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SOLID ROCKET PLANT

Weapon System 133A

FINAL REPORT

QUALIFICATION TEST REPORT FOR
STATHAM ABSOLUTE PRESSURE TRANSDUCER

Contract No. AF 33(600)-36610

Report 0162-01DR-26 27 December 1963

426920

AEROJET
GENERAL TIRE
GENERAL

AEROJET-GENERAL CORPORATION

SACRAMENTO, CALIFORNIA

27 December 1963

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QUALIFICATION TEST REPORT FOR STATHAM ABSOLUTE PRESSURE TRANSDUCER

WEAPON SYSTEM 133A

Contract No. AF 33(600)-36610
Contract Change Notification No. 233

Prepared for

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Report 0162-01DR-26

TABLE OF CONTENTS

		Page
I.	Introduction	1
II.	Summary	1
III.	Test Program	1
	A. Performance Calibration	1
	B. Frequency Response	2
	C. Motor and Igniter Firings	2
	D. Safety Reliability	2
IV.	Conclusions	2

APPENDIX

Qualification and Reliability Test Report for Statham Absolute Pressure Transducer — Appendix A

I. INTRODUCTION

This report describes the results of the qualification tests that were conducted on Statham Instruments absolute pressure transducer Model PA334TC-2.5M in accordance with Aerojet-General Specification 32060A Type II.

II. SUMMARY

Five Statham Instruments absolute pressure transducers Model PA334TC-2.5M were subjected to the tests as described in Appendix A. A part of the qualification test requirements were satisfied on the basis of similarity to absolute pressure transducer Model PA334TC-750 which was previously qualified as described in Report 0162-01DR-22.

III. TEST PROGRAM

Absolute pressure transducers, SN 447, 487, 491, 493, and 703, were subjected to performance, frequency response, motor static firing, and safety reliability tests. Remainder of the qualification tests including vibration, acceleration, temperature-altitude, altitude, humidity, hermetic seal, radio-frequency interference, and performance reliability were performed on transducer Model PA334TC-750 and are considered applicable to Model PA334TC-2.5M based on the similarity of the two parts.

The pressure transducer tests conducted at Aerojet are as follows.

A. PERFORMANCE (CALIBRATION)

Each transducer was subjected to pre- and posttest calibration after each qualification test. The tests were conducted to determine insulation resistance, circuit isolation, primary power

current, linearity, hysteresis, repeatability, zero output, full-scale output, temperature effects, output of 150% full-scale (FS) pressure (voltage limiting), residual noise at FS pressure and shunt calibration.

B. FREQUENCY RESPONSE

For the frequency response tests transducers SN 487 and 703 were subjected to pressure shocks while mounted in the expansion section of a shock tube. The results, including pre- and posttest performance data, are as shown in Appendix A.

C. MOTOR AND IGNITER FIRINGS

Transducer SN 493, 703, and 477 were tested on five static firings of Minuteman second-stage motors. SN 493 and 703 were used in two tests and SN 477 was used in one test. Data obtained from these tests were compared with output data of a reference pressure transducer used for measuring chamber pressure during motor static firings. Prior to and following each test the transducers were subjected to performance tests and the results are shown in Appendix A.

Transducers SN 493 and 477 were subjected to five igniter firings. The results from the igniter firings and the pre- and post-test calibrations are shown in Appendix A.

D. SAFETY RELIABILITY

Safety reliability tests were conducted on two transducer housings to verify structural integrity of the units.

IV. CONCLUSIONS

Successful completion of he qualification tests conducted on Statham absolute pressure transducer Model PA334TC-2.5; SN 447, 487, 491, 493, and 703; have qualified the transducer for use on second-stage Minuteman motors.

Report 0162-01DR-26

Appendix A

QUALIFICATION AND RELIABILITY TEST

REPORT FOR STATHAM ABSOLUTE PRESSURE TRANSDUCER

Report 0162-01DR-26

Appendix A

QUALIFICATION AND RELIABILITY TEST REPORT FOR STATHAM ABSOLUTE PRESSURE TRANSDUCER

Report 0162-01DR-26

Appendix A

	Page No.
1.0 Object	1
2.0 Test Requirements	1
3.0 Description of Test Specimens	1
4.0 Conclusion	1
5.0 Test Procedure and Results	2
5.1 Examination of Product	3
5.2 Performance	3
5.3 Vibration	8
5.4 Acceleration	9
5.5 Temperature - Altitude	9
5.6 Altitude	10
5.7 Humidity	10
5.8 Hermetic Seal	10
5.9 Radio Frequency Interference	11
5.10 Repeat Performance	11
5.11 Frequency Response	11
5.12 Motor and Igniter Test Firings	13
5.13 Reliability	15
	15
	16

Report 0162-01DR-26

Appendix A

FIGURE LIST

	Figure No.
Transducer Dimension Diagram	1
Dimensional Inspection Results	2
Insulation Resistance and Excitation Circuit Isolation	3
Calibration Wiring Diagram	4
Functional Calibration, Transducer SN 477	5
Functional Calibration, Transducer SN 493	6
Functional Calibration, Transducer SN 703	7
Functional Calibration, Transducer SN 491	8
Functional Calibration, Transducer SN 487	9
Frequency Response Traces, Transducer SN 703	10
Frequency Response Traces, Transducer SN 487	11
Calibration Prior to Frequency Response Test, Transducer SN 487	12
Calibration After Frequency Response Test, Transducer SN 487	13
Calibration Prior to Frequency Response Test, Transducer SN 703	14
Calibration After Frequency Response Test, Transducer SN 703	15
Pretest Calibration, Transducer SN 703 (Motor 44FW-112)	16
Posttest Calibration, Transducer SN 703 (Motor 44FW-112)	17
Pretest Calibration, Transducer SN 493 (Motor 44FW-113)	18
Posttest Calibration, Transducer SN 493 (Motor 44FW-113)	19
Pretest Calibration, Transducer SN 703 (Motor 44FW-88)	20
Posttest Calibration, Transducer SN 703 (Motor 44FW-88)	21

Figure List

	Figure No.
Pretest Calibration, Transducer SN 477 (Motor 44FW-75)	22
Posttest Calibration, Transducer SN 477 (Motor 44FW-75)	23
Pretest Calibration, Transducer SN 493 (Motor 44FW-94)	24
Posttest Calibration, Transducer SN 493 (Motor 44FW-94)	25
Wiring Diagram for Motor Static Tests	26
View of Transducer Installed on Static Test Motor	27
Percent Deviation-vs-Time, Transducer SN 477	28
Pressure Amplitude-vs-Time, Transducer SN 477	29
Percent Deviation-vs-Time, Transducer SN 493	30
Pressure Amplitude-vs-Time, Transducer SN 493	31
Percent Deviation-vs-Time, Transducer SN 493	32
Pressure Amplitude-vs-Time, Transducer SN 493	33
Percent Deviation-vs-Time, Transducer SN 703	34
Pressure Amplitude-vs-Time, Transducer SN 703	35
Percent Deviation-vs-Time, Transducer SN 703	36
Pressure Amplitude-vs-Time, Transducer SN 703	37
View of Igniter Test Installation, Transducer SN 493	38
Pressure-vs-Time, Igniter Test (SN 493)	39
Percent Deviation-vs-Time, Igniter Test (SN 493)	40
Pressure-vs-Time, Igniter Test (SN 493)	41
Percent Deviation-vs-Time, Igniter Test (SN 493)	42
Pressure-vs-Time, Igniter Test (SN 493)	43
Percent Deviation-vs-Time, Igniter Test (SN 493)	44
Pressure-vs-Time, Igniter Test, (SN 493)	45
Percent Deviation-vs-Time, Igniter Test (SN 493)	46
Pressure-vs-Time, Igniter Test (SN 493)	47

Figure List

	Figure No.
Percent Deviation-vs-Time, Igniter Test (SN 493)	48
Pressure-vs-Time, Igniter Test (SN 477)	49
Percent Deviation-vs-Time, Igniter Test (SN 477)	50
Pressure-vs-Time, Igniter Test (SN 477)	51
Percent Deviation-vs-Time, Igniter Test (SN 477)	52
Pressure-vs-Time, Igniter Test (SN 477)	53
Percent Deviation-vs-Time, Igniter Test (SN 477)	54
Pressure-vs-Time, Igniter Test (SN 477)	55
Percent Deviation-vs-Time, Igniter Test (SN 477)	56
Pressure-vs-Time, Igniter Test (SN 477)	57
Percent Deviation-vs-Time, Igniter Test (SN 477)	58
Pretest Calibration, Igniter Test (SN 493)	59
Posttest Calibration, Igniter Test (SN 493)	60
Pretest Calibration, Igniter Test (SN 477)	61
Posttest Calibration, Igniter Test (SN 477)	62
Safety Reliability Test Setup Schematic	63
View of Safety Reliability Test Setup	64

Appendix A

1.0 Object

The purpose of this program was to determine compliance of Statham Instruments Model PA334TC-2.5M pressure transducer with the requirements set forth in Paragraph 2.0.

2.0 Test Requirements

Perform qualification tests (Pre-production and Reliability) on Statham Instruments Model PA334TC-2.5M pressure transducer to verify compliance with design requirements of Aerojet-General Component Specification 32060A Type II. Unless otherwise indicated, paragraph numbers referenced in this Report are those of the Aerojet-General Corporation Specification.

3.0 Description of Test Specimens

Five Statham Model PA334TC-2.5M pressure transducers were submitted for tests as described above. Three were used for frequency response tests and two for safety tests and motor static test firings. The specimens were arbitrarily assigned numbers as follows:

Serial No.	Specimen No.
477	1
493	2
703	3
491	4
487	5

4.0 Conclusion

4.1 Qualification Testing

The transducers were subjected to the test program as required. The transducers complied with all requirements of the specification based on tests performed and on the basis

of similarity to the Statham Model PA3345C-750 previously qualified to Aerojet Specification 32060 Type I. Each test is so indicated where similarity is used as a basis for qualification. For details of these tests see Aerojet Report 0162-01DR-22, "Qualification Test Report for Statham Operational Pressure Transducer and CTL I Pressure Measuring System".

5.0 Test Procedures and Results

5.1 Examination of Product

Test by: R. E. Leeds

Test started: 3 Mar 63

Test completed: 3 Mar 63

5.1.1 Test Requirement

Aerojet-General Corporation Specification 32060A. Paragraphs 3.6.1, 3.6.2 and 3.7. Specimens 1 through 5.

Examination: Visual and manual.

5.1.2 Test Method

The pressure transducers were examined visually to determine compliance with engraving, finish, and workmanship. The pressure transducers were manually measured to determine dimensional and weight compliance with the specification.

5.1.3 Test Results

Visual: The transducers conformed to all visual requirements relating to marking, cleanliness, workmanship, and general appearance.

Manual: Results of the dimensional measurements are presented in Figures 1 and 2.

Comments: Dimensional measurements and weight of the transducers complied with the specification requirements.

5.1.4 Test Equipment

5.1.4.1 Calipers

5.1.4.2 Tragkraft, Mikro Doft Scales

5.2 Performance

5.2.1 Insulation Resistance and Excitation Circuit Isolation

Test by: Dept. 8772

Test started: 5 Dec 62

Test completed: 5 Dec 62

5.2.1.1 Test Requirement

Aerojet-General Corporation Specification 32060A, Paragraphs 3.3.13.1 and 3.3.13.2. Specimen No's. 1, 2, 3, 4, and 5

Insulation Resistance: 1 megohm minimum at 50 v dc

Excitation Isolation: 1 megohm minimum at 50 v dc

5.2.1.2 Test Method

The insulation resistance between all connector pins and the transducer case was measured at 50 v dc. The excitation isolation was measured between pins A and D and output pins B and C.

5.2.1.3 Test Results

The transducers complied with all test requirements of paragraph 5.2.1.1. Data and test results are shown in Figure 3.

5.2.1.4 Test Equipment

5.2.1.4.1 Insulation Tester

5.2.2 Output Impedance

5.2 Performance

5.2.2.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 3.3.15.

Output Impedance: 1000 ohms maximum.

5.2.2.2 Test Method

This test not required since the unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060, Paragraph 4.4.3.

5.2.3 Bridge Excitation Power Supply

5.2.3.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 3.3.16.

Excitation Current: Less than 70 milliamperes at 28 $\pm$ 2 v dc.

5.2.3.2 Test Method

This test not required since the unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060 Paragraph 4.4.3.

5.2.4 Recovery from Primary Power Transients

5.2.4.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 3.3.17.

Transient Amplitude: 45 v dc

Transient Duration: 500 millisec

5.2 Performance

Output Amplitude Change. 150 millivolts (P-P) maximum

Output Amplitude Change Duration: 50 millisec maximum

5.2.4.2 Test Method

This test was not required since the unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060. Paragraph 4.4.3.

5.2.5 Noise (Broad band)

5.2.5.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 3.3.3.

Output (broad band) noise. Less than 25 millivolts peak to peak.

5.2.5.2 Test Method

This test was not required since the unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification. Paragraph 4.4.3.

NOTE: A noise test is performed on all transducers during receiving inspection.

5.2.6 Functional Calibration

Test by. Dept. 8772

Test started 5 Dec 62

Test completed 5 Dec 62

5.2.6.1 Test Requirement

Aerojet-General Corporation Specification 32060. Paragraphs 3.3.2, 3.3.2.2, 3.3.4, 3.3.5, 3.3.12.6.3 and 3.3.14.

5.2 Performance

Excitation: 28 v dc

Pressure: 0 to 2500 psig, 3 calibration cycles

Zero Output Voltage: Output voltage at 0.1 psia

5.2.6.2 Test Method

The pressure port of the transducer was connected to a dead weight pressure system capable of producing pressure variation from 0 psig to 2500 psig. For verification of zero output voltage the pressure system incorporated a cacuum pump to produce pressures below atmospheric. The transducer was energized with 28 v dc. A calibration cycle consisted of 11 pressure points taken in 500 psig increments from 0 psig increasing to 2500 psig and decreasing to 0 psig. Three calibration cycles were performed.

Upon completion of each of the three calibration cycles, the zero balance was recorded at less than 0.1 psia. A simulated pressure calibration was performed at the completion of the three cycles. After each calibration cycle, the data was interpreted for non-linearity, hysteresis, repeatability, full scale output voltage, zero output voltage and simulated pressure calibration accuracy.

5.2.6.3 Test Results

The transducers complied with all test requirements of Paragraph 5.2.6.1. Figures 5 through 9 show test results. The definitions used in the data reduction and presentation of results are as described in Paragraph 6.3 of Aerojet specification 32060.

5.2 Performance

5.2.6.4 Test Equipment

5.2.6.4.1 Amthor Dead Weight Tester, Model 460

5.2.6.4.2 Power Supply-Kay Lab Absolute d c PN 110-542-200-1

5.2.6.4.3 Alirco Type C Calibrator PN 0-220907

5.2.6.4.4 Micron Gauge CVC Model 321-T

5.2.6.4.5 Vacuum Pump

5.2.6.4.6 Dual Seal Temperature Oven Statham Model TC-2

5.2.7 Zero and Sensitivity Shift with Temperature

Test by Dept 8772

Test started 5 Dec 63

Test completed 5 Dec 63

5.2.7.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraphs 3.3.9, 3.3.10 and 3.3.11

Zero Shift. Less than 0.02% FS/^{o}F

Sensitivity shift. Less than 0.02% FS/^{o}F

5.2.7.2 Test Method

The transducer was placed in a temperature test chamber pre-adjusted to maintain a constant temperature of + 30°F. The transducer pressure port was connected to a dead weight pressure system capable of producing pressure variation from 0 psig to 2500 psig. The pressure system also incorporated a vacuum pump and a vacuum gage. A potential of 28 v dc was applied and a calibration performed consisting of 11 pressure points taken in 500 psig increments from 0 psig increasing to 2500 psig and decreasing to 0 psig. This procedure was repeated at temperatures of 30, 75, and 150°F. A simulated pressure

5.2.7.2 Test Method (cont)

calibration was performed when the transducer was stabilized at 75°F.

5.2.7.3 Test Results

The transducers complied with all test requirements of Paragraph 5.2.7.1. Output values during the temperature tests are shown in Figures 5 through 9.

5.2.7.4 Test Equipment

5.2.7.4.1 Amthor Dead Weight Tester Model 460

5.2.7.4.2 Power Supply, Kay Labs., Absolute dc, PN 110-542-200-1

5.2.7.4.3 Alinco Type C Calibrator, PN 0-220907

5.2.7.4.4 Micron Gauge, CVC, Model 321-T

5.2.7.4.5 Temperature Test Chamber, Statham Model TC-2

5.2.7.4.6 Vacuum Pump, Welch

5.3 Vibration

5.3.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraphs 3.4.2(e), 4.7.1.1

Excitation: 28 v d-c

Vibration: Sinusoidal and random per Figures 2 and 3 of Aerojet-General Specification 32060.

Performance Verification: Per Paragraph 5.2.6 of this document.

5.3.2 Test Method

This test not required. Unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060, Paragraph 4.4.3.

5.4 Acceleration

5.4.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 3.4.2(a) and 4.7.1.2

Acceleration: ± 15 g three mutually perpendicular axes

Duration: 3 minutes each direction

Excitation: 28 ± 0.01 v d-c

Performance Verification: Per Paragraph 5.2.6 of this document

5.4.2 Test Method

This test not required. Unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060, Paragraph 4.4.3.

5.5 Temperature Altitude

5.5.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 3.4.1(e) and 4.7.1.3.

5.5.1.1 Ambient Pressure: 6.8 psia (20,000 ft)

Temperature: -45°F to + 160°F

Duration: 4 minutes

Performance Verification: Strip Chart recording during test, and per Paragraph 5.2.6 of this document following exposure.

5.5.2 Test Method

This test not required. Unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060, Paragraph 4.4.3.

5.6 Altitude

5.6.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 3.4.2(d) and 4.7.1.3.1.

Excitation: 28 v d-c

Ambient Pressure: 240 microns-Hg (200,000 ft)

Performance: Per Paragraph 5.2.6 of this Report

5.6.2 Test Method

This test not required. Unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060, Paragraph 4.4.3.

5.7 Humidity

5.7.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 3.4.1(a) and 4.7.1.4

Excitation: 28 v d-c

Relative Humidity: 95%

Temperature: 110°F and 120°F

Duration: 100 cycles at 2 hr/cycle

5.7.2 Test Method

This test not required. Unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060, Paragraph 4.4.3.

5.8 Hermetic Seal

5.8.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 4.7.1.6

5.8 Hermetic Seal

5.8.2 Test Method

This test not required. Unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060, Paragraph 4.4.3.

5.9 Radio Frequency Interference

5.9.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 3.3.3.2 and 4.7.1.11

5.9.2 Test Method

This test not required. Unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060, Paragraph 4.4.3.

5.10 Repeat Performance

Following completion of all environmental tests, the transducer shall demonstrate continued satisfactory performance in accordance with the tests specified in Paragraph 5.2 of this document. This test not required. Unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060, Paragraph 4.4.3.

5.11 Frequency Response

Test by M. A. Henry

Test started. 5 Nov 1962

Test completed: 12 Dec 1963

5.11.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 3.3.7.2

5.11 Frequency Response

Specimen No's. 3 and 5

Excitation: 28 v d-c

Response Time: Less than 1 millisec from 10 to 90% full scale when stimulated with a full-scale pressure step function.

5.11.2 Test Method

The transducer was installed in the expansion section of a shock tube. The driver section of the shock tube was pressurized and the diaphragm separating the driving and expansion sections was ruptured. The response of the transducer to the shock pressure was generated when the diaphragm rupture was recorded on an oscilloscope and photographed.

The frequency response testing was conducted using the shock tube at the Aerojet Azusa facility. Pressure shock amplitudes varying from 400 to 1000 psig were applied.

5.11.3 Test Results

The transducers complied with all test requirements of Paragraph 5.11.5. Data and test results are shown in Figures 10 through 15.

Three test specimens were tested at the Azusa shock tube test facility. Two of the test specimens met the rise time requirements (Reference Aerojet Specification 32060, Paragraph 5.11.5); however, both units failed the performance calibration test performed after the shock tube tests. The third unit failed to meet the rise time requirement.

5.11 Frequency Response

Inspection of the test specimens showed that the outer diaphragm (approximately 0.002 in. thick) which transmits the damping fluid to the inner (serior) diaphragm (approximately 0.025 in. thick). The resultant damage was deformation and rupture of the outer diaphragm. This caused the loss of the damping fluid which also acts as the coupling between the diaphragms. Therefore, the performance of the transducer was severely degraded. It was found that the pressure step caused a mechanical shock of 1000 g's. A redesign of the pressure transmitting system within the transducer was required so that testing could be completed on schedule. The redesign eliminated the outer diaphragm, the orifice, and the damping fluid. The new design uses only the pressure sensing diaphragm.

Two test specimens of the new design were again tested. The transducers complied with all test requirements of paragraph 5.11.5 Test results indicate that the dynamic characteristics of the transducer are repeatable at the various pressure levels verifying the linearity of the transducer dynamic characteristics.

5.11.4 Test Equipment

5.11.4.1 Shock Tube

5.11.4.2 Oscilloscope

5.12 Motor and Igniter Test Firings

5.12.1 Test Requirements

Aerojet-General Corporation Specification 32060, Paragraph 3.0.

5.12 Motor Static Test Firings

Specimen No.'s: 1, 2, and 3

The object of the tests are to prove the capability of the test specimens to meet all performance characteristics under actual operating conditions. Performance verification per Paragraph 5.2.6 was conducted after each test.

5.12.2 Test Method

5.12.2.1 The test specimen's were installed on five second-stage Minutemar motors to monitor igniter pressures during static test firings. Identical hardware and installation methods were used to mount the test specimen as those used on flight-test motors. For comparative purposes, a pressure transducer used to monitor chamber pressure was used as a reference with the test specimen. Pressure transducer output from both the test specimen and the reference was monitored and recorded during the motor firings on an oscillograph.

5.12.2.2 The test specimens were subjected to five igniter firings for each of two tests. The igniters were fired in a special igniter test fixture. For comparative purposes, a reference pressure transducer was connected to the igniter pressure chamber monitoring igniter pressure simultaneously with the test specimens, pressure transducer output from both the test specimen and the reference was monitored and recorded during the igniter firings on an oscillograph.

5.12 Motor Static Test Firings

5.12.3 Test Results

The transducers complied with all test requirements of Paragraph 5.12.1. Pre- and posttest calibration of the transducers and data from the motor firings are shown in Figures 16 through 37. Results from the igniter firings are shown in Figures 38 through 62.

5.13 Reliability

5.13.1 Performance Reliability

5.13.1.1 Test Requirement

Aerojet-General Corporation Specification 32060, Paragraph 4.7.1.13.1.

Excitation: 28 v d-c

Temperature: 75 $\pm$ 10°F

Duration: 30 minutes

Pressure: Room ambient

Temperature-time Profile: (Established from the tests of Paragraph 5.5 of this Report).

Vibration: Sinusoidal and random as per Figures 2 and 3 of Aerojet Specification 32060.

Performance Tests. Per Paragraph 5.2.6 of this Report.

5.13.1.2 Test Method

5.13.1.2.1 This test not required. Unit is considered qualified based on similarity to Statham Model PA334TC-750 previously qualified to Aerojet Specification 32060, Paragraph 4.4.3.

5.13.2 Safety Reliability

Test by: Dept. 3830

Test started: 6 Feb 63

Test completed: 17 April 63

5.13.2.1 Test Requirement

Aerojet-General Corporation Specification 32060A, Paragraph 3.5.1.

Safety Reliability 1558 minimum applications of 5000 psig to two transducer pressure housings.

5.13.2.2 Test Method

A pressure cycling device was fabricated which enabled repeated application of 5000 psig to two pressure transducers. The transducers were manifolded to the pressure cycler and 5000 psig pressure applications were applied for a minimum of 1558 consecutive times. Following the pressure cycling, the transducers were examined for evidence of physical deformation and leakage.

5.13.2.3 Test Results

The transducers complied with all test requirements of Paragraph 5.14.1. Test methods and results are shown as follows.

The Safety Reliability Test was started 2 February 1963. The test setup was as shown in Figures 63 and 64. Test specimens were pulsed 1 pressure application of 5000 psi and pressure released. Visual inspection revealed no visible leaks. Testing continued for 44 pressure cycles. (1 sec pressure, 1 sec no pressure) using an electrical sequencer

5.13.2 Safety Reliability

for cycle control. After 45 pressure cycles a leak was detected in both test specimens.

A failure diagnosis study showed the six 6-32 by 0.375-in.-long cap screws used to secure the pressure cap to the transducer housing were of too low a tensile strength and stretched which allowed the pressure cap to unseat from the transducer housing thereby causing pressure release. The cap screws were replaced with 6-32 by 0.375-in.-long alloy steel cap screws which have a higher tensile strength than those originally used and testing was continued.

The two test specimens were subjected to an additional 778 pressure cycles of 5000 psig after the cap screw replacement. A visual posttest observation of the specimens revealed no learage of hydraulic oil; no longitudinal or radial deformation of the cases was evident. Pre- and posttest micrometer measurements of case diameter were identical. High tensile strength screws will be used in all transducers of this model delivered to Aerojet.

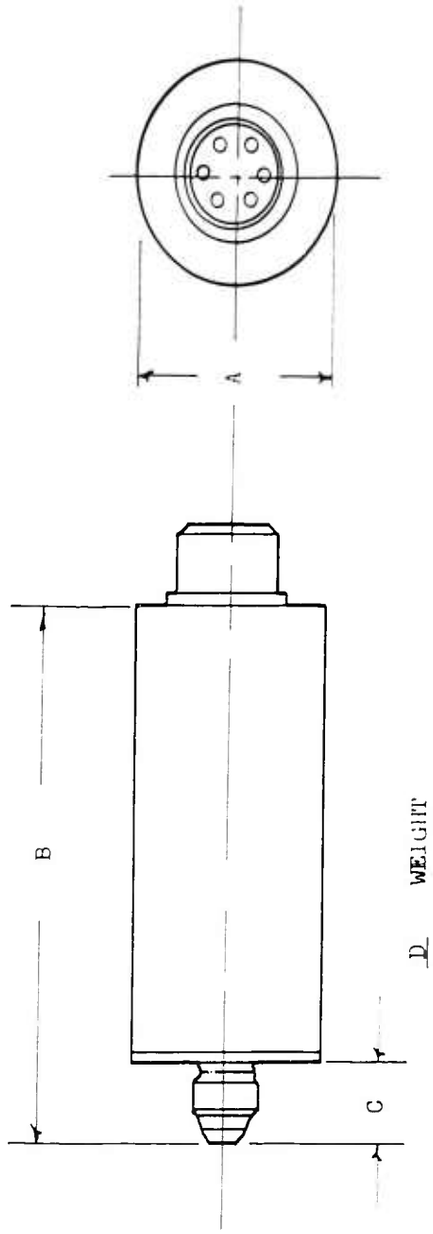
5.13.2.4 Test Equipment

7.17 Pressure Cycler equipment including:

a. Hydraulic supply, (5000 psig) Nankervis model 9440B

b. Pressure valve, Futurematic Solenoid, 3-way, 0 to 6000 psi, A/N 20896

c. Pressure system monitor, Taber Pressure Transducer, range 0 to 10K with C.E.C. recording oscillograph, Type 5-119.



Transducer Dimension Diagram

Figure 1

Dimensional Code*	Requirements	SN 477 Specimen No. 1	SN 493 Specimen No. 2	SN 703 Specimen No. 3	SN 491 Specimen No. 4	SN 487 Specimen No. 5
A	1.75 in. max	1.375	1.375	1.375	1.375	1.375
B	5.00 in. max	3.750	3.750	3.749	3.750	3.741
C	0.55 in. max	.550	.552	.552	.551	.554
D	13 oz. max	9	10	10	10	10

* See Figure 1

Dimensional Inspection Results

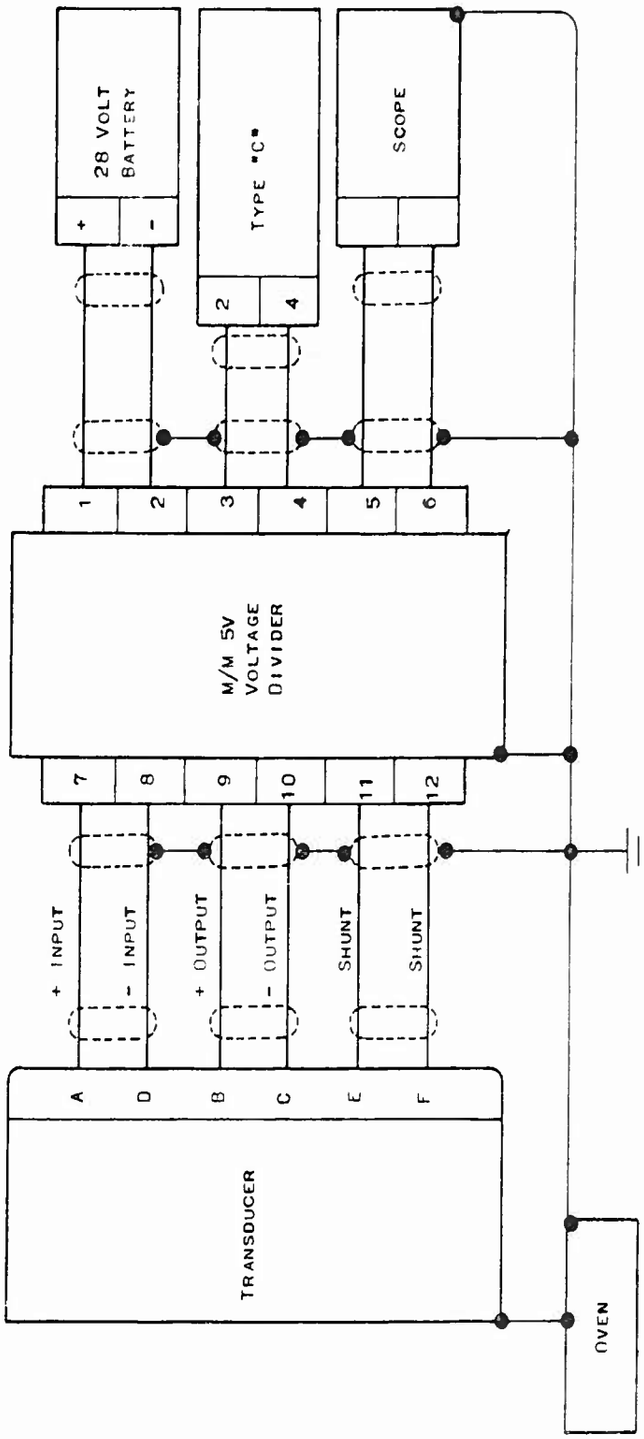
Figure 2

I. Insulation Resistance		SN 477	SN 493	SN 703	SN 491	SN 487
Insulation Resistance Between	Tolerance In Megohms	Specimen No. 1	Specimen No. 2	Specimen No. 3	Specimen No. 4	Specimen No. 5
Pins A, B, C, D, E, and F To Case	1 Megohm Minimum	10K Megs	10K Megs	10K Megs	10K Megs	10K Megs

II. Excitation Circuit Isolation		SN 477	SN 493	SN 703	SN 491	SN 487
Circuit Isolation Between Pins	Tolerance In Megohms	Specimen No. 1	Specimen No. 2	Specimen No. 3	Specimen No. 4	Specimen No. 5
A,B To C,D	1 Meghom Minimum	10K Megs	10K Megs	10K Megs	10K Megs	10K Megs

Insulation Resistance and Excitation Circuit Isolation

Figure 3



Calibration Wiring Diagram

Figure 4

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

FUNCTIONAL CALIBRATION
Page 1 of 5

P.O.# _____

MFG. Statham SERIAL NO. 477 RANGE 0-2500 psia

MODEL PA33NTC CALIBRATED BY Dept. 8772 DATE 12-11-62

ROOM TEMP. 76 °F ASSIGNED TO ENGINE NO. Qual Test

BAROMETRIC PRESSURE 757.4 MM HG PARAMETER MEASURED _____

CHECKED BY Ken Bushey

[X] ACCEPTED (NOTE g)

ASSIGNED BY Dept. 8772 P. E. Leeds

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS _____

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	10K Meg	1 Megohm Minimum
B	10K Meg	
C	10K Meg	
D	10K Meg	
E	10K Meg	
F	10K Meg	

[X] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	10K Meg	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
41	70 MA Max.	28	28±0.2VDC

[X] ACCEPT

Functional Calibration, Transducer SN 477

Figure 5

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-12-62

S/N 477

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
35.9	5.037	6.736	7.50V MAXIMUM	49.6	5.056

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
15 mv	25 MV MAXIMUM

[X] ACCEPT

Functional Calibration, Transducer SN 477

Figure 5

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-12-62

S/N 477

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS DECREASING	OUTPUT IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEAT-ABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	0000	0000	X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	28V	28 ± 0.2 VDC
500	2001	2006	1940 2060				
1000	4005	3975	3940 4060				
1500	6003	5975	5940 6060				
2000	8006	7990	7940 8060				
2500	10,000	10000	X				
0	0000	0000	X	40 Unit Variation		28V	
500	2003	2008	1940 2060				
1000	4005	3978	3940 4060				
1500	6001	5983	5940 6060				
2000	8005	7992	7940 8060				
2500	10000	10000	X				
0	0000	0000	X	40 Unit Variation		28V	
500	2004	2009	1940 2060				
1000	4008	3973	3940 4060				
1500	6005	5980	5940 6060				
2000	8008	7988	7940 8060				
2500	10000	10000	X				

A. LINEARITY
[X] ACCEPT

B. HYSTERESIS
[X] ACCEPT

C. REPEATABILITY
[X] ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7510	7,475 7,525	28V	28±0.2 VDC

[X] ACCEPT

Functional Calibration, Transducer SN 477

Figure 5

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-12-62

S/N 477

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	+1		X	40 Unit Variation	28V	28 ±0.2 VDC
500	2000	1975	1940 2060			
1000	4004	3972	3940 4060			
1500	6000	5972	5940 6060			
2000	8003	7986	7940 8060			
2500	10,000	10000	X			

[X] ACCEPT

X. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	-1		X	40 Unit Variation	28V	28 ± 0.2 VDC
500	1993	1973	1940 2060			
1000	3998	3970	3940 4060			
1500	5998	5973	5940 6060			
2000	8000	7985	7940 8060			
2500	10,000	9998	X			

[X] ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A 21.2	28V	+25.8	28V	-30.8	28V	28 ± 0.2 VDC
ZERO OUTPUT TOLERANCE	-D +102mv	X	A±55 mv	X	A±85 mv	X	

[X] ACCEPT

Functional Calibration, Transducer SN 477

Figure 5

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 5 of 5
DATE 12-12-62
S/N 477

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S.OUTPUT (PSIG) IN VOLTS	5.053	28V	5.047	28V	5.031	28V	28 ± 0.2 VDC
ZERO OUTPUT (PSIA) IN VOLTS	.0491	28V	.0542	28V	.0040	28V	
CORRECTED F.S.OUTPUT IN VOLTS	A 5.0039	28V	4.993	28V	5.027	28V	
F.S.OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .055V	X	A ± .085V	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Functional Calibration, Transducer SN 477

Figure 5

FUNCTIONAL CALIBRATION
Page 1 of 5

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

P.O.# _____

MFG. Statham SERIAL NO. 493 RANGE 0-2500 psia

MODEL PA33LTC CALIBRATED BY Dept. 8772 DATE 12-11-62

ROOM TEMP. 75 °F ASSIGNED TO ENGINE NO. Dual Test

BAROMETRIC PRESSURE 757.4 MM HG PARAMETER MEASURED ~~INTERNAL PRESSURE~~

CHECKED BY Ken Bushey

[X] ACCEPTED (NOTE g)

ASSIGNED BY Dept. 8772 P. E. Leeds

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS _____

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	10K Meg	1 Megohm Minimum
B	10K Meg	
C	10K Meg	
D	10K Meg	
E	10K Meg	
F	10K Meg	

[ ] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	10K Meg	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
41	70 MA Max.	28	28±0.2VDC

[X] ACCEPT

Functional Calibration, Transducer SN 493

Figure 6

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-12-62

S/N 493

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
62.5	5.038	6.759	7.50V MAXIMUM	72.4	5.052

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
13 mv	25 MV MAXIMUM

[X] ACCEPT

Functional Calibration, Transducer SN 493

Figure 6

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-12-62

S/N 493

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS DECREASING	OUTPUT IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEAT-ABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	0000	0000	X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	28V	28 ± 0.2 VDC
500	2014	2018	1940 2060				
1000	4023	4030	3940 4060				
1500	6038	6047	5940 6060				
2000	8038	8051	7940 8060				
2500	10,000	10000	X				
0	0000	0000	X	40 Unit Variation		28V	
500	2018	2020	1940 2060				
1000	4037	4036	3940 4060				
1500	6044	6050	5940 6060				
2000	8041	8050	7940 8060				
2500	10000	10000	X				
0	0000	0000	X	40 Unit Variation		28V	
500	2017	2020	1940 2060				
1000	4032	4036	3940 4060				
1500	6041	6048	5940 6060				
2000	8045	8050	7940 8060				
2500	10000	10000	X				

A. LINEARITY
[X] ACCEPT

B. HYSTERESIS
[X] ACCEPT

C. REPEATABILITY
[X] ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7506	7,475 7,525	28V	28±0.2 VDC

[X] ACCEPT

Functional Calibration, Transducer SN 493

Figure 6

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 4 of 5

DATE 12-12-62

S/N 493

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	-16		X	40 Unit Variation	28V	28 ±0.2 VDC
500	1998	1992	1940 2060			
1000	4024	4015	3940 4060			
1500	6038	6031	5940 6060			
2000	8037	8030	7940 8060			
2500	10,000	9995	X			

[X] ACCEPT

X. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	-3		X	40 Unit Variation	28V	28 ± 0.2 VDC
500	2004	2000	1940 2060			
1000	4020	4011	3940 4060			
1500	6031	6022	5940 6060			
2000	8035	8030	7940 8060			
2500	10,000	9997	X			

[X] ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A 43.3	28V	+53.2	28V	+2.17	28V	28 ± 0.2 VDC
ZERO OUTPUT TOLERANCE	-D +102mv	X	A±55 mv	X	A±85 mv	X	

[X] ACCEPT

Functional Calibration, Transducer SN 493

Figure 6

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 5 of 5

DATE 12-12-62

S/N 493

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S.OUTPUT (PSIG) IN VOLTS	5.052	28V	5.068	28V	5.011	28V	28 ± 0.2 VDC
ZERO OUTPUT (PSIA) IN VOLTS	.0698	28V	.0859	28V	.0529	28V	
CORRECTED F.S.OUTPUT IN VOLTS	A 4.9822	28V	4.982	28V	4.958	28V	
F.S.OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .055V	X	A ± .085V	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Functional Calibration, Transducer SN 493

Figure 6

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

FUNCTIONAL CALIBRATION
Page 1 of 5

P.O.# _____

MFG. Statham SERIAL NO. 703 RANGE 0-2500 psia

MODEL PA33HTC CALIBRATED BY Dept. 8772 DATE 12-5-62

ROOM TEMP. 74 °F ASSIGNED TO ENGINE NO. Qual Test

BAROMETRIC PRESSURE 759.3 MM HG PARAMETER MEASURED _____

CHECKED BY Ken Bushey
Dept. 8772

[X] ACCEPTED (NOTE g)

ASSIGNED BY R. E. Leeds

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS _____

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	10,000M	1 Megohm Minimum
B	10,000M	
C	10,000M	
D	10,000M	
E	10,000M	
F	10,000M	

[X] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	10,000M	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
42	70 MA Max.	28	28±0.2VDC

[X] ACCEPT

Functional Calibration, Transducer SN 703

Figure 7

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-5-62

S/N 703

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
77.5	5.052	6.581	7.50V MAXIMUM	68.4	5.044

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
10	25 MV MAXIMUM

[X] ACCEPT

Functional Calibration, Transducer SN 703

Figure 7

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-5-62

S/N 703

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS DECREASING	OUTPUT IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEATABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	+1		X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	28V	28 ± 0.2 VDC
500	1998	1998	1940 2060				
1000	4010	4009	3940 4060				
1500	6016	6017	5940 6060				
2000	8019	8020	7940 8060				
2500	10,000	9998	X				
0	-1		X	40 Unit Variation		28V	
500	1998	1998	1940 2060				
1000	4010	4008	3940 4060				
1500	6015	6016	5940 6060				
2000	8018	8020	7940 8060				
2500	9998	9998	X				
0	-1		X	40 Unit Variation		28V	
500	1998	1998	1940 2060				
1000	4009	4007	3940 4060				
1500	6015	6016	5940 6060				
2000	8019	8018	7940 8060				
2500	9998	9995	X				

A. LINEARITY
[X] ACCEPT

B. HYSTERESIS
[X] ACCEPT

C. REPEATABILITY
[X] ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7512	7,475 7,525	28V	28±0.2 VDC

[X] ACCEPT

Functional Calibration, Transducer SN 703

Figure 7

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-5-62

S/N 703

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	-6		X	40 Unit Variation	28V	28 ±0.2 VDC
500	1994	1992	1940 2060			
1000	4005	4008	3940 4060			
1500	6012	6017	5940 6060			
2000	8012	8018	7940 8060			
2500	10,000	10006	X			

[X] ACCEPT

X. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0		X	40 Unit Variation	28V	28 ± 0.2 VDC
500	1993	1990	1940 2060			
1000	4001	3999	3940 4060			
1500	6007	6007	5940 6060			
2000	8014	8018	7940 8060			
2500	10,000	9998	X			

[X] ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A +39.7	28V	+33.0	28V	+30.3	28V	28 ± 0.2 VDC
ZERO OUTPUT TOLERANCE	-0 +102mv	X	A±55 mv	X	A±85 mv	X	

[X] ACCEPT

Functional Calibration, Transducer SN 703

Figure 7

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 5 of 5
DATE 12-5-62
S/N 703

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S.OUTPUT (PSIG) IN VOLTS	5.046	28V	5.043	28V	5.0170	28V	28 ± 0.2 VDC
ZERO OUTPUT (PSIA) IN VOLTS	.0690	28V	.0600	28V	.0618	28V	
CORRECTED F.S.OUTPUT IN VOLTS	A 4.977	28V	4.983	28V	4.9552	28V	
F.S.OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .055V	X	A ± .085V	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Functional Calibration, Transducer SN 703

Figure 7

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

FUNCTIONAL CALIBRATION
Page 1 of 5

P.O.# _____

MFG. Statham SERIAL NO. 491 RANGE 0-2500 psia

MODEL PA334TC CALIBRATED BY Dept. 8772 DATE 12-5-62

ROOM TEMP. 74 °F ASSIGNED TO ENGINE NO. Qual Test

BAROMETRIC PRESSURE 759.3 MM HG PARAMETER MEASURED _____

CHECKED BY Ken Bushey
Dept. 8772

[X] ACCEPTED
(NOTE g)

ASSIGNED BY R. E. Leeds

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS _____

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	10,000M	1 Megohm Minimum
B	10,000M	
C	10,000M	
D	10,000M	
E	10,000M	
F	10,000M	

[X] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	10,000M	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
42	70 MA Max.	28V	28±0.2VDC

[X] ACCEPT

Functional Calibration, Transducer SN 491

Figure 8

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-5-62

S/N 491

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
95.4	5.107	7.105	7.50V MAXIMUM	77.0	5.100

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
12	25 MV MAXIMUM

[X] ACCEPT

Functional Calibration, Transducer SN 491

Figure 8

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-5-62

S/N 491

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS DECREASING	OUTPUT IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEAT-ABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	+2		X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	28V	28 ± 0.2 VDC
500	1998	1980	1940 2060				
1000	3999	3977	3940 4060				
1500	5996	5982	5940 6060				
2000	8005	7996	7940 8060				
2500	10,000	9997	X				
0	-1		X	40 Unit Variation		28V	
500	1995	1981	1940 2060				
1000	3997	3975	3940 4060				
1500	5995	5980	5940 6060				
2000	8002	7995	7940 8060				
2500	9997	9998	X				
0	-2		X	40 Unit Variation		28V	
500	1994	1977	1940 2060				
1000	3975	3973	3940 4060				
1500	5993	5978	5940 6060				
2000	8002	7994	7940 8060				
2500	9998	9996	X				

A. LINEARITY [X] ACCEPT

B. HYSTERESIS [X] ACCEPT

C. REPEATABILITY [X] ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7505	7,475 7,525	28V	28±0.2 VDC

[X] ACCEPT

Functional Calibration, Transducer SN 491

Figure 8

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-5-62

S/N 491

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	-12		X	40 Unit Variation	28V	28 ±0.2 VDC
500	1987	1968	1940 2060			
1000	3997	3976	3940 4060			
1500	6003	5988	5940 6060			
2000	8008	8000	7940 8060			
2500	10,000	9997	X			

[X] ACCEPT

X. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0		X	40 Unit Variation	28V	28 ± 0.2 VDC
500	1992	1975	1940 2060			
1000	3995	3971	3940 4060			
1500	5992	5970	5940 6060			
2000	8000	7982	7940 8060			
2500	10,000	9994	X			

[X] ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A +47.4	28V	+68.7	28V	+63.5	28V	28 ± 0.2 VDC
ZERO OUTPUT TOLERANCE	-D +102mv	X	A±55 mv	X	A±85 mv	X	

[X] ACCEPT

Functional Calibration, Transducer SN 491

Figure 8

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 5 of 5
DATE 12-5-62
S/N 491

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S.OUTPUT (PSIG) IN VOLTS	5.102	28V	5.087	28V	5.1150	28V	28 ± 0.2 VDC
ZERO OUTPUT (PSIA) IN VOLTS	.0773	28V	.0521	28V	.1020	28V	
CORRECTED F.S.OUTPUT IN VOLTS	A 5.025	28V	5.035	28V	5.0130	28V	
F.S.OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .055V	X	A ± .085V	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Functional Calibration, Transducer SN 491

Figure 8

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

FUNCTIONAL CALIBRATION
Page 1 of 5

P.O.# _____

MFG. Statham SERIAL NO. 487 RANGE 0-2500 psia

MODEL PA334TC CALIBRATED BY Dept. 8772 DATE 12-5-62

ROOM TEMP. 74 °F ASSIGNED TO ENGINE NO. Qual Test

BAROMETRIC PRESSURE 759.3 MM HG PARAMETER MEASURED _____

CHECKED BY Ken Bushey

[X] ACCEPTED (NOTE g)

ASSIGNED BY Dept. 8772 R. E. Leeds

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS _____

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	10,000 M	1 Megohm Minimum
B	10,000M	
C	10,000M	
D	10,000M	
E	10,000M	
F		

[X] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	10,000M	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
42	70 MA Max.	28	28±0.2VDC

[X] ACCEPT

Functional Calibration, Transducer SN 487

Figure 9

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-5-62

S/N 487

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
123.0	5.106	6.736	7.50V MAXIMUM	124.1	5.111

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
15	25 MV MAXIMUM

[X] ACCEPT

Functional Calibration, Transducer SN 487

Figure 9

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-5-62

S/N 487

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS DECREASING	OUTPUT IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEAT-ABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	+3		X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	28V	28 ± 0.2 VDC
500	2008	1994	1940 2060				
1000	4018	4002	3940 4060				
1500	6019	6007	5940 6060				
2000	8011	8004	7940 8060				
2500	10,000	9998	X				
0	+4		X	40 Unit Variation		28V	
500	2010	1996	1940 2060				
1000	4018	4003	3940 4060				
1500	6017	6008	5940 6060				
2000	8010	8005	7940 8060				
2500	9998	9998	X				
0	+5		X	40 Unit Variation		28V	
500	2009	1995	1940 2060				
1000	4018	4003	3940 4060				
1500	6016	6008	5940 6060				
2000	8010	8003	7940 8060				
2500	9998	9995	X				

A. LINEARITY
[X] ACCEPT

B. HYSTERESIS
[X] ACCEPT

C. REPEATABILITY
[X] ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7513	7,475 7,525	28V	28±0.2 VDC

[X] ACCEPT

Functional Calibration, Transducer SN 487

Figure 9

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-5-62

S/N 487

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	-1		X	40 Unit Variation	28V	28 ±0.2 VDC
500	2003	1988	1940 2060			
1000	4015	3997	3940 4060			
1500	6015	6003	5940 6060			
2000	8011	8008	7940 8060			
2500	10,000	10008	X			

X ACCEPT

X. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0		X	40 Unit Variation	28V	28 ± 0.2 VDC
500	1999	1984	1940 2060			
1000	4011	3992	3940 4060			
1500	6015	6000	5940 6060			
2000	8015	8002	7940 8060			
2500	10,000	9970	X			

X ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A +97.0	28V	+93.9	28V	+86.1	28V	28 ± 0.2 VDC
ZERO OUTPUT TOLERANCE	-D +102mv	X	A±55 mv	X	A±85 mv	X	

X ACCEPT

Functional Calibration, Transducer SN 487

Figure 9

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 5 of 5

DATE 12-5-62

S/N 487

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S.OUTPUT (PSIG) IN VOLTS	5.109	28V	5.128	28V	5.0760	28V	28 ± 0.2 VDC
ZERO OUTPUT (PSIA) IN VOLTS	.1269	28V	.1218	28V	.1160	28V	
CORRECTED F.S.OUTPUT IN VOLTS	A 4.982	28V	5.006	28V	4.9600	28v	
F.S.OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .055V	X	A ± .085V	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

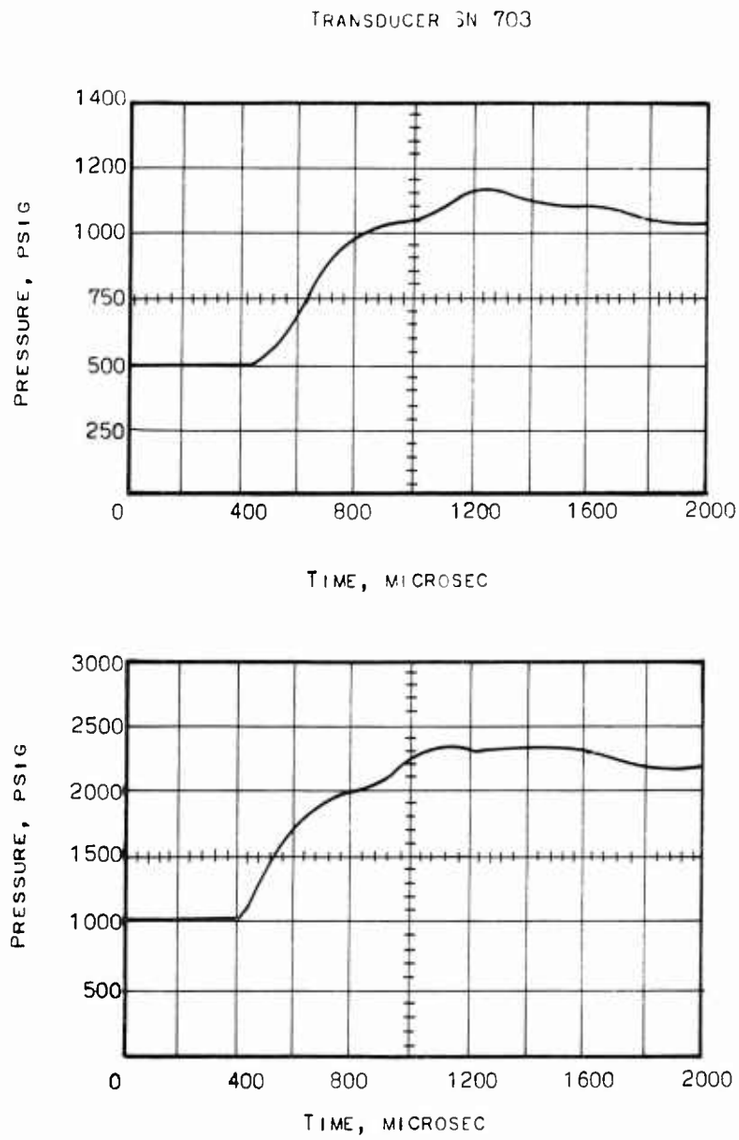
4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

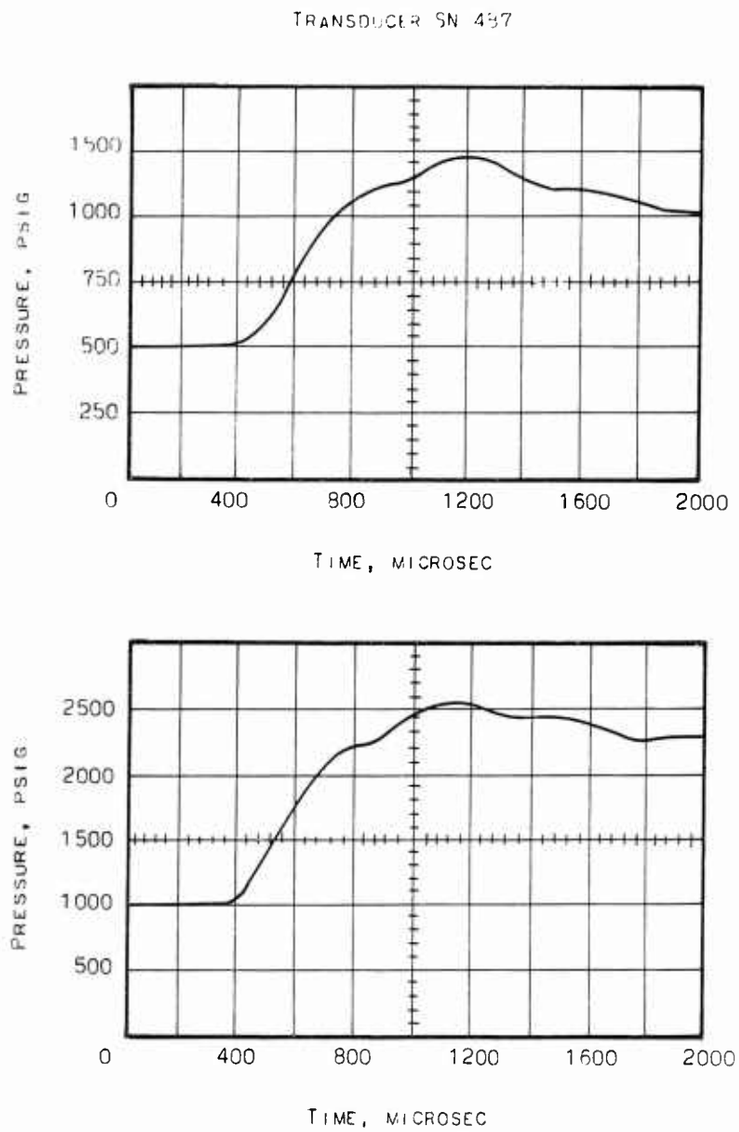
Functional Calibration, Transducer SN 487

Figure 9



Pressure Shock Traces, Transducer SN 703

Figure 10



Pressure Shock Traces, Transducer SN 487

Figure 11

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

PRE-SHOCK TUBE CALIBRATION
Page 1 of 5

P.O.# _____

MFG. Statham SERIAL NO. 487 RANGE 2.5M

MODEL PA334TC CALIBRATED BY Dept. 8772 DATE 12-5-62

ROOM TEMP. 74 °F ASSIGNED TO ENGINE NO. Qual Test

BAROMETRIC PRESSURE 759.3 MM HG PARAMETER MEASURED _____

CHECKED BY Ken Bushey
Dept. 8772

[X] ACCEPTED (NOTE g)

ASSIGNED BY R. E. Leeds

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS _____

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	10,000M	1 Megohm Minimum
B	10,000M	
C	10,000M	
D	10,000M	
E	10,000M	
F	10,000M	

[X] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	10,000M	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
42	70 MA Max.	28	28±0.2VDC

[X] ACCEPT

Calibration Prior to Pressure Shock Test,
Transducer SN 487

Figure 12

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-5-62

S/N 487

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
123.0	5.106	6.736	7.50V MAXIMUM	124.1	5.111

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
15	25 MV MAXIMUM

[X] ACCEPT

Calibration Prior to Pressure Shock Test,
Transducer SN 487

Figure 12

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-5-62

S/N 487

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS DECREASING	OUTPUT IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEAT-ABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	+3	+3	X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	28V	28 ± 0.2 VDC
500	2008	1994	1940 2060				
1000	4018	4002	3940 4060				
1500	6019	6007	5940 6060				
2000	8011	8004	7940 8060				
2500	10,000	9998	X				
0	+4	+4	X	40 Unit Variation		28V	
500	2010	1996	1940 2060				
1000	4018	4003	3940 4060				
1500	6017	6008	5940 6060				
2000	8010	8005	7940 8060				
2500	9998	9998	X				
0	+5	+5	X	40 Unit Variation		28V	
500	2009	1995	1940 2060				
1000	4018	4003	3940 4060				
1500	6016	6008	5940 6060				
2000	8010	8003	7940 8060				
2500	9998	9998	X				

A. LINEARITY [X] ACCEPT

B. HYSTERESIS [X] ACCEPT

C. REPEATABILITY [X] ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7513	7,475 7,525	28V	28±0.2 VDC

[X] ACCEPT

Calibration Prior to Pressure Shock Test,
Transducer SN 487

Figure 12

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-5-62

S/N 487

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	-1	-1	X	40 Unit Variation	28V	28 ±0.2 VDC
500	2003	1988	1940 2060			
1000	4015	3997	3940 4060			
1500	6015	6003	5940 6060			
2000	8011	8008	7940 8060			
2500	10,000	10008	X			

[X] ACCEPT

X. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0	0	X	40 Unit Variation	28V	28 ± 0.2 VDC
500	1999	1984	1940 2060			
1000	4011	3992	3940 4060			
1500	6015	6000	5940 6060			
2000	8015	8002	7940 8060			
2500	10,000	9970	X			

[X] ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A 97.0	28V	93.9	28V	86.1	28V	28 ± 0.2 VDC
ZERO OUTPUT TOLERANCE	-0 +102mv	X	A±55 mv	X	A±85 mv	X	

[X] ACCEPT

Calibration Prior to Pressure Shock Test,
Transducer SN 487

Figure 12

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 5 of 5
DATE 12-5-62
S/N 487

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S.OUTPUT (PSIG) IN VOLTS	5.109	28V	5.128	28V	5.076	28V	28 ± 0.2 VDC
ZERO OUTPUT (PSIA) IN VOLTS	.126	28V	.121	28V	.116	28V	
CORRECTED F.S.OUTPUT IN VOLTS	A 4.982	28V	5.006	28V	4.960-	28V	
F.S.OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .055V	X	A ± .085V	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Calibration Prior to Pressure Shock Test,
Transducer SN 487

Figure 12

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 5 of 5
DATE 12-5-62
S/N 487

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S.OUTPUT (PSIG) IN VOLTS	5.109	28V	5.128	28V	5.076	28V	28 ± 0.2 VDC
ZERO OUTPUT (PSIA) IN VOLTS	.126	28V	.121	28V	.116	28V	
CORRECTED F.S.OUTPUT IN VOLTS	A 4.982	28V	5.006	28V	4.960-	28V	
F.S.OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .055V	X	A ± .085V	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Calibration Prior to Pressure Shock Test,
Transducer SN 487

Figure 12

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

POST SHOCK TUBE CALIBRATION
Page 1 of 5

P.O.# _____

MFG. Statham SERIAL NO. 487 RANGE 0-2500 psia

MODEL PA334TC CALIBRATED BY Dept. 8772 DATE 1-22-63

ROOM TEMP. 75 °F ASSIGNED TO ENGINE NO. _____

BAROMETRIC PRESSURE 757.8 MM HG PARAMETER MEASURED _____

CHECKED BY Ken Bushey
Dept. 8772

[X] ACCEPTED (NOTE g)

ASSIGNED BY R. E. Leeds

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS _____

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	10,000M	1 Megohm Minimum
B	10,000M	
C	10,000M	
D	10,000M	
E	10,000M	
F	10,000M	

[X] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	10,000M	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
42	70 MA Max.	28	28±0.2VDC

[X] ACCEPT

Calibration After Pressure Shock Test,
Transducer SN 487

Figure 13

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-22-63

S/N 487

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
142.5	5.137	6,850	7.50V MAXIMUM	143.1	5.139

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
20mv	25 MV MAXIMUM

[X] ACCEPT

Calibration After Pressure Shock Test,
Transducer SN 487

Figure 13

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-22-63

S/N 487

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS DECREASING	OUTPUT IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEAT-ABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	+3		X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	28V	28 ± 0.2 VDC
500	2009	1993	1940 2060				
1000	4016	4000	3940 4060				
1500	6015	6004	5940 6060				
2000	8009	8003	7940 8060				
2500	10,000	9996	X				
0	+4		X	40 Unit Variation		28V	
500	2010	1994	1940 2060				
1000	4017	4001	3940 4060				
1500	6015	6005	5940 6060				
2000	8008	8003	7940 8060				
2500	9996	9996	X				
0	+6		X	40 Unit Variation		28V	
500	2010	1993	1940 2060				
1000	4018	4001	3940 4060				
1500	6015	6006	5940 6060				
2000	8008	8003	7940 8060				
2500	9996	9996	X				

A. LINEARITY
[X] ACCEPT

B. HYSTERESIS
[X] ACCEPT

C. REPEATABILITY
[X] ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7486	7,475 7,525	28	28±0.2 VDC

[X] ACCEPT

Calibration After Pressure Shock Test,
Transducer SN 487

Figure 13

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-22-63

S/N 487

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	+2		X	40 Unit Variation	28V	28 ±0.2 VDC
500	2001	1990	1940 2060			
1000	4011	3996	3940 4060			
1500	6009	5995	5940 6060			
2000	8007	7996	7940 8060			
2500	10,000	9995	X			

[X] ACCEPT

X. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0		X	40 Unit Variation	28V	28 ± 0.2 VDC
500	2001	1984	1940 2060			
1000	4012	3994	3940 4060			
1500	6015	6001	5940 6060			
2000	8015	8006	7940 8060			
2500	10,000	9984	X			

[X] ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A 100.5	28V	108.1	28V	106.9	28V	28 ± 0.2 VDC
ZERO OUTPUT TOLERANCE	-0 +102mv	X	A±55 mv	X	A±85 mv	X	

[X] ACCEPT

Calibration After Pressure Shock Test,
Transducer SN 487

Figure 13

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 5 of 5
DATE 1-22-63
S/N 487

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S. OUTPUT (PSIG) IN VOLTS	5.137	28	5.157	28	5.114	28	28 ± 0.2 VDC
ZERO OUTPUT (PSIG) IN VOLTS	.1427	28	.1373	28	.1382	28	
CORRECTED F.S. OUTPUT IN VOLTS	A 4.9943	28	5.0197	28	4.9758	28	
F.S. OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .055V	X	A ± .085V	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Calibration After Pressure Shock Test,
Transducer SN 487

Figure 13

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

PRE-SHOCK TUBE
Page 1 of 5

P.O.# _____

MFG. Statham SERIAL NO. 703 RANGE 0-2500 psia

MODEL PA334TC CALIBRATED BY Dept. 8772 DATE 12-5-62

ROOM TEMP. 74 °F ASSIGNED TO ENGINE NO. Qual Test

BAROMETRIC PRESSURE 759.3 MM HG PARAMETER MEASURED [illegible]

CHECKED BY Ken Bushey

[X] ACCEPTED (NOTE g)

ASSIGNED BY Dept. 8772 R. E. Leeds

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS _____

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	10,000M	1 Megohm Minimum
B	10,000M	
C	10,000M	
D	10,000M	
E	10,000M	
F	10,000M	

[X] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	10,000M	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
42	70 MA Max.	28	28±0.2VDC

[X] ACCEPT

Calibration Prior to Pressure Shock Test,
Transducer SN 703

Figure 14

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-5-62

S/N 703

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
77.5	5.052	6.581	7.50V MAXIMUM	68.4	5.044

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
10	25 MV MAXIMUM

[X] ACCEPT

Calibration Prior to Pressure Shock Test,
Transducer SN 703

Figure 14

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-5-62

S/N 703

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS DECREASING	OUTPUT IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEAT-ABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	+1		X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	28V	28 ± 0.2 VDC
500	1998	1998	1940 2060				
1000	4010	4009	3940 4060				
1500	6016	6017	5940 6060				
2000	8019	8020	7940 8060				
2500	10,000	9998	X				
0	-1		X	40 Unit Variation		28V	
500	1998	1998	1940 2060				
1000	4010	4008	3940 4060				
1500	6015	6016	5940 6060				
2000	8018	8020	7940 8060				
2500	9998	9998	X				
0	-1		X	40 Unit Variation		28V	
500	1998	1996	1940 2060				
1000	4009	4007	3940 4060				
1500	6015	6016	5940 6060				
2000	8019	8018	7940 8060				
2500	9998	9995	X				

A. LINEARITY [X] ACCEPT

B. HYSTERESIS [X] ACCEPT

C. REPEATABILITY [X] ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7512	7,475 7,525	28	28±0.2 VDC

[X] ACCEPT

Calibration Prior to Pressure Shock Test,
Transducer SN 703

Figure 14

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-5-62

S/N 703

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	-6		X	40 Unit Variation	28V	28 ±0.2 VDC
500	1994	1992	1940 2060			
1000	4005	4008	3940 4060			
1500	6012	6017	5940 6060			
2000	8012	8018	7940 8060			
2500	10,000	10006	X			

[X] ACCEPT

I. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0		X	40 Unit Variation	28V	28 ± 0.2 VDC
500	1993	1990	1940 2060			
1000	4001	3999	3940 4060			
1500	6007	6007	5940 6060			
2000	8014	8013	7940 8060			
2500	10,000	9998	X			

[X] ACCEPT

II. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A +39.7	28V	-33.0	28V	+30.3	28V	28 ± 0.2 VDC
ZERO OUTPUT TOLERANCE	-D +102mv	X	A±55 mv	X	A±85 mv	X	

[X] ACCEPT

Calibration Prior to Pressure Shock Test,
Transducer SN 703

Figure 14

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 5 of 5
DATE 12-5-62
S/N 703

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S.OUTPUT (PSIG) IN VOLTS	5.046	28V	5.043	28V	5.0170	28V	28 ± 0.2 VDC
ZERO OUTPUT (PSIA) IN VOLTS	.0690	28V	.0600	28V	.0618	28V	
CORRECTED F.S.OUTPUT IN VOLTS	A 4.977	28V	4.983	28V	4.9552	28V	
F.S.OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .055V	X	A ± .085V	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Calibration Prior to Pressure Shock Test,
Transducer SN 703

Figure 14

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

POST-SHOCK TUBE TEST
Page 1 of 5

P.O.# _____

MFG. Statham SERIAL NO. 703 RANGE 0-2500 psia

MODEL PA334TC-2.5M CALIBRATED BY Dept. 8772 DATE 1-9-63

ROOM TEMP. 74 °F ASSIGNED TO ENGINE NO. 44 FW-113

BAROMETRIC PRESSURE 766.30 MM HG PARAMETER MEASUREL _____

CHECKED BY P. Duxbury

[X] ACCEPTED (NOTE g)

ASSIGNED BY Dept. 8772 P. E. Leeds

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS _____

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	400M	1 Megohm Minimum
B	20,000M	
C	20,000M	
D	800M	
E	600M	
F	700M	

[X] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	20,000M	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
38MA	70 MA Max.	28V	28±0.2VDC

[X] ACCEPT

Calibration After Pressure Shock Test,
Transducer SN 703

Figure 15

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-9-63

S/N 703

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
67.1 mv	5.046	6.659	7.50V MAXIMUM	57.8	5.038

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
14 mv	25 MV MAXIMUM

[X] ACCEPT

Calibration After Pressure Shock Test,
Transducer SN 703

Figure 15

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-9-63

S/N 703

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS DECREASING	OUTPUT IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEAT-ABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	0	0	X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	28VDC	28 ± 0.2 VDC
500	1994.8	1992.2	1940 2060				
1000	4003.6	4000.6	3940 4060				
1500	6013.5	6010.8	5940 6060				
2000	8019.5	8012.5	7940 8060				
2500	10,000	9997.9	X				
0	0	0	X	40 Unit Variation		28V	
500	1995.4	1991.6	1940 2060				
1000	4002.4	3999.8	3940 4060				
1500	6012.8	6010.0	5940 6060				
2000	8013.7	8012.3	7940 8060				
2500	9997.9	9996.0	X				
0	0	0	X	40 Unit Variation		28V	
500	1995.4	1991.6	1940 2060				
1000	4002.8	3999.2	3940 4060				
1500	6012.1	6009.2	5940 6060				
2000	8013.3	8011.0	7940 8060				
2500	9996.0	9990.0	X				

A. LINEARITY [X] ACCEPT

B. HYSTERESIS [X] ACCEPT

C. REPEATABILITY [X] ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7503.7	7,475 7,525	28V	28±0.2 VDC

[X] ACCEPT

Calibration After Pressure Shock Test.
Transducer SN 703

Figure 15

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-9-63

S/N 703

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	-11	-11	X	40 Unit Variation	28V	28 ±0.2 VDC
500	1981.9	1996.7	1940 2060			
1000	3993.4	4001.0	3940 4060			
1500	6007.0	6012.0	5940 6060			
2000	8008.0	8010.7	7940 8060			
2500	10,000	9998.5	X			

[X] ACCEPT

X. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0	0	X	40 Unit Variation	28V	28 ± 0.2 VDC
500	1993.0	1997.5	1940 2060			
1000	4000.0	3995.0	3940 4060			
1500	6010.8	6006.9	5940 6060			
2000	8016.5	8013.7	7940 8060			
2500	10,000	9999.8	X			

[X] ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A 28mv	28V	7.5mv	28V	28.5mv	28V	28 ± 0.2 VDC
ZERO OUTPUT TOLERANCE	-D +102mv	X	A±55 mv	X	A±85 mv	X	

[X] ACCEPT

Calibration After Pressure Shock Test.
Transducer SN 703

Figure 15

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-9-63
S/N 703

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S. OUTPUT (PSIG) IN VOLTS	5.038V	28V	5.029V	28V	5.017V	28V	28 ± 0.2 VDC
ZERO OUTPUT (PSIA) IN VOLTS	57.8mv	28V	35.7mv	28V	57.33mv	28V	
CORRECTED F.S. OUTPUT IN VOLTS	A 4.980	28V	4.993	28V	4.959	28V	
F.S. OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .055V	X	A ± .085V	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Calibration After Pressure Shock Test,
Transducer SN 703

Figure 15

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 1 of 5

P.O.# _____

PRE TEST CALIBRATION

MFG. Statham SERIAL NO. 703 RANGE 0-2500 psia

MODEL PA33MTC CALIBRATED BY Dept. 8772 DATE 12-5-62

ROOM TEMP. 74 °F ASSIGNED TO ENGINE NO. 44 FW-112

BAROMETRIC PRESSURE 759.3 MM HG PARAMETER MEASURED Igniter Pressure

CHECKED BY Ken Bushey

[X] ACCEPTED (NOTE g)

ASSIGNED BY Dept. 8772 R. S. Leeds

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS _____

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	10,000M	1 Megohm Minimum
B	10,000M	
C	10,000M	
D	10,000M	
E	10,000M	
F	10,000M	

[X] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	10,000M	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
42	70 MA Max.	28	28±0.2VDC

[X] ACCEPT

Pretest Calibration, Transducer SN 703 (Motor 44FW-112)

Figure 16

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-5-62

S/N 703

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
77.5	5.052	6.581	7.50V MAXIMUM	68.4	5.044

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
10	25 MV MAXIMUM

[X] ACCEPT

Pretest Calibration, Transducer SN 703 (Motor 44FW-112)

Figure 16

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-5-62

S/N 703

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS DECREASING	OUTPUT IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEATABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	+1		X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	28	28 ± 0.2 VDC
500	1998	1998	1940 2060				
1000	4010	4009	3940 4060				
1500	6016	6017	5940 6060				
2000	8019	8020	7940 8060				
2500	10,000	9998	X				
0	-1		X	40 Unit Variation		28	
500	1998	1998	1940 2060				
1000	4010	4008	3940 4060				
1500	6015	6016	5940 6060				
2000	8018	8020	7940 8060				
2500	9998	9998	X				
0	-1		X	40 Unit Variation		28	
500	1998	1996	1940 2060				
1000	4009	4007	3940 4060				
1500	6015	6016	5940 6060				
2000	8019	8018	7940 8060				
2500	9998	9995	X				

A. LINEARITY [X] ACCEPT

B. HYSTERESIS [X] ACCEPT

C. REPEATABILITY [X] ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7512	7,475 7,525	28	28±0.2 VDC

[X] ACCEPT

Pretest Calibration, Transducer SN 703 (Motor 44FW-112)

Figure 16

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-5-62

S/N 703

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	-6		X	40 Unit Variation	28	28 ±0.2 VDC
500	1994	1992	1940 2060			
1000	4005	4008	3940 4060			
1500	6012	6017	5940 6060			
2000	8012	8018	7940 8060			
2500	10,000	10006	X			

[X] ACCEPT

X. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0		X	40 Unit Variation	28	28 ± 0.2 VDC
500	1993	1990	1940 2060			
1000	4001	3999	3940 4060			
1500	6007	6007	5940 6060			
2000	8014	8013	7940 8060			
2500	10,000	9998	X			

[X] ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A +39.7	28	+33.0	28	+39.3	28	28 ± 0.2 VDC
ZERO OUTPUT TOLERANCE	-D +102mv	X	A±55 mv	X	A±85 mv	X	

[X] ACCEPT

Pretest Calibration, Transducer SN 703 (Motor 44FW-112)

Figure 16

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 5 of 5
DATE 12-5-62
S/N 703

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S.OUTPUT (PSIG) IN VOLTS	5.046	28	5.043	28	5.0170	28	28 ± 0.2 VDC
ZERO OUTPUT (PSIA) IN VOLTS	.0690	28	.0690	28	.0618	28	
CORRECTED F.S.OUTPUT IN VOLTS	A 4.977	28	4.983	28	4.9552	28	
F.S.OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .055V	X	A ± .085V	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Pretest Calibration, Transducer SN 703 (Motor 44FW-112)

Figure 16

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 1 of 5

P.O.# _____

POST TEST CALIBRATION

MFG. Statham SERIAL NO. 703 RANGE 0-2500 psia

MODEL PA334TC CALIBRATED BY Dept. 8772 DATE 1-31-63

ROOM TEMP. 74 °F ASSIGNED TO ENGINE NO. 44 FW-112

BAROMETRIC PRESSURE 749.3 MM HG PARAMETER MEASURED Igniter Pressure

CHECKED BY Ken Bushey

[X] ACCEPTED (NOTE g)

ASSIGNED BY Dept. 8772 R. E. Leeds

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS _____

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	10,000M	1 Megohm Minimum
B	10,000M	
C	10,000M	
D	10,000M	
E	10,000M	
F	10,000M	

[X] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	10,000M	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
42	70 MA Max.	28	28±0.2VDC

[X] ACCEPT

Posttest Calibration, Transducer SN 703 (Motor 44FW-112)

Figure 17

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-31-63

S/N 703

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
69.5	5.048	6.647	7.50V MAXIMUM	63.6	5.045

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
14	25 MV MAXIMUM

[X] ACCEPT

Posttest Calibration, Transducer SN 703 (Motor 44FW-112)

Figure 17

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-31-63

S/N 703

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
69.5	5.048	6.647	7.50V MAXIMUM	63.6	5.045

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
14	25 MV MAXIMUM

[X] ACCEPT

Posttest Calibration, Transducer SN 703 (Motor 44FW-112)

Figure 17

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-31-63

S/N 703

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS DECREASING	OUTPUT IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEAT-ABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	0		X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	28	28 ± 0.2 VDC
500	2000	1995	1940 2060				
1000	4007	4005	3940 4060				
1500	6014	6009	5940 6060				
2000	8018	8014	7940 8060				
2500	10,000	9996	X				
0	-1		X	40 Unit Variation		28	
500	1998	1994	1940 2060				
1000	4006	4003	3940 4060				
1500	6012	6007	5940 6060				
2000	8016	8013	7940 8060				
2500	9996	9995	X				
0	-1		X	40 Unit Variation		28	
500	1996	1993	1940 2060				
1000	4005	4001	3940 4060				
1500	6007	6006	5940 6060				
2000	8013	8011	7940 8060				
2500	9995	9993	X				

A. LINEARITY
[X] ACCEPT

B. HYSTERESIS
[X] ACCEPT

C. REPEATABILITY
[X] ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7503	7,475 7,525	28	28±0.2 VDC

[X] ACCEPT

Posttest Calibration, Transducer SN 703 (Motor 44FW-112)

Figure 17

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-31-63

S/N 703

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0		X	40 Unit Variation	28	28 ±0.2 VDC
500	1999	1996	1940 2060			
1000	4008	4006	3940 4060			
1500	6013	6013	5940 6060			
2000	8015	8017	7940 8060			
2500	10,000	9998	X			

[X] ACCEPT

X. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0		X	40 Unit Variation	28	28 ± 0.2 VDC
500	1992	1988	1940 2060			
1000	4001	3997	3940 4060			
1500	6007	6002	5940 6060			
2000	8013	8011	7940 8060			
2500	10,000	9997	X			

[X] ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A 34.3	28	31.8	28	23.5	28	28 ± 0.2 VDC
ZERO OUTPUT TOLERANCE	-0 +102mv	X	A±55 mv	X	A±85 mv	X	

[X] ACCEPT

Posttest Calibration, Transducer SN 703 (Motor 44FW-112)

Figure 17

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 5 of 5
DATE 1-31-63
S/N 703

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S. OUTPUT (PSIG) IN VOLTS	5.037	28	5.0500	28	5.0070	28	28 ± 0.2 VDC
ZERO OUTPUT (PSIA) IN VOLTS	.0630	28	.0605	28	.0539	28	
CORRECTED F.S. OUTPUT IN VOLTS	A 4.9740	28	4.9895	28	4.9531	28	
F.S. OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .055V	X	A ± .085V	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Posttest Calibration, Transducer SN 703 (Motor 44FW-112)

Figure 17

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 1 of 5

P.O.# _____

PRE-TEST CALIBRATION

MFG. Statham SERIAL NO. 493 RANGE 0-2500 psia

MODEL PA334TC-2.5M CALIBRATED BY Dept. 8772 DATE 1-16-63

ROOM TEMP. 75 °F ASSIGNED TO ENGINE NO. 44 FW-113

BAROMETRIC PRESSURE 759.0 MM HG PARAMETER MEASURED Igniter Pressure

CHECKED BY Ken Bushey
Dept. 8772

[X] ACCEPTED (NOTE g)

ASSIGNED BY R. E. Leeds

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS _____

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	10,000M	1 Megohm Minimum
B	10,000M	
C	10,000M	
D	10,000M	
E	10,000M	
F	10,000M	

[X] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	10,000M	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
40.5	70 MA Max.	28	28±0.2VDC

[X] ACCEPT

Pretest Calibration, Transducer SN 493 (Motor 44FW-113)

Figure 18

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-16-63

S/N 493

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
82.4	5.064	6.785	7.50V MAXIMUM	79.2	5.063

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
13 mv	25 MV MAXIMUM

[X] ACCEPT

Pretest Calibration, Transducer SN 493 (Motor 44FW-113)

Figure 18

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-16-63

S/N 493

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS DECREASING	OUTPUT IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEAT-ABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	-3		X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	28	28 ± 0.2 VDC
500	2010	2001	1940 2060				
1000	4028	4020	3940 4060				
1500	6040	6033	5940 6060				
2000	8037	8033	7940 8060				
2500	10,000		X				
0	-3		X	40 Unit Variation		28	
500	2008	2006	1940 2060				
1000	4026	4024	3940 4060				
1500	6038	6033	5940 6060				
2000	8038	8033	7940 8060				
2500	10000	10000	X				
0	-3		X	40 Unit Variation		28	
500	2005	2004	1940 2060				
1000	4026	4021	3940 4060				
1500	6037	6030	5940 6060				
2000	8035	8033	7940 8060				
2500	10000	10000	X				

A. LINEARITY
[X] ACCEPT

B. HYSTERESIS
[X] ACCEPT

C. REPEATABILITY
[X] ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7496	7,475 7,525	28	28±0.2 VDC

[X] ACCEPT

Pretest Calibration, Transducer SN 493 (Motor 44FW-113)

Figure 18

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-16-63

S/N 493

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0		X	40 Unit Variation	28	28 ±0.2 VDC
500	2003	2010	1940 2060			
1000	4030	4033	3940 4060			
1500	6040	6042	5940 6060			
2000	8036	8042	7940 8060			
2500	10,000	9997	X			

[X] ACCEPT

X. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	-2	-2	X	40 Unit Variation	28	28 ± 0.2 VDC
500	2009	2000	1940 2060			
1000	4020	4012	3940 4060			
1500	6034	6023	5940 6060			
2000	8034	8030	7940 8060			
2500	10,000	9998	X			

[X] ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A +49.7	28	59.7	28	27.2	28	28 ± 0.2 VDC
ZERO OUTPUT TOLERANCE	-D +102mv	X	A±55 mv	X	A±85 mv	X	

[X] ACCEPT

Pretest Calibration, Transducer SN 493 (Motor 44FW-113)

Figure 18

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 5 of 5
DATE 1-16-63
S/N 493

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S.OUTPUT (PSIG) IN VOLTS	5.057	28	5.077	28	5.025	28	28 ± 0.2 VDC
ZERO OUTPUT (PSIA) IN VOLTS	.0759	28	.0883	28	.0561	28	
CORRECTED F.S.OUTPUT IN VOLTS	A 4.9881	28	4.9887	28	4.9689	28	
F.S.OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .055V	X	A ± .085V	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Pretest Calibration, Transducer SN 493 (Motor 44FW-113)

Figure 18

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

P.O.# _____

POST TEST CALIBRATION

MFG. Statham SERIAL NO. 493 RANGE 0-2500 psia

MODEL PA33LTC CALIBRATED BY Dept. 8772 DATE 1-31-63

ROOM TEMP. 74 °F ASSIGNED TO ENGINE NO. 44 FW-113

BAROMETRIC PRESSURE 749.3 MM HG PARAMETER MEASURED Limiter Pressure

CHECKED BY Ken Bushey

[X] ACCEPTED (NOTE g)

ASSIGNED BY Dept. 8772 R. E. Leeds

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS _____

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	10,000M	1 Megohm Minimum
B	10,000M	
C	10,000M	
D	10,000M	
E	10,000M	
F	10,000M	

[X] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	10,000M	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
40	70 MA Max.	28	28±0.2VDC

[X] ACCEPT

Posttest Calibration, Transducer SN 493 (Motor 44FW-113)

Figure 19

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-31-63

S/N 493

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
83.9	5.062	6.783	7.50V MAXIMUM	80.3	5.064

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
14	25 MV MAXIMUM

[X] ACCEPT

Posttest Calibration, Transducer SN 493 (Motor 44FW-113)

Figure 19

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-31-63

S/N 493

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS DECREASING	OUTPUT IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEAT-ABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	0		X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	28	28 ± 0.2 VDC
500	2010	2004	1940 2060				
1000	4027	4018	3940 4060				
1500	6036	6030	5940 6060				
2000	8036	8029	7940 8060				
2500	10,000	9996	X				
0	0		X	40 Unit Variation		28	
500	2009	2002	1940 2060				
1000	4026	4017	3940 4060				
1500	6036	6028	5940 6060				
2000	8033	8027	7940 8060				
2500	9996	9995	X				
0	0		X	40 Unit Variation		28	
500	2009	2002	1940 2060				
1000	4025	4017	3940 4060				
1500	6034	6028	5940 6060				
2000	8032	8026	7940 8060				
2500	9995	9995	X				

A. LINEARITY
[X] ACCEPT

B. HYSTERESIS
[X] ACCEPT

C. REPEATABILITY
[X] ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7497	7,475 7,525	28	28±0.2 VDC

[X] ACCEPT

Posttest Calibration, Transducer SN 493 (Motor 44FW-113)

Figure 19

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 4 of 5

DATE 1-31-63

S/N 493

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0		X	40 Unit Variation	28	28 ±0.2 VDC
500	2004	1997	1940 2060			
1000	4027	4019	3940 4060			
1500	6038	6033	5940 6060			
2000	8034	8032	7940 8060			
2500	10,000	9998	X			

[X] ACCEPT

X. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0		X	40 Unit Variation	28	28 ± 0.2 VDC
500	2005	1997	1940 2060			
1000	4019	4010	3940 4060			
1500	6030	6020	5940 6060			
2000	8033	8028	7940 8060			
2500	10,000	9998	X			

[X] ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A 48.9	28	60.9	28	29.2	28	28 ± 0.2 VDC
ZERO OUTPUT TOLERANCE	-0 +102mv	X	A±55 mv	X	A±85 mv	X	

[X] ACCEPT

Posttest Calibration, Transducer SN 493 (Motor 44FW-113)

Figure 19

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 5 of 5
DATE 1-31-63
S/N 493

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S. OUTPUT (PSIG) IN VOLTS	5.055	28	5.0730	28	5.0260	28	28 ± 0.2 VDC
ZERO OUTPUT (PSIA) IN VOLTS	.0783	28	.0903	28	.0595	28	
CORRECTED F.S. OUTPUT IN VOLTS	A 4.9767	28	4.9827	28	4.9665	28	
F.S. OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .055V	X	A ± .085V	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Posttest Calibration, Transducer SN 493 (Motor 44FW-113)

Figure 19

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

P.O.#

PRE-TEST CALIBRATION

MFG. Statham SERIAL NO. 703 RANGE 0-2500 psia

MODEL PA334TC CALIBRATED BY Dept. 8772 DATE 1-31-63

ROOM TEMP. 74 °F ASSIGNED TO ENGINE NO. 44 FW-88

BAROMETRIC PRESSURE 749.3 MM HG PARAMETER MEASURED Igniter Pressure

CHECKED BY Ken Bushey
Dept. 8772

[X] ACCEPTED (NOTE g)

ASSIGNED BY R. E. Leeds

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	10,000M	1 Megohm Minimum
B	10,000M	
C	10,000M	
D	10,000M	
E	10,000M	
F		

[X] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	10,000M	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
42	70 MA Max.	28	28±0.2VDC

[X] ACCEPT

Pretest Calibration, Transducer SN 703 (Motor 44FW-88)

Figure 20

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-31-63

S/N 703

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
69.5	5.048	6.647	7.50V MAXIMUM	63.6	5.045

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
14	25 MV MAXIMUM

[X] ACCEPT

Pretest Calibration, Transducer SN 703 (Motor 44FW-88)

Figure 20

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-31-63

S/N 703

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS DECREASING	OUTPUT IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEATABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	0		X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	28	28 ± 0.2 VDC
500	2000	1995	1940 2060				
1000	4007	4005	3940 4060				
1500	6014	6009	5940 6060				
2000	8018	8014	7940 8060				
2500	10,000	9996	X				
0	-1		X	40 Unit Variation		28	
500	1998	1994	1940 2060				
1000	4006	4003	3940 4060				
1500	6012	6007	5940 6060				
2000	8016	8013	7940 8060				
2500	9996	9995	X				
0	-1		X	40 Unit Variation		28	
500	1996	1993	1940 2060				
1000	4005	4001	3940 4060				
1500	6007	6006	5940 6060				
2000	8013	8011	7940 8060				
2500	9995	9993	X				

A. LINEARITY
[X] ACCEPT

B. HYSTERESIS
[X] ACCEPT

C. REPEATABILITY
[X] ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7503	7,475 7,525	28	28±0.2 VDC

[X] ACCEPT

Pretest Calibration, Transducer SN 703 (Motor 44FW-88)

Figure 20

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-31-63

S/N 703

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0		X	40 Unit Variation	28	28 ±0.2 VDC
500	1999	1996	1940 2060			
1000	4008	4006	3940 4060			
1500	6013	6013	5940 6060			
2000	8015	8017	7940 8060			
2500	10,000	9998	X			

[X] ACCEPT

I. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0		X	40 Unit Variation	28	28 ± 0.2 VDC
500	1992	1988	1940 2060			
1000	4001	3997	3940 4060			
1500	6007	6002	5940 6060			
2000	8013	8011	7940 8060			
2500	10,000	9997	X			

[X] ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A 34.3	28	31.8	28	23.5	28	28 ± 0.2 VDC
ZERO OUTPUT TOLERANCE	-0 +102mv	X	A±55 mv	X	A±85 mv	X	

[X] ACCEPT

Pretest Calibration, Transducer SN 703 (Motor 44FW-88)

Figure 20

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 5 of 5
DATE 1-31-63
S/N 703

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S.OUTPUT (PSIG) IN VOLTS	5.037	28	5.0500	28	5.0070	28	28 ± 0.2 VDC
ZERO OUTPUT (PSIA) IN VOLTS	.0630	28	.0605	28	.0539	28	
CORRECTED F.S.OUTPUT IN VOLTS	A 4.9730	28	4.9895	28	4.9531	28	
F.S.OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .055V	X	A ± .085V	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Pretest Calibration, Transducer SN 703 (Motor 44FW-88)

Figure 20

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

POST TEST CALIBRATION
Page 1 of 5

P.O.# _____

MFG. Statham SERIAL NO. 703 RANGE 0-2500 psia

MODEL PA33HTC-750 CALIBRATED BY Dept. 8772 DATE 3-15-63

ROOM TEMP. 75 °F ASSIGNED TO ENGINE NO. 44 FW-88

BAROMETRIC PRESSURE 752.0 MM HG PARAMETER MEASURED Igniter Pressure

CHECKED BY Ken Bushey

[X] ACCEPTED (NOTE g)

ASSIGNED BY Dept. 8772 R. E. Leeds

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS _____

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	10,000M	1 Megohm Minimum
B	10,000M	
C	10,000M	
D	10,000M	
E	10,000M	
F	10,000M	

[X] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	10,000M	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
42	70 MA Max.	28	28±0.2VDC

[X] ACCEPT

Posttest Calibration, Transducer SN 703 (Motor 44FW-88)

Figure 21

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 3-15-63

S/N 703

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
72.4	5.069	6.672	7.50V MAXIMUM	68.4	5.065

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
10	25 MV MAXIMUM

[X] ACCEPT

Posttest Calibration, Transducer SN 703 (Motor 44FW-88)

Figure 21

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 3-15-63

S/N 703

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS DECREASING	OUTPUT IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEAT-ABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	0		X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	28	28 ± 0.2 VDC
500	1999	1995	1940 2060				
1000	4010	4006	3940 4060				
1500	6017	6013	5940 6060				
2000	8020	8016	7940 8060				
2500	10,000	9997	X				
0	0		X	40 Unit Variation		28	
500	1999	1995	1940 2060				
1000	4 1[illegible]	4007	3940 4060				
1500	6015	6013	5940 6060				
2000	8017	8016	7940 8060				
2500	9997	9997	X				
0	0		X	40 Unit Variation		28	
500	1999	1993	1940 2060				
1000	4010	4005	3940 4060				
1500	6015	6011	5940 6060				
2000	8017	8013	7940 8060				
2500	9997	9994	X				

A. LINEARITY
[X] ACCEPT

B. HYSTERESIS
[X] ACCEPT

C. REPEATABILITY
[X] ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7505	7,475 7,525	28	28±0.2 VDC

[X] ACCEPT

Posttest Calibration, Transducer SN 703 (Motor 44FW-88)

Figure 21

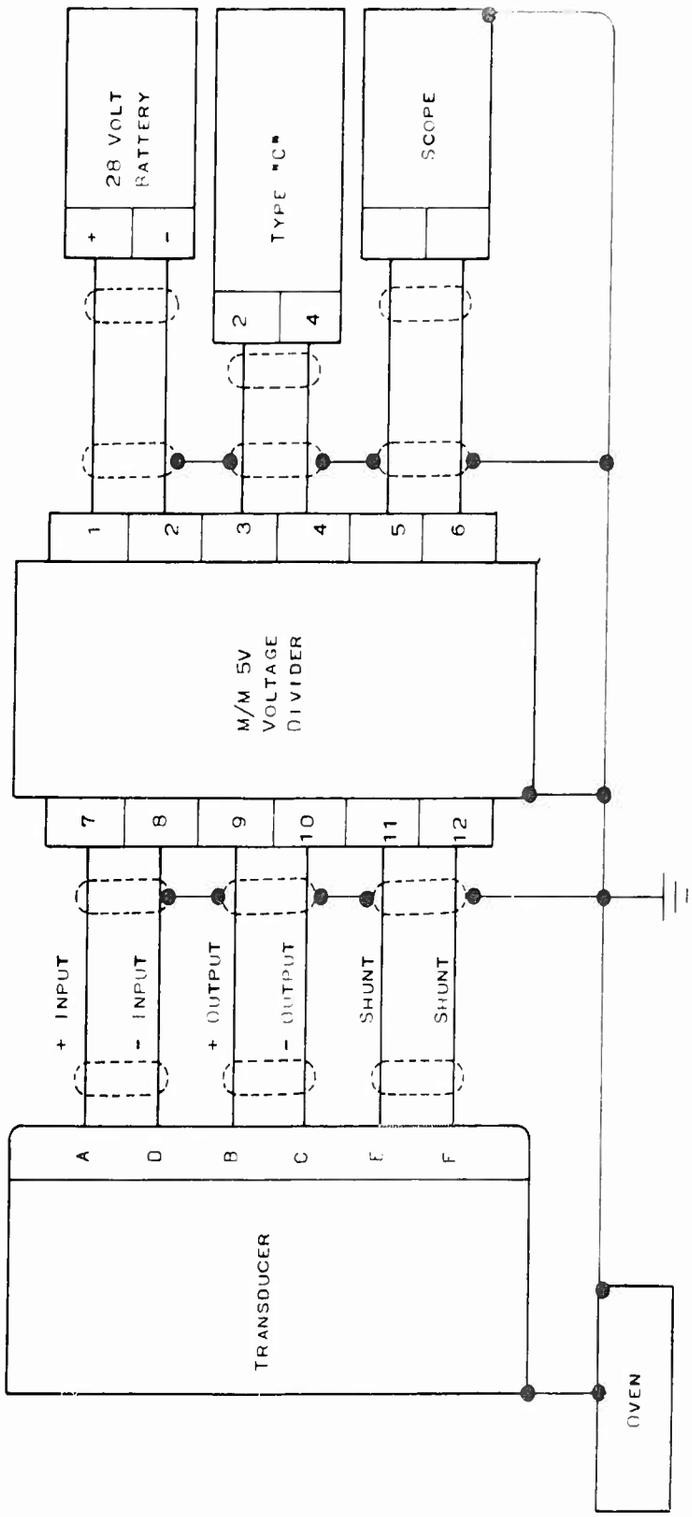


Figure 21

Posttest Calibration, Transducer SN 703 (Motor 44FW-88)

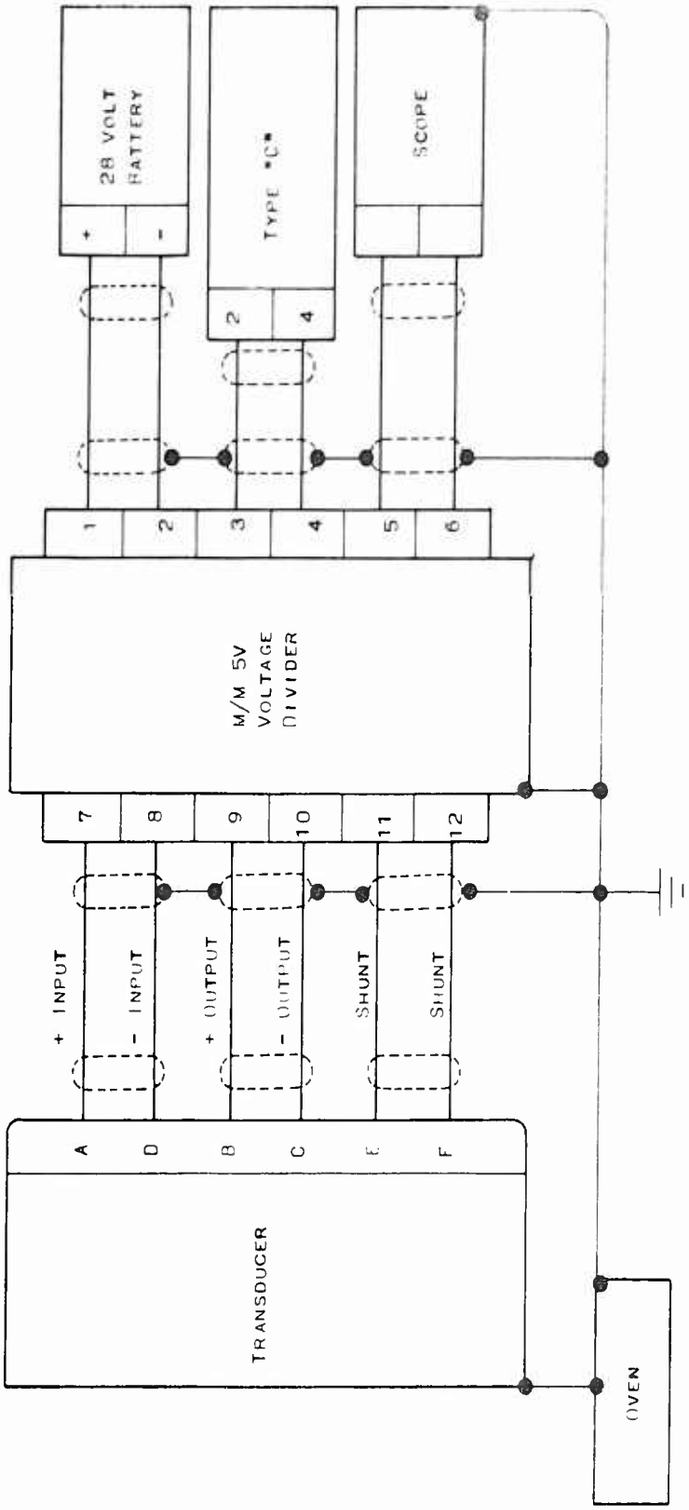
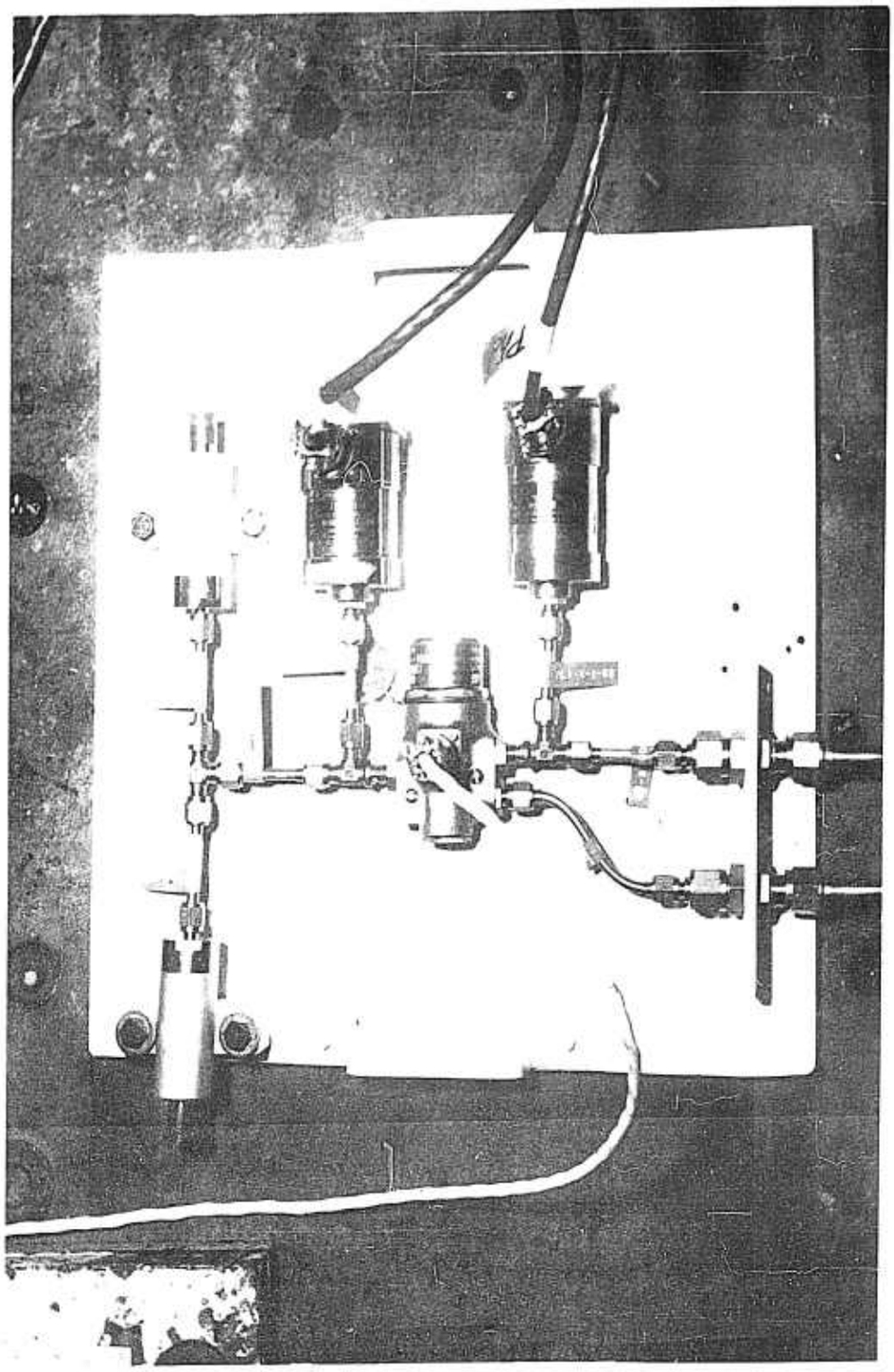


Figure 21

Posttest Calibration, Transducer SN 703 (Motor 44FW-88)



Posttest Calibration, Transducer SN 703 (Motor 44FW-88)

Figure 21

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 1 of 5

P.O.# _____

PRE TEST CALIBRATION

MFG. Statham SERIAL NO. 477 RANGE 0-2500 psia

MODEL PA33ATC CALIBRATED BY Dept. 8772 DATE 12-11-62

ROOM TEMP. 76 °F ASSIGNED TO ENGINE NO. 44 FW-75

BAROMETRIC PRESSURE 757.4 MM HG PARAMETER MEASURED Igniter Pressure

CHECKED BY Ken Bushey

[X] ACCEPTED (NOTE g)

ASSIGNED BY Dept. 8772 R. E. Leeds

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS _____

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	10,000M	1 Megohm Minimum
B	10,000M	
C	10,000M	
D	10,000M	
E	10,000M	
F	10,000M	

[X] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	10,000M	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
41	70 MA Max.	28	28±0.2VDC

[X] ACCEPT

Pretest Calibration, Transducer SN 477 (Motor 44FW-75)

Figure 22

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-12-62

S/N 477

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
35.9	5.037	6.736	7.50V MAXIMUM	49.6	5.056

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
15mv	25 MV MAXIMUM

[X] ACCEPT

Pretest Calibration, Transducer SN 477 (Motor 44FW-75)

Figure 22

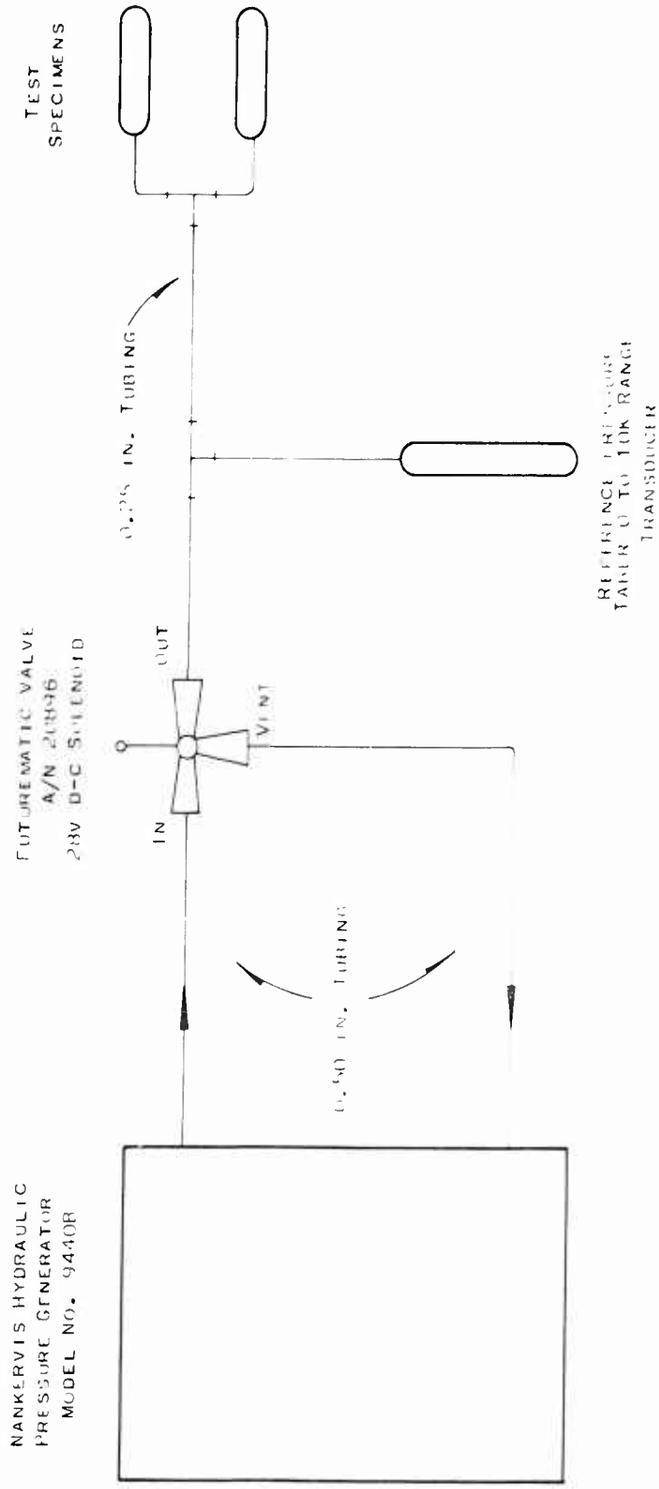


Figure 22

Protest Calibration, Transducer SN 477 (Motor 4FW-75)

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 3-15-63

S/N 773

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0		X	40 Unit Variation	28	28 ±0.2 VDC
500	1999	1996	1940 2060			
1000	4010	4010	3940 4060			
1500	6017	6019	5940 6060			
2000	8014	8019	7940 8060			
2500	10,000	10000	X			

[X] ACCEPT

X. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	-2		X	40 Unit Variation	28	28 ± 0.2 VDC
500	1993	1990	1940 2060			
1000	4003	3997	3940 4060			
1500	6009	6000	5940 6060			
2000	8015	8005	7940 8060			
2500	10,000	9990	X			

[X] ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A +41.5	28	-21.9	28	-30.0	28	28 ± 0.2 VDC
ZERO OUTPUT TOLERANCE	-D +102mv	X	A±55 mv	X	A±85 mv	X	

[X] ACCEPT

Pretest Calibration, Transducer SN 477 (Motor 44FW-75)

Figure 22

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE [illegible]

S/N [illegible]

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S. OUTPUT (PSIG) IN VOLTS	5.063	28	5.063	28	5.035	28	28 ± 0.2 VDC
ZERO OUTPUT (PSIA) IN VOLTS	.0691	28	[illegible]	28	[illegible]	28	
CORRECTED F.S. OUTPUT IN VOLTS	A 4.9939	28	[illegible]	28	[illegible]	28	
F.S. OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .0557	X	A ± .0857	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Pretest Calibration, Transducer SN 477 (Motor 44FW-75)

Figure 22

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

P.O.# _____

POST TEST CALIBRATION

MFG. Statham SERIAL NO. 477 RANGE 0-2500 psia

MODEL PA33-TC-2.5V CALIBRATED BY Dept. 8772 DATE 9-24-63

ROOM TEMP. 75 °F ASSIGNED TO ENGINE NO. 44FW-75

BAROMETRIC PRESSURE 759.0 MM HG PARAMETER MEASURED Chamber Pressure

CHECKED BY Alex Busey
Dept. 8772

[X] ACCEPTED (NOTE g)

ASSIGNED BY R. E. Leeds

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS _____

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	10,000M	1 Megohm Minimum
B	10,000M	
C	10,000M	
D	10,000M	
E	10,000M	
F	10,000M	

[X] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	10,000M	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
20.5	70 MA Max.	28	28±0.2VDC

[X] ACCEPT

Posttest Calibration, Transducer SN 477 (Motor 44FW-75)

Figure 23

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-16-63
S/N 477

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
62.7	5.067	6.774	7.50V MAXIMUM	60.5	5.070

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
15 mv	25 MV MAXIMUM

[X] ACCEPT

Posttest Calibration, Transducer SN 477 (Motor 44FW-75)

Figure 23

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-12-62

S/N 477

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS DECREASING	OUTPUT IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEATABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	0000	0000	X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	28V	28 ± 0.2 VDC
500	2001	2006	1940 2060				
1000	4005	3975	3940 4060				
1500	6003	5975	5940 6060				
2000	8006	7990	7940 8060				
2500	10,000	10000	X				
0	0000	0000	X	40 Unit Variation		28V	
500	2003	2008	1940 2060				
1000	4005	3978	3940 4060				
1500	6001	5983	5940 6060				
2000	8005	7992	7940 8060				
2500	10000	10000	X				
0	0000	0000	X	40 Unit Variation		28V	
500	2004	2009	1940 2060				
1000	4008	3973	3940 4060				
1500	6005	5980	5940 6060				
2000	8008	7988	7940 8060				
2500	10000	10000	X				

A. LINEARITY [X] ACCEPT

B. HYSTERESIS [X] ACCEPT

C. REPEATABILITY [X] ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7510	7,475 7,525	28	28±0.2 VDC

[X] ACCEPT

Posttest Calibration, Transducer SN 477 (Motor 44FW-75)

Figure 23

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-12-62

S/N 477

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	-1		X	40 Unit Variation	28	28 ±0.2 VDC
500	[illegible]	1975	1940 2060			
1000	[illegible]	3972	3940 4060			
1500	[illegible]	5973	5940 6060			
2000	[illegible]	7986	7940 8060			
2500	10,000	[illegible]	X			

[X] ACCEPT

X. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	-1		X	40 Unit Variation	28	28 ± 0.2 VDC
500	1993	1973	1940 2060			
1000	3998	3970	3940 4060			
1500	5998	5973	5940 6060			
2000	8000	7985	7940 8060			
2500	10,000	9998	X			

[X] ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A 21.2	28	-25.8	28	-30.8	28	28 ± 0.2 VDC
ZERO OUTPUT TOLERANCE	-0 +102mv	X	A±55 mv	X	A±85 mv	X	

[X] ACCEPT

Posttest Calibration, Transducer SN 477 (Motor 44FW-75)

Figure 23

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 5 of 5
DATE 12-12-62
S/N 477

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S.OUTPUT (PSIG) IN VOLTS	5.053	28	5.047	28	5.031	28	28 ± 0.2 VDC
ZERO OUTPUT (PSIA) IN VOLTS	.0491	28	.0542	28	[illegible]	28	
CORRECTED F.S.OUTPUT IN VOLTS	A 5.0039	28	4.993	28	5.027	28	
F.S.OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .055V	X	A ± .085V	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Posttest Calibration, Transducer SN 477 (Motor 44FW-75)

Figure 23

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

PRE-TEST CALIBRATION
Page 1 of 5

P.O.# _____

MFG. [illegible] SERIAL NO. [illegible] RANGE 2500 psia

MODEL PA33.X CALIBRATED BY Dept. 8772 DATE [illegible]

ROOM TEMP. [illegible] °F ASSIGNED TO ENGINE NO. [illegible]

BAROMETRIC PRESSURE [illegible] MM HG PARAMETER MEASURED Igniter Pressure

CHECKED BY [illegible]
Dept. 8772
ASSIGNED BY R. A. Meece

[X] ACCEPTED
(NOTE g)

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS _____

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	10,000M	1 Megohm Minimum
B	10,000M	
C	10,000M	
D	10,000M	
E	10,000M	
F	10,000M	

[X] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	10,000M	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
[illegible]	70 MA Max.	28	28±0.2VDC

[X] ACCEPT

Pretest Calibration, Transducer SN 493 (Motor 44FW-94)

Figure 24

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-31-63

S/N 493

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
23.9	5.062	6.783	7.50V MAXIMUM	20.3	5.064

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
14	25 MV MAXIMUM

[X] ACCEPT

Pretest Calibration, Transducer SN 493 (Motor 44FW-94)

Figure 24

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE [illegible]

S/N [illegible]

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS DECREASING	OUTPUT IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEATABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	[illegible]		X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	[illegible]	28 ± 0.2 VDC
500	[illegible]	[illegible]	1940 2060				
1000	[illegible]	[illegible]	3940 4060				
1500	[illegible]	[illegible]	5940 6060				
2000	[illegible]	[illegible]	7940 8060				
2500	10,000	[illegible]	X				
0	[illegible]		X	40 Unit Variation		[illegible]	
500	[illegible]	[illegible]	1940 2060				
1000	[illegible]	[illegible]	3940 4060				
1500	[illegible]	[illegible]	5940 6060				
2000	[illegible]	[illegible]	7940 8060				
2500	[illegible]	[illegible]	X				
0	[illegible]		X	40 Unit Variation		[illegible]	
500	[illegible]	[illegible]	1940 2060				
1000	[illegible]	[illegible]	3940 4060				
1500	[illegible]	[illegible]	5940 6060				
2000	[illegible]	[illegible]	7940 8060				
2500	[illegible]	[illegible]	X				

A. LINEARITY [X] ACCEPT

B. HYSTERESIS [X] ACCEPT

C. REPEATABILITY [X] ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	[illegible]	7,475 7,525	[illegible]	28±0.2 VDC

[X] ACCEPT

Pretest Calibration, Transducer SN 493 (Motor 44FW-94)

Figure 24

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE [illegible]

S/N [illegible]

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0		X	40 Unit Variation	28	28 ±0.2 VDC
500	[illegible]	[illegible]	1940 2060			
1000	4027	[illegible]	3940 4060			
1500	[illegible]	[illegible]	5940 6060			
2000	[illegible]	[illegible]	7940 8060			
2500	10,000	[illegible]	X			

[X] ACCEPT

X. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0		X	40 Unit Variation	28	28 ± 0.2 VDC
500	[illegible]	[illegible]	1940 2060			
1000	4019	[illegible]	3940 4060			
1500	6030	6020	5940 6060			
2000	[illegible]	[illegible]	7940 8060			
2500	10,000	[illegible]	X			

[X] ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A [illegible]	28	[illegible]	28	[illegible]	28	28 ± 0.2 VDC
ZERO OUTPUT TOLERANCE	-0 +102mv	X	A±55 mv	X	A±85 mv	X	

[X] ACCEPT

Pretest Calibration, Transducer SN 493 (Motor 44FW-94)

Figure 24

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE_____

S/N_____

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S. OUTPUT (PSIG) IN VOLTS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	28 ± 0.2 VDC
ZERO OUTPUT (PSIA) IN VOLTS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
CORRECTED F.S. OUTPUT IN VOLTS	A [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
F.S. OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .0557	X	A ± .0857	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Pretest Calibration, Transducer SN 493 (Motor 44FW-94)

Figure 24

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 1 of 5

P.O.# _____

POST-TEST CALIBRATION

MFG. Statham SERIAL NO. 493 RANGE [illegible]

MODEL PA33LTC CALIBRATED BY Dept. 8772 DATE [illegible]

ROOM TEMP. 77 °F ASSIGNED TO ENGINE NO. [illegible]

BAROMETRIC PRESSURE 755.2 MM HG PARAMETER MEASURED [illegible]

CHECKED BY Ken Bushey
Dept. 8772

[X] ACCEPTED (NOTE g)

ASSIGNED BY R. B. Leeds

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS _____

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	10,000M	1 Megohm Minimum
B	10,000M	
C	10,000M	
D	10,000M	
E	10,000M	
F		

[X] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	10,000M	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
41	70 MA Max.	28	28±0.2VDC

[X] ACCEPT

Posttest Calibration, Transducer SN 493 (Motor 44FW-94)

Figure 25

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 3-7-63

S/N 493

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
85.3	5.064	6.795	7.50V MAXIMUM	82.3	5.064

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
12	25 MV MAXIMUM

[X] ACCEPT

Posttest Calibration, Transducer SN 493 (Motor 44FW-94)

Figure 25

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 3-7-63

S/N 493

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS DECREASING	OUTPUT IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEAT-ABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	0		X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	28	28 ± 0.2 VDC
500	2009	2002	1940 2060				
1000	4028	4019	3940 4060				
1500	6040	6031	5940 6060				
2000	8038	8031	7940 8060				
2500	10,000	10000	X				
0	0		X	40 Unit Variation		28	
500	2008	2002	1940 2060				
1000	4027	4018	3940 4060				
1500	6038	6030	5940 6060				
2000	8036	8030	7940 8060				
2500	10000	10000	X				
0	0		X	40 Unit Variation		28	
500	2008	2001	1940 2060				
1000	4027	4018	3940 4060				
1500	6038	6029	5940 6060				
2000	8035	8028	7940 8060				
2500	10000	9997	X				

A. LINEARITY [X] ACCEPT

B. HYSTERESIS [X] ACCEPT

C. REPEATABILITY [X] ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7500	7,475 7,525	28	28±0.2 VDC

[X] ACCEPT

Posttest Calibration, Transducer SN 493 (Motor 44FW-94)

Figure 25

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 3-7-63

S/N 493

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0		X	40 Unit Variation	28	28 ±0.2 VDC
500	2002	1995	1940 2060			
1000	4025	4019	3940 4060			
1500	6038	6033	5940 6060			
2000	8033	8030	7940 8060			
2500	10,000	9998	X			

[X] ACCEPT

X. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0		X	40 Unit Variation	28	28 ± 0.2 VDC
500	2005	1999	1940 2060			
1000	4020	4012	3940 4060			
1500	6030	6022	5940 6060			
2000	8034	8030	7940 8060			
2500	10,000	10000	X			

[X] ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A 51.2	28	66.3	28	30.1	28	28 ± 0.2 VDC
ZERO OUTPUT TOLERANCE	-D +102mv	X	A±55 mv	X	A±85 mv	X	

[X] ACCEPT

Posttest Calibration, Transducer SN 493 (Motor 44FW-94)

Figure 25

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 5 of 5

DATE 3-7-63

S/N 493

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S.OUTPUT (PSIG) IN VOLTS	5.000	28	5.0850	28	5.0330	28	28 ± 0.2 VDC
ZERO OUTPUT (PSIA) IN VOLTS	.0833	28	.0848	28	.0582	28	
CORRECTED F.S.OUTPUT IN VOLTS	A 4.9767	28	4.9902	28	4.9718	28	
F.S.OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .055V	X	A ± .085V	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

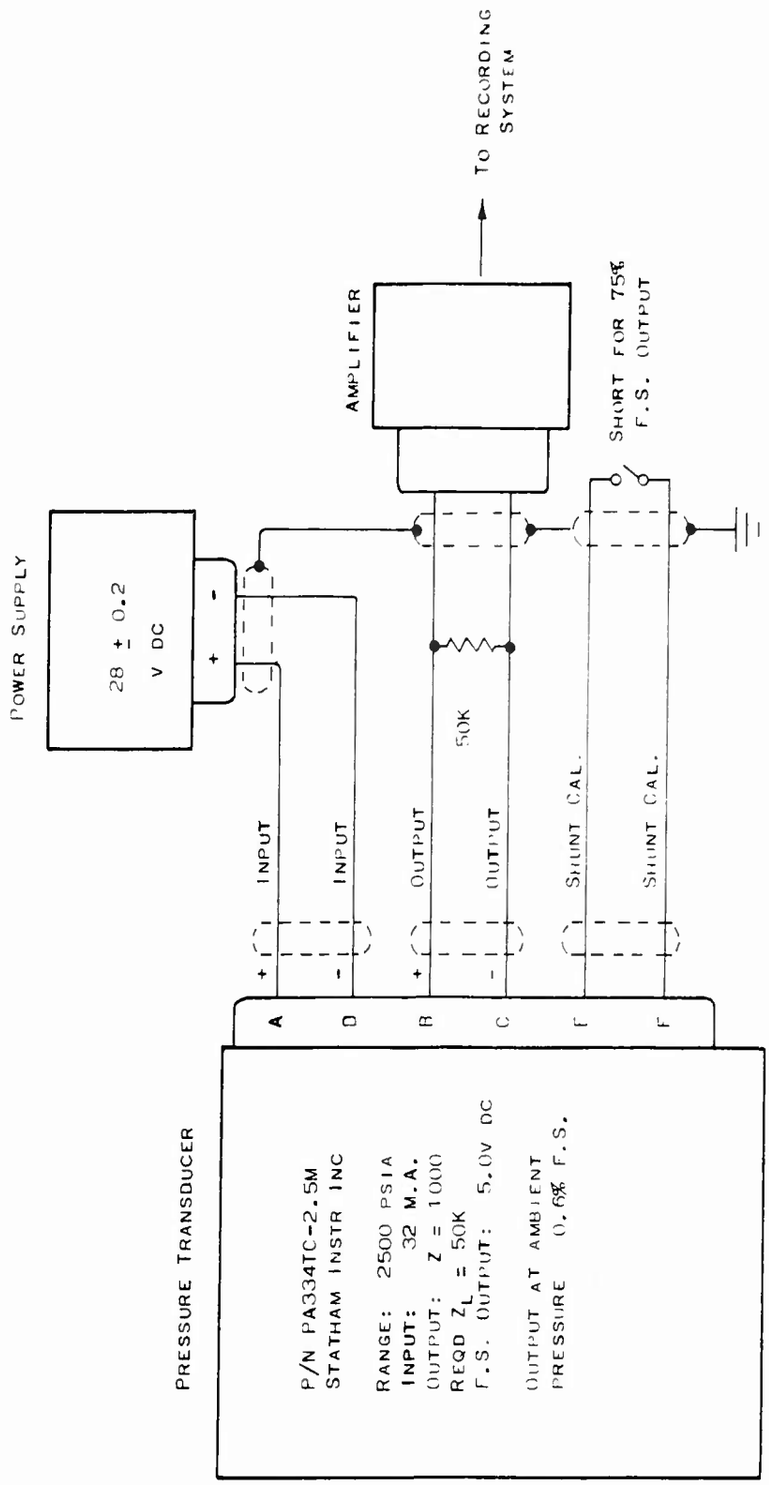
4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

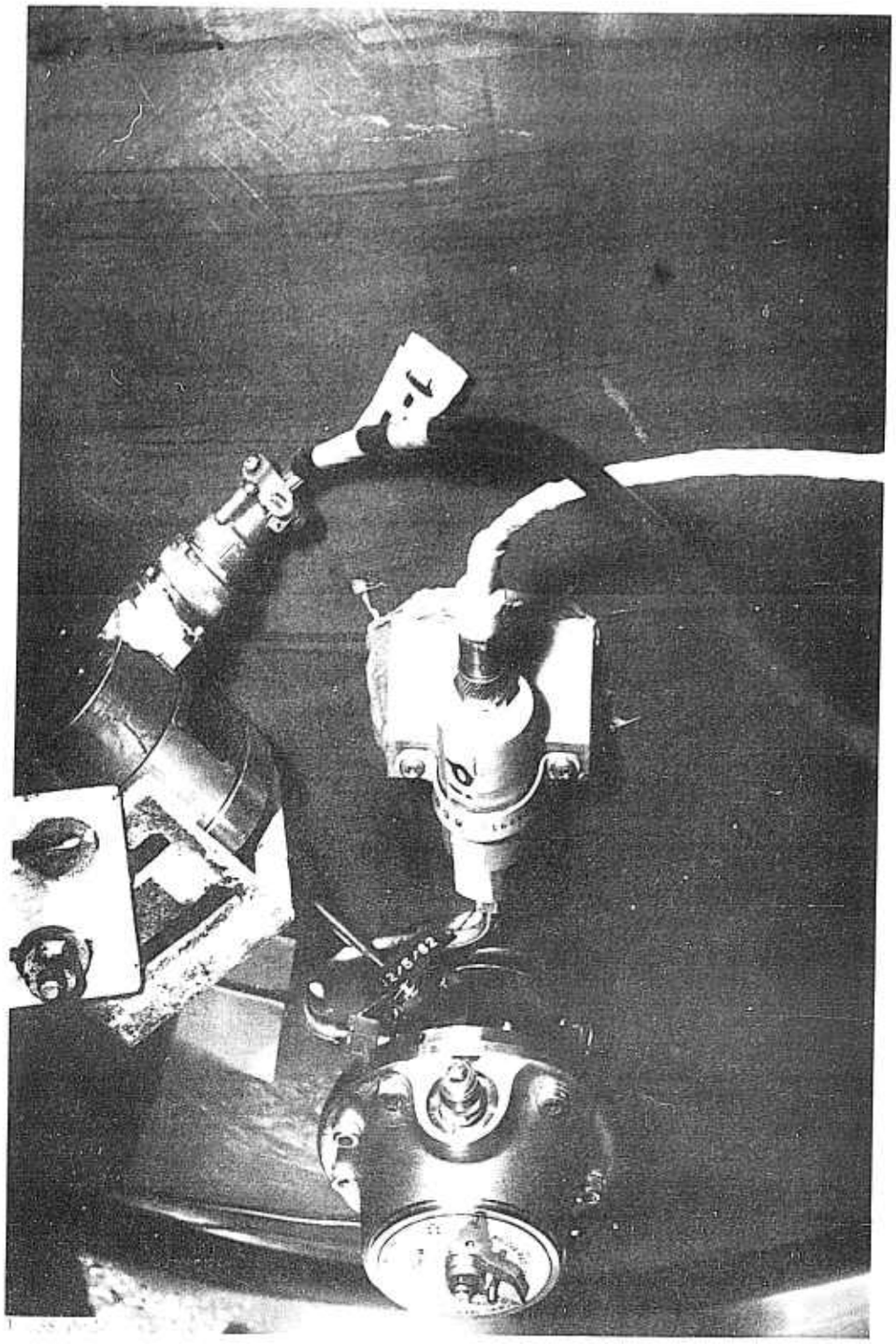
Posttest Calibration, Transducer SN 493 (Motor 44FW-94)

Figure 25



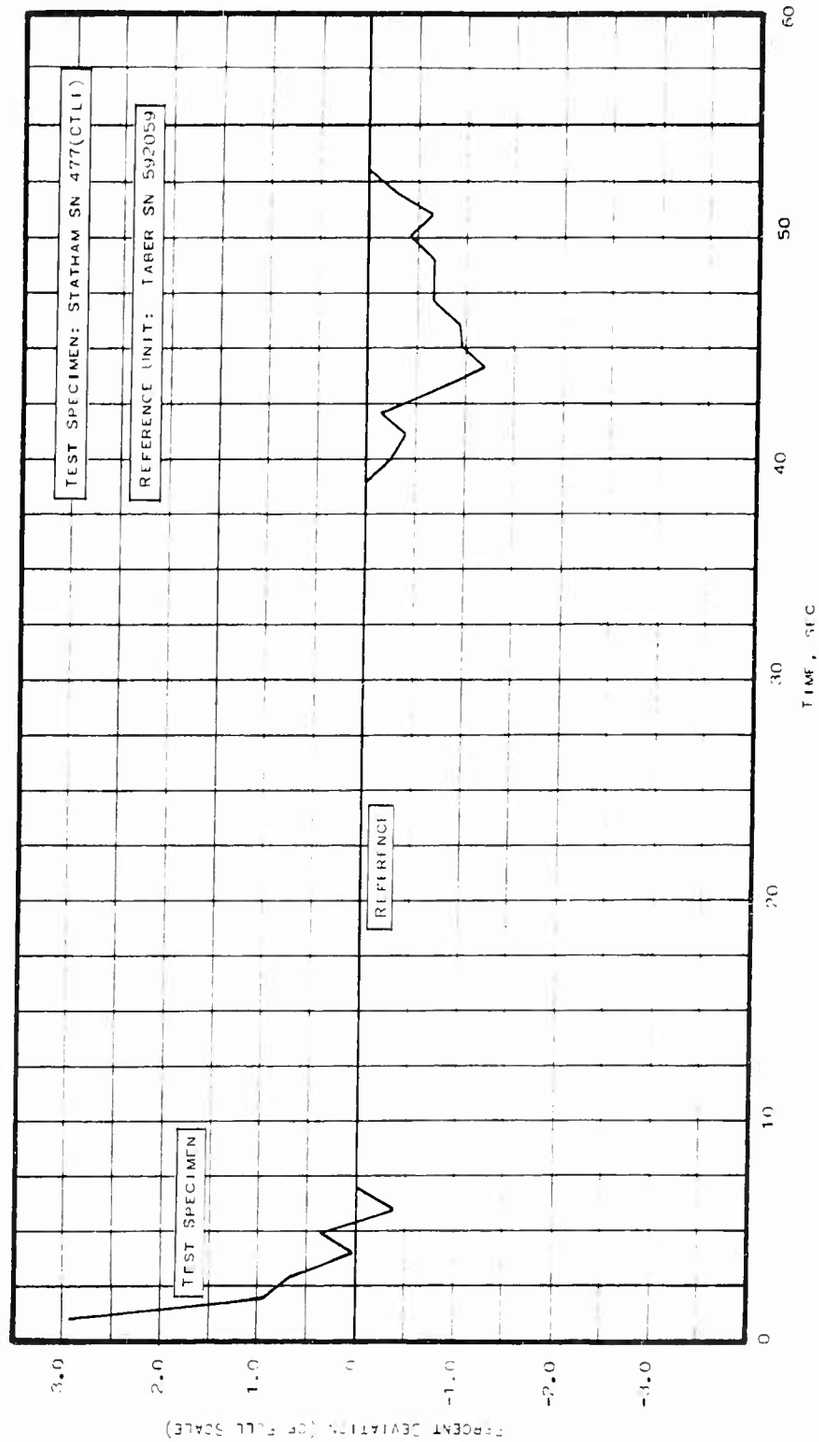
Wiring Diagram for Motor Static Tests

Figure 26



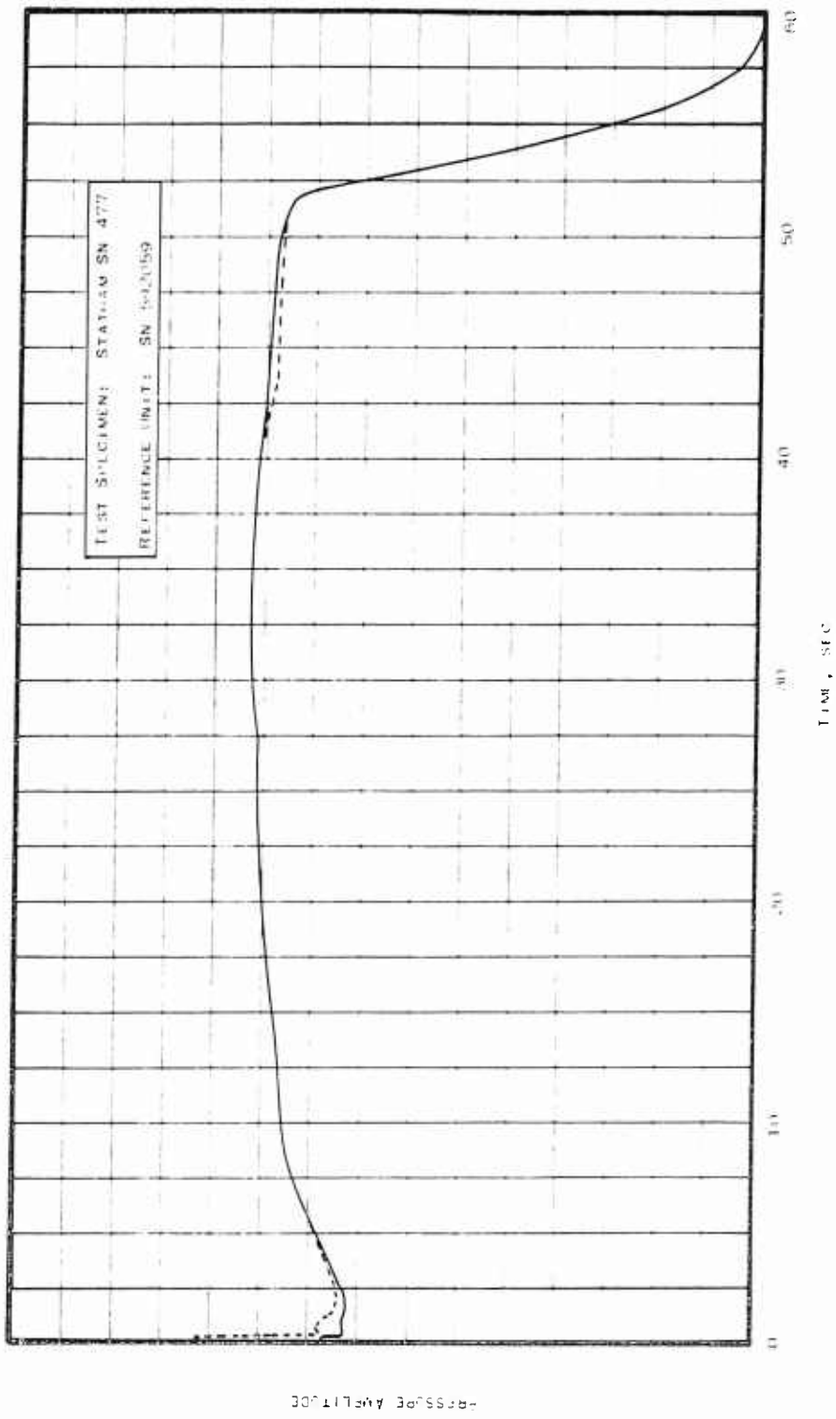
View of Transducer Installed on Static Test Motor

Figure 27



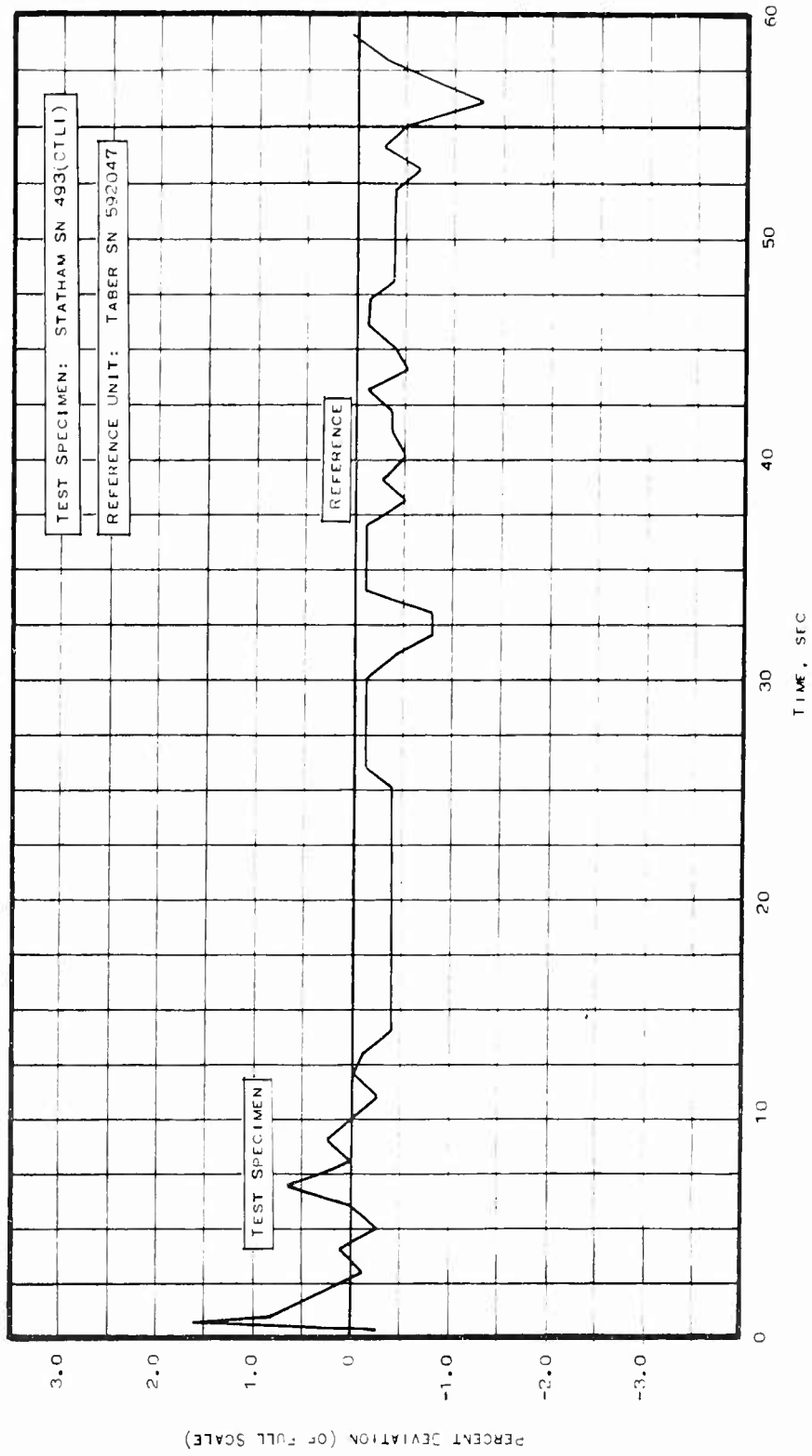
Percent Deviation-vs-Time, Transducer SN 477

Figure 28



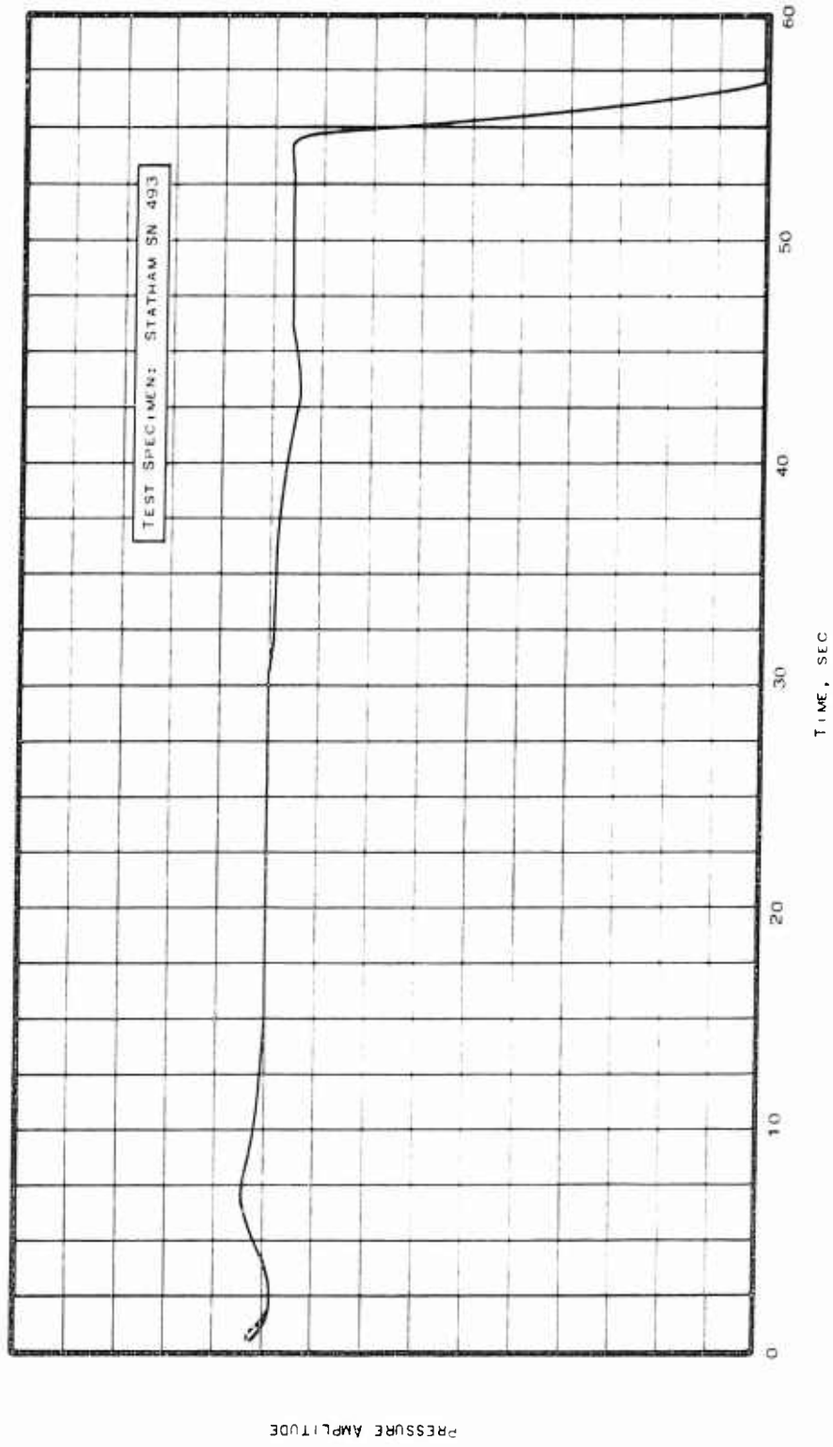
Pressure Amplitude-vs-Time, Transducer SN 477

Figure 29



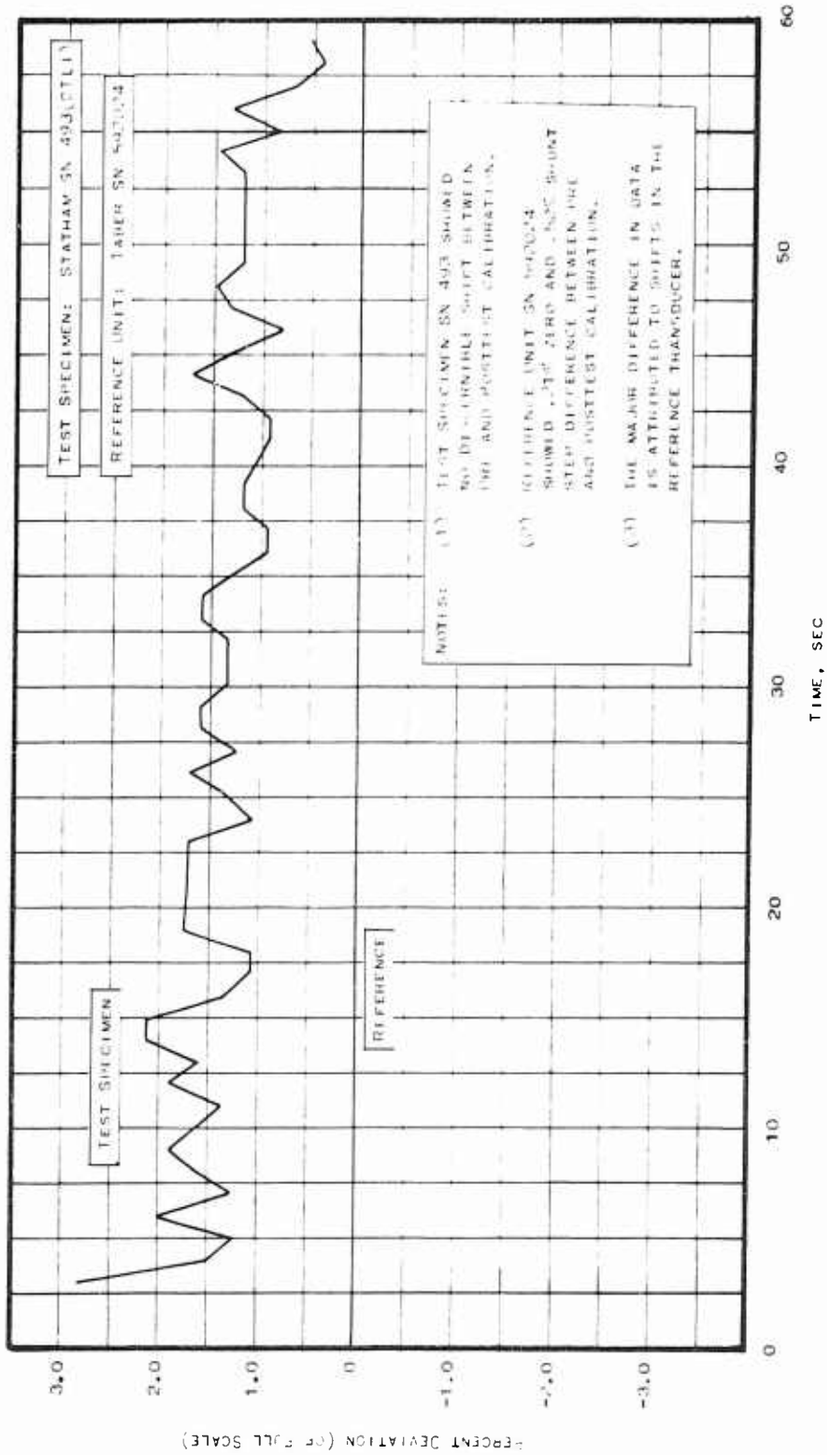
Percent Deviation-vs-Time, Transducer SN 493

Figure 30



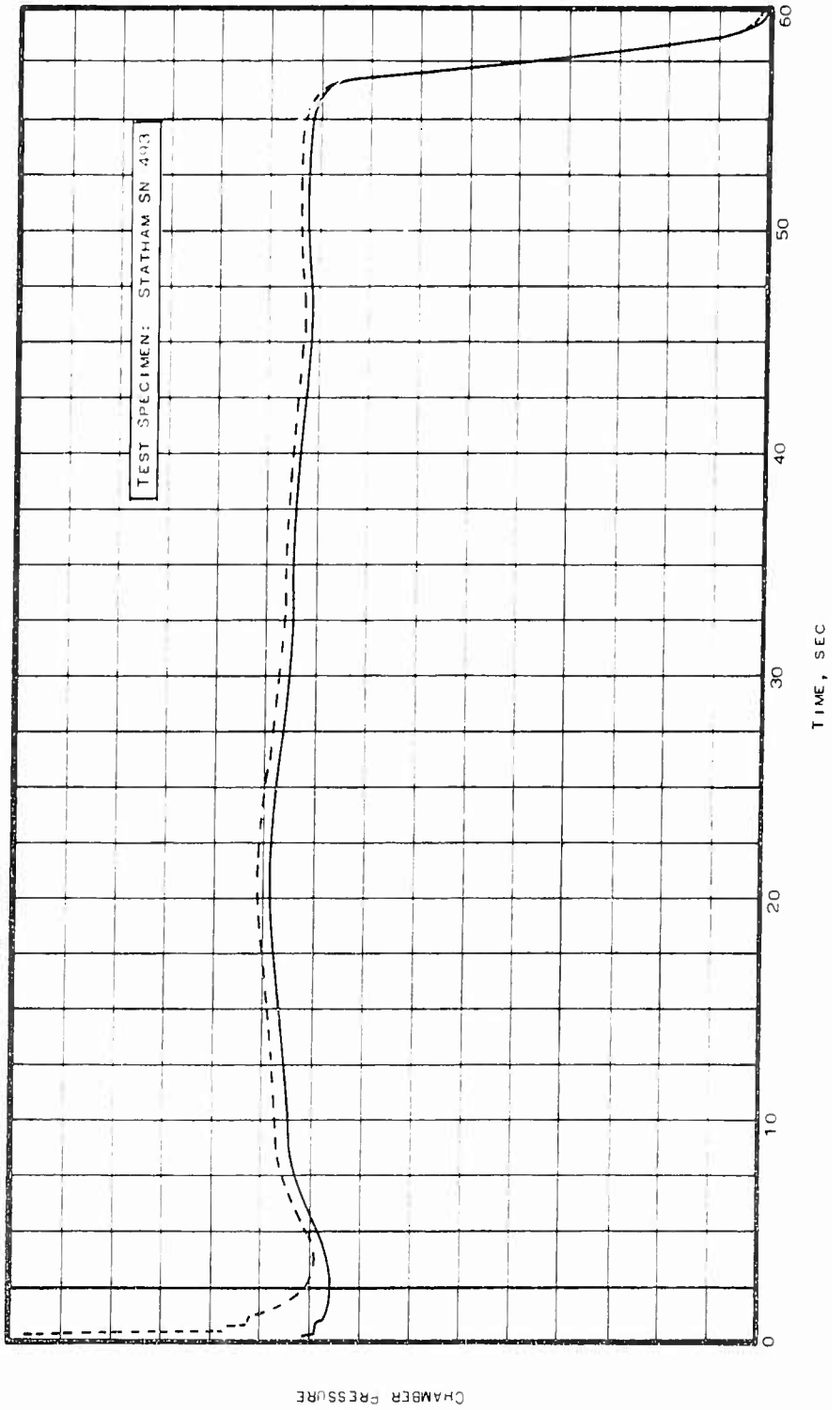
Pressure Amplitude-vs-Time, Transducer SN 493

Figure 31



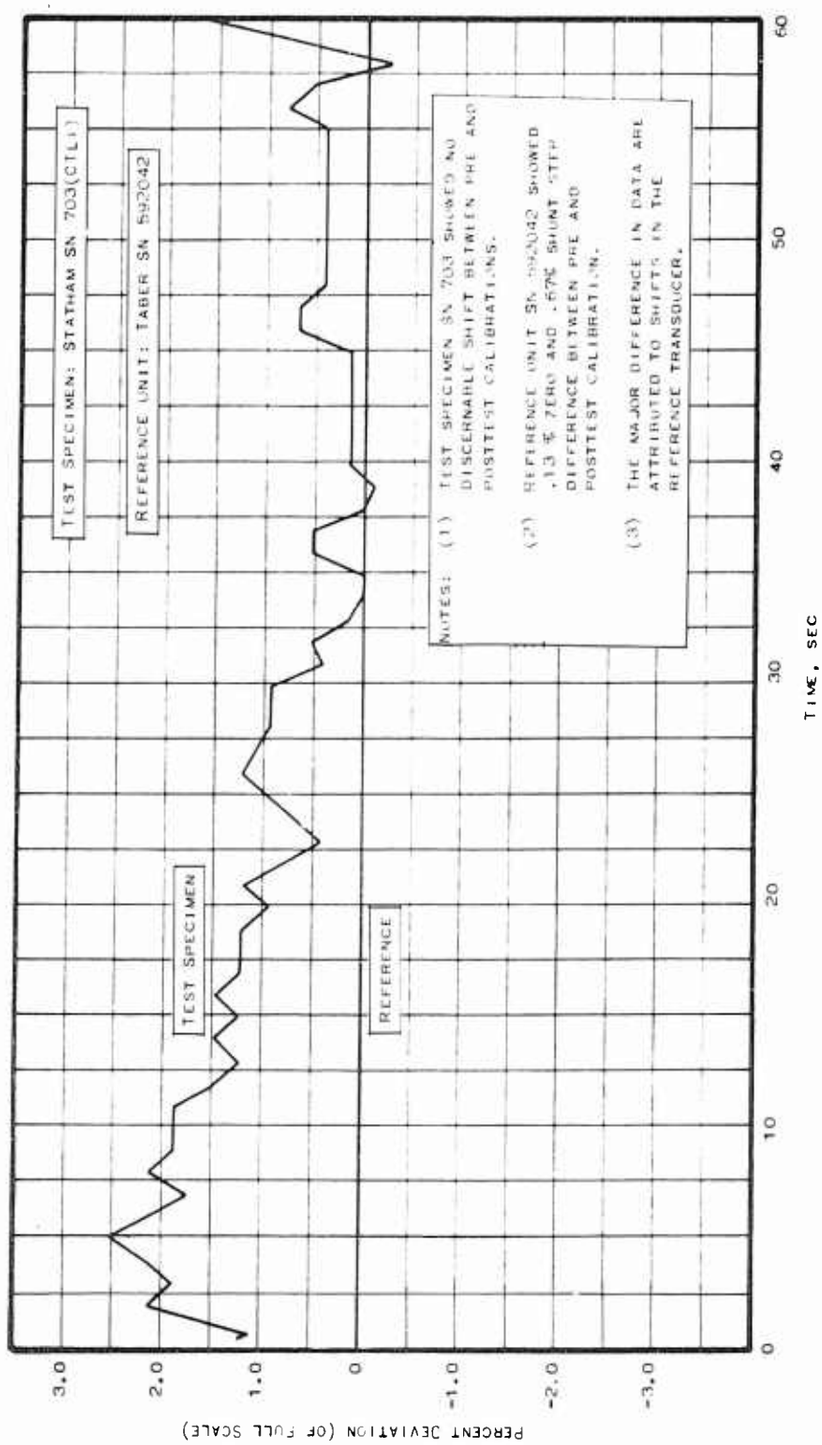
Percent Deviation-vs-Time, Transducer SN 493

Figure 32



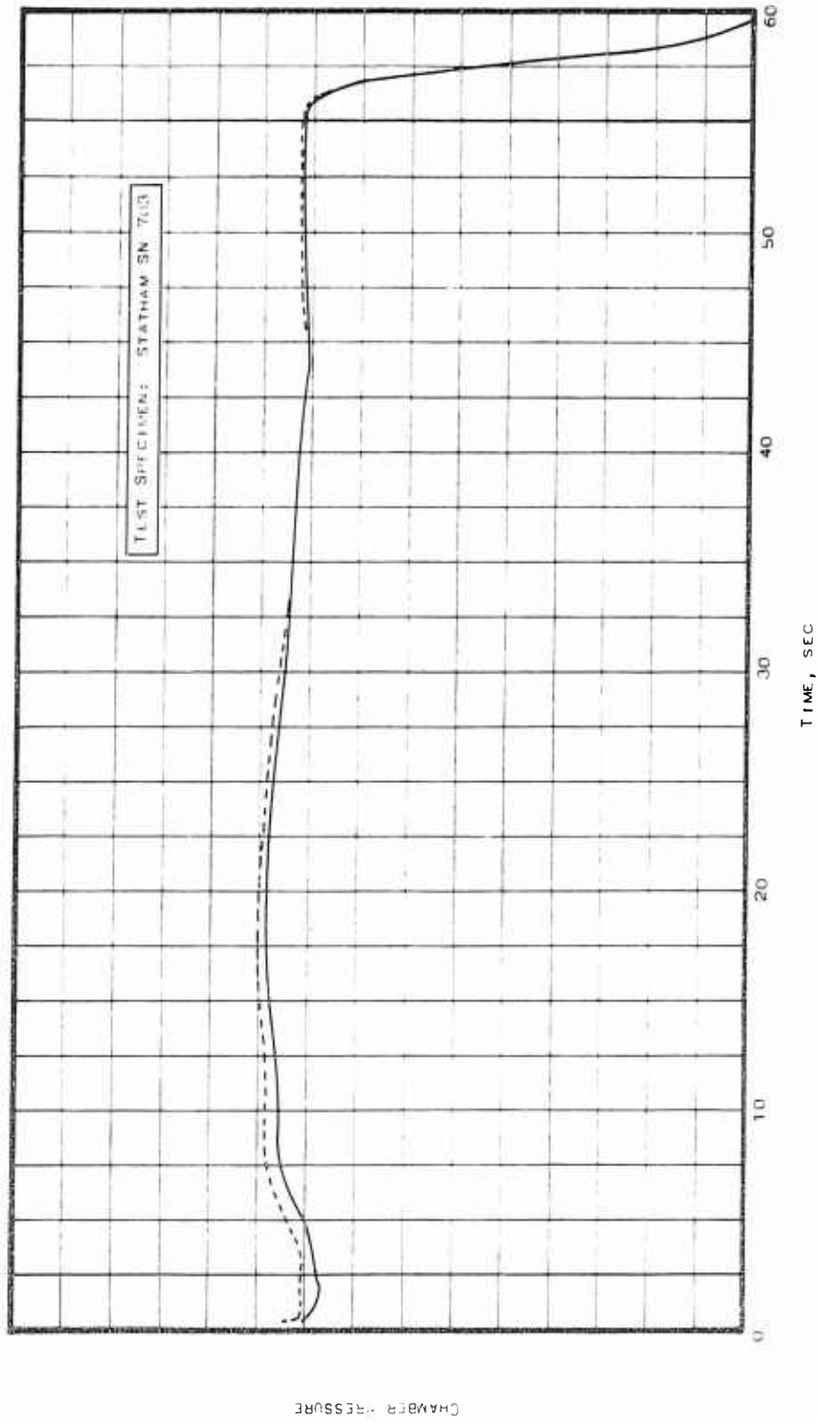
Pressure Amplitude-vs-Time, Transducer SN 493

Figure 33



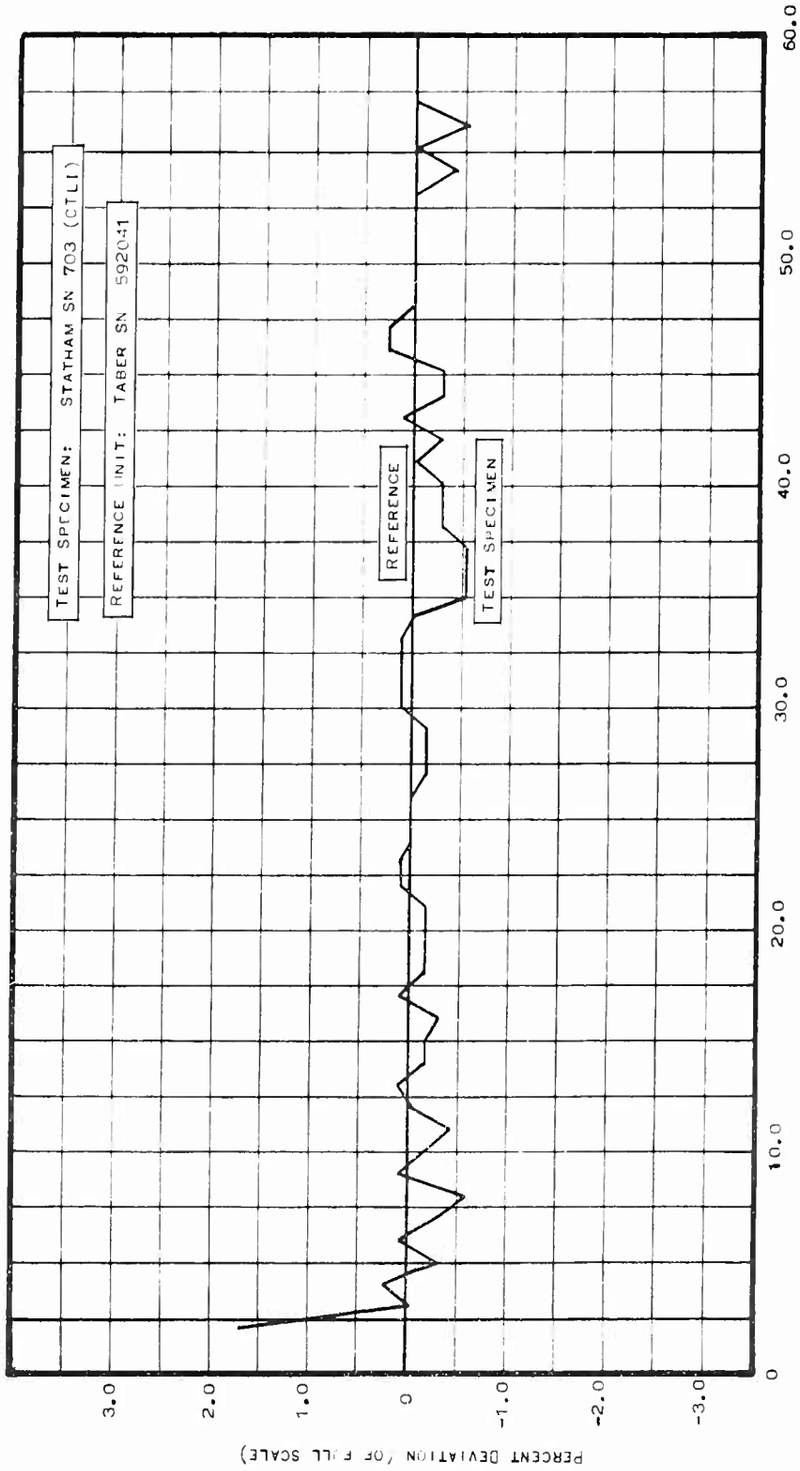
Percent Deviation-vs-Time, Transducer SN 703

Figure 34



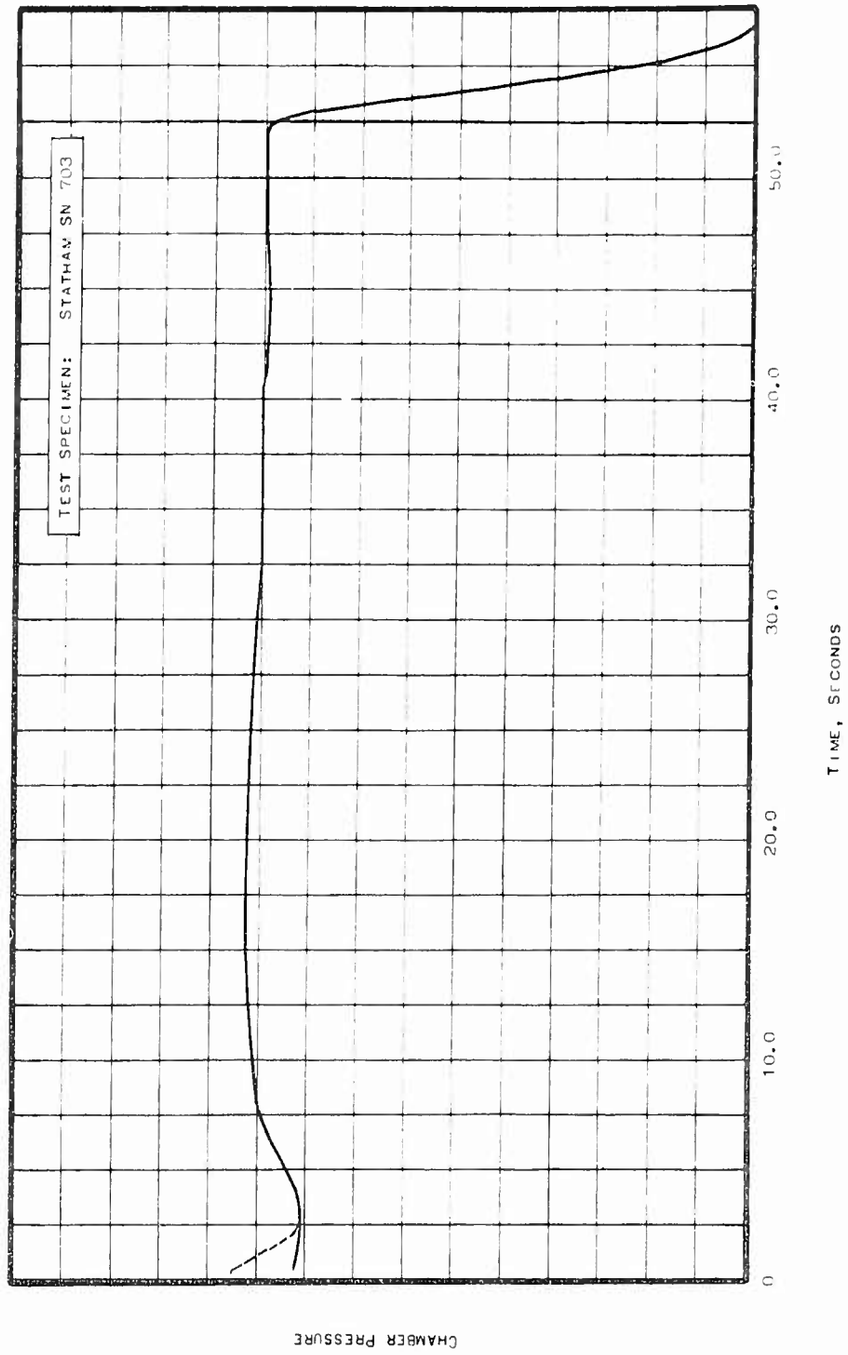
Pressure Amplitude-vs-Time, Transducer SN 703

Figure 35



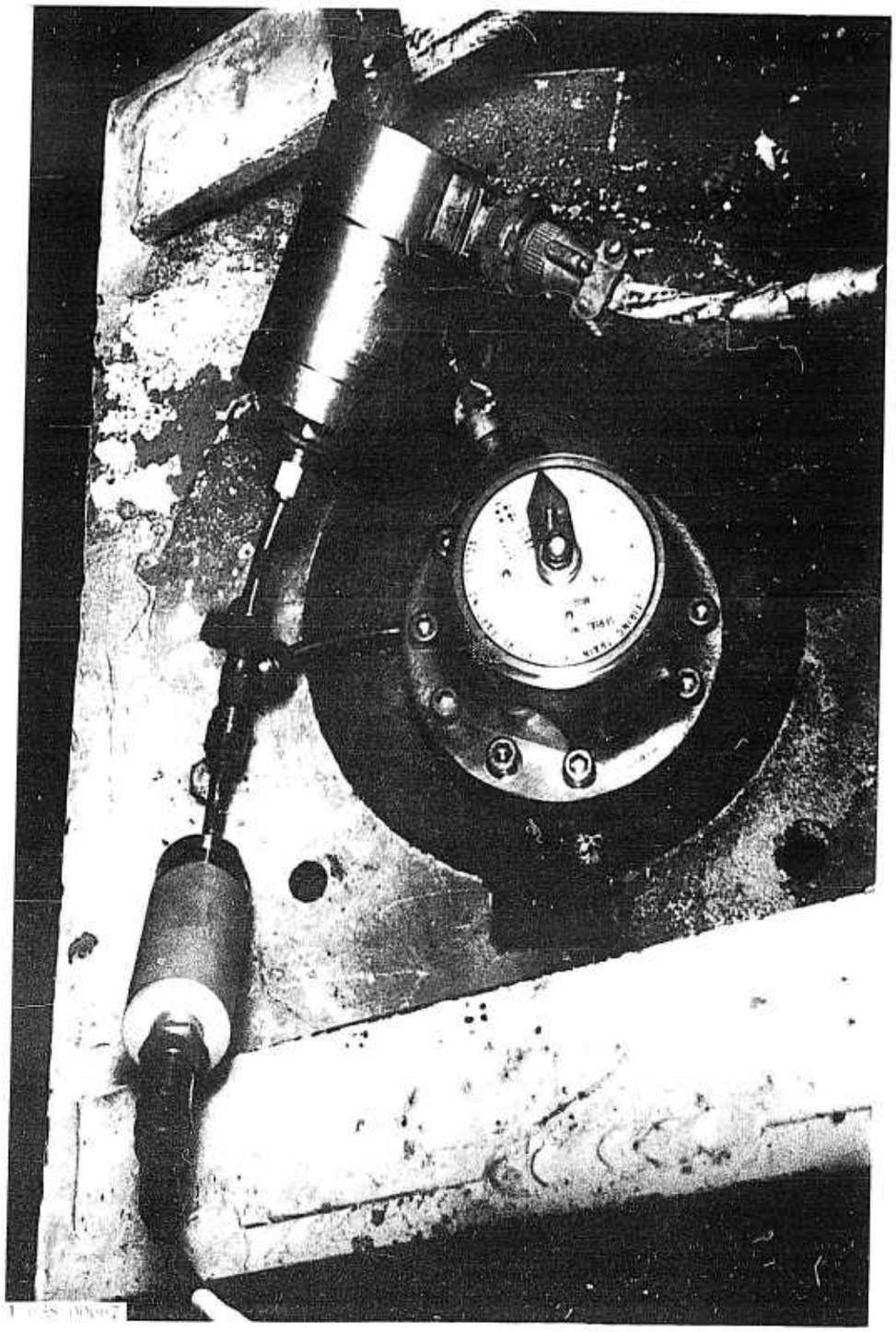
Percent Deviation-vs-Time, Transducer SN 703

Figure 36



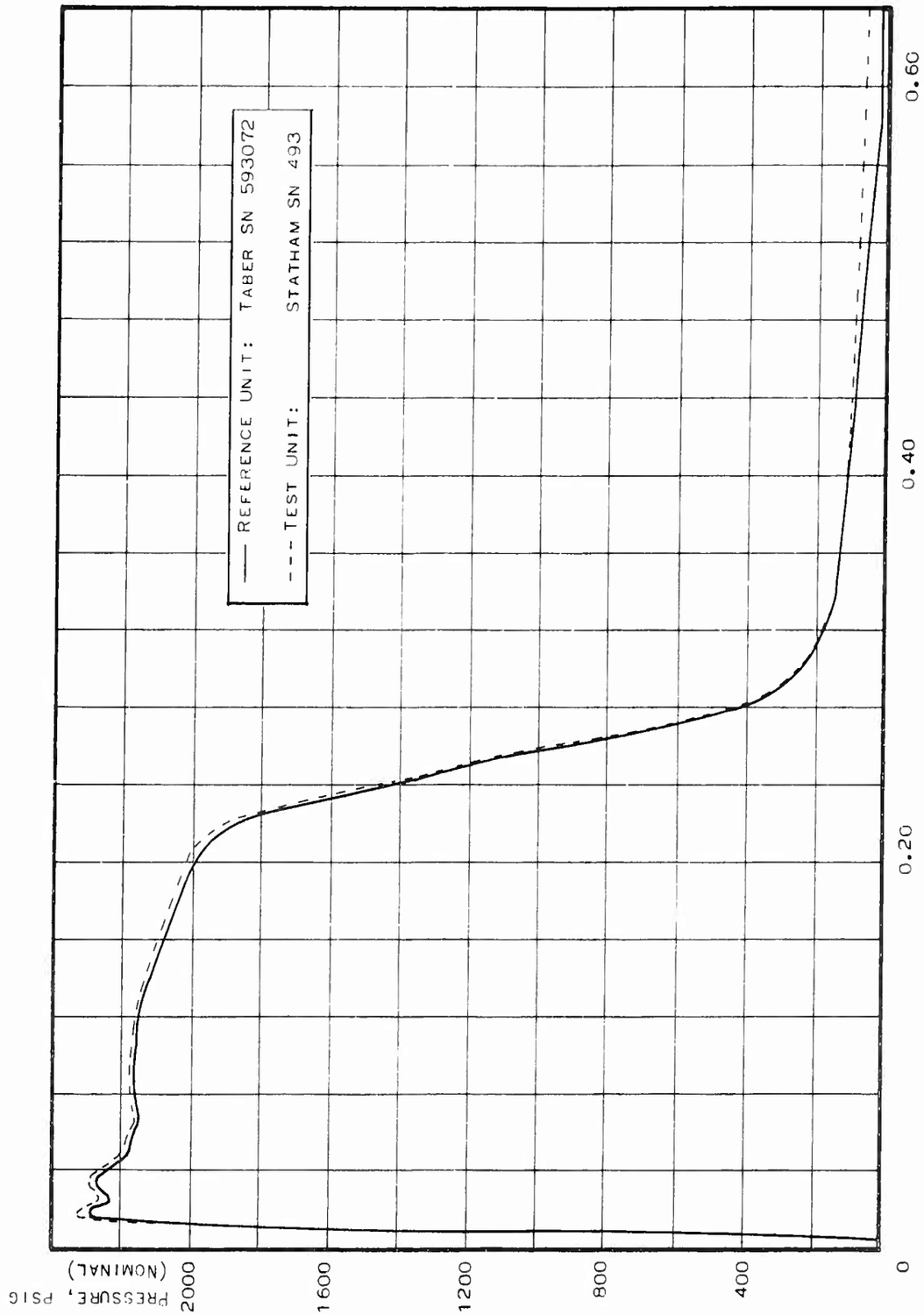
Pressure Amplitude-vs-Time, Transducer SN 703

Figure 37



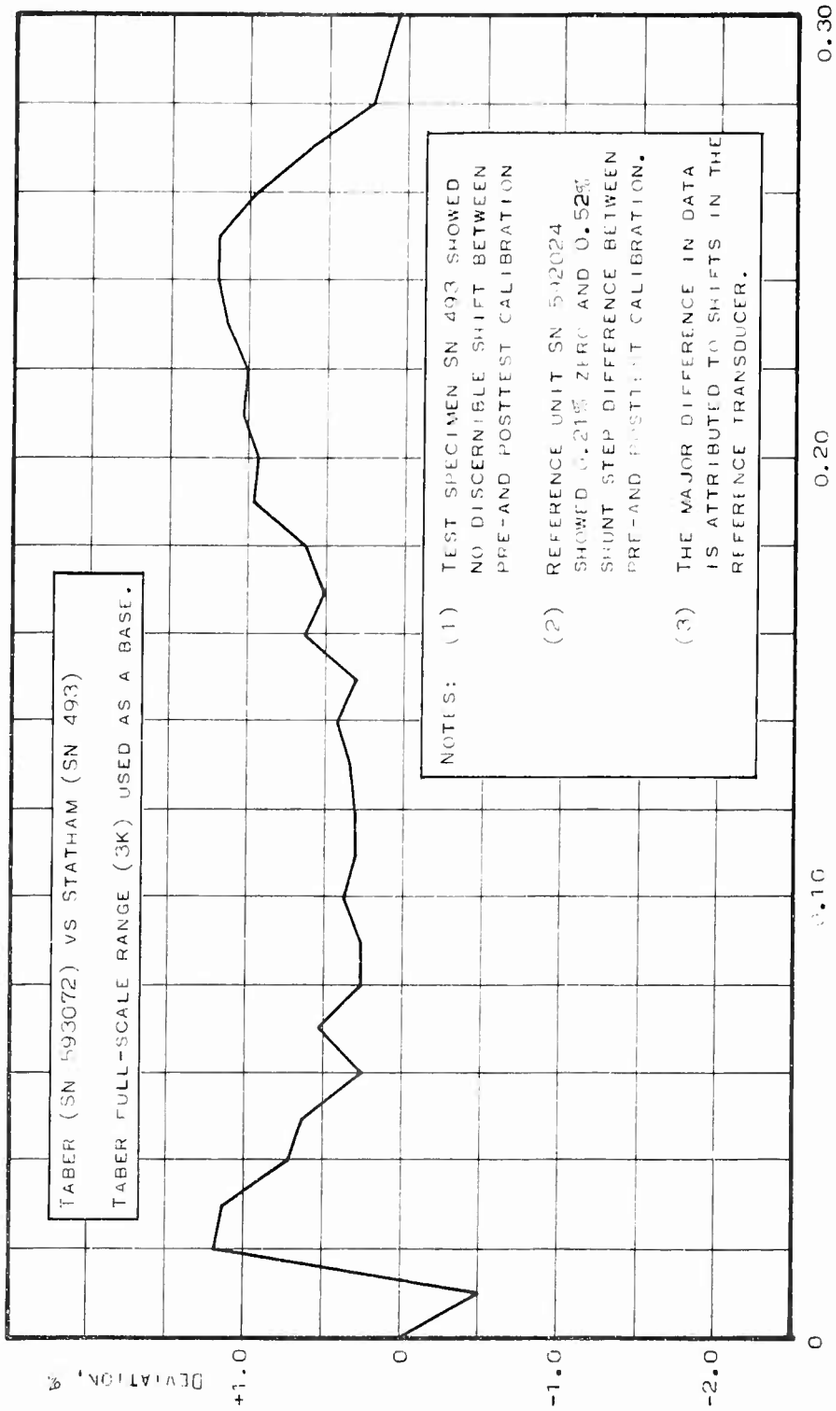
View of Igniter Test Installation, Transducer SN 493

Figure 38



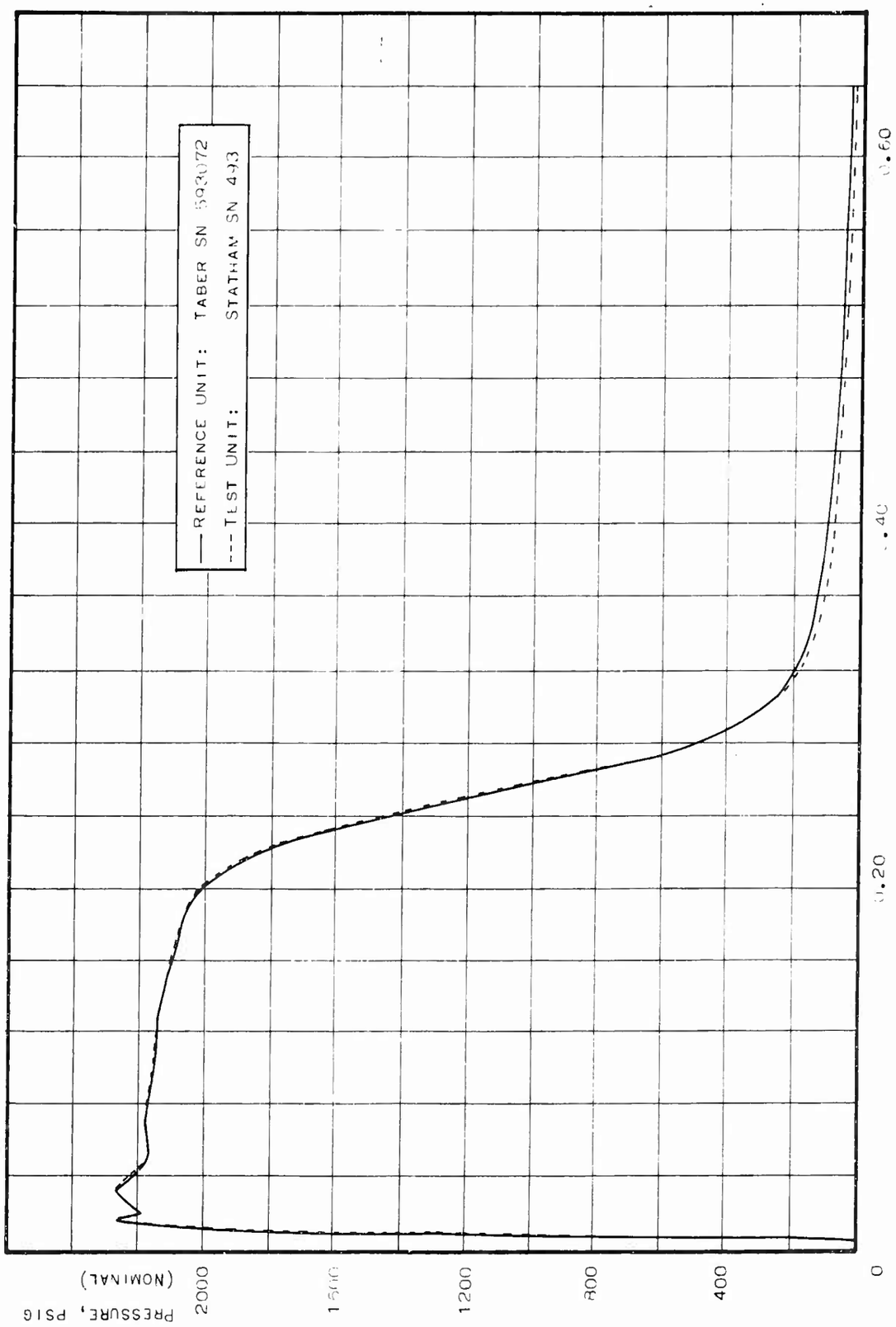
Pressure-vs-Time, Igniter Test (SN 493)

Figure 39



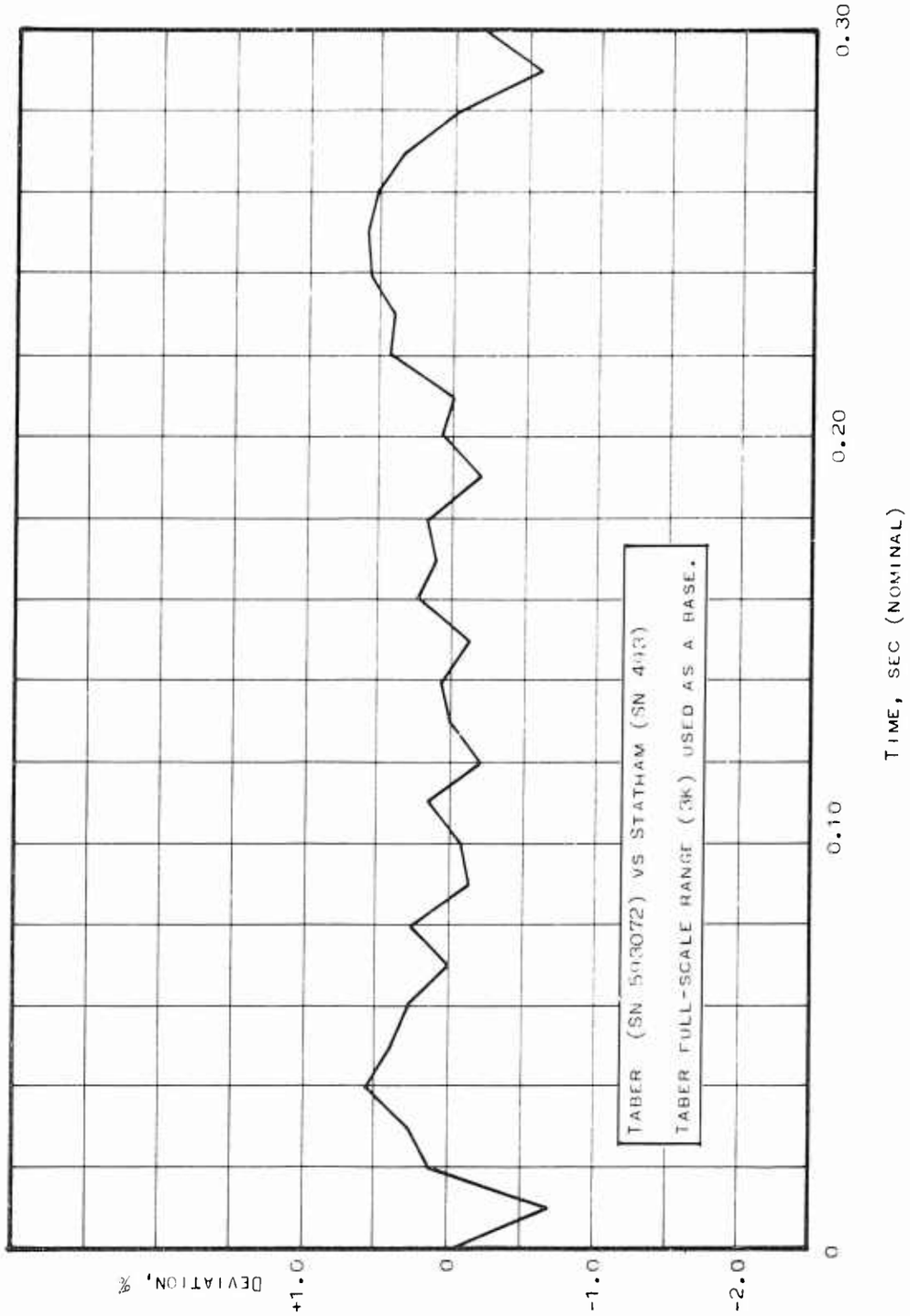
Percent Deviation-vs-Time, Igniter Test (SN 493)

Figure 40



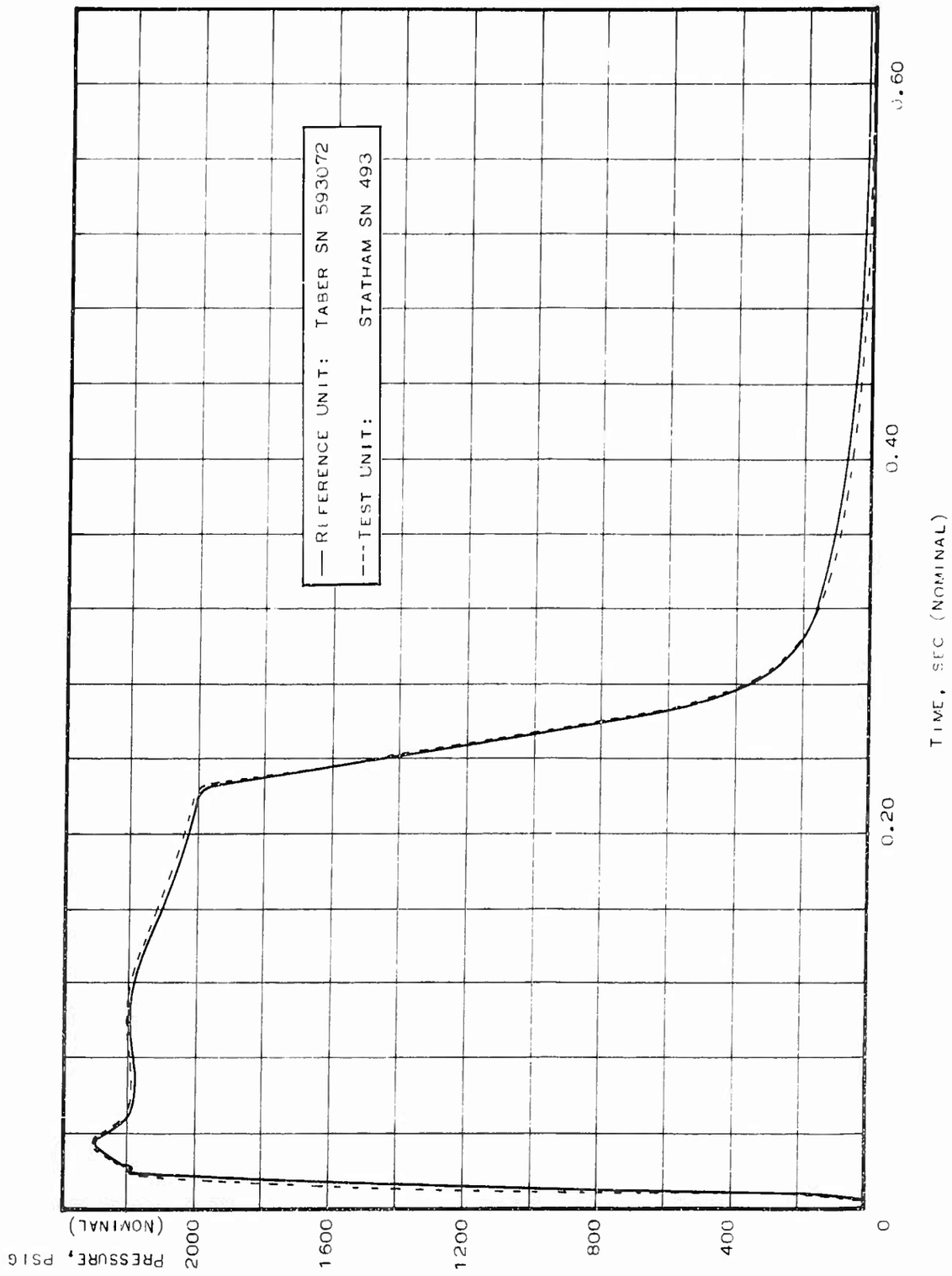
Pressure-vs-Time, Igniter Test (SN 493)

Figure 41



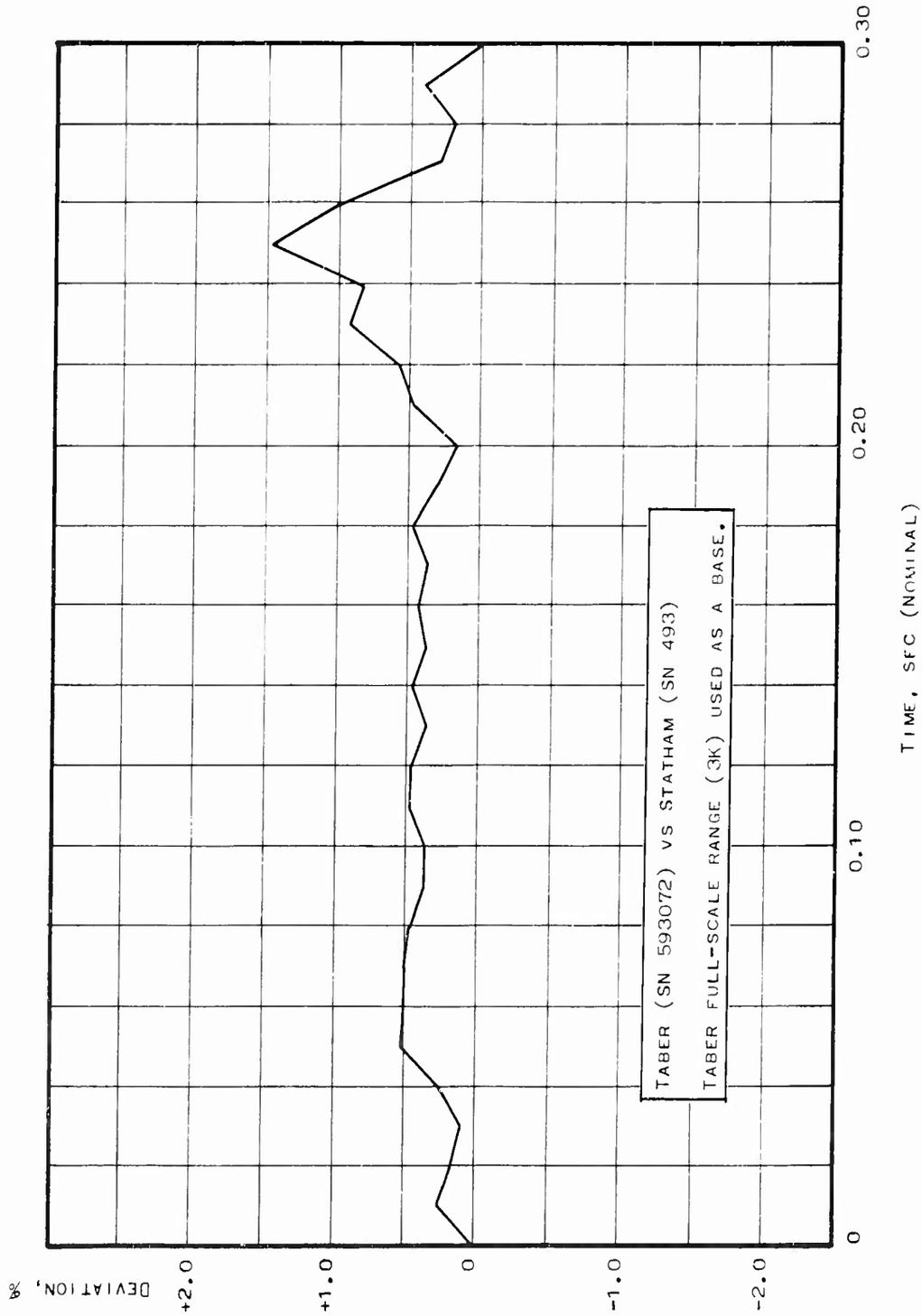
Percent Deviation-vs-Time, igniter Test (SN 493)

Figure 42



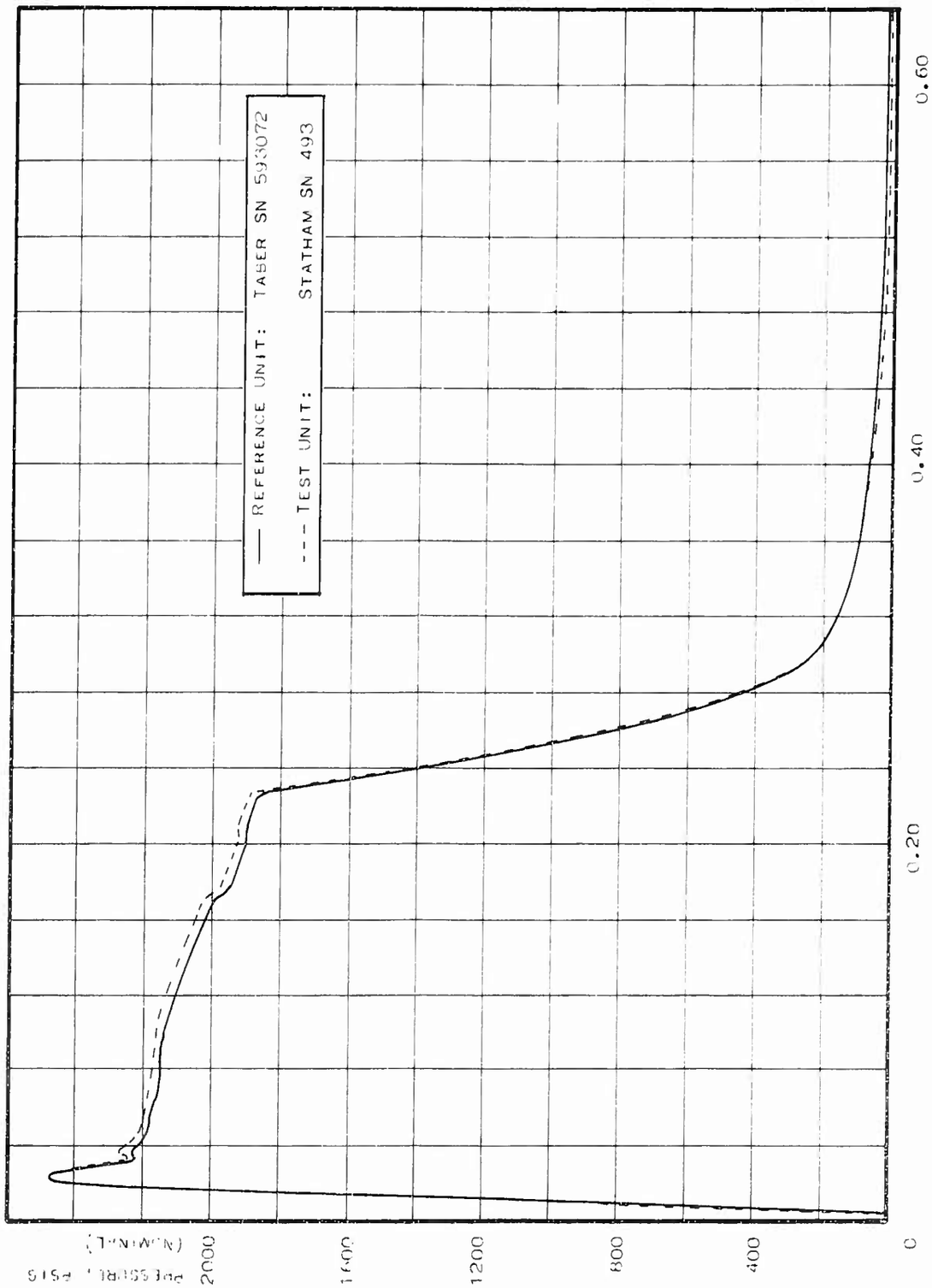
Pressure-vs-Time, Igniter Test (SN 493)

Figure 43



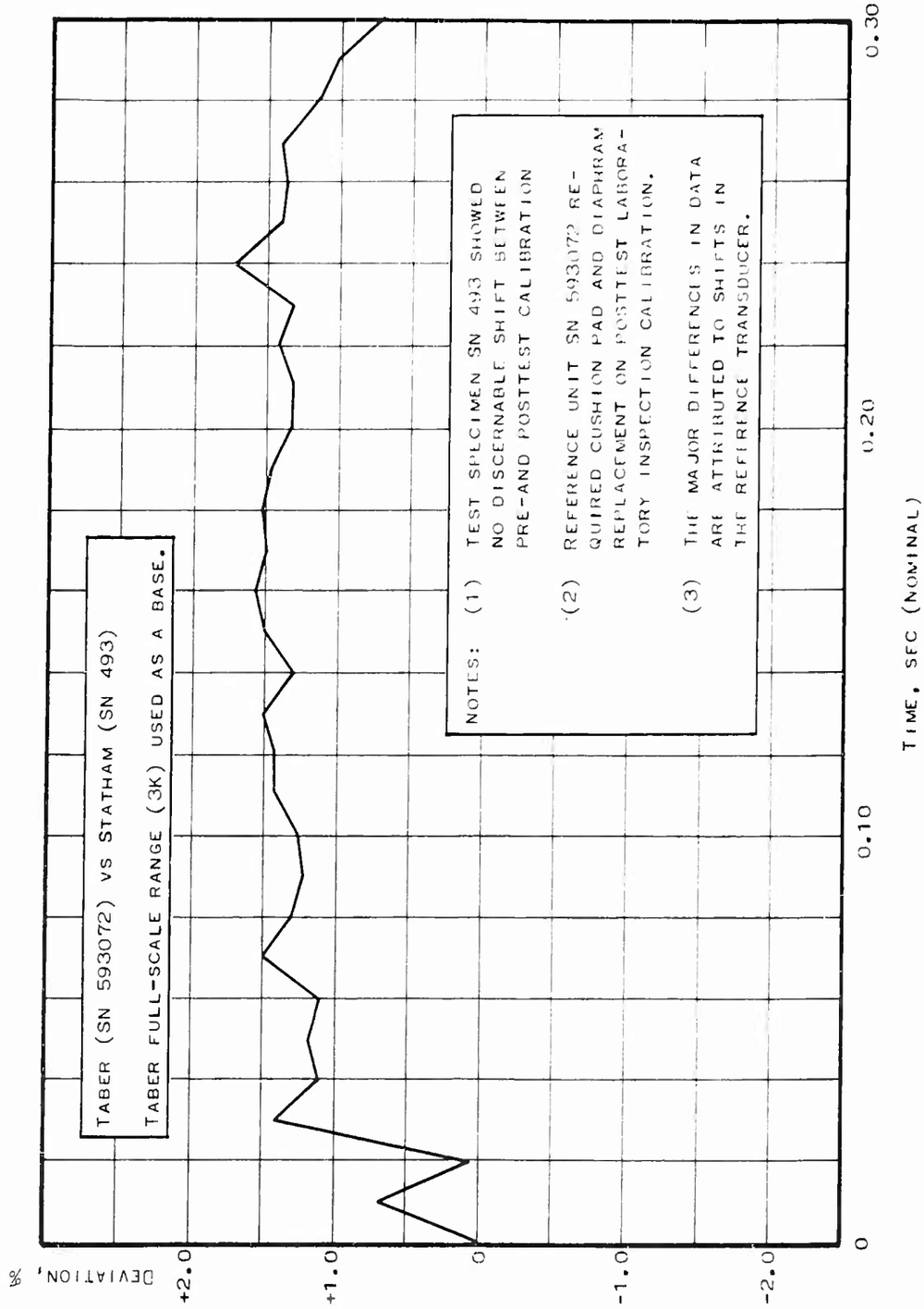
Percent Deviation-vs-Time, Igniter Test (SN 493)

Figure 44



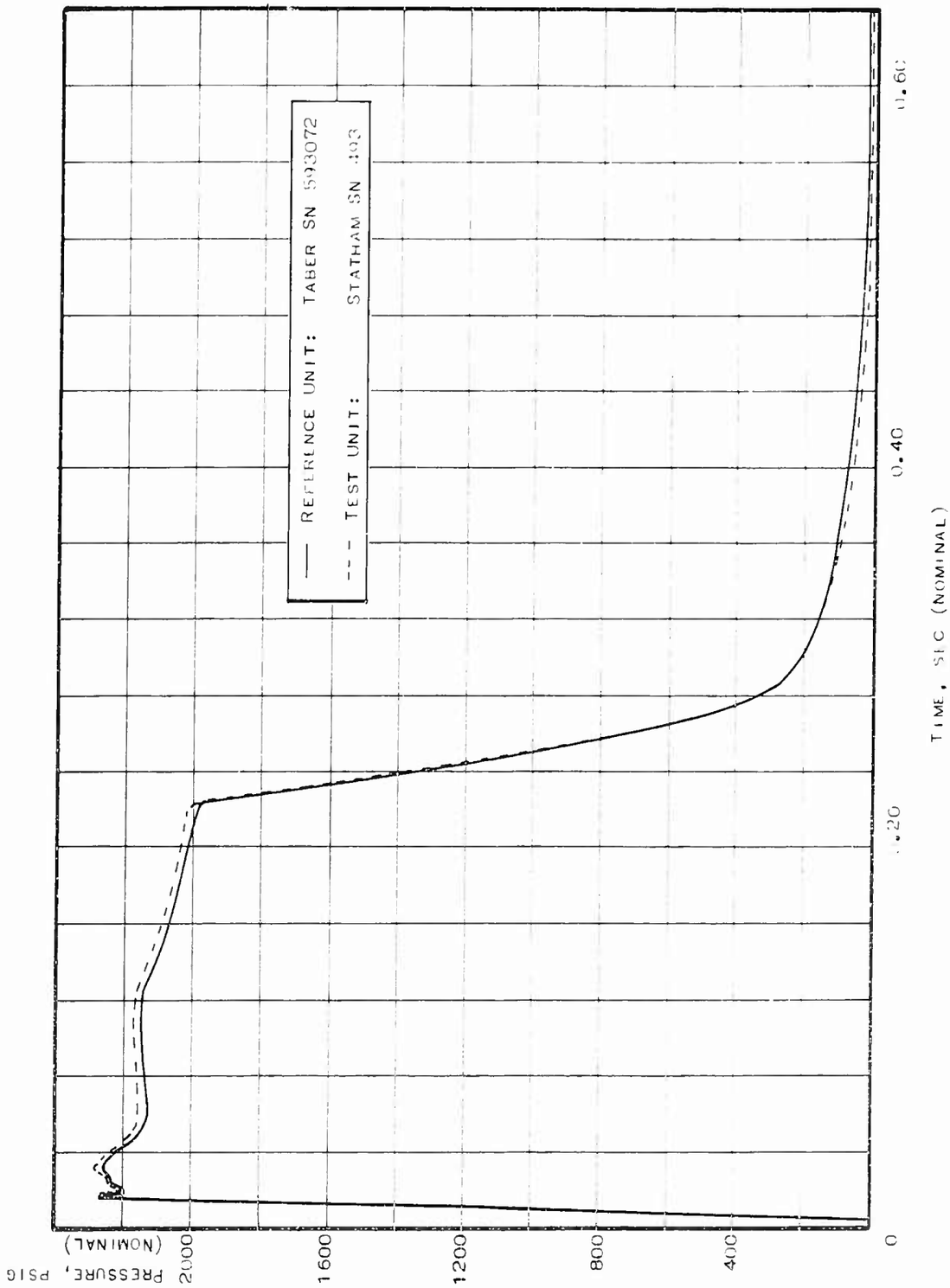
Pressure-vs-Time, Igniter Test, (SN 493)

Figure 45



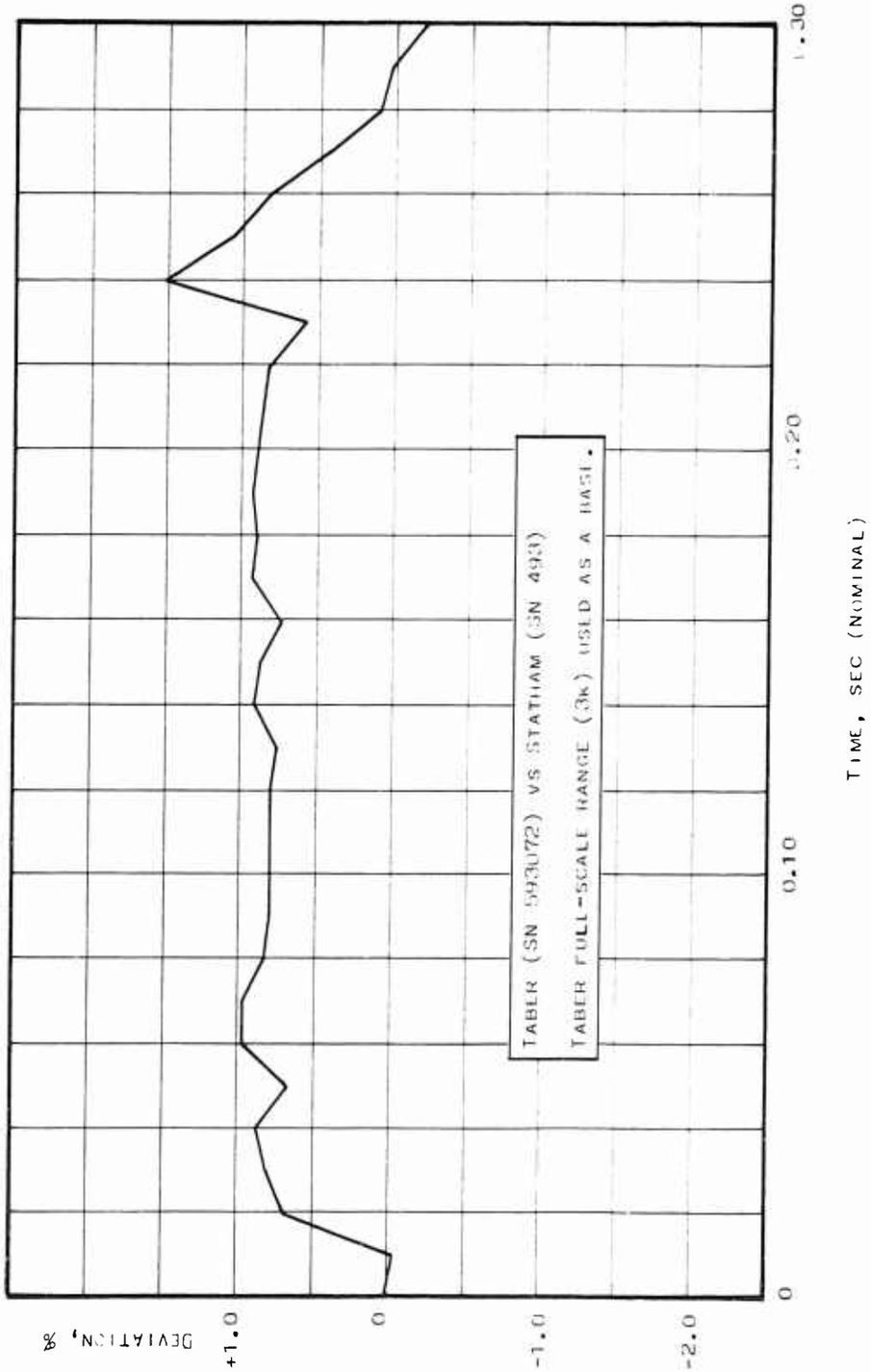
Percent Deviation-vs-Time, Igniter Test (SN 493)

Figure 46



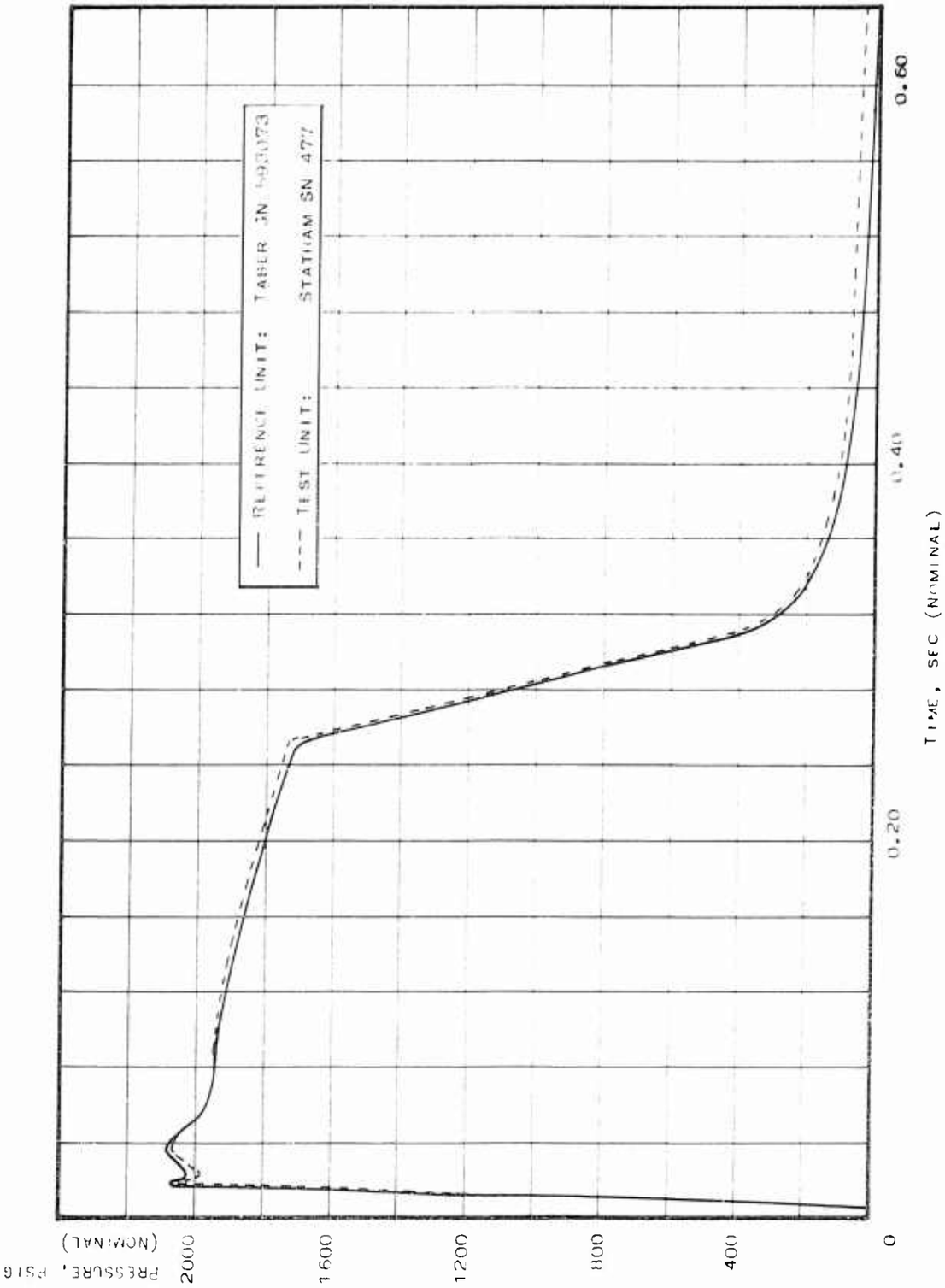
Pressure-vs-Time, Igniter Test, (SN 493)

Figure 47



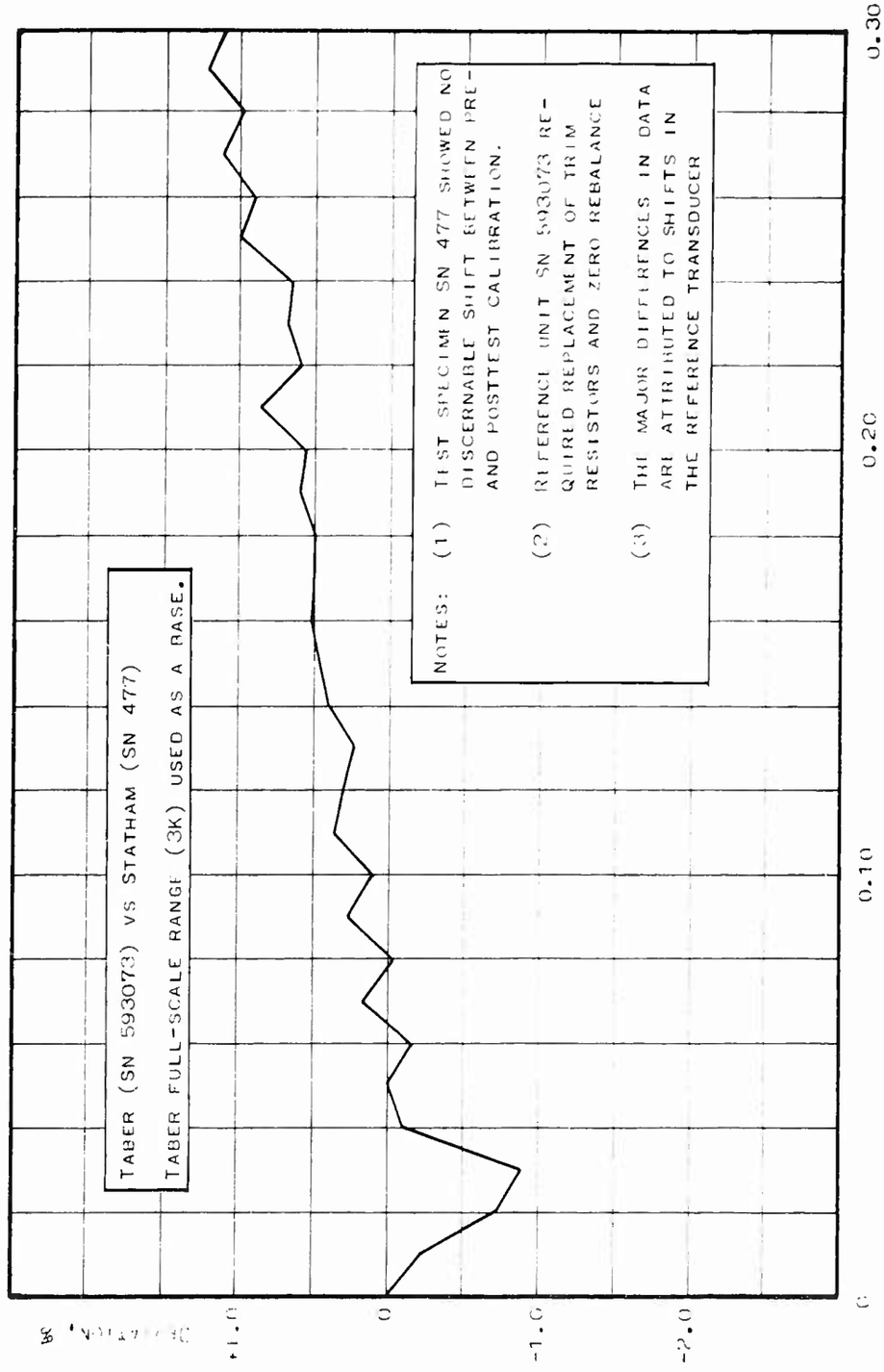
Percent Deviation-vs-Time, Igniter Test (SN 493)

Figure 48



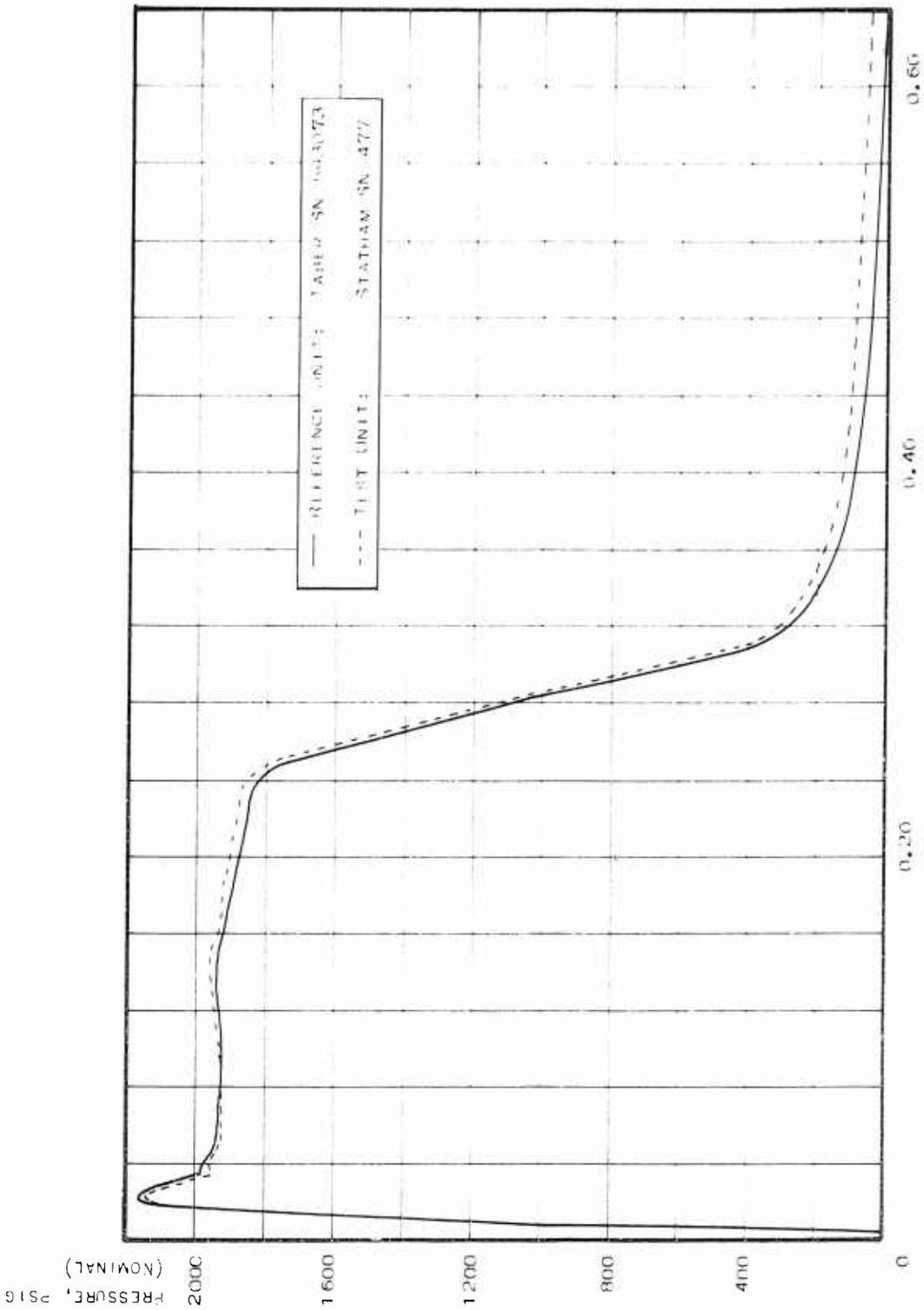
Pressure-vs-Time, Igniter Test, (SN 477)

Figure 49



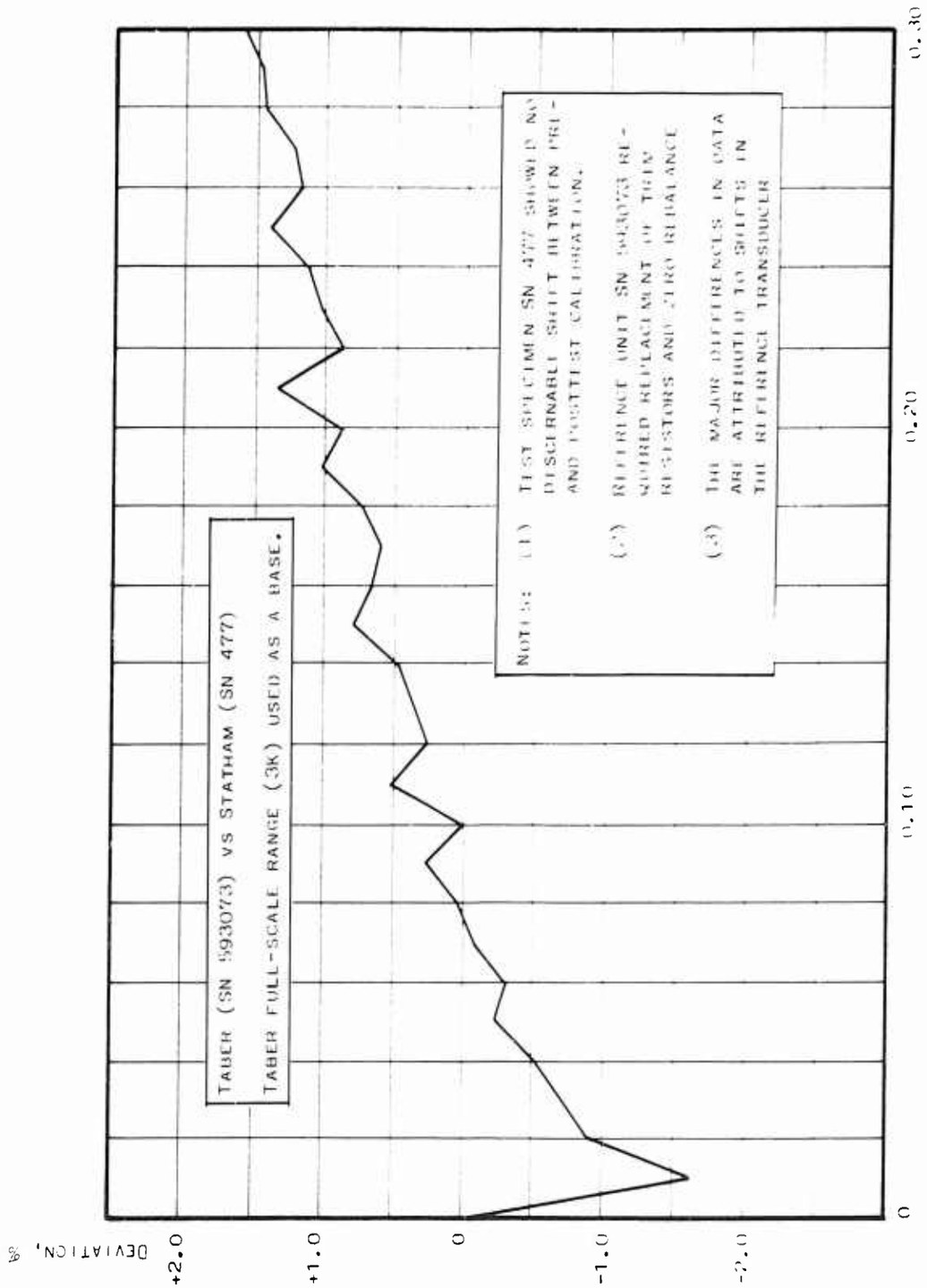
Percent Deviation-vs-Time, Igniter Test (SN 477)

Figure 50



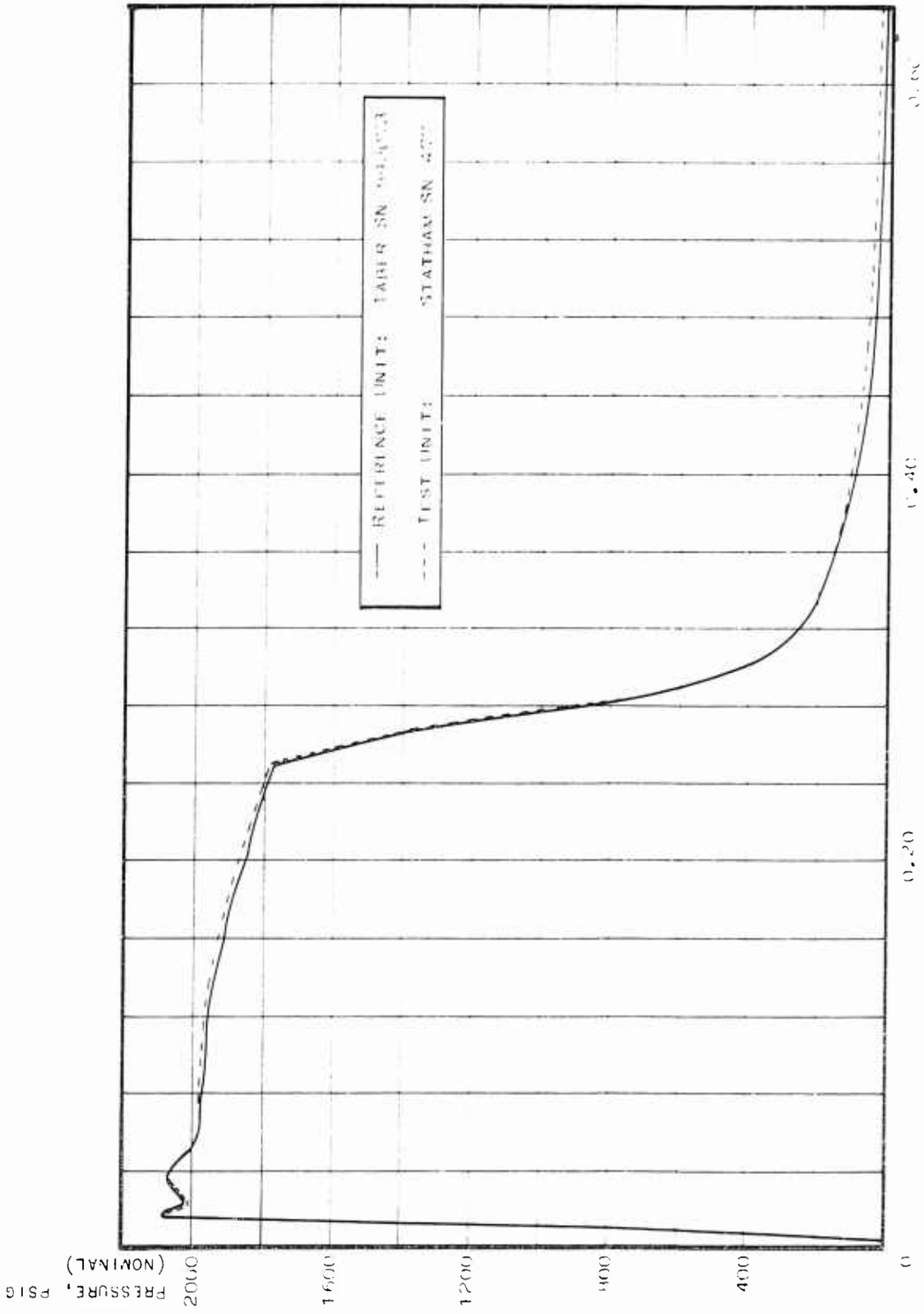
Pressure-vs-Time, Igniter Test (SN 477)

Figure 51



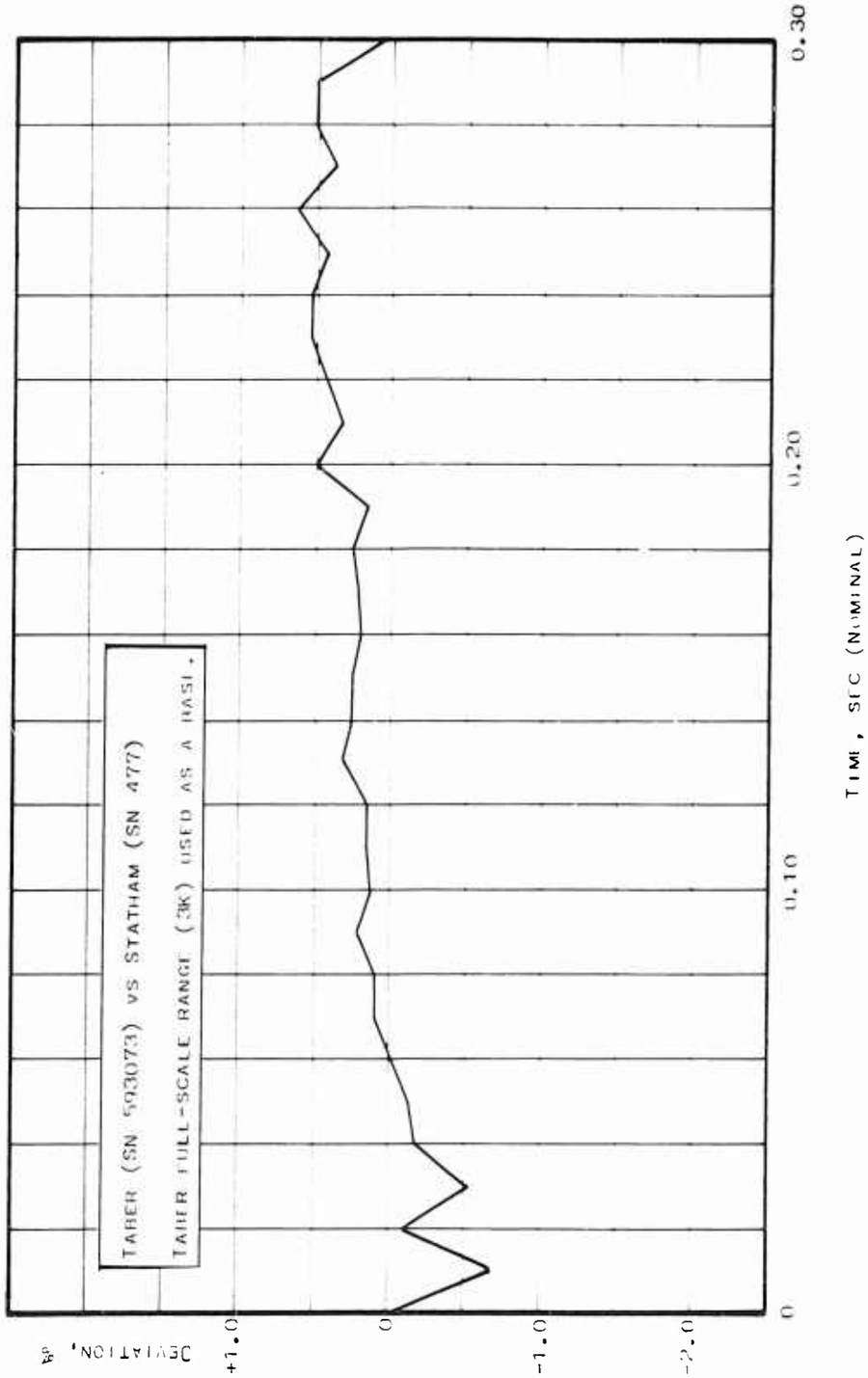
Percent Deviation-vs-Time, Igniter Test (SN 477)

Figure 52



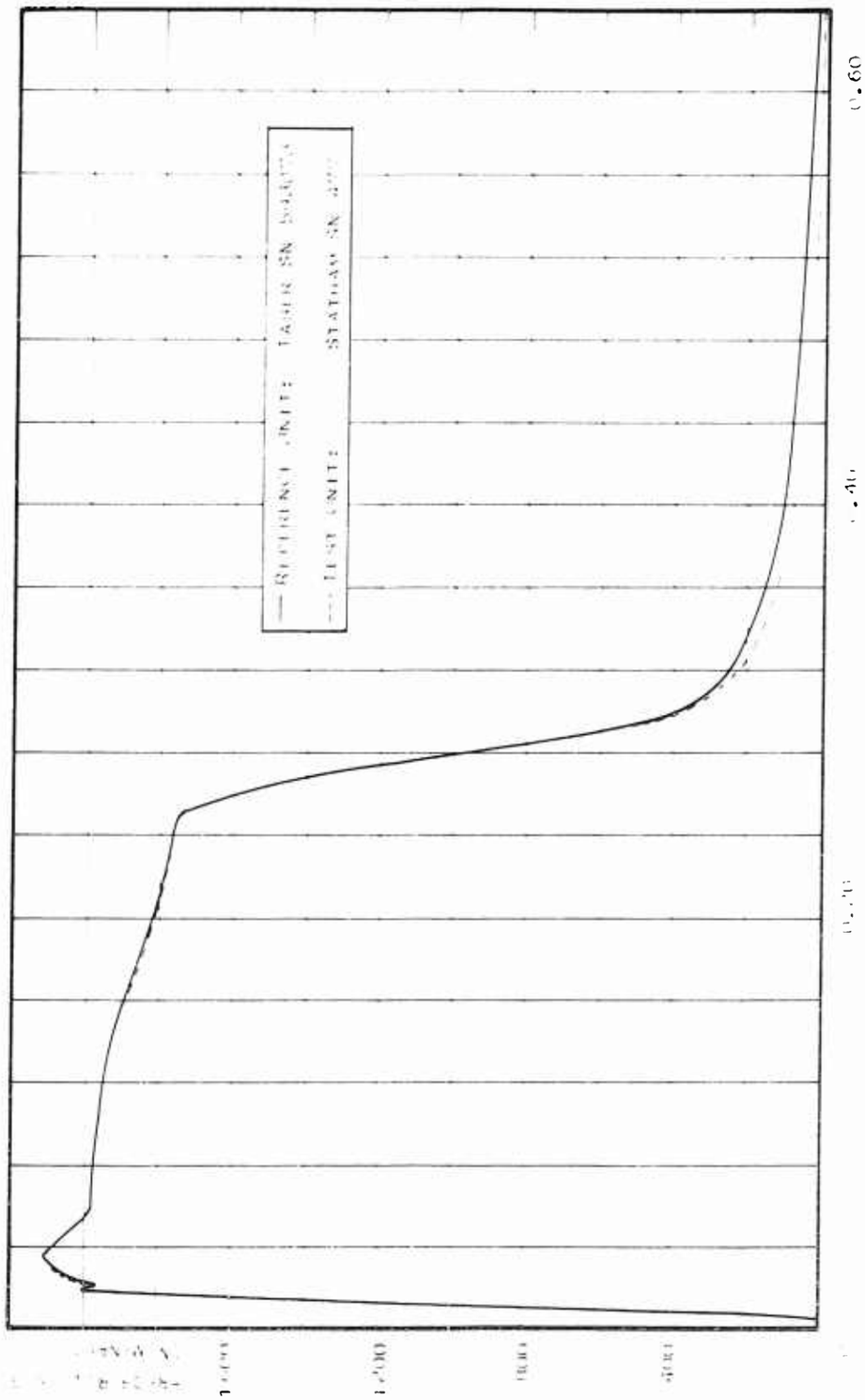
Pressure vs Time, Igniter Test (SN 477)

Figure 53



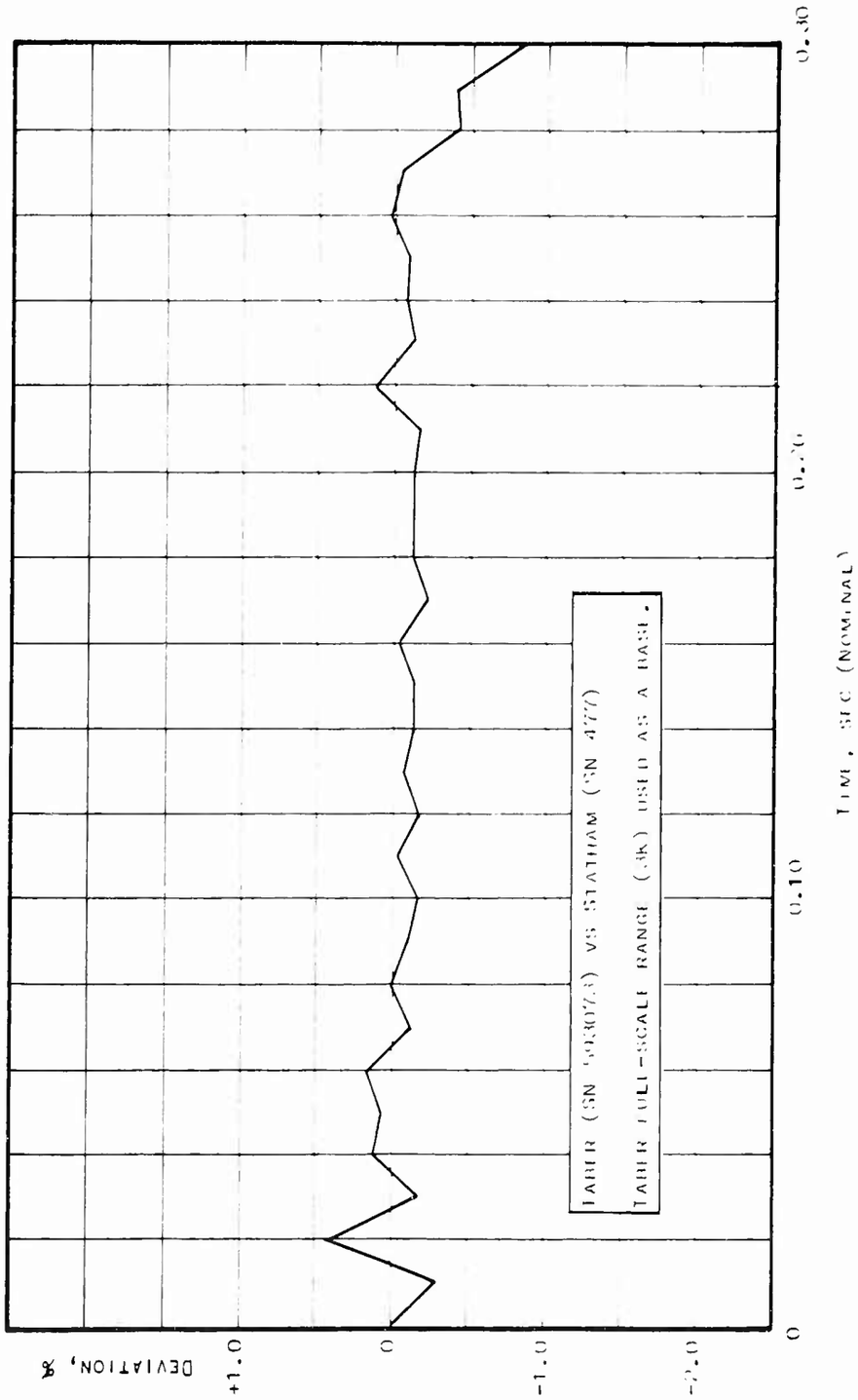
Percent Deviation vs Time, Igniter (SN 477)

Figure 54



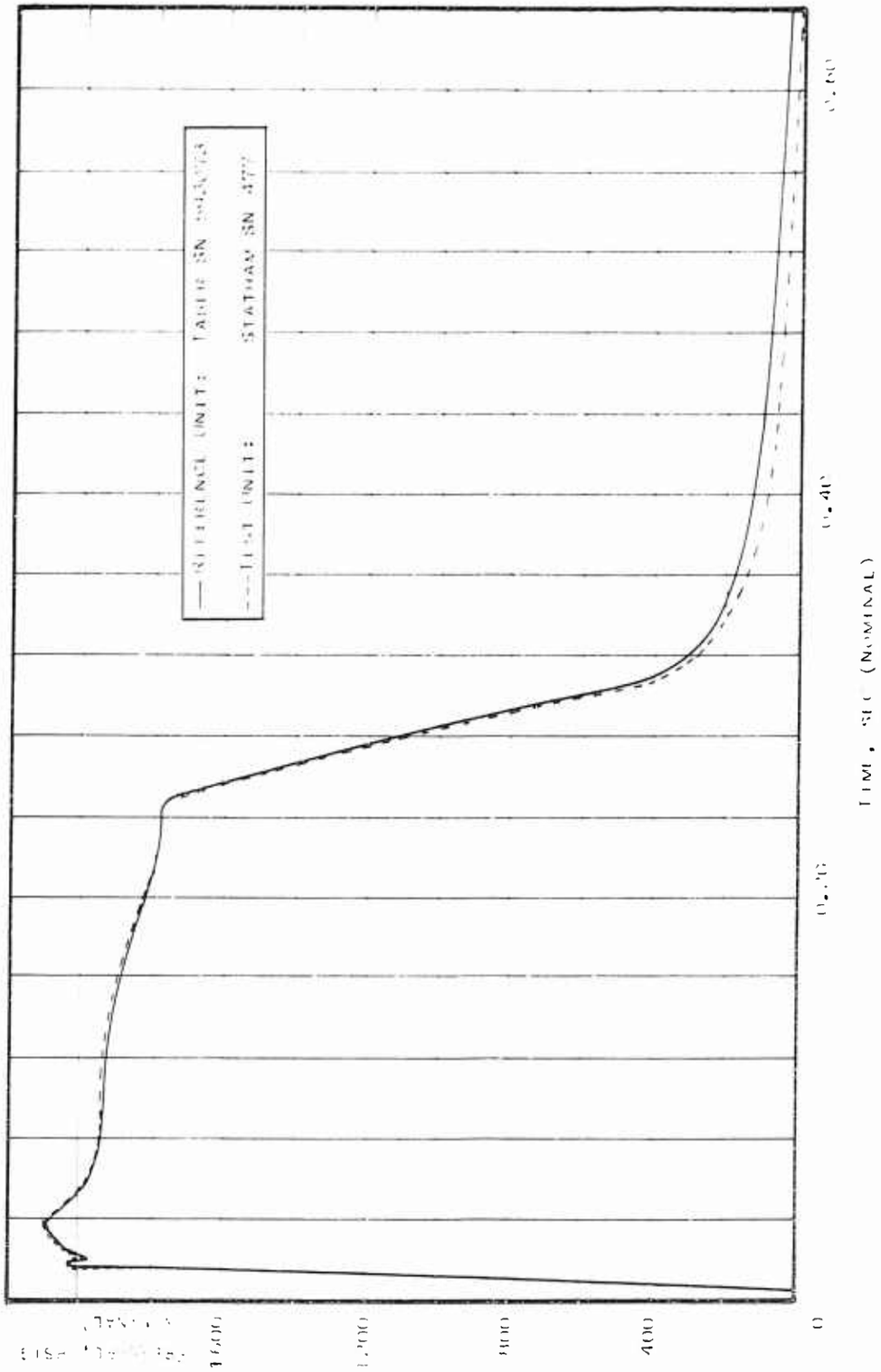
Pressure-vs Time, Igniter Test (SN 477)

Figure 55



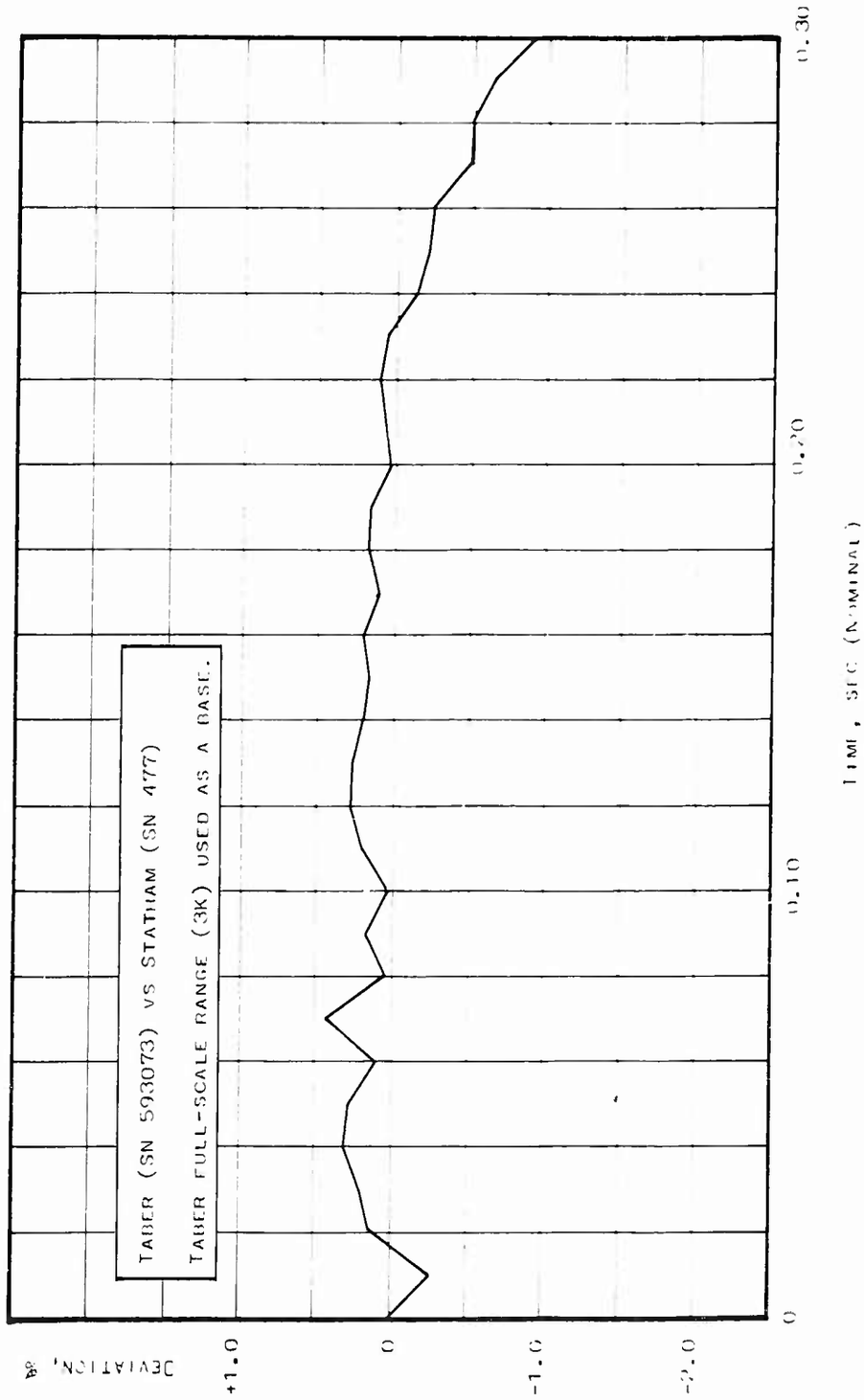
Percent Deviation vs Time, Igniter Test (SN 477)

Figure 56



Pressure vs Time, Igniter Test (SN 477)

Figure 57



Percent Deviation vs Time, Igniter Test (SN 477)

Figure 58

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 1 of 5

P.O.# _____

PRE-TEST CALIBRATION

MFG. Statham SERIAL NO. 493 RANGE 0-2500 psia

MODEL PA334TC CALIBRATED BY Dept. 8772 DATE 12-11-62

ROOM TEMP. 76 °F ASSIGNED TO ENGINE NO. For Igniter Firing

BAROMETRIC PRESSURE 757.4 MM HG PARAMETER MEASURED Qual Test

CHECKED BY Ken Burney

[X] ACCEPTED (NOTE g)

ASSIGNED BY Dept. 8772 R. E. Leeds

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS _____

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	10,000M	1 Megohm Minimum
B	10,000M	
C	10,000M	
D	10,000M	
E	10,000M	
F	10,000M	

[X] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	10,000M	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
41	70 MA Max.	28	28±0.2VDC

[X] ACCEPT

Pretest Calibration, Igniter Test (SN 493)

Figure 59

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-12-62

S/N .93

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
62.5	5.038	6.759	7.50V MAXIMUM	72.4	5.052

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
13mv	25 MV MAXIMUM

[X] ACCEPT

Pretest Calibration, Igniter Test (SN 493)

Figure 59

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-12-62

S/N 493

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS DECREASING	OUTPUT IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEATABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	[illegible]	[illegible]	X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	28V	28 ± 0.2 VDC
500	2014	2018	1940 2060				
1000	4023	4030	3940 4060				
1500	6038	6047	5940 6060				
2000	8038	8051	7940 8060				
2500	10,000	10000	X				
0	[illegible]	[illegible]	X	40 Unit Variation		28V	
500	2017	2020	1940 2060				
1000	4037	4036	3940 4060				
1500	6044	6050	5940 6060				
2000	8041	8050	7940 8060				
2500	10000	10000	X				
0	[illegible]	[illegible]	X	40 Unit Variation		28V	
500	2017	2020	1940 2060				
1000	4032	4036	3940 4060				
1500	6041	6049	5940 6060				
2000	8045	8050	7940 8060				
2500	10000	10000	X				

A. LINEARITY
[X] ACCEPT

B. HYSTERESIS
[X] ACCEPT

C. REPEATABILITY
[X] ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	[illegible]	7,475 7,525	28V	28±0.2 VDC

[X] ACCEPT

Pretest Calibration. Igniter Test (SN 493)

Figure 59

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 12-12-62

S/N 493

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	-16		X	40 Unit Variation	28V	28 ±0.2 VDC
500	1998	1992	1940 2060			
1000	4024	4015	3940 4060			
1500	6038	6031	5940 6060			
2000	8037	8030	7940 8060			
2500	10,000	9995	X			

[E] ACCEPT

X. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	-3		X	40 Unit Variation	28V	28 ± 0.2 VDC
500	2004	2000	1940 2060			
1000	4020	4011	3940 4060			
1500	6031	6022	5940 6060			
2000	8035	8030	7940 8060			
2500	10,000	9997	X			

[X] ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A 43.3	28V	+53.2	28V	+21.7	28V	28 ± 0.2 VDC
ZERO OUTPUT TOLERANCE	-0 +102mv	X	A±55 mv	X	A±85 mv	X	

[X] ACCEPT

Pretest Calibration, Igniter Test (SN 493)

Figure 59

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 5 of 5
DATE 12-12-62
S/N 493

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S.OUTPUT (PSIG) IN VOLTS	5.052	28V	5.068	28V	5.011	28V	28 ± 0.2 VDC
ZERO OUTPUT (PSIA) IN VOLTS	.0698	28V	.0859	28V	.0529	28V	
CORRECTED F.S.OUTPUT IN VOLTS	A 4.9822	28V	4.982	28V	4.958	28V	
F.S.OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .055V	X	A ± .085V	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Pretest Calibration, Igniter Test (SN 493)

Figure 59

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 1 of 5

P.O.# _____

MFG. Statham SERIAL NO. 493 RANGE POST-IGNITER FIRINGS 0-2500 psia

MODEL PA334TC-2.5M CALIBRATED BY Dept. 8772 DATE 1-16-63

ROOM TEMP. 75 °F ASSIGNED TO ENGINE NO. For Igniter Firing

BAROMETRIC PRESSURE 759.0 MM HG PARAMETER MEASURED Igniter Pressure

CHECKED BY Ken Bushey

[X] ACCEPTED (NOTE g)

ASSIGNED BY Dept. 8772 R. E. Leeds

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS _____

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	10,000M	1 Megohm Minimum
B	10,000M	
C	10,000M	
D	10,000M	
E	10,000M	
F	10,000M	

[X] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	10,000M	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
40.5	70 MA Max.	28	28±0.2VDC

[X] ACCEPT

Posttest Calibration, Igniter Test (SN 493)

Figure 60

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-26-63

S/N 493

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
82.4	5.064	6.795	7.50V MAXIMUM	79.2	5.063

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
13 mv	25 MV MAXIMUM

[X] ACCEPT

Posttest Calibration, Igniter Test (SN 493)

Figure 60

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-16-63

S/N 493

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS DECREASING	OUTPUT IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEAT-ABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	-3		X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	28.7	28 ± 0.2 VDC
500	2010	2001	1940 2060				
1000	4028	4020	3940 4060				
1500	6040	6033	5940 6060				
2000	8037	8033	7940 8060				
2500	10,000		X				
0	-3		X	40 Unit Variation		28.7	
500	2008	2006	1940 2060				
1000	4026	4024	3940 4060				
1500	6038	6033	5940 6060				
2000	8038	8033	7940 8060				
2500	10,000	10000	X				
0	-3		X	40 Unit Variation		28.7	
500	2005	2004	1940 2060				
1000	4026	4021	3940 4060				
1500	6037	6030	5940 6060				
2000	8035	8033	7940 8060				
2500	10000	10000	X				

A. LINEARITY [X] ACCEPT

B. HYSTERESIS [X] ACCEPT

C. REPEATABILITY [X] ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7496	7,475 7,525	28	28±0.2 VDC

[X] ACCEPT

Posttest Calibration, Igniter Test (SN 493)

Figure 60

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 4 of 5

DATE 2-16-63

S/N -33

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0	0	X	40 Unit Variation	28V	28 ±0.2 VDC
500	2003	2010	1940 2060			
1000	4030	4033	3940 4060			
1500	6040	6042	5940 6060			
2000	8036	8042	7940 8060			
2500	10,000	9997	X			

[X] ACCEPT

X. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	-2	-2	X	40 Unit Variation	28V	28 ± 0.2 VDC
500	2009	2000	1940 2060			
1000	4020	4012	3940 4060			
1500	6034	6023	5940 6060			
2000	8034	8030	7940 8060			
2500	10,000	9998	X			

[X] ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A -49.7	28V	59.7	28V	27.2	28V	28 ± 0.2 VDC
ZERO OUTPUT TOLERANCE	-0 +102mv	X	A±55 mv	X	A±85 mv	X	

[X] ACCEPT

Posttest Calibration, Igniter Test (SN 493)

Figure 60

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 5 of 5
DATE 1-16-63
S/N 493

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S.OUTPUT (PSIG) IN VOLTS	5.057	28	5.077	28	5.025	28	28 ± 0.2 VDC
ZERO OUTPUT (PSIA) IN VOLTS	.0759	28	.0883	28	.0561		
CORRECTED F.S.OUTPUT IN VOLTS	A 4.9881	28	4.9887	28	4.9680	28	
F.S.OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .055V	X	A ± .085V	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Posttest Calibration, Igniter Test (SN 493)

Figure 60

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 1 of 5

P.O.# _____

PRE-TEST CALIBRATION

MFG. Statham SERIAL NO. 477 RANGE 0-2500 psia

MODEL PA33WTC-2.5M CALIBRATED BY Dept. 8772 DATE 1-16-63

ROOM TEMP. 75 °F ASSIGNED TO ENGINE NO. Pre-test calibration

BAROMETRIC PRESSURE 759.0 MM HG PARAMETER MEASURED Igniter Pressure

CHECKED BY Ken Bushey

[X] ACCEPTED (NOTE g)

ASSIGNED BY Dept. 8772 R. E. Leeds

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS _____

[X] ACCEPT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A	10,000M	1 Megohm Minimum
B	10,000M	
C	10,000M	
D	10,000M	
E	10,000M	
F	10,000M	

[X] ACCEPT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN MEGOHMS	TOLERANCE
A-D & B-C	10,000M	1 Megohm Minimum

[X] ACCEPT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
40.5	70 MA Max.	28	28±0.2VDC

[X] ACCEPT

Pretest Calibration, Igniter Test (SN 477)

Figure 61

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-16-63

S/N 477

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
62.7	5.067	6.774	7.50V MAXIMUM	60.5	5.070

[X] ACCEPT

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
15 mv	25 MV MAXIMUM

[X] ACCEPT

Pretest Calibration, Igniter Test (SN 477)

Figure 61

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-16-63

S/N 477

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS DECREASING	OUTPUT IN UNITS INCREASING	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEAT-ABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	-3		X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	28V	28 ± 0.2 VDC
500	2000	1978	1940 2060				
1000	4002	3982	3940 4060				
1500	6002	5975	5940 6060				
2000	8004	7987	7940 8060				
2500	10,000	10000	X				
0	-3		X	40 Unit Variation		28V	
500	1999	1978	1940 2060				
1000	4001	3986	3940 4060				
1500	6001	5980	5940 6060				
2000	8003	7988	7940 8060				
2500	10000	10000	X				
0	-3		X	40 Unit Variation		28V	
500	1998	1980	1940 2060				
1000	4000	3985	3940 4060				
1500	6000	5983	5940 6060				
2000	8003	7988	7940 8060				
2500	10000	10000	X				

A. LINEARITY [X] ACCEPT

B. HYSTERESIS [X] ACCEPT

C. REPEATABILITY [X] ACCEPT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7501	7,475 7,525	28V	28±0.2 VDC

[X] ACCEPT

Pretest Calibration, Igniter Test (SN 477)

Figure 61

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

DATE 1-26-63

S/N 477

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0	0	X	40 Unit Variation	28V	28 ±0.2 VDC
500	2003	1975	1940 2060			
1000	4005	3970	3940 4060			
1500	6002	5970	5940 6060			
2000	8003	7980	7940 8060			
2500	10,000	10003	X			

[X] ACCEPT

X. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	-2	-2	X	40 Unit Variation	28V	28 ± 0.2 VDC
500	1994	1972	1940 2060			
1000	3998	3970	3940 4060			
1500	6000	5972	5940 6060			
2000	8002	7983	7940 8060			
2500	10,000	10008	X			

[X] ACCEPT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A 29.7	28V	27.5	28V	-22.5	28	28 ± 0.2 VDC
ZERO OUTPUT TOLERANCE	-0 +102mv	X	A±55 mv	X	A±85 mv	X	

[X] ACCEPT

Pretest Calibration, Igniter Test (SN 477)

Figure 61

ST 3083A
DATE: 9-17-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 5 of 5

DATE 1-14-63

S/N 477

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
F.S. OUTPUT (PSIG) IN VOLTS	5.065	28	5.062	28	5.033	28	28 ± 0.2 VDC
ZERO OUTPUT (PSIA) IN VOLTS	.0559	28	.0562	28	+.0037	28	
CORRECTED F.S. OUTPUT IN VOLTS	A 5.0091	28	5.0058	28	5.0293	28	
F.S. OUTPUT COLUMN A TOL.	5 ± 0.1 V	X	A ± .055V	X	A ± .085V	X	

[X] ACCEPT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 0.2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.

e. A 5-minute warmup time is required for each transducer.

f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416.

g. The "D" inspection stamp is used to indicate that transducer is subject to materials or engineering review. Use of this stamp requires discrepant transducer to be diverted from normal production use until a review decision is made.

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

Pretest Calibration, Igniter Test (SN 477)

Figure 61

ST 3083
DATE: 7-2-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 1 of 5
POST TEST CALIBRATION
P.O.# ISR 4184

MFG. Statham SERIAL NO. 477 RANGE 2500 psia

MODEL PA 334TC CALIBRATED BY Dept. 8772 DATE 1-23-63

ROOM TEMP. 75 °F ASSIGNED TO ENGINE NO. Igniter Firings

BAROMETRIC PRESSURE 761.1 MM HG

TRANSDUCER SHOULD BE

☐ MRB ACCEPTED ☒ ACCEPTED ☐ REJECTED

PREPARED BY K. W. Bushey
Dept. 8772

APPROVED
Dept. 4830

IR #

I. VISUAL INSPECTION

NO VISIBLE DAMAGE DUE TO SHIPPING, HANDLING, PACKAGING, ETC.
REMARKS

☒ ACCEPT ☐ REJECT

II. CASE INSULATION

BETWEEN CASE & PINS	RESISTANCE IN OHMS	TOLERANCE
A	10 KM	1 Megohm Minimum
B	10 KM	
C	10 KM	
D	10 KM	
E	10 KM	
F	10 KM	

☒ ACCEPT ☐ REJECT

III. CIRCUIT ISOLATION

BETWEEN PINS	RESISTANCE IN OHMS	TOLERANCE
A-D & B-C	10 KM	1 Megohm Minimum

☒ ACCEPT ☐ REJECT

IV. PRIMARY POWER CURRENT

READING IN MILLIAMPS	TOLERANCE	EXCITATION VOLTAGE	TOLERANCE
41	70 MA Max.	28	28 ± 2 VDC

☒ ACCEPT ☐ REJECT

Posttest Calibration, Igniter Test (SN 477)

Figure 62

ST 3083
DATE 7-2-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 2 of 5

DATE 1-23-63

S/N 477

V. 150% OVERPRESSURE AND LIMITING VOLTAGE

FOR REFERENCE ONLY BEFORE OVERPRESSURE PSIG READINGS		OVERPRESSURE 3750 ±10 PSIA		FOR REFERENCE ONLY AFTER OVERPRESSURE PSIG READINGS	
ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS	FULL SCALE OUTPUT IN VOLTS	TOLERANCE	ZERO OUTPUT IN MILLIVOLTS	FULL SCALE OUTPUT IN VOLTS
65.2	5.067	6.746	7.50V MAXIMUM	65.9	5.065

[X] ACCEPT [ ] REJECT

2nd run

VI. RESIDUAL NOISE

MILLIVOLT (PEAK TO PEAK) READING @ F.S.	TOLERANCE
20 MV	25 MV MAXIMUM

[ ] ACCEPT [ ] REJECT

Posttest Calibration, Igniter Test (SN 477)

Figure 62

Page 3 of 5

DATE 1-23-63

S/N 477

(5V OUTPUT)

VII. LINEARITY, HYSTERESIS, REPEATABILITY @ 75 ± 5°F (NOTES 1 & 2).

[illegible]	[illegible]	[illegible]	LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	REPEATABILITY TOLERANCE	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
0	0		X	40 Unit Variation	Maximum Deviation From Average of Three Cycles 20 Units	28	28 ± 2 VDC
[illegible]	2002	1977	[illegible]				
[illegible]	4005	3985					
[illegible]	6007	5986	[illegible]				
[illegible]	8007	7991	[illegible]				
[illegible]	10,000	10001	X				
0	0		X	40 Unit Variation		28	
500	2000	1978	1940 2060				
1000	4005	3988	3940 4060				
1500	6005	5983	5940 6060				
2000	8005	7992	7940 8060				
2500	10001	10001	X				
0	0		X	40 Unit Variation		28	
500	2000	1980	1940 2060				
1000	4006	3988	3940 4060				
1500	6006	5985	5940 6060				
2000	8006	7993	7940 8060				
2500	10001	10000	X				

A. LINEARITY
- [X] ACCEPT
- [ ] REJECT

B. HYSTERESIS
- [X] ACCEPT
- [ ] REJECT

C. REPEATABILITY
- [X] ACCEPT
- [ ] REJECT

VIII. SHUNT CALIBRATION (NOTE 3)

% OF FULL SCALE	75±5°F	SHUNT TOLERANCE	EXCITATION VOLTAGE	TOL
75	7496	7,475 7,525	28	28±2 VDC

- [ ] ACCEPT
- [ ] REJECT

Posttest Calibration, Igniter Test (SN 477)

Figure 62

ST 3083
DATE 7-2-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET-GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 4 of 5

DATE 1-23-63

S/N 477

IX. LINEARITY, HYSTERESIS, @ 30 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0		X	40 Unit Variation	28	28 ± 2 VDC
500	2000	1975	1940 2060			
1000	4000	3970	3940 4060			
1500	5999	5970	5940 6060			
2000	8002	7984	7940 8060			
2500	10,000	10006	X			

[X] ACCEPT [ ] REJECT

X. LINEARITY, HYSTERESIS, @ 150 ± 5°F (NOTES 1 & 2)

PRESSURE (PSIG)	OUTPUT IN UNITS		LINEARITY TOLERANCE	HYSTERESIS TOLERANCE	RECORD EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
	DECREASING	INCREASING				
0	0		X	40 Unit Variation	28	28 ± 2 VDC
500	2000	1972	1940 2060			
1000	4003	3972	3940 4060			
1500	6003	5974	5940 6060			
2000	8006	7989	7940 8060			
2500	10,000	10000	X			

[X] ACCEPT [ ] REJECT

XI. ZERO OUTPUT (NOTES 4 & 5)

FUNCTION	OUTPUT @ 75±5°F	EXCITATION VOLTAGE	OUTPUT @ 30±5°F	EXCITATION VOLTAGE	OUTPUT @ 150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT IN MILLIVOLT	A 38.8	28	33.6	28	-15.8	28	28 ± 2 VDC
ZERO OUTPUT TOLERANCE	-0 +102 mv	X	A±55 mv	X	A±85 mv	X	

[X] ACCEPT [ ] REJECT

Posttest Calibration, Igniter Test (SN 477)

Figure 62

ST 3083
DATE 7-2-62
RANGE: 2500 PSIA ONLY
(5V OUTPUT)

AEROJET GENERAL CORPORATION
SOLID ROCKET PLANT
MINUTEMAN OPERATIONAL
PRESSURE TRANSDUCER

Page 5 of 5

DATE 1-23-63

S/N 477

XII. FULL SCALE OUTPUT (NOTE 6)

FUNCTION	OUTPUT @75±5°F	EXCITATION VOLTAGE	OUTPUT @30±5°F	EXCITATION VOLTAGE	OUTPUT @150±5°F	EXCITATION VOLTAGE	EXCITATION VOLTAGE TOLERANCE
ZERO OUTPUT AT ATMOSPHERIC	5.066	28	5.067	28	5.036	28	28 ± 2 VDC
F.S. OUTPUT AT 2500 PSIG	.0640	28	.0618	28	.0120	28	
CORRECTED FULL SCALE OUTPUT	A 5.0020	28	5.0052	28	5.0240	28	
F.S. OUTPUT COLUMN A TOL.	5 ± 0.1V	X	A ± 55MV	X	A ± 85MV	X	

☐ ACCEPT ☐ REJECT

GENERAL NOTES:

a. All readings shall be taken at 75 ± 5°F unless otherwise specified.

b. The transducer excitation voltage shall be 28 ± 2 VDC.

c. 10,000 units shall equal 100% full scale transducer reading.

d. X = not applicable.
e. A 10-minute warmup time is required for each transducer.
f. These calibration data sheets shall be used with the latest revision of Aerojet Calibration Procedure ACP A-2416

SPECIFIC TEST NOTES:

1. Balance transducer output to zero at atmospheric pressure, apply 2500 psig pressure and range type "C" calibrator for 10,000 units on first cycle only.

2. Linearity tolerance applies to increasing portion of pressure cycle only.

3. Balance transducer output to zero at atmospheric pressure for shunt calibration.

4. Unbalanced transducer zero output (test XI) shall be recorded at 5.0 mm Hg or less.

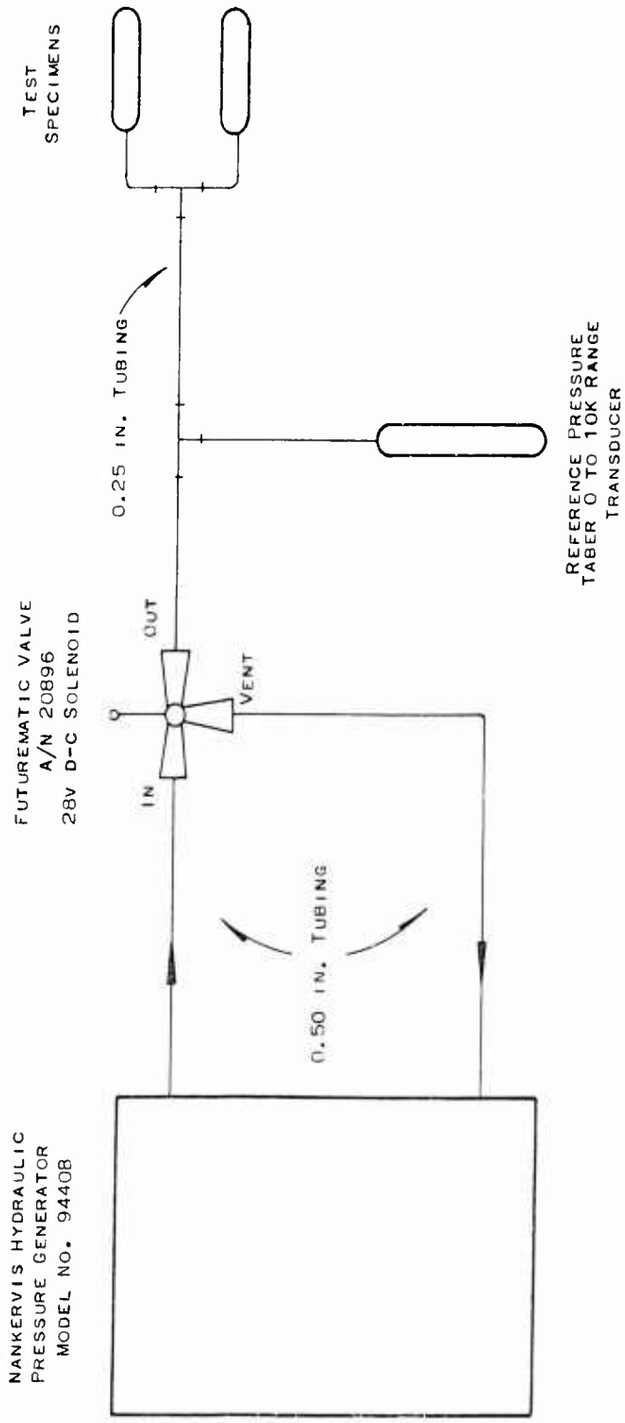
5. Negative voltage reading shall not be accepted at 75 ± 5°F.

6. Read and record transducer output voltage at atmospheric pressure. Apply 2500 psig, read and record output voltage. Subtract the voltage reading at atmospheric from the voltage reading at 2500 psig and record the difference in column A as full scale output at each temperature point.

7. Part I to be performed by AGC Receiving and Inspection Department.

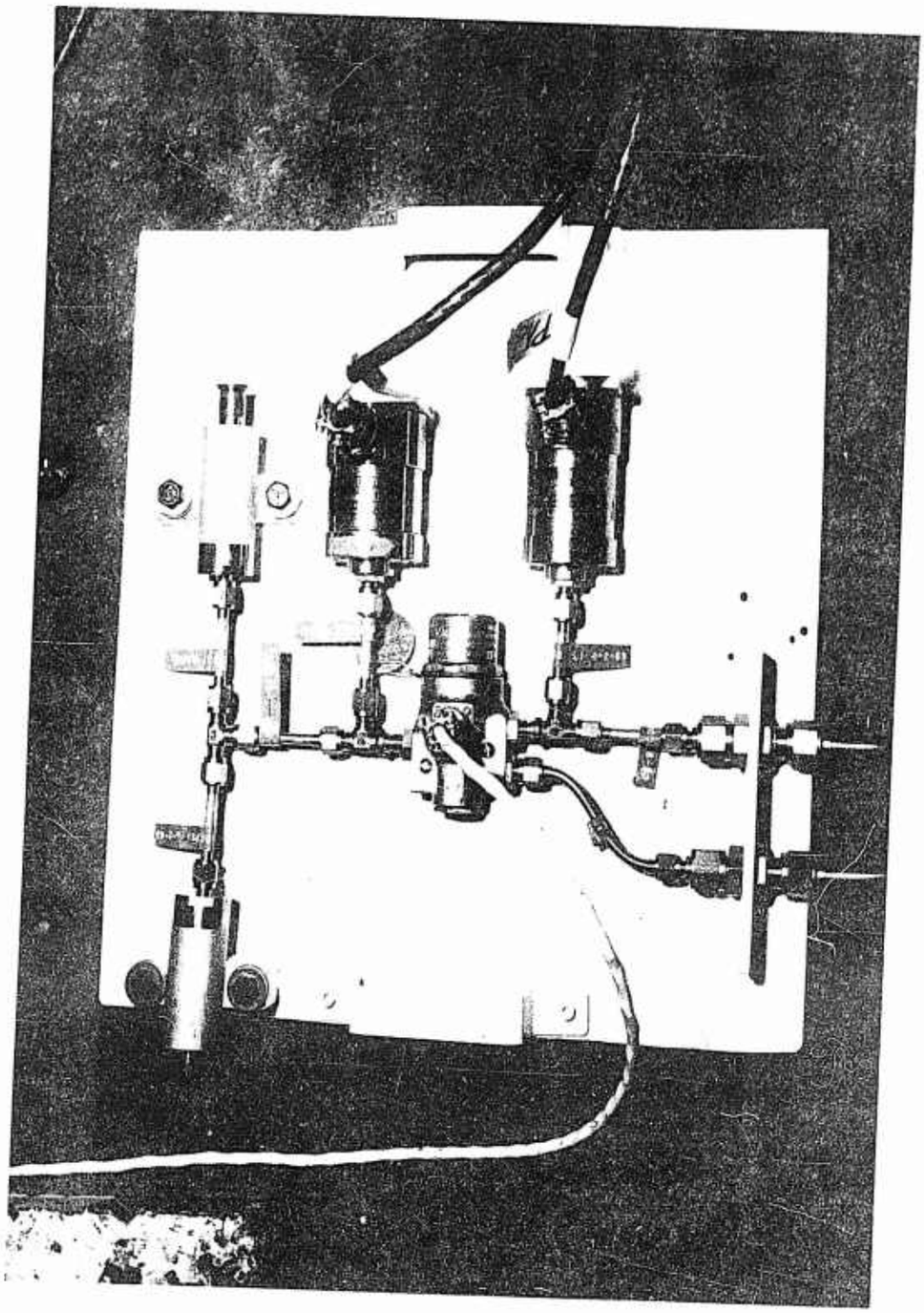
Posttest Calibration, Igniter Test (SN 477)

Figure 62



Safety Reliability Test Setup Schematic

Figure 63



View of Safety Reliability Test Setup

Figure 64