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Low-Flow Stability Tests at Peach Bottom Atomic Power Station Unit 2 During Cycle 3

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Research Project 1020-2

Final Report, April 1981

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Prepared by
General Electric Company
San Jose, California

EPRI PERSPECTIVE

PROJECT DESCRIPTION

This report under RP1020-2 is a description of the results from the low-flow stability tests conducted at the Peach Bottom-2 boiling water reactor (BWR) in 1978 during Cycle 3. These tests were a continuation of the series begun in 1977 under RP1020-1. Results from the earlier tests have been documented in EPRI Topical Report NP-564.

The low-flow stability tests in a large BWR core such as Peach Bottom 2 are part of EPRI's effort to gather those necessary data from operating power plants that can be used to improve operating flexibility. In this particular series of tests, the sponsors have sought to measure the stability of a large BWR core at operating conditions where the system is less stable.

PROJECT OBJECTIVE

The long-range goal of the EPRI BWR stability project is to improve the operating flexibility of BWR nuclear power plants. The data from the low-flow stability tests are important today to the technical base for the licensing of BWR power plants. More important, the measurements provide reference data for the qualification of advanced BWR stability predictive computer codes.

PROJECT RESULTS

As expected, the Peach Bottom-2 BWR core is very stable even at minimum core flow rate conditions. These data constitute high-quality proof of some long-held hypotheses about BWR stability at high power-to-flow ratios. In the future, these data will become part of the qualification data base for the improved BWR stability predictive computer codes being developed and tested under RP1384.

A companion report, EPRI Final Report NP-971, *Core Design and Operating Data for Cycle 3 of Peach Bottom 2*, provides a compilation of reactor design and operating data for use in developing input information for BWR stability computer codes. Further, these data may also be used in the qualification of reactor core analysis methods.

This report will be of interest to utility engineers concerned with (1) licensing BWRs, (2) developing and qualifying BWR stability predictive codes, and (3) nuclear fuel management. It will also be useful to the regulatory commission staff in their efforts to develop appropriate stability criteria for reactor licensing.

Robert N. Whitesel, Project Manager
Nuclear Power Division

FOREWORD

This report is a description of the results from low-flow stability tests conducted at the Peach Bottom-2 BWR during Cycle 3 (September 1977 through September 1978). These tests were a continuation of the stability measurements performed near the end of Cycle 2 in April 1977 (see EPRI-NP-564). The data from these pressure perturbation tests are important not only to the technical base for BWR plant licensing, but also as reference data for the qualification of BWR stability prediction computer codes.

A companion report, NP-971, *Core Design and Operating Data for Cycle 3 of Peach Bottom 2*, contains a compilation of those additional nuclear steam supply system design and operating data needed to construct predictive computer code models. This latter report augments similar information for Cycles 1 and 2 published in EPRI-NP-563.

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ABSTRACT

Low-flow stability tests were performed at the Peach Bottom-2 boiling water reactor (BWR) power plant on four different occasions during Cycle 3 operation in 1978. The testing was carried out to determine a measure of BWR core stability at operating conditions near the rated power-flow control line and to investigate the sensitivity of core stability to changes in reactor operating conditions.

The low-flow stability tests demonstrated that the Peach Bottom-2 Cycle 3 core was very stable at the limiting test condition above the rated power-flow control line. This series of tests also showed that the sensitivity of plant stability to changes in exposure states is slight.

The measure of reactor core stability was determined from the closed-loop pressure-to-average neutron flux transfer function. This quantity was based on the maximum likelihood estimates of the parameters in a relatively simple transfer function model determined from nonlinear regression analysis of the data. Both static and dynamic error estimates were taken into consideration in evaluating the test results.

ACKNOWLEDGMENT

We wish to acknowledge the cooperation and assistance of the staff and management of the Philadelphia Electric Company and, in particular, the station superintendent and plant engineers at the Peach Bottom Atomic Power Station in the successful conduct of the tests.

We would like to thank station superintendent W. T. Ullrich for coordinating the operating and engineering staff during the test program and for providing needed impetus for the program in the initial series. Tony Wasong coordinated the first two test series and his cooperation in getting the vital first test series started is appreciated. Bruce Clark and Joe Clupp were instrumental in the coordination of the third and fourth test series, respectively; they also guided the connection of the special instrumentation. Roman Cyhan and Fred Polaski provided the nuclear engineering talent for maneuvering the plant through the various test conditions. Jack Winzenried provided critical guidance for the fourth series of tests.

The contributions of Mr. Ullrich and his staff in the achievement of this successful test series are gratefully acknowledged.

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1. INTRODUCTION

1.1 BACKGROUND

1.1.1 Core Stability Tests

The possibility of instability in the core of a boiling water reactor induced by thermal-hydraulic and void reactivity feedback has been the subject of analytical and experimental investigations since the startup of early boiling water power reactors.[1,2] The analytical methods available to the designer have evolved to higher sophistication; however, the uncertainty in the prediction of boiling water reactor core stability behavior still contributes to the imposition of design constraints on the natural circulation operation of commercial boiling water reactor nuclear power plants. The amount of test data taken to improve this situation for modern higher-power-density reactor cores is, in fact, limited due to the high cost of the conventional control rod oscillator experiments in commercial power plants and the lower quality of the data because of poor signal-to-noise ratios in large reactor cores.[3] Using a pressure perturbation technique, a series of stability tests were performed at the end of Cycle 2 at Peach Bottom-2 in 1977. These tests have provided a significant quantity of high quality operating plant stability data. These tests are described in Reference 4 and they form the basis for the Cycle 3 stability measurements described in this report.

1.1.2 Previous Tests at Peach Bottom-2

In April 1977 the stability tests conducted at Peach Bottom 2 used pseudorandom and periodic pressure perturbations to induce core reactivity response.[4] Those tests demonstrated the practicality of the pseudorandom pressure perturbation approach to core reactivity stability testing. The Cycle 3 stability tests at Peach Bottom-2 are a follow-on to the end of Cycle 2 stability tests.

1.2 OBJECTIVES

The objectives of this program of tests are to:

1) Improve the stability data base at higher decay ratio test conditions, i.e., high power and low flow.

2) Provide for evaluation of plant stability at exposure dependent core conditions due to nuclear parameter changes throughout the fuel cycle.

3) Provide data for continued model qualification.

4) Provide data to extend operating regions during low core flow startup.

These tests were practically identical to those performed at Peach Bottom-2 at the end of Cycle 2 except that the Cycle 3 tests were more extensive, covering four exposure points and up to three power-flow conditions at each exposure point.

1.3 TEST PLAN AND DATA ACQUISITION

Arrangements with Philadelphia Electric Company (PECo) were made for conducting up to four series of low-flow stability tests at the Peach Bottom-2 BWR during 1978. The selection of this reactor was based on its being a large BWR/4 with the necessary instrumentation installed for the end of cycle 2 stability tests.

The dynamic measurements were taken with a high-speed digital data acquisition system capable of sampling over 150 signals every 6 milliseconds. The core power distribution measurements were taken from the plant's local in-core flux detectors. Special fast response pressure and differential pressure transducers were installed in parallel with existing plant instruments to measure the response of important variables in the nuclear steam supply system.

The basis for selection of the test conditions is presented in Section 3. The criteria used in their selection were generally based on a combination of previous testing experience, evaluation of expected BWR core stability and conditions required by PECo in performing the tests.

1.4 EXPECTED APPLICATION OF TEST RESULTS

The low-flow stability tests measured reactor core stability near the limiting conditions used in design and safety analysis (low flow, high power), providing a comparison for design calculations.

The raw test results consisted of digitized transient data recorded on magnetic tape and process computer printouts for steady-state core power determinations at each test condition. The interpreted results of the low-flow stability tests were derived from a Fourier time-series analysis of the raw test data to obtain experimental transfer functions between core pressure and average fission power. From these transfer functions the stability of the core was determined as the decay ratio of the fundamental oscillatory response mode.

The various forms of the data allow for a variety of expected applications for evaluating BWR performance and establishing model qualification. The experimental transfer functions, decay ratios and empirically determined transfer function fits are all provided in this report. The decay ratios were determined from the empirical transfer function fits.

2. SUMMARY OF RESULTS AND CONCLUSIONS

2.1 SUMMARY OF RESULTS

The results of the stability tests can be summarized in terms of the decay ratio determined for each of the test conditions. Decay ratio is defined as the ratio of magnitude of the second overshoot to the magnitude of the initial overshoot in the response of a system to a step disturbance. Decay ratios and damped natural frequencies determined from the empirical transfer functions are listed in Table 2-1. More detailed results, including typical time plots, transfer function plots and statistical data are presented in Section 6 and Appendix D. Figure 2-1 is a plot of all of the Peach Bottom-2 test results from both 1977 and 1978 test series.

2.2 CONCLUSIONS

Stability tests were conducted along the power-flow line corresponding to minimum recirculation pump speed. An evaluation of the data leads to some important overall experimental conclusions. They are:

1. The Peach Bottom-2 Cycle 3 core design exhibited a large degree of stability in the power-to-void closed-loop response at each test condition.

2. Safe and stable operation of the reactor at a stability test condition above the rated power-flow line was verified.

3. The experimental determination of the reactor core pressure to fission power transfer function is adequately modeled by a simple, empirical transfer function.

4. The small pressure perturbation tests have been shown to offer an operationally simple and precise technique for determining boiling water reactor core stability margins.

Table 2-1
SUMMARY OF RESULTS

			From Curve Fit	
Test Point	**Power % Rated**	**Flow % Rated**	**Decay Ratio**	**Natural Frequency Hz**
1PT1	39.7	47.8	0.236	0.439
1PT2	46.7	47.6	0.314	0.411
2PT2	52.0	45.5	0.435	0.438
2PT3	61.7	44.6	0.509	0.435
3PT2	52.1	47.1	0.391	0.412
3PT3	61.6	46.2	0.504	0.410
4PT1	50.7	47.5	0.355	0.398
4PT2	44.0	48.0	0.293	0.388
4PT3	38.4	48.1	0.210	0.386

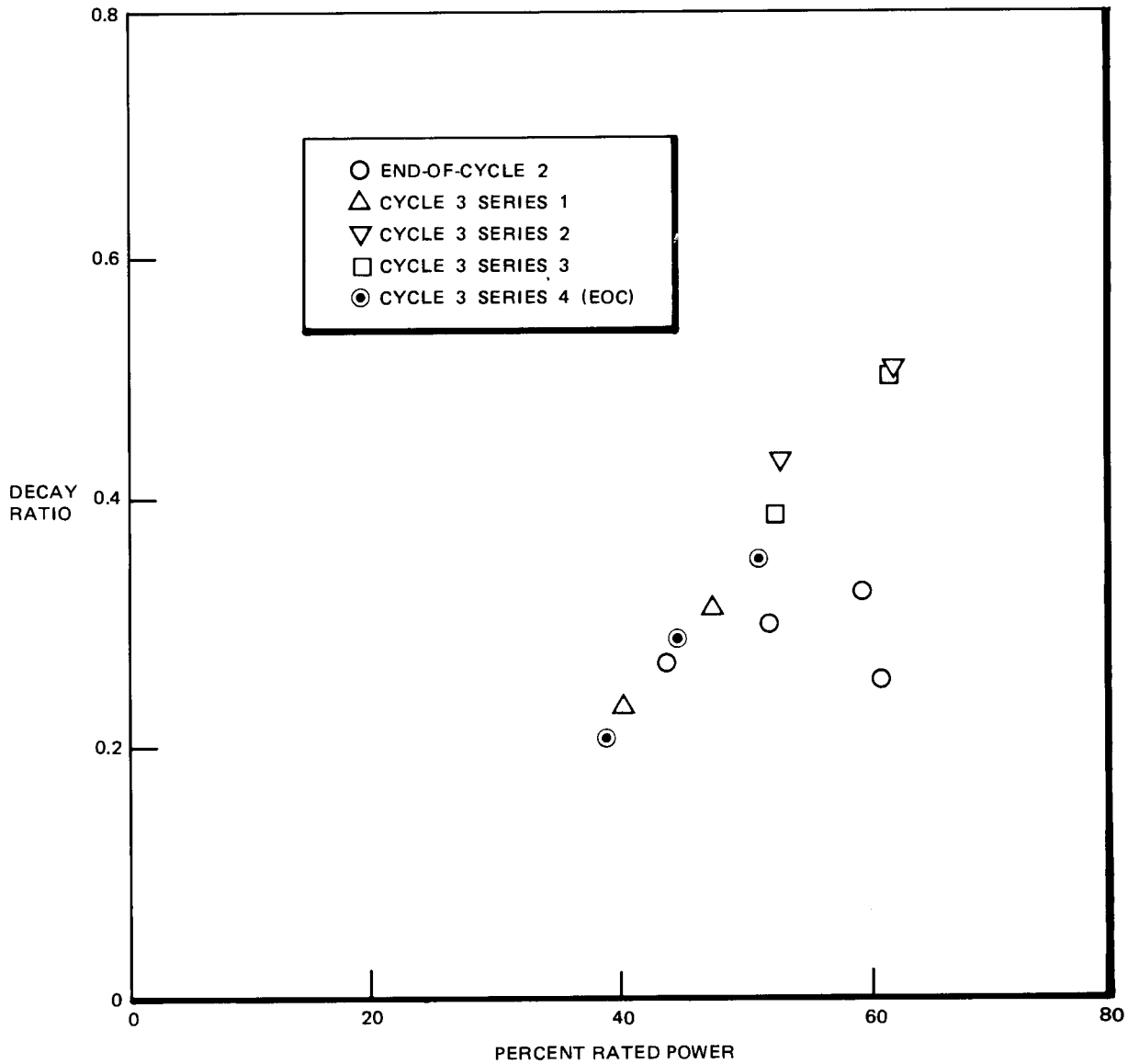


Figure 2-1. Peach Bottom Unit 2 Stability Test Results

3. PLAN OF THE EXPERIMENT

3.1 BASIS FOR TEST CONDITIONS

The criteria for the selection of the test conditions for the low-flow stability tests were:

1. Tests should show the sensitivity of the boiling water reactor core stability* to changes in core power.

2. Tests should be conducted at several times spaced throughout a fuel cycle so that the results reflect the effect of fuel exposure on stability.

3. At least one test should be conducted at a power-flow condition as close as practical to the design reference condition for more direct model qualification.

4. Impact of the tests on PECo operations should be minimized by conducting the tests at times of reduced power demand and by minimizing the maneuvering time between test power-flow conditions.

3.2 PLANNED TEST SEQUENCE

Three test conditions were originally planned at each of four times during operating Cycle 3 of the plant. It was planned to maneuver the reactor to the test points in order of decreasing stability so that the results of each test could be evaluated before proceeding to the next test. The planned test points were:

1. Minimum recirculation pump speed and reactor power below the rated power-flow control line.

2. Minimum recirculation pump speed and reactor power near the rated power-flow control line.

3. Minimum recirculation pump speed and reactor power above the rated power-flow control line.

In order to conduct tests at a power level above the rated power-flow control line, temporary changes were needed in the plant technical specification of APRM rod block and scram settings. In order to expedite approval to the temporary changes by PECo and by the NRC, the same settings used for the end of cycle 2 stability tests were also used for the Cycle 3 stability tests. These settings are listed in Table 3-1.

3.3 ACTUAL TEST CONDITIONS

The actual reactor operating conditions at which the low flow core stability testing was conducted are listed in Table 3-2. Table 3-2 lists two values for % rated core flow. The first is based on the plant process computer determination of core flow. The process computer uses a jet pump flow calibration that is accurate near rated core flow and under-estimates flow at low flow. The second or "adjusted" value has been corrected for jet pump calibration at low flow. See Appendix E for details of this adjustment. Some deviation from the planned test points became necessary for each of the four test series because of conditions existing at the time of the tests. The first test series was conducted before approval of a temporary change in APRM rod block and scram settings had been received from the NRC, so testing could not be done at a power level above the rated power-flow control line. Testing for the first series was performed at only two power levels, both of them below the rated power-flow control line. Time constraints imposed by PECo because of the demand for electric power resulted in testing also being done at only two power levels during the second and third series of stability tests. In each of these two test series, measurements were made at one power level above the rated power-flow control line and at one power level below the line. Testing was performed at three power levels in the fourth test series. in order to stay within the allotted time, the length of the test at each power level was shortened. Because the

*The principal feedback path affecting boiling water reactor core stability is the power-to-void reactivity transfer function.[6]

Table 3-1
TEMPORARY TECHNICAL SPECIFICATION
ROD BLOCK AND APRM SCRAM LINES

Normal	Test
A. APRM Rod Block Line	
$S = (0.66\ W + 42) \times (A/MTPF)$	$S = (0.58\ W + 50) \times (A/MTPF)$
B. APRM Flux Scram Line	
$S = (0.66\ W + 54) \times (A/MTPF)$	$S = (0.58\ W + 62) \times (A/MTPF)$
C. APRM Scram Clamp	
$S = 120 \times (A/MTPF)$	$S = 90 \times (A/MTPF)$

where:

S = Setting in % of rated thermal power (3293 MWt)

W = Recirculation flow in % of rated (34.2×10^6 lb/hr)

A = Design value of core peaking factor (2.63 for 7×7 fuel and 2.44 for 8×8 fuel)

MTPF = Operating maximum total peaking factor if greater than A; otherwise MTPF = A.

fourth test series was conducted at the end of the fuel cycle, there was not enough reactivity available to reach a power level above the rated power-flow control line. Thus, out of the tests, only two were conducted at power levels above the flow control line.

Reactor-core stability is sensitive to axial distribution of power generated in the core. Axial power distributions from Cycle 3 stability test series 1 through 4 are shown in Figure 3-1 through 3-18, respectively. These power distributions were obtained from the plant process computer.

Table 3-2
PLANT OPERATING CONDITIONS FOR TESTS
(P1 PROCESS COMPUTER DATA)

Test Series	Cycle 3 Accumulated Core Average Fuel Exposure (MWD/t)	Test Point Designation	Reactor Pressure (psia)	Core Inlet Subcooling (Btu/lb)	Core Power (MWt)	Core Power (%)	Core Flow (10^6 lb/hr)	Core Flow (%)	Adjusted (%)
1	3100	1PT1	1006	28.79	1307	39.7	44.38	43.3	47.8
		1PT2	1006	32.37	1537	46.7	44.49	43.4	47.6
2	4600	2PT2	1012	36.63	1713	52.0	43.03	42.0	45.5
		2PT3	1007	42.53	2032	61.7	42.32	41.3	44.6
3	5400	3PT2	1004	39.17	1715	52.1	43.44	42.5	47.1
		3PT3	1008	47.58	2028	61.6	42.69	41.6	46.2
4	6150	4PT1	1004	37.06	1671	50.7	45.21	44.1	47.5
		4PT2	1010	33.11	1450	44.0	44.87	43.8	48.0
		4PT3	993	29.18	1266	38.4	44.68	43.6	48.1

	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58
59					48	48	48	48	48	48	48				
55				48	48	42	48	38	48	42	48	48			
51			48	48	0	48	30	48	30	48	0	48	48		
47		48	48	44	48	48	48	42	48	48	48	44	48	48	
43	48	48	0	48	34	48	0	48	0	48	34	48	0	48	48
39	48	42	48	48	48	48	48	42	48	48	48	48	48	42	48
35	48	48	30	48	0	48	16	48	16	48	0	48	30	48	48
31	48	38	48	42	48	42	48	42	48	42	48	42	48	38	48
27	48	48	30	48	0	48	16	48	16	48	0	48	30	48	48
23	48	42	48	48	48	48	48	42	48	48	48	48	48	42	48
19	48	48	0	48	34	48	0	48	0	48	34	48	0	48	48
15		48	48	44	48	48	48	42	48	48	48	44	48	48	
11			48	48	0	48	30	48	30	48	0	48	48		
07				48	48	42	48	38	48	42	48	48			
03					48	48	48	48	48	48	48				

(NUMBER OF 3 inch NOTCHES WITHDRAWN)

Figure 3-1. Peach Bottom-2 Cycle 3 Low Flow Stability Test Control Rod Pattern, Test 1PT1

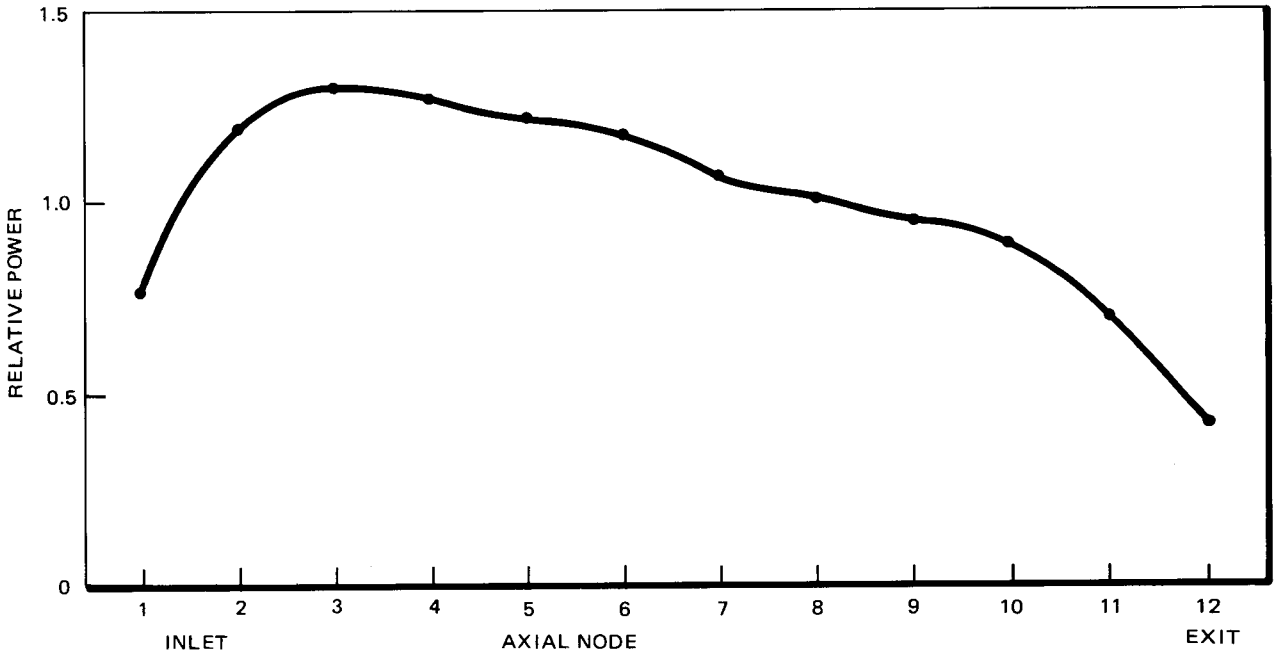


Figure 3-2. Peach Bottom-2 Cycle 3 Low Flow Stability Test Average Axial Power Distribution, Test 1PT1

	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58
59					48	48	48	48	48	48	48				
55				48	48	42	48	38	48	42	48	48			
51			48	48	14	48	30	48	30	48	14	48	48		
47		48	48	44	48	48	48	42	48	48	48	44	48	48	
43	48	48	14	48	34	48	0	48	0	48	34	48	14	48	48
39	48	42	48	48	48	48	48	42	48	48	48	48	48	42	48
35	48	48	30	48	0	48	22	48	22	48	0	48	30	48	48
31	48	38	48	42	48	42	48	42	48	42	48	42	48	38	48
27	48	48	30	48	0	48	22	48	22	48	0	48	30	48	48
23	48	42	48	48	48	48	48	42	48	48	48	48	48	42	48
19	48	48	14	48	34	48	0	48	0	48	34	48	14	48	48
15		48	48	44	48	48	48	42	48	48	48	44	48	48	
11			48	48	14	48	30	48	30	48	14	48	48		
07				48	48	42	48	38	48	42	48	48			
03					48	48	48	48	48	48	48				

(NUMBER OF 3 inch NOTCHES WITHDRAWN)

Figure 3-3. Peach Bottom-2 Cycle 3 Low Flow Stability Test Control Rod Pattern, Test 1PT2

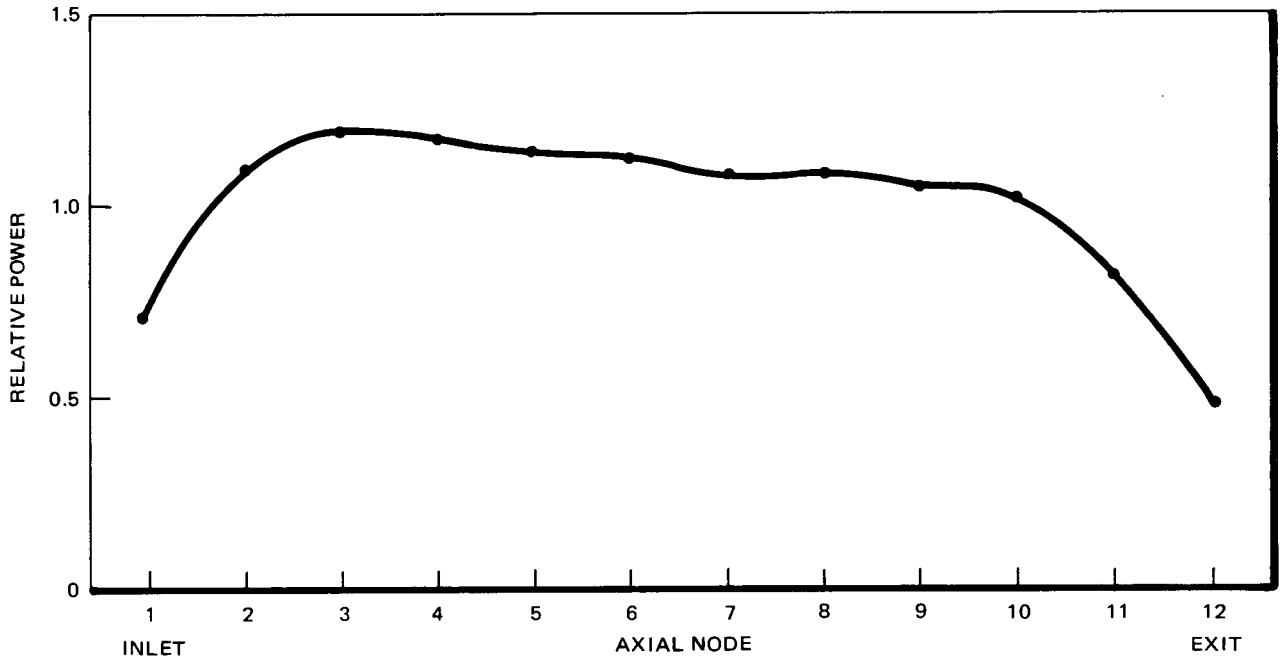


Figure 3-4. Peach Bottom-2 Cycle 3 Low Flow Stability Test Average Axial Power Distribution, Test 1PT2

	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58
59					48	48	48	48	48	48	48				
55				48	44	48	38	48	38	48	44	48			
51			48	34	48	6	48	24	48	6	48	34	48		
47		48	28	48	42	48	48	48	48	48	42	48	28	48	
43	48	48	48	0	48	30	48	0	48	30	48	0	48	48	48
39	48	48	40	48	48	48	48	48	48	48	48	48	40	48	48
35	48	20	48	36	48	0	48	38	48	0	48	36	48	20	48
31	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
27	48	20	48	36	48	0	48	38	48	0	48	36	48	20	48
23	48	48	40	48	48	48	48	48	48	48	48	48	40	48	48
19	48	48	48	0	48	30	48	0	48	30	48	0	48	48	48
15		48	28	48	42	48	48	48	48	48	42	48	28	48	
11			48	34	48	6	48	24	48	6	48	34	48		
07				48	44	48	38	48	38	48	44	48			
03					48	48	48	48	48	48	48				

(NUMBER OF 3 inch NOTCHES WITHDRAWN)

Figure 3-5. Peach Bottom-2 Cycle 3 Low Flow Stability Test Control Rod Pattern, Test 2PT2

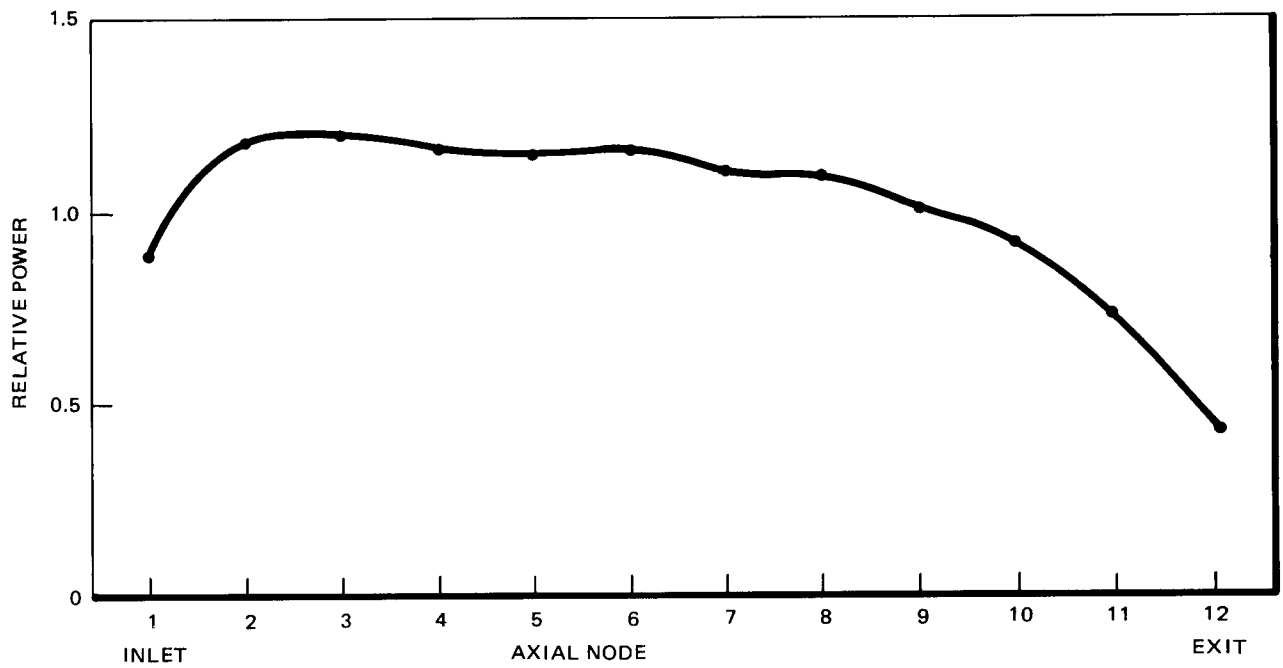


Figure 3-6. Peach Bottom-2 Cycle 3 Low Flow Stability Test Average Axial Power Distribution, Test 2PT2

	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58
59					48	48	48	48	48	48	48				
55				48	44	48	36	48	36	48	44	48			
51			48	34	48	18	48	30	48	18	48	34	48		
47		48	28	38	42	48	48	48	48	48	42	48	28	48	
43	48	48	48	6	48	30	48	18	48	30	48	6	48	48	48
39	48	48	40	48	48	48	48	48	48	48	48	48	40	48	48
35	48	20	48	36	48	12	48	38	48	12	48	36	48	20	48
31	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
27	48	20	48	36	48	12	48	38	48	12	48	36	48	20	48
23	48	48	40	48	48	48	48	48	48	48	48	48	40	48	48
19	48	48	48	6	48	30	48	18	48	30	48	6	48	48	48
15		48	28	48	42	48	48	48	48	48	42	48	28	48	
11			48	34	48	18	48	30	48	18	48	34	48		
07				48	44	48	36	48	36	48	44	48			
03					48	48	48	48	48	48	48				

(NUMBER OF 3 inch NOTCHES WITHDRAWN)

Figure 3-7. Peach Bottom-2 Cycle 3 Low Flow Stability Test Control Rod Pattern, Test 2PT3

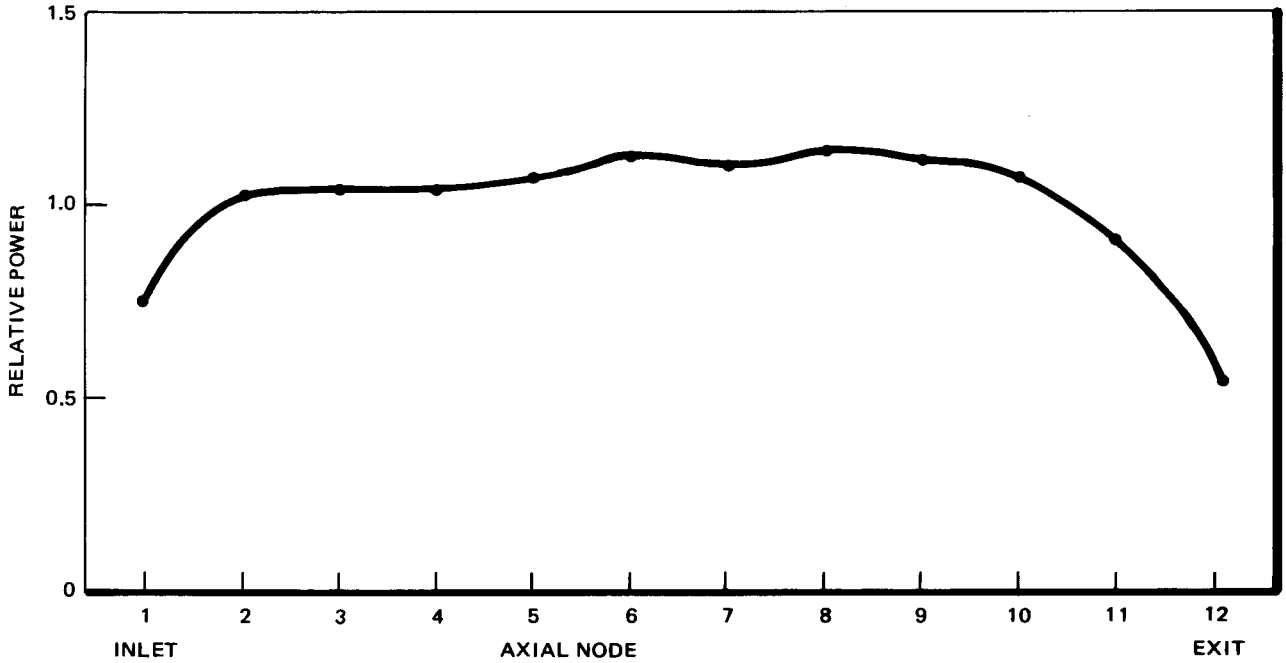


Figure 3-8. Peach Bottom-2 Cycle 3 Low Flow Stability Test Average Axial Power Distribution, Test 2PT3

59				48	48	48	48	48	48	48				
55			48	48	34	48	12	48	34	48	48			
51		48	48	40	48	48	48	48	48	40	48	48		
47	48	48	28	48	6	48	38	48	6	48	28	48	48	
43	48	48	40	48	48	48	48	48	48	48	48	48	40	48	48
39	48	34	48	6	48	38	48	12	48	38	48	6	48	34	48
35	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
31	48	12	48	38	48	12	48	44	48	12	48	38	48	12	48
27	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
23	48	34	48	6	48	38	48	12	48	38	48	6	48	34	48
19	48	48	40	48	48	48	48	48	48	48	48	48	40	48	48
15		48	48	28	48	6	48	38	48	6	48	28	48	48	
11			48	48	40	48	48	48	48	48	40	48	48		
07				48	48	34	48	12	48	34	48	48			
03					48	48	48	48	48	48	48				
	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58

(NUMBER OF 3 inch NOTCHES WITHDRAWN)

Figure 3-9. Peach Bottom-2 Cycle 3 Low Flow Stability Test Control Rod Pattern, Test 3PT2

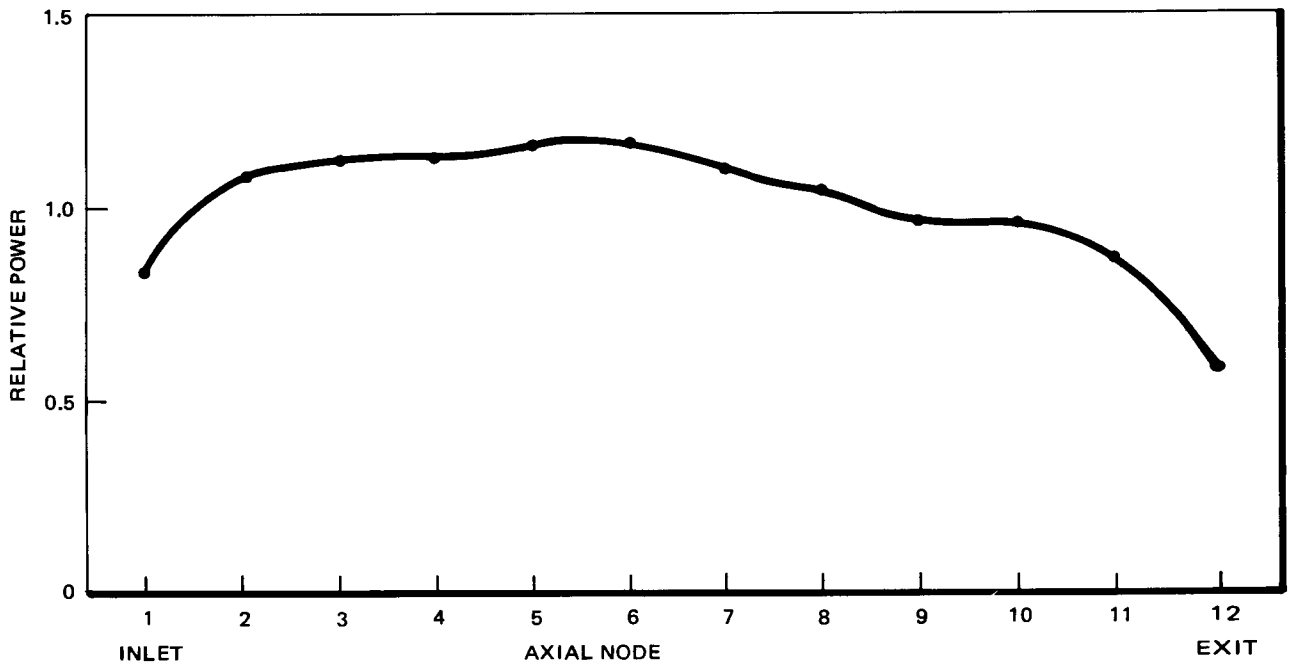


Figure 3-10. Peach Bottom-2 Cycle 3 Low Flow Stability Test Average Axial Power Distribution, Test 3PT2

	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58
59					48	48	48	48	48	48	48				
55				48	48	34	48	20	48	34	48	48			
51			48	48	40	48	48	48	48	48	40	48	48		
47		48	48	28	48	16	48	38	48	16	48	28	48	48	
43	48	48	40	48	48	48	48	48	48	48	48	48	40	48	48
39	48	34	48	16	48	38	48	20	48	38	48	16	48	34	48
35	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
31	48	20	48	38	48	20	48	44	48	20	48	38	48	20	48
27	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
23	48	34	48	16	48	38	48	20	48	38	48	16	48	34	48
19	48	48	40	48	48	48	48	48	48	48	48	48	40	48	48
15		48	48	28	48	16	48	38	48	16	48	28	48	48	
11			48	48	40	48	48	48	48	48	40	48	48		
07				48	48	34	48	20	48	34	48	48			
03					48	48	48	48	48	48	48				

(NUMBER OF 3 inch NOTCHES WITHDRAWN)

Figure 3-11. Peach Bottom-2 Cycle 3 Low Flow Stability Test Control Rod Pattern, Test 3PT3

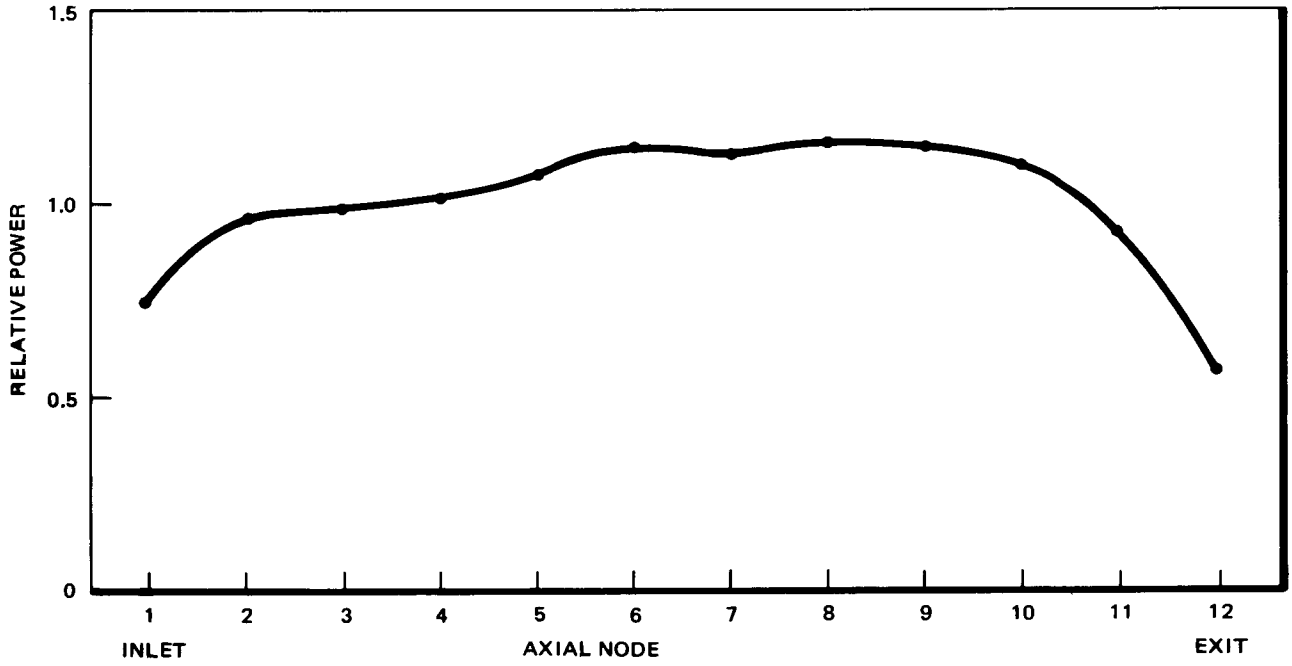


Figure 3-12. Peach Bottom-2 Cycle 3 Low Flow Stability Test Average Axial Power Distribution, Test 3PT3

	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58
59					48	48	48	48	48	48	48				
55				40	48	38	48	34	48	38	48	40			
51			48	48	48	48	48	48	48	48	48	48	48		
47		40	48	36	48	22	48	42	48	22	48	36	48	40	
43	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
39	48	38	48	22	48	42	48	36	48	42	48	22	48	33	48
35	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
31	48	34	48	42	48	36	48	48	48	36	48	42	48	34	48
27	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
23	48	38	48	22	48	42	48	36	48	42	48	22	48	38	48
19	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
15		40	48	36	48	22	48	42	48	22	48	36	48	40	
11			48	48	48	48	48	48	48	48	48	48	48		
07				40	48	38	48	34	48	38	48	40			
03					48	48	48	48	48	48	48				

(NUMBER OF 3 inch NOTCHES WITHDRAWN)

Figure 3-13. Peach Bottom-2 Cycle 3 Low Flow Stability Test Control Rod Pattern, Test 4PT1

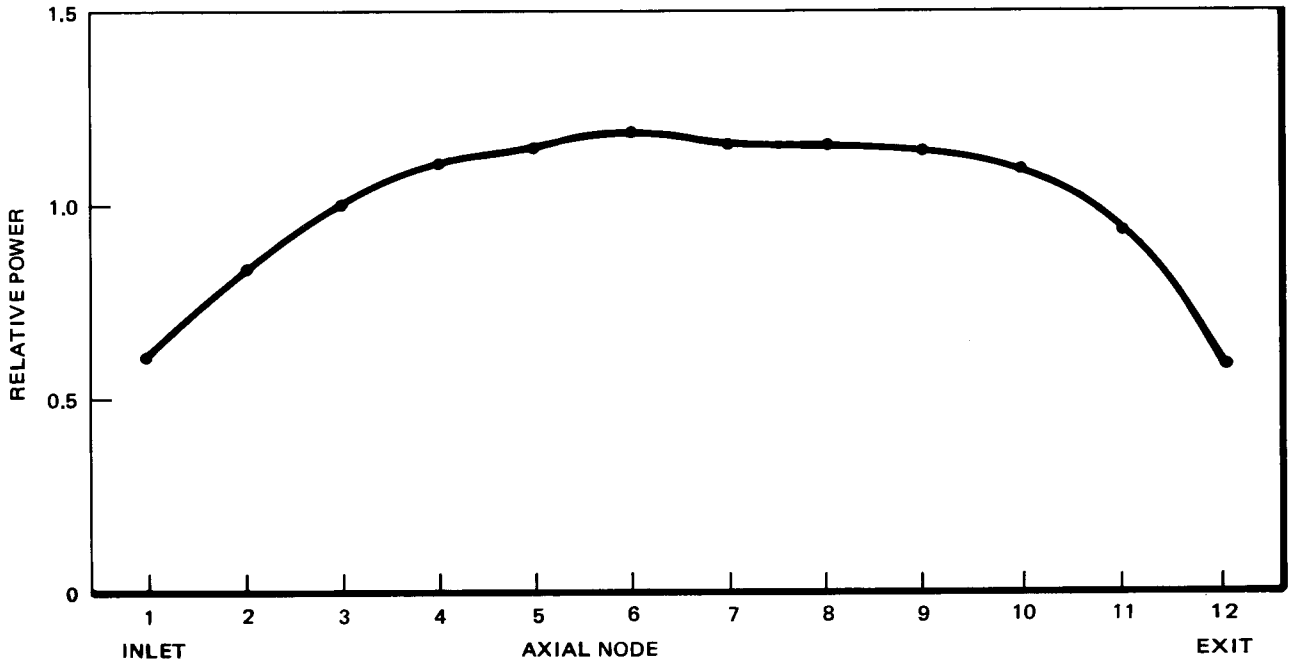


Figure 3-14. Peach Bottom-2 Cycle 3 Low Flow Stability Test Average Axial Power Distribution, Test 4PT1

	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58
59					48	48	48	48	48	48	48				
55				40	48	38	48	34	48	38	48	40			
51			-99	48	48	48	48	48	48	48	48	48	48		
47		40	48	36	48	0	48	42	48	18	48	36	48	40	
43	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
39	48	38	48	18	48	42	48	36	48	42	48	0	48	38	48
35	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
31	48	34	48	42	48	36	48	48	48	36	48	42	48	34	48
27	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
23	48	38	48	0	48	42	48	36	48	42	48	18	48	38	48
19	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
15		40	48	36	48	18	48	42	48	0	48	36	48	40	
11			48	48	48	48	48	48	48	48	48	48	48		
07				40	48	38	48	34	48	38	48	40			
03					48	48	48	48	48	48	48				

(NUMBER OF 3 inch NOTCHES WITHDRAWN)

Figure 3-15. Peach Bottom-2 Cycle 3 Low Flow Stability Test Control Rod Pattern, Test 4PT2

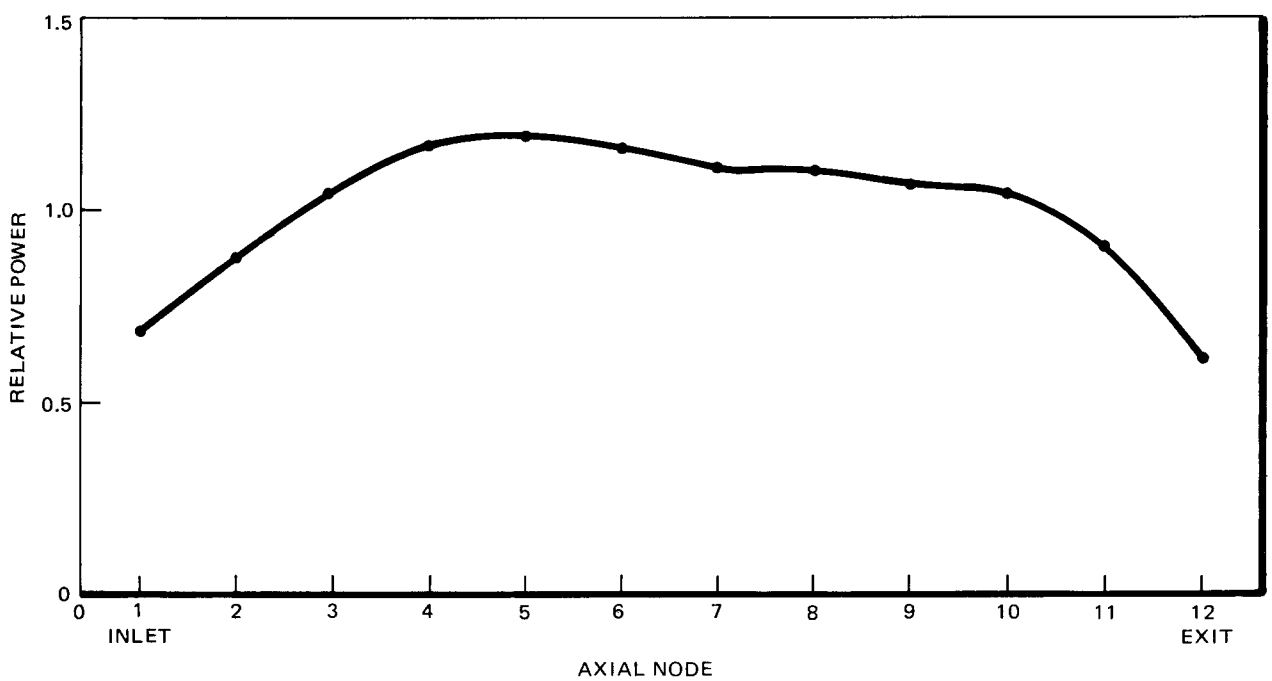


Figure 3-16. Peach Bottom-2 Cycle 3 Low Flow Stability Test Average Axial Power Distribution, Test 4PT2

	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58
59					48	48	48	48	48	48	48				
55				40	48	38	48	34	48	38	48	40			
51			48	48	48	48	48	48	48	48	48	48	48		
47		40	48	36	48	0	48	42	48	0	48	36	48	40	
43	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
39	48	38	48	0	48	42	48	16	48	42	48	0	48	38	48
35	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
31	48	34	48	42	48	16	48	48	48	16	48	42	48	34	48
27	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
23	48	38	48	0	48	42	48	16	48	42	48	0	48	38	48
19	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
15		40	48	36	48	0	48	42	48	0	48	36	48	40	
11			48	48	48	48	48	48	48	48	48	48	48		
07				40	48	38	48	34	48	38	48	40			
03					48	48	48	48	48	48	48				

(NUMBER OF 3 inch NOTCHES WITHDRAWN)

Figure 3-17. Peach Bottom-2 Cycle 3 Low Flow Stability Test Control Rod Pattern, Test 4PT3

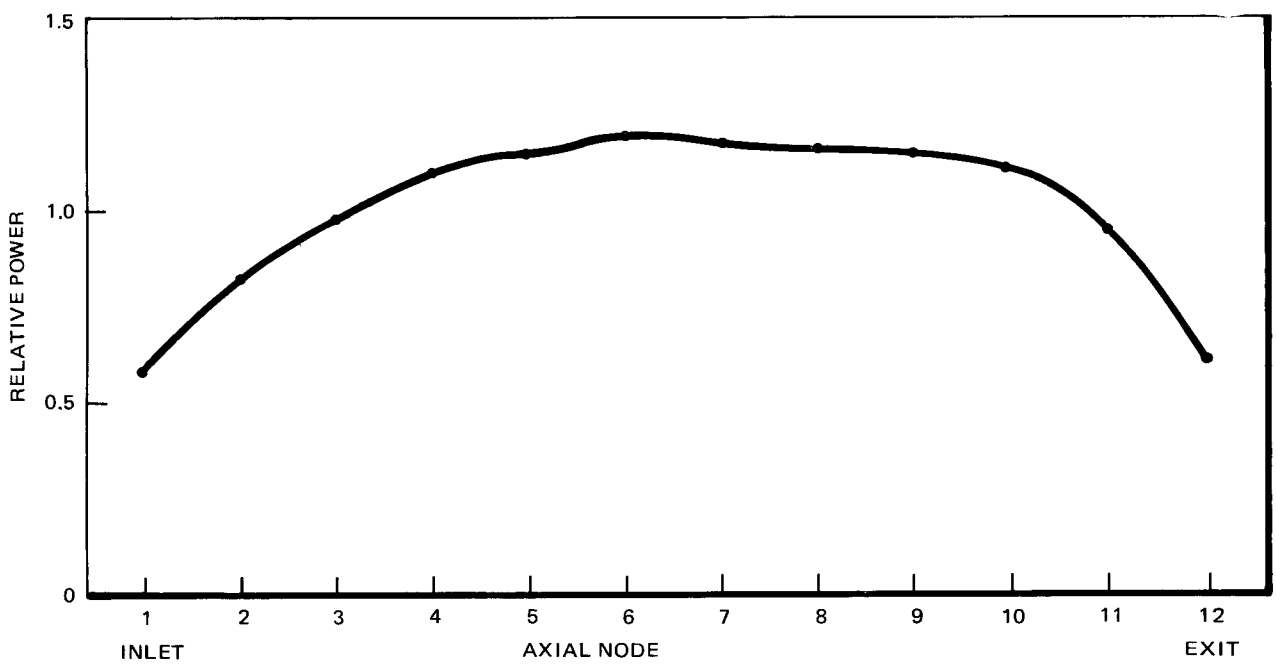


Figure 3-18. Peach Bottom-2 Cycle 3 Low Flow Stability Test Average Axial Power Distribution, Test 4PT3

4. PLANT AND TEST EQUIPMENT DESCRIPTION

4.1 PLANT DESCRIPTION

Peach Bottom-2 is a single-cycle boiling water reactor (BWR/4) supplied by General Electric Company. The architect-engineer work was performed by Bechtel Power Corporation. The plant is owned by Philadelphia Electric, Public Service Electric and Gas, Delmarva Power and Light, and Atlantic City Electric Companies and operated by Philadelphia Electric Company. The plant is located on the Susquehanna River three miles northeast of Delta, Pennsylvania, and 60 miles southwest of Philadelphia, Pennsylvania. The reactor vessel has a diameter of 251 inches, and contains 764 fuel bundles in a "D" lattice. The active core length is 144 inches. The vessel also contains 172 local power range detectors (LPRM), four source range detectors, eight intermediate range detectors, and five traversing in-core probes. The total core flow is 102.5×10^6lb/hr, licensed power is 3293 MWt. The plant was accepted by Philadelphia Electric in July 1974. The tests were conducted in March, June, July and September 1978. This time period spans the range from approximately mid-cycle to the end of Cycle 3.

Details of the Peach Bottom-2 Nuclear Steam Supply System and Containment, as well as its various instrumentation, control, and safety system are provided in the plant Final Safety Analysis Report.[7] A complete characterization of Cycles 1, 2 and 3 for the Peach Bottom-2 core, and the requisite detailed plant layout data for the simulation of the stability tests, has been prepared separately.[8,9]

4.2 SPECIAL TRANSDUCER INSTALLATION

In order to measure effectively some of the faster-responding plant variables and to prevent signal saturation during the stability tests, the following instrumentation was installed at Peach Bottom-2 specifically for the test.

1. Direct measurements of local neutron detector power supply currents to provide a linear flux signal. A schematic of a power supply installation is shown in Figure 4-1.

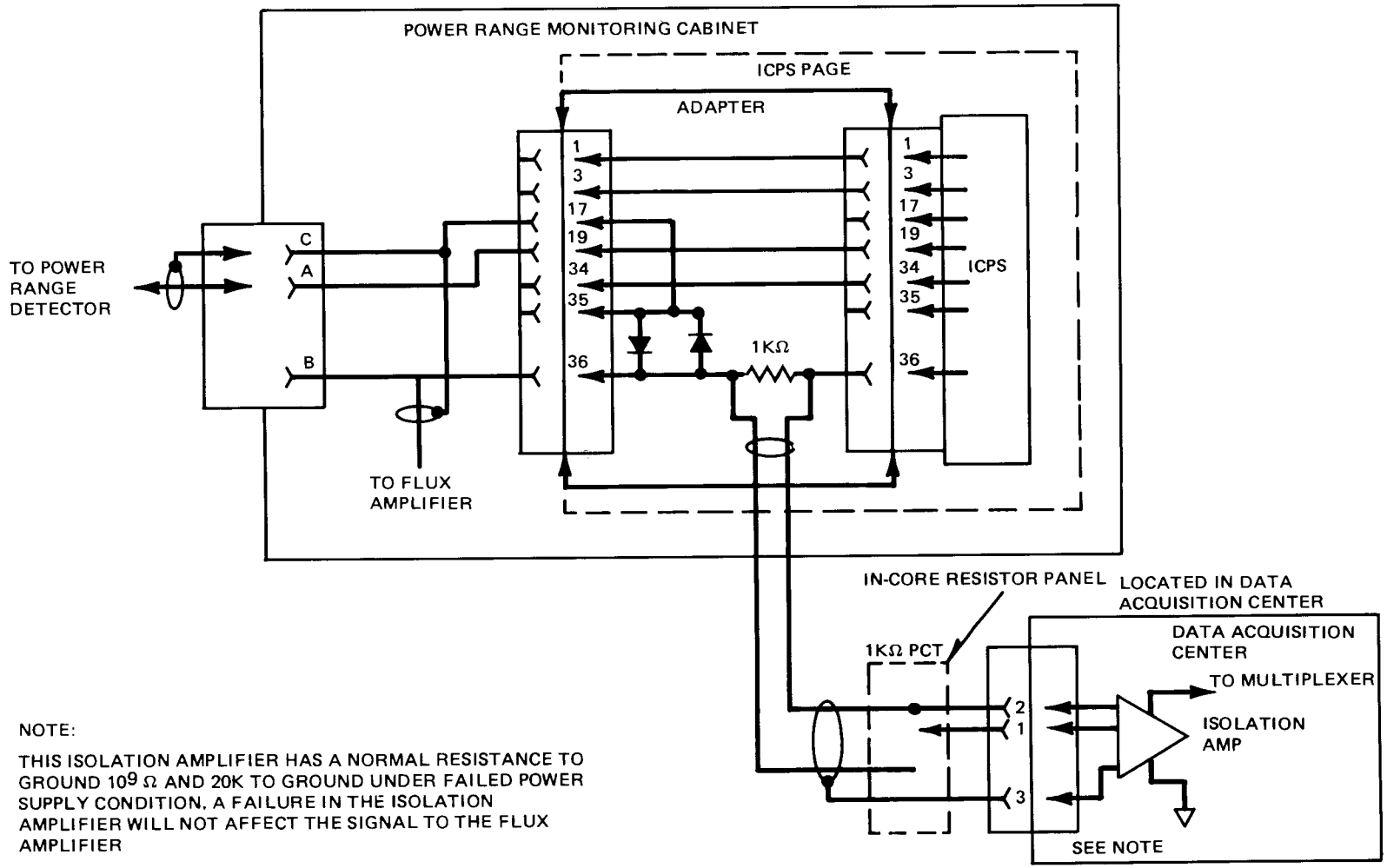
2. There were seven Viatran pressure transducers, providing fast response measurements of absolute and differential pressures in the reactor vessel and recirculation system piping. There were two model 218-15 0–1500 psia, four model 220-15 0–50 psid, and one model 220-15 0–100 psid transducers mounted in parallel with the existing plant instruments at the locations shown in Figure 4-2.*

4.3 DATA ACQUISITION SYSTEM

The data acquisition system used at Peach Bottom-2 consisted of the following equipment (refer to Figure 4-3).

1. HP 21MX computer (32K memory, 16 bit).
2. HP 2313A analog subsystem (45 Hz, 12 bit A/D, 160 channels).
3. HP 7970B magnetic tape (45 ips, 800 BPI).
4. HP 7970E magnetic tape (45 ips, 1600 BPI).
5. HP 7900A disc subsystem (25M word).
6. HP 2615A CRT terminal.
7. Versatec D1110A printer/plotter.
8. NEFF Model 620 differential amplifiers (128 channels).
9. General Electric attentuation box (51-to-1 attenuation, 32 channels).

*Detailed diagrams of the individual pressure transducer installations are given in Appendix B.



NOTE:

THIS ISOLATION AMPLIFIER HAS A NORMAL RESISTANCE TO GROUND 10^9 Ω AND 20K TO GROUND UNDER FAILED POWER SUPPLY CONDITION. A FAILURE IN THE ISOLATION AMPLIFIER WILL NOT AFFECT THE SIGNAL TO THE FLUX AMPLIFIER

ICPS IS ION CHAMBER POWER SUPPLY

Figure 4-1. LPRM Power Supply Signal Tap

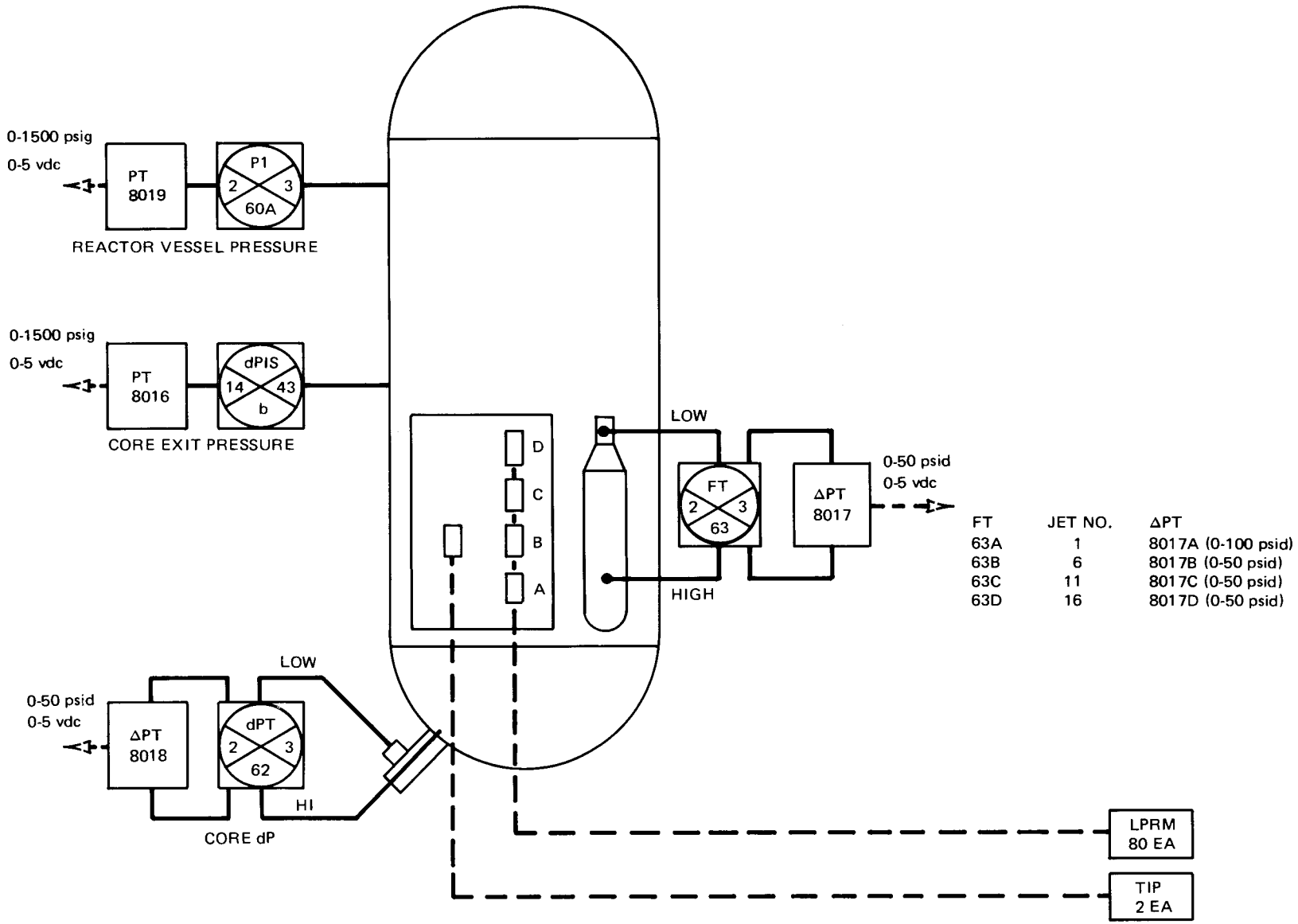


Figure 4-2. Special Pressure Transducer Installation

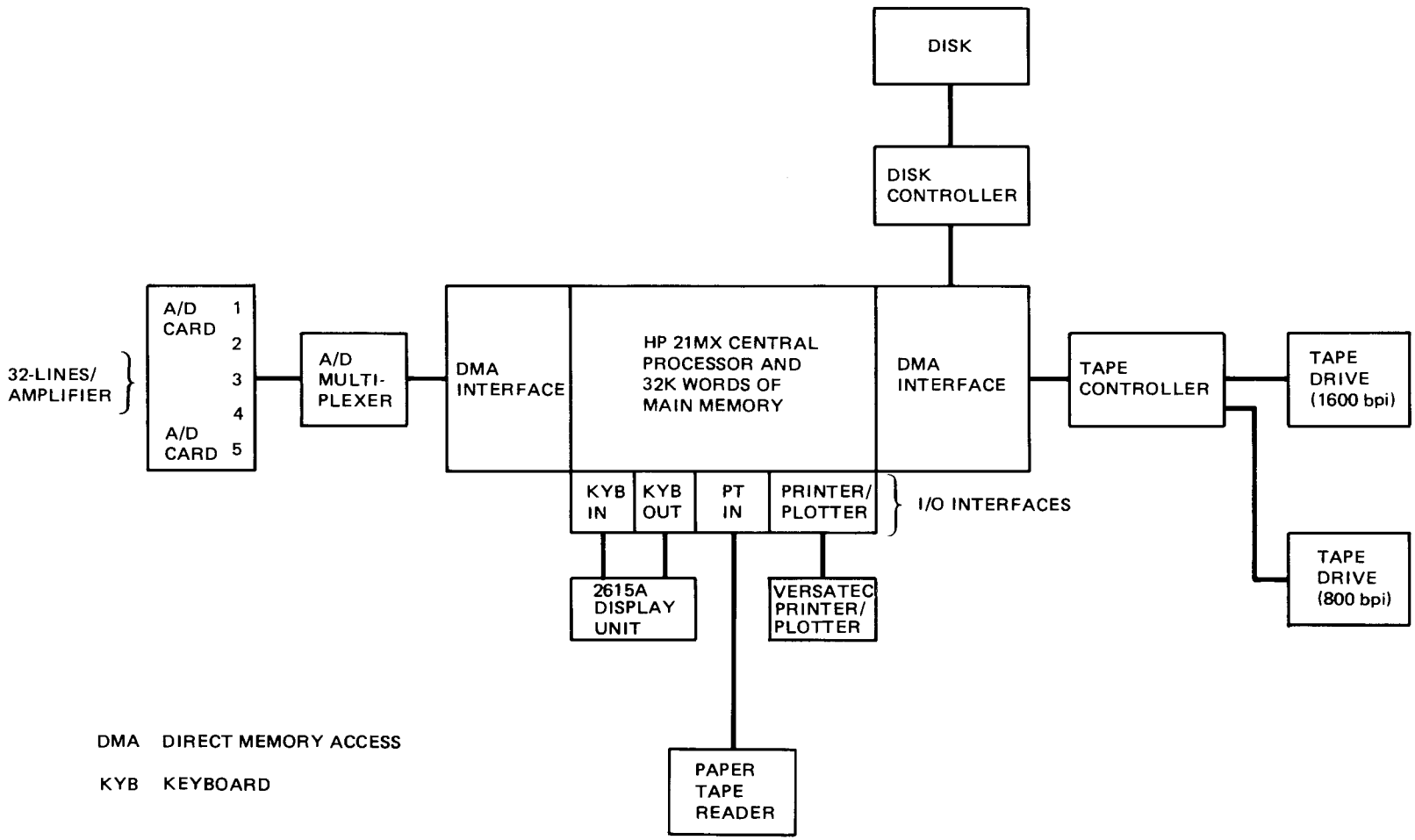


Figure 4-3. Digital Data Acquisition System Hardware Configuration

The maximum data throughput rate to magnetic tape is 30 kHz. The number of data points per second per channel is dependent upon the number of channels being scanned. For these tests, the data were sampled at 83.3 samples per second per channel (128 channels) for a throughput rate of 10,666.6 Hz. This is equivalent to a sampling interval of 12 millisecond between data points for each channel.

4.4 MEASUREMENT SYSTEM CALIBRATION

Table 4.1 lists the ranges and conditioning for 11 different signal types, including two reactor pressure signals at different sensitivities. The calibrations for these signals are outlined in the following paragraphs in terms of ten signal types for calibration purposes. These ten signal types list the wide and narrow range pressure signals as two different signal types because they require different calibration procedures. Jet pump pressure drop signals, for calibration purposes, are listed as of the same type as the wide range reactor pressure signal because the same calibration procedure is used.

1. Signal Type—Local Power Range Monitor

   Channel Numbers — 0-79

   Signal Description — The equivalent of a 500 Ω resistor (one 1 kΩ resistor in parallel with a 1 kΩ potentiometer) was placed in series between the power supply and the flux amplifier input. The voltage developed across this resistor was amplified at the data acquisition system (DAS).

   Calibration Description — Using the latest LPRM current values determined by PECo instrumentation technicians during the calibration of the flux amplifiers, the pre-test voltage developed across the resistor was calculated. This was multiplied to determine the voltage which would be present at the DAS amplifier input for a reading corresponding to 125 W/cm^2. The potentiometer was adjusted to yield a 0-10 Vdc output for a 0-125 W/cm^2 scale. Readings from the DAS were then compared to the readings from a current process computer printout from the OD8 program.

2. Signal Type — Average Power Range Monitor and Traversing Incore Probe (TIP).

   Channel Numbers — 80-85

   Signal Description — The recorder output was amplified at the DAS.

   Signal Calibration — The 0-1 Vdc recorder output was delivered to the DAS amplifier configured for a gain of 10. The amplifier was calibrated for a 0-10 Vdc output corresponding to a 0-125% scale.

3. Signal Type — Special Pressure Transducers, (wide range) and Special Differential Pressure Transducers: reactor pressure, core exit pressure, jet pump ΔP, and core ΔP.

   Channel Number — 104, 106, (1514.7 psia); 92, (100 psid); 93, 94, 95, 98 (50 psid).

   Signal Description — Special pressure transducers were installed in parallel with existing plant instruments. Refer to Figure 4-2 for additional details. Signals from the transducers were amplified at the DAS.

   Calibration Description — Each transducer was calibrated over its full range, and adjusted, if required, for a 0-5 Vdc output. The DAS amplifiers for the absolute pressures had a gain of 2 and were calibrated for a 0-10 Vdc output corresponding to a scale of 14.7-1514.7 psia. The differential pressure DAS channels were calibrated for a 0-5 Vdc output for both the 0-100 psid, and the 0-50 psid transducer ranges.

Table 4-1
PEACH BOTTOM-2 SIGNAL RANGE AND CONDITIONING

Signal*	Channels	Units	Signal Calibration: Low End of Range Engineering Units	Low End of Range Output Voltage	High End of Range Engineering Units	High End of Range Output Voltage	Filter Cutoff (Hz)
LPRM	0-79	W/cm^2	0	0	125	10	100
APRM	80-83	% Rated	0	0	125	10	100
Rx Pressure Wide	104	psia	14.7	0	1514.7	10	10
Core Exit Pressure Wide	106	psia	14.7	0	1514.7	10	10
Rx Pressure Narrow	105	psia	864.7	−10	1164.7	10	10
Core Exit Pressure Narrow	107	psia	864.7	−10	1164.7	10	10
RWL Narrow	91	inch	16.1	2	46.1	4	100
RC ΔP	86-87	psid	0	1	24.68	5.0	100
FW ΔP	88-90	psid	0	0.32	17.8	1.60	100
FW Temperature	99	°F	290	0.100	430	1.500	100
RC Temperature	101-102	°F	420	0	570	1.50	100
Jet Pump ΔP	92	psid	0	0	100	5.0	10
Jet Pump ΔP	93-95	psid	0	0	50	5.0	10
Core ΔP	98	psid	0	0	100	5.0	10
Total Core Flow	103	%	0	0.320	117.1	1.600	100

*Not all signals were recorded for all tests, Appendix D lists statistical data for the signals recorded in each test.

4. Signal Type — Special Pressure Transducers, Narrow Range for reactor pressure and core exit pressure.

   Channel Numbers — 105, 107

   Signal Description — The amplified signal from the 0-1500 psig transducers was used as the high input to a second differential amplifier with an offset voltage being used as the low input, giving an expanded-scale output.

   Calibration Description — An offset equivalent to 6.666 Vdc from a stable power supply was supplied to the low input of the differential amplifier with a gain of 10. At the input of the first amplifier (gain of 2), an input voltage corresponding to 1000 psig was applied. The output of the narrow range amplifier (gain of 10) was adjusted to give 0.00 Vdc output. Then an input voltage corresponding to 1150 psig was applied to the gain of 2 amplifier and the output adjusted to 10.000 Vdc for the first calibration. For the second calibration point, an input corresponding to 850 psig was applied but no amplifier adjustments were made. The output range of −10.000 to 10.000 Vdc corresponded approximately to 864.7 to 1164.7 psia.

5. Signal Type — Reactor Water Level, Narrow Range

   Channel Number — 91

   Signal Description — A resistor was placed in the Reactor Level C circuit between the power supply and differential pressure transmitter. The voltage developed across this resistor was amplified at the DAS.

   Calibration Description — The scale for the narrow-range level is 0-60 inches. From the calibration data, 16.1 inch = 20.10 mA and 46.1 inches = 40.10 mA. Based on this data, the voltage drop across the 10 Ω resistor placed in series with differential pressure transmitter (6-52C) and the power supply (6-124) negative side was calculated to be 0.201 Vdc for 16.1 inches and 0.401 Vdc for 46.1 inches. The amplifier with a gain of 10 was calibrated for an output of 2-4 Vdc for a 16.1-46.1 inch scale.

6. Signal Type — Recirculation Flow Element Differential Pressure A and B

   Channel Numbers — 86, 87

   Signal Description — A 10 Ω resistor was placed in series with the power supply negative (2-162B) and flow transmitters (2-110B and D).

   Signal Calibration — Based on the calibrated data, the following were calculated for 0 psid = 0.100 Vdc at the lower end of the scale and 24.68 psid = 0.500 Vdc for RC "A", and 0.098 and 0.499 Vdc for RC "B" at the lower and upper ends of the scale, respectively. These inputs were used to calibrate the DAS amplifiers with a gain of 10 for a 1-5.000 Vdc output.

7. Signal Type — Feedwater Differential Pressure A, B, and C.

   Channel Numbers — 88-90

   Signal Description — The 3.2 Ω resistors used for the process computer which are in series with the power supply negative (FW "A" 6-93, FW "B" 6-92 , and FW "C" 6-91) and the differential pressure tranmitters (FW "A" 6-50A, FW "B" 6-50B, and FW "C" 6-50C) were tapped for these signals.

   Signal Calibration — Based on the calibration data, the following were calculated for 0 psid = 0.032 Vdc for all instruments at the lower end of the scale and 17.77, 17.95 and 17.81 psid = 0.160 Vdc for FW "A" "B" and "C". These inputs were used to calibrate the DAS amplifiers with a gain of 10 for a 0.32-1.60 Vdc output range.

8. Signal Type — Recirculation Loop Suction Temperature, A.

   Channel Numbers — 101, 102

   Signal Description — The temperature signal was tapped off the process computer signal.

   Signal Calibration — The calibration data were 420°F = 0.01 mV, and 570°F = 150.0 mV. With an amplifier gain of 10, the outputs were set to 0 and 1.500 volts respectively.

9. Signal Type — Feedwater Temperature, Loop A.

   Channel Number — 99

   Signal Description — The temperature signals were tapped off the process computer signal.

   Signal Calibration — The calibration data were: 290°F = 10 mv, 430°F = 150.0 mV.

10. Signal Type — Total Core Flow

    Channel Number — 103

    Signal Description — The total core flow signal was tapped from the process computer signal.

    Signal Calibration — The calibration was 120 million pounds per hour (117.1% of rated flow) = 160 mV. Zero flow = 32 mV. With an amplifier gain of 10, the output ranged from 0.32 to 1.60 volts for a flow range of 0 to 117.1 percent.

5. TEST PROCEDURES

All signal calibrations were checked immediately before each test series. Because of the short time available in signal calibration prior to test series 1, only minimum instrumentation was used for that test series (LPRM, APRM, core exit pressure). Completion of the calibration required that the LPRM ion chamber power supply (ICPS) adapters be installed. The LPRM connections were determined to have no effect on the LPRM readings by taking process computer edits (OD8) before and after insertion of the ICPS adapters. The installation of the special pressure regulator test board (A73) and the operability of the manual override switch were verified. Jumper logs of the EHC and safety systems were reviewed for status verification.

Following the signal calibration, the reactor was maneuvered to the test conditions by reducing recirculation pump speed to its minimum value (30% rated speed) and then adjusting control rods to obtain the desired power level. The magnitude of the pressure perturbation was adjusted. A process computer edit, PI, was obtained from the plant process computer. Two TIPs were inserted at symmetrical locations in the core at vertical locations midway between LPRMs. One TIP, at location 40-33, was inserted to the 24 inch level (above the bottom of the core). The other, at location 32-41, was inserted to the 72 inch level. Data were recorded with steady state conditions and with a pseudorandom binary sequence (PRBS) applied to the pressure regulator set point adjuster. Usually, steady state data were recorded for 30 minutes, followed by 60 minutes of PRBS data. In a few cases the order of steady state and PRBS recordings was reversed, and for the fourth test series the data record period was reduced. The recording periods, times of starting each recording and times of obtaining the process computer PI printout are listed in Table 5-1.

Two tests were conducted at power levels above the rated power-flow control line. Before adjusting control rods to approach these two test conditions, the flow referenced scram and rod block settings were adjusted. The scram and rod block settings are given in Section 3.

The procedure for adjusting the magnitude of the pressure perturbation is as follows.

1. Set the potentiometer on the special pressure regulator test board (A73) to zero.

2. Activate the manual override switch to supply power to the special test board.

3. Adjust the potentiometer on the special test board to reduce reactor pressure by 3 to 5 psi.

4. Apply a step perturbation to the pressure regulator by tripping the relay on the special test board, returning the set point to its initial value.

5. Check the APRM response using a storage oscilloscope.

6. Repeat steps 3, 4 and 5, increasing the pressure perturbation in small increments until an acceptable signal-to-noise ratio is obtained in the APRM response.

The pressure steps and resulting APRM responses for each of the tests are listed in Table 5-2.

Offgas readings were taken before and after each test. There was no discernible change in offgas during any of the tests. Process computer periodic logs (PI) were taken usually near the beginning of data recording, between steady state and PRBS recordings and at the end of the test. Copies of these logs are contained in Appendix C.

At the completion of the recordings, the manual override switch was deactivated to prevent accidental operation of the pressure stepping system, the reactor instrumentation was monitored to verify return to the pretest condition, offgas data were taken and the TIP's were withdrawn. The perturbation data were evaluated to verify that the following criteria had been met.

Table 5-1
TIME OF TESTS AND PROCESS COMPUTER PERIODIC LOG (P1)

Test Point	Test Type	Date	Start Time Hr	Min	Recording Period (Hr)	P1 Edit Time
1PT1	SS*	3-24	06	41	1/2	0654
1PT1	PRBS	3-24	07	24	1	0754
1PT2	SS	3-24	03	34	1/2	0342
1PT2	PRBS	3-24	04	11	1	0514
2PT2	SS	6-14	00	06	1/2	0032
2PT2	PRBS	6-14	01	34	1	0150
2PT3	PRBS	6-14	05	58	1	0700
2PT3	SS	6-14	07	05	1/2	0700
3PT2	SS	7-18	22	58	1/2	2300
3PT2	PRBS	7-19	00	07	1	2348
3PT3	PRBS	7-19	06	59	1	0629
3PT3	SS	7-19	08	02	1/2	0629
4PT1	PRBS	9-8	01	41	1/2	0211
4PT1	SS	9-8	02	16	1/4	0211
4PT2	PRBS	9-8	03	05	1/2	0335
4PT2	SS	9-8	03	41	1/2	0335
4PT3	PRBS	9-8	04	41	1/2	0511
4PT3	SS	9-8	05	16	1/2	0511

*SS = Steady state data recording
PRBS = Pseudorandom binary sequence

Table 5-2
RESPONSE TO SINGLE PRESSURE STEP

Test Point	Step 1 psi	APRM Resp. %	Step 2 psi	APRM Resp. %	Step 3 psi	APRM Resp. %	Step 4 psi	APRM Resp. %	Step 5 psi	APRM Resp. %	Step 6 psi	APRM Resp. %
1PT1	6.0	6.0	8.0	8.0	10.0	10.0						
1PT2	2.0	—	4.0	4.0	6.0	7.0	8.0	10.0				
2PT2	5.0	6.0	7.5	9.0	11.0	14.0	9.5	11.0	7.0	9.0	7.0	8.0
2PT3	3.0	3.7	4.0	4.0	4.0	5.8	4.0	5.8	3.5	4.5		
3PT2	1.5	—	4.8	3.3	9.3	8.8	−8.3	−6.5	9.0	6.0		
3PT3	4.5	4.0	5.0	2.5	5.0	4.0	6.0	6.0	−5.0	−4.0	6.0	4.0
4PT1	6.3	4.6	−6.0	−4.6	10.2	6.9	8.7	6.0				
4PT2	6.0	5.0	10.2	8.5								
4PT3	10.5	8.5										

1. Maximum APRM response for pressure set point steps was less than ± 15% of rated (checked prior to start of stepping sequence).

2. The decay ratio was less than 1.0 for each process variable that exhibits oscillatory response to pressure set point changes.

3. The daily offgas increase did not exceed 50%* of the unit's release prior to beginning testing. (Release rate 1 hour after test had to be less than 150% of release rate prior to start of test). When the tests which required modification of the scram and rod block lines were complete, the systems were restored to pre-test settings. At the completion of the last test point, the LPRM plugs at the back of the data acquisition system were disconnected as soon as practical to prevent any interference with plant instrumentation. The DAS amplifiers were wired directly to the power line so that they could not be shut off except by a failure of the vital a-c reactor instrument power bus. Failure of this bus would also cause a reactor shutdown.

*Limits for test required by PECo.

6. EXPERIMENTAL RESULTS

The series of small pressure perturbation tests conducted at each of the low-flow stability test conditions were composed of runs with pseudo-random binary switching (PRBS) of small step inputs to the pressure regulator reference set point. Typical reactor core and vessel pressure responses, and the average and local neutron flux signals, are plotted in Figures 6-1 and 6-2. The minimum switching time of the PRBS signal was 1 second. Since each set point change either reduced pressure or stepped back to the steady state initial condition, the mean reactor pressure was decreased slightly during the pressure perturbation tests.† The magnitude of the pressure set points was selected to provide a good signal-to-noise ratio in the neutron flux response and did not cause operational difficulties during the test. The rise time of the reactor pressure response to a pressure regulator step input command is approximately 1.5 seconds. The response of the pressure control feedback loop is very close to that of an ideal underdamped second-order system, for which normalized step response curves can be found in many standard control references.[10] Using such a curve, it is possible to identify the natural frequency of the pressure control loop as being approximately 1/4 Hz. From the frequency response of a second order system, the energy in the reactor pressure signal is expected to drop by at least 10^4 for each decade above the natural frequency. The useful frequency bandwidth of the ideal 2047 bit PRBS input can be estimated by a rule of thumb†† to extend to 0.44 Hz, with a possible frequency resolution of 5×10^{-4}Hz.†* However, as Kerlin[11] shows, the non-ideal actuator response, in this case that of the pressure control-loop, reduces the energy in the PRBS reactor pressure signal at frequencies above its natural frequency. Figure 6-3 is a typical PSD of the core exit pressure for the PRBS input. The steady state noise PSD of core exit pressure for the same test point is given in Figure 6-4. Figures 6-5 and 6-6 show neutron flux PSD plots corresponding to the pressure PSD of Figures 6-3 and 6-4, respectively.

The results of analysis of the 1977 Peach Bottom-2 tests and of rod oscillator stability testing performed at other commercial boiling water reactors have shown that the resonant frequency of the reactor closed-loop neutron flux to reactivity transfer function lies between 0.2 and 0.6 Hz. At reduced reactor core flow, the resonance is expected to shift toward lower frequencies, due to the longer delay in the two-phase void transit time through the core. Examination of the neutron flux responses shows a tendency to lead or overshoot the pressure response curve. This is because the neutron flux in a boiling water reactor core responds to the rate of change of pressure within a certain band of frequency, 0.1 to 0.5 Hz.*

This has been confirmed in several earlier pressure oscillator experiments conducted in boiling water reactors which showed the expected increasing magnitude** and positive phase angle in the measured reactor pressure to reactor flux transfer function. The reactor flux signal energy continues to increase with frequency even after the pressure PSD has started to decrease due to the reduced turbine control frequency response. This indicates an amplification of the neutron flux and an approach to a core resonant condition. The magnitude of the pressure to neutron flux transfer function confirms the trend, with a well defined peak at about 0.4 Hz (Figure 6-7). A comparison of the core exit pressure PSD with the PRBS input (Figure 6-3) and with just steady state noise (Figure 6-4) indicates essentially the same energy at frequencies above about 1.0 Hz. This shows that at frequencies above approximately 1.0 Hz the energy from the applied perturbation is smaller compared to the steady state noise than at lower frequencies, so the transfer function cannot be determined as reliably at these higher frequencies. This conclusion is corroborated by the larger variations in the transfer function, particularly in the phase angle (Figure 6-8), at the higher frequencies. The coherence*† between neutron flux and core exit pressure (Figure 6-9) is greater than 0.7 in the frequency range of about 0.06 Hz to about 0.6 Hz, indicating a high degree of confidence in the transfer function in this frequency range but reduced confidence outside this range. Figures 6-7 through 6-33 are the plots of magnitude and phase of the core pressure to neutron flux transfer function and coherence between pressure and neutron flux for the low flow stability test conditions.‡ Since the

†This is a hardware limitation of the Peach Bottom-2 EHC pressure regulator test input card. The effect on the mean reactor power is very small due to the very low steady state pressure coefficient of a boiling water reactor.

††See rule of thumb analysis by Kerlin.[11]

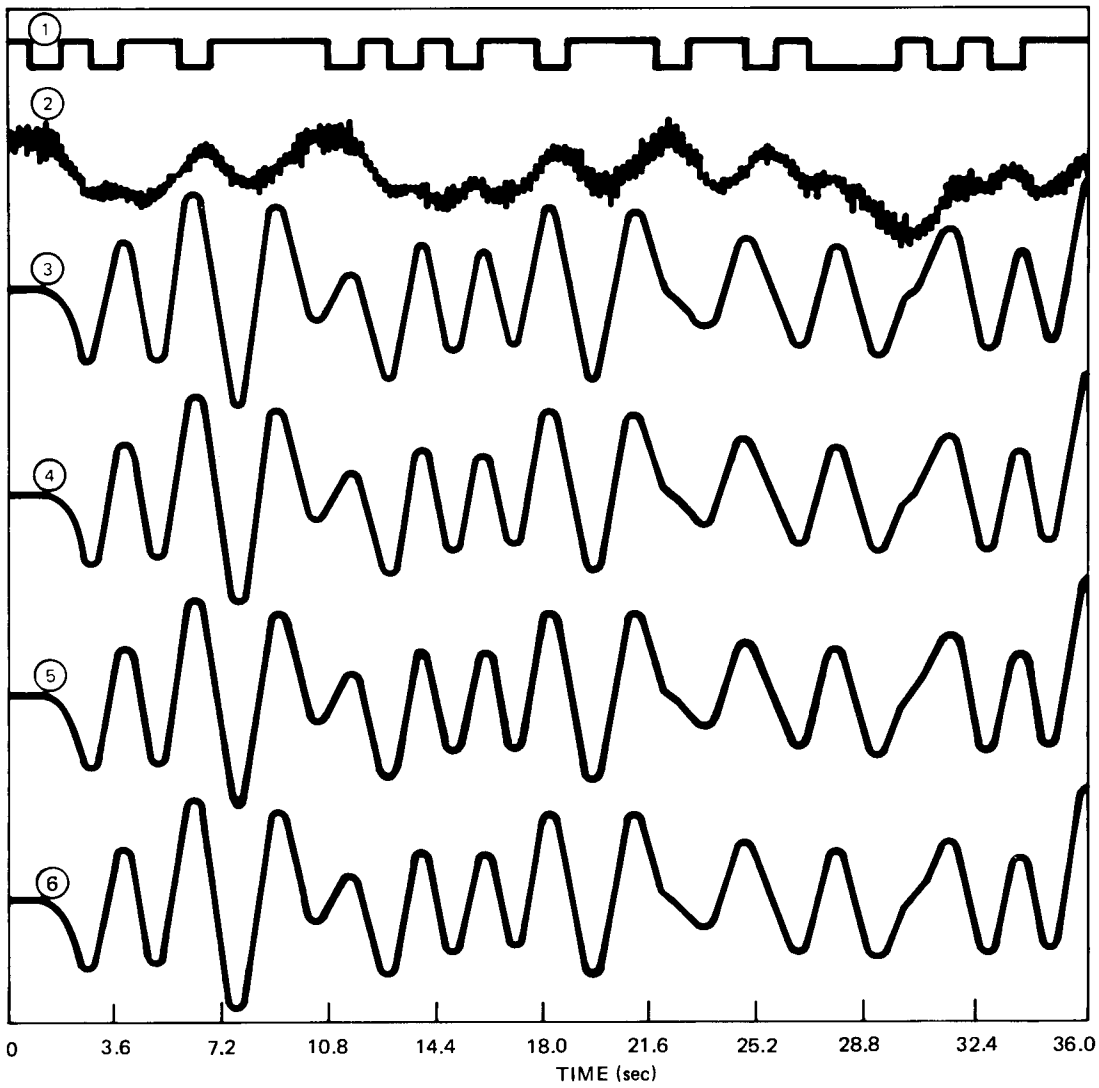
†*Frequency resolution is sacrificed for statistical stability in PSD analysis.

*The delayed feedback path through the fuel thermal time constant results in a lead term in the closed loop transfer function.

**A slope in the magnitude curve of a factor of 10 (20 decibels) per decade of frequency is characteristic of an ideal lead network.

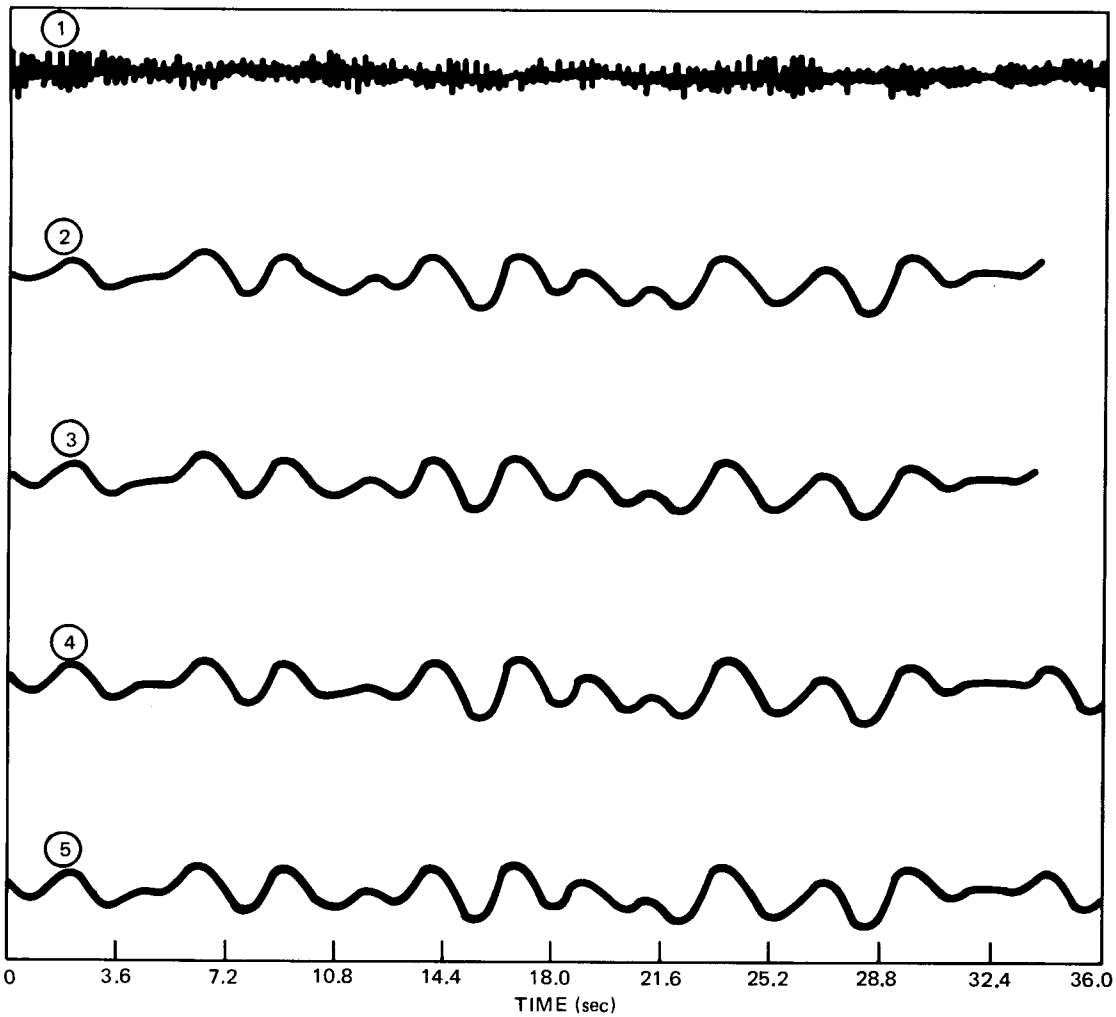
*†See Appendix A for a description of the numerical Fourier analysis algorithm.

‡See Appendix D for statistical data.



NUMBER CURVE	MEASURED VARIABLE	PLOT SCALE (UNITS/DIV)	INITIAL VALUE
1	PERTURBATION	25 psi	0 psi
2	CORE PRESSURE	5 psi	1021 psi
3	APRM F	5%	62.9%
4	APRM D	5%	61.2%
5	APRM C	5%	62.2%
6	APRM A	5%	62.9%

Figure 6-1. Peach Bottom-2 Cycle 3 Low Flow Stability Test Typical Perturbation Time Response, Test Point 3PT3



NUMBER CURVE	MEASURED VARIABLE	PLOT SCALE (UNITS/DIV)	INITIAL VALUE
1	CORE PRESSURE	5 psi	1021 psi
2	APRM F	5%	63.1%
3	APRM D	5%	61.5%
4	APRM C	5%	62.5%
5	APRM A	5%	63.2%

Figure 6-2. Peach Bottom-2 Cycle 3 Low Flow Stability Test Typical Noise Time Plot, Test Point 3PT3

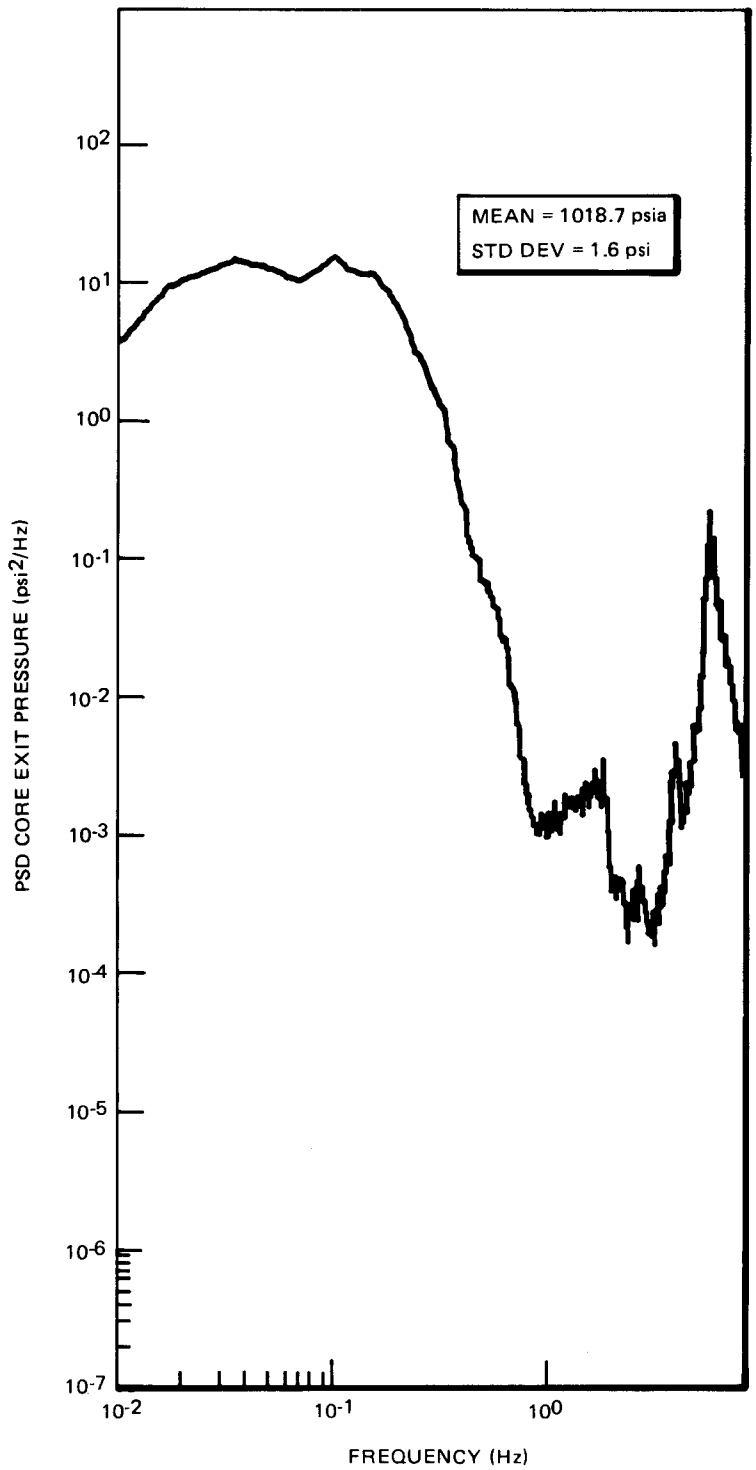


Figure 6-3. Peach Bottom-2 Cycle 3 Low Flow Stability Test (3PT3) Power Spectrum, Core Exit Pressure

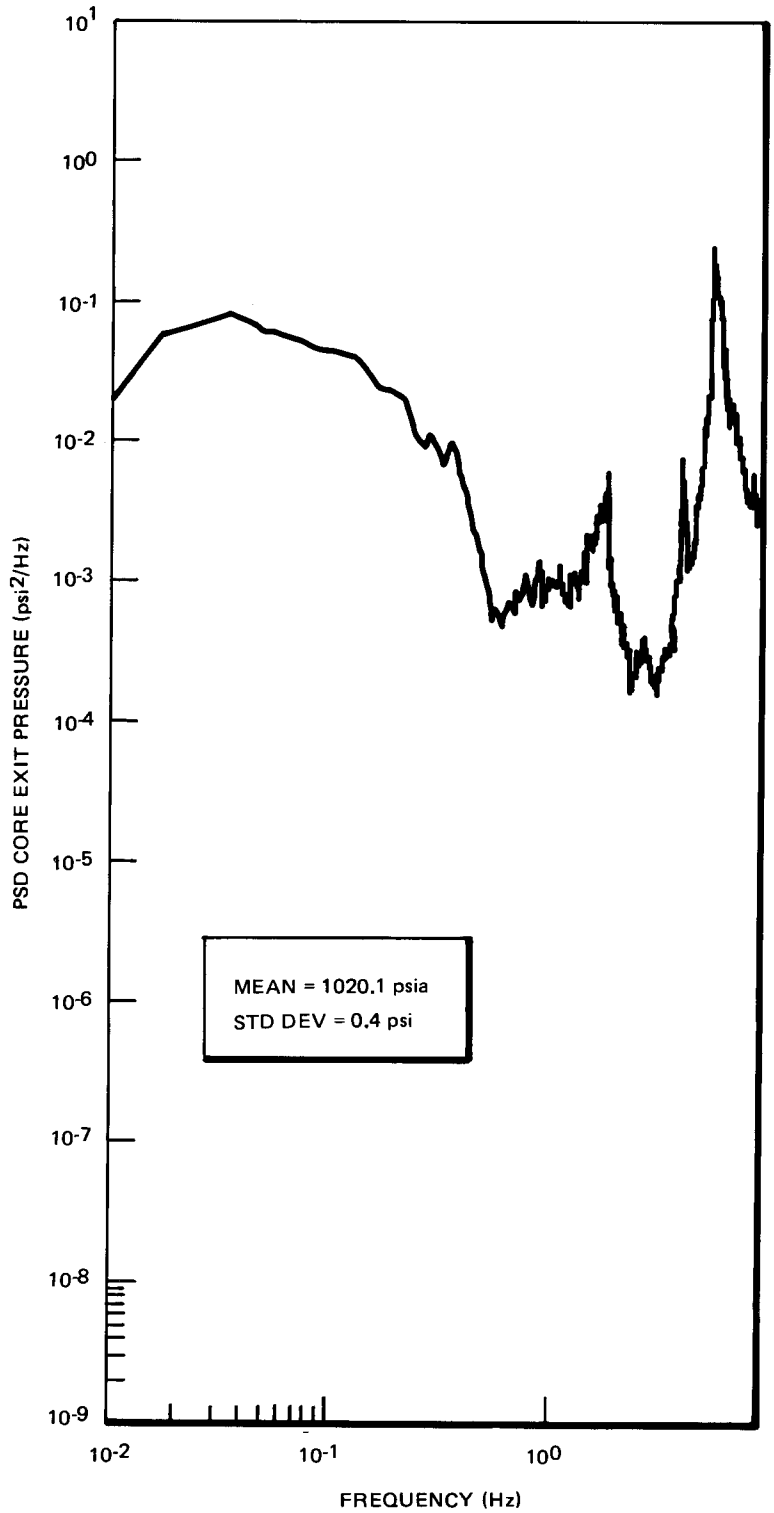


Figure 6-4. Peach Bottom-2 Cycle 3 Low Flow Stability Test (3PT3) Noise Power Spectrum, Core Exit Pressure

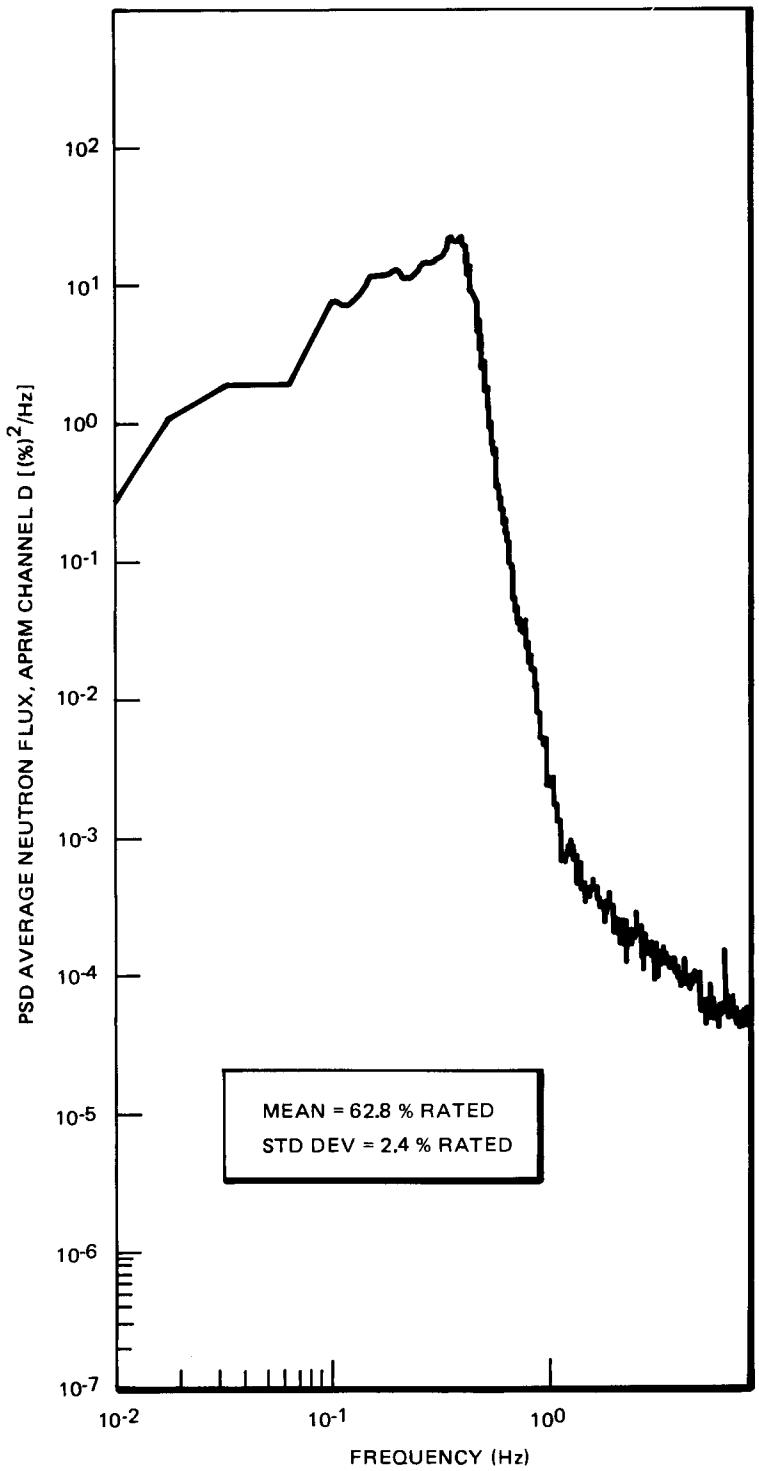


Figure 6-5. Peach Bottom-2 Cycle 3 Low Flow Stability Test (3PT3) Power Spectrum, Average Neutron Flux (APRM D)

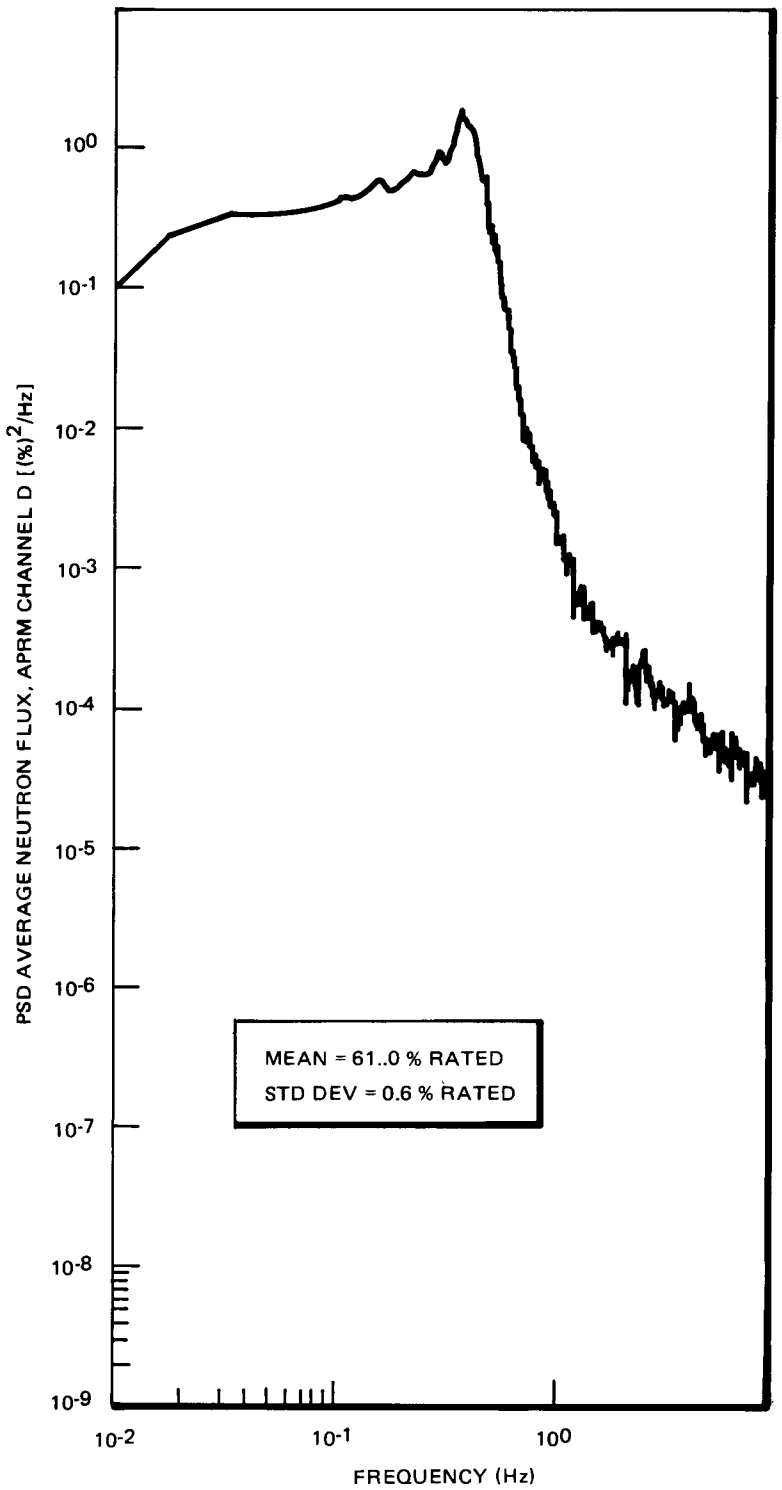


Figure 6-6. Peach Bottom-2 Cycle 3 Low Flow Stability Test (3PT3) Noise Power Spectrum, Average Neutron Flux (APRM D)

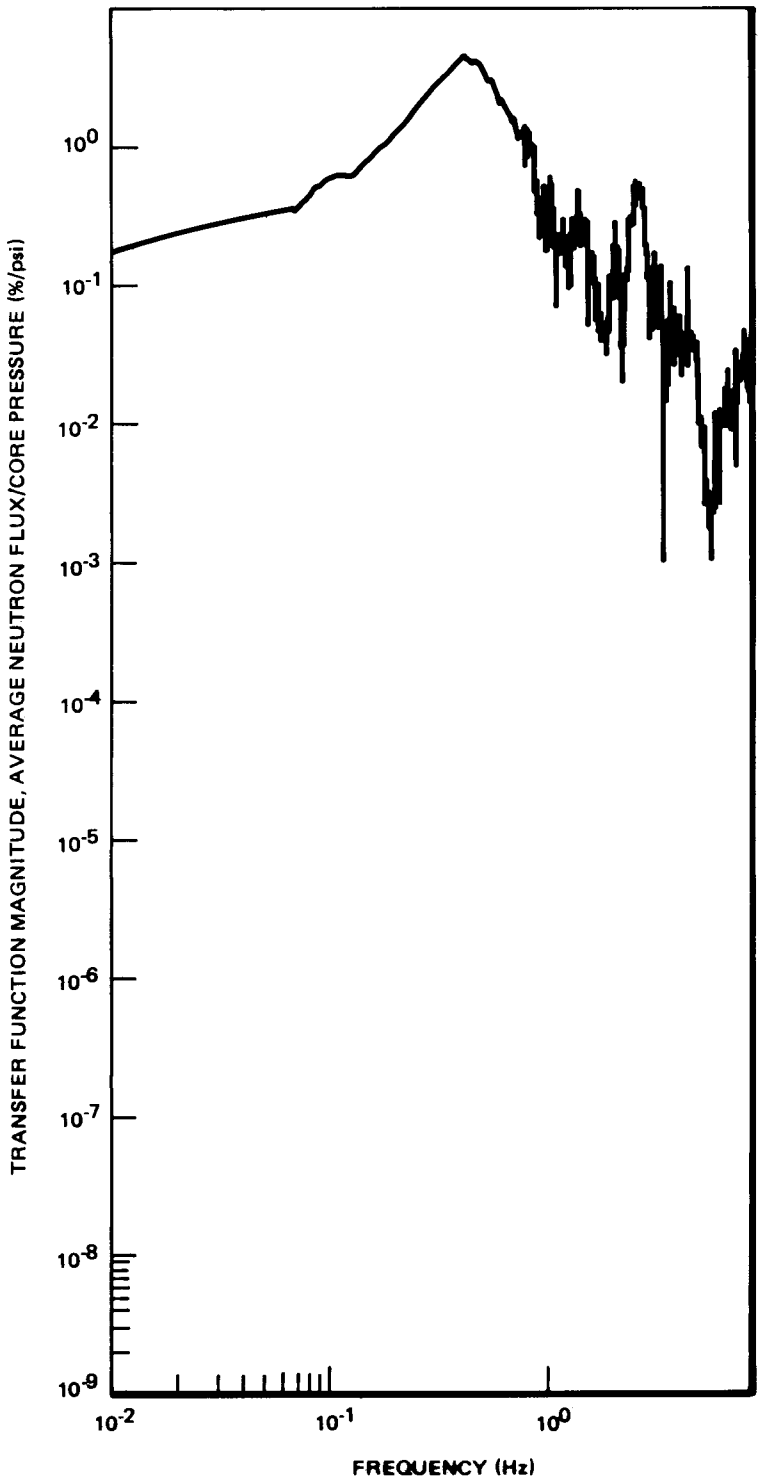


Figure 6-7. Peach Bottom-2 Cycle 3 Low Flow Stability Test (1PT1) Transfer Function Magnitude, Average Neutron Flux (APRM D)/Core Pressure

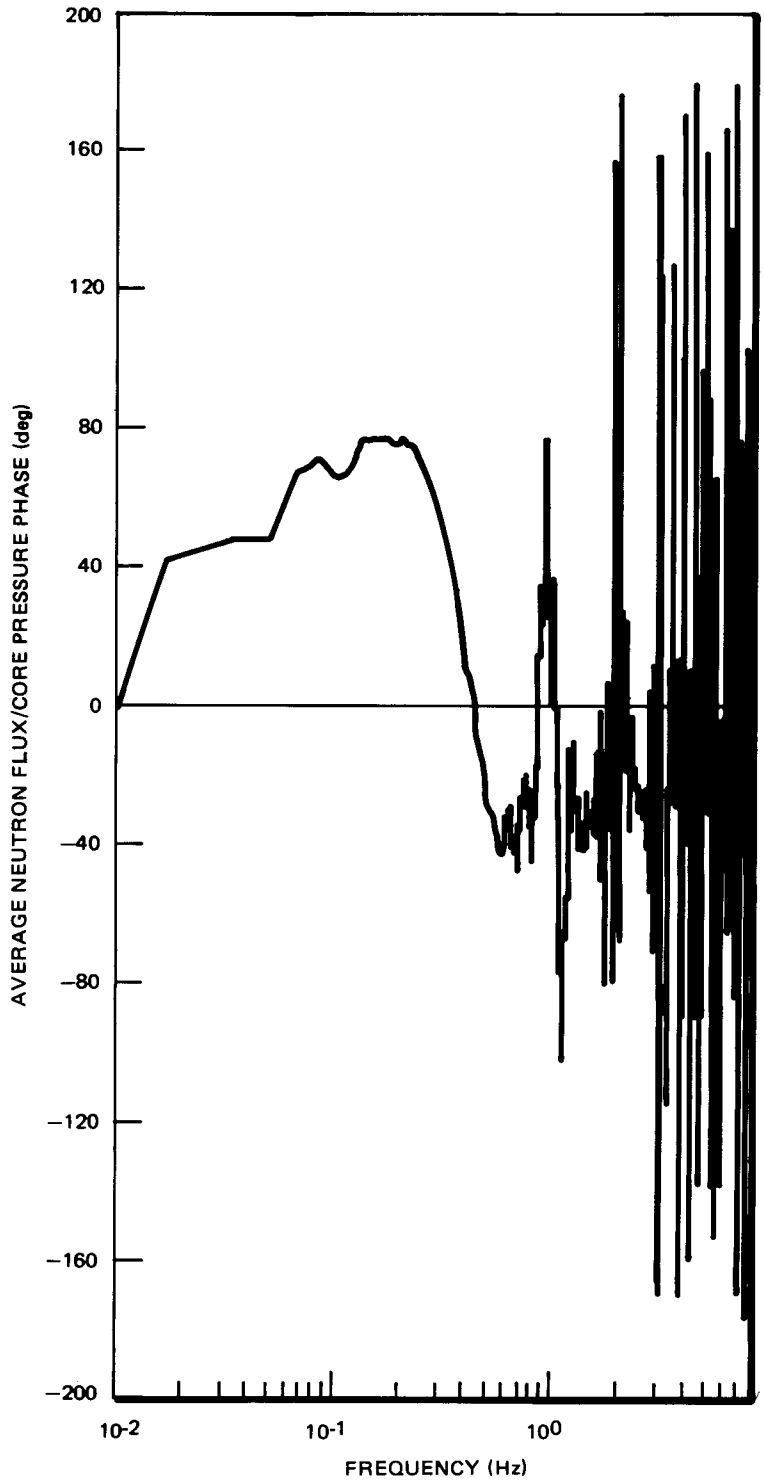


Figure 6-8. Peach Bottom-2 Cycle 3 Low Flow Stability Test (1PT1) Transfer Function Phase, Average Neutron Flux (APRM D)/Core Pressure

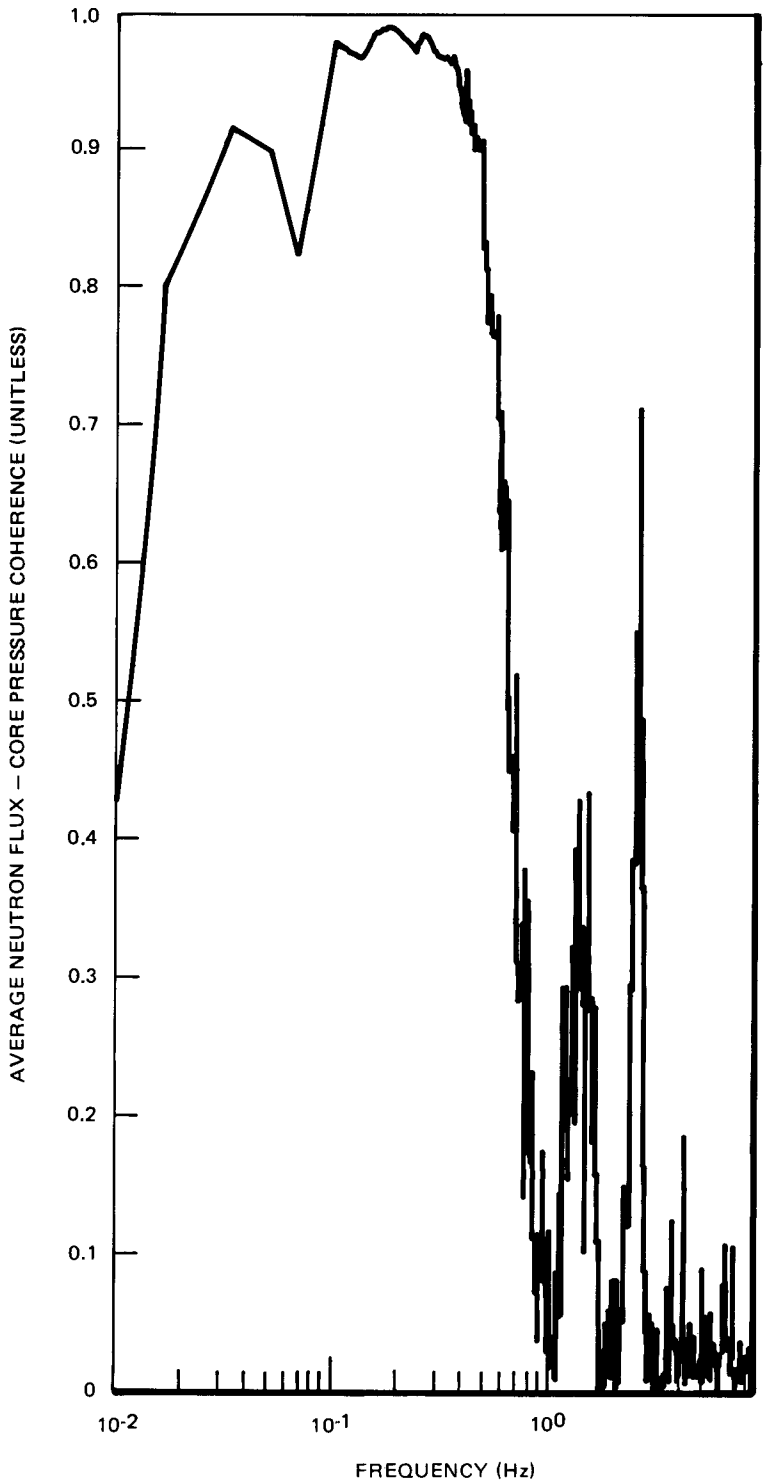


Figure 6-9. Peach Bottom-2 Cycle 3 Low Flow Stability Test (1PT1) Coherence Between Average Neutron Flux (APRM D) and Core Pressure

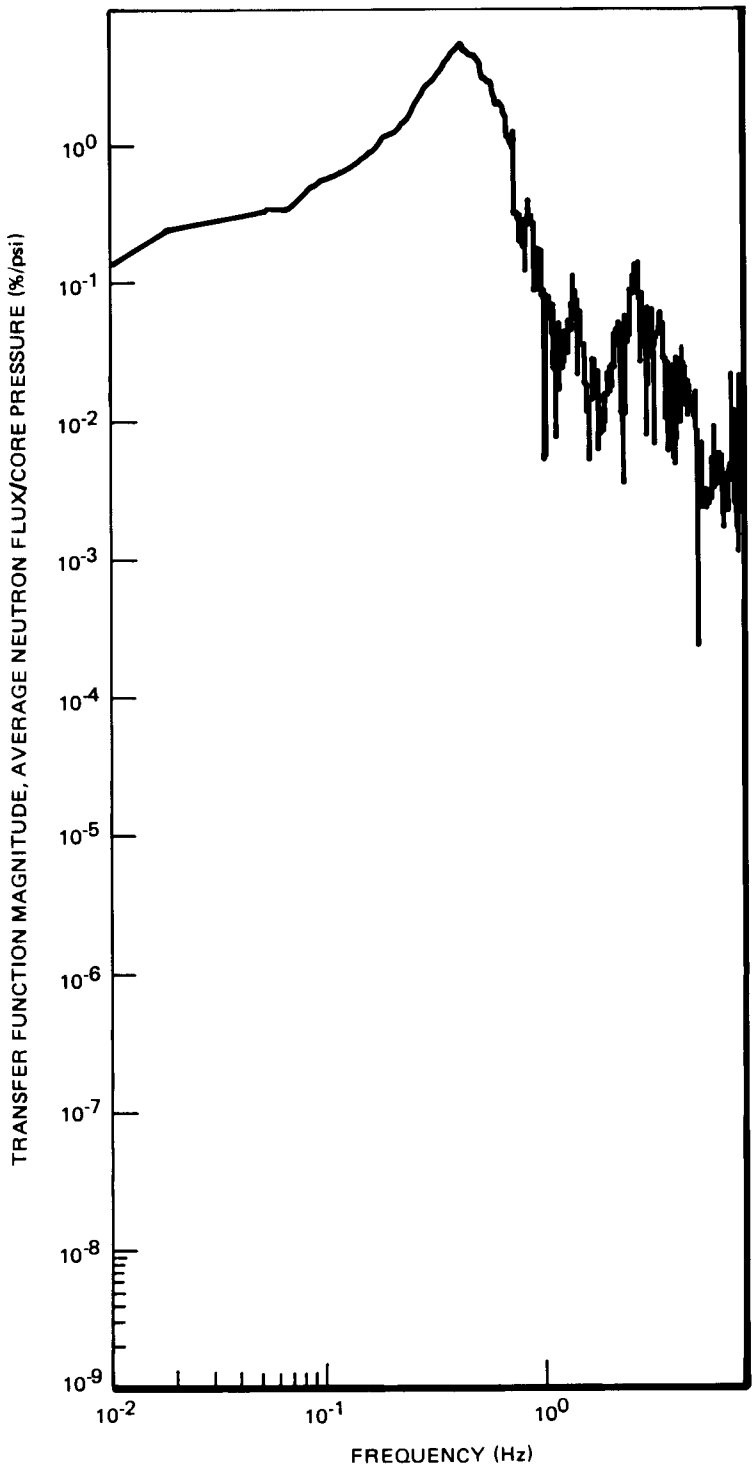


Figure 6-10. Peach Bottom-2 Cycle 3 Low Flow Stability Test (1PT2) Transfer Function Magnitude, Average Neutron Flux (APRM D)/Core Pressure

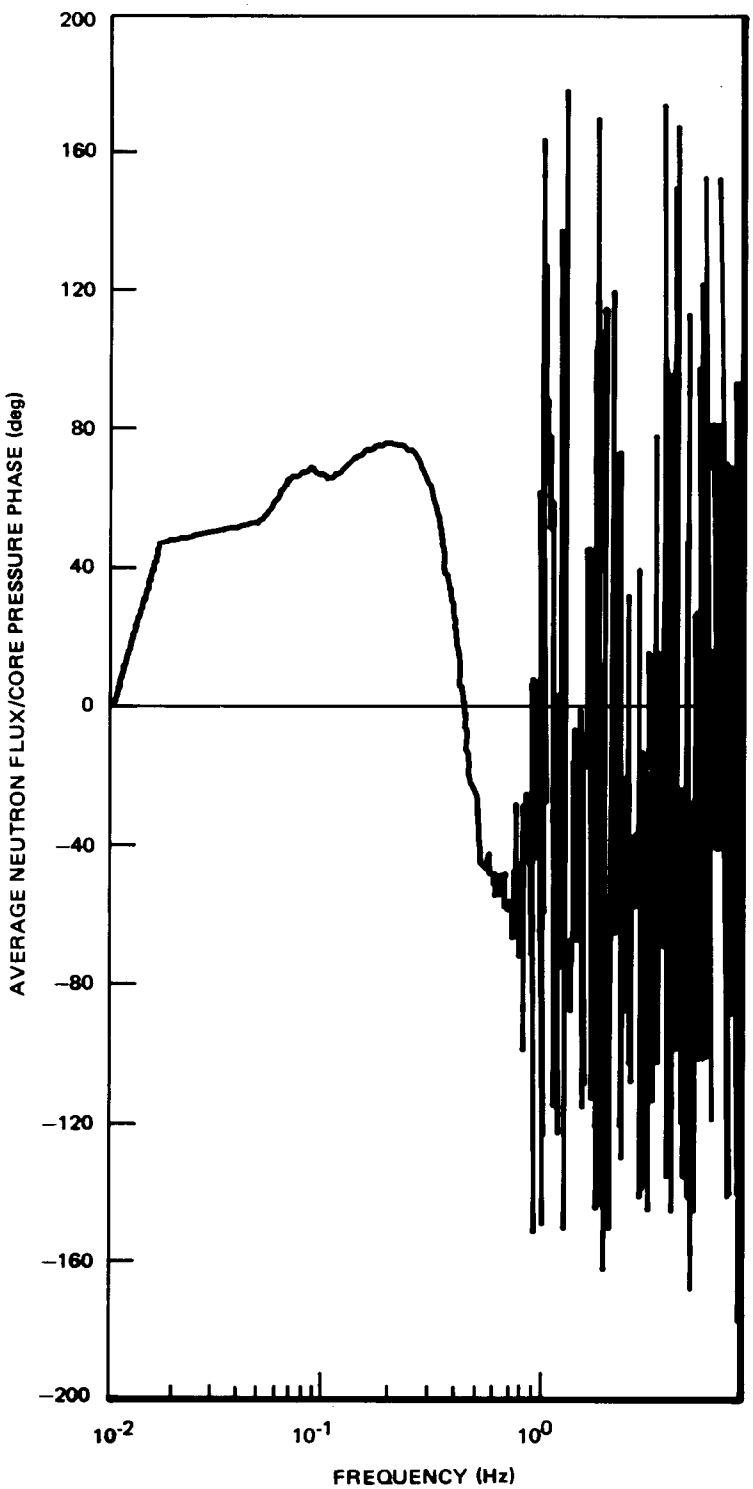


Figure 6-11. Peach Bottom-2 Cycle 3 Low Flow Stability Test (1PT2) Transfer Function Phase, Average Neutron Flux (APRM D)/Core Pressure

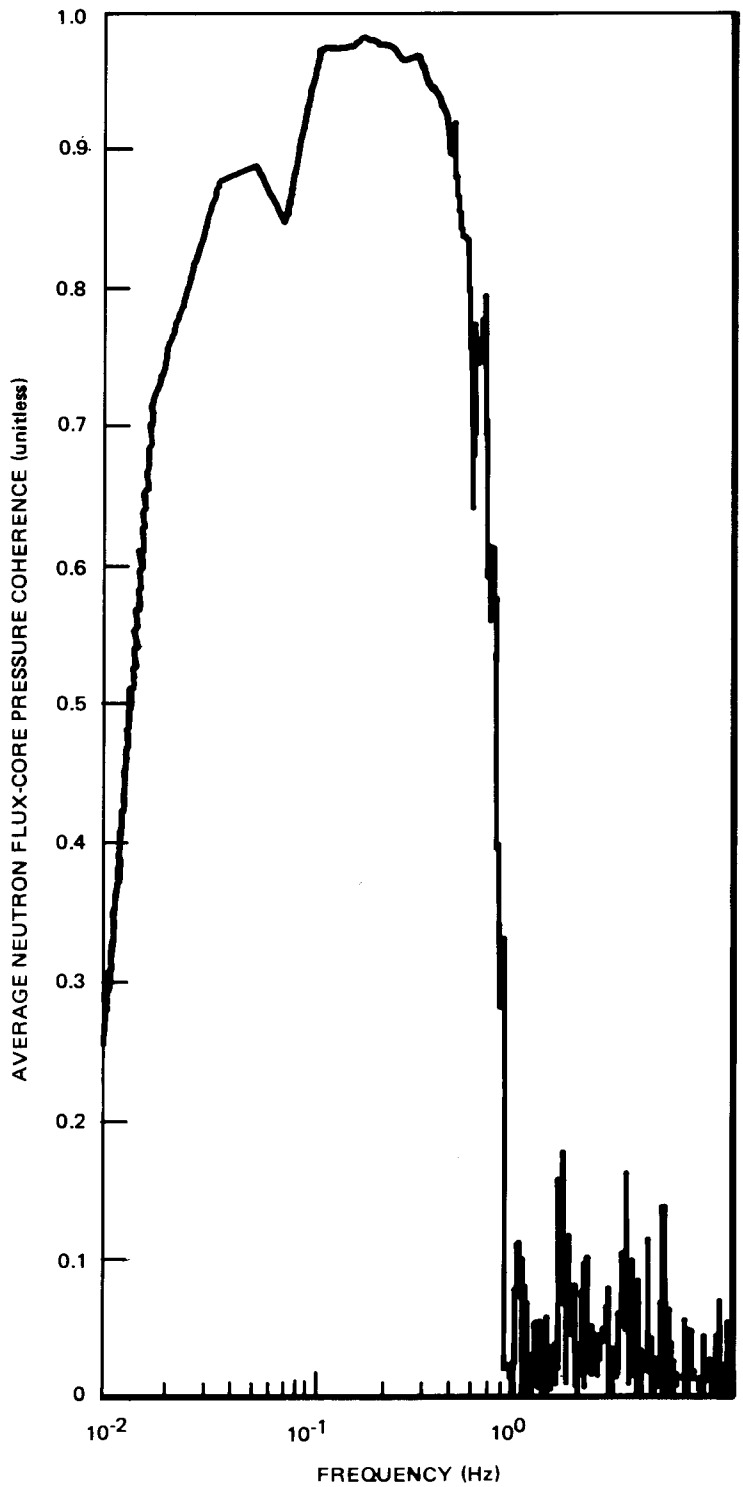


Figure 6-12. Peach Bottom-2 Cycle 3 Low Flow Stability Test (1PT2) Coherence Between Average Neutron Flux (APRM D) and Core Pressure

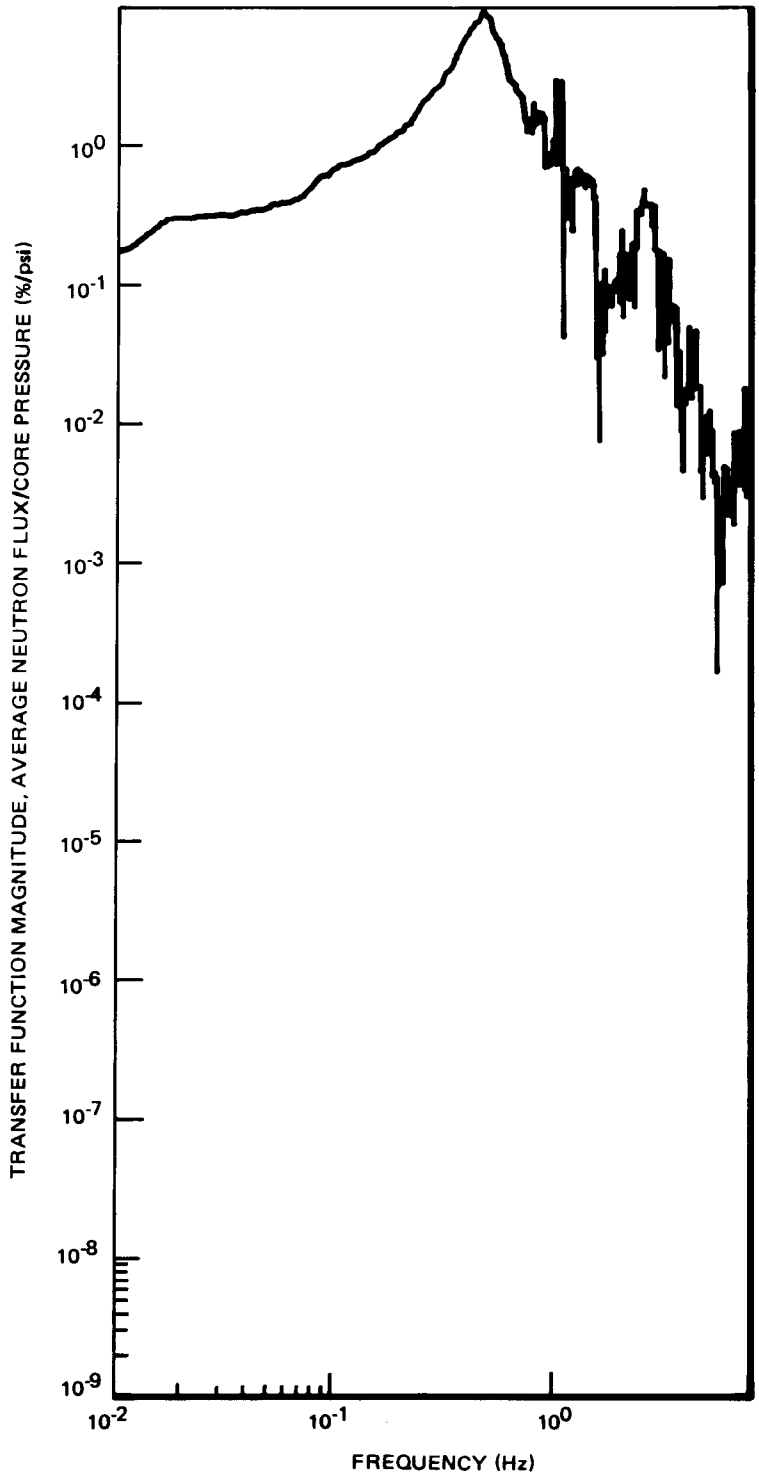


Figure 6-13. Peach Bottom-2 Cycle 3 Low Flow Stability Test (2PT2) Transfer Function Magnitude, Average Neutron Flux (APRM D)/Core Pressure

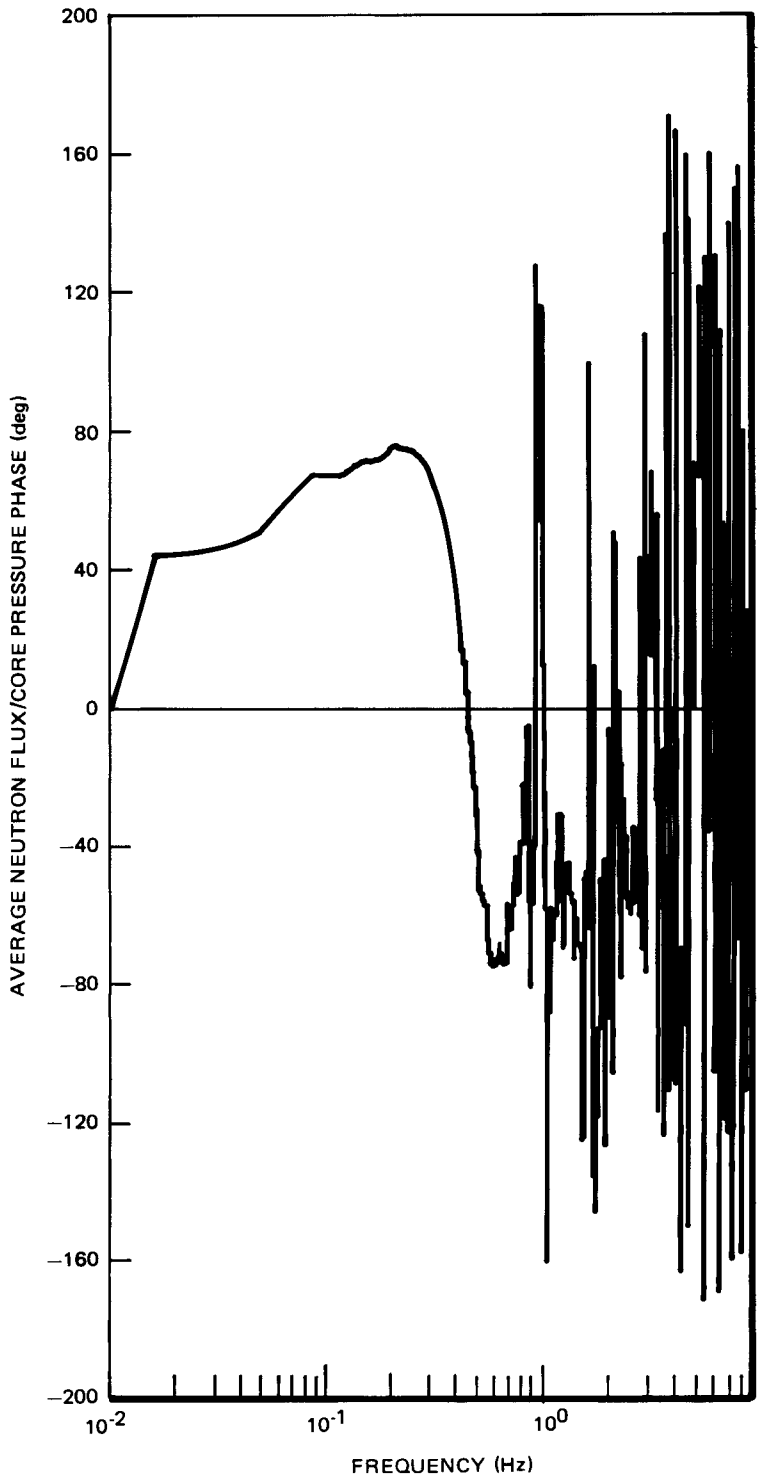


Figure 6-14. Peach Bottom-2 Cycle 3 Low Flow Stability Test (2PT2) Transfer Function Phase, Average Neutron Flux (APRM D)/Core Pressure

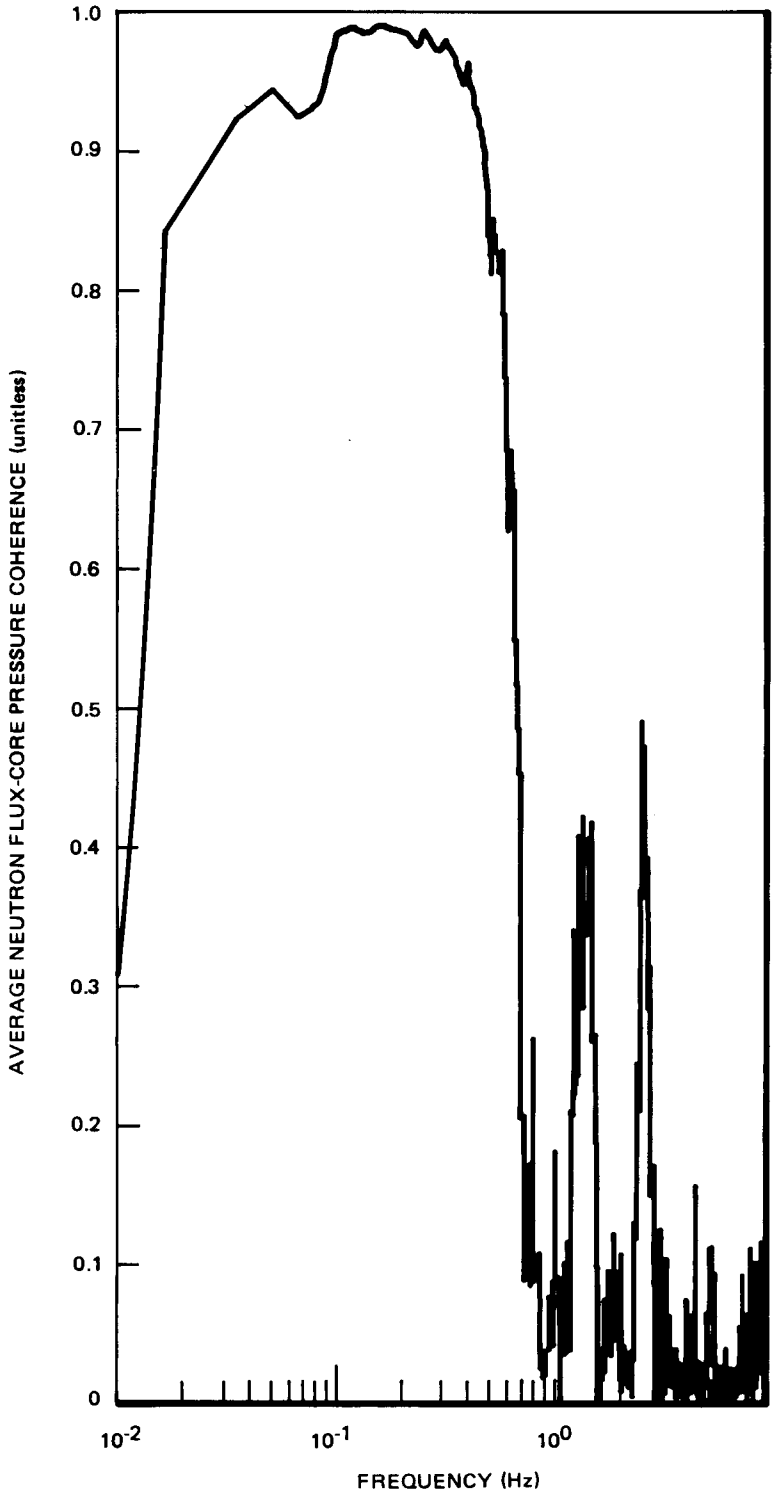


Figure 6-15. Peach Bottom-2 Cycle 3 Low Flow Stability Test (2PT2) Coherence Between Average Neutron Flux (APRM D) and Core Pressure

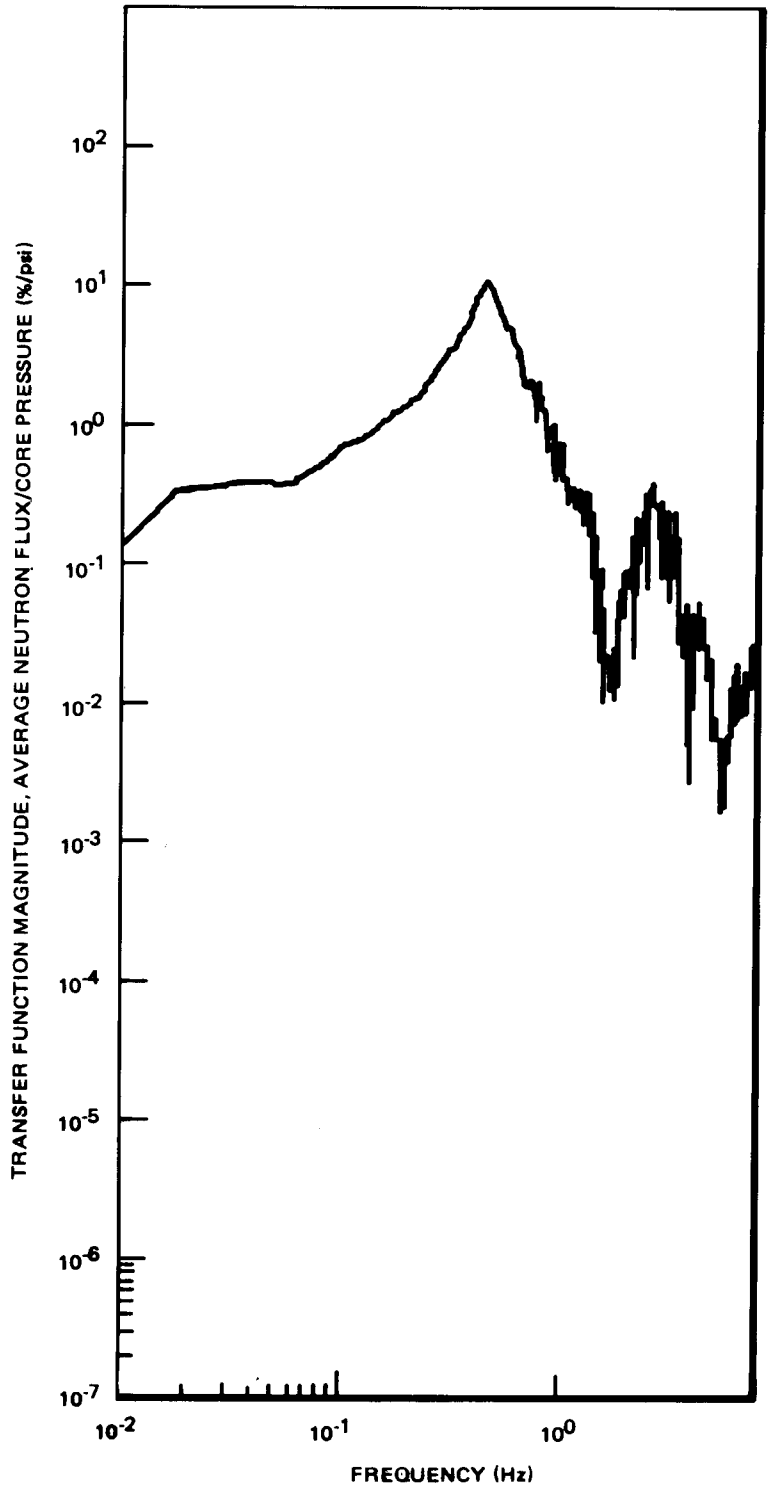


Figure 6-16. Peach Bottom-2 Cycle 3 Low Flow Stability Test (2PT3) Transfer Function Magnitude, Average Neutron Flux (APRM D)/Core Pressure

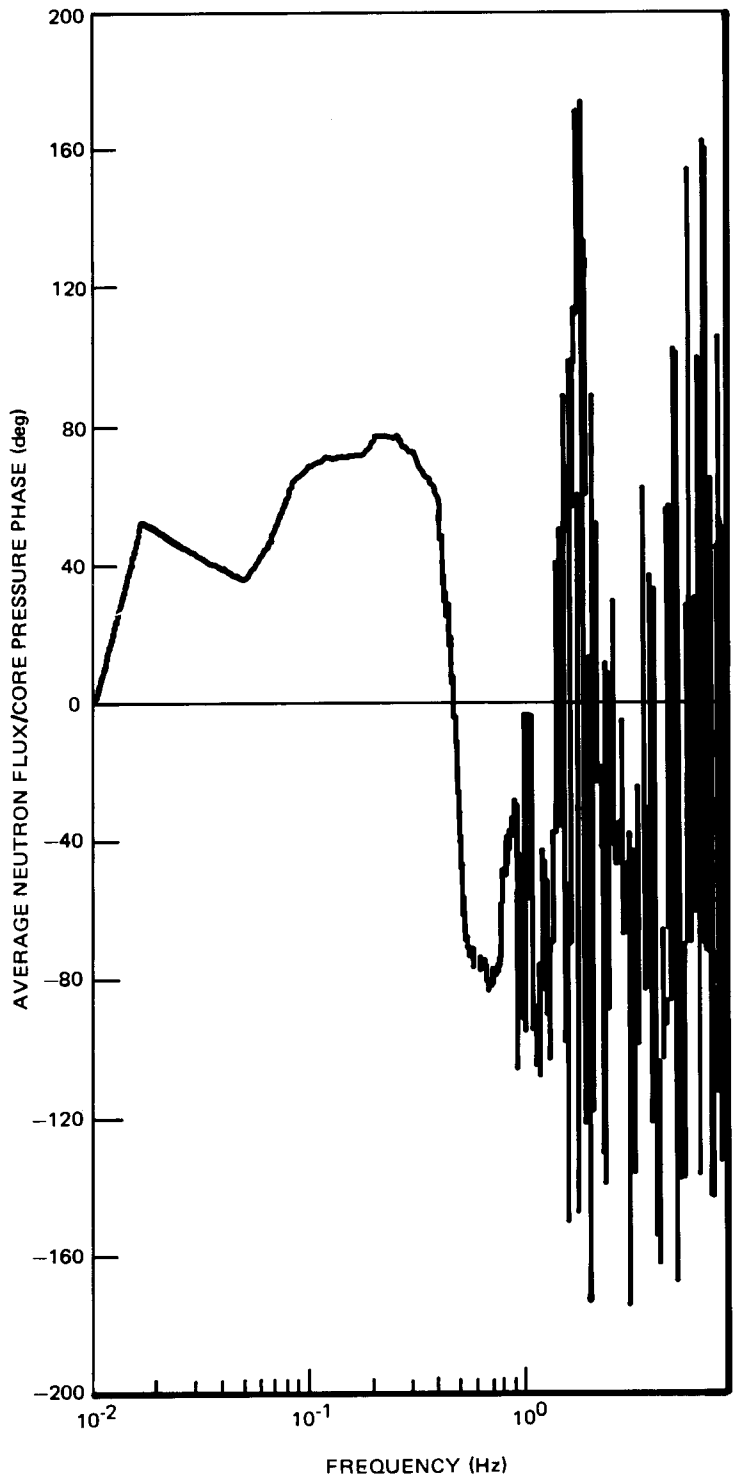


Figure 6-17. Peach Bottom-2 Cycle 3 Low Flow Stability Test (2PT3) Transfer Function Phase, Average Neutron Flux (APRM D)/Core Pressure

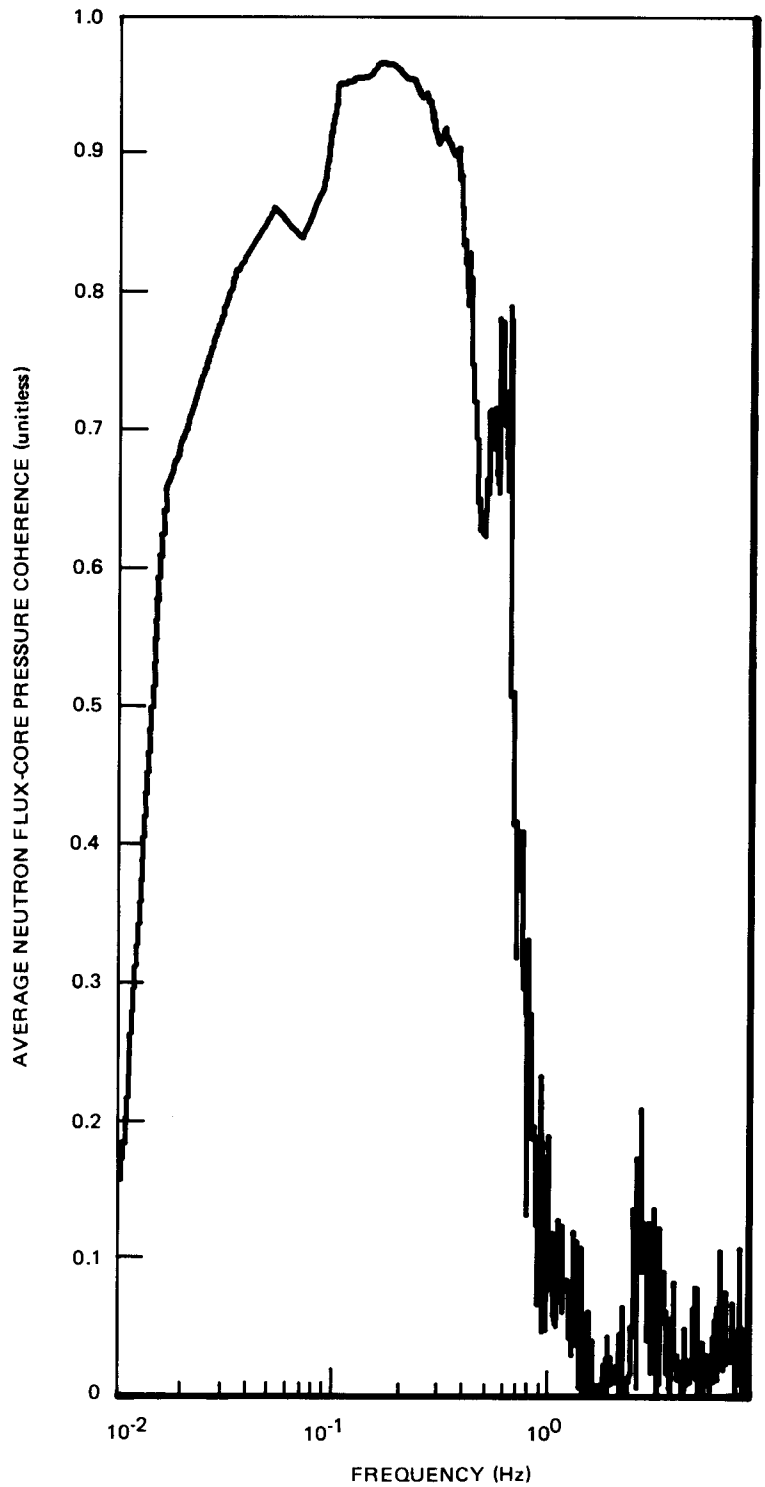


Figure 6-18. Peach Bottom-2 Cycle 3 Low Flow Stability Test (2PT3) Coherence Between Average Neutron Flux (APRM D) and Core Pressure

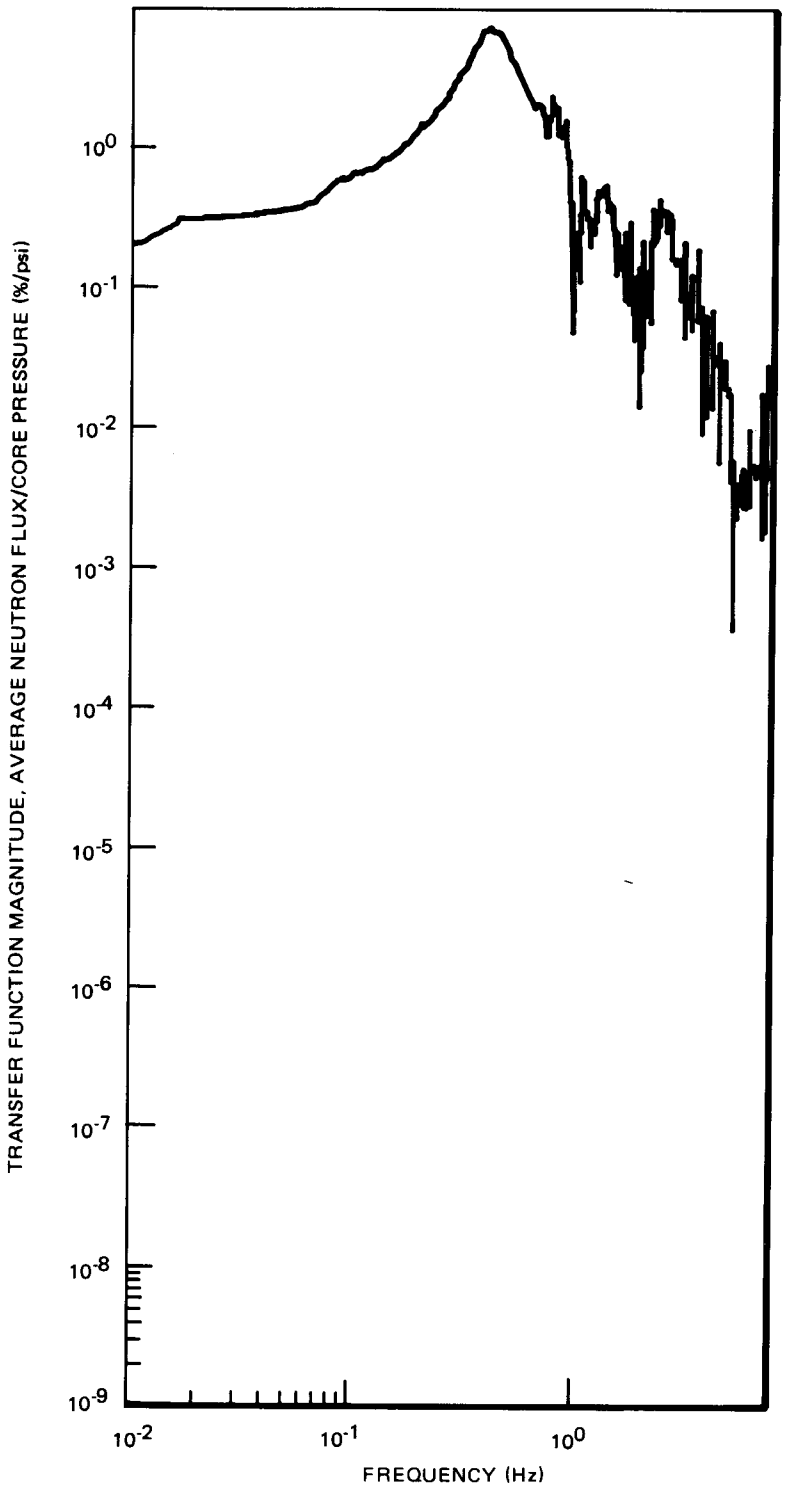


Figure 6-19. Peach Bottom-2 Cycle 3 Low Flow Stability Test (3PT2) Transfer Function Magnitude, Average Neutron Flux (APRM D)/Core Pressure

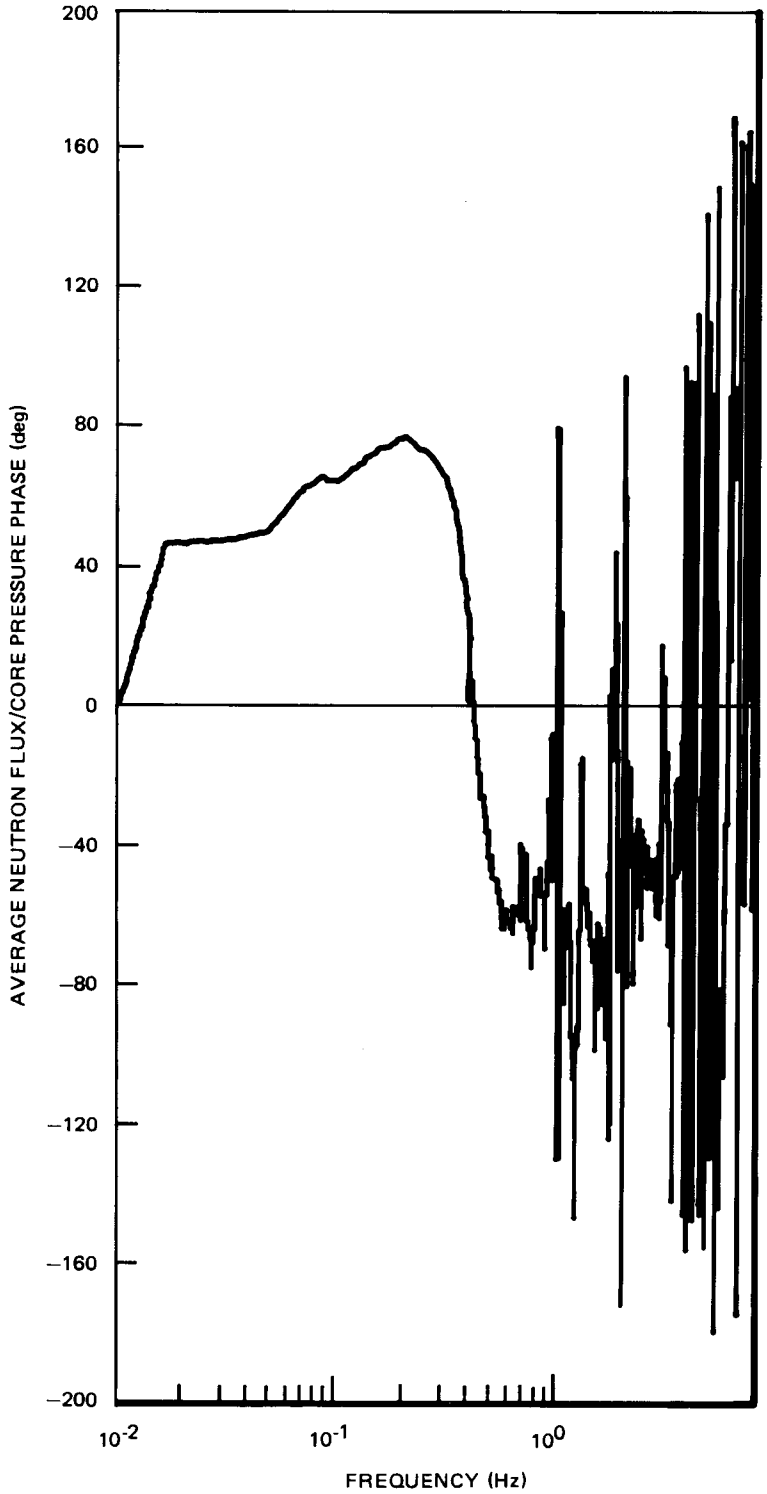


Figure 6-20. Peach Bottom-2 Cycle 3 Low Flow Stability Test (3PT2) Transfer Function Phase, Average Neutron Flux (APRM D)/Core Pressure

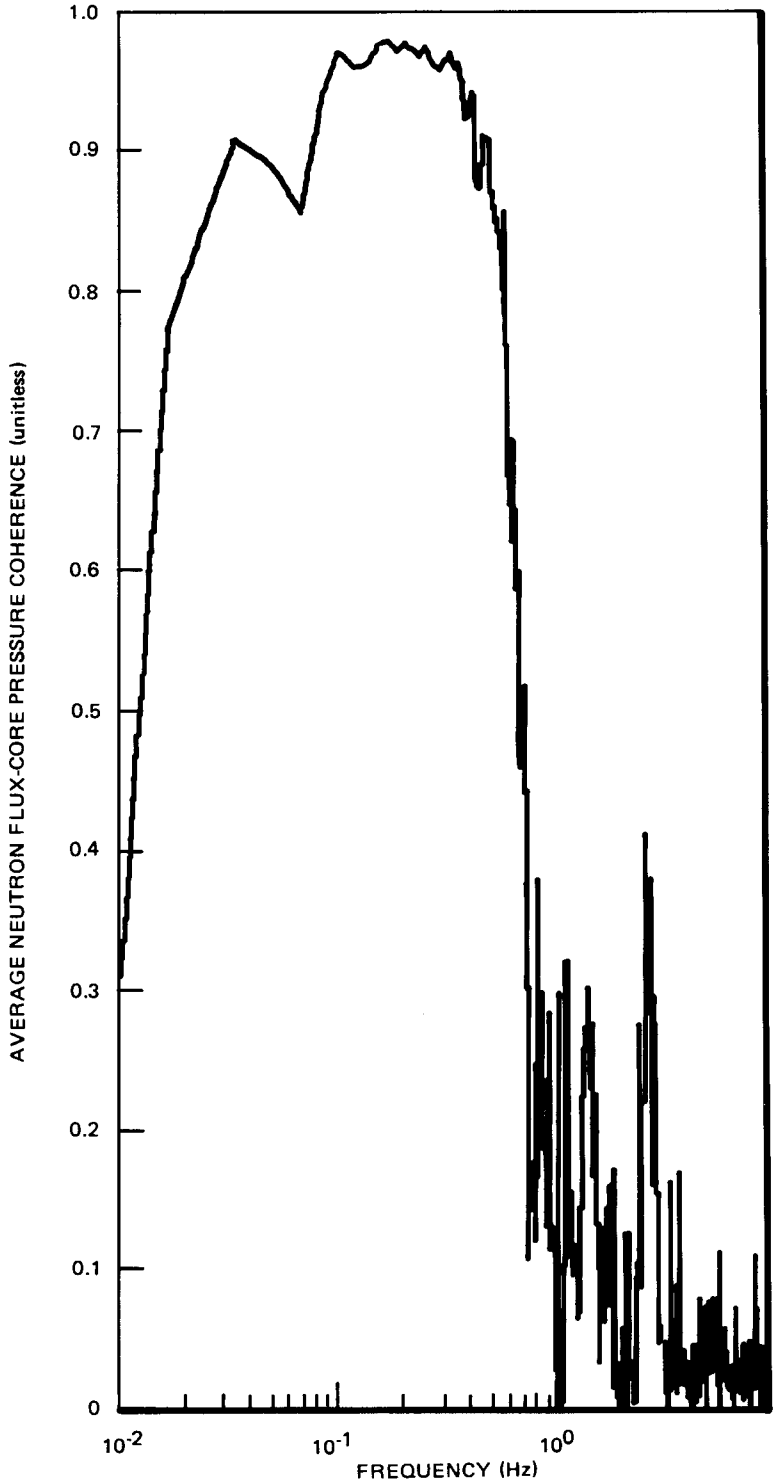


Figure 6-21. Peach Bottom-2 Cycle 3 Low Flow Stability Test (3PT2) Coherence Between Average Neutron Flux (APRM D) and Core Pressure

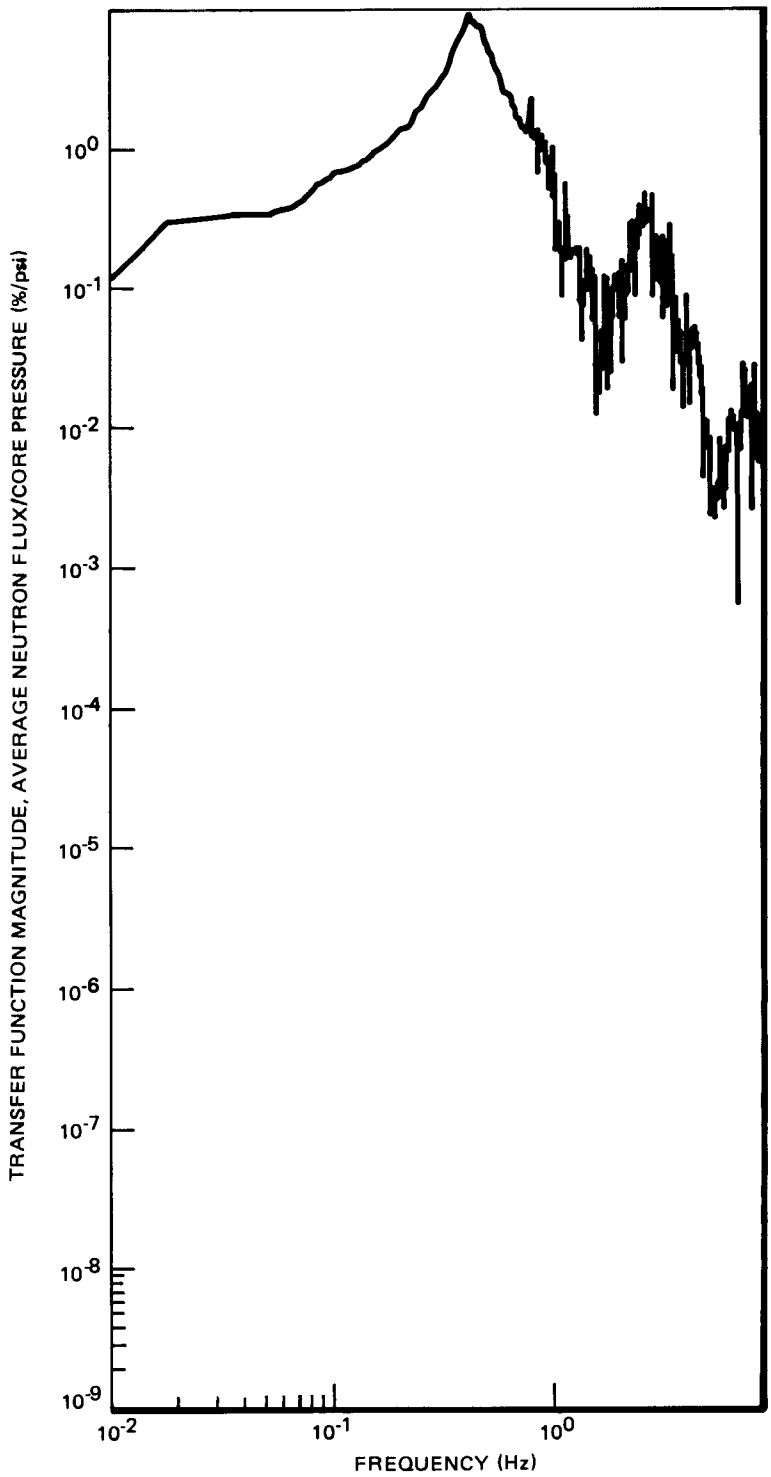


Figure 6-22. Peach Bottom-2 Cycle 3 Low Flow Stability Test (3PT3) Transfer Function Magnitude, Average Neutron Flux (APRM D)/Core Pressure

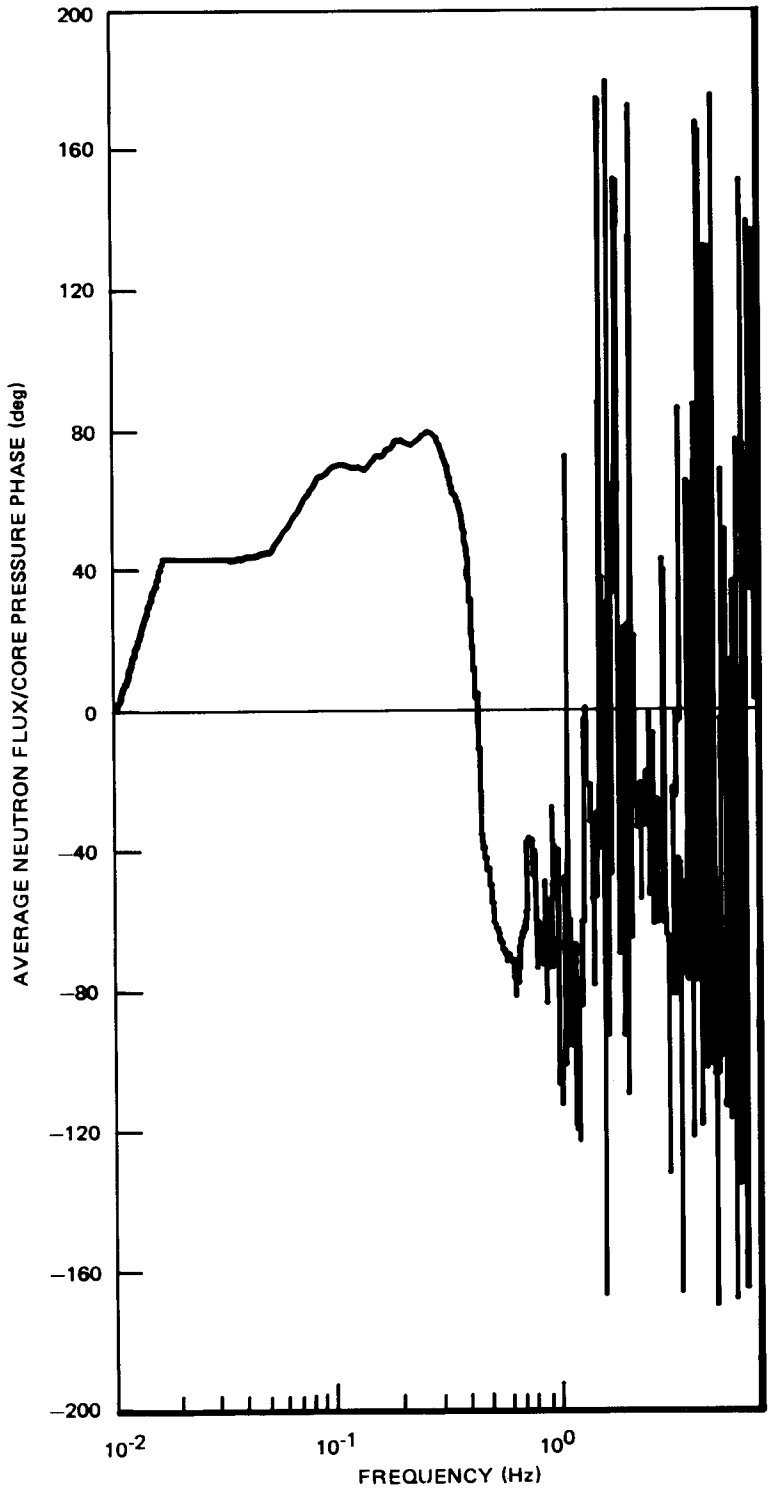


Figure 6-23. Peach Bottom-2 Cycle 3 Low Flow Stability Test (3PT3) Transfer Function Phase, Average Neutron Flux (APRM D)/Core Pressure

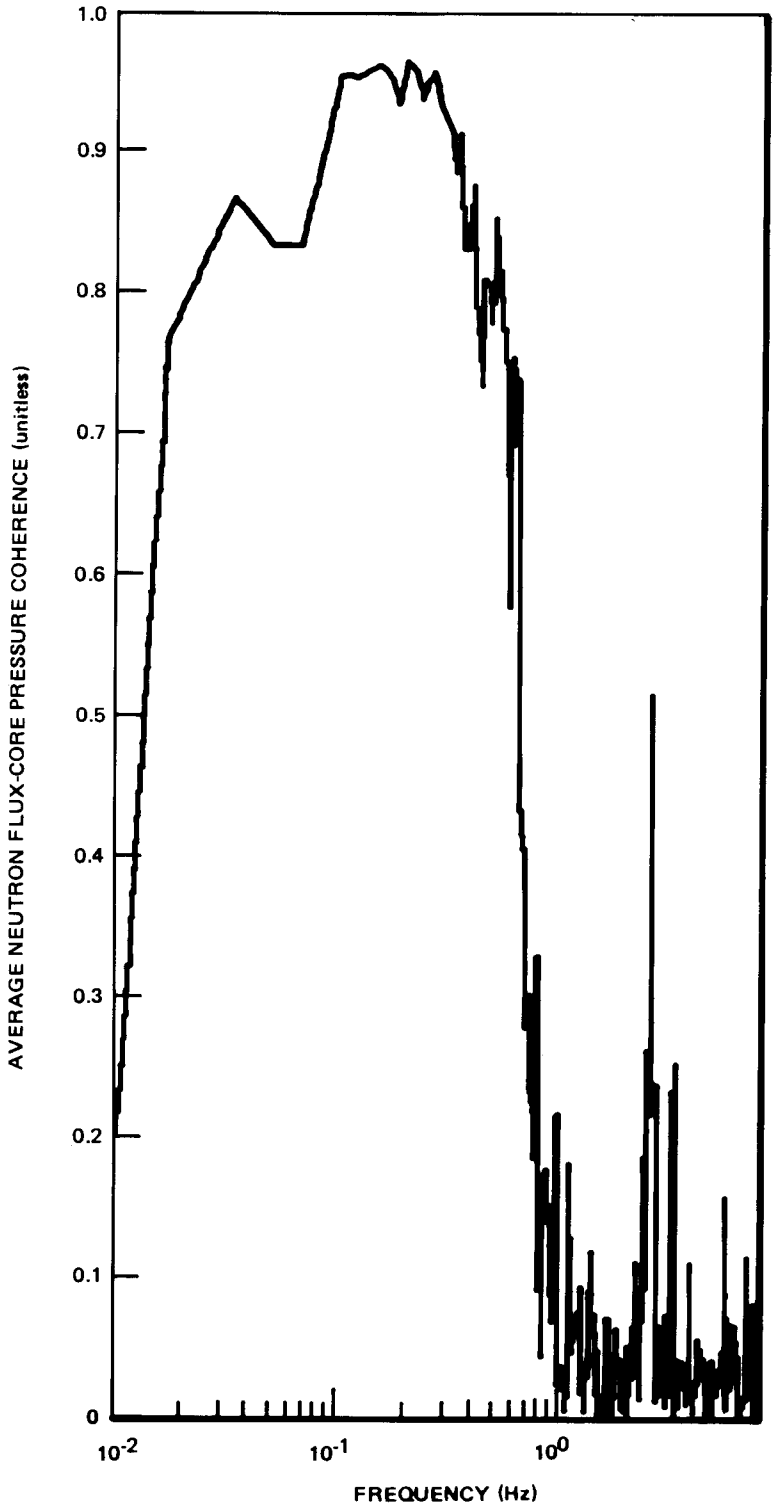


Figure 6-24. Peach Bottom-2 Cycle 3 Low Flow Stability Test (3PT3) Coherence Between Average Neutron Flux (APRM D) and Core Pressure

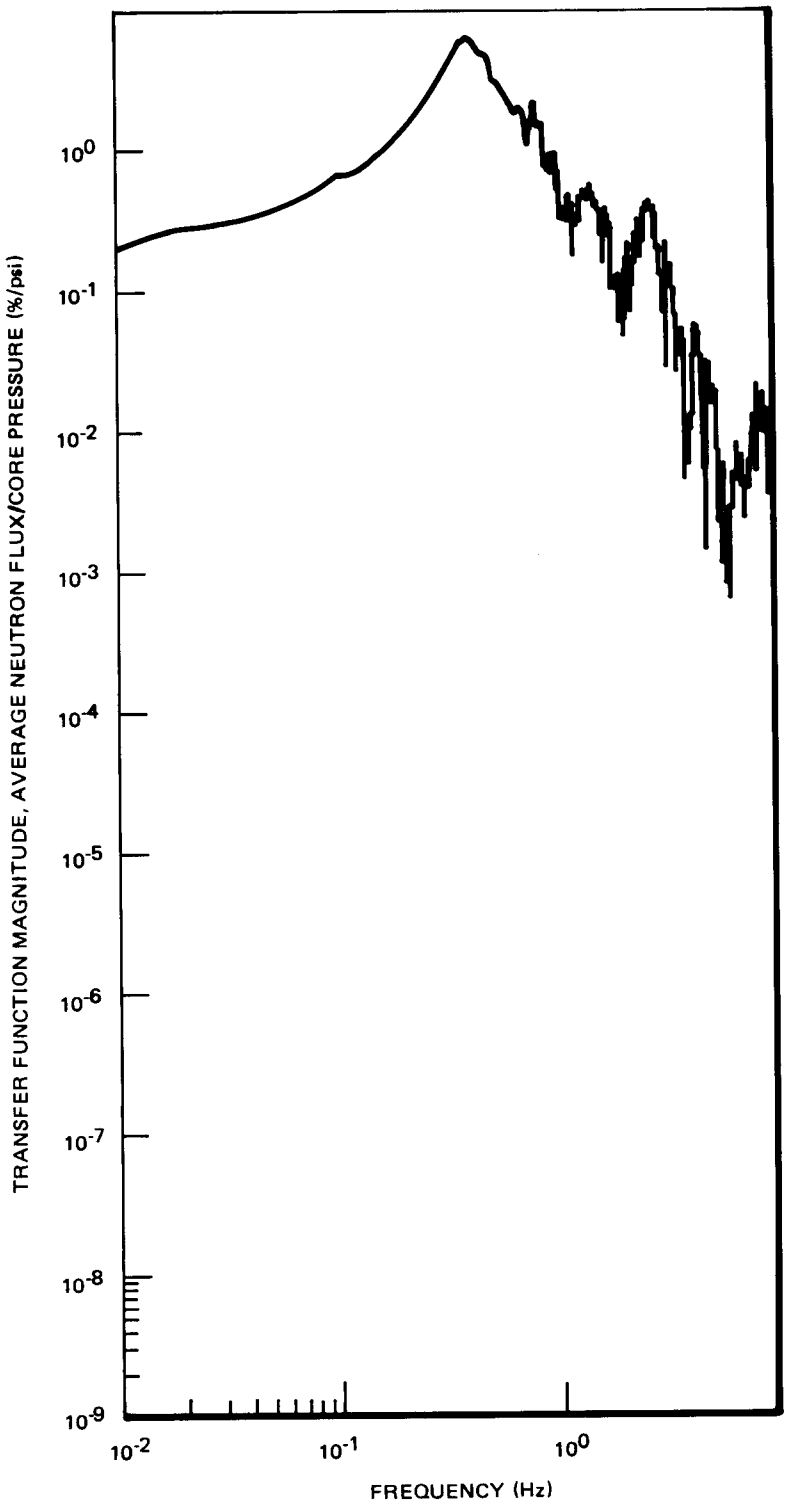


Figure 6-25. Peach Bottom-2 Cycle 3 Low Flow Stability Test (4PT1) Transfer Function Magnitude, Average Neutron Flux (APRM D)/Core Pressure

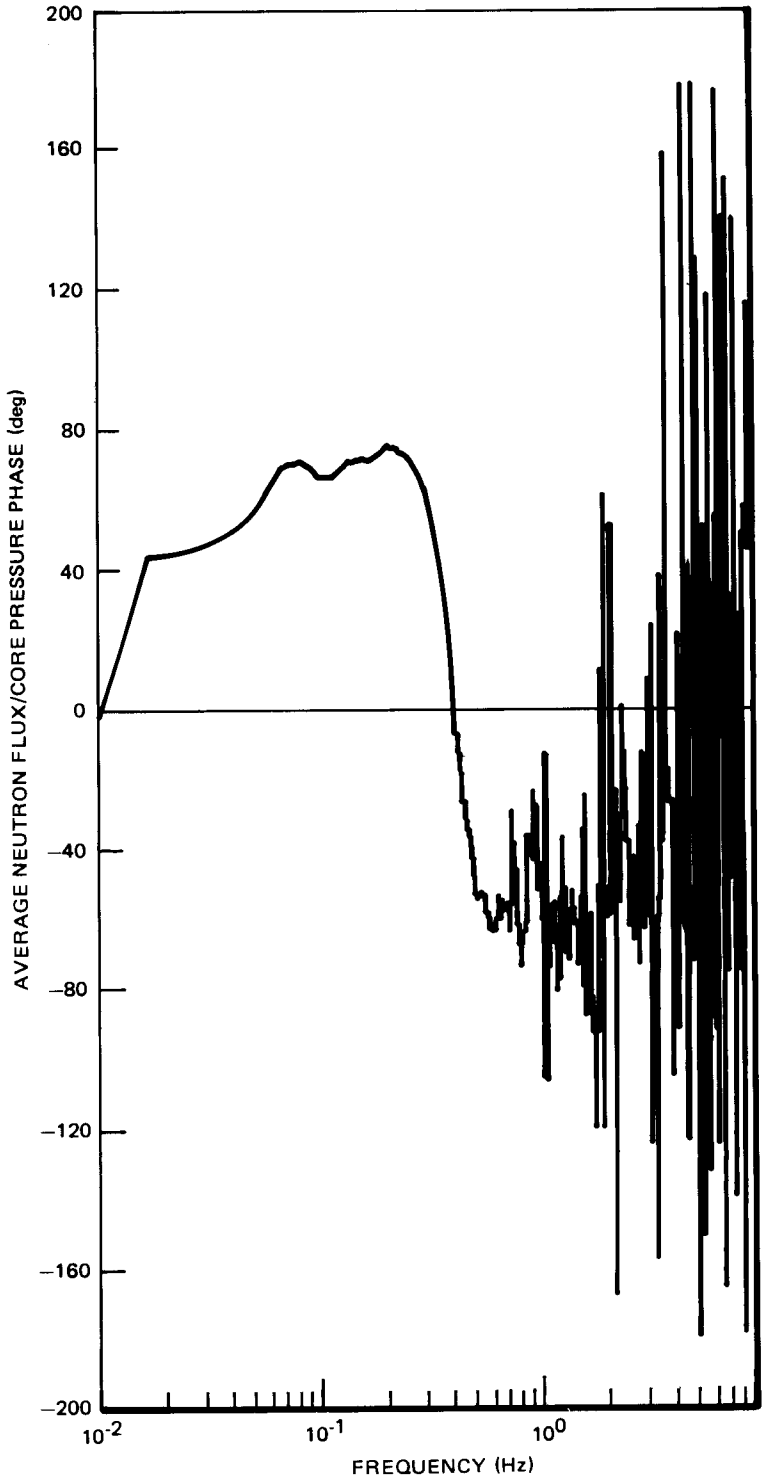


Figure 6-26. Peach Bottom-2 Cycle 3 Low Flow Stability Test (4PT1) Transfer Function Phase, Average Neutron Flux (APRM D)/Core Pressure

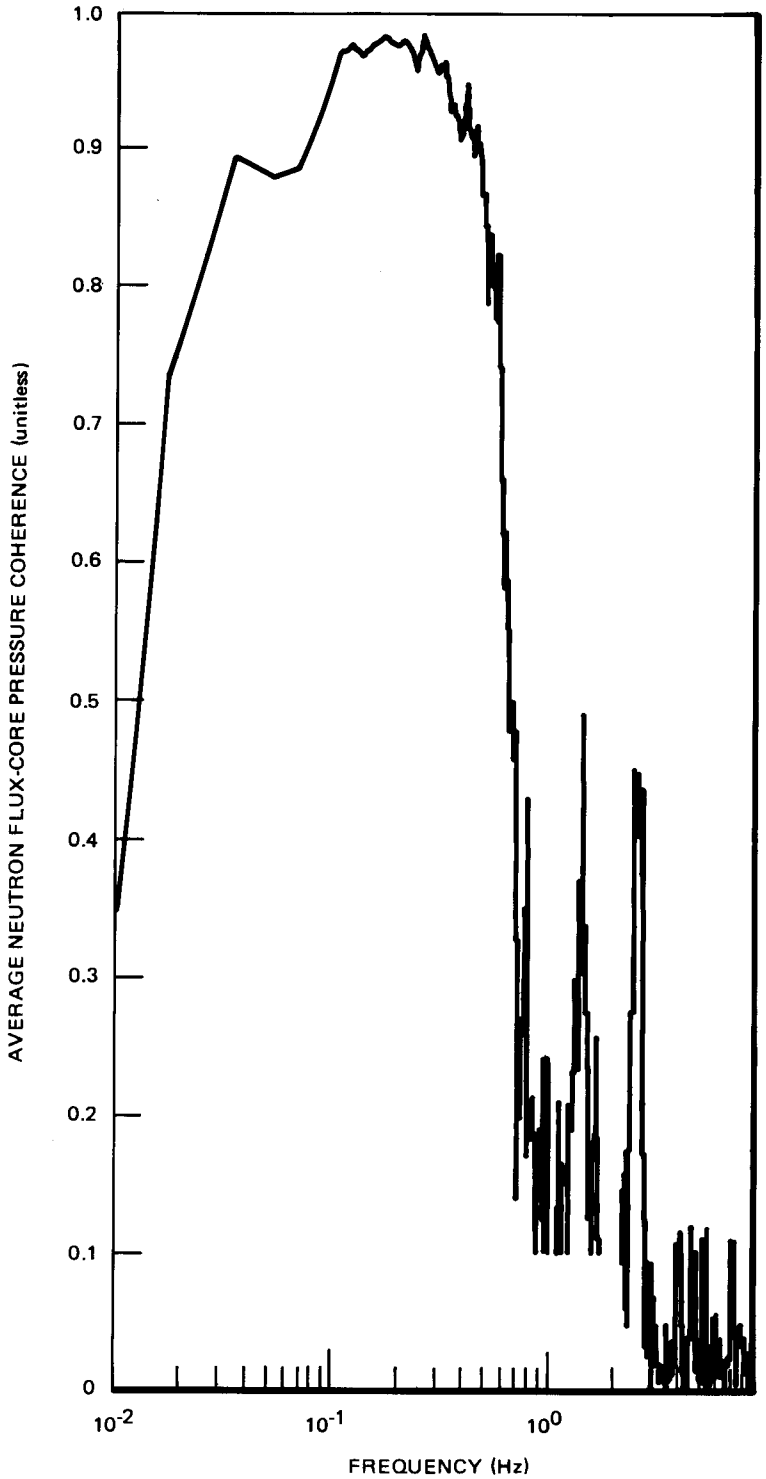


Figure 6-27. Peach Bottom-2 Cycle 3 Low Flow Stability Test (4PT1) Coherence Between Average Neutron Flux (APRM D) and Core Pressure

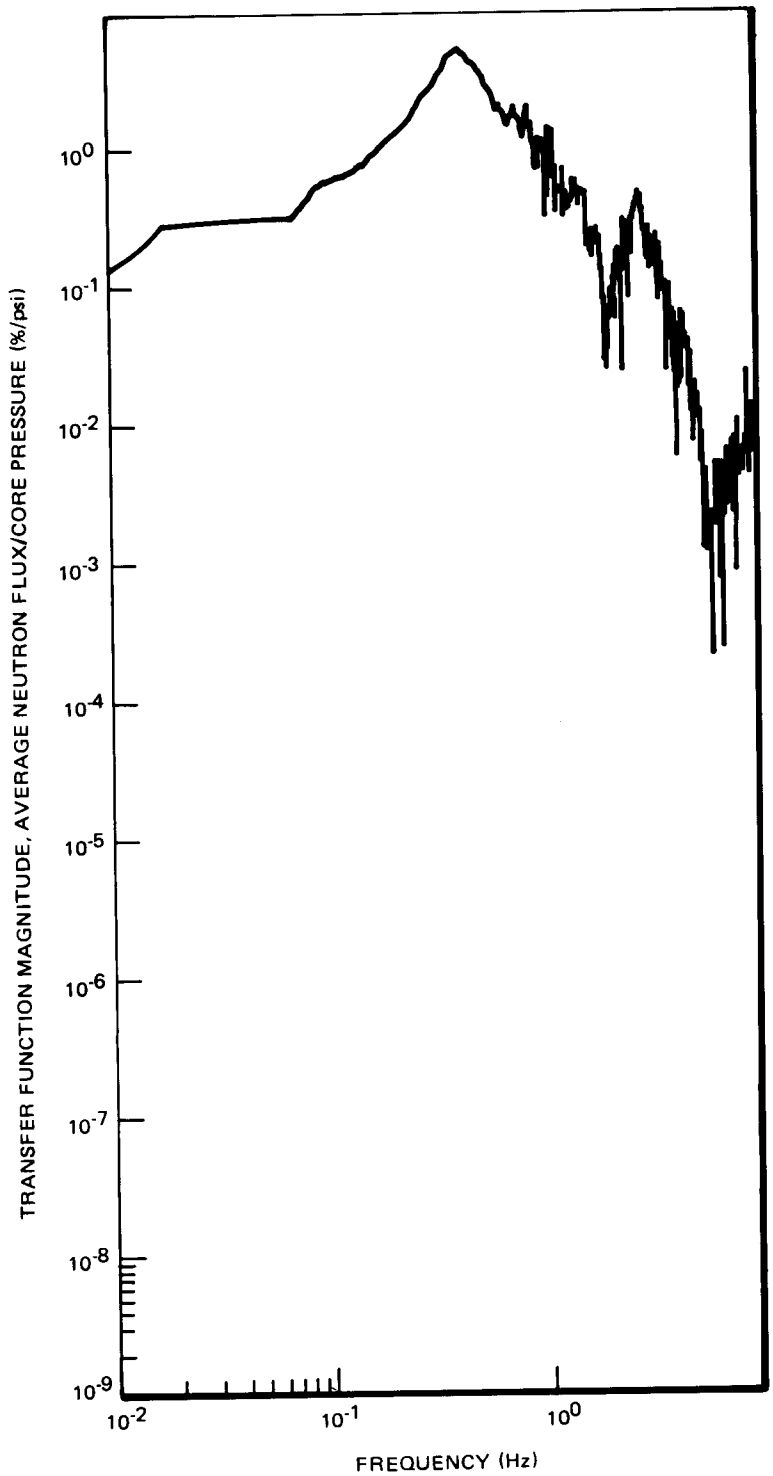


Figure 6-28. Peach Bottom-2 Cycle 3 Low Flow Stability Test (4PT2) Transfer Function Magnitude, Average Neutron Flux (APRM D)/Core Pressure

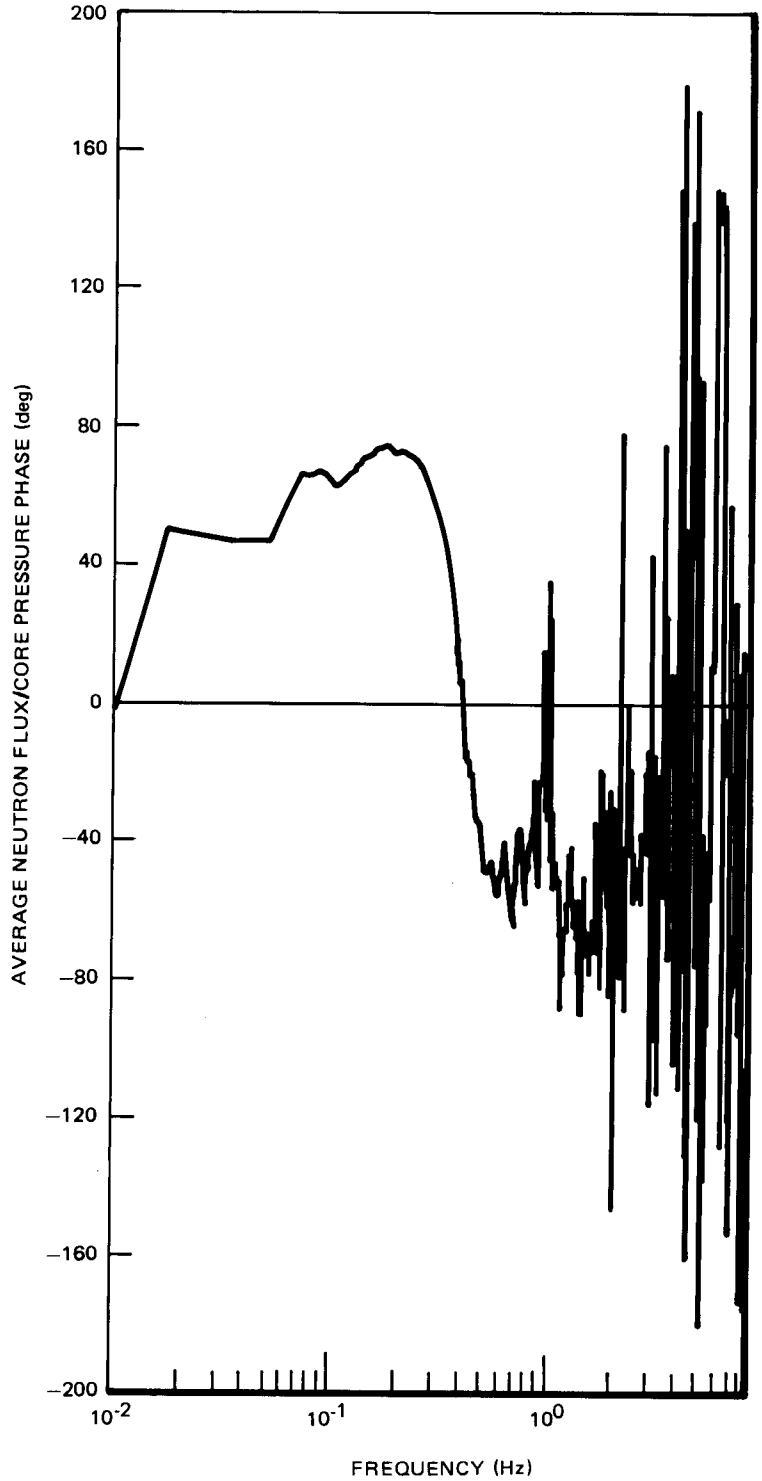


Figure 6-29. Peach Bottom-2 Cycle 3 Low Flow Stability Test (4PT2) Transfer Function Phase, Average Neutron Flux (APRM D)/Core Pressure

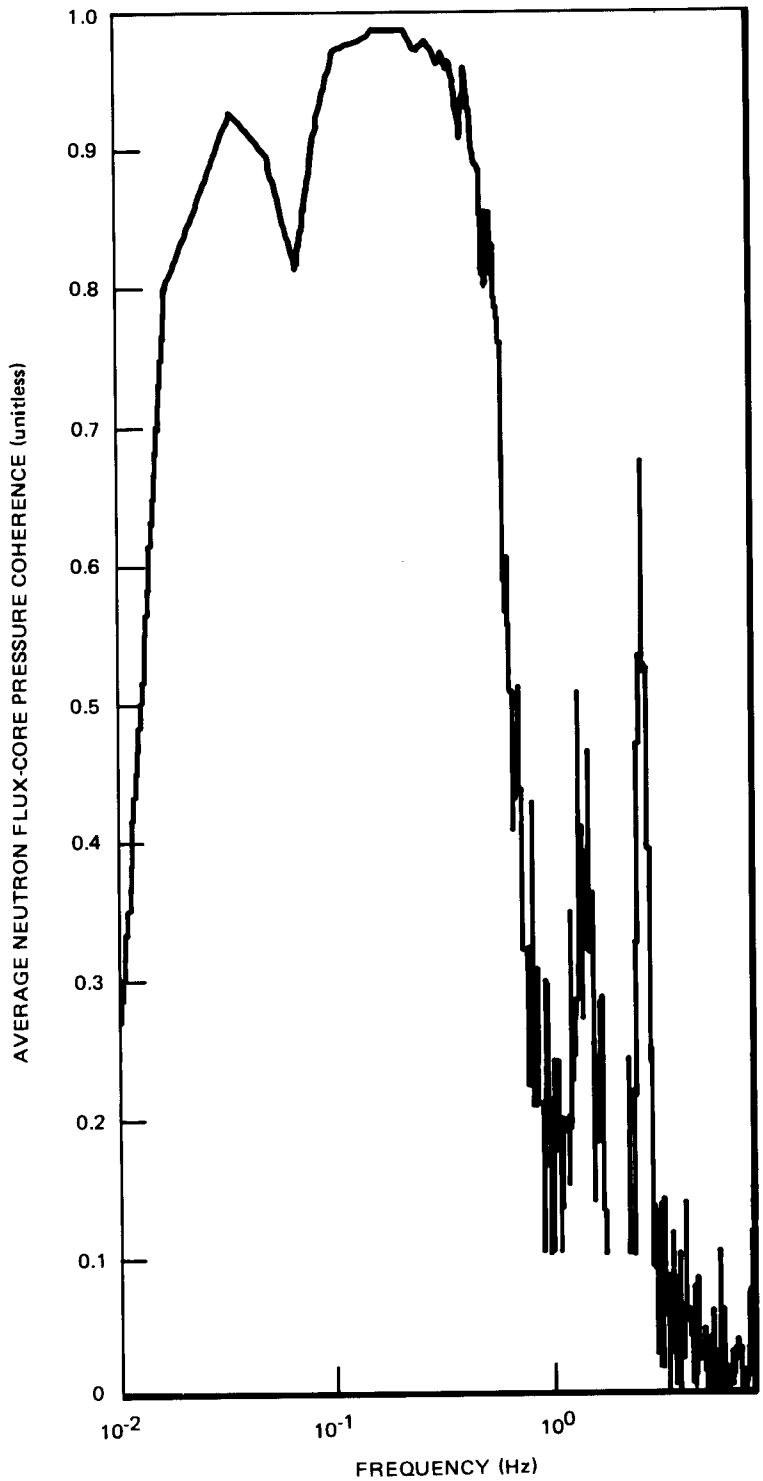


Figure 6-30. Peach Bottom-2 Cycle 3 Low Flow Stability Test (4PT2) Coherence Between Average Neutron Flux (APRM D) and Core Pressure

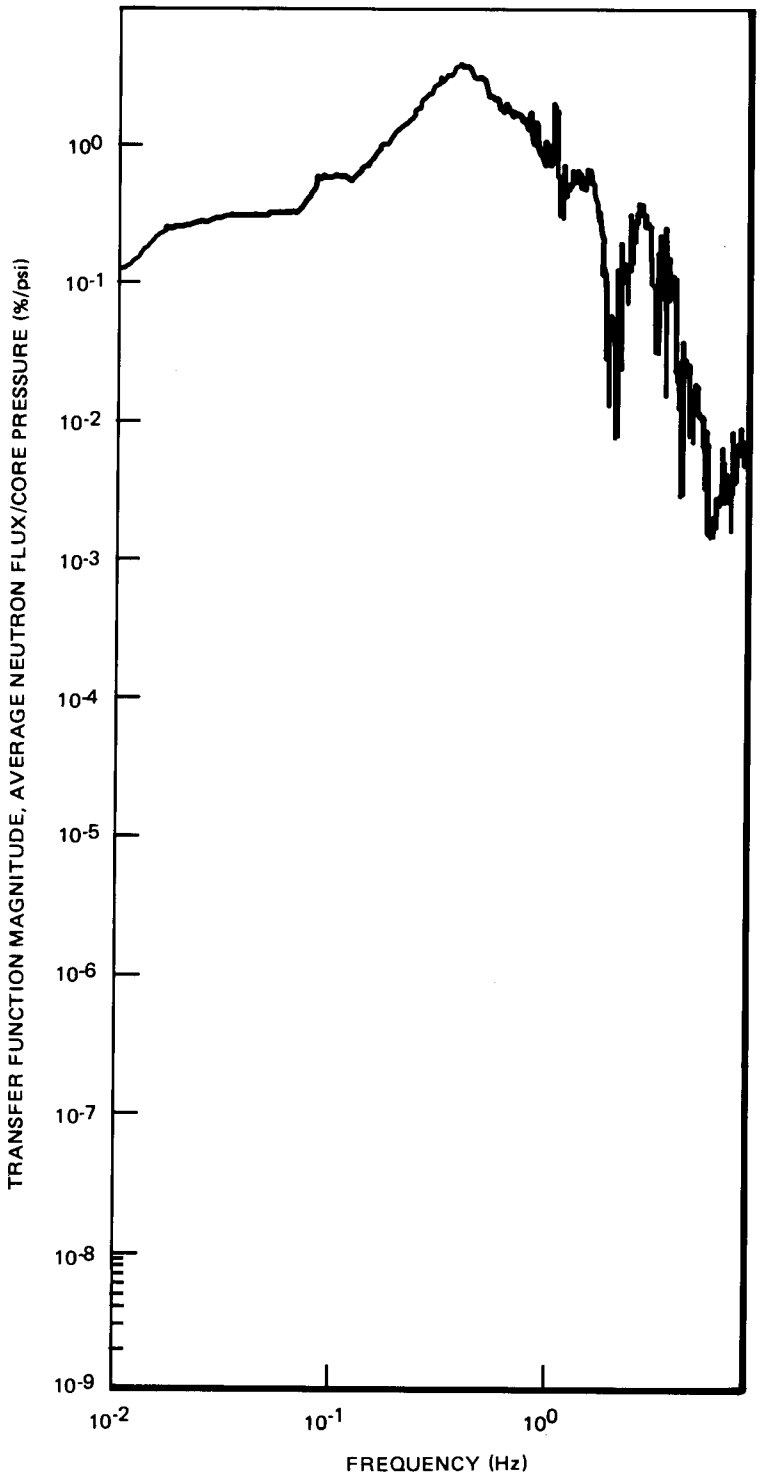


Figure 6-31. Peach Bottom-2 Cycle 3 Low Flow Stability Test (4PT3) Transfer Function Magnitude, Average Neutron Flux (APRM D)/Core Pressure

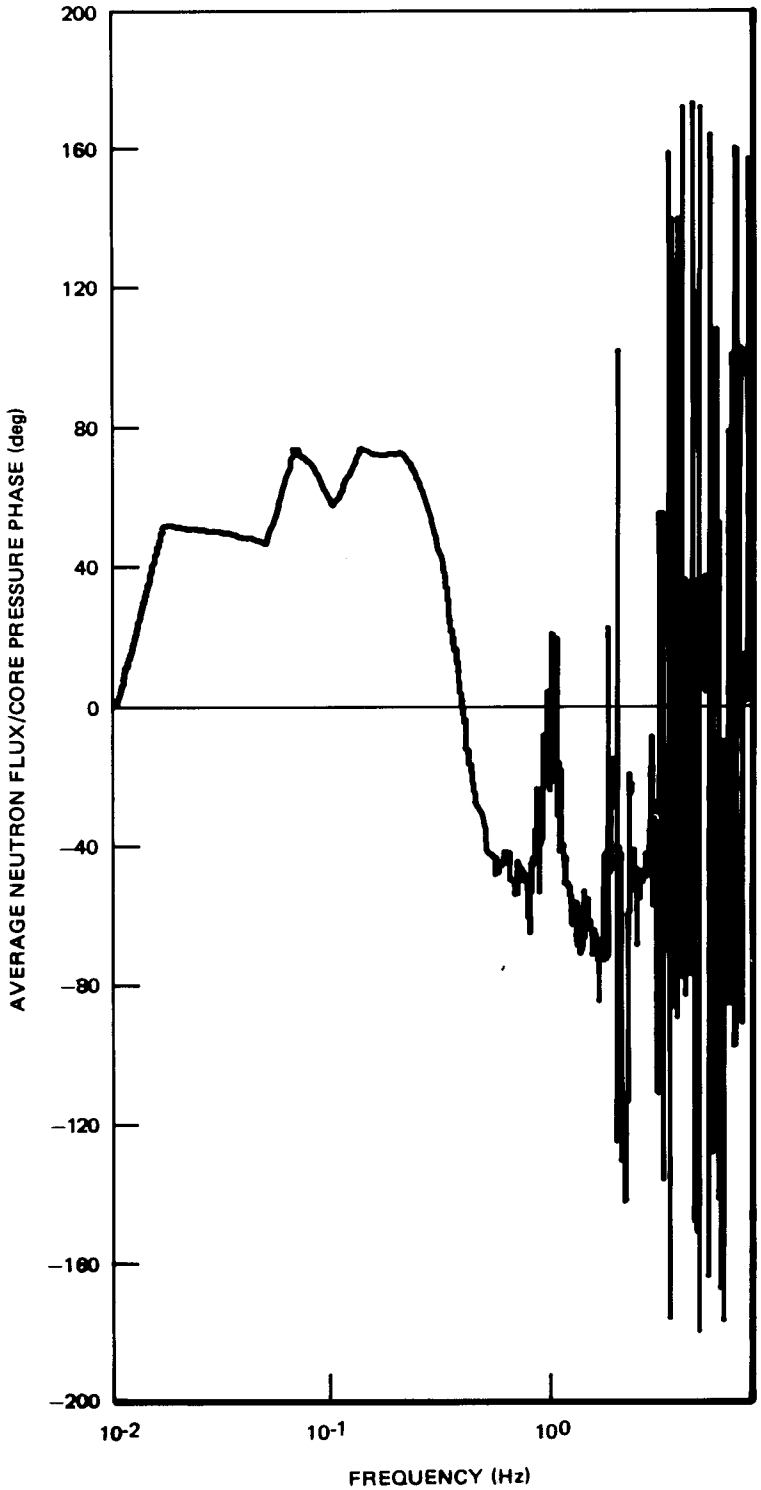


Figure 6-32. Peach Bottom-2 Cycle 3 Low Flow Stability Test (4PT3) Transfer Function Phase, Average Neutron Flux (APRM D)/Core Pressure

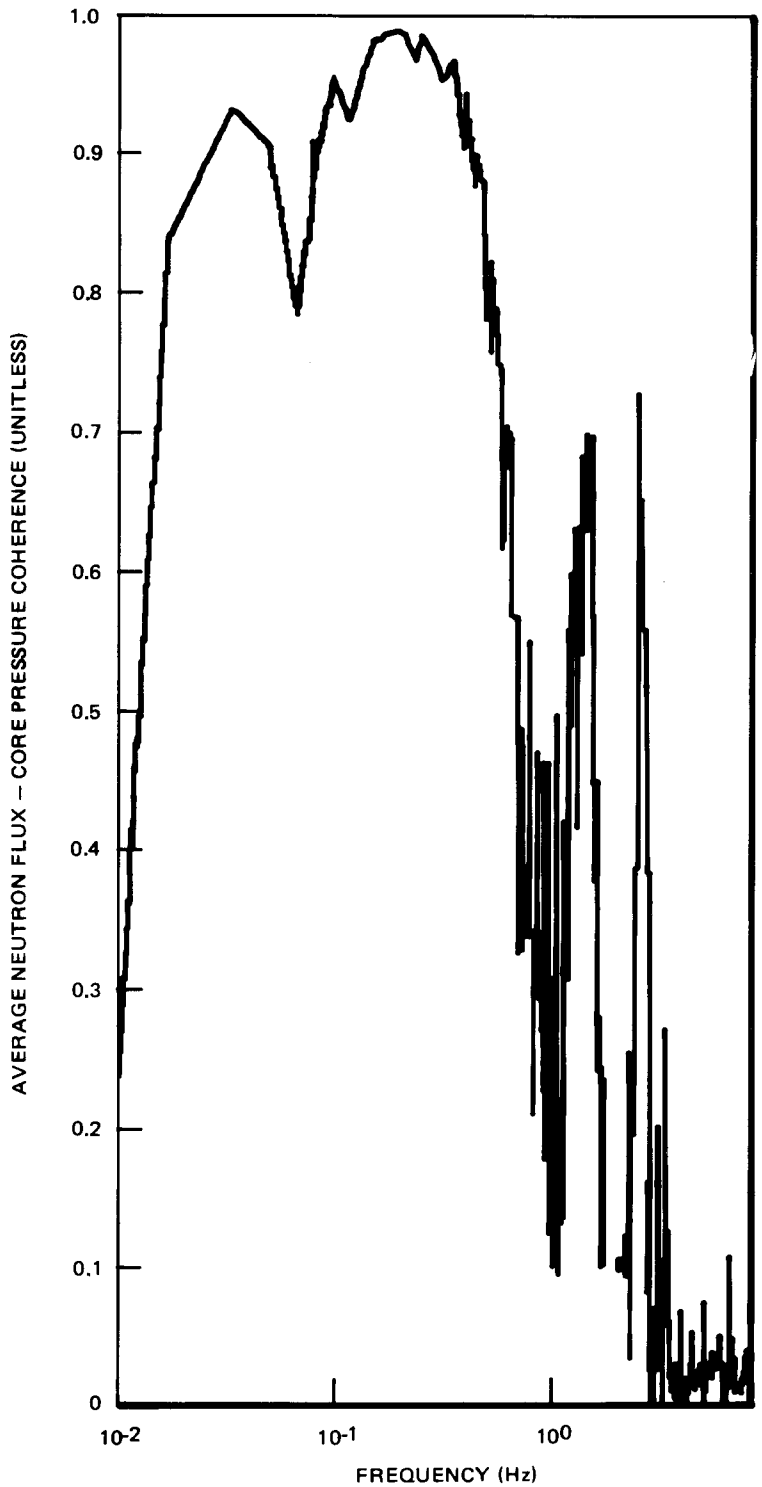


Figure 6-33. Peach Bottom-2 Cycle 3 Low Flow Stability Test (4PT3) Coherence Between Average Neutron Flux (APRM D) and Core Pressure

transfer function exhibits an easily identifiable resonance peak at about 0.4 Hz and the neutron flux PSD does not, the closed loop transfer function provides a more sensitive indication of core stability than neutron flux PSD does, particularly for the relatively high degree of stability exhibited by the Peach Bottom-2 core.*

The results of the non-linear curve fit of the transfer function model described in Appendix A-1 to the measured transfer function at the test conditions are shown in Figures 6-34 through 6-42. The parameters which were identified in the model are tabulated in Tables 6-1 through 6-9. It was concluded from the results of the Cycle 2 tests[4] that increasing the order of the denominator of the model beyond two causes an unstable root to be identified. The frequency at which the unstable root occurs (2.4 Hz) is in fact beyond the useful frequency range of $\leqslant$1.0 Hz because the coherence between the core flux response and core pressure drops to very low values at frequency >1.0 Hz. This is analogous to allowing too many degrees of freedom in the model for the number of independent measurements taken, i.e., too limited a frequency range to identify faster response modes in the system, a result which has been discussed by other investigators.[12,13] It is reassuring, however, that the natural frequency, ω_n, and relative damping, δ, are insensitive to the assumed order of the transfer function model. The uncertainty in the decay ratio estimate is, however, increased significantly, because of the larger sensitivity of this parameter to variations in the coefficients for the three pole method. The second order denominator transfer function model was therefore chosen to best represent the measured reactor core closed-loop pressure to average fission power transfer function. The core relative stability margin estimates, in terms of decay ratio, are summarized in Table 2-1.

*If the core stability margin is very small, the resonant peak could probably be identified in the APRM noise power spectrum.

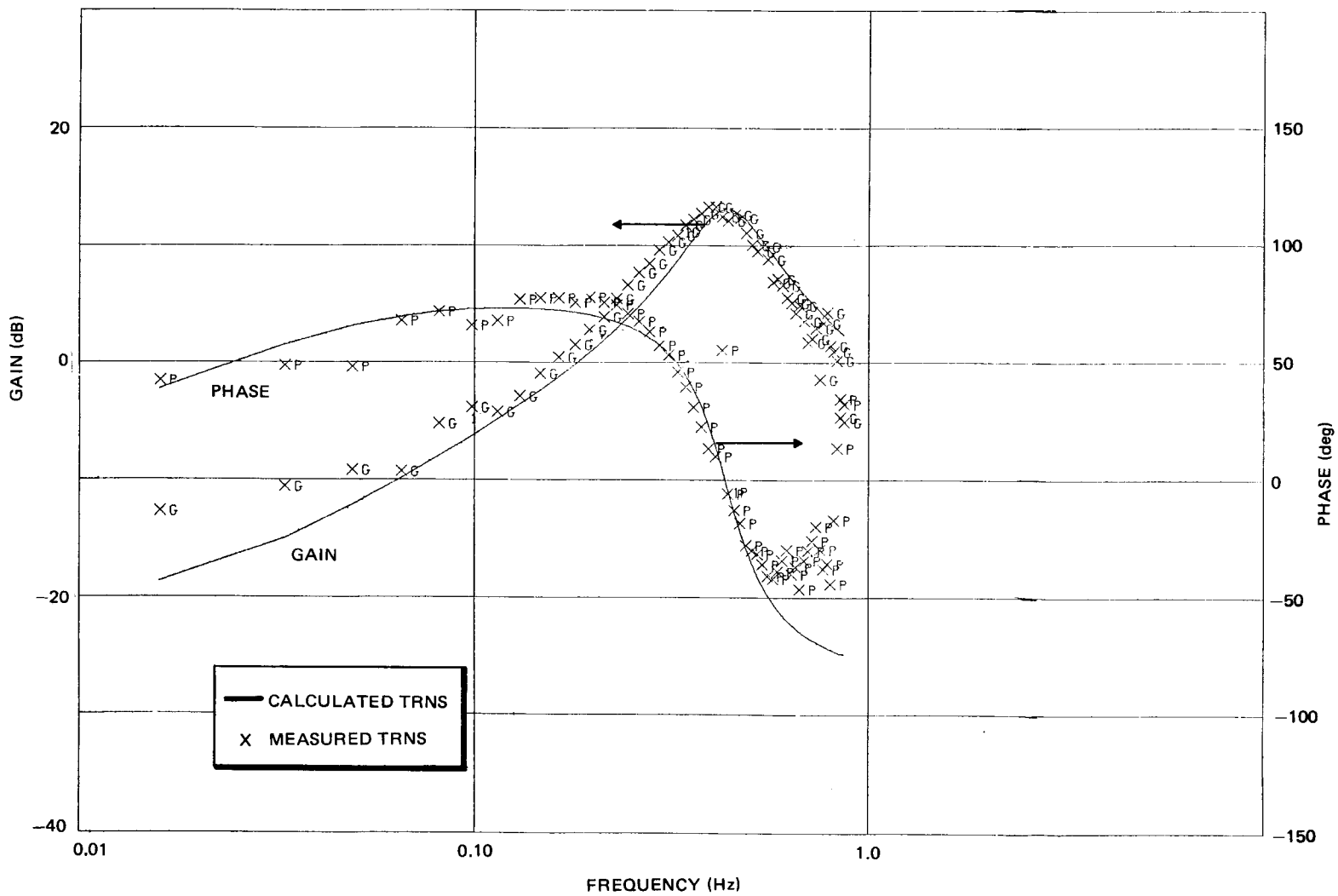


Figure 6-34. Peach Bottom-2 Cycle 3 Low Flow Stability Test 1PT1 Transfer Function Model Comparison

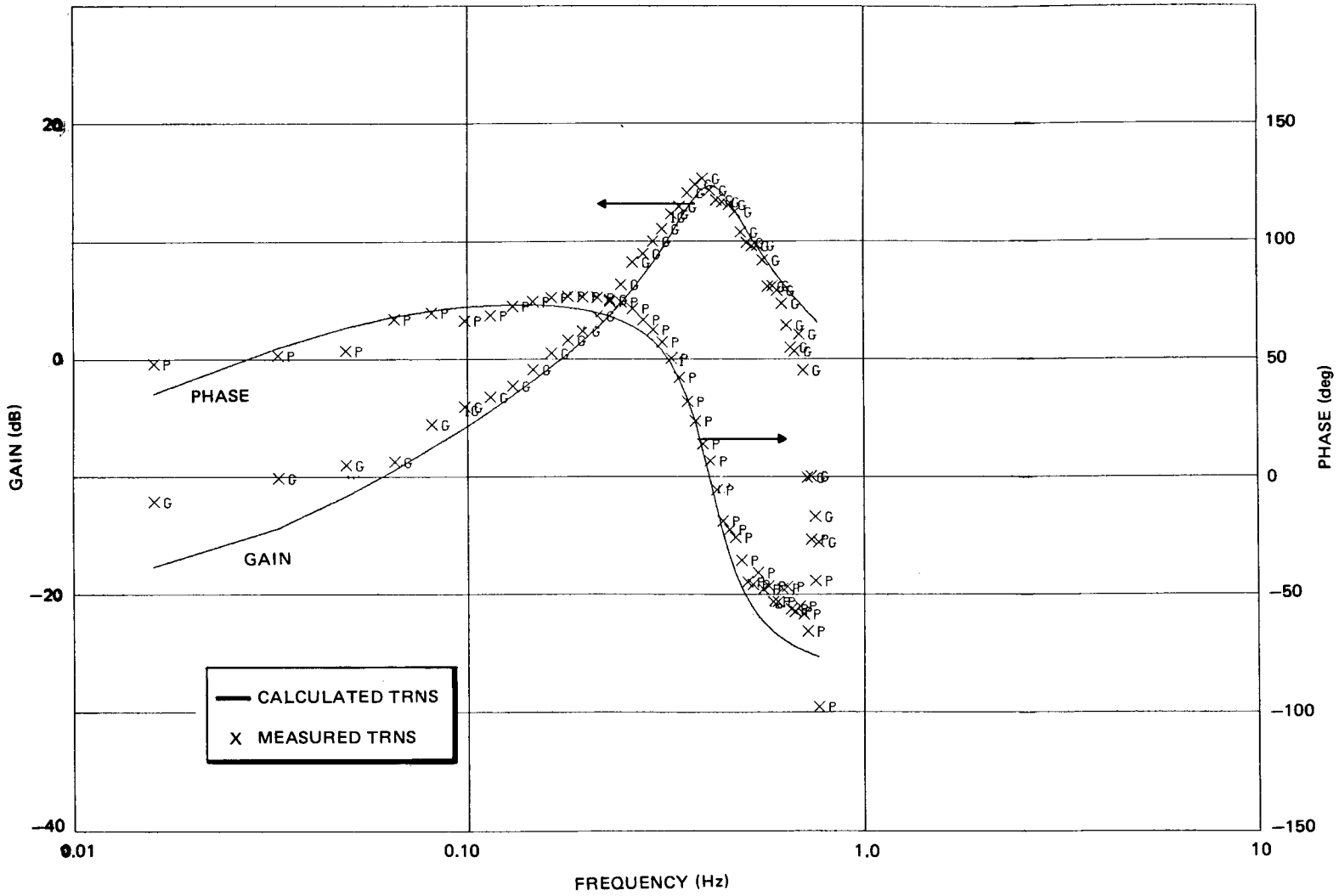


Figure 6-35. Peach Bottom-2 Cycle 3 Low Flow Stability Test 1PT2 Transfer Function Model Comparison

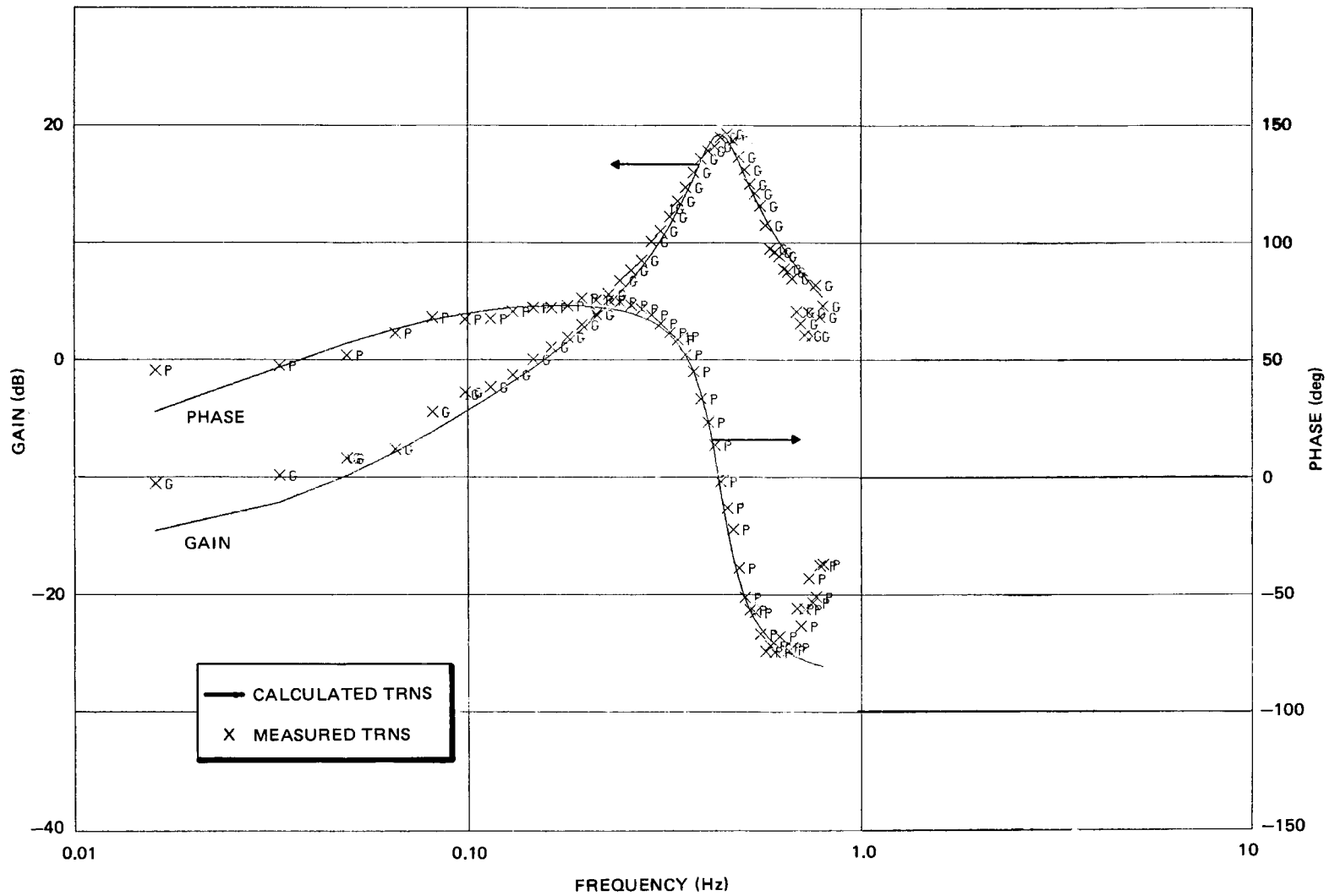


Figure 6-36. Peach Bottom-2 Cycle 3 Low Flow Stability Test 2PT2 Transfer Function Model Comparison

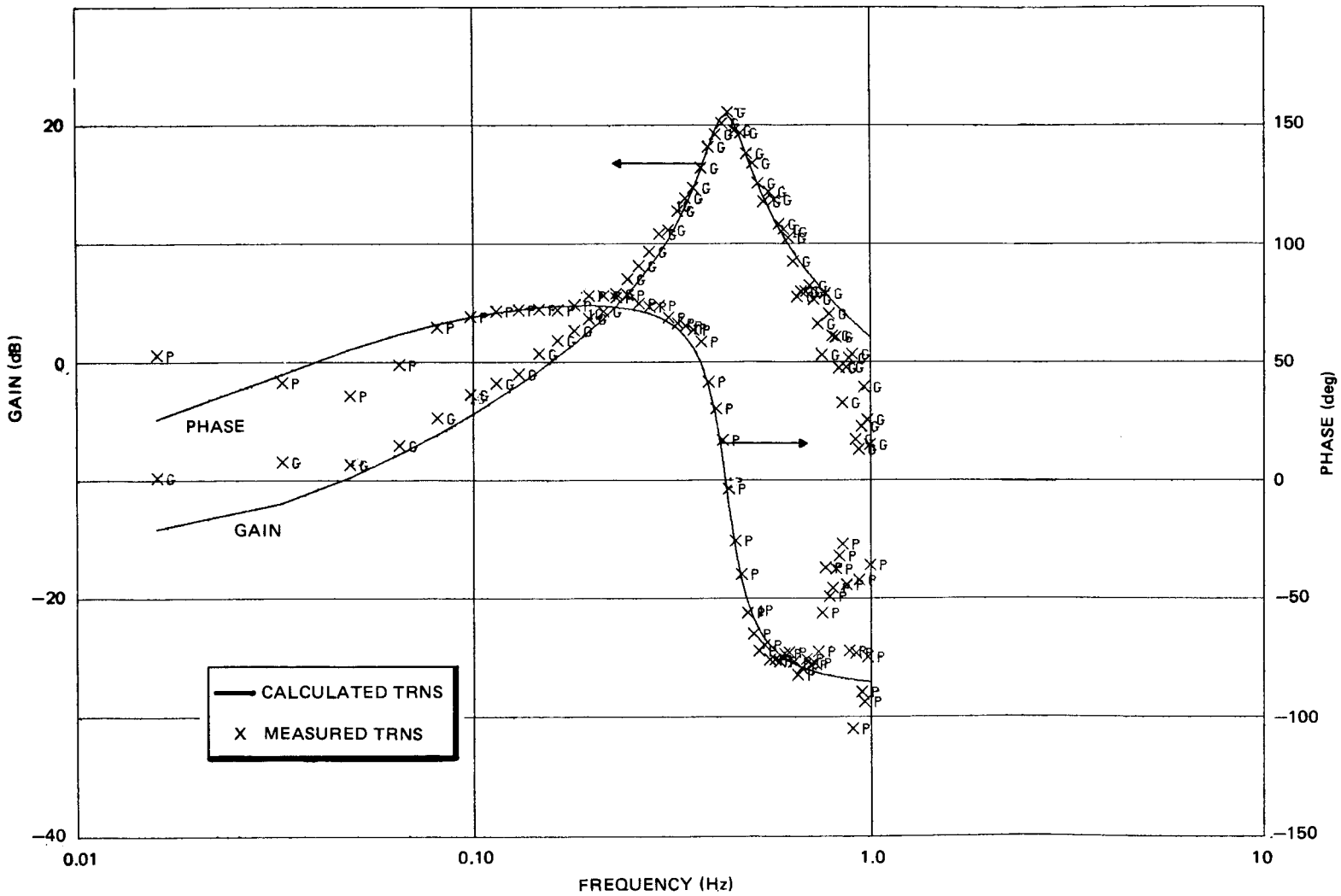


Figure 6-37. Peach Bottom-2 Cycle 3 Low Flow Stability Test 2PT3 Transfer Function Model Comparison

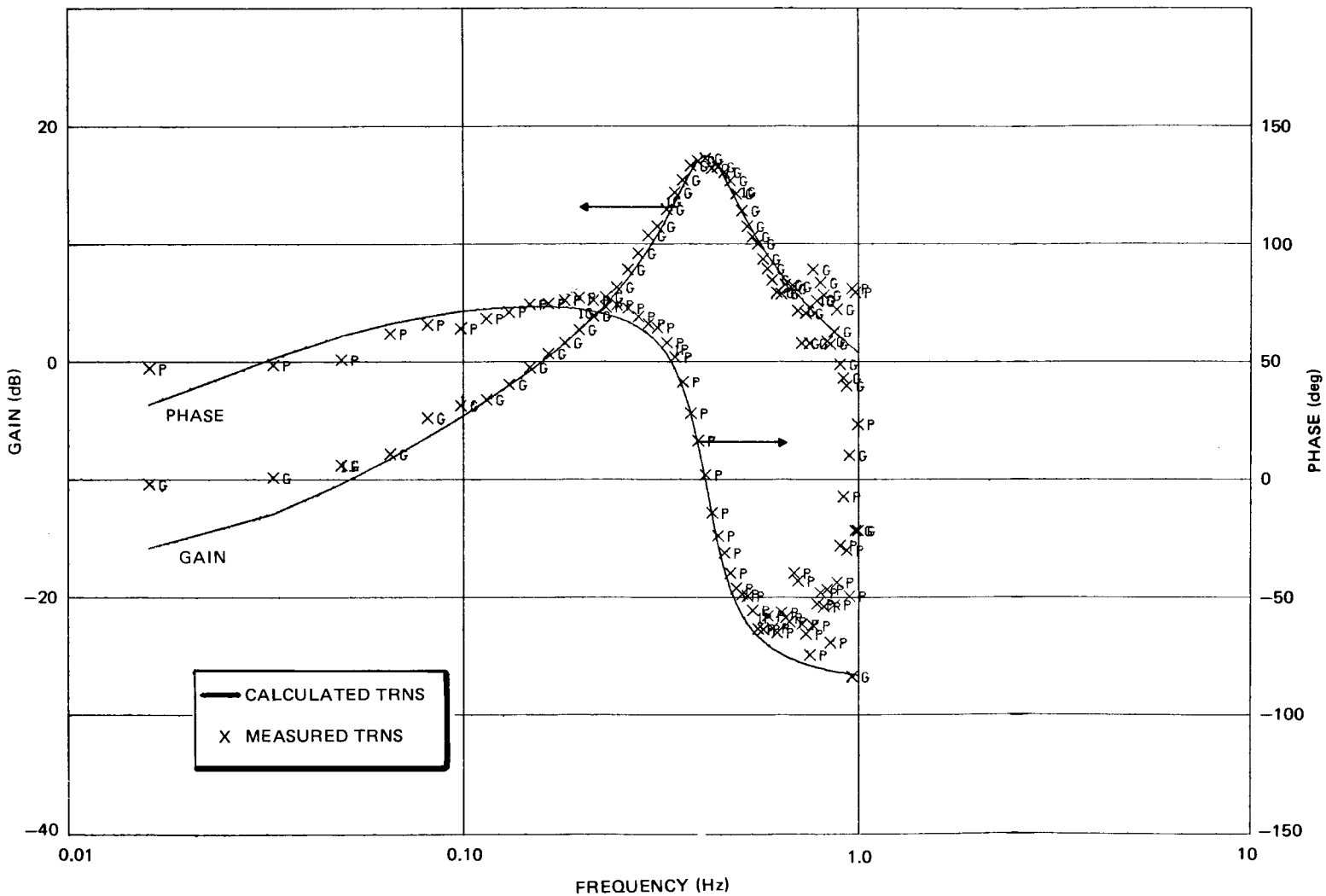


Figure 6-38. Peach Bottom-2 Cycle 3 Low Flow Stability Test 3PT2 Transfer Function Model Comparison

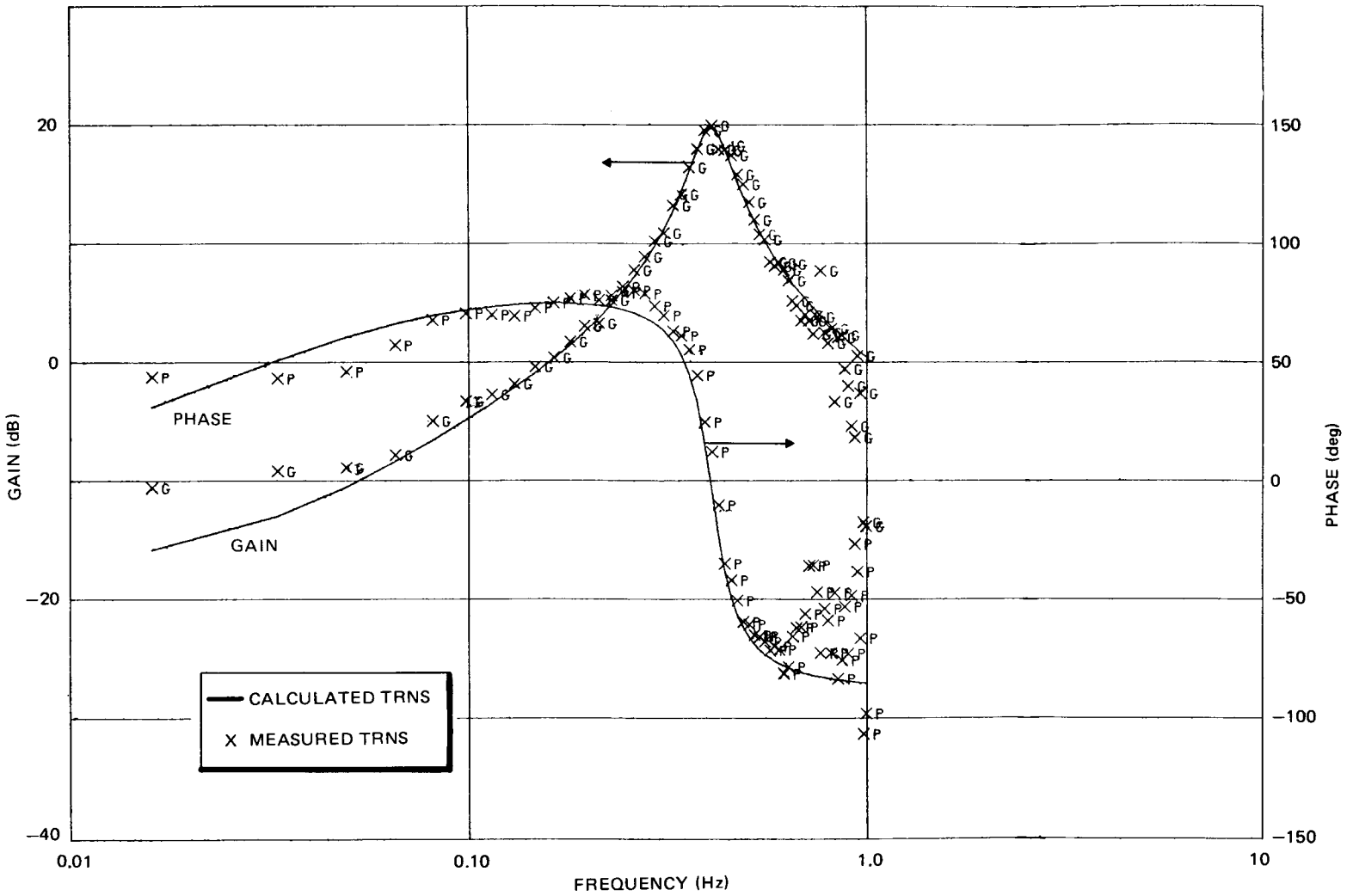


Figure 6-39. Peach Bottom-2 Cycle 3 Low Flow Stability Test 3PT3 Transfer Function Model Comparison

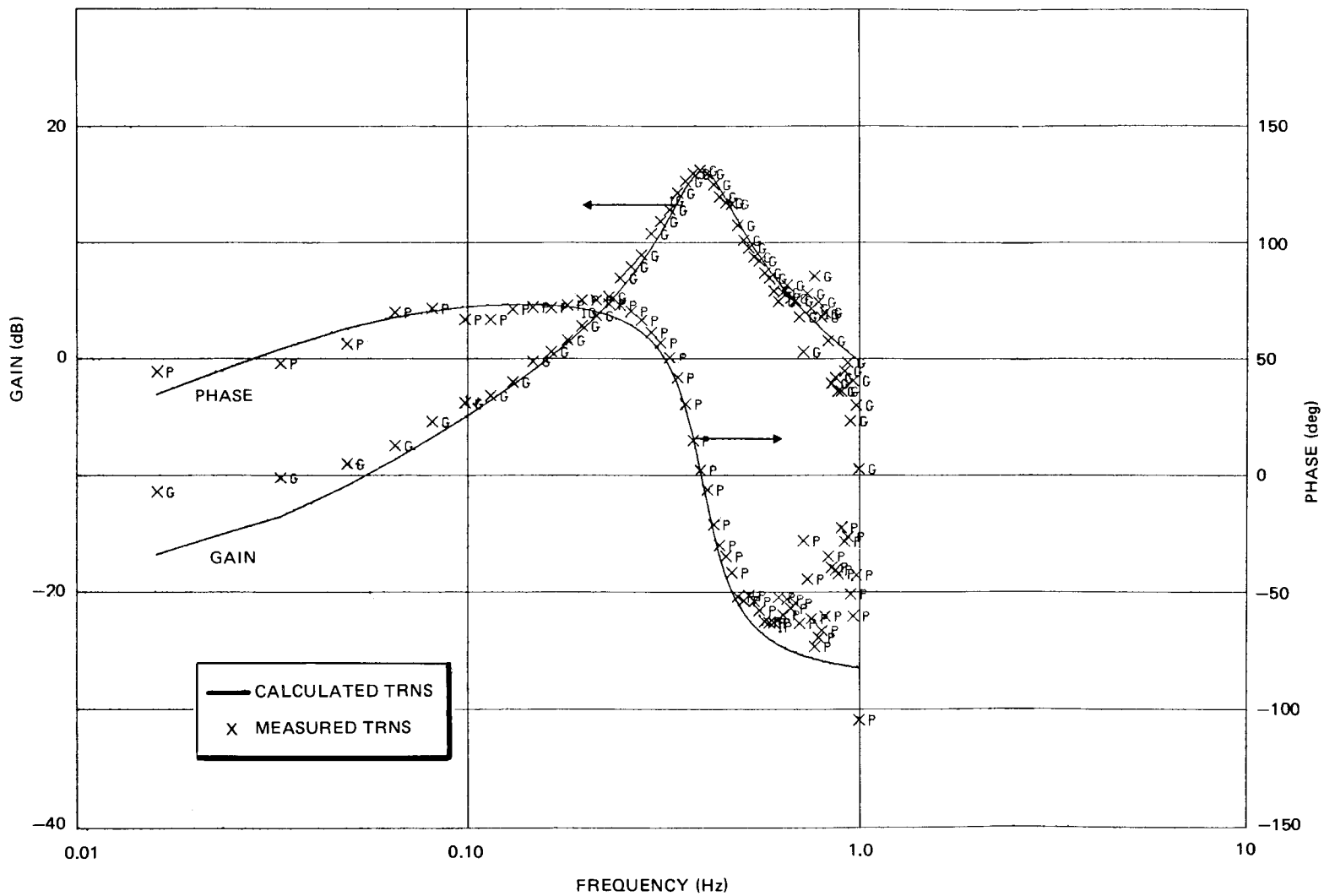


Figure 6-40. Peach Bottom-2 Cycle 3 Low Flow Stablity Test 4PT1 Transfer Function Model Comparison

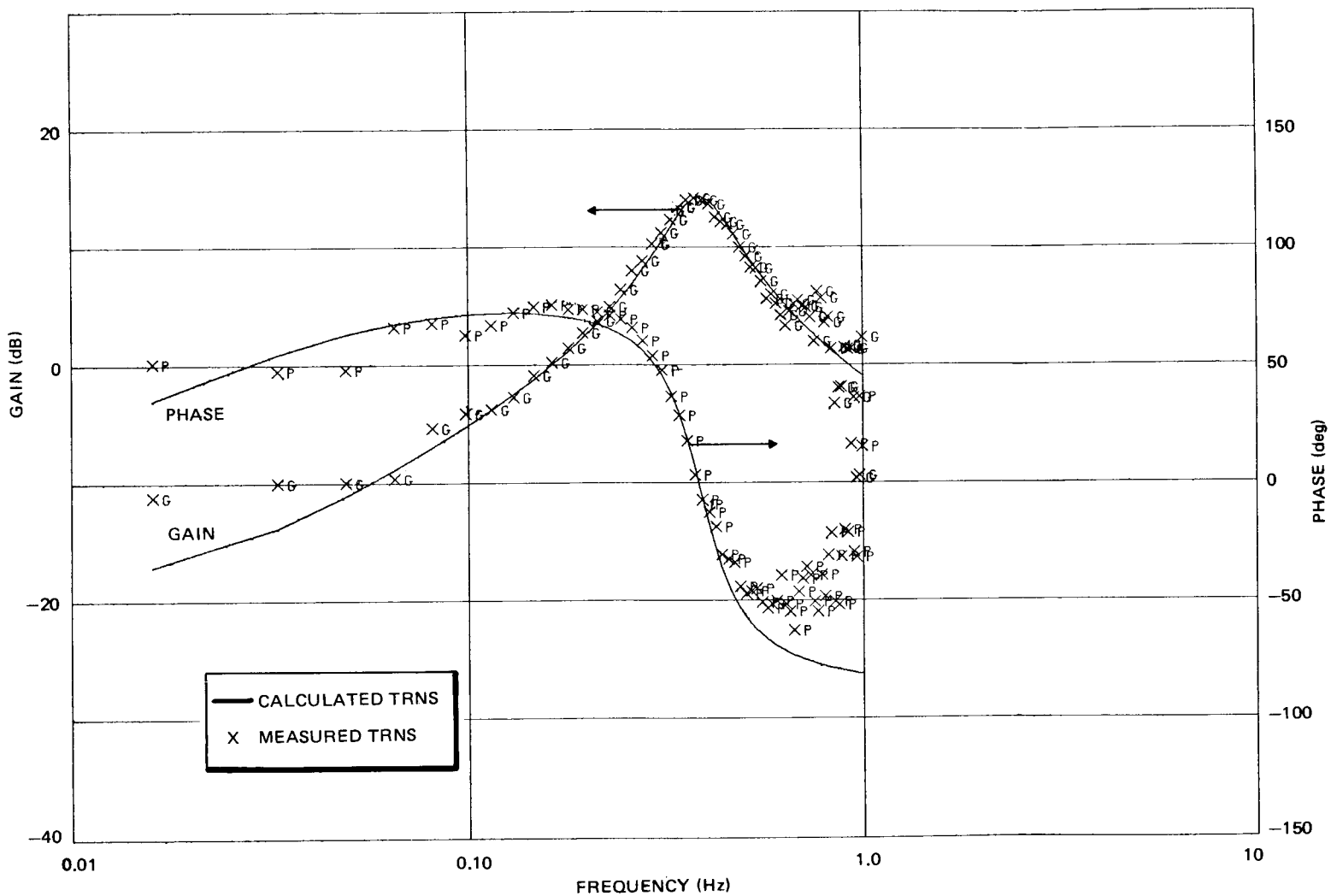


Figure 6-41. Peach Bottom-2 Cycle 3 Low Flow Stability Test 4PT2 Transfer Function Model Comparison

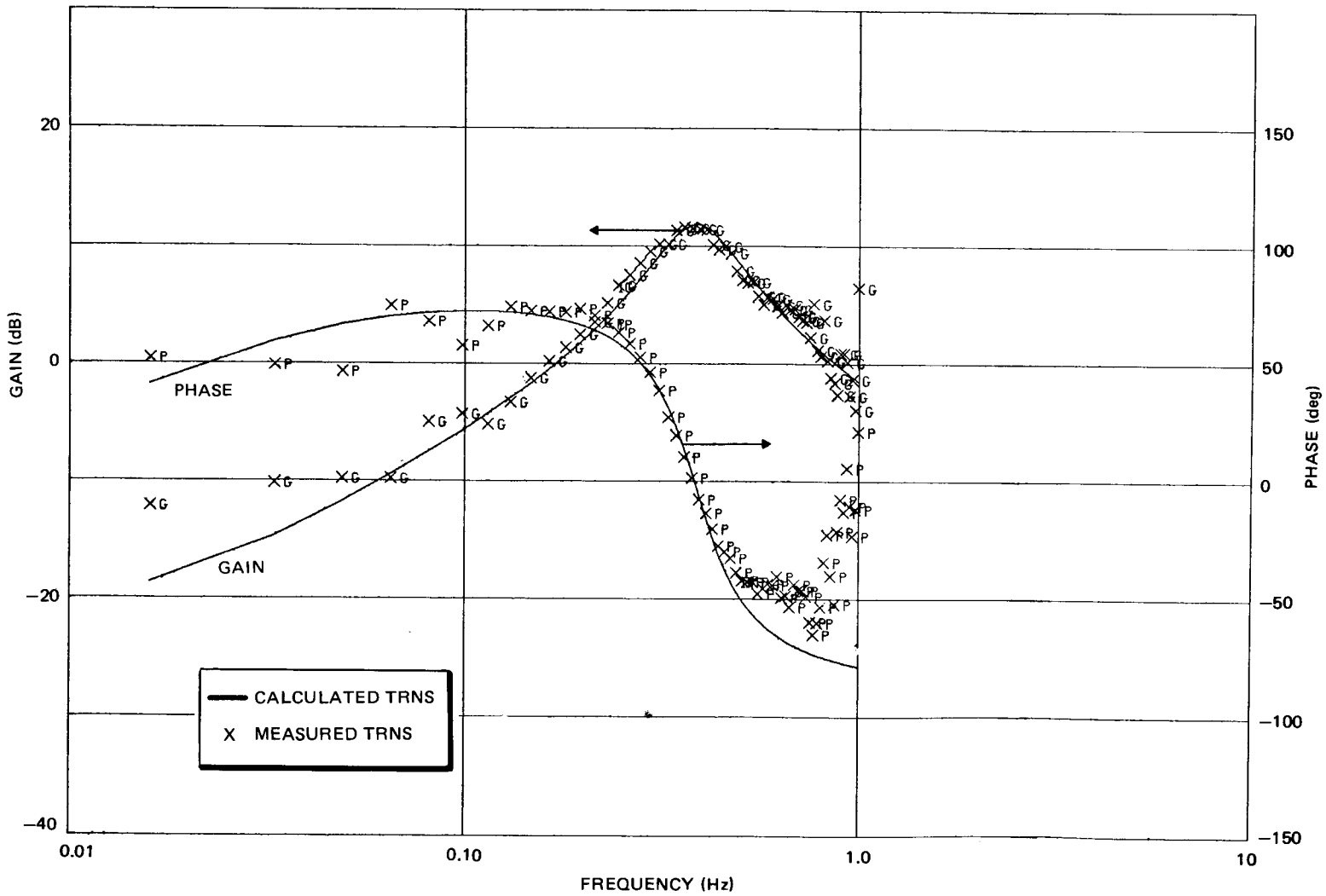


Figure 6-42. Peach Bottom-2 Cycle 3 Low Flow Stability Test 4PT3 Transfer Function Model Comparison

Table 6-1
LOW-FLOW STABILITY TEST 1PT1
RESULTS OF EMPIRICAL TRANSFER FUNCTION
MODEL PARAMETER IDENTIFICATION

a_0	0.0898	± 0.019
a_1	0.736	± 0.044
b_1	0.163	± 0.026
b_2	0.132	± 0.079
Gain, K_p (%/psi)	0.0898	
τ_1 (sec)	8.19	
δ_1 (Dimensionless)	0.224	
ω_1 (Rad/sec)	2.75	
Decay Ratio (Dimensionless)	0.236	± 0.0045
$S(\bar{\alpha})$	0.805	

Table 6-2
LOW-FLOW STABILITY TEST 1PT2
RESULTS OF EMPIRICAL TRANSFER FUNCTION
MODEL PARAMETER IDENTIFICATION

a_0	0.1056	± 0.022
a_1	0.764	± 0.046
b_1	0.141	± 0.0023
b_2	0.150	± 0.009
Gain, K_p (%/psi)	0.105	
τ_1 (sec)	7.27	
δ_1 (Dimensionless)	0.182	
ω_1 (Rad/sec)	2.58	
Decay Ratio (Dimensionless)	0.314	± 0.0016
$S(\bar{\alpha})$	0.343	

Table 6-3
LOW-FLOW STABILITY TEST 2PT2
RESULTS OF EMPIRICAL TRANSFER FUNCTION
MODEL PARAMETER IDENTIFICATION

a_0	0.165	± 0.035
a_1	0.878	± 0.053
b_1	0.0956	± 0.015
b_2	0.132	± 0.0079
Gain, K_p (%/psi)	0.165	
τ_1 (sec)	5.32	
δ_1 (Dimensionless)	0.132	
ω_1 (Rad/sec)	2.75	
Decay Ratio (Dimensionless)	0.435	± 0.0047
$S(\bar{\alpha})$	0.218	

Table 6-4
LOW-FLOW STABILITY TEST 2PT3
RESULTS OF EMPIRICAL TRANSFER FUNCTION
MODEL PARAMETER IDENTIFICATION

a_0	0.176	± 0.037
a_1	0.868	± 0.052
b_1	0.0782	± 0.013
b_2	0.134	± 0.008
Gain, K_p (%/psi)	0.176	
τ_1 (sec)	4.93	
δ_1 (Dimensionless)	0.107	
ω_1 (Rad/sec)	2.73	
Decay Ratio (Dimensionless)	0.509	± 0.0027
$S(\bar{\alpha})$	0.198	

Table 6-5
LOW-FLOW STABILITY TEST 3PT2
RESULTS OF EMPIRICAL TRANSFER FUNCTION
MODEL PARAMETER IDENTIFICATION

a_0	0.136	± 0.029
a_1	0.860	± 0.052
b_1	0.114	± 0.018
b_2	0.149	± 0.009
Gain, K_p (%/psi)	0.136	
τ_1 (sec)	6.32	
δ_1 (Dimensionless)	0.148	
ω_1 (Rad/sec)	2.59	
Decay Ratio (Dimensionless)	0.391	± 0.0038
$S(\bar{\alpha})$	0.279	

Table 6-6
LOW-FLOW STABILITY TEST 3PT3
RESULTS OF EMPIRICAL TRANSFER FUNCTION
MODEL PARAMETER IDENTIFICATION

a_0	0.137	± 0.029
a_1	0.824	± 0.049
b_1	0.0843	± 0.0013
b_2	0.151	± 0.0091
Gain, K_p (%/psi)	0.137	
τ_1 (sec)	6.01	
δ_1 (Dimensionless)	0.108	
ω_1 (Rad/sec)	2.57	
Decay Ratio (Dimensionless)	0.504	± 0.0014
$S(\bar{\alpha})$	0.182	

Table 6-7
LOW-FLOW STABILITY TEST 4PT1
RESULTS OF EMPIRICAL TRANSFER FUNCTION
MODEL PARAMETER IDENTIFICATION

a_0	0.018	± 0.025
a_1	0.832	± 0.05
b_1	0.130	± 0.021
b_2	0.160	± 0.01
Gain, K_p (%/psi)	0.118	
τ_1 (sec)	7.05	
δ_1 (Dimensionless)	0.163	
ω_1 (Rad/sec)	2.50	
Decay Ratio (Dimensionless)	0.355	± 0.0044
$S(\bar{\alpha})$	0.163	

Table 6-8
LOW-FLOW STABILITY TEST 4PT2
RESULTS OF EMPIRICAL TRANSFER FUNCTION
MODEL PARAMETER IDENTIFICATION

a_0	0.112	± 0.023
a_1	0.812	± 0.048
b_1	0.157	± 0.025
b_2	0.168	± 0.01
Gain, K_p (%/psi)	0.112	
τ_1 (sec)	7.25	
δ_1 (Dimensionless)	0.192	
ω_1 (Rad/sec)	2.44	
Decay Ratio (Dimensionless)	0.293	± 0.0049
$S(\bar{\alpha})$	0.352	

Table 6-9
LOW-FLOW STABILITY TEST 4PT3
RESULTS OF EMPIRICAL TRANSFER FUNCTION
MODEL PARAMETER IDENTIFICATION

a_0	0.0864	± 0.018
a_1	0.777	± 0.047
b_1	0.199	± 0.032
b_2	0.170	± 0.01
Gain, K_p (%/psi)	0.0864	
τ_1 (sec)	8.99	
δ_1 (Dimensionless)	0.241	
ω_1 (Rad/sec)	2.43	
Decay Ratio (Dimensionless)	0.210	± 0.0054
$S(\bar{\alpha})$	0.320	

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APPENDIX A

DATA REDUCTION METHODS

A.1 REACTOR TRANSFER FUNCTION IDENTIFICATION

The results of rod oscillator experimental stability measurements in a reactor core are usually reported in terms of a calculated open-loop transfer function.[A-1, A-2] The block diagram representation of the reactor core reactivity feedback loops is shown in Figure A-1. If the forward-loop transfer function, $G_f(s)$, is assumed to be adequately modeled by the zero-power point kinetics transfer function,

$$G_f(s) = \left[\frac{\delta n/n_o}{\delta K_N}\right] = \frac{1}{s\Lambda + \beta - \sum_{i=1}^{6} \frac{\lambda_i \beta_i}{s + \lambda_i}} \tag{A-1}$$

and since for a single-input, single-output system, the closed-loop response is given by,

$$G_c(s) = \left[\frac{\delta n/n_o}{\delta R_P}\right] = \frac{K_{cr} G_f(s)}{1 + G_f(s) H_{fb}(s)} \tag{A-2}$$

the reactivity feedback transfer function $H_{fb}(s)$ can be obtained from,

$$H_{fb}(s) = \left[\frac{K_{cr}}{G_c(s)} - \frac{1}{G_f(s)}\right] \tag{A-3}$$

In the case of the boiling water reactor, $H_{fb}(s)$ is a parallel combination of the Doppler and void reactivity feedback paths, $[H_{fb1}(s) + H_{fb2}(s)]$. Since K_{cr}, the experimental rod reactivity to position calibration, is usually not well known, the results of rod oscillator experiments are normalized to high-frequency measurements. The approximation

$$G_c(s) \simeq G_f(s) \tag{A-4}$$

when

$$\left|\frac{1}{G_f}\right| >> \left|H_{fb}\right| \tag{A-5}$$

is used to find K_{cr}. For a boiling water reactor, this approximation is typically valid for frequencies greater than 2 Hz.

The reactor pressure to neutron flux closed-loop transfer function measurements must, however, be analyzed in a somewhat different manner. The original block diagram is modified in Figure A-2 to represent pressure disturbance input to the reactor power-to-reactivity feedback loop.* The closed-loop transfer function is now given by

$$G_c(s) = \left[\frac{\delta n/n_o}{\delta P_r}\right] = \frac{G_{fp}(s) G_f(s)}{1 + G_f(s) H_{fb}(s)} \tag{A-6}$$

*A potential feedback path between neutron flux and reactor pressure has been neglected. Its effect on the transfer function measurement is discussed later.

In this case, the gain between the reactor core pressure changes and the resulting void reactivity change, $G_{fp}(s)$, is itself an unknown transfer function. Therefore, a different technique for the determination of the BWR core stability margin must be found.

An accepted method for the identification of stable linear systems is one in which an empirical transfer function, $G_{CE}(s)$, is fitted to the magnitude and phase measurements of the system frequency response. As Graupe[A-3] points out, the limitation to stable systems is not just a theoretical one, since no practical frequency response of unstable systems can be measured. The general empirical model described by Graupe is as follows:

$$G_{CE}(s) = \frac{a_m s^m + a_{m-1} s^{m-1} + \ldots + a_o}{b_n s^n + b_{n-1} s^{n-1} + \ldots + b_o} \tag{A-7}$$

or

$$G_{CE}(s) = \frac{K \prod_{i=1}^{p} (\tau_i s + 1) \cdot \prod_{j=1}^{q} (s^2/\omega_j^2 + 2\delta_j s/\omega_j + 1)}{s^r \cdot \prod_{k=1}^{t} (\tau_k s + 1) \cdot \prod_{\ell=1}^{u} (s^2/\omega_\ell^2 + 2\delta_\ell s/\omega_\ell + 1)} \tag{A-8}$$

where:

$p + 2q = m$ = order of the polynomial in numerator

$r + t + 2u = n$ = order of the polynomial in denominator

It is well known that the transfer function measurement of a linear system contains only information about the observable and controllable modes of a linear system, i.e., the modes of response that are excited by the input, e.g., core pressure, and those that are observable in the average neutron flux response. In the case of the boiling water reactor, analytical model investigations have shown that the fundamental underdamped mode of the reactor core reactivity feedback loop response is both observable in the average neutron flux measurement and excited by the input pressure disturbance.[A-4] The results of the low-flow stability test transfer function measurements, which exhibit a well-defined resonant peak in the expected frequency range, 0.3-0.5 Hz, offer experimental verification of the analytical predictions.

Two empirical transfer function models were considered in the identification of the reactor transfer function. After observing the data, it was postulated that a transfer function having one real zero and two complex poles should adequately fit the measured transfer function between 0.02 and 1.0 Hz,

$$G_{CEI}(s) = \frac{K_p(\tau_1 s + 1)}{s^2/\omega_1^2 + 2\delta_1 s/\omega_1 + 1} \tag{A-9}$$

A higher order model,

$$G_{CEII}(s) = \frac{K_p(\tau_1 s + 1)}{(\tau_2 s + 1)(s^2/\omega_1^2 + 2\delta_1 s/\omega_1 + 1)} \tag{A-10}$$

was also tried to examine the effect of model order on the parameters which were identified.

The empirical models were fitted to the data by minimizing the sum of the phase and gain errors weighted by the uncertainty in their measurement (Reference A-5):

$$S(\bar{\alpha}) = \sum_{k=1}^{N} \left(\frac{M_{CM}^k - M_{CE}^k(\bar{\alpha})}{\sigma_M^k M_{CM}^k} \right)^2 + \sum_{K=1}^{N} \left(\frac{\theta_{CM}^k - \theta_{CE}^k(\bar{\alpha})}{\sigma_\theta^k \theta_{CM}^k} \right)^2 \tag{A-11}$$

where

N	=	the total number of frequency data points
M_{CM}^k (or θ_{CM}^k)	=	the magnitude (or phase) of the measured closed-loop transfer function at the kth frequency
M_{CE}^k (or θ_{CE}^k)	=	the magnitude (or phase) of the calculated closed-loop transfer function at the kth frequency
σ_M^k (or σ_θ^k)	=	the standard deviation in the magnitude (or phase) measurement at the kth frequency
$\bar{\alpha}$	=	a vector of the unknown parameters to be identified in the transfer function model.

The least-squares curve fit was accomplished using Powell's method for minimizing the sum of squares of nonlinear functions without calculating the derivatives.[A-6] The version of the computer program used for these calculations is described in Reference A-7.

If the noise vector, $\bar{n}_k{}^T = [n_M^k, n_\theta^k]^T$, in the gain and phase measurements is assumed to have a Gaussian distribution,* the probability distribution of the measured transfer function at a single frequency can be written as[A-8]

$$P[\bar{Z}_M^k/\bar{\alpha}] = \frac{1}{2\pi|R|^{1/2}} \exp\left[-\tfrac{1}{2}(\bar{Z}_M^k - \bar{Z}_C^k)^T R^{-1} (\bar{Z}_M^k - \bar{Z}_C^k) \right] \tag{A-12}$$

where

$R = E\left\{\bar{n}_k \bar{n}_k{}^T\right\}$	=	measurement error covariance matrix
$\bar{Z}_M^k$ (or $\bar{Z}_C^k$)	=	measured (or calculated) vector containing magnitude and phase at kth frequency.

*In the next section the gain and phase errors are shown to be distributed with a Fischer's F distribution. However, for a large number of samples averaged this assumption is approximately correct.

If the values of $\bar{n}_k$ are taken as independent at each frequency, then the probability of the entire set of measured responses, $\bar{Z}_M$) can be written as,

$$P[\bar{Z}_M/\bar{\alpha}] = \frac{1}{(2\pi)^N |R|^{N/2}} \exp\left[-\frac{1}{2}\sum_{k=1}^{N} (\bar{Z}_M^k - \bar{Z}_C^k)^T R^{-1} (\bar{Z}_M^k - \bar{Z}_C^k)\right] \tag{A-13}$$

Maximizing $P[\bar{Z}_M/\bar{\alpha}]$ is accomplished by minimizing the exponent for the unknown parameter set $\bar{\alpha}$. The value of $\bar{\alpha}$ which maximizes $P[\bar{Z}_M/\bar{\alpha}]$ also minimizes $S(\bar{\alpha})$ in Equation A-11. It can be shown that the error covariance matrix of the parameter estimates, $\bar{\alpha}$,* can be estimated from A-9,

$$E\left[(\bar{\alpha}^* - \bar{\alpha}_{true})(\bar{\alpha}^* - \bar{\alpha}_{true})^T\right] = \left[\sum_{k=1}^{N} \left(\frac{d\bar{Z}_C^k}{d\bar{\alpha}}\right)^T R^{-1} \left(\frac{d\bar{Z}_C^k}{d\bar{\alpha}}\right)\right]^{-1} \tag{A-14}$$

The decay ratio of the dominant complex poles of the reactor closed-loop transfer function can be calculated from the roots of the quadratic term in the denominator of the fitted transfer function model. The complex roots are

$$s_{1,2} = -\alpha \pm j\beta \tag{A-15}$$

or

$$s_{1,2} = -\delta_1 \omega_1 \pm j\omega_1 \sqrt{1-\delta_1^2} \tag{A-16}$$

from which the decay ratio is calculated

$$\delta_1 = \left[\frac{(\alpha/\beta)^2}{1+(\alpha/\beta)^2}\right]^{1/2} \quad \text{for } \beta > 0 \tag{A-17}$$

and the natural logarithm of the decay ratio by,

$$\ln DR = -2\pi\delta_1/\sqrt{1-\delta_1^2} \tag{A-18}$$

for $\delta_1 < 1$.

The uncertainty in the decay ratio estimate is related to the error covariance in the transfer function model parameter estimates by considering a Taylor series expansion of DR $(\alpha_1^*, \alpha_2^*, \ldots, \alpha_M^*)$ about the point $(\alpha_1, \alpha_2, \ldots, \alpha_M)_{true}$. To first order,

$$DR(\alpha_1^*, \alpha_2^*, \ldots, \alpha_M^*) \simeq DR(\alpha_1, \alpha_2, \ldots, \alpha_M)_{true} + \sum_{i=1}^{M} \left(\frac{\partial DR}{\partial \alpha_i}\right)_{\bar{\alpha}_{true}} (\alpha_i^* - \alpha_{true,i}) \tag{A-19}$$

*In nonlinear regression analysis, it may be that the bias errors are considerably larger than the statistical error estimates from this analysis.[A-9]

The variance of DR is related to the covariance of the α_i^* estimates by

$$E\left[(DR^* - DR_{true})^2\right] \simeq \sum_{i=1}^{M}\sum_{j=1}^{M}\left(\frac{\partial DR}{\partial \alpha_i}\right)\left(\frac{\partial DR}{\partial \alpha_j}\right)_{\bar{\alpha}_{true}} E\left[(\alpha_i^* - \alpha_{i,true})(\alpha_j^* - \alpha_{j,true})\right] \tag{A-20}$$

or, in matrix notation,

$$E\left[(DR^* - DR_{true})^2\right] = (\nabla_{\bar{\alpha}_{true}} DR)^T M_{\bar{\alpha}} (\nabla_{\bar{\alpha}_{true}} DR) \tag{A-21}$$

where

$$M_{\bar{\alpha}} = E\left[(\bar{\alpha}^* - \bar{\alpha}_{true})(\bar{\alpha}^* - \bar{\alpha}_{true})^T\right] \tag{A-22}$$

A.2 TRANSFER FUNCTION CALCULATION

The neutron flux to pressure transfer functions were estimated from the data using the Fast Fourier Transform (FFT) algorithm of Cooley and Tukey.[A-10] A finite series of data (x_k and y_k; $k = 0, 1, \ldots, N-1$) was constructed by sampling the pressure and neutron flux signals at a constant sampling frequency, ($f_s = 1/\Delta t$ Hz), consistent with the aliasing requirements of the data acquisition system input filtering.* The spectral functions of the time series were calculated as follows:

1. The mean is calculated and subtracted from each time sample,

$$\tilde{x}_k = x_k - \hat{x}_k \tag{A-23}$$

$$\tilde{y}_k = y_k - \hat{y}_k$$

where

$$\hat{x}_k = \frac{1}{N}\sum_{k=0}^{N-1} x_k \tag{A-24}$$

$$\hat{y}_k = \frac{1}{N}\sum_{k=0}^{N-1} y_k$$

*The data was taken at a 5 millisecond sampling rate. To improve the low frequency resolution in the transfer function calculation the digital data was decimated by a factor of 10 after multiple passes through a second-order Butterworth digital filter ($f_c = 5$ Hz) to prevent aliasing.

2. Both time series are then multiplied by a Taper function, g_k, to reduce side-lobe leakage.

$$g_k = \begin{cases} \frac{1}{2}\left[1 - \cos\left(\frac{2\pi k}{N}\right)\right] & , 0 \leqslant k < N/2 \\ 1 & , k = N/2 \\ \frac{1}{2}\left[1 - \cos\left(\frac{2\pi(N-k)}{N}\right)\right] & , N/2 < k \leqslant N-1 \end{cases} \tag{A-25}$$

generating the new time series,

$$\bar{x}_k = g_k \cdot \tilde{x}_k \tag{A-26}$$

and

$$\bar{y}_k = g_k \cdot \tilde{y}_k$$

3. The finite discrete Fourier transforms,

$$X(f_\ell) = \Delta t \sum_{k=0}^{N-1} \bar{x}_k W^{\ell k} \qquad \text{for } \ell = 0, 1, \ldots, N-1 \tag{A-27}$$

and

$$Y(f_\ell) = \Delta t \sum_{k=0}^{N-1} \bar{y}_k W^{\ell k} \tag{A-28}$$

where,

$$W^{\ell k} = \exp\left[-j2\pi \frac{k\ell}{N}\right] \tag{A-29}$$

and

$$f_\ell = \ell/N\Delta t \text{ Hz},$$

of the time series were calculated, with the particular version of the Cooley-Tukey FFT algorithm described in Reference A-11.

4. Estimates of the power and cross-power spectral density functions are obtained from

$$\tilde{S}_{xy}(f_\ell) = \frac{2C_B}{N\Delta t} X^*(f_\ell)Y(f_\ell) \tag{A-30}$$ †

†C_B is a bias compensation factor, dependent on sum of g_k squared. For the full cosine Taper data window, $C_B = 8/3$.[A-12]

and

$$\tilde{S}_{xx}(f_\ell) = \frac{2C_B}{N\Delta t} |X(f_\ell)|^2$$

$$\tilde{S}_{yy}(f_\ell) = \frac{2C_B}{N\Delta t} |Y(f_\ell)|^2 \tag{A-31}$$

5. The unsmoothed spectral estimates, defined above, are known to be inconsistent estimates of the power spectral functions since increasing the length of the data sequence has no effect on the random errors in the power spectrum estimates. The statistical stability in the power spectral density estimates is achieved through segmenting the data series into M segments of N samples each, and smoothing the estimates through ensemble averaging of the M raw estimates,[A-13]

$$\hat{S}_{xy}(f_\ell) = \frac{1}{M} \sum_{k=1}^{M} \tilde{S}_{xy}{}^{k}(f_\ell) \tag{A-32}$$

and

$$\hat{S}_{xx}(f_\ell) = \frac{1}{M} \sum_{k=1}^{M} \tilde{S}_{xx}{}^{k}(f_\ell)$$

$$\hat{S}_{yy}(f_\ell) = \frac{1}{M} \sum_{k=1}^{M} \tilde{S}_{yy}{}^{k}(f_\ell) \tag{A-33}$$

6. An estimate of the pressure to neutron flux closed-loop transfer function, $\hat{G}_c(f_\ell)$, can be defined from the ratio of the smoothed cross-power and power spectral density functions,*

$$\hat{G}_c(f_\ell) = \frac{\hat{S}_{xy}(f_\ell)}{\hat{S}_{xx}(f_\ell)} \tag{A-34}$$

7. The estimate of the squared-ordinary coherence between the pressure and neutron flux signals can be defined as

$$\hat{\gamma}_{xy}{}^{2}(f_\ell) = \frac{|\hat{S}_{xy}(f_\ell)|^2}{\hat{S}_{xx}(f_\ell)\hat{S}_{yy}(f_\ell)} \tag{A-35}$$

*There are several other ways in which the transfer function can be defined.[A-13] However, Equation A-34 can be shown to be the best least-squares estimate.

which implies that,

$$0 \leqslant \gamma_{xy}^{2}(f_\ell) \leqslant 1 \tag{A-36}$$

A coherence value less than unity indicates a lack of complete linear dependence of the output y(t) on the input x(t). This may be due to the presence of extraneous noise in y(t), not related to x(t), or due to the fact that the system behaves somewhat nonlinearly. Notice that if the coherence is calculated from the unsmoothed estimates, $\hat{S}_{xy}$, $\hat{S}_{xx}$, and $\hat{S}_{yy}$, then the result can be shown always to be unity (see page 330 of Reference A-13), which is a highly biased estimator of $\gamma_{xy}^{2}(f_\ell)$.

Approximate confidence intervals for the transfer function, gain, and phase estimates can be derived, based on a Gaussian signal assumption* and unbiased estimates, from consideration of the frequency response measurements as a least-squares regression analysis at each frequency [see Jenkins and Watts, Section 10.3 (Reference A-14)]. The $(1-\alpha)\%$ confidence regions for,

$$\hat{G}_c(f_\ell) = \hat{M}_c^{\ell} e^{-j\hat{\theta}_c \ell} \tag{A-37}$$

at a specified frequency f_ℓ, can be written,

$$\hat{M}_c^{\ell} - \Delta M_c^{\ell} \leqslant M_{c,true}^{\ell} \leqslant \hat{M}_c^{\ell} + \Delta M_c^{\ell} \tag{A-38}$$

$$\hat{\theta}_c^{\ell} - \Delta\theta_c^{\ell} \leqslant \theta_{c,true}^{\ell} \leqslant \hat{\theta}_c^{\ell} + \Delta\theta_c^{\ell}$$

and

$$(\Delta M_c^{\ell})^2 = \left(\frac{2}{\nu_{DF}-2}\right)(F_{2,\nu_{DF}-2;\alpha})\left(\frac{1-\hat{\gamma}_{xy}^{2}(f_\ell)}{\hat{\gamma}_{xy}^{2}(f_\ell)}\right)\hat{M}_c^{\ell 2} \tag{A-39}$$

$$\Delta\theta_c^{\ell} = \sin^{-1}\left(\frac{\Delta M_c^{\ell}}{\hat{M}_c^{\ell}}\right)$$

where

ν_{DF} = number of degrees of freedom in each spectral estimate.

$F_{2,\nu_{DF}-2;\alpha}$ = 100α percentage points of Fischer's F distribution with $\nu_{DF}-2$ degrees of freedom.

It can be shown that the individual spectral or cross-spectral estimates are approximately distributed as χ^2 random deviates with two degrees of freedom.[A-13] Averaging M spectral estimates at each frequency gives approximately 2M degrees of freedom in the estimates. However, the full cosine tapering of the time series has the effect of reducing the effective length of the series by 1/2.[A-12] Hence, the combined effect of the cosine tapering and averaging of the raw spectral estimates is to leave approximately M degrees of freedom in each spectral estimate. Therefore,

$$\nu_{DF-2} = M-2 \tag{A-40}$$

*The Gaussian signal assumption is violated for the PRBS or square-wave test signal input, so uncertainty estimates are only qualitative.

Bendat[A-15] suggests possible sources of bias involved in the transfer function estimates. The most important are:

1. Bias in the power and cross-power spectral estimates used to calculate the transfer function.

2. Measurement noise in the input signal x(t) (output signal measurement noise does not cause bias).

3. Additional input noise sources which are correlated with x(t).

The spectral estimator derived by averaging M raw spectra can be shown to be equivalent to smoothing the raw spectrum by the Bartlett spectral window (see Jenkins and Watts, A-14, Section 6.3). The bias associated with this window is given by

$$B_B(f) \simeq \frac{1}{N\Delta t} \int_{-\infty}^{\infty} - |u| C_{zz}(u)\, e^{-2\pi j f u} du \qquad \text{(A-41)}$$

where

$C_{zz}(u)$ = the autocovariance function of the signal analyzed.

Assuming that the autocovariance function of the core pressure and neutron flux signals can be approximated by,

$$C_{zz}(u) = \sigma_{zz}^{2}\, e^{-|u|/T} \qquad \text{(A-42)}$$

which gives,

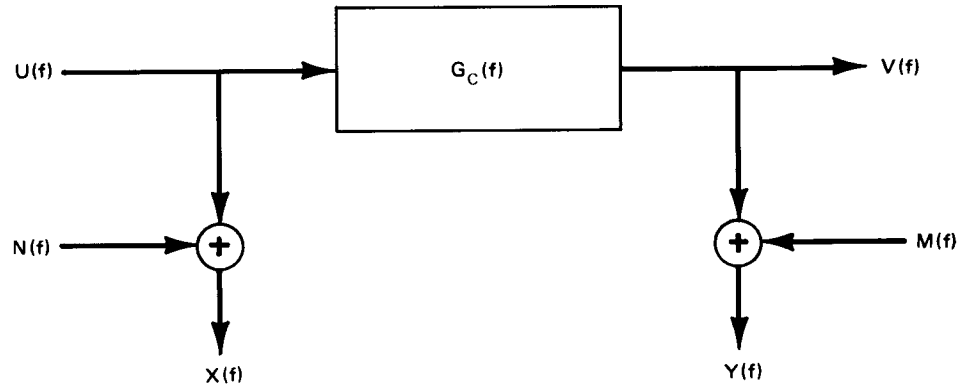
$$B_B(f) < \frac{2\sigma_{zz}^{2} T^{2}}{N\Delta t} \qquad \text{(A-43)}$$

The time series data was decimated to give 50 seconds of data for each spectral estimate. The maximum bias in the pressure and neutron flux signals is estimated to be

Signal	σ_{zz}	**1/T**	**Maximum Bias**
Core Pressure	2.2 psi	2.5 sec^{-1}	~0.02 psi
Neutron Flux (APRM A)	2.5%	0.94	~0.15%

Either bias term contributes about 1% error to the transfer function gain near the resonant peak of the transfer function measurement. Since their polarity is the same, the total error in gain will be somewhat smaller. This error is therefore small relative to the random errors in the transfer function measurements.

The effects of measurement noise have been shown by Bendat.[A-15]



Since the measurement noise terms n(t) and m(t) are assumed to be uncorrelated with u(t) and v(t) respectively,

$$S_{xx}(f) = S_{uu}(f) + S_{nn}(f)$$
$$S_{yy}(f) = S_{vv}(f) + S_{mm}(f) \tag{A-44}$$

and

$$S_{xy}(f) = S_{uv}(f) \tag{A-45}$$

The coherence, $\gamma_{xy}^2(f)$, can be shown to be

$$\gamma_{xy}^2(f) = \frac{1}{1 + (N_1/S_1) + (N_2/S_2) + (N_1/S_1)(N_2/S_2)} < 1 \tag{A-46}$$

where

$$N_1 = S_{nn}(f) \qquad S_1 = S_{uu}(f)$$
$$N_2 = S_{mm}(f) \qquad S_2 = S_{vv}(f) \tag{A-47}$$

which is reduced by the noise in the input and output signals. The magnitude of the estimated transfer function, $|G_c(f)|$, is related to that of the true transfer function by,

$$|\hat{G}_c(f)| = \frac{|S_{xy}(f)|}{S_{xx}(f)} = \frac{|S_{uy}(f)|}{S_{nn}(f) + S_{nn}(f)} = \frac{|G_c(f)|}{|1 + S_{nn}(f)/S_{uu}(f)|} \tag{A-48}$$

Hence the effect of the measurement noise in the input signal is to bias the magnitude of the estimated transfer function below that of the true transfer function.* To estimate the magnitude of the error caused by measurement noise,

*The measurement noise in the output signal has no effect on the transfer function measurement since m(t) is assumed uncorrelated with x(t).

the spectrum of the steady-state noise in the core exit pressure was measured for test condition PT3 EOC-2.[A-18]. The standard deviation in the steady-state pressure signal noise was found to be 0.113 psi. Assuming conservatively that the noise is band limited below 0.5 Hz,

$$S_{nn}(f) \simeq (0.113)^2/0.5 = 0.026 \text{ psi}^2/\text{Hz}. \tag{A-49}$$

The standard deviation of the PRBS test input signal is 2.2 psi, and its spectrum is approximately the same shape as that of the steady-state noise between 0.1 and 0.5 Hz. Hence,

$$S_{nn}(f)/S_{uu}(f) \simeq 0.003 \tag{A-50}$$

Thus, the bias in the transfer function magnitude estimate $|\hat{G}_C(f)|$, is approximately 0.003 due to the measurement noise in the input signal, x(t), not correlated with the output v(t).

Chatfield[A-16] gives the expression for the bias in the transfer function measurement, caused by uncorrelated noise in the process output, V(f), which affects the process input U(f) through the feedback path, $F_P(f)$. For the reactor transfer function measurement, neutron flux disturbances caused by sources not correlated with the test input signal will cause disturbances in core pressure through the neutron flux to pressure feedback path, $F_P(f)$, which was neglected in Figure A-2. The bias in transfer function magnitude estimate is given by

$$\hat{G}_c(f) = \frac{S_{xy}(f)}{S_{xx}(f)} = \frac{G_c(f) + F_p(f)N_1}{1 + |F_p|^2 N_1} \tag{A-51}$$

where

$$N_1 = \frac{S_{nn}(f)}{S_{uu}(f)} \tag{A-52}$$

Thus, only if the ratio N_1 is zero or if the feedback transfer function $F_p(f)$ is equal to zero does $\hat{G}_c(f)$ equal the true transfer function $G_c(f)$. The steady-state average neutron flux noise in a BWR is approximately 5% of rated peak-to-peak. Assuming a Gaussian signal, the standard deviation[A-17] is approximately

$$\sigma_N \simeq 5\%/8 = 0.625\% \text{ Rated}$$

The feedback transfer function $F_p(f)$ can be approximated by the effective fuel time constant, $\tau_{f\ell}$, and an integrator representing the effective mass and energy storage in the reactor vessel. Hence,

$$F_p(f) \simeq \frac{K_p}{(2\pi jf)(1 + 2\pi jf\tau_{f\ell})} \text{ psi/\%} \tag{A-53}$$

where

$$K_p \simeq 1.4 \text{ psi/sec-\%}$$

$$\tau_{f\ell} \simeq 7 \text{ seconds.} \tag{A-54}$$

At the resonant peak frequency of the closed-loop transfer function, $G_c(f)$, 0.45 Hz,

$$|F_p| \simeq 0.025 \text{ psi/\%} \tag{A-55}$$

and assuming the same bandwidth for the neutron flux noise and PRBS test input signal,

$$\frac{S_{nn}(f)}{S_{uu}(f)} \simeq \left(\frac{0.625\%}{2.2 \text{ psi}}\right)^2 = 0.08 \text{ (\%/psi)}^2 \tag{A-56}$$

The error in the transfer function estimate can be written,

$$\frac{\hat{G}_c(f) - G_c(f)}{G_c(f)} = \frac{F_p(f)N_1[1/G_c(f) - 1]}{(1 + |F_p|^2 N_1)} \tag{A-57}$$

Near the resonant peak the measured transfer function magnitude is approximately,

$$|\hat{G}_c(f)| \simeq 8\%/\text{psi} \tag{A-58}$$

Assuming this is nearly the true value, the error due to feedback effects is approximately

$$\left|\frac{\hat{G}_c(f) - G_c(f)}{G_c(f)}\right| \simeq 0.002 \tag{A-59}$$

which also is very small relative to the random errors in the transfer function estimates.

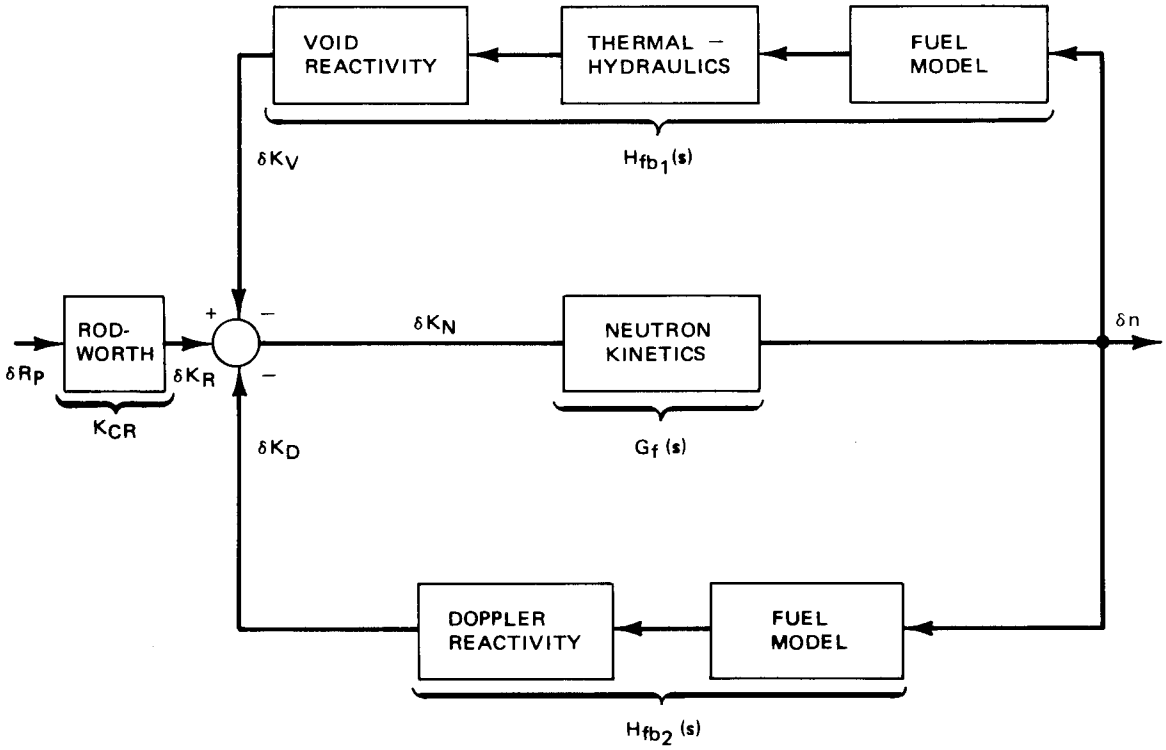


Figure A-1. Boiling Water Reactor Reactivity Feedback Transfer Function Rod Oscillator Test

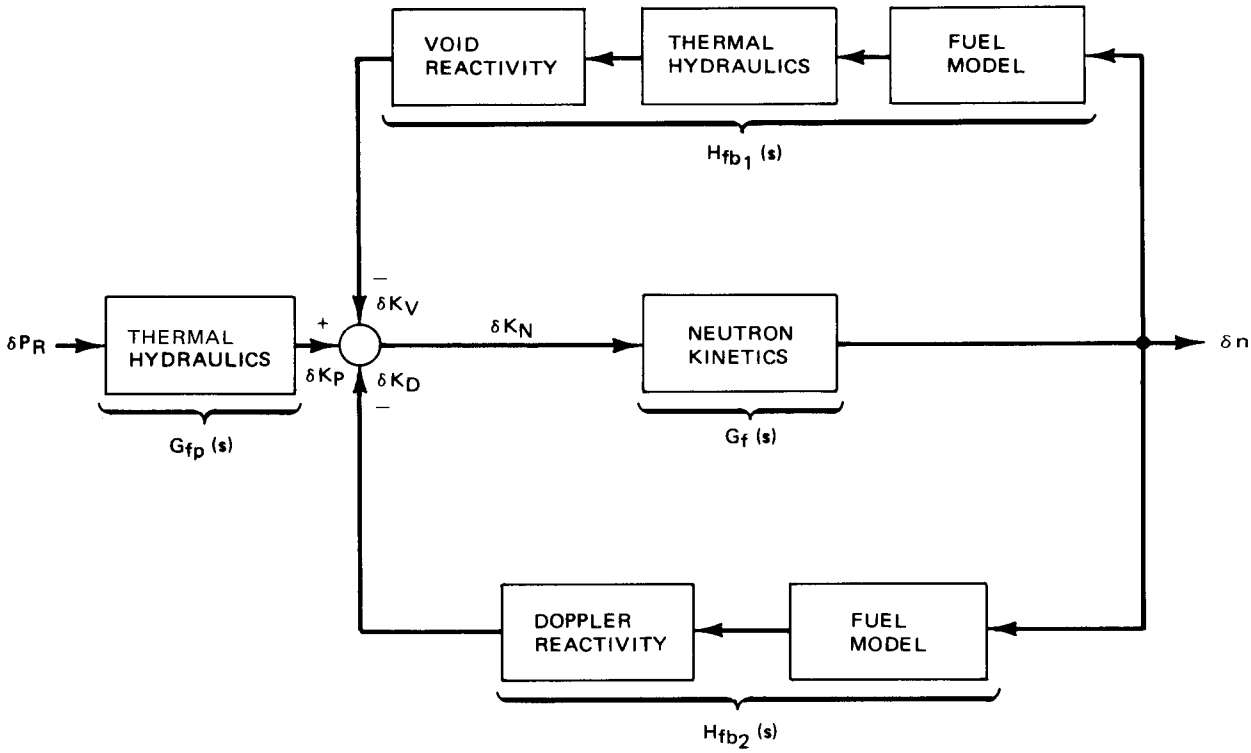


Figure A-2. Boiling Water Reactor Reactivity Feedback Transfer Function Pressure Perturbation Test

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APPENDIX B

MEASUREMENT ERROR ANALYSIS

B.1 STATIC ERROR ESTIMATES

B.1.1 Pressure Measurements

The potential error sources in the pressure measurements can be generated by the following components:

1. Pressure Calibration Equipment
2. Transducers
3. Signal Conditioning Amplifiers
4. Analog-to-Digital Converter

The error estimates for each component are as follows:

1. *Pressure Calibration Equipment*

   Two Heise pressure gages were used as the primary calibration source for pressure transducer calibration during the Peach Bottom-2 tests. The accuracy of the Heise gages is 0.1% Full Scale (FS). Because the plant was in operation at the time of installation of the test equipment, no practical method was available to measure and suppress the bias on the absolute pressure measurements due to the elevation head difference between the pressure measurement point and the transducer locations. The elevations were scaled from plant layout drawings with an estimated uncertainty of ±1 foot, and the fluid temperature can be estimated to within ±25° F. These contribute, respectively, ±0.42 psi and $\pm 3 \times 10^{-3}$ psi/ft of elevation head. The calculated elevation head corrections and the combined statistical uncertainties are listed in Table B-1.

2. *Pressure Transducers*

   Transducer errors are due to nonlinearity, temperature effects, hysteresis, and, for the differential pressure type, base pressure effects.

   The errors for the various sources, obtained from manufacturer's specifications, are given in Table B-2 for the three types of pressure transducers used in Peach Bottom-2 Low Flow Stability tests.

   a. *Absolute Pressure Transducers*

      Calibration was determined for a pressure range of 875 to 1150 psig. The linearity error is reduced to (1150-875)/(1500-0) x 0.4 = 0.08% FS or 1.2 psi. The maximum nonlinearity observed during calibration was 0.5 psi. Hysteresis would be similarly reduced to 0.7 psi. The estimated error, calculated statistically, is 3.6 psi or 0.24% FS. A 10° F temperature drift, an average pressure of 1000 psig, and the largest elevation correction error were assumed.

b. *Differential Pressure Transducers*

The calibration range for the 100-psid transducers is the full 0 to 100 psi range. There is also a base pressure effect on the transducer zero. The error for the differential pressure transducers is 1.1 psi or 1.1% FS.

The calibration range for the 50-psid transducers is the full 0-50 psi range. The error for these differential pressure transducers is 0.56 psi or 1.1% FS.

3. *Amplifiers*

The NEFF amplifiers used were models 620050 (low level) and 620060 (high level). Errors are due to gain stability, linearity, zero stability, zero drift, and common mode rejection. Each error, total errors, and error sources are given in the Table B-3 for the two types of amplifiers. Error estimates assume a $\pm 3^{\circ}$ C temperature change, a voltage input = 0.2 Vdc and a voltage output = 10 Vdc.

4. *Analog-To-Digital Converter*

The Hewlett Packard analog-to-digital converter (ADC), converts analog input signals, in the voltage range of −10.240 to +10.235 volts, to digital form. The ADC contains a bipolar ADC circuit which uses the successive approximation methods to convert analog input signals into a 12-bit digital output, including a sign bit. Negative numbers are in 2's complement. The converter speed is 1 μsec per bit. At this speed, the ADC will perform a conversion with an accuracy commensurate with 12-bit resolution. Least significant bit = 5 mV. Accuracy is ±1 LSB or ±0.049% FS.

5. *Total System Pressure Errors*

The total system errors, including calibration, transducer, and readout, were calculated from the above data and are:

Pressure Range	Error	Nominal Value	Error (%)
1500 psig	4.8 psi	1000 psi	0.48
100 psi	1.2 psi	33.3 psi	3.6
50 psi	0.6 psi	16.7 psi	3.6

Since these values were calculated from specification limits, the expected errors are estimated conservatively to be one half of the above values or as shown in Table B-4.

B.1.2 Flux Signals

1. *LPRM Data (Local Power Radiation Monitor)*

The local power radiation monitor signals are subject to the following static error factors:

1. Plant Calibration Procedure
2. Amplifier Errors
3. Calibration Voltmeter Errors
4. Readout Errors (A/D Converter)

The amplifier and readout errors were previously reviewed in Section B.1. The voltmeter used for calibration was a Fluke model 8600 A digital voltmeter. The error for a signal of magnitude 25% of FS is ±0.01% FS. The principal error in the LPRM reading is due to the plant calibration procedure. This error lumps together all the uncertainties that are associated with the plant LPRM system, exclusive of the current test instrumentation. An estimate of the uncertainty in the local relative power as calculated by diffusion theory has been made and was found to be 3.0%.[B-1] Since the test measurement system errors (items 2, 3, and 4) are negligible by comparison, the uncertainty in the LPRM measurement is 3.0% FS.

In terms of "percent of point" variations, LPRM measurements are expected to have less uncertainty than the quoted 3% FS. This is because some of the uncertainty in an absolute measurement is removed in a ratio calculation. For example, manufacturing uncertainties and uncertainties due to LPRM exposure are eliminated during the calibration based on TIP scan. The principal uncertainty in the LPRM calibration is due to the uncertainty in core thermal power, which has been estimated to be 1.76% (1σ).[B-1] The plant electronic APRM specification quotes an overall accuracy of the averaging circuitry (including linearity and stability) of 2.4% FS, with trip setting accuracy of 2% FS. Assuming that the power distribution and electronic errors are 2σ values, we estimate the overall statistical error in the electronic APRM measurement to be

		Error (1σ)
1.	APRM Measurement	3.2% FS
2.	APRM High Flux Trip Set Point	3.1% FS

B.1.3 Process Signal Uncertainties

The plant signal uncertainties (1σ) have been evaluated.[B-1,B-2] The uncertainties for various signals are given in Table B-5. The dominant factor in the core flow uncertainty is the uncertainty of the calibration constant K_{calib}, of the four diffuser double-tapped jet pumps. The uncertainty in K_{calib} was determined to be 3%, which leads to individual jet jump flow uncertainties of 1.5% of point values.

B.2 DYNAMIC ERROR ESTIMATES

B.2.1 Pressure Measurements

Errors in both timing and amplitude are also generated by the dynamic response characteristics of the various components in the pressure measurement systems:

1. Sensor Instrument Line Response
2. Transducer Response
3. Signal Conditioning Amplifier Response
4. Analog to Digital Converter Response

The dynamic response capability of the various components is described below.

B.2.1.1 Sensor Instrument Line

The special pressure transducers for the Peach Bottom-2 testing were installed on the plant instrumentation racks in the secondary reactor containment building. This arrangement was dictated by the limited access to the reactor secondary containment for transducer calibration and the environment in the primary containment during power operation. This introduces the possibility of measurement errors caused by acoustic oscillations in the long runs of instrument piping between the pressure measurement locations in the drywell and the sensors located on the instrument racks in the secondary containment building. Also the sensor line response is affected by the hydraulic impedance of the existing plant instruments, which operate in parallel with the special test transducers. The schematic diagrams shown in Figures B-1 to B-3 illustrate the core exit pressure and the reactor vessel pressure transducer installations.

The instrument line lengths and diameters are summarized in Table B-6. The dynamic response of each sensor line type was estimated by digitally simulating its response to pressure ramp inputs. The digital simulation was carried out using a convolution method for simulating coupled distributed piping networks described in Reference B-3. The simulations for water and steam filled lines were based on the impulse response kernel derived by Brown for compressible laminar transient flow in cylindrical conduits.[B-4,B-5]

Simulated pressure responses of the transducer end of the instrument lines are shown in Figures B-3 and B-4 for the assumed 150 psi/sec ramp inputs at the reactor end of the instrument lines.* These results are summarized in Table B-7. The most probable estimates of instrument line natural frequencies were identified from power spectral density measurements of the pressure signals taken during the Low-Flow Stability Tests (see Figures B-5 and B-6). The principal resonances found in these signals, most probably related to the instrument line dynamic responses are also tabulated in Table B-7. From these comparisons, it is most likely that the instrument line simulation models overestimated the natural frequency of the real lines and hence underestimate the time delay inherent in their responses. This result may be due to the effect of air trapped in the lines, caused by incomplete bleeding, which would result in an effective reduction in the acoustic wave velocity.[B-6] Also the loading effects on the hydraulic transmission lines due to the generally unknown input impedances of the parallel plant instruments.**

*Essentially the same magnitude of oscillation and time delay were observed for ramp rates of 50 to 200 psi/sec. The filtered responses are described later.

**While this data was available for the Viatran pressure transducers used for the test measurements, it is not readily obtained from manufacturers of process instruments.

B.2.1.2 Transducer Response

The specified response time, i.e., time to reach 90% of full scale, is less than 1 msec for the Model 218 Viatran Absolute pressure transducers. Hence their dynamic response is negligible relative to that of the instrument lines.

B.2.1.3 Signal Conditioning Amplifiers

The NEFF signal conditioning amplifiers for the absolute pressure signals incorporate a 2 pole Butterworth filter with a 10-Hz bandwidth (see Table 4-1). The effect of filtering the pressure signals is also plotted in Figures B-3 and B-4. They show that the filter causes a continuing time delay for a pressure ramp input forcing of the instrument lines. Since the natural frequency of the lines is generally overestimated in the digital simulation models, the Butterworth filter will probably not be as effective in reducing the oscillatory components of the pressure signals in the real system.

B.2.1.4 Analog-to-Digital Converter

The maximum conversion rate for the Hewlett Packard analog-to-digital converter with DMA is 45 kHz, including the response of the sample-and-hold amplifier. However, the limitations of the data throughput to the digital tape recorder reduce the sampling rate to approximately 36 μsec per channel. The time resolution of the 108 channels recorded is, therefore, approximately 6 msec. This time response is negligible compared to that of the Butterworth input filters.

B.2.2 Flux Signals

The dynamic errors in the neutron flux measurements are generated in the following components of the Local Power Range Monitoring System.

1. Neutron Flux Detector Dynamic Response
2. Neutron Detector Cable Response
3. Signal Conditioning Amplifier Response
4. Analog-to-Digital Converter Response

The dynamic errors due to these components are described below:

B.2.2.1 Neutron Flux Detector

The LPRM fission chamber current is made up of both prompt and delayed components. The prompt component is from prompt neutrons and gamma rays from the reactor core. The delayed component comes from delayed neutrons and gammas from the core, as well as delayed betas from the detector coating and its structural materials. Since the LPRM measurements are intended to represent the total neutron flux, the sum of the components of detector current from prompt and delayed neutrons is the desired signal. However, the component caused by the prompt gammas from fissions in the core, is also approximately proportional to total neutron flux, and hence can be considered part of the desired signal. During a transient flux condition, the dynamic errors in the detector response are caused by the delayed gamma and beta detector current components. These currents are not proportional to total neutron flux, but are instead related to the past history of the time varying flux.[B-7] The relative sensitivity of the detector to neutrons and gammas decreases with burnup. This sensitivity ratio is used as a criterion for determining the end-of-useful life of the detector. For a step change in prompt neutron flux, the time response of a GE fission detector was calculated for both beginning and end-of-life conditions. These calculations were based upon the gamma decay curve and the nominal detector parameters reported in References B-8, B-9, B-10. The results of the calculations show that a maximum time response error of ~2% could be generated at the detector end-of-life condition and ~0.6% at beginning of life. Since only a fraction of the detectors in the core (assume 25%) could have been at end-of-life conditions during the Peach Bottom-2 testing, the average dynamic error is expected to be no more than ~1%.

Another source of error in the detector output current is due to a band-limited white noise source caused by the counting uncorrelated events.[B-11] A typical value for the detector mean-square current/direct current ratio is[B-12]

$$\frac{\langle I^2 \rangle}{\langle I \rangle} = 1.14 \times 10^{-13} \frac{\text{amp}^2}{\text{Hz} \cdot \text{amp}}$$

with a noise bandwidth of 1.7×10^5 Hz. Using the detector neutron sensitivity and the design neutron flux level from Reference B-8, the maximum error from the noise source is found to be less than 0.2% of the maximum detector current level.

B.2.2.2 Detector Cable Response

Stray currents produced in the detector cables cause dynamic errors in the transient neutron flux measurements. These currents are generated in the cables from the prompt and delayed gammas from the core, and the betas from the cable materials. Hence this dynamic error is made up of components which are proportional to the average neutron flux along the cable length and which are a function of the time history of the neutron flux. There is also a constant bias current produced in the detector cable by thermally induced ohmic conduction. The step response for a detector at the D level in the core was calculated for the cable parameters described in Reference B-13. The maximum error due to the induced currents ranged from 1.5% at beginning of detector life to 14% at end-of-life. For the average detector at the centerline of the core, the errors are expected to be less ~0.8% to 7% since less cable is exposed to the core conditions. Again assuming 25% of the detectors were at the end of their useful life, the maximum dynamic error due to induced cable currents is ~4%.

B.2.2.3 Signal Conditioning Amplifier

A Butterworth filter with a 100 Hz bandwidth was used to filter the LPRM signals. The time response of the filter is the same order as that of the sampling capability of the analog-to-digital converter, hence a time resolution of 6 milliseconds in the neutron flux signals is possible.

The combined maximum dynamic error (or bias) in the neutron flux measurements (from the LPRM and cable) is ~6%, in addition to the random errors described above.

B.2.3 Process Signals

The errors introduced from the limited time response capability of the signals measured from plant instruments can only be roughly estimated because of the lack of information on their installed dynamic qualification testing. The estimated time response capability of each class of plant process signals measured is tabulated in Table B-8.

Table B-1
ELEVATION HEAD CORRECTION FOR
ABSOLUTE PRESSURE MEASUREMENTS

Plant Pressure Signal	Transducer Elevation Head (ft H_2O)	Transducer Pressure Correction (psi)	Error (psi)
Core Exit	64	27.5	0.5
Reactor	24	10.4	0.4
Steam Line	20	8.4	0.4
Turbine Inlet	26	11.3	0.4

Table B-2
SPECIAL PRESSURE TRANSDUCER SPECIFICATIONS

Error Source	Model 218 (0-1500 psi) Viatran Gage Pressure		Model 220 (0-100 psi) Viatran Differential Pressure		Model 220 (0-50 psi) Viatran Differential Pressure	
Linearity	0.4% FS	6.0 psi	0.4% FS	0.4 psi	0.4% FS	0.2 psi
Hysteresis	0.25% FS	0.375 psi	0.2% FS	0.2 psi	0.2% FS	0.1 psi
Base Pressure	0	0	1% FS @ 1000 psi	1.0 psi	1% FS @ 1000 psi	0.5 psi
Temperature effect on Zero	2% FS for 100°F	3.0 psi for 10°F	2% FS for 100°F	0.2 psi for 10°F	2% FS for 100°F	0.1 psi for 10°F
Temperature effect on Span	1% FS for 100°F	1.5 psi for 10°F	1% FS for 100°F	0.1 psi for 10°F	1% FS for 100°F	0.05 psi for 10°F

Table B-3
SIGNAL CONDITIONING AMPLIFIER SPECIFICATIONS

Error Source	Model 620050	%	Model 620060	%
Gain Stability	±0.01% ±0.002%/°C	0.016	±0.01% ±0.002%/°C	0.016
Linearity	±0.01% FS	0.01	±0.01% FS	0.01
Zero Stability	±4 μV RTI ± 15 μV RTO	0.00415	±150 μV RTO	0.0015
Zero Drift	±1 μV RTI ±15 μV RTO/°C	0.00145	±25 μV RTO/°C	0.00075
Common Mode Rejection	66 dB + Gain (in dB)	0.005	60 dB + Gain (in dB)	0.01
Total Bias Error		0.020		0.021

Table B-4
PRESSURE MEASUREMENT ERROR ESTIMATES

Pressure Range of Transducer (psi)	Nominal Signal Value (psi)	Estimated Expected Error (1σ) (%)	(psi)
1500	1000	0.24	2.4
100	33.3	1.80	0.6
50	16.7	1.80	0.3

Table B-5
PROCESS MEASUREMENT ERRORS

Signal	Instrument Error (1σ)	Uncertainty (% FS)
Reactor Pressure[a]	7.5 psi	0.75
Core Flow[a]	3×10^6 lb/h	2.5
Feedwater Temperature	0.7°F at 350°F	0.2
Feedwater Flow	8.2×10^4 lb/h	1.76
Recirculation Suction Temperature	3°F	0.5

[a]Process computer measurements only.

Table B-6
PLANT INSTRUMENT LINE DATA

Plant Pressure Signal	Line Diameter (Inches)	Line Length (ft)
1. Core Exit Pressure	11.75 0.957	40. 111.
2. Reactor Pressure	1.50 0.957	25. 82.
3. Steamline Pressure	0.957	111. (135.)[a]
4. Turbine Inlet Pressure	0.957	76. (90.)[a]

[a]"A" Steam line ("D" Steam line).

Table B-7
SIMULATED INSTRUMENT LINE DYNAMIC ERROR ESTIMATES AND COMPARISON TO EXPERIMENTAL RESULTS

Plant Pressure Signal	Simulated Line Natural Frequency	Maximum Time Delay for Ramp Input[a]	Maximum Amplitude Error for Ramp Input[a]	Measured Natural Frequencies
1. Core Exit Pressure	~9.5 Hz	~30 millisec	~4 psi	5.2 Hz 10.0 Hz
2. Reactor Pressure	~10 Hz	~30 millisec	~3 psi	8.7 Hz
3. Steamline Pressure	~8.5 Hz	~30 millisec	~3 psi	5.8 A Steam line 2.5 D Steam line
4. Turbine Inlet Pressure	b	b	b	9.8 A Steam line 7.5 D Steam line

[a]Includes delay and attenuation due to 10 Hz Butterworth Signal Conditioning Filters.
[b]Not simulated.

Table B-8
PLANT PROCESS INSTRUMENTATION
ESTIMATED DYNAMIC RESPONSE

Plant Process Signal Type	Estimated Instrument Time Response (sec)
1. Flow Measurement	<0.25
2. Level Measurement	<0.25
3. Temperature Measurement	5 – 20

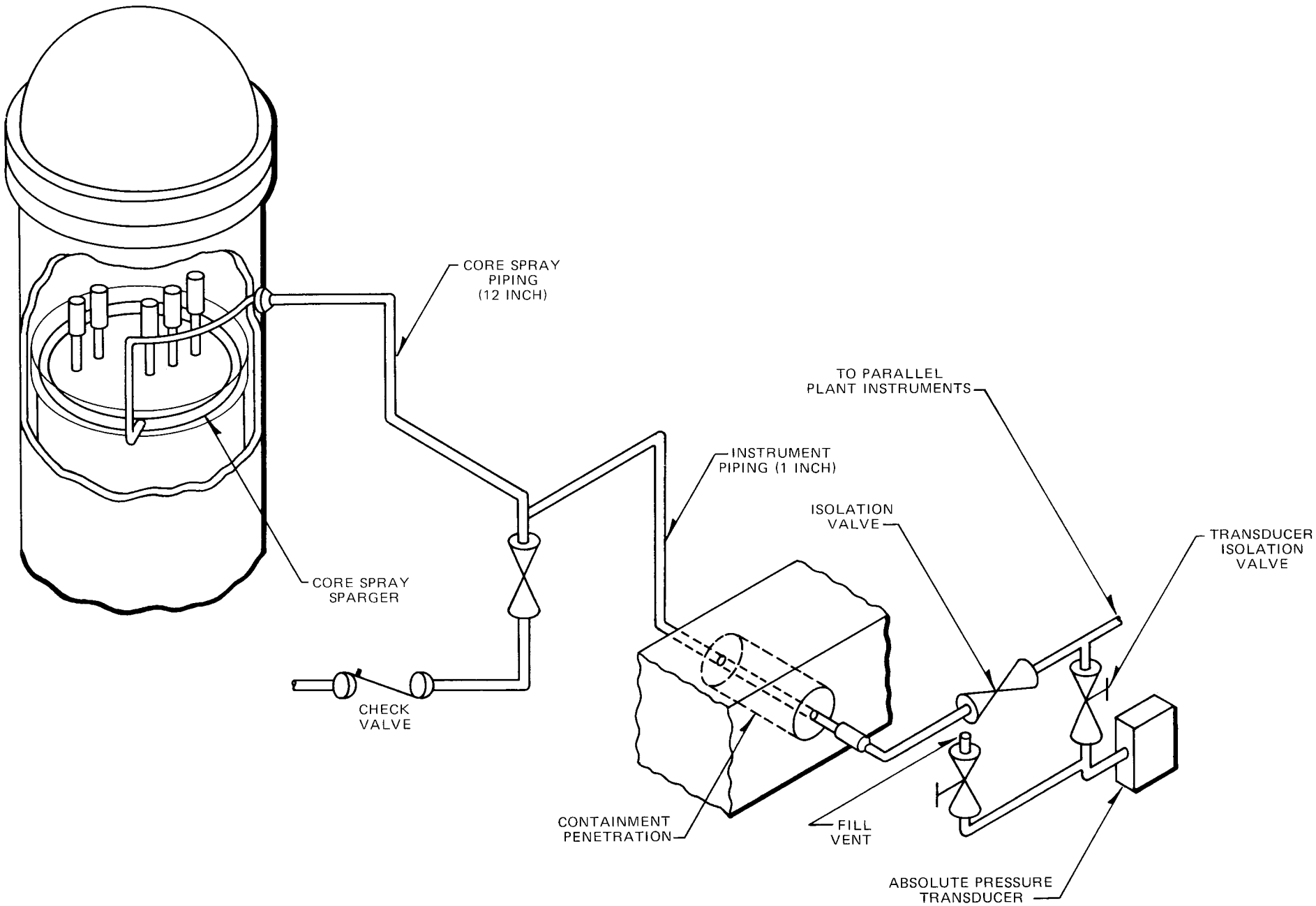

Figure B-1. Core Pressure Measurement

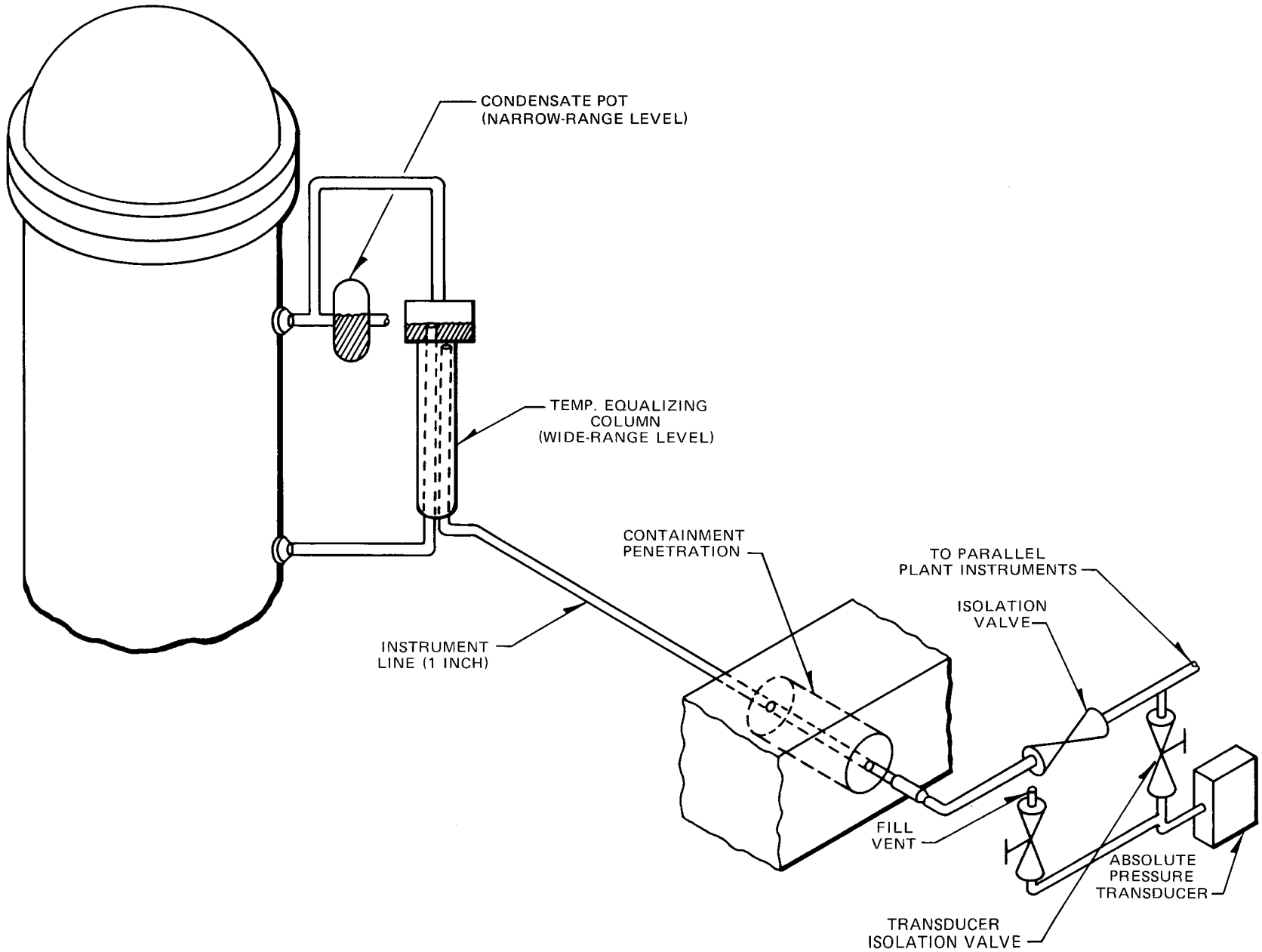

Figure B-2. Reactor Pressure Measurement

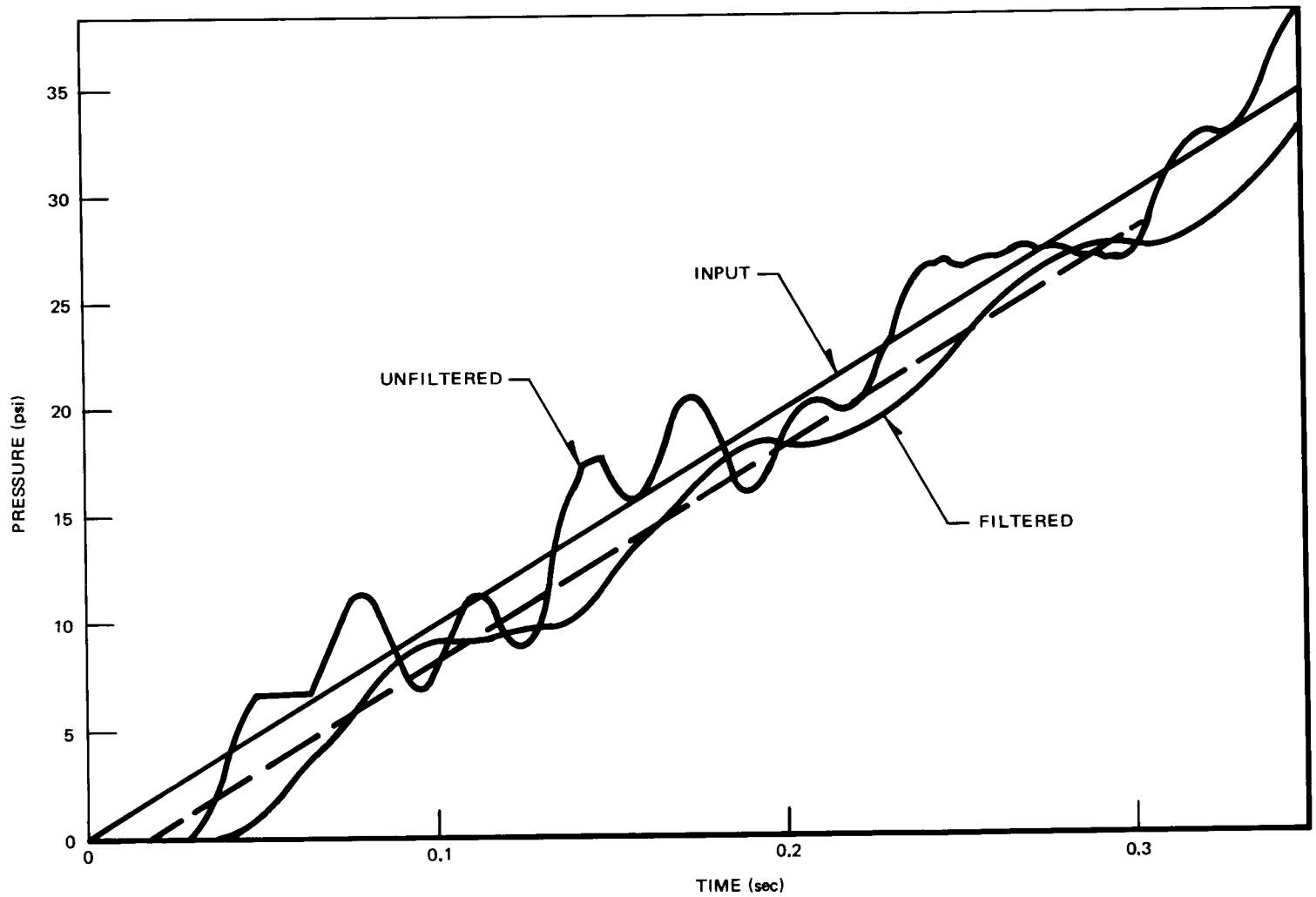

Figure B-3. Simulated Core Spray Sensor, Filtered and Unfiltered, 100 psi/sec Ramp Input

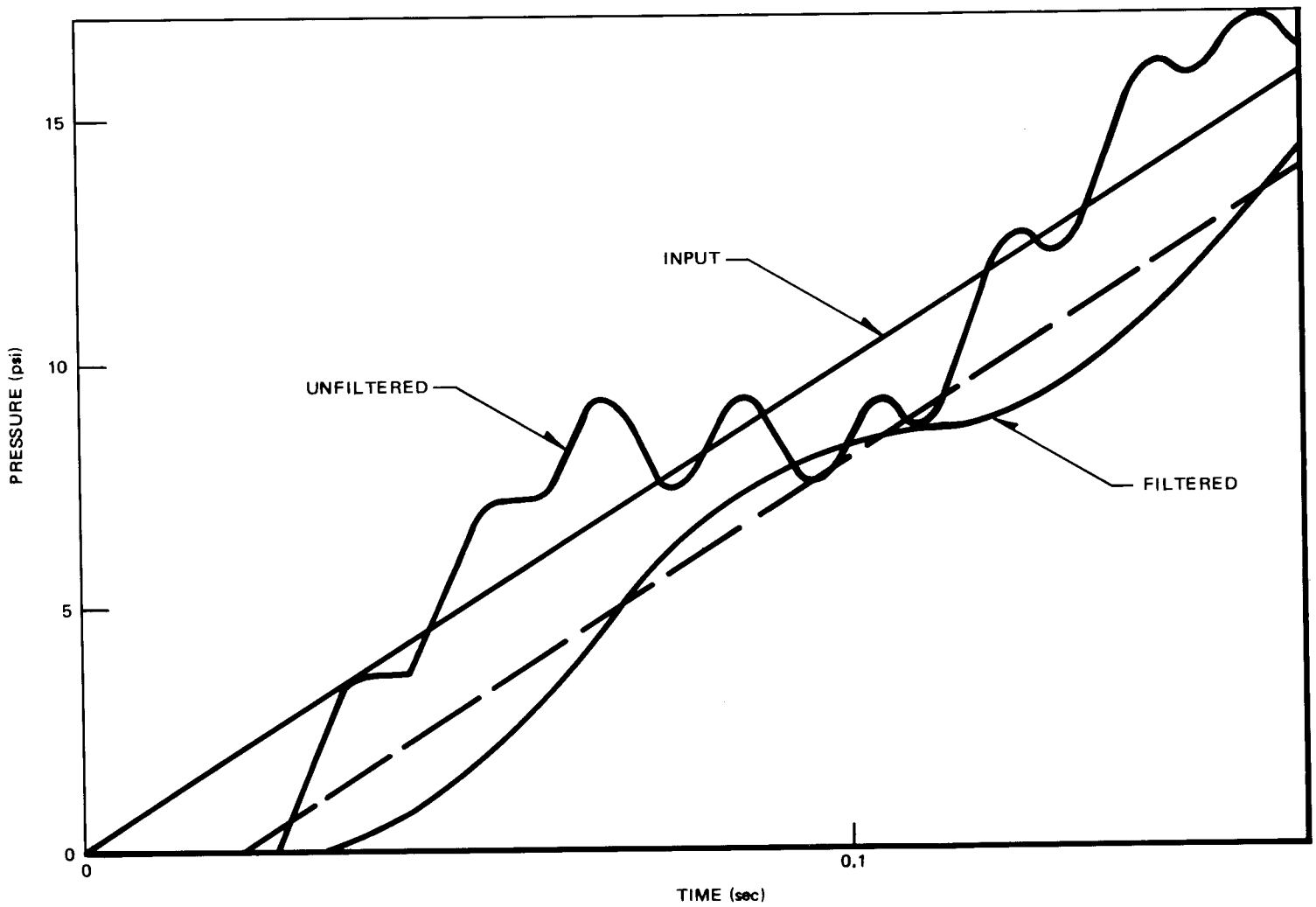

Figure B-4. Simulated Reactor Pressure, Filtered and Unfiltered, 100 psi/sec Ramp Input

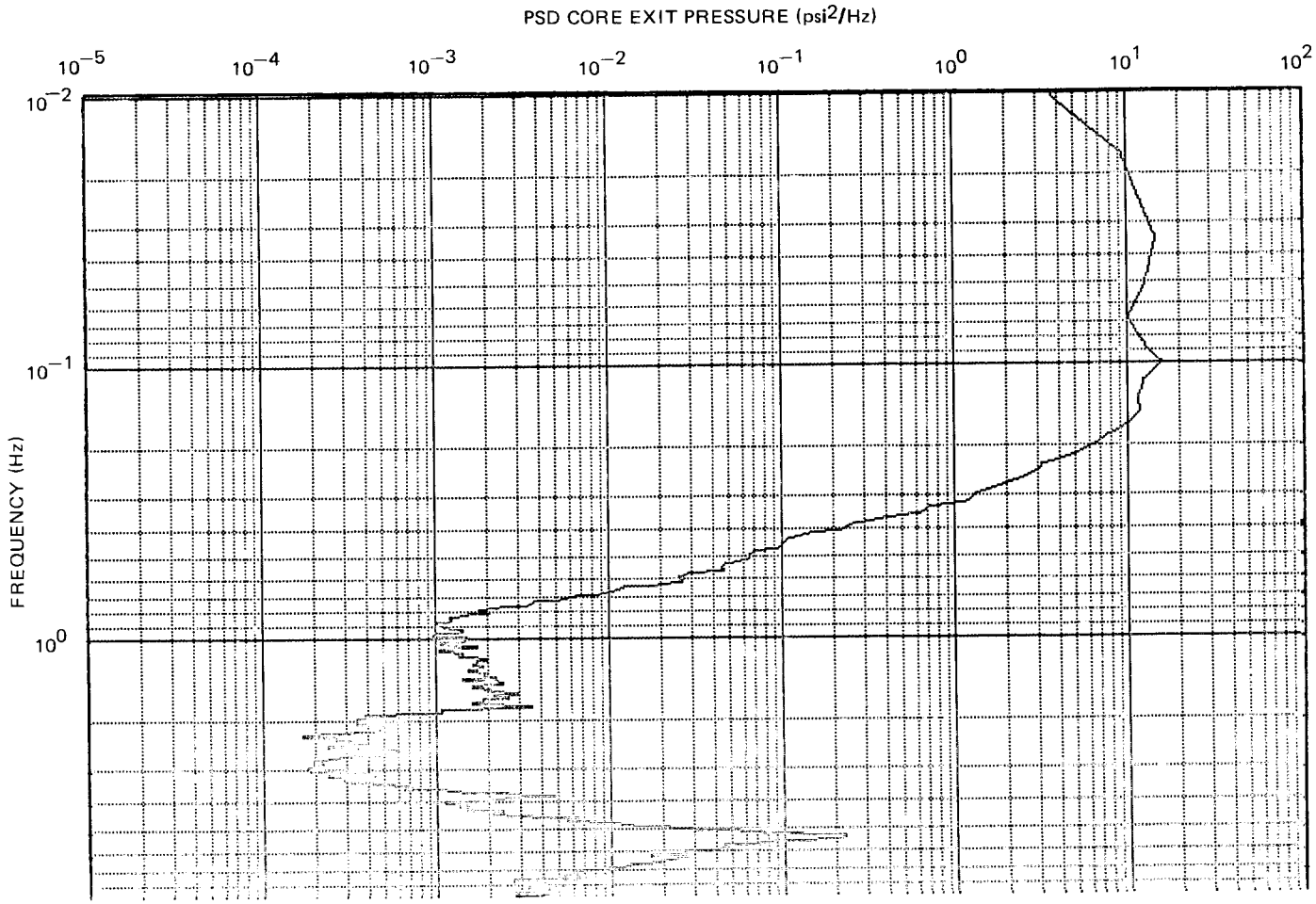

Figure B-5. Peach Bottom 2 Low Flow Stability Test (3PT3) Power Spectrum of Core Exit Pressure

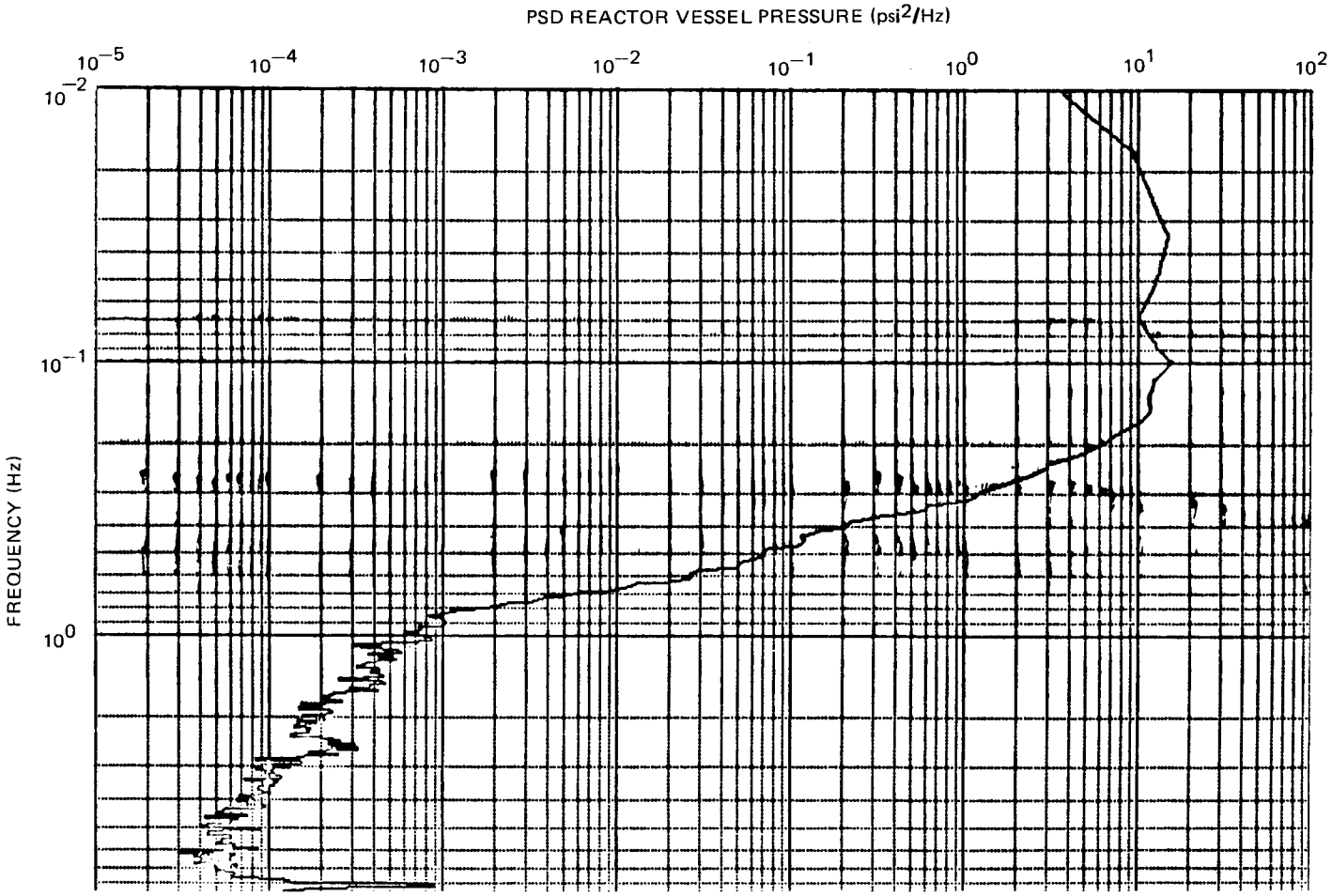

Figure B-6. Peach Bottom 2 Low Flow Stability Test (3PT3) Power Spectrum of Reactor Pressure

B.3 REFERENCES

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APPENDIX C

PROCESS COMPUTER PERIODIC LOG (P1)

The process computer periodic log, P1 edit, was taken several times during each test series. Table 5-1 in the main body of this report lists the dates and starting times of the steady state and PRBS recordings. It also lists the time of the P1 edit nearest the time of each of these records. This appendix contains the P1 edits, providing details of the plant operating conditions during the tests.

Table C-1

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12
AXIAL REL PWR	0.76	1.18	1.30	1.26	1.22	1.18	1.08	1.03	0.95	0.90	0.71	0.42
REGION REL PWR	0.91	1.09	0.91	1.09	1.04	1.09	0.91	1.09	0.91			
~~RING REL PWR~~	~~1.01~~	~~0.97~~	1.09	~~0.94~~	~~1.15~~	~~1.11~~	~~1.12~~	0.74				
APRM GAF	0.93	0.94	0.92	0.93	0.92	0.94						

FAILED LPRM LIST 1609,D,3 4017,B,1 3241,D,3 2449,D,1 4049,C,3

BASE CRIT CODE	1609,A	2409,B	3209,B	4009,A	4809,A	0817,A	1617,A
2417,A	3217,A	4017,A	4817,A	5617,A	0825,B	1625,A	2425,A
4025,A	4825,B	5625,B	0833,B	1633,A	2433,A	4033,A	4833,A
5633,B	0841,B	1641,A	2441,A	3241,A	4041,A	5641,A	0849,A

FAILED SENSORS 5 6 15 24 25 27

DATE	3-24-78																	
TIME	0654	0654																
~~SEQ. NO.~~	9																	
CMWT	1314.																	
CMWF	368.2																	
CMCHFR	6.78																	
CMFLPD	0.416																	
CMPF	2.561																	
CMFD	0.203																	
CAFD	0.112																	
CADA	0.061																	
CAVF	0.317																	
CAPD	20.24																	
CRD	0.141																	
CRSYM	1.																	

PERIODIC LOG	
PEACHBOTTOM UNIT 2	
PR	1003.
DPC-M	13.64
DPC-C	7.28
RWL	24.45
DHS	29.06
WRM	4.81
WD	14.15
WTSUB	42.38
WTHR	-1.00
WT	44.12
WTFLAG	2.
ITER	1.
IREC	0.
IEOL	0.

REGION	1	2	3	4	5	6	7	8	9
MCHFR	7.96	6.87	8.00	6.78	9.36	6.88	8.00	6.86	7.93
LOC	21- 8- 5	31- 6- 8	53-22- 5	5-30- 8	35-34-19	55-32- 8	7-40- 5	29-56- 8	39-54- 5
FLOW	0.0542	0.0528	0.0542	0.0526	0.0599	0.0528	0.0542	0.0528	0.0541
PKFL	2.18	2.53	2.17	2.56	1.65	2.52	2.17	2.53	2.19
MFLPD	0.354	0.411	0.352	0.416	0.278	0.410	0.353	0.411	0.355
~~LOC~~	~~21- 8- 5~~	~~31- 6- 8~~	~~53-22- 5~~	~~5-30- 8~~	~~35-32-19~~	~~55-32- 8~~	~~7-40- 5~~	~~29-56- 8~~	~~39-54- 5~~
PKFL	2.18	2.53	2.17	2.56	1.71	2.52	2.17	2.53	2.19
MAXEQ	0.166	0.203	0.166	0.201	0.160	0.200	0.166	0.202	0.166
LOC	21-14	29-10	47-22	7-34	37-34	53-28	13-40	31-52	39-48
FLOW	0.0534	0.0520	0.0535	0.0521	0.0542	0.0521	0.0535	0.0520	0.0535
PKF	1.27	1.46	1.27	1.45	1.25	1.44	1.27	1.45	1.27

CALIBRATED LPRM READINGS

57		7	10	11	10		
		11	18	19	17		
		16	26	28	23		
		18	27	26	26		
49	7	10	16	13	11	9	
	13	18	23	23	23	15	
	19	25	27	31	25	21	
	23	30	27	24	28	30	
41	9	12	15	19	14	12	10
	17	20	21	18	22	20	18
	25	24	24	21	27	24	26
	28	25	25	21	25	25	27
33	15	13	19	21	14	15	10
	26	20	20	21	20	26	20
	35	23	22	19	23	29	30
	25	22	21	17	22	24	27
25	13	12	17	19	14	13	11
	22	21	20	23	19	23	20
	29	25	22	24	22	27	29
	25	26	24	21	23	25	28
17	9	12	12	13	13	12	7
	15	21	20	19	23	19	12
	22	29	26	24	26	26	17
	29	28	28	23	27	28	20
00C		13	12	15	10	8	
2		15	22	25	19	12	
8		23	29	34	24	18	
A		30	29	25	27	21	

59				48	48	48	48	48	48	48					
55			48	48	42	48	38	48	42	48	48				
51		48	48	0	48	30	48	30	48	0	48	48			
47	48	48	44	48	48	48	42	48	48	48	44	48	48		
43	48	48	0	48	34	48	0	48	0	48	34	48	0	48	48
39	48	42	48	48	48	48	48	42	48	48	48	48	48	42	48
35	48	48	30	48	0	48	16	48	16	48	0	48	30	48	48
31	48	38	48	42	48	42	48	42	48	42	48	42	48	38	48
27	48	48	30	48	0	48	16	48	16	48	0	48	30	48	48
23	48	42	48	48	48	48	48	42	48	48	48	48	48	42	48
19	48	48	0	48	34	48	0	48	0	48	34	48	0	48	48
15		48	48	44	48	48	48	42	48	48	48	44	48	48	
11			48	48	0	48	30	48	30	48	0	48	48		
07				48	48	42	48	38	48	42	48	48			
03					48	48	48	48	48	48	48				
	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58

OPERATOR SUBS VAL OR LOC	NON SYM ROD LOC FIRST QUAD

Table C-2

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12
AXIAL REL PWR	0.77	1.19	1.31	1.27	1.22	1.18	1.07	1.02	0.94	0.90	0.70	0.42
REGION REL PWR	0.91	1.09	0.91	1.09	1.03	1.09	0.91	1.09	0.91			
RING REL PWR	1.00	0.97	1.09	0.93	1.15	1.11	1.12	0.79				
APRM GAF	0.90	0.90	0.90	0.90	0.94	0.90						

FAILED LPRM LIST 1609,D,3 4017,B,1 3241,D,3 2449,D,1 4049,C,3

BASE CRIT CODE	1609,A	2409,B	3209,B	4009,A	4809,A	0817,A	1617,A
2417,A	3217,A	4017,A	4817,A	5617,A	0825,B	1625,A	4025,A
4825,B	5625,B	0833,B	1633,A	2433,A	4033,A	4833,A	5633,B
0841,B	1641,A	2441,A	3241,A	4041,A	5641,A	0849,A	1649,A

FAILED SENSORS 5 6 15 24 25 27

DATE	3-24-78	PERIODIC LOG	
TIME	0754	PEACHBOTTOM UNIT 2	
SEQ. NO.	10		
CMWT	1307.	PR	1006.
CMWF	359.4	DPC-M	3.67
CMCWFP	6.79	DPC-C	7.31
CMFLPD	0.415	RWL	23.96
CMPF	2.568	DHS	28.79
CMFP	0.198	WFW	4.79
CAFO	0.111	WD	14.05
CADA	0.061	WTSUB	42.18
CAVF	0.317	WTHB	-1.00
CAPO	20.14	WT	44.38
CRO	0.141	WTFLAG	2.
CRSYM	1.	ITER	1.
		IREC	0.
		IEQL	0.

REGION	1	2	3	4	5	6	7	8	9
MCHFR	7.98	6.88	7.99	6.79	9.46	6.89	8.02	6.88	7.95
LOC	21- 8- 5	31- 6- 7	45-14- 4	5-30- 7	35-34-19	55-32- 7	7-40- 5	29-56- 7	39-54- 5
FLOW	0.0546	0.0531	0.0595	0.0529	0.0602	0.0531	0.0547	0.0531	0.0546
PKFL	2.18	2.53	1.94	2.57	1.64	2.53	2.17	2.53	2.19
MFLPD	0.353	0.409	0.351	0.415	0.277	0.409	0.351	0.409	0.354
LOC	21- 8- 5	31- 8- 7	33-22- 5	5-30- 7	23-24- 4	55-32- 7	7-40- 5	29-56- 7	39-54- 5
PKFL	2.18	2.53	2.17	2.57	1.71	2.53	2.17	2.53	2.19
MAXEQ	0.165	0.198	0.165	0.196	0.157	0.195	0.155	0.197	0.165
LOC	21-14	29-10	47-22	7-34	37-34	53-28	13-40	31-52	39-49
FLOW	0.0537	0.0525	0.0538	0.0525	0.0546	0.0526	0.0539	0.0525	0.0538
PKF	1.28	1.44	1.28	1.43	1.25	1.43	1.28	1.44	1.28

59				48	48	48	48	48	48	48				
55			48	48	42	48	38	48	42	48	48			
51		48	48	0	48	30	48	30	48	0	48	48		
47	48	48	44	48	48	48	42	48	48	48	44	48	48	
43	48	48	0	48	34	48	0	48	0	48	34	48	0	48	48
39	48	42	48	48	48	48	48	42	48	48	48	48	48	42	48
35	48	48	30	48	0	48	16	48	16	48	0	48	30	48	48
31	48	38	48	42	48	42	48	42	48	42	48	42	48	38	48
27	48	48	30	48	0	48	16	48	16	48	0	48	30	48	48
23	48	42	48	48	48	48	48	42	48	48	48	48	48	42	48
19	48	48	0	48	34	48	0	48	0	48	34	48	0	48	48
15		48	48	44	48	48	48	42	48	48	48	44	48	48	
11			48	48	0	48	30	48	30	48	0	48	48		
07				48	48	42	48	38	48	42	48	48			
03					48	48	48	48	48	48	48				
	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58

OPERATOR NOT SYM
SUPS VAL ROD LOC
OR LOC FIRST QUAD

CALIBRATED LPRM READINGS

57		7	10	10	9		
		11	17	18	16		
		16	26	28	23		
		18	27	26	26		
49	7	10	15	13	10	9	
	13	18	22	22	23	14	
	19	25	27	31	25	21	
	23	30	27	24	28	29	
41	9	12	14	19	13	11	9
	17	19	20	17	21	19	18
	25	24	24	21	27	23	26
	28	24	25	21	25	25	27
33	14	12	19	20	13	14	10
	25	19	20	20	19	25	20
	34	23	22	19	23	29	29
	25	22	21	17	22	23	27
25	13	12	17	19	13	12	11
	22	21	19	23	18	23	19
	29	24	22	23	22	27	29
	25	28	24	21	23	25	28
17	8	11	12	13	13	11	7
	14	21	20	19	22	19	12
	22	28	25	24	26	26	17
	29	27	28	23	27	28	20
000		13	12	14	9	8	
0		15	22	25	17	12	
8		22	29	34	24	19	
8		29	29	25	27	21	
	08	16	24	32	40	48	56

Table C-3

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12
AXIAL REL PWR	0.73	1.12	1.21	1.17	1.13	1.12	1.07	1.06	1.04	1.03	0.82	0.48
REGION REL PWR	0.94	1.05	0.94	1.05	1.05	1.05	0.96	1.05	0.94			
RING REL PWR	1.02	1.01	1.09	0.92	1.13	1.13	1.12	0.74				
APRM GAF	1.00	0.99	1.00	0.99	0.98	1.01						

FAILED LPRM LIST 1609,D,1 4017,B,1 3241,D,3 2449,D,1 4049,D,3

BASE CRIT CODE 1609,A 2409,B 3209,B 0817,A 2425,A 3225,A 5625,B
2433,A 5633,B 3241,A 4041,A 3249,B 1657,A 2457,B 3257,B
4057,B

FAILED SENSORS 5 6 15 24 25 27

DATE	3-24-78	PERIODIC LP	
TIME	0342	PEACHBOTTOM UNIT 2	
SEQ. NO.	6		
CMWT	1551.	PR	1005.
CMWF	469.3	DPC-M	3.78
CMCHFR	6.20	DPC-C	7.41
CMFLPD	0.454	RWL	24.37
CMPF	2.368	DHS	32.78
CMFD	0.225	WFW	5.80
CAFC	0.134	WD	14.28
CAOA	0.072	WTSUB	42.64
CAVF	0.334	WTHB	-1.00
CAPO	23.80	WT	44.23
CRD	0.126	WTFLAG	2.
CRSYM	1.	ITER	1.
		IREC	0.
		IEQL	0.

REGION	1	2	3	4	5	6	7	8	9
MCHFR	7.24	6.29	7.19	6.20	7.16	6.30	7.12	6.29	7.19
LOC	17-14-20	31- 6- 7	47-18-20	5-30- 7	37-34-19	55-32- 7	13-46-20	29-56- 7	45-48-20
FLOW	0.0534	0.0530	0.0533	0.0529	0.0538	0.0530	0.0533	0.0530	0.0534
PKFL	1.61	2.34	1.62	2.37	1.77	2.33	1.54	2.34	1.52
MFLPD	0.385	0.448	0.385	0.454	0.354	0.447	0.384	0.446	0.385
LOC	5-22- 5	31- 6- 7	39- 6- 5	5-30- 7	35-32-16	55-32- 7	21-56- 5	29-56- 7	55-40- 5
PKFL	2.01	2.34	2.01	2.37	1.85	2.33	2.00	2.34	2.01
MAXEQ	0.202	0.225	0.202	0.223	0.195	0.222	0.204	0.224	0.201
LOC	21-14	29-10	47-22	7-34	37-34	53-28	23-44	31-52	39-48
FLOW	0.0532	0.0525	0.0532	0.0525	0.0538	0.0525	0.0532	0.0525	0.0532
PKF	1.29	1.38	1.28	1.37	1.26	1.37	1.30	1.38	1.28

59				48	48	48	48	48	48	48				
55			48	48	42	48	38	48	42	48	48			
51		48	48	14	48	30	48	30	48	14	48	48		
47	48	48	44	48	48	48	42	48	48	48	44	48	48	
43	48	48	14	48	34	48	0	48	0	48	34	48	14	48	48
39	48	42	48	48	48	48	48	42	48	48	48	48	48	42	48
35	48	48	30	48	0	48	22	48	22	48	0	48	30	48	48
31	48	38	48	42	48	42	48	42	48	42	48	42	48	38	48
27	48	48	30	48	0	48	22	48	22	48	0	48	30	48	48
23	48	42	48	48	48	48	48	42	48	48	48	48	48	42	48
19	48	48	14	48	34	48	0	48	0	48	34	48	14	48	48
15		48	48	44	48	48	48	42	48	48	48	44	48	48	
11			48	48	14	48	30	48	30	48	14	48	48		
07				48	48	42	48	38	48	42	48	48			
03					48	48	48	48	48	48	48				
	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58

OPERATOR NOW SYM
SUBS VAL POD LOC
CR LOC FIRST QUAD

CALIBRATED LPRM READINGS

57		11	13	13	14		
		14	21	21	20		
		18	28	31	26		
		20	30	29	29		
49	12	18	18	16	18	15	
	17	23	27	26	27	19	
	21	27	30	32	27	23	
	26	33	30	27	32	33	
41	16	16	17	22	17	19	14
	21	23	26	22	26	24	22
	27	26	27	24	30	27	29
	31	27	28	24	29	29	31
33	18	15	20	21	15	18	13
	30	23	29	31	25	29	24
	38	26	26	23	26	32	32
	28	24	23	20	25	27	31
25	17	15	18	20	16	17	15
	26	25	27	33	23	27	23
	32	27	25	28	25	30	32
	28	29	27	24	27	28	31
17	16	18	15	15	18	21	12
	19	26	24	22	29	24	15
	24	31	28	26	30	29	19
	33	31	31	26	30	32	23
000		16	16	18	16	13	
C		19	26	28	21	16	
B		25	31	36	26	19	
A		33	32	28	30	24	
	08	16	24	32	40	48	56

Table C-4

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12
AXIAL REL PWR	0.71	1.10	1.20	1.17	1.14	1.13	1.08	1.08	1.05	1.03	0.82	0.49
REGION REL PWR	0.94	1.05	0.94	1.05	1.05	1.05	0.94	1.05	0.94			
RING REL PWR	1.03	1.01	1.09	0.92	1.13	1.15	1.12	0.74				
APRM GAF	1.00	0.99	1.00	0.99	0.99	1.00						

FAILED LPRM LIST 1609,D,1 4017,B,1 3241,D,3 2449,D,1 4049,C,3

BASE CRIT CODE	1609,A	2409,B	3209,B	2425,A	3225,A	5625,B	2433,A
5633,B	3241,A	3249,B	1657,A	2457,B	3257,B	4057,B	

FAILED SENSORS 5 6 15 24 25 27

DATE	3-24-78
TIME	0514
SEQ. NO.	7
CMWT	1537.
GWE	464.4
CMCHFR	5.26
CMFLPD	0.450
CMPF	2.366
CMFG	0.222
CAEQ	0.132
CADA	0.072
CAVF	0.330
CAPD	23.68
CPD	0.126
CRSYM	1.

PERIODIC LOG
PEACHBOTTOM UNIT 2

PR	1006.
DPC-M	3.80
DPC-C	7.44
QWL	24.15
QHS	32.37
WFW	5.75
WD	14.25
WTSUB	42.59
WTHR	-1.00
WT	44.49
WTFLAG	2.
ITER	1.
IREC	0.
IEQL	0.

REGION	1	2	3	4	5	6	7	8	9
MCHFR	7.29	6.34	7.23	6.26	7.34	6.36	7.19	6.34	7.29
LOC	17-14-20	31- 6- 8	47-18-20	5-30- 8	37-34-19	55-32- 8	13-46-20	29-56- 8	45-48-20
FLOW	0.0537	0.0534	0.0537	0.0532	0.0543	0.0534	0.0590	0.0534	0.0590
PKFL	1.62	2.34	1.63	2.37	1.71	2.33	1.55	2.34	1.53
MFLPD	0.380	0.444	0.378	0.450	0.350	0.443	0.378	0.444	0.381
LOC	21- 8- 5	31- 6- 8	53-22- 5	5-30- 8	35-32-16	55-32- 8	7-40- 5	29-56- 8	39-54- 5
PKFL	2.00	2.34	1.99	2.37	1.84	2.33	1.99	2.34	2.01
MAXEQ	0.197	0.222	0.197	0.220	0.190	0.219	0.197	0.221	0.196
LOC	21-14	29-10	47-18	7-34	37-34	53-28	21-44	31-52	39-48
FLOW	0.0537	0.0529	0.0537	0.0529	0.0543	0.0529	0.0537	0.0529	0.0537
PKF	1.28	1.39	1.28	1.38	1.26	1.38	1.28	1.38	1.28

59				48	48	48	48	48	48	48			
55			48	48	42	48	38	48	42	48	48		
51		48	48	14	48	30	48	30	48	14	48	48	
47	48	48	44	48	48	48	42	48	48	48	44	48	48
43	48	48	14	48	34	48	0	48	0	48	34	48	14	48	48
39	48	42	48	48	48	48	42	48	48	48	48	48	42	48
35	48	48	30	48	0	48	22	48	22	48	0	48	30	48	48
31	48	38	48	42	48	42	48	42	48	42	48	42	48	38	48
27	48	48	30	48	0	48	22	48	22	48	0	48	30	48	48
23	48	42	48	48	48	48	48	42	48	48	48	48	48	42	48
19	48	48	14	48	34	48	0	48	0	48	34	48	14	48	48
15		48	48	44	48	48	48	42	48	48	48	44	48	48
11			48	48	141	48	30	48	30	48	14	48	48
07				48	48	42	48	38	48	42	48	48
03				48	48	48	48	48	48	48		
	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58

OPERATOR	NOM SYM
SUBS VAL	ROD LOC
CR LOC	FIRST QUAD
1051	

CALIBRATED LPRM READINGS

57		11	13	13	14		
		14	21	22	20		
		18	27	30	25		
		19	29	28	28		
49	12	18	18	16	18	15	
	17	23	27	26	27	19	
	21	27	29	33	27	23	
	25	32	29	26	31	32	
41	16	16	17	22	17	19	14
	21	24	26	22	26	24	22
	27	27	27	24	30	27	29
	31	27	27	23	28	29	30
33	18	15	20	21	15	18	13
	30	23	30	31	25	30	24
	38	26	26	23	26	32	32
	27	24	23	19	24	26	30
25	17	15	19	20	16	17	15
	26	25	27	33	23	27	23
	31	27	25	27	25	30	32
	28	28	27	23	26	28	31
17	16	18	16	15	18	21	12
	19	26	24	22	28	24	15
	24	31	29	26	30	29	19
	32	30	31	25	29	31	22
09		16	16	18	16	13	
C		20	26	28	21	16	
B		25	31	37	26	19	
A		33	31	27	30	23	
	28	16	24	32	40	48	56

Table C-5

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12
AXIAL REL PWR	0.91	1.20	1.21	1.17	1.14	1.15	1.10	1.08	1.00	0.91	0.72	0.42
REGION REL PWR	0.94	1.00	0.94	1.11	1.04	1.11	0.94	1.00	0.94			
RING REL PWR	1.03	1.07	1.01	1.06	1.13	1.07	1.10	0.75				
APRM GAF	1.00	0.98	0.99	0.98	0.98	0.97						

FAILED LPRM LIST 1609,D,1 5633,B,1 3241,D,1 2449,D,1 4849,A,2

BASE CRIT CODE

FAILED SENSORS 5 6 15 25 28

DATE	6-14-78
TIME	0032
SEQ. NO.	27
CMWT	1730. 52.5%
GWT	513.1
CMCHFR	4.90
CMFLPD	0.499
CMPF	2.331
CMEQ	0.284
CAEQ	0.155
CAQA	0.081
CAVF	0.367
CAPD	26.66
CRD	0.135
CRSYM	2.

PERIODIC
PEACHBOTTOM UNIT 2

PR	1014.
DPC-M	3.53
DPC-C	7.33
RWL	23.74
DHS	37.05
WFW	6.55
WD	13.70
WTSUB	41.48
WTHB	-1.00
WT	42.96 41.9
WTFLAG	2.
ITER	1.
IREC	0.
IEQL	0.

REGION	1	2	3	4	5	6	7	8	9
MCHFR	5.63	5.84	5.65	4.94	6.53	4.90	5.65	5.84	5.66
LOC	9-22- 5	29- 6- 5	51-22- 5	11-28-19	27-24- 3	49-28-20	9-40- 5	31-56- 5	51-40- 5
FLOW	0.0501	0.0501	0.0502	0.0497	0.0498	0.0497	0.0502	0.0501	0.0502
PKFL	2.33	2.25	2.33	1.70	2.01	1.58	2.33	2.25	2.32
MFLPD	0.499	0.481	0.497	0.439	0.430	0.439	0.498	0.482	0.497
LOC	9-22- 5	29- 6- 5	51-22- 5	7-28-16	27-24- 3	53-34-16	9-40- 5	31-56- 5	51-40- 5
PKFL	2.33	2.25	2.33	2.05	2.01	2.05	2.33	2.25	2.32
MAXEQ	0.255	0.248	0.257	0.284	0.256	0.284	0.256	0.248	0.256
LOC	17-14	29- 6	43-14	9-32	27-24	51-32	17-48	29-56	43-48
FLOW	0.0500	0.0501	0.0499	0.0489	0.0498	0.0489	0.0499	0.0501	0.0499
PKF	1.33	1.31	1.34	1.43	1.34	1.43	1.34	1.31	1.34

59					48	48	48	48	48	48	48				
55				48	44	48	38	48	38	48	44	48			
51			48	34	48	6	48	24	48	6	48	34	48		
47		48	28	48	42	48	48	48	48	48	42	48	28	48	
43	48	48	48	0	48	30	48	0	48	30	48	0	48	48	48
39	48	48	40	48	48	48	48	48	48	48	48	48	40	48	48
35	48	20	48	36	48	0	48	38	48	0	48	36	48	20	48
31	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
27	48	20	48	36	48	0	48	38	48	0	48	36	48	20	48
23	48	48	40	48	48	48	48	48	48	48	48	48	40	48	48
19	48	48	48	0	48	30	48	0	48	30	48	0	48	48	48
15		48	28	48	42	48	48	48	48	48	42	48	28	48	
11			48	34	48	6	48	24	48	6	48	34	48		
07				48	44	48	38	48	38	48	44	48			
03					48	48	48	48	48	48	48				
	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58

OPERATOR	NON SYM
SUBS VAL	ROD LOC
CR LOC	FIRST QUAD

CALIBRATED LPRM READINGS

57		11	12	14	13		
		17	21	22	22		
		24	29	32	31		
		24	32	37	38		
49	12	16	17	16	16	14	
	24	29	24	25	25	24	
	27	39	30	26	33	28	
	20	34	36	34	36	22	
41	15	14	17	14	16	16	15
	26	24	28	22	27	27	27
	32	30	32	27	31	31	29
	43	33	38	36	36	30	40
33	21	18	15	16	14	20	17
	34	27	22	23	25	33	28
	32	34	28	31	31	36	23
	41	37	38	35	39	37	35
25	20	16	14	16	15	18	18
	32	30	23	27	23	30	30
	31	36	30	35	29	35	26
	35	38	40	40	36	31	34
17	14	15	16	15	17	17	12
	26	27	27	22	30	30	19
	31	34	34	26	36	32	22
	38	31	38	34	34	28	27
09D		14	15	18	14	13	
C		24	24	29	21	22	
B		36	31	33	30	29	
A		36	33	31	37	17	
	08	16	24	32	40	48	56

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12
AXIAL REL PWR	0.88	1.18	1.19	1.16	1.14	1.16	1.11	1.09	1.01	0.92	0.74	0.43
REGION REL PWR	0.94	1.00	0.94	1.11	1.04	1.11	0.94	0.99	0.94			
RING REL PWR	1.02	1.06	1.00	1.06	1.13	1.07	1.11	0.75				
APRM GAF	0.97	0.94	0.97	0.96	0.96	0.95						

FAILED LPRM LIST 1609,D,1 5633,B,1 3241,D,1 2449,D,1 4849,A,2

BASE CRIT CODE

FAILED SENSORS 5 6 15 25 28

DATE	6-14-78	PERIODIC LOG	
TIME	0150	PEACHBOTTOM UNIT 2	
SEQ. NO.	28		
CMWT	1713. 52.0 %	PR	1012.
GWF	502.6	DPC-M	3.53
CMCHFR	5.01	DPC-C	7.34
CMFLPD	0.485	RWL	23.68
CMPF	2.288	DHS	36.63
CMEQ	0.281	WFW	6.48
CAEQ	0.153	WD	13.55
CAQA	0.080	WTSUB	41.17
CAVF	0.362	WTHB	-1.00
CAPD	26.39	WT	43.03 42.0%
CRD	0.135	WTFLAG	2.
CRSYM	2.	ITER	1.
		IREC	0.
		IEQL	0.

REGION	1	2	3	4	5	6	7	8	9
MCHFR	5.80	6.00	5.82	5.01	6.75	5.01	5.82	6.00	5.83
LOC	9-22- 5	29- 6- 5	51-22- 5	9-32-19	27-24- 3	51-32-19	9-40- 5	31-56- 5	51-40- 5
FLOW	0.0503	0.0504	0.0504	0.0490	0.0500	0.0490	0.0504	0.0504	0.0504
PKFL	2.29	2.21	2.28	1.64	1.97	1.64	2.28	2.21	2.28
MFLPD	0.485	0.469	0.483	0.440	0.417	0.441	0.483	0.469	0.483
LOC	9-22- 5	29- 6- 5	51-22- 5	7-28-16	27-24- 3	53-34-16	9-40- 5	31-56- 5	51-40- 5
PKFL	2.29	2.21	2.28	2.08	1.97	2.08	2.28	2.21	2.28
MAXEQ	0.247	0.242	0.250	0.281	0.252	0.281	0.248	0.242	0.249
LOC	17-14	29- 6	43-14	9-32	27-24	51-32	17-48	29-56	43-48
FLOW	0.0503	0.0504	0.0502	0.0490	0.0500	0.0490	0.0502	0.0504	0.0502
PKF	1.32	1.30	1.33	1.43	1.33	1.43	1.33	1.30	1.33

59					48	48	48	48	48	48	48			
55				48	44	48	38	48	38	48	44	48		
51			48	34	48	6	48	24	48	6	48	34	48	
47		48	28	48	42	48	48	48	48	48	42	48	28	48
43	48	48	48	0	48	30	48	0	48	30	48	0	48	48	48
39	48	48	40	48	48	48	48	48	48	48	48	48	40	48	48
35	48	20	48	36	48	0	48	38	48	0	48	36	48	20	48
31	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
27	48	20	48	36	48	0	48	38	48	0	48	36	48	20	48
23	48	48	40	48	48	48	48	48	48	48	48	48	40	48	48
19	48	48	48	0	48	30	48	0	48	30	48	0	48	48	48
15		48	28	48	42	48	48	48	48	48	42	48	28	48	
11			48	34	48	6	48	24	48	6	48	34	48		
07				48	44	48	38	48	38	48	44	48			
03					48	48	48	48	48	48	48				
	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58

OPERATOR	NON SYM
SUBS VAL	ROD LOC
CR LOC	FIRST QUAD

CALIBRATED LPRM READINGS

57		11	13	14	14		
		17	21	22	22		
		23	29	32	30		
		23	31	36	37		
49	12	16	17	16	16	14	
	24	29	24	25	25	24	
	26	39	30	25	32	28	
	19	33	35	32	35	22	
41	15	15	17	14	16	16	16
	27	24	28	22	26	27	27
	31	29	32	26	31	31	28
	42	32	37	34	34	29	39
33	21	18	15	16	14	20	17
	34	28	22	23	25	33	28
	31	34	28	30	31	35	22
	41	36	37	34	38	36	34
25	21	17	14	16	16	18	19
	33	30	23	28	23	31	30
	31	36	30	35	29	35	26
	34	37	39	39	35	31	33
17	15	16	17	15	17	18	12
	27	28	28	22	30	31	19
	31	35	34	26	36	32	23
	38	31	38	33	33	27	27
09D		13	16	19	14	13	
C		24	24	29	22	22	
B		36	32	33	30	29	
A		36	33	30	36	17	
	08	16	24	32	40	48	56

Table C-7

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12
AXIAL REL PWR	0.76	1.03	1.04	1.04	1.07	1.13	1.11	1.14	1.12	1.08	0.91	0.56
REGION REL PWR	0.95	1.06	0.92	1.05	1.11	1.05	0.92	1.06	0.92			
RING REL PWR	1.08	1.13	1.08	1.09	1.13	1.08	1.08	0.71				
APRM GAF	1.02	1.01	1.02	1.01	1.01	1.00						

FAILED LPRM LIST 1609,D,1 5633,D,1 3241,D,3 2449,D,3 4849,A,1

BASE CRIT CODE	1609,B	2409,B	3209,B	4009,B	0817,B	1617,B	2417,B
3217,A	4017,B	4817,B	5617,B	0825,B	1625,A	2425,A	3225,A
4025,A	4825,B	5625,B	0833,B	1633,A	2433,A	3233,A	4033,A
4833,B	5633,B	0841,B	2441,B	3241,A	4041,B	4841,B	5641,B

FAILED SENSORS 5 6 15 25 28

DATE	6-14-78	PERIODIC LOG	
TIME	0700	PEACHBOTTOM UNIT 2	
SEQ. NO.	35		
CMWT	2032. 61.7%	PR	1007.
GMWE	618.8	DPC-M	3.59
CMCHFR	2.81	DPC-C	7.42
CMFLPD	0.516	RWL	23.66
CMPF	2.053	DHS	42.53
CMFQ	0.339	WFW	7.81
CAEQ	0.187	WD	13.85
CAQA	0.095	WTSUB	41.78
CAVF	0.370	WTHB	-1.00
CAPD	31.31	WT	42.32 41.3
CRD	0.117	WTFLAG	2.
CRSYM	2.	ITER	1.
		IREC	0.
		IEQL	0.

REGION	1	2	3	4	5	6	7	8	9
MCHFR	3.76	3.38	3.67	3.82	2.81	3.81	3.71	3.48	3.71
LOC	17-14-21	25-22-21	43-14-21	17-26-21	27-24-22	43-26-21	17-48-21	35-40-21	43-48-21
FLOW	0.0485	0.0483	0.0484	0.0485	0.0474	0.0485	0.0485	0.0485	0.0484
PKFL	1.38	1.56	1.38	1.41	1.40	1.41	1.38	1.56	1.38
MFLPD	0.516	0.487	0.514	0.478	0.433	0.479	0.515	0.487	0.514
LOC	9-22- 5	29-10-12	51-22- 5	7-28-16	27-24- 3	53-34-16	9-40- 5	33-56- 8	51-40- 5
PKFL	2.05	1.94	2.05	1.90	1.73	1.91	2.05	1.94	2.04
MAXEQ	0.307	0.314	0.310	0.306	0.339	0.306	0.308	0.312	0.309
LOC	17-14	25-22	43-14	17-26	27-24	43-26	17-48	29-56	43-48
FLOW	0.0485	0.0483	0.0484	0.0485	0.0474	0.0485	0.0485	0.0481	0.0484
PKF	1.32	1.34	1.33	1.31	1.40	1.32	1.32	1.33	1.32

59					48	48	48	48	48	48	48			
55				48	44	48	36	48	36	48	44	48		
51			48	34	48	18	48	30	48	18	48	34	48	
47		48	28	48	42	48	48	48	48	48	42	48	28	48
43	48	48	48	6	48	30	48	18	48	30	48	6	48	48	48
39	48	48	40	48	48	48	48	48	48	48	48	48	40	48	48
35	48	20	48	36	48	12	48	38	48	12	48	36	48	20	48
31	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
27	48	20	48	36	48	12	48	38	48	12	48	36	48	20	48
23	48	48	40	48	48	48	48	48	48	48	48	48	40	48	48
19	48	48	48	6	48	30	48	18	48	30	48	6	48	48	48
15		48	28	48	42	48	48	48	48	48	42	48	28	48	
11			48	34	48	18	48	30	48	18	48	34	48		
07				48	44	48	36	48	36	48	44	48			
03					48	48	48	48	48	48	48				
	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58

OPERATOR SURS VAL CR LOC 1051

NON SYM ROD LOC FIRST QUAD

CALIBRATED LPRM READINGS

57		15	18	19	19		
		22	28	30	30		
		27	34	39	36		
		24	31	36	38		
49	15	22	20	24	25	18	
	27	36	36	34	35	28	
	29	42	35	34	36	31	
	20	34	36	34	37	26	
41	18	22	28	17	24	22	18
	29	28	36	32	32	30	29
	33	31	35	29	34	33	30
	44	33	38	36	36	31	41
33	24	26	29	27	27	25	19
	37	32	28	30	30	36	30
	33	36	31	33	33	37	27
	42	37	38	35	39	37	35
25	24	23	27	28	27	23	21
	35	34	30	36	28	34	32
	33	39	32	38	31	37	28
	35	38	40	39	36	31	34
17	18	23	25	25	25	23	14
	30	33	36	32	38	35	21
	33	37	38	30	39	35	24
	39	31	39	34	34	28	28
09D		16	23	25	20	17	
C		30	35	38	31	27	
B		39	37	43	34	32	
A		37	32	29	38	17	

Table C-8

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12
AXIAL REL PWR	0.86	1.10	1.12	1.13	1.15	1.16	1.09	1.03	0.37	0.36	0.86	0.57
REGION REL PWR	0.97	0.99	0.97	1.03	1.10	1.03	0.97	0.99	0.97			
RING REL PWR	1.07	1.12	1.07	1.12	1.00	1.13	1.10	0.73				
APRM GAF	0.00	0.99	0.98	0.97	0.00	0.99						

FAILED LPRM LIST	1609,D,1	2409,C,1	2409,D,1	4009,A,2	1617,D,1	3217,B,1	4817,D,1
	0825,C,1	2425,A,1	4025,C,1	5625,A,1	1633,B,1	3233,D,1	4833,B,1
	0841,A,1	2441,C,1	3241,D,1	4041,A,1	4841,D,1	5641,C,1	1649,D,1
	3249,B,1	3249,C,1	4849,D,1	2457,A,1	4057,C,1		

BASE CRIT CODE	2409,A	3209,A	4009,B	4809,B	0817,	1617,A	2417,A
	3217,A	4017,A	4817,B	5617,A	0825,A	1625,A	2425,A
	4025,A	4825,A	5625,A	0833,A	1633,A	4033,A	4833,A
	1641,B	4041,A	4841,B	5641,A	0849,B	1649,B	4049,B

	3225,A	0841,B	4849,B				

FAILED SENSORS 5 6 15 25 27 29 33

DATE	7-18-78
TIME	2300
SEQ. NO.	15
CMWT	1741. (52.87%)
GMWE	593.6
CMCHFR	5.42
CMFLPD	0.482
CMPF	2.237
CMEQ	0.256
CAEQ	0.147
CAQA	0.081
CAVF	0.336
CAPD	26.83
CRD	0.109
CRSYM	2.

PERIODIC LOG
PEACHBOTTOM UNIT 2

PR	1017.
DPC-M	3.48
DPC-C	7.40
RWL	23.32
DHS	41.05
WFW	6.31
WD	13.40
WTSUB	40.87
WTHB	-1.00
WT	43.63
WTFLAG	2.
ITER	2.
IREC	0.
IEQL	0.

REGION	1	2	3	4	5	6	7	8	9
MCHFR	5.68	5.42	5.66	6.86	6.66	6.86	5.68	5.52	5.52
LOC	13-18-21	25-22-20	47-18-21	5-24-10	27-24-21	55-38-10	13-44-21	35-40-20	47-44-21
FLOW	0.0516	0.0508	0.0515	0.0592	0.0521	0.0592	0.0516	0.0509	0.0515
PKFL	1.39	1.60	1.39	1.69	1.42	1.69	1.39	1.59	1.40
MFLPD	0.481	0.411	0.480	0.399	0.403	0.398	0.482	0.411	0.481
LOC	17-10- 6	35-10- 3	43-10- 6	7-24-11	35-36- 5	53-24-11	17-52- 6	25-52- 3	43-52- 6
PKFL	2.23	1.91	2.23	1.85	1.87	1.85	2.24	1.91	2.23
MAXEQ	0.254	0.253	0.255	0.223	0.222	0.223	0.254	0.250	0.256
LOC	13-18	25-22	47-18	9-26	25-36	51-26	13-44	35-40	47-44
FLOW	0.0516	0.0508	0.0515	0.0519	0.0519	0.0519	0.0516	0.0509	0.0515
PKF	1.39	1.36	1.39	1.26	1.26	1.26	1.39	1.35	1.40

CALIBRATED LPRM READINGS

57		12	15	17	15		
		18	21	19	25		
		23	28	24	33		
		21	23	31	23		
49	12	18	18	18	18	15	
	21	30	23	24	25	24	
	28	34	28	27	32	28	
	28	30	32	33	29	31	
41	16	18	22	21	20	19	16
	25	23	27	22	26	26	28
	35	26	33	26	32	32	36
	27	29	35	32	31	26	25
33	19	20	23	22	22	21	17
	24	24	23	23	24	27	20
	31	28	27	27	29	31	24
	36	31	35	37	33	31	32
25	19	19	21	24	21	19	18
	28	24	25	25	25	24	26
	34	29	32	30	31	30	35
	31	31	34	35	33	31	26
17	15	19	19	19	20	21	12
	26	28	23	22	26	33	19
	35	32	29	30	32	37	26
	34	30	35	33	33	30	22
09D		15	18	21	17	14	
C		26	27	23	25	21	
B		35	34	29	36	27	
A		37	35	36	27	25	
	08	16	24	32	40	48	56

59					48	48	48	48	48	48	48				
55				48	48	34	48	12	48	34	48	48			
51			48	48	40	48	48	48	48	48	40	48	48		
47		48	48	28	48	6	48	38	48	6	48	28	48	48	
43	48	48	40	48	48	48	48	48	48	48	48	48	40	48	48
39	48	34	48	6	48	38	48	12	48	38	48	6	48	34	48
35	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
31	48	12	48	38	48	12	48	44	48	12	48	38	48	12	48
27	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
23	48	34	48	6	48	38	48	12	48	38	48	6	48	34	48
19	48	48	40	48	48	48	48	48	48	48	48	48	40	48	48
15		48	48	28	48	6	48	38	48	6	48	28	48	48	
11			48	48	40	48	48	48	48	48	40	48	48		
07				48	48	34	48	12	48	34	48	48			
03					48	48	48	48	48	48	48				
	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58

OPERATOR SUBS VAL CR LOC	NON SYM ROD LOC FIRST QUAD

Table C-9

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12
AXIAL REL PWR	0.83	1.08	1.11	1.13	1.16	1.17	1.10	1.04	0.97	0.97	0.87	0.58
REGION REL PWR	0.97	0.99	0.97	1.03	1.09	1.03	0.97	0.99	0.97			
RING REL PWR	1.06	1.11	1.07	1.12	1.00	1.13	1.10	0.73				
APRM GAF	0.00	0.99	0.99	0.98	0.00	0.99						

FAILED LPRM LIST	1609,D,1	2409,C,1	2409,D,1	4009,A,2	1617,D,1	3217,B,1	4817,D,1
0825,C,1	2425,A,1	4025,C,1	5625,A,1	1633,B,1	3233,D,1	4833,B,1	5633,B,1
0841,A,1	2441,C,1	3241,D,1	4041,A,1	4841,D,1	5641,C,1	1649,D,1	2449,D,1
3249,B,1	3249,C,1	4849,D,1	2457,A,1	4057,C,1			

BASE CRIT CODE	2409,A	3209,A	4009,B	4809,B	0817,B	1617,B	2417,A
3217,A	4017,A	4817,B	5617,B	0825,B	1625,A	2425,A	3225,A
4025,A	4825,A	5625,B	0833,A	1633,A	4033,A	4833,A	0841,B
1641,B	4041,A	4841,B	5641,B	0849,B	1649,B	4049,B	4849,B

FAILED SENSORS 5 6 15 25 27 29 33

DATE	7-18-78
TIME	2348
SEQ. NO.	1
CMWT	1715.
GWWE	494.9
CMCHFR	5.68
CMFLPD	0.470
CMPF	2.218
CMEQ	0.250
CAEQ	0.145
CAQA	0.080
CAVF	0.334
CAPD	26.42
CRD	0.109
CRSYM	2.

PERIODIC LOG
PEACHBOTTOM UNIT 2

PR	1004.
DPC-M	3.48
DPC-C	7.39
RWL	23.85
DHS	40.25
WFW	6.20
WD	13.37
WTSUB	40.81
WTHB	-1.00
WT	43.59
WTFLAG	2.
ITER	1.
IREC	0.
IEQL	0.

REGION	1	2	3	4	5	6	7	8	9
MCHFR	5.93	5.68	5.92	6.96	7.04	6.96	5.90	5.78	5.87
LOC	13-18-20	25-22-20	47-18-20	5-24-10	27-24-21	55-38-10	13-46-12	35-40-20	47-44-20
FLOW	0.0517	0.0508	0.0516	0.0591	0.0523	0.0591	0.0584	0.0509	0.0516
PKFL	1.49	1.59	1.48	1.70	1.42	1.70	2.00	1.59	1.43
MFLPD	0.470	0.403	0.469	0.400	0.396	0.400	0.470	0.403	0.469
LOC	17-10- 6	37- 8- 9	43-10- 6	7-24-11	35-36- 5	53-24-11	17-52- 6	37-54- 9	43-52- 6
PKFL	2.22	1.90	2.21	1.89	1.87	1.88	2.22	1.90	2.21
MAXEQ	0.248	0.247	0.249	0.222	0.220	0.222	0.249	0.244	0.250
LOC	13-18	25-22	47-18	9-26	25-36	51-26	13-44	35-40	47-44
FLOW	0.0517	0.0508	0.0516	0.0518	0.0518	0.0518	0.0516	0.0509	0.0516
PKF	1.39	1.36	1.39	1.27	1.27	1.27	1.39	1.35	1.39

	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58
59					48	48	48	48	48	48	48				
55				48	48	34	48	12	48	34	48	48			
51			48	48	40	48	48	48	48	48	40	48	48		
47		48	48	28	48	6	48	38	48	6	48	28	48	48	
43	48	48	40	48	48	48	48	48	48	48	48	48	40	48	48
39	48	34	48	6	48	38	48	12	48	38	48	6	48	34	48
35	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
31	48	12	48	38	48	12	48	44	48	12	48	38	48	12	48
27	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
23	48	34	48	6	48	38	48	12	48	38	48	6	48	34	48
19	48	48	40	48	48	48	48	48	48	48	48	48	40	48	48
15		48	48	28	48	6	48	38	48	6	48	28	48	48	
11			48	48	40	48	48	48	48	48	40	48	48		
07				48	48	34	48	12	48	34	48	48			
03					48	48	48	48	48	48	48				

OPERATOR	NON SYM
SUBS VAL	ROD LOC
CR LOC	FIRST QUAD

CALIBRATED LPRM READINGS

57		12	14	17	15		
		17	21	19	25		
		23	28	24	32		
		20	22	30	23		
49	12	17	18	18	18	15	
	21	29	23	24	25	24	
	27	34	28	27	32	28	
	27	29	31	32	28	30	
41	16	18	22	21	20	13	16
	25	23	27	21	26	26	28
	35	26	33	25	32	32	36
	27	28	34	31	31	26	24
33	19	20	23	22	22	21	16
	24	23	23	23	24	27	20
	31	28	26	27	29	31	24
	35	30	33	35	32	30	31
25	19	19	21	23	21	18	18
	27	23	25	24	25	24	26
	34	29	31	29	31	30	35
	30	30	33	34	32	29	25
17	15	19	19	19	20	21	12
	26	28	23	22	26	33	19
	34	32	29	29	31	37	25
	33	29	33	31	31	29	21
09D		15	18	21	16	14	
C		26	27	23	26	21	
B		35	34	29	35	25	
A		36	34	35	27	24	
	08	16	24	32	40	48	56

Table C-10

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12
AXIAL REL PWR	0.75	0.97	0.98	1.02	1.08	1.15	1.13	1.16	1.15	1.11	0.93	0.57
REGION REL PWR	0.95	1.01	0.95	1.05	1.12	1.05	0.95	1.01	0.95			
RING REL PWR	1.06	1.11	1.12	1.13	1.04	1.12	1.08	0.71				
APRM GAF	0.99	1.01	1.01	1.00	1.00	0.99						

FAILED LPRM LIST 1609,D,1 2409,D,1 5633,B,1 3241,D,2 2449,D,3 3249,C,1

DATE	7-19-78	PERIODIC LOG	
TIME	0629	PEACHBOTTOM UNIT 2	
SEQ. NO.	7		
CMWT	2028.	PR	1008.
GMWE	600.2	DPC-M	3.36
CMCHFR	3.40	DPC-C	7.43
CMFLPD	0.503	RWL	23.77
CMPF	2.004	DHS	47.58
CMEQ	0.309	WFW	7.43
CAEQ	0.177	WD	13.03
CAQA	0.094	WTSUB	40.12
CAVF	0.343	WTHB	-1.00
CAPD	31.25	WT	42.69
CRD	0.092	WTFLAG	2.
CRSYM	2.	ITER	1.
		IREC	0.
		IEQL	0.

BASE CRIT CODE 2409,B 3209,B 4009,B 4809,B 0817,B 1617,B 2417,B
3217,B 4017,B 4817,B 5617,B 0825,B 1625,B 2425,B 3225,B
4025,B 4825,A 5625,B 0833,B 1633,B 2433,B 3233,A 4033,B
4833,A 0841,B 1641,B 3241,B 4041,B 4841,B 5641,B 0849,B

FAILED SENSORS 5 6 15 25 27

REGION	1	2	3	4	5	6	7	8	9
MCHFR	3.74	3.40	3.72	4.57	4.43	4.53	3.74	3.49	3.69
LOC	13-18-21	25-22-21	47-18-21	11-28-21	25-36-21	49-28-21	13-44-21	35-40-21	47-44-21
FLOW	0.0502	0.0488	0.0501	0.0501	0.0498	0.0501	0.0502	0.0489	0.0501
PKFL	1.52	1.59	1.51	1.43	1.41	1.44	1.51	1.58	1.52
MFLPD	0.502	0.457	0.501	0.457	0.435	0.459	0.503	0.457	0.501
LOC	17-10- 6	25-22-19	43-10- 6	21-32-16	27-24-18	39-30-16	17-52- 6	37-54-11	43-52- 6
PKFL	2.00	1.82	2.00	1.82	1.73	1.83	2.00	1.82	2.00
MAXEQ	0.295	0.309	0.297	0.271	0.278	0.272	0.296	0.305	0.298
LOC	13-18	25-22	47-18	11-28	25-36	49-28	13-44	35-40	47-44
FLOW	0.0502	0.0488	0.0501	0.0501	0.0498	0.0501	0.0502	0.0489	0.0501
PKF	1.35	1.36	1.36	1.26	1.28	1.27	1.36	1.35	1.36

CALIBRATED LPRM READINGS

57		14	17	19	18		
		21	27	29	30		
		26	31	27	36		
		22	26	31	24		
49	14	22	21	22	24	18	
	25	36	30	28	31	28	
	30	37	31	33	35	30	
	28	31	33	34	29	32	
41	19	24	27	25	26	26	19
	30	30	35	33	34	33	33
	38	29	37	28	35	34	39
	30	29	36	32	34	26	25
33	23	25	27	26	26	25	19
	35	31	34	32	37	35	31
	34	33	30	30	32	36	28
	37	31	34	36	33	32	32
25	23	25	25	27	25	25	21
	33	32	34	37	33	32	33
	37	32	35	33	34	33	39
	31	31	36	35	33	31	29
17	18	24	26	23	27	25	15
	30	35	31	30	34	40	23
	37	35	32	33	34	40	28
	35	31	35	33	32	30	23
09D		18	21	25	20	17	
C		30	33	34	31	25	
B		38	38	33	39	29	
A		39	37	37	30	26	
	08	16	24	32	40	48	56

59					48	48	48	48	48	48	48				
55				48	48	34	48	20	48	34	48	48			
51			48	48	40	48	48	48	48	48	40	48	48		
47		48	48	28	48	16	48	38	48	16	48	28	48	48	
43	48	48	40	48	48	48	48	48	48	48	48	48	40	48	48
39	48	34	48	16	48	38	48	20	48	38	48	16	48	34	48
35	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
31	48	20	48	38	48	20	48	44	48	20	48	38	48	20	48
27	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
23	48	34	48	16	48	38	48	20	48	38	48	16	48	34	48
19	48	48	40	48	48	48	48	48	48	48	48	48	40	48	48
15		48	48	28	48	16	48	38	48	16	48	28	48	48	
11			48	48	40	48	48	48	48	48	40	48	48		
07				48	48	34	48	20	48	34	48	48			
03					48	48	48	48	48	48	48				
	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58

OPERATOR NON SYM
SUBS VAL ROD LOC
CR LOC FIRST QUAD

Table C-11

[illegible]

[illegible] 9- 3-7[illegible] TIME 0211 PEACHBOTTOM UNIT 2 SEQ. NO. 1

PERIODIC NSS CORE PERFORMANCE LOG

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12
AVG REL PWR	0.69	0.91	1.02	1.11	1.14	1.15	1.15	1.18	1.12	1.09	0.90	0.55
MODE REL PWR	0.94	1.03	0.94	1.06	1.12	1.06	0.94	1.22	0.94			
RING REL PWR	1.02	1.10	1.14	1.09	1.05	1.14	1.11	0.69				
APRM GAF	0.97	0.99	0.99	0.99	1.00	0.99						

REGION	1	2	3	4	5	6	7	8	9
FLCPR	0.663	0.667	0.652	0.656	0.645	0.65[illegible]	0.653	0.652	0.633
LOC	17-10	25-22	43-10	7-23	25-36	53-34	17-52	35-40	43-52
FLOW	0.0533	0.0537	0.0533	0.0538	0.0541	0.0538	0.0533	0.0533	0.0533
PKF	1.35	1.32	1.35	1.30	1.28	1.30	1.35	1.31	1.35
MFLPD	0.380	0.366	0.380	0.390	0.346	0.385	0.381	0.367	0.380
LOC	17-10- 1	25- 5- 8	43-10- 4	5-32- 5	27-24-13	55-30- 9	17-52- 5	31-58- 3	43-52- 4
PARL	1.64	1.77	1.84	1.69	1.67	1.56	1.64	1.76	1.84
MAXEQ	0.225	0.218	0.227	0.215	0.210	0.215	0.225	0.216	0.228
LOC	17-10	25-22	43-10	7-23	27-24	53-34	17-52	35-40	43-52
FLOW	0.0533	0.0537	0.0533	0.0538	0.0540	0.0538	0.0533	0.0533	0.0533
PKF	1.35	1.32	1.35	1.30	1.28	1.30	1.35	1.31	1.35

FAILED SENSORS 5 6 15 25 35

FAILED LPRM LIST

1609,D,1 3633,B,2 2441,C,2 3241,D,1
2449,D,1 4049,C,2 4849,A,2 4349,C,2
2457,A,1 4057,A,2

BASE UNIT CODE

CMWT	1671.
GWE	500.1
CMFCP	0.683
CMFLPD	0.390
CMPF	1.889
CMEQ	0.228
CAEQ	0.137
CADA	0.078
CAVF	0.313
CAPD	29.75
CRD	0.062
CRSYM	2.
PR	1004.
DPC-1	3.77
DPC-2	7.50
RWL	24.24
DHS	37.06
WFW	6.08
WD	14.52
WTSUB	43.13
WTRE	-1.00
WT	45.21
WTFLAG	2.
ITEL	1.
IREC	0.
ISOL	0.
IXYFLG	3.

Table C-12

DATE 9-8-78 TIME 0335 PEACHBOTTOM UNIT 2 SEQ. NO.3

DATA FROM

PERIODIC NSS CORE PERFORMANCE LOG

	1	2	3	4	5	6	7	8	9	10	11	12	
AXIAL LOCATION REL PWR	0.68	0.87	1.03	1.17	1.19	1.18	1.12	1.11	1.07	1.05	0.91	0.62	CMWT 1450.
													PR 1010.
													DHS 33.11
													WT 44.87

Table C-13

09/08/78

DATE 9- 8-78 TIME 0511 PEACHBOTTOM UNIT 2 SEQ. NO. 5

PERIODIC NSS CORE PERFORMANCE LOG

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12
AXIAL REL PWR	0.58	0.82	0.97	1.10	1.15	1.20	1.18	1.17	1.15	1.12	0.95	0.61
REGION REL PWR	0.96	1.03	0.95	1.05	1.04	1.05	0.95	1.02	0.95			
RING REL PWR	1.00	1.04	1.03	1.03	0.95	1.16	1.18	0.74				
APRM GAF	0.96	0.96	0.98	1.01	1.02	1.00						

REGION	1	2	3	4	5	6	7	8	9
MFLCPR	0.543	0.517	0.543	0.544	0.473	0.544	0.544	0.517	0.543
LOC	17-10	35-10	43-10	7-28	25-36	53-34	17-52	35-52	43-52
FLOW	0.0546	0.0548	0.0546	0.0545	0.0552	0.0545	0.0546	0.0548	0.0546
PKF	1.41	1.34	1.41	1.41	1.23	1.41	1.41	1.34	1.41
MFLPD	0.313	0.314	0.312	0.311	0.287	0.312	0.313	0.314	0.313
LOC	17-10-12	29- 6-10	43-10-12	7-28-12	29-26-19	53-34-12	17-52-12	31-56-10	43-52-12
PKFL	2.00	2.00	2.00	1.99	1.83	1.99	2.00	2.01	2.00
MAXEQ	0.175	0.164	0.175	0.174	0.145	0.174	0.175	0.164	0.175
LOC	17-10	35-10	43-10	7-28	25-36	53-34	17-52	35-52	43-52
FLOW	0.0546	0.0548	0.0546	0.0545	0.0552	0.0545	0.0546	0.0548	0.0546
PKF	1.41	1.34	1.41	1.41	1.23	1.41	1.41	1.34	1.41

CMWI	1266.
GMWE	359.8
CMFCP	0.544
CMFLPD	0.314
CMPF	2.007
CMEQ	0.175
CAEQ	0.104
CAQA	0.059
CAVF	0.267
CAPD	19.50
CRD	0.091
CRSYM	2.
PR	993.
DPC-M	3.36
DPC-C	7.34
RWL	23.55
DHS	29.18
WFW	4.51
WD	14.15
WTSUB	42.38
WTHB	-1.00
WI	44.68
WIFLAG	2.
ITER	1.
IREC	0.
IEQL	0.
IXYFLG	0.

FAILED SENSORS 5 6 15 25 28

FAILED LPRM LIST

1609,D,1 5633,B,2 2441,C,1 3241,D,2
2449,D,3 4049,C,2 4849,A,2 4849,C,2
2457,A,1 4057,A,2

BASE CRIT CODE

1609,2 2409,2 2417,1 3217,1
1625,1 2425,2 3225,2 4025,1
0833,2 1633,1 2433,2 3233,2
4033,1 2441,2 3241,2 2449,2
3249,2 4049,2 2457,2 3257,2

APPENDIX D

STATISTICAL DATA

The tables in this appendix contain statistical data for the recorded signals. These tables are copies of the mini-computer output obtained at the test site from the data acquisition system (DAS) computer. The first column, headed CH#, lists signal channel number. The second column, headed NAME, identifies each signal. For example L 08-17A, signifies LPRM string at reactor coordinates 08-17 and sensor at level A (See Figure 24 of Reference 8). Other typical abbreviations are: APRM A for average power range monitor A; TIP 4 for traversing in-core probe 4; RC A DP for recirculation loop A flow nozzle differential pressure; FW A DP for feedwater line A flow nozzle differential pressure; WLRL NG for reactor water level, narrow range; JP 1 DP for jet pump number 1 diffuser differential pressure; STM A DP for main steam line A flow nozzle differential pressure; CORE DP for core differential pressure; FW TEM A for temperature in feedwater line A; WTRL WR for reactor water level, wide range; RC TEM A for recirculation loop A temperature; CF TOTAL for total core flow; P RX W and P RX N for reactor pressure, wide range and narrow range, respectively; CORE P for core pressure; STMA P for steam line A pressure.

The column headed EU shows engineering units: W/C^2 means watts per square centimeter; PCT means percent; PSID and PSIA for pounds per square inch differential and absolute, respectively; INCH means inch; DEGF means degrees Fahrenheit; GAIN and FILTER columns give signal amplifier gain and low pass filter cutoff frequency. The SLOPE and INT. columns give slope and intercept values to be applied to the recorded data to obtain data in engineering units. The remaining columns: MEAN, mean value; STD DEV, standard deviation; MIN VAL, minimum value; and MAX VAL, maximum value; are in the corresponding engineering units. If a line in a table is blank, it indicates that a signal was deleted for that particular test for some reason. In some cases the notation NSIG (no signal) is printed in the engineering units column. Occasionally an instrument would be recalibrated by plant personnel after the slopes and intercepts had been established in the DAS. If there was not time to correct the DAS information before the test, the tables show an asterisk in the engineering units column to indicate some inaccuracy in the data as a result of using old calibration values.

There are two types of data in the tables, NOISE and PRBS. The NOISE tables have steady state data. The PRBS (Pseudorandom Binary Sequence) tables have data for the perturbed system. At the end of each table the number of data points included in the statistics and the frequency band of the digital filter used are given.

Table D-1
STATISTICAL DATA, RANDOM STEP, 1PT1 (39.7%P, 47.8%F)

RUN NO. 5 DATE 3/24/78 TIME 7:24:38:524 THRU 7:25: 7:924

1PT1
RANDOM STEPS
P=39.7%
F=47.8%

PB2 PT1 RANDOM STEPS

WDS BUF	BUF REC	CLOSURE PERIOD	SCAN PERIOD	PACER PERIOD
116	35	0	12	25

SCAN MODE	FIRST CHANNEL	LAST CHANNEL	PHYREC SIZE
0	0	115	4064

I. D. T A B L E

CH#	NAME	EU	GAIN	FILTER		SLOPE	INT.	MEAN	STD DEV	MIN VAL	MAX VAL
0	L 08-17A	W/C2	46	100		.062500	-.062500	28.456250	1.710682	24.000000	32.750000
1	L 08-17B	W/C2	50	100		.065800	-.065800	22.171456	1.756447	17.437000	26.385799
2	L 08-17C	W/C2	38	100		.062500	-.062500	14.343265	1.365338	10.812500	17.750000
3	L 08-17D	W/C2	27	100		.062500	-.062500	8.871454	.822034	5.937500	10.250000
4	L 08-25A	W/C2	25	100		.062500	-.062500	24.132245	1.454567	20.687500	27.375000
5	L 08-25B	W/C2	23	100		.062500	-.062500	27.055689	2.163505	21.875000	31.875000
6	L 08-25C	W/C2	10	100		.062500	-.062500	21.315969	1.988276	16.750000	26.312500
7	L 08-25D	W/C2	19	100		.062500	-.062500	12.281097	1.257241	9.375000	15.562500
8	L 08-33A	W/C2	20	100		.062500	-.062500	24.148240	1.458487	20.750000	27.812500
9	L 08-33B	W/C2	25	100		.062500	-.062500	32.748342	2.581290	26.875000	39.500000
10	L 08-33C	W/C2	26	100		.062500	-.062500	25.894289	2.295436	19.875000	31.125000
11	L 08-33D	W/C2	21	100		.062500	-.062500	14.558612	1.461821	10.875000	18.500000
12	L 08-49A	W/C2	42	100		.062500	-.062500	21.630204	1.289123	18.250000	25.062500
13	L 08-49B	W/C2	37	100		.062500	-.062500	17.548903	1.344597	14.250000	21.125000
14	L 08-49C	W/C2	39	100		.062500	-.062500	12.916607	1.216210	9.812500	16.312500
15	L 08-49D	W/C2	28	100		.062500	-.062500	6.974745	.740952	5.000000	9.250000
16	L 16-33A	W/C2	22	100		.062500	-.062500	23.455791	1.374271	20.250000	26.750000
17	L 16-33B	W/C2	22	100		.062500	-.062500	22.818061	1.729741	18.125000	26.250000
18	L 16-33C	W/C2	17	100		.062500	-.062500	18.889668	1.699333	14.875000	23.062500
19	L 16-33D	W/C2	23	100		.062500	-.062500	12.579566	1.257464	9.500000	15.875000
20	L 16-49A	W/C2	43	100		.062500	-.062500	28.755714	1.740192	24.312500	33.520000
21	L 16-49B	W/C2	45	100		.062500	-.062500	23.828138	1.905661	19.125000	29.800000
22	L 16-49C	W/C2	44	100		.062500	-.062500	16.998699	1.599562	13.312500	21.250000
23	L 16-49D	W/C2	31	100		.062500	-.062500	9.527296	.984734	7.062500	12.312500
24	L 16-57A	W/C2	22	100		.062500	-.062500	17.776199	1.083347	15.000000	20.750000
25	L 16-57B	NSIG	50	100		.000000	.000000	.000000	.000000	.000000	.000000
26	L 16-57C	W/C2	20	100		.062500	-.062500	11.209541	1.066410	8.562500	13.875000
27	L 16-57D	W/C2	19	100		.062500	-.062500	6.501582	.661713	4.750000	8.250000
28	L 24-17A	W/C2	23	100		.062500	-.062500	26.27 72	1.554593	22.375000	29.875000
29	L 24-17B	W/C2	24	100		.062500	-.062500	24.196684	1.924166	19.375000	28.750000
30	L 24-17C	W/C2	25	100		.062500	-.062500	19.736939	1.802340	15.250000	24.375000
31	L 24-17D	NSIG	50	100		.000000	-.000000	-.000000	.000000	-.000000	-.000000
32	L 24-25A	W/C2	43	100		.062500	-.063000	22.904261	1.342021	19.373699	26.248699
33	L 24-25B	W/C2	40	100		.062500	-.062500	21.786173	1.732179	17.250000	26.250000
34	L 24-25C	W/C2	50	100		.075000	-.075000	18.538329	1.741935	14.174601	22.967400
35	L 24-25D	W/C2	41	100		.062500	-.062500	16.936454	1.703109	12.562500	21.187500
36	L 24-41A	W/C2	41	100		.062500	-.062500	24.457372	1.452820	20.875000	28.250000
37	L 24-41B	W/C2	42	100		.062500	-.062500	23.159413	1.845289	18.500000	27.562500
38	L 24-41C	W/C2	50	100		.068338	-.069717	20.875872	1.928167	15.832982	25.147007
39	L 24-41D	W/C2	33	100		.062500	-.062500	14.327934	1.406324	10.250000	17.500000
40	L 32-09A	NSIG	50	100		.000000	.000000	.000000	.000000	.000000	.000000
41	L 32-09B	W/C2	25	100		.062501	-.062500	32.205592	2.551711	26.187920	38.250610
42	L 32-09C	W/C2	27	100		.062500	-.062500	24.469439	2.253984	19.062500	29.937500
43	L 32-09D	W/C2	22	100		.062503	-.062500	14.091086	1.393057	10.750519	17.375835
44	L 32-33A	W/C2	19	100		.062500	-.062500	17.281224	.988876	14.750000	19.625000
45	L 32-33B	W/C2	23	100		.062503	-.062500	18.375730	1.376485	15.063225	21.751045
46	L 32-33C	W/C2	27	100		.062503	-.062500	19.599973	1.780695	15.250734	24.126160
47	L 32-33D	W/C2	23	100		.062500	-.062500	19.620204	1.941[illegible]	14.875000	24.375000
48	L 32-41A	W/C2	25	100		.062500	-.062500	19.467580	1.14753[illegible]	16.625000	22.375000
49	L 32-41B	W/C2	28	100		.062500	-.062500	20.135561	1.583994	16.625000	24.000000
50	L 32-41C	W/C2	30	100		.062500	-.062500	16.208571	1.520784	12.625000	20.000000
51	L 32-41D	NSIG	50	100		-.000000	-.000000	-.000000	.000000	-.000000	-.000000
52	L 32-57A	W/C2	22	100		.062500	-.062500	24.647781	1.562195	21.000000	28.750000
53	L 32-57B	W/C2	27	100		.062503	-.062500	27.271962	2.199126	22.125089	33.081328
54	L 32-57C	W/C2	25	100		.062503	-.062500	18.409245	1.742687	14.563232	23.063660
55	L 32-57D	W/C2	18	100		.062505	-.062515	10.587139	1.071128	8.063135	13.501072
56	L 40-33A	W/C2	42	100		.062501	-.062485	20.848218	1.[illegible]51174	17.625366	24.062992
57	L 40-33B	W/C2	41	100		.062500	-.062500	21.345969	1.683947	17.312500	25.750000
58	L 40-33C	W/C2	41	100		.062501	-.062500	18.962384	1.764274	14.625147	23.625237
59	L 40-33D	W/C2	32	100		.062502	-.062500	13.055139	1.322431	9.500288	16.563000
60	L 40-41A	W/C2	27	100		.062500	-.062500	24.136913	1.399810	20.625000	27.687500
61	L 40-41B	W/C2	19	100		.062501	-.062485	26.607864	1.987490	22.000450	31.125633
62	L 40-41C	W/C2	20	100		.062500	-.062500	21.890536	1.982605	16.625000	25.500000
63	L 40-41D	W/C2	22	100		.062530	-.062546	13.257447	1.317670	10.129848	16.445381
64	L 48-25A	W/C2	40	100		.062507	-.062515	24.211543	1.490426	20.377438	28.003349
65	L 48-25B	W/C2	43	100		.062500	-.062500	26.824634	2.097081	21.750000	32.000000
66	L 48-25C	W/C2	50	100		.066702	-.066711	22.926882	2.082453	17.342510	28.615147
67	L 48-25D	W/C2	36	100		.062510	-.062515	11.650813	1.221941	8.251314	15.189924
68	L 48-49A	W/C2	45	100		.062501	-.062500	28.362112	1.671432	24.125385	32.375519
69	L 48-49B	W/C2	50	100		.076781	-.076797	21.482150	1.771295	16.891804	26.105526
70	L 48-49C	W/C2	47	100		.062500	-.062500	14.097168	1.372951	10.562500	18.062500
71	L 48-49D	W/C2	30	100		.062500	-.062500	8.731378	.893840	6.500000	11.125000
72	L 56-25A	W/C2	27	100		.062500	-.062500	25.563444	1.694346	22.250000	30.750000
73	L 56-25B	W/C2	27	100		.062502	-.066254	29.365906	2.387739	23.746964	35.122307
74	L 56-25C	W/C2	25	100		.062500	-.062500	19.286846	1.813314	15.062500	24.000000
75	L 56-25D	W/C2	21	100		.062500	-.062500	10.987219	1.103534	8.312500	14.062500
76	L 56-33A	W/C2	47	100		.062507	-.062515	26.110162	1.659855	21.564907	30.440903
77	L 56-33B	W/C2	40	100		.062509	-.062500	29.876658	2.364238	23.878448	35.898173
78	L 56-33C	W/C2	40	100		.062513	-.062515	20.597264	1.924941	15.753273	25.567814
79	L 56-33D	W/C2	50	100		-.000000	-.000000	-.000000	.000000	-.000000	-.000000
80	APRM A	PCT	10	100		.062503	-.062500	42.619187	3.138274	35.581427	50.002007
81	APRM C	PCT	10	100		.062502	-.062500	42.448343	3.246817	35.126060	50.126511
82	APRM D	PCT	10	100		.062501	-.063751	43.043135	3.269228	35.561607	50.686760
83	APRM F	PCT	10	100		.062506	-.062500	42.347684	3.333343	34.753479	50.255028
106	CORE P W	PSIA	2	10		.747100	11.965799	1010.236544	2.480246	1004.861694	1015.321167
107	CORE P N	PSIA	10	100		.075300	1012.880859	1014.836535	2.507[illegible]	1008.664062	1020.184932

2450 SAMPLES PER CHANNEL ANALYZED
FILTER BAND .00 TO 1000.0 HZ

Table D-2
STATISTICAL DATA, NOISE RUN, 1PT1 (39.7%P, 47.8%F)

RUN NO. 4 DATE 3/24/78 TIME 6:41:22:196 THRU 6:41:45:296

1PT1
NOISE
P=39.7%
F=47.8%

PB2 PT1 NOISE

WDS BUF	BUF REC	CLOSURE PERIOD	SCAN PERIOD	PACER PERIOD
116	35	0	12	25

SCAN MODE	FIRST CHANNEL	LAST CHANNEL	PHYREC SIZE
0	0	115	4064

I. D. T A B L E

CH#	NAME	EU	GAIN	FILTER	SLOPE	INT.	MEAN	STD DEV	MIN VAL	MAX VAL
0	L 08-17A	W/C2	46	100	.062500	-.062500	28.687727	.510959	27.187500	29.812500
1	L 08-17B	W/C2	50	100	.065800	-.065800	22.282613	.486269	20.924400	23.668000
2	L 08-17C	W/C2	38	100	.062500	-.062500	14.535844	.425933	13.312500	15.750000
3	L 08-17D	W/C2	27	100	.062500	-.062500	8.171396	.321038	7.312500	9.062500
4	L 08-25A	W/C2	25	100	.062500	-.062500	24.276839	.345126	23.312500	25.125000
5	L 08-25B	W/C2	23	100	.062500	-.062500	27.270877	.489209	25.937500	28.500000
6	L 08-25C	W/C2	10	100	.062500	-.062500	21.484058	.394559	20.312500	22.812500
7	L 08-25D	W/C2	19	100	.062500	-.062500	12.424903	.265768	11.625000	13.187500
8	L 08-33A	W/C2	20	100	.062500	-.062500	24.257078	.311019	23.250000	25.000000
9	L 08-33B	W/C2	25	100	.062500	-.062500	32.951916	.519917	31.437500	34.312500
10	L 08-33C	W/C2	26	100	.062500	-.062500	25.292825	.495598	23.625000	27.062500
11	L 08-33D	W/C2	21	100	.062500	-.062500	14.626883	.303971	13.750000	15.562500
12	L 08-49A	W/C2	42	100	.062500	-.062500	21.739188	.443248	20.500000	22.812500
13	L 08-49B	W/C2	37	100	.062500	-.062500	17.709968	.400219	16.625000	18.625000
14	L 08-49C	W/C2	39	100	.062500	-.062500	13.075130	.397028	12.000000	14.125000
15	L 08-49D	W/C2	28	100	.062500	-.062500	7.102500	.335659	6.312500	8.062500
16	L 16-33A	W/C2	22	100	.062500	-.062500	23.572143	.265995	22.750000	24.250000
17	L 16-33B	W/C2	22	100	.062500	-.062500	22.225000	.334467	21.375000	23.125000
18	L 16-33C	W/C2	17	100	.062500	-.062500	19.007890	.322829	18.062500	20.000000
19	L 16-33D	W/C2	23	100	.062500	-.062500	12.736656	.288126	11.875000	13.750000
20	L 16-49A	W/C2	43	100	.062500	-.062500	28.981299	.519472	27.437500	30.250000
21	L 16-49B	W/C2	45	100	.062500	-.062500	24.077305	.523545	22.500000	25.375000
22	L 16-49C	W/C2	44	100	.062500	-.062500	17.223529	.282227	16.125000	18.187500
23	L 16-49D	W/C2	31	100	.062500	-.062500	9.673094	.287541	8.750000	10.375000
24	L 16-57A	W/C2	22	100	.062500	-.062500	17.889773	.314015	17.000000	18.750000
25	L 16-57B	NSIG	50	100	.000000	.000000	.000000	.000000	.000000	.000000
26	L 16-57C	W/C2	20	100	.062500	-.062500	11.355032	.271552	10.500000	12.062500
27	L 16-57D	W/C2	19	100	.062500	-.062500	6.584773	.230379	6.000000	7.125000
28	L 24-17A	W/C2	23	100	.062500	-.062500	26.371234	.341356	25.375000	27.375000
29	L 24-17B	W/C2	24	100	.062500	-.062500	24.431883	.426187	22.937500	25.750000
30	L 24-17C	W/C2	25	100	.062500	-.062500	19.953929	.413458	18.625000	21.312500
31	L 24-17D	NSIG	50	100	.000000	-.000000	-.000000	.000000	-.000000	-.000000
32	L 24-25A	W/C2	43	100	.062500	-.063800	23.029836	.440135	21.990699	23.998699
33	L 24-25B	W/C2	40	100	.062500	-.062500	22.032045	.595607	20.500000	23.375000
34	L 24-25C	W/C2	50	100	.075000	-.075000	18.771191	.594883	17.206600	20.086998
35	L 24-25D	W/C2	41	100	.062500	-.062500	17.153214	.473293	15.750000	18.312500
36	L 24-41A	W/C2	41	100	.062500	-.062500	24.658344	.419817	23.500000	25.562500
37	L 24-41B	W/C2	42	100	.062500	-.062500	23.368052	.459041	22.062500	24.375000
38	L 24-41C	W/C2	50	100	.068338	-.069717	20.232138	.715307	18.381545	22.413486
39	L 24-41D	W/C2	33	100	.062500	-.062500	14.216948	.357674	13.062500	15.125000
40	L 32-09A	NSIG	50	100	.000000	.000000	.000000	.000000	.000000	.000000
41	L 32-09B	W/C2	25	100	.062501	-.062500	32.265516	.534987	30.625492	33.563034
42	L 32-09C	W/C2	27	100	.062500	-.062500	24.638571	.534101	23.000000	26.187500
43	L 32-09D	W/C2	22	100	.062503	-.062500	14.219580	.343359	13.188135	15.258734
44	L 32-33A	W/C2	19	100	.062500	-.062500	17.298961	.263478	16.625000	18.000000
45	L 32-33B	W/C2	23	100	.062503	-.062500	18.544788	.305897	17.750854	19.250927
46	L 32-33C	W/C2	27	100	.062503	-.062500	19.792542	.402981	18.563393	20.813499
47	L 32-33D	W/C2	23	100	.062500	-.062500	19.820000	.359191	18.625000	20.875300
48	L 32-41A	W/C2	25	100	.062500	-.062500	19.653214	.301127	18.812500	20.375000
49	L 32-41B	W/C2	20	100	.062500	-.062500	20.485292	.342210	19.500000	21.375000
50	L 32-41C	W/C2	30	100	.062500	-.062500	16.473831	.388421	15.375000	17.625000
51	L 32-41D	NSIG	50	100	-.000000	-.000000	-.000000	.000000	-.000000	-.000000
52	L 32-57A	W/C2	22	100	.062500	-.062500	24.901556	.354768	24.000000	25.750000
53	L 32-57B	W/C2	27	100	.062503	-.062500	27.506234	.494255	26.001045	28.751156
54	L 32-57C	W/C2	25	100	.062503	-.062500	18.658657	.411280	17.375874	19.875999
55	L 32-57D	W/C2	18	100	.062505	-.062515	10.691755	.278325	9.750771	11.500912
56	L 40-33A	W/C2	42	100	.062501	-.062485	20.932996	.455907	19.812908	21.875450
57	L 40-33B	W/C2	41	100	.062500	-.062500	21.409188	.463782	20.187500	22.625000
58	L 40-33C	W/C2	41	100	.062501	-.062500	19.878861	.508571	17.750179	20.500206
59	L 40-33D	W/C2	32	100	.062502	-.062500	13.204100	.388049	12.125366	14.250429
60	L 40-41A	W/C2	27	100	.062500	-.062500	24.351299	.406465	23.250000	25.375000
61	L 40-41B	W/C2	19	100	.062501	-.062485	26.773761	.526713	25.375519	28.250576
62	L 40-41C	W/C2	20	100	.062500	-.062500	21.289286	.419915	19.875000	22.500000
63	L 40-41D	W/C2	22	100	.062538	-.062546	13.433318	.296275	12.505989	14.256830
64	L 48-25A	W/C2	40	100	.062507	-.062515	24.314596	.449391	23.065258	25.378036
65	L 48-25B	W/C2	43	100	.062500	-.062500	27.815682	.444365	25.625000	28.000000
66	L 48-25C	W/C2	50	100	.066702	-.066711	23.136158	.612316	21.211224	24.879833
67	L 48-25D	W/C2	36	100	.062510	-.062515	11.815456	.473235	10.501675	13.002075
68	L 48-49A	W/C2	45	100	.062501	-.062500	28.699843	.485748	27.250435	29.875477
69	L 48-49B	W/C2	50	100	.076791	-.076797	21.794263	.742761	19.502357	23.571751
70	L 48-49C	W/C2	47	100	.062500	-.062500	14.304448	.541648	12.875000	15.812500
71	L 48-49D	W/C2	30	100	.062500	-.062500	8.866786	.346658	7.875000	9.750000
72	L 56-25A	W/C2	27	100	.062500	-.062500	26.648539	.443871	25.500000	27.625000
73	L 56-25B	W/C2	27	100	.062502	-.066254	29.525772	.557637	28.122893	30.747173
74	L 56-25C	W/C2	25	100	.062500	-.062500	19.468505	.418398	18.000000	20.625000
75	L 56-25D	W/C2	21	100	.062500	-.062500	11.135097	.286094	10.187500	12.000000
76	L 56-33A	W/C2	47	100	.062507	-.062515	26.183056	.596633	24.502739	27.628086
77	L 56-33B	W/C2	40	100	.062509	-.062500	30.040178	.695914	27.754005	32.129639
78	L 56-33C	W/C2	40	100	.062513	-.062515	20.769867	.542913	19.066460	22.129597
79	L 56-33D	W/C2	50	100	-.000000	-.000000	-.000000	.000000	-.000000	-.000000
80	APRM A	PCT	10	100	.062503	-.062500	42.305292	.506759	41.626671	44.001762
81	APRM C	PCT	10	100	.062502	-.062500	42.786937	.546214	41.376244	44.001328
82	APRM D	PCT	10	100	.062501	-.063751	43.413348	.543802	41.999168	44.749199
83	APRM F	PCT	10	100	.062506	-.062500	42.711383	.534803	41.316635	44.129417
106	CORE P W	PSIA	2	10	.747100	11.965799	1015.106860	.807507	1013.826904	1016.815308
107	CORE P N	PSIA	10	100	.075300	1012.880859	1019.793906	.606400	1017.050700	1021.540405

1925 SAMPLES PER CHANNEL ANALYZED
FILTER BAND .00 TO 1000.0 HZ

Table D-3
STATISTICAL DATA, RANDOM STEP 1PT2 (46.7%P, 47.6%F)

RUN NO. 2 DATE 3/24/78 TIME 4:11: 8. .15 THRU 4:11:50:935

PB2 STEPS

1PT2
RANDOM STEPS
P=46.7%
F=47.6%

LDS BUF	BUF REC	CLOSURE PERIOD	SCAN PERIOD	PACER PERIOD
116	35	0	12	25

SCAN MODE	FIRST CHANNEL	LAST CHANNEL	PHYREC SIZE
0	0	115	4064

I. D. T A B L E

CH#	NAME	EU.	GAIN	FILTER	SLOPE	INT.	MEAN	STD DEV	MIN VAL	MAX VAL
0	L 08-17A	W/C2	46	100	.062500	-.062500	31.915348	1.720326	27.875000	36.625000
1	L 08-17B	W/C2	50	100	.065000	-.065000	24.044360	1.725517	20.069000	29.215199
2	L 08-17C	W/C2	38	100	.062500	-.062500	18.392857	1.584625	14.687500	22.875000
3	L 08-17D	W/C2	27	100	.062500	-.062500	15.361585	1.414968	12.000000	19.312500
4	L 08-25A	W/C2	25	100	.062500	-.062500	26.617536	1.401919	23.437500	30.375000
5	L 08-25B	W/C2	23	100	.062500	-.062500	29.197786	2.046467	24.750000	35.125000
6	L 08-25C	W/C2	18	100	.062500	-.062500	24.897949	2.026952	20.312500	30.625000
7	L 08-25D	W/C2	19	100	.062500	-.062500	16.575280	1.521139	13.125000	20.750000
8	L 08-33A	W/C2	20	100	.062500	-.062500	26.409017	1.408400	23.250000	30.000000
9	L 08-33B	W/C2	25	100	.062500	-.062500	35.308117	2.494925	30.000000	41.625000
10	L 08-33C	W/C2	26	100	.062500	-.062500	28.779442	2.349939	23.625000	35.375000
11	L 08-33D	W/C2	21	100	.062500	-.062500	17.777745	1.629847	14.000000	22.250000
12	L 08-49A	W/C2	42	100	.062500	-.062500	23.876432	1.381276	20.562500	27.125000
13	L 08-49B	W/C2	37	100	.062500	-.062500	19.247860	1.390737	15.875000	22.812500
14	L 08-49C	W/C2	39	100	.062500	-.062500	16.486570	1.418651	13.062500	20.500000
15	L 08-49D	W/C2	28	100	.062500	-.062500	11.790422	1.101785	9.062500	15.062500
16	L 16-33A	W/C2	22	100	.062500	-.062500	25.933102	1.353628	23.062500	29.437500
17	L 16-33B	W/C2	22	100	.062500	-.062500	24.322904	1.711926	20.812500	28.750000
18	L 16-33C	W/C2	17	100	.062500	-.062500	22.010521	1.782776	16.375000	26.937500
19	L 16-33D	W/C2	23	100	.062500	-.062500	15.095410	1.354203	12.125000	18.625000
20	L 16-49A	W/C2	43	100	.062500	-.062500	31.812352	1.663986	27.812500	36.062500
21	L 16-49B	W/C2	45	100	.062500	-.062500	25.947624	1.801569	21.750000	30.562500
22	L 16-49C	W/C2	44	100	.062500	-.062500	21.852715	1.812209	17.812500	26.750000
23	L 16-49D	W/C2	31	100	.062500	-.062500	17.166617	1.584702	13.500000	21.312500
24	L 16-57A	W/C2	22	100	.062500	-.062500	19.712470	1.048757	17.312500	22.375000
25	L 16-57B	NSIG	50	100	.000000	.000000	.000000	.000000	.000000	.000000
26	L 16-57C	W/C2	20	100	.062500	-.062500	14.032955	1.207149	11.312500	17.062500
27	L 16-57D	W/C2	19	100	.062500	-.062500	10.461128	.958476	8.187500	13.062500
28	L 24-17A	W/C2	23	100	.062500	-.062500	29.144495	1.529591	25.812500	33.000000
29	L 24-17B	W/C2	24	100	.062500	-.062500	26.765142	1.920914	22.375000	31.8[illegible]500
30	L 24-17C	W/C2	25	100	.062500	-.062500	23.448511	1.949861	18.312500	29.125000
31	L 24-17D	NSIG	50	100	.000000	-.000000	-.000000	.000000	-.000000	-.000000
32	L 24-25A	W/C2	43	100	.062500	-.063800	25.715258	1.362072	22.623699	29.240699
33	L 24-25B	W/C2	40	100	.062500	-.062500	24.910700	1.801813	20.500000	29.750000
34	L 24-25C	W/C2	50	100	.075000	-.075000	25.910749	2.164407	20.693398	32.139206
35	L 24-25D	W/C2	41	100	.062500	-.062500	18.315835	1.655476	14.250000	23.000000
36	L 24-41A	W/C2	41	100	.062500	-.062500	27.280310	1.416360	24.125000	30.875000
37	L 24-41B	W/C2	42	100	.062500	-.062500	25.939522	1.857955	21.937500	31.125000
38	L 24-41C	W/C2	50	100	.068330	-.069717	24.725765	2.116300	19.679966	31.297428
39	L 24-41D	W/C2	33	100	.062500	-.062500	16.374823	1.480187	12.750000	20.625000
40	L 32-09A	NSIG	50	100	.000000	.000000	.000000	.000000	.000000	.000000
41	L 32-09B	W/C2	25	100	.062501	-.062500	34.337082	2.405859	29.000465	40.625648
42	L 32-09C	W/C2	27	100	.062500	-.062500	28.087146	2.297825	23.187500	34.437500
43	L 32-09D	W/C2	22	100	.062503	-.062500	17.442368	1.575317	13.750662	21.751045
44	L 32-33A	W/C2	19	100	.062500	-.062500	19.480136	1.003860	17.375000	22.000000
45	L 32-33B	W/C2	23	100	.062503	-.062500	22.873648	1.509896	18.813484	26.001247
46	L 32-33C	W/C2	27	100	.062503	-.062500	29.398239	2.352244	24.438675	35.626709
47	L 32-33D	W/C2	23	100	.062500	-.062500	19.867577	1.758597	15.812500	24.625000
48	L 32-41A	W/C2	25	100	.[illegible]	.062500	21.830652	1.139573	19.312500	24.625000
49	L 32-41B	W/C2	20	100	[illegible]	.062500	22.777715	1.571367	19.500000	26.687500
50	L 32-41C	W/C2	30	100	.062500	-.062500	20.274454	1.668449	16.375000	24.750000
51	L 32-41D	NSIG	50	100	-.000000	-.000000	-.000000	.000000	-.000000	-.000000
52	L 32-57A	W/C2	22	100	.062500	-.062500	27.848583	1.494087	23.750000	30.812500
53	L 32-57B	W/C2	27	100	.062503	-.062500	29.254642	2.113414	24.875999	34.876396
54	L 32-57C	W/C2	25	100	.062503	-.062500	21.369963	1.798021	17.313370	26.126312
55	L 32-57D	W/C2	18	100	.062505	-.062515	13.211629	1.222474	10.563335	16.581312
56	L 40-33A	W/C2	42	100	.062501	-.062485	23.512997	1.261552	20.750427	26.813046
57	L 40-33B	W/C2	41	100	.062500	-.062500	24.344481	1.718745	20.625000	28.812500
58	L 40-33C	W/C2	41	100	.062501	-.062500	23.748822	1.964303	19.250195	29.125294
59	L 40-33D	W/C2	32	100	.062502	-.062500	14.548624	1.311435	11.375343	18.250549
60	L 40-41A	W/C2	27	100	.062500	-.062500	27.129560	1.414366	24.062500	30.750000
61	L 40-41B	W/C2	19	100	.062501	-.062485	29.001904	1.991600	24.625504	34.063194
62	L 40-41C	W/C2	20	100	.062500	-.062500	25.343890	2.067520	20.875000	30.750000
63	L 40-41D	W/C2	22	100	.062530	-.062546	16.474055	1.492196	13.193819	20.509834
64	L 48-25A	W/C2	40	100	.062507	-.062515	26.846674	1.427400	23.752042	30.566158
65	L 48-25B	W/C2	43	100	.062500	-.062500	29.255682	2.055043	25.250000	34.312500
66	L 48-25C	W/C2	50	100	.066702	-.066711	26.822384	2.201425	21.878242	32.683968
67	L 48-25D	W/C2	36	100	.062510	-.062515	15.550977	1.444873	12.126934	19.753155
68	L 48-49A	W/C2	45	100	.062501	-.062500	31.575461	1.645958	28.062950	35.750572
69	L 48-49B	W/C2	50	100	.076781	-.076797	23.494482	1.747273	19.041672	28.562519
70	L 48-49C	W/C2	47	100	.062500	-.062500	18.068920	1.600066	14.250000	22.750000
71	L 48-49D	W/C2	30	100	.062500	-.062500	14.577258	1.364299	11.500000	18.312500
72	L 56-25A	W/C2	27	100	.062500	-.062500	29.305091	1.578270	26.000000	33.250000
73	L 56-25B	W/C2	27	100	.062502	-.066254	31.848298	2.258394	27.497074	37.247368
74	L 56-25C	W/C2	25	100	.062500	-.062500	22.662721	1.895320	18.562500	27.750000
75	L 56-25D	W/C2	21	100	.062500	-.062500	14.491942	1.318549	11.750000	18.250000
76	L 56-33A	W/C2	47	100	.062507	-.062515	28.782400	1.582468	24.877781	32.816170
77	L 56-33B	W/C2	40	100	.062509	-.062500	32.300055	2.320741	27.128914	38.193000
78	L 56-33C	W/C2	40	100	.062513	-.062515	23.710933	1.997686	19.066460	29.006027
79	L 56-33D	W/C2	50	100	-.000000	-.000000	-.000000	.000000	-.000000	-.000000
80	APRM A	PCT	10	100	.062503	-.062500	47.015492	3.151855	41.001648	54.877197
81	APRM C	PCT	10	100	.062502	-.062500	47.418354	3.265614	41.063736	55.501671
82	APRM D	PCT	10	100	.062501	-.063751	47.388333	3.249133	41.124161	55.374306
83	APRM F	PCT	10	100	.062506	-.062500	46.457923	3.318882	40.066505	54.755479
106	CORE P W	PSIA	2	10	.747100	11.965799	1016.928434	2.460341	1009.344360	1022.[illegible]
107	CORE P M	PSIA	10	100	.875300	1012.898859	1021.459138	2.418096	1013.959741	1026.585449

4235 SAMPLES PER CHANNEL ANALYZED
FILTER BAND 00 TO 1000.0 HZ

Table D-4
STATISTICAL DATA, NOISE RUN, 1PT2 (46.7%P, 47.6%F)

RUN NO. 1 DATE 3/24/78 TIME 3:34: 6:900 THRU 3:34:32:940

PT2 NOISE

1PT2
NOISE
P=46.7%
F=47.6%

WDS BUF	BUF REC	CLOSURE PERIOD	SCAN PERIOD	PACER PERIOD
116	35	0	12	25

SCAN MODE	FIRST CHANNEL	LAST CHANNEL	PHYREC SIZE
0	0	115	4064

I. D. T A B L E

CH#	NAME	EU	GAIN	FILTER	SLOPE	INT.	MEAN	STD DEV	MIN VAL	MAX VAL
0	L 08-17A	W/C2	46	100	.062500	-.062500	32.479312	.615961	31.000000	34.312500
1	L 08-17B	W/C2	50	100	.065800	-.065800	24.110913	.616568	22.437796	26.320000
2	L 08-17C	W/C2	30	100	.062500	-.062500	18.442079	.505985	16.875000	20.125000
3	L 08-17D	W/C2	27	100	.062500	-.062500	15.482765	.404663	14.250000	16.812500
4	L 08-25A	W/C2	25	100	.062500	-.062500	27.098301	.469657	26.000000	28.750000
5	L 08-25B	W/C2	23	100	.062500	-.062500	29.371717	.678812	27.750000	31.812500
6	L 08-25C	W/C2	10	100	.062500	-.062500	24.963335	.506760	23.625000	27.000000
7	L 08-25D	W/C2	19	100	.062500	-.062500	16.637471	.336315	15.562500	17.875000
8	L 08-33A	W/C2	28	100	.062500	-.062500	26.721227	.403713	25.687500	28.062500
9	L 08-33B	W/C2	25	100	.062500	-.062500	35.321342	.653901	33.500000	37.687500
10	L 08-33C	W/C2	26	100	.062500	-.062500	28.600317	.571866	27.250000	31.062500
11	L 08-33D	W/C2	21	100	.062500	-.062500	17.766244	.351134	16.750000	19.062500
12	L 08-49A	W/C2	42	100	.062500	-.062500	24.241071	.473748	22.937500	25.500000
13	L 08-49B	W/C2	37	100	.062500	-.062500	19.251210	.452909	17.875000	20.500000
14	L 08-49C	W/C2	39	100	.062500	-.062500	16.473013	.435762	15.062500	17.687500
15	L 08-49D	W/C2	28	100	.062500	-.062500	11.799597	.372290	10.750000	13.000000
16	L 16-33A	W/C2	22	100	.062500	-.062500	26.313249	.344486	25.437500	27.250000
17	L 16-33B	W/C2	22	100	.062500	-.062500	24.318030	.432944	23.250000	25.625000
18	L 16-33C	W/C2	17	100	.062500	-.062500	22.020421	.396571	20.750000	23.312500
19	L 16-33D	W/C2	23	100	.062500	-.062500	15.185858	.314844	14.125000	16.375000
20	L 16-49A	W/C2	43	100	.062500	-.062500	32.413278	.538537	30.812500	33.750000
21	L 16-49B	W/C2	45	100	.062500	-.062500	26.082258	.556193	24.375000	27.500000
22	L 16-49C	W/C2	44	100	.062500	-.062500	21.942339	.372023	20.750000	23.000000
23	L 16-49D	W/C2	31	100	.062500	-.062500	17.240445	.357849	16.000000	18.437500
24	L 16-57A	W/C2	22	100	.062500	-.062500	20.162241	.325107	19.125000	21.000000
25	L 16-57B	NSIG	50	100	.000000	.000000	.000000	.000000	.000000	.000000
26	L 16-57C	W/C2	20	100	.062500	-.062500	14.155962	.292359	13.250000	15.062500
27	L 16-57D	W/C2	19	100	.062500	-.062500	10.514977	.261883	9.750000	11.375000
28	L 24-17A	W/C2	23	100	.062500	-.062500	29.619844	.400396	28.375000	30.562500
29	L 24-17B	W/C2	24	100	.062500	-.062500	26.810686	.470519	25.375000	28.000000
30	L 24-17C	W/C2	25	100	.062500	-.062500	23.509706	.434413	22.000000	24.750000
31	L 24-17D	NSIG	50	100	.000000	-.000000	-.000000	.000000	-.000000	-.000000
32	L 24-25A	W/C2	43	100	.062500	-.063000	26.223556	.450957	24.939699	27.311199
33	L 24-25B	W/C2	40	100	.062500	-.062500	25.066043	.623194	23.375000	26.625000
34	L 24-25C	W/C2	50	100	.075000	-.075000	26.072371	.640741	24.407600	27.894398
35	L 24-25D	W/C2	41	100	.062500	-.062500	18.485052	.474806	17.062500	19.750000
36	L 24-41A	W/C2	41	100	.062500	-.062500	27.863969	.437521	26.562500	28.812500
37	L 24-41B	W/C2	42	100	.062500	-.062500	26.358727	.490909	24.875000	27.750000
38	L 24-41C	W/C2	50	100	.068338	-.069717	24.957204	.746343	22.960190	27.197147
39	L 24-41D	W/C2	33	100	.062500	-.062500	16.574856	.369602	15.500000	17.562500
40	L 32-09A	NSIG	50	100	.000000	.000000	.000000	.000000	.000000	.000000
41	L 32-09B	W/C2	25	100	.062501	-.062500	34.437475	.588179	32.563019	36.000500
42	L 32-09C	W/C2	27	100	.062500	-.062500	28.183641	.544531	26.312500	30.125000
43	L 32-09D	W/C2	22	100	.062503	-.062500	17.531258	.363101	16.250782	18.625896
44	L 32-33A	W/C2	19	100	.062500	-.062500	19.939142	.269856	19.187500	20.562500
45	L 32-33B	W/C2	23	100	.062503	-.062500	22.330397	.303689	21.501034	23.063610
46	L 32-33C	W/C2	27	100	.062503	-.062500	29.553925	.449522	28.251358	30.876484
47	L 32-33D	W/C2	23	100	.062500	-.062500	20.060801	.320861	19.000000	21.062500
48	L 32-41A	W/C2	25	100	.062500	-.062500	22.350691	.299140	21.375000	23.062500
49	L 32-41B	W/C2	20	100	.062500	-.062500	22.982480	.365031	21.750000	24.125000
50	L 32-41C	W/C2	30	100	.062500	-.062500	20.383554	.410234	18.812500	21.562500
51	L 32-41D	NSIG	50	100	.000000	-.000000	-.000000	.000000	-.000000	-.000000
52	L 32-57A	W/C2	22	100	.062500	-.062500	27.626181	.355104	26.312500	28.500000
53	L 32-57B	W/C2	27	100	.062503	-.062500	29.483384	.483577	27.376099	30.813736
54	L 32-57C	W/C2	25	100	.062503	-.062500	21.429043	.421532	20.126011	22.751141
55	L 32-57D	W/C2	18	100	.062505	-.062515	13.230867	.292111	12.250971	14.063616
56	L 40-33A	W/C2	42	100	.062501	-.062485	24.845279	.454397	22.875469	25.800511
57	L 40-33B	W/C2	41	100	.062500	-.062500	24.585714	.459096	23.312500	25.687500
58	L 40-33C	W/C2	41	100	.062501	-.062500	23.910263	.517366	22.312725	25.500256
59	L 40-33D	W/C2	32	100	.062502	-.062500	14.706089	.382958	13.625412	15.750475
60	L 40-41A	W/C2	27	100	.062500	-.062500	27.794412	.391177	26.562500	28.812500
61	L 40-41B	W/C2	19	100	.062501	-.062485	29.196389	.510440	27.625565	30.688126
62	L 40-41C	W/C2	20	100	.062500	-.062500	25.486038	.445442	23.812500	26.750000
63	L 40-41D	W/C2	22	100	.062530	-.062546	16.613319	.311004	15.632490	17.500392
64	L 48-25A	W/C2	48	100	.062507	-.062515	27.441330	.450662	26.128124	28.440903
65	L 48-25B	W/C2	43	100	.062500	-.062500	29.441244	.432110	28.000000	30.500000
66	L 48-25C	W/C2	50	100	.066702	-.066711	26.930414	.620874	24.946537	28.548443
67	L 48-25D	W/C2	36	100	.062510	-.062515	15.662034	.487309	14.252274	17.002716
68	L 48-49A	W/C2	45	100	.062501	-.062500	32.287844	.507438	30.875496	33.625542
69	L 48-49B	W/C2	50	100	.076781	-.076797	23.667853	.756529	21.575447	25.875183
70	L 48-49C	W/C2	47	100	.062500	-.062500	18.115121	.570448	16.500000	19.750000
71	L 48-49D	W/C2	30	100	.062500	-.062500	14.635052	.389901	13.500000	15.750000
72	L 56-25A	W/C2	27	100	.062500	-.062500	30.802333	.402437	28.750000	30.975000
73	L 56-25B	W/C2	27	100	.062502	-.066254	32.203984	.485591	30.809673	33.497253
74	L 56-25C	W/C2	25	100	.062500	-.062500	22.795363	.422107	21.125000	24.062500
75	L 56-25D	W/C2	21	100	.062500	-.062500	14.593528	.301714	13.625000	15.500000
76	L 56-33A	W/C2	47	100	.062507	-.062515	29.314740	.572621	27.565578	30.628422
77	L 56-33B	W/C2	40	100	.062509	-.062500	32.474299	.671710	30.804330	34.254944
78	L 56-33C	W/C2	40	100	.062513	-.062515	23.749577	.531757	22.129597	25.130222
79	L 56-33D	W/C2	50	100	.000000	-.000000	-.000000	.000000	-.000000	-.000000
80	APRM A	PCT	10	100	.062503	-.062500	47.453948	.473899	46.126846	48.564445
81	APRM C	PCT	10	100	.062502	-.062500	47.852649	.522745	46.501396	49.313900
82	APRM D	PCT	10	100	.062501	-.063751	47.862478	.522689	46.374214	49.124245
83	APRM F	PCT	10	100	.062506	-.062500	46.867764	.521663	45.504555	48.254829
106	CORE P W	PSIA	2	10	.747100	11.965799	1017.764489	.627926	1015.321167	1019.003711
107	CORE P N	PSIA	10	100	.075300	1012.880859	1022.247901	.594747	1015.803789	1024.477851

2170 SAMPLES PER CHANNEL ANALYZED
FILTER BAND .00 TO 1000.0 HZ

Table D-5

TEST POINT 2PT2/PRBS PRESSURE STEPS POWER = 52.0%/FLOW = 45.5%/RUN 202

MEANS CODE/MEAN, STANDARD DEVIATION, MINIMUM, MAXIMUM

WDS BUF	BUF REC	CLOSURE PERIOD	SCAN PERIOD	PACER PERIOD
116	35	0	12	25

SCAN MODE	FIRST CHANNEL	LAST CHANNEL	PHYREC SIZE
0	0	115	4064

I. D. T A B L E

CH#	NAME	EU	GAIN	FILTER	SLOPE	INT.	MEAN	STD DEV	MIN VAL	MAX VAL
0	L 08-17A	W/C2	46	100	.070822	-.070816	37.151591	2.463044	31.869907	43.404711
1	L 08-17B	W/C2	50	100	.085909	-.085907	29.588227	2.628493	23.882702	36.769051
2	L 08-17C	W/C2	38	100	.062500	-.062500	26.010000	2.703619	20.062500	32.875000
3	L 08-17D	W/C2	27	100	.062500	-.062500	14.351976	1.598787	10.625000	18.375000
4	L 08-25A	W/C2	25	100	.062500	-.062500	32.145262	2.123645	28.000000	37.312500
5	L 08-25B	W/C2	23	100	.062500	-.062500	28.833968	2.538456	23.750000	35.000000
6	L 08-25C	W/C2	10	100	.062500	-.062500	29.882294	3.069502	23.375000	37.562500
7	L 08-25D	W/C2	19	100	.062500	-.062500	19.286087	2.182160	14.625000	24.625000
8	L 08-33A	W/C2	20	100	.062500	-.062500	36.429317	2.434119	31.500000	42.125000
9	L 08-33B	W/C2	25	100	.062500	-.062500	28.259516	2.465623	23.000000	34.250000
10	L 08-49B	NSIG								
11	L 08-33D	W/C2	21	100	.062500	-.062500	19.990405	2.248171	15.125000	25.062500
12	L 08-49A	W/C2	42	100	.064107	-.064117	17.616675	1.216518	14.616386	20.898872
13	L 08-33C	W/C2	37	100	.062501	-.065002	29.735577	3.035384	23.247871	36.810585
14	L 08-49C	W/C2	39	100	.062500	-.062500	22.407143	2.280336	17.562500	28.187500
15	L 08-49D	NSIG								
16	L 16-33A	W/C2	22	100	.062500	-.062500	31.705587	2.053613	27.375000	36.562500
17	L 16-33B	W/C2	22	100	.062500	-.062500	32.972698	2.870538	27.062500	39.937500
18	L 16-33C	W/C2	17	100	.062500	-.062500	26.108286	2.588888	20.875000	32.250000
19	L 16-33D	W/C2	23	100	.062500	-.062500	18.049286	1.996037	13.500000	22.625000
20	L 16-49A	W/C2	50	100	.062500	-.062500	31.621619	2.098252	26.875000	37.125000
21	L 16-49B	W/C2	50	100	.075574	-.075577	34.740177	2.993844	28.038090	42.397217
22	L 16-49C	W/C2	49	100	.062500	-.062500	26.420270	2.597564	21.250000	32.500000
23	L 16-49D	W/C2	36	100	.062500	-.062500	14.875429	1.644477	11.250000	18.750000
24	L 16-57A	*	22	100	.062500	-.062500	19.792341	1.320441	16.750000	23.125000
25	L 16-57B	W/C2	18	100	.062500	-.062500	19.646286	1.678523	16.062500	23.750000
26	L 16-57C	W/C2	22	100	.062500	-.062500	16.334325	1.660862	12.687500	20.562500
27	L 16-57D	W/C2	21	100	.062501	-.065002	11.145174	1.192843	8.497669	13.935278
28	L 24-17A	NSIG								
29	L 24-17B	W/C2	27	100	.062500	-.062500	29.507143	2.533049	23.812500	35.375000
30	L 24-17C	W/C2	31	100	.062500	-.062500	27.340762	2.683044	21.375000	34.060000
31	L 24-17D	*	24	100	.062500	-.062500	15.910476	1.735135	11.875000	20.[illegible]
32	L 24-25A	W/C2	50	100	.066489	-.066490	36.300384	2.334013	31.117016	42.021271
33	L 24-25B	W/C2	48	100	.062501	-.065002	29.758325	2.593017	23.747974	36.560730
34	L 24-25C	W/C2	50	100	.087719	-.087708	22.370715	2.238069	17.192993	28.070187
35	L 24-25D	W/C2	48	100	.062501	-.063751	15.066051	1.663322	10.873857	19.248943
36	L 24-41A	W/C2	50	100	.068312	-.068314	38.602258	2.521236	33.063004	45.085915

* OLD CALIBRATION VALUES

Table D-5

TEST POINT 2PT2/PRBS PRESSURE STEPS POWER = 52.0%/FLOW = 45.5%/RUN 202

MEANS CODE/MEAN, STANDARD DEVIATION, MINIMUM, MAXIMUM (Continued)

37	L 24-41B	W/C2	50	100	.062500	-.062500	32.328516	2.804635	26.312500	39.625000	
38	L 24-41C	W/C2	50	100	.083339	-.091690	28.190305	2.835372	21.659763	35.994057	
39	L 24-41D	W/C2	40	100	.062500	-.062500	16.690738	1.815252	12.375000	21.250000	
40	L 32-09A	W/C2	30	100	.062500	-.062500	28.924810	1.865083	24.750000	33.375000	
41	L 32-09B	W/C2	34	100	.062500	-.062500	32.693738	2.687974	26.875000	39.750000	
42	L 32-09C	W/C2	33	100	.062500	-.062500	29.269175	2.840637	23.250000	36.875000	
43	L 32-09D	W/C2	27	100	.062500	-.062500	17.690770	1.939673	13.250000	22.250000	
44	L 32-33A	W/C2	23	100	.062500	-.062500	33.294460	2.116508	28.500000	38.312500	
45	L 32-33B	W/C2	29	100	.062502	-.066254	29.105456	2.478038	23.809464	34.934799	
46	L 32-33C	W/C2	35	100	.062501	-.065002	23.444913	2.296749	18.372868	29.310585	
47	L 32-33D	W/C2	26	100	.062501	-.063751	15.874472	1.689453	12.061371	19.873947	
48	L 32-41A	W/C2	29	100	.062500	-.062500	33.368484	2.185872	28.750000	39.000000	
49	L 32-41B	W/C2	25	100	.062502	-.066254	29.201245	2.526191	23.746964	35.309807	
50	L 32-41C	W/C2	41	100	.062503	-.067505	22.024070	2.196927	16.995678	27.746109	
51	L 32-41D	NSIG									
52	L 32-57A	W/C2	18	100	.062503	-.062500	38.375500	2.573083	32.625000	44.750000	
53	L 32-57B	W/C2	32	100	.062528	-.062546	29.614231	2.549548	23.510330	36.078362	
54	L 32-57C	W/C2	29	100	.062500	-.062500	21.793754	2.204206	17.125000	27.250000	
55	L 32-57D	W/C2	20	100	.062501	-.065002	22.199848	2.463767	16.622833	28.248066	
56	L 40-33A	*	42	100	.062501	-.062485	31.375661	2.046831	27.063053	36.750740	
57	L 40-33B	W/C2	50	100	.065104	-.065109	27.466027	2.367723	22.460934	33.854164	
58	L 40-33C	W/C2	47	100	.062500	-.062500	23.782341	2.350075	18.625000	30.312500	
59	L 40-33D	W/C2	37	100	.062500	-.062500	14.038849	1.545323	10.312500	18.062500	
60	L 40-41A	W/C2	28	100	.062501	-.063751	34.692446	2.254898	29.874050	40.374153	
61	L 40-41B	W/C2	25	100	.062502	-.066254	31.824101	2.690124	25.684521	39.372429	
62	L 40-41C	W/C2	25	100	.062501	-.065002	26.376043	2.589927	20.747913	33.248161	
63	L 40-41D	W/C2	26	100	.062500	-.062500	16.298865	1.783209	12.312500	20.750000	
64	L 48-25A	W/C2	48	100	.062500	-.062500	28.421310	1.866260	24.125000	33.250000	
65	L 48-25B	W/C2	48	100	.062503	-.066238	34.068566	2.877117	27.997662	41.248322	
66	L 48-25C	W/C2	50	100	.077417	-.078964	29.764557	2.938032	23.533112	38.242271	
67	L 48-25D	W/C2	42	100	.062500	-.062500	16.589643	1.855531	12.125000	21.562500	
68	L 48-49A	W/C2	50	100	.067589	-.068939	19.564920	1.301574	16.490486	23.249435	
69	L 48-49B	W/C2	50	100	.094697	-.094696	28.647103	2.512281	22.537880	36.079544	
70	L 48-49C	W/C2	50	100	.065989	-.065994	23.918861	2.420339	18.344887	30.486832	
71	L 48-49D	W/C2	33	100	.062501	-.063751	14.105041	1.541955	10.498854	18.123932	
72	L 56-25A	W/C2	32	100	.062501	-.063751	32.332049	2.091081	27.936531	37.561623	
73	L 56-25B	W/C2	31	100	.062500	-.062500	25.319048	2.160505	21.250000	30.875000	
74	L 56-25C	W/C2	31	100	.062501	-.065002	29.437326	3.049882	23.247963	37.373245	
75	L 56-25D	*	21	100	.062500	-.062500	16.789976	1.844161	12.875000	21.500000	
76	L 56-33A	W/C2	50	100	.070860	-.070847	34.654539	2.314548	29.194363	41.524017	
77	L 56-33B	W/C2	49	100	.062500	-.062500	16.410270	1.502619	12.750000	21.000000	
78	L 56-33C	W/C2	46	100	.062500	-.062500	26.256405	2.762676	20.312500	33.750000	
79	L 56-33D	W/C2	31	100	.062500	-.062500	16.775746	1.871158	12.750000	21.750000	
80	APRM A	PCT	10	100	.062503	-.062500	52.579101	4.116862	44.814301	61.752480	
81	APRM C	PCT	10	100	.062502	-.062500	53.858302	4.504776	45.251358	64.001923	
82	APRM D	PCT	10	100	.062501	-.063751	53.172933	4.326670	44.811699	62.874302	
83	APRM F	PCT	10	100	.062506	-.062500	53.536965	4.478134	42.629265	63.560855	* OLD
84	TIP 4	W/C2	10	100	.062500	-.062500	4.918976	.321056	4.250000	5.750000	CALIBRATION
85	TIP 5	W/C2	10	100	.062500	-.062500	3.363135	.295996	2.750000	4.062500	VALUES
86	RC A DP	PSID	10	100	.030811	-6.199886	.899780	.043907	.732697	1.040812	
87	RC B DP	PSID	10	100	.030778	-6.065044	1.151578	.066363	.767597	1.413929	
88	FW A DP	PSID	10	100	.069382	-4.520901	3.689152	.245835	2.833544	4.568003	
89	FW B DP	PSID	10	100	.070123	-4.586021	3.790213	.174542	3.127471	4.179312	
90	FW C DP	PSID	10	100	.069516	-4.535221	-.088395	.084706	-.572809	.122351	

Table D-5

TEST POINT 2PT2/PRBS PRESSURE STEPS POWER = 52.0%/FLOW = 45.5%/RUN 202

MEANS CODE/MEAN, STANDARD DEVIATION, MINIMUM, MAXIMUM (Continued)

91	WLRL NG	INCH	10	100	.074820	-14.052643	22.662191	.834576	19.766197	25.826653
92	JP 1 DP	PSID	1	10	.100008	-.104004	1.994094	.631644	-.304020	3.996324
93	JP 6 DP	PSID	1	10	.050001	-.050003	2.334260	.636958	-.950021	4.400085
94	JP 11 DP	PSID	1	10	.050865	.101730	1.727301	.523382	-.457781	3.407936
95	JP 16 DP	PSID	1	10	.050094	-.150276	1.400608	.435533	-.350653	2.955563
96										
97										
98	CORE DP	PSID	1	10	.050146	-.150436	3.225032	.724480	.551614	5.917281
99	FW TEM A	DEGF	10	100	.499501	279.590393	322.433588	.348088	322.047974	324.045959
100										
101	RC TEM A	DEGF	10	100	.499501	419.500488	511.907512	.033297	511.408569	513.406616
102	RC TEM B	DEGF	10	100	.499900	419.500122	-603.795266	.000000	-603.795288	-603.795288
103	CF TOTAL	PCT	10	100	.457708	-29.888336	42.154022	.515991	40.140976	43.802643
104	P RX W	PSIA	1	10	.752196	9.434570	994.188838	3.982700	987.289917	999.325073
105	P RX N	PSIA	33	100	.075076	1011.362061	992.753905	3.022481	985.986328	997.848389
106	CORE P W	PSIA	1	10	.749122	14.071533	1012.816591	3.169711	1003.089111	1020.295898
107	CORE P N	PSIA	1	100	.074166	1012.238403	1012.866736	3.123505	1003.783447	1019.803345
108										
109										
110										
111										
112										
113										
114										
115										

7875 SAMPLES PER CHANNEL ANALYZED

FILTER BAND .00 TO 1000.0 HZ

Table D-6

TEST POINT 2PT2/NOISE POWER = 52.5%/FLOW = 45.5%/RUN 201

MEANS CODE/MEAN, STANDARD DEVIATION, MINIMUM, MAXIMUM

WDS BUF	BUF REC	CLOSURE PERIOD	SCAN PERIOD	PACER PERIOD
116	35	0	12	25

SCAN MODE	FIRST CHANNEL	LAST CHANNEL	PHYREC SIZE
0	0	115	4064

I. D. T A B L E

CH#	NAME	EU	GAIN	FILTER	SLOPE	INT.	MEAN	STD DEV	MIN VAL	MAX VAL	
0	L 08-17A	W/C2	46	100	.070822	-.070816	38.308981	.729199	35.977585	40.793400	
1	L 08-17B	W/C2	50	100	.085909	-.085907	29.730479	.692619	27.319061	32.387695	
2	L 08-17C	W/C2	38	100	.062500	-.062500	25.839982	.610634	23.750000	27.812500	
3	L 08-17D	W/C2	27	100	.062500	-.062500	14.192531	.389086	12.875000	15.500000	
4	L 08-25A	W/C2	25	100	.062500	-.062500	33.140366	.513968	31.375000	34.750000	
5	L 08-25B	W/C2	23	100	.062500	-.062500	28.996352	.588379	27.000000	30.937500	
6	L 08-25C	W/C2	10	100	.062500	-.062500	29.878835	.579590	27.750000	32.000000	
7	L 08-25D	W/C2	19	100	.062500	-.062500	19.176829	.385083	17.500000	20.687500	
8	L 08-33A	W/C2	20	100	.062500	-.062500	37.428173	.569987	35.375000	39.000000	
9	L 08-33B	W/C2	25	100	.062500	-.062500	28.428336	.540544	26.500000	29.875000	
10	L 08-49B	NSIG									
11	L 08-33D	W/C2	21	100	.062500	-.062500	19.889545	.398343	18.375000	21.375000	
12	L 08-49A	W/C2	42	100	.064107	-.064117	18.232341	.490944	16.796024	19.488518	
13	L 08-33C	W/C2	37	100	.062501	-.065002	29.827555	.598359	27.747940	31.748005	
14	L 08-49C	W/C2	39	100	.062500	-.062500	22.423368	.524498	20.750000	24.000000	
15	L 08-49D	NSIG									
16	L 16-33A	W/C2	22	100	.062500	-.062500	32.731533	.449409	31.125000	34.000000	
17	L 16-33B	W/C2	22	100	.062500	-.062500	33.164852	.575968	31.250000	35.250000	
18	L 16-33C	W/C2	17	100	.062500	-.062500	26.085172	.458263	24.312500	27.750000	
19	L 16-33D	W/C2	23	100	.062500	-.062500	17.933242	.362113	16.625000	19.125000	
20	L 16-49A	W/C2	50	100	.062500	-.062500	32.669758	.568990	30.625000	34.312500	
21	L 16-49B	W/C2	50	100	.075574	-.075577	35.033471	.749364	32.194679	37.258163	
22	L 16-49C	W/C2	49	100	.062500	-.062500	26.351690	.440685	24.687500	28.187500	
23	L 16-49D	W/C2	36	100	.062500	-.062500	14.742075	.371154	13.500000	16.000000	
24	L 16-57A	*	22	100	.062500	-.062500	20.393030	.316335	19.125000	21.500000	
25	L 16-57B	W/C2	18	100	.062500	-.062500	19.773906	.327217	18.375000	20.875000	
26	L 16-57C	W/C2	22	100	.062500	-.062500	16.257090	.326676	15.062500	17.375000	
27	L 16-57D	W/C2	21	100	.062501	-.065002	10.937359	.286026	9.935198	11.747734	
28	L 24-17A	NSIG									
29	L 24-17B	W/C2	27	100	.062500	-.062500	29.621798	.570280	27.750000	31.625000	
30	L 24-17C	W/C2	31	100	.062500	-.062500	27.234629	.555253	25.250000	29.250000	* OLD
31	L 24-17D	*	24	100	.062500	-.062500	15.765491	.349808	14.312500	17.000000	CALIBRATION
32	L 24-25A	W/C2	50	100	.066409	-.066498	37.547044	.636534	35.638290	39.494675	VALUES
33	L 24-25B	W/C2	48	100	.062501	-.065002	29.897651	.771544	27.373047	32.185646	
34	L 24-25C	W/C2	50	100	.087719	-.087708	22.266038	.697818	20.350887	24.210537	
35	L 24-25D	W/C2	48	100	.062501	-.063751	14.931426	.504153	13.498884	16.373913	
36	L 24-41A	W/C2	50	100	.068312	-.068314	39.878014	.626920	37.708214	41.806938	

Table D-6

TEST POINT 2PT2/NOISE POWER = 52.5%/FLOW = 45.5%/RUN 201

MEANS CODE/MEAN, STANDARD DEVIATION, MINIMUM, MAXIMUM (Continued)

37	L 24-41B	W/C2	50	100	.062500	-.062500	32.473301	.612878	30.437500	34.312500	
38	L 24-41C	W/C2	50	100	.083339	-.091690	28.086453	.893919	25.410015	30.827042	
39	L 24-41D	W/C2	40	100	.062500	-.062500	16.553591	.428649	15.250000	17.750000	
40	L 32-09A	W/C2	30	100	.062500	-.062500	29.745992	.428503	28.375000	31.187500	
41	L 32-09B	W/C2	34	100	.062500	-.062500	32.906744	.570066	30.562500	35.000000	
42	L 32-09C	W/C2	33	100	.062500	-.062500	29.191134	.573442	27.250000	31.375000	
43	L 32-09D	W/C2	27	100	.062500	-.062500	17.538964	.380472	16.250000	18.750000	
44	L 32-33A	W/C2	23	100	.062500	-.062500	34.473307	.467306	32.875000	35.875000	
45	L 32-33B	W/C2	29	100	.062502	-.066254	29.225299	.494416	27.559578	30.747173	
46	L 32-33C	W/C2	35	100	.062501	-.065002	23.316812	.517180	21.497929	24.998001	
47	L 32-33D	W/C2	26	100	.062501	-.063751	15.726211	.317231	14.561396	16.873917	
48	L 32-41A	W/C2	29	100	.062500	-.062500	34.912668	.485148	33.250000	36.500000	
49	L 32-41B	W/C2	25	100	.062502	-.066254	29.590287	.492690	27.747082	31.309689	
50	L 32-41C	W/C2	41	100	.062503	-.067505	21.912989	.517066	20.183308	23.370934	
51	L 32-41D	NSIG									
52	L 32-57A	W/C2	18	100	.062500	-.062500	39.380813	.489733	37.875000	41.125000	
53	L 32-57B	W/C2	32	100	.062528	-.062546	29.702303	.511431	28.012310	31.451324	
54	L 32-57C	W/C2	29	100	.062500	-.062500	21.710220	.452028	19.875000	23.250000	
55	L 32-57D	W/C2	20	100	.062501	-.065002	21.925045	.507211	19.810394	23.622971	
56	L 40-33A	*	42	100	.062501	-.062485	32.982087	.554468	31.188133	34.625702	
57	L 40-33B	W/C2	50	100	.065104	-.065109	27.626785	.563160	25.585934	29.427082	
58	L 40-33C	W/C2	47	100	.062500	-.062500	23.704344	.580946	21.562500	25.625000	
59	L 40-33D	W/C2	37	100	.062500	-.062500	13.944792	.423120	12.625000	15.250000	
60	L 40-41A	W/C2	28	100	.062501	-.063751	35.873489	.501747	34.061592	37.624123	
61	L 40-41B	W/C2	25	100	.062502	-.066254	31.858707	.626856	29.497135	33.997269	
62	L 40-41C	W/C2	25	100	.062501	-.065002	26.349087	.480481	24.497990	28.249066	
63	L 40-41D	W/C2	26	100	.062500	-.062500	16.157680	.329335	15.000000	17.250000	
64	L 48-25A	W/C2	48	100	.062500	-.062500	29.388518	.529190	27.812500	30.875000	
65	L 48-25B	W/C2	48	100	.062503	-.066238	34.349162	.557840	32.560387	35.998062	
66	L 48-25C	W/C2	50	100	.077417	-.078964	29.787491	.723863	27.403946	31.894108	
67	L 48-25D	W/C2	42	100	.062500	-.062500	16.481082	.550495	14.750000	18.125000	
68	L 48-49A	W/C2	50	100	.067589	-.068939	20.181480	.434076	18.788528	21.356930	
69	L 48-49B	W/C2	50	100	.094697	-.094696	28.841672	.873535	26.325760	31.250000	
70	L 48-49C	W/C2	50	100	.065989	-.065994	23.810394	.652213	21.776306	25.933601	
71	L 48-49D	W/C2	33	100	.062501	-.063751	13.941607	.410025	12.498875	15.373903	
72	L 56-25A	W/C2	32	100	.062501	-.063751	33.274731	.508556	31.686565	34.874100	
73	L 56-25B	W/C2	31	100	.062500	-.062500	25.461319	.406418	24.125000	27.000000	
74	L 56-25C	W/C2	31	100	.062501	-.065002	29.510566	.553065	27.560551	31.498131	
75	L 56-25D	*	21	100	.062500	-.062500	16.760796	.355899	15.500000	18.125000	
76	L 56-33A	W/C2	50	100	.070860	-.070847	35.710383	.742074	33.233391	38.122734	
77	L 56-33B	W/C2	49	100	.062500	-.062500	16.556941	.566155	14.750000	18.250000	
78	L 56-33C	W/C2	46	100	.062500	-.062500	26.310445	.626533	24.000000	28.500000	
79	L 56-33D	W/C2	31	100	.062500	-.062500	16.712015	.408459	15.250000	18.125000	
80	APRM A	PCT	10	100	.062503	-.062500	53.117841	.515430	51.377060	54.752197	
81	APRM C	PCT	10	100	.062502	-.062500	54.132484	.527801	52.501579	55.876678	
82	APRM D	PCT	10	100	.062501	-.063751	53.720769	.532342	52.124268	55.436806	* OLD
83	APRM F	PCT	10	100	.062506	-.062500	53.954964	.546678	52.255226	55.755577	CALIBRATION
84	TIP 1	W/C2	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122	VALUES
85	TIP 2	W/C2	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122	
86	RC A DP	PSID	10	100	.030811	-6.199886	.886490	.041608	.732697	1.040812	
87	RC B DP	PSID	10	100	.030778	-6.065044	1.142012	.067465	.890708	1.413929	
88	FW A DP	PSID	10	100	.069382	-4.520901	3.676902	.208460	2.902925	4.429319	
89	FW B DP	PSID	10	100	.070123	-4.586021	3.902278	.108032	3.618330	4.249434	
90	FW C DP	PSID	10	100	.069516	-4.535221	-.087206	.084820	-.294744	.122351	

Table D-6

TEST POINT 2PT2/NOISE = 52.5%/FLOW = 45.5%/RUN 201

MEANS CODE/MEAN, STANDARD DEVIATION, MINIMUM, MAXIMUM (Continued)

91	WLRL NG	INCH	10	100	.074820	-14.052643	22.697108	.487204	20.888504	26.200752
92	JP 1 DP	PSID	1	10	.100008	-.104004	1.977975	.577761	-.704052	4.096332
93	JP 6 DP	PSID	1	10	.050001	-.050003	2.357848	.660837	-.250007	4.900096
94	JP 11 DP	PSID	1	10	.050865	.101730	1.702515	.542610	-.813834	3.713124
95	JP 16 DP	PSID	1	10	.050094	-.150276	1.350210	.432713	-.400747	2.855375
96										
97										
98	CORE DP	PSID	1	10	.050146	-.150436	3.205114	.855677	.150442	6.218160
99	FW TEM A	DEGF	10	100	.499501	279.590393	323.059565	.215118	322.047974	324.045959
100										
101	RC TEM A	DEGF	10	100	.499501	419.500488	511.891548	.089367	511.408569	511.908081
102	RC TEM B	DEGF	10	100	.499900	419.500122	-603.795266	.000000	-603.795288	-603.795288
103	CF TOTAL	PCT	10	100	.457708	-29.888336	42.103041	.333232	41.056396	42.887222
104	P RX W	PSIA	1	10	.752196	9.434570	998.574610	.036070	998.572876	999.325073
105	P RX N	PSIA	33	100	.075076	1011.362061	997.223861	.105153	996.872314	997.548096
106	CORE P W	PSIA	1	10	.748122	14.071533	1017.177358	.942026	1014.310913	1021.044067
107	CORE P N	PSIA	1	100	.074166	1012.238403	1017.199237	.919125	1013.944214	1020.915771
108										
109										
110										
111										
112										
113										
114										
115										

13020 SAMPLES PER CHANNEL ANALYZED
FILTER BAND .00 TO 1000.0 HZ

Table D-7

TEST POINT 2PT3/PRBS PRESSURE STEPS POWER = 61.7%/FLOW = 44.6%/RUN 204

MEANS CODE/MEAN, STANDARD DEVIATION, MINIMUM, MAXIMUM

WDS BUF	BUF REC	CLOSURE PERIOD	SCAN PERIOD	PACER PERIOD
116	35	0	12	25

SCAN MODE	FIRST CHANNEL	LAST CHANNEL	PHYREC SIZE
0	0	115	4064

I. D. T A B L E

CH#	NAME	EU	GAIN	FILTER	SLOPE	INT.	MEAN	STD DEV	MIN VAL	MAX VAL
0	L 08-17A	W/C2	46	100	.070822	-.070816	38.792308	1.096700	35.269363	44.192932
1	L 08-17B	W/C2	50	100	.085909	-.085907	31.770638	1.165497	28.178150	35.394508
2	L 08-17C	W/C2	38	100	.062500	-.062500	29.226511	1.198908	25.625000	32.625000
3	L 08-17D	W/C2	27	100	.062500	-.062500	17.699719	.785754	15.000000	20.000000
4	L 08-25A	W/C2	25	100	.062500	-.062500	33.567986	.882759	31.250000	36.000000
5	L 08-25B	W/C2	23	100	.062500	-.062500	30.730396	1.072880	27.750000	33.687500
6	L 08-25C	W/C2	10	100	.062500	-.062500	32.648765	1.273419	29.187500	36.125000
7	L 08-25D	W/C2	19	100	.062500	-.062500	22.845474	.980730	20.062500	25.625000
8	L 08-33A	W/C2	20	100	.062500	-.062500	38.211057	.996263	35.562500	40.875000
9	L 08-33B	W/C2	25	100	.062500	-.062500	30.066807	1.041599	27.187500	32.875000
10	L 08-49B	NSIG								
11	L 08-33D	W/C2	21	100	.062500	-.062500	23.236792	.988716	20.250000	26.062500
12	L 08-49A	W/C2	42	100	.064107	-.064117	18.278624	.624221	16.475491	24.104221
13	L 08-33C	W/C2	37	100	.062501	-.065002	32.519829	1.279744	29.060463	36.123077
14	L 08-49C	W/C2	39	100	.062500	-.062500	25.511517	1.035651	22.312500	28.375000
15	L 08-49D	NSIG								
16	L 16-33A	W/C2	22	100	.062500	-.062500	33.049680	.830123	30.812500	35.250000
17	L 16-33B	W/C2	22	100	.062500	-.062500	35.225898	1.181063	32.125000	38.500000
18	L 16-33C	W/C2	17	100	.062500	-.062500	30.098888	1.125677	26.875000	33.562500
19	L 16-33D	W/C2	23	100	.062500	-.062500	25.713960	1.069247	22.375000	28.937500
20	L 16-49A	W/C2	50	100	.062500	-.062500	32.768222	.904728	30.250000	35.562500
21	L 16-49B	W/C2	50	100	.075574	-.075577	37.903253	1.352104	34.008461	42.094917
22	L 16-49C	W/C2	49	100	.062500	-.062500	33.037556	1.249610	29.500000	36.750000
23	L 16-49D	W/C2	36	100	.062500	-.062500	20.443683	.885104	17.750000	23.125000
24	L 16-57A	*	22	100	.062500	-.062500	20.414752	.545719	19.000000	22.125000
25	L 16-57B	W/C2	18	100	.062500	-.062500	22.185720	.743094	20.250000	24.500000
26	L 16-57C	W/C2	22	100	.062500	-.062500	21.266655	.830939	19.000000	23.750000
27	L 16-57D	W/C2	21	100	.062501	-.065002	15.224949	.637654	12.997759	17.060341
28	L 24-17A	NSIG								
29	L 24-17B	W/C2	27	100	.062500	-.062500	33.435434	1.091249	30.250000	36.375000
30	L 24-17C	W/C2	31	100	.062500	-.062500	36.647962	1.362645	32.625000	40.625000
31	L 24-17D	*	24	100	.062500	-.062500	24.273282	.990002	21.375000	27.187500
32	L 24-25A	W/C2	50	100	.066489	-.066498	37.797376	.992963	34.973396	40.624992
33	L 24-25B	W/C2	48	100	.062501	-.065002	32.590374	1.218442	28.990081	36.248222
34	L 24-25C	W/C2	50	100	.087719	-.087708	28.838710	1.208158	25.350887	32.280708
35	L 24-25D	W/C2	48	100	.062501	-.063751	28.012490	1.208486	24.123989	31.561565
36	L 24-41A	W/C2	50	100	.068312	-.068314	39.875726	1.023663	36.751846	42.899925

* OLD CALIBRATION VALUES

Table D-7

TEST POINT 2PT3/PRBS PRESSURE STEPS POWER = 61.7%/FLOW = 44.6%/RUN 204

MEANS CODE/MEAN, STANDARD DEVIATION, MINIMUM, MAXIMUM (Continued)

37	L 24-41B	W/C2	50	100	.062500	-.062500	35.553072	1.193383	32.250000	39.500000
38	L 24-41C	W/C2	50	100	.083339	-.091690	36.600129	1.534128	32.077126	41.327744
39	L 24-41D	W/C2	40	100	.062500	-.062500	26.827780	1.106827	23.125000	29.875000
40	L 32-09A	W/C2	30	100	.062500	-.062500	28.607856	.736229	26.625000	30.500000
41	L 32-09B	W/C2	34	100	.062500	-.062500	42.827931	1.372407	39.062500	46.625000
42	L 32-09C	W/C2	33	100	.062500	-.062500	38.660726	1.443635	34.375000	42.812500
43	L 32-09D	W/C2	27	100	.062500	-.062500	24.265347	1.007109	21.500000	26.875000
44	L 32-33A	W/C2	23	100	.062500	-.062500	34.365369	.839561	32.125000	36.625000
45	L 32-33B	W/C2	29	100	.062502	-.066254	31.688193	1.035796	28.997120	34.497284
46	L 32-33C	W/C2	35	100	.062501	-.065002	30.128240	1.152224	26.998039	33.248161
47	L 32-33D	W/C2	26	100	.062501	-.063751	26.994746	1.086776	23.998989	30.124050
48	L 32-41A	W/C2	29	100	.062500	-.062500	34.927314	.866521	32.312500	37.312500
49	L 32-41B	W/C2	25	100	.062502	-.066254	32.395565	1.052001	29.372131	36.059830
50	L 32-41C	W/C2	41	100	.062503	-.067505	31.899375	1.228217	28.308632	35.558922
51	L 32-41D	NSIG								
52	L 32-57A	W/C2	18	100	.062500	-.062500	37.698607	.962225	35.187500	40.562500
53	L 32-57B	W/C2	32	100	.062528	-.062546	36.290950	1.244730	32.889458	40.080124
54	L 32-57C	W/C2	29	100	.062500	-.062500	29.020614	1.132189	25.375000	32.562500
55	L 32-57D	W/C2	20	100	.062501	-.065002	30.507061	1.315010	26.498028	34.998199
56	L 40-33A	*	42	100	.062501	-.062485	32.600667	.868202	30.125614	35.563217
57	L 40-33B	W/C2	50	100	.065104	-.065109	29.330980	1.002810	26.432289	32.291664
58	L 40-33C	W/C2	47	100	.062500	-.062500	28.851527	1.138315	25.500000	33.250000
59	L 40-33D	W/C2	37	100	.062500	-.062500	25.852869	1.101335	22.375000	29.000000
60	L 40-41A	W/C2	28	100	.062501	-.063751	36.024385	.894911	33.561584	38.561638
61	L 40-41B	W/C2	25	100	.062502	-.066254	34.466382	1.155173	31.247189	37.872383
62	L 40-41C	W/C2	25	100	.062501	-.065002	32.422587	1.212098	28.998081	35.873215
63	L 40-41D	W/C2	26	100	.062500	-.062500	24.797232	1.020968	22.000000	27.750000
64	L 48-25A	W/C2	48	100	.062500	-.062500	29.592711	.814883	27.312500	31.750000
65	L 48-25B	W/C2	48	100	.062503	-.066238	36.313152	1.177481	33.247925	45.123512
66	L 48-25C	W/C2	50	100	.077417	-.078964	33.165252	1.333531	28.797443	36.848778
67	L 48-25D	W/C2	42	100	.062500	-.062500	20.994794	.979394	18.000000	24.125000
68	L 48-49A	W/C2	50	100	.067589	-.068939	20.381613	.606553	18.720940	22.032825
69	L 48-49B	W/C2	50	100	.094697	-.094696	31.567163	1.242505	28.030304	35.606064
70	L 48-49C	W/C2	50	100	.065989	-.065994	28.138003	1.163751	24.811790	32.268532
71	L 48-49D	W/C2	33	100	.062501	-.063751	18.401702	.824807	15.748907	21.811466
72	L 56-25A	W/C2	32	100	.062501	-.063751	33.913830	.884410	31.374065	36.999123
73	L 56-25B	W/C2	31	100	.062500	-.062500	27.270873	.905219	24.875000	30.000000
74	L 56-25C	W/C2	31	100	.062501	-.065002	32.251244	1.285896	28.623074	35.998222
75	L 56-25D	*	21	100	.062500	-.062500	19.231969	.823694	16.562500	21.750000
76	L 56-33A	W/C2	50	100	.070860	-.070847	36.426968	1.058974	33.304245	42.941216
77	L 56-33B	W/C2	49	100	.062500	-.062500	17.447018	.770124	15.062500	19.625000
78	L 56-33C	W/C2	46	100	.062500	-.062500	28.485945	1.207003	24.625000	32.375000
79	L 56-33D	W/C2	31	100	.062500	-.062500	18.954784	.844134	16.250000	21.375000
80	APRM A	PCT	10	100	.062503	-.062500	60.801343	1.751120	56.627274	65.127609
81	APRM C	PCT	10	100	.062502	-.062500	61.115657	1.862954	56.564201	65.501968
82	APRM D	PCT	10	100	.062501	-.063751	60.934501	1.821101	56.624313	66.124405
83	APRM F	PCT	10	100	.062506	-.062500	61.542575	1.891260	57.130714	65.756577
84	TIP 4	W/C2	10	100	.062500	-.062500	5.150713	.121712	4.625000	5.500000
85	TIP 5	W/C2	10	100	.062500	-.062500	4.014022	.139072	3.562500	4.375000
86	RC A DP	PSID	10	100	.030811	-6.199886	.890645	.040474	.701886	1.010301
87	RC B DP	PSID	10	100	.030778	-6.065044	1.153336	.066185	.552154	1.444706
88	FW A DP	PSID	10	100	.069382	-4.520901	5.129506	.303550	4.082411	6.372004
89	FW B DP	PSID	10	100	.070123	-4.586021	5.693715	.148033	5.161028	6.142746
90	FW C DP	PSID	10	100	.069516	-4.535221	-.100850	.095236	-.503293	.261383

* OLD CALIBRATION VALUES

Table D-7

TEST POINT 2PT3/PRBS PRESSURE STEPS POWER = 61.7%/FLOW = 44.6%/RUN 204

MEANS CODE/MEAN, STANDARD DEVIATION, MINIMUM, MAXIMUM (Continued)

91	WLRL NG	INCH	10	100	.074820	-14.052643	22.746801	.602226	20.289940	24.928810
92	JP 1 DP	PSID	1	10	.100008	-.104004	2.093171	.569622	-.304020	4.096332
93	JP 6 DP	PSID	1	10	.050001	-.050003	2.361168	.630414	-.450011	4.700091
94	JP 11 DP	PSID	1	10	.050865	.101730	1.595978	.470415	-.508646	3.102747
95	JP 16 DP	PSID	1	10	.050094	-.150276	1.424013	.389656	-.450841	2.805280
96										
97										
98	CORE DP	PSID	1	10	.050146	-.150436	3.290640	.571509	1.103224	5.566256
99	FW TEM A	DEGF	10	100	.499501	279.590393	335.237091	.429266	334.035950	354.515503
100										
101	RC TEM A	DEGF	10	100	.499501	419.500488	508.434423	.109592	506.913086	510.409607
102	RC TEM B	DEGF	10	100	.499900	419.500122	-603.795266	.000000	-603.795288	-603.795288
103	CF TOTAL	PCT	10	100	.457708	-29.888336	41.451553	.449075	39.225555	42.429520
104	P RX W	PSIA	1	10	.752196	9.434570	995.680199	1.308563	992.555298	997.820679
105	P RX N	PSIA	33	100	.075076	1011.362061	994.374325	1.204012	991.541992	996.346802
106	CORE P W	PSIA	1	10	.748122	14.071533	1014.484556	1.426410	1009.822144	1018.799683
107	CORE P N	PSIA	1	100	.074166	1012.238403	1014.626843	1.379993	1010.458374	1018.987549
108										
109										
110										
111										
112										
113										
114										
115										

11130 SAMPLES PER CHANNEL ANALYZED
FILTER BAND .00 TO 1000.0 HZ

Table D-8
TEST POINT 2PT3/NOISE POWER = 61.7%/FLOW = 44.6%/RUN 203
MEANS CODE/MEAN, STANDARD DEVIATION, MINIMUM, MAXIMUM

WDS BUF	BUF REC	CLOSURE PERIOD	SCAN PERIOD	PACER PERIOD
116	35	0	12	25

SCAN MODE	FIRST CHANNEL	LAST CHANNEL	PHYREC SIZE
0	0	115	4064

I. D. T A B L E

CH#	NAME	EU	GAIN	FILTER	SLOPE	INT.	MEAN	STD DEV	MIN VAL	MAX VAL
0	L 08-17A	W/C2	46	100	.070822	-.070816	38.567077	.650139	36.756622	41.005943
1	L 08-17B	W/C2	50	100	.085909	-.085907	31.731651	.660158	29.294968	34.019966
2	L 08-17C	W/C2	38	100	.062500	-.062500	29.323833	.625087	27.000000	31.250000
3	L 08-17D	W/C2	27	100	.062500	-.062500	17.779786	.420301	16.312500	19.312500
4	L 08-25A	W/C2	25	100	.062500	-.062500	33.397714	.454044	32.000000	34.812500
5	L 08-25B	W/C2	23	100	.062500	-.062500	30.726226	.552571	28.812500	32.625000
6	L 08-25C	W/C2	10	100	.062500	-.062500	32.661887	.588327	30.375000	34.750000
7	L 08-25D	W/C2	19	100	.062500	-.062500	22.929143	.423259	21.375000	24.375000
8	L 08-33A	W/C2	20	100	.062500	-.062500	38.040262	.530589	36.437500	39.750000
9	L 08-33B	W/C2	25	100	.062500	-.062500	30.054833	.535976	28.187500	31.625000
10	L 08-49B	NSIG								
11	L 08-33D	W/C2	21	100	.062500	-.062500	23.304450	.435465	21.750000	24.750000
12	L 08-49A	W/C2	42	100	.064107	-.064117	18.176761	.489777	16.924236	19.488518
13	L 08-33C	W/C2	37	100	.062501	-.065002	32.557067	.618444	30.372982	35.060562
14	L 08-49C	W/C2	39	100	.062500	-.062500	25.565060	.554091	23.750000	27.250000
15	L 08-49D	NSIG								
16	L 16-33A	W/C2	22	100	.062500	-.062500	32.890054	.406811	31.500000	34.250000
17	L 16-33B	W/C2	22	100	.062500	-.062500	35.236708	.590416	33.187500	37.375000
18	L 16-33C	W/C2	17	100	.062500	-.062500	30.157702	.523134	28.250000	32.000000
19	L 16-33D	W/C2	23	100	.062500	-.062500	25.844768	.466501	24.250000	27.312500
20	L 16-49A	W/C2	50	100	.062500	-.062500	32.596048	.553350	30.625000	34.187500
21	L 16-49B	W/C2	50	100	.075574	-.075577	37.932939	.757745	35.368805	40.583435
22	L 16-49C	W/C2	49	100	.062500	-.062500	33.150167	.548250	31.000000	35.062500
23	L 16-49D	W/C2	36	100	.062500	-.062500	20.529589	.443163	18.875000	22.000000
24	L 16-57A	*	22	100	.062500	-.062500	20.297030	.301148	19.250000	21.250000
25	L 16-57B	W/C2	18	100	.062500	-.062500	22.221048	.345132	21.000000	23.500000
26	L 16-57C	W/C2	22	100	.062500	-.062500	21.374970	.393511	19.812500	22.750000
27	L 16-57D	W/C2	21	100	.062501	-.065002	15.343080	.338681	14.122782	16.372826
28	L 24-17A	NSIG								
29	L 24-17B	W/C2	27	100	.062500	-.062500	33.409036	.524134	31.562500	35.625000
30	L 24-17C	W/C2	31	100	.062500	-.062500	36.738435	.644738	34.375000	39.125000
31	L 24-17D	*	24	100	.062500	-.062500	24.357881	.423748	22.875000	25.875000
32	L 24-25A	W/C2	50	100	.066489	-.066498	37.546677	.582942	35.704781	39.361694
33	L 24-25B	W/C2	48	100	.062501	-.065002	32.563931	.766920	29.998100	34.748192
34	L 24-25C	W/C2	50	100	.087719	-.087708	28.906785	.739495	26.666676	30.964920
35	L 24-25D	W/C2	48	100	.062501	-.063751	28.123864	.610049	26.061512	30.249054
36	L 24-41A	W/C2	50	100	.068312	-.068314	39.675934	.595333	37.434967	41.328751
37	L 24-41B	W/C2	50	100	.062500	-.062500	35.553363	.620995	33.250000	37.500000

* OLD CALIBRATION VALUES

Table D-8

TEST POINT 2PT3/NOISE POWER = 61.7%/FLOW = 44.6%/RUN 203

MEANS CODE/MEAN, STANDARD DEVIATION, MINIMUM, MAXIMUM (Continued)

38	L 24-41C	W/C2	50	100	.083339	-.091690	36.648717	.964008	33.660568	39.744308
39	L 24-41D	W/C2	40	100	.062500	-.062500	26.932345	.523018	25.062500	28.562500
40	L 32-09A	W/C2	30	100	.062500	-.062500	28.391149	.361193	27.000000	29.375000
41	L 32-09B	W/C2	34	100	.062500	-.062500	42.868048	.607991	40.375000	45.000000
42	L 32-09C	W/C2	33	100	.062500	-.062500	38.778458	.665780	36.375000	41.000000
43	L 32-09D	W/C2	27	100	.062500	-.062500	24.349000	.434854	22.875000	25.750000
44	L 32-33A	W/C2	23	100	.062500	-.062500	34.195494	.393447	33.000000	35.375000
45	L 32-33B	W/C2	29	100	.062502	-.066254	31.748184	.463251	30.309658	33.309746
46	L 32-33C	W/C2	35	100	.062501	-.065002	30.211372	.577458	28.310566	32.498146
47	L 32-33D	W/C2	26	100	.062501	-.063751	27.156236	.444762	25.624004	28.749039
48	L 32-41A	W/C2	29	100	.062500	-.062500	35.141196	.437241	33.750000	36.437500
49	L 32-41B	W/C2	25	100	.062502	-.066254	32.618085	.494107	30.997181	34.247276
50	L 32-41C	W/C2	41	100	.062503	-.067505	31.979172	.628747	29.808693	34.058861
51	L 32-41D	NSIG								
52	L 32-57A	W/C2	18	100	.062500	-.062500	37.435708	.452660	36.062500	39.187500
53	L 32-57B	W/C2	32	100	.062528	-.062546	36.390643	.598794	34.265060	38.454407
54	L 32-57C	W/C2	29	100	.062500	-.062500	29.166917	.558607	26.750000	31.250000
55	L 32-57D	W/C2	20	100	.062501	-.065002	30.665928	.639372	28.123062	32.748154
56	L 40-33A	*	42	100	.062501	-.062485	33.053915	.511749	31.500641	34.500702
57	L 40-33B	W/C2	50	100	.065104	-.065109	29.361691	.543668	27.604164	30.924477
58	L 40-33C	W/C2	47	100	.062500	-.062500	28.931518	.617229	26.750000	31.187500
59	L 40-33D	W/C2	37	100	.062500	-.062500	25.965940	.536212	24.125000	27.625000
60	L 40-41A	W/C2	28	100	.062501	-.063751	35.874757	.448843	34.499092	37.249123
61	L 40-41B	W/C2	25	100	.062502	-.066254	34.516666	.602553	32.497223	36.497345
62	L 40-41C	W/C2	25	100	.062501	-.065002	32.495816	.544376	30.435608	34.310684
63	L 40-41D	W/C2	26	100	.062500	-.062500	24.914988	.426976	23.437500	26.375000
64	L 48-25A	W/C2	48	100	.062500	-.062500	29.500500	.498060	28.125000	30.687500
65	L 48-25B	W/C2	48	100	.062503	-.066238	36.346284	.547859	34.622993	37.998161
66	L 48-25C	W/C2	50	100	.077417	-.078964	33.206248	.742316	30.500610	35.610107
67	L 48-25D	W/C2	42	100	.062500	-.062500	21.082077	.575000	19.312500	22.812500
68	L 48-49A	W/C2	50	100	.067589	-.068939	20.307535	.428936	19.126476	21.356930
69	L 48-49B	W/C2	50	100	.094697	-.094696	31.679952	.889788	29.166668	34.090912
70	L 48-49C	W/C2	50	100	.065989	-.065994	28.257201	.686061	26.263546	30.420841
71	L 48-49D	W/C2	33	100	.062501	-.063751	18.485131	.458913	16.623917	20.123951
72	L 56-25A	W/C2	32	100	.062501	-.063751	33.921428	.471710	32.249069	35.249100
73	L 56-25B	W/C2	31	100	.062500	-.062500	27.337048	.410603	25.875000	28.500000
74	L 56-25C	W/C2	31	100	.062501	-.065002	32.373314	.572935	30.498108	34.248184
75	L 56-25D	*	21	100	.062500	-.062500	19.267667	.379912	17.750000	20.500000
76	L 56-33A	W/C2	50	100	.070860	-.070847	36.287767	.682650	34.012848	38.122734
77	L 56-33B	W/C2	49	100	.062500	-.062500	17.404798	.550612	15.750000	18.750000
78	L 56-33C	W/C2	46	100	.062500	-.062500	28.522708	.618892	26.250000	30.312500
79	L 56-33D	W/C2	31	100	.062500	-.062500	18.999149	.419289	17.500000	20.375000
80	APRM A	PCT	10	100	.062503	-.062500	60.802997	.582659	59.252373	62.502502
81	APRM C	PCT	10	100	.062502	-.062500	61.163536	.587483	59.376785	62.876892
82	APRM D	PCT	10	100	.062501	-.063751	61.008009	.604101	59.374344	62.624374
83	APRM F	PCT	10	100	.062506	-.062500	61.636877	.612751	59.880989	63.318832
84	TIP 4	W/C2	10	100	.062500	-.062500	.000232	.003899	-.062500	.062500
85	TIP 5	W/C2	10	100	.062500	-.062500	.005214	.017284	.000000	.062500
86	RC A DP	PSID	10	100	.030811	-6.199886	.908667	.045722	.763509	1.102436
87	RC B DP	PSID	10	100	.030778	-6.065044	1.162428	.065671	.921486	1.413929
88	FW A DP	PSID	10	100	.069382	-4.520901	5.138260	.294377	4.151793	6.163858
89	FW B DP	PSID	10	100	.070123	-4.586021	5.693506	.140027	5.301273	6.142746
90	FW C DP	PSID	10	100	.069516	-4.535221	-.101689	.094336	-.364261	.191867
91	WLRL NG	INCH	10	100	.074820	-14.052643	22.594033	.549815	20.289940	24.928810

* OLD CALIBRATION VALUES

Table D-8
TEST POINT 2PT3/NOISE POWER = 61.7%/FLOW = 44.6%/RUN 203
MEANS CODE/MEAN, STANDARD DEVIATION, MINIMUM, MAXIMUM (Continued)

92	JP 1 DP	PSID	1	10	.100008	-.104004	2.114297	.552597	-.504036	4.496364
93	JP 6 DP	PSID	1	10	.050001	-.050003	2.351592	.640937	-.400010	4.900096
94	JP 11 DP	PSID	1	10	.050865	.101730	1.643061	.500032	-.254323	3.611394
95	JP 16 DP	PSID	1	10	.050094	-.150276	1.438883	.388661	-.250465	2.805280
96										
97										
98	CORE DP	PSID	1	10	.050146	-.150436	3.316850	.577904	1.103224	5.566256
99	FW TEM A	DEGF	10	100	.499501	279.590393	335.053795	.205269	334.535461	336.033936
100										
101	RC TEM A	DEGF	10	100	.499501	419.500488	508.660616	.249761	508.411560	508.911072
102	RC TEM B	DEGF	10	100	.499900	419.500122	-603.795266	.000000	-603.795288	-603.795288
103	CF TOTAL	PCT	10	100	.457708	-29.888336	41.459352	.458073	40.140976	42.429520
104	P RX W	PSIA	1	10	.752196	9.434570	997.070490	.038802	997.068481	997.820679
105	P RX N	PSIA	33	100	.075076	1011.362061	995.718403	.142685	995.370850	996.196655
106	CORE P W	PSIA	1	10	.748122	14.071533	1015.858479	.747895	1012.814697	1018.799683
107	CORE P N	PSIA	1	100	.074166	1012.238403	1016.015937	.660300	1013.054199	1018.468384
108										
109										
110										
111										
112										
113										
114										
115										

10500 SAMPLES PER CHANNEL ANALYZED
FILTER BAND .00 TO 1000.0 HZ

Table D-9

MEAN, STD., DEV., MIN., MAX.

POINT 3PT2, STEPS, 50.3% POWER, 47.1% FLOW

WDS BUF	BUF REC	CLOSURE PERIOD	SCAN PERIOD	PACER PERIOD
130	31	0	12	25

SCAN MODE	FIRST CHANNEL	LAST CHANNEL	PHYREC SIZE
0	0	129	4034

I. D. T A B L E

CH#	NAME	EU	GAIN	FILTER	SLOPE	INT.	MEAN	STD DEV	MIN VAL	MAX VAL
0	L 08-17A	NSIG	46	100	.070822	-.070816	31.655227	1.693866	27.620586	36.331696
1	L 08-17B	W/C2	50	100	.065000	-.065000	24.134360	1.724486	20.150002	28.860001
2	L 08-17C	NSIG	38	100	.062500	-.062500	24.925705	2.043814	20.062500	30.562500
3	L 08-17D	W/C2	27	100	.064400	-.064400	15.390985	1.386342	11.849600	19.255600
4	L 08-25A	W/C2	25	100	.068100	-.068100	30.320676	1.560663	26.831402	34.594803
5	L 08-25B	W/C2	23	100	.068800	-.068800	33.283712	2.333156	27.932800	39.628799
6	L 08-25C	W/C2	10	100	.065000	-.065000	25.004893	2.010896	20.345001	30.355000
7	~~L 08-25D W/C2~~ —		19	100	.000000	-.065000	~~-.065000~~	~~.000000~~	-.065000	-.065000
8	L 08-33A	W/C2	20	100	.069400	-.069400	33.319511	1.721310	29.494999	37.753601
9	L 08-33B	W/C2	25	100	.071900	-.071900	31.009368	2.157656	26.315399	36.812798
10	L 08-49B	NSIG —	26	100	.062500	-.062500	~~-128.000000~~	.000000	-128.000000	-128.000000
11	L 08-33D	W/C2	21	100	.066300	-.066300	19.635182	1.726636	15.381601	24.265800
12	L 08-49A	W/C2	42	100	.065000	-.065000	25.387522	1.352108	21.775002	28.990002
13	L 08-33C	W/C2	37	100	.070600	-.070600	23.148421	1.856139	18.709003	28.451801
14	L 08-49C	W/C2	39	100	.064400	-.064400	20.458296	1.662918	16.035603	24.794003
15	L 08-49D	W/C2	28	100	.065000	-.065000	12.983839	.997383	10.139999	15.924999
16	L 16-33A	W/C2	22	100	.064400	-.064400	25.886506	1.295422	22.926399	29.044403
17	L 16-33B	W/C2	22	100	.065600	-.065600	29.192646	1.989158	24.665596	34.374397
18	L 16-33C	W/C2	17	100	.067500	-.067500	23.520012	1.839151	18.967499	28.484997
19	L 16-33D	W/C2	23	100	.064400	-.064400	20.978969	1.789468	16.100002	25.631203
20	L 16-49A	W/C2	50	100	.065600	-.065600	29.830500	1.535232	25.452797	33.849602
21	L 16-49B	W/C2	50	100	.067500	-.067500	26.178102	1.800123	21.194996	30.847496
22	L 16-49C	W/C2	49	100	.065000	-.065000	27.421627	2.146818	21.970001	32.889999
23	L 16-49D	W/C2	36	100	.065600	-.065600	17.185709	1.515788	13.251200	21.254395
24	L 16-57A	NSIG —	22	100	.066300	-.066300	18.160344	.923274	15.646801	20.553001
25	L 16-57B	W/C2	18	100	.073800	-.073800	22.019855	1.470183	18.081001	25.534801
26	L 16-57C	W/C2	22	100	.065000	-.065000	17.946757	1.434878	14.234999	21.709999
27	L 16-57D	W/C2	21	100	.062501	-.065002	17.783759	1.475206	13.997780	21.747936
28	L 24-17A	NSIG —	31	100	.065000	-.065000	31.228272	1.550853	27.430000	35.359993
29	L 24-17B	W/C2	27	100	.072500	-.072500	27.436530	1.818081	23.055004	32.262497
30	L 24-17C	W/C2	31	100	.065600	-.065600	23.017170	1.780771	18.499195	27.814396
31	L 24-17D	W/C2	24	100	.065600	-.065600	18.559246	1.552461	14.366400	22.959995
32	L 24-25A	W/C2	50	100	.065600	-.065600	31.714422	1.588588	27.551994	35.948799
33	L 24-25B	W/C2	48	100	.065600	-.065600	32.242629	2.223381	26.764797	38.441597
34	L 24-25C	W/C2	50	100	.065000	-.065600	16.836781	1.368713	13.259399	20.669399
35	L 24-25D	W/C2	48	100	.064400	-.064400	21.733108	1.859776	16.550800	26.919201
36	L 24-41A	W/C2	50	100	.065600	-.065600	30.633184	1.524311	26.502396	34.505600

Table D-9
MEAN, STD., DEV., MIN., MAX.
POINT 3PT2, STEPS, 50.3% POWER, 47.1% FLOW (Continued)

37	L 24-41B	W/C2	50	100	.066300	-.066300	33.261163	2.197204	27.381901	38.851807
38	L 24-41C	W/C2	50	100	.065000	-.065000	19.785409	1.621974	15.079998	24.700001
39	L 24-41D	W/C2	40	100	.064400	-.064400	21.070404	1.755808	16.422001	26.017601
40	L 32-09A	W/C2	30	100	.066900	-.066900	32.772856	1.620665	28.700100	36.928795
41	L 32-09B	W/C2	34	100	.067500	-.067500	29.175710	1.950500	23.962498	34.019997
42	L 32-09C	W/C2	33	100	.066300	-.066300	23.519705	1.867362	18.298001	28.509003
43	L 32-09D	W/C2	27	100	.065600	-.065600	20.583327	1.821448	15.612799	25.321594
44	L 32-33A	W/C2	23	100	.069400	-.069400	34.301189	1.639402	30.050198	38.308800
45	L 32-33B	W/C2	29	100	.068800	-.068800	26.568980	1.762453	22.015999	31.097599
46	L 32-33C	W/C2	35	100	.066300	-.066300	22.680772	1.798613	18.033604	27.580803
47	L 32-33D	NSIG	26	100	.062501	-.063751	21.279900	1.767214	16.561417	25.999008
48	L 32-41A	W/C2	29	100	.065600	-.065600	29.379484	1.429446	25.583996	32.799995
49	L 32-41B	NSIG	25	100	.062502	-.066254	25.298402	1.662195	20.871876	29.559635
50	L 32-41C	W/C2	41	100	.064400	-.064400	20.419520	1.622441	15.971199	25.116001
51	L 32-41D	NSIG	50	100	-3125.002930	3250.002930	-1264.865864	-1553.022494	125.000000	-3000.002930
52	L 32-57A	W/C2	18	100	.053100	-.053100	31.243992	1.540954	27.240299	34.806696
53	L 32-57B	W/C2	32	100	.066300	53.000000	76.323480	1.586493	72.227005	80.514511
54	L 32-57C	NSIG	29	100	.062500	-.062500	17.596549	1.413443	13.812500	21.875000
55	L 32-57D	NSIG	20	100	.062501	-.065002	27.313770	2.407728	21.247925	33.873177
56	L 40-33A	NSIG	42	100	.067500	-.067500	27.994039	1.404377	24.299995	31.589996
57	L 40-33B	W/C2	50	100	.067500	-.067500	26.504601	1.774762	21.869999	31.049995
58	L 40-33C	NSIG	47	100	.062500	-.062500	22.400584	1.777628	17.562500	27.500000
59	L 40-33D	W/C2	37	100	.064400	-.064400	21.023383	1.778785	15.842402	26.146400
60	L 40-41A	W/C2	28	100	.066300	-.066300	30.611130	1.489533	26.652603	34.343407
61	L 40-41B	W/C2	25	100	.067500	-.067500	30.508776	1.991142	25.244999	36.112503
62	L 40-41C	W/C2	25	100	.066300	-.066300	24.994237	1.915482	20.022602	30.829502
63	L 40-41D	W/C2	26	100	.064400	-.064400	19.614285	1.642190	15.262800	24.021202
64	L 48-25A	W/C2	48	100	.065600	-.065600	28.155897	1.417288	24.403194	31.815994
65	L 48-25B	W/C2	48	100	.065600	-.065600	28.554983	1.860329	24.075195	33.456001
66	L 48-25C	W/C2	50	100	.065000	-.065000	19.263108	1.529790	14.949999	23.660000
67	L 48-25D	W/C2	42	100	.065000	-.065000	17.043581	1.510188	12.674999	21.125000
68	L 48-49A	W/C2	50	100	.067589	-.068939	27.632003	1.423260	23.654972	31.089817
69	L 48-49B	W/C2	50	100	.067600	-.067600	18.856980	1.372861	14.804399	22.713600
70	L 48-49C	NSIG	50	100	.065989	-.065994	22.684901	1.825418	17.553020	27.979256
71	L 48-49D	W/C2	33	100	.065000	-.065000	15.422234	1.350233	11.764999	19.305000
72	L 56-25A	W/C2	32	100	.064400	-.064400	25.970320	1.293401	22.475601	29.302002
73	L 56-25B	W/C2	31	100	.068800	-.068800	35.263469	2.351170	29.721600	41.142403
74	L 56-25C	NSIG	31	100	.062501	-.065002	24.276436	1.909505	19.310387	29.310585
75	L 56-25D	NSIG	21	100	.066300	-.066300	16.267944	1.412596	12.597002	19.956303
76	L 56-33A	NSIG	50	100	.070860	-.070847	29.457885	1.544404	25.013618	33.729408
77	L 56-33B	NSIG	49	100	.062500	-.062500	13.713752	1.050716	10.625000	16.750000
78	L 56-33C	W/C2	46	100	.065000	-.065000	19.083004	1.579797	15.079998	23.660000
79	L 56-33D	NSIG	31	100	.062500	-.062500	16.070817	1.431254	12.250000	19.750000
80	APRM A	PCT	10	100	.062503	-.062500	53.758099	3.332616	45.876839	61.627472
81	APRM C	PCT	10	100	.062502	-.062500	52.447493	3.343415	44.751343	60.314316
82	APRM D	PCT	10	100	.062501	-.063751	52.586328	3.336013	44.624199	60.374352
83	APRM F	PCT	10	100	.062506	-.062500	52.544755	3.422754	44.566956	60.506050
84	TIP 4	W/C2	10	100	.062500	-.062500	.062626	.004493	-.062500	.125000
85	TIP 5	W/C2	10	100	.062500	-.062500	.062100	.005074	-.062500	.062500
86	RC A DP	PSID	10	100	.030811	-6.199886	.941930	.046344	.393771	1.102436
87	RC B DP	PSID	10	100	.030778	-6.065044	1.098687	.062974	.521377	1.444706
88	FW A DP	PSID	10	100	.069302	-4.520901	2.239250	.261976	1.445912	3.041688
89	FW B DP	PSID	10	100	.070123	-4.586021	.091484	.050925	-.028049	.252442
90	FW C DP	PSID	10	100	.069516	-4.535221	4.471535	.118898	4.154280	4.918955

Table D-9
MEAN, STD., DEV., MIN., MAX.
POINT 3PT2, STEPS, 50.3% POWER, 47.1% FLOW (Continued)

91	WLRL NG	INCH	10	100	.074820	-14.052643	22.649733	.762339	20.140297	25.527374
92	JP 1 DP	PSID	1	10	.100008	-.104004	2.028942	.590219	-.704052	4.096332
93	JP 6 DP	PSID	1	10	.050001	-.050003	2.238033	.644442	-.150005	4.450087
94	JP 11 DP	PSID	1	10	.050865	.101730	1.659395	.574956	-.712105	3.713124
95	JP 16 DP	PSID	1	10	.050094	-.150276	1.420909	.462850	-.601124	2.955563
96	STM A DP	PSID	1	10	.100000	-.100000	-204.799988	.000000	-204.799988	-204.799988
97	STM D DP	PSID	1	10	.100000	-.100000	204.599988	.000000	204.599976	204.599976
98	CORE DP	PSID	1	10	.050146	-.150436	3.362738	.487624	1.704981	5.365670
99	FW TEM A	DEGF	10	100	.499501	279.590393	282.682053	.342742	282.087891	283.086914
100	WTRL W R	INCH	5	100	-.000000	-.000000	-.000000	-.000000	-.000000	-.000000
101	RC TEM A	DEGF	10	100	.499501	419.500488	507.141129	.286147	506.913086	507.912109
102	RC TEM B	DEGF	10	100	.499900	419.500122	-603.795266	.000000	-603.795288	-603.795288
103	CF TOTAL	PCT	10	100	.457708	-29.888336	42.797815	.622718	41.056396	44.260345
104	P RX W	PSIA	1	10	.752196	9.434570	991.315877	2.439300	985.785522	995.564087
105	P RX N	PSIA	33	100	.075076	1011.362061	990.073209	2.474297	984.634888	994.545044
106	CORE P W	PSIA	1	10	.748122	14.071533	1009.674040	2.606882	1003.089111	1015.059082
107	CORE P N	PSIA	1	100	.074166	1012.238403	1009.976417	2.538833	1003.412720	1015.279175
108	STMA P W	PSIA	2	10	.750000	-.750000	1534.500000	.000000	1534.500000	1534.500000
109	STMA P N	PSIA	10	100	.075000	998.350708	1151.875714	.000000	1151.875732	1151.875732
110	STMD P W	PSIA	2	10	.750000	-.750000	1534.500000	.000000	1534.500000	1534.500000
111	STMD P N	PSIA	10	100	.075000	998.827759	1152.352765	.000000	1152.352783	1152.352783
112	ESTMA DP	PSID	1	10	.100000	-.100000	204.599988	.000000	204.599976	204.599976
113	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
114	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
115	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
116	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
117	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
118	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
119	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
120	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
121	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
122	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
123	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
124	NOSIG	NONE	5	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
125	NOSIG	NONE	5	100	-.000000	-.000000	.000122	.000000	.000120	.000120
126	NOSIG	NONE	5	100	-.000000	-.000000	.000122	.000000	.000120	.000120
127	NOSIG	NONE	5	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
128	PRBS	STEP	1	0	.017000	.000000	-.374759	.478542	-1.003000	.102000
129	NOT ASSIGNED									

8897 SAMPLES PER CHANNEL ANALYZED
FILTER BAND .00 TO 1000.0 HZ

Table D-10
MEAN, STD., DEV., MIN., MAX.
POINT 3PT2, NOISE, 50.3% POWER, 47.1% FLOW

WDS BUF	BUF REC	CLOSURE PERIOD	SCAN PERIOD	PACER PERIOD
130	31	0	12	25

SCAN MODE	FIRST CHANNEL	LAST CHANNEL	PHYREC SIZE
0	0	129	4034

I. D. T A B L E

CH#	NAME	EU	GAIN	FILTER	SLOPE	INT.	MEAN	STD DEV	MIN VAL	MAX VAL
0	L 08-17A	NSIG	46	100	.070822	-.070816	33.352431	.690838	30.878399	35.411003
1	L 08-17B	W/C2	50	100	.065000	-.065000	24.529215	.621826	21.840000	26.650002
2	L 08-17C	NSIG	38	100	.062500	-.062500	25.149410	.643864	22.500000	27.250000
3	L 08-17D	W/C2	27	100	.064400	-.064400	15.398553	.430885	13.846001	16.808399
4	L 08-25A	W/C2	25	100	.068100	-.068100	31.943080	.514607	30.100201	33.300903
5	L 08-25B	W/C2	23	100	.068800	-.068800	33.755258	.736456	30.959999	36.120003
6	L 08-25C	W/C2	10	100	.065000	-.065000	25.210152	.529451	23.139999	27.040001
7	L 08-25D	W/C2	19	100	.000000	-.065000	-.065000	.000000	-.065000	-.065000
8	L 08-33A	W/C2	20	100	.069400	-.069400	35.052005	.524515	33.173203	36.712601
9	L 08-33B	W/C2	25	100	.071900	-.071900	31.369614	.645214	29.191399	33.505402
10	L 08-49B	NSIG	26	100	.062500	-.062500	-128.000000	.000000	-128.000000	-128.000000
11	L 08-33D	W/C2	21	100	.066300	-.066300	19.707752	.423745	17.901001	21.216003
12	L 08-49A	W/C2	42	100	.065000	-.065000	26.763540	.562673	24.895000	28.340000
13	L 08-33C	W/C2	37	100	.070600	-.070600	23.364242	.571548	21.038803	25.274803
14	L 08-49C	W/C2	39	100	.064400	-.064400	20.697706	.569477	18.804802	22.475601
15	L 08-49D	W/C2	28	100	.065000	-.065000	12.861207	.388679	11.634998	14.299999
16	L 16-33A	W/C2	22	100	.064400	-.064400	27.317804	.374241	26.017601	28.464802
17	L 16-33B	W/C2	22	100	.065600	-.065600	29.620954	.552160	27.420795	31.356796
18	L 16-33C	W/C2	17	100	.067500	-.067500	23.659069	.460655	21.599998	25.379997
19	L 16-33D	W/C2	23	100	.064400	-.064400	21.114260	.436782	19.448799	22.797600
20	L 16-49A	W/C2	50	100	.065600	-.065600	31.422481	.589121	29.257595	33.127998
21	L 16-49B	W/C2	50	100	.067500	-.067500	26.675503	.650449	24.299995	28.619995
22	L 16-49C	W/C2	49	100	.065000	-.065000	27.684088	.516493	25.740002	29.250000
23	L 16-49D	W/C2	36	100	.065600	-.065600	17.245982	.429514	15.612799	18.630398
24	L 16-57A	NSIG	22	100	.066300	-.066300	19.213887	.323901	18.099903	20.221500
25	L 16-57B	W/C2	18	100	.073800	-.073800	22.465717	.412447	20.959202	23.763599
26	L 16-57C	W/C2	22	100	.065000	-.065000	18.150127	.383528	16.834999	19.369999
27	L 16-57D	W/C2	21	100	.062501	-.065002	17.327372	.379059	15.747814	18.622871
28	L 24-17A	NSIG	31	100	.065000	-.065000	32.987319	.523786	31.070000	34.644997
29	L 24-17B	W/C2	27	100	.072500	-.072500	27.706538	.626444	25.520004	29.725002
30	L 24-17C	W/C2	31	100	.065600	-.065600	23.124653	.539535	21.254395	25.059196
31	L 24-17D	W/C2	24	100	.065600	-.065600	18.629788	.418123	17.318398	20.007996
32	L 24-25A	W/C2	50	100	.065600	-.065600	33.517195	.603599	31.684795	35.096001
33	L 24-25B	W/C2	48	100	.065600	-.065600	32.598620	.843842	29.847996	35.096001
34	L 24-25C	W/C2	50	100	.065000	-.065600	16.946873	.534366	15.209400	18.329399
35	L 24-25D	W/C2	48	100	.064400	-.064400	21.852502	.584606	19.835201	23.634800
36	L 24-41A	W/C2	50	100	.065600	-.065600	32.322400	.556454	30.044796	33.783997

Table D-10
MEAN, STD., DEV., MIN., MAX.
POINT 3PT2, NOISE, 50.3% POWER, 47.1% FLOW (Continued)

37	L 24-41B	W/C2	50	100	.066300	-.066300	33.679937	.654168	30.829502	35.669403
38	L 24-41C	W/C2	50	100	.065000	-.065000	19.853891	.692096	17.680000	22.035000
39	L 24-41D	W/C2	40	100	.064400	-.064400	21.178743	.499936	19.320000	22.733200
40	L 32-09A	W/C2	30	100	.066900	-.066900	34.717029	.576508	32.379601	36.661201
41	L 32-09B	W/C2	34	100	.067500	-.067500	29.701915	.646914	27.337498	31.927498
42	L 32-09C	W/C2	33	100	.066300	-.066300	23.790254	.550941	21.812702	25.724403
43	L 32-09D	W/C2	27	100	.065600	-.065600	20.696856	.452758	19.286396	22.172794
44	L 32-33A	W/C2	23	100	.069400	-.069400	36.382746	.456999	34.769402	37.753601
45	L 32-33B	W/C2	29	100	.068800	-.068800	26.857489	.457644	25.180798	28.345600
46	L 32-33C	W/C2	35	100	.066300	-.066300	22.739045	.535873	21.083401	24.398403
47	L 32-33D	NSIG	26	100	.062501	-.063751	21.398850	.401788	19.998951	22.748978
48	L 32-41A	W/C2	29	100	.065600	-.065600	30.795828	.445214	28.929596	32.143997
49	L 32-41B	NSIG	25	100	.062502	-.066254	25.372876	.446405	23.496956	26.684551
50	L 32-41C	W/C2	41	100	.064400	-.064400	20.489180	.531527	18.547199	22.218002
51	L 32-41D	NSIG	50	100	-3125.002930	3250.002930	-1214.861240	-1546.634688	125.000000	-3000.002930
52	L 32-57A	W/C2	18	100	.053100	-.053100	32.950398	.421175	31.328999	34.302597
53	L 32-57B	W/C2	32	100	.066300	53.000000	76.701274	.483447	75.077896	78.127701
54	L 32-57C	NSIG	29	100	.062500	-.062500	17.849563	.418663	16.375000	19.250000
55	L 32-57D	NSIG	20	100	.062501	-.065002	27.447608	.589122	25.310505	29.560593
56	L 40-33A	NSIG	42	100	.067500	-.067500	29.304636	.523706	27.674995	30.779995
57	L 40-33B	W/C2	50	100	.067500	-.067500	26.899182	.549381	25.109997	28.687496
58	L 40-33C	NSIG	47	100	.062500	-.062500	22.542951	.576858	20.625000	24.250000
59	L 40-33D	W/C2	37	100	.064400	-.064400	21.195197	.517400	19.126801	22.797600
60	L 40-41A	W/C2	28	100	.066300	-.066300	32.425314	.472018	30.895802	34.011902
61	L 40-41B	W/C2	25	100	.067500	-.067500	30.946103	.648124	28.754997	32.940002
62	L 40-41C	W/C2	25	100	.066300	-.066300	25.121706	.496774	23.006104	26.917801
63	L 40-41D	W/C2	26	100	.064400	-.064400	19.741290	.396365	18.289600	20.994400
64	L 48-25A	W/C2	48	100	.065600	-.065600	29.791361	.541543	28.273594	31.225594
65	L 48-25B	W/C2	48	100	.065600	-.065600	29.040083	.490109	27.551994	30.569595
66	L 48-25C	W/C2	50	100	.065000	-.065000	19.405021	.554452	17.485001	20.930000
67	L 48-25D	W/C2	42	100	.065000	-.065000	17.153625	.585538	15.339998	18.850002
68	L 48-49A	W/C2	50	100	.067589	-.068939	29.168057	.539632	27.372395	30.684280
69	L 48-49B	W/C2	50	100	.067600	-.067600	19.197262	.658411	17.102798	21.091198
70	L 48-49C	NSIG	50	100	.065989	-.065994	22.856927	.675884	20.588509	25.075748
71	L 48-49D	W/C2	33	100	.065000	-.065000	15.435486	.448643	13.910000	16.900002
72	L 56-25A	W/C2	32	100	.064400	-.064400	27.399467	.429437	25.888802	28.593601
73	L 56-25B	W/C2	31	100	.068800	-.068800	35.848069	.625926	33.849602	37.702400
74	L 56-25C	NSIG	31	100	.062501	-.065002	24.548703	.509194	22.747955	26.248024
75	L 56-25D	NSIG	21	100	.066300	-.066300	16.360796	.362134	15.116402	17.503201
76	L 56-33A	NSIG	50	100	.070860	-.070847	31.125634	.705273	28.769203	33.162529
77	L 56-33B	NSIG	49	100	.062500	-.062500	13.947754	.560165	12.250000	15.562500
78	L 56-33C	W/C2	46	100	.065000	-.065000	19.235677	.567487	17.290001	21.060001
79	L 56-33D	NSIG	31	100	.062500	-.062500	16.130003	.411465	14.750000	17.500000
80	APRM A	PCT	10	100	.062503	-.062500	55.053056	.610999	53.064629	56.752274
81	APRM C	PCT	10	100	.062502	-.062500	53.603538	.616901	51.501549	55.314163
82	APRM D	PCT	10	100	.062501	-.063751	53.712570	.611866	51.749268	55.374306
83	APRM F	PCT	10	100	.062506	-.062500	53.622576	.631032	51.505150	55.443047
84	TIP 4	W/C2	10	100	.062500	-.062500	4.710512	.075881	4.312500	4.875000
85	TIP 5	W/C2	10	100	.062500	-.062500	3.121871	1.034527	.000000	4.562500
86	RC A DP	PSID	10	100	.030811	-6.199886	.965949	.043506	.825132	1.102436
87	RC B DP	PSID	10	100	.030778	-6.065044	1.106527	.063620	.890708	1.383151
88	FW A DP	PSID	10	100	.069382	-4.520901	2.326343	.167929	1.723439	2.833544
89	FW B DP	PSID	10	100	.070123	-4.586021	.091165	.046240	-.028049	.252442
90	FW C DP	PSID	10	100	.069516	-4.535221	4.745509	.082303	4.432343	5.057987

Table D-10
MEAN, STD., DEV., MIN., MAX.
POINT 3PT2, NOISE, 50.3% POWER, 47.1% FLOW (Continued)

91	WLRL NG	INCH	10	100	.074820	-14.052643	22.813076	.573802	20.813683	25.302910
92	JP 1 DP	PSID	1	10	.100008	-.104004	1.950633	.600937	-.504036	4.396356
93	JP 6 DP	PSID	1	10	.050001	-.050003	2.232365	.670333	-.350009	4.600089
94	JP 11 DP	PSID	1	10	.050865	.101730	1.761955	.580909	-1.220752	3.916583
95	JP 16 DP	PSID	1	10	.050094	-.150276	1.440836	.426244	-.500935	2.755186
96	STM A DP	PSID	1	10	.100000	-.100000	-204.799988	.000000	-204.799988	-204.799988
97	STM D DP	PSID	1	10	.100000	-.100000	204.599988	.000000	204.599976	204.599976
98	CORE DP	PSID	1	10	.050146	-.150436	3.402040	.489633	1.704981	5.215231
99	FW TEM A	DEGF	10	100	.499501	279.590393	284.216680	.219605	284.085876	284.585388
100	WTRL W R	INCH	5	100	-.000000	-.000000	-.000000	-.000000	-.000000	-.000000
101	RC TEM A	DEGF	10	100	.499501	419.500488	507.105939	.308534	506.913086	507.912109
102	RC TEM B	DEGF	10	100	.499900	419.500122	-603.795266	.000000	-603.795288	-603.795288
103	CF TOTAL	PCT	10	100	.457708	-29.888336	42.980344	.519223	41.971817	44.260345
104	P RX W	PSIA	1	10	.752196	9.434570	994.382505	.372325	994.059692	994.811890
105	P RX N	PSIA	33	100	.075076	1011.362061	993.479935	.123667	993.043457	993.794189
106	CORE P W	PSIA	1	10	.748122	14.071533	1013.108506	.714233	1011.318481	1015.059082
107	CORE P N	PSIA	1	100	.074166	1012.238403	1013.348293	.541967	1011.274292	1015.130859
108	STMA P W	PSIA	2	10	.750000	-.750000	1534.500000	.000000	1534.500000	1534.500000
109	STMA P N	PSIA	10	100	.075000	998.350708	1151.875714	.000000	1151.875732	1151.875732
110	STMD P W	PSIA	2	10	.750000	-.750000	1534.500000	.000000	1534.500000	1534.500000
111	STMD P N	PSIA	10	100	.075000	998.827759	1152.352765	.000000	1152.352783	1152.352783
112	ESTMA DP	PSID	1	10	.100000	-.100000	204.599988	.000000	204.599976	204.599976
113	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
114	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
115	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
116	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
117	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
118	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
119	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
120	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
121	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
122	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
123	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
124	NOSIG	NONE	5	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
125	NOSIG	NONE	5	100	-.000000	-.000000	.000122	.000000	.000120	.000120
126	NOSIG	NONE	5	100	-.000000	-.000000	.000122	.000000	.000120	.000120
127	NOSIG	NONE	5	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
128	PRBS	STEP	1	0	.017000	.000000	-.912895	.007906	-.952000	-.901000
129	NOT ASSIGNED									

10106 SAMPLES PER CHANNEL ANALYZED
FILTER BAND .00 TO 1000.0 HZ

Table D-11
MEAN, STD., DEV., MIN., MAX.
POINT 3PT3, STEPS, 61.6% POWER, 46.2% FLOW

WDS BUF	BUF REC	CLOSURE PERIOD	SCAN PERIOD	PACER PERIOD
130	31	0	12	25

SCAN MODE	FIRST CHANNEL	LAST CHANNEL	PHYREC SIZE
0	0	129	4034

I. D. T A B L E

CH#	NAME	EU	GAIN	FILTER	SLOPE	INT.	MEAN	STD DEV	MIN VAL	MAX VAL
0	L 08-17A	NSIG	46	100	.070822	-.070816	34.335858	1.123543	31.020042	37.960602
1	L 08-17B	W/C2	50	100	.065000	-.065000	26.564495	1.103620	23.270000	30.160000
2	L 08-17C	NSIG	38	100	.062500	-.062500	29.563912	1.390928	25.375000	33.500000
3	L 08-17D	W/C2	27	100	.064400	-.064400	18.629326	.952069	15.906801	21.702801
4	L 08-25A	W/C2	25	100	.068100	-.068100	32.676108	1.012899	29.759701	35.684402
5	L 08-25B	W/C2	23	100	.068800	-.068800	37.019294	1.547333	32.748802	41.555199
6	L 08-25C	W/C2	10	100	.065000	-.065000	32.098000	1.484810	27.950001	36.464996
7	L 08-25D	W/C2	19	100	.000000	-.065000	-.065000	.000000	-.065000	-.065000
8	L 08-33A	W/C2	20	100	.069400	-.069400	36.044629	1.100693	32.895599	39.419205
9	L 08-33B	W/C2	25	100	.071900	-.071900	34.734091	1.440904	30.629398	38.969795
10	L 08-49B	NSIG	26	100	.062500	-.062500	-128.000000	.000000	-128.000000	-128.000000
11	L 08-33D	W/C2	21	100	.066300	-.066300	23.360714	1.156323	20.221500	26.520004
12	L 08-49A	W/C2	42	100	.065000	-.065000	27.409771	.908533	24.505001	30.290001
13	L 08-33C	W/C2	37	100	.070600	-.070600	34.081046	1.582996	29.510803	39.112396
14	L 08-49C	W/C2	39	100	.064400	-.064400	24.067899	1.142075	20.865601	27.820801
15	L 08-49D	W/C2	28	100	.065000	-.065000	15.183581	.716460	13.129999	17.680000
16	L 16-33A	W/C2	22	100	.064400	-.064400	27.966616	.833815	25.502399	30.268002
17	L 16-33B	W/C2	22	100	.065600	-.065600	32.965351	1.332704	28.732796	36.604797
18	L 16-33C	W/C2	17	100	.067500	-.067500	31.459408	1.408309	27.269997	35.504997
19	L 16-33D	W/C2	23	100	.064400	-.064400	26.317261	1.246949	22.797600	30.074802
20	L 16-49A	W/C2	50	100	.065600	-.065600	32.182608	1.029135	28.995197	35.423996
21	L 16-49B	W/C2	50	100	.067500	-.067500	28.854141	1.216998	25.244999	32.805000
22	L 16-49C	W/C2	49	100	.065000	-.065000	33.331149	1.498189	29.314999	38.089996
23	L 16-49D	W/C2	36	100	.065600	-.065600	21.492684	1.087550	18.499195	24.731197
24	L 16-57A	NSIG	22	100	.066300	-.066300	19.755071	.610309	18.033604	21.613804
25	L 16-57B	W/C2	18	100	.073800	-.073800	24.749386	.979545	21.992401	27.822601
26	L 16-57C	W/C2	22	100	.065000	-.065000	21.621841	1.003413	18.785000	24.635002
27	L 16-57D	W/C2	21	100	.062501	-.065002	20.931595	.989551	18.247864	24.122982
28	L 24-17A	NSIG	31	100	.065000	-.065000	33.775536	1.009105	30.744999	36.854996
29	L 24-17B	W/C2	27	100	.072500	-.072500	30.755797	1.217251	27.260002	34.510002
30	L 24-17C	W/C2	31	100	.065600	-.065600	31.211768	1.408930	27.092796	35.555199
31	L 24-17D	W/C2	24	100	.065600	-.065600	24.754617	1.169352	21.123196	28.076797
32	L 24-25A	W/C2	50	100	.065600	-.065600	33.885624	1.065021	30.700794	37.129601
33	L 24-25B	W/C2	48	100	.065600	-.065600	36.431226	1.562635	31.356796	41.655998
34	L 24-25C	W/C2	50	100	.065000	-.065600	23.033944	1.098706	19.824398	26.389397
35	L 24-25D	W/C2	48	100	.064400	-.064400	25.943262	1.259352	22.210002	29.173203
36	L 24-41A	W/C2	50	100	.065600	-.065600	32.830067	1.023244	29.782394	35.686401
37	L 24-41B	W/C2	50	100	.066300	-.066300	37.201330	1.486140	32.619606	41.371201

Table D-11
MEAN, STD., DEV., MIN., MAX.
POINT 3PT3, STEPS, 61.6% POWER, 46.2% FLOW (Continued)

38	L 24-41C	W/C2	50	100	.065000	-.065000	26.471145	1.306967	22.555000	30.420002
39	L 24-41D	W/C2	40	100	.064400	-.064400	26.313915	1.247784	22.733200	30.010403
40	L 32-09A	W/C2	30	100	.066900	-.066900	35.837224	1.070325	32.914795	38.935799
41	L 32-09B	W/C2	34	100	.067500	-.067500	32.923170	1.333570	29.429996	36.855003
42	L 32-09C	W/C2	33	100	.066300	-.066300	35.077639	1.617956	30.630604	39.912605
43	L 32-09D	W/C2	27	100	.065600	-.065600	24.545257	1.229019	21.057598	27.683197
44	L 32-33A	W/C2	23	100	.069400	-.069400	36.424990	1.055055	33.381401	39.280403
45	L 32-33B	W/C2	29	100	.068800	-.068800	30.359358	1.222401	27.038399	33.711998
46	L 32-33C	W/C2	35	100	.066300	-.066300	31.318668	1.434594	27.448204	35.404205
47	L 32-33D	NSIG	26	100	.062501	-.063751	24.653199	1.131251	21.248962	27.624027
48	L 32-41A	W/C2	29	100	.065600	-.065600	31.122612	.926400	28.339195	33.587196
49	L 32-41B	NSIG	25	100	.062502	-.066254	28.401180	1.119234	25.309509	31.184685
50	L 32-41C	W/C2	41	100	.064400	-.064400	31.114261	1.422357	26.790401	35.355598
51	L 32-41D	NSIG	50	100	-3125.002930	3250.002930	-1491.857936	-1561.626254	125.000000	-3000.002930
52	L 32-57A	W/C2	18	100	.053100	-.053100	33.877247	1.013975	30.904198	36.532799
53	L 32-57B	W/C2	32	100	.066300	53.000000	79.353410	1.106691	76.006104	82.503510
54	L 32-57C	NSIG	29	100	.062500	-.062500	27.810461	1.327180	23.875000	31.375000
55	L 32-57D	NSIG	20	100	.062501	-.065002	31.810732	1.614681	27.185543	36.498230
56	L 40-33A	NSIG	42	100	.067500	-.067500	29.199868	.936847	26.459995	31.724998
57	L 40-33B	W/C2	50	100	.067500	-.067500	29.634200	1.218519	26.189999	32.940002
58	L 40-33C	NSIG	47	100	.062500	-.062500	34.063466	1.555870	29.625000	38.500000
59	L 40-33D	W/C2	37	100	.064400	-.064400	24.962644	1.208545	21.445202	28.400402
60	L 40-41A	W/C2	28	100	.066300	-.066300	32.707487	.982023	29.768703	35.337906
61	L 40-41B	W/C2	25	100	.067500	-.067500	33.970948	1.362849	29.969997	37.867500
62	L 40-41C	W/C2	25	100	.066300	-.066300	32.514716	1.448371	28.376404	36.332405
63	L 40-41D	W/C2	26	100	.064400	-.064400	25.136112	1.183130	21.896000	28.400402
64	L 48-25A	W/C2	48	100	.065600	-.065600	30.059153	.954798	27.355194	32.603195
65	L 48-25B	W/C2	48	100	.065600	-.065600	31.586465	1.243120	28.339195	34.899200
66	L 48-25C	W/C2	50	100	.065000	-.065000	25.434363	1.222897	21.645000	28.860001
67	L 48-25D	W/C2	42	100	.065000	-.065000	23.128276	1.219692	19.240002	26.650002
68	L 48-49A	W/C2	50	100	.067589	-.068939	29.858151	.973832	26.764088	32.509193
69	L 48-49B	W/C2	50	100	.067600	-.067600	21.039297	1.030277	17.711201	24.200798
70	L 48-49C	NSIG	50	100	.065989	-.065994	26.847363	1.342054	22.964104	31.014740
71	L 48-49D	W/C2	33	100	.065000	-.065000	18.714737	.978107	15.859999	21.709999
72	L 56-25A	W/C2	32	100	.064400	-.064400	27.736855	.843245	25.244801	30.010403
73	L 56-25B	W/C2	31	100	.068800	-.068800	39.335940	1.556409	35.225601	43.412796
74	L 56-25C	NSIG	31	100	.062501	-.065002	31.565539	1.460492	27.373047	35.748215
75	L 56-25D	NSIG	21	100	.066300	-.066300	19.563552	.986469	16.707603	22.409401
76	L 56-33A	NSIG	50	100	.070860	-.070847	31.172830	1.054006	27.635441	34.012848
77	L 56-33B	NSIG	49	100	.062500	-.062500	15.208763	.793931	12.562500	17.375000
78	L 56-33C	W/C2	46	100	.065000	-.065000	29.736750	1.475276	25.350002	33.929993
79	L 56-33D	NSIG	31	100	.062500	-.062500	18.652390	.977412	15.750000	21.625000
80	APRM A	PCT	10	100	.062503	-.062500	62.774310	2.260306	57.002289	68.502747
81	APRM C	PCT	10	100	.062502	-.062500	62.023562	2.302409	56.251694	67.877045
82	APRM D	PCT	10	100	.062501	-.063751	61.032517	2.224808	55.311806	66.686920
83	APRM F	PCT	10	100	.062506	-.062500	62.676830	2.374361	56.755676	68.694366
84	TIP 4	W/C2	10	100	.062500	-.062500	4.762509	.139385	4.375000	5.125000
85	TIP 5	W/C2	10	100	.062500	-.062500	3.915452	.164358	3.500000	4.312500
86	RC A DP	PSID	10	100	.030811	-6.199886	.897733	.043558	.486206	1.040812
87	RC B DP	PSID	10	100	.030778	-6.065044	1.089118	.066553	.736820	1.352373
88	FW A DP	PSID	10	100	.069382	-4.520901	3.837811	.326216	2.833544	5.261898
89	FW B DP	PSID	10	100	.070123	-4.586021	.085635	.070716	-.168294	.322565
90	FW C DP	PSID	10	100	.069516	-4.535221	5.866583	.146326	5.336052	6.378792
91	WLRL NG	INCH	10	100	.074820	-14.052643	22.395690	.647278	19.691376	24.704346

Table D-11
MEAN, STD., DEV., MIN., MAX.
POINT 3PT3, STEPS, 61.6% POWER, 46.2% FLOW (Continued)

92	JP 1 DP	PSID	1	10	.100008	-.104004	2.097293	.546826	-.003996	4.196340
93	JP 6 DP	PSID	1	10	.050001	-.050003	2.219230	.632817	-.250007	5.400105
94	JP 11 DP	PSID	1	10	.050865	.101730	1.584583	.514532	-.559511	3.611394
95	JP 16 DP	PSID	1	10	.050094	-.150276	1.356668	.401622	-.551030	2.705092
96	STM A DP	PSID	1	10	.100000	-.100000	-204.799988	.000000	-204.799988	-204.799988
97	STM D DP	PSID	1	10	.100000	-.100000	204.599988	.000000	204.599976	204.599976
98	CORE DP	PSID	1	10	.050146	-.150436	3.414432	.488907	1.604688	5.014646
99	FW TEM A	DEGF	10	100	.499501	279.590393	294.069320	.057780	293.076904	294.075928
100	WTRL W R	INCH	5	100	-.000000	-.000000	-.000000	-.000000	-.000000	-.000000
101	RC TEM A	DEGF	10	100	.499501	419.500488	503.916120	.004748	503.916077	504.415588
102	RC TEM B	DEGF	10	100	.499900	419.500122	-603.795266	.000000	-603.795288	-603.795288
103	CF TOTAL	PCT	10	100	.457708	-29.888336	42.117432	.324985	41.056396	43.802643
104	P RX W	PSIA	1	10	.752196	9.434570	1000.257860	1.557513	997.068481	1003.086060
105	P RX N	PSIA	33	100	.075076	1011.362061	999.164901	1.551515	995.596069	1001.752319
106	CORE P W	PSIA	1	10	.748122	14.071533	1018.751808	1.790932	1014.310913	1023.288452
107	CORE P N	PSIA	1	100	.074166	1012.238403	1019.113381	1.656120	1014.166748	1022.844116
108	STMA P W	PSIA	2	10	.750000	-.750000	1534.500000	.000000	1534.500000	1534.500000
109	STMA P N	PSIA	10	100	.075000	998.350708	1151.875714	.000000	1151.875732	1151.875732
110	STMD P W	PSIA	2	10	.750000	-.750000	1534.500000	.000000	1534.500000	1534.500000
111	STMD P N	PSIA	10	100	.075000	998.827759	1152.352765	.000000	1152.352783	1152.352783
112	ESTMA DP	PSID	1	10	.100000	-.100000	204.599988	.000000	204.599976	204.599976
113	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
114	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
115	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
116	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
117	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
118	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
119	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
120	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
121	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
122	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
123	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
124	NOSIG	NONE	5	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
125	NOSIG	NONE	5	100	-.000000	-.000000	.000122	.000000	.000120	.000120
126	NOSIG	NONE	5	100	-.000000	-.000000	.000122	.000000	.000120	.000120
127	NOSIG	NONE	5	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
128	PRBS	STEP	1	0	.017000	.000000	-.356662	.475147	-1.003000	.102000
129	NOT ASSIGNED									

11067 SAMPLES PER CHANNEL ANALYZED
FILTER BAND .00 TO 1000.0 HZ

Table D-12
MEAN, STD., DEV., MIN., MAX.
POINT 3PT3, NOISE, 61.6% POWER, 46.2% FLOW

WDS BUF	BUF REC	CLOSURE PERIOD	SCAN PERIOD	PACER PERIOD
130	31	0	12	25

SCAN MODE	FIRST CHANNEL	LAST CHANNEL	PHYREC SIZE
0	0	129	4034

I. D. T A B L E

CH#	NAME	EU	GAIN	FILTER	SLOPE	INT.	MEAN	STD DEV	MIN VAL	MAX VAL
0	L 08-17A	NSIG	46	100	.070822	-.070816	34.700574	.652573	32.719772	36.544159
1	L 08-17B	W/C2	50	100	.065000	-.065000	26.553303	.569692	24.570000	28.730000
2	L 08-17C	NSIG	38	100	.062500	-.062500	29.519486	.653962	27.250000	31.750000
3	L 08-17D	W/C2	27	100	.064400	-.064400	18.589986	.436734	16.872803	19.964001
4	L 08-25A	W/C2	25	100	.068100	-.068100	33.010449	.467590	31.462204	34.322403
5	L 08-25B	W/C2	23	100	.068800	-.068800	36.974378	.691885	34.812798	39.147202
6	L 08-25C	W/C2	10	100	.065000	-.065000	32.053883	.576819	30.029999	34.059998
7	L 08-25D	W/C2	19	100	.000000	-.065000	-.065000	.000000	-.065000	-.065000
8	L 08-33A	W/C2	20	100	.069400	-.069400	36.441065	.488103	34.977600	38.100601
9	L 08-33B	W/C2	25	100	.071900	-.071900	34.734233	.625106	32.786400	36.956596
10	L 08-49B	NSIG	26	100	.062500	-.062500	-128.000000	.000000	-128.000000	-128.000000
11	L 08-33D	W/C2	21	100	.066300	-.066300	23.334593	.434903	21.812702	25.061401
12	L 08-49A	W/C2	42	100	.065000	-.065000	27.654309	.548744	26.130001	29.185001
13	L 08-33C	W/C2	37	100	.070600	-.070600	34.043927	.669138	31.699402	36.570801
14	L 08-49C	W/C2	39	100	.064400	-.064400	24.000141	.569417	22.153603	25.760002
15	L 08-49D	W/C2	28	100	.065000	-.065000	15.278331	.393744	14.039999	16.639999
16	L 16-33A	W/C2	22	100	.064400	-.064400	28.270219	.340231	27.112400	29.430801
17	L 16-33B	W/C2	22	100	.065600	-.065600	32.920517	.552486	31.094395	34.636795
18	L 16-33C	W/C2	17	100	.067500	-.067500	31.409203	.549275	29.227497	33.412498
19	L 16-33D	W/C2	23	100	.064400	-.064400	26.269286	.474842	24.407600	27.949600
20	L 16-49A	W/C2	50	100	.065600	-.065600	32.457870	.566812	30.766396	34.112000
21	L 16-49B	W/C2	50	100	.067500	-.067500	28.778945	.631001	26.729996	30.712498
22	L 16-49C	W/C2	49	100	.065000	-.065000	33.278035	.547296	31.200001	35.229996
23	L 16-49D	W/C2	36	100	.065600	-.065600	21.448790	.456470	19.942398	23.091198
24	L 16-57A	NSIG	22	100	.066300	-.066300	19.930950	.308870	19.094402	20.818203
25	L 16-57B	W/C2	18	100	.073800	-.073800	24.712720	.402333	23.468399	26.051399
26	L 16-57C	W/C2	22	100	.065000	-.065000	21.576596	.400387	19.955002	22.945000
27	L 16-57D	W/C2	21	100	.062501	-.065002	21.001191	.403492	19.372887	22.372948
28	L 24-17A	NSIG	31	100	.065000	-.065000	34.100530	.442763	32.500000	35.359993
29	L 24-17B	W/C2	27	100	.072500	-.072500	30.630787	.527720	28.565002	32.262497
30	L 24-17C	W/C2	31	100	.065600	-.065600	31.143893	.589017	28.732796	33.193596
31	L 24-17D	W/C2	24	100	.065600	-.065600	24.679778	.454002	23.091198	26.567997
32	L 24-25A	W/C2	50	100	.065600	-.065600	34.268989	.564956	32.668800	35.948799
33	L 24-25B	W/C2	48	100	.065600	-.065600	36.390910	.828544	33.587196	38.900795
34	L 24-25C	W/C2	50	100	.065000	-.065600	23.003149	.565642	21.319397	24.894398
35	L 24-25D	W/C2	48	100	.064400	-.064400	25.899976	.605807	23.699200	27.820801
36	L 24-41A	W/C2	50	100	.065600	-.065600	33.219317	.535324	31.487995	34.636795

Table D-12
MEAN, STD., DEV., MIN., MAX.
POINT 3PT3, NOISE, 61.6% POWER, 46.2% FLOW (Continued)

37	L 24-41B	W/C2	50	100	.066300	-.066300	37.201444	.665322	34.873802	39.315903
38	L 24-41C	W/C2	50	100	.065000	-.065000	26.437456	.736093	24.180000	28.860001
39	L 24-41D	W/C2	40	100	.064400	-.064400	26.267987	.531497	24.407600	28.207203
40	L 32-09A	W/C2	30	100	.066900	-.066900	36.183440	.473355	34.386597	37.731598
41	L 32-09B	W/C2	34	100	.067500	-.067500	32.877268	.573014	30.779995	34.695000
42	L 32-09C	W/C2	33	100	.066300	-.066300	35.044913	.666435	32.288101	37.326904
43	L 32-09D	W/C2	27	100	.065600	-.065600	24.540123	.472709	22.631996	26.174397
44	L 32-33A	W/C2	23	100	.069400	-.069400	36.875180	.440371	35.532799	38.169998
45	L 32-33B	W/C2	29	100	.068800	-.068800	30.314564	.475511	28.758400	32.060799
46	L 32-33C	W/C2	35	100	.066300	-.066300	31.244965	.601861	29.172001	33.282600
47	L 32-33D	NSIG	26	100	.062501	-.063751	24.607312	.410581	23.186481	26.186512
48	L 32-41A	W/C2	29	100	.065600	-.065600	31.453995	.404912	30.175995	32.668800
49	L 32-41B	NSIG	25	100	.062502	-.066254	28.290492	.459570	26.622047	29.997150
50	L 32-41C	W/C2	41	100	.064400	-.064400	31.041937	.630683	28.851200	33.359200
51	L 32-41D	NSIG	50	100	-3125.002930	3250.002930	-1347.587151	-1559.965563	125.000000	-3000.002930
52	L 32-57A	W/C2	18	100	.053100	-.053100	34.162042	.399094	32.921997	35.470795
53	L 32-57B	W/C2	32	100	.066300	53.000000	79.295383	.496495	77.464706	80.779709
54	L 32-57C	NSIG	29	100	.062500	-.062500	27.799250	.557319	25.875000	29.812500
55	L 32-57D	NSIG	20	100	.062501	-.065002	31.752475	.626575	29.498089	33.873177
56	L 40-33A	NSIG	42	100	.067500	-.067500	29.561533	.508620	28.147495	31.049995
57	L 40-33B	W/C2	50	100	.067500	-.067500	29.604722	.569000	27.877499	31.387497
58	L 40-33C	NSIG	47	100	.062500	-.062500	34.019051	.668106	31.750000	36.250000
59	L 40-33D	W/C2	37	100	.064400	-.064400	24.911199	.534739	22.926399	26.919201
60	L 40-41A	W/C2	28	100	.066300	-.066300	33.058319	.447459	31.691402	34.409706
61	L 40-41B	W/C2	25	100	.067500	-.067500	33.947538	.645929	31.589996	35.977501
62	L 40-41C	W/C2	25	100	.066300	-.066300	32.457826	.573403	30.490001	34.476006
63	L 40-41D	W/C2	26	100	.064400	-.064400	25.084835	.440342	23.570400	26.790401
64	L 48-25A	W/C2	48	100	.065600	-.065600	30.422140	.509151	28.863995	31.815994
65	L 48-25B	W/C2	48	100	.065600	-.065600	31.593431	.456373	30.175995	33.193596
66	L 48-25C	W/C2	50	100	.065000	-.065000	25.419153	.594254	23.139999	27.170002
67	L 48-25D	W/C2	42	100	.065000	-.065000	23.074457	.618326	21.125000	24.959999
68	L 48-49A	W/C2	50	100	.067589	-.068939	30.146437	.506137	28.656593	31.630531
69	L 48-49B	W/C2	50	100	.067600	-.067600	20.992081	.653663	18.927998	22.848797
70	L 48-49C	NSIG	50	100	.065989	-.065994	26.782559	.700453	24.415859	29.299034
71	L 48-49D	W/C2	33	100	.065000	-.065000	18.663666	.472742	17.160000	20.540001
72	L 56-25A	W/C2	32	100	.064400	-.064400	28.029313	.382299	26.661602	29.108803
73	L 56-25B	W/C2	31	100	.068800	-.068800	39.281627	.572410	37.427200	41.004799
74	L 56-25C	NSIG	31	100	.062501	-.065002	31.525788	.552588	29.498089	33.373169
75	L 56-25D	NSIG	21	100	.066300	-.066300	19.520856	.380910	18.166203	20.818203
76	L 56-33A	NSIG	50	100	.070860	-.070847	31.485824	.637081	29.406944	33.304245
77	L 56-33B	NSIG	49	100	.062500	-.062500	15.195658	.540369	13.562500	16.625000
78	L 56-33C	W/C2	46	100	.065000	-.065000	29.698407	.662995	27.560001	31.980000
79	L 56-33D	NSIG	31	100	.062500	-.062500	18.624697	.417530	17.250000	20.062500
80	APRM A	PCT	10	100	.062503	-.062500	62.883215	.648385	61.127449	64.752594
81	APRM C	PCT	10	100	.062502	-.062500	62.143399	.648174	60.314316	64.251938
82	APRM D	PCT	10	100	.062501	-.063751	61.103226	.628542	59.374344	62.999382
83	APRM F	PCT	10	100	.062506	-.062500	62.745787	.664732	60.818581	64.881485
84	TIP 4	W/C2	10	100	.062500	-.062500	4.796456	.050963	4.562500	5.000000
85	TIP 5	W/C2	10	100	.062500	-.062500	3.901137	.071526	3.500000	4.062500
86	RC A DP	PSID	10	100	.030811	-6.199886	.888356	.040286	.732697	1.040812
87	RC B DP	PSID	10	100	.030778	-6.065044	1.100468	.063650	.890708	1.383151
88	FW A DP	PSID	10	100	.069382	-4.520901	3.853659	.263933	2.902925	4.845608
89	FW B DP	PSID	10	100	.070123	-4.586021	.085120	.069456	-.168294	.322565
90	FW C DP	PSID	10	100	.069516	-4.535221	5.856851	.124939	5.336052	6.378792

Table D-12
MEAN, STD., DEV., MIN., MAX.
POINT 3PT3, NOISE, 61.6% POWER, 46.2% FLOW (Continued)

91	WLRL NG	INCH	10	100	.074820	-14.052643	22.260799	.582102	19.990662	24.704346
92	JP 1 DP	PSID	1	10	.100008	-.104004	2.089289	.559348	-.003996	4.796388
93	JP 6 DP	PSID	1	10	.050001	-.050003	2.205909	.643035	-.850019	4.800094
94	JP 11 DP	PSID	1	10	.050865	.101730	1.589259	.496519	-.712105	3.713124
95	JP 16 DP	PSID	1	10	.050094	-.150276	1.370307	.400961	-.450841	2.755186
96	STM A DP	PSID	1	10	.100000	-.100000	-204.799988	.000000	-204.799988	-204.799988
97	STM D DP	PSID	1	10	.100000	-.100000	204.599988	.000000	204.599976	204.599976
98	CORE DP	PSID	1	10	.050146	-.150436	3.417047	.501975	1.303810	5.365670
99	FW TEM A	DEGF	10	100	.499501	279.590393	294.074339	.040006	293.576416	297.072937
100	WTRL W R	INCH	5	100	-.000000	-.000000	-.000000	-.000000	-.000000	-.000000
101	RC TEM A	DEGF	10	100	.499501	419.500488	503.916212	.016518	503.916077	505.914062
102	RC TEM B	DEGF	10	100	.499900	419.500122	-603.795266	.000000	-603.795288	-603.795288
103	CF TOTAL	PCT	10	100	.457708	-29.888336	42.153555	.335967	41.056396	43.802643
104	P RX W	PSIA	1	10	.752196	9.434570	1001.661962	.232456	1001.581665	1003.086060
105	P RX N	PSIA	33	100	.075076	1011.362061	1000.949018	.112287	1000.551147	1001.301880
106	CORE P W	PSIA	1	10	.748122	14.071533	1020.684086	.575326	1018.051514	1023.288452
107	CORE P N	PSIA	1	100	.074166	1012.238483	1020.906169	.583736	1018.690796	1023.066650
108	STMA P W	PSIA	2	10	.750000	-.750000	1534.500000	.000000	1534.500000	1534.500000
109	STMA P N	PSIA	10	100	.075000	998.350708	1151.875714	.000000	1151.875732	1151.875732
110	STMD P W	PSIA	2	10	.750000	-.750000	1534.500000	.000000	1534.500000	1534.500000
111	STMD P N	PSIA	10	100	.075000	998.827759	1152.352765	.000000	1152.352783	1152.352783
112	ESTMA DP	PSID	1	10	.100000	-.100000	204.599988	.000000	204.599976	204.599976
113	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
114	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
115	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
116	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
117	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
118	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
119	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
120	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
121	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
122	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
123	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
124	NOSIG	NONE	5	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
125	NOSIG	NONE	5	100	-.000000	-.000000	.000122	.000000	.000120	.000120
126	NOSIG	NONE	5	100	-.000000	-.000000	.000122	.000000	.000120	.000120
127	NOSIG	NONE	5	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
128	PRBS	STEP	1	0	.017000	.000000	.022532	.007973	-.000000	.034000
129	NOT ASSIGNED									

14632 SAMPLES PER CHANNEL ANALYZED
FILTER BAND .00 TO 1000.0 HZ

Table D-13
MEANS, STD., DEV., MIN., MAX.
POINT 4PT1, STEPS 50.7% POWER, 47.5% FLOW

WDS BUF	BUF REC	CLOSURE PERIOD	SCAN PERIOD	PACER PERIOD
129	31	0	12	25

SCAN MODE	FIRST CHANNEL	LAST CHANNEL	PHYREC SIZE
0	0	128	4003

I. D. T A B L E

CH#	NAME	EU	GAIN	FILTER	SLOPE	INT.	MEAN	STD DEV	MIN VAL	MAX VAL
0	L 08-17A	W/C2	50	100	.079096	-.079102	27.682374	1.393836	24.045181	31.480206
1	L 08-17B	W/C2	50	100	.097700	-.097700	29.837551	1.982195	24.815804	35.562798
2	L 08-17C	W/C2	45	100	.062500	-.062500	24.302969	1.892359	19.687500	29.500000
3	L 08-17D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
4	L 08-25A	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
5	L 08-25B	W/C2	31	100	.062500	-.062500	28.498204	1.827925	24.125000	33.500000
6	L 08-25C	W/C2	14	100	.062500	-.062500	27.065921	1.998436	22.687500	32.375000
7	L 08-25D	W/C2	24	100	.062500	-.062500	18.665714	1.550837	15.062500	22.875000
8	L 08-33A	W/C2	32	100	.062500	-.062500	27.243524	1.281881	24.062500	31.000000
9	L 08-33B	W/C2	33	100	.062500	-.062500	31.538154	2.006382	26.875000	37.250000
10	L 08-49B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
11	L 08-33D	W/C2	27	100	.062500	-.062500	18.105572	1.482788	14.625000	22.250000
12	L 08-49A	W/C2	50	100	.071000	-.071000	18.139381	.969965	15.619999	21.158001
13	L 08-33C	W/C2	39	100	.062500	-.062500	27.453287	2.037361	22.750000	33.500000
14	L 08-49C	W/C2	50	100	.063800	-.063800	20.275468	1.566706	16.396603	25.009602
15	L 08-49D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
16	L 16-33A	W/C2	29	100	.062500	-.062500	24.028672	1.111541	21.437500	27.062500
17	L 16-33B	W/C2	32	100	.062500	-.062500	26.398179	1.665482	22.625000	31.250000
18	L 16-33C	W/C2	25	100	.062500	-.062500	24.379228	1.766912	20.312500	29.500000
19	L 16-33D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
20	L 16-49A	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
21	L 16-49B	W/C2	50	100	.084500	-.084500	28.269041	1.869994	23.491001	34.138000
22	L 16-49C	W/C2	50	100	.067200	-.067200	26.593630	1.979223	21.772800	32.323204
23	L 16-49D	W/C2	39	100	.062500	-.062500	17.213068	1.417864	13.500000	21.375000
24	L 16-57A	W/C2	28	100	.062500	-.062500	13.954839	.698237	12.187500	16.125000
25	L 16-57B	W/C2	22	100	.062500	-.062500	18.912127	1.168622	16.062500	22.312500
26	L 16-57C	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
27	L 16-57D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
28	L 24-17A	W/C2	37	100	.062500	-.062500	26.202688	1.237805	23.250000	29.500000
29	L 24-17B	W/C2	36	100	.062500	-.062500	26.204710	1.640392	22.125000	30.625000
30	L 24-17C	W/C2	34	100	.062500	-.062500	27.910820	2.004131	23.125000	33.625000
31	L 24-17D	W/C2	27	100	.062500	-.062500	19.555095	1.469734	15.750000	23.562500
32	L 24-25A	W/C2	50	100	.074900	-.074900	29.143115	1.408439	25.615799	32.956001
33	L 24-25B	W/C2	50	100	.064800	-.064800	30.443576	1.984661	25.142399	35.769600
34	L 24-25C	W/C2	50	100	.094700	-.094700	25.072078	1.869637	20.265800	30.303997
35	L 24-25D	W/C2	48	100	.064400	-.064400	19.973085	1.547284	15.971199	24.600800

Table D-13
MEANS, STD., DEV., MIN., MAX.
POINT 4PT1, STEPS 50.7% POWER, 47.5% FLOW (Continued)

37	L 24-41B	W/C2	50	100	.067938	-.069290	29.611706	1.828600	25.271584	34.918777
38	L 24-41C	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
39	L 24-41D	W/C2	42	100	.062500	-.062500	20.719398	1.570133	16.625000	25.250000
40	L 32-09A	W/C2	34	100	.062500	-.062500	26.171359	1.225854	22.875000	29.625000
41	L 32-09B	W/C2	41	100	.062500	-.062500	29.963074	1.871422	25.000000	35.250000
42	L 32-09C	W/C2	36	100	.062500	-.062500	27.218970	1.978962	21.875000	32.750000
43	L 32-09D	W/C2	31	100	.062498	-.062500	18.932335	1.519594	14.999548	22.936810
44	L 32-33A	W/C2	28	100	.062503	-.063751	25.831677	1.172538	23.124676	28.999912
45	L 32-33B	W/C2	33	100	.062502	-.065002	25.865133	1.601363	22.248169	30.310909
46	L 32-33C	W/C2	39	100	.062511	-.062515	24.949238	1.800135	20.753521	30.067604
47	L 32-33D	NSIG	28	100	.062507	-.066269	18.919876	1.401476	15.560452	22.748745
48	L 32-41A	W/C2	32	100	.062518	-.062515	23.013656	1.066726	20.505951	25.819992
49	L 32-41B	W/C2	28	100	.062518	-.068771	26.433733	1.625647	22.750118	31.064949
50	L 32-41C	W/C2	44	100	.062511	-.066254	23.323098	1.692712	19.124699	28.501389
51	L 32-41D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
52	L 32-57A	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
53	L 32-57B	W/C2	36	100	.062502	-.058731	27.788694	1.819402	23.567211	33.130089
54	L 32-57C	W/C2	31	100	.062503	-.062500	22.515103	1.692127	18.125912	27.313869
55	L 32-57D	W/C2	21	100	.062505	-.062515	15.367374	1.258234	12.313477	18.813995
56	L 40-33A	W/C2	50	100	.065807	-.065811	24.388687	1.185347	21.453011	27.770462
57	L 40-33B	W/C2	50	100	.075759	-.075775	28.061081	1.763688	23.939671	32.803413
58	L 40-33C	W/C2	50	100	.063790	-.066345	27.029298	1.947663	22.323887	32.912994
59	L 40-33D	W/C2	40	100	.062503	-.062500	18.959463	1.446464	15.125761	23.126160
60	L 40-41A	W/C2	33	100	.062509	-.062500	26.137543	1.218525	23.128246	29.566647
61	L 40-41B	W/C2	30	100	.062509	-.062500	26.537591	1.679537	22.378365	31.317204
62	L 40-41C	W/C2	29	100	.062517	-.062500	27.150243	1.942968	22.693642	32.258720
63	L 40-41D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
64	L 48-25A	W/C2	50	100	.067944	-.067947	23.767736	1.157279	20.790981	26.905975
65	L 48-25B	W/C2	50	100	.066142	-.066132	24.907287	1.519937	21.496307	28.705837
66	L 48-25C	W/C2	50	100	.085057	-.085052	28.221636	2.056439	23.135551	34.022865
67	L 48-25D	W/C2	46	100	.062503	-.062500	18.211314	1.470160	14.375578	22.563408
68	L 48-49A	W/C2	50	100	.071857	-.079041	22.663566	1.114113	19.825417	25.861423
69	L 48-49B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
70	L 48-49C	W/C2	50	100	.069456	-.069458	1.167056	.556483	.208366	2.430959
71	L 48-49D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
72	L 56-25A	W/C2	35	100	.062518	-.062515	21.183990	1.007041	18.630219	23.881691
73	L 56-25B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
74	L 56-25C	W/C2	34	100	.062510	-.062515	24.820925	1.832751	20.503273	30.254833
75	L 56-25D	W/C2	25	100	.062508	-.062515	16.833397	1.346843	13.564259	20.565170
76	L 56-33A	W/C2	50	100	.075307	-.075302	23.927427	1.239888	20.483410	27.637543
77	L 56-33B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
78	L 56-33C	W/C2	50	100	.064439	-.064423	23.490213	1.794876	19.073952	28.868675
79	L 56-33D	W/C2	32	100	.062509	-.062500	14.668698	1.201975	11.564243	18.127728
80	APRM A	PCT	10	100	.062503	-.062500	52.818601	3.110688	46.564369	60.502426
81	APRM C	PCT	10	100	.062502	-.062500	51.802041	3.165486	45.313866	59.564293
82	APRM D	PCT	10	100	.062501	-.063751	51.659604	3.104477	45.311707	59.374344
83	APRM F	PCT	10	100	.062506	-.062500	51.900938	3.215534	45.254524	59.818481
84	TIP 4	W/C2	10	100	.062500	-.062500	127.875000	.000000	127.875000	127.875000
85	TIP 5	W/C2	10	100	.062500	-.062500	127.875000	.000000	127.875000	127.875000
86	RC A DP	PSID	10	100	.030811	-6.199886	1.232958	.050026	1.010001	1.379739
87	RC B DP	PSID	10	100	.030778	-6.065044	1.130097	.059025	.921486	1.383151
88	FW A DP	PSID	10	100	.069382	-4.520901	3.318136	.284659	2.486636	4.221174
89	FW B DP	PSID	10	100	.070123	-4.586021	3.311257	.112345	3.057348	3.758575

Table D-13
MEANS, STD., DEV., MIN., MAX.
POINT 4PT1, STEPS 50.7% POWER, 47.5% FLOW (Continued)

91	WLRL NG	INCH	10	100	.074820	-14.052643	23.151636	.811613	20.140297	25.901474
92	JP 1 DP	PSID	1	10	.100008	-.104004	2.059610	.559198	-.104004	3.996324
93	JP 6 DP	PSID	1	10	.050001	-.050003	1.919044	.576774	-.150005	4.600089
94	JP 11 DP	PSID	1	10	.050865	.101730	2.271823	.599078	.000001	4.425230
95	JP 16 DP	PSID	1	10	.050094	-.150276	1.814493	.557892	-1.051971	3.957446
96	STM A DP	NONE	1	10	.000000	.000000	.000000	.000000	.000000	.000000
97	STM D DP	NONE	1	10	.000000	.000000	.000000	.000000	.000000	.000000
98	CORE DP	PSID	1	10	.050146	-.150436	3.644334	.485468	1.955713	5.516109
99	FW TEM A	DEGF	10	100	.499501	279.590393	287.765552	.453283	287.082886	288.081909
100	WTRL W R	INCH	5	100	-.000000	-.000000	-.000000	-.000000	-.000000	-.000000
101	RC TEM A	DEGF	10	100	.499501	419.500488	507.912079	.000000	507.912109	507.912109
102	RC TEM B	NONE	10	100	.000000	.000000	.000000	.000000	.000000	.000000
103	CF TOTAL	PCT	10	100	.457708	-29.888336	44.314846	.408429	42.887222	45.633469
104	P RX W	PSIA	1	10	.752196	9.434570	980.332004	2.348169	974.502563	985.033325
105	P RX N	PSIA	33	100	.075076	1011.362061	978.982639	2.372292	973.523682	983.208496
106	CORE P W	PSIA	1	10	.748122	14.071533	998.526434	2.529247	991.867310	1003.837280
107	CORE P N	PSIA	1	100	.074166	1012.238403	998.758566	2.453067	992.065308	1004.154297
108	STMA P W	NONE	2	10	.000000	.000000	.000000	.000000	.000000	.000000
109	STMA P N	NONE	10	100	.000000	.000000	.000000	.000000	.000000	.000000
110	STMD P W	NONE	2	10	.000000	.000000	.000000	.000000	.000000	.000000
111	STMD P N	NONE	10	100	.000000	.000000	.000000	.000000	.000000	.000000
112	ESTMA DP	NONE	1	10	.000000	.000000	.000000	.000000	.000000	.000000
113	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
114	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
115	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
116	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
117	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
118	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
119	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
120	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
121	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
122	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
123	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
124	NOSIG	NONE	5	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
125	NOSIG	NONE	5	100	-.000000	-.000000	.000122	.000000	.000120	.000120
126	NOSIG	NONE	5	100	-.000000	-.000000	.000122	.000000	.000120	.000120
127	NOSIG	NONE	5	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
128	PRBS	STEP	1	0	.017000	.000000	-.361580	.474766	-.986000	.102000

10230 SAMPLES PER CHANNEL ANALYZED
FILTER BAND .00 TO 1000.0 HZ

Table D-14
MEANS, STD., DEV., MIN., MAX.
POINT 4PT1, NOISE 50.7% POWER, 47.5% FLOW

WDS BUF	BUF REC	CLOSURE PERIOD	SCAN PERIOD	PACER PERIOD
129	31	0	12	25

SCAN MODE	FIRST CHANNEL	LAST CHANNEL	PHYREC SIZE
0	0	128	4003

I. D. T A B L E

CH#	NAME	EU	GAIN	FILTER	SLOPE	INT.	MEAN	STD DEV	MIN VAL	MAX VAL
0	L 08-17A	W/C2	50	100	.079096	-.079102	26.610196	.660519	24.994331	28.474556
1	L 08-17B	W/C2	50	100	.097700	-.097700	29.676363	.790696	26.867500	32.436401
2	L 08-17C	W/C2	45	100	.062500	-.062500	24.264916	.630886	22.062500	26.375000
3	L 08-17D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
4	L 08-25A	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
5	L 08-25B	W/C2	31	100	.062500	-.062500	28.076435	.624215	26.062500	30.125000
6	L 08-25C	W/C2	14	100	.062500	-.062500	26.927579	.540813	25.125000	29.250000
7	L 08-25D	W/C2	24	100	.062500	-.062500	18.615336	.380153	17.250000	19.875000
8	L 08-33A	W/C2	32	100	.062500	-.062500	26.102351	.417214	24.812500	27.562500
9	L 08-33B	W/C2	33	100	.062500	-.062500	31.206276	.596223	29.312500	33.375000
10	L 08-49B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
11	L 08-33D	W/C2	27	100	.062500	-.062500	18.110562	.378910	16.812500	19.500000
12	L 08-49A	W/C2	50	100	.071000	-.071000	17.349046	.535962	15.974998	18.743999
13	L 08-33C	W/C2	39	100	.062500	-.062500	27.332343	.621649	25.062500	29.500000
14	L 08-49C	W/C2	50	100	.063800	-.063800	20.194526	.568925	18.438202	21.947201
15	L 08-49D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
16	L 16-33A	W/C2	29	100	.062500	-.062500	22.958274	.319865	21.937500	24.062500
17	L 16-33B	W/C2	32	100	.062500	-.062500	26.075277	.473780	24.500000	27.750000
18	L 16-33C	W/C2	25	100	.062500	-.062500	24.296916	.446865	22.625000	26.000000
19	L 16-33D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
20	L 16-49A	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
21	L 16-49B	W/C2	50	100	.084500	-.084500	27.893517	.735120	25.857002	29.997501
22	L 16-49C	W/C2	50	100	.067200	-.067200	26.459598	.479216	24.931202	28.224003
23	L 16-49D	W/C2	39	100	.062500	-.062500	17.184736	.422158	15.812500	18.625000
24	L 16-57A	W/C2	28	100	.062500	-.062500	13.343992	.294792	12.500000	14.062500
25	L 16-57B	W/C2	22	100	.062500	-.062500	18.565209	.330994	17.500000	19.562500
26	L 16-57C	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
27	L 16-57D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
28	L 24-17A	W/C2	37	100	.062500	-.062500	25.157552	.436835	23.750000	26.375000
29	L 24-17B	W/C2	36	100	.062500	-.062500	26.005013	.553681	24.125000	27.500000
30	L 24-17C	W/C2	34	100	.062500	-.062500	27.855764	.586795	25.875000	29.750000
31	L 24-17D	W/C2	27	100	.062500	-.062500	19.618578	.406920	18.125000	21.062500
32	L 24-25A	W/C2	50	100	.074900	-.074900	27.858409	.606363	26.215000	29.510597
33	L 24-25B	W/C2	50	100	.064800	-.064800	30.122251	.827460	27.734398	32.529602
34	L 24-25C	W/C2	50	100	.094700	-.094700	24.987641	.765716	22.822701	27.084198

Table D-14
MEANS, STD., DEV., MIN., MAX.
POINT 4PT1, NOISE 50.7% POWER, 47.5% FLOW (Continued)

37	L 24-41B	W/C2	50	100	.067938	-.069290	29.186089	.592662	26.698280	30.910439
38	L 24-41C	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
39	L 24-41D	W/C2	42	100	.062500	-.062500	20.709028	.482433	19.062500	22.187500
40	L 32-09A	W/C2	34	100	.062500	-.062500	25.161370	.431420	23.875000	26.500000
41	L 32-09B	W/C2	41	100	.062500	-.062500	29.682377	.635195	27.500000	32.000000
42	L 32-09C	W/C2	36	100	.062500	-.062500	27.106021	.613952	25.062500	29.250000
43	L 32-09D	W/C2	31	100	.062498	-.062500	18.900640	.443842	17.499474	20.499382
44	L 32-33A	W/C2	28	100	.062503	-.063751	24.629052	.373640	23.499691	25.749783
45	L 32-33B	W/C2	33	100	.062502	-.065002	25.518997	.451137	23.998219	26.935810
46	L 32-33C	W/C2	39	100	.062511	-.062515	24.927736	.564417	23.003906	26.817055
47	L 32-33D	NSIG	28	100	.062507	-.066269	18.926606	.366894	17.623180	20.248470
48	L 32-41A	W/C2	32	100	.062518	-.062515	21.982327	.350835	20.818542	22.881641
49	L 32-41B	W/C2	28	100	.062518	-.068771	26.093706	.443546	24.625645	27.376415
50	L 32-41C	W/C2	44	100	.062511	-.066254	23.197585	.560732	21.375107	25.000759
51	L 32-41D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
52	L 32-57A	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
53	L 32-57B	W/C2	36	100	.062502	-.058731	27.456710	.528482	25.692295	29.254936
54	L 32-57C	W/C2	31	100	.062503	-.062500	22.439215	.478689	20.751041	24.001205
55	L 32-57D	W/C2	21	100	.062505	-.062515	15.344494	.332221	14.251131	16.563816
56	L 40-33A	W/C2	50	100	.065807	-.065811	23.236678	.530171	21.847851	24.545929
57	L 40-33B	W/C2	50	100	.075759	-.075775	27.696553	.593037	25.757874	29.545799
58	L 40-33C	W/C2	50	100	.063790	-.066345	26.865797	.648240	24.747898	29.085606
59	L 40-33D	W/C2	40	100	.062503	-.062500	18.911346	.498681	17.313370	20.501030
60	L 40-41A	W/C2	33	100	.062509	-.062500	24.997851	.422684	23.628315	26.378700
61	L 40-41B	W/C2	30	100	.062509	-.062500	26.169195	.606103	24.253647	28.004208
62	L 40-41C	W/C2	29	100	.062517	-.062500	27.003595	.509627	25.256832	28.757774
63	L 40-41D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
64	L 48-25A	W/C2	50	100	.067944	-.067947	22.672379	.517314	21.266590	24.052311
65	L 48-25B	W/C2	50	100	.066142	-.066132	24.512888	.404079	23.348297	25.927853
66	L 48-25C	W/C2	50	100	.085057	-.085052	28.067765	.746510	25.602207	30.450466
67	L 48-25D	W/C2	46	100	.062503	-.062500	18.160464	.609953	16.375660	20.063305
68	L 48-49A	W/C2	50	100	.071857	-.079041	21.730397	.481386	20.400272	23.130848
69	L 48-49B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
70	L 48-49C	W/C2	50	100	.069456	-.069458	1.152482	.554913	.277822	2.222591
71	L 48-49D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
72	L 56-25A	W/C2	35	100	.062518	-.062515	20.226044	.366201	18.880291	21.255955
73	L 56-25B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
74	L 56-25C	W/C2	34	100	.062510	-.062515	24.648308	.501609	22.753635	26.629253
75	L 56-25D	W/C2	25	100	.062508	-.062515	16.821276	.369585	15.376995	18.314877
76	L 56-33A	W/C2	50	100	.075307	-.075302	22.870090	.651626	20.935249	24.700581
77	L 56-33B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
78	L 56-33C	W/C2	50	100	.064439	-.064423	23.374568	.642237	21.393753	25.388969
79	L 56-33D	W/C2	32	100	.062509	-.062500	14.637659	.392938	13.314507	16.002407
80	APRM A	PCT	10	100	.062503	-.062500	51.932462	.567250	50.127007	54.002167
81	APRM C	PCT	10	100	.062502	-.062500	51.092195	.571958	49.251480	53.126595
82	APRM D	PCT	10	100	.062501	-.063751	50.814228	.568868	49.124245	52.811775
83	APRM F	PCT	10	100	.062506	-.062500	51.200673	.584250	49.317436	53.255325
84	TIP 4	W/C2	10	100	.062500	-.062500	127.875000	.000000	127.875000	127.875000
85	TIP 5	W/C2	10	100	.062500	-.062500	127.875000	.000000	127.875000	127.875000
86	RC A DP	PSID	10	100	.030811	-6.199886	1.191840	.053886	1.010001	1.348927
87	RC B DP	PSID	10	100	.030778	-6.065044	1.108847	.061661	.890708	1.352373
88	FW A DP	PSID	10	100	.069382	-4.520901	3.346630	.231725	2.556017	4.082411
89	FW B DP	PSID	10	100	.070123	-4.586021	3.025302	.067591	2.776857	3.197594
90	FW C DP	PSID	10	100	.069516	-4.535221	-.147745	.078496	-.294744	.052835

Table D-14
MEANS, STD., DEV., MIN., MAX.
POINT 4PT1, NOISE 50.7% POWER, 47.5% FLOW (Continued)

91	WLRL NG	INCH	10	100	.074820	-14.052643	22.947442	.605744	20.514404	25.078453
92	JP 1 DP	PSID	1	10	.100008	-.104004	2.107164	.517508	.096012	4.396356
93	JP 6 DP	PSID	1	10	.050001	-.050003	1.821943	.586458	-.900020	3.900075
94	JP 11 DP	PSID	1	10	.050865	.101730	2.189602	.609047	-.406917	4.323501
95	JP 16 DP	PSID	1	10	.050094	-.150276	1.791250	.516016	-.651218	4.308105
96	STM A DP	NONE	1	10	.000000	.000000	.000000	.000000	.000000	.000000
97	STM D DP	NONE	1	10	.000000	.000000	.000000	.000000	.000000	.000000
98	CORE DP	PSID	1	10	.050146	-.150436	3.584167	.488792	1.805274	5.365670
99	FW TEM A	DEGF	10	100	.499501	279.590393	286.460277	.344195	286.083923	287.082886
100	WTRL W R	INCH	5	100	-.000000	-.000000	-.000000	-.000000	-.000000	-.000000
101	RC TEM A	DEGF	10	100	.499501	419.500488	508.348695	.165708	507.912109	508.411560
102	RC TEM B	NONE	10	100	.000000	.000000	.000000	.000000	.000000	.000000
103	CF TOTAL	PCT	10	100	.457708	-29.888336	44.073883	.393259	42.887222	45.633469
104	P RX W	PSIA	1	10	.752196	9.434570	982.048820	.132912	982.024536	982.776733
105	P RX N	PSIA	33	100	.075076	1011.362061	981.047762	.132407	980.655884	981.481689
106	CORE P W	PSIA	1	10	.748122	14.071533	1000.555433	.676502	997.852295	1003.089111
107	CORE P N	PSIA	1	100	.074166	1012.238403	1000.860149	.579608	998.517700	1003.190186
108	STMA P W	NONE	2	10	.000000	.000000	.000000	.000000	.000000	.000000
109	STMA P N	NONE	10	100	.000000	.000000	.000000	.000000	.000000	.000000
110	STMD P W	NONE	2	10	.000000	.000000	.000000	.000000	.000000	.000000
111	STMD P N	NONE	10	100	.000000	.000000	.000000	.000000	.000000	.000000
112	ESTMA DP	NONE	1	10	.000000	.000000	.000000	.000000	.000000	.000000
113	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
114	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
115	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
116	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
117	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
118	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
119	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
120	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
121	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
122	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
123	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
124	NOSIG	NONE	5	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
125	NOSIG	NONE	5	100	-.000000	-.000000	.000122	.000000	.000120	.000120
126	NOSIG	NONE	5	100	-.000000	-.000000	.000122	.000000	.000120	.000120
127	NOSIG	NONE	5	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
128	PRBS	STEP	1	0	.017000	.000000	.023142	.008229	-.017000	.051000

10199 SAMPLES PER CHANNEL ANALYZED
FILTER BAND .00 TO 1000.0 HZ

Table D-15
MEANS, STD., DEV., MIN., MAX.
POINT 4PT2, STEPS 44.0% POWER, 48.0% FLOW

WDS BUF	BUF REC	CLOSURE PERIOD	SCAN PERIOD	PACER PERIOD
129	31.	0	12	25

SCAN MODE	FIRST CHANNEL	LAST CHANNEL	PHYREC SIZE
0	0	128	4003

I. D. T A B L E

CH#	NAME	EU	GAIN	FILTER	SLOPE	INT.	MEAN	STD DEV	MIN VAL	MAX VAL
0	L 08-17A	W/C2	50	100	.079096	-.079102	23.261942	1.455203	19.615803	27.050827
1	L 08-17B	W/C2	50	100	.097700	-.097700	27.078225	2.219786	21.787102	33.217995
2	L 08-17C	W/C2	45	100	.062500	-.062500	21.147785	2.075645	16.250000	26.875000
3	L 08-17D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
4	L 08-25A	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
5	L 08-25B	W/C2	31	100	.062500	-.062500	25.843247	2.070405	20.812500	31.250000
6	L 08-25C	W/C2	14	100	.062500	-.062500	23.065575	2.188592	17.875000	28.625000
7	L 08-25D	W/C2	24	100	.062500	-.062500	15.857258	1.700033	12.125000	20.125000
8	L 08-33A	W/C2	32	100	.062500	-.062500	23.127124	1.354360	19.812500	26.500000
9	L 08-33B	W/C2	33	100	.062500	-.062500	28.857126	2.289771	23.500000	34.437500
10	L 08-49B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
11	L 08-33D	W/C2	27	100	.062500	-.062500	16.853388	1.777601	12.937500	21.375000
12	L 08-49A	W/C2	50	100	.071000	-.071000	15.233126	.999528	12.566999	17.891998
13	L 08-33C	W/C2	39	100	.062500	-.062500	24.759539	2.348662	19.375000	31.000000
14	L 08-49C	W/C2	50	100	.063800	-.063800	18.217934	1.791041	13.908401	22.968002
15	L 08-49D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
16	L 16-33A	W/C2	29	100	.062500	-.062500	20.239733	1.161182	17.562500	23.125000
17	L 16-33B	W/C2	32	100	.062500	-.062500	23.764968	1.843100	19.625000	28.375000
18	L 16-33C	W/C2	25	100	.062500	-.062500	21.331771	1.959612	17.125000	26.312500
19	L 16-33D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
20	L 16-49A	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
21	L 16-49B	W/C2	50	100	.084500	-.084500	25.287681	2.066587	20.364502	30.927002
22	L 16-49C	W/C2	50	100	.067200	-.067200	22.094760	2.087275	17.740803	27.552002
23	L 16-49D	W/C2	39	100	.062500	-.062500	14.660947	1.555806	11.062500	18.812500
24	L 16-57A	W/C2	28	100	.062500	-.062500	11.663397	.721419	9.875000	13.625000
25	L 16-57B	W/C2	22	100	.062500	-.062500	16.741219	1.288064	13.937500	20.250000
26	L 16-57C	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
27	L 16-57D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
28	L 24-17A	W/C2	37	100	.062500	-.062500	21.957691	1.289344	19.062500	25.187500
29	L 24-17B	W/C2	36	100	.062500	-.062500	23.301757	1.812185	19.062500	27.812500
30	L 24-17C	W/C2	34	100	.062500	-.062500	22.987915	2.139067	18.375000	28.625000
31	L 24-17D	W/C2	27	100	.062500	-.062500	18.247352	1.797264	14.062500	23.000000
32	L 24-25A	W/C2	50	100	.074900	-.074900	24.443574	1.459536	20.822197	28.237297
33	L 24-25B	W/C2	50	100	.064800	-.064800	27.442701	2.183769	22.031998	33.566399
34	L 24-25C	W/C2	50	100	.094700	-.094700	22.245872	2.094414	17.235397	28.125896
35	L 24-25D	W/C2	48	100	.064400	-.064400	18.162568	1.815744	13.781601	23.055202
36	L 24-41A	W/C2	50	100	.077200	-.077200	23.978170	1.445947	20.457996	27.791996

Table D-15
MEANS, STD., DEV., MIN., MAX.
POINT 4PT2, STEPS 44.0% POWER, 48.0% FLOW (Continued)

37	L 24-41B	W/C2	50	100	.067938	-.069290	26.479716	2.094366	21.670872	31.793633
38	L 24-41C	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
39	L 24-41D	W/C2	42	100	.062500	-.062500	17.785279	1.769918	13.750000	22.500000
40	L 32-09A	W/C2	34	100	.062500	-.062500	22.088938	1.306048	19.125000	25.375000
41	L 32-09B	W/C2	41	100	.062500	-.062500	27.347924	2.167576	22.500000	32.875000
42	L 32-09C	W/C2	36	100	.062500	-.062500	23.912061	2.249810	18.375000	30.250000
43	L 32-09D	W/C2	31	100	.062498	-.062500	16.805469	1.761282	12.812113	21.249359
44	L 32-33A	W/C2	28	100	.062503	-.063751	21.592382	1.226318	18.749504	24.749744
45	L 32-33B	W/C2	33	100	.062502	-.065002	23.152077	1.778148	19.123074	27.623329
46	L 32-33C	W/C2	39	100	.062511	-.062515	22.794993	2.095676	18.128075	28.317307
47	L 32-33D	NSIG	28	100	.062507	-.066269	17.510258	1.693310	13.622738	22.123676
48	L 32-41A	W/C2	32	100	.062518	-.062515	19.255950	1.122326	16.629826	22.068905
49	L 32-41B	W/C2	28	100	.062518	-.068771	23.657626	1.839608	19.561726	28.064106
50	L 32-41C	W/C2	44	100	.062511	-.066254	20.639447	1.928714	15.999138	25.938427
51	L 32-41D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
52	L 32-57A	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
53	L 32-57B	W/C2	36	100	.062502	-.058731	25.269757	2.063545	20.754597	30.254974
54	L 32-57C	W/C2	31	100	.062503	-.062500	20.487205	1.998564	15.875797	25.563782
55	L 32-57D	W/C2	21	100	.062505	-.062515	14.237794	1.513954	10.750851	18.188946
56	L 40-33A	W/C2	50	100	.065807	-.065811	20.243470	1.229503	17.175568	23.493019
57	L 40-33B	W/C2	50	100	.075759	-.075775	25.141199	1.942409	20.606297	30.076107
58	L 40-33C	W/C2	50	100	.063790	-.066345	23.539583	2.154414	18.241337	29.468346
59	L 40-33D	W/C2	40	100	.062503	-.062500	16.843161	1.663841	12.688139	21.501080
60	L 40-41A	W/C2	33	100	.062509	-.062500	21.821099	1.273376	18.815140	25.128525
61	L 40-41B	W/C2	30	100	.062509	-.062500	23.463193	1.868648	19.127876	28.504284
62	L 40-41C	W/C2	29	100	.062517	-.062500	22.419902	2.087050	17.754807	28.070091
63	L 40-41D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
64	L 48-25A	W/C2	50	100	.067944	-.067947	19.897962	1.229790	16.850204	23.033146
65	L 48-25B	W/C2	50	100	.066142	-.066132	22.203762	1.744274	18.321472	26.456993
66	L 48-25C	W/C2	50	100	.085057	-.085052	23.412582	2.251689	17.776951	29.344723
67	L 48-25D	W/C2	46	100	.062503	-.062500	17.071305	1.799987	12.500504	21.750874
68	L 48-49A	W/C2	50	100	.071857	-.079041	19.228139	1.173307	16.376266	22.268562
69	L 48-49B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
70	L 48-49C	W/C2	50	100	.069456	-.069458	1.013768	.544535	.069454	2.222591
71	L 48-49D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
72	L 56-25A	W/C2	35	100	.062518	-.062515	17.829099	1.086658	15.129240	20.568264
73	L 56-25B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
74	L 56-25C	W/C2	34	100	.062510	-.062515	22.598614	2.190283	17.627815	28.254513
75	L 56-25D	W/C2	25	100	.062508	-.062515	15.900630	1.670703	12.064064	20.002598
76	L 56-33A	W/C2	50	100	.075307	-.075302	20.144230	1.306130	16.642773	23.646290
77	L 56-33B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
78	L 56-33C	W/C2	50	100	.064439	-.064423	21.150543	2.090851	15.980881	26.419994
79	L 56-33D	W/C2	32	100	.062509	-.062500	13.317864	1.425030	9.813980	17.065067
80	APRM A	PCT	10	100	.062503	-.062500	46.331661	3.528355	39.376579	54.439682
81	APRM C	PCT	10	100	.062502	-.062500	45.575474	3.614949	38.501160	54.001625
82	APRM D	PCT	10	100	.062501	-.063751	44.548040	3.480192	37.624123	52.624275
83	APRM F	PCT	10	100	.062506	-.062500	44.867126	3.693231	37.628761	53.130310
84	TIP 4	W/C2	10	100	.062500	-.062500	127.875000	.000000	127.875000	127.875000
85	TIP 5	W/C2	10	100	.062500	-.062500	127.875000	.000000	127.875000	127.875000
86	RC A DP	PSID	10	100	.030811	-6.199886	1.162272	.051234	.979190	1.348927
87	RC B DP	PSID	10	100	.030778	-6.065044	1.105808	.060672	.921486	1.352373
88	FW A DP	PSID	10	100	.069382	-4.520901	2.688434	.314539	1.654058	3.735504
89	FW B DP	PSID	10	100	.070123	-4.586021	2.180366	.166901	1.795140	2.776857

Table D-15
MEANS, STD., DEV., MIN., MAX.
POINT 4PT2, STEPS 44.0% POWER, 48.0% FLOW (Continued)

91	WLRL NG	INCH	10	100	.074820	-14.052643	22.933282	.878544	20.439583	26.425217
92	JP 1 DP	PSID	1	10	.100008	-.104004	2.254509	.544001	.096012	4.596372
93	JP 6 DP	PSID	1	10	.050001	-.050003	1.975666	.563050	-.500012	4.100080
94	JP 11 DP	PSID	1	10	.050865	.101730	2.206618	.582665	.101730	4.221771
95	JP 16 DP	PSID	1	10	.050094	-.150276	1.788718	.532704	-.200370	3.857258
96	STM A DP	NONE	1	10	.000000	.000000	.000000	.000000	.000000	.000000
97	STM D DP	NONE	1	10	.000000	.000000	.000000	.000000	.000000	.000000
98	CORE DP	PSID	1	10	.050146	-.150436	3.453534	.501966	1.203517	5.365670
99	FW TEM A	DEGF	10	100	.499501	279.590393	278.807257	.248325	278.591370	280.089905
100	WTRL W R	INCH	5	100	-.000000	-.000000	-.000000	-.000000	-.000000	-.000000
101	RC TEM A	DEGF	10	100	.499501	419.500488	512.484733	.180918	512.407593	513.906128
102	RC TEM B	NONE	10	100	.000000	.000000	.000000	.000000	.000000	.000000
103	CF TOTAL	PCT	10	100	.457708	-29.888336	44.171982	.505982	41.971817	45.633469
104	P RX W	PSIA	1	10	.752196	9.434570	990.341016	2.764586	983.528931	994.811890
105	P RX N	PSIA	33	100	.075076	1011.362061	988.796950	2.756189	982.382690	993.644043
106	CORE P W	PSIA	1	10	.748122	14.071533	1008.658056	2.902033	1000.844727	1014.310913
107	CORE P N	PSIA	1	100	.074166	1012.238403	1008.648806	2.831312	1000.816895	1014.537598
108	STMA P W	NONE	2	10	.000000	.000000	.000000	.000000	.000000	.000000
109	STMA P N	NONE	10	100	.000000	.000000	.000000	.000000	.000000	.000000
110	STMD P W	NONE	2	10	.000000	.000000	.000000	.000000	.000000	.000000
111	STMD P N	NONE	10	100	.000000	.000000	.000000	.000000	.000000	.000000
112	ESTMA DP	NONE	1	10	.000000	.000000	.000000	.000000	.000000	.000000
113	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
114	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
115	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
116	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
117	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
118	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
119	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
120	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
121	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
122	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
123	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
124	NOSIG	NONE	5	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
125	NOSIG	NONE	5	100	-.000000	-.000000	.000122	.000000	.000120	.000120
126	NOSIG	NONE	5	100	-.000000	-.000000	.000122	.000000	.000120	.000120
127	NOSIG	NONE	5	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
128	PRBS	STEP	1	0	.017000	.000000	-.355954	.473531	-.986000	.102000

10385 SAMPLES PER CHANNEL ANALYZED
FILTER BAND .00 TO 1000.0 HZ

Table D-16
MEANS, STD., DEV., MIN., MAX.
POINT 4PT2, NOISE 44.0% POWER, 48.0% FLOW

WDS BUF	BUF REC	CLOSURE PERIOD	SCAN PERIOD	PACER PERIOD
129	31'	0	12	25

SCAN MODE	FIRST CHANNEL	LAST CHANNEL	PHYREC SIZE
0	0	128	4003

I. D. T A B L E

CH#	NAME	EU	GAIN	FILTER	SLOPE	INT.	MEAN	STD DEV	MIN VAL	MAX VAL
0	L 08-17A	W/C2	50	100	.079096	-.079102	22.419073	.625673	20.960434	23.886990
1	L 08-17B	W/C2	50	100	.097703	-.097700	26.867558	.728247	24.620403	28.919201
2	L 08-17C	W/C2	45	100	.062500	-.062500	21.119396	.579308	19.187500	22.750000
3	L 08-17D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
4	L 08-25A	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
5	L 08-25B	W/C2	31	100	.062500	-.062500	25.651962	.538063	23.937500	27.125000
6	L 08-25C	W/C2	14	100	.062500	-.062500	23.066723	.453561	21.500000	24.500000
7	L 08-25D	W/C2	24	100	.062500	-.062500	15.869019	.341249	14.750000	17.000000
8	L 08-33A	W/C2	32	100	.062500	-.062500	22.325781	.368292	21.000000	23.500000
9	L 08-33B	W/C2	33	100	.062500	-.062500	28.652813	.537520	26.562500	30.250000
10	L 08-49B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
11	L 08-33D	W/C2	27	100	.062500	-.062500	16.891394	.369524	15.500000	18.125000
12	L 08-49A	W/C2	50	100	.071000	-.071000	14.739415	.525432	13.205999	16.046001
13	L 08-33C	W/C2	39	100	.062500	-.062500	24.775420	.575055	22.500000	26.625000
14	L 08-49C	W/C2	50	100	.063800	-.063800	18.246940	.549374	16.332802	19.714203
15	L 08-49D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
16	L 16-33A	W/C2	29	100	.062500	-.062500	19.507528	.274272	18.562500	20.250000
17	L 16-33B	W/C2	32	100	.062500	-.062500	23.599413	.425275	22.125000	24.875000
18	L 16-33C	W/C2	25	100	.062500	-.062500	21.343118	.385687	20.000000	22.750000
19	L 16-33D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
20	L 16-49A	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
21	L 16-49B	W/C2	50	100	.084500	-.084500	25.161344	.703564	23.237499	27.378002
22	L 16-49C	W/C2	50	100	.067200	-.067200	22.098096	.409942	20.697601	23.721603
23	L 16-49D	W/C2	39	100	.062500	-.062500	14.687377	.399607	13.000000	16.125000
24	L 16-57A	W/C2	28	100	.062500	-.062500	11.271542	.285903	10.500000	12.000000
25	L 16-57B	W/C2	22	100	.062500	-.062500	16.574732	.316284	15.625000	17.625000
26	L 16-57C	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
27	L 16-57D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
28	L 24-17A	W/C2	37	100	.062500	-.062500	21.143620	.392098	20.062500	22.125000
29	L 24-17B	W/C2	36	100	.062500	-.062500	23.149964	.490808	21.625000	24.500000
30	L 24-17C	W/C2	34	100	.062500	-.062500	22.998792	.490224	21.312500	24.437500
31	L 24-17D	W/C2	27	100	.062500	-.062500	18.373489	.387362	17.000000	19.562500
32	L 24-25A	W/C2	50	100	.074900	-.074900	23.585404	.573796	22.095497	24.866798
33	L 24-25B	W/C2	50	100	.064800	-.064800	27.235820	.774917	25.012798	29.548798
34	L 24-25C	W/C2	50	100	.094700	-.094700	22.254872	.734300	20.171101	24.243198
35	L 24-25D	W/C2	48	100	.064400	-.064400	18.230747	.557753	16.486401	19.770802
36	L 24-41A	W/C2	50	100	.077200	-.077200	23.112089	.547305	21.615997	24.395195

Table D-16
MEANS, STD., DEV., MIN., MAX.
POINT 4PT2, NOISE 44.0% POWER, 48.0% FLOW (Continued)

37	L 24-41B	W/C2	50	100	.067938	-.069290	26.302027	.561374	24.456329	27.921165
38	L 24-41C	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
39	L 24-41D	W/C2	42	100	.062500	-.062500	17.853643	.458916	16.250000	19.250000
40	L 32-09A	W/C2	34	100	.062500	-.062500	21.266357	.351364	20.125000	22.125000
41	L 32-09B	W/C2	41	100	.062500	-.062500	27.090239	.495073	25.500000	28.562500
42	L 32-09C	W/C2	36	100	.062500	-.062500	23.838494	.515442	22.062500	25.562500
43	L 32-09D	W/C2	31	100	.062498	-.062500	16.816272	.391392	15.499533	17.999458
44	L 32-33A	W/C2	28	100	.062503	-.063751	20.751296	.342742	19.749542	21.624619
45	L 32-33B	W/C2	33	100	.062502	-.065002	22.957047	.400315	21.623150	24.248226
46	L 32-33C	W/C2	39	100	.062511	-.062515	22.857239	.524739	21.316120	24.441650
47	L 32-33D	NSIG	28	100	.062507	-.066269	17.578487	.334888	16.373043	18.623291
48	L 32-41A	W/C2	32	100	.062518	-.062515	18.545150	.324648	17.630116	19.318108
49	L 32-41B	W/C2	28	100	.062518	-.068771	23.651964	.420555	22.312496	24.938232
50	L 32-41C	W/C2	44	100	.062511	-.066254	20.704329	.535873	18.874657	22.250263
51	L 32-41D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
52	L 32-57A	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
53	L 32-57B	W/C2	36	100	.062502	-.058731	25.102698	.510300	23.567211	26.879841
54	L 32-57C	W/C2	31	100	.062503	-.062500	20.507239	.456031	19.000954	22.188614
55	L 32-57D	W/C2	21	100	.062505	-.062515	14.257205	.322393	13.126041	15.376221
56	L 40-33A	W/C2	50	100	.065807	-.065811	19.445711	.509809	18.162670	20.531715
57	L 40-33B	W/C2	50	100	.075759	-.075775	24.958363	.544257	23.333603	26.363941
58	L 40-33C	W/C2	50	100	.063790	-.066345	23.528819	.581614	21.749775	25.258217
59	L 40-33D	W/C2	40	100	.062503	-.062500	16.893926	.464966	15.500780	18.250916
60	L 40-41A	W/C2	33	100	.062509	-.062500	21.032664	.384504	20.002808	22.003086
61	L 40-41B	W/C2	30	100	.062509	-.062500	23.301934	.566966	21.620254	24.816231
62	L 40-41C	W/C2	29	100	.062517	-.062500	22.435376	.422801	20.880650	23.818943
63	L 40-41D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
64	L 48-25A	W/C2	50	100	.067944	-.067947	19.129356	.478006	17.937317	20.179482
65	L 48-25B	W/C2	50	100	.066142	-.066132	21.987767	.315466	21.033310	23.017586
66	L 48-25C	W/C2	50	100	.085057	-.085052	23.403686	.675891	21.094177	25.261978
67	L 48-25D	W/C2	46	100	.062503	-.062500	17.128962	.589080	15.500624	18.875759
68	L 48-49A	W/C2	50	100	.071857	-.079041	18.604502	.450313	17.310413	19.609844
69	L 48-49B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
70	L 48-49C	W/C2	50	100	.069456	-.069458	1.010259	.538376	.138910	2.083679
71	L 48-49D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
72	L 56-25A	W/C2	35	100	.062518	-.062515	17.175727	.308897	16.254555	18.005043
73	L 56-25B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
74	L 56-25C	W/C2	34	100	.062510	-.062515	22.593188	.435900	20.878334	24.003834
75	L 56-25D	W/C2	25	100	.062508	-.062515	15.998888	.341027	14.751913	17.064713
76	L 56-33A	W/C2	50	100	.075307	-.075302	19.430113	.601925	17.772373	20.784637
77	L 56-33B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
78	L 56-33C	W/C2	50	100	.064439	-.064423	21.146817	.570260	19.202827	22.682533
79	L 56-33D	W/C2	32	100	.062509	-.062500	13.337926	.353283	12.126827	14.502184
80	APRM A	PCT	10	100	.062503	-.062500	45.807981	.439862	44.376778	47.251892
81	APRM C	PCT	10	100	.062502	-.062500	45.167859	.460626	43.626312	46.751404
82	APRM D	PCT	10	100	.062501	-.063751	44.010374	.448055	42.499176	45.499207
83	APRM F	PCT	10	100	.062506	-.062500	44.458508	.459707	43.004303	46.004601
84	TIP 4	W/C2	10	100	.062500	-.062500	127.875000	.000000	127.875000	127.875000
85	TIP 5	W/C2	10	100	.062500	-.062500	127.875000	.000000	127.875000	127.875000
86	RC A DP	PSID	10	100	.030811	-6.199886	1.146986	.052164	.979190	1.348927
87	RC B DP	PSID	10	100	.030778	-6.065044	1.101513	.060548	.890708	1.352373
88	FW A DP	PSID	10	100	.069382	-4.520901	2.753930	.196669	2.070347	3.457977
89	FW B DP	PSID	10	100	.070123	-4.586021	1.988194	.069130	1.795140	2.215877

Table D-16
MEANS, STD., DEV., MIN., MAX.
POINT 4PT2, NOISE 44.0% POWER, 48.0% FLOW (Continued)

91	WLRL NG	INCH	10	100	.074820	-14.052643	22.690617	.609319	20.439583	25.003632
92	JP 1 DP	PSID	1	10	.100008	-.104004	2.214372	.529678	.096012	3.996324
93	JP 6 DP	PSID	1	10	.050001	-.050003	2.008132	.564964	-.550013	4.100080
94	JP 11 DP	PSID	1	10	.050865	.101730	2.145601	.623905	-.203458	4.628689
95	JP 16 DP	PSID	1	10	.050094	-.150276	1.801183	.510787	-.450841	3.406411
96	STM A DP	NONE	1	10	.000000	.000000	.000000	.000000	.000000	.000000
97	STM D DP	NONE	1	10	.000000	.000000	.000000	.000000	.000000	.000000
98	CORE DP	PSID	1	10	.050146	-.150436	3.434427	.522980	1.353956	5.516109
99	FW TEM A	DEGF	10	100	.499501	279.590393	278.110714	.461531	277.592407	278.591370
100	WTRL W R	INCH	5	100	-.000000	-.000000	-.000000	-.000000	-.000000	-.000000
101	RC TEM A	DEGF	10	100	.499501	419.500488	512.800601	.204582	512.407593	512.907104
102	RC TEM B	NONE	10	100	.000000	.000000	.000000	.000000	.000000	.000000
103	CF TOTAL	PCT	10	100	.457708	-29.888336	44.083805	.404793	42.887222	45.633469
104	P RX W	PSIA	1	10	.752196	9.434570	992.712097	.309728	992.555298	994.059692
105	P RX N	PSIA	33	100	.075076	1011.362061	991.444025	.098811	991.166504	991.767212
106	CORE P W	PSIA	1	10	.748122	14.071533	1011.463982	.575610	1008.325928	1014.310913
107	CORE P N	PSIA	1	100	.074166	1012.238403	1011.311568	.624898	1008.381836	1013.573364
108	STMA P W	NONE	2	10	.000000	.000000	.000000	.000000	.000000	.000000
109	STMA P N	NONE	10	100	.000000	.000000	.000000	.000000	.000000	.000000
110	STMD P W	NONE	2	10	.000000	.000000	.000000	.000000	.000000	.000000
111	STMD P N	NONE	10	100	.000000	.000000	.000000	.000000	.000000	.000000
112	ESTMA DP	NONE	1	10	.000000	.000000	.000000	.000000	.000000	.000000
113	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
114	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
115	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
116	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
117	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
118	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
119	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
120	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
121	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
122	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
123	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
124	NOSIG	NONE	5	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
125	NOSIG	NONE	5	100	-.000000	-.000000	.000122	.000000	.000120	.000120
126	NOSIG	NONE	5	100	-.000000	-.000000	.000122	.000000	.000120	.000120
127	NOSIG	NONE	5	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
128	PRBS	STEP	1	0	.017000	.000000	.023324	.008228	-.000000	.034000

10137 SAMPLES PER CHANNEL ANALYZED
FILTER BAND .00 TO 1000.0 HZ

Table D-17
MEANS, STD., DEV., MIN., MAX.
POINT 4PT3, STEPS 38.4% POWER, 48.1% FLOW

WDS BUF	BUF REC	CLOSURE PERIOD	SCAN PERIOD	PACER PERIOD
129	31,	0	12	25

SCAN MODE	FIRST CHANNEL	LAST CHANNEL	PHYREC SIZE
0	0	128	4003

I. D. T A B L E

CH#	NAME	EU	GAIN	FILTER	SLOPE	INT.	MEAN	STD DEV	MIN VAL	MAX VAL
0	L 08-17A	W/C2	50	100	.079096	-.079102	19.243985	1.342167	15.819195	23.175125
1	L 08-17B	W/C2	50	100	.097700	-.097700	24.781964	2.198474	19.540001	31.264000
2	L 08-17C	W/C2	45	100	.062500	-.062500	20.015465	2.168888	15.000000	26.250000
3	L 08-17D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
4	L 08-25A	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
5	L 08-25B	W/C2	31	100	.062500	-.062500	23.634919	2.103837	18.625000	29.500000
6	L 08-25C	W/C2	14	100	.062500	-.062500	21.914786	2.342531	16.750000	28.812500
7	L 08-25D	W/C2	24	100	.062500	-.062500	15.185317	1.836798	11.250000	20.250000
8	L 08-33A	W/C2	32	100	.062500	-.062500	18.932424	1.234177	15.750000	22.500000
9	L 08-33B	W/C2	33	100	.062500	-.062500	26.382072	2.322536	20.750000	32.875000
10	L 08-49B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
11	L 08-33D	W/C2	27	100	.062500	-.062500	15.359965	1.832896	11.312500	20.312500
12	L 08-49A	W/C2	50	100	.071000	-.071000	12.692414	.943302	10.224001	15.619999
13	L 08-33C	W/C2	39	100	.062500	-.062500	22.790404	2.427420	17.187500	30.250000
14	L 08-49C	W/C2	50	100	.063800	-.063800	16.621743	1.817154	12.504801	21.947201
15	L 08-49D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
16	L 16-33A	W/C2	29	100	.062500	-.062500	15.092403	.948263	12.750000	17.812500
17	L 16-33B	W/C2	32	100	.062500	-.062500	19.467565	1.671363	15.687500	24.500000
18	L 16-33C	W/C2	25	100	.062500	-.062500	18.912096	1.962490	14.750000	24.562500
19	L 16-33D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
20	L 16-49A	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
21	L 16-49B	W/C2	50	100	.084500	-.084500	23.026366	2.070044	18.251999	28.814499
22	L 16-49C	W/C2	50	100	.067200	-.067200	20.403676	2.157266	15.993603	26.342403
23	L 16-49D	W/C2	39	100	.062500	-.062500	13.526818	1.623319	9.875000	18.125000
24	L 16-57A	W/C2	28	100	.062500	-.062500	9.763231	.673375	8.125000	11.750000
25	L 16-57B	W/C2	22	100	.062500	-.062500	15.310565	1.298503	12.562500	18.750000
26	L 16-57C	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
27	L 16-57D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
28	L 24-17A	W/C2	37	100	.062500	-.062500	16.661422	1.080933	14.062500	19.750000
29	L 24-17B	W/C2	36	100	.062500	-.062500	19.532876	1.668785	15.750000	24.000000
30	L 24-17C	W/C2	34	100	.062500	-.062500	18.459237	1.917621	14.250000	23.875000
31	L 24-17D	W/C2	27	100	.062500	-.062500	14.485836	1.594556	10.750000	19.000000
32	L 24-25A	W/C2	50	100	.074900	-.074900	16.948484	1.133916	13.931400	20.223000
33	L 24-25B	W/C2	50	100	.064800	-.064800	20.094684	1.778238	15.616798	25.531197
34	L 24-25C	W/C2	50	100	.094700	-.094700	20.121308	2.129338	15.151999	26.515999
35	L 24-25D	W/C2	48	100	.064400	-.064400	19.164977	2.143167	13.974800	25.244801
36	L 24-41A	W/C2	50	100	.077200	-.077200	17.326537	1.153661	14.436399	20.689598

Table D-17
MEANS, STD., DEV., MIN., MAX.
POINT 4PT3, STEPS 38.4% POWER, 48.1% FLOW (Continued)

37	L 24-41B	W/C2	50	100	.067938	-.069290	20.649262	1.748248	16.643459	25.883026
38	L 24-41C	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
39	L 24-41D	W/C2	42	100	.062500	-.062500	18.014255	2.002939	13.500000	23.625000
40	L 32-09A	W/C2	34	100	.062500	-.062500	18.197748	1.190539	15.500000	21.500000
41	L 32-09B	W/C2	41	100	.062500	-.062500	25.185362	2.206193	20.437500	31.187500
42	L 32-09C	W/C2	36	100	.062500	-.062500	22.421315	2.335748	17.312500	29.000000
43	L 32-09D	W/C2	31	100	.062498	-.062500	15.884987	1.850005	11.749645	20.749374
44	L 32-33A	W/C2	28	100	.062503	-.063751	14.053400	.862923	11.999231	16.624416
45	L 32-33B	W/C2	33	100	.062502	-.065002	15.042286	1.234144	12.122864	18.748062
46	L 32-33C	W/C2	39	100	.062511	-.062515	21.113544	2.153755	16.252758	27.379650
47	L 32-33D	NSIG	28	100	.062507	-.066269	19.742055	2.132947	14.747862	25.749073
48	L 32-41A	W/C2	32	100	.062518	-.062515	13.532686	.854118	11.503340	16.067165
49	L 32-41B	W/C2	28	100	.062518	-.068771	15.602840	1.292367	12.747318	19.186623
50	L 32-41C	W/C2	44	100	.062511	-.066254	17.233793	1.786471	13.123621	22.125240
51	L 32-41D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
52	L 32-57A	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
53	L 32-57B	W/C2	36	100	.062502	-.058731	23.473496	2.060660	19.004528	29.004925
54	L 32-57C	W/C2	31	100	.062503	-.062500	19.164325	2.039094	14.625736	24.751244
55	L 32-57D	W/C2	21	100	.062505	-.062515	13.210553	1.549483	9.875780	17.376381
56	L 40-33A	W/C2	50	100	.065807	-.065811	14.021973	.962856	11.647799	16.978149
57	L 40-33B	W/C2	50	100	.075759	-.075775	16.335470	1.401803	13.030445	20.606297
58	L 40-33C	W/C2	50	100	.063790	-.066345	19.764149	2.035344	15.179424	25.896114
59	L 40-33D	W/C2	40	100	.062503	-.062500	18.125830	2.011946	13.375673	23.688690
60	L 40-41A	W/C2	33	100	.062509	-.062500	16.205526	1.034966	13.751932	19.315212
61	L 40-41B	W/C2	30	100	.062509	-.062500	19.444979	1.667612	15.564844	24.628704
62	L 40-41C	W/C2	29	100	.062517	-.062500	19.990026	2.034053	15.504200	25.756966
63	L 40-41D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
64	L 48-25A	W/C2	50	100	.067944	-.067947	15.639818	1.070772	13.113264	18.888538
65	L 48-25B	W/C2	50	100	.066142	-.066132	19.554279	1.672773	16.271053	24.274292
66	L 48-25C	W/C2	50	100	.085057	-.085052	18.981952	2.041894	14.204550	25.347038
67	L 48-25D	W/C2	46	100	.062503	-.062500	12.676207	1.526421	8.875359	17.500702
68	L 48-49A	W/C2	50	100	.071857	-.079041	15.910827	1.076038	13.358265	19.250557
69	L 48-49B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
70	L 48-49C	W/C2	50	100	.069456	-.069458	.913988	.535572	.069454	2.153135
71	L 48-49D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
72	L 56-25A	W/C2	35	100	.062518	-.062515	14.691034	.973201	12.378469	17.692459
73	L 56-25B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
74	L 56-25C	W/C2	34	100	.062510	-.062515	20.605480	2.195333	15.877535	27.254353
75	L 56-25D	W/C2	25	100	.062508	-.062515	14.217529	1.680691	10.626375	19.127483
76	L 56-33A	W/C2	50	100	.075307	-.075302	16.575723	1.196970	13.479893	20.558716
77	L 56-33B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
78	L 56-33C	W/C2	50	100	.064439	-.064423	19.992543	2.168390	14.949858	26.806629
79	L 56-33D	W/C2	32	100	.062509	-.062500	12.584775	1.494839	9.251396	17.002560
80	APRM A	PCT	10	100	.062503	-.062500	40.314345	3.428146	33.751358	49.564491
81	APRM C	PCT	10	100	.062502	-.062500	40.429613	3.575009	33.626015	50.001503
82	APRM D	PCT	10	100	.062501	-.063751	37.874757	3.308726	31.561565	46.811722
83	APRM F	PCT	10	100	.062506	-.062500	38.500352	3.460301	31.815685	47.754776
84	TIP 4	W/C2	10	100	.062500	-.062500	127.875000	.000000	127.875000	127.875000
85	TIP 5	W/C2	10	100	.062500	-.062500	127.875000	.000000	127.875000	127.875000
86	RC A DP	PSID	10	100	.030811	-6.199886	1.114413	.051016	.917566	1.287305
87	RC B DP	PSID	10	100	.030778	-6.065044	1.110902	.060792	.890708	1.383151
88	FW A DP	PSID	10	100	.069302	-4.520901	2.336041	.391312	1.099005	3.596741
89	FW B DP	PSID	10	100	.070123	-4.506021	1.300218	.172230	.883546	1.795140
90	FW C DP	PSID	10	100	.069516	-4.535221	-.140450	.078969	-.294744	.122351

Table D-17
MEANS, STD., DEV., MIN., MAX.
POINT 4PT3, STEPS 38.4% POWER, 48.1% FLOW (Continued)

91	WLRL NG	INCH	10	100	.074820	-14.052643	22.615912	.869087	20.140297	25.826653
92	JP 1 DP	PSID	1	10	.100008	-.104004	2.358043	.507109	.296028	4.196340
93	JP 6 DP	PSID	1	10	.050001	-.050003	2.084782	.615429	-.450011	4.450087
94	JP 11 DP	PSID	1	10	.050865	.101730	2.076384	.606063	-.712105	4.526959
95	JP 16 DP	PSID	1	10	.050094	-.150276	1.777899	.467555	-.050088	3.306222
96	STM A DP	NONE	1	10	.000000	.000000	.000000	.000000	.000000	.000000
97	STM D DP	NONE	1	10	.000000	.000000	.000000	.000000	.000000	.000000
98	CORE DP	PSID	1	10	.050146	-.150436	3.297770	.500616	1.153371	5.215231
99	FW TEM A'	DEGF	10	100	.499501	279.590393	269.563824	.136767	269.100891	270.099854
100	WTRL W R'	INCH	5	100	-.000000	-.000000	-.000000	-.000000	-.000000	-.000000
101	RC TEM A	DEGF	10	100	.499501	419.500488	516.349500	.155220	515.904053	516.403564
102	RC TEM B	NONE	10	100	.000000	.000000	.000000	.000000	.000000	.000000
103	CF TOTAL	PCT	10	100	.457708	-29.888336	44.021703	.507227	42.429520	45.633469
104	P RX W	PSIA	1	10	.752196	9.434570	986.397879	2.985354	979.767944	991.803101
105	P RX N	PSIA	33	100	.075076	1011.362061	984.194940	2.926813	977.878052	989.665039
106	CORE P W	PSIA	1	10	.748122	14.071533	1004.833043	3.095374	996.355957	1011.318481
107	CORE P N	PSIA	1	100	.074166	1012.238403	1004.256669	3.022110	996.218628	1010.903442
108	STMA P W	NONE	2	10	.000000	.000000	.000000	.000000	.000000	.000000
109	STMA P N	NONE	10	100	.000000	.000000	.000000	.000000	.000000	.000000
110	STMD P W	NONE	2	10	.000000	.000000	.000000	.000000	.000000	.000000
111	STMD P N	NONE	10	100	.000000	.000000	.000000	.000000	.000000	.000000
112	ESTMA DP	NONE	1	10	.000000	.000000	.000000	.000000	.000000	.000000
113	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
114	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
115	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
116	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
117	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
118	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
119	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
120	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
121	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
122	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
123	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
124	NOSIG	NONE	5	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
125	NOSIG	NONE	5	100	-.000000	-.000000	.000122	.000000	.000120	.000120
126	NOSIG	NONE	5	100	-.000000	-.000000	.000122	.000000	.000120	.000120
127	NOSIG	NONE	5	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
128	PRBS	STEP	1	0	.017000	.000000	-.375091	.478225	-.986000	.102000

12338 SAMPLES PER CHANNEL ANALYZED
FILTER BAND .00 TO 1000.0 HZ

Table D-18

MEANS, STD., DEV., MIN., MAX.

POINT 4PT3, NOISE 38.4% POWER, 48.1% FLOW

WDS BUF	BUF REC	CLOSURE PERIOD	SCAN PERIOD	PACER PERIOD
129	31	0	12	25

SCAN MODE	FIRST CHANNEL	LAST CHANNEL	PHYREC SIZE
0	0	128	4003

I. D. T A B L E

CH#	NAME	EU	GAIN	FILTER	SLOPE	INT.	MEAN	STD DEV	MIN VAL	MAX VAL
0	L 08-17A	W/C2	50	100	.079096	-.079102	18.726023	.607030	17.322018	20.011284
1	L 08-17B	W/C2	50	100	.097700	-.097700	24.774098	.695793	22.764103	26.672100
2	L 08-17C	W/C2	45	100	.062500	-.062500	20.151664	.553026	18.312500	21.750000
3	L 08-17D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
4	L 08-25A	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
5	L 08-25B	W/C2	31	100	.062500	-.062500	23.718114	.476482	22.125000	25.187500
6	L 08-25C	W/C2	14	100	.062500	-.062500	22.124367	.410085	20.625000	23.375000
7	L 08-25D	W/C2	24	100	.062500	-.062500	15.301428	.317901	14.125000	16.375000
8	L 08-33A	W/C2	32	100	.062500	-.062500	18.457455	.351812	17.312500	19.312500
9	L 08-33B	W/C2	33	100	.062500	-.062500	26.477465	.528800	24.687500	27.937500
10	L 08-49B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
11	L 08-33D	W/C2	27	100	.062500	-.062500	15.502684	.342187	14.250000	16.562500
12	L 08-49A	W/C2	50	100	.071000	-.071000	12.378513	.516604	11.076000	13.490000
13	L 08-33C	W/C2	39	100	.062500	-.062500	22.981525	.554829	21.062500	24.750000
14	L 08-49C	W/C2	50	100	.063800	-.063800	16.734693	.516561	15.056801	18.374401
15	L 08-49D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
16	L 16-33A	W/C2	29	100	.062500	-.062500	14.578684	.247872	13.750000	15.125000
17	L 16-33B	W/C2	32	100	.062500	-.062500	19.487656	.387561	18.125000	20.500000
18	L 16-33C	W/C2	25	100	.062500	-.062500	19.158036	.334642	17.937500	20.187500
19	L 16-33D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
20	L 16-49A	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
21	L 16-49B	W/C2	50	100	.084500	-.084500	23.057987	.656824	21.125000	24.758499
22	L 16-49C	W/C2	50	100	.067200	-.067200	20.543122	.343895	19.353603	21.772800
23	L 16-49D	W/C2	39	100	.062500	-.062500	13.639918	.371213	12.375000	14.750000
24	L 16-57A	W/C2	28	100	.062500	-.062500	9.532464	.270728	8.812500	10.187500
25	L 16-57B	W/C2	22	100	.062500	-.062500	15.296619	.272808	14.437500	16.187500
26	L 16-57C	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
27	L 16-57D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
28	L 24-17A	W/C2	37	100	.062500	-.062500	16.103057	.358026	15.062500	16.875000
29	L 24-17B	W/C2	36	100	.062500	-.062500	19.486107	.409036	18.062500	20.562500
30	L 24-17C	W/C2	34	100	.062500	-.062500	18.620328	.391804	17.312500	19.875000
31	L 24-17D	W/C2	27	100	.062500	-.062500	14.722352	.324474	13.625000	15.750000
32	L 24-25A	W/C2	50	100	.074900	-.074900	16.242935	.545370	14.990001	17.226997
33	L 24-25B	W/C2	50	100	.064800	-.064800	20.013503	.711330	18.143997	21.772797
34	L 24-25C	W/C2	50	100	.094700	-.094700	20.443553	.702820	18.655899	22.349197
35	L 24-25D	W/C2	49	100	.064400	-.064400	19.479856	.557763	17.838802	21.123199

Table D-18
MEANS, STD., DEV., MIN., MAX.
POINT 4PT3, NOISE 38.4% POWER, 48.1% FLOW (Continued)

37	L 24-41B	W/C2	50	100	.067938	-.069290	20.625038	.479322	19.157166	21.874683
38	L 24-41C	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
39	L 24-41D	W/C2	42	100	.062500	-.062500	18.297107	.450007	16.812500	19.500000
40	L 32-09A	W/C2	34	100	.062500	-.062500	17.722655	.314524	16.750000	18.562500
41	L 32-09B	W/C2	41	100	.062500	-.062500	25.218127	.440677	23.562500	26.562500
42	L 32-09C	W/C2	36	100	.062500	-.062500	22.564523	.484079	21.000000	24.000000
43	L 32-09D	W/C2	31	100	.062498	-.062500	16.016492	.374947	14.749556	17.124485
44	L 32-33A	W/C2	28	100	.062503	-.063751	13.401296	.303874	12.561754	13.999311
45	L 32-33B	W/C2	33	100	.062502	-.065002	14.881286	.335707	13.872917	15.685471
46	L 32-33C	W/C2	39	100	.062511	-.062515	21.563580	.488795	20.865907	22.753864
47	L 32-33D	NSIG	28	100	.062507	-.066269	20.119092	.355500	18.748302	21.248577
48	L 32-41A	W/C2	32	100	.062518	-.062515	13.000774	.293891	12.253557	13.566439
49	L 32-41B	W/C2	28	100	.062518	-.068771	15.604402	.285611	14.747879	16.373333
50	L 32-41C	W/C2	44	100	.062511	-.066254	17.486545	.486639	15.999138	18.812145
51	L 32-41D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
52	L 32-57A	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
53	L 32-57B	W/C2	36	100	.062502	-.058731	23.527629	.453827	22.004646	24.754757
54	L 32-57C	W/C2	31	100	.062503	-.062500	19.318535	.421567	17.500881	20.626038
55	L 32-57D	W/C2	21	100	.062505	-.062515	13.310019	.298118	12.063456	14.188627
56	L 40-33A	W/C2	50	100	.065807	-.065811	13.450931	.490491	12.371672	14.280069
57	L 40-33B	W/C2	50	100	.075759	-.075775	16.287728	.474959	14.924408	17.272923
58	L 40-33C	W/C2	50	100	.063790	-.066345	20.043056	.538288	18.305126	21.558407
59	L 40-33D	W/C2	40	100	.062503	-.062500	18.409752	.469187	16.813343	19.750992
60	L 40-41A	W/C2	33	100	.062509	-.062500	15.643588	.356222	14.627056	16.439808
61	L 40-41B	W/C2	30	100	.062509	-.062500	19.389057	.536293	17.752670	20.753120
62	L 40-41C	W/C2	29	100	.062517	-.062500	20.209498	.379054	18.880112	21.255753
63	L 40-41D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
64	L 48-25A	W/C2	50	100	.067944	-.067947	15.187622	.460343	14.132431	16.034874
65	L 48-25B	W/C2	50	100	.066142	-.066132	19.579510	.240591	18.784470	20.239601
66	L 48-25C	W/C2	50	100	.085057	-.085052	19.132489	.623745	17.181549	20.583836
67	L 48-25D	W/C2	46	100	.062503	-.062500	12.806602	.557993	11.250454	14.188070
68	L 48-49A	W/C2	50	100	.071857	-.079041	15.530318	.424080	14.364265	16.376266
69	L 48-49B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
70	L 48-49C	W/C2	50	100	.069456	-.069458	.916568	.532534	.069454	1.944767
71	L 48-49D	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
72	L 56-25A	W/C2	35	100	.062518	-.062515	14.335928	.287398	13.503784	14.941687
73	L 56-25B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
74	L 56-25C	W/C2	34	100	.062510	-.062515	20.782474	.401833	19.503113	22.066025
75	L 56-25D	W/C2	25	100	.062508	-.062515	14.321259	.301721	13.314226	15.251978
76	L 56-33A	W/C2	50	100	.075307	-.075302	16.179457	.589568	14.684799	17.320530
77	L 56-33B	NSIG	0	100	.000000	.000000	.000000	.000000	.000000	.000000
78	L 56-33C	W/C2	50	100	.064439	-.064423	20.149209	.552011	18.429562	21.715950
79	L 56-33D	W/C2	32	100	.062509	-.062500	12.682386	.344252	11.564243	13.689562
80	APRM A	PCT	10	100	.062503	-.062500	40.220105	.347818	39.001564	41.189156
81	APRM C	PCT	10	100	.062502	-.062500	40.418596	.378485	39.001175	41.376244
82	APRM D	PCT	10	100	.062501	-.063751	37.766908	.341339	36.561615	38.749138
83	APRM F	PCT	10	100	.062506	-.062500	38.518634	.367238	37.253731	39.566460
84	TIP 4	W/C2	10	100	.062500	-.062500	127.875000	.000000	127.875000	127.875000
85	TIP 5	W/C2	10	100	.062500	-.062500	127.875000	.000000	127.875000	127.875000
86	RC A DP	PSID	10	100	.030811	-6.199886	1.125058	.051694	.948379	1.287305
87	RC B DP	PSID	10	100	.030778	-6.065044	1.104099	.064416	.890708	1.352373
88	FW A DP	PSID	10	100	.069382	-4.520901	2.376273	.213480	1.515294	3.319215
89	FW B DP	PSID	10	100	.070123	-4.586021	1.236792	.077997	1.023791	1.444528
90	FW C DP	PSID	10	100	.069516	-4.535221	-.140276	.082544	-.364261	.122351

Table D-18

MEANS, STD., DEV., MIN., MAX.

POINT 4PT3, NOISE 38.4% POWER, 48.1% FLOW (Continued)

91	WLRL NG	INCH	10	100	.074820	-14.052643	22.545172	.540351	20.514404	24.704346
92	JP 1 DP	PSID	1	10	.100008	-.104004	2.306417	.509815	-.904068	4.196340
93	JP 6 DP	PSID	1	10	.050001	-.050003	2.116808	.576676	-.050003	4.450087
94	JP 11 DP	PSID	1	10	.050865	.101730	2.074338	.596639	-.305187	4.018312
95	JP 16 DP	PSID	1	10	.050094	-.150276	1.825060	.479033	-.150276	3.606787
96	STM A DP	NONE	1	10	.000000	.000000	.000000	.000000	.000000	.000000
97	STM D DP	NONE	1	10	.000000	.000000	.000000	.000000	.000000	.000000
98	CORE DP	PSID	1	10	.050146	-.150436	3.301016	.487017	1.404103	5.215231
99	FW TEM A	DEGF	10	100	.499501	279.590393	269.290277	.246297	268.601379	269.600403
100	WTRL W R	INCH	5	100	-.000000	-.000000	-.000000	-.000000	-.000000	-.000000
101	RC TEM A	DEGF	10	100	.499501	419.500488	516.431304	.114357	516.403564	516.903076
102	RC TEM B	NONE	10	100	.000000	.000000	.000000	.000000	.000000	.000000
103	CF TOTAL	PCT	10	100	.457708	-29.888336	43.981583	.334504	42.887222	45.175766
104	P RX W	PSIA	1	10	.752196	9.434570	989.543704	.045939	988.794312	989.546509
105	P RX N	PSIA	33	100	.075076	1011.362061	987.190026	.072925	986.887207	987.487793
106	CORE P W	PSIA	1	10	.748122	14.071533	1008.134129	.666383	1005.333496	1009.822144
107	CORE P N	PSIA	1	100	.074166	1012.238403	1007.282415	.579073	1004.747681	1009.420044
108	STMA P W	NONE	2	10	.000000	.000000	.000000	.000000	.000000	.000000
109	STMA P N	NONE	10	100	.000000	.000000	.000000	.000000	.000000	.000000
110	STMD P W	NONE	2	10	.000000	.000000	.000000	.000000	.000000	.000000
111	STMD P N	NONE	10	100	.000000	.000000	.000000	.000000	.000000	.000000
112	ESTMA DP	NONE	1	10	.000000	.000000	.000000	.000000	.000000	.000000
113	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
114	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
115	NOSIG	NONE	10	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
116	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
117	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
118	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
119	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
120	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
121	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
122	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
123	NOSIG	NONE	1	100	.000000	.000000	.000000	.000000	.000000	.000000
124	NOSIG	NONE	5	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
125	NOSIG	NONE	5	100	-.000000	-.000000	.000122	.000000	.000120	.000120
126	NOSIG	NONE	5	100	-.000000	-.000000	.000122	.000000	.000120	.000120
127	NOSIG	NONE	5	100	-.000000	-.000000	-.000122	.000000	-.000122	-.000122
128	PRBS	STEP	1	0	.017000	.000000	.021956	.007731	-.000000	.034000

9083 SAMPLES PER CHANNEL ANALYZED

FILTER BAND .00 TO 1000.0 HZ

APPENDIX E

CORE FLOW MEASUREMENT ADJUSTMENT

Reactor core flow at the Peach Bottom Units 2 and 3 Boiling Water Reactors is determined from pressure recovery measurements in the diffusers of the twenty jet pumps that are used to induce core flow. A calibration constant, K_{calib}, was determined for four of the Peach Bottom Unit 2 jet pumps before installation in the reactor. During plant startup, diffuser pressures were measured on all twenty jet pumps. Measurements on the four calibrated jet pumps were used to calibrate the other sixteen jet pumps. The calibration is accurate for the usual operating conditions, near rated core flow, and is adequate for most purposes at low flow. However, a more accurate determination of low core flow is necessary for qualification of computer programs. A production jet pump of the design used at Peach Bottom Units 2 and 3 was tested over wide ranges of drive flow and diffuser (total) flow with water at a pressure and temperature near those that normally exist in an operating BWR. The results of those tests were used to adjust the flow measurements taken during the Peach Bottom-2 Cycle 3 stability tests.

The following expressions are obtained for evaluation of K_{calib}:

$$K_{calib} = \frac{\Delta P_{diffuser}}{\left(\dfrac{W_T^2}{\gamma 2 g_c A_T^2 \times 3600^2 \times 144}\right)}$$ (the calibration coefficient)

$\Delta P_{diffuser}$ = jet pump diffuser pressure rise, psi

W_T = total diffuser flow, lb/hr

γ = fluid density, lb/ft^3

g_c = gravity acceleration, 32.17 ft/sec^2

A_T = jet pump throat area, ft^2

A curve fit to the test data resulted in the expression:

$$K_{calib} = C_1 + C_2M + C_3M^2 + C_4 (W_D/1.73 \times 10^6)$$

C_1, C_2, C_3, C_4 are experimental coefficients

M = mass flow ratio, $\dfrac{W_T - W_D}{W_D}$

W_D = drive flow, lb/hr

The results of calibration tests, using air, for a large number of jet pumps (including the four calibrated jet pumps installed at Peach Bottom-2 and the one tested in water) result in coefficients C_1, C_2, C_3 and C_4 for the four calibrated jet pumps installed at Peach Bottom-2, as follows:

C_1 = 0.3197 for jet pump #1 (diffuser #320)
0.3182 for jet pump #6 (diffuser #322)
0.3127 for jet pump #11 (diffuser #321)
0.3157 for jet pump #16 (diffuser #323)

C_2 = 0.016167

$C_3 = 0.010651$

$C_4 = 0.00163$

Jet pump drive flow is determined from the pressure drop across a flow nozzle. During startup, the calibration of the flow nozzle at 528°F was determined to be:

$G_T = 9.29 \sqrt{H}$

G_T = flow, thousand gallons per minute at 528°F.

H = flow nozzle pressure drop, feet of water at 68°F

Expressed in terms of flow in millions of pounds per hour and pressure drop in pounds per square inch, this becomes:

$W_D = 0.7793 \sqrt{\gamma_D \Delta P_D}$

W_D = drive flow, million pounds per hour

γ_D = fluid density, lb/ft^3

ΔP_D = pressure drop, psi

A static head elevation correction was made to both the drive flow nozzle pressure drop and the jet pump diffuser pressure rise. The pressure sensing lines are at normal operating temperature of about 528°F for part of their length and at near ambient temperature (estimated to be about 140°F) for part of their length. The following increments were added to the measured differential pressures to correct for the elevation pressure difference due to the temperature differences in the instrument lines.

+0.040 psi to drive flow ΔP_D

+0.018 psi to jet pump 1 and 6 $\Delta P_{diffuser}$

+0.058 psi to jet pump 11 and 16 ΔP diffuser

After drive flow and diffuser differential pressure were determined, an iterative procedure was used to determine mass flow ratio and total core flow.

APPENDIX F

CORRECTIONS TO PREVIOUS REPORT (EPRI NP-564)

F.1 PURPOSE OF APPENDIX F

Some re-evaluation has been made of the stability test data reported in Reference 4 in order to make the results consistent with the present report. Discrepancies and errata that have been discovered in Reference 4 are also treated in this Appendix.

F.2 CORE FLOW MEASUREMENT

Section 3.3 and Appendix E of this report describe the determination of core flow from jet pump diffuser differential pressure measurements. Plant instrumentation is calibrated during startup to accurately indicate core flow near rated conditions. Flow measurements based on that flow calibration reported in Reference 4 were obtained from the P1 edit of the plant process computer. Those values of core flow are shown in Table F-1 along with revised core flow values that include an adjustment for jet pump loss coefficient dependence on the ratio of suction to drive flow. Because of the very limited time available for connecting and calibrating instrumentation for the Cycle 2 stability tests, jet pump diffuser pressures were not recorded. The revised core flow figures in Table F-1 were obtained by applying an adjustment to the plant process computer total core flow measurement rather than by recomputing core flow from jet pump differential pressures as was done for the Cycle 3 test series 2, 3 and 4. The adjustment is, however, applied in the same manner. It is also important to note that the core total flow is not used for any system safety function. Instead the recirculation drive flow is used. This flow measurement does not need to be compensated for jet pump calibration variation with flow.

F.3 CORE DAMPING

Core damping of incipient oscillations was determined using a curve fit program to fit a ratio of polynomials to the measured transfer functions. A set of weighting factors based on coherence was used to weight data points with high coherence more heavily than those with low coherence. This caused the curve fit program to fit the data points more closely near resonance, where coherence is high, than at points further removed from resonance. The weighting procedure used for the Cycle 2 stability test reported in Reference 4 was refined during the Cycle 3 test data analysis. Table F-2 gives revised decay ratios determined for the Cycle 2 tests using the same procedure that was used for the Cycle 3 tests.

F.4 DISCREPANCIES AND ERRATA

Several discrepancies and typographical errors have been discovered in Reference 4 since its publication. Corrections are listed below, by page number. Corrected pages are attached to this Appendix.

Table F-1
TOTAL CORE FLOW
PEACH BOTTOM-2 CYCLE 2 STABILITY TESTS

Test Point	Process Computer, P1, Core Flow (Mlb/hr)	Adjusted Core Flow (Mlb/hr)
PT1	52.6	53.6
PT2	43.0	44.9
PT3	38.9	41.4
PT4	38.9	41.3

Table F-2
STABILITY OF CORE DOMINANT OSCILLATORY RESPONSE MODE
PEACH BOTTOM-2 CYCLE 2 LOW FLOW STABILITY TESTS

	Original Estimate		Revised Estimate*	
Test Number	Closed Loop Resonant Frequency Hz	Decay Ratio	Closed Loop Resonant Frequency Hz	Decay Ratio
PT1	0.441	0.121	0.449	0.259
PT2	0.471	0.121	0.449	0.303
PT3	0.437	0.344	0.430	0.331
PT4	0.402	0.296	0.391	0.271

*It is very important to note the data sampling and plant perturbation techniques were changed between tests PT1 and PT2 and tests PT3 and PT4. This resulted in a superior resonance definition for tests PT3 and PT4. Fitting this data is much easier than fitting PT1 and PT2 data where at the resonance there is considerable resonance variability. For this reason the variation in decay ratio of PT3 and PT4 is very small. In refitting PT1 and PT2 the emphasis was placed on fitting the transfer function in regions where the coherence was higher rather than fitting an average of the data points as in EPRI NP-564. In these cases the fitting results in higher decay ratio but also seems to bound the data more satisfactorily.

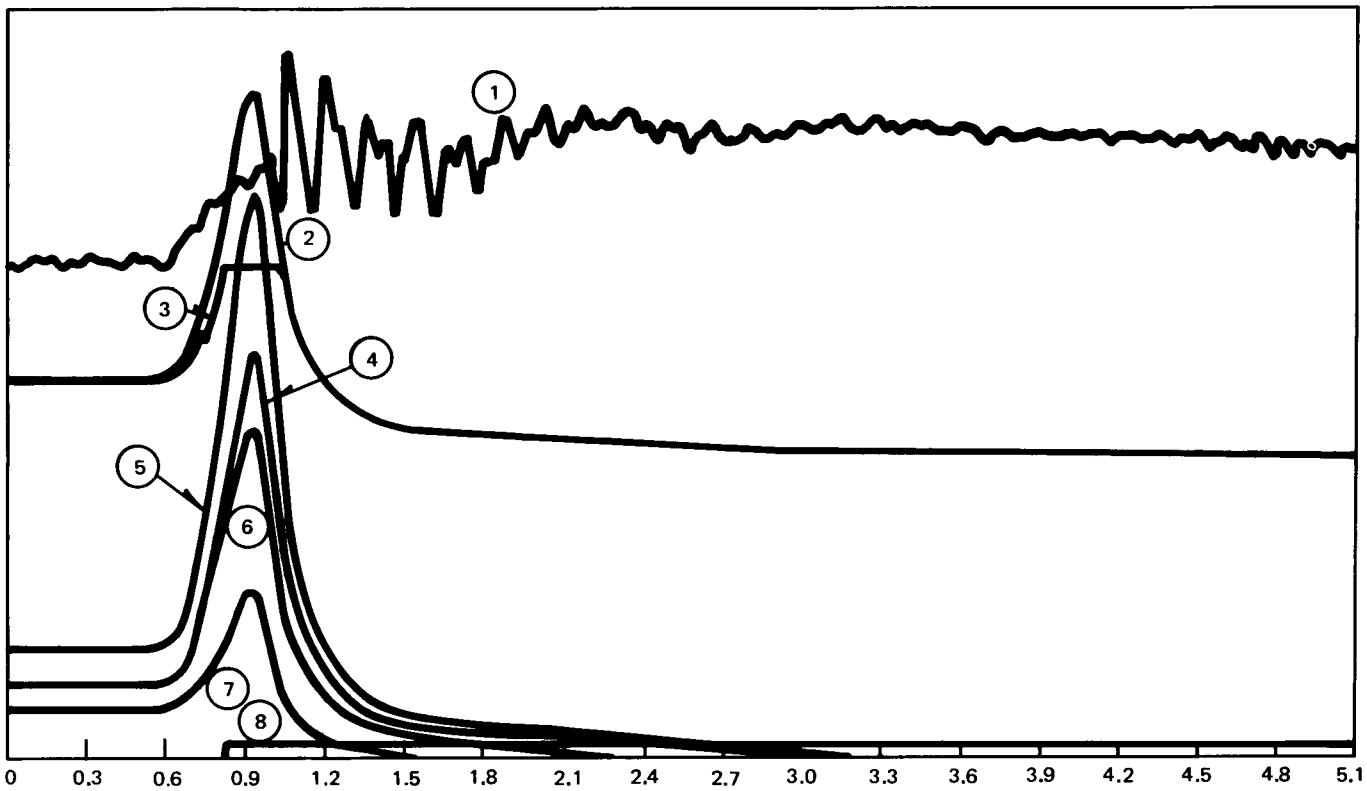
Page	Correction
6-15, 6-16, 6-17	LPRM signals at levels A, B, C and D have scales and initial values in watts/cm^2, not %.
6-19, 6-21, 6-23, D-3 through D-13	LPRM initial readings are in watts/cm^2, not %. Scales are in % of initial reading of each LPRM. The signals recorded were not the same for all tests. Table F-3 summarizes signal changes.
6-25, D-15	Figure 6-11A and Figure D-3A should be interchanged.
6-40	Figure 6-23 LPRM plot scales are 5 watts/cm^2.
B-3	The normalization constant, K, is the ratio of % rated thermal power (from heat balance) to average LPRM reading in watts/cm^2.
C-2 through C-8	Discrepancies between the failed LPRM list on the plant process computer printouts in Appendix C and Figures in the report are explained in Table F-3; see correction to Pages 6-19, 6-21, 6-23 above.
C-2 through C-8	A digit following the identification of a failed LPRM indicates a "critical" (2) or "non-critical" (1) location of the failed sensor. A 2 indicates that the failed sensor is near a region of high local power.
C-5 through C-8	Pages C-5 through C-8 should be replaced by the attached Pages C-5 through C-8.

Table F-3
LPRM SIGNAL STATUS DURING TESTS

Test	Chan.	Signal	Comments
TT1	10	L32-57A	Signal good during calibration, amplifier channel failed between calibration and test.
	48	L56-25B	Sensor failed, on list of failed signals.
	65	L32-33B	Signal good during calibration and test, amplifier failed after test TT1, sensor still good.
	70	L32-57D	Sensor, failed, on list of failed sensors.
TT2	10	—	Channel failed.
	48	L32-57A	Good signal, good sensor shifted from defective channel 10 to good channel 48.
	65	—	Channel failed.
	70	L32-33B	Signal good, good sensor shifted from defective channel 65 to good channel 70.
TT3	Same as for TT2		

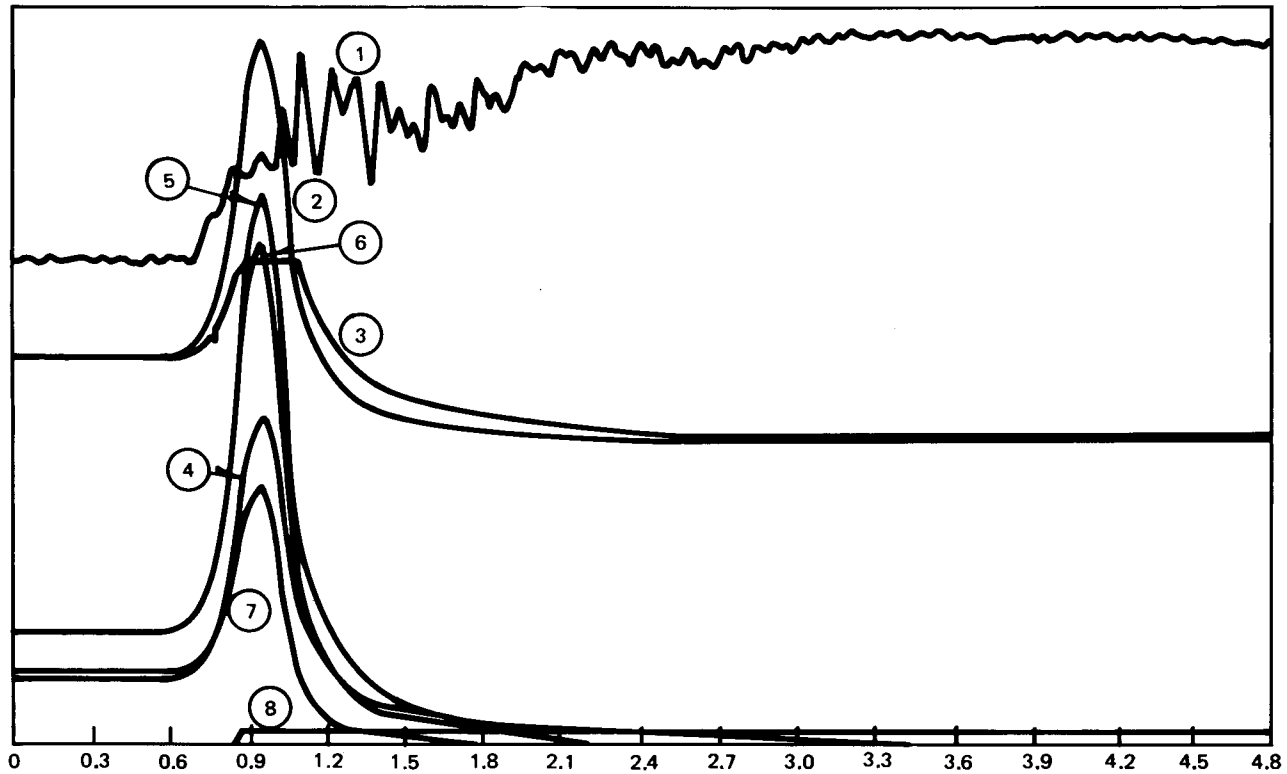
TRANSIENT CURVE SCALE FACTORS

In Figures D-1 A, B, C; D-2 A, B, C; 6-10 A, B, C, the scale is in percent of local pretrip power. Therefore, every signal starts at 100 percent. The initial LPRM readings are the average pre-trip signal values in watts per square centimeter and approximately represent the average heat flux of the four corner fuel rods in the four full bundles adjacent to the LPRM sensor. The scales are all 200 percent of local signal per division.



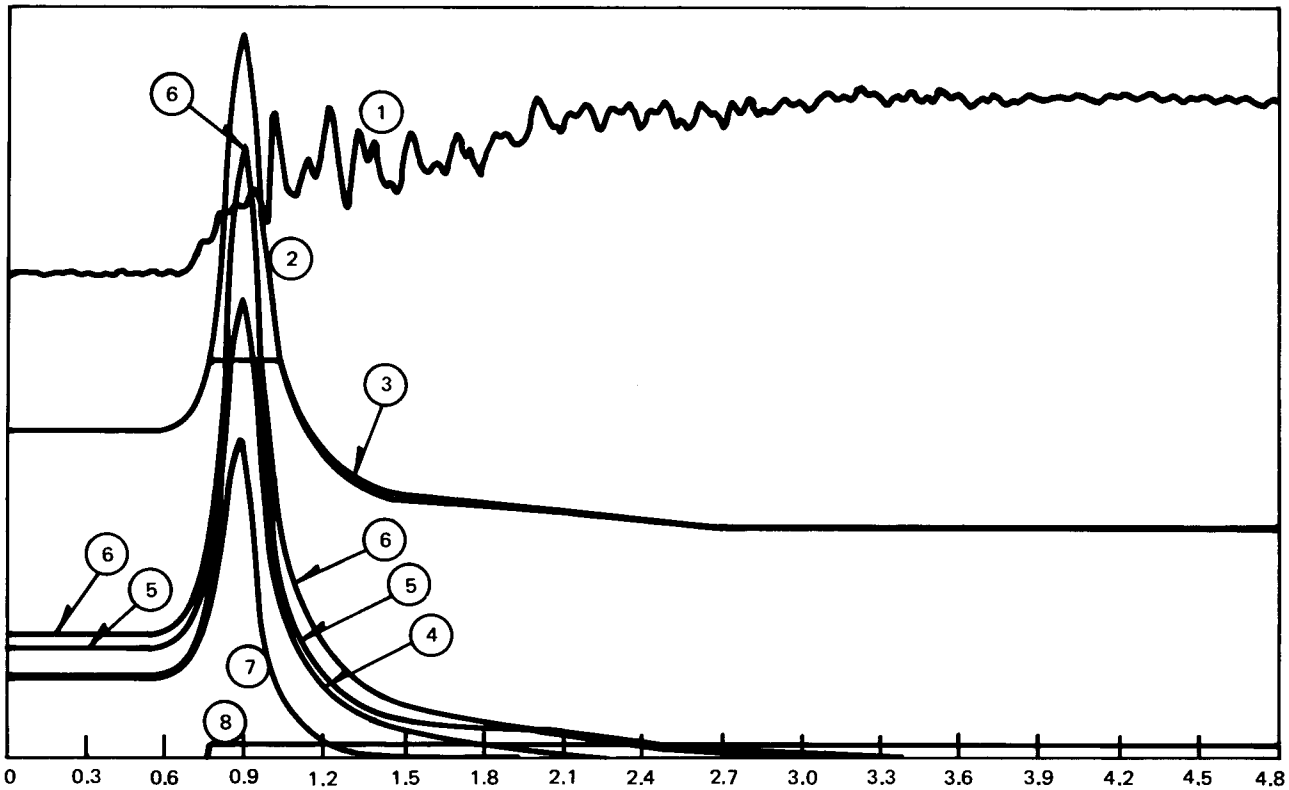
CURVE NO.	MEASURED VARIABLE	PLOT SCALE (UNITS/DIV)	INITIAL VALUE
1	CORE EXIT PRESSURE	50 psi	998.7 psia
2	CORE AVERAGE LPRM SIGNAL	50%	47.7%
3	APRM CHANNEL A	50%	48.6%
4	D LEVEL AVERAGED LPRM SIGNAL	50 W/cm^2	40.5 W/cm^2
5	C LEVEL AVERAGED LPRM SIGNAL	50 W/cm^2	74.3 W/cm^2
6	B LEVEL AVERAGED LPRM SIGNAL	50 W/cm^2	49.4 W/cm^2
7	A LEVEL AVERAGED LPRM SIGNAL	50 W/cm^2	32.3 W/cm^2
8	SCRAM RELAY	LOGIC	

Figure 6-7. Peach Bottom-2 EOC2 Test Turbine Trip TT1 Reactor Core Response



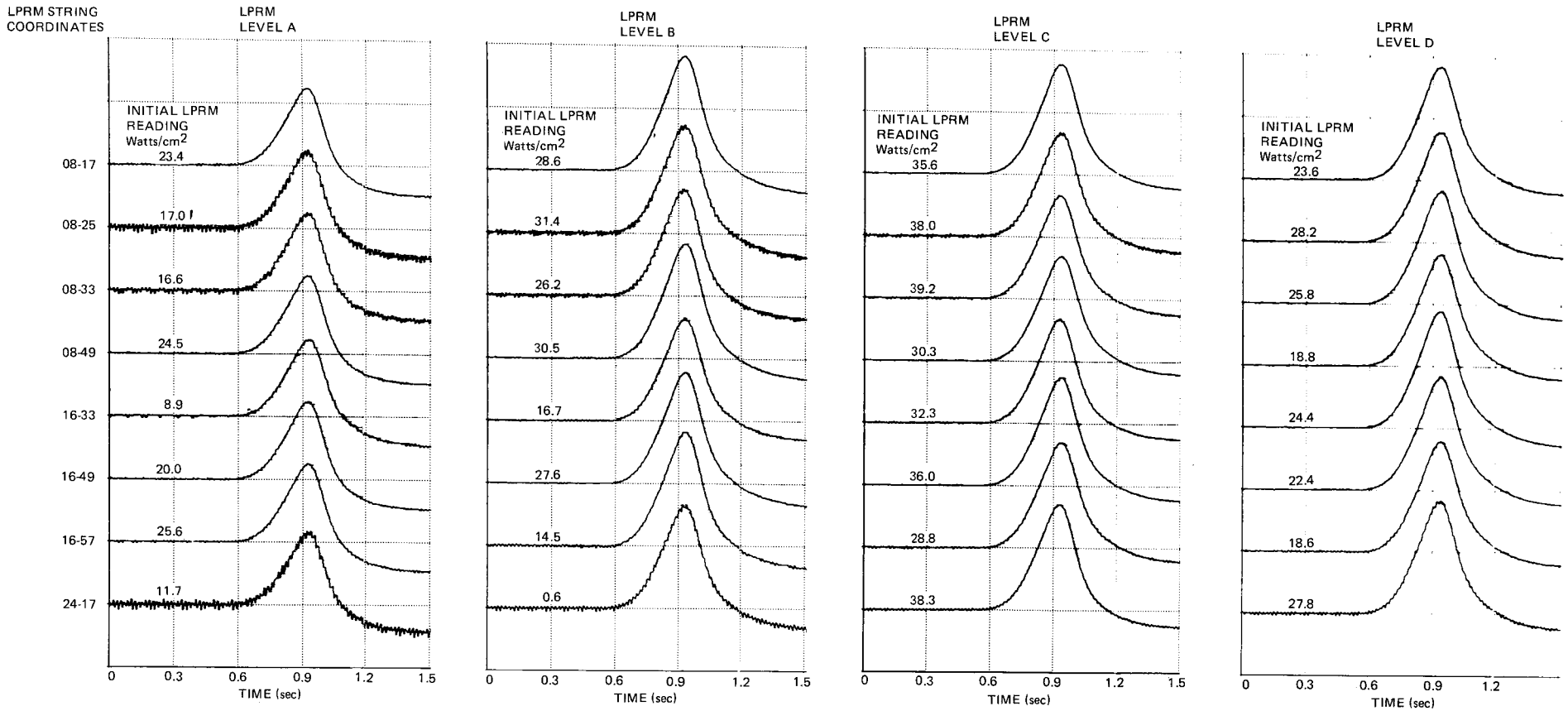
CURVE NO.	MEASURED VARIABLE	PLOT SCALE (UNITS/DIV)	INITIAL VALUE
1	CORE EXIT PRESSURE	50 psi	980.8 psia
2	CORE AVERAGE LPRM SIGNAL	50%	61.6%
3	APRM CHANNEL A	50%	62.3%
4	D LEVEL AVERAGED LPRM SIGNAL	50 W/cm^2	46.7 W/cm^2
5	C LEVEL AVERAGED LPRM SIGNAL	50 W/cm^2	77.3 W/cm^2
6	B LEVEL AVERAGED LPRM SIGNAL	50 W/cm^2	74.4 W/cm^2
7	A LEVEL AVERAGED LPRM SIGNAL	50 W/cm^2	49.1 W/cm^2
8	SCRAM RELAY	LOGIC	

Figure 6-8. Peach Bottom-2 EOC2 Test Turbine Trip Test TT2 Reactor Core Response



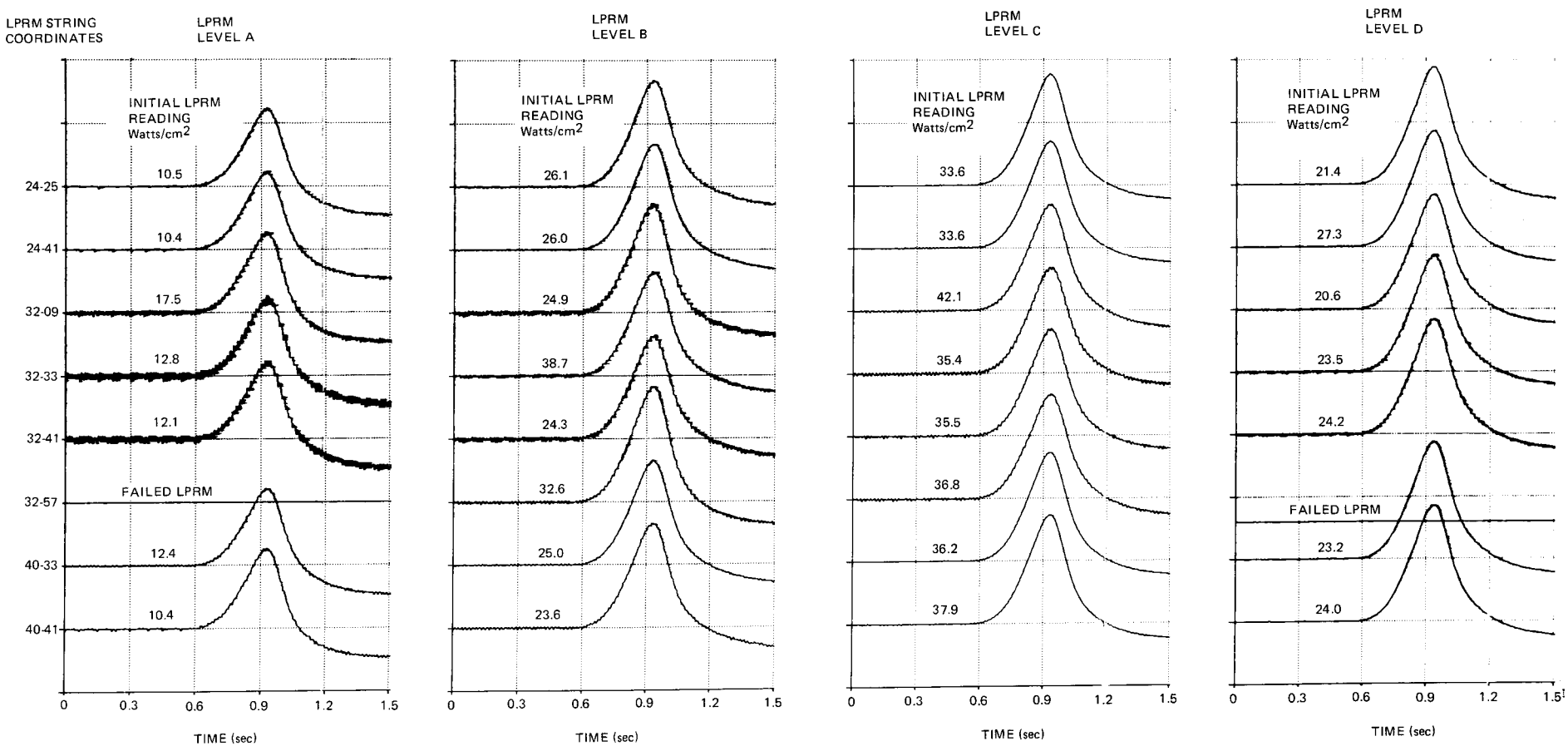
CURVE NO.	MEASURED VARIABLE	PLOT SCALE (UNITS/DIV)	INITIAL VALUE
1	CORE EXIT PRESSURE	50 psi	993.0 psia
2	CORE AVERAGE LPRM SIGNAL	50%	69.1%
3	APRM CHANNEL A	50%	68.9%
4	D LEVEL AVERAGED LPRM SIGNAL	50 W/cm^2	55.8 W/cm^2
5	C LEVEL AVERAGED LPRM SIGNAL	50 W/cm^2	74.7 W/cm^2
6	B LEVEL AVERAGED LPRM SIGNAL	50 W/cm^2	80.7 W/cm^2
7	A LEVEL AVERAGED LPRM SIGNAL	50 W/cm^2	53.0 W/cm^2
8	SCRAM RELAY	LOGIC	

Figure 6-9. Peach Bottom-2 EOC2 Test Turbine Trip Test TT3 Reactor Core Response



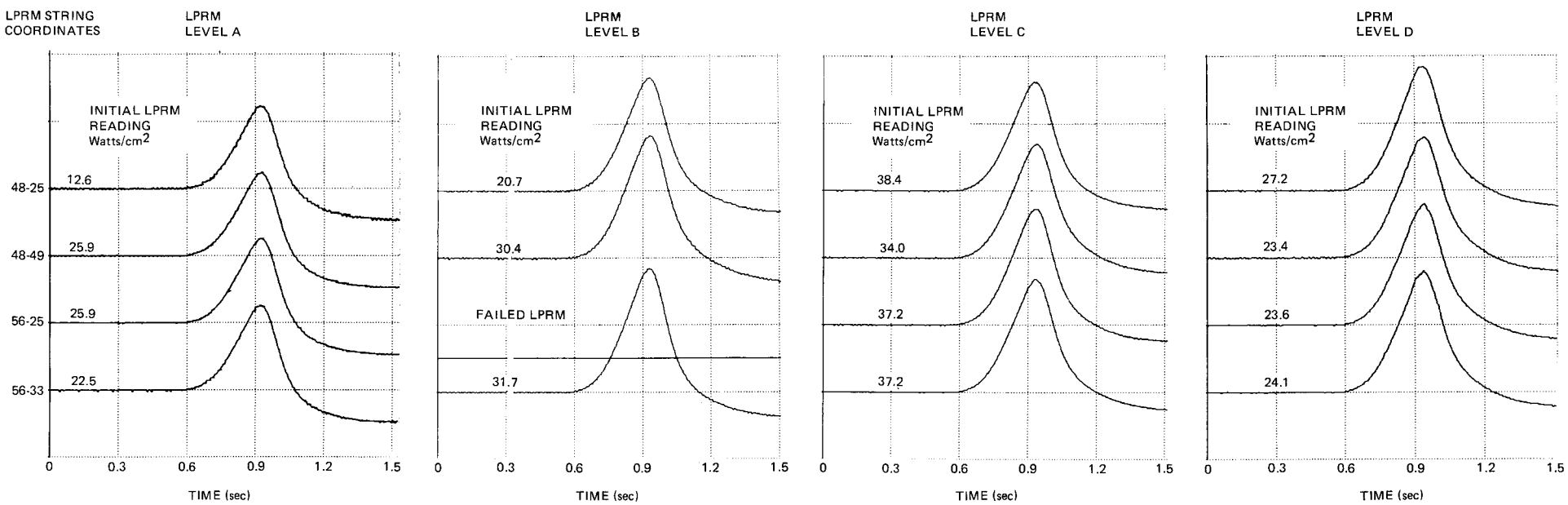
PLOT SCALE (UNITS/DIV): 200% OF INITIAL READING/DIV

Figure 6-10A. Peach Bottom-2 EOC2 Test Turbine Trip Test TT1 Core Local Power Monitor Response



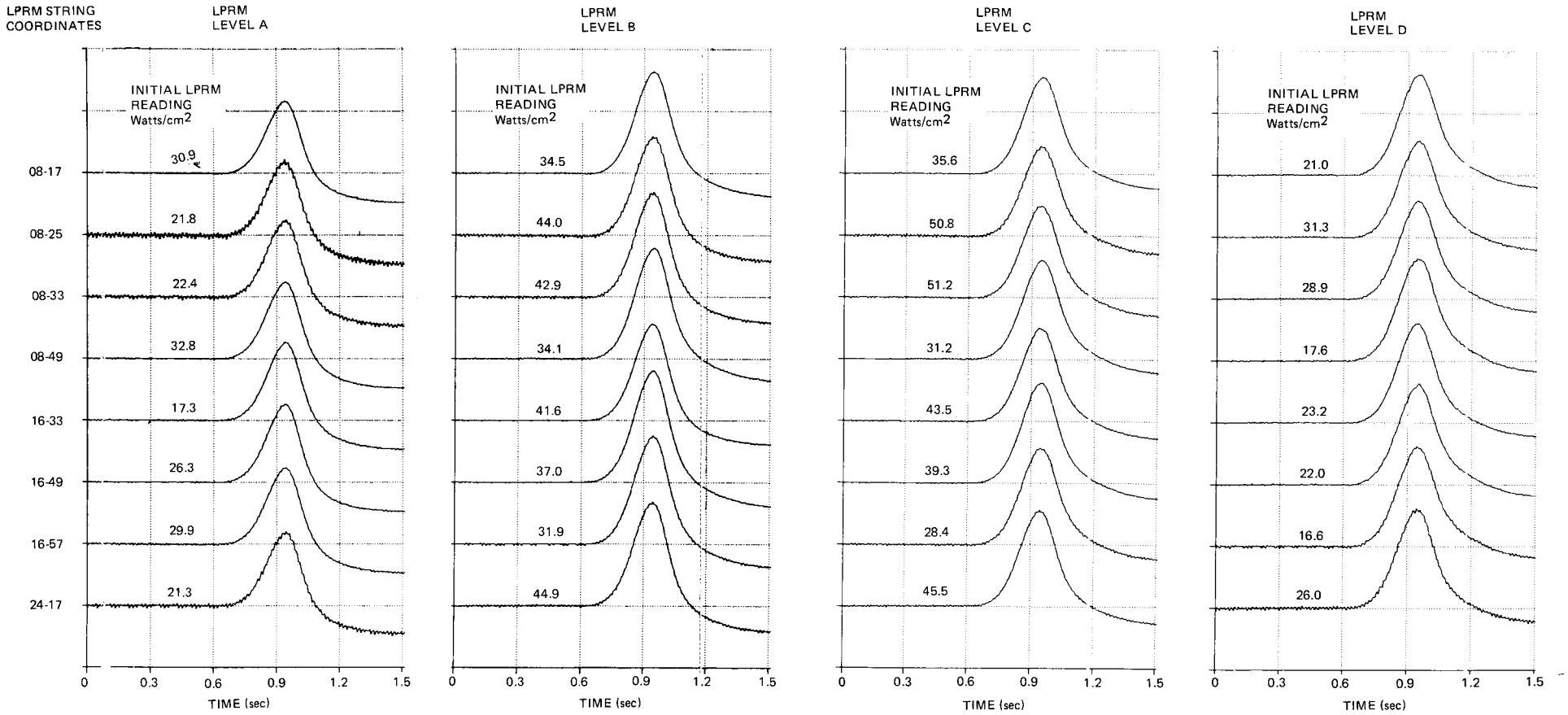
PLOT SCALE (UNITS/DIV): 200% OF INITIAL READING/DIV

Figure 6-10B. Peach Bottom-2 EOC2 Test Turbine Trip Test TT1 Core Local Power Monitor Response



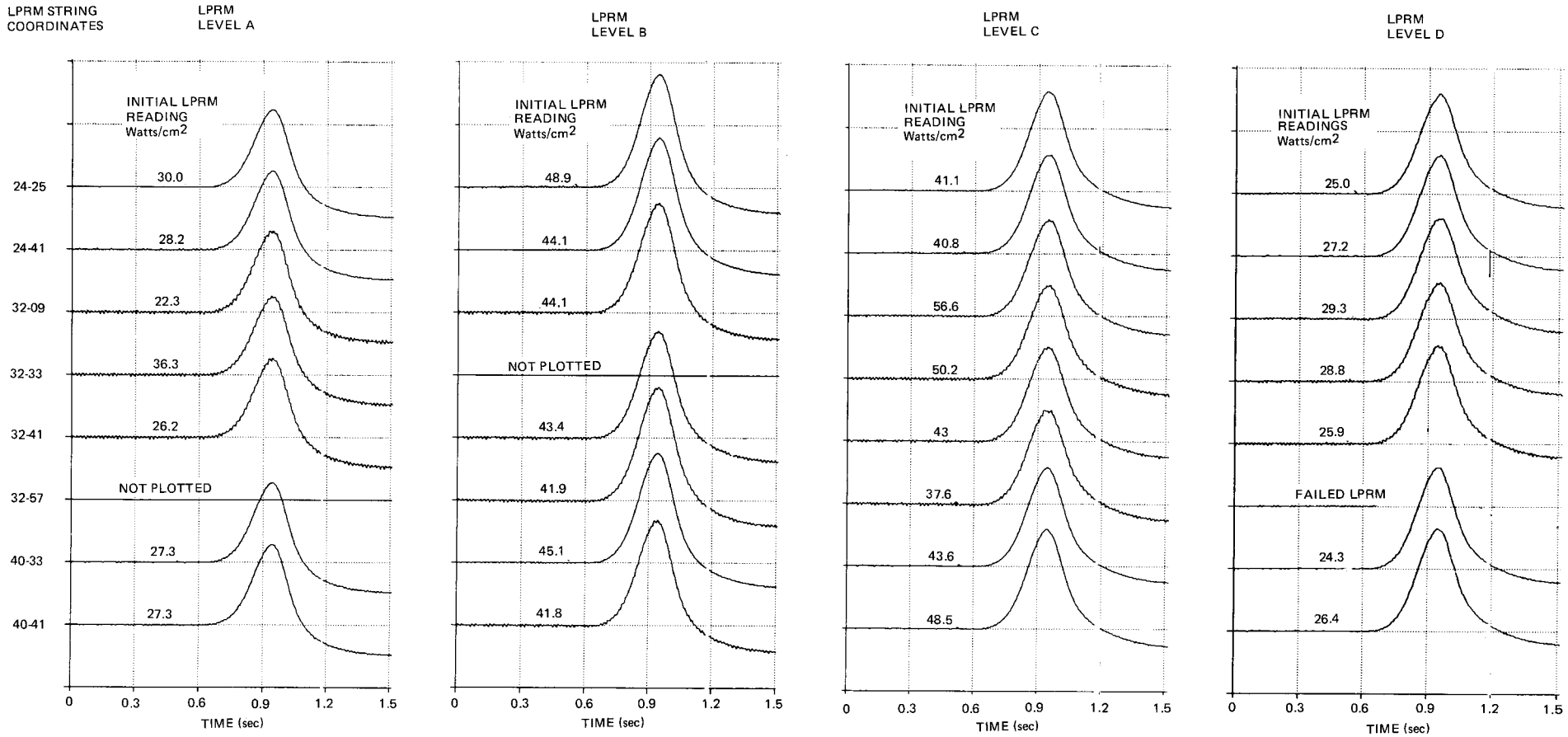
PLOT SCALE (UNITS/DIV): 200% OF INITIAL READING/DIV

Figure 6-10C. Peach Bottom-2 EOC2 Test Turbine Trip Test TT1 Core Local Power Monitor Response



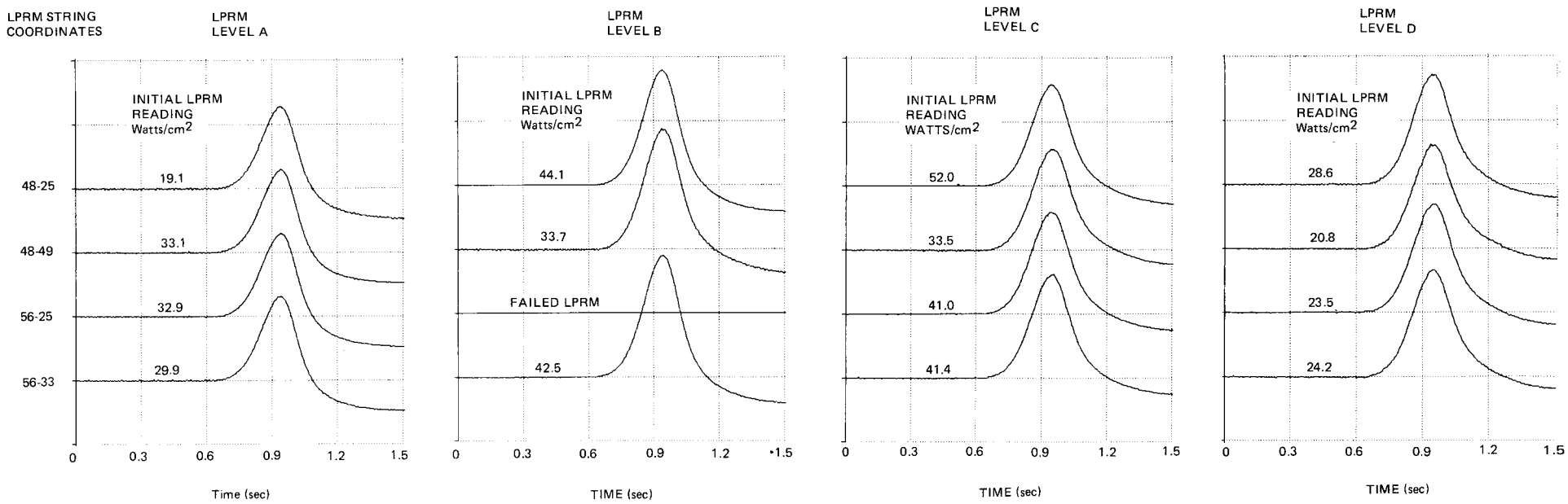
PLOT SCALE (UNITS/DIV): 200% OF INITIAL READING/DIV

Figure D-1A. Peach Bottom-2 EOC2 Test Turbine Trip Test TT2 Core Local Power Monitor Response



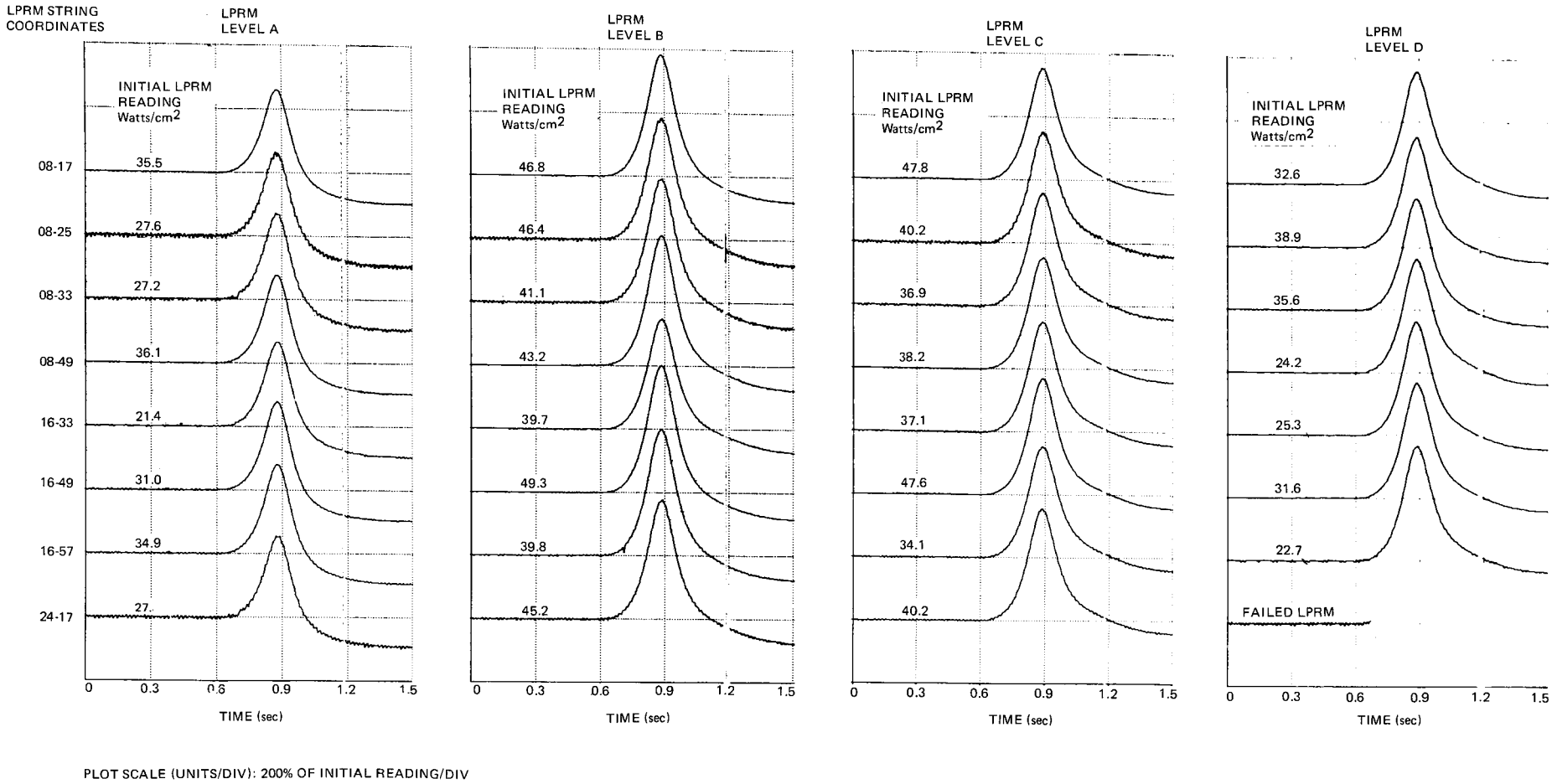
PLOT SCALE (UNITS/DIV): 200% OF INITIAL READING/DIV

Figure D-1B. Peach Bottom-2 EOC2 Test Turbine Trip Test TT2 Core Local Power Monitor Response



PLOT SCALE (UNITS/DIV): 200% OF INITIAL READING/DIV

Figure D-1C. Peach Bottom-2 EOC2 Test Turbine Trip Test TT2 Core Local Power Monitor Response



PLOT SCALE (UNITS/DIV): 200% OF INITIAL READING/DIV

Figure D-2A. Peach Bottom-2 EOC2 Test Turbine Trip Test TT3 Core Local Power Monitor Response

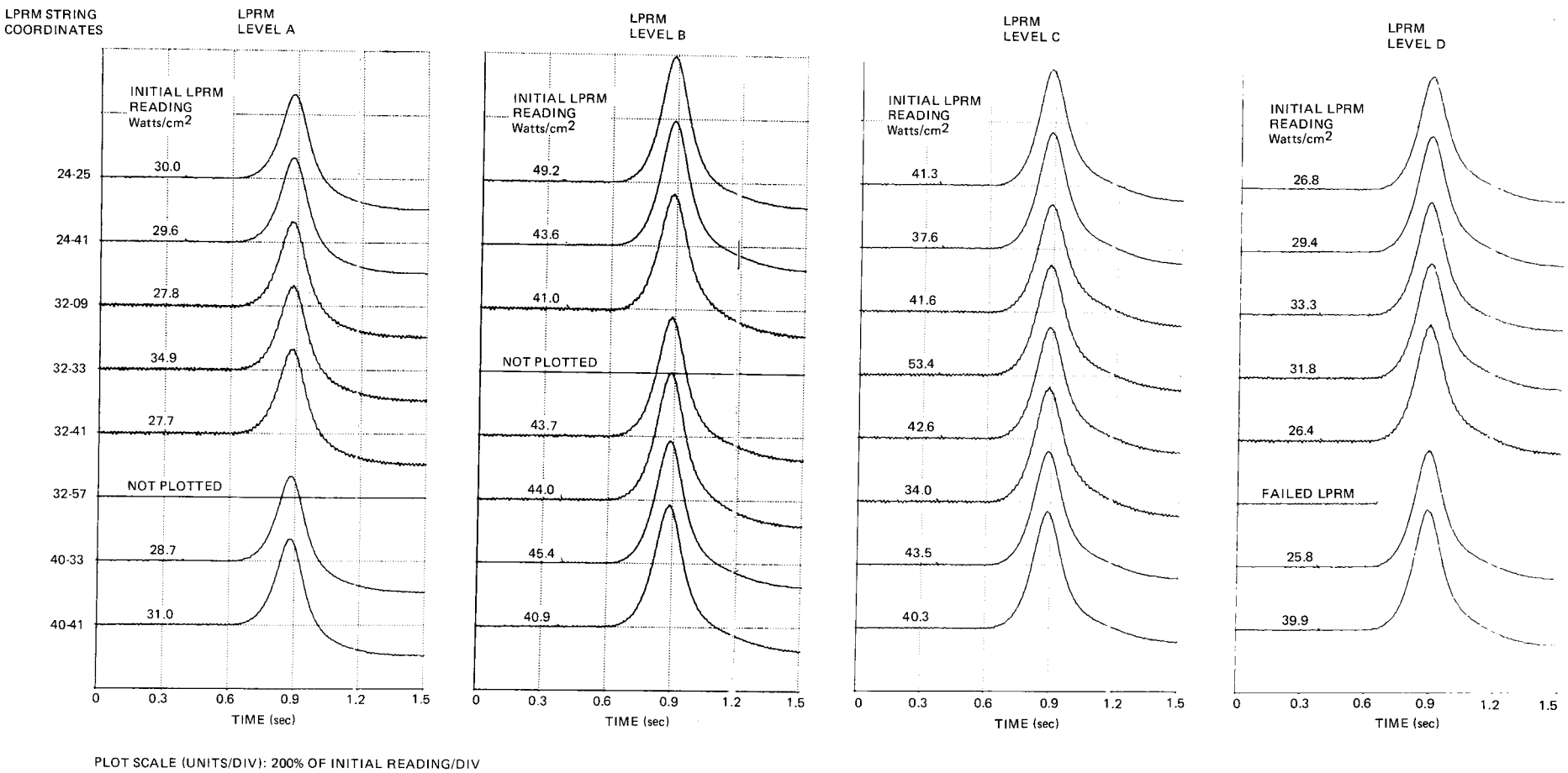
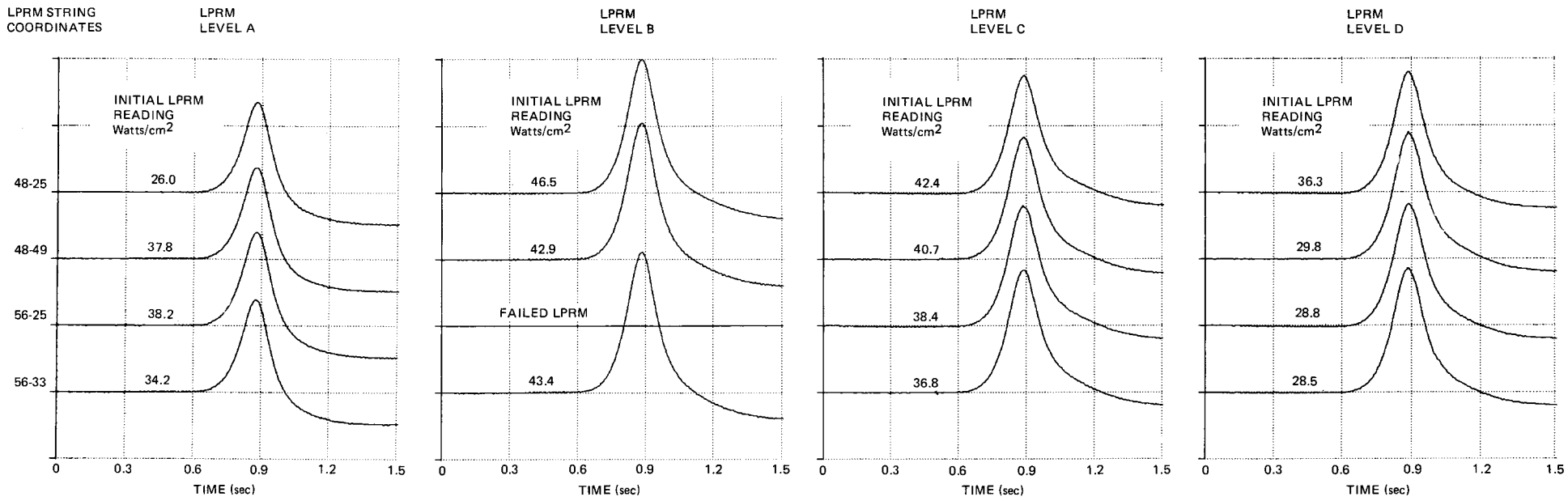


Figure D-2B. Peach Bottom-2 EOC2 Test Turbine Trip Test TT3 Core Local Power Monitor Response



PLOT SCALE (UNITS/DIV): 200% OF INITIAL READING/DIV

Figure D-2C. Peach Bottom-2 EOC2 Test Turbine Trip Test TT3 Core Local Power Monitor Response

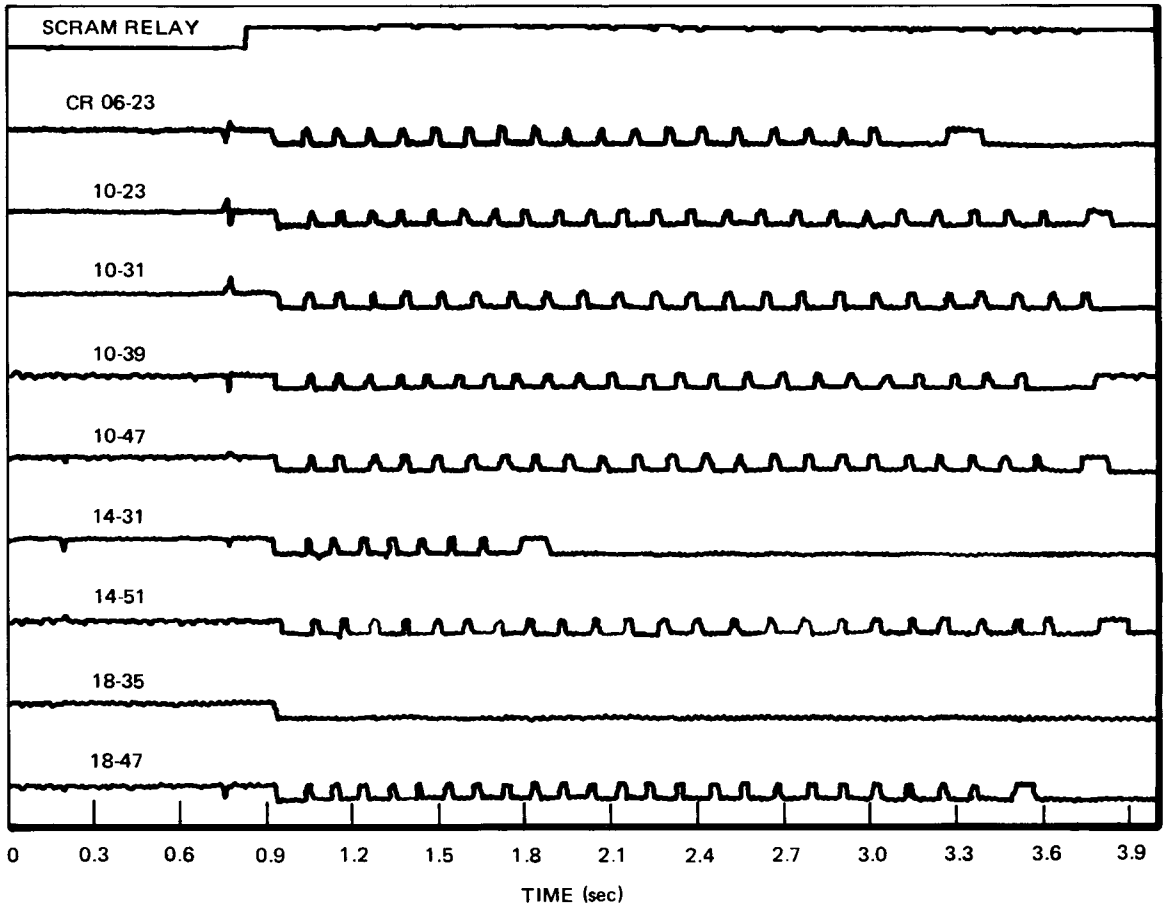


Figure 6-11A. Peach Bottom-2 EOC2 Test Turbine Trip Test TT1 Control Rod Drive Response

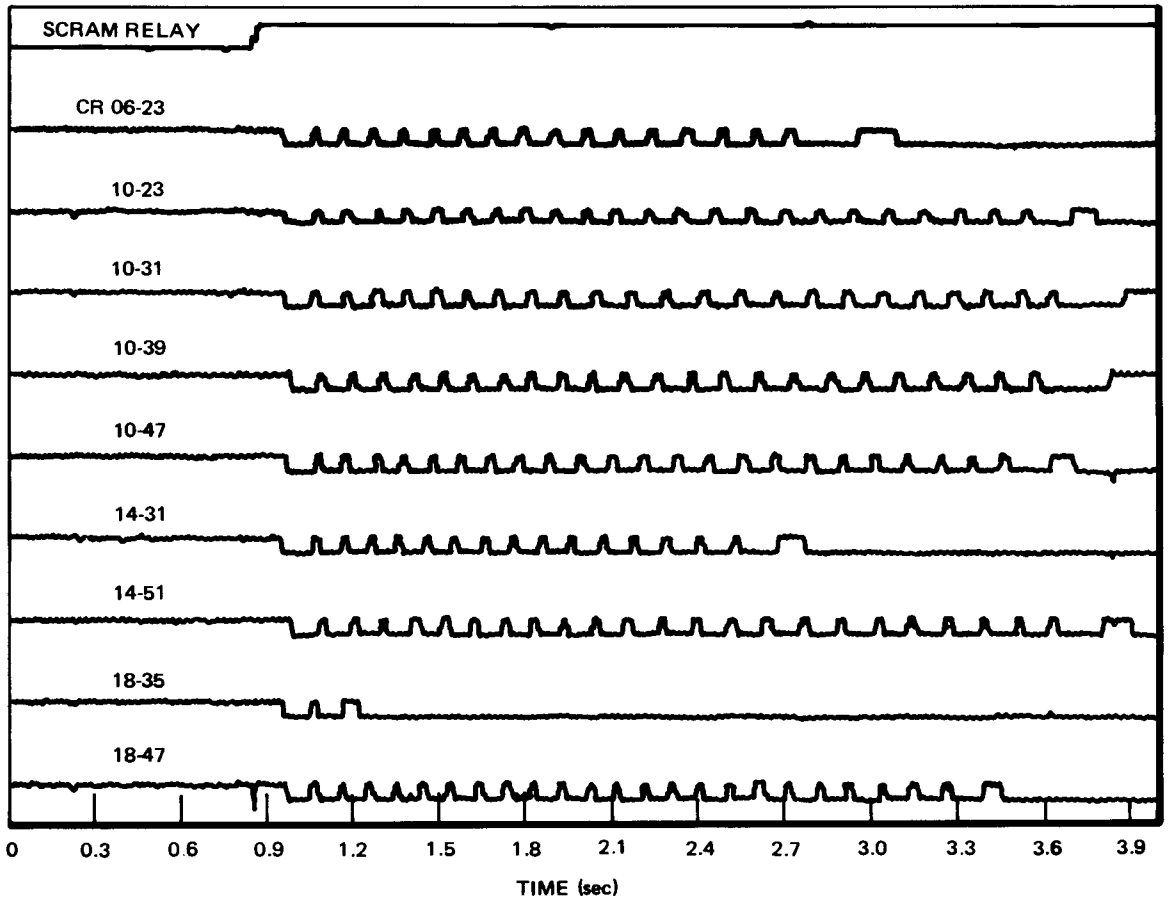
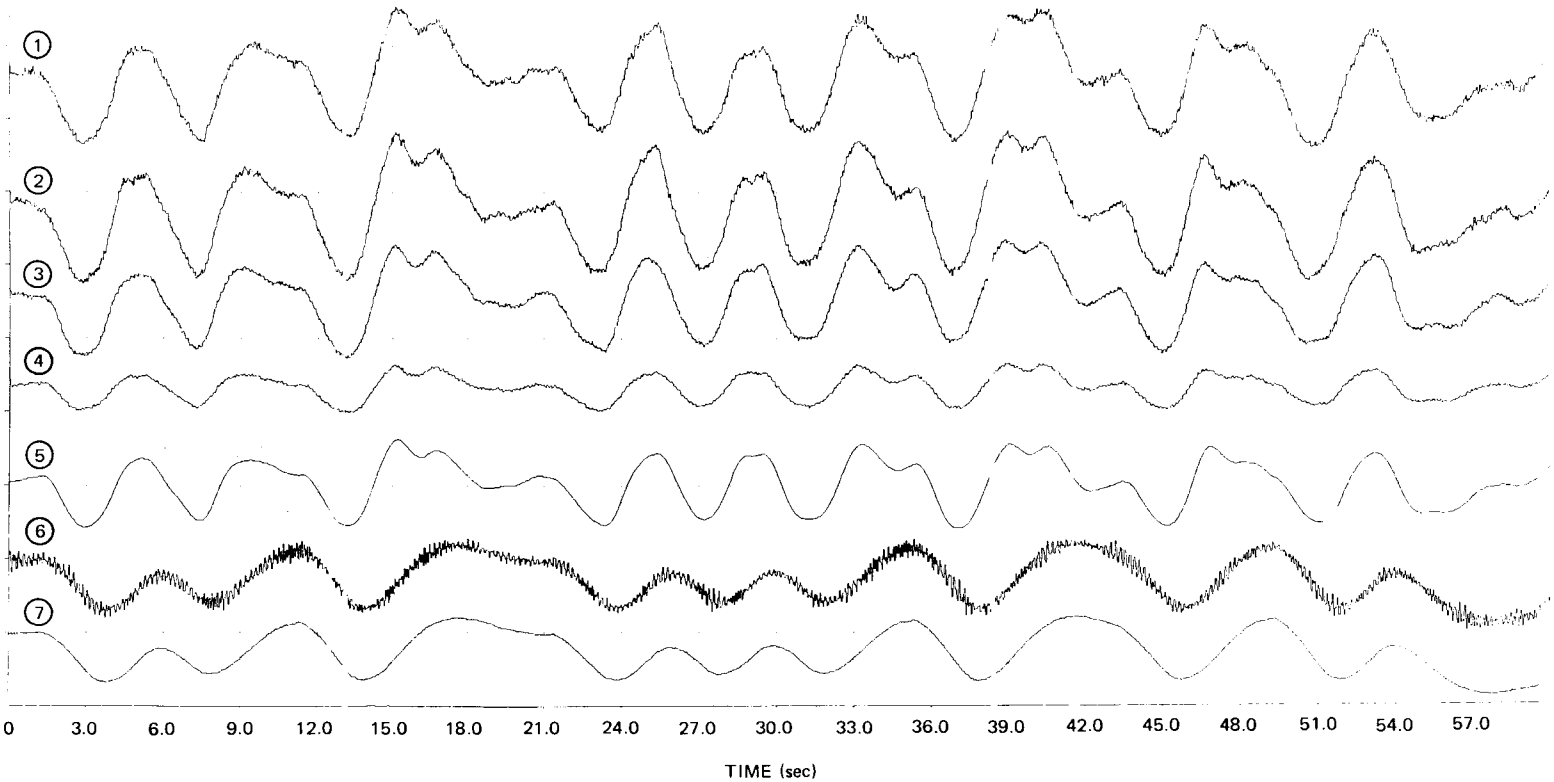


Figure D-3A. Peach Bottom-2 EOC2 Test Turbine Trip Test TT2 Control Rod Drive Response



CURVE NO.	MEASURED VARIABLE	PLOT SCALE (UNITS/DIV)	INITIAL VALUE
1	LPRM 32-41 D	5 W/cm^2	30 W/cm^2
2	LPRM 32-41 C	5 W/cm^2	40 W/cm^2
3	LPRM 32-41 B	5 W/cm^2	36 W/cm^2
4	LPRM 32-41 A	5 W/cm^2	22 W/cm^2
5	APRM CHANNEL A	10%	58%
6	REACTOR VESSEL PRESSURE	10 psi	986 psia
7	CORE EXIT PRESSURE	10 psi	997 psia

Figure 6-23. Peach Bottom-2 EOC2 Test Low-Flow Stability Test PRBS Pressure Regulator Setpoint Steps

The amplifier and readout errors were previously reviewed in Section B.1. The voltmeter used for calibration was a Fluke model 8600 A digital voltmeter. The error for a signal of magnitude 25% of FS is ±0.01% FS. The principal error in the LPRM reading is due to the plant calibration procedure. This error lumps together all the uncertainties that are associated with the plant LPRM system, exclusive of the current test instrumentation. An estimate of the uncertainty in the local relative power as calculated by diffusion theory has been made and was found to be 3.0%.[B-1] Since the test measurement system errors (items 2, 3, and 4) are negligible by comparison, the uncertainty in the LPRM measurement is 3.0% FS.

In terms of "percent of point" variations, LPRM measurements are expected to have less uncertainty than the quoted 3% FS. This is because some of the uncertainty in an absolute measurement is removed in a ratio calculation. For example, manufacturing uncertainties and uncertainties due to LPRM exposure are eliminated during the calibration based on TIP scan. The principal uncertainty in the LPRM calibration is due to the uncertainty in core thermal power, which has been estimated to be 1.76% (1σ).[B-1] The effect of power distribution shift on the electronic APRM measurement (average of 20 LPRM signals) can be estimated from the calculated normalization constant in the "Pseudo" APRM calculation for the tests.

Turbine Trip	*Normalization Constant, K
TT1	2.0049
TT2	1.8095
TT3	1.8350
	1.88 (Average)

The maximum deviation from the average is found to be +0.125 or 5.2% FS of the 0-125% electronic APRM output range. The plant electronic APRM specification quotes an overall accuracy of the averaging circuitry (including linearity and stability) of 2.4% FS, with a trip setting accuracy of 2% FS. Assuming that the power distribution and electronic errors are 2σ values, we estimate the overall statistical error in the electronic APRM measurement to be

		Error (1σ)
1.	APRM Measurement	3.2% FS
2.	APRM High Flux Trip Set Point	3.1% FS

The steady-state calculated "Pseudo" APRM signal is not subject to the power distribution uncertainty because it uses the initial process computer power determination to calculate the normalization factor, and it does make use of the plant's APRM electronics. Hence its estimated uncertainty is simply that of the process computer power determination, 1.76% of rated power (1σ).

B.1.3 Process Signal Uncertainties

The plant signal uncertainties (1σ) have been evaluated.[B-1,B-2] The uncertainties for various signals are given in Table B-5. The dominant factor in the core flow uncertainty is the uncertainty of the calibration constant K_{calib}, of the four diffuser double-tapped jet pumps. The uncertainty in K_{calib} was determined to be 3%, which leads to individual jet pump flow uncertainties of 1.5%.

***Kx (LPRM average power, watts/cm^2) = % Thermal power.**

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12
AXIAL REL PWR	0.59	0.80	0.90	1.02	1.12	1.16	1.14	1.13	1.14	1.17	1.10	0.74
REGION REL PWR	1.04	0.98	1.04	0.98	0.88	0.98	1.04	0.98	1.04			
RING REL PWR	0.85	0.84	0.92	0.88	1.04	1.09	1.16	0.88				
APRM GAF	1.02	1.00	1.00	0.99	0.95	0.99						

FAILED LPRM LIST	1609,D,1	4809,C,2	3217,C,3	4817,C,2	5617,B,2	5617,D,1	3225,B,3
4025,D,1	4825,B,2	5625,B,2	2433,C,3	4833,C,2	0841,A,1	0841,D,1	5641,C,2
5641,D,2	3257,D,1	4057,B,2					

BASE CRIT CODE	1609,B	2409,B	3209,B	4009,B	4809,B	0817,B	1617,A
2417,A	3217,A	4017,A	4817,B	5617,B	0825,B	1625,A	2425,A
3225,A	4025,A	4825,B	5625,B	0833,A	1633,A	2433,B	3233,B
4033,B	4833,B	5633,B	0841,B	1641,A	2441,A	3241,A	4041,A

FAILED SENSORS 5 6 15 17 25 26

REGION	1	2	3	4	5	6	7	8	9
MCHFR	6.50	6.98	6.62	7.06	8.23	7.03	6.53	7.00	6.51
LOC	17-14-22	25-14-21	47-18-22	13-36-21	23-30-8	47-26-21	21-52-21	35-48-21	51-40-21
FLOW	0.0454	0.0463	0.0455	0.0464	0.0516	0.0464	0.0460	0.0463	0.0460
PKFL	1.69	1.80	1.68	1.78	1.71	1.79	1.83	1.79	1.83
MFLPD	0.357	0.373	0.360	0.372	0.339	0.370	0.361	0.374	0.361
LOC	9-18-72	35-10-19	43-10-12	9-26-19	25-30-8	51-36-19	17-52-12	25-52-19	51-44-12
PKFL	2.01	2.10	2.03	2.09	1.90	2.08	2.03	2.10	2.03
MAXEQ	0.236	0.235	0.233	0.235	0.184	0.235	0.235	0.235	0.234
LOC	17-14	25-6	47-18	5-36	25-30	55-26	13-44	35-56	43-48
FLOW	0.0454	0.0454	0.0455	0.0454	0.0470	0.0454	0.0454	0.0454	0.0455
PKF	1.36	1.36	1.35	1.35	1.15	1.35	1.35	1.35	1.35

59					48	48	48	48	48	48	48			
55				48	48	36	48	36	48	36	48	48		
51			48	48	32	48	14	48	14	48	32	48	48	
47	48	48	48	40	48	40	48	42	48	40	48	40	48	
43	48	48	32	48	10	48	8	48	8	48	10	48	32	48	48
39	48	36	48	40	48	48	48	48	48	48	48	40	48	48	48
35	48	48	14	48	8	48	6	48	6	48	8	48	14	36	48
31	48	36	48	42	48	48	48	48	48	48	48	42	48	48	48
27	48	48	14	48	8	48	6	48	6	48	8	48	14	36	48
23	48	36	48	40	48	48	48	48	48	48	48	40	48	48	48
19	48	48	32	48	10	48	8	48	8	48	10	48	32	36	48
15		48	48	40	48	40	48	42	48	40	48	40	48	48	
11			48	48	32	48	14	48	14	48	32	48	48	48	
07				48	48	36	48	36	48	36	48	48			
03					48	48	48	48	48	48	48				
	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58

OPERATOR	NON SYM
SUBS VAL	ROD LOC
CR LOC	FIRST QUAD

DATE	4-16-77	PERIODIC LOG	
TIME	0328	PEACHBOTTOM UNIT 2	
SEQ NO.	17		
CMWT	1434.	PR	996.
GMWE	427.7	DPC-M	2.58
CMCHFR	6.50	DPC-C	6.72
CMFLPD	0.374	RWL	22.54
CMPF	2.102	DHS	34.73
CMEQ	0.236	WFW	5.33
CAEQ	0.140	WD	12.27
CAQA	0.069	WTSUB	−100
CAVF	0.300	WTHB	−100
CAPD	22.10	WT	38.94
CRD	0.147	WTFLAG	5.
CRSYM	1.	ITER	1.
		IREC	0.
		IEQL	0.

CALIBRATED LPRM READINGS

57		15	18	13	20		
		22	25	23	29		
		24	29	27	32		
		23	26	26	27		
49	16	22	24	30	22	21	
	25	30	27	26	29	26	
	28	32	28	25	34	29	
	25	20	18	16	20	26	
41	16	24	26	26	25	26	14
	33	26	23	23	24	32	22
	36	29	23	21	25	33	32
	21	17	18	18	20	18	25
33	27	24	22	24	26	25	20
	26	23	30	21	24	29	25
	28	26	20	20	23	26	29
	18	15	18	19	18	16	24
25	28	25	22	24	17	26	20
	28	26	22	22	23	29	27
	30	26	21	36	24	37	30
	17	16	18	20	19	18	28
17	22	25	26	27	26	26	10
	30	31	25	32	27	28	21
	32	34	28	25	29	36	22
	24	19	18	18	17	22	24
09D		13	24	27	26	18	
C		27	26	28	33	22	
B		31	30	29	34	29	
A		24	19	18	18	26	
	08	16	24	32	40	48	56

Figure C-4. Peach Bottom-2 EOC2 Test Low-Flow Stability Test (PT4) Process Computer P1 Edit

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12
AXIAL REL PWR	0.47	0.69	0.81	0.91	1.03	1.20	1.20	1.40	1.39	1.28	1.00	0.52
REGION REL PWR	1.04	0.98	1.04	0.98	0.90	0.98	1.04	0.98	1.04			
RING REL PWR	0.97	0.85	0.95	0.83	0.86	0.04	1.22	1.05				
APRM GAF	0.98	1.00	0.99	1.00	0.99	0.98						

FAILED LPRM LIST						
	1609,D,1	4809,C,1	3217,C,1	4817,C,1	5617,B,2	5617,D,1	3225,B,1
4025 D,1	4825,B,1	5625,B,2	2433,C,1	4833,C,1	0841,A,1	0841,D,1	5641,C,2
5641,D,1	3257,D,1	4057,B.2					

BASE CRIT CODE

FAILED SENSORS 5 6 10 15 17 21 25 28

053114 VALP T055 99.4

REGION	1	2	3	4	5	6	7	8	9
MCHFR	5.48	5.86	5.49	5.89	7.37	5.89	5.49	5.87	5.50
LOC	21-6-16	25-6-16	55-22-16	5-36-16	23-30-16	55-26-16	5-40-16	35-56-16	39-56-16
FLOW	0.1129	0.1143	0.1129	0.1143	0.1299	0.1143	0.1130	0.1143	0.1130
PKFL	2.48	2.37	2.47	2.36	1.76	2.36	2.47	2.37	2.47
MFLPD	0.483	0.459	0.482	0.457	0.364	0.457	0.481	0.459	0.481
LOC	21-6-12	25-6-16	55-22-12	5-36-16	35-32-16	55-26-16	5-40-12	35-56-16	39-56-12
PKFL	2.49	2.37	2.49	2.36	1.88	2.36	2.48	2.37	2.48
MAXEQ	0.132	0.131	0.132	0.130	0.077	0.131	0.132	0.130	0.132
LOC	21-6	23-2	55-22	1-38	25-30	59-24	5-40	37-60	39-56
FLOW	0.1129	0.0693	0.1129	0.0693	0.1217	0.0693	0.1130	0.0603	0.1130
PKF	1.64	1.00	1.64	0.99	1.13	1.00	1.64	0.99	1.63

59					48	48	48	48	48	48	48				
55				48	48	38	48	28	48	38	48	48			
51			48	48	0	48	0	48	0	48	0	48	48		
47		48	48	40	48	20	48	16	48	20	48	40	48	48	
43	48	48	0	48	0	48	0	48	0	48	0	48	0	48	48
39	48	38	48	20	48	40	48	48	48	40	48	20	48	38	48
35	48	48	0	48	0	48	0	48	0	48	0	48	0	48	48
31	48	28	48	16	48	48	48	40	48	48	48	16	48	28	48
27	48	48	0	48	0	48	0	48	0	48	0	48	0	48	48
23	48	38	48	20	48	40	48	48	48	40	48	20	48	38	48
19	48	48	0	48	0	48	0	48	0	48	0	48	0	48	48
15		48	48	40	48	20	48	16	48	20	48	40	48	48	
11			48	48	0	48	0	48	0	48	0	48	48		
07				48	48	38	48	28	48	38	48	48			
03					48	48	48	48	48	48	48				
	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58

DATE	4-9-77	PERIODIC LOG	
TIME	0527	PEACHBOTTOM UNIT 2	
CMWT	1562.	PR	994.
GMWE	471.4	DPC-M	2.72
CMCHFR	5.48	DPC-C	20.44
CMFLPD	0.483	RWL	23.62
CMPF	2.401	DHS	13.31
CMEQ	0.132	WFW	5.86
CAEQ	0.060	WD	43.57
CAQA	0.075	WTSUB	−1.00
CAVF	0.235	WTHB	−1.00
CAPD	24.07	WT	101.30
CRD	0.239	WTFLAG	5.
CRSYM	1.	ITER	1.
		IREC	0.
		IFQL	0.

CALIBRATED LPRM READINGS

57		19	21	22	25	
		30	38	38	42	
		29	40	35	43	
		26	32	30	32	
49	19	23	25	32	24	25
	33	36	40	36	37	34
	31	29	23	20	24	32
	27	20	13	11	16	28
41	25	25	26	25	24	27	24
	39	39	38	37	38	39	37
	34	23	27	25	25	22	38
	23	12	11	12	11	14	27
33	27	26	22	23	24	26	24
	40	32	32	35	36	32	38
	29	18	28	30	25	18	32
	16	9	14	14	12	10	25
25	28	25	22	23	22	27	24
	38	39	36	36	36	40	41
	32	20	27	30	25	23	38
	17	10	12	15	11	13	28
17	24	25	27	29	25	27	17
	34	40	40	34	38	37	27
	30	30	22	20	21	30	26
	25	16	11	11	11	20	25
09D		19	24	27	27	22	
C		32	37	42	37	34	
B		32	33	28	33	31	
A		27	20	17	18	27	
	08	16	24	32	40	48	56

Figure C-5. Peach Bottom-2 EOC2 Test Turbine Trip Transient (TT1) Process Computer P1 Edit

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12
AXIAL REL PWR	0.55	0.74	0.83	1.01	1.21	1.39	1.40	1.34	1.19	1.05	0.82	0.47
REGION REL PWR	0.92	1.03	0.92	1.04	1.23	1.03	0.92	1.03	0.92			
RING REL PWR	1.32	1.26	1.16	0.96	1.07	1.02	1.04	0.84				
APRM GAF	0.99	0.99	0.99	0.98	1.00	1.00						

FAILED LRPM LIST 1609, D, 1 4809, C, 1 3217, C, 1 4817, C, 2 5617, B, 1 5617, D, 1 3225, B, 2
4025, D, 1 4825, B, 2 5625, B, 2 2433, C, 2 4833, C, 2 0841, A, 1 0841, D, 1 5641, C, 2
5641, D, 1 3257, D, 1 4057, B, 2

BASE CRIT CODE

FAILED SENSORS 5 15 17 25 28

DATE	4-23-77	PERIODIC LOG	
TIME	2002	PEACHBOTTOM	
SEQ No.	25	UNIT 2	
CMWT	2045.	PR	1008.
GMWE	630.3	DPC-M	12.34
CMCHFR	4.48	DPC-C	16.71
CMFLPD	0.611	RWL	23.61
CMPF	2.408	DHS	20.78
CMEQ	0.184	WFW	7.86
CAEQ	0.096	WD	36.67
CAQA	0.098	WTSUB	−1.00
CAVF	0.301	WTHB	−1.00
CAPD	31.52	WT	84.00
CRD	0.159	WTFLAG	5.
CRSYM	1.	ITER	1.
		IREC	0.
		IEQL	0.

REGION	1	2	3	4	5	6	7	8	9
MCHFR	4.82	4.61	4.85	4.61	4.48	4.62	4.83	4.60	4.86
LOC	17-18-12	27-10-13	45-22-11	11-36-13	27-34-11	51-28-13	17-44-12	29-52-16	43-44-12
FLOW	0.1014	0.1098	0.1086	0.1103	0.1062	0.1101	0.1014	0.0971	0.1016
PKFL	2.30	2.14	2.03	2.14	2.20	2.13	2.30	2.21	2.28
MFLPD	0.584	0.609	0.580	0.607	0.601	0.601	0.583	0.611	0.579
LOC	17-18-12	35-10-13	43-18-12	9-26-13	35-32-11	51-36-13	17-44-12	25-52-13	43-44-12
PKFL	2.30	2.40	2.28	2.39	2.37	2.37	2.30	2.41	2.28
MAXEQ	0.154	0.163	0.154	0.163	0.184	0.163	0.152	0.163	0.154
LOC	21-22	25- 6	39-22	5-36	25-30	55-26	21-40	35-56	39-40
FLOW	0.0959	0.0948	0.0595	0.0948	0.0923	0.0948	0.0962	0.0948	0.0959
PKF	1.29	1.34	1.29	1.34	1.44	1.34	1.28	1.34	1.29

CALIBRATED LPRM READINGS (W/cm^2)

57		17	21	23	23		
		29	41	39	42		
		31	45	44	47		
		29	34	35	33		
49	17	22	26	34	23	22	
	32	39	52	56	42	34	
	35	38	47	44	42	35	
	33	26	20	17	22	34	
41	26	26	27	27	27	27	24
	44	49	45	44	49	45	41
	44	47	47	46	45	43	44
	24	22	29	28	29	20	32
33	30	25	26	29	25	28	24
	54	42	46	51	45	52	43
	48	43	54	60	49	44	44
	22	18	34	37	29	17	31
25	31	25	25	27	25	29	24
	52	46	46	48	42	54	43
	47	46	52	58	43	49	45
	22	20	32	36	29	19	34
17	22	27	27	28	28	26	17
	36	51	45	44	50	43	28
	35	45	48	46	43	41	30
	31	23	21	20	20	27	29
09D		20	27	30	27	20	
C		31	47	55	42	34	
B		33	44	48	30	34	
A		31	23	22	22	32	

59					48	48	48	48	48	48	48			
55				48	48	34	48	36	48	34	48	48		
51			48	48	0	48	26	48	26	48	0	48	48	
47		48	48	40	48	36	48	32	48	36	48	40	48	48
43	48	48	0	48	26	48	4	48	4	48	26	48	0	48	48
39	48	34	48	36	48	48	48	48	48	48	48	36	48	34	48
35	48	48	26	48	4	48	32	48	32	48	4	48	26	48	48
31	48	36	48	32	48	48	48	48	48	48	48	32	48	36	48
27	48	48	26	48	4	48	32	48	32	48	4	48	26	48	48
23	48	34	48	36	48	48	48	48	48	48	48	36	48	34	48
19	48	48	0	48	26	48	4	48	4	48	26	48	0	48	48
15		48	48	40	48	36	48	32	48	36	48	40	48	48
11			48	48	0	48	26	48	26	48	0	48	48	
07				48	48	34	48	36	48	34	48	48		
03					48	48	48	48	48	48	48			
	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58

OPERATOR	NON SYM
SUBS VAL	ROD LOC
CR LOC	FIRST QUAD

Figure C-6. Peach Bottom-2 EOC-2 Test Turbine Trip Transient Test (TT2) Process Computer P1 Edit

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12
AXIAL REL PWR	0.56	0.80	0.97	1.11	1.19	1.23	1.19	1.19	1.14	1.14	0.95	0.55
REGION REL PWR	1.06	0.93	1.00	0.93	1.12	0.93	1.05	0.93	1.05			
RING REL PWR	1.13	1.14	1.05	0.85	0.98	1.03	1.15	0.93				
APRM GAF	1.01	1.01	0.99	1.02	0.98	0.97						

FAILED LPRM LIST 1883, D, 1 4809, C, 2 3217, C, 1 4817, C, 2 5817, B, 2 5617, D, 2 3225, B,2
4025, D, 1 4825, B, 2 5625, B, 2 2433, C, 2 4833, C, 2 0841, A, 2 0841, D, 1 5641, C, 2
5641, D, 2 3257, D, 1 4057, B, 2

BASE CRIT CODE

FAILED SENSORS 5 6 15 17 21 25

DATE	4-27-77	PERIODIC LOG	
TIME	2253	PEACHBOTTOM	
SEQ No.	18	UNIT 2	
CMWT	2275.	PR	993.
GMWE	723.3	DPC-1	17.80
CMCHFR	4.27	DPC-C	22.05
CMFLPD	0.590	RWL	29.08
CMPF	2.091	DHS	17.94
CMEQ	0.168	WFW	8.86
CAEQ	0.098	WD	45.08
CAQA	0.109	WTSUB	−1.00
CAVF	0.309	WTHB	−1.00
CAPD	35.05	WT	101.90
CRD	0.143	WTFLAG	5.
CRSYM	1.	ITER	2.
		IREC	0.
		IEQL	0.

REGION	1	2	3	4	5	6	7	8	9
MCHFR	4.30	5.12	4.28	5.10	4.53	5.10	4.32	5.12	4.27
LOC	21-18-19	25- 6-19	51-22-19	5-38-19	27-34-12	55-24-19	3-40-19	35-40-19	30-52-19
FLOW	0.1144	0.1162	0.1142	0.1284	0.1311	0.1234	0.1144	0.1152	0.1143
PKFL	1.88	1.63	1.89	1.50	1.07	1.52	1.87	1.63	1.20
MFLPD	0.582	0.503	0.578	0.501	0.590	0.501	0.577	0.502	0.578
LOC	21- 6- 8	25- 6- 8	55-22- 8	5-30-8	25-38-12	55-26- 8	5-40- 8	35-58- 8	30-56- 8
PKFL	2.05	1.78	2.05	1.78	2.09	1.78	2.05	1.78	2.05
MAXEQ	0.166	0.143	0.167	0.143	0.145	0.143	0.167	0.142	0.158
LOC	7-12	23- 2	49- 8	1-38	25-38	59-24	11-54	37-80	53-59
FLOW	0.0713	0.0719	0.0713	0.0719	0.1157	0.0710	0.0713	0.0719	0.0712
PKF	0.90	0.80	0.90	0.80	1.31	0.80	0.90	0.20	0.01

59					48	48	48	48	48	48	48			
55				48	48	38	48	36	48	38	48	48		
51			48	48	34	48	8	48	10	48	34	48	48	
47		48	48	40	48	40	48	40	48	40	48	40	48	48
43	48	48	34	48	12	48	0	48	0	48	12	48	34	48	48
39	48	38	48	40	48	48	48	48	48	48	48	40	48	38	48
35	48	48	10	48	0	48	32	48	32	48	0	48	8	48	48
31	48	36	48	40	48	48	48	48	44	48	48	40	48	36	48
27	48	48	8	48	0	48	32	48	32	48	0	48	10	48	48
23	48	38	48	40	48	48	48	48	48	48	48	40	48	38	48
19	48	48	34	48	12	48	0	48	0	48	12	48	34	48	48
15		48	48	40	48	40	48	40	48	40	48	40	48	48	
11			48	48	34	48	10	48	8	48	34	48	48		
07				48	48	38	48	36	48	38	48	48			
03					48	48	48	48	48	48	48				
	02	06	10	14	18	22	26	30	34	38	42	46	50	54	58

OPERATOR SUBS VAL CR LOC

NON SYM ROD LOC FIRST QUAD

CALIBRATED LPRM READINGS (W/cm^2)

57		23	26	29	31		
		35	39	36	47		
		38	44	43	53		
		35	43	42	43		
49	25	33	33	40	34	32	
	42	40	41	40	46	42	
	44	53	46	41	51	45	
	39	32	28	23	32	40	
41	39	35	30	29	33	38	32
	51	44	42	43	41	49	43
	59	46	46	44	42	53	50
	32	29	30	29	32	28	39
33	38	27	29	33	28	35	28
	40	36	48	54	45	37	37
	44	40	55	61	47	38	43
	27	22	32	34	30	23	36
25	40	30	29	31	28	38	29
	42	41	47	51	41	44	43
	47	45	52	57	43	47	45
	28	26	32	35	31	27	40
17	35	39	31	31	38	39	24
	50	51	40	39	42	52	34
	52	52	46	43	45	56	36
	37	30	27	26	26	34	36
09D		31	35	37	38	28	
C		42	39	42	48	43	
B		50	47	45	53	45	
A		38	31	28	29	39	
	08	16	24	32	40	48	56

Figure C-7. Peach Bottom-2 EOC-2 Test Turbine Trip Transient Test (TT3) Process Computer P1 Edit

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