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Page 1 of 1

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1	1	Cog. Eng. W.S. Lewis	[Signature]	2/9/96	T5-55	L.T. Cunningham	[Signature]	2-7-96	T5-55	1	1
1	1	Cog. Mgr. M.W. Gibson	[Signature]	2/13/96	T5-55						
		QA									
		Safety									
		Env.									

18. L.T. Cunningham [Signature] Signature of EDT Originator		20. M.W. Gibson [Signature] Cognizant Manager		21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments	
2-7-96 Date		2/13/96 Date			
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Honeywell Modular Automation System Acceptance Test Report

L.T. Cunningham

Westinghouse Hanford Co., Richland, WA 99352

U.S. Department of Energy Contract DE-AC06-87RL10930

EDT/ECN: 610798

UC: UC-506

Org Code: 15530

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Total Pages: 36

Key Words: Honeywell, Modular Automation System, MAS, Thermal
Stabilization, Acceptance Test Report

Abstract: This document provides the results of the Acceptance Test
Procedure for the Honeywell Modular Automation System.

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Date

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1.0 INTRODUCTION

This test report documents the results from the acceptance testing of the Honeywell Modular Automation System (MAS). The test was performed using WHC-SD-CP-ATP-071, "Honeywell Modular Automation System Acceptance Test Procedure" in conjunction with Job Control System work package 2Z-96-162. A completed copy of the test is attached as Appendix A.

The Honeywell MAS will be installed in Room 230A to control six thermal stabilization furnaces in gloveboxes HA-20MB and HA-21I. The use of this system eliminates the need for discrete controllers and alarm switches for each of the furnaces.

2.0 TEST RESULT DISCUSSION

The performance of the acceptance test was completed with only one minor exception. During testing, it was observed that the analog inputs were not immediately recognized. In some instances, it required up to 5 minutes for the PLC to accept input from test thermocouples or from the transduction PPS flexitester. Once recognition was achieved, the input could be manipulated without difficulty. Since test was completed, the deviation alarm has been set to $\pm 20^{\circ}\text{C}$ from $\pm 25^{\circ}\text{C}$. The expected change to the deviation alarm has not taken place and this action will bring the programming into line with current documentation.

Exception Resolution

When performing the thermocouple input checks, it was discerned that the expected display range (input temperature $\pm 0.5^{\circ}\text{C}$) was too restrictive for this system. Nine of the 24 analog input addresses had greater than 0.5°C display errors. However, the greatest difference in display temperature to input temperature was less than 2°C at 1000°C . This is less than a 0.2% error of the thermocouple range. A more reasonable error range of 2% for display readings should have been required.

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APPENDIX A

Honeywell Modular Automation System Acceptance Test Procedure

L.T. Cunningham
Westinghouse Hanford Co., Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-87RL10930

EDT/ECN: 610800 UC: UC-506
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B&R Code: EW7003000 Total Pages: 33

Key Words: Honeywell, Modular Automation System, MAS, Thermal
Stabilization, Acceptance Test

Abstract: This document provides instruction for the operational
testing of the 6 new stabilization furnaces being installed in HA-20MB
and HA-21I and ancillary equipment.

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1.0 PURPOSE

The purpose of this Acceptance Test Procedure (ATP) is to verify the operability of the six new furnaces as controlled by the new Honeywell Modular Automation System (MAS). The Honeywell MAS is being installed in the PFP to control the six thermal stabilization furnaces in gloveboxes HA-20MB and HA-21I.

2.0 SCOPE

This ATP provides instructions for testing the configuration of the Honeywell MAS at the Plutonium Finishing Plant (PFP). The test will be a bench test of the analog inputs, analog outputs, and software interlocks. The interlock test will check the digital input and outputs. Field equipment will not be connected for this test. Simulated signals will be used for thermocouple and limit switch inputs. An Operational Test Procedure (OTP) will be written to perform field testing once the MAS and furnaces have been installed.

3.0 REFERENCES

WHC-IP-1026, *Engineering Practice Guidelines*, Appendix M

4.0 RESPONSIBILITIES

Test Director

The test director will be selected from the PFP Process Engineering Group. The Test Director shall:

- Coordinate and direct acceptance testing.
- Confirm that all prestart requirements have been met before allowing the test to begin.
- If needed, alter the test sequence after verifying that there is no adverse impact.
- Ensure that the system is left in a safe mode if the test is to be suspended for a period of time.
- Reverify test prerequisites before restarting a suspended test.
- Initial each step in the test procedure as it is performed.
- Evaluate the need to make changes to the test and initiate ECNs to document those changes.
- Review and approve test data sheets and exceptions.
- Approve resolution to test exceptions.

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4.0 RESPONSIBILITIES (cont.)

Witnesses

A test witness shall be provided by Quality Assurance. Test witnesses shall:

- Witness all or selected portions of the test.
- Review and approve test data sheets and exceptions for the sections of the test that they witness.
- Approve resolution to test exceptions for the sections of the test that they witness.

Test Performer

The person performing the test shall be designated by the test director. The performer shall:

- Perform the test under the direction of the test director.
- Record required information on the test data sheets as well as initial and date the form.

5.0 SYSTEM DESCRIPTION

The thermal stabilization furnaces will be used to stabilize plutonium bearing materials at the PFP for long term storage. Six new furnaces located in gloveboxes HA-20MB and HA-21I will be connected to a Honeywell MAS (see Figure 1). The control configuration of the Honeywell MAS provides temperature control to heat the furnaces to 1000°C and hold for a prescribed duration depending on the type of material being heated in the furnace. Analog input signals being processed by the MAS include: furnace control temperature, furnace high alarm temperature, furnace off-gas temperature, and glovebox temperature. Analog output signals are sent to the Silicon Control Rectifier (SCR) to supply power to the furnaces. Digital inputs include the furnace door limit switches and a power signal from the off-gas fans. Digital outputs include relay power from the furnace interlock logic and the off-gas fan start/stop signal.

6.0 SAFETY

A pre-job safety meeting shall be conducted in accordance with *Plutonium Operation Administration Manual*, WHC-IP-0821, Chapter 12, Section 5.12 and meeting attendance shall be documented in Table 1 by Process Engineering prior to work start. This ATP shall be read and discussed in detail by all personnel involved with its performance.

TABLE 1
PRE-JOB SAFETY/OPERABILITY BRIEFING LIST

PRESENTER: *UC-jl* DATE: *2-1-96*

ATTENDEES	ORGANIZATION	ATTENDEES	ORGANIZATION
<i>David Adams</i>	<i>PPF GC</i>		
<i>Jeff Miller</i>	<i>INSTRUMENTATION</i>		

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7.0 TEST CONDITIONS AND EQUIPMENT REQUIRED

The control configuration acceptance test will be performed in room 23 of 270-Z in the PFP complex. The personal computer (PC) will be connected to the Honeywell MAS with a coaxial cable. The 50-ohm terminating resistors will be in place.

A special test box will be used to test the function of the 115V discreet inputs (see Figure 2). The box contains four separate test points. Each point has its own switch and removable cable. The cable is connected to the address point and the common (T1, T2, B1, or B2). To turn on the input, the switch is closed, and to turn it off, the switch is opened. To prevent electric shock, any unused electric cables must be disconnected from the box. In addition, the cable must be disconnected from the box whenever connecting or disconnected from the digital input card.

Current measurement and continuity checks will be taken with a FLUKE 8060A:

Device ID # 773-45-08-003 Last Calibrated 9-12-95
Next Calibration 9-12-96

For Type K thermocouple signal generation, either of the following instruments can be utilized:

Calibrated Transmation PPS minitemp Calibrator, Model 1064P

Device ID # 777-13-20-009 Last Calibrated 5-24-95
Next Calibration 5-24-96

OR

Calibrated Transmation PPS Flexitester, Model 1080

Device ID # _____ Last Calibrated _____
Next Calibration _____

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8.0 PROCEDURE

Discrepancies will be noted on the Exceptions List provided (Section 8.0) and according to provisions outlined in WHC-IP-1026, *Engineering Practice Guidelines*, Appendix M.

WC 8.1 Download the current controller configuration to the logic controller.

WC 8.2 Enter VIEW from the windows screen and acknowledge all alarms.

Thermocouple Input Checks (see Figure 3)

WC 8.3 From the FURNACE 20MB-1 screen, test the following temperature inputs for FUR-20MB-1.

WC 8.3.1 Input compensated temperature inputs to Address 0 per data sheet 1 to check temperature controller thermocouple input.

WC 8.3.2 Input compensated temperature inputs to Address 1 per data sheet 1 to check furnace high temperature alarm thermocouple input.

WC 8.3.3 Input compensated temperature inputs to Address 9 per data sheet 1 to check off-gas thermocouple input.

WC 8.4 From the FURNACE 20MB-2 screen, test the following temperature inputs for FUR-20MB-2.

WC 8.4.1 Input compensated temperature inputs to Address 2 per data sheet 1 to check temperature controller thermocouple input.

WC 8.4.2 Input compensated temperature inputs to Address 3 per data sheet 1 to check furnace high temperature alarm thermocouple input.

WC 8.4.3 Input compensated temperature inputs to Address 10 per data sheet 1 to check off-gas thermocouple input.

WC 8.5 From the FURNACE 20MB-3 screen, test the following temperature inputs for FUR-20MB-3.

WC 8.5.1 Input compensated temperature inputs to Address 4 per data sheet 1 to check temperature controller thermocouple input.

WC 8.5.2 Input compensated temperature inputs to Address 5 per data sheet 1 to check furnace high temperature alarm thermocouple input.

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8.0 PROCEDURE (cont.)

- LTC 8.5.3 Input compensated temperature inputs to Address 11 per data sheet 1 to check off-gas thermocouple input.
- LTC 8.6 From the FURNACE OVERVIEW screen, test the following temperature inputs for glovebox HA-20MB.
- LTC 8.6.1 Connect blank test thermocouples to Addresses 7 and 8. Input compensated temperature inputs to Address 6 per data sheet 1 to glovebox thermocouple input.
- LTC 8.6.2 Connect blank test thermocouples to Addresses 6 and 8. Input compensated temperature inputs to Address 7 per data sheet 1 to glovebox thermocouple input.
- LTC 8.6.3 Connect blank test thermocouples to Addresses 6 and 7. Input compensated temperature inputs to Address 8 per data sheet 1 to glovebox thermocouple input.
- LTC 8.7 From the FURNACE 21I-1 screen, test the following temperature inputs for FUR-21I-1.
- LTC 8.7.1 Input compensated temperature inputs to Address 32 per data sheet 2 to check temperature controller thermocouple input.
- LTC 8.7.2 Input compensated temperature inputs to Address 33 per data sheet 2 to check furnace high temperature alarm thermocouple input.
- LTC 8.7.3 Input compensated temperature inputs to Address 41 per data sheet 2 to check off-gas thermocouple input.
- LTC 8.8 From the FURNACE 21I-2 screen, test the following temperature inputs for FUR-21I-2.
- LTC 8.8.1 Input compensated temperature inputs to Address 34 per data sheet 2 to check temperature controller thermocouple input.
- LTC 8.8.2 Input compensated temperature inputs to Address 35 per data sheet 2 to check furnace high temperature alarm thermocouple input.
- LTC 8.8.3 Input compensated temperature inputs to Address 42 per data sheet 2 to check off-gas thermocouple input.

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8.0 PROCEDURE (cont.)

- LTC 8.9 From the FURNACE 211-3 screen, test the following temperature inputs for FUR-211-3.
- LTC 8.9.1 Input compensated temperature inputs to Address 36 per data sheet 2 to check temperature controller thermocouple input.
- LTC 8.9.2 Input compensated temperature inputs to Address 37 per data sheet 2 to check furnace high temperature alarm thermocouple input.
- LTC 8.9.3 Input compensated temperature inputs to Address 43 per data sheet 2 to check off-gas thermocouple input.
- LTC 8.10 From the FURNACE OVERVIEW screen, test the following temperature inputs for glovebox HA-211.
- LTC 8.10.1 Connect blank test thermocouples to Addresses 39 and 40. Input compensated temperature inputs to Address 38 per data sheet 2 to glovebox thermocouple input.
- LTC 8.10.2 Connect blank test thermocouples to Addresses 38 and 40. Input compensated temperature inputs to Address 39 per data sheet 2 to glovebox thermocouple input.
- LTC 8.10.3 Connect blank test thermocouples to Addresses 38 and 39. Input compensated temperature inputs to Address 40 per data sheet 2 to glovebox thermocouple input.

Check Analog Output for SCR (see Figure 4)

- LTC 8.11 Record the output of address 64 when Output for furnace 20MB-1 is 0% as seen on the FURNACE 20MB-1 screen. 3.95 mA
- LTC 8.12 From FURNACE 20MB-1 screen, start heating cycle by pressing the 1-OXIDE button.
- LTC 8.13 Monitor output of address 64. Output shall be in 4-20mA $\pm$ 0.1mA range and should increase as the setpoint climbs.
- LTC 8.14 Record output for address 64 when Output for furnace 20MB-1 is 100% as seen on the FURNACE 20MB-1 screen. 19.95 mA
- LTC 8.15 Stop heating cycle by pressing Stop Cycle button.
- LTC 8.16 Record the output of address 65 when Output for furnace 20MB-2 is 0% as seen on the FURNACE 20MB-2 screen. 3.95 mA

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8.0 PROCEDURE (cont.)

- WTC 8.17 From FURNACE 20MB-2 screen, start heating cycle by pressing the 1-OXIDE button.
- WTC 8.18 Monitor output of address 65. Output shall be in 4-20mA $\pm$ 0.1mA range and should increase as the setpoint climbs.
- WTC 8.19 Record output for address 65 when Output for furnace 20MB-2 is 100% as seen on the FURNACE 20MB-2 screen. 19.95 mA
- WTC 8.20 Stop heating cycle by pressing Stop Cycle button.
- WTC 8.21 Record the output of address 66 when Output for furnace 20MB-3 is 0% as seen on the FURNACE 20MB-3 screen. 3.96 mA
- WTC 8.22 From FURNACE 20MB-3 screen, start heating cycle by pressing the 1-OXIDE button.
- WTC 8.23 Monitor output of address 66. Output shall be in 4-20mA $\pm$ 0.1mA range and should increase as the setpoint climbs.
- WTC 8.24 Record output for address 66 when Output for furnace 20MB-3 is 100% as seen on the FURNACE 20MB-3 screen. 19.95 mA
- WTC 8.25 Stop heating cycle by pressing Stop Cycle button.
- WTC 8.26 Record the output of address 72 when Output for furnace 21I-1 is 0% as seen on the FURNACE 21I-1 screen. 3.96 mA.
- WTC 8.27 From FURNACE 21I-1 screen, start heating cycle by pressing the 1-OXIDE button.
- WTC 8.28 Monitor output of address 72. Output shall be in 4-20mA $\pm$ 0.1mA range and should increase as the setpoint climbs.
- WTC 8.29 Record output for address 72 when Output for furnace 21I-1 is 100% as seen on the FURNACE 21I-1 screen. 19.94 mA
- WTC 8.30 Stop heating cycle by pressing Stop Cycle button.
- WTC 8.31 Record the output of address 73 when Output for furnace 21I-2 is 0% as seen on the FURNACE 21I-2 screen. 3.94 mA
- WTC 8.32 From FURNACE 21I-2 screen, start heating cycle by pressing the 1-OXIDE button.
- WTC 8.33 Monitor output of address 73. Output shall be in 4-20mA $\pm$ 0.1mA range and should increase as the setpoint climbs.

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8.0 PROCEDURE (cont.)

- WTC 8.34 Record output for address 73 when Output for furnace 21I-2 is 100% as seen on the FURNACE 21I-2 screen. 19.95 mA
- WTC 8.35 Stop heating cycle by pressing Stop Cycle button.
- WTC 8.36 Record the output of address 74 when Output for furnace 21I-3 is 0% as seen on the FURNACE 21I-3 screen. 3.95 mA
- WTC 8.37 From FURNACE 21I-3 screen, start heating cycle by pressing the 1-OXIDE button.
- WTC 8.38 Monitor output of address 74. Output shall be in 4-20mA $\pm$ 0.1mA range and should increase as the setpoint climbs.
- WTC 8.39 Record output for address 74 when Output for furnace 21I-3 is 100% as seen on the FURNACE 21I-3 screen. 19.94 mA
- WTC 8.40 Stop heating cycle by pressing Stop Cycle button.

Interlock Validation

- WTC 8.41 On the Digital Input card 621-1100R, ensure the jumpers are connected across contact points B1 and B2 and contact points T1 and T2. (see Figure 5)
- WTC 8.42 On the Digital Output card 621-2100R, ensure the jumpers are connected across contact points B1 and B2 and contact points T1 and T2. (see Figure 6)
- WTC 8.43 Install test thermocouples to addresses 0-11 and 32-43 on the UAIs.
- WTC 8.44 On the FURNACE OVERVIEW screen, ensure EMERGENCY SHUTDOWN button is RED. Push EMERGENCY SHUTDOWN button if gray.
- WTC 8.45 Connect Digital input test box to input addresses 80, 81, 82, and 83. The common (-) is to be connected to B1/B2.
- WTC 8.46 Close contacts 80, 81, 82, and 83. The furnace doors should be closed on FURNACE OVERVIEW screen for FUR-20MB-1, FUR-20MB-2, FUR-20MB-3, and FUR-21I-1.
- 8.47 Perform Furnace FUR-20MB-1 interlock validation.
- WTC 8.47.1 From FURNACE 20MB-1 screen, start heating cycle by pressing the 1-OXIDE button.
- WTC 8.47.2 Verify continuity for address 88 on the DI card.

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8.0 PROCEDURE (cont.)

- WTC 8.47.3 Open contact 80 with DI test box.
- WTC 8.47.4 Verify open circuit for address 88.
- WTC 8.47.5 Verify door to furnace FUR-20MB-1 opens.
- WTC 8.47.6 Close contact 80 with DI test box.
- WTC 8.47.7 Verify continuity for address 88.
- WTC 8.47.8 Verify door to furnace FUR-20MB-1 closes.
- WTC 8.47.9 Press Stop Cycle Button.
- WTC 8.47.10 Verify open circuit for address 88.
- WTC 8.47.11 Restart heating cycle by pressing the 1-OXIDE button.
- WTC 8.47.12 Verify closed circuit for address 88.
- WTC 8.47.13 Wait for deviation alarm to annunciated when setpoint is $25 \pm 1^\circ\text{C}$ above furnace temperature.
- WTC 8.47.14 Verify open circuit for address 88.
- WTC 8.47.15 Remove test thermocouple from address 1 and input compensated temperature of 1055°C .
- WTC 8.47.16 Restart heating cycle by pressing the Stop Cycle button and then the 1-OXIDE button.
- WTC 8.47.17 Verify open circuit for address 88.
- WTC 8.47.18 Replace test thermocouple in address 1.
- WTC 8.47.19 Verify closed circuit for address 88.
- WTC 8.47.20 Remove test thermocouple from address 6 and input compensated temperature of 75°C .
- WTC 8.47.21 Verify open circuit for address 88.
- WTC 8.47.22 Replace test thermocouple in address 6.
- WTC 8.47.23 Verify closed circuit for address 88.
- WTC 8.47.24 Press Emergency Stop Button.

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8.0 PROCEDURE (cont.)

- WTC 8.47.25 Verify open circuit for address 88.
- 8.48 Perform Furnace FUR-20MB-2 interlock validation.
- WTC 8.48.1 From FURNACE 20MB-2 screen, start heating cycle by pressing the 1-OXIDE button.
- WTC 8.48.2 Verify continuity for address 89 on the DI card.
- WTC 8.48.3 Open contact 81 with DI test box.
- WTC 8.48.4 Verify open circuit for address 89.
- WTC 8.48.5 Verify door to furnace FUR-20MB-2 opens.
- WTC 8.48.6 Close contact 81 with DI test box.
- WTC 8.48.7 Verify continuity for address 89.
- WTC 8.48.8 Verify door to furnace FUR-20MB-2 closes.
- WTC 8.48.9 Press Stop Cycle Button.
- WTC 8.48.10 Verify open circuit for address 89.
- WTC 8.48.11 Restart heating cycle by pressing the 1-OXIDE button.
- WTC 8.48.12 Verify closed circuit for address 89.
- WTC 8.48.13 Wait for deviation alarm to annunciated when setpoint is $25 \pm 1^\circ\text{C}$ above furnace temperature.
- WTC 8.48.14 Verify open circuit for address 89.
- WTC 8.48.15 Remove test thermocouple from address 3 and input compensated temperature of 1055°C .
- WTC 8.48.16 Restart heating cycle by pressing the Stop Cycle button and then the 1-OXIDE button.
- WTC 8.48.17 Verify open circuit for address 89
- WTC 8.48.18 Replace test thermocouple in address 3.
- WTC 8.48.19 Verify closed circuit for address 89.
- WTC 8.48.20 Remove test thermocouple from address 7 and input compensated temperature of 75°C .

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8.0 PROCEDURE (cont.)

- WTC 8.48.21 Verify open circuit for address 89.
- WTC 8.48.22 Replace test thermocouple in address 7.
- WTC 8.48.23 Verify closed circuit for address 89.
- WTC 8.48.24 Press Emergency Stop Button.
- WTC 8.48.25 Verify open circuit for address 89.
- 8.49 Perform Furnace FUR-20MB-3 interlock validation.
- WTC 8.49.1 From FURNACE 20MB-3 screen, start heating cycle by pressing the 1-OXIDE button.
- WTC 8.49.2 Verify continuity for address 90 on the DI card.
- WTC 8.49.3 Open contact 82 with DI test box.
- WTC 8.49.4 Verify open circuit for address 90.
- WTC 8.49.5 Verify door to furnace FUR-20MB-3 opens.
- WTC 8.49.6 Close contact 82 with DI test box.
- WTC 8.49.7 Verify continuity for address 90.
- WTC 8.49.8 Verify door to furnace FUR-20MB-3 closes.
- WTC 8.49.9 Press Stop Cycle Button.
- WTC 8.49.10 Verify open circuit for address 90.
- WTC 8.49.11 Restart heating cycle by pressing the 1-OXIDE button.
- WTC 8.49.12 Verify closed circuit for address 90.
- WTC 8.49.13 Wait for deviation alarm to annunciated when setpoint is $25 \pm 1^\circ\text{C}$ above furnace temperature.
- WTC 8.49.14 Verify open circuit for address 90.
- WTC 8.49.15 Remove test thermocouple from address 5 and input compensated temperature of 1055°C .
- WTC 8.49.16 Restart heating cycle by pressing the Stop Cycle button and then the 1-OXIDE button.

8.0 PROCEDURE (cont.)

- WTC 8.49.17 Verify open circuit for address 90.
- WTC 8.49.18 Replace test thermocouple in address 5.
- WTC 8.49.19 Verify closed circuit for address 90.
- WTC 8.49.20 Remove test thermocouple from address 8 and input compensated temperature of 75°C.
- WTC 8.49.21 Verify open circuit for address 90.
- WTC 8.49.22 Replace test thermocouple in address 9.
- WTC 8.49.23 Verify closed circuit for address 90.
- WTC 8.49.24 Press Emergency Stop Button.
- WTC 8.49.25 Verify open circuit for address 90.
- 8.50 Perform Furnace FUR-21I-1 interlock validation.
- WTC 8.50.1 From FURNACE 21I-1 screen, start heating cycle by pressing the 1-OXIDE button.
- WTC 8.50.2 Verify continuity for address 91 on the DI card.
- WTC 8.50.3 Open contact 83 with DI test box.
- WTC 8.50.4 Verify open circuit for address 91.
- WTC 8.50.5 Verify door to furnace FUR-21I-1 opens.
- WTC 8.50.6 Close contact 83 with DI test box.
- WTC 8.50.7 Verify continuity for address 91.
- WTC 8.50.8 Verify door to furnace FUR-21I-1 closes.
- WTC 8.50.9 Press Stop Cycle Button.
- WTC 8.50.10 Verify open circuit for address 91.
- WTC 8.50.11 Restart heating cycle by pressing the 1-OXIDE button.
- WTC 8.50.12 Verify closed circuit for address 91.
- WTC 8.50.13 Wait for deviation alarm to annunciated when setpoint is 25±1°C above furnace temperature.

ACCEPTANCE TEST PROCEDURE	HONEYWELL MODULAR AUTOMATION SYSTEM	WHC-SD-CP-ATR-071 REV-0 PAGE 16 ¹⁷ OF 33 ³⁶
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8.0 PROCEDURE (cont.)

- WTC 8.50.14 Verify open circuit for address 91.
- WTC 8.50.15 Remove test thermocouple from address 33 and input compensated temperature of 1055°C.
- WTC 8.50.16 Restart heating cycle by pressing the Stop Cycle button and then the 1-OXIDE button.
- WTC 8.50.17 Verify open circuit for address 91.
- WTC 8.50.18 Replace test thermocouple in address 33.
- WTC 8.50.19 Verify closed circuit for address 91.
- WTC 8.50.20 Remove test thermocouple from address 38 and input compensated temperature of 75°C.
- LTP 8.50.21 Verify open circuit for address 91.
- WTC 8.50.22 Replace test thermocouple in address 38.
- WTC 8.50.23 Verify closed circuit for address 91.
- WTC 8.50.24 Press Emergency Stop Button.
- WTC 8.50.25 Verify open circuit for address 91.
- WTC 8.51 Disconnect test box from addresses 80, 81, 82, and 83.
- WTC 8.52 Connect Digital input test box to input addresses 84 and 85.
- 8.53 Perform Furnace FUR-21I-2 interlock validation.
- WTC 8.53.1 From FURNACE 21I-2 screen, start heating cycle by pressing the 1-OXIDE button.
- WTC 8.53.2 Verify continuity for address 92 on the DI card.
- WTC 8.53.3 Open contact 84 with DI test box.
- WTC 8.53.4 Verify open circuit for address 92.
- WTC 8.53.5 Verify door to furnace FUR-21I-2 opens.
- WTC 8.53.6 Close contact 84 with DI test box.
- WTC 8.53.7 Verify continuity for address 92.

8.0 PROCEDURE (cont.)

- WTC 8.53.8 Verify door to furnace FUR-21I-2 closes.
- WTC 8.53.9 Press Stop Cycle Button.
- WTC 8.53.10 Verify open circuit for address 92.
- WTC 8.53.11 Restart heating cycle by pressing the 1-OXIDE button.
- WTC 8.53.12 Verify closed circuit for address 92.
- WTC 8.53.13 Wait for deviation alarm to annunciated when setpoint is $25\pm 1^{\circ}\text{C}$ above furnace temperature.
- WTC 8.53.14 Verify open circuit for address 92.
- WTC 8.53.15 Remove test thermocouple from address 35 and input compensated temperature of 1055°C .
- WTC 8.53.16 Restart heating cycle by pressing the Stop Cycle button and then the 1-OXIDE button.
- WTC 8.53.17 Verify open circuit for address 92.
- WTC 8.53.18 Replace test thermocouple in address 35.
- WTC 8.53.19 Verify closed circuit for address 92.
- WTC 8.53.20 Remove test thermocouple from address 39 and input compensated temperature of 75°C .
- WTC 8.53.21 Verify open circuit for address 92.
- WTC 8.53.22 Replace test thermocouple in address 39.
- WTC 8.53.23 Verify closed circuit for address 92.
- WTC 8.53.24 Press Emergency Stop Button.
- WTC 8.53.25 Verify open circuit for address 92.
- 8.54 Perform Furnace FUR-21I-3 interlock validation.
- WTC 8.54.1 From FURNACE 21I-3 screen, start heating cycle by pressing the 1-OXIDE button.
- WTC 8.54.2 Verify continuity for address 93 on the DI card.
- WTC 8.54.3 Open contact 85 with DI test box.

ACCEPTANCE TEST PROCEDURE	HONEYWELL MODULAR AUTOMATION SYSTEM	WHC-SD-CP-ATR-071 REV-0 PAGE 18 OF 33 21 OF 36
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8.0 PROCEDURE (cont.)

- WCE 8.54.4 Verify open circuit for address 93.
- WCE 8.54.5 Verify door to furnace FUR-211-3 opens.
- WCE 8.54.6 Close contact 85 with DI test box.
- WCE 8.54.7 Verify continuity for address 93.
- WCE 8.54.8 Verify door to furnace FUR-211-3 closes.
- WCE 8.54.9 Press Stop Cycle Button.
- WCE 8.54.10 Verify open circuit for address 93.
- WCE 8.54.11 Restart heating cycle by pressing the 1-OXIDE button.
- WCE 8.54.12 Verify closed circuit for address 93.
- WCE 8.54.13 Wait for deviation alarm to annunciated when setpoint is $25 \pm 1^{\circ}\text{C}$ above furnace temperature.
- WCE 8.54.14 Verify open circuit for address 93.
- WCE 8.54.15 Remove test thermocouple from address 37 and input compensated temperature of 1055°C .
- WCE 8.54.16 Restart heating cycle by pressing the Stop Cycle button and then the 1-OXIDE button.
- WCE 8.54.17 Verify open circuit for address 93.
- WCE 8.54.18 Replace test thermocouple in address 37.
- WCE 8.54.19 Verify closed circuit for address 93.
- WCE 8.54.20 Remove test thermocouple from address 40 and input compensated temperature of 75°C .
- WCE 8.54.21 Verify open circuit for address 93.
- WCE 8.54.22 Replace test thermocouple in address 40.
- WCE 8.54.23 Verify closed circuit for address 93.
- WCE 8.54.24 Press Emergency Stop Button.
- WCE 8.54.25 Verify open circuit for address 93.

8.0 PROCEDURE (cont.)

- LC 8.55 Disconnect test box from addresses 84, and 85. Disconnect common from B1/B2.

Check Digital Signals for Off-Gas Fans

- LC 8.56 On the Digital Output card 621-2100R, ensure the jumpers are connected across contact points B1 and B2 and contact points T1 and T2. (see Figure 6)
- LC 8.57 From the OFF-GAS FAN screen, press Vacuum Fan 1 button to close contact. Motor and part of line going through the motor should turn RED.
- LC 8.58 Verify continuity between contact 7 (address 94) and B1/B2 on the digital input card.
- LC 8.59 From the OFF-GAS FAN screen, press Vacuum Fan 1 button to open contact. Motor and part of line going through the motor should turn black.
- LC 8.60 Verify open circuit between contact 7 (address 94) and B1/B2 on the digital input card.
- LC 8.61 From the OFF-GAS FAN screen, press Vacuum Fan 2 button to close contact. Motor and part of line going through the motor should turn RED.
- LC 8.62 Verify continuity between contact 8 (address 95) and B1/B2 on the digital input card.
- LC 8.63 From the OFF-GAS FAN screen, press Vacuum Fan 2 button to open contact. Motor and part of line going through the motor should turn black.
- LC 8.64 Verify open circuit between contact 8 (address 95) and B1/B2 on the digital input card.
- LC 8.65 Connect Digital input test box to input address 86. The common (-) is to be connected to B1/B2.
- LC 8.66 Close circuit to address 86 and verify that the OFF-GAS FAN light changes to red.
- LC 8.67 Open circuit to address 86 and verify that the OFF-GAS FAN light changes to white.
- LC 8.68 Disconnect test box from address 86. Disconnect common from B1/B2.

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10.0 ATP ACCEPTANCE

Any equipment non-conformance or anomalies will be listed on the Exceptions List.

Upon test completion and acceptance, the Cognizant Engineer will prepare an Acceptance Test Report (ATR) from the original ATP with field entries and transmit it to Central Files via Engineering Data Transmittal (EDT).

The undersigned concur that the ATP was completed successfully. The Honeywell Modular Automation System (MAS) was tested and operates within acceptable parameters.

Quality Engineer DR GUTH / DR Guth / Date 2-05-96
Print Signature

Cognizant Engineer WS Lewis / WS Lewis / Date 2/2/96
Print Signature

Cognizant Engineer MW Gilson / MW Gilson / Date 2/5/96
Group Manager Print Signature

ACCEPTANCE TEST
PROCEDURE

HONEYWELL MODULAR AUTOMATION
SYSTEM

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APPENDIX A

FIGURES

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ACCEPTANCE TEST PROCEDURE	HONEYWELL MODULAR AUTOMATION SYSTEM	WHC-SD-CP-ATR-071 REV-0 PAGE 23 OF 33 26 OF 36
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Figure 1 - Honeywell Modular Automation System (MAS)

Figure 2 - Digital Input Test Box

Figure 3 - Analog Input Module Connection Schematic

CARD #1

CARD #2

ADDRESS

ADDRESS

0

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

32

33

34

35

36

37

38

39

40

41

42

43

44

45

46

47

UNUSED	5
1	•
2	•
3	•
4	•
5	•
6	•
7	•
8	•
UNUSED	5
9	•
10	•
11	•
12	•
13	•
14	•
15	•
16	•

Figure 4 - Analog Output Module Connection Schematic

Figure 5 - Digital Input Module Connection Schematic

ADDRESSES

Figure 6 - Digital Output Module Connection Schematic

ADDRESSES

ACCEPTANCE TEST PROCEDURE	HONEYWELL MODULAR AUTOMATION SYSTEM	WHC-SD-CP-ATR-071 REV-0 PAGE 29 OF 33 32 OF 36
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APPENDIX B
TEST DATA SHEETS

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ACCEPTANCE TEST PROCEDURE	HONEYWELL MODULAR AUTOMATION SYSTEM	WHC-SD-CP-ATR-071 REV-0 PAGE 30 OF 33 33 OF 34
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Data Sheet 1 - HA-20MB Temperature Inputs
Page 1 of 2

STEP	ADDRESS	INPUT	DISPLAY
8.3.1	0	25 ± 0.2 °C	25
		200 ± 0.2 °C	200
		1000 ± 0.2 °C	1000
8.3.2	1	25 ± 0.2 °C	25 ^{21.2-16}
		200 ± 0.2 °C	200
		1000 ± 0.2 °C	1000
8.3.3	9	25 ± 0.2 °C	25
		200 ± 0.2 °C	199.8
		1000 ± 0.2 °C	1000
8.4.1	2	25 ± 0.2 °C	25.1
		200 ± 0.2 °C	199.6
		1000 ± 0.2 °C	999.8
8.4.2	3	25 ± 0.2 °C	24.7 24.6 ²⁻¹⁴⁶
		200 ± 0.2 °C	199.9
		1000 ± 0.2 °C	999.5
8.4.3	10	25 ± 0.2 °C	24.6
		200 ± 0.2 °C	199.6
		1000 ± 0.2 °C	999.2 *
8.5.1	4	25 ± 0.2 °C	24.5
		200 ± 0.2 °C	199.8
		1000 ± 0.2 °C	999.5
8.5.2	5	25 ± 0.2 °C	24.8
		200 ± 0.2 °C	199.6
		1000 ± 0.2 °C	999.8

NOTE - The display reading should be ± 0.5 °C of the input value.

Comments Exception For Address 10 Reading For 1000 °C Has Been Written.

ACCEPTANCE TEST PROCEDURE	HONEYWELL MODULAR AUTOMATION SYSTEM	WHC-SD-CP-ATR-071 REV-0 PAGE 31 ³² OF 33 34 OF 36
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Data Sheet 1 - HA-20MB Temperature Inputs
Page 2 of 2

STEP	ADDRESS	INPUT	DISPLAY
8.5.3	11	25 ± 0.2 °C	24.5
		200 ± 0.2 °C	199.7
		1000 ± 0.2 °C	999.5
8.6.1	6	25 ± 0.2 °C	25.2
		75 ± 0.2 °C	74.9
		100 ± 0.2 °C	99.7
8.6.2	7	25 ± 0.2 °C	24.5
		75 ± 0.2 °C	74.9
		100 ± 0.2 °C	98.7
8.6.3	8	25 ± 0.2 °C	24.0
		75 ± 0.2 °C	74.5
		100 ± 0.2 °C	99.5

NOTE - The display reading should be ± 0.5 °C of the input value.

Test Performer *Jeff K. Simpson* Test Director *ATC* 2-2-96
Signature/Date Signature/Date

Quality Control *Rudolf W. H. 2/1/96*
Signature/Date

Comments EXCEPTION HAS BEEN WRITTEN FOR LOW DISPLAY READING ON THIS
DATA SHEET.

ACCEPTANCE TEST PROCEDURE	HONEYWELL MODULAR AUTOMATION SYSTEM	WHC-SD-CP-ATR-071 REV-0 PAGE 32 OF 33 35 OF 36
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Data Sheet 2 - HA-21I Temperature Inputs
Page 1 of 2

STEP	ADDRESS	INPUT	DISPLAY	
8.7.1	32	25 ± 0.2 °C	25.1	
		200 ± 0.2 °C	199.8	
		1000 ± 0.2 °C	999.5	
8.7.2	33	25 ± 0.2 °C	24.5 ^{OC 24.46}	
		200 ± 0.2 °C	199.5	
		1000 ± 0.2 °C	999.3	*
8.7.3	41	25 ± 0.2 °C	23.8	*
		200 ± 0.2 °C	199.1	*
		1000 ± 0.2 °C	998.5	*
8.8.1	34	25 ± 0.2 °C	24.5	
		200 ± 0.2 °C	200.0	
		1000 ± 0.2 °C	999.7	
8.8.2	35	25 ± 0.2 °C	25.1	
		200 ± 0.2 °C	200.3	
		1000 ± 0.2 °C	1000.0	
8.8.3	42	25 ± 0.2 °C	24.0	*
		200 ± 0.2 °C	199.1	*
		1000 ± 0.2 °C	998.4	*
8.9.1	36	25 ± 0.2 °C	24.7	
		200 ± 0.2 °C	199.7	
		1000 ± 0.2 °C	999.7	
8.9.2	37	25 ± 0.2 °C	24.1	*
		200 ± 0.2 °C	199.5	
		1000 ± 0.2 °C	998.9	*

NOTE - The display reading should be ± 0.5 °C of the input value.

Comments _____

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ACCEPTANCE TEST PROCEDURE	HONEYWELL MODULAR AUTOMATION SYSTEM	WHC-SD-CP-ATR-071 REV-0 PAGE 33 OF 33 36 of 36
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Data Sheet 1 - HA-21I Temperature Inputs
Page 2 of 2

STEP	ADDRESS	INPUT	DISPLAY	
8.9.3	43	25 ± 0.2 °C	24.3	*
		200 ± 0.2 °C	198.8	*
		1000 ± 0.2 °C	998.2	*
8.10.1	38	25 ± 0.2 °C	24.1	*
		75 ± 0.2 °C	74.3	*
		100 ± 0.2 °C	99.1	*
8.10.2	39	25 ± 0.2 °C	25.0	
		75 ± 0.2 °C	75.2	
		100 ± 0.2 °C	99.8	
8.10.3	40	25 ± 0.2 °C	24.6	
		75 ± 0.2 °C	74.75.1	
		100 ± 0.2 °C	99.9	

NOTE - The display reading should be ± 0.5 °C of the input value.

Test Performer [Signature]
Signature/Date

Test Director [Signature] 2-2-96
Signature/Date

Quality Control [Signature]
Signature/Date

Comments EXCEPTION 1 HAS BEEN WRITTEN FOR THE DISPLAY READINGS ON THIS DATA SHEET THAT DID NOT MEET ± 0.5°C OF INPUT VALUE.