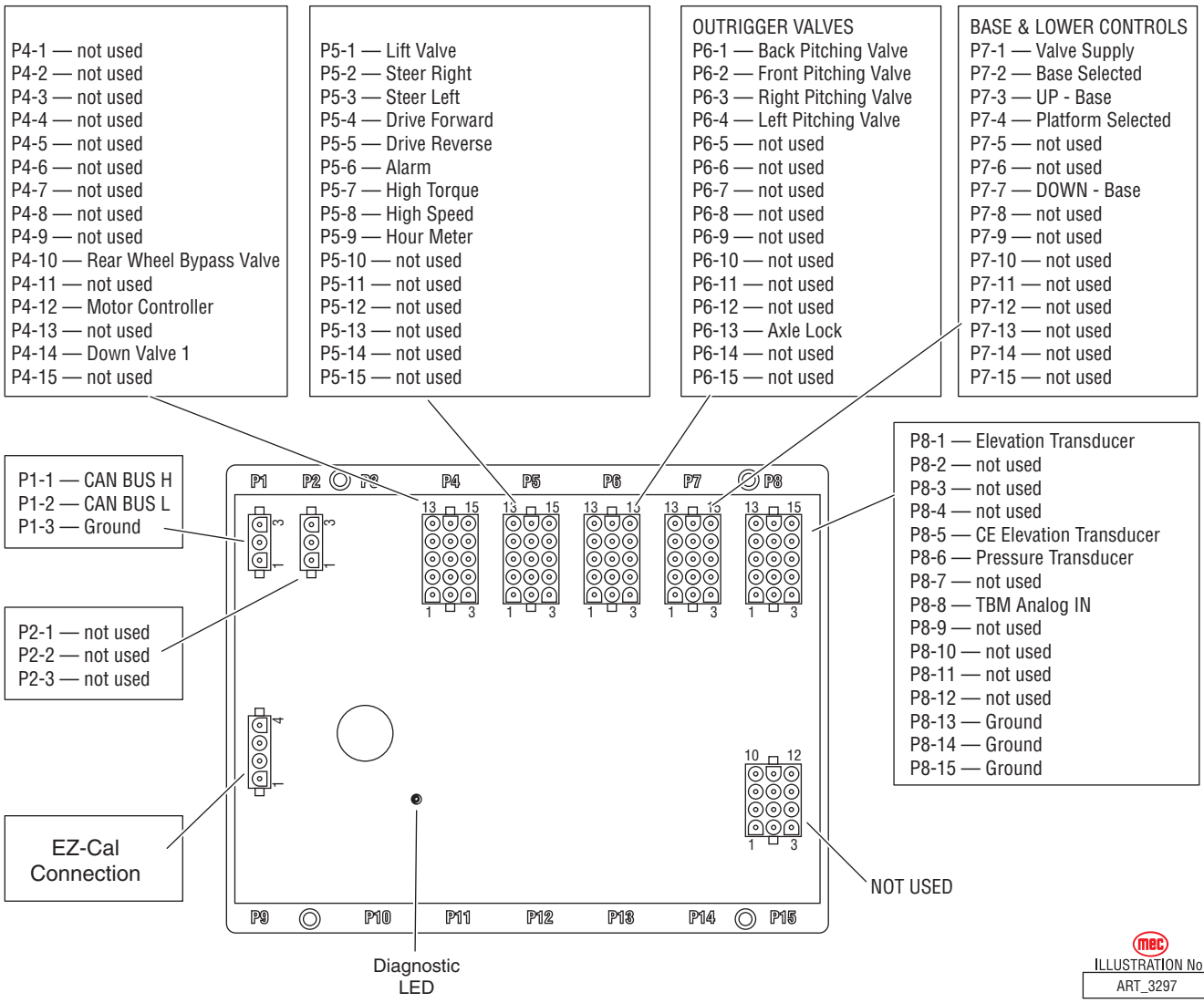
GP400 MODULE

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.

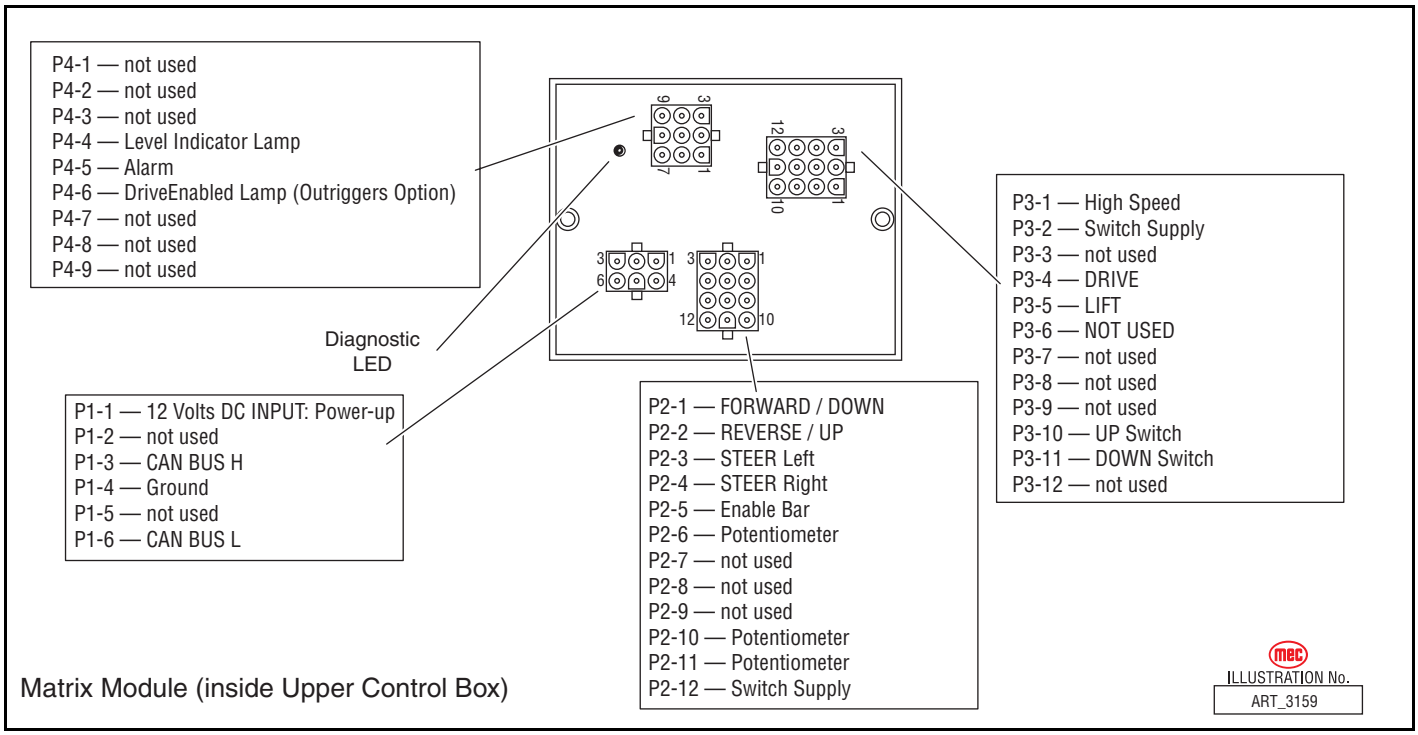
Figure 4b-1: GP400 Module



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

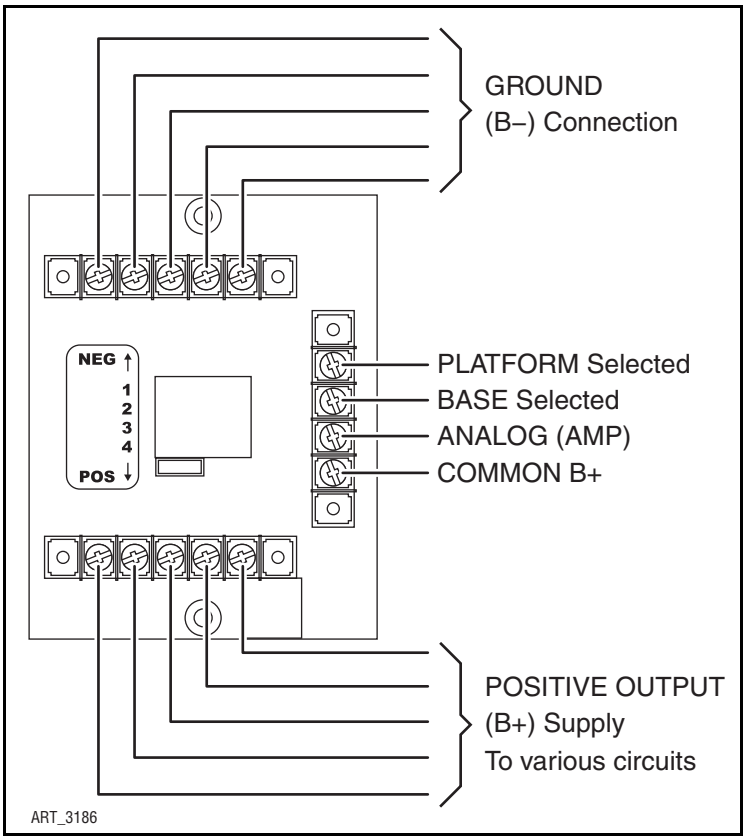


Matrix Module (inside Upper Control Box)

TERMINAL BLOCK MODULE (TBM)

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

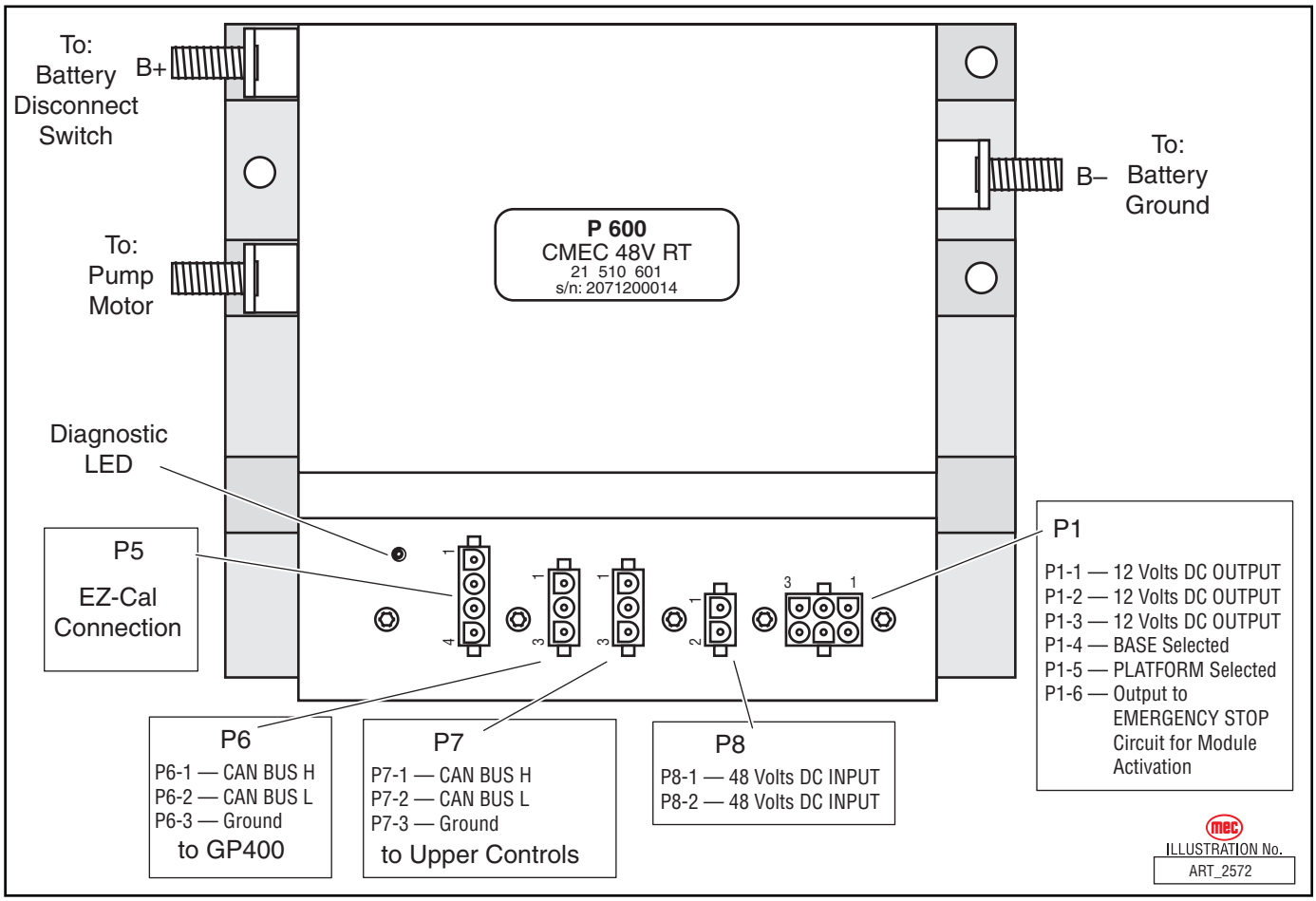
There is a module inside the lower control box, called a TBM (Terminal Block Module) that provides terminal point connections for both positive and ground circuits. A signal from the Emergency Stop circuit activates a load-reduction relay within the TBM that provides ample power to the B+ (positive) 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

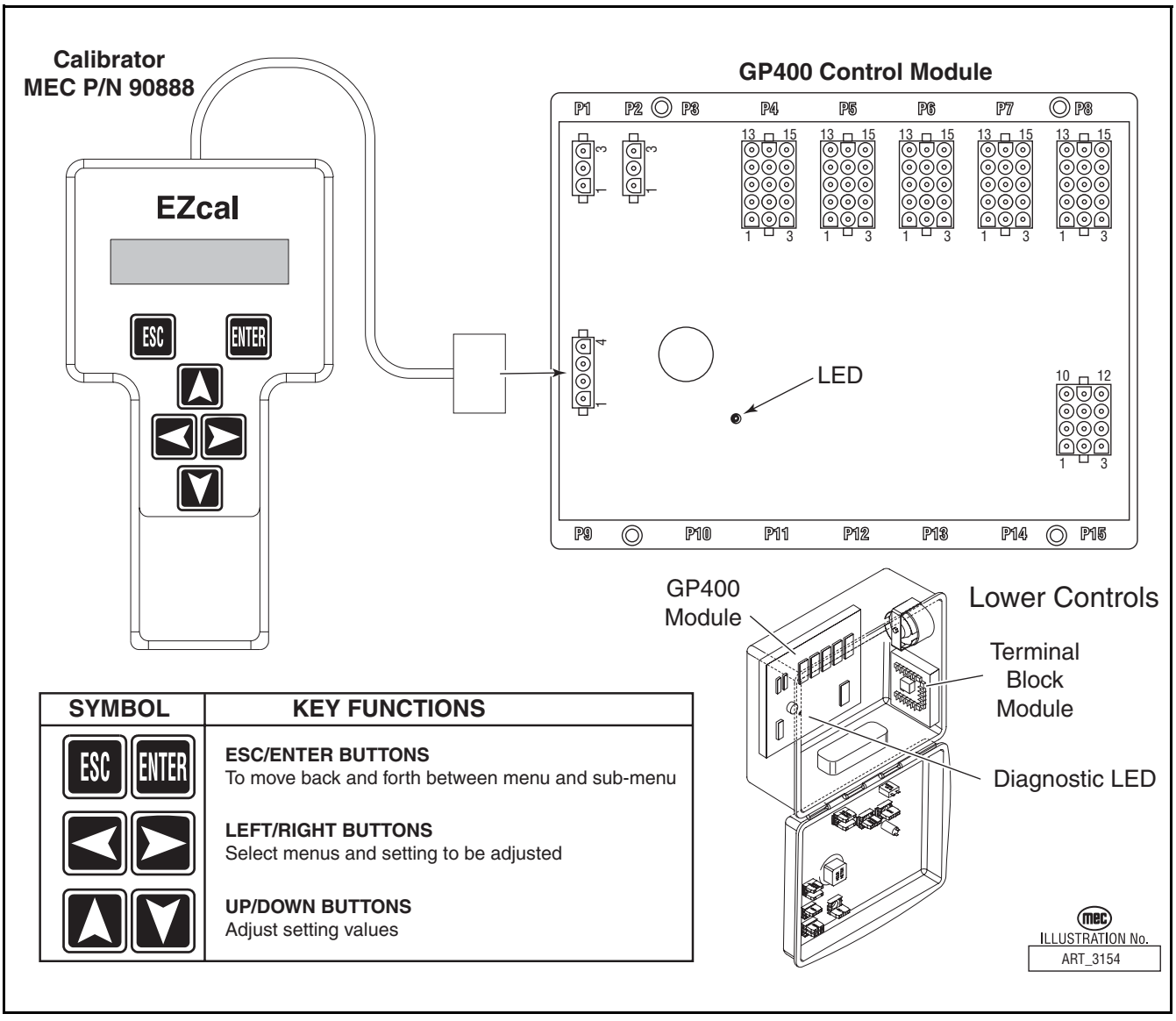
The EZ-Cal (MEC part # 90888; not part of the machine) is a hand-held scan tool that interfaces with the system to provide various information and adjustments. The EZ-cal receives its power from the GP400 when connected. The system must be powered up by closing the Battery disconnect switch and pulling 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

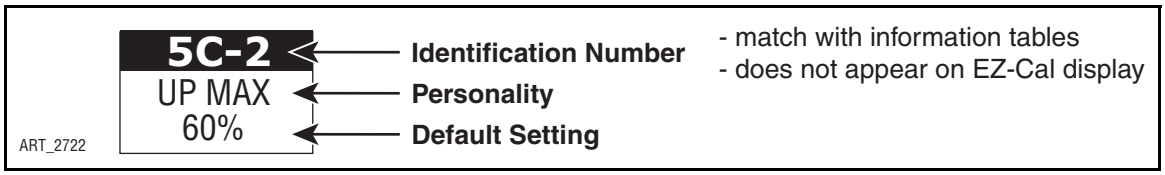


SYMBOL	KEY FUNCTIONS
ESC ENTER	**ESC/ENTER BUTTONS** To move back and forth between menu and sub-menu
◀ ▶	**LEFT/RIGHT BUTTONS** Select menus and setting to be adjusted
▲ ▼	**UP/DOWN BUTTONS** Adjust setting values

USING THE EZ-CAL WITH THE FLOW CHARTS

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

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

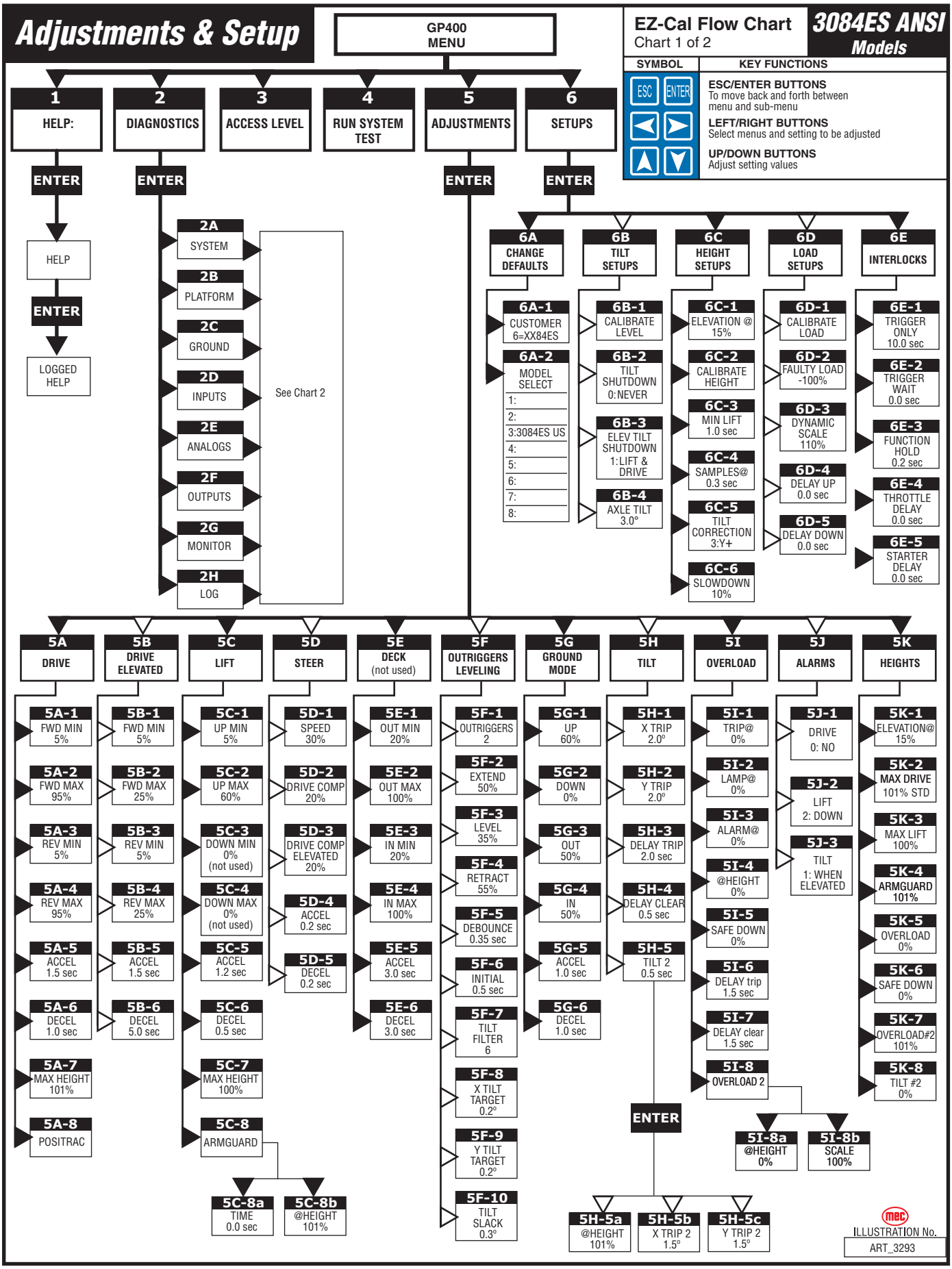


Figure 4b-8: EZ-Cal Flow Chart: Diagnostic, ANSI Models

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-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-14a RETRACTED Y or N
  - 2A-14b EXTENDED Y or N
  - 2A-14c STATUS
  - 2A-14d OUTRIGGER TEST
  - 2A-14e AUTO RETRACT
  - 2A-9a HEIGHT 1%
  - 2A-9b HEIGHT 2%
  - 2A-7a TILT FILTERED
  - 2A-7b TILT LOCAL
  - 2A-2a SUPPLY 12 V DC
  - 2A-2b SUPPLY CAP BANK
- **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

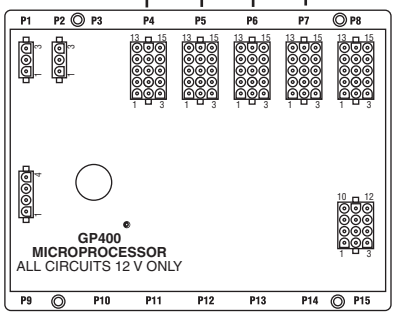


ILLUSTRATION No. ART_3294

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

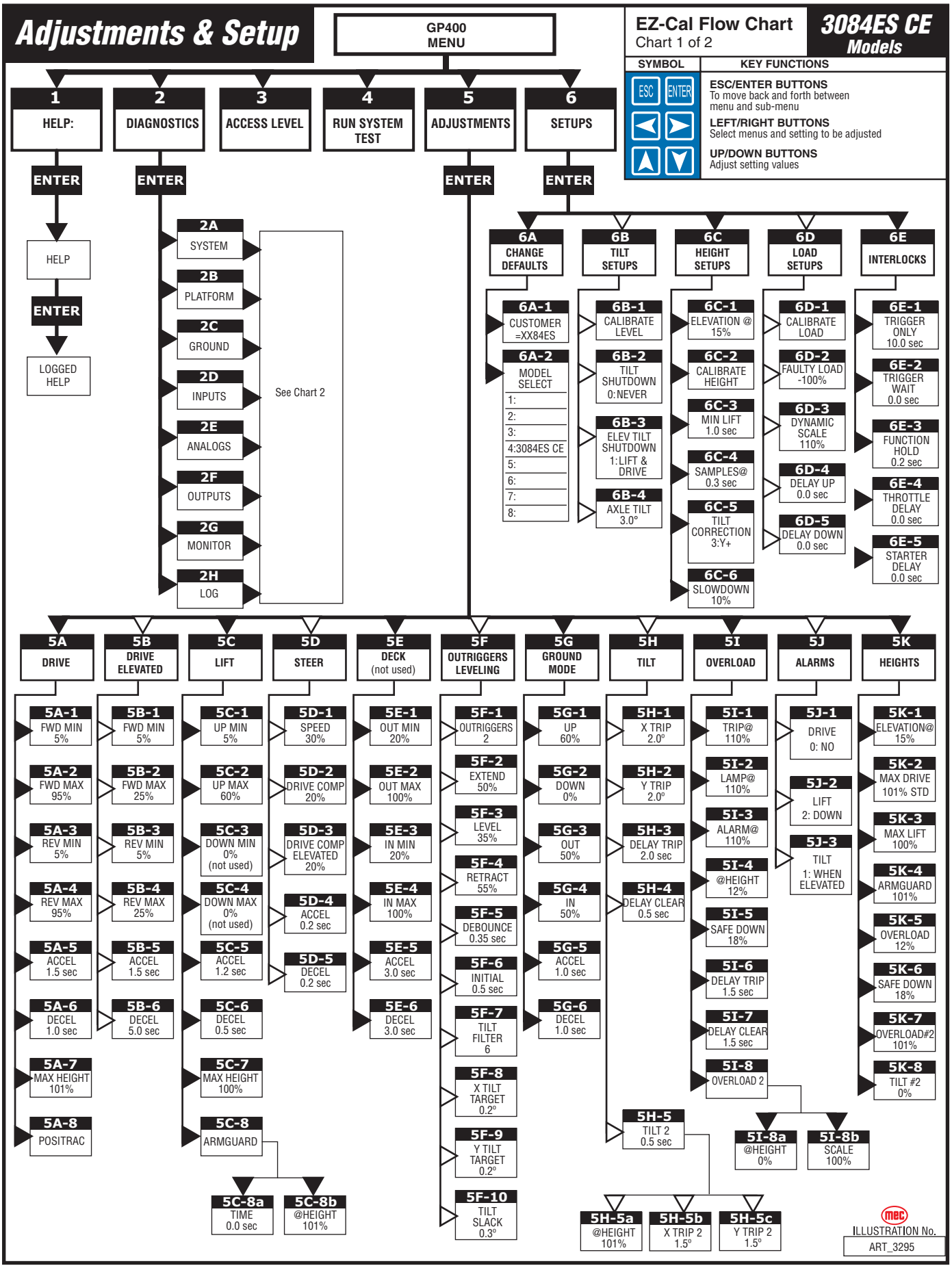


Figure 4b-10: "Outriggers" EZ-Cal Flow Chart: Diagnostic, CE Models

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-14a RETRACTED Y or N
  - 2A-14b EXTENDED Y or N
  - 2A-14c STATUS
  - 2A-14d OUTRIGGER TEST
  - 2A-14e AUTO RETRACT
  - 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%
- **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

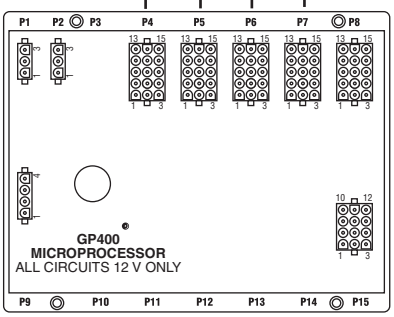


ILLUSTRATION No. ART_3296

EZ-CAL 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 Rt. arrow to “DIAGNOSTICS”. Press Enter. Rt. arrow to MODE.
- 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.**

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

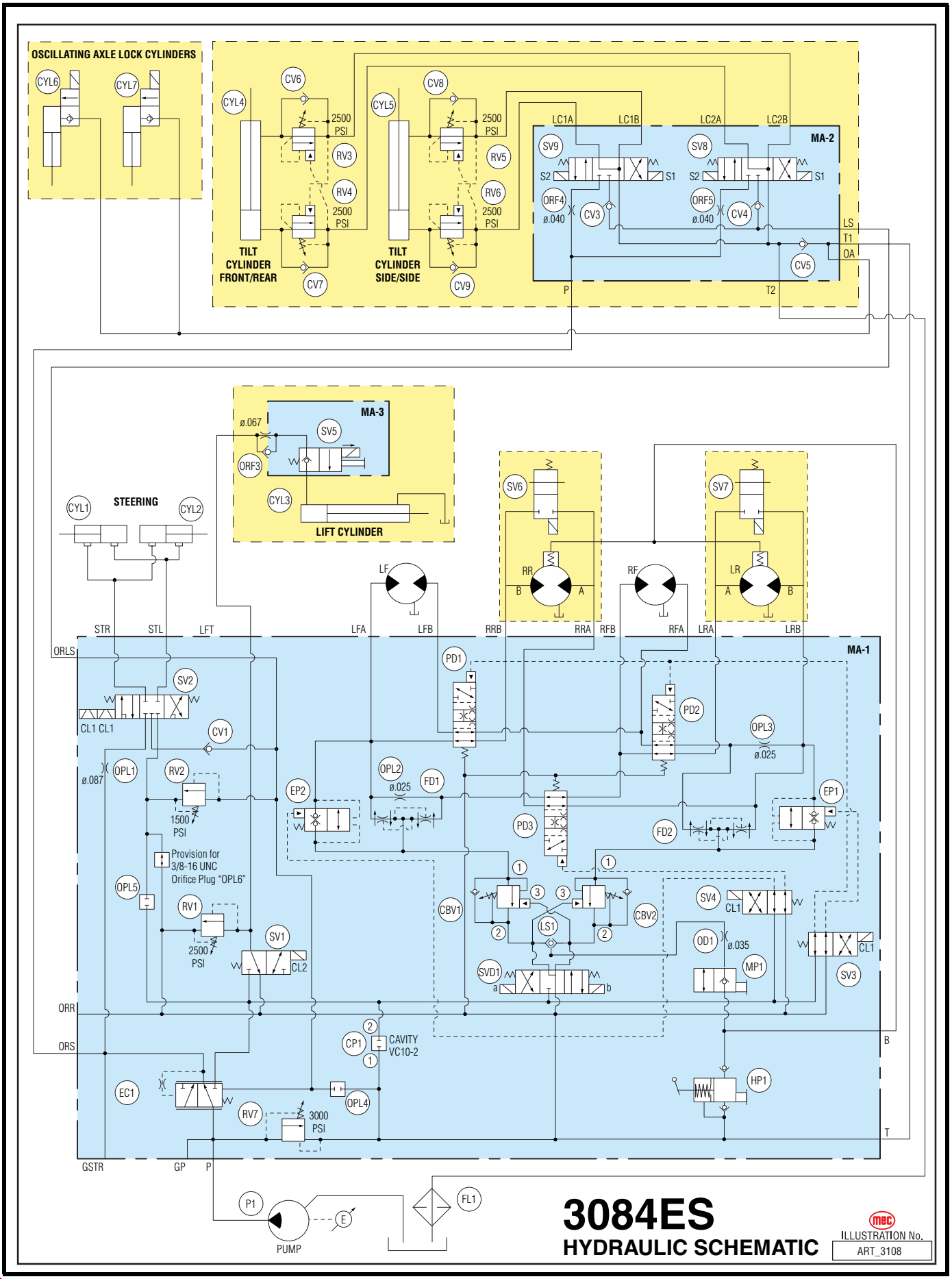


Figure 5-12: Hydraulic Manifold, Main M1 - 3084ES

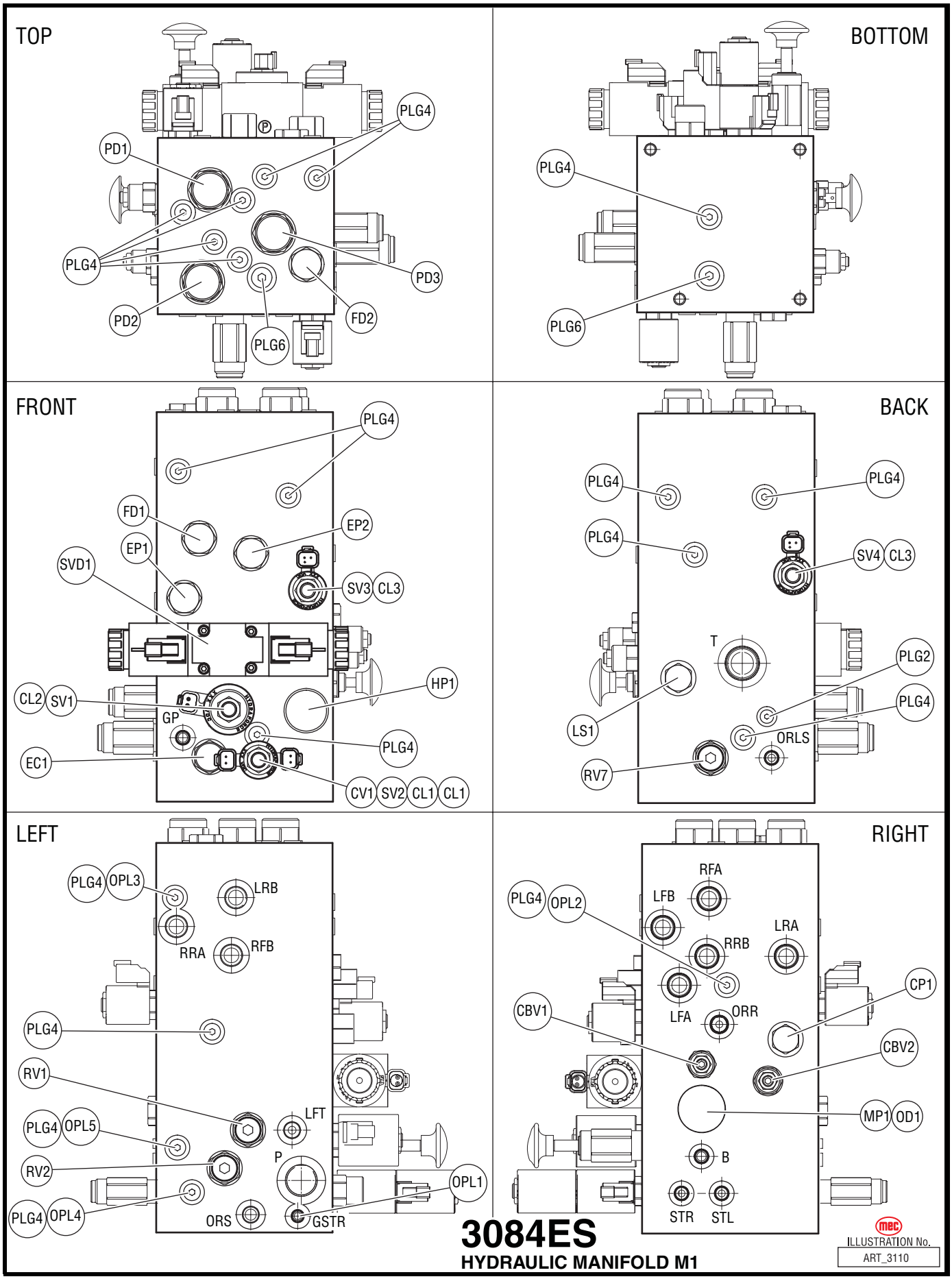
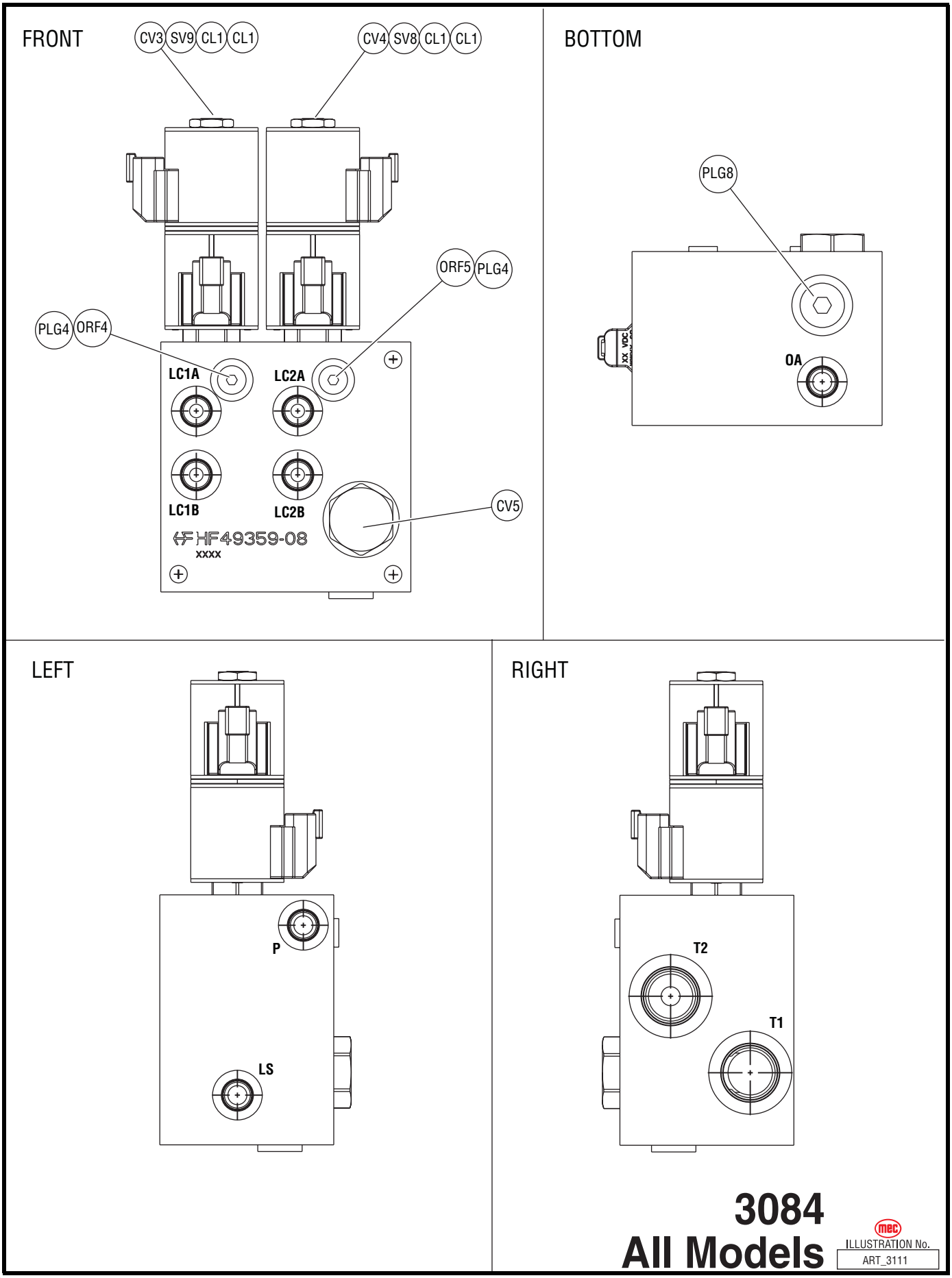


Figure 5-13: Hydraulic Manifold, Tilt M2 - All Models



ELECTRICAL - 3084ES

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

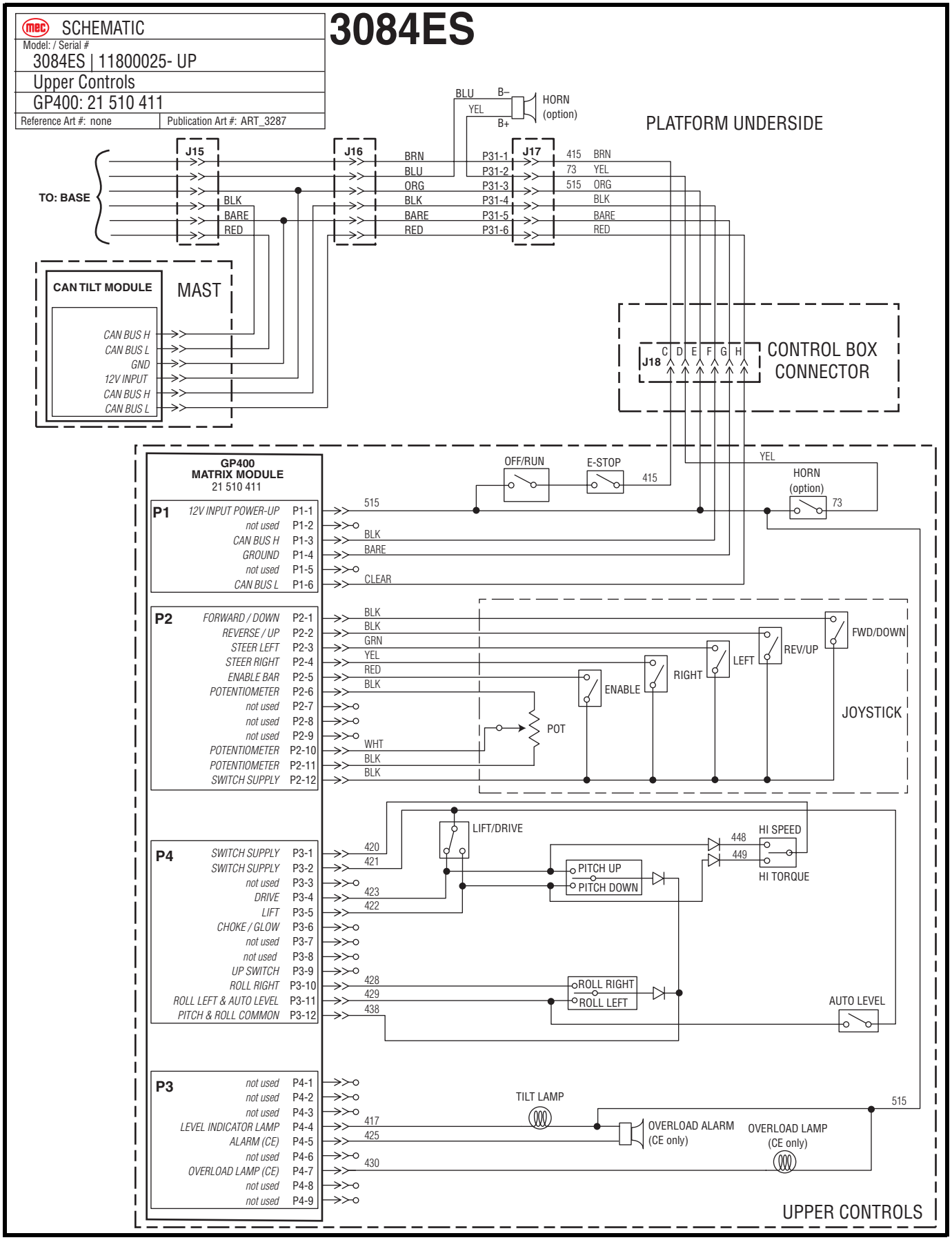


Figure 5-15: Upper Controls Components - 3084ES

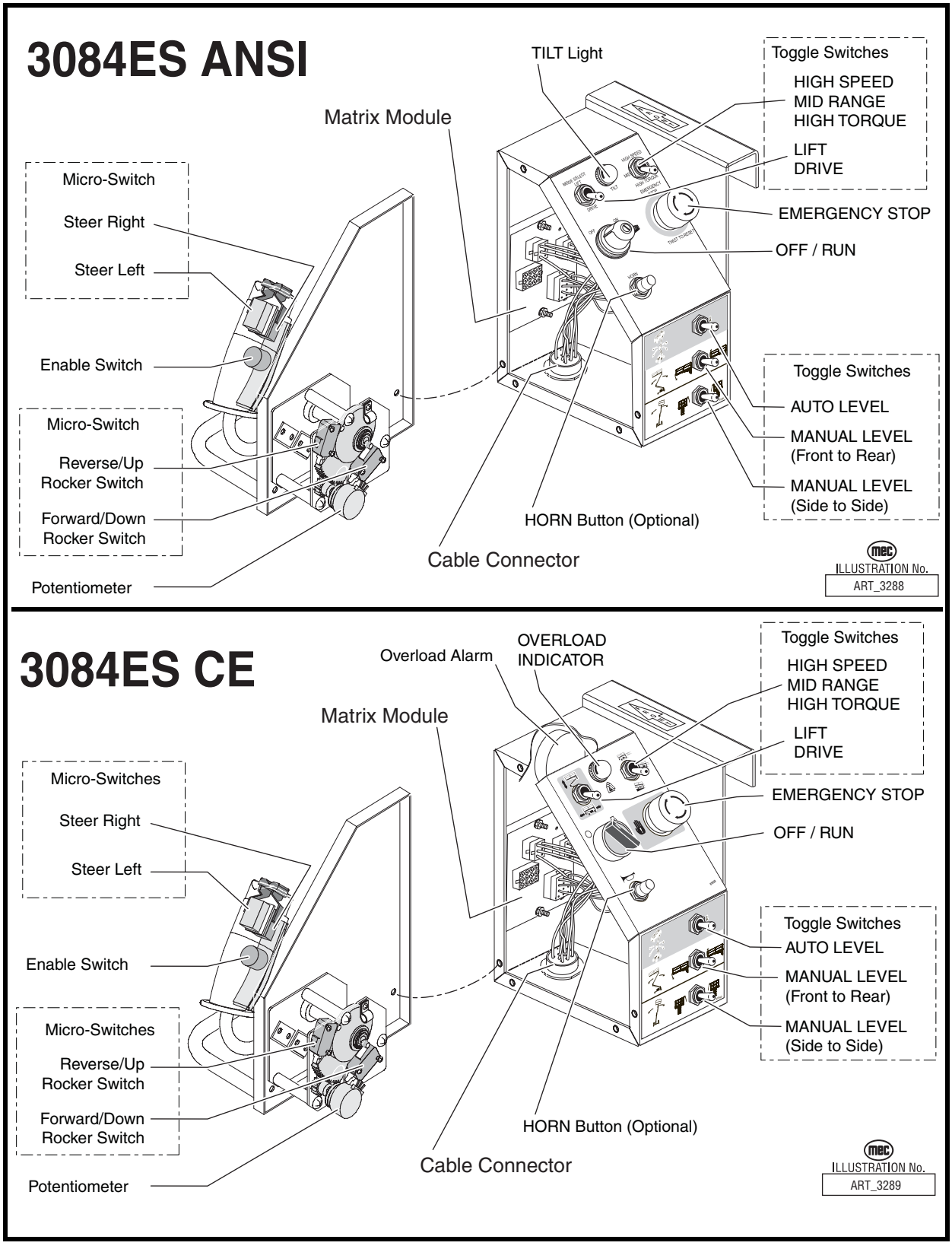


Figure 5-16: Electric Schematic, Lower Control Box - 3084ES

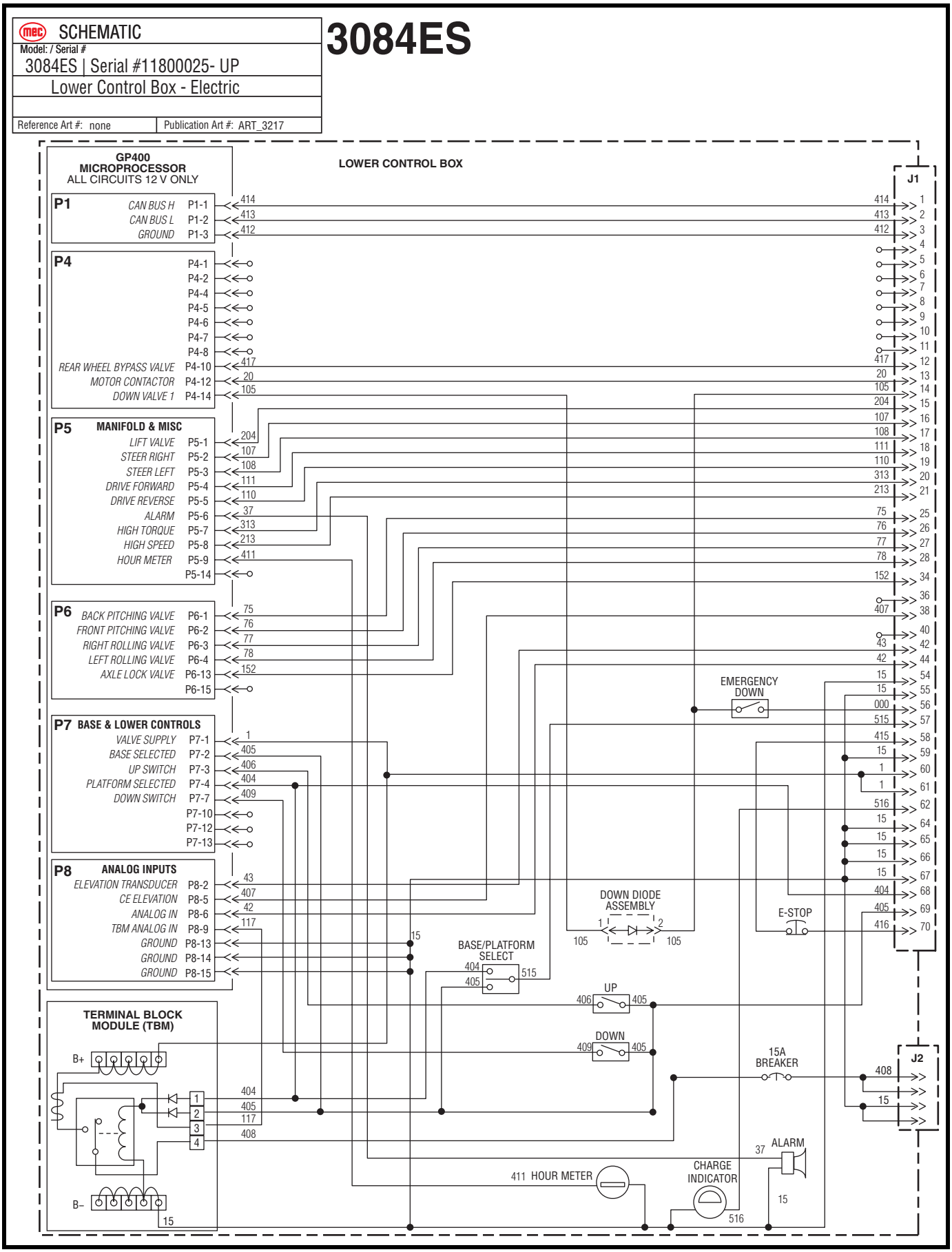


Figure 5-17: Electric Schematic, Base - 3084ES

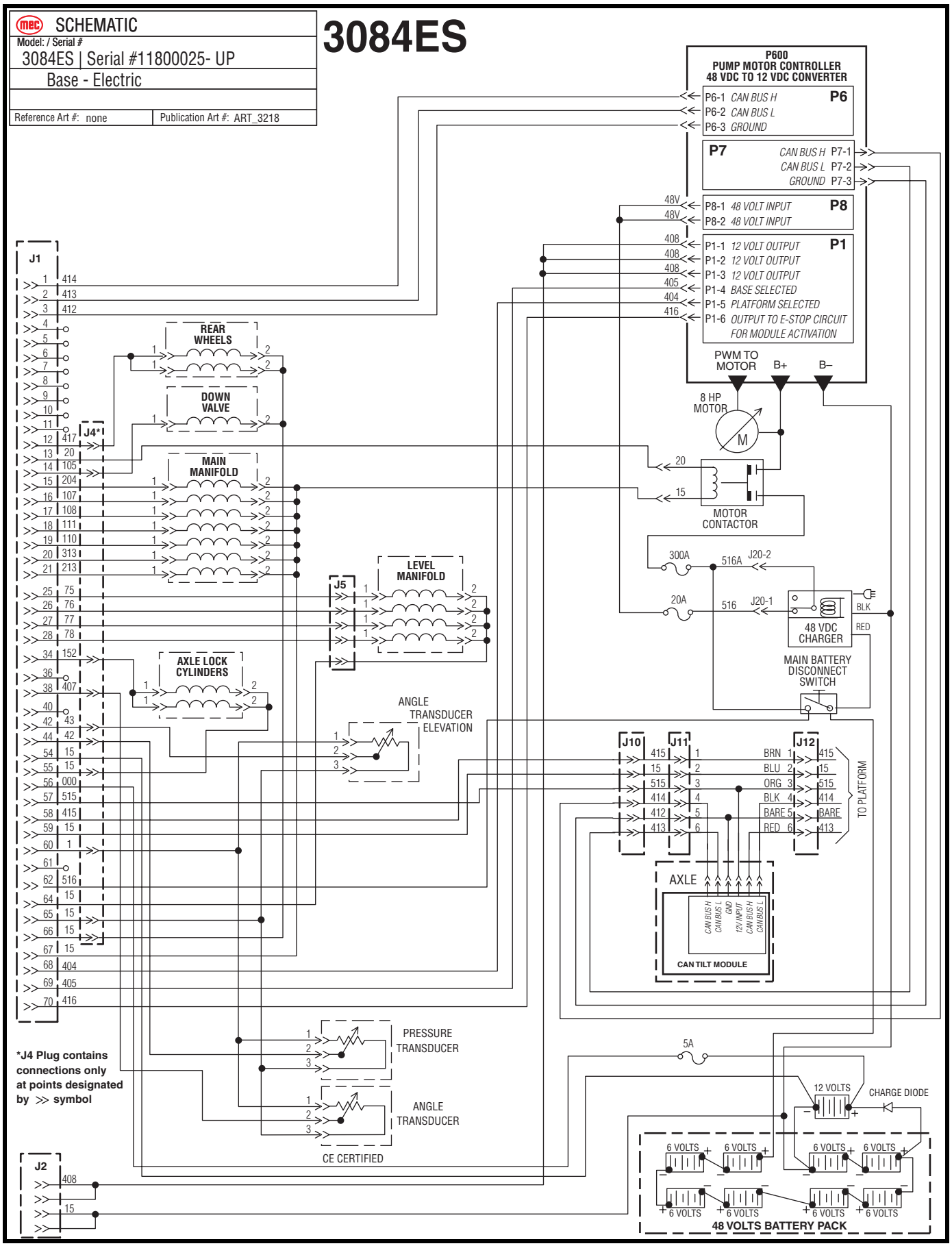
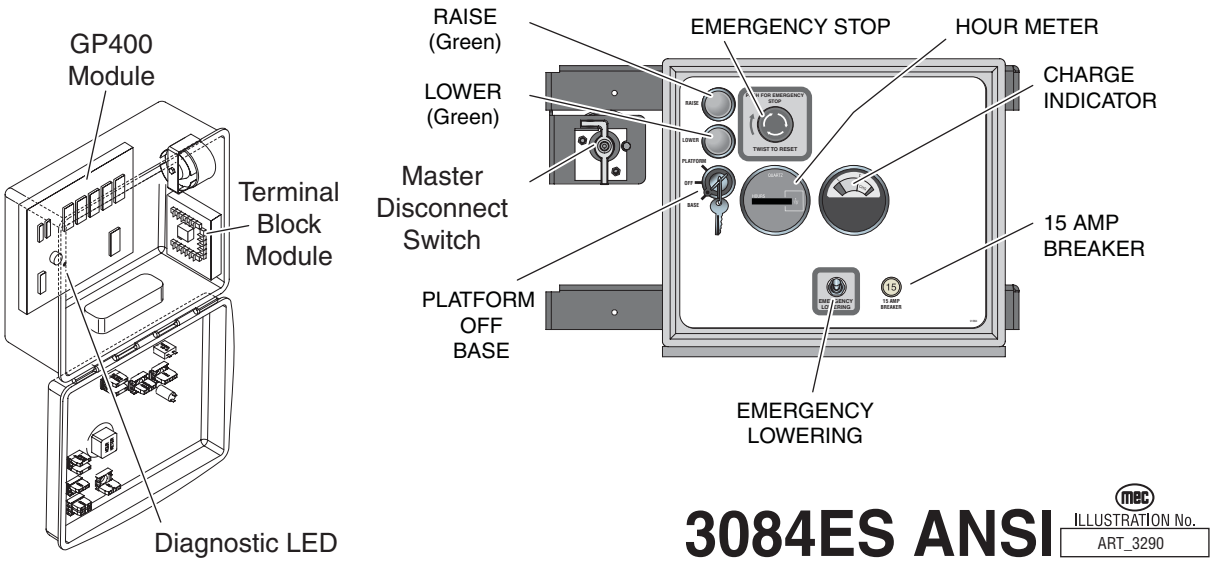
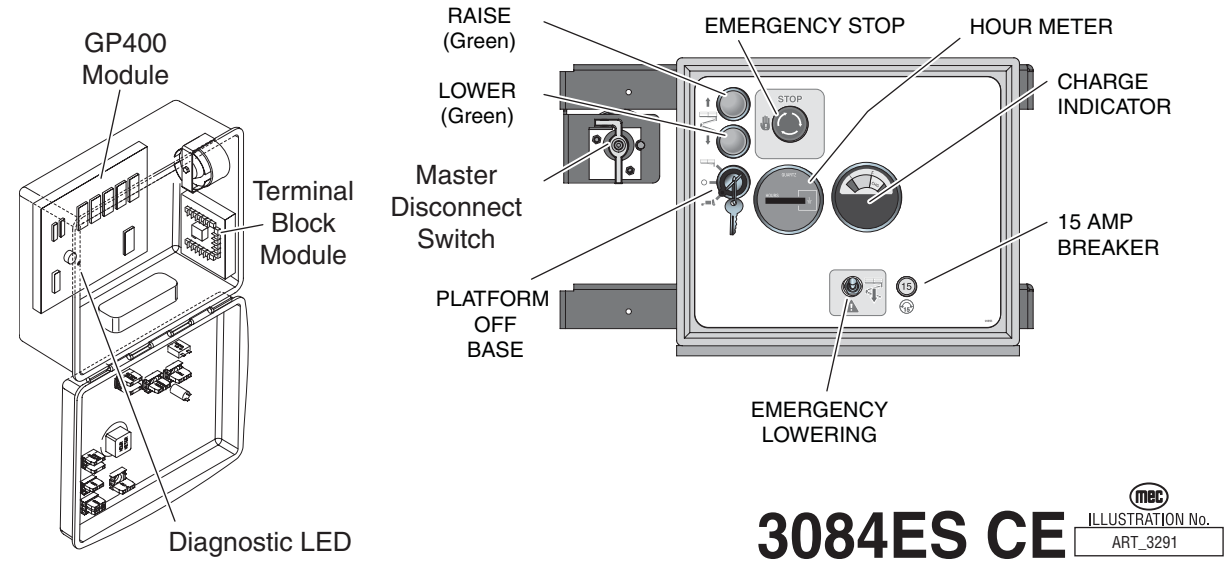


Figure 5-18: Lower Controls Components - 3084ES



3084ES ANSI ILLUSTRATION No. ART_3290



3084ES CE ILLUSTRATION No. ART_3291