Hydraulic Fluid Pump

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

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

Common Causes of Electrical System Malfunctions:

- Battery switch is turned OFF (located at the front of the engine module).
- Battery connections are loose or corroded
- Battery is not fully charged.
- Emergency Stop buttons are pushed (OFF position).
- Circuit breaker is tripped (OFF position).

Common Causes of Hydraulic System Malfunctions:

- Hydraulic fluid level is too low.
- Incompatible hydraulic fluids mixed, destroying the additives and causing varnish build up, resulting in the valves sticking.
- Water in the hydraulic fluid due to a damp climate.
- Improper hydraulic fluid used. Viscosity too high in cold climates. Viscosity too low in warm climates.
- Hydraulic fluid contaminated with debris filter change interval neglected.
- **Note:** MEC uses a multiple viscosity fluid that is light enough for cold climates and resists thinning in warm climates. Use only the recommended hydraulic fluid. Substituting a lower grade fluid will cause the machine to operate incorrectly and may lead to pump and drive motor failure. Refer to "Lubrication" in Section 10 of this manual.
- **Note:** Contamination always causes failure in any hydraulic system. It is very important to be careful not to introduce any contamination into hydraulic system during the assembly procedures. Make sure all ports and cavities of the manifold and cylinders are properly covered/plugged during maintenance activities.



Electrical System Troubleshooting

The electronic control system used on this machine was designed for low maintenance and long, trouble-free operation. The system consists of two microprocessor based modules: the GP440 Module in the upper controls box and the GP400 Processor, located in the lower controls box. They communicate through a low voltage digital signal called CAN-Bus communication.

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

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

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



GP400 Module

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

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

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





Valve Constant Current Module and Terminal Block Module

Valve Constant Current Modules (VCCM)

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



Terminal Block Module (TBM)

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



GP440 Module

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



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EZ-Cal Scan Tools

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

EZ-Cal Handheld

Onboard EZ-Cal Option -- Lower Controls Box

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

Handheld EZ-Cal -- Upper Controls Box

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

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

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

Using The EZ-Cal Scan Tool

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







Using The EZ-Cal With The Flow Charts

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



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

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

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



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

Error Messages

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

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

Flash Codes

Flash Codes, provided from the GP400 red LED, will also assist in the event an EZ-Cal is not available. However, the EZ-Cal yields considerably more relevant information. Refer to "EZ-Cal Messages" on page 104 for flash coded error messages.











EZ-Cal Messages

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

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

Operational Messages

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

EVERYTHING OK______ Flash Code: None

All circuits performing properly, no current operation performed.

GROUND MODE ACTIVE______ Flash Code: None

• Base/Platform selector switch set to base control station.

STARTUP______Flash Code: None

• GP400 performing start up procedure, normally a short sequence.

MOVING FRAMEFla	lash Code: None
-----------------	-----------------

• Chassis level in progress.

MOVING PLATFORM

• Platform level in progress

TELESCOPING______ Flash Code: None

• Boom extend/retract (telescope) in progress

LIFTING______ Flash Code: None

• Boom lift up in progress

LOWERING___

• Boom Lower down in progress

DRIVING

• Drive forward or reverse in progress

VEHICLE TILTED_

Flash Code: None

Flash Code: None

Flash Code: None

Flash Code: None

• Chassis is tilted beyond pre-set maximum. Use auto-level feature to level chassis or re-position the machine.



Can Bus Related Messages

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

NO DATA FROM CAN TILT #1___

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

NO DATA FROM CAN TILT #2_

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

NO DATA FROM CAN TILT #3

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

NO DATA FROM CAN TILT #4_

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

FAULT: CAN BUS!

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



Flash Code: None



Flash Code: None

Flash Code: 6/6

Flash Code: None

Flash Code: None

Calibration Related Messages

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

FACTORY OVERRIDE_

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

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

NOT CALIBRATED_

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

HEIGHT NOT CALIBRATED

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

FUNCTIONS LOCKED - NOT CALIBRATED_____ Flash Code: 1/1

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

FAULT: CUSTOMER_

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



FAST FLASH

OVER

Flash Code: 1/1

Flash Code: 1/1

Flash Code: 1/1

Interlock Messages

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

FUNCTIONS LOCKED - LIMIT REACHED_____

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

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

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

FUNCTIONS LOCKED - OUTRIGGERS

• Stabilizers must be set before operation is allowed.

FUNCTIONS LOCKED - OVERLOADED_____ Flash Code: 2/2

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

FUNCTIONS LOCKED - UNDERLOADED____

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

FUNCTIONS LOCKED - TILTED_

• Platform sensors indicate platform out of level; level platform or chassis until alarm stops or reposition machine

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

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

FUNCTIONS LOCKED - TOO HIGH_

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

FUNCTIONS LOCKED - EXTERNAL SHUTDOWN_____ Flash Code: 2/2

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

CHECK DRIVE/STEER SWITCHES_

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

CHECK LIFT SWITCHES_

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



Flash Code: 2/2

Flash Code: 2/2

Flash Code: 2/2

Flash Code: 2/2

Flash Code: 2/2

Flash Code: 2/2

Flash Code: 2/2

CHECK PLATFORM SWITCHES_

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

Flash Code 2/2

Flash Code 2/2

Flash Code 2/2

CHECK TELE SWITCHES_

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

RELEASE ENABLE SWITCH_

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



Other Messages

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

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

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

FAULT: ENERGIZED VALVE

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

Flash Code: 3/2

FAULT: VALVE FEEDBACK HIGH!

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

FAULT: BAD INTERNAL SAFETY SWITCH!

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

FAULT: LOW OIL PRESSURE!

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

FAULT: BAD INTERNAL SLAVE!

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

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

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

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

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

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

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

FAULT: CHECK HEIGHT 2 SENSOR!

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

FAULT: CHECK HEIGHT 1 SENSOR!

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



Flash Code 6/1

Flash Code: 3/4

Flash Code: 4/1

Flash Code: 4/2

Flash Code 6/1



Flash Code: 3/2

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

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

Check for incorrect GP 400 part. •

FAULT: CHECK HEIGHT SENSORS!

FAULT: LOW OIL PRESSURE! ____ Flash Code 7/7

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

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

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



Flash Code 6/1 • Voltage from Height sensors out of range, should be .5 volts to 4.5 volts

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

Troubleshooting Chart

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

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

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

Problem	Possible Cause	Remedy/Solution
General Power Issue		
	Emergency stop switch pushed in or ignition switch turned off or faulty switches	Lower e-stop switch and ignition switch will cut all power. Upper e-stop will cut only upper power as will the ignition switch in platform control box.
No operation from upper	Battery discharged or faulty cables	Will receive 4-4 or 7-7 flash on GP400. Clean, service and charge battery. Repair cables.
or lower control station. No LEDs on modules.	Circuit breaker tripped	Located in lower control box. Look for short circuit and/or damage in wiring or high amperage draw at valve coils or engine actuators.
	Faulty Terminal Block Module (TBM)	Located inside the lower control box. Initiates all power when signaled by the key switch. Check for loose terminals. Terminal 4 is Common power from Circuit breaker. Terminals 1 and 2 are signals to close the relay.
No operation from upper or lower control station Module LEDs on or flashing	Flash codes are the GP400's indication of a fault in the system.	Refer to flash code designation in this section of the manual or plug in an EZ-Cal scan for more relevant information relating to the failure. See EZ-Cal Instructions for more information.
	Starter Relay or Starter failure	Test for signal and Common power to Starter Relay. Check fuse for Common power to relay. Test Starter.
	Base/Platform select switch not in Platform position or switch malfunction	Ensure that the switch is in the Platform position. Check switch function.
Operates from lower controls but not from upper controls. No LEDs when in Upper control position.	Damaged or loose harness connections to upper control box	Check for power inside the upper control box on e-stop switch and at Buss Module. Check for presence of ground on the Ground Buss Module. Repair connections.
	Malfunctioning GP440 Module (Module inside the upper control box)	Check help messages using the EZ-Cal tool. Also check for joystick inputs (see 2C2 and 2D2 Diagnostic Chart for inputs from GP440).
	System interlock	Check EZ-Cal HELP messages for interlock

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



Section 19 - Troubleshooting

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

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



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

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



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

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

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

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

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

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



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



Hydraulic Schematics ~Serial #14400126, Part 1





Hydraulic Schematics ~Serial #14400126, Part 2





Primary Functions Manifold, ~Serial #14400126, Part 1





Primary Functions Manifold, ~Serial #14400126, Part 2





60-J Boom, Diesel Additional Manifolds



ILLUSTRATION No

ART_4925

Hydraulic Schematic, Serial #14400127~, Part 1





Hydraulic Schematic, Serial #14400127~, Part 2





Primary Functions Manifold, Serial #14400127~, Part 1





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Primary Functions Manifold, Serial #14400127~, Part 2



Hydraulic Pump Ports, PMP Pump





Electric Schematic, Lower Control Box, Standard Machines



Electric Schematic, Chassis, Standard Machines





Electric Schematic, Lower Control Box, Optional Overload Sensing System





Electric Schematic, Chassis, Optional Overload Sensing System





Electric Schematic, Upper Controls Box, All Machines



