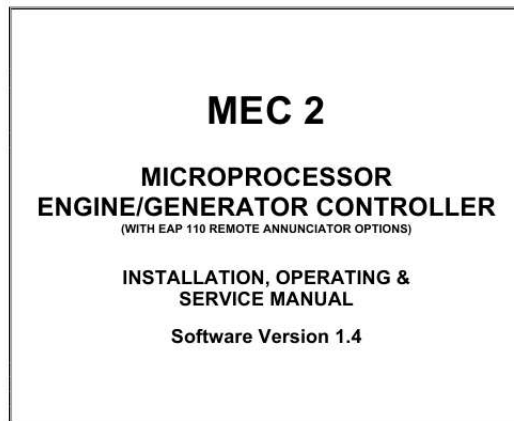




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You can read the recommendations in the user guide, the technical guide or the installation guide for THOMSON MEC 2. You'll find the answers to all your questions on the THOMSON MEC 2 in the user manual (information, specifications, safety advice, size, accessories, etc.). Detailed instructions for use are in the User's Guide.

**User manual THOMSON MEC 2**  
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**Operating instructions THOMSON MEC 2**  
**Instructions for use THOMSON MEC 2**  
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9087A - 198<sup>th</sup> Street, Langley, BC Canada V1M 3B1 • Telephone (604) 888-0110  
Telefax (604) 888-3381 • E-Mail: info@thomsontechnology.com • www.thomsontechnology.com



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15. SPECIFICATIONS CONNECTION DIAGRAM TROUBLE SHOOTING NOTES 80 81 82 85 PM056 Rev 6 05/10/15 5 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER 1. INTRODUCTION 1.1. PRODUCT REVISION HISTORY The following information provides an historical summary of changes made to this product since the original release.

Software Version 1.4 05/10/15 Added AC protection faults Under/Over Voltage, Under/Over Frequency and Over Current Revised Idle circuit operation with digital faults #1 & 2 1.31 03/03/04 Changed Oil Pressure Sender Manufacturer requiring revised pressure/resistance calibration data New Oil Pressure Sender Thomson p/n-003654, Manufacturer Datcon, p/n 102227. Discontinued Oil Pressure Sender Manufacturer- Isspro, p/n R9279C Thomson p/n-000772, Note: The oil pressure senders are not interchangeable with the software versions. 1.

3 02/09/09 Added Programmable Output Feature "EPS Supplying Load" Added Digital Input Feature "No-Load Test" Added New Digital Fault Names Basin Rupture ATS in Bypass Fuel Leak Vent Damper Fail High Fuel Level Low Fuel Press Bat Charger Fail Fail to Sync HighIntkManfTemp Added Independent Programming features for AMF Outputs Added references for EAP 110 Remote Annunciator Misc. Display & Menu changes PM056 Rev 6 05/10/15 1 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER 1.2 02/01/31 Key changes implemented as follows: Auto Mains Failure (AMF) logic with new timers, control outputs and display features Line to Neutral AC Voltage Display on 3 Phase 4 Wire Systems (neutral connection required) Analog Shutdown Capability from Oil Pressure and Temperature Senders Expanded oil pressure operation up to 150 PSI (was 100 PSI) Single Point Calibration for Oil Pressure/engine temperature sender inputs (simplified calibration, field calibration is now mandatory) 3 Additional Programmable Outputs #2, #3, #4 Enabled Programmable Output features now expanded to map to every available fault circuit Add new Programmable Output features Engine Ready & Engine Run (Fuel) Expansion Port Enabled for optional relay expansion board There were also minor changes that are reflected in the manual. Add "Ready to Load"; changes in temperature and pressure calibrations; extended temperature 1.1 01/07/24 1.0 01/01/31 Original version Operating & Service Manual Version Rev 6 05/10/15 Added AC protection faults Over/Under Voltage, Over/Under Frequency and Over Current for software version 1.4 Rev 5 03/03/04 Changed Oil pressure/resistance calibration data and new software version 1.31. Rev 4 02/09/09 Rev 3 02/01/31 Rev 2 01/07/25 Added descriptive information for new software version 1.3 Added descriptive information for new software version 1.

2 Addition of "Static Precaution"; deletion of calibration jumpers to requiring external calibration resistors/potentiometers; Ready status changes to "Ready to Load"; changes in temperature and pressure calibrations; extended temperature ratings. Rev 1 01/02/15 Rev 0 01/01/31 Minor corrections. Original release. PM056 Rev 6 05/10/15 2 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER Contact Thomson Technology, to obtain applicable instruction manuals. Soft copy of most current version is available at [www.thomsontechnology.com](http://www.thomsontechnology.com). 1.2. GENERAL DESCRIPTION The Thomson Technology MEC 2 Microprocessor-based Engine/Generator Controller utilizes the latest advancements in microprocessor design technology for the control and monitoring of engine-generator sets.

The MEC 2 provides a comprehensive array of operational, protection and display features for automatically controlling an engine/generator set. All standard and optional features of the MEC 2 are configurable from the front panel LCD display and are security password protected. The LCD display screen prompts are in plain English, providing a user-friendly operator interface with many display options available. The microprocessor design provides high accuracy for all voltage monitoring, current monitoring and timing functions as well as providing many standard features which were previously only available as expensive add-on optional features. The MEC 2 provides the following advanced features: . . . . . Up to 15 alarm/shutdown fault circuits utilizing analog and digital inputs.

Standard model meets or exceeds CSA C282, NFPA 110 Level 1 generator set control requirements. Backlit LCD display screen with alpha-numeric readout for display and programming. Digital 3-phase voltage, 3-phase current, KVA and frequency metering for generator output. Non-volatile memory retains logic and setpoints if control power is lost. Direct 3-phase voltage sensing inputs on generator supply from 120VAC up to 600VAC (nominal).

Security password-protected programming levels. Self diagnostic features continuously verify processing, I/O and memory circuits. Superior EMI/RFI noise immunity and surge performance features as per IEEE C62.41 requirements. Dual microprocessor design provides independent speed sensing circuitry for higher performance. PM056 Rev 6 05/10/15 3 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER This equipment contains static-sensitive parts. Please observe the following anti-static precautions at all times when handling this equipment. precautions may cause equipment failure and/or damage. · Discharge body static charge before handling the equipment (contact a grounded surface and maintain contact while handling the equipment, a grounded wrist strap can/should also be utilized). · Do not touch any components on the printed circuit board with your hands or any other conductive equipment.

· Do not place the equipment on or near materials such as Styrofoam, plastic and vinyl.

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Place the equipment on grounded surfaces and only use an anti-static bag for transporting the equipment. Failure to observe these 2. INSTALLATION 2.1. GENERAL INFORMATION NOTE: Installations should be done according to all applicable electrical regulation codes as required. The following installation guidelines are provided for general information only pertaining to typical site installations. For specific site installation information, consult Thomson Technology as required. Note: Factory installations of THOMSON TECHNOLOGY supplied control panels that have been tested and proven may deviate from these recommendations. CAUTION!!! All installation and/or service work performed must be done by qualified personnel only. Failure to do so may cause personal injury or death. 2.2. BATTERY SUPPLY INPUT The MEC 2 can operate on any battery supply from 10 to 30 volts DC. The battery DC negative or common conductor must be grounded to the main generator-set frame PM056 Rev 6 05/10/15 4 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER ground.

The MEC 2 is internally protected by a solid state type fuse that protects it from internal short circuits. The solid state fuse will automatically reset when the over current condition is removed. Wiring from the engine cranking battery to the control panel should conform to the following guidelines to avoid possible controller malfunction and/or damage. 2.2.

1. Avoid wiring from the engine starter terminals - wiring should go directly from the battery terminals to the engine control panel (to avoid voltage drop in the starter cables and starter motor commutator noise). Note: Unit mounted control panels with short wiring runs may utilize connections from the starter terminals provided that the specific application is tested satisfactorily. CAUTION!!! The battery charger must be turned off before battery cables are removed from the battery (i.e. for servicing). Failure to do so may subject the control panel to an over voltage condition in which damage may result. 2.2.2.

Wiring from battery to engine control panel should be two - #14 AWG (2.5mm<sup>2</sup>) wires (i.e. do not use the engine block as one of the common conductors). 2.2.3. Under noisy environments (i.e. gas engines with high voltage ignitions, etc.), wiring from battery should be a twisted pair of #14 AWG (2.5mm<sup>2</sup>) wires. 2.3. SPEED SENSING INPUT Field wiring of the speed sensing signal wires should conform to the following guidelines to avoid possible controller malfunction and/or damage: 2.

3.1. Wiring from magnetic pickup must utilize a 2 conductor shielded/twisted cable. The drain (shield) wire must be connected at the control panel end only. 2.

3.2. Magnetic pickup voltage at cranking speed must be greater than 3.0VAC. At nominal speed, magnetic pickup voltage should be between 3 and 5VAC. 2.3.3. A single dedicated magnetic pickup is recommended for connection to the speed sensing input terminals. Note: One common magnetic pickup may be utilized for the system provided specific test measurements are done with the equipment installed (i.e. mag pickup voltage levels meet the required levels). PM056 Rev 6 05/10/15 5 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER 2.4. DC VOLTAGE INPUTS All DC voltage inputs to the MEC 2 are optically isolated and filtered for protection from noise spikes and transients. Input wiring must be routed so that it is not near electrically "noisy" wiring such as ignition, starter wires or main AC power conductors. All contacts must be "dry" (i.e. non-powered) and one side must be connected to the common DC negative conductor. 2.

5. AC VOLTAGE INPUT The MEC 2 can accept direct AC voltage input from 120-600VAC (nominal). Note: Direct input voltage sensing can only be used when the generator utilizes a single phase 3 wire or 3 phase, 4 wire distribution system with a solidly grounded neutral conductor. For 3 phase 3 wire systems (i.e. no neutral) or high voltage systems, potential transformers must be used. Refer to FIGURES #1 - 4 for voltage sensing connections. To display generator line to neutral voltage in a 3 phase 4 wire system, the neutral must be connected as shown. PM056 Rev 6 05/10/15 6 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER MEC 2 A B C N MEC 2 L1 L2 N VA VB VC VN GRD GRD VA VB VC VN Connection VN GRD GRD VOLTAGE INPUTS 600VAC L-L, 347VAC L-N 380VAC L-L, 220VAC L-N 480VAC L-L, 277VAC L-N 208VAC L-L, 120VAC L-N A B C N GRD GEN. VOLTAGE INPUTS 240VAC L-L, 120VAC L-N Note: L1 and L2 phase voltages must be 120Vac when referenced to common nsistance of greater than 5. 0 ohms. 2.9.4. The remote start contact must be voltage free (i.e. dry contact). The use of a "powered" contact will damage the engine controller. 2.10.

MEC MOUNTING LOCATION/INSTALLATION The MEC 2 Engine-generator controller is designed for mounting directly onto a control panel door. Considerations should be given for the following: . . . The controller should be installed in a dirt free, dry location away from extreme heat sources. The LCD window should be installed at an optimum height for operator viewing. Adequate space should be provided around the rear of the MEC 2 circuit board for control wiring. Verify that the intended AC voltage input to the controller does not exceed the maximum allowable level on the control panel door as per the applicable control panel certification standard. PM056 Rev 6 05/10/15 9 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER The MEC 2 controller can be installed onto a door of a control panel using one of the following methods: . The first method requires a special door cutout for the LCD display and LED's as shown in FIGURE #6. This mounting method requires the lexan faceplate to be mounted directly onto the door of the control panel. The controller must be disassembled to mount on the door, then re-assembled. Refer to FIGURE #7 for correct assembly location of all parts. . The second method of controller mounting requires a factory supplied adapter faceplate as shown in FIGURE #8. This method only requires a single large rectangular hole to be cut out of the door as shown in FIGURE #9. 2.11. FACEPLATE MOUNTING DIMENSIONS 268 mm. 126 mm. C TOP 126 mm. 80 mm. 9 HOLES 6 mm. DIAMETER (1/4" DRILL) 75 mm. 7 mm. 16.5 mm. 33 mm. 41 mm. 75 mm. 32 mm. CUTOUT 166 mm. C 20 mm. 8 mm. 8 mm.

OUTLINE OF PRINTED CIRCUIT BOARD UNDER PANEL DOOR G:\ENGINEER\PRODUCTS\MEC20\_07.VSD 24 mm. 49 mm. 24 mm. 49 mm. 4 HOLES 4 mm. DIAMETER (3/16" DRILL) FIGURE #6 PM056 Rev 6 05/10/15 10 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER 2.12. MEC 2 ASSEMBLY - SIDE VIEW MEC 2 ASSEMBLY SIDE VIEW FRONT PANEL DOOR MEC 2 PCB MEC 2 REAR COVER REAR PEM STUD #8-32 x 1" #8-32 x 3/8" MACHINE SCREW # 8-32 INTERNAL TOOTH LOCK WASHER 1/2" NYLON SPACER (#8-32 CLEARANCE UNTHREADED) HIGH VOLTAGE MYLAR BARRIER (mounts on bottom right hand corner, as viewed from rear) 1.



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25" ALLUMINUM STANDOFF (HEX) #8-32 THREAD #8-32 INTERNAL TOOTH LOCK WASHER G:\ENGINEER\PRODUCTSMEC2MEC2\_09.VSD Rev. 0 00/12/11 FIGURE #7 Notes: 1. Ensure that all lockwashers are installed as shown above. 2. The high voltage mylar barrier (P/N TMW;10805;1) must be installed as shown when the MEC 2 is installed onto the door of a control panel.

3. When the MEC 2 is installed on a door without 1" PEM studs, 1" machine screws must be used. PM056 Rev 6 05/10/15 11 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER 11.5 in C TOP 9 HOLES 1/4" DIAMETER CUTOUT 7.5 in C 4 STUDS #8/32 1/4" 1/4" FIGURE #8: ADAPTER FACEPLATE 5.

5 in C 3.5 in 10.875 in C FIGURE #9: DOOR CUTOUT FOR ADAPTER FACEPLATE G:\ENGINEER\PRODUCTSMEC20\_11.VSD Rev. 1 00/07/13 2.13. DIELECTRIC TESTING Do not perform any high voltage dielectric testing on the control panel with the MEC 2 connected in the circuit as serious damage will occur to the controller. All AC control fuses connected to the MEC 2 must be removed if high voltage dielectric testing is performed on the control panel. PM056 Rev 6 05/10/15 12 Thomson Technology 6.875 in MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER 3.

*DESCRIPTION* The MEC 2 controller consists of three parts; a Lexan faceplate which is mounted externally on the enclosure door, a printed circuit board (PCB) which is mounted inside the enclosure door, and a rear cover for the PCB. 3.1. LEXAN FACEPLATE The Lexan faceplate is shown as in FIGURE #10.

The Lexan pushbuttons are connected to the main PCB via plug-in ribbon cable. The main features of the Lexan faceplate are described as follows with reference to FIGURE #10. 13 1 4 11 3 14 2 ALARM MICROPROCESSOR ENGINE CONTROLLER READY SPEED SIGNAL SILENCE EXIT MEC 2 12 5 8 9 SHUTDOWN LAMP TEST RESET ENTER DECREMENT INCREMENT 7 6 RUN OFF AUTO LOAD TEST EMERGENCY STOP 10 MEC2\_03.VSD Rev. 0 00/12/11 FIGURE #10 LCD viewing window. The LCD display is mounted on the main PCB that is visible through the lexan faceplate viewing window. EXIT pushbutton. The EXIT function is used to scroll backwards through the status menus or programming prompts to the previous item. The EXIT function is used to "exit" the programming menu by holding this button down for approximately 2 seconds while in the programming mode. DECREMENT pushbutton.

The DECREMENT function is used to change a programming value while in the programming mode.

When this pushbutton is PM056 Rev 6 05/10/15 13 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER held down, the displayed value will be "decremented" to a lower value as desired. Note: The longer the pushbutton is held down, the faster the value will be decremented.

INCREMENT pushbutton. The INCREMENT function is used to change a programming value while in the programming mode or to select a desired programming menu loop. When this pushbutton is held down, the displayed value will be "incremented" to a higher value as desired.

Note: The longer the pushbutton is held down, the faster the value will be incremented. ENTER pushbutton. The ENTER function is used to scroll forwards through the status menus or programming prompts to the next item. The ENTER function is used to "enter" a programming mode as well as accepting changed programming values. Note: In the programming mode, the longer the ENTER pushbutton is held down, the faster the next menu prompts will appear. RUN pushbutton and LED light viewing window. The RUN function is used to initiate a manual start signal to the engine-generator set. Refer to the operating instructions for detailed information. OFF pushbutton and LED light viewing window. The OFF function is used to initiate a stop signal to the engine-generator set.

Refer to the operating instructions for detailed information. AUTO pushbutton and LED light viewing window. The AUTO function is used to initiate automatic operation of the engine-generator set. Refer to the operating instructions for detailed information. LOAD TEST pushbutton and LED light viewing window. The LOAD TEST function is used to initiate load test of the engine-generator set when connected to an associated transfer switch. Refer to the operating instructions for detailed information. EMERGENCY STOP pushbutton and LED light viewing window. The EMERGENCY STOP function is used to initiate an emergency stop signal to the engine-generator set. Refer to the operating instructions for detailed information.

11 READY LED light viewing window. The READY LED illuminates when the engine-generator set is set for automatic operation and no shutdown or alarm faults have been activated. 12 SPEED SIGNAL LED light viewing window. The SPEED SIGNAL LED illuminates when the engines speed signal is detected (i.e.

the engine is turning over). 13 ALARM LED light viewing window. The ALARM LED illuminates (flashes) 14 Thomson Technology PM056 Rev 6 05/10/15 MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER when any pre-programmed alarm fault has been activated. 14 SHUTDOWN LED light viewing window. The SHUTDOWN LED illuminates (flashes) when any pre-programmed shutdown fault has been activated.

3.2. PRINTED CIRCUIT BOARD The printed circuit board (PCB) is shown in FIGURE #11. The PCB contains the following user interface items: MEC 2 CIRCUIT BOARD LAYOUT B+ B- GRD TB4 TB2 MP1 MP2 1 17 J6 R115 TB1 IN IC IB IA VN Expansion Port CONTRAST WATCHDOG REMOTE START CRANK RUN COM FAIL VC VB VA TB3 18 38 G:\ENGINEER\PRODUCTSMEC2MEC2\_02.VSD Rev.2 02/01/23 DRAWING SCALE (mm) = .6:1 FIGURE #11 PM056 Rev 6 05/10/15 15 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER 3.2.1. TERMINAL BLOCKS Four terminal blocks are located on the PCB as follows: TB1 AC Voltage and Current sensing terminal block (120-600VAC & 0-5AAC) WARNING!!! Voltage sensing circuits are capable of lethal voltages while energized.

Current transformer (CT) secondary circuits are capable of generating lethal voltages when open circuited with their primary circuit energized. Standard safety procedures should be followed and be performed by qualified personnel only. Failure to do so may cause personal injury and/or death. TB2 TB3 TB4 Speed sensing and digital contact input terminal block Output contacts and engine temperature/pressure input signal terminal block DC power input and ground connection terminal block 3.2.2. DIAGNOSTIC LED'S The MEC 2 controller provides five diagnostics LED lights that are mounted on the rear of the printed circuit board as per FIGURE #11. Their functions are described as follows: 3.2.2.

1. WATCHDOG This LED flashes on and off at irregular intervals which indicates that the microprocessor is functioning normally. 3.2.2.

2. REMOTE START This LED is illuminated whenever the MEC 2 has received a remote start signal.



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### 3.2.2.

3. CRANK This LED is illuminated whenever the MEC 2 is initiating an engine cranking signal. 3.2.2.4. RUN This LED is illuminated whenever the MEC 2 has called the engine to run. 3.2.2.

5. COMMON FAIL This LED is illuminated whenever the MEC 2 has initiated a common fail signal (i.e. whenever an alarm or shutdown fault has been activated). PM056 Rev 6 05/10/15 16 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER Note: All LED's will be illuminated whenever a lamp test function is performed. 3.2.3. CONTRAST ADJUSTMENT (R115) A contrast adjustment potentiometer is located on the rear of the PCB and is factory set for ambient temperatures of 15° to 30° Celsius. For different ambient temperatures, consult the factory for adjustment procedures.

4. FAULT CIRCUIT DESCRIPTIONS The MEC 2 engine-generator controller utilizes many analog and digital inputs to perform both monitoring and control functions. Three types of fault circuits are used to monitor and control the engine-generator set. The first type is Internal Fault Circuits that are derived from a combination of digital and analog inputs. The second type is Digital Input Fault circuits that are initiated from external contact inputs.

The third type is Analog Input Fault circuits that are initiated from external analog signal inputs. The following functional block diagram (FIGURE #12) shows how all input/output fault circuits are organized. PM056 Rev 6 05/10/15 17 Thomson Technology MEC 2 MICROPROCESSOR

ENGINE/GENERATOR CONTROLLER 4.1. MAGNETIC PICKUP MEC 2 FUNCTIONAL BLOCK DIAGRAM FEATURE STANDARD FAULTS OVERSPEED SHUTDOWN RPM DISPLAY FAULT LOGIC LOSS OF SPEED ALARM/SHUTDOWN OVERCRANK SHUTDOWN AUTO PUSHBUTTON LOGIC SWITCH NOT IN AUTO ALARM LOW ENGINE TEMP.

ALARM TEMP. DISPLAY FAULT LOGIC HIGH ENGINE TEMP. ALARM HIGH ENGINE TEMP. SHUTDOWN CRANK 10A, 240Vac, 8A/24Vdc RESISTIVE RUN 10A, 240Vac, 8A/24Vdc RESISTIVE OUTPUT CONTACTS ENGINE TEMPERATURE SENDER ENGINE OIL PRESSURE SENDER PRESS. DISPLAY FAULT LOGIC LOW OIL PRESSURE ALARM LOW OIL PRESSURE SHUTDOWN LOW BATTERY VOLTAGE ALARM 2 PROGRAMMABLE CONTACT #1 10A, 240Vac, 8A/24Vdc RESISTIVE + BATTERY VOLTAGE DC VOLT DISPLAY FAULT LOGIC HIGH BATTERY VOLTAGE ALARM WEAK BATTERY ALARM V 3 PHASE AC VOLTAGE AC VOLT/ FREQ. DISPLAY UNDERVOLTAGE SHUTDOWN UNDERFREQUENCY SHUTDOWN 2 PROGRAMMABLE CONTACT #2 10A, 240Vac, 8A/24Vdc RESISTIVE 3 PHASE AC CURRENT AC CURRENT DISPLAY 2 PROGRAMMABLE CONTACT #3 10A, 240Vac, 8A/24Vdc RESISTIVE DIGITAL INPUT CONTACTS (N/O or N/C) 1 2 3 4 FAULT LOGIC 1 NOTES: 1 DIGITAL FAULT LABEL LIST EACH POINT PROGRAMMABLE PROGRAMMABLE FUNCTION LIST LOW OIL PRESSURE SHUTDOWN HIGH ENGINE TEMP. SHUTDOWN LOW COOLANT LEVEL SHUTDOWN LOW FUEL LEVEL ALARM 2 PROGRAMMABLE CONTACT #4 10A, 240Vac, 8A/24Vdc RESISTIVE 2 E. STOP N/O EMERGENCY STOP G:\ENGINEER\PRODUCTS\MEC2\_05.VSD Rev. 4 02/01/23 FIGURE #12 18 PM056 Rev 6 05/10/15 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER 4.

2. INTERNAL FAULT CIRCUITS The MEC 2 Engine Controller provides four internally activated fault circuits as described below. All internal fault circuits are provided as standard with every MEC 2 controller. 4.2.1. OVER CRANK The over crank fault circuit is initiated when the engine fails to start after the selected crank time or number of crank cycles. The over crank fault circuit is internally programmed as a latching shutdown fault and is not user programmable. Refer to the programming instructions for further information. 4.

2.2. OVER SPEED The over speed fault circuit is initiated when the engine's speed has increased above the over speed setpoint. The over speed fault circuit is internally programmed as a latching shutdown fault. The over speed shutdown fault circuit is programmable for the percentage of nominal engine speed (i.e. over speed setpoint) and for the transient time delay period. The programming prompts for over speed are located in the main menu programming loop. programming instructions for further information. Refer to the 4.

2.3. LOSS OF SPEED The loss of speed fault circuit is initiated when the engine's speed sensing circuit does not detect a speed signal for a period more than 2 seconds following a run signal. The loss of speed fault may be user programmed as a latching shutdown fault or alarm only. The programming prompts for loss of speed are located in the main menu programming loop. Refer to the programming instructions for further information. 4.2.4. SWITCH NOT IN AUTO The "Switch Not In Auto" fault circuit is initiated when the controller's operating mode switch is changed from the auto position to any other position via the front mounted keypad.

This fault is internally programmed as a non latching alarm. In the main programming loop, this alarm may be user programmed to initiate the common fail output relay. PM056 Rev 6 05/10/15 19 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER 4.3. DIGITAL FAULT

INPUT CIRCUITS The MEC 2 Engine Controller provides four digital fault input circuits that are user programmable. Each digital fault input circuit is activated via a remote sensing contact that is external to the controller. Each digital fault input circuit may be programmed with a unique fault label description as stored in the controller's non-volatile memory. The following digital fault labels are provided in each MEC 2 Engine Controller: AIR DAMPER TRIPPED BAT CHARGER INPUT FAIL BAT CHRG TROUBLE BREAKER TRIPPED DC FAIL FAILED TO SYNC GEN BREAKER OPEN GROUND FAULT HIGH BEARING TEMP HIGH COOLER VIBRATION HIGH ENGINE TEMP HIGH ENGINE VIBRATION HIGH FUEL LEVEL NO LOAD TEST \*HIGHINTKMANFTEMP VENT DAMPER FAIL HIGH FUEL LEVEL FAIL TO SYNC "Blank" (i.e. no text for unused inputs) HIGH OIL LEVEL HIGH OIL TEMP HIGH WINDING TEMP LOW COOLANT LEVEL LOW ENGINE TEMP LOW FUEL PRESS LOW FUEL LEVEL LOW OIL LEVEL LOW OIL PRESSURE REMOTE EMERG.

STOP REVERSE POWER BASIN RUPTURE ATS IN BYPASS FUEL LEAK LOW FUEL PRESS BAT CHARGER FAIL 4.3.1. STANDARD DIGITAL FAULT CIRCUITS The MEC 2 is supplied from the factory with four standard digital fault circuits as follows: PM056 Rev 6 05/10/15 20 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER FAULT NAME Low Oil Pressure High Engine Temperature Battery Charger Input Fail Low Fuel Level FAULT ACTION Shutdown Shutdown Alarm Alarm INPUT TERMINAL # 1 2 3 4 All faults require a customer connected contact to the MEC 2 input terminal as indicated. All fault circuits may be user field programmed for different control functions or alternate fault names.

Note: Shutdown functions for Low Oil Pressure and High Engine Temperature may alternatively be provided via analog pressure and temperature sender inputs if programmed accordingly in the analog fault programming menu. Section 9.4 for further information.



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Refer to 4.4.

**ANALOG FAULT INPUT CIRCUITS** The MEC 2 Engine Controller provides up to eight analog fault input circuits that are user programmable. Each analog fault input circuit is activated via specific analog signal type. **WARNING!!!** The analog protection circuits for voltage, frequency, current, engine oil pressure, engine temperature and engine speed will be set at factory default settings only. Final settings will be required to be set by the commissioning authority. Failure to do so may result in severe equipment failure or damage.

4.4.1. **ANALOG FAULT CIRCUITS** The MEC 2 is supplied from the factory with fifteen standard analog fault circuits as follows: PM056 Rev 6 05/10/15 21 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER  
FAULT NAME Over voltage Over frequency Over current Under voltage Under frequency Weak battery Low battery voltage High battery voltage Low engine temperature High engine temperature #1 High engine temperature #2 Low oil pressure #1 Low oil pressure #2 Over speed Loss of speed signal  
FAULT ACTION Shutdown Alarm Alarm Shutdown Shutdown Alarm Alarm Alarm Alarm Shutdown Alarm Shutdown Shutdown Shutdown  
INPUT SIGNAL Generator voltage Generator frequency Generator current AC Voltage AC Frequency Battery voltage Battery voltage Battery voltage Engine temperature Engine temperature Engine temperature Oil pressure Oil pressure Engine speed Engine speed Refer to the All fault circuits may be user field programmed for different control functions however their designated fault function is not programmable. programming instructions for further information.

4.4.2. **GENERATOR AC VOLTAGE** 4.4.2.1. **GENERATOR UNDER VOLTAGE** The MEC 2 controller provides a 3-phase under voltage sensor for the generator supply. The under voltage sensor is programmable for type of fault action (i.e. alarm or shutdown), pickup and dropout voltage setpoints (i.e. adjustable hysteresis) and transient time delay settings. Refer to the programming instructions for further information. 4.

4.4.2.2. **GENERATOR OVER VOLTAGE** The MEC 2 controller provides a 3-phase over voltage sensor for the generator supply. The over voltage sensor is programmable for type of fault action (i.e. alarm or shutdown), pickup and dropout voltage setpoints PM056 Rev 6 05/10/15 22 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER (i.e. adjustable hysteresis) and transient time delay settings. Refer to the programming instructions for further information. 4.4.2.3. **GENERATOR UNDER FREQUENCY** The MEC 2 controller provides an under frequency sensor for the generator supply.

The under frequency sensor is programmable for type of fault action (i.e. alarm or shutdown), frequency setpoint, and transient time delay settings. Refer to the programming instructions for further information. 4.4.2.4. **GENERATOR OVER FREQUENCY** The MEC 2 controller provides an over frequency sensor for the generator supply. The over frequency sensor is programmable for type of fault action (i.e. alarm or shutdown), frequency setpoint, and transient time delay settings. Refer to the programming instructions for further information. 4.4.

2.5. **GENERATOR OVER CURRENT** The MEC 2 controller provides a 3-phase current sensor for the generator supply. The current sensor is programmable for type of fault action (i.e. alarm or shutdown), pickup current setpoint, and transient time delay settings. Refer to the programming instructions for further information. 4.4.3.

**BATTERY VOLTAGE ANALOG INPUT** The MEC 2 battery voltage sensor measures DC voltage on terminals B+ and B- that are connected to the engines cranking battery. The battery voltage sensor provides information to perform the following control functions: 4.4.3.1.

**WEAK BATTERY ALARM** The weak battery alarm fault circuit is activated when the battery voltage drops below a pre-determined setpoint for a specified time delay. The weak battery alarm will detect a low capacity (i.e. "weak") battery condition during the cranking cycle. The weak battery alarm is programmed for a lower battery voltage setpoint and shorter time delay than the low battery alarm function. The weak battery alarm fault is programmable for voltage setpoint level, transient time delay settings and PM056 Rev 6 05/10/15 23 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER other functions. information. Refer to the programming instructions for further 4.4.3.

2. **LOW BATTERY VOLTAGE ALARM** The low battery voltage alarm fault circuit is activated when the battery voltage drops below a pre-determined setpoint for a specified time delay. The low battery voltage alarm fault is programmable for the voltage setpoint level, transient time delay settings and other functions. Refer to the programming instructions for further information. 4.

4.3.3. **HIGH BATTERY VOLTAGE ALARM** The high battery voltage alarm fault circuit is activated when the battery voltage rises above a pre-determined setpoint for a specified time delay. The high battery voltage alarm fault is programmable for voltage setpoint level, transient time delay settings and other functions.

programming instructions for further information. Refer to the 4.4.4. **ENGINE TEMPERATURE ANALOG INPUT** The MEC 2 engine temperature sensor measures a DC analog signal from an engine mounted sender. The MEC 2 software provides calibration for engine temperature to coordinate with the engine mounted sender and control logic to detect a wiring or sender failure (i.e. open or shorted signal). In case of a sender or wiring failure, the MEC 2 will display zero or 9999 °C and will initiate an alarm signal as programmed by the user. provides the following control functions: 4.

4.4.1. **LOW ENGINE TEMPERATURE ALARM** The low engine temperature alarm fault circuit is activated when the engine temperature drops below a pre-determined setpoint for a specified time delay. The low engine temperature alarm fault is programmable for temperature setpoint level, transient time delay settings and other functions. Refer to the programming instructions for further information. 4.4.4.2.

**HIGH ENGINE TEMPERATURE #1 ALARM** The high engine temperature alarm fault circuit is activated when the engine temperature rises above a pre-determined setpoint for a specified time delay. The high engine temperature alarm fault is programmable for The engine temperature analog input PM056 Rev 6 05/10/15 24 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER the level of temperature setpoint, transient time delay settings and other functions. Refer to the programming instructions for further information. 4.4.

4.3. **HIGH ENGINE TEMPERATURE #2 SHUTDOWN** The high engine temperature shutdown fault circuit is activated when the engine temperature rises above a pre-determined setpoint for a specified time delay. The high engine temperature shutdown fault is programmable for the level of temperature setpoint, transient time delay settings and other functions. information.

Note: High Engine Temperature shutdown may alternately be programmed and wired as a digital fault input contact.



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Refer to Section 9.5 for further details. Refer to the programming instructions for further 4.4.5. ENGINE OIL PRESSURE ANALOG INPUT The MEC 2 engine oil pressure sensor measures a DC analog signal from an engine mounted sender. The MEC 2 software provides calibration for oil pressure to coordinate with the engine mounted sender and control logic to detect a wiring or sender failure (i.e. open or shorted signal).

In case of a sender or wiring failure, the MEC 2 will display zero or 9999 PSI and will initiate an alarm and/or shutdown signal as programmed by the user.

The engine oil pressure analog input provides the following control function: 4.4.5.1. LOW OIL PRESSURE #1 ALARM The low oil pressure alarm fault circuit is activated when the oil pressure drops below a pre-determined setpoint for a specified time delay. The low oil pressure alarm fault is programmable for pressure setpoint level, transient time delay settings and other functions. programming instructions for further information. 4.4.

5.2. LOW OIL PRESSURE #2 SHUTDOWN The low oil pressure shutdown fault circuit is activated when the oil pressure drops below a pre-determined setpoint for a specified time delay. The low oil pressure shutdown fault is programmable for pressure setpoint level, transient time delay settings and other functions. Refer to the programming instructions for further information.

Refer to the PM056 Rev 6 05/10/15 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER Note: Low Oil Pressure shutdown may alternately be programmed and wired as a digital fault input contact. details. Refer to Section 9.5 for further 4.4.

6. ENGINE SPEED ANALOG INPUT The MEC 2 engine speed sensor measures AC voltage and frequency from an engine mounted magnetic pick-up. The engine speed sensor provides information to perform the following control functions: Over speed shutdown Crank Disconnect control Loss of speed signal detection Starter Re-engage control RPM display Refer to the programming instructions for further information. 5. CONTROL OUTPUT CONTACT

DESCRIPTIONS All output contacts from the MEC 2 Engine Controller are non-powered (i.e. dry contacts) and are rated 10A/240VAC, 8A/28Vdc resistive (3A inductive, 0.4pf). Output contacts are not fused therefore external over current protection (maximum 10A) is required for all control circuits using these contacts. Contacts indicated on schematic drawings and connection diagrams are shown in a de-energized state and will change state upon activation of the specific control function.

5.1. RUN, CRANK OUTPUT CONTACTS The MEC 2 Controller provides two dedicated output contacts for basic control and alarm circuits as described below: 5.1.1. RUN OUTPUT The Run output contact is a Form A dry contact and is used to control the engines "run" circuit. This typically includes external control devices such as "fuel rack solenoids" or electronic governors. Note: An additional pilot relay will be required to energize high current devices that exceed the 10A resistive rating. The run output control logic provides an "energize to run signal" (i.e.

the run contact closes when a run condition is activated). Note: For energize to stop control logic, refer to the programmable output control function. PM056 Rev 6 05/10/15 26 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER 5.1.2.

CRANK OUTPUT The crank output contact is a Form A dry contact and is used to control an external crank pilot relay that directly controls the engine starter motor. Note: An external crank pilot relay is required to energize the high current starter motor pinion solenoid that exceeds the 10A resistive crank output contact rating. The crank output contact closes when a crank condition is activated and the contact will automatically open when crank disconnect speed is obtained and/or the generators output AC voltage exceeds 10% of nominal level. The generators output AC voltage is utilized for back-up crank disconnect protection should the speed sensor fail. 5.

2. PROGRAMMABLE OUTPUT CONTACT The MEC 2 Controller provides four (4) standard programmable output contacts. Each programmable output is a Form C dry contact that is programmable for many different control functions. The programmable output may be user field programmed for the desired control function. The following programmable features are provided: AIR FLAP OIL BYPASS TIMER COMPLETE COMMON FAIL SWITCH NOT IN AUTO ENGINE READY ENGINE RUN (FUEL) PREHEAT ENGINE RUNNING ATS TEST COMMON ALARM COMMON SHUTDOWN EPS SUPPLYING LOAD OVER CURRENT UNDER VOLTAGE UTILITY READY TO LOAD DIGITAL FAULTS #1 #4 OVER SPEED LOSS OF SPEED SIGNAL LOW BAT VOLTAGE HIGH BAT VOLTAGE WEAK BAT VOLTAGE LOW OIL PRESS #1 ALARM LOW OIL PRESS #2 SHUTDOWN HIGH ENG TEMP #1 ALARM HIGH ENG TEMP #2 SHUTDOWN OVER VOLTAGE OVER FREQUENCY UNDER FREQUENCY 5.2.1. ENERGIZE TO STOP The designated programmable output relay will energize when a stop signal has been activated. The output will remain energized for 10 seconds once the engine has come to a complete stop, then de-energizes. 27 PM056 Rev 6 05/10/15 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER 5.

2.2. SWITCH NOT IN AUTO The designated programmable output relay will energize when the controller's operation mode switch is not in the auto position.

5.2.3. ENGINE READY The designated programmable output relay will energize when the engine controller's mode switch is in the auto mode and no shutdown or alarm conditions are present. 5.2.4.

PREHEAT The designated programmable output relay will energize during the start delay timer period and cranking period until the engine starts and reaches crank disconnect speed. The preheat output is typically used for an engine starting aid such as glow plugs. Note: An external pilot relay is required to switch the high current glow plug load. 5.2.

5. GEN READY TO LOAD The designated programmable output relay will energize when the generators voltage and frequency exceeds predetermined setpoints (e.g. voltage 90% nominal, frequency 95% nominal as user programmed) and a warmup time delay period expires. Once the output has energized, it will remain latched on irrespective of voltage/frequency levels until the controller either has a stop/shutdown signal, or the engine's speed drops below crank disconnect level.

The voltage, frequency and time delay levels are programmable. Refer to Section 9 for PROGRAMMING. The Generator Ready To Load output is typically used in an Auto Mains Failure (AMF) application. operation. Refer to Section 8.3.5 for further details on sequence of 5.2.6. UTILITY READY TO LOAD The designated programmable output relay will energize when the remote start input has not been activated (i.

e. contact on terminals 16 & 17 is not closed) and the Return Delay & Neutral Delays have expired (if programmed). The output will de-energize when the remote start input has been activated and the Engine Start Delay & Warmup Delays have expired (if programmed).



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This output is typically PM056 Rev 6 05/10/15 28 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER used for Auto Mains Failure (AMF) applications. Refer to Section 8.3.5 for further details on the sequence of operation. 5.2.7.

**ENGINE RUNNING** The designated programmable output relay will energize when the engine has started and has reached crank disconnect speed. 5.2.8.

**ENGINE RUN (FUEL)** The designated programmable output relay will energize when the engine "RUN" (i.

e. FUEL) energizes prior to the engine starting. The output will remain on until the engine has reached a "stop" or "shutdown" command. 5.2.

**9. AIRFLAP** The designated programmable output relay will energize when the engine's speed exceeds the over speed setpoint level. The output will remain energized until the engine's speed drops below the low speed setpoint (typically 5% of rated speed). Note: An external pilot relay will be required if the main air flap solenoid current rating exceeds the MEC 2 contact rating. (Refer to Section 2.7) 5.2.10.ATS TEST NOTE: This control feature is only operative if a remote transfer switch is interconnected with remote testing capability. The designated programmable output relay will energize when a load test operating mode is selected via the front keypad pushbutton.

Once initiated, the engine will receive a start signal from the transfer switch and upon the generator reaching nominal voltage and frequency levels, a load transfer will be initiated. The generator set will remain running on load until a different operating mode is selected or the generator set develops an alarm or shutdown condition. Notes: 1) The MEC 2's standard programmable output contact is factory supplied with the ATS LOADTEST function programmed. When the "Utility Ready to Load" and "Generator Ready to Load" outputs are programmed, the "Load Test" PM056 Rev 6 05/10/15 29 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER programmable output is not required as the engine starting logic is internally initiated. 2) When both "Utility Ready to Load" and "Generator Ready to Load" programmable outputs are programmed and utilized in a AMF control configuration, the ATS Output is not utilized (i.e. engine start signal is internally generated). 5.2.11.

**OIL BYPASS TIMER COMPLETE** The designated programmable output relay will energize upon the expiry of the controller's oil bypass delay timer function, following a normal start sequence. 5.2.12.COMMON ALARM The designated programmable output relay will energize when any alarm fault circuit has been activated.

5.2.13.COMMON FAIL The designated programmable output relay will energize when any alarm or shutdown fault circuit has been activated. 5.

2.14.COMMON SHUTDOWN The designated programmable output relay will energize when any shutdown fault circuit has been activated. 5.2.15.EPS

**SUPPLYING LOAD** The designated programmable output relay will energize when the engine is running and the generator is supplying current to the load more than or equal to 10% of nominal CT ratio. 6. **EXPANSION OUTPUT MODULE OPTION** Optional expansion output modules are available for the MEC 2 engine generator controller. Each module can provide 16 individual fault output contacts for remote alarming or control purposes.

The expansion modules are interconnected to the MEC 2 controller via RS422 communication link utilizing 8 conductor shielded cable with plug-in RJ45 connectors. Refer to FIGURE #13 for the expansion output module connection diagram. PM056 Rev 6 05/10/15 30 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER TO ADDITIONAL EXPANSION TO MEC 2 J6 UNIT 1A 12-24VDC POWER INPUT B+ B+ J1 RJ45 IN J2 RJ45 OUT R E LAY ID C 282/N FPA S TAN D ARD FAULTS (J17 OFF) 1 2 3 EMERGENCY STOP OVERCRANK OVERSPEED LOSS OF SPEED SIGNAL W EAK BATTERY LOW BATTERY VOLTAGE HIGH BATTERY VOLTAGE LOW ENGINE TEMPERATURE HIGH ENGINE TEMPERATURE ALARM LOW OIL PRESSURE ALARM DIGITAL FAULT #1 DIGITAL FAULT #2 DIGITAL FAULT #3 DIGITAL FAULT #4 SW ITCH NOT IN AUTO PROGRAMMABLE OUTPUT #5 AD D ITIO N AL FAULTS (J17 ON ) B- B- GRD 5 4 5 GRD 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 K8 4 3 3 17 K1 3 3 6 7 K9 18 19 8 9 10 K2 3 3 K10 20 21 11 12 13 K3 3 3 K11 22 23 14 15 16 K4 3 3 K12 24 25 1 2 3 27 4 5 6 7 8 30 31 9 10 11 32 12 13 K5 3 3 UNDER VOLTAGE OVER VOLTAGE UNDER FREQUENCY OVER FREQUENCY OVER CURRENT HIGH ENGINE TEMP 2 SHUTDOWN LOW OIL PRESSURE 2 SHUTDOWN K13 26 K6 3 3 K14 28 29 K7 3 3 K15 K16 4 2 J17 14 15 16 PROGRAMMABLE OUTPUT #6 N O T E S : 1 2 3 ALL CONTACTS RATED MAXIMUM 0.5A, 120VAC/1.0A, 30Vdc RESISTIVE PROGRAMMABLE MODULE ADDRESS (REMOVE JUMPER FOR STANDARD C282/NFPA FAULTS,ADD JUMPER FOR ADDITIONAL FAULTS) CONTACT LOGIC IS INDIVIDUALLY PROGRAMMABLE VIA PIN JUMPERS (CONTACT TO OPEN OR CLOSE W HEN FAULT ACTIVATED) PROGRAMMABLE CONTACT - USER CONFIGURED FUNCTION VIA MEC 2 SOFTWARE (REFER TO MEC 2 LITERATURE) "GRD" CONNECTION TO BE MADE TO COMMON CHASSIS/ENCLOSURE GROUND BOND SYSTEM C282 OR NFPA 110 STANDARD FAULTS EXCLUDE ANALOG FAULTS OVER/UNDER VOLTAGE, OVER/UNDER FREQUENCY, OVER CURRENT, AND PROGRAMMABLE OUTPUT #6 (I.E. MUST SPECIFY SECOND EXPANSION MODULE TO OBTAIN CONTACTS FOR THESE FAULTS). G:\ENGINEER\PRODUCTS\MEC 2\MEC2\_14.VSD 4 5 6 FIGURE #13: EXPANSION OUTPUT MODULE CONNECTION DIAGRAM PM056 Rev 6 05/10/15 31 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER The expansion module outputs are relay contacts that may be individually configured for normally open or normally closed contact position. Contact configuration is via circuit board mounted jumper pins and clips.

Refer to FIGURE #18 for jumper pin location and configuration settings. Each output contact is rated maximum 0.5A 120VAC, 1.0A 30Vdc resistive. Each expansion module also provides one programmable contact for desired control function.

Refer to Section 9.2 of this manual for programming functions and procedures for the programmable contact feature. Note: The communication cable between the MEC 2 and the expansion module must be ordered separately. JMP 1-10, 16 JMP FOR NORMALLY OPEN CONTACT JMP FOR NORMALLY CLOSED CONTACT TB1 B+ B- GRD 1 K2 K3 K4 K5 K6 K7 K8 K9 K10 20 K1 JMP1 JMP2 JMP3 JMP4 JMP5 JMP6 JMP7 JMP8 JMP9 JMP10 JMP11 K11 K12 K13 K14 K15 K16 21 JMP12 JMP13 JMP14 JMP15 JMP16 32 J1 RJ45 (IN) J2 RJ45 (OUT) DIAGNOSTIC LED'S JMP 17 OFF - STANDARD C282/NFPA FAULTS G:\ENGINEER\PRODUCTS\MEC2\MEC2\_12.VSD FIGURE #14: MEC 2 EXPANSION OUTPUT MODULE PRINTED CIRCUIT BOARD LAYOUT PM056 Rev 6 05/10/15 32 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER Diagnostic LED's are provided on each expansion module as shown in FIGURE #13.



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Their functions are described as follows: WATCHDOG - This LED flashes on and off at a very high rate which indicates that the expansion module microprocessor is functioning normally. MESSAGE - This LED flashes on and off at irregular intervals which indicates that the expansion module is correctly receiving all data messages from the MEC 2. Two expansion modules may be connected to a single MEC 2 controller to provide additional output contacts. Two modules are interconnected together using a single communication cable to the MEC 2 controller. Refer to FIGURE #15 for interconnection details. The first expansion module addresses standard C282/NFPA110 MEC 2 fault circuits and the second expansion module addresses all additional fault circuits. To select which faults are addressed by each expansion module, jumper pins and clips are provided on the circuit boards. Refer to FIGURE #16 for jumper pin location and configuration settings. Expansion Module #1 (C 282/N F PA Stand ar d F ault C irc uits) Expansion Module #2 (Additional Fault C irc uits) 8 conductor Shielded Cable c/w RJ45 connectors J6 GRD GRD J7 J17 on J17 off GRD MEC 20 Engine Controller 300M (~1000') maximum cable length 1 To remote communication system (optional) C282 or NFPA 110 standard faults exclude analog faults Over/Under voltage, Over/Under Frequency, Overcurrent, spare digital inputs #5-#12 and programmable output #6 (i.e.

must specify second expansion module to obtain contacts for these faults). G:\ENGINEER\PRODUCTS\MEC20\MEC20\_17.VSD FIGURE #15 MEC 2 EXPANSION MODULE INTERCONNECTION DIAGRAM PM056 Rev 6 05/10/15 33 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER 7. EAP 110 REMOTE ANNUNCIATOR OPTION Optional EAP 110 remote annunciators are available for the MEC 2 engine generator controller. One annunciator is required for the standard NFPA 110 faults and a second annunciator is required for additional faults on the controller if required. The standard features of the EAP 110 meet and exceed all requirements of NFPA 110, NFPA 99 & CSA 282-00 building code standards for Emergency Standby Generator systems. The design uses an 8 conductor RS 422 communication data link to provide the control & monitoring signals between the engine controller and remote annunciator. Up to 20 individual fault conditions are remotely monitored utilizing both visual LED lights & audible alarm annunciation. The EAP 110 is DC powered from the same 12 or 24V engine starting battery as the engine controller is connected to. Two EAP 110 annunciators can be interconnected together via the communication link to allow up to 40 remote annunciator points from a single engine controller. For complete information on the EAP 110 contact Thomson Technology to obtain the specific product documentation available. Refer to FIGURE #16 for the EAP 110 remote annunciator connection diagram. EAP 110 Annunciator Ext 1 Ext 2 Ext 3 Ext 4 J1 GRD J6 Communication Cable\*\* Expansion Port No Connection Com Port MEC 2/20 Engine Controller J7 B+ B- B+ B- 1000' maximum cable length External Alarm Sensing contacts (optional use as required) + 12-24V Engine Cranking Battery suitably routed to protect it from sources of electrical interference. Refer to instruction manual for further information. FIGURE #16 : EAP 110 REMOTE ANNUNCIATOR CONNECTION DIAGRAM PM056 Rev 6 05/10/15 34 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER 8.

OPERATING INSTRUCTIONS 8.1. MEC 2 POWER-UP OPERATION SEQUENCE When the MEC 2 is first energized with DC supply voltage at terminals B+ & B-, the controller will power-up into a fail-safe mode, preventing possible engine operation. The controller will default to an Emergency Stop failure mode and must be manually reset before the controller is put into normal operation. pushbuttons simultaneously. To reset the Emergency Stop condition, press the OFF pushbutton first, then press both INCREMENT and ENTER The controller will then reset, provided a remote emergency stop condition is not activated. The Utility Ready to Load programmable output will energize if the remote start contact is open. 8.2. MEC 2 DISPLAY MENUS The MEC 2 contains a Liquid Crystal Display (LCD) which is visible through the front lexan faceplate viewing window. The LCD has pre-programmed display screens and menus that may be selected by pressing the ENTER or EXIT pushbuttons in succession until the desired screen or menu is displayed. The display screen types and order in which they are programmed are as follows: PM056 Rev 6 05/10/15 35 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER OPERATING STATUS TIMER COUNTDOWN FAULT DISPLAY GENERATOR METERING (Average) GENERATOR PHASE VOLTAGES GENERATOR LINE TO NEUTRAL VOLTAGES GENERATOR PHASE CURRENTS GENERATOR KVA GENERATOR FREQUENCY/HOURMETER BATTERY VOLTAGE/ENGINE SPEED (TACH) ENGINE TEMPERATURE/OIL PRESSURE PROGRAM MENU FAULT DISPLAY (Multiple Faults) 8.2.1. OPERATING STATUS MENU The operating status menu provides the operator with detailed information as to the status of the engine-generator set.

NOTE: The operating status screen may be momentarily replaced with a time delay countdown screen when a start or stop sequence is initiated. The display will automatically return to the previous menu following expiry of the timing sequence. PM056 Rev 6 05/10/15 36 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER The operating status sub-menus are organized as follows: OPERATING STATUS UNIT READY SWITCH IN OFF UNIT RUNNING UNIT SHUTDOWN UNIT ALARM 8.2.1.1. UNIT READY This indicates that the controller is in "Auto" position and there are no active shutdowns or alarms. 8.2.1. 2. SWITCH IN OFF This indicates that the controller has been selected to the "off" position from the front panel keypad pushbutton. 8.2.1. 3. UNIT RUNNING This indicates that the engine is running and all conditions are normal. 8.2.1. 4. UNIT SHUTDOWN This indicates that a shutdown fault circuit is active. The specific fault condition will be automatically displayed. 8.2.1.5. UNIT ALARM This indicates that one or more alarm fault circuits are active. The display will automatically scroll through all active faults at a rate of every two seconds. 8. 2.2. FAULT DISPLAY MENU The fault display menu is automatically displayed when either an alarm or shutdown circuit is activated. The specific alarm or shutdown fault label will be displayed and if multiple alarm conditions are present, the display will automatically scroll through all active faults. 8.2.3. TIMER COUNTDOWN MENUS Timer countdown menus are automatically displayed when a specific time delay function occurs during a control sequence. When a time delay begins, the LCD display will indicate the time delay function name (i.e. ENGINE START DELAY) 37 PM056 Rev 6 05/10/15 Thomson Technology MEC 2 MICROPROCESSOR ENGINE/GENERATOR CONTROLLER and the current time remaining in the countdown sequence.



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