

# **MEI633**

# **Training Manual**

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## **Revision History**

<b>Section</b>	<b>Description of change</b>
Section 6.6, 6.8	Front facia LED's description modified.
Section 7.1.4, 7.3.4	Counter Box details added.
Section 13.2	Vital Processor Troubleshooting Information modified

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## 1 Scope of the document

This document intends to provide preliminary training about MEI633 Electronic Interlocking System. It also provides information about the preliminary steps to be taken to switch ON the system. The fault codes associated with all the modules of MEI633 are listed out and basic information about troubleshooting activities during fault conditions is also provided.

The scope of this document is limited to provide basic information necessary to understand the system composition and the sub-system components.

## 2 System Overview

Interlocking is an arrangement of functions in a yard, interconnected in a manner that ensures safe passage of the train through the controlled area. An Electronic Interlocking System is used in the Railway stations and yards for ensuring the safe passage of trains. The train movement is allowed in accordance with the rules and regulations governing the movement of trains. The request to set a route or operate a signal or a point comes from the operator, who is a signaller, but the decision to allow the move is made by the interlocking system on the basis of the existing field conditions and the inbuilt safety logic. The final goal is to ensure safe passage of train through the controlled area. The System continuously monitors the field conditions, and if any condition is detected which violates the inbuilt safety logic, it drives the corresponding output to safe state.

The Electronic Interlocking System (EIS) offers a lot of advantages over the conventional relay based interlocking. An EIS occupies much less space, consumes less power, is easy to install and maintain and is cost-effective. The interlocking logic in the EIS is based on software and hence any modification is easy without the need for any wiring changes. This eliminates the need to block traffic for long intervals whenever there is need for system up-gradation or modification. The EIS are processor based systems which have extensive diagnostic tests built into them. This improves the reliability of the system and leads to minimal system down time even in case of failures. The faulty module can be located easily and replaced with a spare one.

The EI System operation involves the operation of functions, which directly affect the safety, and hence it is designed to be fail-safe i.e. any failure within the system does not cause the outputs to assume unsafe state. Fail- safe in railway parlance means the system shall put the signals to danger and will not move any switch in case of any failure.

The Electronic Interlocking System is designed to meet Safety Integrity Level 4 requirements as specified in the CENELEC Standard EN 50129. MEI633 is a microprocessor based system with interface to the Points, Signals, Track Circuits, Axle Counters, Level Crossing Gates, Ground Frames, Block Instruments for Block working with adjacent stations, and crank handles for manual operation of Points. It has the provision to interface with an External Data Logger, CTC or ATP through Serial Link.

It is a self-contained independent system, which can be used standalone to control the train movement in the Yard. In case of big yards, where the System capacity is not sufficient to address the needs of interlocking, two systems can be cascaded using a Serial link to achieve the required functionality.

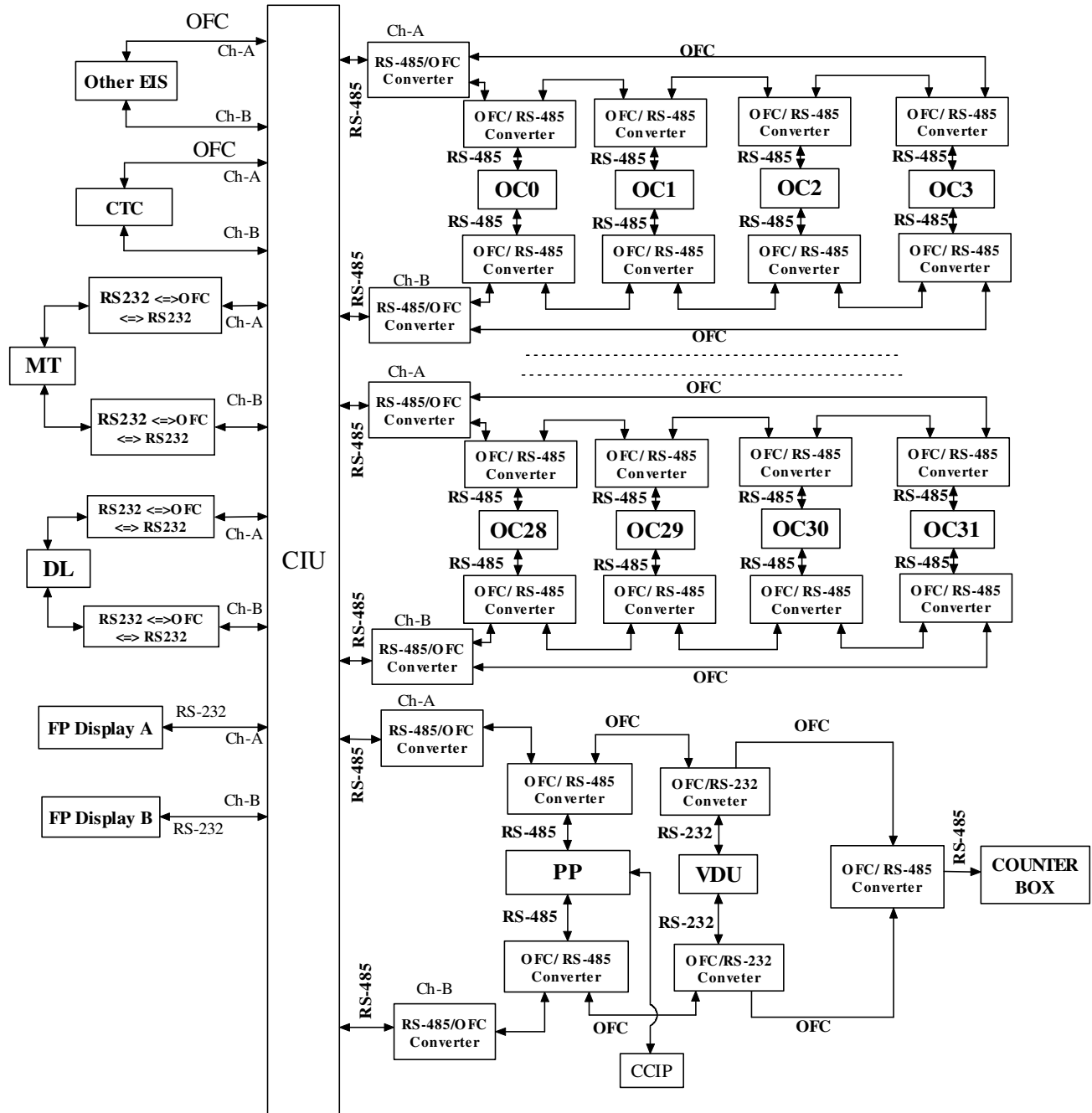
MEI633 system implements Two-out-of-Two Hardware architecture with identical Hardware and identical Software for Vital modules.

MEI633 System is implemented as multi-processor distributed system, with the System functionality being apportioned to various sub-systems. The division of the total System functionality into different subsystems provides modularity, expandability and cost-effectiveness.

MEI633 can be installed as a centralized system or a distributed system. When the Centralized installation is used, the Relays in the Relay room have to be repeated in the field for operating the respective functions. This requires extensive use of expensive Signaling cables. When used in distributed configuration, the field modules can be located in the Wayside Huts, in proximity to the functions being operated by them. For a group of Inputs and Outputs, a redundant pair of Optical fiber communication cable is used for carrying the commands from the Central Interlocking Unit to the field modules. Since the Signaling cables can be replaced with Optical fiber communication cable, substantial cost savings can be achieved.

MEI633 is modular system, which is scalable and configurable to suit the needs of a specific installation. The number of Object Controllers, the number of Input and Output WFMs in each OC, and the Input and Output modules required for the Panel Processor can be selected as per the Yard I/O requirement.

The MEI633 Block diagram is as follows:





### 3 MEI633 Subsystem

The MEI633 comprises of the following sub-systems:

#### 3.1 Central Interlocking Unit (CIU)

Central Interlocking Unit consists of VIC, COMP, CIF and VHM cards, which are enclosed in a single box. Input data from PP/VDU Modules, OCMs is received by CIU. The received input data is processed for interlocking by CIU and output data is generated based on the input data. The respective output data is sent to PP/VDU Modules, Counter Box, MT and OCMs. CIU also has power supply modules to provide required voltages to all the cards in the CIU. VHM-A monitors the voltage and health of VIC-A, COMP-A. VHM-B monitors the voltage and health of VIC-B, COMP-B.

CIU has 12 serial communication ports, out of which 8 ports are used for 32 OCMs (on each port, a maximum of 4 OCMs can be connected), one port is used for PPs and VDUs (a maximum of 4 PPs and/or 4 VDUs can be connected), one port is reserved for other EIS, one port is reserved for CTC and the remaining port is reserved for future use, as shown in the block diagram. CIU is also connected to Counter Box, MT, Data Logger (DL) and Display units (identified as DISPLAY-A and DISPLAY-B).

VIC card receives the wayside function input data and the commands issued from CCIP/VDU through COMP. VIC processes the received inputs. VIC generates wayside function output data and the yard status information to be displayed on CCIP/VDU and sends to COMP. COMP card is connected to PP/VDU Modules, Counter Box, CTC, Other EIS and OCMs through OFC interface. COMP requests wayside function input data from OCMs and sends the wayside function output data to OCMs. Each COMP can be connected to other EIS, if more than one EIS is installed in the yard. CIF is used to convert the serial data stream generated by UARTs (from COMP) to RS-485 signals and vice-versa.

#### 3.2 Object Controllers (OC)

Object Controller Module consists of two IOCOMs namely IOCOM-A, IOCOM-B and a maximum of 8 WFMs. There can be a maximum of 32 OCMs in a system. WFMs are connected to IOCOM-A and IOCOM-B through RS485 interface. IOCOM-A and IOCOM-B are connected to COMP-A and COMP-B respectively, through OFC interface.

Input WFM gets the status of the wayside functions in the yard and sends the same to IOCOM-A and IOCOM-B. In turn IOCOM-A and IOCOM-B send the wayside function input data received from Input WFMs to respective COMPs. IOCOM-A and IOCOM-B receive the wayside function output data from respective COMPs and sends the same to Output WFMs. Output WFM receives the wayside function output data from IOCOMs and drives the wayside functions connected to it.

Each Input WFM can read at most eight wayside function inputs and each Output WFM can drive at most 8 wayside function outputs. A WFM consists of two WFPs – Master WFP and Slave WFP.

Both the WFPs of each WFM are connected to IOCOM-A and IOCOM-B through RS485 interface. Master WFP and Slave WFP communicate through UART Interface. Output WFPs of an Output WFM verify each other's output relay data received from IOCOMs. Input WFPs of an Input WFM verify each other's input relay data.

OCM also consists of two VHMs namely OVH-A and OVH-B for monitoring the voltage and health of IOCOM-A and IOCOM-B respectively. OCM consists of power supply modules, which provides the required voltages to the cards in the OCM. All Output WFMs in OCM are monitored by Vital Cut-off (OVC) card. OVC card drives the VCOR, based on the voltage and health status of connected Output WFMs in the OCM.

### 3.3 Panel Processor Unit (PP)

Panel Processor module consists of two Panel Processors (PP A & PP B) and each is connected to a common set of Input and Output cards through parallel interface. On the other hand, each Panel Processor is connected to COMP through Optical Fiber Interface. Each Panel Processor scans the state of the inputs on CCIP through Input cards, and sends the same to VICs via the respective COMP. Each of them receives Indication Information from active VIC and drives the same to CCIP through output cards, providing visual indication to operator. Indication Information represents the current Yard status. The Panel Processor CPU cards and the Input/Output cards are housed in separate enclosures. The data transfer between the CPU cards in one enclosure and the Input/Output cards in the other enclosure is achieved by the use of PP Extender Driver card on the CPU enclosure and PP Extender Receiver card on the I/O Enclosure.

### 3.4 Power Supply Module (PS)

MEI633 uses three types of Power Supply modules viz, Type A, Type B and Type C Power supplies. These power supplies are designed specifically to meet the requirements of various cards in the CIU, OC and PP modules. All the three types take +24V as input. Power supply Type A (M633PSA-01) is used to power the Input and Output cards of the PP module and is rated at 4.5V@8A. Type B Power supplies (M633PSB-01) are used to provide power to the VIC, COMP, PP CPU and IOCOM cards and are rated at 4.5V@3A. Type C Power supplies (M633PSC-01) are dual output type and are used to provide power to the Input and Output WFM CPU cards and are rated at 4.5V@6A, 5.8V@2A.

### 3.5 Control Cum Indication Panel (CCIP)

CCIP consists of Push Buttons/Knobs, Keys, LEDs and Buzzers. Push Buttons/Knobs are used to issue commands to System. Keys on CCIP can be in, Key In/Key Out position to enable/disable processing of the commands issued by operator to System. LEDs on CCIP indicate the yard status e.g. color signal on/off status, point position and track occupation status. Buzzers are used to indicate the stuck of any Push Button or yard status is not available to the system. CCIP is connected to PP Modules through Input and Output Cards. PP module's link status with CIU and its Health status are shown on CCIP.

### 3.6 Counter Box Module (CB)

Counter Box consists of CPU card and Driver card. Driver card is used to drive the counters and buzzers. CPU card is connected to Driver card and on the other hand it is connected to COMP-A and COMP-B, through Optical Fibre Interface. CPU card receives messages from both COMPs.

Ultimately it takes data to drive counters and buzzers from the active COMP channel. Counter Box module also indicates VIC-A and VIC-B status (Active, Standby and Not Available) by the corresponding LEDs.

### 3.7 Data Logger (DL)

Data Logger (DL) is a device connected to CIU through RS232-OFC interface. DL is used to log the yard and system status in every cycle. Proprietary serial communication protocol is used for communication between CIU and Data Logger.

### 3.8 Video Display Unit (VDU)

Video Display Unit is a PC based application Software. VDU is connected to CIU through OFC interface. Operator can issue commands using the simulated buttons on the VDU screen. It sends the command and receives the yard status from COMP and displays the same on the VDU screen.

### 3.9 Front Panel Display (FPD)

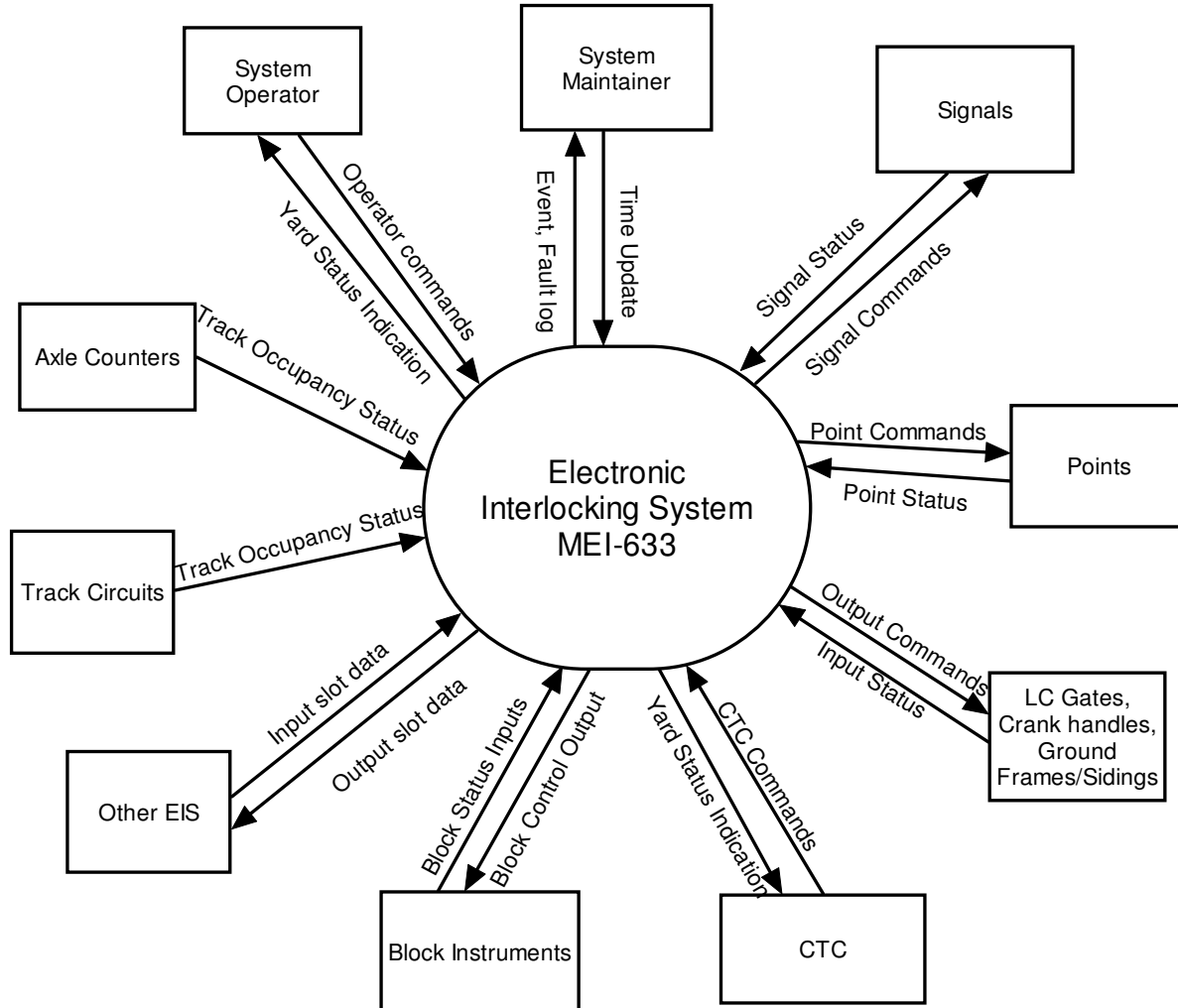
LED Display is connected to CIU through RS232 interface. The system consists of two LED display units, namely Display-A and Display-B. LED Display is used to display the system faults/recovery messages.

### 3.10 Maintenance Terminal (MT)

Maintenance Terminal is a PC based application Software. MT is connected to CIU through RS232-OFC Interface. MT screen shows the status of the system, logs the events/faults received from CIU and generates alarm signal if any critical fault is received from the CIU. Proprietary serial communication protocol is used for communication between CIU and MT.

## 4 MEI633 External Interface

MEI633 interface to external systems can be visualized by the following interface diagram.



## 5 Sub System Components

MEI633 consists of various sub-systems that can be housed in standard racks. Each sub-system / bin is designed to house individual PCBs pertaining to a logical sub-system of the MEI633. The following tables list the PCBs housed in the individual bins

### 5.1 Central Interlocking Unit Rack – MCI (Bottom Bin)

PCB Name	MEI633 Part No.	Qty
CIU Bottom Backplane	M633CBBP-01	1
Communication Processor card (COMP card)	M633CCC-01	2
Communication Interface card (CIF card)	M633CIF-01	2
Vital Interlocking Computer card (VIC card)	M633CVC-01	2
CIU Voltage and Health Monitoring card (CVH card)	M633CVH-01	2

### 5.2 Central Interlocking Unit Rack – MCI (Top Bin)

PCB Name	MEI633 Part No.	Qty
CIU Top Backplane	M633CTBP-01	1
Power Supply Type B	M633PSB-01	4

### 5.3 Object Controller Rack – MOC (Bottom Bin)

PCB Name	MEI633 Part No.	Qty
OC Bottom Backplane	M633OBBP-01	1
Input Wayside Function Module CPU Card (OCI Card)	M633OCI-01	5 (max)
Output Wayside Function Module Output Card (OCO Card)	M633OCO-01	3 (max)
WFM Relay Driver Card (ORD Card)	M633ORLD-01	3 (max)
Vital Cut-off Card (OVC Card)	M633OVC-01	1

#### 5.4 Object Controller Rack – MOC (Top Bin)

PCB Name	MEI633 Part No.	Qty
OC Top Backplane	M633OTBP-01	1
IO Communication Processor card (IOCOM card)	M633OIC-01	2
Power Supply Type B	M633PSB-01	2
Power Supply Type C	M633PSC-01	2
OC Voltage and Health Monitoring card (OVH card)	M633OVH-01	2

#### 5.5 Panel Processor Rack – MPP (Bottom Bin)

PCB Name	MEI633 Part No.	Qty
PP CPU Backplane	M633PCBP-01	1
PP CPU card	M633PCC-01	2
Power Supply Type B	M633PSB-01	2
PP Extender Driver Card	M633PExD-01	2 (max)
PP Voltage and Health Monitoring card (PVH card)	M633PVH-01	2

#### 5.6 Panel Processor Rack – MPP (Top Bin)

PCB Name	MEI633 Part No.	Qty
PP IO Backplane	M633PBP-01	1
PP Receiver Card	M633PExR-01	1
PP Input Card	M633PIP-01	3 (max)
PP Output Card	M633POP-01	10 (max)
Power Supply Type A	M633PSA-01	2

## 6 Facia Details

The front facia of all the cards are provided with LED indications. These indications assist the operator to know the status of the card at any point of time. The following tables provide detailed information about the indications and other components provided on the facia of each card.

### 6.1 VIC card

Nameplate: CVC-A and CVC-B

Indication/Interface	Description
LED ( <b>POWER</b> )	Availability of input power to the card
LED ( <b>CYC</b> )	Cyclic activity status of SVP. Toggled every cycle
LED ( <b>ACT</b> )	VIC is in active mode
LED ( <b>STD BY</b> )	VIC is in standby mode
LED ( <b>MRST</b> )	Provided for future use
LEDs ( <b>COM A and COM B</b> )	Active status of COMP A and COMP B respectively
9 Pin D-Female Connector ( <b>RS232</b> )	Used for Data Logger, Maintenance Terminal and Front Panel Display communication during normal operation and for Application Data download during offline mode.

### 6.2 COMP card

Nameplate: CCC-A and CCC-B

Indication/Interface	Description
LED ( <b>POWER</b> )	Availability of input power to the card
LED ( <b>CYC</b> )	Cyclic activity status of COMP. Toggled every cycle
LEDs ( <b>VIC A and VIC B</b> )	Active status of VIC A and VIC B respectively
9 pin Female connector ( <b>RS 232</b> )	Used for Debug port & Application data download during offline mode

### 6.3 CIF card

Nameplate: CIF-A and CIF-B

Indication/Interface	Description
LED ( <b>POWER</b> )	Availability of input power to the card
Two 50 pin D type connectors	Provides full duplex RS485 interface with communication processor card

### 6.4 CVH card

Nameplate: CVHM-A and CVHM-B

Indication/Interface	Description
LED ( <b>POWER</b> )	Availability of input power to the CVH card
LED ( <b>VIC VS</b> )	<b>Glow Green:</b> VIC card voltages monitored by the Power Manager are within predefined limits <b>Glow Red:</b> Any of the VIC card voltages monitored by the Power Manager has gone beyond limits
LED ( <b>VIC HS</b> )	<b>Glow Green and starts blinking:</b> VIC CPU Health OK <b>Glow Red:</b> VIC CPU Health Not OK
LED ( <b>VIC CO</b> )	<b>Glow Green:</b> CPU is operating normally <b>Glow Red:</b> CPU Power is cut-off by the VHM card
LED ( <b>COM VS</b> )	<b>Glow Green:</b> COMP voltages monitored by the Power Manager are within predefined limits <b>Glow Red:</b> Any of the COMP voltages monitored by the Power



	Manager has gone beyond limits
LED ( <b>COM HS</b> )	<b>Glow Green and starts blinking:</b> COMP Health OK <b>Glow Red:</b> COMP Health Not OK
LED ( <b>COM CO</b> )	<b>Glow Green:</b> CPU is operating normally <b>Glow Red:</b> CPU Power is cut-off by the VHM card
Push button ( <b>VIC SD</b> )	When pressed power manager turns OFF the Power supply to VIC card
Push button ( <b>VIC ON</b> )	When pressed power manager turns ON the Power supply to VIC and continues to function normally.
Push button ( <b>COM SD</b> )	When pressed power manager turns OFF the Power supply to COMP
Push button ( <b>COM ON</b> )	When pressed power manager turns ON the Power supply to COMP and continues to function normally

## 6.5 IOCOM card

Nameplate: OICC-A and OICC-B

Indication/Interface	Description
LED ( <b>POWER</b> )	Availability of input power to the card
Dual digit 7 segment display	Visual indication of fault-codes
LEDs ( <b>WFP TX</b> and <b>WFP RX</b> )	Transmission and reception of data from WFP's respectively
LED ( <b>CYC</b> )	Status of cyclic activity of the CPU.
LEDs ( <b>COM TX</b> and <b>COM RX</b> )	Transmission and reception of data from COMP card

	respectively
15 Pin Male Connector ( <b>RS485</b> )	Provides serial communication between the OIC card and COMP card.

## 6.6 OVH card

Nameplate: OVH-A and OVH-B

Indication/Interface	Description
LED ( <b>POWER</b> )	Availability of power to the OVH card
LED ( <b>V. STS</b> )	<p><b>Glow Green:</b> All the monitoring voltages are within predefined limits</p> <p><b>Glow Red:</b> Any of the monitoring voltage has gone beyond limit</p>
LED ( <b>H. STS</b> )	<p><b>Glow Green:</b> IOCOM CPU Health OK</p> <p><b>Glow Red:</b> IOCOM CPU Health Not OK</p>
LED ( <b>CUT. OFF</b> )	<p><b>Glow Green:</b> Card is operating normally</p> <p><b>Glow Red:</b> IOCOM CPU power is cut off by OVH card</p>
Push button ( <b>RESET</b> )	When pressed, OVH card turns ON the Power to the OIC card when it is in OFF condition.

## 6.7 OCI card

Nameplate: OCCI-1

Indication/Interface	Description
LED ( <b>POWER</b> )	Availability of input power to the card
LEDs ( <b>B TX1</b> and <b>B TX0</b> )	Slave CPU status of communication with IOCOM-B CPU and IOCOM-A CPU respectively
LED ( <b>B STS</b> )	Status of cyclic activity of the Slave CPU
LED ( <b>A STS</b> )	Status of cyclic activity of the Master CPU
LEDs ( <b>A TX1</b> and <b>A TX0</b> )	Master CPU status of communication with IOCOM-B CPU and IOCOM-A CPU respectively
LEDs ( <b>IP1 to IP8</b> )	Input Relay State (Picked Up/Dropped)

## 6.8 OCO card

Nameplate: OCCO-1

Indication/Interface	Description
LED ( <b>POWER</b> )	Availability of input power to the card
LEDs ( <b>B TX1</b> and <b>B TX0</b> )	Slave CPU status of communication with IOCOM-B CPU and IOCOM-A CPU respectively
LED ( <b>B STS</b> )	Status of cyclic activity of the Slave CPU
LED ( <b>A STS</b> )	Status of cyclic activity of the Master CPU
LEDs ( <b>A TX1</b> and <b>A TX0</b> )	Master CPU status of communication with IOCOM-B CPU and IOCOM-A CPU respectively.

## 6.9 ORD card

Nameplate: ORLD-1

Indication/Interface	Description
LED ( <b>POWER</b> )	Availability of vital power to the relays

LEDs (OP1 - OP8)	<p>Drive status of the eight relays</p> <p><b>Glows Orange:</b></p> <p>Relay connected to that particular section is driven</p> <p><b>Glows Red:</b></p> <p>Drive signal is present but the relay is not driven as the fuse is blown due to over load condition</p> <p><b>Glows Green:</b></p> <p>External feed to the Relay during the fuse blown out condition</p>
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## 6.10 OVC card

Nameplate: OVCO

Indication/Interface	Description
LED (POWER)	Availability of input power to the Vital Cut-off card
LED (VCOR)	Vital Cut-off relay is being driven by the CPLDs
LED (STS A)	<p><b>Starts Blinking:</b></p> <p>All the 'A' CPUs sends correct status pattern and the status of all the 'A' CPUs is OK</p>
LED (STS B)	<p><b>Starts Blinking:</b></p> <p>All the 'B' CPUs sends correct status pattern and the status of all the 'B' CPUs is OK</p>
LEDs (OP1 to OP3)	They are driven by CPLD B and represent the connect status of Output WFM card 1, 2 and 3
LED (VCOR POWER)	VCOR drive power is available to OVC card

## 6.11 PCC card

Nameplate: PPCC-A and PPCC-B

Indication/Interface	Description
LED ( <b>POWER</b> )	Availability of the power to the card
Dual digit 7-segment display	Visual indication of fault codes
LED ( <b>CYC</b> )	Status of cyclic activity of the CPU
LED ( <b>OE</b> )	Reception of Password from the COMP for driving the output cards
LEDs ( <b>COM Rx</b> and <b>COM Tx</b> )	Status of communication with COMP
15 pin Female connector ( <b>RS232</b> )	Provides external communication interfaces for serial ports with RS232 levels
15 pin Male connector ( <b>RS485</b> )	Provides RS485 communication interface with <b>RS485-OFC Bi-directional converter</b>

## 6.12 PVH card

Nameplate: PPVH-A and PPVH-B

Indication/Interface	Description
LED ( <b>POWER</b> )	Availability of input power to the PVH card
LED ( <b>V.STS</b> )	<p><b>Glow Green:</b></p> <p>All the voltages monitored by the Power Manager are within limits</p> <p><b>Glow Red:</b></p> <p>Any of the voltage monitored by the Power Manager has gone beyond limit.</p>
Third LED ( <b>H.STS</b> )	<p><b>Glow Green:</b></p> <p>PP CPU Health OK</p>

	<b>Glows Red:</b> PP CPU Health Not OK
Fourth LED ( <b>Cutt.Off</b> )	<b>Glows Green:</b> CPU is operating normally <b>Glows Red:</b> CPU Power is cut-off by the VHM card
Push-button switch ( <b>RESET</b> )	When pressed, VHM card restarts the PP CPU card when it is in Power OFF condition

### 6.13 PIP card

Nameplate: PPIP-1

Indication/Interface	Description
LED ( <b>POWER</b> )	Availability of the power to the card
Two 37 pin D-Male Connectors	Provides external communication interfaces for 64 inputs coming from the CCIP

### 6.14 POP card

Nameplate: PPOP-1

Indication/Interface	Description
LED ( <b>POWER</b> )	Availability of the power to the card
Two 37 pin D-Female Connectors	Provides external communication interfaces to drive 64 outputs on CCIP

### 6.15 PSA card

Nameplate: PPSA-A and PPSA-B

Indication/Interface	Description
LED ( <b>24 V</b> )	Availability of power to the card

LED ( <b>ERROR</b> )	Power supply Input out of limits
LED ( <b>4.5V</b> )	4.5V Output voltage OK

### 6.16 PSB card

Nameplate: CCPSB-A, CCPSB-B, CVPSB-A, CVPSB-B, OPSB-A, OPSB-B, PPSB-A and PPSB-B

Indication/Interface	Description
LED ( <b>POWER</b> )	Availability of power to the card
LED ( <b>ERROR</b> )	Power supply Input out of limits
LED ( <b>4.5 V</b> )	4.5V Output voltage OK

### 6.17 PSC card

Nameplate: OPSC-1

Indication/Interface	Description
LED ( <b>POWER</b> )	Availability of power to the card
LED ( <b>ERROR</b> )	Power supply Input out of limits
LED ( <b>5.8 V</b> )	5.8V Output OK
LED ( <b>4.5 V</b> )	4.5V Output OK

### 6.18 RS485-OFC Bi-directional converter card

Indication/Interface	Description
LED ( <b>POWER</b> )	Availability of input power to CPLD / OFC section of the card
LED ( <b>POWER</b> )	Availability of input power to RS485 section of the card
LED ( <b>PTX</b> )	Data transmitting through primary channel
LED ( <b>PRX</b> )	Data receiving on primary channel

LED (STX)	Data transmitting through secondary channel
LED (SRX)	Data receiving on secondary channel
LED (M/S)	ON - The Card is programmed for Master OFF - The Card is programmed for Slave
LED (P/S)	ON - The Card is using primary channel for SSI communication. OFF - The Card is using secondary channel for SSI communication.
15 pin Female connector ( <b>RS 485</b> )	RS485 interface to corresponding CPU cards.



## **7 Start up Details**

This section provide the details of the startup operation and indications of MEI633 Electronic Interlocking System.

### **7.1 Initial Checks**

The following checks should be made before switching ON the system:

#### **7.1.1 CIU**

When the front door of the CIU rack is opened, there will be a glass door with lock through which the sub-systems that are housed inside, can be observed.

- The glass door should be in locked position. The rest of the checks can be made viewing through the glass door.
- The connectors of the cable connecting the CIF Cards and RS485 Distribution box are fixed properly.
- The connectors on the CVC Cards are fixed properly
- No loose wires are hanging from any of the PCBs.
- All the indications on the facias of all the PCBs are in OFF condition
- No PCB is projecting outside. The fixing screws for all the PCBs are fixed properly.
- The RS485 cable connections and OFC connections to the RS485-OFC Bi-directional converters are fixed properly.

#### **7.1.2 OCM**

When the front door of the OC rack is opened, there will be a glass door with lock through which the boards housed inside, can be observed.

- The glass door should be in locked position. The rest of the checks can be made viewing through the glass door.
- The cables on the D-type connectors on the front facia of OIC card are fixed properly
- No loose wires are hanging from any of the PCBs.
- All the indications on the facias of all the PCBs are in OFF condition
- No PCB is projecting outside. The fixing screws for all the PCBs are fixed properly.
- The RS485 cable connections and OFC connections to the RS485-OFC Bi-directional converters are fixed properly.

#### **7.1.3 PP / CCIP**

All the PP module related PCBs are housed in two racks and will be enclosed on the rear side of the Control-Cum-Indication-Panel (CCIP).

- On the CCIP, the Panel/PC key should be present and should be in “Panel” position. If the particular yard is provided with VDU also, the key can be in any position.
- No indication on the CCIP should be ON.

### 7.1.4 COUNTER BOX

- The Counter Box should also be checked before the system is switched ON.
- The cables on the D-type connector on the front facia of PP CPU card is fixed properly
- No loose wires are hanging from any of the PCBs.
- All the indications on the facias of all the PCBs are in OFF condition
- No PCB is projecting outside. The fixing screws for all the PCBs are fixed properly.

The OFC connections on the RS485-OFC converter are fixed properly.

## 7.2 MEI633 Power ON

The following Switch-ON sequence should be followed for starting up the MEI633.

- 110V Mains Switch ON (in the IPS room) for powering the Central Cabin modules
- 110V Mains Switch ON (in the IPS room) for powering the End Cabin A
- 110 Mains Switch ON (in the IPS room) for powering the End Cabin B

## 7.3 Indications

The following text gives information about the indications on each of the MEI633 sub-systems at the time of Power ON.

### 7.3.1 CIU

1. The Power ON LEDs on all the Power supply cards, Front Panel Displays and VHM cards will be ON. Status LEDs on FPDs will be ON and the name of the Yard will be displayed on both the FPDs.
2. The VIC A, VIC B, COMP A and COMP B cards will be ON in sequence.
3. Messages start to be displayed on the FPDs and the L.STS LED will be OFF on the FPDs. The following messages will be displayed on FPD.

FPD A – **RDSO Test Yard**, Link Failed, COMP A:001D Post OK, COMP B: 001D Post OK, SVP A:0014 Post OK.

FPD B – **RDSO Test Yard**, Link Failed, COMP A:001D Post OK, COMP B: 001D Post OK, SVP B:0014 Post OK.

Note: The specific yard name will be displayed in place of **RDSO Test Yard** for the actual installation.

4. The POST activities will take place inside the VIC and COMP CPUs. The POST OK code for COMP will be displayed on the 7-segment display of the COMP cards. The VIC card displays the temperature after displaying the character 't' on the 7-segment display. Next, the POST

OK code is displayed on the VIC cards. For COMP, the POST OK code is “1d” and for VIC, it is “14”.

5. The POST OK messages for each of the CPUs of channel A and B will scroll on the corresponding FPDs. POST OK messages for COMP, SVP and IOCOMs are displayed in sequence.

### **7.3.2 OC**

1. The Power ON LEDs on all the Power supply cards, VHM, OCI, OCO and RS485-OFC Bi-directional converter cards will be ON.
2. After a small delay, the OIC card will be ON. The 7-segment display on the front facia of the OIC card will display '00'.
3. The Health Status LED on the VHM cards will start to blink indicating that the IOCOM cards are healthy.
4. VCOR picks up and the corresponding LED on the OVC card will be ON.
5. When VCOR picks up, all the available ORD cards will become ON
6. After around 1.5 minutes, the character 't' followed by the actual temperature are displayed on the 7-segment display of the OIC card.

### **7.3.3 PP/ CCIP**

1. Either of PANEL or PC LEDs will be ON depending upon PANEL/PC key position.
2. SYSTEM HEALTH LEDs for Ch-A and Ch-B will start to blink indicating that the System is healthy.
3. LINK STATUS LEDs (RED) for Ch-A and Ch-B will indicate that the PP link with COMP is FAULTY. Also, an audio alarm will be ON which indicates the Link Faulty condition. Pressing the corresponding ACK button will stop the audio alarm but the visual indication will be intact.
4. After the communication with COMP CPU is established, the LINK STATUS LEDs (AMBER) for Ch-A and Ch-B will start to blink, indicating that the PP serial link with COMP is OK. The audio alarm will also stop now.
5. The indications on the CCIP will reflect the actual field conditions – Signals, Points, Track Circuits etc.

### 7.3.4 COUNTER BOX

Indication is provided to the Operator for the following Critical faults on the Counter Box Front Facia:

1. Wrong Side failure Detection by the System:

This is indicated by a Red LED accompanied with a Fault Alarm on the Counter Box Front Facia.

CIU SHDN (CIU Shutdown) – If the Wrong side failure is detected by CIU

OC SHDN (OC Shutdown) – If the Wrong Side failure is detected by OC

The Fault Alarm and Indication will persist till the Fault is acknowledged by pressing the WSF ACK Button provided on the Counter Box Front Facia.

2. Change in the CVC Status:

Each CVC (CVC-A and CVC-B) Status is indicated as follows:

ACT (Active) – Green LED

STBY (Standby) – Yellow LED

NA (Not Available) – Red LED

When any change in the CVC status occurs, it is indicated by an Alarm to the Operator.

The Fault Alarm will persist till the Fault is acknowledged by pressing the CO ACK Button provided on the Counter Box Front Facia.

3. Panel Blank:

When the CCIP becomes blank and no Route / Signal indication is shown, it may be due to either of the following conditions:

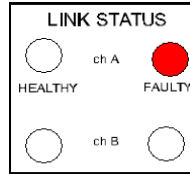
- i) Panel Power Supply is faulty
- ii) Communication from CIU is faulty from both the channels

If all the indications on the CCIP are OFF, it indicates that the Panel Power supply is faulty.

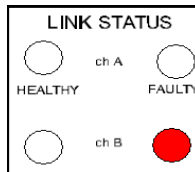
If the Link Status Faulty indication is displayed for both the channels, it indicates that both the communication channels are faulty.

4. Link Status Indication:

When Channel A or Channel B link is faulty, corresponding red indication will be flashing continuously.



Channel –A Link Status is Faulty



Channel –B Link Status is Faulty

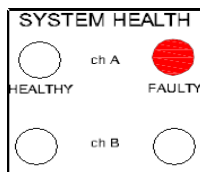
#### **Buzzer and Acknowledgement:**

When Channel A link or Channel B Link fails, a Buzzer is turned on to alert the operator. To acknowledge the fault, Press the Acknowledge button. The Buzzer stops when the fault is acknowledged by the Operator.

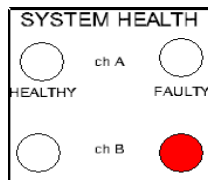
The System Maintainer should be informed so that appropriate action could be taken to rectify the fault.

#### **5. Health Status Indication:**

When Channel A or Channel B is faulty, corresponding red indication will be flashing continuously.



Channel – A Link Status is Faulty



Channel – B Link Status is Faulty

**Buzzer and Acknowledgement:**

When Channel A link or Channel B Link is failed, a Buzzer is turned on to alert the operator. To acknowledge the fault, Press the Acknowledge button. The Buzzer stops when the fault is acknowledged by the Operator.

## 8 Safety Features

1. ICs and other components used in the equipment are of industrial grade.
2. Discrete components like diodes, transistors, etc. conform to HIREL.
3. All resistors used are rated for at least double the power, which is supposed to be dissipated in them. The voltage rating of the capacitor is at least 50% above peak value. The resistors and capacitors are of tolerances not more than 5% and 10% respectively.
4. All fail-safe circuits work on continuous energisation principle such that open circuits in wiring, relay contacts, etc. or loss of power supply will not cause unsafe conditions.
5. To enhance the safety of the system, the design incorporates the detection of power supply variations beyond tolerable range at two levels.
6. On the Power supply boards, input Over-voltage and Under-voltage cut-off circuitry is provided and protection against output Over-voltage and Over-load is provided.
7. The exclusive Voltage and Health Monitoring (VHM) Card for the detection of Over-voltage and Under-voltage monitor the Power supply output voltage. In case of the Power supply voltage going beyond limits, it is shutdown by the VHM card.
8. Surge suppression and Reverse polarity protection provided for all the vital inputs add to the safety of the hardware.
9. All the electronic cards are designed to be of standard Double Euro or Extended Double Euro size. The position of PCB edge connectors of each card is set to be different from that of the any other card so that there is no probability of wrongly inserting one card into the slot meant for any other card.
10. All the sub-systems of MEI633 have been subjected to the Environmental / climatic tests specified in RDSO/SPN/144 and the results are satisfactory.
11. The Power supplies for the different sub-systems have been designed to have adequate safety factor for supplying power.

## 9 External and Internal Interfaces

### CIU External Interfaces:

Subsystems	Interface	Description
CIU-PP/VDU	Serial Communication	Multidrop Optical Fiber Interface, CIU as Master and PPs/VDUs connected as Slave nodes. Max distance 1 km, Baud rate 115.2 kbps or more.
CIU-OC	Serial Communication	Ring fashion Optical Fiber Interface, CIU as Master and OCs connected as Slave nodes. Max distance 15 km, Baud rate 115.2 kbps or more.
CIU-MT	Serial Communication	RS232/OFC, Baud rate 115.2 kbps.
CIU – DL	Serial Communication	RS232/OFC, Baud rate 115.2 kbps.
CIU-FP Display	Serial Communication	RS232, Max distance 5m, Baud rate 115.2 kbps.

### CIU Internal Interfaces:

Modules	Interface	Description
VIC Ch A-COMP Ch A	Shared Memory	8K x 16 DPRAM
VIC Ch A-COMP Ch B	Shared Memory	8K x 16 DPRAM
VIC Ch B-COMP Ch A	Shared Memory	8K x 16 DPRAM
VIC Ch B-COMP Ch B	Shared Memory	8K x 16 DPRAM

### OC External Interfaces:

Subsystems	Interface	Description
CIU-OC	Serial Communication	Ring fashion Optical Fiber Interface, CIU as Master and OCs connected as Slave nodes. Max distance 15 km, baud rate 115.2 kbps or more.
Input/Output Relays	-	24V Supply to read the potential free input relay contacts or to drive the Output relay Coil

### OC Internal Interfaces:

Interface	Interface	Description
IOCOM-WFMs	Serial Communication	RS485 Multidrop with IOCOM as Master and WFPs as Slave nodes, Baud rate 115.2 kbps



## 10 Operation with CCIP

The CCIP is a part of Electronic Interlocking System MEI633. This is used to give Commands to the System and to view the current Yard status. The commands are given through push buttons. In an EIS System, both Panel Processor along with CCIP and a VDU CT can be connected, or any one can be connected as Operator Interface, as per the user railway requirement.

To use CCIP as Active Command Panel, execute the following steps:

1. Key In SM Key or SE Key in CCIP.
2. Change CCIP to Command mode using Panel/PC Key Control.
3. Change the Panel/PC key to PANEL Position, and remove the Panel/PC Key.
4. Remove the SM Key from Domino Panel.

Refer **User Manual for Command cum Indication Panel of MEI633 Version 1.0 (MEI633-CCIP-UM-1\_0)** for operator commands and indications.

### 10.1 Fault Indication and Messages on CCIP

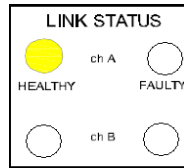
#### 10.1.1 Panel blank:

- When the CCIP becomes blank and no Route / Signal indication is shown, it may be due to either of the following conditions:
  - i. Panel Power Supply is faulty
  - ii. Communication from CIU is faulty from both the channels
- If all the indications on the CCIP are OFF, it indicates that the Panel Power supply is faulty.
- If the Link Status Faulty indication is displayed for both the channels, it indicates that both the communication channels are faulty.

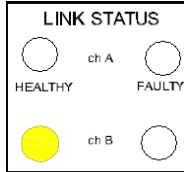
In either of the above cases, the System Maintainer should be informed so that appropriate action could be taken to rectify the fault.

#### 10.1.2 Link Status Indication:

- When Channel A or Channel B link is healthy, corresponding yellow indication will be flashing continuously.

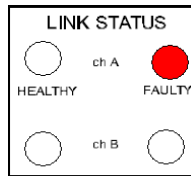


Channel –A Link Status is Healthy

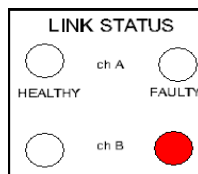


Channel – B Link Status is Healthy.

- When Channel A or Channel B link is faulty, corresponding red indication will be flashing continuously.



Channel –A Link Status is Faulty



Channel –B Link Status is Faulty

### **Buzzer and Acknowledgement:**

When Channel A link or Channel B Link fails, a Buzzer is turned on to alert the operator. To acknowledge the fault, Press the Acknowledge button. The Buzzer stops when the fault is acknowledged by the Operator.

## 11 Operation with VDU

The VDU CT (PC based Operator's Command Cum Indication Panel) is a part of Electronic Interlocking System MEI633. It is used by the System Operator to give Commands to the System and to view the current Yard status. The VDU CT is equivalent in functionality to the conventional Domino type Control Panel. Instead of Domino type CCIP, the operator can use the VDU to give commands to the EIS. Instead of knobs and buttons as in a Domino type CCIP, the commands are given through mouse by selecting the appropriate commands from the drop down menus.

In an EIS System, both Panel Processor along with CCIP and a VDU CT can be connected, or any one can be connected as Operator Interface, as per the user railway requirement.

To run VDU CT application, please ensure that following two points are met and also in sequence i.e. first point must be completed and then second point.

1. Yard specific database to be present in Database folder (this 'database' folder is present in application installed folder).
2. And also at least one user account exists(SM key User or SE key User).

For Example:

If application is installed in "C:\Program Files\PCCIP" then place Yard specific database  
Ex: RDSO.mdb (database file for RDSO yard) in "C:\Program Files\PCCIP\Database".

### Steps to Start the PCCIP Application

1. Click on Start → Programs → PCCIP → PCCIP
2. Login window will be shown. In this enter any valid Username and password, i.e. User Account created in User Accounts application. And click **OK** Button.
3. Next PCCIP Initialization Window will be shown. Enter the Configuration Parameters and Click OK Button.
4. Yard shall be displayed and it shows progress bar.
5. Finally Yard is displayed .It consists of tracks and panel buttons and other miscellaneous elements in the yard. Now required operation in the yard can be performed.

Refer **User manual for VDU Control terminal of MEI633 Version 1.0 (DOCID- MEI633-VDU\_CT-UM-1\_0)** for operator commands and indications.

## 12 MEI633 Fault Codes

This section enlists the Fault codes associated with different modules of MEI633.

The Fault Codes for MEI633 are categorized into Critical and Non Critical Faults.

The Critical Faults are the Faults, which may cause Restart or Shutdown of the Faulty module, or they indicate a serious error, which needs immediate attention.

The Maintainer is alerted about the Critical Fault by a Fault Buzzer in the Front Panel Display and also in the Maintenance Terminal, if it is connected to the System.

Non Critical Faults are the faults, which do not cause the System to restart, or shutdown, but the System may continue to operate through the other redundant channel or in a de-graded mode of operation.

The following Tables indicate the Fault Codes for the Individual Modules in MEI633 System when the corresponding Fault Codes are observed on System Front Panel Display or on the Maintainer's Terminal.

The Fault types are indicated as below in the Fault Code Tables:

N- Non-Critical,

C (S)- Critical Faults, which cause the Module to shutdown

C(R) – Critical, which cause the Module to Restart

C (P) – Critical, which requires power recycling after recovery

### 12.1 Supervisory Processor Fault Codes

Fault Code No.	Fault Message	Fault Types
0X01	CPU Test Fail	C(S)
0X02	INT. Flash Test Fail	C(S)
0X03	TIMERS Test Fail	C(S)
0X04	INT. RAM Test Fail	C(S)
0X05	INT. BUS Test Fail	C(S)
0X06	EXT. BUS Test Fail	C(S)
0X07	App. Data Flash Test Fail	C(S)

0X08	VP1 DPRAM Test Fail	C(S)
0X09	VP2 DPRAM Test Fail	C(S)
0X0A	EXT. WDT Test Fail	C(S)
0X0B	DIP Switch Setting Mismatch	C(S)
0X0C	POST Timer Test Fail	C(S)
0X0D	Program Flow Check Fail	C(R)
0X0E	RTC RAM Test Fail	C(R)
0X0F	I2C BUS Test Fail	C(R)
0X10	INT UART0 Lpback Tst Fail	N
0X11	EXT UART CH A Lpback Tst Fail	N
0X12	EXT UART CH B Lpback Tst Fail	N
0X13	PSC Timeout	C(S)
0X14	VIC Post OK	N
0X15	POST Time Out	C(S)
0X16	System Installation Id Mismatch	C(S)
0X17	Yard Data Ver Id Mismatch	C(S)
0X18	Cyc Timer Overflow	C(R)
0X19	FC25	-
0X1A	FC26	-
0X1B	CY. Interrupt In Fail	C(R)
0X1C	SVP Seq. Number. Mismatch	C(R)
0X1D	Invalid Pulse Received	N
0X1E	COMPA Mode Invalid	N
0X1F	COMPB Mode Invalid	N
0X20	COMPA Health Fail	N
0X21	COMPB Health Fail	N
0X22	VP1 Health Fail	C(R)
0X23	VP2 Health Fail	C(R)
0X24	SVP status conflict	C(S)
0X25	Unresolved status	C(R)
0X26	COMP active cyclic interrupt NA	C(R)
0X27	Power On Synch Fail	C(R)
0X28	Changed to Active	N
0X29	Both COMPS Not Available	C(R)
0X2A	Synchronization Fail	C(R)
0X2B	FC43	-
0X2C	FC44	-
0X2D	FC45	-

0X2E	FC46	-
0X2F	FC47	-
0X30	FC48	-
0X31	MT. Link Fail	N
0X32	MT. Link Recovered	N
0X33	MT. Channel Noisy	N
0X34	DL. Link Fail	N
0X35	DL Link Recovered	N
0X36	DL. Channel Noisy	N
0X37	FP. Link Fail	N
0X38	FP. Link Recovered	N
0X39	FP. Channel Noisy	N
0X3A	FC58	-
0X3B	FC59	-
0X3C	FC60	-
0X3D	FC61	-
0X3E	FC62	-
0X3F	FC63	-
0X40	FC64	-
0X41	FC65	-
0X42	FC66	-
0X43	FC67	-
0X44	VP1 DPRAM Semaphore Lock Fail	N
0X45	VP1 DPRAM Semaphore Release Fail	N
0X46	VP2 DPRAM Semaphore Lock Fail	N
0X47	VP2 DPRAM Semaphore Release Fail	N
0X48	WFM Input Data Compare Fail	N
0X49	PP Input Data Compare Fail	N
0X4A	VDU Input Data Compare Fail	N
0X4B	WFM Output Data Compare Fail	C(S)
0X4C	IND. Data Compare Fail	C(S)
0X4D	INT. Relay Data Compare Fail	C(S)
0X4E	Timer Relay Data Compare Fail	C(S)
0X4F	Panel Relay Data Compare Fail	N
0X50	WFM Output Message Verification Fail	C(S)
0X51	IND. Message1 Verification Fail	C(S)
0X52	IND. Message2 Verification Fail	C(S)
0X53	IND. Message3 Verification Fail	C(S)

0X54	PP Request Message Verification Fail	C(S)
0X55	VDU Request Message Verification Fail	C(S)
0X56	Exception Fault	C(R)
0X57	Data Read From RTC Fail	C(R)
0X58	I2C Bus Access Fail	C(R)
0X59	Data Log Flash read pointer Mismatch	C(R)
0X5A	Data Log Flash Write pointer Mismatch	C(R)
0X5B	Data Log Flash Operation Timeout	C(R)
0X5C	Data Log Flash Block Erase Fail	C(R)
0X5D	SYNC. Data Not Written	N
0X5E	DPRAM CRC Fail	N
0X5F	Random Error	N
0X60	Waiting For Manual Restart	N

## 12.2 Vital Processor Fault Codes

Fault Code No.	Fault Message	Fault Types
0X01	POST Check Timer Test Fail	C(S)
0X02	CPU Test Fail	C(S)
0X03	RAM Test Fail	C(S)
0X04	INT Flash Test Fail	C(S)
0X05	Timers Test Fail	C(S)
0X06	SVP DPRAM Test Fail	C(S)
0X07	Application Data Flash Test Fail	C(S)
0X08	FC8	-
0X09	POST Perform Fault	C(S)
0X0A	POST Timeout	C(S)
0X0B	Program Flow Check Fail	C(R)
0X0C	PSC Timeout	C(R)
0X0D	COMP A and B DPRAM Tests Fail	C(S)
0X0E	FC14	-
0X0F	COMP A DPRAM Test Fail	N
0X10	COMP B DPRAM Test Fail	N
0X11	SVP DPR Data CRC Check Fail	N
0X12	COMP A DPR Data CRC Check Fail	N
0X13	COMP B DPR Data CRC Check Fail	N

0X14	COMP A DPRAM Test OK	N
0X15	COMP B DPRAM Test OK	N
0X16	POST OK	N
0X17	SVP DPR Data CRC Fail Rcvrd	N
0X18	COMP A DPR Data CRC Fail Rcvrd	N
0X19	COMP B DPR Data CRC Fail Rcvrd	N
0X1A	Invalid VP Channel No.	C(S)
0X1B	Invalid VIC No.	C(S)
0X1C	FC28	-
0X1D	FC29	-
0X1E	Cyclic Interrupt Timeout	C(S)
0X1F	Power On Sync Fail	C(R)
0X20	Invalid SVP Sequence No.	C(R)
0X21	Cyclic Synchronization Fail	C(R)
0X22	Invalid Pulse Width	C(R)
0X23	SVP Cyclic Intr. Sts Conflict	C(S)
0X24	SVP DHS Fail	C(R)
0X25	Cyclic Activity Timeout	C(R)
0X26	Sync. Mode Change Fail	C(R)
0X27	COMP A DHS Fail	N
0X28	COMP B DHS Fail	N
0X29	FC41	-
0X2A	COMP A DHS OK	N
0X2B	COMP B DHS OK	N
0X2C	FC44	-
0X2D	FC45	-
0X2E	Invalid Relay No.	C(R)
0X2F	Invalid Relay State	C(R)
0X30	Invalid Logical Operator	C(R)
0X31	Illegal Equation Offset	C(R)
0X32	END EQN Not Found	C(R)
0X33	FC51	-
0X34	FC52	-
0X35	IND Data CMP Fail	C(R)
0X36	IND Msg1 Verf Rslts Fail	N
0X37	IND Msg2 Verf Rslts Fail	N
0X38	IND Msg3 Verf Rslts Fail	N
0X39	FC57	-



0X3A	FC58	-
0X3B	IND Msgs Verf Rslts OK	N
0X3C	FC60	-
0X3D	FC61	-
0X3E	Activity Variable Corrupted	C(R)
0X3F	Exception Occurred	C(R)
0X40	Variable Corruption	C(R)
0X41	FC65	-
0X42	SVP DPR SEM ACQ Fail - SEM	N
0X43	COMP A DPR SEM ACQ Fail - SEM	N
0X44	COMP B DPR SEM ACQ Fail - SEM	N
0X45	SVP DPR SEM RLSE Fail - SEM	N
0X46	COMP A DPR SEM RLSE Fail - SEM	N
0X47	COMP B DPR SEM RLSE Fail - SEM	N
0X48	SVP DPR SEM ACQ OK - SEM	N
0X49	SVP DPR SEM RLSE OK - SEM	N
0X4A	COMP A DPR SEM ACQ OK - SEM	N
0X4B	COMP A DPR SEM RLSE OK - SEM	N
0X4C	COMP B DPR SEM ACQ OK - SEM	N
0X4D	COMP B DPR SEM RLSE OK - SEM	N
0X4E	OC CHNL A IP WFM Msg NA - OC	N
0X4F	OC CHNL B IP WFM Msg NA - OC	N
0X50	OC CHNL A OP WFM Msg NA - OC	N
0X51	OC CHNL B OP WFM Msg NA - OC	N
0X52	OC CHNL A IP WFM Msg Available - OC	N
0X53	OC CHNL B IP WFM Msg Available - OC	N
0X54	OC CHNL A OP WFM Msg Available - OC	N
0X55	OC CHNL B OP WFM Msg Available - OC	N
0X56	WFM CHNL A IP/RB Msg DHS Fail - WFM	N
0X57	WFM CHNL B IP/RB Msg DHS Fail - WFM	N
0X58	WFM CHNL A IP Msg NA - WFM	N
0X59	WFM CHNL B IP Msg NA - WFM	N
0X5A	WFM CHNL A OP RB Msg NA - WFM	N
0X5B	WFM CHNL B OP RB Msg NA - WFM	N
0X5C	WFM CHNL A IP/RB Msg Intg Fail - WFM	N
0X5D	WFM CHNL B IP/RB Msg Intg Fail - WFM	N
0X5E	WFM CHNL A IP/RB Msg DHS OK - WFM	N
0X5F	WFM CHNL B IP/RB Msg DHS OK - WFM	N

0X60	WFM CHNL A Input Msg Avail. - WFM	N
0X61	WFM CHNL B Input Msg Avail. - WFM	N
0X62	WFM CHNL A OP RB Msg Avail - WFM	N
0X63	WFM CHNL B OP RB Msg Avail - WFM	N
0X64	WFM CHNL A IP/RB Msg Intg OK - WFM	N
0X65	WFM CHNL B IP/RB Msg Intg OK - WFM	N
0X66	WFM IP/RB Data CMP Rslts Fail - WFM	N
0X67	WFM OP Data CMP Rslts Fail - WFM	C(R)
0X68	WFM OP Msg VERF Rslts Fail - WFM	N
0X69	FC105	-
0X6A	FC106	-
0X6B	WFM IP/RB Data CMP Rslts OK - WFM	N
0X6C	WFM OP Msg VERF Rslts OK - WFM	N
0X6D	FC109	-
0X6E	FC110	-
0X6F	PP CHNL A IP Msg DHS Fail - PP	N
0X70	PP CHNL B IP Msg DHS Fail - PP	N
0X71	PP CHNL A IP Msg NA - PP	N
0X72	PP CHNL B IP Msg NA - PP	N
0X73	PP CHNL A IP Msg Intg Fail - PP	N
0X74	PP CHNL B IP Msg Intg Fail - PP	N
0X75	PP CHNL A IP Msg DHS OK - PP	N
0X76	PP CHNL B IP Msg DHS OK - PP	N
0X77	PP CHNL A IP Msg Available - PP	N
0X78	PP CHNL B IP Msg Available - PP	N
0X79	PP CHNL A IP Msg Intg OK - PP	N
0X7A	PP CHNL B IP Msg Intg OK - PP	N
0X7B	PP Input Data CMP Rslts Fail - PP	N
0X7C	PP Req Msg VERF Rslts Fail - PP	N
0X7D	FC125	-
0X7E	FC126	-
0X7F	PP Input Data CMP Rslts OK - PP	N
0X80	PP Req Msg VERF Rslts OK - PP	N
0X81	FC129	-
0X82	FC130	-
0X83	VDU CHNL A IP Msg DHS Fail - VDU	N
0X84	VDU CHNL B IP Msg DHS Fail - VDU	N
0X85	VDU CHNL A IP Msg NA - VDU	N

0X86	VDU CHNL B IP Msg NA- VDU	N
0X87	VDU CHNL A IP Msg Intg Fail- VDU	N
0X88	VDU CHNL B IP Msg Intg Fail - VDU	N
0X89	VDU CHNL A IP Msg DHS OK - VDU	N
0X8A	VDU CHNL B IP Msg DHS OK- VDU	N
0X8B	VDU CHNL A IP Msg Available - VDU	N
0X8C	VDU CHNL B IP Msg Available - VDU	N
0X8D	VDU CHNL A IP Msg Intg OK - VDU	N
0X8E	VDU CHNL B IP Msg Intg OK - VDU	N
0X8F	VDU Input Data CMP Rslts Fail - VDU	N
0X90	VDU Req Msg VERF Rslts Fail - VDU	N
0X91	Invalid Panel Setting	N
0X92	No CMD Panel	C(R)
0X93	Both PP and VDU are Indication Panels	C(R)
0X94	VDU Input Data CMP Rslts OK - VDU	N
0X95	VDU Req Msg VERF Rslts OK - VDU	N
0X96	Panel Setting OK	N
0X97	FC151	-
0X98	HR Wrong Side Fail - SIG	C(S)
0X99	DR Wrong Side Fail - SIG	C(S)
0X9A	HHR Wrong Side Fail - SIG	C(S)
0X9B	FC155	-
0X9C	Invalid Lamp Aspect - SIG	N
0X9D	Signal Blank - SIG	N
0X9E	HR Relay Drive Fail - SIG	N
0X9F	DR Relay Drive Fail - SIG	N
0XA0	HHR Relay Drive Fail - SIG	N
0XA1	FC161	-
0XA2	FC162	-
0XA3	FC163	-
0XA4	Signal Faults Recovered	N
0XA5	FC165	-
0XA6	FC166	-
0XA7	Invalid Point Detection - PT	C(S)
0XA8	FC168	-
0XA9	FC169	-
0XAA	FC170	-
0XAB	Point Detection Failed - PT	N

0XAC	FC172	-
0XAD	FC173	-
0XAE	Point Faults Recovered - PT	N
0XAF	FC175	-
0XB0	FC176	-

### 12.3 Communication Processor Fault Codes

Fault Code No.	Fault Message	Fault Types
0X01	CPU Test Fail	C(S)
0X02	TIMERS Test Fail	C(S)
0X03	INT. Flash Test Fail	C(S)
0X04	INT. RAM Test Fail	C(S)
0X05	POST Timer Test Fail	C(S)
0X06	EXT. WDT Test Fail	C(S)
0X07	VP1A DPRAM Test Fail	Conditional shutdown (Out of 4 VP DPRAMs atleast one VP DPRAM fail in both VICs or all the VP DPRAMs fail, then COMP will shutdown)
0X08	VP2A DPRAM Test Fail	
0X09	VP1B DPRAM Test Fail	
0X0A	VP2B DPRAM Test Fail	
0X0B	INT. BUS Test Fail	C(S)
0X0C	EXT. BUS Test Fail	C(S)
0X0D	EXT. Flash Test Fail	C(S)
0X0E	DIP Switch Setting Mismatch	C(S)
0X0F	POST Timeout	C(S)
0X10	Program Flow Check Fail	C(R)
0X11	EXT. UART0 Loopback Test Fail	N
0X12	EXT. UART1 Loopback Test Fail	N
0X13	EXT. UART2 Loopback Test Fail	N
0X14	EXT. UART3 Loopback Test Fail	N
0X15	EXT. UART4 Loopback Test Fail	N
0X16	EXT. UART5 Loopback Test Fail	N
0X17	EXT. UART6 Loopback Test Fail	N
0X18	EXT. UART7 Loopback Test Fail	N

0X19	EXT. UART8 Loopback Test Fail	N
0X1A	EXT. UART9 Loopback Test Fail	N
0X1B	EXT. UART10 Loopback Test Fail	N
0X1C	EXT. UART11 Loopback Test Fail	N
0X1D	POST OK	N
0X1E	System Installation Id Mismatch	C(S)
0X1F	Yard Data Ver Id Mismatch	C(S)
0X20	VP1A DPRAM Test Ok	N
0X21	VP2A DPRAM Test Ok	N
0X22	VP1B DPRAM Test Ok	N
0X23	VP2B DPRAM Test Ok	N
0X24	Cyc Interrupt Timeout	C(R)
0X25	Active VIC CY. Interrupt Not Available	C(R)
0X26	Active VIC Not Available	C(R)
0X27	Both VICs Not Available	C(R)
0X28	CY. Interrupt A Received In Wrong Time	C(S)
0X29	CY. Interrupt B Received In Wrong Time	C(S)
0X2A	VICs Seq. Number. Mismatch	C(R)
0X2B	VICA Health Fail	N
0X2C	VICB Health Fail	N
0X2D	VICA Mode Invalid	N
0X2E	VICB Mode Invalid	N
0X2F	Invalid Pulse received from Channel0	N
0X30	Invalid Pulse received from Channel1	N
0X31	VIC Act Stby status Conflict	C(S)
0X32	VP1A SYNC. Data Not Written	N
0X33	VP1B SYNC. Data Not Written	N
0X34	VP2A SYNC. Data Not Written	N
0X35	VP2B SYNC. Data Not Written	N
0X36	Both VICs Health Fail	C(R)
0X37	CY. Timer Overflow	C(R)
0X38	CY. Interrupt A Not Available	N
0X39	CY. Interrupt B Not Available	N
0X3A	First CY. Interrupt Received in Wrong Time	C(R)
0X3B	Both CY. Interrupts Not Available	C(R)
0X3C	VICA Health Ok	N

0X3D	VICB Health Ok	N
0X3E	IOCOM Port0 Fail	N
0X3F	IOCOM Port1 Fail	N
0X40	IOCOM Port2 Fail	N
0X41	IOCOM Port3 Fail	N
0X42	IOCOM Port4 Fail	N
0X43	IOCOM Port5 Fail	N
0X44	IOCOM Port6 Fail	N
0X45	IOCOM Port7 Fail	N
0X46	PP/VDU Port Fail	N
0X47	CTC Port Fail	N
0X48	Other EIS Port Fail	N
0X49	PSC Timeout	C(R)
0X4A	IOCOM Port0 Recovered	N
0X4B	IOCOM Port1 Recovered	N
0X4C	IOCOM Port2 Recovered	N
0X4D	IOCOM Port3 Recovered	N
0X4E	IOCOM Port4 Recovered	N
0X4F	IOCOM Port5 Recovered	N
0X50	IOCOM Port6 Recovered	N
0X51	IOCOM Port7 Recovered	N
0X52	PP/VDU Port Recovered	N
0X53	CTC Port Recovered	N
0X54	Other EIS Port Recovered	N
0X55	Exception Fault	C(R)
0X56	VP1A DPRAM Semaphore Lock Fail	N
0X57	VP1B DPRAM Semaphore Lock Fail	N
0X58	VP2A DPRAM Semaphore Lock Fail	N
0X59	VP2B DPRAM Semaphore Lock Fail	N
0X5A	VP1A DPRAM Semaphore Release Fail	N
0X5B	VP1B DPRAM Semaphore Release Fail	N
0X5C	VP2A DPRAM Semaphore Release Fail	N
0X5D	VP2B DPRAM Semaphore Release Fail	N
0X5E	VP1A DPRAM CRC Comparison Fail	N
0X5F	VP1B DPRAM CRC Comparison Fail	N

0X60	VP2A DPRAM CRC Comparison Fail	N
0X61	VP2B DPRAM CRC Comparison Fail	N
0X62	VP1A Output Message Not Available	N
0X63	VP2A Output Message Not Available	N
0X64	VP1B Output Message Not Available	N
0X65	VP2B Output Message Not Available	N
0X66	VP1A IND. Message1 Not Available	N
0X67	VP1A IND. Message2 Not Available	N
0X68	VP1A IND. Message3 Not Available	N
0X69	VP1B IND. Message1 Not Available	N
0X6A	VP1B IND. Message2 Not Available	N
0X6B	VP1B IND. Message3 Not Available	N
0X6C	VP1A PP/VDU Req. Message Not Available	N
0X6D	VP1B PP/VDU Req. Message Not Available	N
0X6E	Random Error	N
0X6F	Excess Fault Codes	N
0X70	Link Fail - IOCOM	N
0X71	Channel Noisy - IOCOM	N
0X72	PSC Fail - IOCOM	N
0X73	Link Recovered - IOCOM	N
0X74	PSC Recovered - IOCOM	N
0X75	WFM Config. Mismatch - IOCOM	N
0X76	FC118	-
0X77	FC119	-
0X78	FC120	-
0X79	FC121	-
0X7A	Link Fail - PP	N
0X7B	Channel Noisy - PP	N
0X7C	PSC Fail - PP	N
0X7D	Link Recovered - PP	N
0X7E	PSC Recovered - PP	N
0X7F	FC127	-
0X80	FC128	-
0X81	FC129	-
0X82	FC130	-

0X83	FC131	-
0X84	Link Fail - VDU	N
0X85	Channel Noisy - VDU	N
0X86	PSC Fail - VDU	N
0X87	Link Recovered - VDU	N
0X88	PSC Recovered - VDU	N

## 12.4 IOCOM Processor Fault Codes

Fault Code No.	Fault Message	Fault Types
0X01	POST Check Timer Test Fail	C(R)
0X02	CPU Test Fail	C(R)
0X03	RAM Test Fail	C(R)
0X04	INT. Flash Test Fail	C(R)
0X05	Reserved	-
0X06	EXT. WDT Test Fail	C(R)
0X07	Timers Test Fail	C(R)
0X08	COMP UART Test Fail	C(R)
0X09	WFP UART Test Fail	C(R)
0X0A	WFP Configuration Test Fail	C(R)
0X0B	Reserved	-
0X0C	POST Timeout	C(R)
0X0D	PSC Timeout	C(R)
0X0E	Program Flow Check Word Fail	C(R)
0X0F	IOCOM Activity Corrupted	C(R)
0X10	IOCOM Mode Corrupted	C(R)
0X11	IOCOM POST Fail	C(R)
0X12	Reserved	-
0X13	IOCOM Synchronization Fail	N
0X14	WFM Configuration Mismatch	N
0X15	COMP Message Receive Time Invalid	N
0X16	COMP Message Receive Timeout	N
0X17	Reserved	-
0X18	No Output Telegram Received	N
0X19	No Input Telegram Request Received	N
0X1A	No Output RDBK. REQ. Message Received	N



0X1B	IOCOM Synchronization OK	N
0X1C	COMP Communication OK	N
0X1D	WFP Channel Link Not OK	N
0X1E	WFP Channel Noisy	N
0X1F	WFP Message Transmission Fail	N
0X20	WFP Message Receive Timeout	N
0X21	WFP Channel Link OK	N
0X22	WFP1 Connectivity Status Not OK	N
0X23	WFP2 Connectivity Status Not OK	N
0X24	WFP3 Connectivity Status Not OK	N
0X25	WFP4 Connectivity Status Not OK	N
0X26	WFP5 Connectivity Status Not OK	N
0X27	WFP6 Connectivity Status Not OK	N
0X28	WFP7 Connectivity Status Not OK	N
0X29	WFP8 Connectivity Status Not OK	N
0X2A	WFP9 Connectivity Status Not OK	N
0X2B	WFP10 Connectivity Status Not OK	N
0X2C	WFP11 Connectivity Status Not OK	N
0X2D	WFP12 Connectivity Status Not OK	N
0X2E	WFP13 Connectivity Status Not OK	N
0X2F	WFP14 Connectivity Status Not OK	N
0X30	WFP15 Connectivity Status Not OK	N
0X31	WFP16 Connectivity Status Not OK	N
0X32	WFP1 Link Fail	N
0X33	WFP2 Link Fail	N
0X34	WFP3 Link Fail	N
0X35	WFP4 Link Fail	N
0X36	WFP5 Link Fail	N
0X37	WFP6 Link Fail	N
0X38	WFP7 Link Fail	N
0X39	WFP8 Link Fail	N
0X3A	WFP9 Link Fail	N
0X3B	WFP10 Link Fail	N
0X3C	WFP11 Link Fail	N
0X3D	WFP12 Link Fail	N
0X3E	WFP13 Link Fail	N
0X3F	WFP14 Link Fail	N
0X40	WFP15 Link Fail	N

0X41	WFP16 Link Fail	N
0X42	WFP1 Communication Not OK	N
0X43	WFP2 Communication Not OK	N
0X44	WFP3 Communication Not OK	N
0X45	WFP4 Communication Not OK	N
0X46	WFP5 Communication Not OK	N
0X47	WFP6 Communication Not OK	N
0X48	WFP7 Communication Not OK	N
0X49	WFP8 Communication Not OK	N
0X4A	WFP9 Communication Not OK	N
0X4B	WFP10 Communication Not OK	N
0X4C	WFP11 Communication Not OK	N
0X4D	WFP12 Communication Not OK	N
0X4E	WFP13 Communication Not OK	N
0X4F	WFP14 Communication Not OK	N
0X50	WFP15 Communication Not OK	N
0X51	WFP16 Communication Not OK	N
0X52	WFP1 Link OK	N
0X53	WFP2 Link OK	N
0X54	WFP3 Link OK	N
0X55	WFP4 Link OK	N
0X56	WFP5 Link OK	N
0X57	WFP6 Link OK	N
0X58	WFP7 Link OK	N
0X59	WFP8 Link OK	N
0X5A	WFP9 Link OK	N
0X5B	WFP10 Link OK	N
0X5C	WFP11 Link OK	N
0X5D	WFP12 Link OK	N
0X5E	WFP13 Link OK	N
0X5F	WFP14 Link OK	N
0X60	WFP15 Link OK	N
0X61	WFP16 Link OK	N
0X62	WFP1 HS Fail	N
0X63	WFP2 HS Fail	N
0X64	WFP3 HS Fail	N
0X65	WFP4 HS Fail	N
0X66	WFP5 HS Fail	N

0X67	WFP6 HS Fail	N
0X68	WFP7 HS Fail	N
0X69	WFP8 HS Fail	N
0X6A	WFP9 HS Fail	N
0X6B	WFP10 HS Fail	N
0X6C	WFP11 HS Fail	N
0X6D	WFP12 HS Fail	N
0X6E	WFP13 HS Fail	N
0X6F	WFP14 HS Fail	N
0X70	WFP15 HS Fail	N
0X71	WFP16 HS Fail	N
0X72	WFP1 HS OK	N
0X73	WFP2 HS OK	N
0X74	WFP3 HS OK	N
0X75	WFP4 HS OK	N
0X76	WFP5 HS OK	N
0X77	WFP6 HS OK	N
0X78	WFP7 HS OK	N
0X79	WFP8 HS OK	N
0X7A	WFP9 HS OK	N
0X7B	WFP10 HS OK	N
0X7C	WFP11 HS OK	N
0X7D	WFP12 HS OK	N
0X7E	WFP13 HS OK	N
0X7F	WFP14 HS OK	N
0X80	WFP15 HS OK	N
0X81	WFP16 HS OK	N
0X82	WFP Fault Reserved	-
0X83	WFP Fault Reserved	-
0X84	WFP Fault Reserved	-
0X85	WFP Fault Reserved	-
0X86	WFP Fault Reserved	-
0X87	WFP Fault Reserved	-
0X88	WFP Fault Reserved	-
0X89	WFP Fault Reserved	-
0X8A	WFP Fault Reserved	-
0X8B	WFP Fault Reserved	-
0X8C	WFP Fault Reserved	-

0X8D	WFP Fault Reserved	-
0X8E	WFP Fault Reserved	-
0X8F	WFP Fault Reserved	-
0X90	WFP Fault Reserved	-
0X91	WFP Fault Reserved	-
0X92	WFPs Synchronization Fail	N
0X93	WFPs Inter WFP Communication Mismatch	N
0X94	WFPs Inter WFP Communication fail	N
0X95	WFPs UART2 Channel Noisy	N
0X96	WFPs Fault Reserved	-
0X97	WFPs Fault Reserved	-
0X98	WFPs Fault Reserved	-
0X99	WFPs Channel A Noisy	N
0X9A	WFPs CHNL. A Cycle Start INTG. Fail	N
0X9B	WFP CHNL. A MSGS. Wrong Time Receive	N
0X9C	WFP CHNL. A MSGS. TX Timeout	N
0X9D	WFP CHNL. A OP. MSGS. INTG. Fail	N
0X9E	WFPs Fault Reserved	-
0X9F	WFPs Fault Reserved	-
0XA0	WFPs Fault Reserved	-
0XA1	WFPs Fault Reserved	-
0XA2	WFPs Fault Reserved	-
0XA3	WFPs Fault Reserved	-
0XA4	WFPs Fault Reserved	-
0XA5	WFPs Fault Reserved	-
0XA6	WFPs Channel B Noisy	N
0XA7	WFPs CHNL. B Cycle Start INTG. Fail	N
0XA8	WFP CHNL. B MSGS. Wrong Time Receive	N
0XA9	WFP CHNL. B MSGS. TX Timeout	N
0XAA	WFP CHNL. B OP. MSGS. INTG. Fail	N
0XAB	WFPs Fault Reserved	-
0XAC	WFPs Fault Reserved	-
0XAD	WFPs Fault Reserved	-
0XAE	WFPs Fault Reserved	-
0XAF	WFPs Fault Reserved	-
0XB0	WFPs Fault Reserved	-
0XB1	WFPs Fault Reserved	-
0XB2	WFPs Fault Reserved	-

0XB3	WFP CHNL. A Communication OK	N
0XB4	WFP CHNL. B Communication OK	N
0XB5	WFP CHNL. C Communication OK	N
0XB6	WFP Read back safe side fail OK	N
0XB7	WFPs POST OK	N
0XB8	COMP Channel Noisy	N
0XB9	IOCOM POST OK	N
0XBA	IOCOM Random Error	C(R)
0XBB	IOCOM Processor Exception	C(R)
0XBC	Invalid WFP Connections	C(R)
0XBD	I2C Bus Fail	N
0XBE	Power On Synch Activity Time out	C(R)
0XBF	Initialization Mode Time out	C(R)
0XC0	COMP Repeated Query Messages	N
0XC1	Repeated COMP Query Messages RCVD	N

## 12.5 Panel Processor Fault Codes

Fault Code No.	Fault Message	Fault Types
0X01	CPU Test Fail	C(R)
0X02	Program memory Test Fail	C(R)
0X03	Internal Data memory Test Fail	C(R)
0X04	Application Data memory Test Fail	C(R)
0X05	External Buses Test Fail	C(R)
0X06	Timers Test Fail	C(R)
0X07	External UART Test Fail	C(R)
0X08	I/O cards Presence Test Fail	C(R)
0X09	Application Data Version Mismatch OR System Installation ID Mismatch	C(R)
0X0A	External WDT Test Fail	C(R)
0X0B	POST Timeout	C(R)
0X0C	Configuration Test Fail	C(R)
0X0D	PSC Timeout	C(R)
0X0E	Program Flow Sequence Fail	C(R)
0X0F	Variable corruption error	C(R)
0X10	Both Output Enables Active	C(R)
0X11	FC17	-

0X12	FC18	-
0X13	FC19	-
0X14	FC20	-
0X15	FC21	-
0X16	FC22	-
0X17	FC23	-
0X18	FC24	-
0X19	FC25	-
0X1A	Power On Synchronization Fail	C(R)
0X1B	Cycle Synchronization Fail	N
0X1C	COMP Link Fail	N
0X1D	COMP Receive Fail	N
0X1E	COMP Channel Noisy	N
0X1F	Indication Message Integrity Fail	N
0X20	Request Message Integrity Fail	N
0X21	COMP Message Receive Time	N
0X22	Command Acknowledge Fail	N
0X23	Message Transmission Timeout	N
0X24	Message Receive Timeout	N
0X25	Invalid Message ID	N
0X26	Cycle Synchronization Recovered	N
0X27	COMP Channel Noisy Recovered	N
0X28	Indication Message Integrity Recovered	N
0X29	Request Message Integrity Recovered	N
0X2A	COMP Message Receive Time Recovered	N
0X2B	Command Acknowledge Recovered	N
0X2C	Message Transmission Timeout Recovered	N
0X2D	Message Receive Timeout Recovered	N
0X2E	COMP Channel Recovered	N
0X2F	Invalid Message ID Recovered	N
0X30	FC48	-
0X31	FC49	-
0X32	FC50	-
0X33	FC51	-
0X34	FC52	-
0X35	No Output Enable Active	N
0X36	Output Enable Recovered	N
0X37	FC55	-

0X38	FC56	-
0X39	FC57	-
0X3A	FC58	-
0X3B	Buttons Normalized	N
0X3C	FC60	-
0X3D	FC61	-
0X3E	FC62	-
0X3F	FC63	-
0X40	FC64	-
0X41	FC65	-
0X42	FC66	-
0X43	POST OK	N
0X44	Button Stuck	N
0X45	Button Stuck	N
0X46	Button Stuck	N

## 12.6 Input & Output WFP Fault Codes

Fault Code No.	Fault Message	Fault Types
0X01	Timer2 Fail	C(R)
0X02	Timer1 Fail	C(R)
0X03	Timer0 Fail	C(R)
0X04	CPU Test Fail	C(R)
0X05	Internal RAM Faulty	C(R)
0X06	Internal Flash Faulty	C(R)
0X07	DipSwitch Config Fail	C(R)
0X08	Uart0 Loopback Fail	N
0X09	Uart1 Loopback Fail	N
0X0A	External Bus Fail	C(R)
0X0B	Watchdog Timer Fail	C(R)
0X0C	Excess Time for Self Test	C(R)
0X0D	RLD Card Not Available	C(R)
0X0E	Intermediate Read Back Not ok	C(R)
0X0F	Relay State Read Back Not Ok	C(R)
0X10	Ch 0 Rd Bk HW Test Fail	C(R)
0X11	Ch 1 Rd Bk HW Test Fail	C(R)
0X12	Ch 2 Rd Bk HW Test Fail	C(R)

0X13	Ch 3 Rd Bk HW Test Fail	C(R)
0X14	Ch 4 Rd Bk HW Test Fail	C(R)
0X15	Ch 5 Rd Bk HW Test Fail	C(R)
0X16	Ch 6 Rd Bk HW Test Fail	C(R)
0X17	Ch 7 Rd Bk HW Test Fail	C(R)
0X18	FC24	-
0X19	Unwanted Fault Mode Entry	C(R)
0X1A	Program flow sequence fail	C(R)
0X1B	Activity time out	C(R)
0X1C	VCOR WS Drive Op Detected	C(R)
0X1D	VCOR Wrong side Failure	C(R)
0X1E	VCOR NO-NC mismatch	C(R)
0X1F	Variable corruption	C(R)
0X20	Invalid Relay Drive	C(R)
0X21	Scan Timer Faulty	C(R)
0X22	WFP activity variable corruption	C(R)
0X23	Power On Sync flag corruption	C(R)
0X24	Relay 0 Wrong side failure	C(P)
0X25	Relay 1 Wrong side failure	C(P)
0X26	Relay 2 Wrong side failure	C(P)
0X27	Relay 3 Wrong side failure	C(P)
0X28	Relay 4 Wrong side failure	C(P)
0X29	Relay 5 Wrong side failure	C(P)
0X2A	Relay 6 Wrong side failure	C(P)
0X2B	Relay 7 Wrong side failure	C(P)
0X2C	Relay 0 Intermediate Readback WSF	C(P)
0X2D	Relay 1 Intermediate Readback WSF	C(P)
0X2E	Relay 2 Intermediate Readback WSF	C(P)
0X2F	Relay 3 Intermediate Readback WSF	C(P)
0X30	Relay 4 Intermediate Readback WSF	C(P)
0X31	Relay 5 Intermediate Readback WSF	C(P)
0X32	Relay 6 Intermediate Readback WSF	C(P)
0X33	Relay 7 Intermediate Readback WSF	C(P)
0X34	Output Relay 0 NO-NC mismatch	C(P)
0X35	Output Relay 1 NO-NC mismatch	C(P)
0X36	Output Relay 2 NO-NC mismatch	C(P)
0X37	Output Relay 3 NO-NC mismatch	C(P)
0X38	Output Relay 4 NO-NC mismatch	C(P)



0X39	Output Relay 5 NO-NC mismatch	C(P)
0X3A	Output Relay 6 NO-NC mismatch	C(P)
0X3B	Output Relay 7 NO-NC mismatch	C(P)
0X3C	VCOR Drive Op Fail	C(P)
0X3D	VCOR Safe side Failure	C(P)
0X3E	Relay 0 Safe side failure	N
0X3F	Relay 1 Safe side failure	N
0X40	Relay 2 Safe side failure	N
0X41	Relay 3 Safe side failure	N
0X42	Relay 4 Safe side failure	N
0X43	Relay 5 Safe side failure	N
0X44	Relay 6 Safe side failure	N
0X45	Relay 7 Safe side failure	N
0X46	Relay 0 Intermediate Readback SSF	N
0X47	Relay 1 Intermediate Readback SSF	N
0X48	Relay 2 Intermediate Readback SSF	N
0X49	Relay 3 Intermediate Readback SSF	N
0X4A	Relay 4 Intermediate Readback SSF	N
0X4B	Relay 5 Intermediate Readback SSF	N
0X4C	Relay 6 Intermediate Readback SSF	N
0X4D	Relay 7 Intermediate Readback SSF	N
0X4E	Input Relay 0 Readback mismatch	N
0X4F	Input Relay 1 Readback mismatch	N
0X50	Input Relay 2 Readback mismatch	N
0X51	Input Relay 3 Readback mismatch	N
0X52	Input Relay 4 Readback mismatch	N
0X53	Input Relay 5 Readback mismatch	N
0X54	Input Relay 6 Readback mismatch	N
0X55	Input Relay 7 Readback mismatch	N
0X56	FC86	-
0X57	FC87	-
0X58	FC88	-
0X59	FC89	-
0X5A	FC90	-
0X5B	Cycle Sync Fail	N
0X5C	Inter WFP Exchg Mismatch	N
0X5D	Inter WFP Communication fail	N
0X5E	Inter WFP Comm channel noisy	N

0X5F	FC95	-
0X60	FC96	-
0X61	FC97	-
0X62	Channel-A Noisy	N
0X63	Chnl-A Cycle Start Integrity Fail	N
0X64	Chnl-A Msg Wrong time Receive	N
0X65	Chnl-A Msg Tx Timeout	N
0X66	Chnl-A OpMsg Integrity Fail	N
0X67	FC103	-
0X68	FC104	-
0X69	FC105	-
0X6A	FC106	-
0X6B	FC107	-
0X6C	FC108	-
0X6D	FC109	-
0X6E	FC110	-
0X6F	Channel-B Noisy	N
0X70	Chnl-B Cycle Start Integrity Fail	N
0X71	Chnl-B Msg Wrong time Receive	N
0X72	Chnl-B Msg Tx Timeout	N
0X73	Chnl-B OpMsg Integrity Fail	N
0X74	FC116	-
0X75	FC117	-
0X76	FC118	-
0X77	FC119	-
0X78	FC120	-
0X79	FC121	-
0X7A	FC122	-
0X7B	FC123	-
0X7C	Chnl-A Comm Recovered	N
0X7D	Chnl-B Comm Recovered	N
0X7E	Inter WFP Comm Recovered	N
0X7F	Safe side failure Recovered	N
0X80	POST OK	N

## 13 Troubleshooting

This section provides the troubleshooting actions to be taken for the fault codes observed on each Module.

### 13.1 Supervisory Processor Troubleshooting Information

Fault Code.	Fault Message	Troubleshooting Action
0X01	CPU Test Fail	<ul style="list-style-type: none"> <li>Switch ON the power input to the corresponding CVC card, through the pushbutton switch on the CVHM card, and check.</li> <li>If the problem persists, replace the CVC Card (<i>Refer MEI-633 Installation and Commissioning Manual</i>)</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X02	INT. Flash Test Fail	
0X03	TIMERS Test Fail	
0X04	INT. RAM Test Fail	
0X05	INT. BUS Test Fail	
0X06	EXT. BUS Test Fail	
0X07	App. Data Flash Test Fail	
0X08	VP1 DPRAM Test Fail	
0X09	VP2 DPRAM Test Fail	
0X0A	EXT. WDT Test Fail	
0X0B	DIP Switch Setting Mismatch	
0X0C	POST Timer Test Fail	
0X13	PSC Timeout	
0X15	POST Time Out	
0X16	System Installation Id Mismatch	
0X17	Yard Data Ver Id Mismatch	
0X24	SVP status conflict	
0X4B	WFM Output Data Compare Fail	
0X4C	IND. Data Compare Fail	
0X4D	INT. Relay Data Compare Fail	
0X4E	Timer Relay Data Compare Fail	
0X50	WFM Output Message Verification Fail	
0X51	IND. Message1 Verification Fail	
0X52	IND. Message2 Verification Fail	
0X53	IND. Message3 Verification Fail	

0X54	PP Request Message Verification Fail	
0X55	VDU Request Message Verification Fail	
0X5F	Random Error	
0X0D	Program Flow Check Fail	<ul style="list-style-type: none"> <li>After restart, if the system continues to function normally, ignore the fault.</li> <li>If CVC shuts down due to the repeated occurrence of the same fault, Switch ON the power input to the corresponding CVC card, through the pushbutton switch on the CVHM card, and check.</li> <li>If the problem persists, replace the CVC Card. (<i>Refer MEI-633 Installation and Commissioning Manual</i>)</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X0E	RTC RAM Test Fail	
0X0F	I2C BUS Test Fail	
0X18	Cyc Timer Overflow	
0X1B	CY. Interrupt In Fail	
0X1C	SVP Seq. Number. Mismatch	
0X22	VP1 Health Fail	
0X23	VP2 Health Fail	
0X25	Unresolved status	
0X26	COMP active cyclic interrupt NA	
0X27	Power On Synch Fail	
0X29	Both COMPS Not Available	
0X2A	Synchronization Fail	
0X56	Exception Fault	
0X57	Data Read From RTC Fail	
0X58	I2C Bus Access Fail	
0X59	Data Log Flash read pointer Mismatch	
0X5A	Data Log Flash Write pointer Mismatch	
0X5B	Data Log Flash Operation Timeout	
0X5C	Data Log Flash Block Erase Fail	
0X5E	DPRAM CRC Fail	
0X1D	Invalid Pulse Received	<ul style="list-style-type: none"> <li>Indicates that Pulse Width of the Cyclic Interrupt Input is not ok. Check the other CVC Card.</li> </ul>
0X1E	COMPA Mode Invalid	<ul style="list-style-type: none"> <li>If the same Fault code is observed in both CVC cards, check corresponding</li> </ul>

0X1F	COMPB Mode Invalid	<p>Communication Processor.</p> <ul style="list-style-type: none"> <li>If the Fault is observed only in this CVC, Switch ON the power input to the corresponding CVC card, through the pushbutton switch on the CVHM card, and check.</li> <li>If the problem persists, replace the CVC Card. <i>(Refer MEI-633 Installation and Commissioning Manual)</i></li> <li>If the problem still persists, call Service Engineer</li> </ul>
0X20	COMPA Health Fail	
0X21	COMPB Health Fail	
0X31	MT. Link Fail	<ul style="list-style-type: none"> <li>Check the Cable connections between SVP and MT or DL or FP.</li> <li>Switch OFF and switch ON the power input to the corresponding CVC and check.</li> <li>If the problem persists, replace the CVC Card. <i>(Refer MEI-633 Installation and Commissioning Manual)</i></li> <li>If the problem still persists, call Service Engineer</li> </ul>
0X33	MT. Channel Noisy	
0X34	DL. Link Fail	
0X36	DL. Channel Noisy	
0X37	FP. Link Fail	
0X39	FP. Channel Noisy	
0X10	INT UART0 Lpback Tst Fail	
0X11	EXT UART CH A Lpback Tst Fail	
0X12	EXT UART CH B Lpback Tst Fail	
0X44	VP1 DPRAM Semaphore Lock Fail	<ul style="list-style-type: none"> <li>If any data comparison result or message verification checks are caused due to this fault, switch OFF and switch ON the power input to the corresponding CVC and check.</li> <li>If the problem persists, replace the CVC Card. <i>(Refer MEI-633 Installation and Commissioning Manual)</i></li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X45	VP1 DPRAM Semaphore Release Fail	
0X46	VP2 DPRAM Semaphore Lock Fail	
0X47	VP2 DPRAM Semaphore Release Fail	
0X48	WFM Input Data Compare Fail	

0X49	PP Input Data Compare Fail	<ul style="list-style-type: none"> <li>This fault may be due to non-availability of data from the corresponding module. If the corresponding module is available, switch OFF and switch ON the power input to the CVC and check.</li> </ul>
0X4A	VDU Input Data Compare Fail	<ul style="list-style-type: none"> <li>If the problem persists, replace the CVC Card. (<i>Refer MEI-633 Installation and Commissioning Manual</i>)</li> <li>If the problem still persists, call Service Engineer</li> </ul>

## 13.2 Vital Processor Troubleshooting Information

Fault Code No.	Fault Message	Troubleshooting Action
0X01	POST Check Timer Test Fail	<ul style="list-style-type: none"> <li>Switch ON the power input to the corresponding CVC card, through the pushbutton on the CVHM card, and check.</li> <li>If the problem persists, replace the CVC Card. (<i>Refer MEI-633 Installation and Commissioning Manual</i>)</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X02	CPU Test Fail	
0X03	RAM Test Fail	
0X04	INT Flash Test Fail	
0X05	Timers Test Fail	
0X06	SVP DPRAM Test Fail	
0X07	Application Data Flash Test Fail	
0X09	POST Perform Fault	
0X0A	POST Timeout	
0X0D	COMP A and B DPRAM Tests Fail	
0X1A	Invalid VP Channel No.	
0X1B	Invalid VIC No.	
0X1E	Cyclic Interrupt Timeout	
0X23	SVP Cyclic Intr. Sts Conflict	
0X0B	Program Flow Check Fail	<ul style="list-style-type: none"> <li>After restart, if the system continues to function normally, ignore the fault.</li> <li>If CVC shuts down due to the repeated occurrence of the same fault, Switch ON the power</li> </ul>
0X0C	PSC Timeout	
0X1F	Power On Sync Fail	
0X20	Invalid SVP Sequence No.	
0X21	Cyclic Synchronization Fail	
0X22	Invalid Pulse Width	
0X24	SVP DHS Fail	

0X25	Cyclic Activity Timeout	<p>input to the corresponding CVC card, through the pushbutton on the CVHM card, and check.</p> <ul style="list-style-type: none"><li>If the problem persists, replace the CVC Card. <i>(Refer MEI-633 Installation and Commissioning Manual)</i></li><li>If the problem still persists, call Service Engineer.</li></ul>
0X26	Sync. Mode Change Fail	
0X2E	Invalid Relay No.	
0X2F	Invalid Relay State	
0X30	Invalid Logical Operator	
0X31	Illegal Equation Offset	
0X32	END EQN Not Found	
0X35	IND Data CMP Fail	
0X36	IND Msg1 Verf Rslts Fail	
0X37	IND Msg2 Verf Rslts Fail	
0X38	IND Msg3 Verf Rslts Fail	
0X3E	Activity Variable Corrupted	
0X3F	Exception Occurred	
0X40	Variable Corruption	
0X67	WFM OP Data CMP Rslts Fail - WFM	
0X68	WFM OP Msg VERF Rslts Fail - WFM	
0X7C	PP Req Msg VERF Rslts Fail - PP	
0X90	VDU Req Msg VERF Rslts Fail - VDU	
0X0F	COMP A DPRAM Test Fail	
0X10	COMP B DPRAM Test Fail	
0X11	SVP DPR Data CRC Check Fail	<ul style="list-style-type: none"><li>If the Fault is observed only in this CVC, Switch ON the power input to the corresponding CVC card, through the pushbutton on the CVHM card, and check.</li><li>If the problem persists, replace the CVC Card. <i>(Refer MEI-633 Installation and Commissioning Manual)</i></li><li>If the problem still persists, call Service Engineer.</li></ul>
0X12	COMP A DPR Data CRC Check Fail	
0X13	COMP B DPR Data CRC Check Fail	
0X42	SVP DPR SEM ACQ Fail - SEM	<ul style="list-style-type: none"><li>If the fault is immediately recovered, as indicated by the recovery code, it may be a transient fault.</li></ul>
0X43	COMP A DPR SEM ACQ Fail- SEM	
0X44	COMP B DPR SEM ACQ Fail - SEM	

0X45	SVP DPR SEM RLSE Fail - SEM	<ul style="list-style-type: none"> <li>If the fault code is observed frequently, replace the CVC Card. (<i>Refer MEI-633 Installation and Commissioning Manual</i>)</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X46	COMP A DPR SEM RLSE Fail - SEM	
0X47	COMP B DPR SEM RLSE Fail - SEM	
0X27	COMP A DHS Fail	
0X28	COMP B DHS Fail	
0X4E	OC CHNL A IP WFM Msg NA - OC	<ul style="list-style-type: none"> <li>Indicates that the Messages from the corresponding Module may not be available.</li> <li>Check the corresponding Module communication link. If it is OK, Switch OFF and switch ON the CVC card and check.</li> <li>If the problem persists, replace the CVC Card. (<i>Refer MEI-633 Installation and Commissioning Manual</i>)</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X4F	OC CHNL B IP WFM Msg NA - OC	
0X50	OC CHNL A OP WFM Msg NA - OC	
0X51	OC CHNL B OP WFM Msg NA - OC	
0X5A	WFM CHNL A OP RB Msg NA - WFM	
0X5B	WFM CHNL B OP RB Msg NA - WFM	
0X58	WFM CHNL A IP Msg NA - WFM	
0X59	WFM CHNL B IP Msg NA - WFM	
0X71	PP CHNL A IP Msg NA - PP	
0X72	PP CHNL B IP Msg NA - PP	
0X85	VDU CHNL A IP Msg NA - VDU	
0X86	VDU CHNL B IP Msg NA - VDU	
0X56	WFM CHNL A IP/RB Msg DHS Fail - WFM	<ul style="list-style-type: none"> <li>Indicates that the corresponding module may not be OK.</li> <li>If the corresponding WFM/ PP/ VDU is healthy, Switch OFF and switch ON the CVC and check.</li> <li>If the problem persists, replace the CVC Card. (<i>Refer MEI-633 Installation and Commissioning Manual</i>)</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X57	WFM CHNL B IP/RB Msg DHS Fail - WFM	
0X5C	WFM CHNL A IP/RB Msg Intg Fail - WFM	
0X5D	WFM CHNL B IP/RB Msg Intg Fail - WFM	
0X66	WFM IP/RB Data CMP Rslts Fail - WFM	
0X6F	PP CHNL A IP Msg DHS Fail - PP	
0X70	PP CHNL B IP Msg DHS Fail - PP	
0X73	PP CHNL A IP Msg Intg Fail - PP	
0X74	PP CHNL B IP Msg Intg Fail - PP	
0X7B	PP Input Data CMP Rslts Fail - PP	
0X83	VDU CHNL A IP Msg DHS Fail - VDU	



0X84	VDU CHNL B IP Msg DHS Fail - VDU	
0X87	VDU CHNL A IP Msg Intg Fail - VDU	
0X88	VDU CHNL B IP Msg Intg Fail - VDU	
0X8F	VDU Input Data CMP Rslts Fail - VDU	
0X91	Invalid Panel Setting	<ul style="list-style-type: none"> <li>Set any one of PP /VDU to Indication Mode which is not used for Route setting</li> </ul>
0X92	No Command Panel Available	<ul style="list-style-type: none"> <li>Switch ON the PP/VDU</li> </ul>
0X93	Both PP and VDU are Indication Panels	<ul style="list-style-type: none"> <li>Switch-on the PP/VDU Module or both Modules</li> <li>After restart, if the system continues to function normally, ignore the fault.</li> <li>If the problem persists, replace the CVC Card.</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X9C	Invalid Lamp Aspect - SIG	<ul style="list-style-type: none"> <li>Check corresponding Signal or the Input WFM.</li> </ul>
0X9D	Signal Blank - SIG	
0X9E	HR Relay Drive Fail - SIG	<ul style="list-style-type: none"> <li>Check the Output WFM to which corresponding Signal is connected.</li> </ul>
0X9F	DR Relay Drive Fail - SIG	
0XA0	HHR Relay Drive Fail - SIG	
0XAB	Point Detection Failed - PT	
0XA7	Invalid Point Detection - PT	<ul style="list-style-type: none"> <li>Check corresponding Input WFM or the Point.</li> <li>If the problem persists, replace the CVC card. (<i>Refer MEI-633 Installation and Commissioning Manual</i>)</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X98	HR Wrong Side Fail - SIG	
0X99	DR Wrong Side Fail - SIG	
0X9A	HHR Wrong Side Fail - SIG	

### 13.3 Communication Processor Troubleshooting Information

Fault Code No.	Fault Message	Troubleshooting Action
0X01	CPU Test Fail	<ul style="list-style-type: none"> <li>Switch ON the power input to the corresponding CCC card, through the pushbutton switch on the CVHM card, and check.</li> <li>If the problem persists, replace the CCC card. . (Refer MEI-633 Installation and Commissioning Manual)</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X02	TIMERS Test Fail	
0X03	INT. Flash Test Fail	
0X04	INT. RAM Test Fail	
0X05	POST Timer Test Fail	
0X06	EXT. WDT Test Fail	
0X07	VP1A DPRAM Test Fail	
0X08	VP2A DPRAM Test Fail	
0X09	VP1B DPRAM Test Fail	
0X0A	VP2B DPRAM Test Fail	
0X0B	INT. BUS Test Fail	
0X0C	EXT. BUS Test Fail	
0X0D	EXT. Flash Test Fail	
0X0E	DIP Switch Setting Mismatch	
0X0F	POST Timeout	
0X1E	System Installation Id Mismatch	
0X1F	Yard Data Version Id Mismatch	
0X28	CY. Interrupt A Received In Wrong Time	
0X29	CY. Interrupt B Received In Wrong Time	
0X31	VIC Act Stby status Conflict	
0X6E	Random Error	
0X10	Program Flow Check Fail	<ul style="list-style-type: none"> <li>After restart, if the system continues to function normally, ignore the fault.</li> <li>If CCC shuts down due to the repeated occurrence of the same fault, Switch ON the power input to the corresponding CCC card, through the pushbutton switch on the CVHM card, and check.</li> <li>If the problem persists, replace the CCC card. . (Refer MEI-633 Installation</li> </ul>
0X24	Cyc Interrupt Timeout	
0X25	Active VIC CY. Interrupt Not Available	
0X26	Active VIC Not Available	
0X27	Both VICs Not Available	
0X2A	VICs Seq. Number. Mismatch	
0X36	Both VICs Health Fail	
0X37	CY. Timer Overflow	
0X3A	First CY. Interrupt Received in Wrong Time	

0X3B	Both CY. Interrupts Not Available	<i>and Commissioning Manual)</i> <ul style="list-style-type: none"> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X49	PSC Timeout	
0X55	Exception Fault	
0X2B	VICA Health Fail	<ul style="list-style-type: none"> <li>If the same Fault code is observed in both CCC cards, check corresponding CVC Card.</li> <li>If the Fault is observed only in this COMP, Switch OFF and Switch ON the power input to the corresponding CCC card, through the pushbutton switch on the CVHM card, and check.</li> <li>If the problem persists, replace the CCC Card. . <i>(Refer MEI-633 Installation and Commissioning Manual)</i></li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X2C	VICB Health Fail	
0X2D	VICA Mode Invalid	
0X2E	VICB Mode Invalid	
0X2F	Invalid Pulse received from Channel0	
0X30	Invalid Pulse received from Channel1	
0X32	VP1A SYNC. Data Not Written	
0X33	VP1B SYNC. Data Not Written	
0X34	VP2A SYNC. Data Not Written	
0X35	VP2B SYNC. Data Not Written	
0X11	EXT. UART0 Loopback Test Fail	<ul style="list-style-type: none"> <li>Check whether all the connectors between CIU and OCM/PP-VDU are firmly fixed.</li> <li>Switch OFF and switch ON the system and check.</li> <li>If the problem persists, replace the CCC card. . <i>(Refer MEI-633 Installation and Commissioning Manual)</i></li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X12	EXT. UART1 Loopback Test Fail	
0X13	EXT. UART2 Loopback Test Fail	
0X14	EXT. UART3 Loopback Test Fail	
0X15	EXT. UART4 Loopback Test Fail	
0X16	EXT. UART5 Loopback Test Fail	
0X17	EXT. UART6 Loopback Test Fail	
0X18	EXT. UART7 Loopback Test Fail	
0X19	EXT. UART8 Loopback Test Fail	
0X1A	EXT. UART9 Loopback Test Fail	
0X1B	EXT. UART10 Loopback Test Fail	
0X1C	EXT. UART11 Loopback Test Fail	
0X3E	IOCOM Port0 Fail	
0X3F	IOCOM Port1 Fail	
0X40	IOCOM Port2 Fail	
0X41	IOCOM Port3 Fail	
0X42	IOCOM Port4 Fail	

0X43	IOCOM Port5 Fail	
0X44	IOCOM Port6 Fail	
0X45	IOCOM Port7 Fail	
0X46	PP/VDU Port Fail	
0X70	Link Fail - IOCOM	
0X71	Channel Noisy - IOCOM	
0X7A	Link Fail - PP	
0X7B	Channel Noisy - PP	
0X84	Link Fail - VDU	
0X85	Channel Noisy – VDU	
0X56	VP1A DPRAM Semaphore Lock Fail	<ul style="list-style-type: none"> <li>If no other fault code is observed in corresponding VP, it may be transient fault.</li> <li>If the fault code is observed frequently, replace the corresponding CVC Card. . (Refer MEI-633 Installation and Commissioning Manual)</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X57	VP1B DPRAM Semaphore Lock Fail	
0X58	VP2A DPRAM Semaphore Lock Fail	
0X59	VP2B DPRAM Semaphore Lock Fail	
0X5A	VP1A DPRAM Semaphore Release Fail	
0X5B	VP1B DPRAM Semaphore Release Fail	
0X5C	VP2A DPRAM Semaphore Release Fail	
0X5D	VP2B DPRAM Semaphore Release Fail	
0X5E	VP1A DPRAM CRC Comparison Fail	
0X5F	VP1B DPRAM CRC Comparison Fail	
0X60	VP2A DPRAM CRC Comparison Fail	<ul style="list-style-type: none"> <li>Check the corresponding CVC Card. If the CVC is healthy, Switch OFF and switch ON the power input to the corresponding CCC card, through the pushbutton switch on the CVHM card, and check.</li> </ul>
0X61	VP2B DPRAM CRC Comparison Fail	
0X62	VP1A Output Message Not Available	
0X63	VP2A Output Message Not Available	
0X64	VP1B Output Message Not Available	
0X65	VP2B Output Message Not Available	

0X66	VP1A IND. Message1 Not Available	<ul style="list-style-type: none"> <li>If the problem persists, replace the CCC card. (<i>Refer MEI-633 Installation and Commissioning Manual</i>)</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X67	VP1A IND. Message2 Not Available	
0X68	VP1A IND. Message3 Not Available	
0X69	VP1B IND. Message1 Not Available	
0X6A	VP1B IND. Message2 Not Available	
0X6B	VP1B IND. Message3 Not Available	
0X6C	VP1A PP/VDU Req. Message Not Available	
0X6D	VP1B PP/VDU Req. Message Not Available	
0X72	PSC Fail - IOCOM	<ul style="list-style-type: none"> <li>Check the corresponding IOCOM Module.</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X75	WFM Config. Mismatch – IOCOM	<ul style="list-style-type: none"> <li>Check the DIP Switch Settings in the corresponding IOCOM.</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X7C	PSC Fail - PP	<ul style="list-style-type: none"> <li>Check the corresponding PP Module.</li> <li>If the problem still persists, call Service Engineer.</li> </ul>

## 13.4 Panel Processor Troubleshooting Information

Fault Code No.	Fault Message	Troubleshooting Action
0X01	CPU Test Fail	<ul style="list-style-type: none"> <li>Switch OFF and switch ON the power input to the PCC card and check.</li> <li>If the problem persists, replace the PCC card. (<i>Refer MEI-633 Installation and Commissioning Manual</i>)</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X02	Program memory Test Fail	
0X03	Internal Data memory Test Fail	
0X04	Application Data memory Test Fail	
0X05	External Buses Test Fail	
0X06	Timers Test Fail	
0X07	External UART Test Fail	
0X0A	External WDT Test Fail	
0X0B	POST Time Out	
0X0C	Configuration Test Fail	
0X0D	PSC Time Out	
0X0E	Program Flow Sequence Fail	
0X0F	Variable Corruption Error	
0X08	IO Cards Presence Test Fail	<ul style="list-style-type: none"> <li>Check the power input to the IO Backplane. Atleast one of the Power supplies (PSA) should be ON.</li> <li>Check whether all the Input (PIP) and Output (POP) cards are ON and the Extender Receiver card (PPRC) is ON (the power LED on the facia of the cards should be ON). If the power to any card is NOT OK, switch OFF the system and replace the faulty card with a new one.</li> <li>Check whether the connecting cables between the PP IO backplane and the CPU backplane are OK.</li> <li>Check whether the power input to the Extender driver card (PPDR) is OK (the power LED on the facia of</li> </ul>

		<p>the card should be ON).</p> <ul style="list-style-type: none"> <li>Switch OFF and switch ON the system.</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X1C	COMP Link Fail	<ul style="list-style-type: none"> <li>Check whether all the OFC connectors are firmly fixed.</li> <li>Switch OFF and switch ON the system and check.</li> <li>If the problem persists, replace the PCC card. (<i>Refer MEI-633 Installation and Commissioning Manual</i>)</li> <li>If the problem still persists, call Service Engineer</li> </ul>
0X1D	COMP Receive Fail	
0X1E	COMP Channel Noisy	
0X1F	Indication Message Integrity Fail	
0X20	Request Message Integrity Fail	
0X21	COMP Message Receive Time	
0X22	Command Acknowledge Fail	
0X23	Message Transmission Time Out	
0X24	Message Receive Time Out	
0X25	Invalid Message ID	
0X1A	Power On Synchronization Fail	
0X1B	Cycle Synchronization Fail	
0X35	No Output Enable Active	
0X44	Button Stuck	<ul style="list-style-type: none"> <li>Check whether the D-type connectors on the facia of the Input cards are firmly fixed.</li> <li>Continuously operate the corresponding button on the CCIP.</li> <li>If the problem persists, switch OFF and switch ON the system and check.</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X45	Button Stuck	
0X46	Button Stuck	
0X09	Application Data Version Mismatch OR System Installation ID Mismatch	<ul style="list-style-type: none"> <li>Switch OFF and switch ON</li> </ul>

0X10	Both Output Enables Active	<p>the system and check.</p> <ul style="list-style-type: none"> <li>If the problem persists, call Service Engineer.</li> </ul>
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### 13.5 IOCOM Processor Troubleshooting Information

Fault Code No.	Fault Message	Troubleshooting Action
0X01	POST Check Timer Test Fail	<ul style="list-style-type: none"> <li>Switch OFF and switch ON the power input to the OICC card and check.</li> <li>If the problem persists, replace the OICC card. (<i>Refer MEI-633 Installation and Commissioning Manual</i>)</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X02	CPU Test Fail	
0X03	RAM Test Fail	
0X04	INT. Flash Test Fail	
0X06	EXT. WDT Test Fail	
0X07	Timers Test Fail	
0X08	COMP UART Test Fail	
0X09	WFP UART Test Fail	
0X0A	WFP Configuration Test Fail	
0X0C	POST Timeout	
0X0D	PSC Timeout	
0X0E	Program Flow Check Word Fail	
0X0F	IOCOM Activity Corrupted	
0X10	IOCOM Mode Corrupted	
0X11	IOCOM POST Fail	
0XBA	IOCOM Random Error	
0XBB	IOCOM Processor Exception	
0xBC	Invalid WFP Connections	
0XBE	Power On Synch Activity Time out	
0XBF	Initialization Mode Time out	
0X1D	WFP Port Fail	<ul style="list-style-type: none"> <li>Check the RS485 cable connection between the Top and Bottom OCM backplanes.</li> <li>Switch OFF and switch ON the power input to the corresponding OCM and check.</li> </ul>
0X1E	WFP Channel Noisy	
0X1F	WFP Message Transmission Fail	
0X20	WFP Message Receive Timeout	
0X99	WFPs Channel A Noisy	
0X9C	WFP CHNL. A MSGS. TX Timeout	
0XA6	WFPs Channel B Noisy	



0XA9	WFP CHNL. B MSGS. TX Timeout	<ul style="list-style-type: none"> <li>If the problem persists, replace the OICC card. (Refer <i>MEI-633 Installation and Commissioning Manual</i>)</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X13	IOCOM Sync Fail	<ul style="list-style-type: none"> <li>Check whether all the OFC connectors between Ring Modems, RS-485 connectors at both COMP and IOCOM end are firmly fixed.</li> <li>Switch OFF and switch ON the system and check.</li> <li>If the problem persists, replace the OICC card. (Refer <i>MEI-633 Installation and Commissioning Manual</i>)</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X15	COMP Message Receive Time Invalid	
0X16	COMP Message Receive Timeout	
0X18	No Output Telegram Received	
0X19	No Input Telegram Request Received	
0X1A	No Output RDBK. REQ. Message Received	
0XB8	COMP Channel Noisy	
0XC0	COMP Repeated Query messages	
0X22	WFP1 Connectivity Status Not OK	<ul style="list-style-type: none"> <li>Switch OFF and switch ON the power input to the corresponding OCM and check.</li> <li>Check the RS485 cable connection between the Top and Bottom OCM backplanes.</li> <li>If the problem persists, replace the OICC card. If the problem is not solved, replace the corresponding WFP CPU card. (Refer <i>MEI-633 Installation and Commissioning Manual</i>)</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X23	WFP2 Connectivity Status Not OK	
0X24	WFP3 Connectivity Status Not OK	
0X25	WFP4 Connectivity Status Not OK	
0X26	WFP5 Connectivity Status Not OK	
0X27	WFP6 Connectivity Status Not OK	
0X28	WFP7 Connectivity Status Not OK	
0X29	WFP8 Connectivity Status Not OK	
0X2A	WFP9 Connectivity Status Not OK	
0X2B	WFP10 Connectivity Status Not OK	
0X2C	WFP11 Connectivity Status Not OK	
0X2D	WFP12 Connectivity Status Not OK	
0X2E	WFP13 Connectivity Status Not OK	
0X2F	WFP14 Connectivity Status Not OK	
0X30	WFP15 Connectivity Status Not OK	
0X31	WFP16 Connectivity Status Not OK	
0X32	WFP1 Link Fail	
0X33	WFP2 Link Fail	

0X34	WFP3 Link Fail
0X35	WFP4 Link Fail
0X36	WFP5 Link Fail
0X37	WFP6 Link Fail
0X38	WFP7 Link Fail
0X39	WFP8 Link Fail
0X3A	WFP9 Link Fail
0X3B	WFP10 Link Fail
0X3C	WFP11 Link Fail
0X3D	WFP12 Link Fail
0X3E	WFP13 Link Fail
0X3F	WFP14 Link Fail
0X40	WFP15 Link Fail
0X41	WFP16 Link Fail
0X42	WFP1 Communication Not OK
0X43	WFP2 Communication Not OK
0X44	WFP3 Communication Not OK
0X45	WFP4 Communication Not OK
0X46	WFP5 Communication Not OK
0X47	WFP6 Communication Not OK
0X48	WFP7 Communication Not OK
0X49	WFP8 Communication Not OK
0X4A	WFP9 Communication Not OK
0X4B	WFP10 Communication Not OK
0X4C	WFP11 Communication Not OK
0X4D	WFP12 Communication Not OK
0X4E	WFP13 Communication Not OK
0X4F	WFP14 Communication Not OK
0X50	WFP15 Communication Not OK
0X51	WFP16 Communication Not OK
0X62	WFP1 HS Fail
0X63	WFP2 HS Fail
0X64	WFP3 HS Fail
0X65	WFP4 HS Fail
0X66	WFP5 HS Fail
0X67	WFP6 HS Fail
0X68	WFP7 HS Fail
0X69	WFP8 HS Fail

0X6A	WFP9 HS Fail	
0X6B	WFP10 HS Fail	
0X6C	WFP11 HS Fail	
0X6D	WFP12 HS Fail	
0X6E	WFP13 HS Fail	
0X6F	WFP14 HS Fail	
0X70	WFP15 HS Fail	
0X71	WFP16 HS Fail	
0X93	WFPs Inter WFP Communication Mismatch	
0X94	WFPs Inter WFP Communication fail	
0X95	WFPs UART2 Channel Noisy	
0X9A	WFPs CHNL. A Cycle Start INTG. Fail	
0X9B	WFP CHNL. A MSGS. Wrong Time Receive	
0X9D	WFP CHNL. A OP. MSGS. INTG. Fail	
0XA7	WFPs CHNL. B Cycle Start INTG. Fail	
0XA8	WFP CHNL. B MSGS. Wrong Time Receive	
0XAA	WFP CHNL. B OP. MSGS. INTG. Fail	
0XBC	Invalid WFP Connections	<ul style="list-style-type: none"> <li>Problem may be due to DIP Switch settings in OICC.</li> <li>Switch OFF and Switch ON the OC and check</li> </ul>
0X14	WFM Configuration Mismatch	

### 13.6 Input and Output WFP Troubleshooting Information

Fault Code No.	Fault Message	Troubleshooting Action
0X01	Timer2 Fail	<ul style="list-style-type: none"> <li>Switch OFF and switch ON the power input to the corresponding OCM and check.</li> </ul>
0X02	Timer1 Fail	
0X03	Timer0 Fail	
0X04	Cpu Test Fail	
0X05	Internal RAM Faulty	

0X06	Internal Flash Faulty	<ul style="list-style-type: none"> <li>If the problem persists, replace the corresponding WFP CPU card. (<i>Refer MEI-633 Installation and Commissioning Manual</i>)</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X07	DipSwitch Config Fail	
0X08	Uart0 Loopback Fail	
0X09	Uart1 Loopback Fail	
0X0A	External Bus Fail	
0X0B	Watchdog Timer Fail	
0X0C	Excess Time for Self Test	
0X10	Ch 0 Toggle Test Failed	
0X11	Ch 1 Toggle Test Failed	
0X12	Ch 2 Toggle Test Failed	
0X13	Ch 3 Toggle Test Failed	
0X14	Ch 4 Toggle Test Failed	
0X15	Ch 5 Toggle Test Failed	
0X16	Ch 6 Toggle Test Failed	
0X17	Ch 7 Toggle Test Failed	
0X19	Unwanted Fault Mode Entry	
0X1A	Program flow sequence fail	
0X1B	Activity time out	
0X1F	Variable corruption	
0X20	Invalid Relay Drive	
0X21	Scan Timer Faulty	
0X22	WFP activity variable corruption	
0X23	Power On Sync flag corruption	
0X5B	Cycle Sync Fail	
0X5C	Inter WFP Exchg Mismatch	
0X5D	Inter WFP Communication fail	
0X5E	UART2 channel noisy	
0X0D	RLD Card Not Available	<ul style="list-style-type: none"> <li>Switch OFF and switch ON the power input to the corresponding OCM and check.</li> <li>If the problem persists, switch OFF the power to the OCM, remove the ORLD card from the backplane, re-insert the</li> </ul>
0X0E	Intermediate Read Back Not ok	
0X2C	Relay 0 Intermediate Readback WSF	
0X2D	Relay 1 Intermediate Readback WSF	

0X2E	Relay 2 Intermediate Readback WSF	<p>card and check.</p> <ul style="list-style-type: none"> <li>If the problem persists, replace the corresponding ORLD card with a new one. (<i>Refer MEI-633 Installation and Commissioning Manual</i>)</li> <li>If the problem persists, replace the Output CPU card (OCCO) with a new one. (<i>Refer MEI-633 Installation and Commissioning Manual</i>)</li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X2F	Relay 3 Intermediate Readback WSF	
0X30	Relay 4 Intermediate Readback WSF	
0X31	Relay 5 Intermediate Readback WSF	
0X32	Relay 6 Intermediate Readback WSF	
0X33	Relay 7 Intermediate Readback WSF	
0X46	Relay 0 Intermediate Readback SSF	
0X47	Relay 1 Intermediate Readback SSF	
0X48	Relay 2 Intermediate Readback SSF	
0X49	Relay 3 Intermediate Readback SSF	
0X4A	Relay 4 Intermediate Readback SSF	
0X4B	Relay 5 Intermediate Readback SSF	
0X4C	Relay 6 Intermediate Readback SSF	
0X4D	Relay 7 Intermediate Readback SSF	

0X0F	Relay State Read Back Not Ok	<ul style="list-style-type: none"> <li>Check the Relay wiring and rectify the fault, if any.</li> <li>Check the Relay and visually ensure the correct state.</li> <li>Check the Relay connections in the OCM and rectify any loose/open contacts or shorts.</li> <li>If the problem persists, replace the corresponding Output CPU card (OCCO) with a new one. <i>(Refer MEI-633 Installation and Commissioning Manual)</i></li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X1C	VCOR WS Drive Op Detected	<ul style="list-style-type: none"> <li>Switch OFF and switch ON the power input to the corresponding OCM and check.</li> <li>If the problem persists, replace the Vital cut-off card (OVCO) with a new one. <i>(Refer MEI-633 Installation and Commissioning Manual)</i></li> </ul>
0X3C	VCOR Drive Op Fail	<ul style="list-style-type: none"> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X1D	VCOR Wrongside Failure	<ul style="list-style-type: none"> <li>Check wiring to the VCOR for any shorts and rectify the fault, if any.</li> <li>Check the VCOR and visually</li> </ul>

0X1E	VCOR NO-NC mismatch	<p>ensure the correct state.</p> <ul style="list-style-type: none"> <li>Switch OFF and switch ON the power input to the corresponding OCM and check.</li> <li>If the problem persists, replace the OVCO with a new one. <i>(Refer MEI-633 Installation and Commissioning Manual)</i></li> </ul>
0X3D	VCOR Safeside Failure	<ul style="list-style-type: none"> <li>If the problem persists, replace the corresponding Output CPU card (OCCO) with a new one. <i>(Refer MEI-633 Installation and Commissioning Manual)</i></li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X24	Relay 0 Wrong side failure	<ul style="list-style-type: none"> <li>Check the Relay wiring and rectify the fault, if any.</li> <li>Check the Relay and visually ensure the correct state.</li> <li>Check the Relay connections in the OCM and rectify any loose/open contacts or shorts.</li> <li>Check the Relay drive indication LED on the facia of the ORLD card. If wrong indication is shown, replace the corresponding ORLD card . <i>(Refer MEI-633 Installation and Commissioning Manual)</i></li> <li>If the problem persists, replace the corresponding Output CPU card (OCCO). <i>(Refer MEI-633 Installation and Commissioning Manual)</i></li> <li>If the problem still persists,</li> </ul>
0X25	Relay 1 Wrong side failure	
0X26	Relay 2 Wrong side failure	
0X27	Relay 3 Wrong side failure	
0X28	Relay 4 Wrong side failure	
0X29	Relay 5 Wrong side failure	
0X2A	Relay 6 Wrong side failure	
0X2B	Relay 7 Wrong side failure	
0X3E	Relay 0 Safe side failure	
0X3F	Relay 1 Safe side failure	
0X40	Relay 2 Safe side failure	
0X41	Relay 3 Safe side failure	
0X42	Relay 4 Safe side failure	
0X43	Relay 5 Safe side failure	

0X44	Relay 6 Safe side failure	call Service Engineer.
0X45	Relay 7 Safe side failure	
0X34	Output Relay 0 NO-NC mismatch	<ul style="list-style-type: none"> <li>Check the Relay wiring and rectify the fault, if any.</li> <li>Check the Relay and visually ensure the correct state.</li> <li>Check the Relay connections in the OCM and rectify any loose/open contacts or shorts.</li> <li>If the problem persists, Switch OFF and switch ON the OCM and check. If the problem persists, replace the corresponding OCCO card. <i>(Refer MEI-633 Installation and Commissioning Manual)</i></li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X35	Output Relay 1 NO-NC mismatch	
0X36	Output Relay 2 NO-NC mismatch	
0X37	Output Relay 3 NO-NC mismatch	
0X38	Output Relay 4 NO-NC mismatch	
0X39	Output Relay 5 NO-NC mismatch	
0X3A	Output Relay 6 NO-NC mismatch	
0X3B	Output Relay 7 NO-NC mismatch	
0X62	Channel-A Noisy	<ul style="list-style-type: none"> <li>Check the RS485 cable connection between the Top and Bottom OCM backplanes.</li> <li>Switch OFF and switch ON the power input to the corresponding OCM and check.</li> <li>If the problem persists, replace the corresponding WFP CPU card. <i>(Refer MEI-633 Installation and Commissioning Manual)</i></li> <li>If the problem still persists, call Service Engineer.</li> </ul>
0X63	Chnl-A Cycle Start Integrity Fail	
0X64	Chnl-A Msg Wrong time Receive	
0X65	Chnl-A Msg Tx Timeout	
0X66	Chnl-A OpMsg Integrity Fail	
0X6F	Channel-B Noisy	
0X70	Chnl-B Cycle Start Integrity Fail	
0X71	Chnl-B Msg Wrong time Receive	
0X72	Chnl-B Msg Tx Timeout	
0X73	Chnl-B OpMsg Integrity Fail	



0X4E	Input Relay 0 Readback mismatch	<ul style="list-style-type: none"> <li>• Check the Relay wiring and rectify the fault, if any.</li> <li>• Check the Relay and visually ensure the correct state.</li> <li>• Check the Relay connections in the OCM and rectify any loose/open contacts or shorts.</li> <li>• If the problem persists, Switch OFF and switch ON the OCM and check. If the problem persists, replace the Input CPU card. (<i>Refer MEI-633 Installation and Commissioning Manual</i>)</li> <li>• If the problem still persists, call Service Engineer.</li> </ul>
0X4F	Input Relay 1 Readback mismatch	
0X50	Input Relay 2 Readback mismatch	
0X51	Input Relay 3 Readback mismatch	
0X52	Input Relay 4 Readback mismatch	
0X53	Input Relay 5 Readback mismatch	
0X54	Input Relay 6 Readback mismatch	
0X55	Input Relay 7 Readback mismatch	