

QUALIFICATION TEST REPORT  
EMI Tests - MC170AD-Q2/MC370AD-Q2  
and  
Associated PC Boards & Plug-in Modules

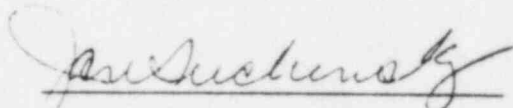
Report No. QTR 82-010 Rev. A

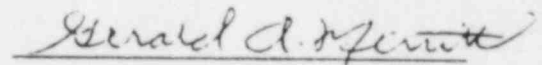
CERTIFICATE OF CONFORMANCE

State of California  
County of Los Angeles

Gerald A. Merritt, Vice President of Validyne Engineering Corp., Northridge, California, being duly sworn deposes and says that the information contained in this report is the result of complete and carefully conducted tests and is to the best of his knowledge true and correct in all respects.

SUBSCRIBED and sworn to before me this 10<sup>th</sup> day of February, 1984

  
Notary Public in and for the  
County of Los Angeles,  
State of California

  
Gerald A. Merritt

My commission expires October 1, 1986

Issue Date: April, 1983



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APPR.   
**DOCUMENT CONTROL**

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A PDR

QUALIFICATION TEST REPORT  
EMI Tests - MC170AD-Q2/MC370AD-Q2  
and  
Associated PC Boards & Plug-in Modules  
Report No. QTR 82-010 Rev. A



REVISIONS				
LTR	ECO	DESCRIPTION	DATE	APPROVED
A		Replaced transient conducted & radiated EMI test data with new data taken with Transient EMI Generator specified in QTP 82-007 Rev A.	6/17/82	

SIGNATURE		DATE	TITLE	
PROD SUPPORT	<i>J E Kopp</i>	4/15/82	QUALIFICATION TEST REPORT EMI Tests - MC170AD-Q2/MC370AD-Q2 and Associated PC Boards & Plug-in Modules	
ENGINEERING	<i>Steve Pfeiffer</i>	4/15/82		
QUAL CONTROL	<i>Bob Marshall</i>	4/16/82		
			NUMBER	REV
			QTR 82-010	A
			SHEET 11	

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## EMI QUALIFICATION REPORT

### 1.0 SCOPE

This test report covers Electromagnetic Interference (EMI) Susceptability tests performed on the Validyne Model MC170AD-Q2/MC370AD-Q2 Remote Multiplexer Module Case and associated plug-in signal conditioning modules and accessories. The tests cover the susceptibility of the Remote Multiplexer to the following EMI input modes:

- A. Conducted radio frequency EMI on the AC power line
- B. Radiated radio frequency EMI on the input signal circuits
- C. Conducted EMI transients
- D. Radiated EMI transients

### 2.0 APPLICABLE DOCUMENTS

- A. Validyne Test Procedure number QTP 82-007 Rev. A
- B. General Electric NED Document number 249A1238 Rev. 5, EMI Susceptability Test Guide

### 3.0 TEST RESULTS

3.1 Conducted RF EMI, 0.5 to 100 MHz. The DI325-Q2, PT174-Q2, CD173-Q2 and CM249-Q2 signal conditioners were not significantly affected by conducted RF EMI of 5 Volt peak-to-peak.

In the case of the TC292-Q2 and BA332-Q2, the output stayed within 1% over the entire frequency spectrum of 0.5 to 100 MHz, with slightly lowered thresholds of -2.5 db at 52.7 MHz, and -5 db at 53.0 MHz, respectively.

### 3.2 Radiated RF EMI.

- A. System Test. In this test the digital output of the Remote Multiplexer was in parallel with the RF EMI signal through a 50 foot tube. The DI325-Q2, PT174-Q2, CD173-Q2 and CM249-Q2

signal conditioners were not significantly affected by radiated RF EMI of 5 Volts peak-to-peak. In the case of the TC292-Q2 and BA332-Q2 the output remained within 1% over the entire frequency range of 0.5 to 100 MHz with slightly lowered thresholds of -3.8 db at 28.1 MHz, and -2.9 db at 98.5 MHz, respectively.

- B. Individual Signal Conditioner Tests. In this test the input signals to the plug-in signal conditioners were coupled with radiated RF EMI through parallel cables in a 50 foot plastic tube. The PT174-Q2, CD173-Q2 and the CD173-Q2/CM249-Q2 combination (with the CM249-Q2 output coupled to RF EMI), were not significantly affected by radiated RF EMI of 5 volts peak-to-peak.

In the case of the DI325-Q2, TC292-Q2, BA332-Q2 and the combination of CD173-Q2/CM249-Q2 (with the CM249-Q2 input coupled to RF EMI), the outputs remained within 1% over the entire frequency range of 0.5 to 100 MHz with slightly lowered thresholds of -1.7 db at 2.48 MHz, -9.7 db at 2.11 MHz, -4.7 db at 22 MHz, and -0.9 db at 2.82 MHz, respectively.

3.3 Conducted EMI Transients. There was no effect on the outputs of the plug-in signal conditioners or the combination of CD173-Q2 and CM249-Q2. There was a +0.13% effect on the output of the PS324-Q2 Remote Power Supply.

3.4 Radiated EMI Transients. There was no effect on the outputs of the plug-in signal conditioners or the combination of CD173-Q2 and CM249-Q2.

#### 4.0 TEST EQUIPMENT

The list of test equipment used was as follows:

- A. Transient EMI Generator
- B. Hewlett Packard 8601A Generator/Sweeper 0.1 MHz - 110 MHz

## List of Test Equipment (Cont'd.)

- C. Hewlett Packard 1201A Oscilloscope
- D. Tektronix 465 Oscilloscope
- E. Digital Multimeter, Data Precision Model 245
- F. Digital Multimeter, Data Precision Model 248
- G. Isolation transformer with electrostatic shield
- H. Isolation transformer, TRIAD
- I. Heathkit Decade Resistance Box, IN-17
- J. 9 Volt battery with 90.9 k  $\Omega$  resistor and 1 k  $\Omega$  10-turn potentiometer as signal source

## 5.0 EQUIPMENT TESTED

The following is a list of the part numbers and serial numbers of the equipment tested:

<u>Part Number</u>	<u>Description</u>	<u>Serial Number</u>
1. MC170AD-Q2	Remote Multiplexer/Module Case	54279
2. PS171-Q2	Plug-in Oscillator Power Supply	56287
3. PS294-Q2	Power Supply Card	Q9702-2-B
4. AB295-Q2	Analog Card	QS981-2-E
5. AD296-Q2	Digital Card	QS982-1-A
6. 9860-400-Q2	Filter Board Assembly	QS981-9-400 Hz-B
7. DI325-Q2	4-Input Digital Encoder	QE424-4-B/QE427-1-B
8. PT174-2-Q2	Platinum RTD Conditioner	QE507-1-E/QE579-14-F
9. TC292-Q2	Thermocouple Conditioner	QE425-1-A/QE583-40-B
10. BA332-Q2	Buffer Amplifier	QE419-2-C/QE419-957-B
11. CD173-Q2	High Gain Carrier Demodulator	QE538-2-C/QE428-5-A
12. CM249-Q2	Remote Carrier Modulator	55420/55421
13. PS324-Q2	Remote 24 Vdc Power Supply	56460
14. PC202-Q2	Potentiometer Conditioner	QE427-2-C

### NOTES:

1. Items 1 through 6, above, comprise the MC170AD-Q2 assembly.

#### NOTES (Cont'd.)

2. Items 7 through 11 and 14 are plug-in signal conditioning modules used in the MC170AD-Q2.
3. Item 12 is a remote device used in conjunction with the CD173-Q2, electrically connected via cable.
4. Item 13 is a remote power supply used to provide 24 Vdc to the MC170AD-Q2 for use with the DI325-Q2.

#### 6.0 TEST DATA SHEETS

Specific Data Sheets listing test data for each item tested are included in the Appendix to this report.

#### 7.0 QUALIFICATION TEST PROCEDURE

A copy of the qualification test procedure, QTP82-007 Rev. A, is included in the Appendix.

APPENDIX I

Test Data Sheets, Pages A-2 through A-35

# DATA SHEET

Section 5.0: Conducted RF EMI, 0.5 to 100 MHz

Equipment Tested:

MC170AD-Q2, S/N 54279 PS171-Q2 56237

PS294-Q2 Q9702-2-B AB295-Q2 Q5491-2-E AD296- -Q2 Q5982-1-A

SIGNAL COND. MODULE: Type DE325-Q2 S/N QE424-4-13 Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		
	5V P-P	OUTPUT WITH NO RF = 5.699 VDC MAX. OUTPUT WITH R.F = 5.712 VDC MIN " " " = 5.699 VDC	

Test Equipment:

Isolation Xfmr \_\_\_\_\_

RF Generator(s) \_\_\_\_\_

Receiver/DAC \_\_\_\_\_

Digital Multimeter \_\_\_\_\_

Oscilloscopes \_\_\_\_\_



Test by Cass Martin Date 4/12/82

Q.C. Approval Rod Marshall Date 4/12/82

# DATA SHEET

Section 5.0: Conducted RF EMI, 0.5 to 100 MHz

Equipment Tested:

MC170AD-Q2, S/N 54279 PS171-Q2 56287

PS294-Q2 Q9702-2-B AB295-Q2 Q5981-2-E AD296-Q2 Q5982-1-A

SIGNAL COND. MODULE: Type PT174-Q2 S/N GC-537-1-E Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		
	5 V P-P	OUTPUT WITH NO R.F. = 1.038 VDC MAX. OUTPUT WITH R.F. = 1.041 VDC MIN OUTPUT WITH R.F. = 1.036 VDC	

Test Equipment:

Isolation Xfmr \_\_\_\_\_

RF Generator(s) \_\_\_\_\_

Receiver/DAC \_\_\_\_\_

Digital Multimeter \_\_\_\_\_

Oscilloscopes \_\_\_\_\_



Test by Cass Martin

Date 4/12/82

Q.C. Approval Rod Marshall

Date 4/12/82

# DATA SHEET

Section 5.0: Conducted RF EMI, 0.5 to 100 MHz

Equipment Tested:

MC170AD-Q2, S/N 54279 PS171-Q2 56287

PS294-Q2 Q 9702-2-B AB295-Q2 Q5981-2-E AD296- -Q2 Q5982-1-A

SIGNAL COND. MODULE: Type CD173-Q2 S/N Q5538-2-C Slot 25  
CM249-Q2 55420 N/A

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		
	<u>51P-P</u>	<p>OUTPUT WITH NO RF. = <u>1.013 VDC</u></p> <p>MAX. OUTPUT WITH RF. = <u>1.015 VDC</u></p> <p>MIN. " " " = <u>1.003 VDC</u></p>	

Test Equipment:

Isolation Xfrm \_\_\_\_\_

RF Generator(s) \_\_\_\_\_

Receiver/DAC \_\_\_\_\_

Digital Multimeter \_\_\_\_\_

Oscilloscopes \_\_\_\_\_



Test by Cass Martin Date 4/12/82

Q.C. Approval Rod Marshall Date 4/12/82



# DATA SHEET

Section 5.0: Conducted RF EMI, 0.5 to 100 MHz

Equipment Tested:

MC170AD-Q2, S/N 54279 PS171-Q2 56287

PS294-Q2 Q9702-2-B AB295-Q2 Q5931-2-E AD296-Q2 Q5932-1-A

SIGNAL COND. MODULE: Type CD173-Q2 S/N Q5535-2-C Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		
	5V P-P	OUTPUT WITH NO RF. = 1.005VDC Max. OUTPUT WITH R.F. = 1.010VDC MIN " " " " = 1.003VDC	

Test Equipment:

Isolation Xfmr \_\_\_\_\_

RF Generator(s) \_\_\_\_\_

Receiver/DAC \_\_\_\_\_

Digital Multimeter \_\_\_\_\_

Oscilloscopes \_\_\_\_\_



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# DATA SHEET

Section 5.0: Conducted RF EMI, 0.5 to 100 MHz

Equipment Tested:

MC170AD-Q2, S/N 54279 PS171-Q2 56287  
 PS294-Q2 Q9702-2-B AB295-Q2 Q5981-2-E AD296-Q2 Q5482-1-A

SIGNAL COND. MODULE: Type TC292-Q2 S/N Q542521-4 Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		
	5V P-P	OUTPUT WITH NO RF. = 0.004 VDC MAX. OUTPUT WITH RF. = 0.006 VDC MIN. " " " = -0.154 VDC	
52.7	5V P-P	-0.154 VDC WITHIN 1% WITH _____	3.76 V P-P

Test Equipment:

Isolation Xfrmr \_\_\_\_\_

RF Generator(s) \_\_\_\_\_

Receiver/DAC \_\_\_\_\_

Digital Multimeter \_\_\_\_\_

Oscilloscopes \_\_\_\_\_



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Date 4/12/82

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Date 4/12/82

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# DATA SHEET

Section 5.0: Conducted RF EMI, 0.5 to 100 MHz

Equipment Tested:

MC170AD-Q2, S/N 54279 PS171-Q2 56237  
 PS294-Q2 Q9702-2-B AB295-Q2 Q5981-2-E AD296-Q2 Q5982-1-A

SIGNAL COND. MODULE: Type BA332-Q2 S/N Q5E419-2-C Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		
	5 V P-P	OUTPUT WITH NO R-F = 1.020 VDC MAX OUTPUT WITH R-F = 1.600 VDC MIN. " " " = 1.020 VDC	
50.1 - 65.7		Output above 1.0 within this range	
57.0		OUTPUT = 1.6 VDC OUTPUT WITHIN 1% with	2.8 V P-P

Test Equipment:

Isolation Xfmr \_\_\_\_\_

RF Generator(s) \_\_\_\_\_

Receiver/DAC \_\_\_\_\_

Digital Multimeter \_\_\_\_\_

Oscilloscopes \_\_\_\_\_



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# DATA SHEET

Section 6.0: Radiated RF EMI (system)

Equipment Tested:

MC170AD-Q2, S/N 54279

PS171-Q2 56287

PS294-Q2 Q9702-2-13

AB295-Q2 Q25981-2-E

AD296-Q2 Q5932-1-A

SIGNAL COND. MODULE: Type DI325-Q2 S/N QEG24-4-13 Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		
	5V P-P	<p>OUTPUT WITH NO R.F. = 5.690VAC</p> <p>MAX. OUTPUT WITH R.F. = 5.701VAC</p> <p>MIN. " " " = 5.686VAC</p>	

Test Equipment:

Isolation Xfrmr \_\_\_\_\_

RF Generator(s) \_\_\_\_\_

Receiver/DAC \_\_\_\_\_

Digital Multimeter \_\_\_\_\_

Oscilloscopes \_\_\_\_\_



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Date 4/12/82

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Date 4/12/82

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# DATA SHEET

Section 6.0: Radiated RF EMI (SYSTEM)

Equipment Tested:

MC170AD-Q2, S/N 54279 PS171-Q2 56237

PS294-Q2 Q9702-2-B AB295-Q2 Q5981-2-E AD296-Q2 Q5982-1-A

SIGNAL COND. MODULE: Type PT174-62 S/N QES07-1-E Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		
	5. VSR	<p>OUTPUT WITH NO R.F. = 1.037 VDC</p> <p>MAX. OUTPUT WITH R.F. = 1.045 VDC</p> <p>MIN. " " = 1.036 VDC</p>	

Test Equipment:

Isolation Xfrmr \_\_\_\_\_

RF Generator(s) \_\_\_\_\_

Receiver/DAC \_\_\_\_\_

Digital Multimeter \_\_\_\_\_

Oscilloscopes \_\_\_\_\_



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Date 4/12/82

*W JAC 4/12/82*

DATA SHEET

Section 6.0: Radiated RF EMI (SYSTEM)

Equipment Tested:

MC170AD-Q2, S/N 54279 PS171-Q2 56287

PS294-Q2 Q 9702-2-13 AB295-Q2 Q 5981-2-E AD296- -Q2 Q 5982-1-A

SIGNAL COND. MODULE: Type CD173-Q2 S/N Q E 538-2-C Slot 23  
CM249-Q2 55420 N/A

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		
	5VP-P	OUTPUT WITH NO R.F. = 1.007 VDC MAX. OUTPUT WITH R.F. = 1.011 VDC MIN. " " " = 1.006 VDC	

Test Equipment:

Isolation Xfrmr \_\_\_\_\_

RF Generator(s) \_\_\_\_\_

Receiver/DAC \_\_\_\_\_

Digital Multimeter \_\_\_\_\_

Oscilloscopes \_\_\_\_\_



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# DATA SHEET

Section 6.0: Radiated RF EMI (SYSTEM)

Equipment Tested:

MC170AD-Q2, S/N 54279 PS171-Q2 56287

PS294-Q2 G9702-2-B AB295-Q2 QS981-2-E AD296-Q2 QS982-1-A

SIGNAL COND. MODULE: Type TC292-Q2 S/N QE425-1-A Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		
	5 VPP	OUTPUT WITH NO R.F. = -0.000V MAX. OUTPUT WITH R.F. = -0.136V MIN. " " " " = -0.000V	
23.1	5 VPP	OUTPUT = -0.245V DC W/RSSE CASE OUTPUT TO BE WITHIN ± 1% of 10V OUTPUT	<del>1.14 VPP</del> 3.22 VPP 4.28

Test Equipment:

Isolation Xfrmr \_\_\_\_\_

RF Generator(s) \_\_\_\_\_

Receiver/DAC \_\_\_\_\_

Digital Multimeter \_\_\_\_\_

Oscilloscopes \_\_\_\_\_



Test by Cass Martin

Date 4/12/82

Q.C. Approval Rod Marshall

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# DATA SHEET

Section 6.0: Radiated RF EMI (SYSTEM)

Equipment Tested:

MC170AD-Q2, S/N 54279

PS171-Q2 56287

PS294-Q2 9702-2-B

AB295-Q2 Q5981-2-E

AD296-Q2 Q5982-1-A

SIGNAL COND. MODULE: Type BA332-Q2 S/N Q6419-2-C Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		
	5VPP	Output WITH NO R.F. = 0.978VDC Max. Output WITH R.F. = 1.180VDC MIN. " " " = 0.854VDC	
2.05		was 1.084VDC FOR WITHIN 1% just slightly out.	
10.00		" " " 1%	4.30VPP
93.5		was 1.180VDC #1 " "	3.59VPP

Test Equipment:

Isolation Xfmr \_\_\_\_\_

RF Generator(s) \_\_\_\_\_

Receiver/DAC \_\_\_\_\_

Digital Multimeter \_\_\_\_\_

Oscilloscopes \_\_\_\_\_



Test by Cass Martin

Date 4/12/82

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Date 4/12/82



# DATA SHEET

Section 6.0: Radiated RF EMI

Equipment Tested:

MC170AD-Q2, S/N 54279 PS171-Q2 56287

PS294-Q2 9702-2-B AB295-Q2 Q5981-2-E AD296- -Q2 Q5982-1-17

SIGNAL COND. MODULE: Type PT174-Q2 S/N Q5507-1-E Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		
	5VPP	<p>OUTPUT WITH NO R.F. = 1.008 VDC</p> <p>MAX. OUTPUT WITH R.F. = 1.018 VDC</p> <p>MIN. OUTPUT " " = 1.008 VDC</p>	

Test Equipment:

Isolation Xfrmr \_\_\_\_\_

RF Generator(s) \_\_\_\_\_

Receiver/DAC \_\_\_\_\_

Digital Multimeter \_\_\_\_\_

Oscilloscopes \_\_\_\_\_



Test by Cass Martin Date 4/12/82

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# DATA SHEET

Section 6.0: Radiated RF EMI

Equipment Tested:

MC170AD-Q2, S/N 54279 PS171-Q2 56237

PS294-Q2 Q9702-2-B AB295-Q2 Q5981-2-E AD296-Q2 Q5982-1-A

SIGNAL COND. MODULE: Type CD173-Q2 S/N Q533-2-C Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		
	5 V P-P	OUTPUT WITH NO R.F. = 1.002 VDC MAX. OUTPUT WITH R.F. = 1.012 VDC MIN. " " " " = 0.998 VDC	

Test Equipment:

Isolation Xfer \_\_\_\_\_

RF Generator(s) \_\_\_\_\_

Receiver/DAC \_\_\_\_\_

Digital Multimeter \_\_\_\_\_

Oscilloscopes \_\_\_\_\_



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# DATA SHEET

Section 6.0: Radiated RF EMI

Equipment Tested:

MC170AD-Q2, S/N 54279

PS171-Q2 56287

PS294-Q2 9702-2-B

AB295-Q2 Q5931-2-1E

AD296-Q2 Q5932-1-A

SIGNAL COND. MODULE: Type CD173-Q2 S/N Q5538-2-C Slot 23

CM249-Q2 55420

RF coupled  
to the output  
of CM249  
by terminating

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		
	5V P-P	<p>OUTPUT WITH NO RF. = 1.020 V DC</p> <p>MAX. OUTPUT WITH RF. = 1.024 V DC</p> <p>MIN " " " = 1.015 V DC</p>	

Test Equipment:

Isolation Xfrmr \_\_\_\_\_

RF Generator(s) \_\_\_\_\_

Receiver/DAC \_\_\_\_\_

Digital Multimeter \_\_\_\_\_

Oscilloscopes \_\_\_\_\_



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Date 4/12/82

# DATA SHEET

Section 6.0: Radiated RF EMI

Equipment Tested:

MC170AD-Q2, S/N 54279 PS171-Q2 56287  
 PS294-Q2 9702-2-B AB295-Q2 85981-2-E AD296- -Q2 85982-1-A

SIGNAL COND. MODULE: Type DE325-Q2 S/N 06424-4-B Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		
2.48	5V P-P	OUTPUT WITH NO R.F. = 5.692 V DC MAX. OUTPUT WITH R.F. = 5.700 MIN " " " = 5.364 VDC For OUTPUT WITHIN 1%	4.13 VPP

Test Equipment:

Isolation Xform \_\_\_\_\_  
 RF Generator(s) \_\_\_\_\_  
 Receiver/DAC \_\_\_\_\_  
 Digital Multimeter \_\_\_\_\_  
 Oscilloscopes \_\_\_\_\_

*Handwritten:* JAC 4/12/82



Test by Cass Martin Date 4/12/82  
 Q.C. Approval Rod Marshall Date 4/12/82

# DATA SHEET

Section 6.0: Radiated RF EMI

Equipment Tested:

MC170AD-Q2, S/N 54279

PS171-Q2 56287

PS294-Q2 9702-2-B

AB295-Q2 Q5981-2-12

AD296-Q2 Q5932-1-A

SIGNAL COND. MODULE: Type TC292-Q2 S/N Q5425-1-A Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		
2.11	5	<p>OUTPUT WITH NO RF. = -0.002VDC</p> <p>MAX OUTPUT WITH RF. = 1.063VDC</p> <p>MIN. OUTPUT " " = -0.071VDC</p> <p>FOR WITHIN 1%</p>	1.64V

Test Equipment:

Isolation Xfmr \_\_\_\_\_

RF Generator(s) \_\_\_\_\_

Receiver/DAC \_\_\_\_\_

Digital Multimeter \_\_\_\_\_

Oscilloscopes \_\_\_\_\_



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Q.C. Approval Rod Marshall

Date 4/12/82

Date 4/12/82

QTP 82-007

A-17

4/82

*[Handwritten signature]*  
JAC 4/12/82

# DATA SHEET

Section 6.0: Radiated RF EMI

Equipment Tested:

MC170AD-Q2, S/N 54279 PS171-Q2 56287

PS294-Q2 Q9702-2-B AB295-Q2 Q5931-2-E AD296- -Q2 Q5982-1-A

SIGNAL COND. MODULE: Type BA332-Q2 S/N QE419-2-C Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		
	5 VPP.	OUTPUT WITH NO R.F. = 1.017 VDC MAX. OUTPUT WITH R.F. = 1.155 VDC MIN. OUTPUT " " = 1.009 VDC	
22 MHz	5 VPP.	OUTPUT = 1.306 VDC WORSE CASE	
"	2.91 VPP.	" = 1.117 VDC 1% change	

Test Equipment:

Isolation Xfrmr \_\_\_\_\_

RF Generator(s) \_\_\_\_\_

Receiver/DAC \_\_\_\_\_

Digital Multimeter \_\_\_\_\_

Oscilloscopes \_\_\_\_\_

Test by Cass Martin Date 4/12/82

Q.C. Approval Rod Marshall Date 4/12/82

# DATA SHEET

Section 6.0: Radiated RF EMI

Equipment Tested:

MC170AD-Q2, S/N 54279

PS171-Q2 56287

PS294-Q2 9702-2-B

AB295-Q2 CS981-2-E

AD296-Q2 CS932-1-A

SIGNAL COND. MODULE: Type CD173-Q2 S/N AE533-2-C Slot 23

CM249-Q2 <sup>55420</sup>

N/A

R-F Coupled  
to the input  
of CM249  
is radiating

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		
	5 V P-P	OUTPUT WITH NO R.F. = 1.001 VDC MAX. OUTPUT WITH R.F. = 1.099 VDC MIN. " " " = 0.855 VDC	
2.52	<del>5 V P-P</del>	For 1% shift	4.53 V P-P

Test Equipment:

Isolation Xfmr \_\_\_\_\_

RF Generator(s) \_\_\_\_\_

Receiver/DAC \_\_\_\_\_

Digital Multimeter \_\_\_\_\_

Oscilloscopes \_\_\_\_\_



Test by Cass Martin

Date 4/12/82

Q.C. Approval Rod Marshall

Date 4/12/82

W JAC 4/12/82



# DATA SHEET

## Section 7.0: Conducted EMI Transients

Equipment Tested:

MC170AD-Q2, S/N 54281

PS171-Q2 56238

PS294-Q2 Q9702-2-B

AB295-Q2 Q8 981-2-E

AD296-Q2 Q8 982-1-A

SIGNAL COND. MODULE: Type DE325-G2 S/N GE424-1-B Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
K MHz	V P-P		
0	0	5.853V	
100	300	5.853V	
200	300	5.853V	
300	300	5.853V	
400	300	5.853V	
500	300	5.853V	
		no effect on output no effect observed on oscilloscope	

## Test Equipment:

Isolation Xfrmr HIT-3 IN EMI TRANSIENT GENERATOR

RF Generator(s) N/A

Receiver/DAC 55708

Digital Multimeter DATA PRECISION 248 CONTROL #1506

Oscilloscopes TEKTRONIX 415 CONTROL #1561

Test by CASS MARTIN

Date 6/16/82

Q.C. Approval (Signature)

Date 6/16/82



# DATA SHEET

## Section 7.0: Conducted EMI Transients

### Equipment Tested:

MC170AD-Q2, S/N 54281

PS171-Q2 56288

PS294-Q2 Q9702-2-B AB295-Q2 Q5 981-2-E AD296- -Q2 Q5 982-1-A

SIGNAL COND. MODULE: Type CD173-Q2 S/N Q5 428-5-A Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
K MHz	V P-P		
0	0	1.006 V	
100	300	1.006 V	
200	300	1.006 V	
300	300	1.006 V	
400	300	1.006 V	
500	300	1.006 V	
		No effect on output	
		No effect observed on oscilloscope	

### Test Equipment:

Isolation Xfrmr HTT-3 IN EMI TRANSIENT GENERATOR

RF Generator(s) N/A


Receiver/DAC 55705

Digital Multimeter DATL PRECISION 245 CONTROL #1506

Oscilloscopes TEKTRONIX 465 CONTROL #1561

Test by CASS MARTIN

Date 6/16/82

Q.C. Approval 

Date 6/16/82

# DATA SHEET

## Section 7.0: Conducted EMI Transients

### Equipment Tested:

MC170AD-Q2, S/N 54281 PS171-Q2 576-288

PS294-Q2 Q9702-2-B AB295-Q2 Q5 981-2-E AD296- -Q2 Q5 982-1-A

SIGNAL COND. MODULE: Type CD123-Q2 S/N GE423-5-B Slot 23  
CM249-Q2 55421 N/A

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
K MHz	V P-P		
0	0	1.006 V	
100	300	1.006 V	
200	300	1.006 V	
300	300	1.006 V	
400	400	1.006 V	
500	500	1.006 V	
		No effect on output no effect observed on oscilloscope.	

### Test Equipment:

Isolation Xfrmr HIT-3 IN EMI TRANSIENT GENERATOR

RF Generator(s) N/A

Receiver/DAC 55708

Digital Multimeter DATA PRECISION 243 CONTROL # 1506

Oscilloscopes TEKTRONIX 485 CONTROL # 1561

Test by CARL MARTIN Date 6/16/82

Q.C. Approval (Signature) Date 6/16/82

DATA SHEET

Section 7.0: Conducted EMI Transients

Equipment Tested:

MC170AD-Q2, S/N 54281

PS171-Q2 56238

PS294-Q2 Q 9702-2-B

AB295-Q2 QS 931-2-E

AD296- -Q2 QS 982-1-A

SIGNAL COND. MODULE: Type PC202-Q2 S/N QF427-2-C Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
K MHz	V P-P		
00	0.0	1.002V	
100	300	1.002V	
200	300	1.002V	
300	300	1.002V	
400	300	1.002V	
500	300	1.002V	
		No effect on output no effect observed on the oscilloscope	

Test Equipment:

Isolation Xfrmr HIT-3 IN EMI TRANSIENT GENERATOR

RF Generator(s) N/A

Receiver/DAC 55703

Digital Multimeter DATA PRECISION 243 CONTROL #1506

Oscilloscopes TEKTRONIX 465 CONTROL #1561

Test by CASS MARTIN

Date 6/16/82

Q.C. Approval (Signature)

Date 6/16/82

# DATA SHEET

## Section 7.0: Conducted EMI Transients

Equipment Tested:

MC170AD-Q2, S/N 54281

PS171-Q2 56288

PS294-Q2 Q9702-2-B AB295-Q2 QS 981-2-E AD296- -Q2 QS 982-1-A

SIGNAL COND. MODULE: Type TC242-G2 S/N 1E583-40-15 Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
KHz	V P-P		
0	0	1.017 V	
100	300	1.017 V	
200	300	1.017 V	
300	300	1.017 V	
400	300	1.017 V	
500	300	1.017 V	
		No effect on output. No effect observed on oscilloscope	

## Test Equipment:

Isolation Xfrmr 145T-3 IN EMI TRANSIENT GENERATOR

RF Generator(s) N/A

Receiver/DAC 55703

Digital Multimeter DATA PRECISION 248 CONTROL # 1506

Oscilloscopes TEK TRONIX 465 CONTROL # 1561

Test by CASS MARTIN

Date 6/16/82

Q.C. Approval



Date 6/16/82

# DATA SHEET

## Section 7.0: Conducted EMI Transients

Equipment Tested:

MC170AD-Q2, S/N 54281 PS171-Q2 56283  
 PS294-Q2 Q9702-2-B AB295-Q2 Q5981-2-E AD296-Q2 Q5982-1-A

SIGNAL COND. MODULE: Type PT174-Q2 S/N Q6579-14-F Slot 25

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		
0	0	0.903V	
100	300	0.903V	
200	300	0.903V	
300	300	0.903V	
400	300	0.903V	
500	300	0.903V	
		No effect on output - No effect observed on oscilloscope	

## Test Equipment:

Isolation Xfrmr HIT 3 IN EMI TRANSIENT GENERATOR

RF Generator(s) N/A

Receiver/DAC 55703

Digital Multimeter DATA PRECISION 248 CONTROL # 1506

Oscilloscopes TEKTRONIX 465 CONTROL # 1561

Test by CASS MARTIN  Date 6/16/82

Q.C. Approval \_\_\_\_\_ Date 6/16/82

# DATA SHEET

## Section 7.0: Conducted EMI Transients

### Equipment Tested:

MC170AD-Q2, S/N 54281

PS171-Q2 56238

PS294-Q2 Q 9702-2-B AB295-Q2 Q 5 981-2-E AD296- -Q2 Q 5 982-1-A

SIGNAL COND. MODULE: Type BA32-2-Q S/N Q/E 419-957<sup>-b</sup> Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
K MHz	V P-P		
0	2.00	1.002V	
100	300	1.005V	
200	300	1.005V	
300	300	1.005V	
400	300	1.005V	
500	3.0	1.005V	
The difference with EMI was 0.003V no effect observed on oscilloscope.			

### Test Equipment:

Isolation Xfrmr HIT 3 IN EMI TRANSIENT GENERATOR

RF Generator(s) N/A

Receiver/DAC 55708

Digital Multimeter DATA PRECISION 243 CONTROL # 1506

Oscilloscopes TEKTRONIX 465 CONTROL # 1561

Test by CASS MARTIN

Date 6/16/82

Q.C. Approval [Signature]

Date 6/16/82

# DATA SHEET

## Section 7.0: Conducted EMI Transients

Equipment Tested: PS324-Q2

MC170AD-Q2, S/N N/A PS171-Q2 N/A

PS294-Q2 N/A AB295-Q2 N/A AD296-Q2 N/A

SIGNAL COND. MODULE: Type PS324-Q2 S/N 56460 Slot N/A

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
<del>MHz</del> KHz	V P-P		
0	0	23.62V NO LOAD OUTPUT	
0	0	23.64V FULL LOAD OUTPUT	
100	300	23.67V " " "	
200	300	23.67V " " "	
300	300	23.67V " " "	
400	300	23.67V " " "	
500	300	23.67V " " "	
<p>The effect on output with RFI transients was +0.03V DC. No effect was observed on the oscilloscope.</p>			

## Test Equipment:

Isolation Xfrmr HIT-3 IN RFI TRANSIENT GENERATOR

RF Generator(s) N/A

Receiver/DAC N/A

Digital Multimeter DATA PRECISION 248 CONTROL # 1506

Oscilloscopes TEKTRONIX 465 " " 1561

Test by CAS. MARTIN Date 6/15/82

Q.C. Approval  Date 6-15-82



# DATA SHEET

## Section 8.0: Radiated EMI Transients

### Equipment Tested:

MC170AD-Q2, S/N 54281 PS171-Q2 56288  
 PS294-Q2 Q 9702-2-B AB295-Q2 Q5 981-2-E AD296- -Q2 Q5 982-1-A

SIGNAL COND. MODULE: Type DI325-Q2 S/N Q6427-1-B Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
KMHz	V P-P		
0	0	5.862 V	
100	300	5.862 V	
200	300	5.862 V	
300	300	5.862 V	
400	300	5.862 V	
500	300	5.862 V	
		no effect on output. no effect observed on oscilloscope	

### Test Equipment:

Isolation Xfrmr HIT-3 IN EMI TRANSIENT GENERATOR

RF Generator(s) NA

Receiver/DAC 55708

Digital Multimeter DATA ~~FROM~~ PRECISION 248 CONTROL # 1506

Oscilloscopes TEKTRONICS 465 CONTROL # 1561

Test by CAS MARTIN

Date 6/16/92

Q.C. Approval (Signature)

Date 6/16/92



# DATA SHEET

## Section 8.0: Radiated EMI Transients

Equipment Tested:

MC170AD-Q2, S/N 54231 PS171-Q2 56288  
 PS294-Q2 Q9702-2-B AB295-Q2 Q5981-2-E AD296-Q2 Q5982-1-A  
 (Q16427-2-C)  
 SIGNAL COND. MODULE: Type PC202-G2 S/N ~~Q111457~~ Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
K MHz	V P-P		
0	00	1.106V	
100	300	1.106V	
200	300	1.106V	
300	300	1.106V	
400	300	1.106V	
500	300	1.106V	

## Test Equipment:

Isolation Xfrmr HTT-3 IN ANT TRANSIENT GENERATOR  
 RF Generator(s) N/A

Receiver/DAC 55703  
 Digital Multimeter DATA PRECISION 243 CONTROL #1506  
 Oscilloscopes TEKTRONIX 465 CONTROL #1561

Test by CASS MARTIN Date 6/16/82  
 Q.C. Approval  Date 6/16/82

# DATA SHEET

## Section 8.0: Radiated EMI Transients

Equipment Tested:

MC170AD-Q2, S/N 54281 PS171-Q2 56258

PS294-Q2 Q9702-2-B AB295-Q2 QS 981-2-E AD296- -Q2 QS 982-1-A

SIGNAL COND. MODULE: Type BA332-Q2 S/N Q419-952 R Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
KHz	V P-P		
C	0.0	1.022 V	
100	300	1.022 V	
200	300	1.022 V	
300	300	1.022 V	
400	300	1.022 V	
500	300	1.022 V	
		no effect on output No effect observed on oscilloscope	

## Test Equipment:

Isolation Xfrmr HIT-3 IN EMI TRANSIENT GENERATOR

RF Generator(s) N/A

Receiver/DAC 5570S

Digital Multimeter DATAPRECISION 245 CONTROL #1506

Oscilloscopes TEKTRONIX 465 CONTROL #1501

Test by CHSS MARTIN Date 6/16/82

Q.C. Approval [Signature] Date 6/16/82

# DATA SHEET

## Section 8.0: Radiated EMI Transients

### Equipment Tested:

MC170AD-Q2, S/N 54281 PS171-Q2 56288  
 PS294-Q2 Q9702-2-B AB295-Q2 QS981-2-E AD296-Q2 QS982-1-A

SIGNAL COND. MODULE: Type TC292-GL S/N Q1583-40-B Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
f MHz	V P-P		
0	000	1.018V	
100	300	1.018V	
200	300	1.018V	
300	300	1.018V	
400	300	1.018V	
500	300	1.018V	
		no effect on output no effect observed on oscilloscope	

### Test Equipment:

Isolation Xfrmr HIT-3 IN EMI TRANSIENT GENERATOR  
 RF Generator(s) N/A

Receiver/DAC 55708  
 Digital Multimeter DATA PRECISION 248 CONTROL #1506  
 Oscilloscopes TEKTRONICS 465 CONTROL #1561

Test by CASS MACTIN Date 6/16/82  
 Q.C. Approval \_\_\_\_\_ Date 8/16/82

# DATA SHEET

## Section 8.0: Radiated EMI Transients

### Equipment Tested:

MC170AD-Q2, S/N 54281 PS171-Q2 56285

PS294-Q2 Q9702-2-B AB295-Q2 QS 981-2-E AD296- -Q2 QS 982-1-A

SIGNAL COND. MODULE: Type CD173-Q2 S/N QE 428-5-B Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
KMHz	V P-P		
0	0.0	1.006V	
100	300	1.006V	
200	300	1.006V	
300	300	1.006V	
400	300	1.006V	
500	300	1.006V	
		No effect on output. No effect observed on oscilloscope.	

### Test Equipment:

Isolation Xfrmr ITT-3 IN EMI TRANSIENT GENERATOR

RF Generator(s) N/A

Receiver/DAC 55708

Digital Multimeter DATA PRECISION 243 CONTROL # 1506

Oscilloscopes TEKTRONIX 465 CONTROL # 1561

Test by CLASS MARTIN Date 6/16/82

Q.C. Approval [Signature] Date 6/16/82

# DATA SHEET

## Section 8.0: Radiated EMI Transients

### Equipment Tested:

MC170AD-Q2, S/N 54281 PS171-Q2 56285

PS294-Q2 Q9702-2-B AB295-Q2 QS 981-2-E AD296-Q2 QS 982-1-A

SIGNAL COND. MODULE: Type CD173-QL S/N            Slot 23  
CM249-V2 (LOCAL) N/A

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
K MHz	V P-P		
0	0.0	1.003 V	
100	300	1.003 V	
200	300	1.003 V	
300	300	1.003 V	
400	300	1.003 V	
500	300	1.003 V	
		no effect on output	
		no effect observed on oscilloscope	

### Test Equipment:

Isolation Xfrmr 141T-3 IN EMI TRANSIENT GENERATOR

RF Generator(s) N/A

Receiver/DAC 55708

Digital Multimeter DATA PRECISION 245 CONTROL #1506

Oscilloscopes TEKTRONIX 465 CONTROL #1561

Test by CASS MARTIN Date 6/16/82

Q.C. Approval (Signature) Date 6/16/82

# DATA SHEET

## Section 8.0: Radiated EMI Transients

### Equipment Tested:

MC170AD-Q2, S/N 54281 PS171-Q2 56288  
 PS294-Q2 Q9702-2-B AB295-Q2 Q3981-2-E AD296-Q2 Q5982-1-A

SIGNAL COND. MODULE: Type CP173-Q2 S/N \_\_\_\_\_ Slot 23  
CM249-Q2 (REMOTE) N/A

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
K MHz	V P-P		
0	000	1.007V	
100	300	1.007V	
200	300	1.007V	
300	300	1.007V	
400	300	1.007V	
500	300	1.007V	
		No effect on output. No effect observed on oscilloscope.	

### Test Equipment:

Isolation Xfrmr HIT-3 IN EMI TRANSIENT GENERATOR  
 RF Generator(s) N/A

Receiver/DAC 55703  
 Digital Multimeter DATA PRECISION 245 CONTROL # 1506  
 Oscilloscopes TEKTRONICS 465 CONTROL # 1501

Test by CASS MARTIN Date 6/16/82  
 Q.C. Approval (Signature) Date 6/16/82

# DATA SHEET

## Section 8.0: Radiated EMI Transients

Equipment Tested:

MC170AD-Q2, S/N 54231 PS171-Q2 56288

PS294-Q2 Q9702-2-B AB295-Q2 Q5981-2-E AD296-Q2 Q5922-1-A

SIGNAL COND. MODULE: Type PT174-RL S/N Q1539-14-F Slot 23

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
KHz	V P-P		
0	∞	0.910V	
100	300	0.910V	
200	300	0.910V	
300	300	0.910V	
400	300	0.910V	
500	300	0.910V	
		No effect on output. No effect observed on oscilloscope.	

## Test Equipment:

Isolation Xfrmr HIT-3 IN EMI TRANSIENT GENERATOR

RF Generator(s) N/A

Receiver/DAC 55708

Digital Multimeter DATA DESIGN 245 CONTROL # 1506

Oscilloscopes TEKTRONIX 465 CONTROL # 1561

Test by CASS MARTIN

Date 6/16/82

Q.C. Approval (Signature)

Date 6/16/82

APPENDIX II

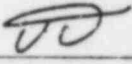
Qualification Test Procedure QTP82-007 Rev. A



QUALIFICATION TEST PROCEDURE  
for  
EMI Tests - MC170AD-Q2/MC370AD-Q2  
and  
Associated PC Boards & Plug-in Modules  
Report No. QTP 82-007 Rev. A

**CERTIFIED COPY**

MAR 12 1984

APPR.   
DOCUMENT CONTROL



REVISIONS				
LTR	ECO	DESCRIPTION	DATE	APPROVED
A		Added Radiated Transient Test; Replaced SWC Generator with Transient EMI Gen.	6/82	

SIGNATURE		DATE	TITLE	
PROD SUPPORT	<i>J E Loop</i>	4/2/82	QUALIFICATION TEST PROCEDURE for EMI Tests MC170AD-Q2/MC370AD-Q2 and Associated Plug-in Modules	
ENGINEERING	<i>RK [Signature]</i>	4/2/82		
QUAL CONTROL	<i>[Signature]</i>	4/12/82		
			NUMBER	QTP 82-007
				REV A
			SHEET 11	

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## EMI QUALIFICATION TEST PROCEDURE

### 1.0 SCOPE

This test procedure specifies the Electromagnetic Interference (EMI) Susceptibility tests to be performed on the Validyne Model MC170AD-Q2/MC370AD-Q2 Remote Multiplexer/Module Case and associated plug-in signal conditioning modules. These tests cover the susceptibility of the Remote Multiplexer to the following EMI input modes:

- A. Conducted radio frequency EMI on the AC power line
- B. Radiated radio frequency EMI on the input signal circuits
- C. Conducted EMI transients
- D. Radiated EMI transients

### 2.0 APPLICABLE DOCUMENTS

General Electric NED Document No. 249A1238 Rev. 5, EMI Susceptibility Test Guide.

### 3.0 EQUIPMENT TO BE TESTED

3.1 List of Equipment. The following equipment shall be subjected to the EMI tests described herein:

- A. MC170AD-Q2 or MC370AD-Q2 Remote Multiplexer/Module Case with a PS171-Q2 Power Supply (these are identical except for input connections); PS294-Q2 Power Supply Card; AB295-Q2 Analog Board; and, AD296-Q2 Digital Board.
- B. CD173-Q2 Carrier Demodulator, and CM249-Q2 Carrier Modulator
- C. PT174-Q2 RTD Signal Conditioner
- D. TC292-Q2 Thermocouple Signal Conditioner
- E. DI325-Q2 or DI338-Q2 Four-Input Digital Encoder (these are identical except for input connections).
- F. BA332-Q2 Buffer Amplifier or PC202-Q2 Potentiometer Conditioner (these are identical except for part numbering).
- G. PS324-Q2 Remote 24 Vdc Power Supply.

3.2 Equipment Configurations. The equipment configuration for the conducted EMI tests shall consist of a module case with power supply with dummy load to simulate full load condition and any one of the above signal conditioning modules (except the CM249-Q2) plugged into the module case. The output of this module shall be used to determine the test effects.

The equipment configuration for the radiated EMI and conducted EMI transient tests shall consist of a module case with power supply with dummy load to simulate full load condition and one each of the above signal conditioning modules (except the CM249-Q2) plugged into the module case. These tests shall be run with each different module successively plugged into the same module position.

#### 4.0 TEST EQUIPMENT

The required characteristics of the EMI generators are given below. Other test equipment required by the procedures shall be as specified by the test procedures.

4.1 Radio Frequency EMI. The RF generator shall be capable of providing sine wave output variable from 0.5 MHz to 100 MHz at amplitudes from zero to 5 volts peak-to-peak and an output impedance of 47 ohms.

4.2 EMI Transients. The transient EMI generator of Figure 4 shall be used.

#### 5.0 CONDUCTED RF EMI TEST PROCEDURE

5.1 Test Setup. Connect the test equipment as shown in Figure 1, using a signal conditioning module whose gain and response have been set to the requirements of Table 1. Connect the appropriate input circuit from Figure 3.



## 5.2 Test Procedure.

- A. Set the module controls as shown in Table 1. Set the Remote Multiplexer to continuously sample the active signal conditioning channel (Sublink 1, Link 1, and Channel 32).
- B. Plug module into MC170AD/MC370AD. Apply zero signal and adjust zero control to give 0.00 V output. Apply 10% signal and adjust span control to give 1.00 Vdc output.
- C. Apply a 5 V peak-to-peak RF signal, varying the frequency from 0.5 MHz to 100 MHz at a rate of between 1 and 5 MHz per second. Observe the Rec/Dac (Receiver/Digital-To-Analog Converter) output during this sweep. If any significant output changes ( $>1\%$  of full scale) are noted, dwell at these frequency inputs and record the frequency and effect on the output. At such points decrease the RF amplitude until the output change is less than 1% of full scale and record the EMI threshold on data sheet.
- D. Repeat the above steps for each module type with the exception of DI325-Q2/DI338-Q2 and the CD173-Q2/CM249-Q2 combination.

In the case of DI325-Q2/DI338-Q2 two most significant inputs are activated using PS324-Q2, and the two least significant inputs are left open circuit. With no power to PS324-Q2, the suppression control of DI325-Q2/DI338-Q2 is adjusted to give  $-9.375 \pm 0.010$  Vdc. Then with power applied to PS324-Q2 the gain of DI325-Q2/DI338-Q2 is adjusted to give an output of  $5.625 \pm 0.010$  Vdc. After these adjustments an RF signal of 5 V peak-to-peak is applied as in Step C above.

In the case of the CD173-Q2/CM249-Q2 combination, the above steps will be performed twice, once with the RF signal coupling at the input of the CM249-Q2, and once with the RF coupling at the output of the CM249-Q2.

## 6.0 RADIATED RF EMI TEST PROCEDURE

These tests shall be performed on the signal conditioning modules listed in Section 3.1.

### 6.1 Test Setup:

- A. Connect the test equipment as shown in Figure 2. Use a signal conditioning module whose gain and response have been set in accordance with Table 1. Connect the appropriate input circuit from Figure 3 to the signal input cable.

### 6.2 Test Procedure:

- A. Adjust the module zero, span (gain) and other controls as specified in Table 1.
- B. Set the Remote Multiplexer to continuously sample the active signal conditioning channel (Sublink 1, Link 1, and Channel 32).
- C. Apply a 5 V peak-peak RF signal, varying the frequency from 0.5 MHz to 100 MHz at a rate between 1 and 5 MHz per second. Observe both the module output and the DA313-Q1 output during this sweep. If any significant output changes ( $>1\%$  full scale) are noted, dwell at these frequency inputs and record the frequency and effect on output. Then decrease the RF amplitude until the output change is less than 1% of full scale and record the EMI threshold amplitude on the data sheet.

## 7.0 CONDUCTED EMI TRANSIENTS TEST PROCEDURE

7.1 Test Setup: Correct the test equipment as shown in Figure 5, using a signal conditioning module whose gain and response have been set to the requirements of Table 1. Connect the appropriate input circuit from Figure 3.



## 7.2 Test Procedure:

- A. Adjust the module zero, span (gain) and other controls as specified in Table 1.
- B. Set the Remote Multiplexer to continuously sample the active signal conditioning channel (Sublink 1, Link 1, and Channel 32).
- C. Apply the transient generator output at 100, 200, 300, 400, and 500 kHz. Observe the DA313-Q1 output. If any significant output changes occur, note the change on the data sheet.
- D. Using setup in Figure 6, repeat paragraph C for a conducted EMI transient test on the PS324-Q2 power supply.

## 8.0 RADIATED EMI TRANSIENT TEST PROCEDURE

8.1 Test Setup: Connect the test equipment as shown in Figure 7, using a signal conditioning module whose gain and response have been set to the requirements of Table 1; connect the appropriate input circuit from Figure 3.

## 8.2 Test Procedure:

- A. Adjust the module zero, span (gain) and other controls as specified in Table 1.
- B. Set the Remote Multiplexer to continuously sample the active signal conditioning channel (Sublink 1, Link 1, and Channel 32).
- C. Apply the transient generator output at 100, 200, 300, 400, and 500 kHz. Observe the DA313-Q1 output. If any significant output changes occur, note the change on the data sheet.

MODULE	CONTROL SETTINGS	
	Gain and Function	Filter Response
CM249-Q2	No adjustments or controls	N/A
CD173-Q2	Gain Switch: 2.5 mV/V Span Adjustment: to give 10Vdc output C Bal. and $\emptyset$ Ref: NA 2 ARM/4 ARM: 4 ARM	Filter Switch: 200Hz
PT174-Q2	Zero input: 92.89 $\Omega$ , 0 V dc output Full Scale Input: 297.31 $\Omega$ , 10 Vdc output Operation at 113 Ohm Input and 1 V output Internal 3W/4W SW: 4W	10Hz Fixed
TC292-Q2	Internal: S1-1, S1-2, S1-7 and S1-8: NA S1-3, S1-5, S1-6: Close S1-4: Open  Input 0-10 mV for 0-10 V output Operation at 1 mV input and 1.0 V output	Internal S1-9: Open (100Hz).
DI325-Q2 DI338-Q2	Internal: S2-1, S2-2, S2-3, S2-4: Open  S3-1, S3-2: Open  No input: -9.375 Vdc No.1, No.2 Input: 5.625 Vdc	Internal: S1-1, S1-2, S1-3 and S1-4: Open  Fast response.
BA332-Q2 PC202-Q2	Gain: X 25 Span: Adjusted for 10 Vdc output with 400 mV input. AC/DC Switch: dc Suppression: NA Internal: S1-A: Out S1-B: -5 V S1-C: Diff.	Filter SW: 200 Hz
AD296-Q2	Sublink----1 Link ----1 Channels--32	

TABLE 1. Module Control Settings

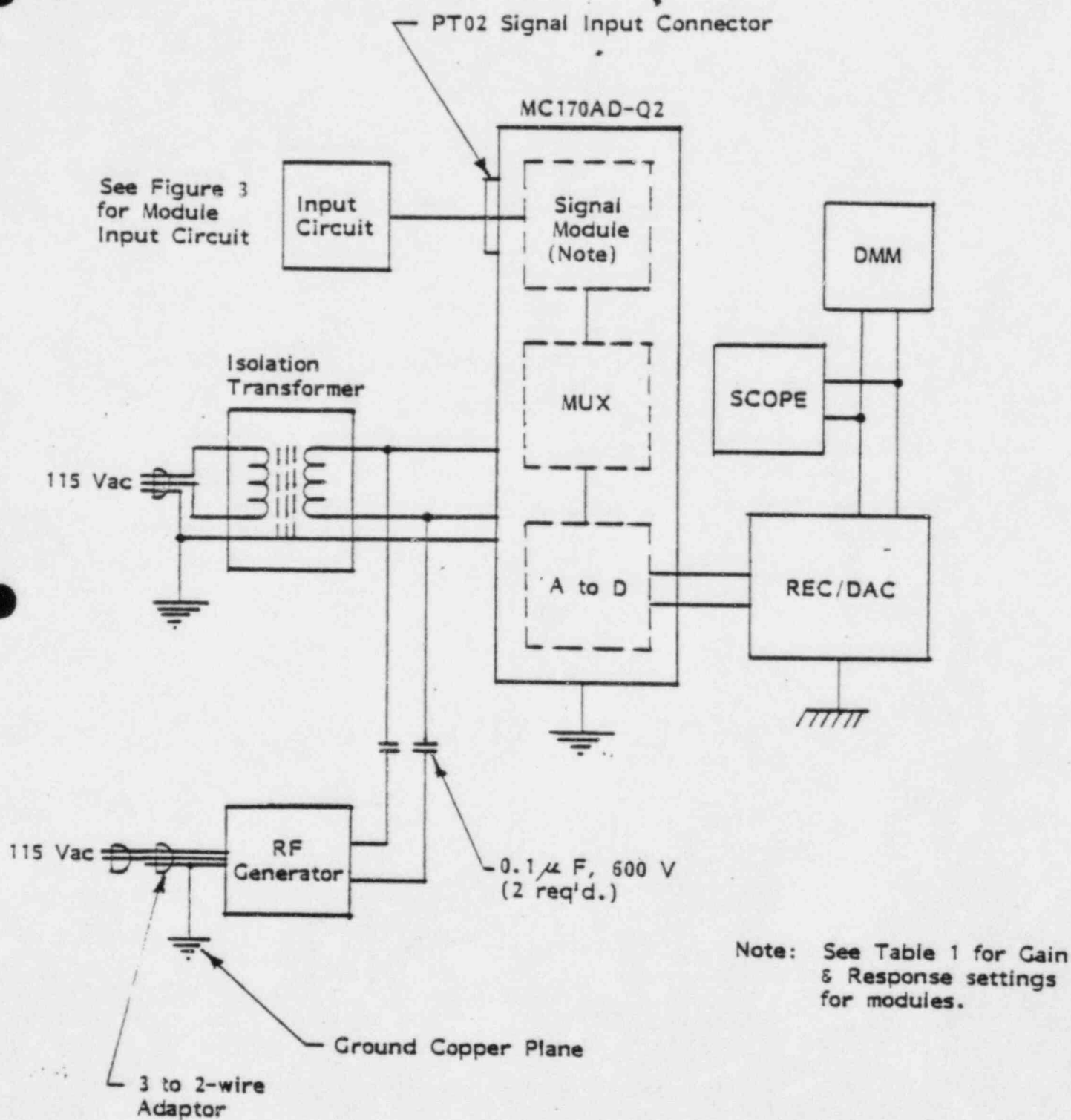
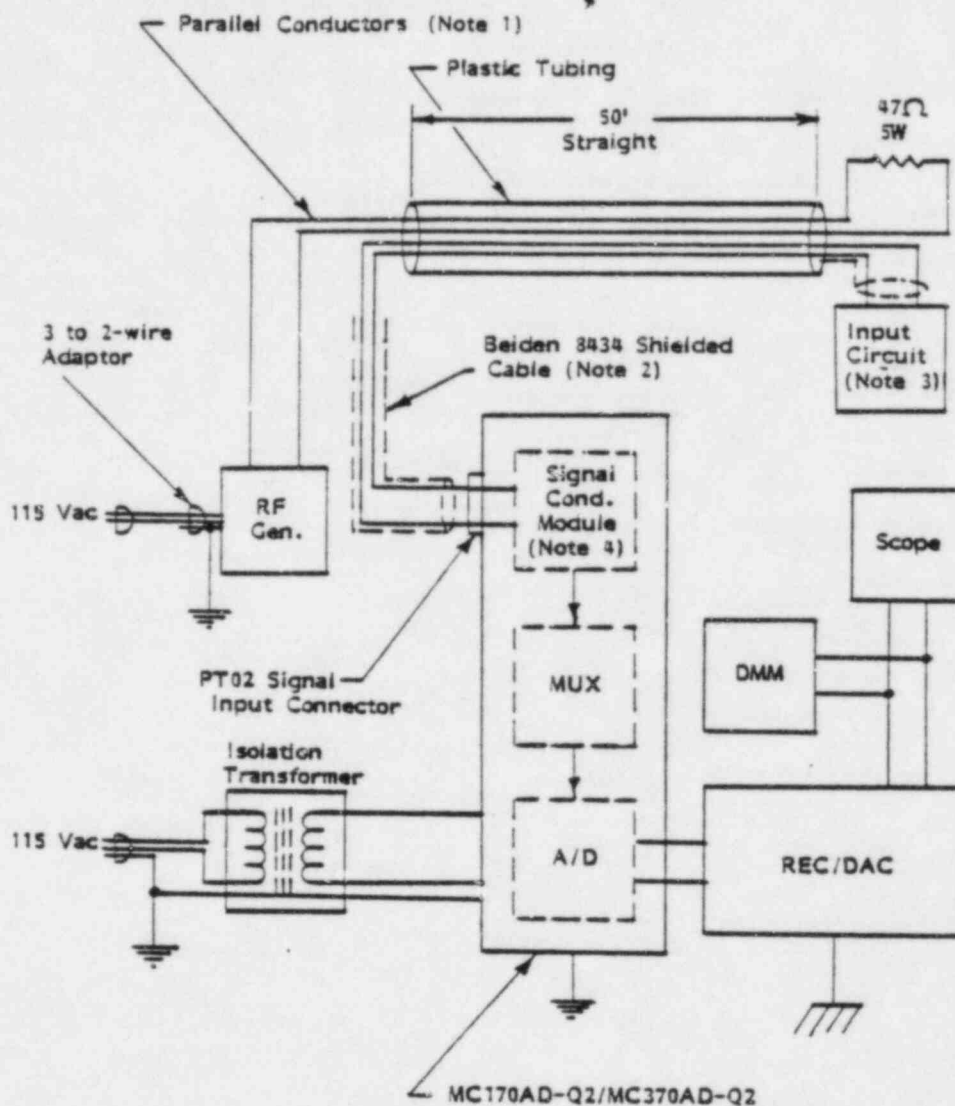


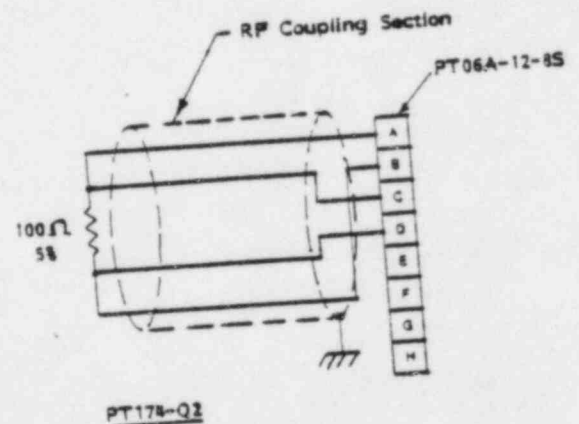
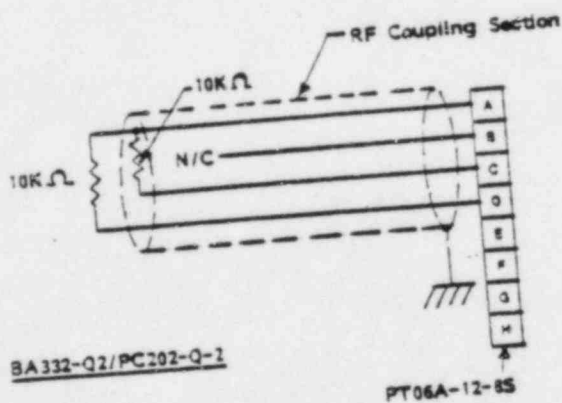
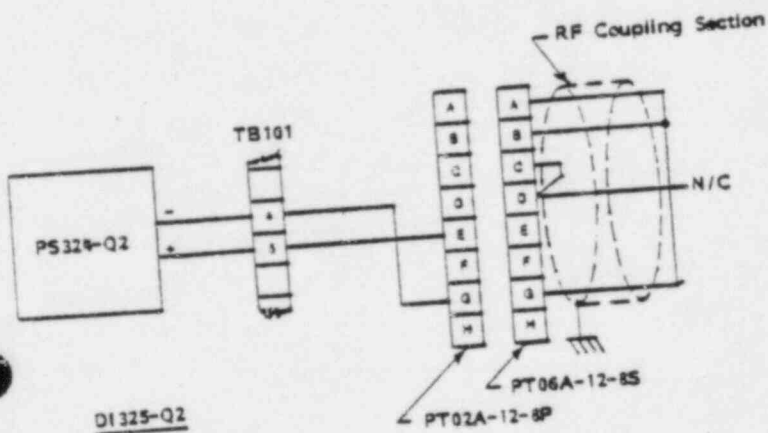
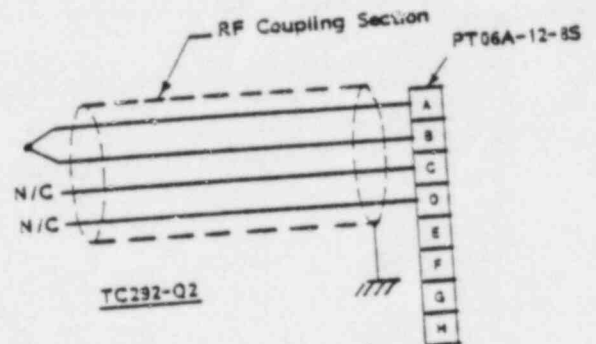
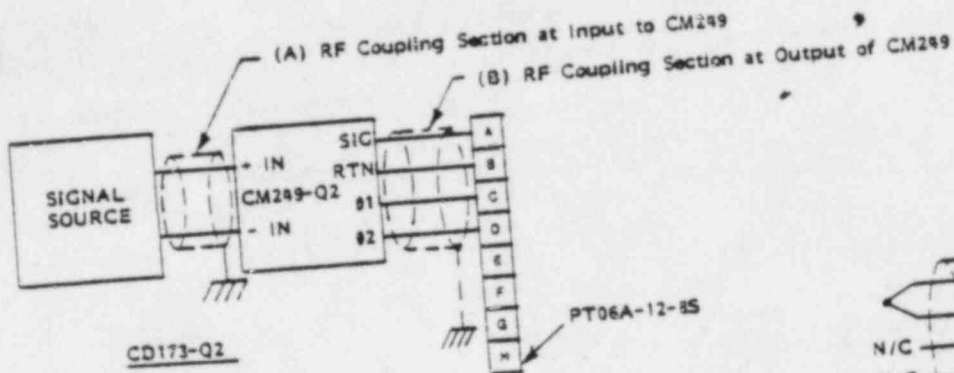
FIGURE 1 - Test Setup, Conducted RF EMI



NOTES:

1. EMI generator leads shall be parallel conductors, not twisted or coiled.
2. Module signal cable shield to be grounded at MC170AD end only.
3. See Figure 3 for applicable input ckt.
4. See Table 1 for module gain and response settings.

FIGURE 2 - Test Setup, Radiated RF EMI



Notes:

1. Shielded Cables are Belden Type 8834

FIGURE 3 Module Input Circuits





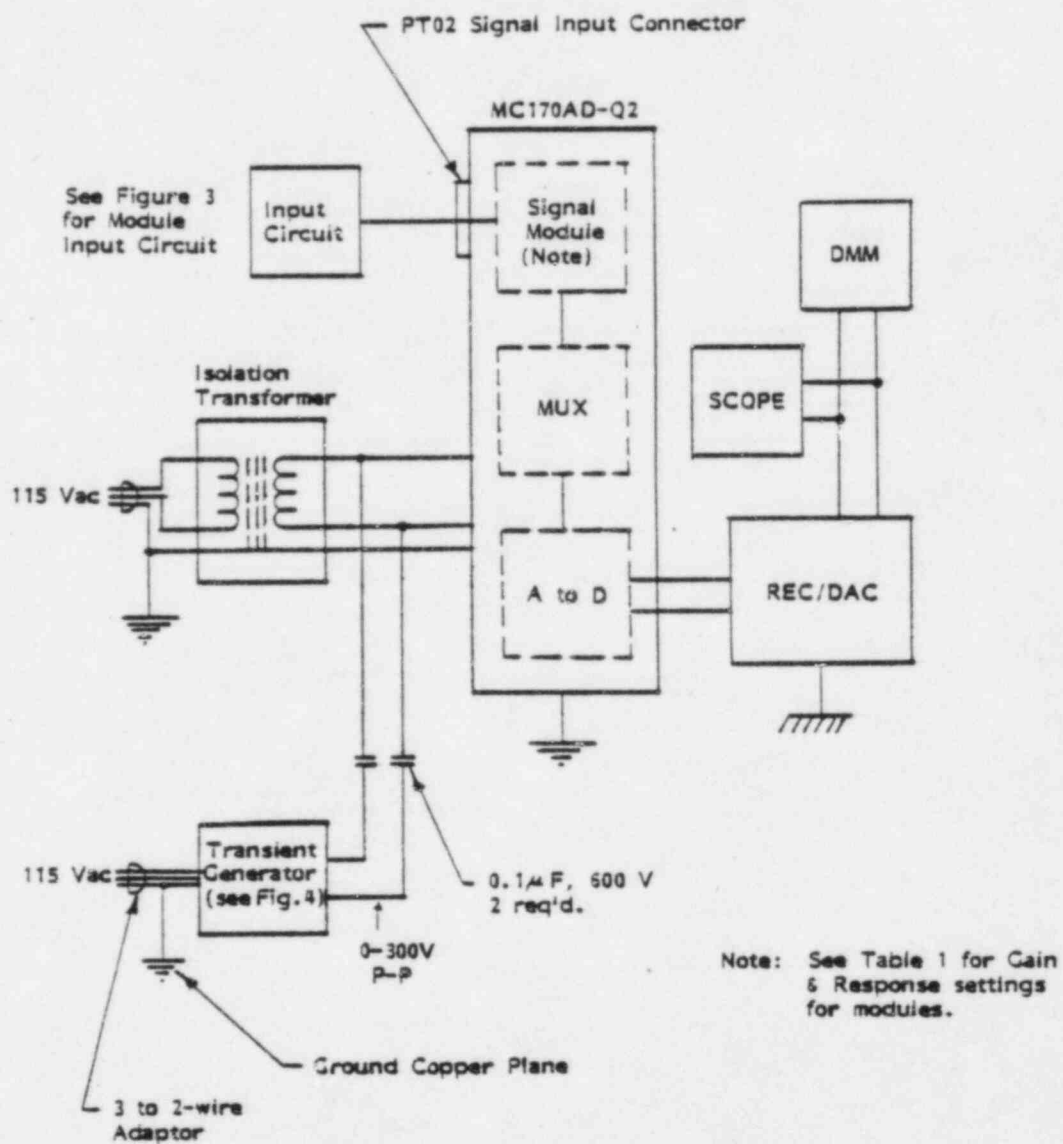


FIGURE 5 - Test Setup, Conducted EMI Transients

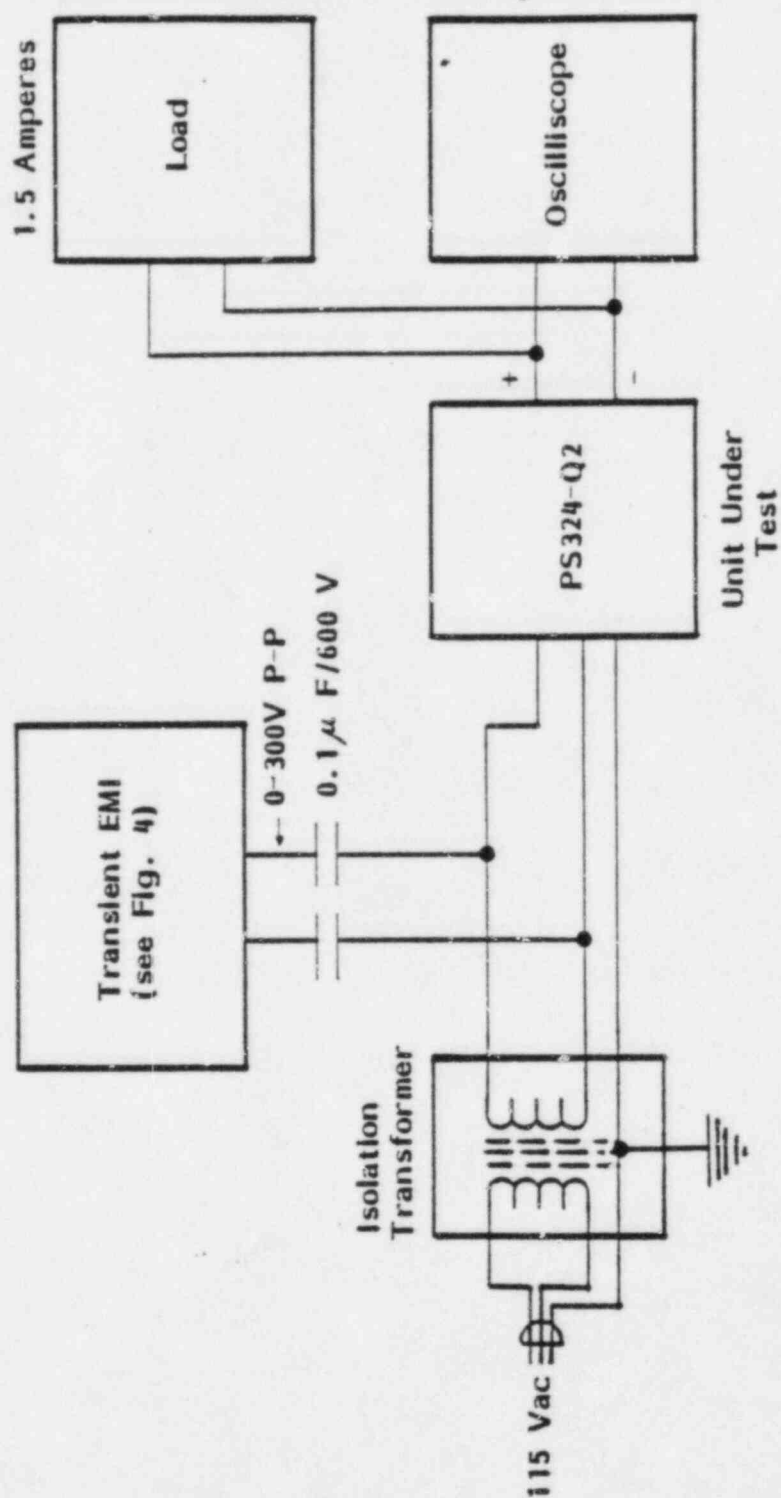


FIGURE 6 - Test Set-up, Model PS324-Q2 Conducted EMI Transient Test





## DATA SHEET

Section 5.0: Conducted RF EMI, 0.5 to 100 MHz •

Equipment Tested:

MC170AD-Q2, S/N \_\_\_\_\_ PS171-Q2 \_\_\_\_\_

PS294-Q2 \_\_\_\_\_ AB295-Q2 \_\_\_\_\_ AD296- -Q2 \_\_\_\_\_

SIGNAL COND. MODULE: Type \_\_\_\_\_ S/N \_\_\_\_\_ Slot \_\_\_\_\_

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		

Test Equipment:

Isolation Xfrmr

RF Generator(s) \_\_\_\_\_

Receiver/DAC \_\_\_\_\_

Digital Multimeter

Oscilloscopes

Test by \_\_\_\_\_ Date \_\_\_\_\_

Q.C. Approval \_\_\_\_\_ Date \_\_\_\_\_

DATA SHEET

Section 6.0: Radiated RF EMI

Equipment Tested:

MC170AD-Q2, S/N \_\_\_\_\_ PS171-Q2 \_\_\_\_\_

PS294-Q2 \_\_\_\_\_ AB295-Q2 \_\_\_\_\_ AD296- -Q2 \_\_\_\_\_

SIGNAL COND. MODULE: Type \_\_\_\_\_ S/N \_\_\_\_\_ Slot \_\_\_\_\_

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		

Test Equipment:

Isolation Xfrmr \_\_\_\_\_

RF Generator(s) \_\_\_\_\_

Receiver/DAC \_\_\_\_\_

Digital Multimeter \_\_\_\_\_

Oscilloscopes \_\_\_\_\_

Test by \_\_\_\_\_ Date \_\_\_\_\_

Q.C. Approval \_\_\_\_\_ Date \_\_\_\_\_

DATA SHEET

Section 7.0: Conducted EMI Transients

Equipment Tested:

MC170AD-Q2, S/N \_\_\_\_\_ PS171-Q2 \_\_\_\_\_

PS294-Q2 \_\_\_\_\_ AB295-Q2 \_\_\_\_\_ AD296- -Q2 \_\_\_\_\_

SIGNAL COND. MODULE: Type \_\_\_\_\_ S/N \_\_\_\_\_ Slot \_\_\_\_\_

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		

Test Equipment:

Isolation Xfrmr \_\_\_\_\_

RF Generator(s) \_\_\_\_\_

Receiver/DAC \_\_\_\_\_

Digital Multimeter \_\_\_\_\_

Oscilloscopes \_\_\_\_\_

Test by \_\_\_\_\_ Date \_\_\_\_\_

Q.C. Approval \_\_\_\_\_ Date \_\_\_\_\_

DATA SHEET

Section 8.0: Radiated EMI Transients

Equipment Tested:

MC170AD-Q2, S/N \_\_\_\_\_ PS171-Q2 \_\_\_\_\_

PS294-Q2 \_\_\_\_\_ AB295-Q2 \_\_\_\_\_ AD296- -Q2 \_\_\_\_\_

SIGNAL COND. MODULE: Type \_\_\_\_\_ S/N \_\_\_\_\_ Slot \_\_\_\_\_

RF Input		Effect on Output (Describe)	EMI Thresh'd Vp-p
MHz	V P-P		

Test Equipment:

Isolation Xfrmr \_\_\_\_\_

RF Generator(s) \_\_\_\_\_

Receiver/DAC \_\_\_\_\_

Digital Multimeter \_\_\_\_\_

Oscilloscopes \_\_\_\_\_

Test by \_\_\_\_\_ Date \_\_\_\_\_

Q.C. Approval \_\_\_\_\_ Date \_\_\_\_\_