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REMOTE MULTIPLEXER DOC. #466

INTEGRATED FUNCTIONAL TEST PROCEDURE

I. PURPOSE:

The purpose of this test is to demonstrate that the MC170AD-Q2 Remote Multiplexer unit and associated equipment remains functionally operational or does not degrade the connected input circuitry in the event of a failure. This test will be performed while the equipment is subjected to the following tests:

a) Safe Shutdown Seismic Event

b) Extreme Temperature/Humidity Environmental Test

II. SEISMIC TEST

A. PRE-REQUISITES:

1) All equipment to be tested shall have completed all irradiation and aging requirements.

2) All equipment shall have been tested per applicable component acceptance test procedures.

3) The equipment shall be configured and mounted per Figures 1 and 2 with actual mounting methods recorded.

4) Amplifier inputs and outputs shall be adjusted per Table 1.

5) Amplifier inputs and outputs shall be connected to a PCM recorder.

6) All test and recording equipment checked and calibrated.

B. PROCEDURE:

1) Prior to energizing the seismic table, record a minimum of 120 sec. of data.

2) While recording data, energize the seismic table and increase to required frequency and amplitude.

3) Maintain seismic table at required frequency and amplitude for required time specified by tester and approved by Validyne Engineering Corporation engineer.

4) De-energize the seismic table per tester's procedures. Record data during this time.

5) After de-energizing the seismic table, record a minimum of 120 sec. of data from the test unit.

6) Reproduce the recorded PCM data through Digital-to-Analog Converters (DAC's) onto an analog strip chart recorder. Analyze each channel (32) of data for irregularities, such as amplitude increases, decreases, noise and distortion. Use a DVM and/or scope to supplement the recorder, if necessary. Data transmitted via both fiber optic and balanced line shall be analyzed.

II. SEISMIC TEST (Continued)

B. PROCEDURE: (Continued)

7) Reproduce the recorded input signals and analyze for amplitude changes, noise, distortion, etc.

III. EXTREME TEMPERATURE/HUMIDITY TEST

A. PRE-REQUISITE:

1) All equipment to be qualified shall have completed required irradiation, aging and seismic testing.

2) All equipment shall have been tested per applicable component acceptance test procedure.

3) All equipment shall be configured per Figure 1.

4) Module inputs and outputs adjusted per Table 1.

5) Equipment supply voltage adjusted for a nominal 115 VAC, 60 Hz.

6) Equipment to be tested shall be installed in a suitable environmental chamber.

B: PROCEDURE:

1) Prior to energizing the environmental chamber, record the input and output data for 120 sec.

2) While recording data, vary the input supply voltage to the equipment under test ±10%. Hold each extreme for 120 sec.

3) Increase temperature and humidity to required levels (173°F and 95% R.H.) and soak equipment for a minimum of 24 hours.

4) Record signal input and data outputs for minimum of 5 minutes.

5) While recording data, vary the input supply voltage ±10% of the nominal 115 VAC. Hold each extreme for a minimum of 120 sec.

6) Secure environmental chamber per tester's procedures.

III. EXTREME TEMPERATURE/HUMIDITY TEST (Continued)

B. PROCEDURE: (Continued)

7) Reproduce recorded data thru DAC's onto strip chart recorders and analyze for amplitude changes, noise, distortion, etc. DVM's and scopes will be required to supplement the recorder.

8) Compare the data taken at temperature to pre-test data.

IV. ACCEPTANCE/FAILURE CRITERIA:

A. FUNCTIONAL OPERATION:

1) Functional operation failure is defined as output data signal variation which exceeds published manufacturer's specification.

During seismic tests, the sample dropout error rate shall not exceed 3 dropouts per 0.15 second period. The calibration shift after seismic tests shall not exceed 0.5% of full scale. During extreme temperature, the thermal effects shall not exceed the following:

Zero Shift:	±100 microvolts/°F referred to signal conditioning input
Span Shift:	±0.005%/°F (percent of range)

2) Signal variation which exceeds specification and is not directly traceable to a module or input signal shall constitute a module case failure.

3) A closely related failure in two or more modules of the same type shall constitute a generic design failure of that module type.

B. FAIL-SAFE:

1) A failure in the Remote Multiplexer unit or associated equipment which directly degrades below an acceptable level an input signal shall constitute a failure of that piece of equipment.

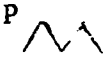
V. TEST REPORTS

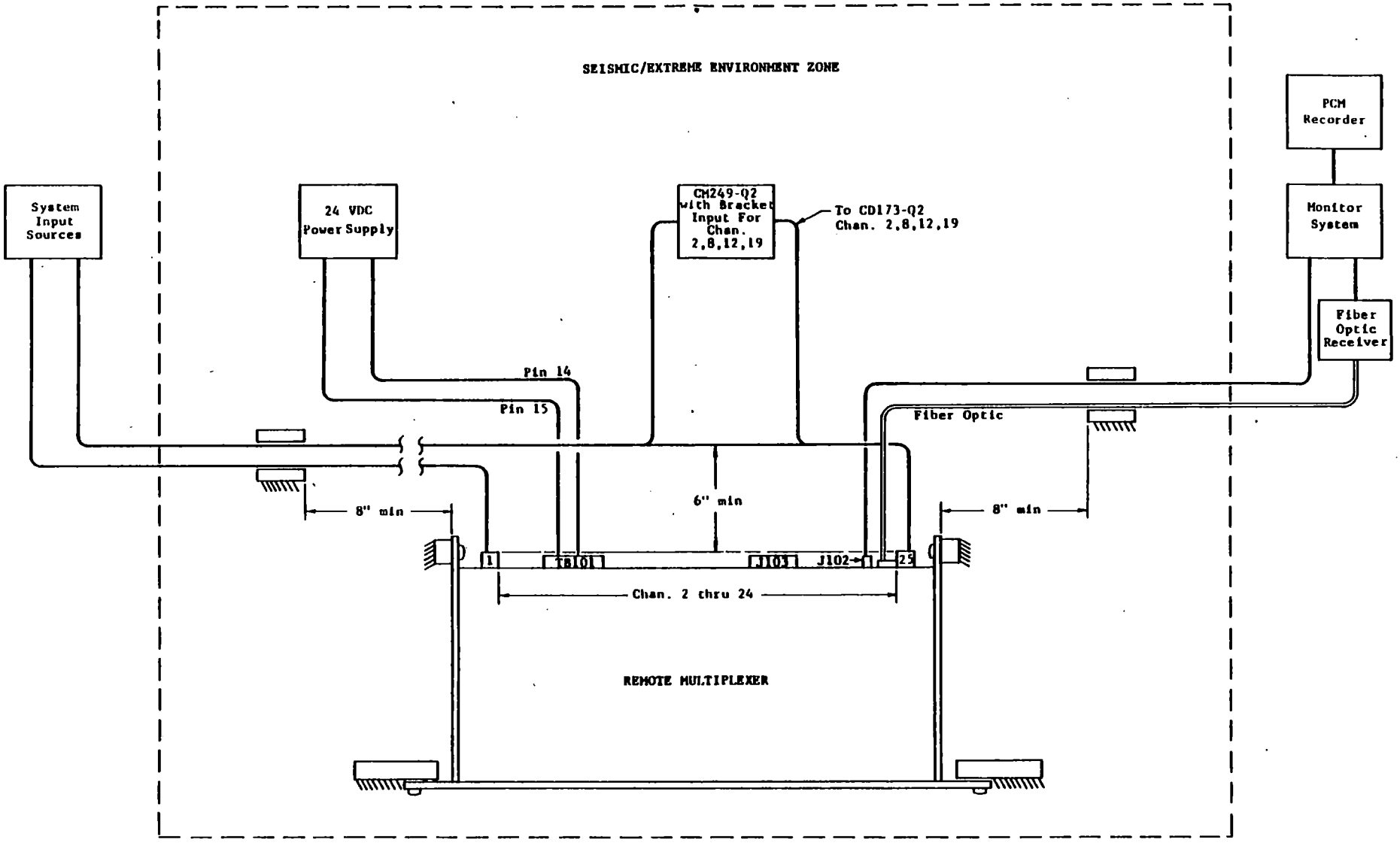
Test Reports for Seismic and Extreme Temperature/Humidity Tests will be issued after all data has been analyzed.

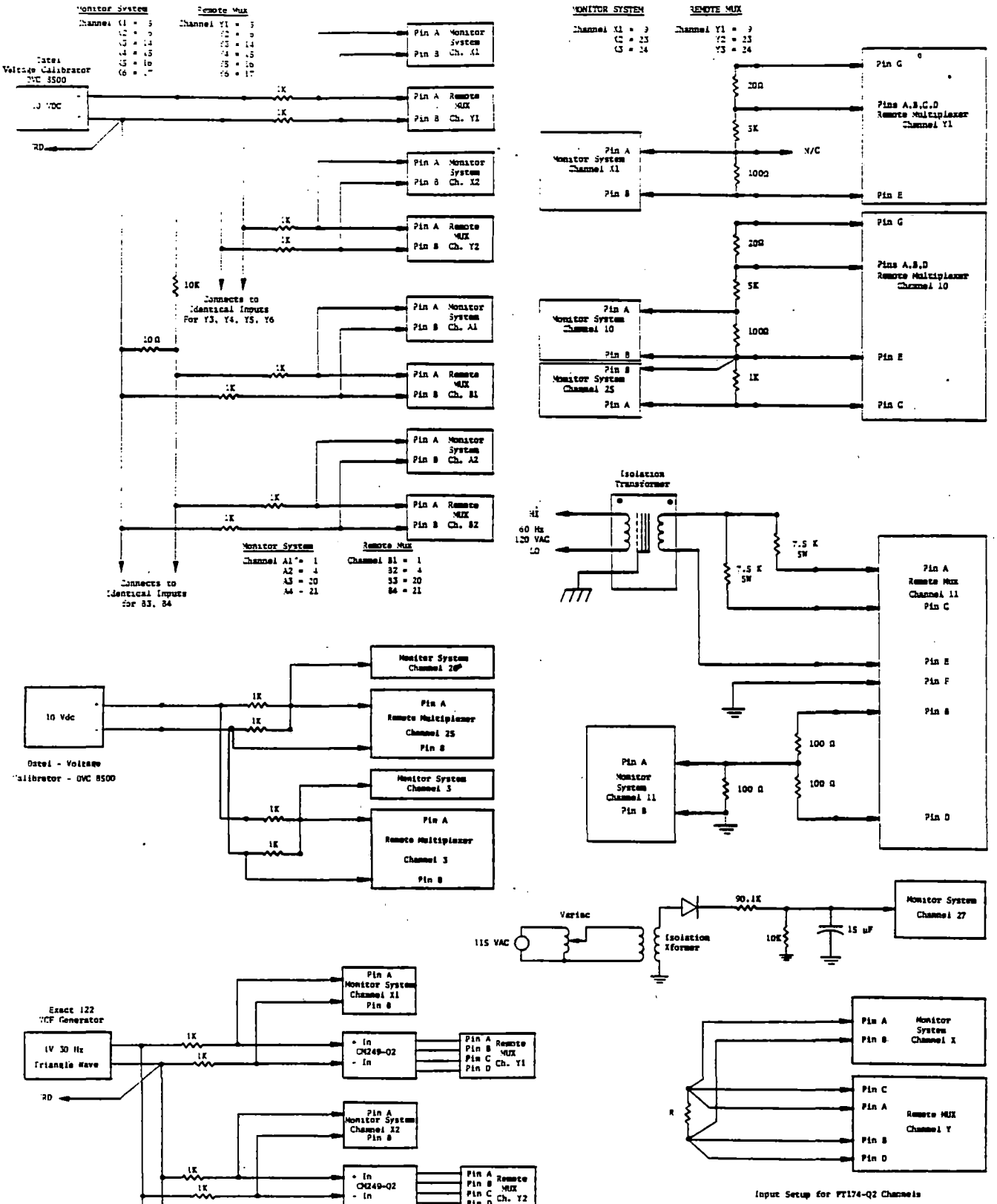
All data recorded during each test shall be transcribed to hard copy under appropriate QC witness and included as part of each Test Report.

DATA SHEET 1

I. NO.	AMP TYPE	SERIAL NUMBER	INPUT	OUTPUT
1.	TC292	QE425-1	+10 mV	+8.0 VDC (OV_{in} → OV_{out})
2.	CD173 CM249	QE428-22 55422	1V P-P 30 HZ	15V P-P (OV_{in} → OV_{out})
3.	JC177	QE429-1	+5 VDC	+5 VDC
4.	TC292	QE425-2	+10 mV	+9.50 VDC (OV_{in} → OV_{out})
5.	BA332	QE419-1-C	+10 VDC	+7.50 VDC (OV_{in} → OV_{out})
6.	PC202	QE427-1	+10 VDC	+7.00 VDC (OV_{in} → OV_{out})
7.	PT174	Q9702-1	249//1180Ω	+5.380 VDC
8.	CD173 CM249	QE538-1 55423	1V P-P 30 Hz	18V P-P (4-arm input) (OV_{in} → OV_{out})
9.	DI325	QE424-1	1,2,3,4 = 23 VDC	+9.375 VDC (All OFF → -9.375V)
10.	DI325	QE424-2	1,2,4 = 23 VDC 3 = OV	+6.375 VDC (All OFF → -9.375V)
11.	DI325	QE424-3	1,3 = 120 VAC 2,4 = OV	+3.125 VDC (All OFF → -9.375V)
12.	CD173 CM249	QE538-2 55420	1V P-P 30 Hz	16V P-P (4-arm input) (OV_{in} → OV_{out})
13.	PT174	Q9702-2	261 + 10Ω	+8.738
14.	PC202	QE427-2	+10 VDC	9.50 VDC (OV_{in} → OV_{out})

CH. NO.	AMP TYPE	SERIAL NUMBER	INPUT	OUTPUT
15.	BA332	QE419-2	1V P-P 30 Hz 	17V P-P (OV_{in} → OV_{out})
16.	BA332	QE419-341-C	1V P-P 30 Hz 	14V P-P (OV_{in} → OV_{out})
17.	PC202	QE427-100	1V P-P 30 Hz 	19V P-P (OV_{in} → OV_{out})
18.	PT174	QE426-143	10 Ω +150 Ω	3.118 VDC
19.	CD173 CM249	Q428-21 55421	1V P-P 30 Hz 	10V P-P (4 Hi) (OV_{in} → OV_{out})
20.	TC292	QE506-1	+10 mV	+9.00 VDC (OV_{in} → OV_{out})
21.	TC292	QE506-2	+10 mV	+7.00 VDC (OV_{in} → OV_{out})
22.	PT174	QE507-1-E)	249 Ω // 1180 Ω	+5.387
23.	DI325	QE424-4	1,2,3,4 = 23 VDC	+9.375 VDC (All OFF → -9.375V)
24.	DI325	QE424-5	1,2,3,4 = 23 VDC	+9.375 VDC (All OFF → -9.375V)
25.	JC177	QE429-2	+5 VDC	+5 VDC
26.	N/A		+7.5 VDC	Jumper J103 Pin B-7 to A-13
27.	N/A		+9.0 VDC	Jumper J103 Pin B-8 to Pin B-12
28.	N/A		-7.5 VDC	Jumper J103 Pin A-7 to Pin A-12
29.	N/A		-9.0 VDC	Jumper J103 Pin A-8 to Pin B-11
30.	N/A		5 VDC	Jumper J103 Pin B-20 to Pin A-11
31.	N/A		7.75 VDC	Jumper J103 Pin B-13 to Pin B-10
				Jumper J103 Pin A-17


SEISMIC/EXTREME ENVIRONMENT ZONE
PCM Recorder
System Input Sources
24 VDC Power Supply
CM249-Q2 with Bracket Input For Chan. 2,8,12,19
To CD173-Q2 Chan. 2,8,12,19
Monitor System
Fiber Optic Receiver
Pin 14
Pin 15
Fiber Optic
8" min
6" min
8" min
J101
J103
J102
1
25
Chan. 2 thru 24
REMOTE MULTIPLEXER



Input Setup for FT174-Q2 Channels

TABLE I

Ref.	Monitor Channel	Remote Mux Channel	R Value
X1, Y1	-	-	205 Ω
X2, Y2	13	13	271 Ω
X3, Y3	18	18	160 Ω
X4, Y4	22	22	205 Ω

REPORT OF COMPLIANCE

Procedure Number: _____

Procedure Rev: _____

Validyne Order No: _____

Addendum: _____

This report is certification that testing operations contained in the above procedure were completely and carefully conducted on this day of _____, 19____, and were witnessed by the undersigned.

To the best of my knowledge, the above statement is true and correct.

_____ _____

(Signature) (Date)

_____ _____

(Title) (Organization)

_____ _____

(Signature) (Date)

_____ _____

(Title) (Organization)