3084ES ELECTRIC MODEL

HYDRAULIC - 3084ES

The following table applies to Figure 5-11, Figure 5-12 and Figure 5-13.

Callout	Description
MA-1	**MAIN MANIFOLD**
CBV1	Counter Balance Valve, Drive
CBV2	Counter Balance Valve, Drive
CL1	Coil - Speed/Torque/Steer #8
CL2	Coil - Lift Valve #10
CL3	Coil - Proportional
CP1	Cavity Plug, Stopped
CV1	Check Valve, Load Sense Steer
EC1	Priority Flow Control
EP1	Piloted Poppet Valve - Torque/Speed
EP2	Piloted Poppet Valve - Torque/Speed
FD1	Flow Divider/Combiner
FD2	Flow Divider/Combiner
HP1	Hand Pump, Brake Release
LS1	Load Sense Shuttle
MP1	Manual Push Brake Release Valve
OD1	Orifice Disc, Brakes, 0.035
OPL1	Orifice Plug, Steering, 0.087
OPL2	Orifice Plug, Flow Divider Bleed, 0.025
OPL3	Orifice Plug, Flow Divider Bleed, 0.025
OPL4	Orifice Plug, Stopped
OPL5	Orifice Plug, Stopped
PD1	Pilot Valve, Series Parallel, 4-Way / 3-Position
PD2	Pilot Valve, Series Parallel, 4-Way / 3-Position
PD3	Pilot Valve, Series Parallel, 4-Way / 3-Position
PLG4	Port Plug
PLG6	Port Plug
RV1	Relief Valve, Lift, 2500 PSI
RV2	Relief Valve, Steering, 2000 PSI
RV7	Relief Valve, 3000 PSI Main
SV1	Spool Valve, Lift, 3-Way
SV2	Spool Valve, Steer, 4-Way / 3-Position
SV3	Spool Valve, Series Parallel, 4-Way / 3-Position
SV4	Spool Valve, Series Parallel, 4-Way / 3-Position
SVD1	Spool Valve, Drive, 4-Way / 3-Position

Callout	Description
	STEERING COMPONENTS
CYL1	Steer Cylinder, Right
CYL2	Steer Cylinder, Left
	TILT COMPONENTS
MA-2	Combination Valve Manifold - Tilt
CV3	Check Valve, Tilt, Side/Side Load Sense
CV4	Check Valve, Tilt, Front/Rear Load Sense
CV5	Check Valve, 10PSI Oscillating Axle
CV6	Check Valve, Tilt Cyl, Front/Rear
CV7	Check Valve, Tilt Cyl, Front/Rear
CV8	Check Valve, Tilt Cyl, Side/Side
CV9	Check Valve, Tilt Cyl, Side/Side
CYL4	Tilt Cylinder, Front/Rear
CYL5	Tilt Cylinder, Side/Side
CYL6	Axle Lock Cylinder
CYL7	Axle Lock Cylinder
ORF4	Orifice, 0.040, Tilt, Side/Side
ORF5	Orifice, 0.040, Tilt, Front/Rear
RV3	Relief Valve, Tilt Cyl Front/Rear, 2500 PSI
RV4	Relief Valve, Tilt Cyl Front/Rear, 2500 PSI
RV5	Relief Valve, Tilt Cyl Side/Side, 2500 PSI
RV6	Relief Valve, Tilt Cyl Side/Side, 2500 PSI
SV8	Spool Valve, Tilt Front/Rear
SV9	Spool Valve, Tilt Side/Side
	LIFT COMPONENTS
MA-3	Lift Cylinder Manifold
CYL3	Lift Cylinder
ORF3	Orifice, 0.067 Descend
SV5	Solenoid Valve, 12V, Dual Coil
	Wheel Motors
LF	Wheel Motor - Left Front
LR	Wheel Motor w/ Brake - Left Rear
RF	Wheel Motor - Right Front
RR	Wheel Motor w/ Brake - Right Rear
SV6	Spool Valve - Right Wheel Motor Bypass
SV7	Spool Valve - Left Wheel Motor Bypass
	RESERVOIR
FL1	Filter, 10 Micron, Fluid Return
P1	Pump, Hydraulic Fluid

Figure 5-11: Hydraulic Schematic - 3084ES

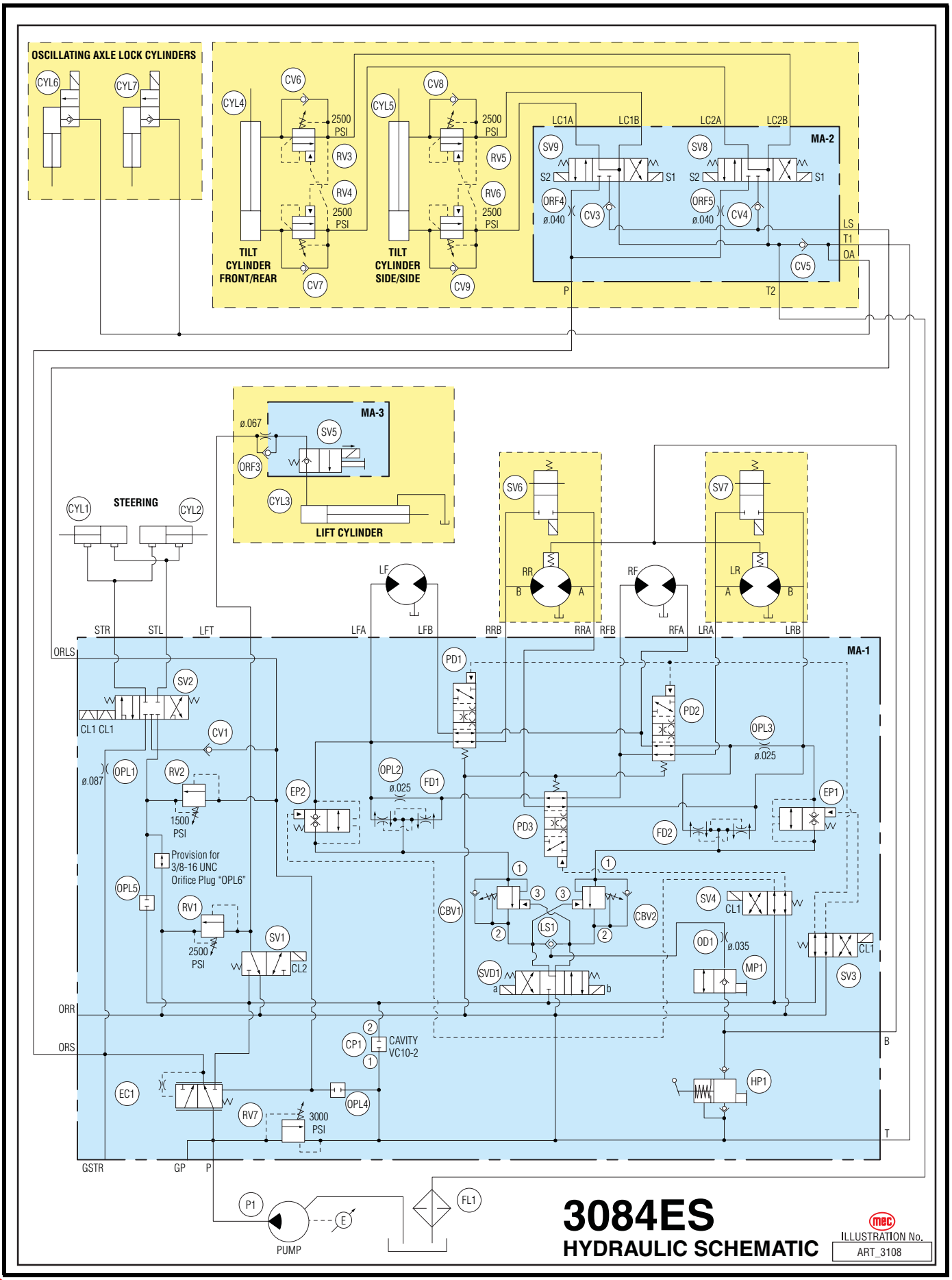


Figure 5-12: Hydraulic Manifold, Main M1 - 3084ES

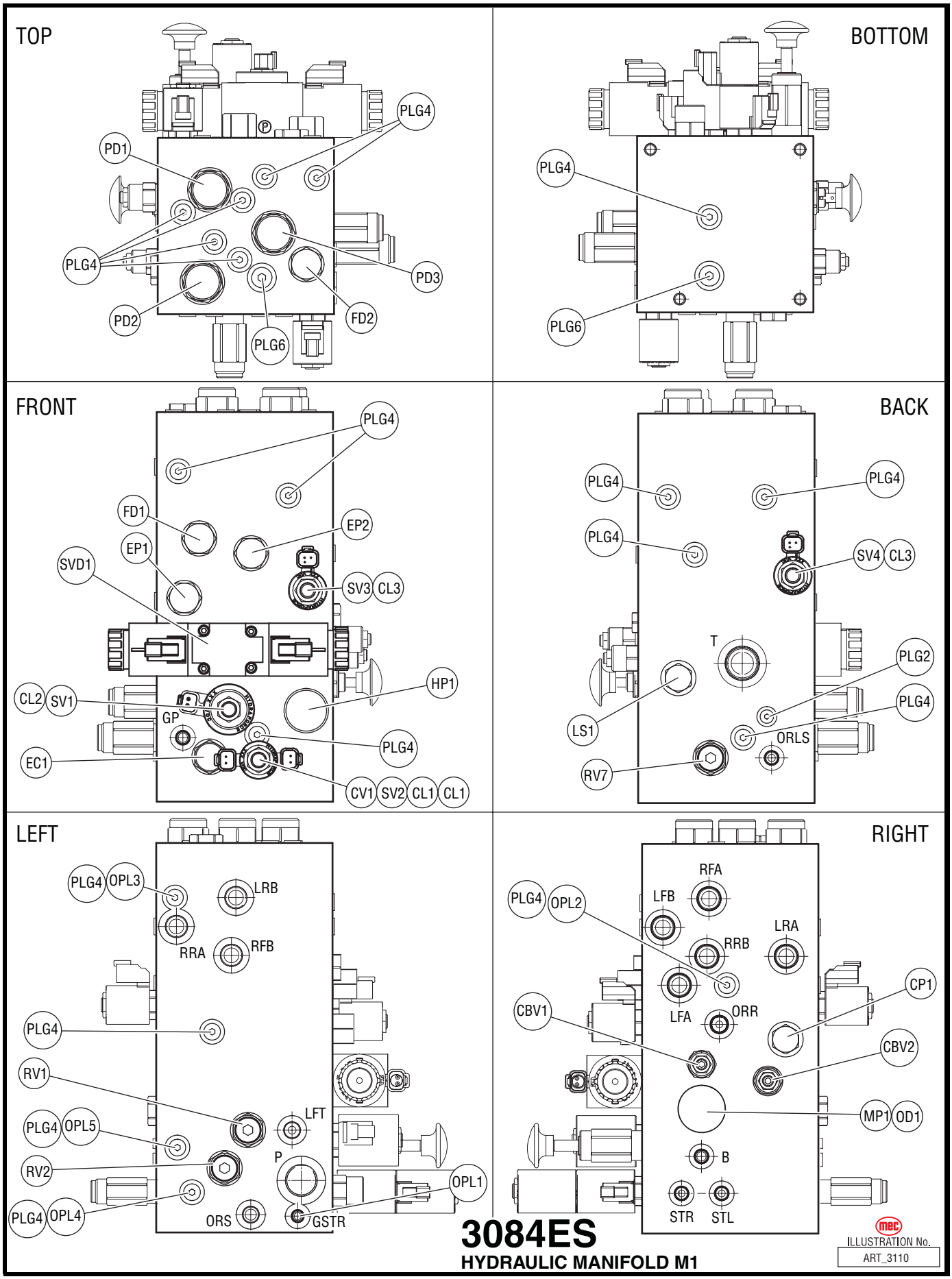
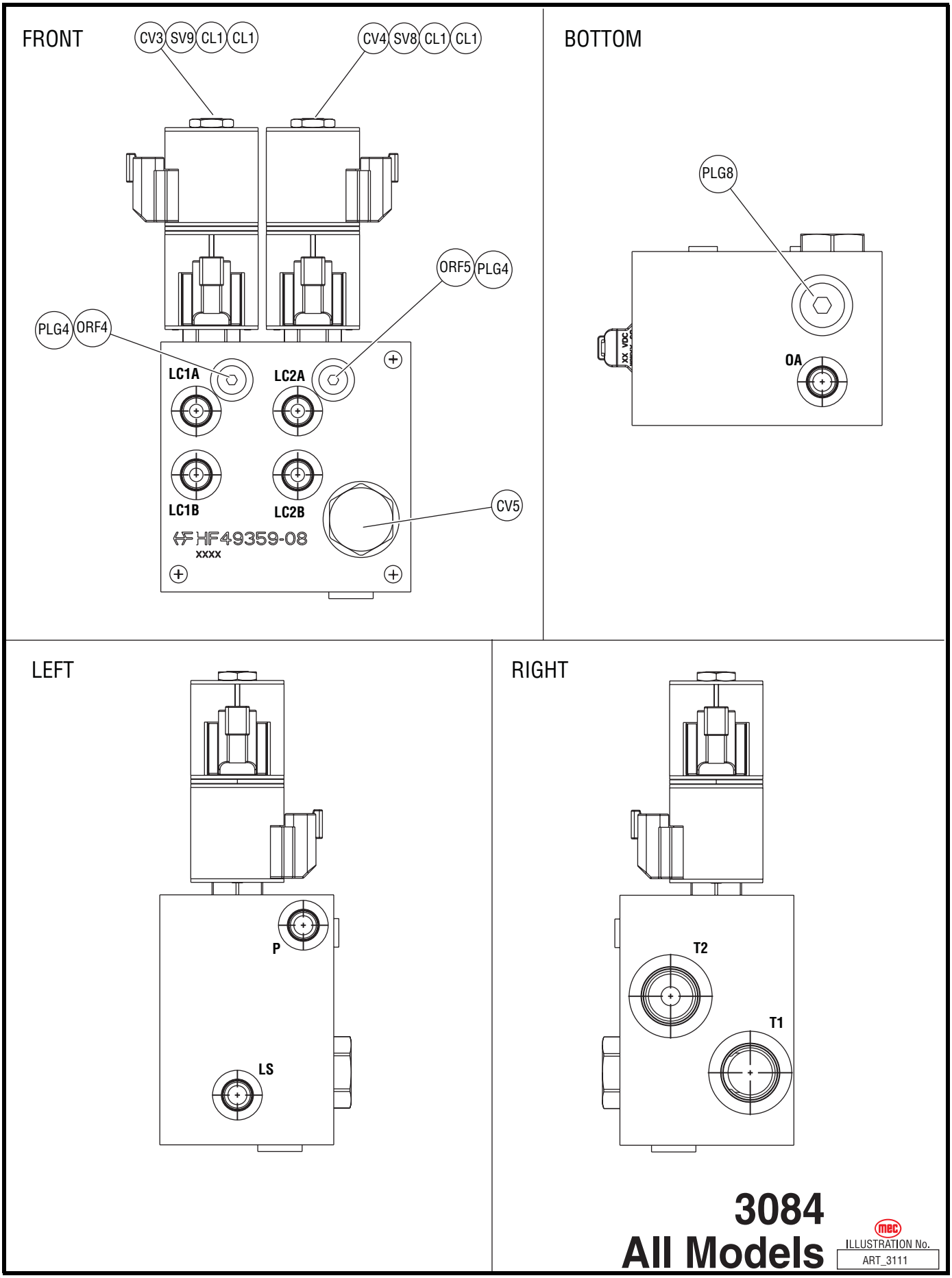


Figure 5-13: Hydraulic Manifold, Tilt M2 - All Models



ELECTRICAL - 3084ES

Figure 5-14: Electric Schematic, Upper Controls - 3084ES

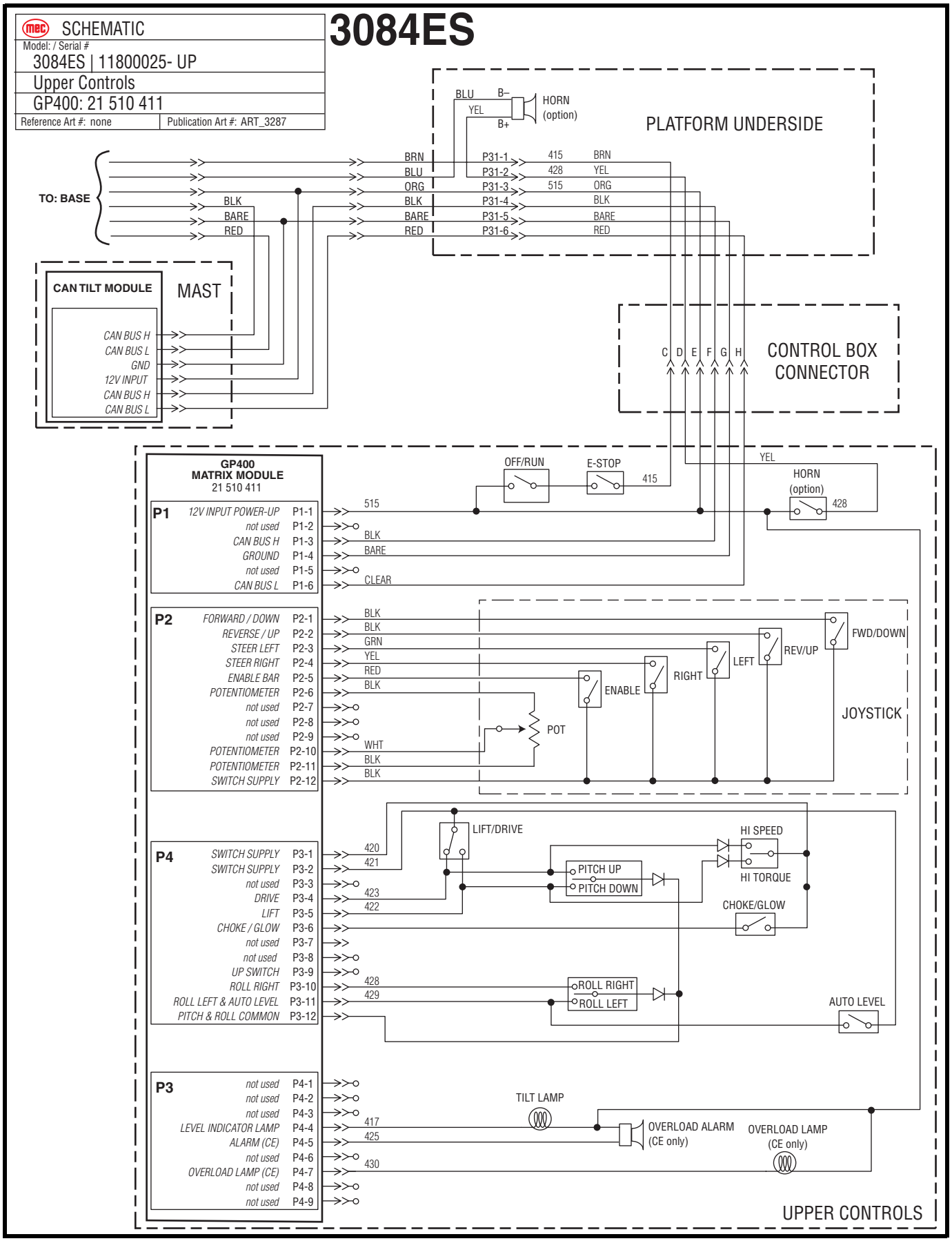


Figure 5-15: Upper Controls Components - 3084ES

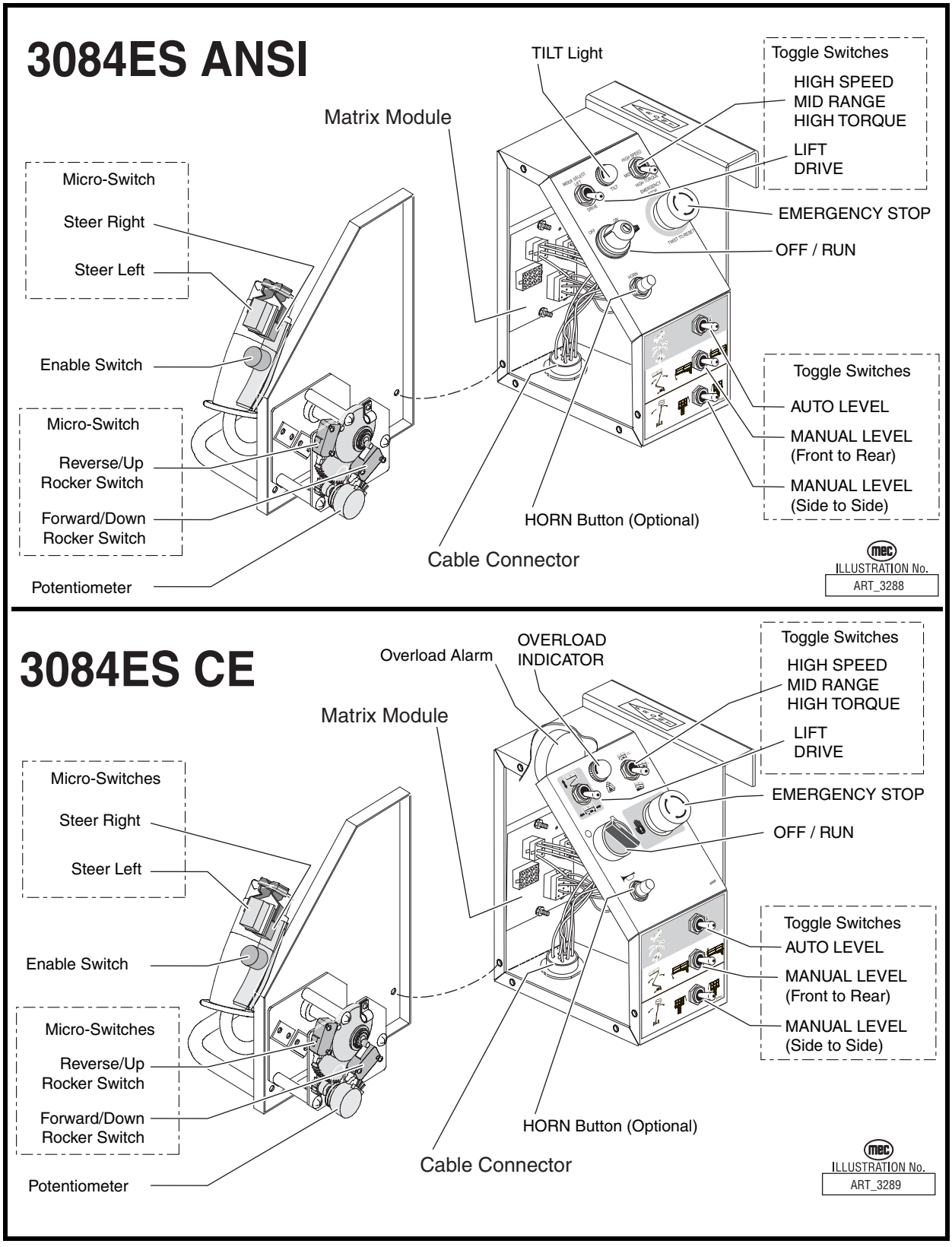


Figure 5-16: Electric Schematic, Lower Control Box - 3084ES

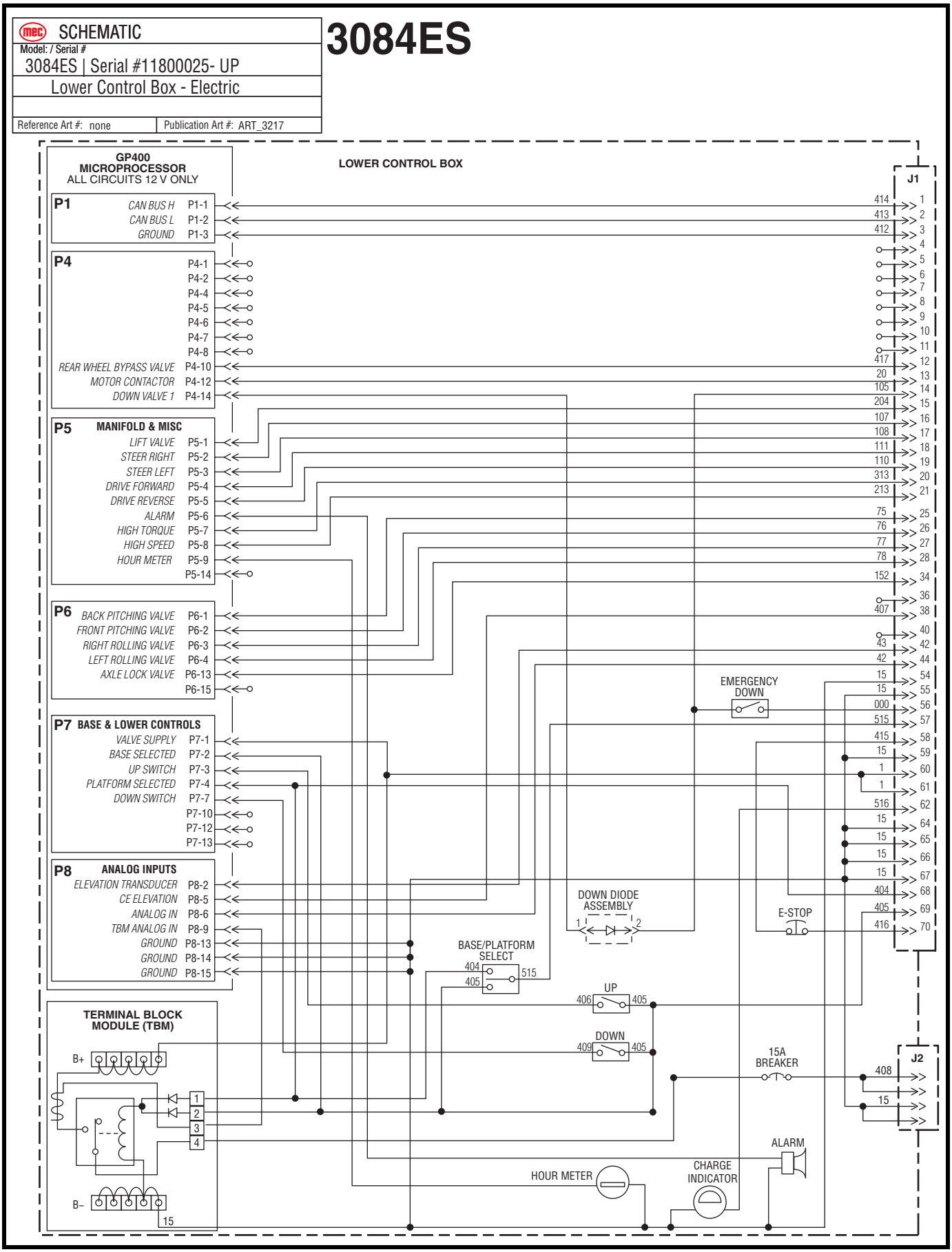


Figure 5-17: Electric Schematic, Base - 3084ES

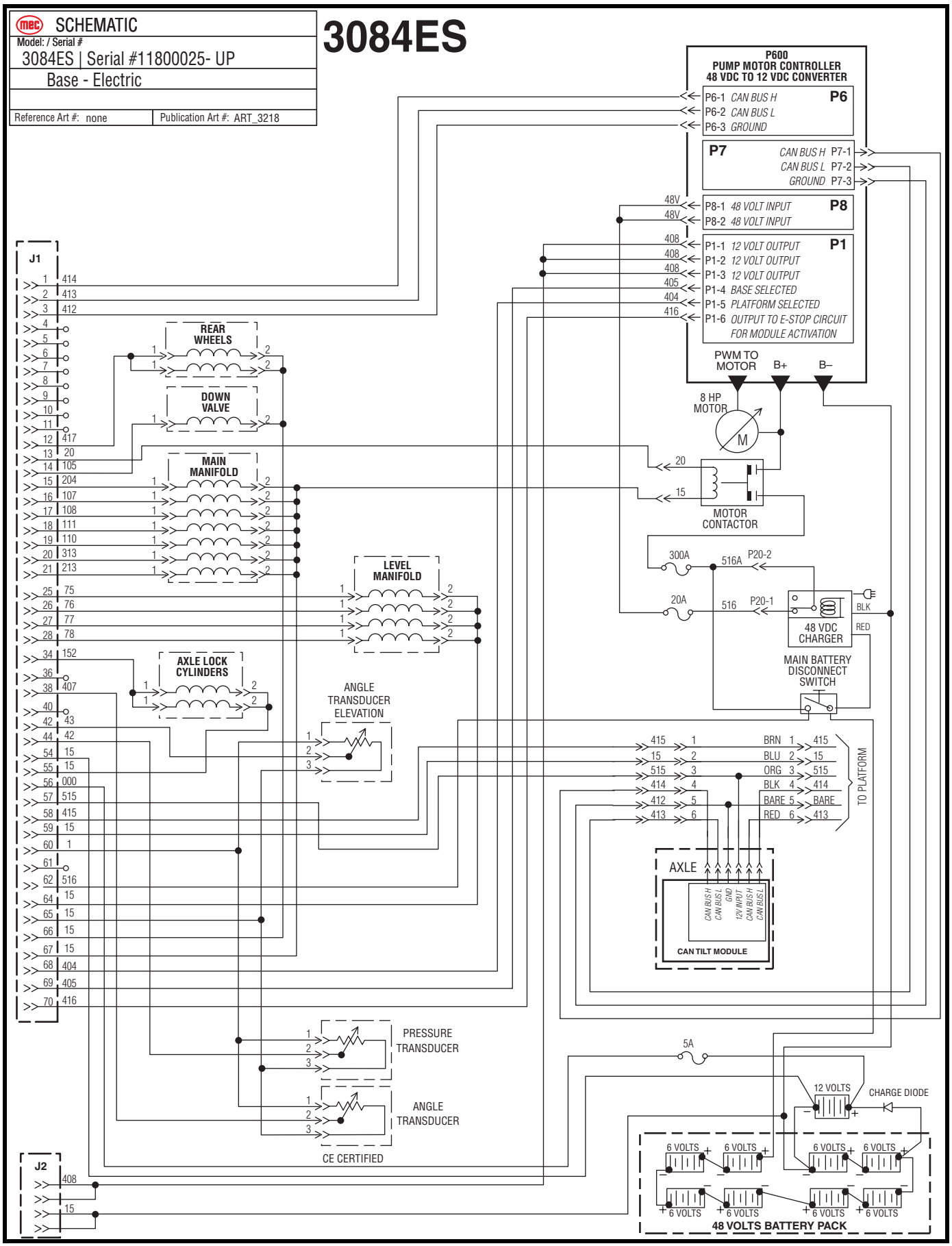
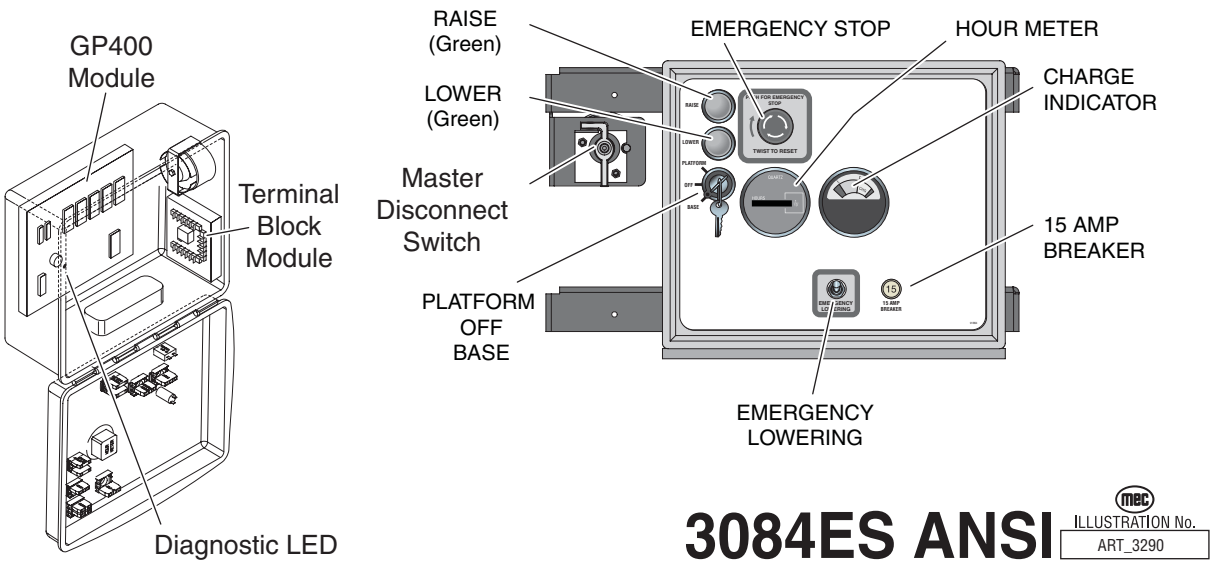
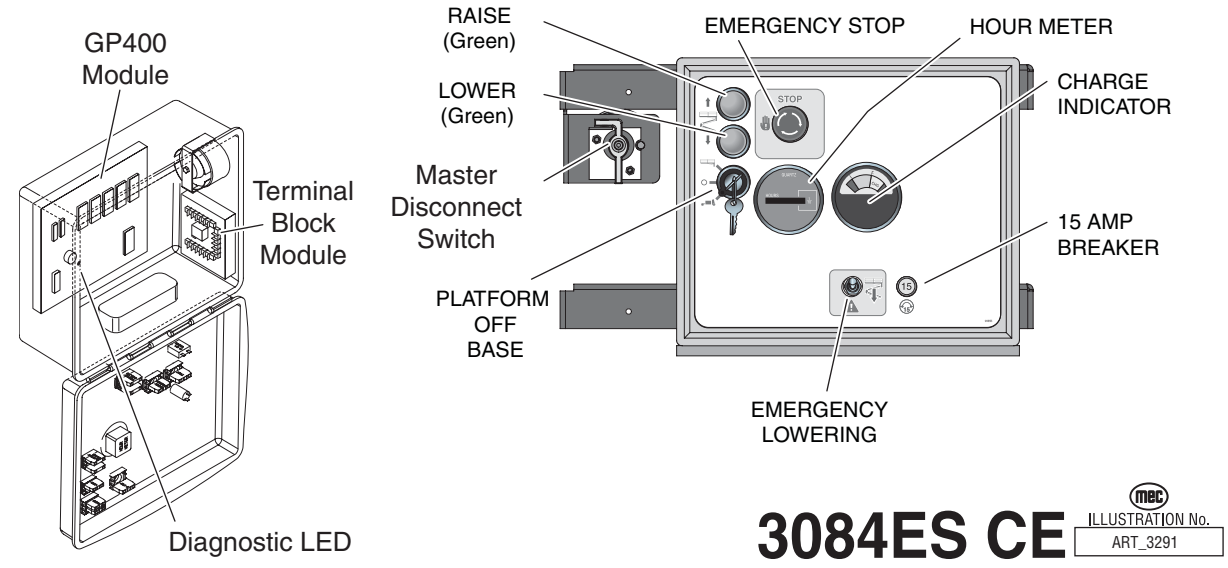


Figure 5-18: Lower Controls Components - 3084ES



3084ES ANSI ILLUSTRATION No. ART_3290



3084ES CE ILLUSTRATION No. ART_3291

SERVICE

Section 4b

TROUBLESHOOTING - 3084ES MODEL

CONTENTS

FIGURES PAGE

TABLES PAGE

GENERAL TROUBLESHOOTING TIPS

HYDRAULIC FLUID PUMP: 3084ES MODELS

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

BATTERY CHARGE STATE: 3084ES MODELS

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

Common Causes of Electrical System Malfunctions:

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

Common Causes of Hydraulic System Malfunctions:

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

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

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

ELECTRICAL SYSTEM TROUBLESHOOTING - 3084ES

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

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

WARNING

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

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

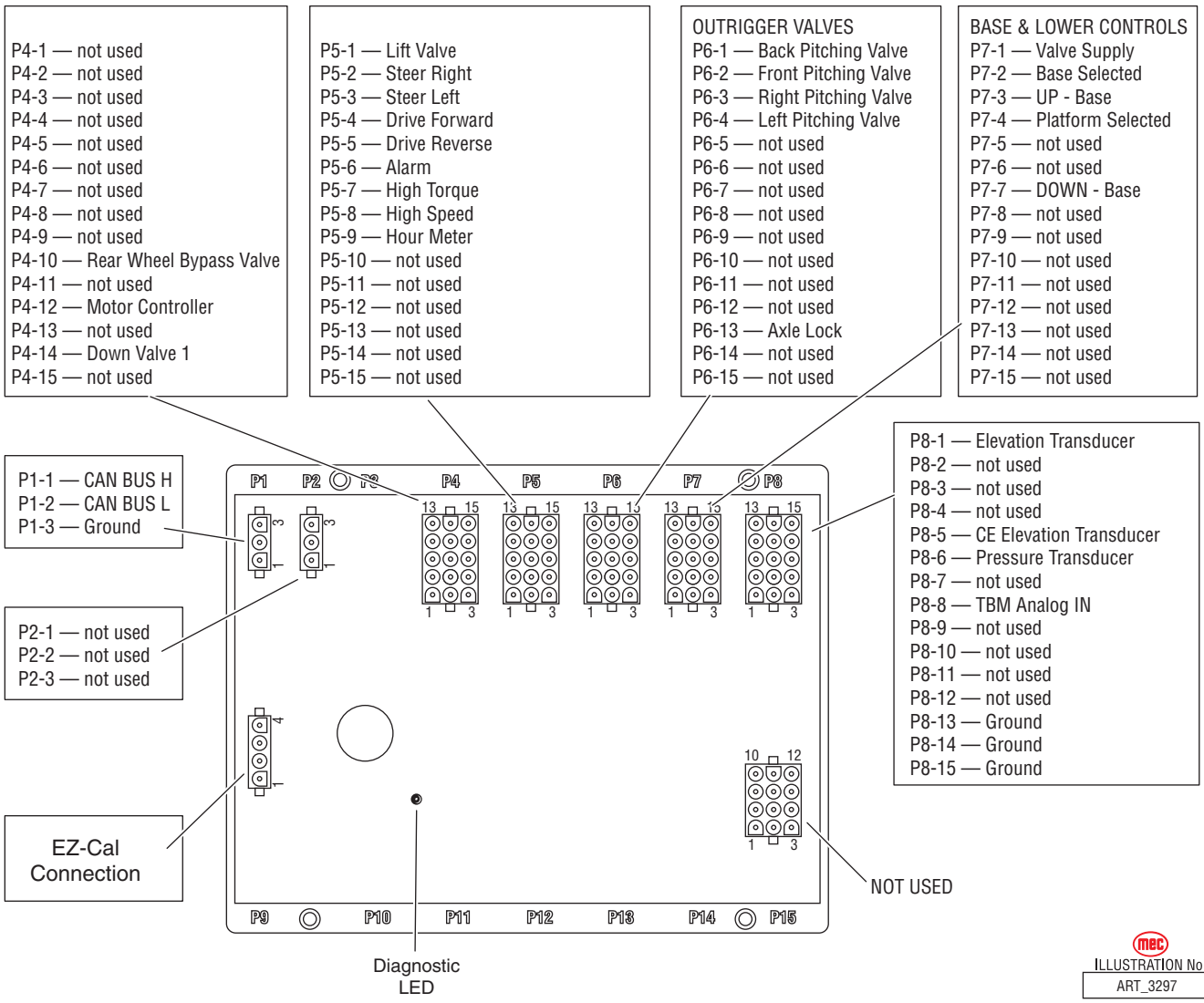
GP400 MODULE

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

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

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

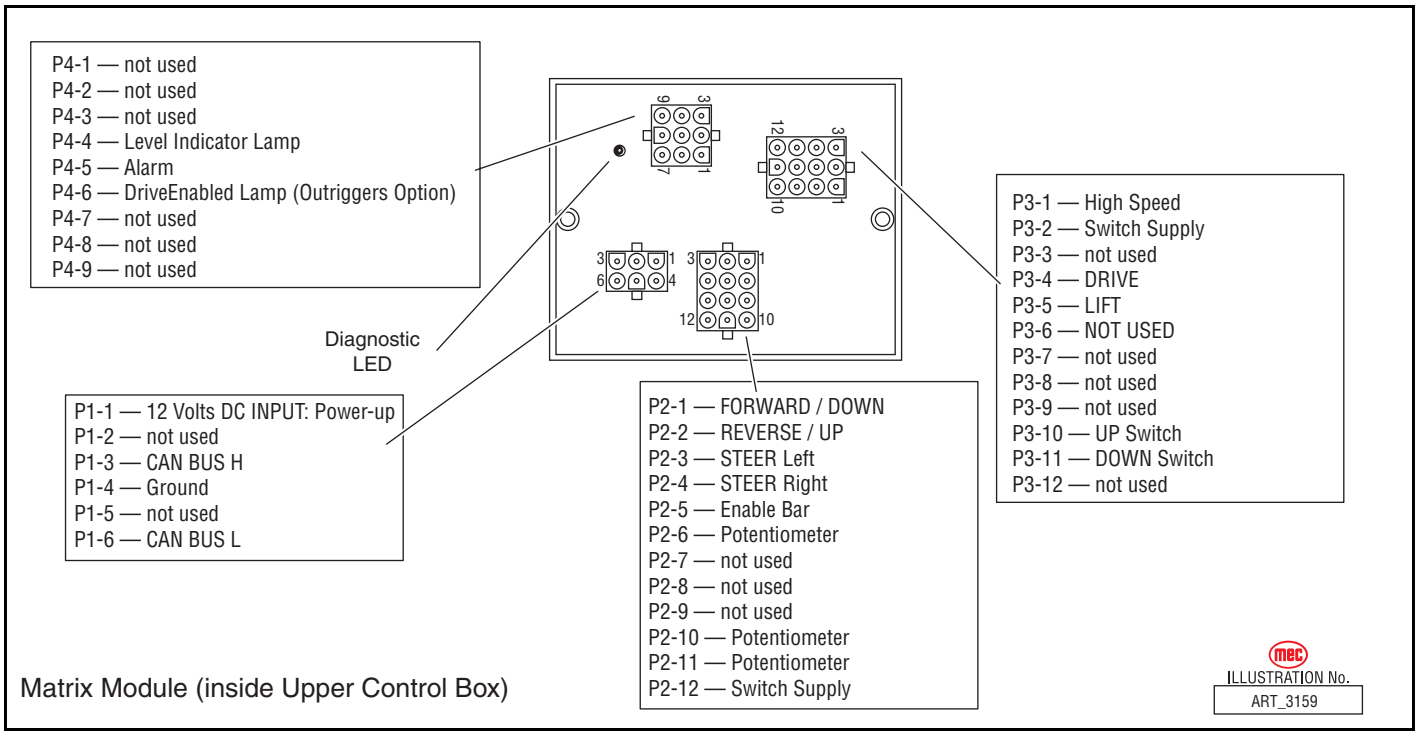
Figure 4b-1: GP400 Module



MATRIX MODULE

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

Figure 4b-2: Matrix Module

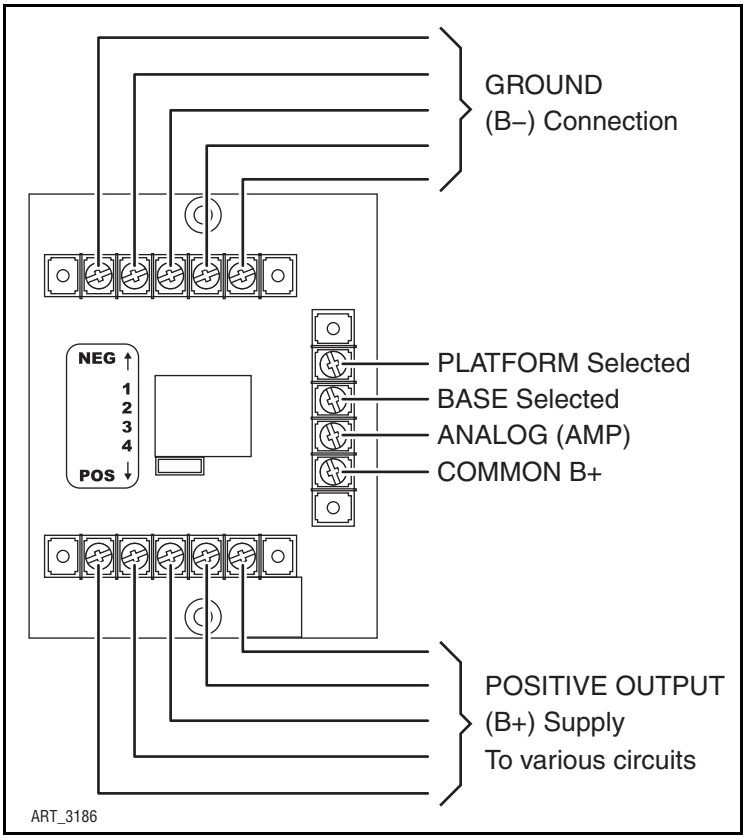


Matrix Module (inside Upper Control Box)

TERMINAL BLOCK MODULE (TBM)

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

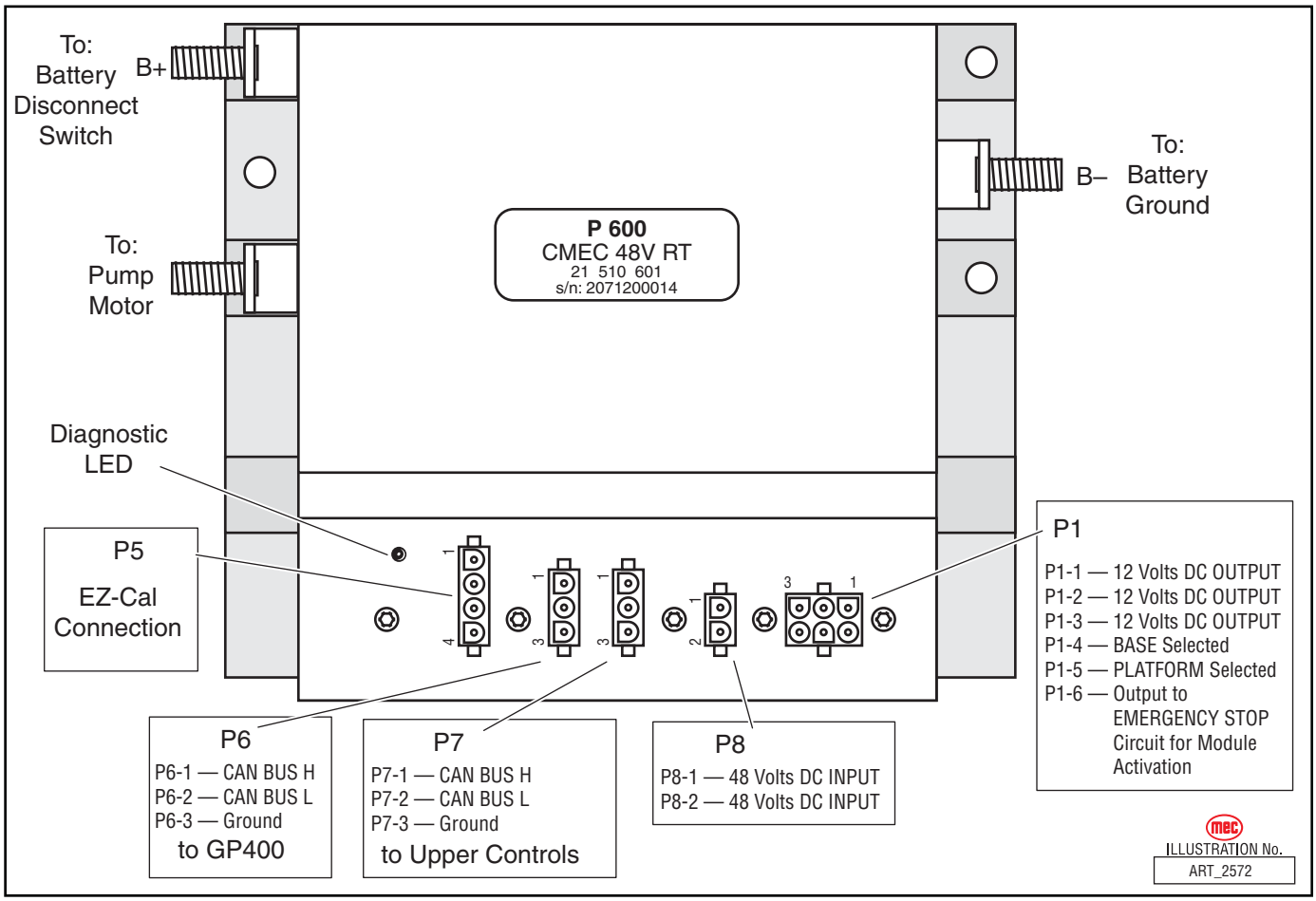
There is a module inside the lower control box, called a TBM (Terminal Block Module) that provides terminal point connections for both positive and ground circuits. A signal from the Emergency Stop circuit activates a load-reduction relay within the TBM that provides ample power to the B+ (positive)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



P600 MOTOR CONTROL MODULE

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

Figure 4b-4: P600 Motor Control Module



EZ-CAL SCAN TOOL

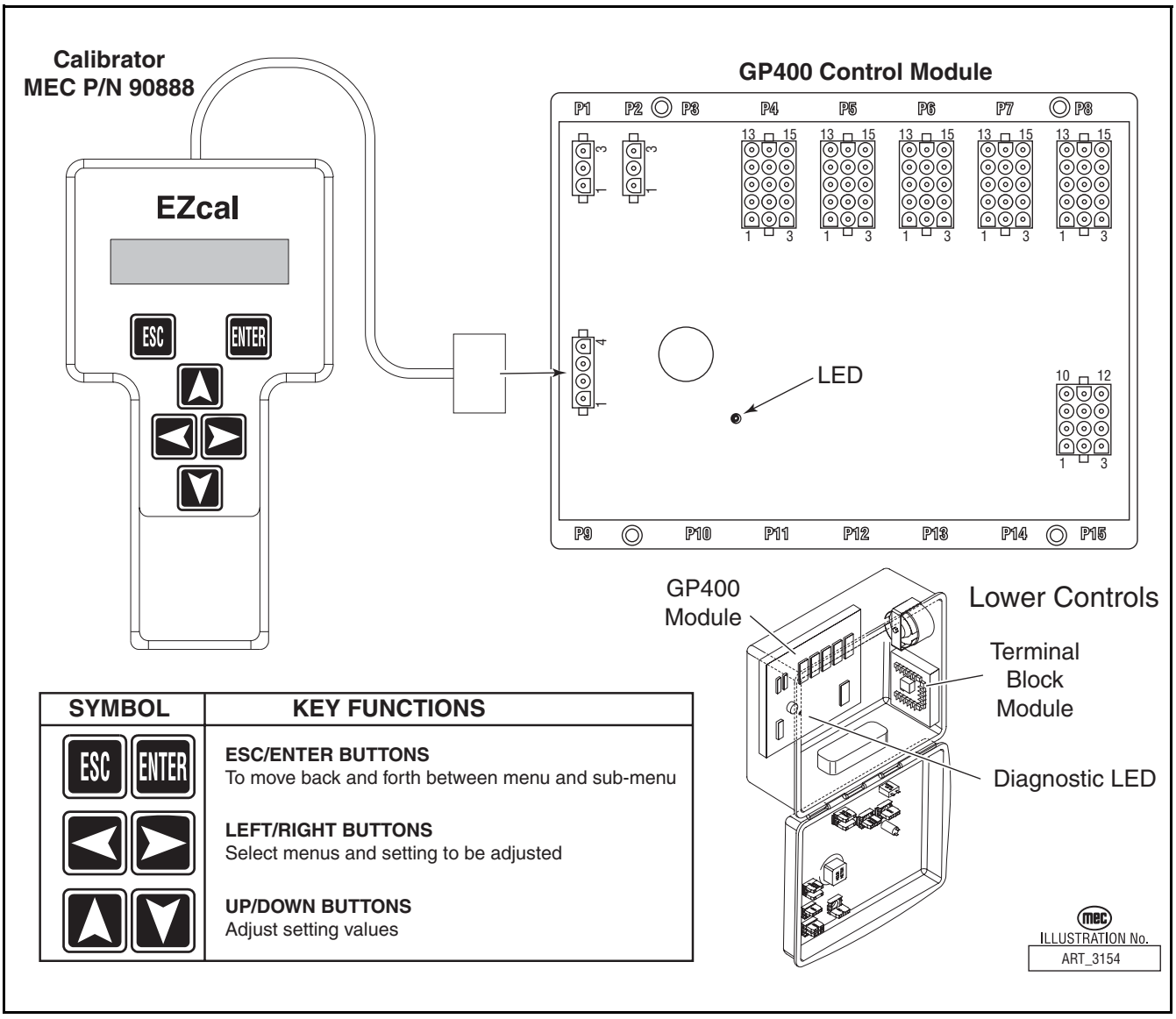
The EZ-Cal (MEC part # 90888; not part of the machine) is a hand-held scan tool that interfaces with the system to provide various information and adjustments. The EZ-cal receives its power from the GP400 when connected. The system must be powered up by closing the Battery disconnect switch and pulling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

USING THE EZ-CAL SCAN TOOL

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

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

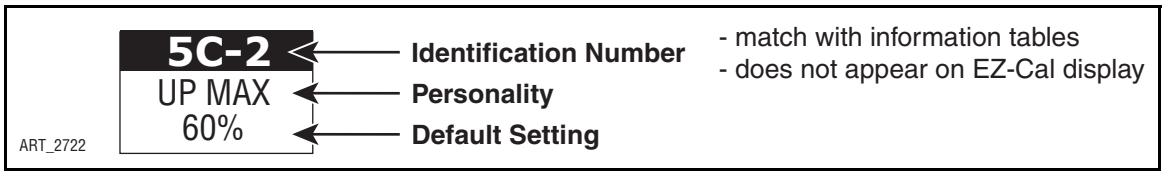
Figure 4b-5: EZ-Cal Scan Tool Connections - GP400 Module



USING THE EZ-CAL WITH THE FLOW CHARTS

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

Figure 4b-6: EZ-Cal Display Example



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

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

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

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

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

SCROLLING MESSAGES

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

FLASH CODES

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

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

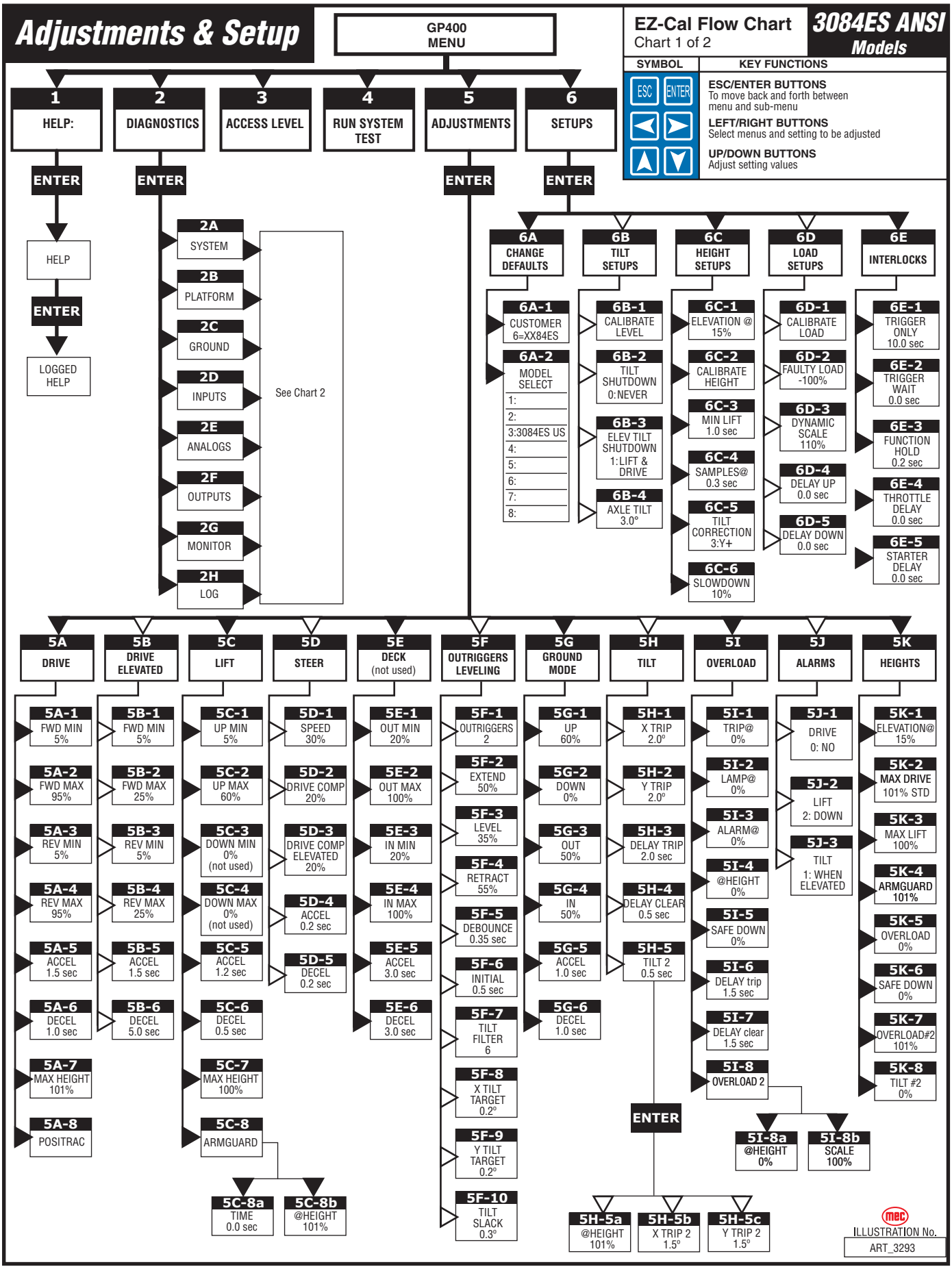


Figure 4b-8: EZ-Cal Flow Chart: Diagnostic, ANSI Models

DIAGNOSTIC

Use in conjunction with Diagnostic Tables for thorough explaination of readout and values.

GP400 MENU

2 DIAGNOSTICS

ENTER

EZ-Cal Flow Chart
Chart 2 of 2

3084ES ANSI Models

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**
  - 2A-1 MODE
  - 2A-2 SUPPLY
    - 2A-2a SUPPLY 12 V DC
    - 2A-2b SUPPLY CAP BANK
  - 2A-3 VALVE SUPPLY
  - 2A-4 MOTOR VOLTS (ES ONLY)
  - 2A-5 MOTOR AMPS (ES ONLY)
  - 2A-6 TEMPERATURE (ES ONLY)
  - 2A-7 TILT
    - 2A-7a TILT FILTERED
    - 2A-7b TILT LOCAL
  - 2A-8 TILTED Y or N
  - 2A-9 HEIGHT (CE ONLY)
    - 2A-9a HEIGHT 1%
    - 2A-9b HEIGHT 2%
  - 2A-10 LOAD (CE ONLY)
  - 2A-11 OVERLOADED Y or N (CE ONLY)
  - 2A-12 NOT USED
  - 2A-13 ELEVATED Y or N
  - 2A-14 OUTRIGGER Y or N
    - 2A-14a RETRACTED Y or N
    - 2A-14b EXTENDED Y or N
    - 2A-14c STATUS
    - 2A-14d OUTRIGGER TEST
    - 2A-14e AUTO RETRACT
  - 2A-15 AXLE
    - 2A-15a LEVEL / OFF LEVEL
    - 2A-15b LOCKED Y or N
    - 2A-15c ANGLE
- **2B PLATFORM**
  - 2B-1 TRIGGER ON / OFF
  - 2B-2 DLD
  - 2B-3 JOYSTICK
  - 2B-4 FWD / DWN OFF / ON
  - 2B-5 REV / UP OFF / ON
  - 2B-6 LEFT OFF / ON
  - 2B-7 RIGHT OFF / ON
  - 2B-8 POSITRAC Y or N
  - 2B-9 NOT USED
- **2C GROUND**
  - 2C-1 UP ON / OFF
  - 2C-2 DOWN ON / OFF
  - 2C-3 NOT USED
  - 2C-4 NOT USED
  - 2C-5 NOT USED
- **2D INPUTS**
  - 2D-1 P7-1 12 V SUPPLY
  - 2D-2 P7-2 BASE SELECTED
  - 2D-3 P7-3 UP SELECTED
  - 2D-4 P7-4 PLATFORM SELECTED
  - 2D-5 P7-5 NOT USED
  - 2D-6 P7-7 DOWN SELECTED
- **2E ANALOGS** LOAD SENSE
  - 2E-1 P8-2 ANGLE TRANSDUCER
  - 2E-2 P8-6 PRESS TRANSDUCER
  - 2E-3 TBM AMPERAGE
- **2F OUTPUTS**
  - 2F-1 P4-10 REAR WHEELS
  - 2F-2 P4-12 PROPORTIONAL
  - 2F-3 P4-14 DOWN
  - 2F-4 P5-1 LIFT
  - 2F-5 P5-2 STEER RIGHT
  - 2F-6 P5-3 STEER LEFT
  - 2F-7 P5-4 DRIVE FWD
  - 2F-8 P5-5 DRIVE REV
  - 2F-9 P5-6 ALARM
  - 2F-10 P5-7 HIGH TORQUE
  - 2F-11 P5-8 HIGH SPEED
  - 2F-12 P5-9 HOUR METER
  - 2F-13 P5-12 POWER OUT
  - 2F-14 P6-1 BACK PITCH
  - 2F-15 P6-2 FRONT PITCH
  - 2F-16 P6-3 RIGHT ROLLING
  - 2F-17 P6-4 LEFT ROLLING
  - 2F-18 P6-13 AXLE LOCK
- **2G LOG**
  - 2G-1 CAL DATE
  - 2G-2 SOFTWARE
  - 2G-3 POWERED

P4		
P4-10	*REAR WHEEL BYPASS VALVE*	ON = Powered - Rear Wheels in bypass
P4-12	*MOTOR CONTROLLER*	ON = Contactor closed
P4-14	*DOWN VALVE 1*	ON = Down Valve activated

P5	MANIFOLD & MISC	
P5-1	*LIFT VALVE*	ON = Lift Valve activated
P5-2	*STEER RIGHT*	ON = Valve activated
P5-3	*STEER LEFT*	ON = Valve activated
P5-4	*DRIVE FORWARD*	ON = Valve activated
P5-5	*DRIVE REVERSE*	ON = Valve activated
P5-6	*ALARM*	ON = Alarm activated
P5-7	*HIGH TORQUE*	ON = Valve activated
P5-8	*HIGH SPEED*	ON = Valve activated
P5-9	*HOUR METER*	ON = Meter activated
P5-12	*Power Supply B+*	ON=System powered up

P6	OUTRIGGER MANIFOLD	
P6-1	*REAR PITCH VALVE*	ON = Valve activated
P6-2	*FRONT PITCH VALVE*	ON = Valve activated
P6-3	*RIGHT ROLLING VALVE*	ON = Valve activated
P6-4	*LEFT ROLLING VALVE*	ON = Valve activated
P6-13	*AXLE LOCK VALVES*	ON = Valve powered

P7	BASE & LOWER CONTROLS	
P7-1	*BATTERY VOLTAGE from TBM*	ON = Voltage, OFF = No Voltage
P7-2	*BASE SELECTED*	ON = Base Controls
P7-3	*UP SWITCH (BASE CONTROLS)*	ON = Up activated
P7-4	*PLATFORM SELECTED*	ON = Platform Controls
P7-5	*LIMIT SWITCH*	NOT USED
P7-7	*DOWN SWITCH (BASE CONTROLS)*	ON = Down activated

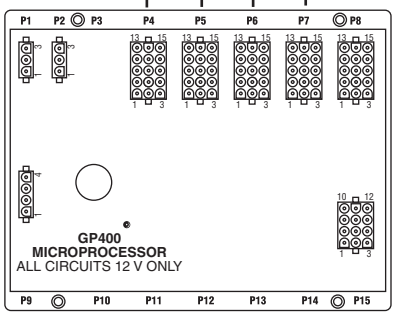


ILLUSTRATION No.
ART_3294

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

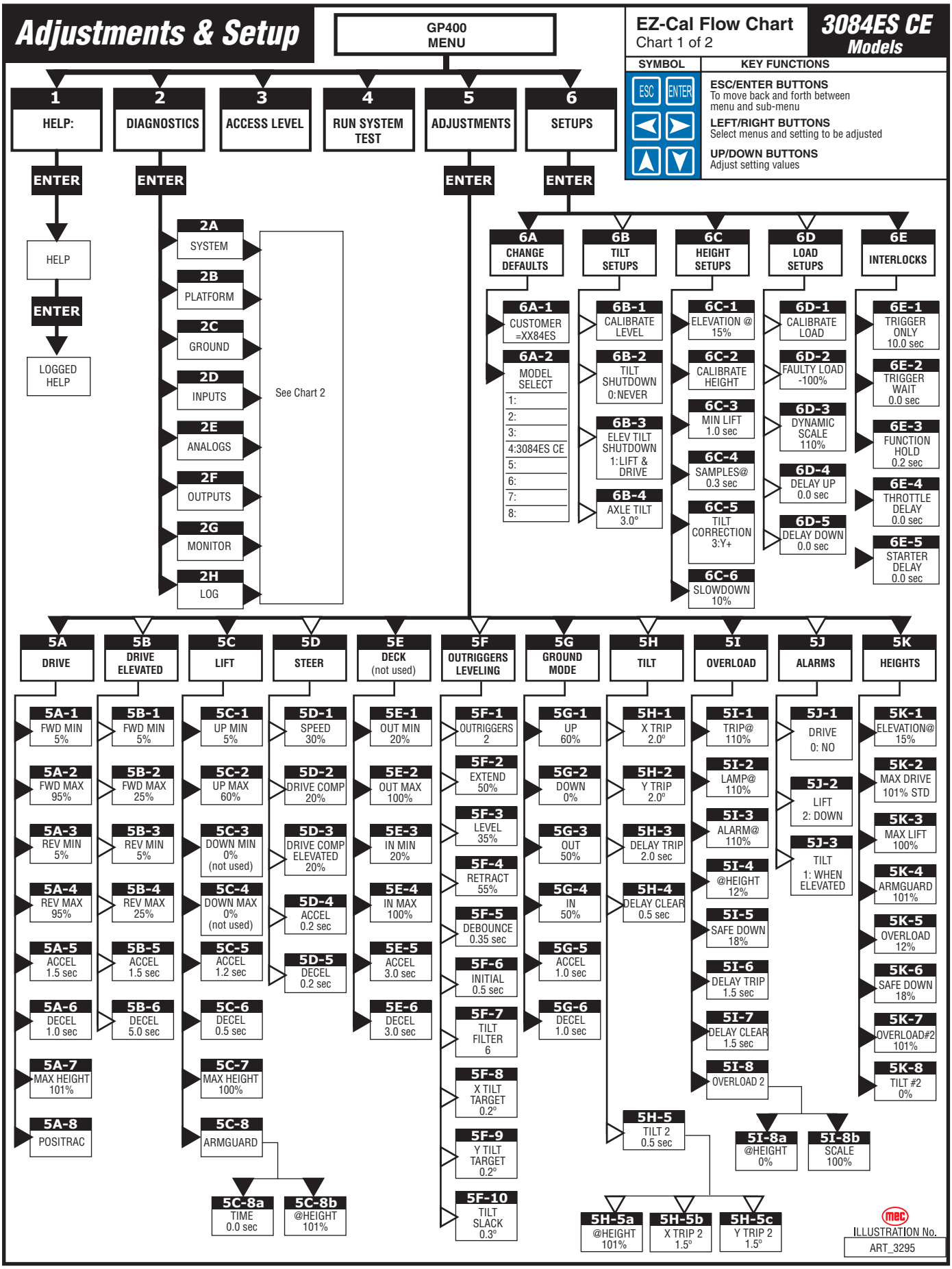


Figure 4b-10: "Outriggers" EZ-Cal Flow Chart: Diagnostic, CE Models

DIAGNOSTIC

Use in conjunction with Diagnostic Tables for thorough explaination of readout and values.

GP400 MENU → 2 DIAGNOSTICS → ENTER

EZ-Cal Flow Chart Chart 2 of 2 — **3084ES CE Models**

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**
  - 2A-1 MODE
  - 2A-2 SUPPLY
  - 2A-3 VALVE SUPPLY
  - 2A-4 MOTOR VOLTS (ES ONLY)
  - 2A-5 MOTOR AMPS (ES ONLY)
  - 2A-6 TEMPERATURE (ES ONLY)
  - 2A-7 TILT
  - 2A-8 TILTED Y or N
  - 2A-9 HEIGHT (CE ONLY)
  - 2A-10 LOAD (CE ONLY)
  - 2A-11 OVERLOADED Y or N (CE ONLY)
  - 2A-12 NOT USED
  - 2A-13 ELEVATED Y or N
  - 2A-14 OUTRIGGER Y or N
  - 2A-15 AXLE
    - 2A-15a LEVEL / OFF LEVEL
    - 2A-15b LOCKED Y or N
    - 2A-15c ANGLE
  - 2A-2a SUPPLY 12 V DC
  - 2A-2b SUPPLY CAP BANK
  - 2A-7a TILT FILTERED
  - 2A-7b TILT LOCAL
  - 2A-9a HEIGHT 1%
  - 2A-9b HEIGHT 2%
  - 2A-14a RETRACTED Y or N
  - 2A-14b EXTENDED Y or N
  - 2A-14c STATUS
  - 2A-14d OUTRIGGER TEST
  - 2A-14e AUTO RETRACT
- **2B PLATFORM**
  - 2B-1 TRIGGER ON / OFF
  - 2B-2 DLD
  - 2B-3 JOYSTICK
  - 2B-4 FWD / DWN OFF / ON
  - 2B-5 REV / UP OFF / ON
  - 2B-6 LEFT OFF / ON
  - 2B-7 RIGHT OFF / ON
  - 2B-8 POSITRAC Y or N
  - 2B-9 NOT USED
- **2C GROUND**
  - 2C-1 UP ON / OFF
  - 2C-2 DOWN ON / OFF
  - 2C-3 NOT USED
  - 2C-4 NOT USED
  - 2C-5 NOT USED
- **2D INPUTS**
  - 2D-1 P7-1 12 V SUPPLY
  - 2D-2 P7-2 BASE SELECTED
  - 2D-3 P7-3 UP SELECTED
  - 2D-4 P7-4 PLATFORM SELECTED
  - 2D-5 P7-5 NOT USED
  - 2D-6 P7-7 DOWN SELECTED
- **2E ANALOGS** LOAD SENSE
  - 2E-1 P8-2 ANGLE TRANSDUCER
  - 2E-2 P8-6 PRESS TRANSDUCER
  - 2E-3 TBM AMPERAGE
- **2F OUTPUTS**
  - 2F-1 P4-10 REAR WHEELS
  - 2F-2 P4-12 PROPORTIONAL
  - 2F-3 P4-14 DOWN
  - 2F-4 P5-1 LIFT
  - 2F-5 P5-2 STEER RIGHT
  - 2F-6 P5-3 STEER LEFT
  - 2F-7 P5-4 DRIVE FWD
  - 2F-8 P5-5 DRIVE REV
  - 2F-9 P5-6 ALARM
  - 2F-10 P5-7 HIGH TORQUE
  - 2F-11 P5-8 HIGH SPEED
  - 2F-12 P5-9 HOUR METER
  - 2F-13 P5-12 POWER OUT
  - 2F-14 P6-1 BACK PITCH
  - 2F-15 P6-2 FRONT PITCH
  - 2F-16 P6-3 RIGHT ROLLING
  - 2F-17 P6-4 LEFT ROLLING
  - 2F-18 P6-13 AXLE LOCK
- **2G LOG**
  - 2G-1 CAL DATE
  - 2G-2 SOFTWARE
  - 2G-3 POWERED

P4		
P4-10	*REAR WHEEL BYPASS VALVE*	ON = Powered - Rear Wheels in bypass
P4-12	*MOTOR CONTROLLER*	ON = Contactor closed
P4-14	*DOWN VALVE 1*	ON = Down Valve activated

P5	MANIFOLD & MISC	
P5-1	*LIFT VALVE*	ON = Lift Valve activated
P5-2	*STEER RIGHT*	ON = Valve activated
P5-3	*STEER LEFT*	ON = Valve activated
P5-4	*DRIVE FORWARD*	ON = Valve activated
P5-5	*DRIVE REVERSE*	ON = Valve activated
P5-6	*ALARM*	ON = Alarm activated
P5-7	*HIGH TORQUE*	ON = Valve activated
P5-8	*HIGH SPEED*	ON = Valve activated
P5-9	*HOUR METER*	ON = Meter activated
P5-12	*POWER SUPPLY B+*	ON = System powered up

P6	OUTRIGGER MANIFOLD	
P6-1	*REAR PITCH VALVE*	ON = Valve activated
P6-2	*FRONT PITCH VALVE*	ON = Valve activated
P6-3	*RIGHT ROLLING VALVE*	ON = Valve activated
P6-4	*LEFT ROLLING VALVE*	ON = Valve activated
P6-13	*AXLE LOCK VALVES*	ON = Valve powered

P7	BASE & LOWER CONTROLS	
P7-1	*BATTERY VOLTAGE from TBM*	ON = Voltage, OFF = No Voltage
P7-2	*BASE SELECTED*	ON = Base Controls
P7-3	*UP SWITCH (BASE CONTROLS)*	ON = Up activated
P7-4	*PLATFORM SELECTED*	ON = Platform Controls
P7-5	*LIMIT SWITCH - NOT USED*	NOT USED
P7-7	*DOWN SWITCH (BASE CONTROLS)*	ON = Down activated

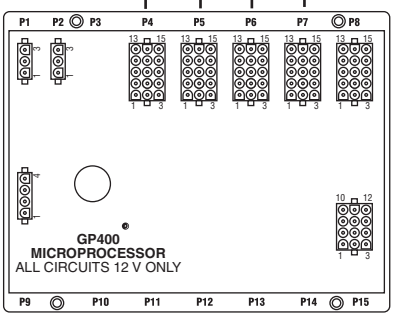


ILLUSTRATION No. ART_3296

EZ-CAL ADJUSTMENT

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

Adjustments possible in Access Level 1 Only.

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

To reach ADJUSTMENTS, first access Level 1, then press --> for ADJUSTMENTS. Press Enter, then press --> to scroll through the sub-menus.

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

Table 4b-1: EZ-Cal Adjustment Table

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

Table 4b-1: EZ-Cal Adjustment Table

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

EZ-CAL SETUP

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

Table 4b-2: EZ-Cal Setup Table

OPERATION	ID	PERSONALITY	FACTORY SETTING	EXPLAINATION
6A CHANGE DEFAULTS	6A-1	Customer	5=xx84ES	Choose basic model and power source
	6A-2	Model Select	3 = 3084ES ANSI 4 = 3084ES CE	Choose model and certification
6D TILT SETUPS	6B-1	Calibrate Level?	Y = ENTER N = ESC	Pressing ENTER twice will calibrate level sensor
		Ensure machine is on flat level surface before calibration. See Section 2 for instructions.		
	6B-2	Tilt Shutdown	0 = Never	Function shutdown tilted when platform stowed
	6B-3	Elev Tilt Shutdown	1 = Lift & Drive	Function shutdown tilted when platform elevated
	6B-4	Axle Tilt	3.0 deg	Oscillating axle maximum interlock angle
6C HEIGHT SETUP	6C-1	Elevation @	15%	% of maximum height when system goes into elevated mode
	6C-2	Calibrate Height	CE procedure	For calibration of CE Load Sense system
	6C-3	Min Lift	1.0 sec	Minimum lift time when lift is operated
	6C-4	Samples	0.30 sec	calibration setting - do not change
	6C-5	Tilt Correction	3=Y+	
	6C-6	Slow Down	10%	Amount lift speed is reduced when near full elevation
6D LOAD SETUPS (EUROPEAN OPTION ONLY)	6D-1	Calibrate Load	CE procedure	start calibration of CE Load Sense system
	6D-2	Faulty Load	-100%	calibration setting - do not change
	6D-3	Dynamic Scale	110%	calibration setting - do not change
6E INTERLOCKS	6E-1	Trigger Only	10.0 sec	Time that the enable bar can be held without operation before timeout
	6E-2	Trigger Wait	0.0 sec	Delay before function after enable bar is actuated
	6E-3	Function hold	0.2 sec	Function enabled after operator release
	6E-4	Throttle Delay	0.0 sec	Delay before throttle enabled (not used)
	6E-5	Starter Delay	10.0 sec	Starter over-crank feature; time starter is off (not used)

EZ-CAL DIAGNOSTICS

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

To reach DIAGNOSTICS menu from HELP;

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

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

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

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

Table 4b-3: EZ-Cal Diagnostics Menu

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

Table 4b-3: EZ-Cal Diagnostics Menu

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

EZ-CAL RETRIEVE MODE AND HELP MESSAGES

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

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

MODE MENU

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

HELP MENU

Provides various HELP messages to identify failure modes.

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

MODE MESSAGE

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

SCROLLING MESSAGE

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

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

MODE MESSAGES

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

INITIALIZING

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

SHUTDOWN!

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

CHECK CANBUS

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

PLATFORM, GROUND

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

GROUND UP, GROUND DOWN,

- A ground function is operating normally

GROUND UP LOCKED, GROUND DOWN LOCKED,

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

GROUND FAULTY

- Multiple ground function inputs are active at the same time

WAITING FOR TRIGGER

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

TRIGGER CLOSED

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

TRIGGER LOCKED

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

FORWARD, REVERSE

- A platform drive function is operating normally

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

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

STEER LEFT, STEER RIGHT

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

UP, DOWN

- A platform lift/lower function is operating normally

FORWARD LOCKED, REVERSE LOCKED

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

LEFT LOCKED, RIGHT LOCKED

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

UP LOCKED, DOWN LOCKED

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

CHECK DRIVE/LIFT

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

CHECK JOYSTICK

- Both platform joystick directions are active at the same time

STEER FAULTY

- Both platform steer directions are active at the same time

EXTENDING LEGS

- Outrigger legs are extending normally

RETRACTING LEGS

- Outrigger legs are extending normally

OUTRIGGERS LOCKED

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

INTERLOCKED**

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

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

TEST MODE

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

TILTED

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

OVERLOADED

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

TOO HIGH

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

ARMGUARD

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

TOO HOT

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

UNCALIBRATED

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

EXTERNAL ALL, EXTERNAL DRIVE, EXTERNAL LIFT

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

EZ-CAL HELP MESSAGES

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

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

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

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

INFORMATION ONLY MESSAGES

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

STARTUP! _____ ***(no flash code)***

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

EVERYTHING OK _____ ***(no flash code)***

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

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

GROUND MODE ACTIVE! _____ ***(no flash code)***

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

CLOSE TRIGGER _____ ***(no flash code)***

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

VEHICLE TILTED _____ ***(no flash code)***

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

FUNCTION ACTIVE MESSAGES

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

DRIVING! _____ ***(no flash code)***

LIFTING! _____ ***(no flash code)***

LOWERING! _____ ***(no flash code)***

STEERING! _____ ***(no flash code)***

EXTENDING OUTRIGGERS! _____ ***(no flash code)***

RETRACTING OUTRIGGERS! _____ ***(no flash code)***

CALIBRATION MESSAGES

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

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

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

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

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

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

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

SHUTDOWN HELP MESSAGES

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

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

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

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

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

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

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

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

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

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

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

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

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

FUNCTIONS LOCKED - TILTED _____ ***Flash Code: 2/2***

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

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

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

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

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

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

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

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

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

CHECK JOYSTICK SWITCHES! _____ ***Flash Code: 2/2***

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

RELEASE TRIGGER! _____ ***Flash Code: 2/2***

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

RELEASE GROUND SWITCHES! _____ ***Flash Code: 2/2***

- Ground function switches were closed at power-on.

RELEASE JOYSTICK SWITCHES! _____ ***Flash Code: 2/2***

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

RELEASE OUTRIGGER SWITCHES! _____ ***Flash Code: 2/2***

- Outrigger switches were closed at power-on.

WIRING MESSAGES

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

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

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

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

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

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

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

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

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

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

P600 TEMPERATURE MESSAGES

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

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

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

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

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

SUPPLY MESSAGES

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

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

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

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

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

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

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

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

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

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

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

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

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

SENSOR MESSAGES CE MODELS

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

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

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

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

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

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

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

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

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

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

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

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

POWER WIRING MESSAGES

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

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

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

OTHER MESSAGES

The following are other HELP messages:

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

- This message should not occur!

FACTORY OVERRIDE_____ Flash Code: (fast flashing)

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

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

TROUBLESHOOTING CHART

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

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

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

Table 4b-4: Troubleshooting Chart

Problem	Possible Cause	Remedy/Solution
General Power Issue		
No operation from upper or lower control station; no red LED at GP400.	Main battery switch turned off	Located left of lower control box.
	Emergency switch pushed in or ignition switch turned off or defective	Upper or lower e-stop switch will cut all power, as will the ignition switch in the platform control box.
	Batteries discharged	Will receive 4-4 or 7-7 flash on GP400. Clean, service and charge batteries. Battery charger may not operate if battery voltage drops below 20 volts.
	Blown 30 amp fuse	Located just below the battery cutoff switch
	Circuit breaker tripped	Located in lower control box panel
No functions; LED illuminated or flashing on GP400	Blown 300 amp fuse	Located just to the left of lower control station. Check for excessive motor amperage draw. Will receive a 7-7 flash code on GP400.
	Batteries discharged	Will receive 4-4 or 7-7 flash on GP400. Clean, service and charge batteries. Battery charger may not operate if battery voltage drops below 20 volts
	Damaged upper control box harness	Inspect from harness plug to terminal strip under platform. May receive 6-6 flash code on GP-400 (CAN bus)
	Other fault in system monitored by GP400	Check Help message on EZ-Cal or check flash code for error
Functions from lower controls but not from upper controls	Interlock switch (joystick)	Check power to red wire (power to switch) and power to purple wire (power out of switch) at joystick plug
	Loose plug connections on Matrix module	Check plug connections
	Damaged upper control box harness	Inspect from harness plug to terminal strip under platform. May receive 6-6 flash code on GP-400 (CAN bus)
	System interlock	Check HELP messages using EZ-Cal

LIFT/LOWER		
Platform will not raise; electric motor operating.	Excessive weight on platform	Reduce weight to rated platform capacity
	Lift Relief Valve RV-1 out of adjustment	Adjust relief valve to rated platform capacity
	Lift Valve SV-1 not energized	Check wiring to lift valve. Check for EZ-Cal message or flash code
	Lowering Valve SV-5 stuck open (located at base of lift cylinder)	Check and remove contamination from valve
	Main system pressure inadequate	Check pump output pressure
Platform will not raise; electric motor NOT operating.	Level sensor out of level (platform elevated above10')	Reposition machine to firm level surface. Check level sensor function using EZ-Cal See Diagnostic chart 2e1
	Batteries discharged	Will receive 4-4 or 7-7 flash on GP400. Clean, service and charge batteries Battery charger may not operate if battery voltage drops below 20 volts
	System interlock	Check HELP messages using EZ-Cal
Platform raises uncommanded when operating other functions	Lift Valve SV-1 sticking	Clean or replace SV-1 valve
	Shuttle Valve LS-2 damaged or contaminated	Clean or replace LS-2 valve. See hydraulic diagram for location
Platform will not lower or lowers slowly	Maintenance lock in maintenance position	Return maintenance lock to the stowed position
	Lowering valve not energized	Check wiring to lowering valve located on Lift Cylinder. Check for EZ-Cal message or Flash code
	Lowering valve not shifting	Clean debris. Check for damage, replace
	Lowering orifice plugged	Clean orifice located inside hose fitting on lift cylinder
	System interruption	Check HELP messages using EZ-Cal
Platform lowers uncommanded (drift down)	Lowering Valve SV-5 sticking or contaminated	**Deploy Maintenance Lock!** Remove and clean or replace lowering valve SV5
	Cylinder internal seal failure	Check, repair seals
Emergency lowering not working	Lowering valve not shifting	Clean debris, check for damage, replace
	Lowering Orifice ORF-3 plugged	Clean orifice, located in Lift cylinder hose port.
	Emergency Down battery discharged	Charge, check charge diode & connections
	Emergency Down supply fuse blown	Replace fuse, check for shorts in wire and coil
	Valve coil failed on cylinder	Test, replace
DRIVE:		
No drive function	Drive Valve not shifting	Check electrical connections at drive valve, check drive valve for contamination.
	Lift/Drive select switch malfunction	Check continuity through switch
	Drive system interlock	Check HELP and MODE messages on EZ-Cal
Drive operates uncommanded when operating other functions	Drive Valve SVD-1 sticking or damaged	Clean, replace SVD-1 valve. See hydraulic diagram.
	Shuttle Valve LS-3 damaged or contaminated	Clean or replace LS-3 valve. See hydraulic diagram for location

No drive elevated	Unit out of level	Lower and re-position the machine.
	Batteries discharged	Will receive 4-4 or 7-7 flash on GP400. Clean, service and charge batteries. Battery charger may not operate if battery voltage drops below 20 volts
	System interlock	Check HELP messages using EZ-Cal
Slow drive with platform in stowed position	High torque enabled	Check Speed/Torque Switch at platform controls
	Elevation sensor out of calibration	Use EZ-Cal to monitor platform state of elevation. See Diagnostic chart I.D. 2a13 for elevated status and 2e1 for platform % of elevation input. Failure of the angle transducer will trigger a fault code.
	Malfunctioning rear wheel bypass valve	Located on rear wheel motors only. Check by replacing valves.
	Wheel motor/s not functioning correctly	Inspect wheel motors for excessive bypass
Poor gradability performance	High or Mid Speed enabled	Check Speed/Torque Switch
	Batteries discharged	Will receive 4-4 or 7-7 flash on GP400, Clean, service and charge batteries. Battery charger may not operate if battery voltage drops below 20 volts
	Wheel motor/s not functioning correctly	Inspect wheel motors for excessive bypass
	Malfunctioning Rear wheel bypass valve	Located on rear wheel motors only. Check electrical by disconnecting valves or function by replacing valves
	Malfunctioning Series/Parallel Valves	Located on top of main hydraulic Manifold
	Worn hydraulic pump	Check with flow meter or replace pump
Drive in one direction only	Drive Valve SVD1 not energizing in one direction	Check 12 volts to appropriate coil, check coil, check valve function
	Counterbalance Valve CBV1 or CBV2 malfunction	Swap counterbalance valves to see if functioning direction changes.
	No output from GP400	Scan using EZ-Cal and troubleshooting charts. EZ-cal chart I.D 4f-7 - Fwd or 2f-9 - Reverse
No Low Speed (high torque mode)	Speed/torque selector switch inoperative	Check continuity of Speed/Torque switch in platform control box
	Valve SV3 not functioning	Check for 12 volts and ground to valve check for faulty valve spool
	EP1 poppet valve not functioning	Check or replace valve
No Mid Speed	SV3 or SV4 powered and/or shifted	These valves should not have 12 volts, in mid-speed, check valve function
	Speed/torque selector switch malfunction	Check continuity through switch
No High Speed	Speed/torque selector switch inoperative	Check continuity of Speed/Torque switch in platform control box
	Valve SV4 not functioning	Check voltage and ground to valve check for faulty valve spool
	EP2 poppet valve not functioning	Check or replace valve
No brake effectiveness	Brake Orifice OD-1 obstructed	Remove, clean orifice. See hydraulic diagram for location in manifold.
	Brake discs worn past service limit	Replace brake discs located inside rear wheel motors.

LIFT AND DRIVE		
No drive or lift operation motor operates	Main Relief Valve RV-3 out of adjustment	For test purposes, swap RV-3 with RV-2.
	Pump or pump coupler failure	Inspect, replace as necessary
	Diverter Valve EC-1 malfunction	Inspect, replace as necessary
	Hydraulic tank empty	Check, fill with approved oil
No drive or lift operation motor does not operate	Motor malfunction	Inspect, replace as necessary
	System interlock	Check HELP messages using EZ-Cal
	Battery discharged	Will receive 4-4 or 7-7 flash on GP400. Clean, service and charge batteries. Battery charger may not operate if battery voltage drops below 20 volts.
STEER		
No steer in either direction	Joystick rocker switch inoperative	Check rocker switch output on green and yellow wires, input on blue wire.
	Steering Valve SV-2 inoperative	Check steering valve for power or damage.
	System interlock	Check HELP messages using EZ-Cal
	Hoses connected incorrectly	See hydraulic section for correct connection.
	Pressure Relief Valve RV-2 set too low	Set steer relief valve to 2000 PSI
Steers in one direction only	Steering Valve inoperative or stuck	Inspect; replace steering valve
	No power to steering coil	Check for power and ground in both directions, repair wiring
	System interlock	Check HELP messages using EZ-Cal
Steers but not fully or steers slowly	One or both steering cylinder internal seal failure	Check steering cylinder seals, replace
	Pressure relief valve set too low	Set steer relief valve to 2000 PSI
	King pin/s seizing in the bore	Disassemble and inspect, repair, replace bushings
Wheels do not stay in position while driving	One or both steering cylinder internal seal failure	Check steering cylinder seals, replace
Steers uncommanded	Steering Valve SV-2 sticking or damaged	Remove and inspect for visible debris and stem straightness, clean with solvent and air
	Check Valve CV-1 or CV-2 damaged or contaminated with debris	Remove and clean or replace check valves see hydraulic diagram for manifold location
LEVEL, AUTO & MANUAL		
No level operation	Platform is in elevated position or is perceived to be in the elevated position. Elevation is monitored by a sensor located on left-rear portion of the scissor stack.	Use EZ-Cal to monitor platform state of elevation. See Diagnostic chart I.D. 2a13 for elevated status and 2e1 for platform % of elevation input. Failure of the angle transducer will trigger a fault code.
	System interlock	Check HELP messages using EZ-Cal
	Level switch/s inoperative	Check level switch located in the upper control box
	Directional pressure valve not functioning	Located behind lower control box. Inspect valve for loss of power, ground or damage.

No auto-level operation; manual level operates	Switch or switch wiring problem. Located inside upper control box	Check switch and wiring
	Level Sensor not calibrated	See Tilt Sensor Calibration instructions found earlier in this section.
	System Interlock	Check HELP messages using EZ-Cal
Unit will not accurately level platform	Unit on too extreme an angle	Relocate unit to more level ground
	Level valve sticking	Inspect/replace valves located behind lower control box
	Excessive weight on platform	Reduce weight to 1500 lbs max (680Kg)
	Pressure relief valve out of adjustment	Set steering relief valve SV-2 to 2000 PSI (138 bar)
	Tilt sensor not calibrated or not calibrated properly	See Tilt Sensor Calibration instructions found earlier in this section.
	Level cylinder valves wired incorrectly	Refer to schematic diagram for correct wiring.
	Level cylinder hoses connected incorrectly	See Hydraulic section for hose routing detail
Will not stay level; drifts down	Counterbalance valve adjustment or failure	Located on the outrigger cylinder, not adjustable. If valve is suspect it must be replaced
	Failure of cylinder internal seals	Inspect and repair as necessary

Figure 4b-15: Hydraulic Manifold, ES

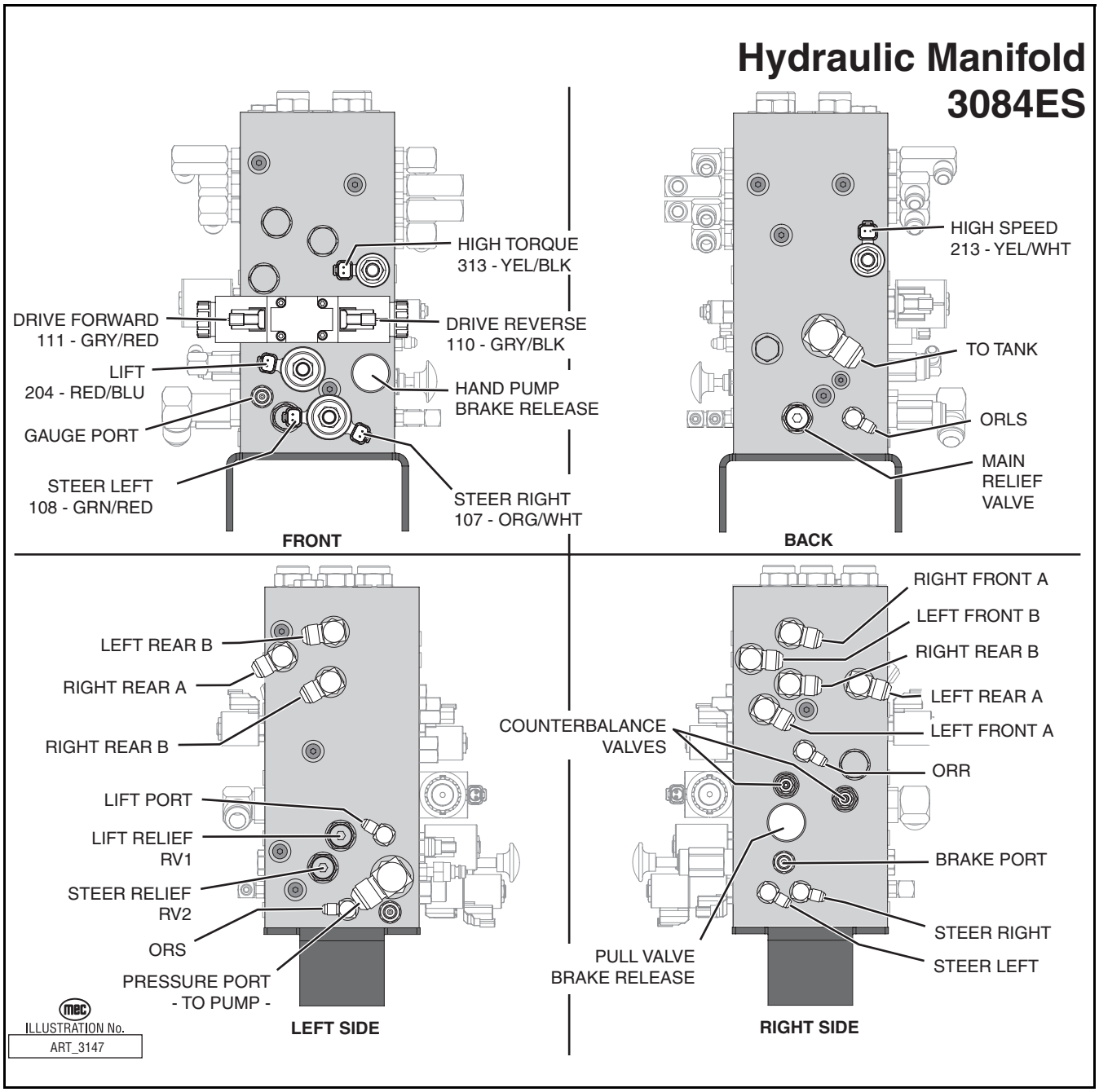


Figure 4b-16: Main Hydraulic Manifold - 3084ES Alternate Configuration

Hydraulic Manifold - Alternate Configuration 3084ES