



*“MIM” & “MIM-LINK” Interface
Module and
“MIM-X” Expansion Module*

***TROUBLESHOOTING AND
CONTROLLER REPAIR
MANUAL***

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Troubleshooting & Controller Repair Manual “MIM” & “MIM-LINK” Interface Module & “MIM-X” Expansion Module

1.0 Purpose of this Guide

This guide is intended to assist Authorized Service Personnel in troubleshooting and making the necessary repairs on the MIM and MIM-X Series of MAXI Interface Modules, both “hard wired” and “wireless LINK” units. This guide is NOT intended for field troubleshooting, although certainly some of it would be applicable, but it is intended to be a guide for the “BOARD LEVEL” repair of the MIM, and MIM-X modules on the bench.

This guide does not list every possible problem that may arise. It does, however, provide the various testing procedures that are required for troubleshooting the units at the Board Level. It should enable you to isolate the problem and thus make the necessary repairs to eliminate the problem.

This guide also is intended to guide you in the proper sequence that should be taken in order to isolate and determine the problem components.

2.0 Main Components of the Module

The “MIM”, “MIM-LINK”, and “MIM-X” Interface Modules consist of the following major components:

“MIM” INTERFACE MODULE:

- 630815 – Display PC Board Assembly
- 630458 – Central Processing Unit (CPU) PC Board Assembly
- 630461 – Output PC Board Assembly
- 630832 – Transformer Assembly

“MIM-LINK” INTERFACE MODULE:

- 630815 – Display PC Board Assembly
- 632671 – Link Central Processing Unit (CPU) PC Board Assy.
- 631889 – Link Output PC Board Assembly
- 632444 – Link RF Package Assembly
- 632285 – Link Modem PC Board Assembly
- 630832 – Transformer Assembly

“MIM-X” INTERFACE EXPANSION MODULE:

- 630461 – Output PC Board Assembly
- 630882 – Transformer Assembly

For the layouts of these PC Boards, the Schematic Wiring Diagrams, and details of the assemblies – refer to the drawings and data given in the Appendix of this manual. This data will be essential in your troubleshooting and repair of the “MIM”, “MIM-LINK” and “MIM-X” Interface Modules.

3.0 Troubleshooting of Transformer, Display PC Board, Central Processing PC Board, Output PC Board, RF Radio Package and Modem PC Board.

A. *Interface Module (MIM, MIM-LINK & MIM-X) appears to be “DEAD.”*

1. Check the 1.25 AMP – fast acting FUSE that is located in the power input socket, located on the bottom of the cabinet in the left rear corner. Refer to 630779 – cabinet sub-assembly in the Appendix.

TRANSFORMER:

2. Check Power INPUT to transformer.

120 VAC transformer	105 Volts AC Min / 129 Volts AC Max
220 VAC transformer	198 Volts AC Min / 242 Volts AC Max
240 VAC transformer	216 Volts AC Min / 264 Volts AC Max
260 VAC transformer	234 Volts AC Min / 286 Volts AC Max

3. Check power OUTPUT of transformer secondary – at 10-pin plug on secondary side of transformer assembly.
 - Between pins 1 and 2 (brown wires from transformer).

Should be 26.5 Volts AC +/-
 - Between pins 3 and 4 (red wires from transformer).

Should be 26.5 volts AC +/-
 - Between pins 5 and 10 (blue wires from transformer).

Should be 11.0 Volts AC +/-
 - Between pins 8 and 9 (yellow wires from transformer).

Should be 26.5 Volts AC +/-
 - Between pins 6 and 7 (orange wires from transformer).

Should be 26.5 Volts AC +/-

OUTPUT PC BOARD:

4. Check the same pins on plug “J2” on the OUTPUT PC Board, as outlined above for the transformer 10 in secondary plug.

In all cases you should have the same voltage readings as outlined above for the 10 pin secondary plug of the transformer.
5. Check across Test Points “TP1” (+5V) and “TP2” (GND).

Should have 5.0 Volts DC +/-

3.1 Problem is suspected to be on the “CPU” PC Board

CPU PC BOARD:

1. Check 0.5 AMP Slow Blow fuse “F1”.

2. Check voltage across “LP1”.
Should have 11.0 VAC +/-
3. Check voltage between “TP5” (GND) and “TP4” (+5V).
Should have +5 Volts DC +/-
4. Check voltage between one leg of Diode “CR1” (refer to schematic wiring diagram - 630457 - for CPU PC Board) and one leg of Resistor “R1”.
Should have +5 Volts DC +/-
5. Check voltage between pin 7 (GND) and pin 14 (+5V) on chip “U1”.
Should have +5 Volts DC +/-

B. Checking MICRO-PROCESSOR “U3” on CPU PC Board

CPU PC BOARD

1. Check the voltage between pin 20 (VSS) or pin 31 (EA) and pin 40 (VCC)
Should have +5 Volts DC +/-
2. Install a known “GOOD” “U8” chip and test to observe if the problem has gone away.
3. Check the MicroProcessor “U3” with a scope. Check the following Pins in reference to ground:
 - Check pin 19 (XTAL1) to ground.
 - Check Pin 18 (XTAL2) to ground.Should have 3.6 MHz +/-
If NOT, investigate “Y1”, “C2” and “C3”.

4. Check pin 9 (RST) to ground.
Should stay "LOW"
If NOT, investigate "U4" chip.
5. Check pin 30 (ALE/PG) to ground.
Should have a somewhat Square WAVEFORM.
If NOT, investigate "U1" and "U5".
6. Check pin 29 (PSEN) to ground.
Should have some type of WAVEFORM.
7. Check pin 16 (P37/RD) to ground and check pin 17 (P37RD) to ground.

In both cases, should have some type of WAVEFORM – NOT a solid "LOW" or "HIGH".

If NOT, investigate "U9".

Also check pin 7 to ground on "J2A" connector.

Also check pin 8 to ground on "J2A" connector.

In both cases, should have some type of WAVEFORM – NOT a solid "LOW" or "HIGH".

If NOT, investigate "U9".
8. While communicating with MAXI -
 - Check pin 10 (P30/RX) to ground.
 - Check pin 11 (P31/TX) to ground.
In both cases, you should have some type of WAVEFORM.

C. Checking “U8” PROM chip

FUNCTION: ROM CHIP – “MIM” Program resides in this chip.

CPU PC BOARD

1. Check voltage between pin 14 (GND) and pin 1 (VPP) and also between pin 14 (GND) and pin 28 (VCC).

Should have +5 Volts DC +/- in each case.

2. With a scope, check the following pins in reference to ground.

➤ Check pin 20 (CE) to ground.

➤ Check pin 22 (OE) to ground.

In both cases, you should get some type of WAVEFORM, which indicates it is getting the signal but does not operate, therefore chip may be “BAD”.

Replace chip “U8”.

If replacing “U8” does NOT correct the problem – then also replace chip “U9”.

If waveform is “BAD” and you get a Solid “LOW” or “HIGH”, it indicates signal is NOT being received and chip may be OK.

Replace chip “U9”.

- In checking any of the pins 2 thru 13, pins 15 thru 19, 21, and 23 thru 26 to ground – you should have some type of WAVEFORM.

D. Checking “U9” Chip

FUNCTION: RAM CHIP – User entered DATA resides in this chip.

CPU PC BOARD

1. Check for voltage between pin 14 (GND) and pin 28 (VCC).

Should have +5 Volts DC +/-

2. With a scope, check the following pins in reference to ground.

- Check pin 20 (CE) to ground.
- Check pin 22 (RD) to ground.
- Check pin 27 (WR) to ground.

In all cases, you should get some type of WAVEFORM, which indicates it is getting the signal but does not operate, therefore chip may be “BAD”.

Replace chip “U9”.

If replacing “U9” does NOT correct the problem – then also replace chip “U8”.

If waveform is “BAD” and you get a Solid “LOW” or “HIGH”, it indicates signal is NOT being received and chip may be OK.

Replace chip “U8”.

- In checking any of the pins 1 thru 13, pins 15 thru 19, 21, and 23 thru 26 to ground – you should have some type of WAVEFORM.

E. Checking “U5” Chip

FUNCTION: 8 BIT LATCH CHIP

CPU PC BOARD

1. Check voltage between pin 10 (GND) or pin 1 (OE) and pin 20 (VCC).

Should have +5 Volts DC +/-

2. With a scope, check the following pins in reference to ground.

- Check pin 11 (LATCH) to ground.

You should have some type of WAVEFORM.

- In checking any of the pins 2 thru 9 and pins 12 thru 19 to ground

You should have some type of WAVEFORM.

F. Checking “U2” Chip

FUNCTION: INTERFACE CHIP – Dual function “Reads” and “Talks”.

CPU PC BOARD

1. Check voltage between pin 6 (GND) or pin 9 (GND) and pin 7 (VCC).

Should have +5 Volts DC +/-

2. With a scope and while communicating with MAXI – check the following pins in reference to ground:

- Check pin 2 or “TP2” to ground.
- Check pin 3 or “TP3” to ground.
- Check pin 4 to ground.
- Check pin 5 to ground.

In all cases, you should have some type of WAVEFORM.

If you see a waveform at pins 2 and 3 but DO NOT find a waveform at pins 4 and 5 – then replace “U2” chip.

G. Checking “U4” Chip

FUNCTION: MONITOR CHIP – Resets Microprocessor chip “U3”.

CPU PC BOARD

1. Check RESET breaker “S2”.
2. Check voltage between pin 4 (GND) and pin 8 (VCC).

Should have +5 Volts DC +/-

3. With a scope, check the following pins in reference to ground:

- Check pin 5 (RST) to ground.

Should stay “LOW”.

If NOT, replace “U4” chip.

- Check pin 7 (ST) to ground.

Should have some type of WAVEFORM.

3.2 Problem seems to be with OUTPUT PC Board

“MIM”, “MIM-LINK” or “MIM-X” UNITS

H. Checking “U6” Chip

FUNCTION: 8 BIT LATCH CHIP - Switches data to one of eight wire paths or Groups of Satellites.

CPU PC BOARD

1. Check voltage between pin 10 (GND) or pin 1 (OE) and pin 20 (VCC).

Should have +5 Volts DC +/-

2. With a scope, check the following pins in reference to ground.

- Check pin 11 (LATCH) to ground.

You should have some type of WAVEFORM.

- In checking any of the pins 2 thru 9 and 12 thru 19 to ground –

You should have some type of WAVEFORM.

3.3 Problem is being experienced with feedback.

“MIM”, “MIM-LINK” or “MIM-X” UNITS

I. Checking “U7” Chip

FUNCTION: INVERTING BUFFER CHIP – For Feedback Signal.

CPU PC BOARD

1. Check voltage between pin 10 (GND) and pin 20 (VCC).
Should have +5 Volts DC +/-
2. With a scope, check the following pins in reference to ground:
 - Check pin 1 (1G) or pin 19 (2G) to ground.
Should have some type of WAVEFORM.
 - Check any of the pins 2 thru 9 and 11 thru 18 to ground –
Should have some type of WAVEFORM.

3.4 Problem is suspected to be on the “OUTPUT” PC BOARD

“MIM”, “MIM-LINK” or “MIM-X” UNITS

OUTPUT PC BOARD

1. Check voltage between pin 1 or 2 and pin 14 or 15 on socket “J1” on the OUTPUT PC Board.
Should have 11 VAC +/-
For “MIM” and “MIM-X” UNITS ONLY!
2. Check voltage across legs of “LP1” – for Wire PATH 1.
Should have 26.5 VAC +/-

3. Check voltage across legs of “LP6” – for Wire PATH 2.
Should have 26.5 VAC +/-
4. Check voltage across legs of “LP11” – for Wire PATH 3.
Should have 26.5 VAC +/-
5. Check voltage across legs of “LP16” – for Wire PATH 4.
Should have 26.5 VAC +/-

J. All “LED” lights, for the four wire paths, burn “steady and very dim” or DO NOT burn at all.

For “MIM” and “MIM-X” UNITS ONLY!

ON FRONT PANEL OF UNIT

1. Check Circuit Breakers for each wire path (CB1), (CB2), (CB3) and (CB4) respectively – to see that they are in the “ON” position.

ON OUTPUT PC BOARD

2. With a scope, check each of the following test points, on each of the wire paths in question, in reference to ground:

Wire PATH #1

- Check “TP3” (ACSW1) to ground.
- Check “TP4” (FB1) to ground.

In both cases, you should have some type of WAVEFORM.

If NOT, investigate chips “U6” and “U7” on the CPU PC Board.

Wire PATH #2

- Check “TP5” (ACSW2) to ground.
- Check “TP6” (FB2) to ground.

In both cases, you should have some type of WAVEFORM.

If NOT, investigate chips “U6” and “U7” on the CPU PC Board.

Wire PATH #3

- Check “TP7” (ACSW3) to ground.
- Check “TP8” (FB3) to ground.

In both cases, you should have some type of WAVEFORM.

If NOT, investigate chips “U6” and “U7” on the CPU PC Board.

Wire PATH #4

- Check “TP9” (ACSW4) to ground.
- Check “TP10” (FB4) to ground.

In both cases, you should have some type of WAVEFORM.

If NOT, investigate chips “U6” and “U7” on the CPU PC Board.

K. Further checks of OUTPUT PC BOARD

For “MIM” and “MIM-X” UNITS ONLY!

OUTPUT PC BOARD

1. Check all Diodes for each wire path in question.
 - Wire PATH #1:
Diodes CR1, CR2, CR3, CR4, CR5, VR1 and VR2.
 - Wire PATH #2
Diodes CR6, CR7, CR8, CR9, CR10, VR3 and VR4.

- Wire PATH #3:
Diodes CR11, CR12, CR13, CR14, CR15, VR5 and VR6.
 - Wire PATH #4:
Diodes CR16, CR17, CR18, CR19, CR20 VR7 and VR8.
2. Check Transistors on each wire path.
- “Q1” and “Q2” on Wire PATH #1.
 - “Q3” and “Q4” on Wire PATH #2.
 - “Q5” and “Q6” on Wire PATH #3.
 - “Q7” and “Q8” on Wire PATH #4.

L. No OUTPUT on one or more wire Paths

For “MIM” and “MIM-X” UNITS ONLY!

OUTPUT PC BOARD

1. Replace Transistor “Q2” and/or “U2” – for Wire PATH #1.
2. Replace Transistor “Q4” and/or “U3” – for Wire PATH #2
3. Replace Transistor “Q6” and/or “U5” – for Wire PATH #3.
4. Replace Transistor “Q8” and/or “U6” – for Wire PATH #4

M. No FEEDBACK from Units on Wire Path

For “MIM” and “MIM-X” UNITS ONLY!

OUTPUT PC BOARD

1. Replace chip “U1” for Wire PATH #1 or #2.
2. Replace chip “U4” for Wire PATH #3 OR #4.

N. Further checks of OUTPUT PC BOARD on “MIM-LINK” Unit.

For “MIM-LINK” UNIT ONLY!

1. Verify that computer port used for the MIM unit is operational.

ON FRONT PANEL OF MIM-LINK UNIT

2. Check Circuit Breakers for each of the satellite groups – (CB1), (CB2), and (CB3) and (CB4) respectively – to see that they are in the “ON” position.

LINK OUTPUT PC BOARD

3. Check between test point “TP1” (+5V) and “TP2” (GND) –

Should have +5 Volts DC +/-

4. Check between pins 5 and 10 (blue wires from transformer) on 10-pin connector, coming from transformer and connecting to the Output PC Board.

Should have 11 VAC +/-

5. If 11 VAC are found coming from the Transformer “T1” – then check between terminals 8 and 11 of the transformer –

Should have 12 VAC +/-

If NOT, replace transformer “T1”.

6. Check Radio Fuse “F1” to see that it is Good. Located on LINK OUTPUT PC BOARD.
7. Verify that connections between MIM radio and Antenna are secure and reliable.
8. Verify that all cables between MIM-LINK Output PC Board, RF Radio Package Assembly and Modem to Radio are secure.

9. Use a scanner unit and verify that the MIM-LINK RADIO is transmitting.

MIM will poll 8 non-active satellites and all sensors every 2 minutes and should be heard on the scanner unit.

(NOTE!) Use the MIM Manual Mode to force MIM transmission without waiting for poll.

10. Verify that MIM Output Board Diagnostic LED's "DS1" (TXD), "DS2" (RTS), "DS3" (RXD) and "DS4" (CD) are functioning properly when the radio should be transmitting or receiving.

If no response is received from the Satellite, the MIM will wait approximately 1 second before another transmission is attempted. (The cadence of the MIM output can be heard on the scanner and interpreted.)

11. Check Transistors "Q1", "Q2", "Q3" and "Q4"

➤ **If all seems to be O.K., then substitute a complete RF Radio/Modem package with a known working unit.**

3.5 Problem is suspected to be with the RF MODEM.

For "MIM-LINK" UNIT ONLY!

RF RADIO/MODEM PACKAGE

1. Substitute the entire RF Radio/Modem package with a known "GOOD" unit.
2. If problem has now been corrected – the RF Radio/Modem Package is most likely defective.

Substitute a known "GOOD" RADIO in the suspected defective RF Radio/Modem Package – in order to determine if the Radio or the Modem are defective.

P. Modem RECEIVES but Radio Does NOT TRANSMIT correctly.

For “MIM-LINK” UNIT ONLY!

MODEM PC BOARD

1. Use the Manual MIM feature to address Satellites during quiet time.
 - Select MIM Manual channel and Group and Press “CANCEL” Switch.

MIM sends station reset (Station 00 output) and immediately polls channel.
2. Listen for Satellite RESPONSE with the scanner.
 - If carrier with no modulation is heard, Modem chip “U1” is defective.

Replace “U1” chip.
 - If radio continues to transmit for a period in excess of > 1 second, Control chip “U3” is defective.

Replace “U3” chip.

3.6 Problem is suspected to be on the DISPLAY PC Board

For “MIM”, “MIM-LINK” or “MIM-X” UNITS

Q. Checking “U3” Chip

FUNCTION: INTERFACE CHIP – Directs output to other chips by way of latch

DISPLAY PC BOARD

1. Check voltage between pin 8 (VSS) and pin 16 (VCC) on chip “U3”.

Should have +5 Volts DC +/-

2. With a scope, check the following in reference to ground:

- Check pin 4 (E) to ground.
- Check pin 5 (E) to ground.

In both cases you should have some type of WAVEFORM.

3. In checking any of the pins 7, 9, 10, 11, 12, 13, 14 and 15 to ground –

- You should have a normal “HIGH” with a “LOW” Beep.

R. Checking “U6”, “U7”, “U8” and “U9” Chips

FUNCTION: DELATCHER CHIPS – Used to drive “LED’s”

DISPLAY PC BOARD

1. Check voltage between pin 10 (VSS) or pin 1 (OC) and pin 20 (VCC).

Should have + 5 Volts DC +/-

2. With a scope, check the following pins in reference to ground:

- Check pin 11 (LATCH) to ground.

Should have a normal “HIGH” with a “LOW” Beep.

- In checking any of pins 3, 4, 7, 8, 13, 14, 17 or 18 to ground –

You should have some type of WAVEFORM.

- In checking any of pins 2, 5, 6, 9, 12, 15, 16 or 19 to ground –

You should have a “LOW” when channel is “ON”.

S. Checking “U10” Chip**DISPLAY PC BOARD**

1. Check voltage between pin 10 (VSS) or pin 1 (OC) and pin 20 (VCC).

Should have +5 Volts DC +/-

2. With a scope, check the following pins in reference to ground:

- Check pin 11 (LATCH) to ground.

Should have a normal “HIGH” with a “LOW” Beep.

- In checking any of pins 3, 4, 7, 8, 13, 14, 17 or 18 to ground –

You should have some type of WAVEFORM.

- In checking any of pins 2, 5, 6, 9, 12, 15, 16 or 19 to ground-

You should have a “LOW” when Group is “ON”.

T. Checking “U11” Chip**DISPLAY PC BOARD**

1. Check voltage between pin 10 (VSS) and pin 20 (VCC) on chip “U11”.

Should have +5 Volts DC +/-

2. With a scope, check the following pins in reference to ground:

- Check pin 1 (1G) or pin 19 (2G) to ground on chip “U11”.

Should have a normal “HIGH”.

- In checking any pins 3, 5, 7, 9, 12, 14, 16 or 18 to ground –

You should have some type of WAVEFORM.

- Check pin 2 (1A1) to ground.
Should be “HIGH” when switch “SW1” is on channel (VCC) and should be “LOW” when switch “SW1” is on station.
- Check pin 4 (1A2) to ground.
Should be “HIGH” when switch “SW2” is “ON” (VCC) and should be “LOW” when switch “SW2” is “OFF”.
- Check pin 6 (1A3) to ground.
Should be “HIGH” when switch “SW3” is in manual (VCC) position and should be “LOW” when switch “SW3” is in the automatic position.
- Check pin 8 (1A4) to ground.
Should be “HIGH” when switch “SW4” is in (VCC) position and should be “LOW” when switch “SW4” is in the start/advance position.
- Check pin 11 (2A1) to ground.
Should be “HIGH” when switch “SW5” is in (VCC) position and should be “LOW” when switch “SW5” is in the cancel position.
- Check pin 13 (2A2) to ground.
Should be “HIGH” when switch “SW6” is in (VCC) position and should be “LOW” when switch “SW6” is in the test position.

U. Checking “U2”, “U4” and “U5” Chips

FUNCTION: NUMBER BLOCKS

DISPLAY PC BOARD

1. Check Voltage between pin 11 (VSS) and pin 14 (VCC).

Should be +5 Volts DC +/-

2. With a scope, check the following pins in reference to ground:
- Check pin 4 (CLKIN) to ground.
Should have some type of WAVEFORM.
 - Check pin 17 (CLKOUT) to ground.
Should have some type of WAVEFORM.
 - Check pin 13 (CE2) to ground.
Should have some type of WAVEFORM.
 - Check pin 7 (WE) to ground.
Should have some type of WAVEFORM.
 - Check pin 8 (OE) to ground.
Should have some type of WAVEFORM.
 - Check pin 1 (D0), pin 2 (D2), pin 18 (D3) and pin 19 (D1) each to ground.
In each case you should have some type of WAVEFORM.
 - Check pin 3 (RST) to ground.
Should have some type of WAVEFORM.

***Please Refer to APPENDIX on the
Following Pages for
PC Board Layouts & Schematic Wiring Diagrams***

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