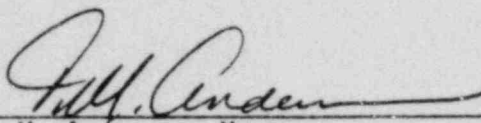


EQUIPMENT QUALIFICATION DATA PACKAGE

This document contains information, relative to the qualification of the equipment identified below in accordance with the methodology of WCAP-8587. The Specification section (Section 1) defines the assumed limits for the equipment qualification and constitute interface requirements to the user.

Recorders: Post Accident Monitoring

APPROVED:



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SECTION 1 - SPECIFICATIONS

1.0 PERFORMANCE SPECIFICATIONS

1.1 Electrical Requirements

1.1.1 Voltage: 118 \pm 2% VAC (Power), 0-10 VDC (signal)

1.1.2 Frequency: 60 or 0.5 Hz

1.1.3 Load: N/A

1.1.4 Electromagnetic Interference: N/A

1.1.5 Other: N/A

1.2 Installation Requirements: Installed in seismically qualified structure, in a controlled environment per Reference 1.

1.3 Auxiliary Devices: None

1.4 Preventative Maintenance Schedule: The details of any preventative maintenance schedule, assumed in establishing the qualified life, will be specified in this section on completion of the Westinghouse Aging Evaluation program.

1.5 Design Life: 40 years

1.6 Operating Cycles (Expected number of cycles during design life including test): Continuous Duty

1.7 Performance Requirements for (b): PAMS Recording

Parameter	Normal Conditions	Abnormal Conditions	Containment Test Conditions	DBE Conditions (a)			Post DBE Conditions (a)		
				FLB/SLB	LOCA	SEISMIC	FLB/SLB	LOCA	SEISMIC
1.7.1 Time requirement	Continuous	12 hours	N/A	event duration	event duration	event duration	continuous	continuous	continuous
1.7.2 Performance requirement	+ 0.5% span accuracy	+ 4.5% span accuracy		as normal	as normal	Note c	as normal	as normal	+ 4.5% span accuracy
1.8 Environmental Conditions for Same Function (4)									
1.8.1 Temperature (°F)	60 - 80	Note d		ambient conditions	ambient conditions	ambient	ambient conditions	ambient conditions	ambient conditions
1.8.2 Pressure (psig)	0	0				0			
1.8.3 Humidity (% RH)	30 - 50	Note d				ambient			
1.8.4 Radiation (R)	< 400	None				None			
1.8.5 Chemicals	None	None				None			
1.8.6 Vibration	None	None				None			
1.8.7 Acceleration(g)	None	None				None			

Note a: DBE is the Design Basis Event.

b: Margin is not included in the parameters of this section.

c: Continued operation required, no specified accuracy.

d: Figure 1, Envelope 3. However, for plants having a Class 1E HVAC for the area in which the Recorders are located, the abnormal extremes are the same as the normal specified above.



1.9 Qualified Life: The demonstrated qualified life will be specified in this section on completion of Subprogram C of the Westinghouse Aging Evaluation Program (Appendix B to WCAP-8587).

1.10 Remarks: None

SECTION 2 - QUALIFICATION BY TEST

2.0 TEST PLAN

2.1 Equipment Description: Westinghouse CID Optimac Recorders (two and three pen) (See Section 2.10.2)

2.2 Number Tested: Lot test performed on eight (8) units

2.3 Mounting: As described in Reference 1

2.4 Connections: Power and signal lead to terminal board

2.5 Aging Simulation Procedure:

By a separate component test program as described by Subprogram C of Appendix B to WCAP-8587.

2.6 Simulated Service Conditions⁽¹⁾

	<u>Normal</u>	<u>Abnormal</u>	<u>Containment Test</u>	<u>Seismic</u>	<u>HELB</u>	<u>Post-HELB</u>
2.6.1 Temperature (⁰ F)	ambient	Figure 3	N/A	ambient	N/A	N/A
2.6.2 Pressure (psig)	0	0		0		
2.6.3 Humidity (% RH)	ambient	Figure 3		ambient		
2.6.4 Radiation (R)	None	None		None		
2.6.5 Chemicals	None	None		None		
2.6.6 Vibration	None	None		5 OBE's		
2.6.7 Acceleration (g)	None	None		TRS>RRS		

2.7 Measured Variables

This section identifies the parameters required to be measured during the test sequence(s).

	<u>Required</u>	<u>Not Required</u>
2.7.1 Category I - Environment		
2.7.1.1 Temperature	B	A
2.7.1.2 Pressure		A,B
2.7.1.3 Moisture	B	A
2.7.1.4 Gas Composition		A,B
2.7.1.5 Seismic Acceleration	A	B
2.7.1.6 Time	A,B	
2.7.2 Category II - Input Electrical Characteristics		
2.7.2.1 Voltage	A,B	
2.7.2.2 Current		A,B
2.7.2.3 Frequency	B	A
2.7.2.4 Power		A,B
2.7.2.5 Other		A,B
2.7.3 Category III - Fluid Characteristics		
2.7.3.1 Chemical Composition		A,B
2.7.3.2 Flow Rate		A,B
2.7.3.3 Spray		A,B
2.7.3.4 Temperature		A,B
2.7.4 Category IV - Radiological Features		
2.7.4.1 Energy Type		A,B
2.7.4.2 Energy Level		A,B
2.7.4.3 Dose Rate		A,B
2.7.4.4 Integrated Dose		A,B

2.7.5 Category V - Electrical
Characteristics

2.7.5.1	Insulation Resistance	A,B
2.7.5.2	Output Voltage	A,B
2.7.5.3	Output Current	A,B
2.7.5.4	Output Power	A,B
2.7.5.5	Response Time	A,B
2.7.5.6	Frequency Characteristics	A,B
2.7.5.7	Simulated Load	A,B

2.7.6 Category VI - Mechanical
Characteristics

2.7.6.1	Thrust	A,B
2.7.6.2	Torque	A,B
2.7.6.3	Time	A,B
2.7.6.4	Load Profile	A,B

2.7.7 Category VII - Auxiliary Equipment

None

A: Seismic Test

B: Operational Test, Abnormal Conditions

2.8 Test Sequence Preferred

This section identifies the preferred test sequence as specified in IEEE-323-74.

- 2.8.1 Inspection of Test Item
- 2.8.2 Operation (Normal Condition)
- 2.8.3 Operation (Performance Specifications Extremes, Section 1)
- 2.8.4 Simulated Aging
- 2.8.5 Seismic
- 2.8.6 Operation (Simulated High Energy Line Break Conditions)

- 2.8.7 Operation (Simulated Post HELB Conditions)
- 2.8.8 Inspection

2.9 Test Sequence Actual(2)

This section identifies the actual test sequence(s) which, in total, constitutes the overall qualification program for this equipment. The separate subsections indicate the separate test sequences completed on differing, but essentially identical, equipment and/or components. The justification for employing anything other than the preferred sequence is as follows;

The DBE is simulated during the Environmental and Seismic Test Sequence of Section 2.9.1. The HELB Tests (Sections 2.8.6 and 2.8.7) have been excluded since the recorders are not exposed to the HELB environment due to their location. The aging test employs the preferred sequence test (Section 2.8 excluding HELB and Abnormal Extremes Sections 2.8.6, 2.8.7, and 2.8.3) on a representative sample of components from the recorders. The Aging Tests will demonstrate that during the qualified life there are no in-service aging mechanisms capable of reducing the capability of the recorders to perform during or after a seismic event. As a consequence, the seismic testing on the un-aged recorders, is not prejudiced by any in-service aging mechanisms.

<u>Step</u>	<u>Notes</u>
2.9.1 Environmental and Seismic Test Sequence	
2.8.1	} The justification for the exclusion of aging from this test sequence is given in Section 2.10.3.3.
2.8.2	
2.8.3	
2.8.5	
2.8.8	

Step

Notes

2.9.2 Aging Test Sequence

2.8.1

2.8.2

2.8.4

2.8.5

2.8.8

} Aging to be addressed by separate testing as described
in Subprogram C of Appendix B to WCAP-8587.

2.10 Type Test Data

2.10.1 Objective

The objective of this test program is to demonstrate, employing the recommended practices of Reg. Guide 1.89 (IEEE-323-1974) and Reg. Guide 1.100 (IEEE-344-1975), the capability of the Post Accident Monitoring Recorders to complete their safety related functions described in EQDP Section 1.7 while exposed to the applicable environments defined in EQDP Section 1.8.

2.10.2 Equipment Tested

2.10.2.1 Environmental and Seismic Testing

The equipment that was tested is the 2 and 3 Pen Post Accident Monitoring Recorders from Lot Numbers 1 and 2 (see Reference 1 for more details).

2.10.2.2 Aging Evaluation Program

A representative sample of critical components from the Post Accident Monitoring Recorders will be included in Subprogram C of the Aging Evaluation Program described in Appendix B to WCAP-8587.

2.10.3 Test Summary

2.10.3.1 Environment Test

Westinghouse requires that the Post Accident Monitoring Recorders be located such that they do not experience a consequent adverse environment when required to operate following a high energy line break either inside or outside containment. Therefore the only environmental testing required, is to demonstrate equipment capability under normal and abnormal environmental extremes.

Reference 2 summarizes the results of available radiation testing of organic and inorganic materials and justifies that, for radiation doses less than 10^4 rads, no deterioration in material structural properties is detectable. As a consequence, a radiation simulation is not required on this equipment, since estimated in-service radiation doses will not prejudice the capability of the equipment to perform under design basis event (i.e. seismic event) conditions.

The environmental testing reported in Reference 1 is designed to demonstrate the capability of the Post Accident Monitoring Recorders to meet the safety-related performance requirements specified in EQDP Section 1.7 when exposed to the variations in temperature, humidity, voltage and frequency specified by Figure 3. The testing successfully demonstrated the specified safety related requirements. Additional margin was, furthermore, included in this test by submitting the equipment to a double cycle of electrical and environmental extremes as described by Figure 3. This test is

considered to satisfactorily demonstrate the Post Accident Monitoring Recorders capability to meet its safety-related functional requirements when exposed to the specified abnormal environments (EQDP Section 1.7) and the permitted range of frequency and voltage variations (EQDP Section 1.1) in accordance with IEEE 323-1974 Section 6.3.2.(2) and (3).

2.10.3.2 Seismic Tests

The single design basis event capable of producing an adverse environment at the equipment location is a seismic event. The seismic testing reported in Reference 1 was completed on new equipment employing multi-axis multifrequency inputs in accordance with Reg. Guide 1.100 (IEEE-344-1975). The generic required response spectrum (Figure 2) contains significant margin with respect to any single plant application referencing this program.(1)

2.10.3.3 Aging Evaluation

Subprogram C of the Westinghouse Aging Evaluation Program (Appendix B, WCAP-8587) will incorporate a representative sample of components from the Recorders. This program is currently in progress and will be reported in WCAP-8587 Supplement 2, Appendix A (Non-Proprietary), WCAP-8687 Supplement 2, Appendix A (Proprietary). The objective of Subprogram C is to demonstrate that during the qualified life there are no in-service aging mechanisms capable of reducing the capability of the Recorders to perform during or after a seismic

event. As a consequence, the seismic testing on the full Recorders described above, is not prejudiced by an in-service aging mechanism.

2.10.4 Conclusion

The demonstrated qualified life of the Recorders will be established by Subprogram C of the Westinghouse Aging Evaluation Program. The results of the aging program, together with the seismic and environmental testing described herein, demonstrate the qualification of the Recorders employing the practices recommended by Reg. Guide 1.89 and 1.100.

2.11 Section 2 Notes

- (1) The generic tests completed by Westinghouse employ parameters designed to envelope a number of plant applications. Margin is a plant specific parameter and will be established by the applicant.

2.12 References

1. McElhaney, D. L., Miller, R. B. "Equipment Qualification Test Report Recorders (Post Accident Monitoring) (Environmental and Seismic Design Verification)" WCAP-8687-Supp 2 - E10A (Proprietary) WCAP-8587-Supp 2 - E10A (Non-Proprietary), May 1980.
2. Damerow, F. W., "Effects of Gamma Radiation Doses Below 10^4 Rads on the Mechanical Properties of Materials," WCAP-9741 (Non-Proprietary), (Currently in Progress).

SECTIONS 3 AND 4 QUALIFICATION BY EXPERIENCE AND/OR ANALYSIS

Westinghouse does not employ operating experience or analysis in support of the qualification program for the Post Accident Monitoring Recorders.

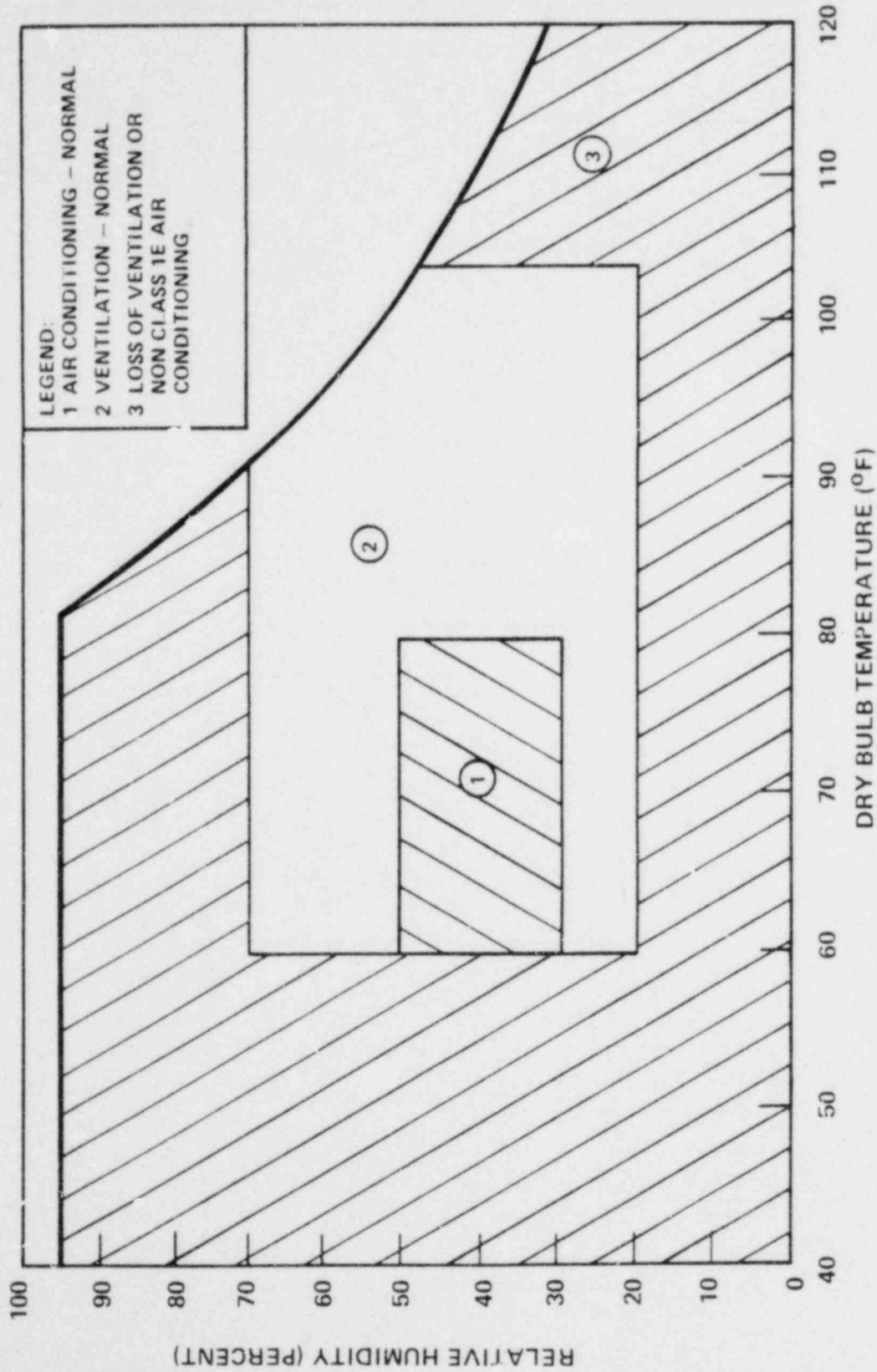


Figure 1 Temperature Versus Humidity - Enclosed Environments Outside Containment

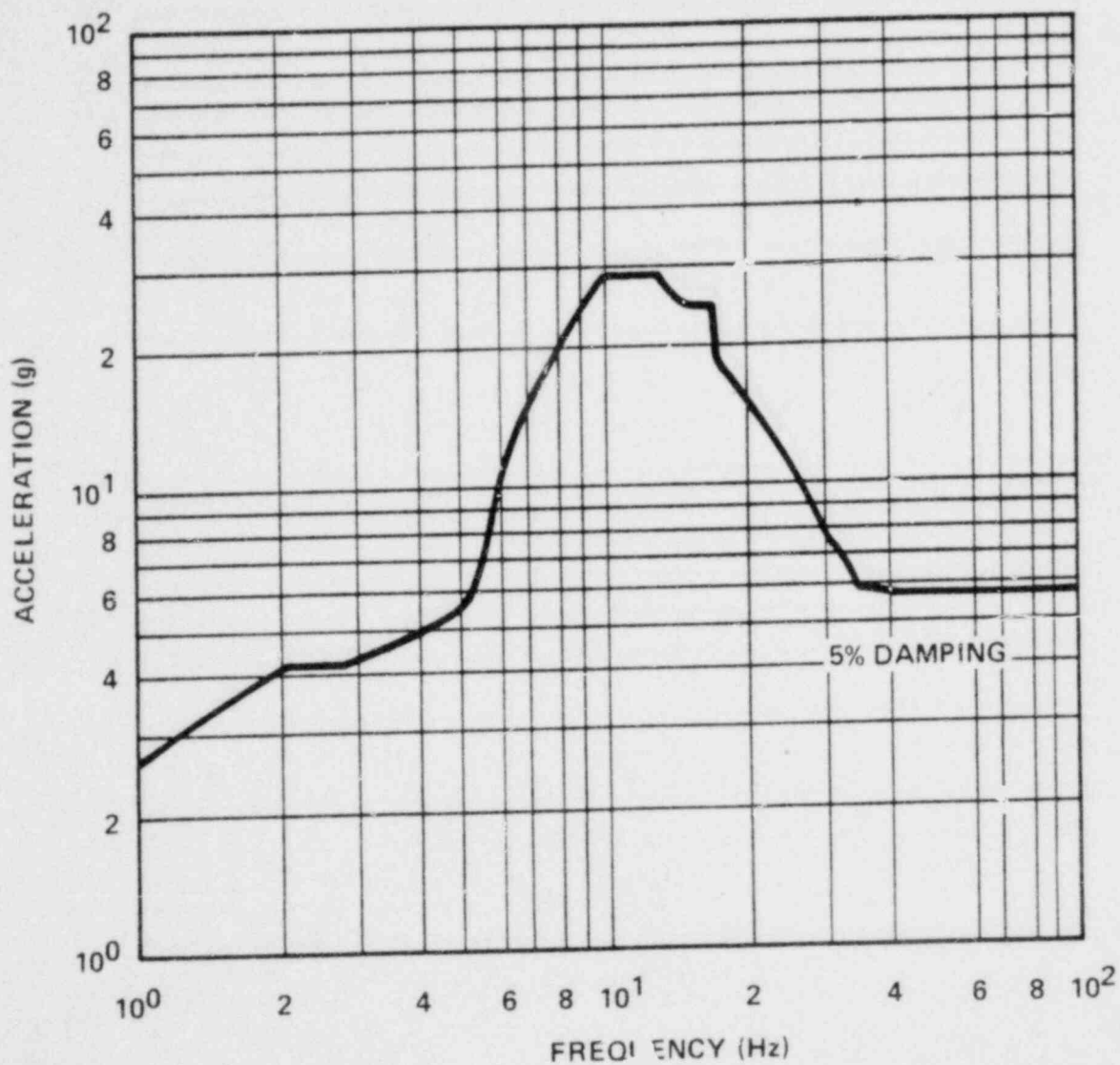


Figure 2 Required Response Spectrum (RRS) for Safe Shutdown Earthquake (SSE)
(Note: OBE Required Response Spectrum = 0.5 SSE RRS)

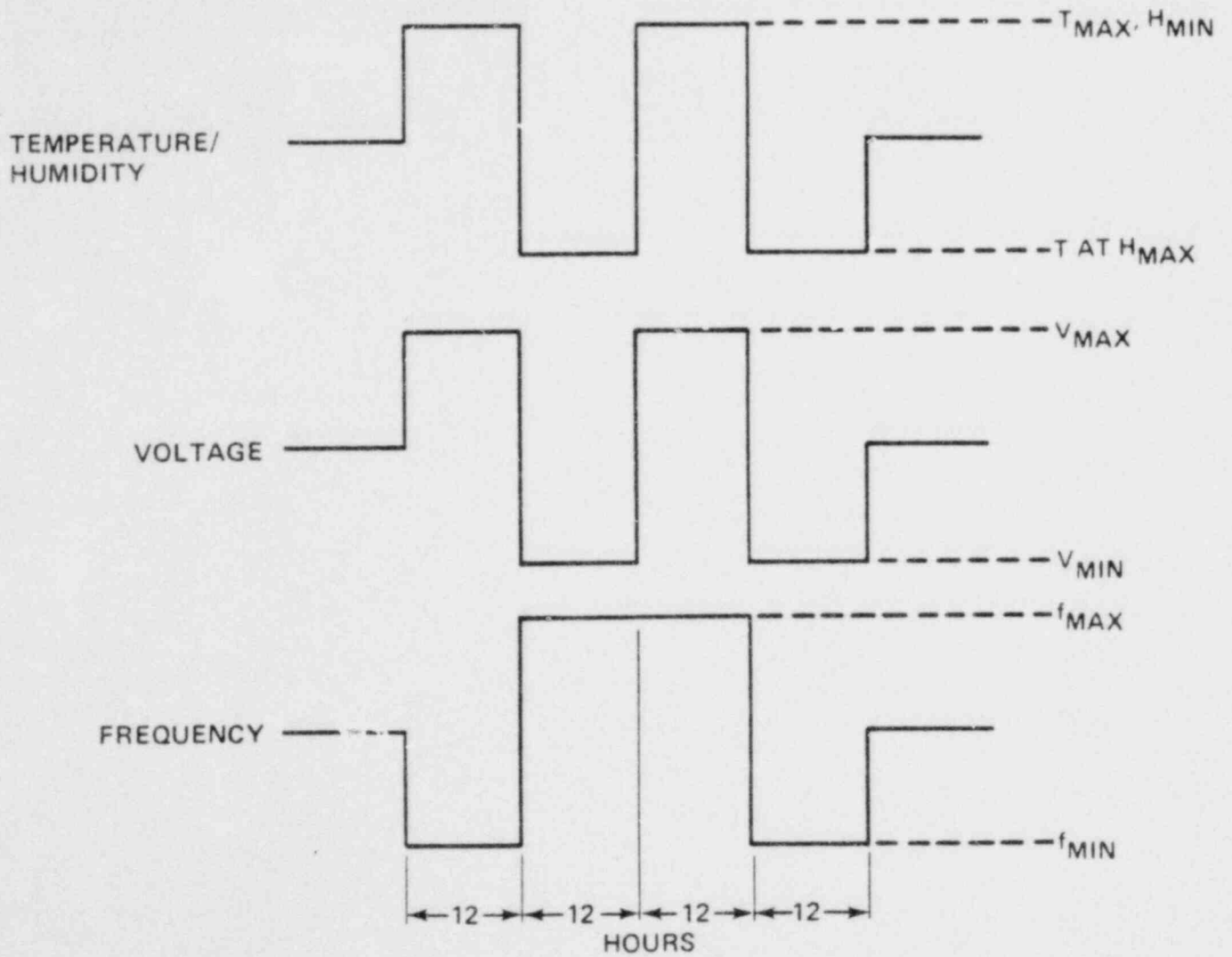


Figure 3 Verification Test Profile