

025133

**OWNERS
MANUAL**



Digital Joystick Controller



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Rev. A3



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NOTE TO END USER

TLD P/N 025133 and Interphasic LLC P/N 10SM11-GSE are the same functional controller. This manual will address the joystick controller as the 10SM11-GSE controller.

Accessories

Connectors with new special side locking feature:

(Locking connectors only work with Interphasic controls)

10 Pole input connector **P/N CON10W**

14 Pole output connector (HIGH CAPACITY) **P/N CON14W**

Connector operating lever:

This tool allows easy connection of wires to connectors.

Operating lever, 10 per package **P/N CONTW**

Controller Mounting Kit:

This kit contains all the standoffs and hardware necessary to securely mount the 10SM11 controller.

Mounting kit **P/N MK10SM11**



WARNING

READ THIS ENTIRE MANUAL AND ALL OTHER PUBLICATIONS PERTAINING TO THE WORK TO BE PERFORMED BEFORE INSTALLING, OPERATING, OR SERVICING THIS EQUIPMENT. PRACTICE ALL PLANT AND SAFETY INSTRUCTIONS AND PRECAUTIONS. FAILURE TO FOLLOW INSTRUCTIONS CAN CAUSE PERSONAL INJURY AND/OR PROPERTY DAMAGE.

GENERAL

This guide provides general information covering the installation, operation and maintenance of the 10SM11-GSE Interphasic LLC control.

By following this guide, the installer will be instructed in the proper installation, operation, and maintenance guidelines. Failure to follow this guide usually results in erratic or unpredictable performance or failure for the controller to perform at all. Incorrect installation often causes poor performance and serious start-up problems. Following this guide will minimize those effects.

HANDLING

The high input impedance of some semiconductors makes them susceptible to damage from static discharges. For this reason avoid touching circuit terminals.

Test instruments such as voltmeters should be battery powered. Line powered instruments, due to earth grounding, can give inaccurate results and may damage the controller when their connection to the circuit forms a ground loop. Double-check all connections before attaching meter probes.

WARNING: Never use test lights or jumper wires to simulate inputs or outputs as this could damage the controller and VOIDS the warranty.

Table of Contents

Introduction and Warnings	1
Getting to know the 10SM11-GSE Controller	2
LED's	3
Connections	4
Test Switches	5
Installation and Operation	5
Key Features	6
Operation	8
Input / Output truth table	9
Control Circuit Upgrades	10
Controller Relocation	10
The #41 circuit	11
Container Rotate	12
Using the high power connection	15
Maintenance	16
Troubleshooting	17
Diagnostics	18
Warranty	20
Two Year Limited Warranty	20
Return Policy	22
Specifications	23
Copyright Information	25
Computer Software Copyrights	25
Accessories	26

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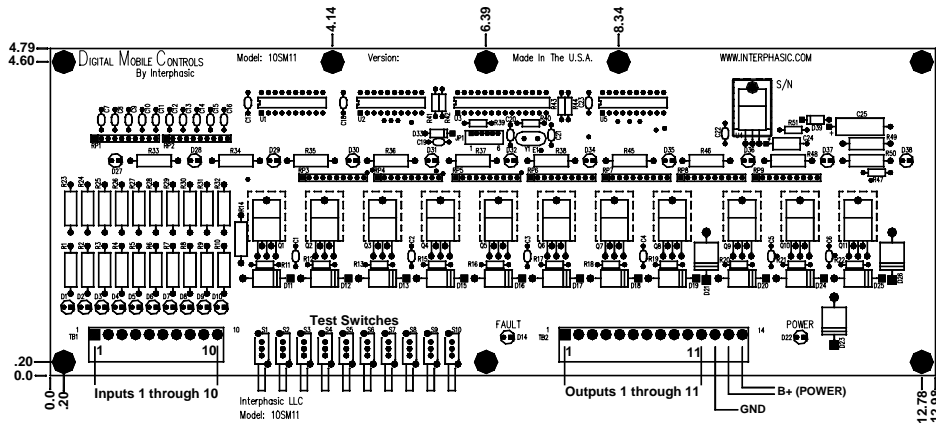
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Outputs: 5 Amps maximum at 30 Volts D.C.
 Inductive load protected, repetitive
 3 Amp maximum
 Voltage swing: 0V to Battery voltage
 Duty cycle: 0 to 100%

Output resistance: 0.038 Ohms @ 25°C

Reverse voltage protected
 100% CMOS logic

Dimensions: 12.98”L x 4.79”W



Mounting holes, 7 locations typical with 8-32 x 3/8 screws.

Introduction and Warnings

The 10SM11-GSE controller has been designed to meet and exceed the original equipment specifications. With advanced digital micro-controller technology at the heart of this controller, accuracy, reliability and safety are the fundamental properties of each system.

For ownership security, each controller is electronically and physically serialized.



WARNING

SENSITIVE ELECTRONIC DEVICES.
 DO NOT WELD ON YOUR EQUIPMENT WITHOUT FIRST DISCONNECTING ALL ELECTRICAL CONNECTIONS FROM THE 10SM11-GSE CONTROLLER. DO NOT PARALLEL OR BACK FEED CONTROLLER OUTPUTS. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN A DAMAGED CONTROLLER AND VOIDS THE WARRANTY.

See the WARRANTY section for other details.

Getting to know the 10SM11-GSE Controller

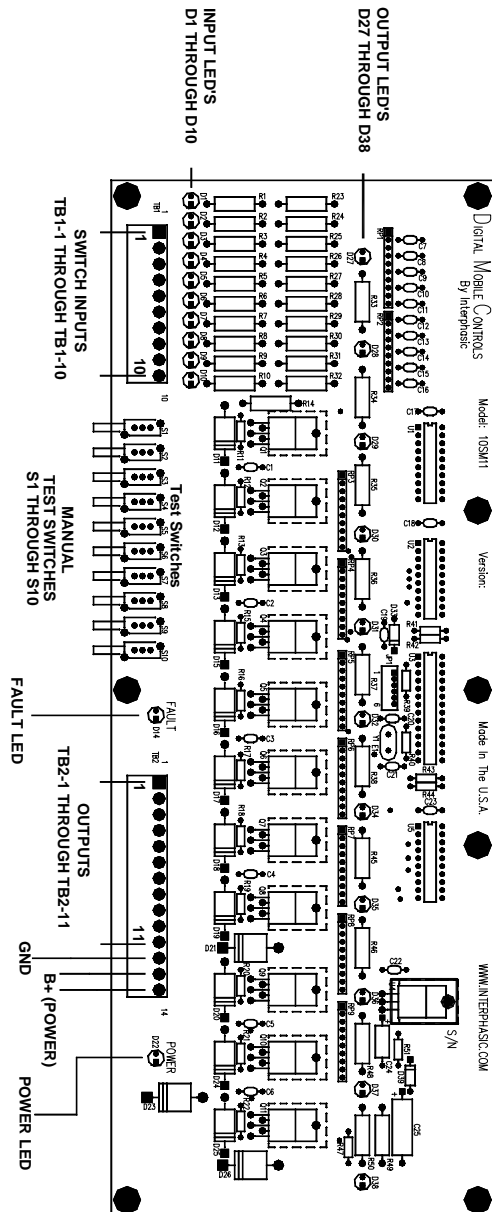


Figure 1

Specifications

Direct OEM replacement
 Quality manufactured to ISO 9002 standards
 Enhanced operational features reducing mechanical/hydraulic stress thus lowering operation cost
 Rugged heavy-duty design with short proof protection and fault diagnostics
 Environmentally sealed for extended service life
 New mechanical locking connectors to resist vibration
 2 year warranty

Conforms to SAE J1113 Transient Load Dump
 UL 94V-0 Flame Retardant Classification
 Ideally Suited to Automotive Applications
 Operating Temperature -40°C to 85°C
 Operating Voltage 9 to 30 Volts D.C.
 Outputs are Short Circuit Protected
 Input, Output, Fault and Power Tell-Tail LED's
 Brown-out reset safety circuit
 Push to Test Diagnostic switches

Inputs: -3 Volts to 30 Volts D.C.
 Input speed D.C. to 600Hz

Input resistance: 1.1K Ohms @ 13V D.C.
 968 Ohms @ 30V D.C.

Input current: 12mA @ 13V D.C.
 31mA @ 30V D.C.

Input logic level: 0 = $<0.9\text{V D.C.}$, 1 = $>4\text{V D.C.}$

Environmental protection: Gelatinous silicone conformal coating.

determination will be made if eligibility requirements are met for replacement, exchange, or repair. Please be sure to follow these guidelines to avoid any delay or possible denial of processing your return:

- Products that are improperly packaged.
- Products returned to us in non-qualified shipping containers.
- Packages affixed with counterfeit label(s) or affixed with labels exhibiting tampering.
- Products with a serial number that does not match serial number on the package or invoice (We maintain serial number tracking).

If you wish to return the merchandise because it was not used, you may do so within 30 days of the original invoice date, provided you have contacted us at (800) 538-5920 and been issued a Return Merchandise Authorization (RMA) number. Your return must be received within 3 weeks from the issuance of the RMA to receive a credit consideration.

This type of return will only be honored if you haven't opened the anti-static bag. If signs of installation, fastener marks, electrical connection or other have been discovered, we will consider this as Fraud and the merchandise will then be returned to you.

If we receive your package in order, your account will immediately be credited less a 15% restocking fee.

If you receive your shipment damaged, do the following:

- A) Save all package materials, photograph your shipment damage.
- B) Contact your shipper for inspection and place a claim.
- C) Contact TLD.

LED's

The 10SM11-GSE controller contains 23 L.E.D. indicating lights for TELL-TAIL diagnostic purposes. Below is the L.E.D. nomenclature:

SWITCH INPUTS, GREEN L.E.D.'S:

- D1 - WIRE A, ELEVATOR REAR REVERSE
- D2 - WIRE B, ELEVATOR REAR FORWARD
- D3 - WIRE C, ELEVATOR REAR VEHICLE LEFT
- D4 - WIRE D, ELEVATOR REAR VEHICLE RIGHT
- D5 - WIRE E, ELEVATOR FRONT REVERSE
- D6 - WIRE F, ELEVATOR FRONT FORWARD
- D7 - WIRE G, ELEVATOR FRONT VEHICLE LEFT
- D8 - WIRE H, ELEVATOR FRONT VEHICLE RIGHT
- D9 - WIRE J, BRIDGE REVERSE
- D10 - WIRE K, BRIDGE FORWARD

OUTPUT FUNCTION, YELLOW L.E.D.'S:

- D27 - WIRE 82, BRIDGE CONVEY FORWARD
- D28 - WIRE 83, BRIDGE CONVEY REVERSE
- D29 - WIRE 71, ELEVATOR REAR CONVEY FORWARD
- D30 - WIRE 67, ELEVATOR REAR CONVEY REVERSE
- D31 - WIRE 75, ELEVATOR FRONT CONVEY FORWARD
- D32 - WIRE 74, ELEVATOR FRONT CONVEY REVERSE
- D34 - WIRE 69, TRACKS UP WHEELS DOWN
- D35 - WIRE 68, TRACKS DOWN WHEELS UP
- D36 - WIRE 73, SIDE ROLLERS VEHICLE LEFT
- D37 - WIRE 72, SIDE ROLLERS VEHICLE RIGHT
- D38 - WIRE 41, MAIN BYPASS, ENGINE DEMAND

SPECIAL FUNCTION L.E.D.'S:

- D14 FAULT L.E.D. (RED), SHORT OR OPEN CIRCUIT
- D22 POWER L.E.D. (GREEN) SUPPLY VOLTAGE PRESENT

CONNECTIONS

Two connectors are used to interface the 10SM11-GSE to the control circuit environment. Below is the connection detail.

TB1-1 INPUT - WIRE A, JOYSTICK SW-15
 TB1-2 INPUT - WIRE B, JOYSTICK SW-15
 TB1-3 INPUT - WIRE C, JOYSTICK SW-15
 TB1-4 INPUT - WIRE D, JOYSTICK SW-15
 TB1-5 INPUT - WIRE E, JOYSTICK SW-16
 TB1-6 INPUT - WIRE F, JOYSTICK SW-16
 TB1-7 INPUT - WIRE G, JOYSTICK SW-16
 TB1-8 INPUT - WIRE H, JOYSTICK SW-16
 TB1-9 INPUT - WIRE J, JOYSTICK SW-20
 TB1-10 INPUT - WIRE K, JOYSTICK SW-20

TB2-1 OUTPUT - WIRE 82, SV-54
 TB2-2 OUTPUT - WIRE 83, SV-53
 TB2-3 OUTPUT - WIRE 71, SV-42
 TB2-4 OUTPUT - WIRE 67, SV-41
 TB2-5 OUTPUT - WIRE 75, SV-38
 TB2-6 OUTPUT - WIRE 74, SV-37
 TB2-7 OUTPUT - WIRE 69, SV-32, SV-70
 TB2-8 OUTPUT - WIRE 68, SV-31
 TB2-9 OUTPUT - WIRE 73, SV-27
 TB2-10 OUTPUT - WIRE 72, SV-26
 TB2-11 OUTPUT - WIRE 41, ENGINE DEMAND

TB2-12 GROUND - WIRE 3, VEHICLE GROUND
 TB2-13 POWER - WIRE 90, SUPPLY VOLTAGE
 TB2-14 POWER - WIRE 90, SUPPLY VOLTAGE*

* This optional high power input requires a 14-position plug. All power and ground wires must be 14 AWG. Input wires can be 16 to 18 AWG. Output wires can be 14 or 16 AWG.

RETURN POLICY

If you wish to return your controller because it doesn't work, or is otherwise defective, you may do so within 2 years of the original invoice date, provided you have contacted us at (800) 538-5920 and been issued a Return Merchandise Authorization (RMA) number. Your return must be received within 3 weeks from the issuance of the RMA to receive warranty consideration.

Please describe by writing the manner in which the product does not work.

We will, at our discretion, repair the item and return it to you, or we may ship a replacement product pre-paid by the customer and charges refunded upon receipt of the defective controller. Simply place the item in an anti-static bag and package with the RMA number, description of problem, add fill, seal the package, and return it to us.

Ship and Insure Your Return. We STRONGLY recommend that you FULLY insure the package you are returning. THIS IS FOR YOUR PROTECTION in the event the package is lost or damaged in transit. We suggest that you use a "traceable carrier" that can provide you with "proof of delivery." COD returns will not be accepted. Interphasic LLC will not be responsible for items returned that are lost or damaged in transit. Postage and handling charges to our warehouse will be paid by the customer and is non-refundable. In the event that the product you are returning does NOT meet the requirements described in this document, we will photograph the merchandise and packaging and prepare a detailed summary of our determination to deny the return. The merchandise will then be returned to you.

All returned packages will be thoroughly inspected in accordance with our INSPECTION CRITERIA, and a

Warranty

2 YEAR LIMITED WARRANTY

Interphasic LLC warrants the enclosed product against defects in material and workmanship under normal use and service for (2) years provided it is returned in accordance with this warranty, and under the rules as stated in the TERMS CONDITIONS STATEMENT. If defective, this product will be repaired or replaced at Interphasic's option, at no charge except shipping, with proof of purchase from the original owner. This warranty does not cover defects or damage resulting from: misuse, improper operation, improper installation, neglected maintenance, modification, picking and poking or removal of the conformal coating, liquid damage, welding, improper handling, lightening, engine exhaust, or normal wear.

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TEST SWITCHES

The 10SM11-GSE is equipped with 10 manual test switches for diagnostic purposes. To test a circuit of interest, press and hold the test switch. See test switch nomenclature below:

TEST SWITCH INPUTS:

S1 - D1 - WIRE A, ELEVATOR REAR REVERSE
 S2 - D2 - WIRE B, ELEVATOR REAR FORWARD
 S3 - D3 - WIRE C, ELEVATOR REAR VEHICLE LEFT
 S4 - D4 - WIRE D, ELEVATOR REAR VEHICLE RIGHT
 S5 - D5 - WIRE E, ELEVATOR FRONT REVERSE
 S6 - D6 - WIRE F, ELEVATOR FRONT FORWARD
 S7 - D7 - WIRE G, ELEVATOR FRONT VEHICLE LEFT
 S8 - D8 - WIRE H, ELEVATOR FRONT VEHICLE RIGHT
 S9 - D9 - WIRE J, BRIDGE REVERSE
 S10 - D10 - WIRE K, BRIDGE FORWARD

Installation and Operation

The 10SM11-GSE controller requires no adjustments and is ready for operation after this installation procedure.

- 1) With the ignition off and the emergency stop buttons activated, locate the existing cargo control circuit board and disconnect the two orange connector plugs. Unscrew all mounting hardware and remove the existing controller.
- 2) Before installing the 10SM11-GSE controller, ensure that all 7 mounting standoffs are in place and securely tightened to the controller mounting area. The standoffs must all be at the same height. Installation of the 10SM11-GSE controller on unequal or missing standoffs could damage the controller and VOIDS the warranty. Ensure the mounting area is clean

of debris. Order the MK10SM11 mounting kit if required.

- 3) With the 10SM11-GSE controller placed on the standoffs, install all the mounting screws loose. Once all the hardware is in place, tighten the center screws first and then the outer screws. This sequence of tightening prevents warp and twist and possible control failure.
- 4) The 10SM11-GSE controller comes with the test switches and both orange connectors treated with silicone dielectric grease. If installing a used controller, apply silicone dielectric grease to both orange connectors before connection of the plugs. Install the orange plugs into the controllers' connectors. Ensure the plugs are seated and locked in position.
- 5) If the 10SM11-GSE controller is installed on a K- loader before S/N 525, ensure to change the supply wire at the joysticks from ground to wire #90. Terminate the supply wire at the elevator lift switch #90.
- 6) Installation complete.

KEY FEATURES

The 10SM11-GSE controller comes with 9 new operational features. Each new feature is detailed below.

- 1) **Power stable timer:** The 10SM11-GSE controller waits 1 second after voltage is applied before allowing operation of the controller. This ensures a good electrical start up.
- 2) **Engine demand timer:** After all the inputs have returned to the off position, the demand output will remain energized for 3 seconds. This reduces throttle linkage wear.

The typical ohmic value should be between 2.6 ohms to 9 ohms.

If the value is less than 2.6 ohms, this is a short circuit.

If the value is greater than 9 ohms, this is an open circuit.

Knowing the circuit wire number as discovered in the prior paragraphs, this will enable you to trace the electrical wiring and check the hydraulic coil for proper electrical resistance (ohms).

Repair or replace the defective components.

- D27 - WIRE 82, BRIDGE CONVEY FORWARD
- D28 - WIRE 83, BRIDGE CONVEY REVERSE
- D29 - WIRE 71, ELEVATOR REAR CONVEY FORWARD
- D30 - WIRE 67, ELEVATOR REAR CONVEY REVERSE
- D31 - WIRE 75, ELEVATOR FRONT CONVEY FORWARD
- D32 - WIRE 74, ELEVATOR FRONT CONVEY REVERSE
- D34 - WIRE 69, TRACKS UP WHEELS DOWN
- D35 - WIRE 68, TRACKS DOWN WHEELS UP
- D36 - WIRE 73, SIDE ROLLERS VEHICLE LEFT
- D37 - WIRE 72, SIDE ROLLERS VEHICLE RIGHT
- D38 - WIRE 41, MAIN BYPASS, ENGINE DEMAND

DIAGNOSTICS

If the red FAULT L.E.D. is illuminated, one of two circuit conditions will exist. A short circuit in the vehicle wiring or a open circuit in the vehicle wiring.

First, determine which output is sensing the vehicle fault. By pressing each input test switch one at a time, the fault will be discovered and the red FAULT L.E.D. will illuminate.

Knowing which input test switch discovered the FAULT condition, use the I/O chart below and determine which output L.E.D. is off. The output table L.E.D. that is off when the input switch is pressed is the vehicle circuit with a problem.

INPUTS:	OUTPUTS:
S1	—————▶ D30, D34, D38
S2	—————▶ D29, D34, D38
S3	—————▶ D29, D35, D36, D38
S4	—————▶ D30, D35, D37, D38
S5	—————▶ D32, D34, D38
S6	—————▶ D31, D34, D38
S7	—————▶ D31, D35, D36, D38
S8	—————▶ D32, D35, D37, D38
S9	—————▶ D28, D38
S10	—————▶ D27, D38

Use the L.E.D. number to wire number chart to identify the circuit of interest.

With your equipment off, disconnect the orange connector from TB2. Using a digital ohmmeter, measure the ohmic value of the electrical circuit from the wire that was identified with the vehicle FAULT.

- 3) **Single FAULT disable:** During the controller operation if any outputs have detected a circuit fault, the controller will only turn off the output affected and display the FAULT L.E.D.. This allows the rest of the controller to continue operating.
- 4) **Anti cargo reversal:** If during an operation the input direction is reversed quickly, the controller will first stop the operation. Then, reverse the function as commanded. This feature prevents mechanical and hydraulic shock damage without any control lag time.
- 5) **Power ON - Input disable:** During the power-up of the 10SM11-GSE controller, all inputs must be off before the controller will operate. This feature prevents any accidental movement if a switch has been left in the activated position.
- 6) **High power connection:** An additional new connection has been added to TB2-14 on the 10SM11-GSE controller. This additional power connection allows for increased amperage to be delivered to the hydraulic control valves. To use this connection requires a 14-position plug. See Accessories for ordering information.
- 7) **Brown-out Reset:** If the supply voltage to the 10SM11-GSE should fall below 7 volts D.C., the controller will reset. This feature prevents erratic hydraulic operation.
- 8) **Mechanical locking connectors:** In the mobile equipment-operating environment the vibration forces can be great. The 10SM11-GSE has been designed to accept side mechanical locking connectors. These connectors provide a secure connection and prevent vibration failure. See Accessories for ordering information.

- 9) **Extended operating voltage:** The 10SM11-GSE controller features an extended supply operating voltage range from 9 to 30 volts D.C.. This extended voltage range minimizes controller damage due to equipment in need of a battery charge from another vehicle.

OPERATION

This section describes the general operating environment of the 10SM11-GSE controller. Refer to Figure 1 for component locations.

The 10SM11-GSE controller is powered in load mode by the #90 circuit. When the operator moves a joystick off center the controller reads the input signals and displays which inputs are active by illuminating the green input L.E.D.'s (D1 through D10) located on the controller.

When the inputs have been recognized by the 10SM11-GSE controller, all the appropriate outputs will be energized as defined by the I/O truth table. Each output is represented by yellow L.E.D.'s (D27 through D38) located on the controller.

If during the operating environment a circuit fault should occur in the equipment, the 10SM11-GSE will detect which circuit has faulted and disable that output. With a fault detected, the red FAULT L.E.D. (D14) will illuminate and blink to notify service personnel of circuit problems.

The output that was disabled due to the equipment circuit fault will be reset, to operate again, when the input for that function is off. Also, the fault L.E.D. (D14) will reset automatically when the input related to the fault is off.

Troubleshooting

This guide provides the most common problems encountered on mobile equipment and possible solutions. It cannot however, cover all application sites. Because each site has its own conditions, it may be necessary to solve problems in ways not mentioned in this manual. It is sometimes necessary to eliminate problems by trial-and-error techniques.

Problem	Solution
No Input L.E.D.'s	Make sure the loader is in load mode. Check for 12 volts at the joysticks. Check and replace the joystick switch contacts as needed. Check for broken wires between the joysticks and the controller.
No Power	Check the power wires and connection at TB2-13 and 14. Check the ground wire and connection at TB2-12.
Fault L.E.D. is on	A short circuit has been detected in one of the outputs. Go to the diagnostics section in this manual for instructions. An open circuit has been detected in one of the outputs. Go to the diagnostics section in this manual for instructions.

Maintenance

Interphasic LLC recommends the following schedule for maintenance in addition to any OEM recommended practice.

Every 6 calendar months, the following system checks and testing should be performed:

- 1) Make a visual inspection of the 10SM11-GSE controller for signs of corrosion or rust. Remove the orange electrical connectors and check connecting pins for corrosion. Clean and apply dielectric grease on the affected areas. Always apply dielectric grease to the connector contact area.
- 2) Look for signs of water ingress under the gelatinous conformal coating. If water ingress is observed, replace the controller.
- 3) Check both orange electrical connectors to ensure they are securely attached.
- 4) Using the I/O truth table below, press on each input test switch and verify all outputs are operating.

INPUTS:	OUTPUTS:
S1	—————▶ D30, D34, D38
S2	—————▶ D29, D34, D38
S3	—————▶ D29, D35, D36, D38
S4	—————▶ D30, D35, D37, D38
S5	—————▶ D32, D34, D38
S6	—————▶ D31, D34, D38
S7	—————▶ D31, D35, D36, D38
S8	—————▶ D32, D35, D37, D38
S9	—————▶ D28, D38
S10	—————▶ D27, D38
S3 & S8	—————▶ D29, D32, D35, D36, D38
S4 & S7	—————▶ D30, D31, D35, D37, D38

See the Troubleshooting section for additional fault information.

The 10SM11-GSE controller has a voltage present green L.E.D. (D22). This L.E.D. will illuminate when voltage is present on the #90 control circuit.

INPUT / OUTPUT TRUTH TABLE

The I/O truth table shows all possible inputs and the resulting outputs. To check the operation of the 10SM11-GSE controller, simply activate each input one at a time and observe the corresponding L.E.D. input and outputs. Inputs can be checked from the switched inputs or the test switches.

INPUTS:	OUTPUTS:
A:D1	—————▶ D30, D34, D38: WIRES 67, 69, 41
B:D2	—————▶ D29, D34, D38: WIRES 71, 69, 41
C:D3	—————▶ D29, D35, D36, D38: WIRES 71, 68, 73, 41
D:D4	—————▶ D30, D35, D37, D38: WIRES 67, 68, 72, 41
E:D5	—————▶ D32, D34, D38: WIRES 74, 69, 41
F:D6	—————▶ D31, D34, D38: WIRES 75, 69, 41
G:D7	—————▶ D31, D35, D36, D38: WIRES 75, 68, 73, 41
H:D8	—————▶ D32, D35, D37, D38: WIRES 74, 68, 72, 41
J:D9	—————▶ D28, D38: WIRES 83, 41
K:D10	—————▶ D27, D38: WIRES 82, 41

Special Conditions:

Clock-Wise Rotation

C & H:D3, D8 → D29, D32, D35, D36, D38: WIRES 71,
74, 68, 73, 41

Counter-Clock-Wise Rotation

D & G:D4, D7 → D30, D31, D35, D37, D38: WIRES 67,
75, 68, 72, 41

Control Circuit Upgrades

Interphasic LLC recommends the following list of circuit upgrades to promote safety and equipment reliability.

CONTROLLER RELOCATION

If your equipment has a serial number between 373 to 525 or your equipment has the cargo controller located under the operator's joystick panel, you are requested to make this upgrade.

Controls should never be mounted in a horizontal plane as this allows water and other contaminants to collect on the component surface. By relocating your controller to the main electric box, this will promote a longer lasting environment and increase operating performance. By centrally locating the 10SM11-GSE controller in the main electric box, this will reduce voltage drop to all hydraulic valves due to shorter control wire lengths.

Call TLD and order kit #029446. This kit comes with instructions and parts to make this upgrade.

HIGH POWER CONNECTION

The 10SM11-GSE comes with an additional power terminal located at TB2-14. This terminal allows additional energy to be delivered to the hydraulic coils. The additional connection also lowers voltage drops and prevents connectors from overheating.

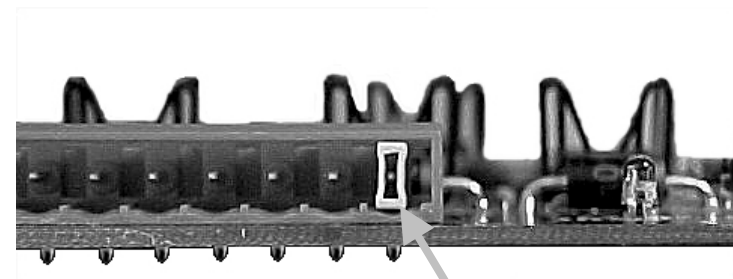
A new 14 position mechanical locking connector is required for this upgrade. See "Accessories" for ordering information.

To use this feature, remove the insulated polarizing key with needle-nose pliers. See Figure 5.

Remove the old connector and transfer the wires to the new connector. Add an additional 14-gage wire to TB2-14 and connect the other end to the #90 electrical circuit.

Install the orange plug into the controllers' connector. Ensure the plug is seated and locked in position.

Upgrade complete.



Polarizing Key

Figure 5

Ensure that all the crimped connections do not have any exposed wire areas. Use black tape as required.

Use 18 gage jumper wires to complete this upgrade.

- 5) Use a jumper wire with the appropriate terminals crimped on each end. Connect one end to SW-27 at the location noted in step 3. Connect the other end to the joystick with the wire "D" circuit.
- 6) Use a jumper wire with the appropriate terminals crimped on each end. Connect one end to SW-27 opposite the "D" terminal. Connect the other end to the joystick with the wire "C" circuit.

AFTER:

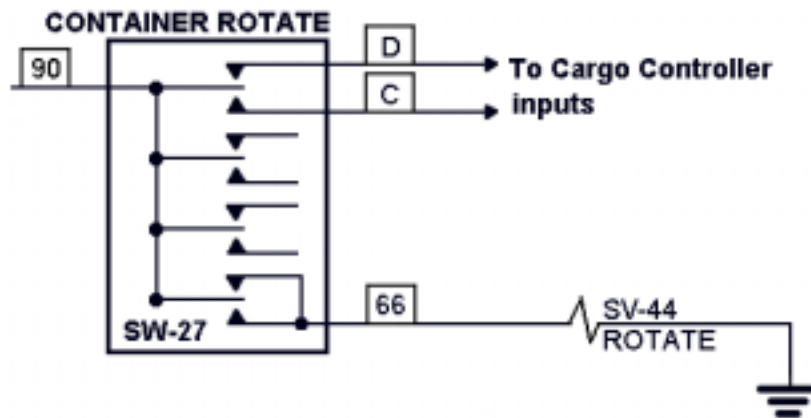


Figure 4

Modification complete. Your circuit should now be wired as shown in the "AFTER" figure 4.

THE #41 CIRCUIT

The Engine demand and secondary hydraulic system are activated from the wire #41 electrical circuit. This wire #41 circuit connects to many different switches and electrical solenoids. With all of these circuits connected to wire #41, it is difficult to identify the electrical loading placed on the cargo controller. For this reason the following circuit modification will increase operating reliability.

As shown in Figure 2, the before section, this shows the typical wiring from the output of the cargo controller. Use 16 gage jumper wire to complete this upgrade.

- 1) To perform this upgrade mount a small control relay, Bosch or equivalent, close to the Cargo Controller.
- 2) Disconnect wire #41 from the orange connector TB2-11 and connect this wire to terminal 30 on the Bosch relay.
- 3) With a jumper wire, connect terminal 86 on the Bosch relay to TB2-11 on the orange connector.
- 4) With a ground wire, connect to terminal 85 on the Bosch relay.
- 5) With a jumper wire from the #90 circuit, connect to terminal 87 on the Bosch relay.

Modification complete. Your circuit should now be wired as shown in the "AFTER" section.

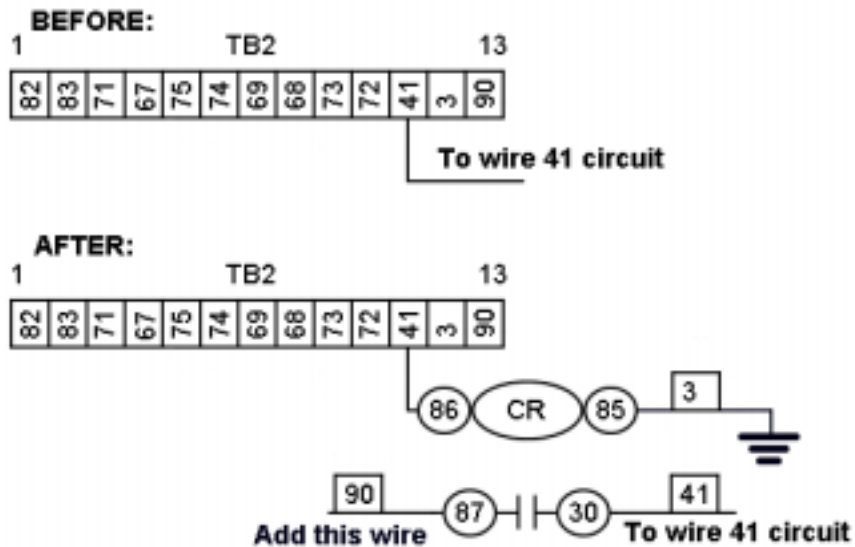


Figure 2

CONTAINER ROTATE

The container rotate switch, when operated, manually energizes the cargo hydraulic valves without the use of the cargo controller. During this function the outputs on the cargo controller are being “paralleled” or “back feed” and may damage or cause the cargo controller to work intermittently.

To prevent this back feed condition, this upgrade will simplify the control wiring and use the cargo controller to provide the rotate function.

As a reference, the “BEFORE” schematic Figure 3, shows the rotate circuit as found on your equipment.

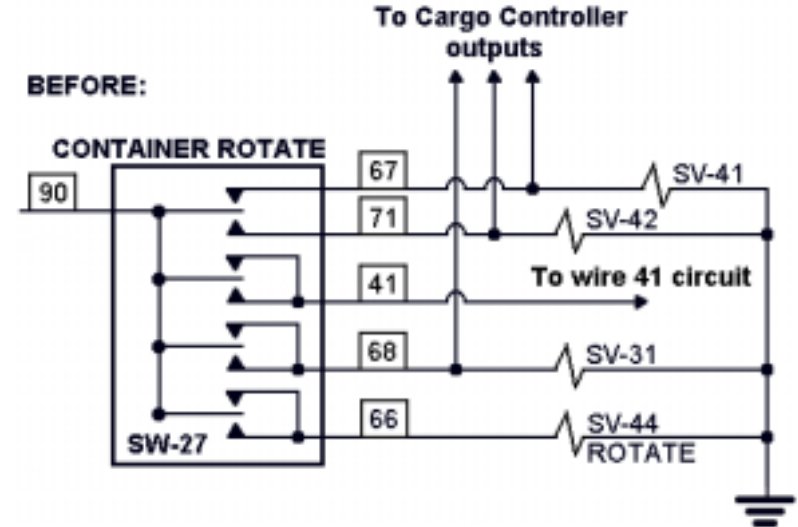


Figure 3

To upgrade the rotate circuit, do the following:

- 1) Disconnect the wire #68 circuit from SW-27. Using a butt-connector or end cap, connect all #68 wires by making a crimped connection.
- 2) Disconnect the wire #41 circuit from SW-27. Using a butt-connector or end cap, connect all #41 wires by making a crimped connection.
- 3) Disconnect the wire #71 circuit from SW-27 and note terminal position used on the switch. Using a butt-connector or end cap, connect all #71 wires by making a crimped connection.
- 4) Disconnect the wire #67 circuit from SW-27. Using a butt-connector or end cap, connect all #67 wires by making a crimped connection.