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Attention: BSRPQ-3 - Captain J. W. Mullins

And: BSRKP-3 - Mr. J. A. Weir

Subject: Contract AF 04(694)-127, WS-133A Minuteman Rocket Motor M57A1
Thin Skirt Structural Tests Final Report on Full Scale Forward
Skirt Specimen W2SD-14A and Full Scale Case RH00283

- Reference
- (1) HPC Letter -127/2/6-128, "Transmittal of Test Plan for Qualification Testing of Thin Forward Skirts," Dated 4 December 1964
 - (2) HPC Letter -127/2/6-187, "Amendment to Test Plan for Qualification Testing of Thin Forward Skirts," Dated 8 December 1964
 - (3) HPC Letter -127/2/6-247, "Thin Skirt Structural Tests Quick-Look Reports on Full Scale Forward Skirt Specimen W2SD-14A and Full Scale Case RH00283," Dated 15 February 1965

Gentlemen:

Attached is the Final Report on the subject Thin Skirt Tests. This completes the test program as outlined in References (1) and (2), and (3).

Very truly yours,

M. W. Plunkett
M. W. PLUNKETT, MANAGER
MINUTEMAN PROGRAM

MWP:MFJensen:la

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FINAL REPORT ON QUALIFICATION TESTING
OF WING II THROUGH WING VI CASES WITH
THIN FORWARD SKIRTS

MTO-752-38

WEAPON SYSTEM 133A

1 July 1965

Contract Number AF 04(694)-127

Prepared by

HERCULES POWDER COMPANY
CHEMICAL PROPULSION DIVISION
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Magna, Utah

Prepared for

HEADQUARTERS
AIR FORCE SYSTEMS COMMAND
UNITED STATES AIR FORCE
Los Angeles, California

Report No. MTO-752-38
Copy No. 20
Date 1 JULY 1965

**FINAL REPORT ON QUALIFICATION TESTING
OF WING II THROUGH WING VI CASES WITH
THIN FORWARD SKIRTS**

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FOREWORD

The Minuteman Third Stage motor case is wound from continuous glass filaments and has forward and aft skirts which are integrally wound to the pressure vessel. These skirts are made up of continuous glass filaments and of layers of glass cloth which are layed up on the skirt mandrel by hand. Because of the hand lay-up process it is not uncommon to realize small variations in skirt thickness.

This report describes the results of a qualification test series that was necessitated by a deviation from the specified thickness of the forward skirt on Drawing No. 01A00221.

This program was conducted under Contract No. AF 04(694)-127.

Published by
Minuteman Engineering Group
HERCULES POWDER COMPANY
Bacchus Works
Magna, Utah

ABSTRACT

This test series was conducted to determine the ultimate capability of Minuteman Third Stage motor cases having a forward skirt thickness below the 0.158 inch minimum as specified by Drawing No. 01A00221. A full scale motor and a forward skirt specimen were used to determine this capability.

The forward skirt specimen had an average thickness of 0.157 inch with a minimum of 0.152 inch. Failure occurred under the combined effects of 63.7 kips axial compression load and 29.7 psig overpressure. This exceeds the required loads of 46.3 kips axial compression load and 28.9 psig overpressure. The mode of failure was an inward buckling of the skirt over the entire circumference.

The full scale case had an average forward skirt thickness of 0.155 inch with a minimum of 0.149 inch. Failure occurred under the combined effects of 40.84 kips axial compression load, 7.68 kips shear load and 717.02 in-kips bending moment at an average external surface temperature of 160 °F giving an equivalent axial load of 117.24 kips. The required loads for this test are 18.50 kips axial compression load, 7.23 kips shear load, and 725.50 in-kips bending moment at an external surface temperature of 160 °F giving an equivalent axial load of 95.99 kips. The mode of failure was a buckling of the forward skirt over approximately 320 degrees of the circumference.

These tests successfully demonstrated that cases with a forward skirt thickness as much as 0.009 inch below the 0.158 inch minimum, per Drawing No. 01A00221 are capable of withstanding the present flight loads requirement.

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SECTION I

INTRODUCTION

A. BACKGROUND

The design of the Wing II Design X, Third Stage Minuteman motor case was established in October of 1962. The limits for the forward skirt thickness dimension were 0.158 inch to 0.190 inch. This configuration was qualified through preproduction testing of cases that were fabricated with a cam controlled type winding machine. Throughout the period of manufacture of cases with this type of machine the skirt thickness was maintained within the specified limits.

Later on in the Wing II program (December, 1963) a new machine was introduced for fabrication of Third Stage motor cases. This machine utilized a numerical tape control system and had an electronic tension control in conjunction with an advanced glass filament delivery system.

Soon after the numerically controlled (N.C.) machine was incorporated into the system it became evident that the thickness of the forward skirt had decreased. This led to a study of the skirt thickness measurements on several hundred cases to determine the history and thickness trends of the Wing II skirt for various periods of time and to compare the difference due to different winding machines and various changes in the fabrication processes. The results of this study showed that the change in skirt thickness came at the same time as the change in winding machines. A comparison of machines showed that for a given setting the actual delivered tension by the cam controlled machine was less than that by the N.C. machine. This comparison is shown in Tables I and II.

The N.C. machine tension system was designed for a higher tension range than the cam controlled machine and was already operating on its lower range so the possibility of reducing tension to increase skirt thickness was not considered a good fix. To revert back to the original thickness would mean a design change in the delivery system of the N.C. machine. Since this was not practical a qualification test program was set up to qualify the as-built condition of the forward skirt. This plan consisted of structural tests on two (2) full scale skirt specimens and one (1) full scale motor case. These tests, if successful, would be adequate qualification of the cases with thin forward skirts for operational use.

The test results of the first full scale skirt specimen tested are presented in a separate report entitled "Final Report W2SD-13A, Wing VI Structural Skirt Test," dated 31 July 1964.

This report describes the tests and results of the second skirt test (W2SD-14A) and the full scale case test (RH00283). Skirt test W2SD-14A is a duplicate test of W2SD-13A.

B. PURPOSE

The primary purpose of tests W2SD-14A and RH00283 was to determine the structural integrity of Wing II - VI motor cases having forward skirts thinner than the minimum allowable dimension of 0.158 inch presently called out on Drawing 01A00221.

These tests were conducted at Hercules Powder Company's Engineering Test facilities, located at Bacchus, Utah, on the following dates:

W2SD-14A, Phase I (maximum wind shear loading) and Phase II (simulated silo launch) - 28 January 1965

RH00283, Phase I (simulated silo launch) - 1 February 1965

RH00283, Phase II (simulated flight loads) and Phase III (maximum wind shear loading) - 5 February 1965

C. TEST OBJECTIVES

1. To determine the capability of a "thin" Third Stage motor forward skirt to take combined flight loading conditions of axial load, shear load and bending moment experienced at the maximum wind shear condition of the flight cycle. This capability to be established at ambient temperature.
2. To determine the ultimate capability of this thin forward skirt specimen when loaded to failure with an increasing axial compressive load and at the same time subjected to silo over-pressure at ambient temperature.
3. To determine the capability of a full scale case with a "thin" skirt to withstand silo launch conditions at ambient temperature followed by Wing VI flight loads at elevated temperatures.
4. To determine the ultimate capability of this case when subjected to maximum wind shear conditions with an increasing axial load to failure at elevated temperatures.

SECTION II

TECHNICAL DISCUSSION

A. TEST SPECIMEN DESCRIPTION

1. Full Scale Skirt Sample (W2SD-14A)

Forward skirt sample W2SD-14A was constructed at Hercules Powder Company's Rocky Hill Plant, Rocky Hill, New Jersey, of Spiralloy (Spiralloy is a Hercules material made of glass roving windings, nylon roving windings, glass cloth and epoxy resins). The nominal outside diameter was 37.50 inches and the overall length of the Spiralloy skirt was 11.35 inches.

The winding geometry of the forward skirt test specimen consisted of two layers of 14.5 degree glass windings, nine layers of 143 reverse weave glass cloth, one layer of 90 degree glass windings and three layers of 90 degree nylon roving. The mean skirt thickness calculated from 72 measurements was 0.157 inch with a maximum thickness of 0.165 inch and a minimum thickness of 0.152 inch (see table III).

The skirt specimen in its finished condition was a Wing VI Operational configuration having forward skirt flight hardware consisting of G&C cable support bracketry, TT wiring clips, TT switch bracket, destruct S&A bracket, forward skirt vent cup, forward skirt G&C cable access hole with doubler plate, and forward skirt interstage ring. The aft end of the skirt specimen had an aluminum ring installed and machined to receive a simulated 2 - 3 interstage.

The preparation for the test, a metal-reinforced R&D section was attached to the forward skirt interstage ring using the standard nut plates present on the ring and a reinforced 2 - 3 interstage section was fastened to the aft end of the specimen utilizing the standard 2 - 3 interstage bolt hole pattern (72 bolts).

2. Full Scale Case (RH00283)

Case No. RH00283 was fabricated at Rocky Hill, New Jersey, per Drawing 01A00221-089. The forward skirt on this case was constructed of the same material and configuration as the skirt specimen above. The skirt is integrally wound to the case during the case fabrication process. The mean forward skirt thickness calculated from 72

measurements was 0.1546 inch with a maximum of 0.164 inch and a minimum of 0.149 inch (see table IV).

This case in its finished condition was a Wing VI Operational configuration having forward skirt flight hardware consisting of G&C cable support bracketry, TT wiring clips, TT switch bracket, destruct S&A bracket, forward skirt vent cup, forward skirt G&C, cable access hole with doubler plate, and forward skirt interstage ring. The case also had an aft skirt interstage ring and an operational raceway.

In preparation for the test a simulated R&D section was attached to the aft skirt interstage ring utilizing the standard 2 - 3 interstage bolt hole pattern (72 bolts).

B. TEST PROCEDURE

1. Full Scale Skirt Sample (W2SD14-A)

Following installation of the instrumentation (figure 1), the assembly was mounted in an upright position in the structural test stand. A rubber overpressure bladder backed up by a steel hoop was then placed around the skirt on the outside. The compression loading device consisted of a loading head and three hydraulic rams, designated P₁, P₂, and P₃. Ram P₁ was positioned on the base at 270 degrees and Ram P₂ at 90 degrees. Ram P₃ was mounted on the head 34 inches above the 2 - 3 interstage-skirt joint at 90 degrees. The force from Ram P₃ was normal to the longitudinal centerline of the case. The rubber bladder was connected to a pressurized water supply. Figure 2 illustrates the test setup. The instrumentation was attached to the recorders and checked for accuracy, polarity and calibration. Next the loads were applied as programmed in figure 3. Phase I, maximum wind shear loading was applied first, and then Phase II, silo overpressure combined with axial compression load was applied until failure occurred.

2. Full Scale Unit (Case No. RH00283)

For the first phase of the test, Case RH00283 was instrumented as shown in figure 4. After the instrumentation was applied the case was installed in the structural test stand in an upright position. A rubber overpressure bladder backed up by a steel hoop was placed around the forward skirt section of the case and was connected to a pressurized water supply. The test setup is illustrated in figure 5. After the normal instrumentation check the loads were applied in accordance with figure 6.

For the second phase of the test the apparatus was disassembled and the case reinstrumented as shown in figure 7. The case was reinstalled into the structural test stand as shown in figure 8. Heat lamps were placed around the case and all instrumentation was connected to recorders and calibrated. Loads were then applied to the case in accordance with figure 9 followed by loading to failure in accordance with figure 10.

C. TEST RESULTS

1. Skirt Sample

During the first phase of the test, which was the application of simulated flight loads for the maximum wind shear condition, the specimen saw the following maximum loads:

Axial load	18.22 kips
Shear load	7.53 kips
Bending moment	709.00 in-kips

The equivalent axial load for the above loads is 93.8 kips. This load was calculated using the following equation:

$$P_{eq.} = P_A + 2 M/R$$

where:

$P_{eq.}$	=	Equivalent axial load
P_A	=	Applied axial load
M	=	Applied bending moment
R	=	Radius of case

The required loads at the maximum wind shear condition per BSD document 6680.14-6467 (Aerospace Vehicle Design Loads) dated 19 April 1963 are per figure 3 and as follows:

Axial load	18.50 kips
Shear load	7.23 kips
Bending moment	726.50 in-kips
Equivalent axial load	95.99 kips

Because of a modification resulting from a repair to the Test Stand which was not accounted for in the loading program, the bending moment load was lower than required. The test data are shown graphically in figures 11 through 17 and are listed in table V.

The maximum strain and deflection data at 40 seconds show net tension on the skirt from 0 degrees to approximately 160 degrees and compression over the remaining circumference. This indicates a slight shift of the neutral axis of bending on one side of the skirt from 180 degrees to 160 degrees. The strain and deflection data correlated very well around the circumference except at 270 degrees. The EDI reading and the strain readings on either side of 270 degrees indicate that the strain gage reading at 270 degrees was possibly in error.

Poissons ratio, when calculated from the strain readings, averages out to 0.292 in. compression and 0.228 in. tension.

During the second phase of the test which was the application of axial compressive load plus overpressure the specimen was loaded to failure with the following loads being applied at failure:

Axial load 63.72 kips

Overpressure 29.7 psig

Required silo loads for this phase of the test per BSD document 6680.6267 are per figure 3 and as follows:

Axial load 46.3 kips

Overpressure 28.9 psig

The mode of failure was a series of diamond shaped equally spaced buckled areas that extended completely around the circumference of the skirt. The center position of the "diamond" was buckled inward (see photos in figures 18 through 25). The data from this phase of the test are shown in figures 26 through 41 and table VI.

Those axial strains which were opposite the diamond "dimples" showed net tension up to 60 seconds at which time the overpressure was leveled off and held constant. At this point the increasing axial load overrode the effects of overpressure and reversed the direction of strain. The tension indicated during the first 60 seconds is a result of bending of the skirt wall due to application of external pressure. The E.D.I.'s also show tension up to 60 seconds due to bending. This does not mean that the skirt wall

was in tension itself but that the brackets attaching the E.D.I.'s to the skirt were being bent or "twisted" as a result of the external pressure load.

All data from this test indicates a normal reaction of the specimen to the imposed loads. This test was very similar to skirt test W2SD-13A which was subjected to the same loads.

2. FSU Case RH00283

During the first phase of the test, which was silo launch conditions (overpressure and axial load), the case saw the following maximum loads:

Axial load	48.4 kips
Overpressure	30.0 psig

This compares to the requirement per BSD Document 6680.14-6267 of:

Axial load	46.3 kips
Overpressure	28.9 psig

Test data for this phase are shown in figures 42 through 49 and table VII.

The strain readings show a slight amount of net tension in the axial direction due to the bending moment resulting from application of external pressure. The gages in the circumferential direction gave compressive readings. This again shows that at this particular location of the gages (at the midway point on the skirt) the reactions from overpressure bending are overriding the reactions from axial compression at the applied load levels. The bending effects were more predominant at the doubler plate reinforcement location (210 degree) as evidenced by strain gages 25 and 26.

During the second phase of the test the case was exposed to flight cycle loading as shown in figure 9. The specimen passed this phase of the test without any detrimental effects. Test data are shown in figures 50 through 61 and table VIII.

The general trends of the strain data correlate with the applied flight loads cycle. At approximately zero seconds, or silo launch, the axial strains are leaning slightly heavier in compression on the side 270 degrees from target. This is probably due to the

shear load (P_3) as it begins to influence the sample through a bending moment. It also appears that the compressive strains prior to this time are weighted a little more at 90 degrees and 270 degrees. This would suggest influence of the two opposite jacks applying concentrated loads through the loading head.

At the maximum wind shear condition (approximately 30 seconds) the strain readings verify the bending moment about the 0 degree - 180 degree axis. These readings show net tension on the 90 degree side of the neutral axis and compression on the 270 degree side. These strains also verify the presence of an axial compressive load in addition to the bending moment due to the fact that the strain readings are not equal and opposite about the neutral axis of bending. The strains on the compression side are considerably higher than those on the tension side.

Following this loading the specimen was subjected to maximum wind shear conditions with the axial load increased to failure. The maximum loads applied at failure were as follows:

Axial load	40.84 kips
Shear load	7.68 kips
Bending moment	717.02 in-kips
Equivalent axial load . . .	117.32 kips

The required loads from BSD document 6680.14-6467 are as follows:

Axial load	18.50 kips
Shear load	7.23 kips
Bending moment	726.50 in-kips
Equivalent axial load . . .	95.99 kips

Test data from the failure cycle are shown in figures 62 through 76 and table IX.

A change in strain rate can be seen at 30 seconds due to the leveling off of the bending and shear loads. At this point the data indicates the neutral axis is parallel to the 0 degree - 180 degree axis but is shifted slightly to the 90 degree side. The point of maximum compression was at approximately 280 degrees from target and the point of maximum tension at approximately 100 degrees from target. This position remained constant until failure occurred at 58 seconds from the time of initial load application.

The mode of failure was a circumferential buckling of the forward skirt approximately 8 inches aft of the forward bearing surface. The failure extended completely around the circumference of the skirt (see figures 77 through 80).

SECTION III

CONCLUSIONS

1. The objectives of these tests were met in that the ultimate capability of a Third Stage motor forward skirt having a thickness less than 0.158 in. was determined.
2. These tests demonstrated that a motor case having a mean forward skirt thickness of 0.155 in. and a minimum thickness of 0.150 in. is capable of withstanding Wing II through Wing VI flight loads.
3. Data obtained from these tests can be used as an aid in evaluating cases with skirts of less thickness than those tested in this series.

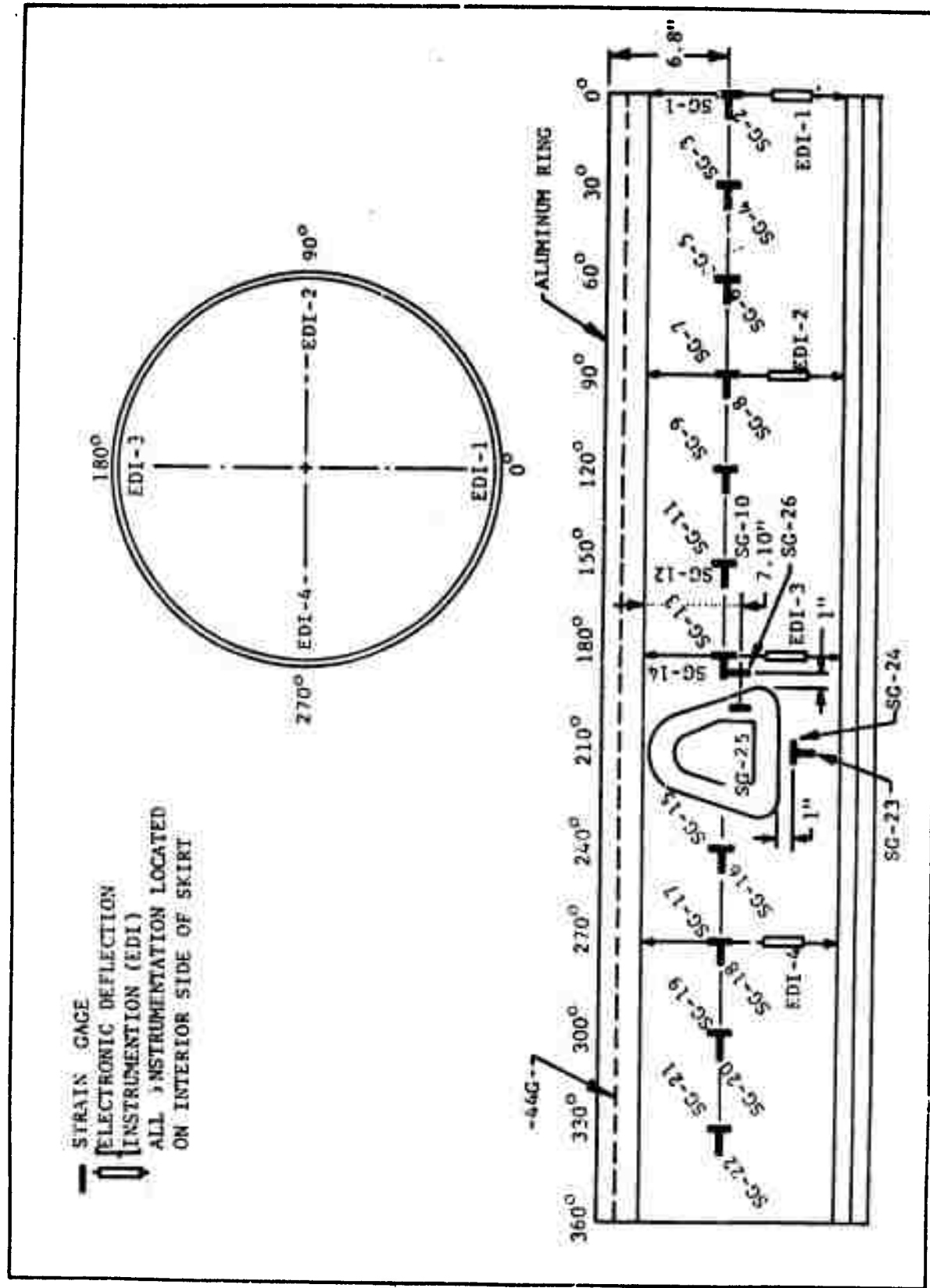
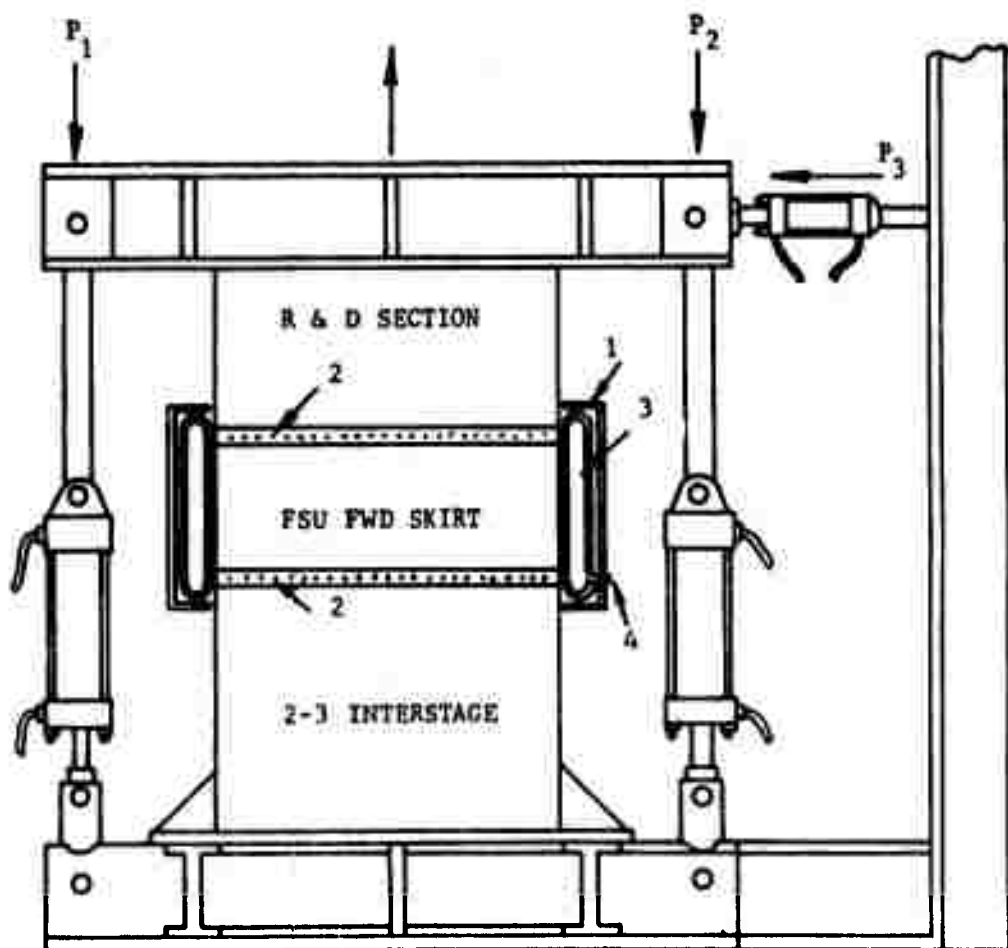


FIGURE 1 Instrumentation Location, W2SD-14A



1. STEEL JACKET (OVERPRESSURE)
2. TORQUE BOLTS TO 200 -220 IN. - LB.
3. RUBBER BLADDER (OVERPRESSURE)
4. PRESSURE SUPPLY

FIGURE 2

Test Setup, W2SD-14A

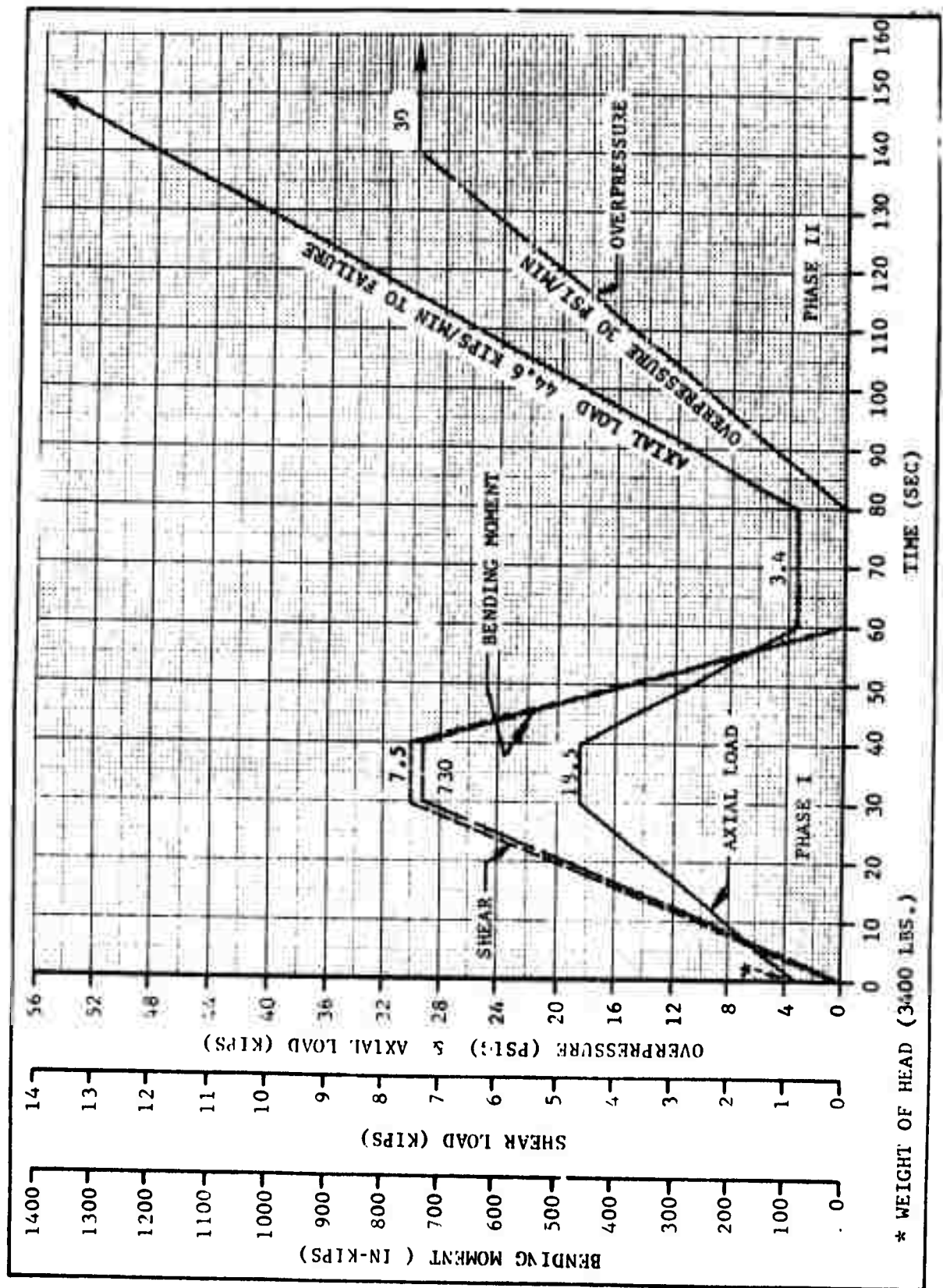


FIGURE 3 Programmed Loads, W2SD-14A

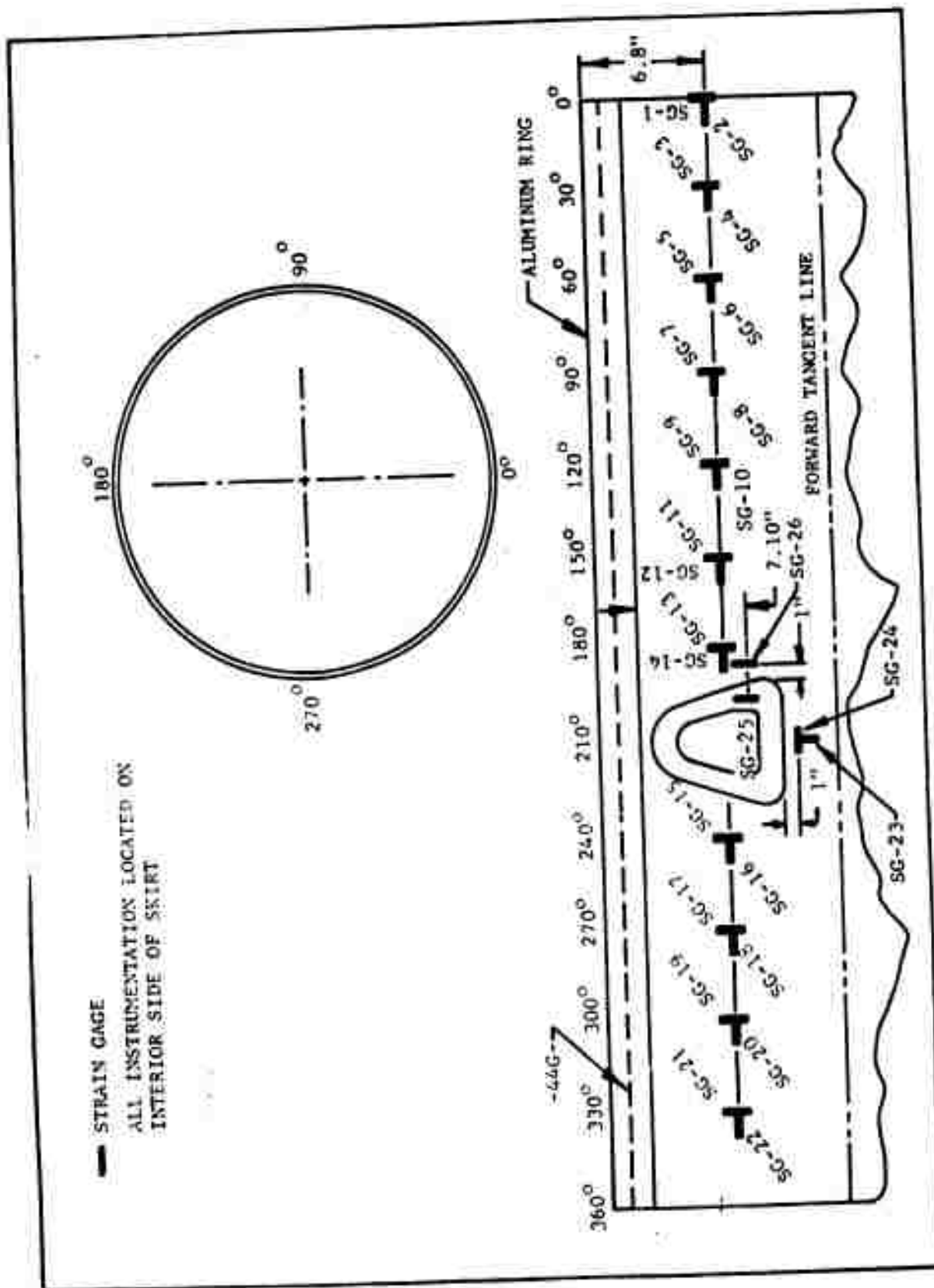


FIGURE 4 Instrumentation Location, Phase I, RH00283

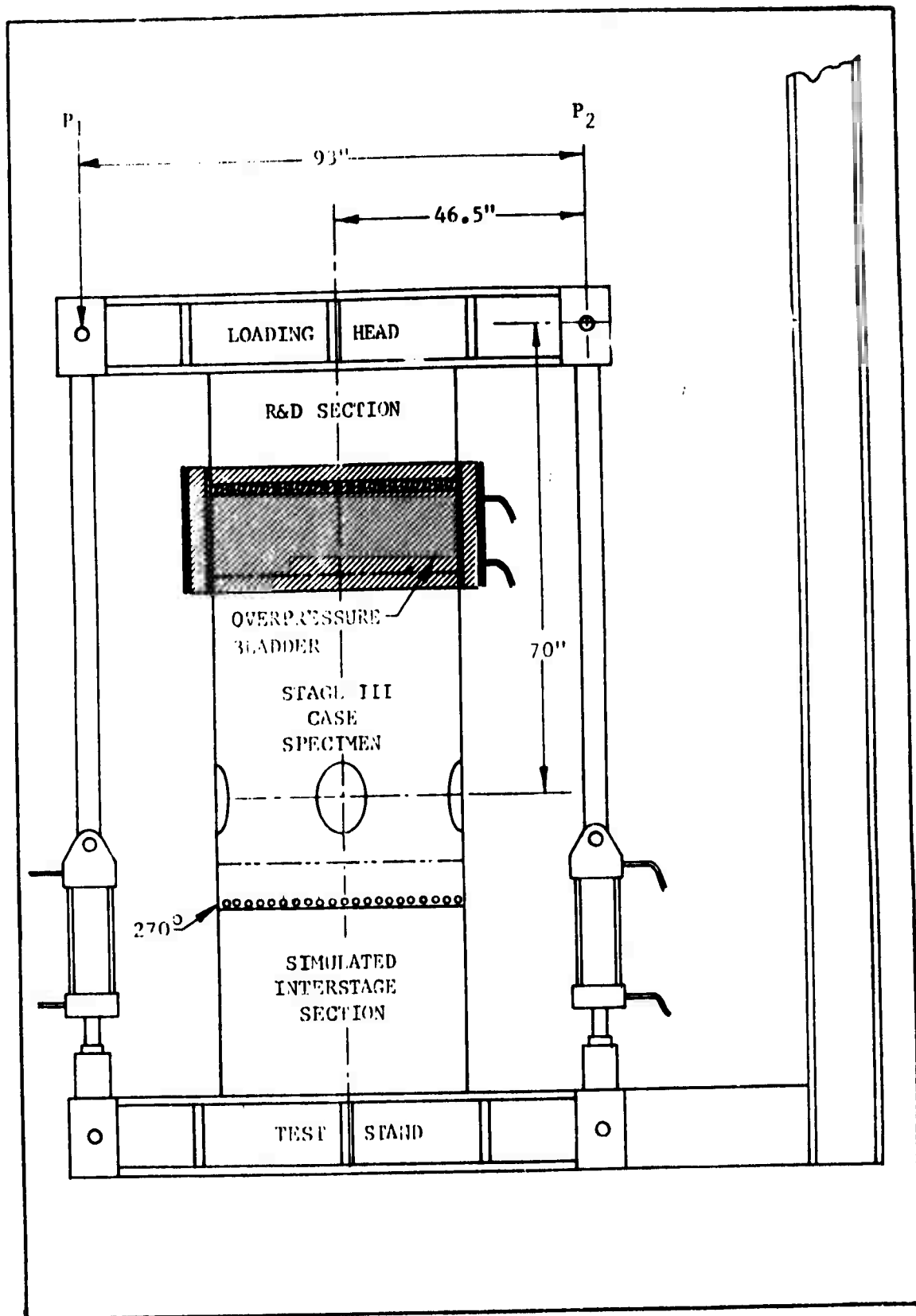
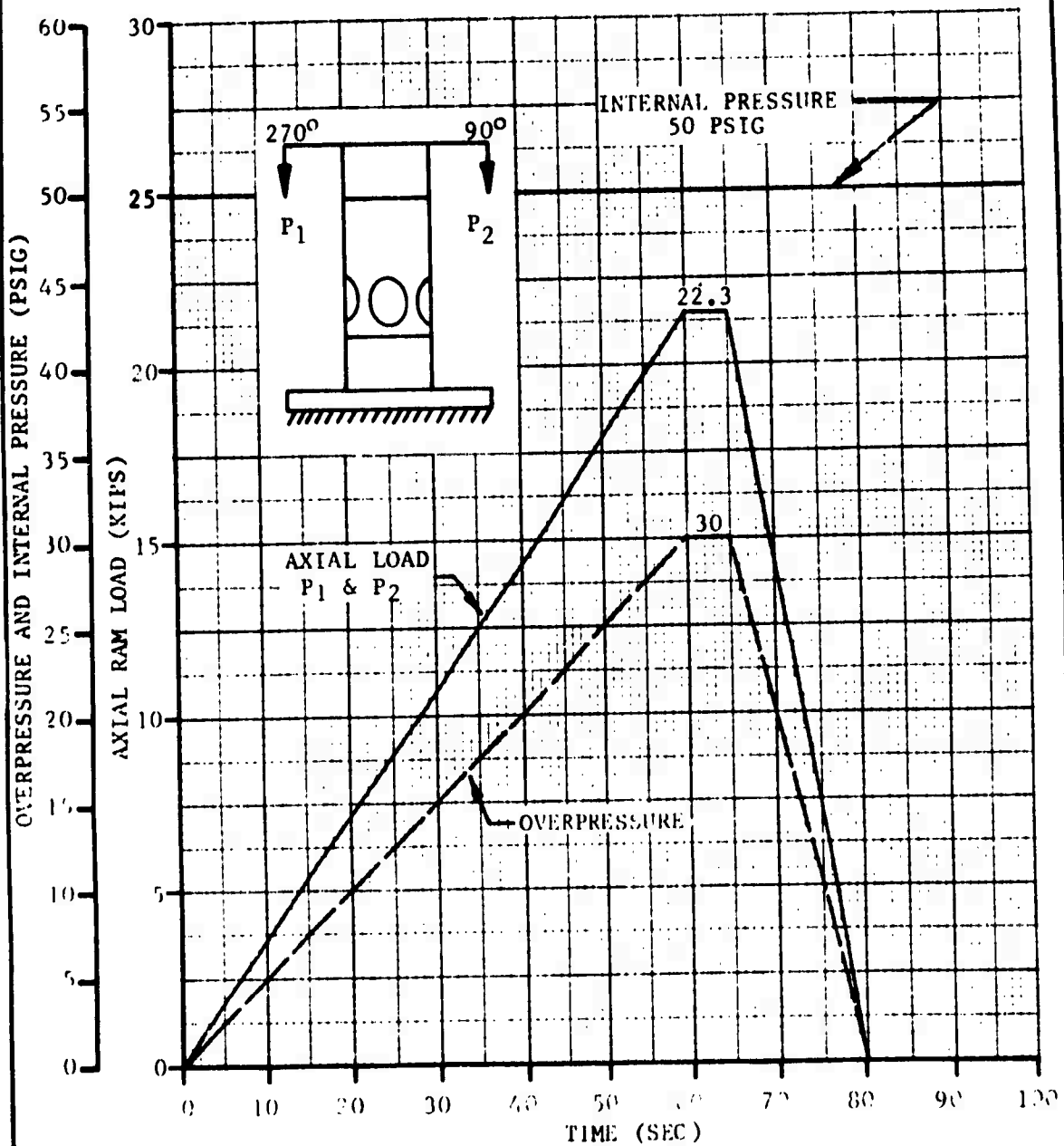


FIGURE 5 Test Setup, Phase I, RH00283



NOTE: 50 PSI INTERNAL PRESSURE TO BE HELD DURING ENTIRE TEST

FIGURE 6 Programmed Loads, Phase I, RH00283

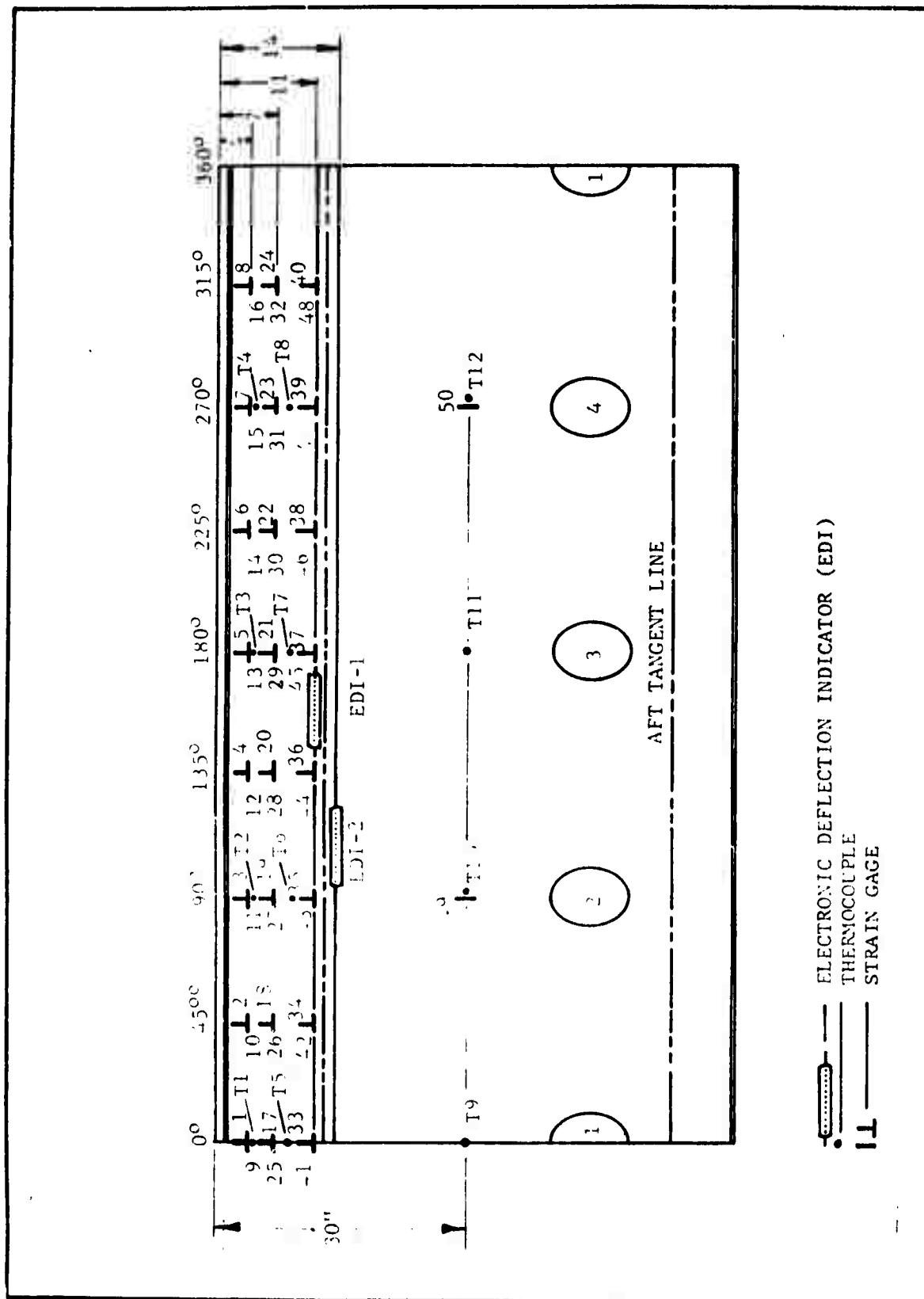


FIGURE 7 Instrumentation Location, Phase II and III, RH00283

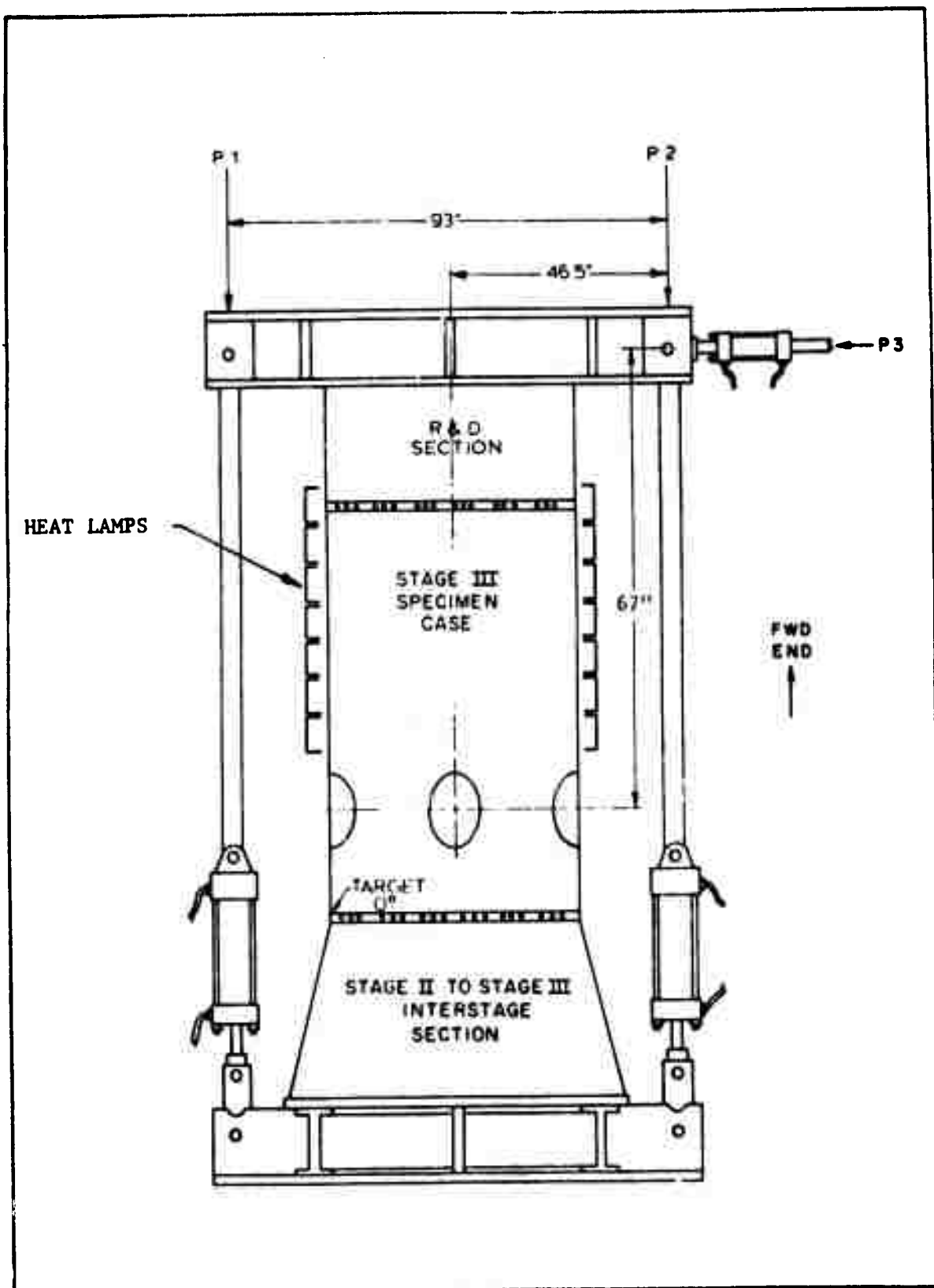


FIGURE 8 Test Setup, Phase II, RH00283

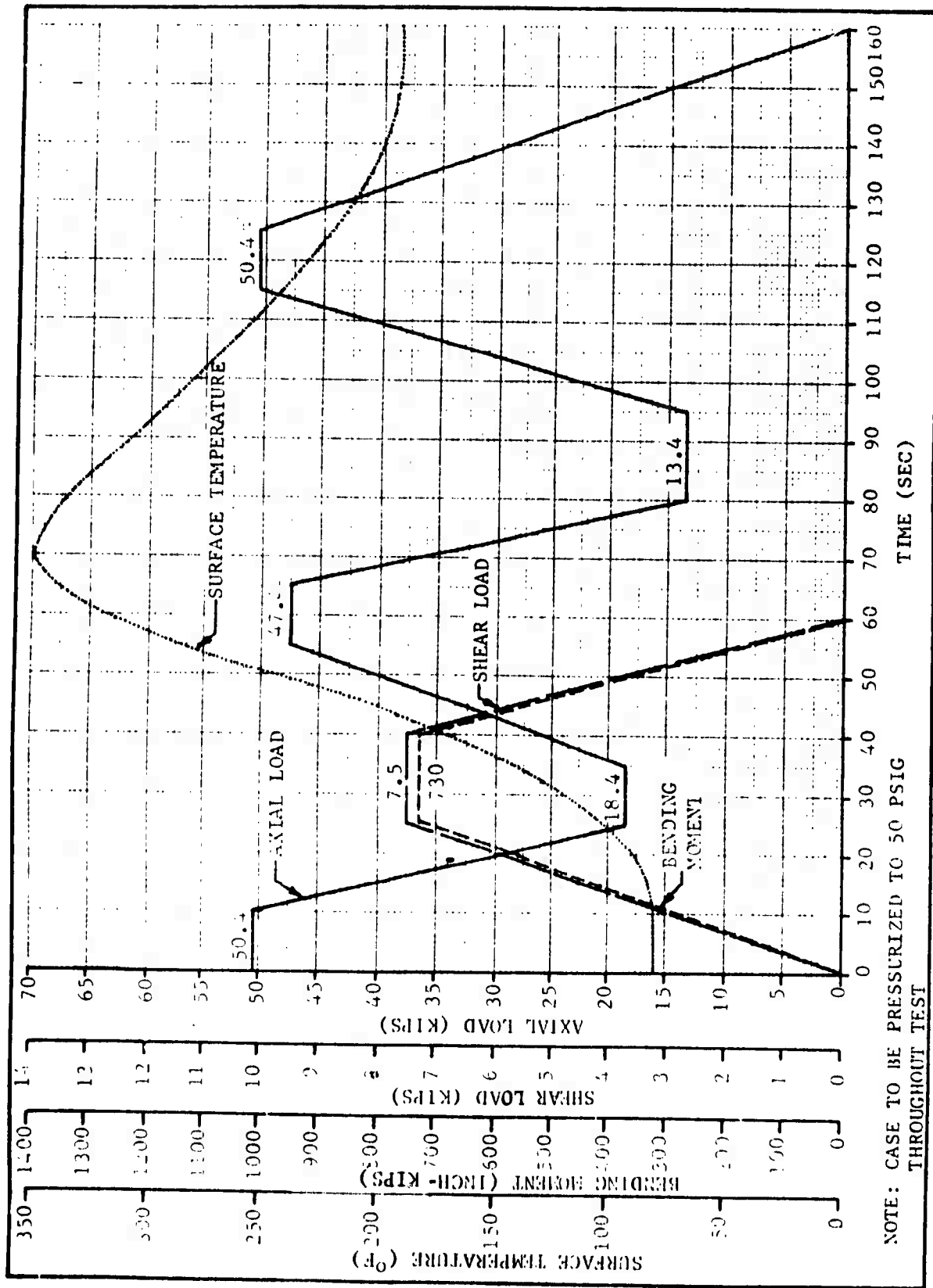


FIGURE 9 Programmed Loads, Phase II, RH00283

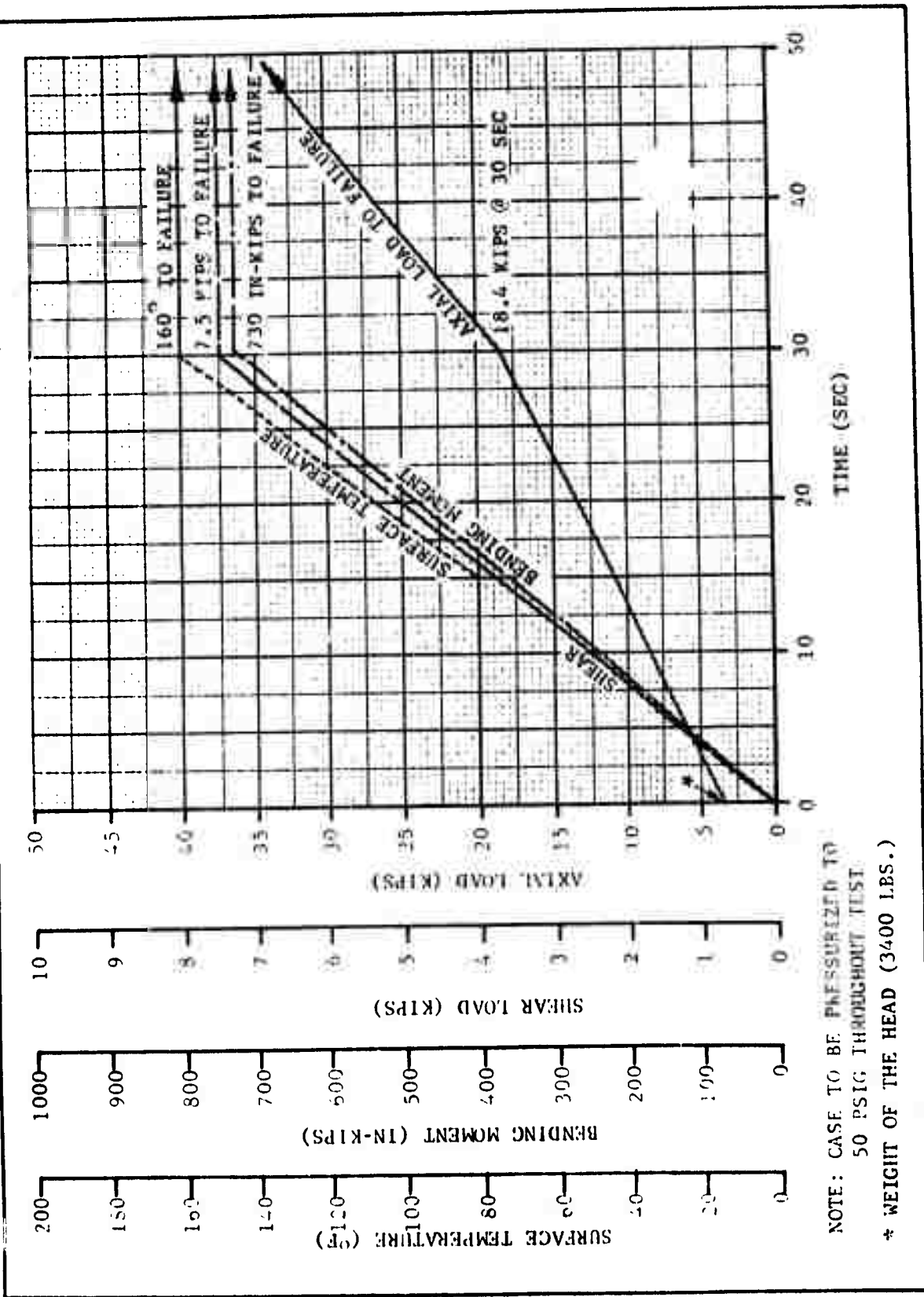


FIGURE 10 Programmed Loads, Phase III, RH00283

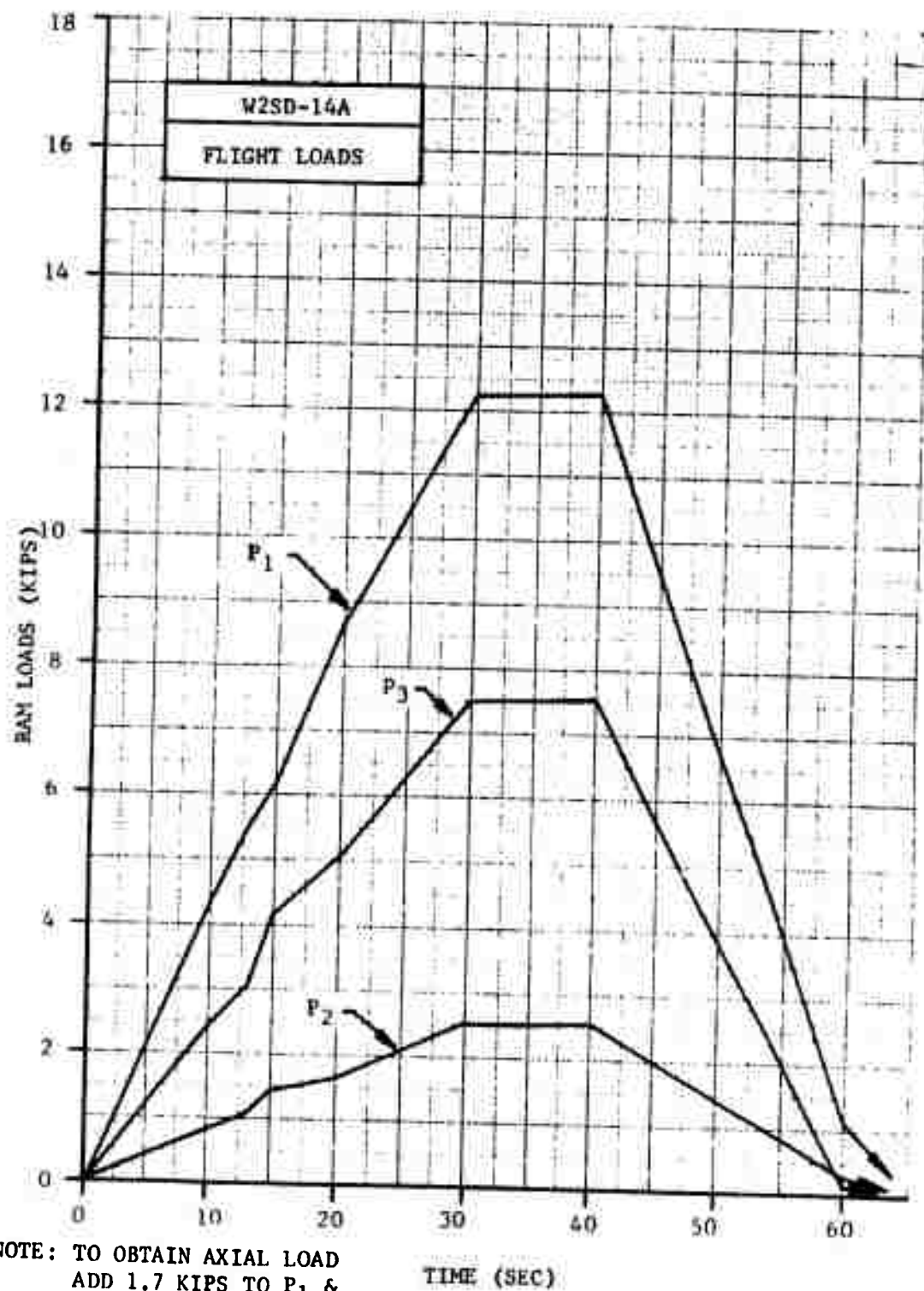


FIGURE 11 Actual Ram Loads, Phase I, W2SD-14A

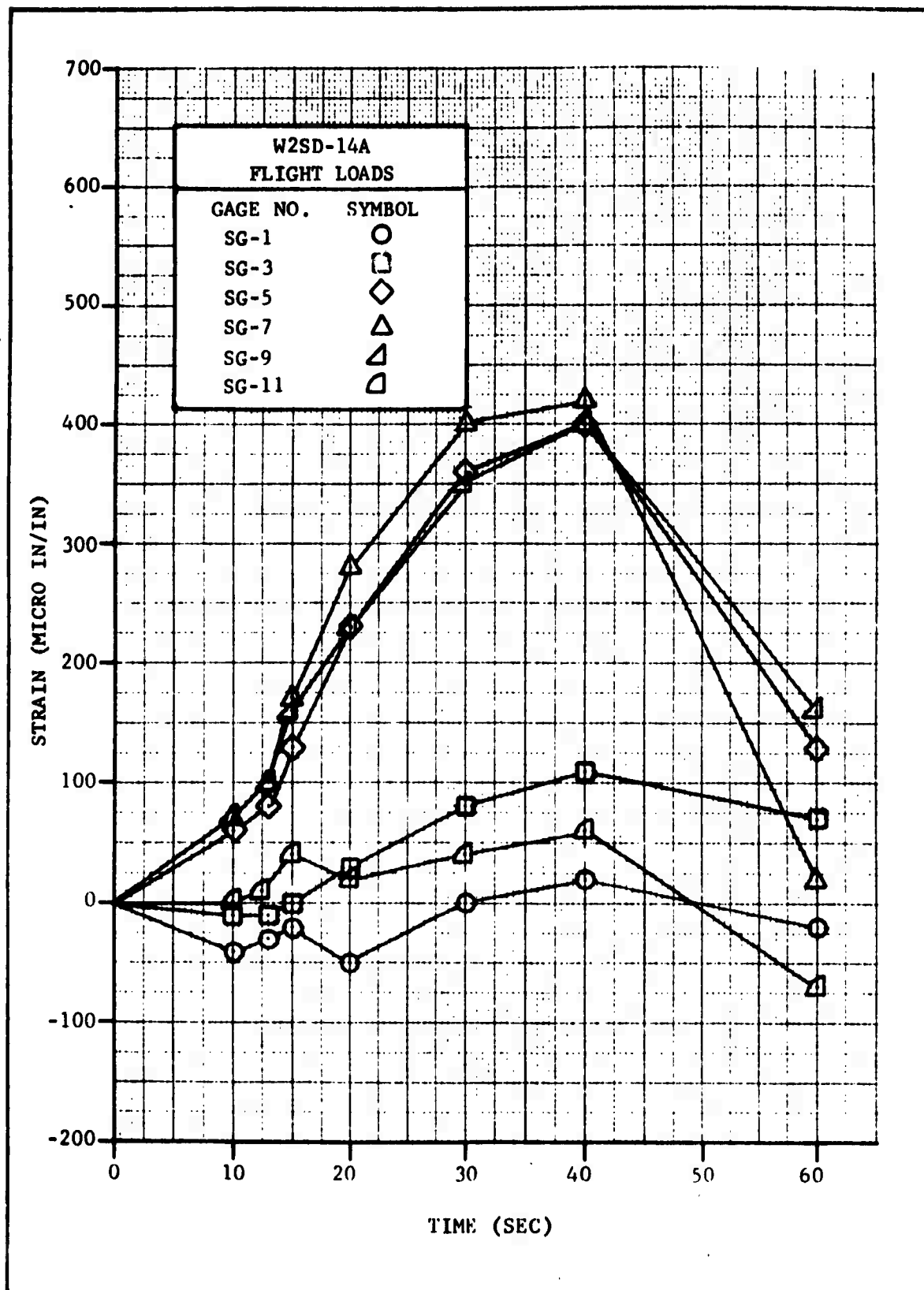


FIGURE 12

Strain Versus Time, Phase I, W2SD-14A, Gages
1, 3, 5, 7, 9 and 11

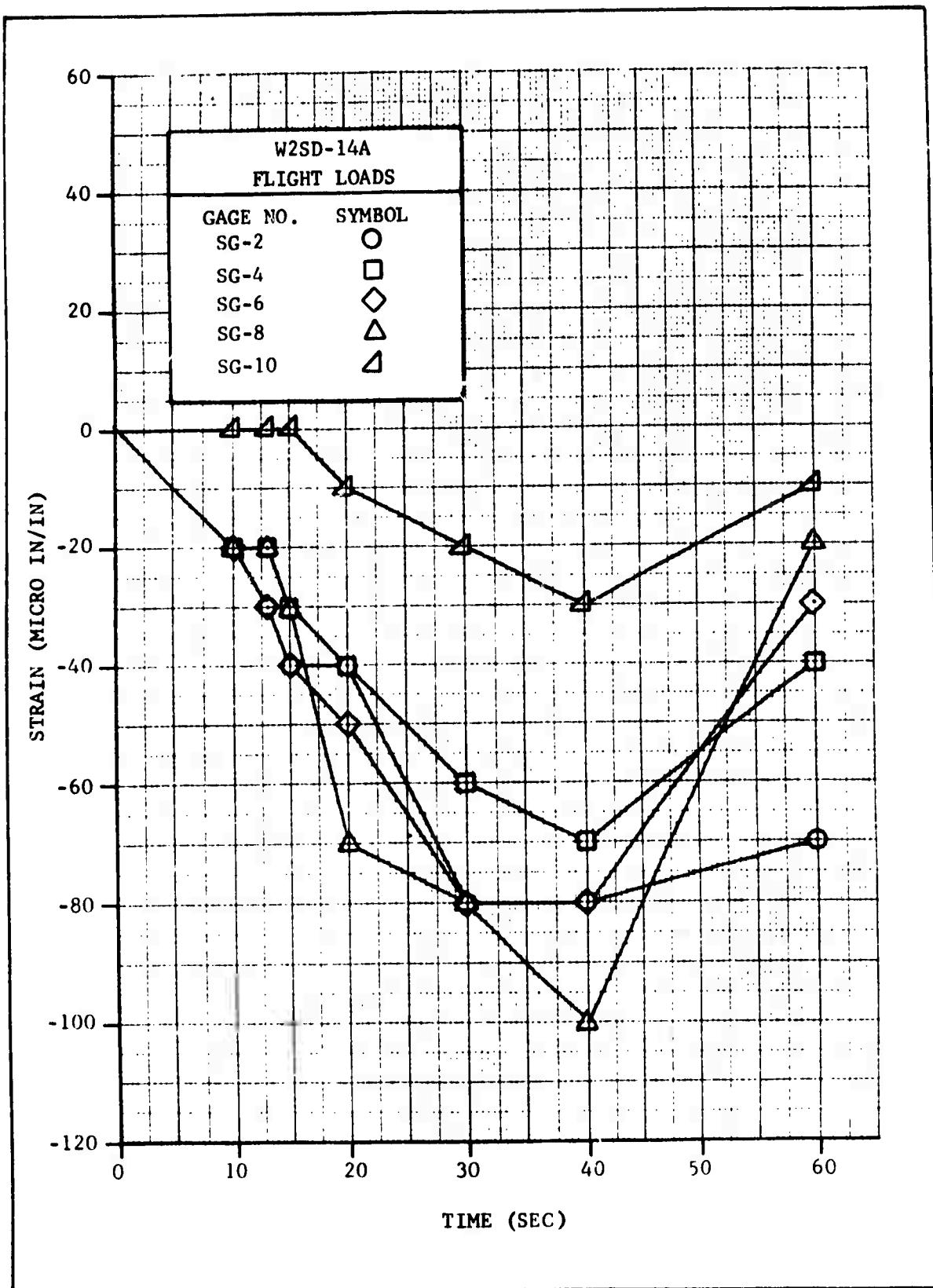


FIGURE 13 Strain Versus Time, Phase I, W2SD-14A, Gages 2, 4, 6, 8 and 10

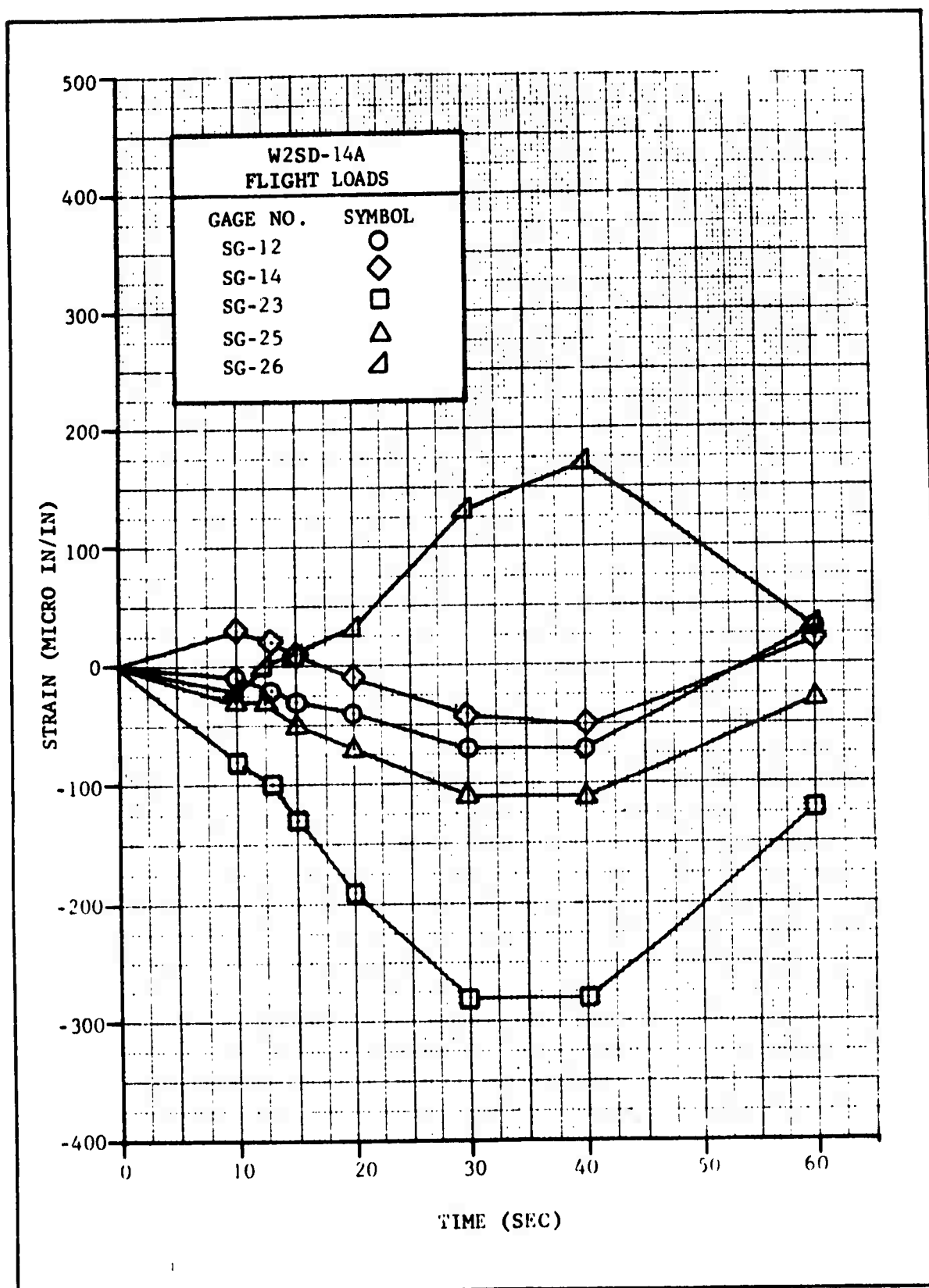


FIGURE 14 Strain Versus Time, Phase I, W2SD-14A, Gages 12, 14, 23, 25 and 26

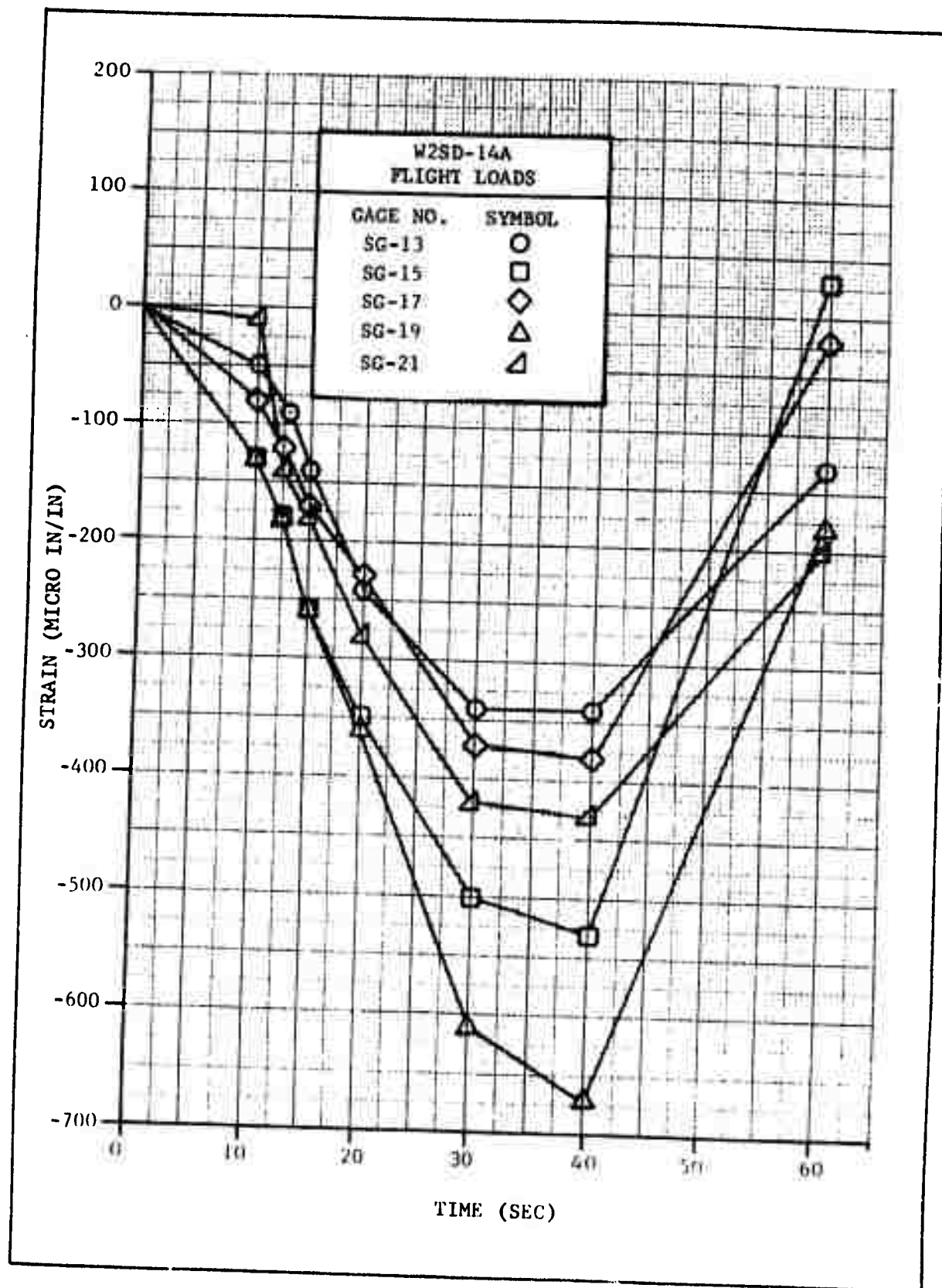


FIGURE 15

Strain Versus Time, Phase I, W2SD-14A, Gages 13, 15, 17, 19 and 21

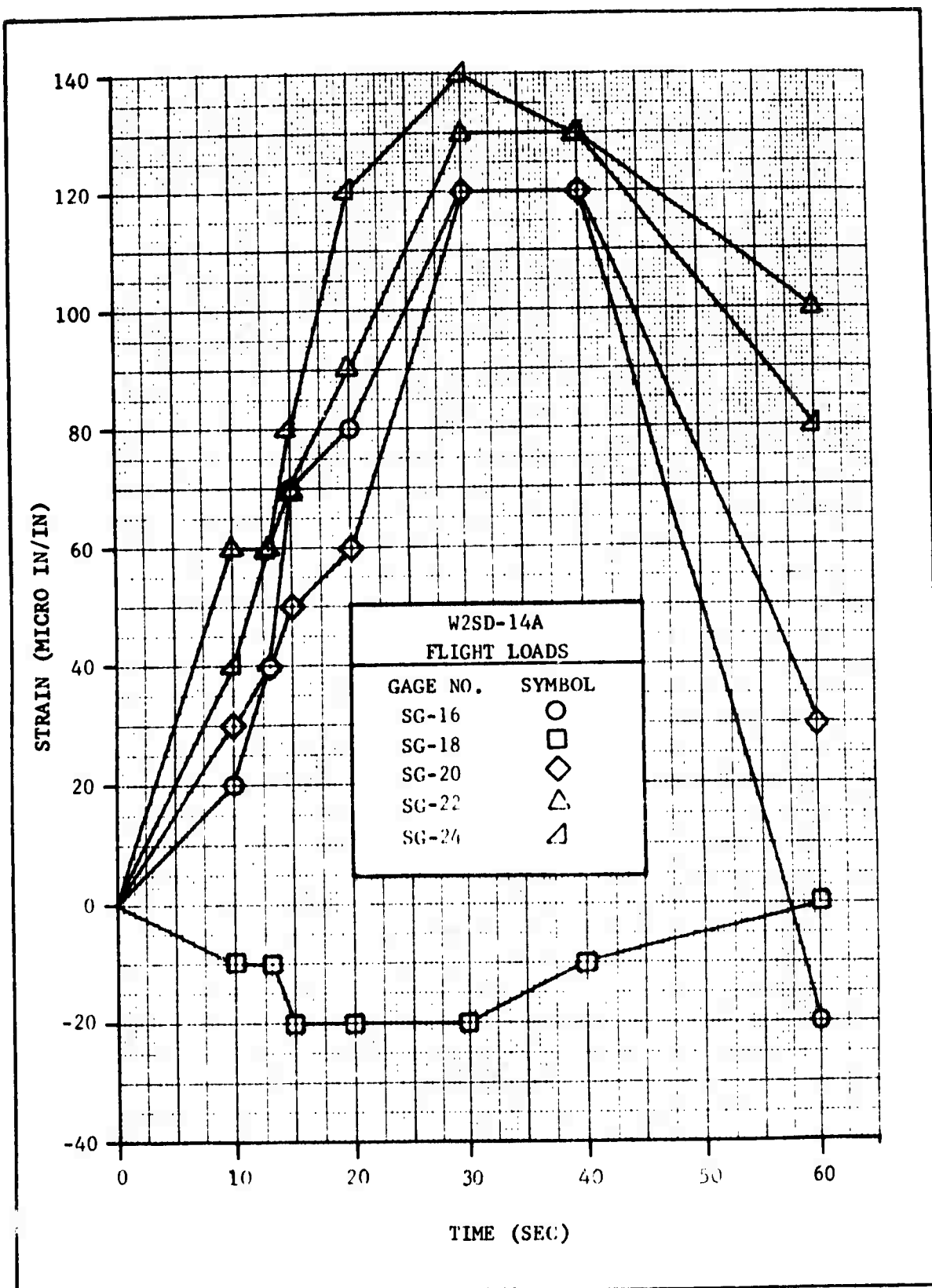


FIGURE 16 Strain Versus Time, Phase 1, W2SD-14A, Gages 16, 18, 20, 22 and 24

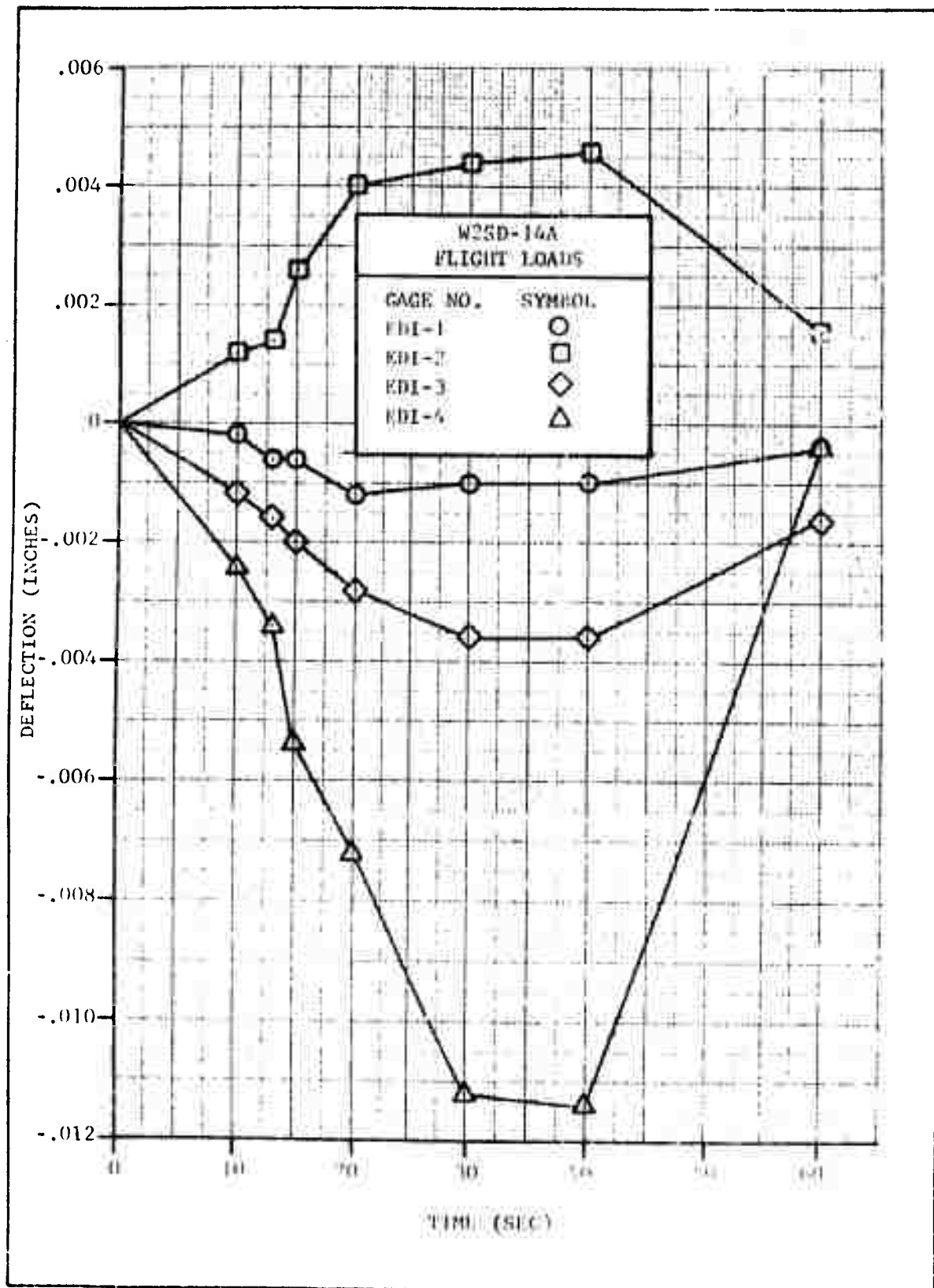


FIGURE 17 Deflection Versus Time, Phase 1, W2SD-14A, Gages 1, 2, 3, and 4

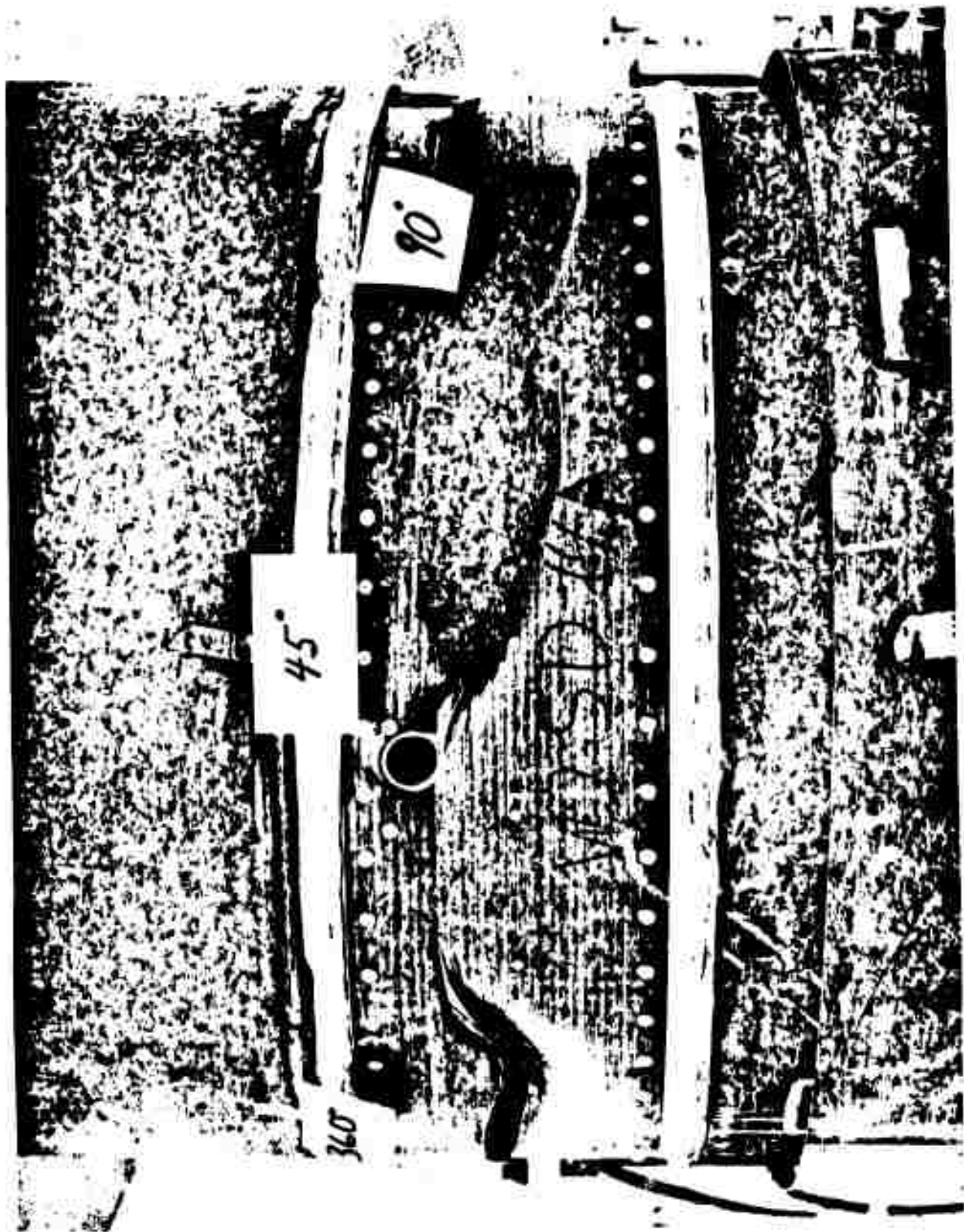


FIGURE 18 Failure Area 45° External, Phase II, W2SD-14A

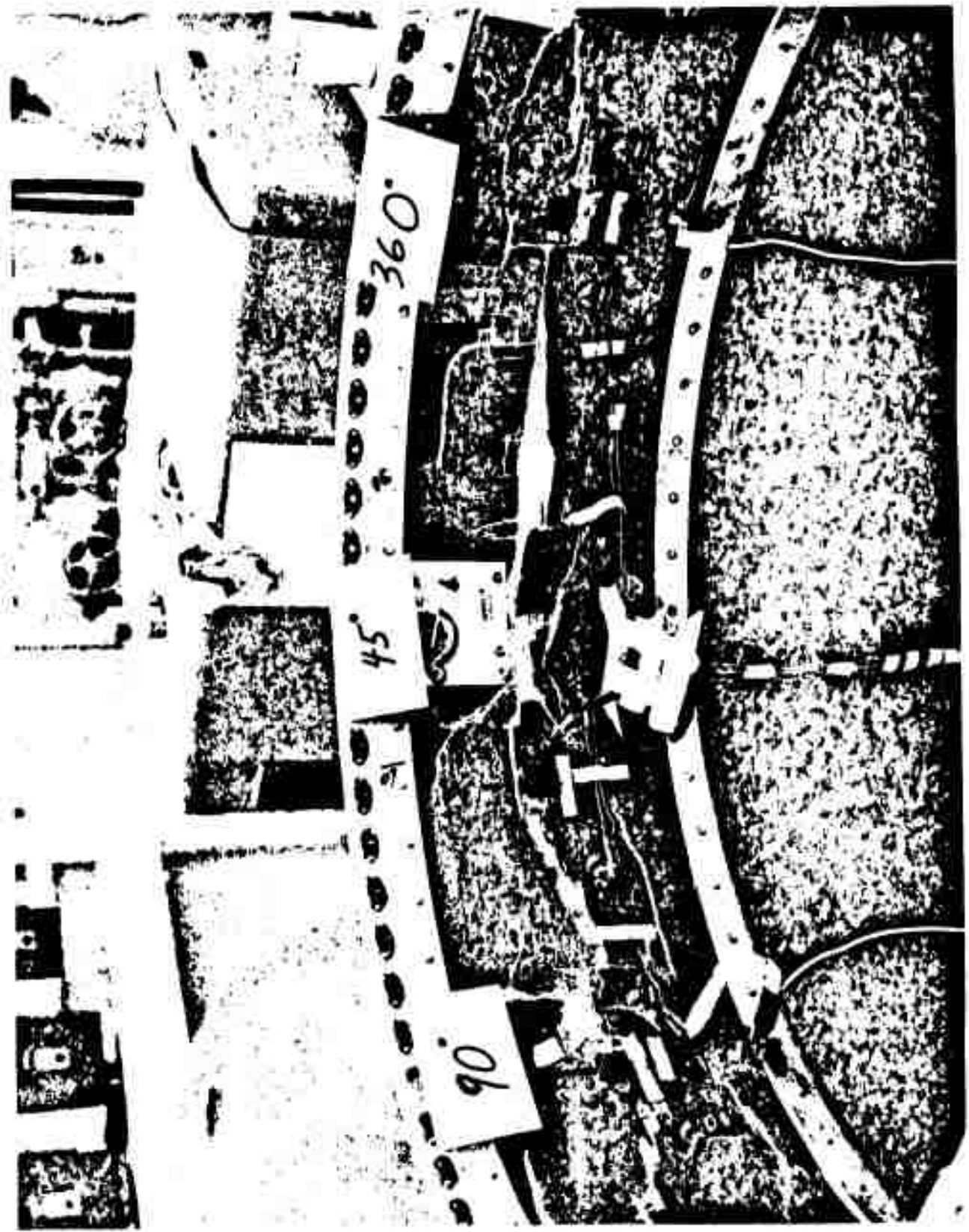


FIGURE 19 Failure Area 45° Internal, Phase II, W2SD-14A

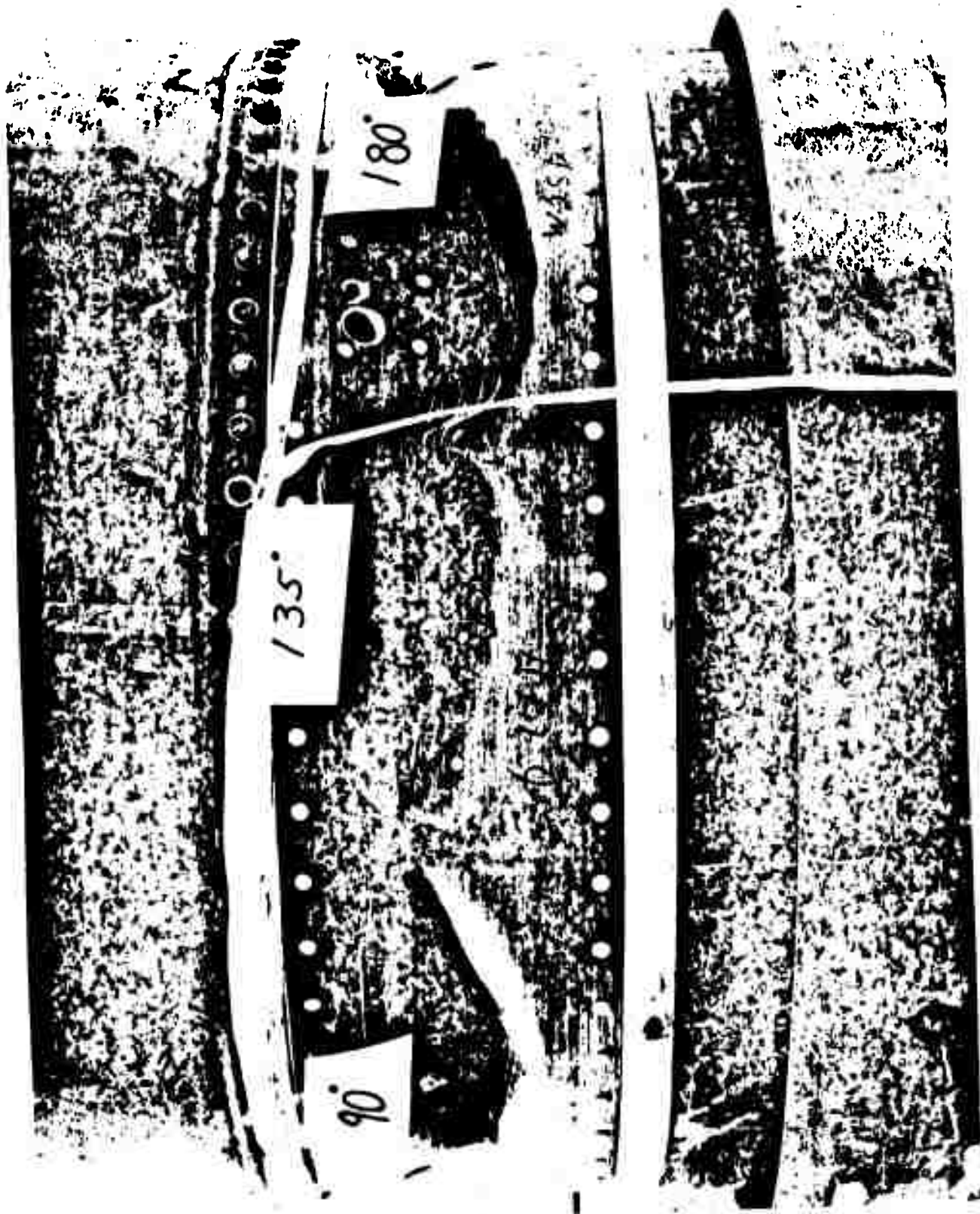


FIGURE 20 Failure Area 135° External, Phase II, W2SD-14A

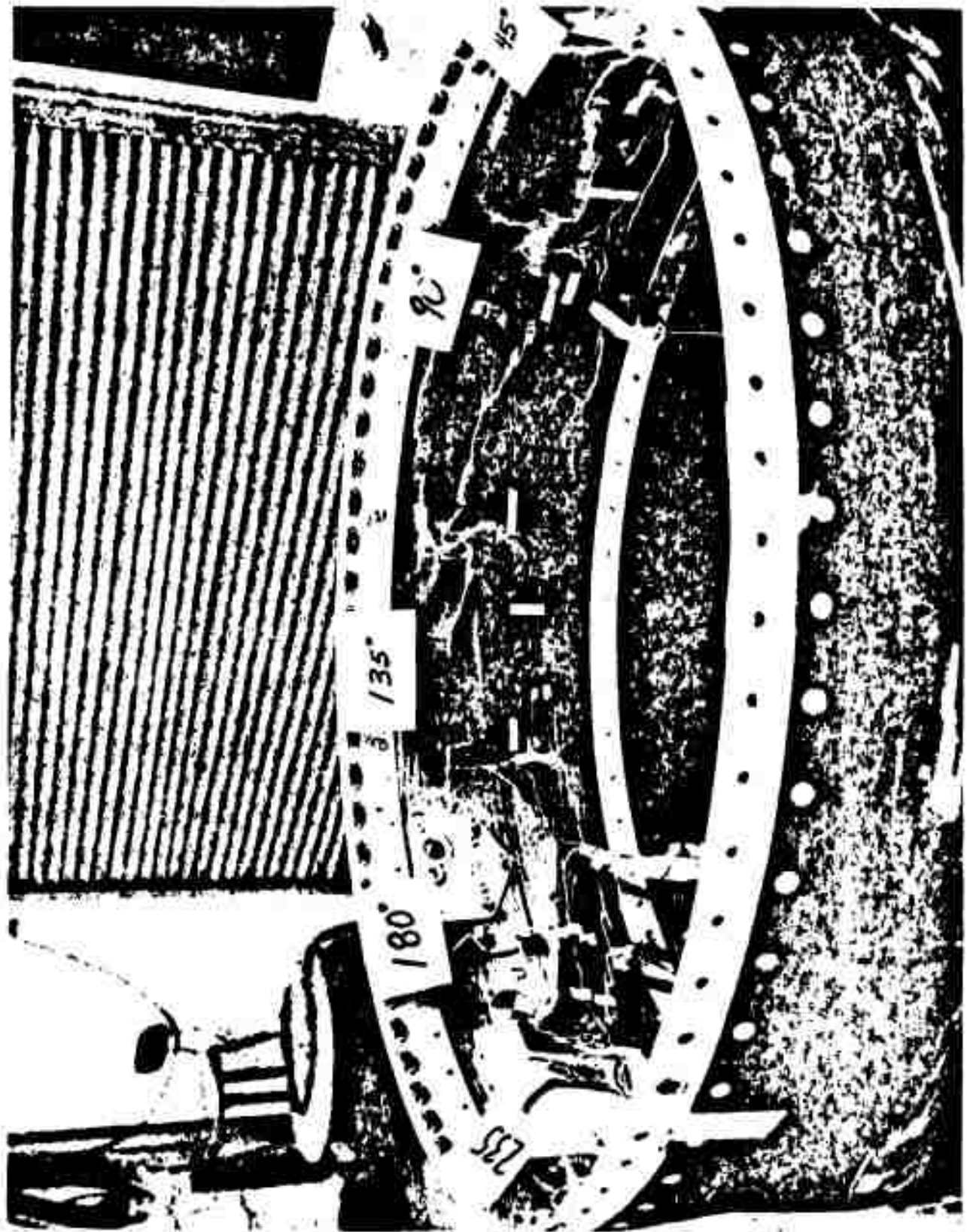


FIGURE 21 Failure Area 135° Internal, Phase II, W2SD-14A

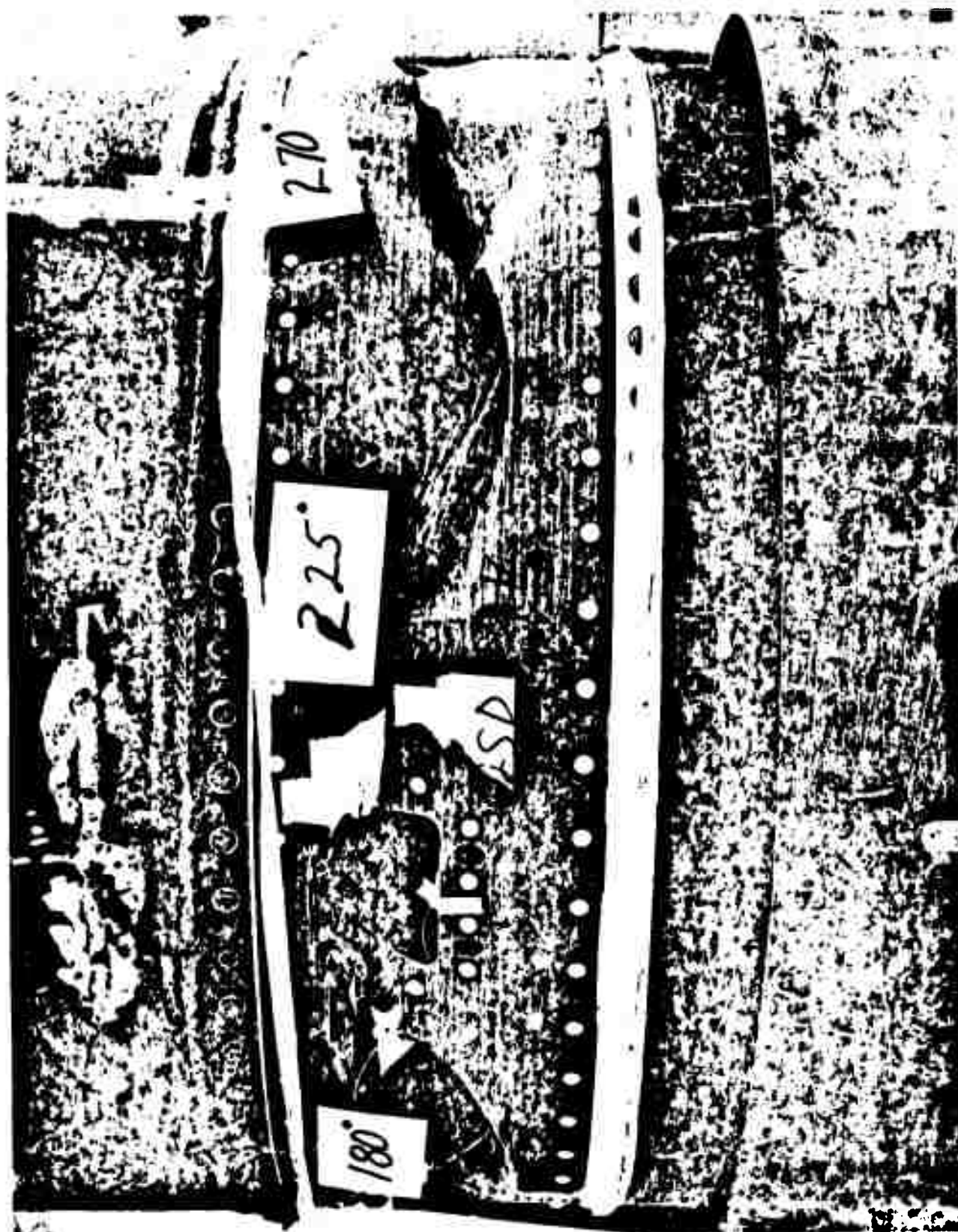


FIGURE 22 Failure Area 225° External, Phase II, WSD-14A

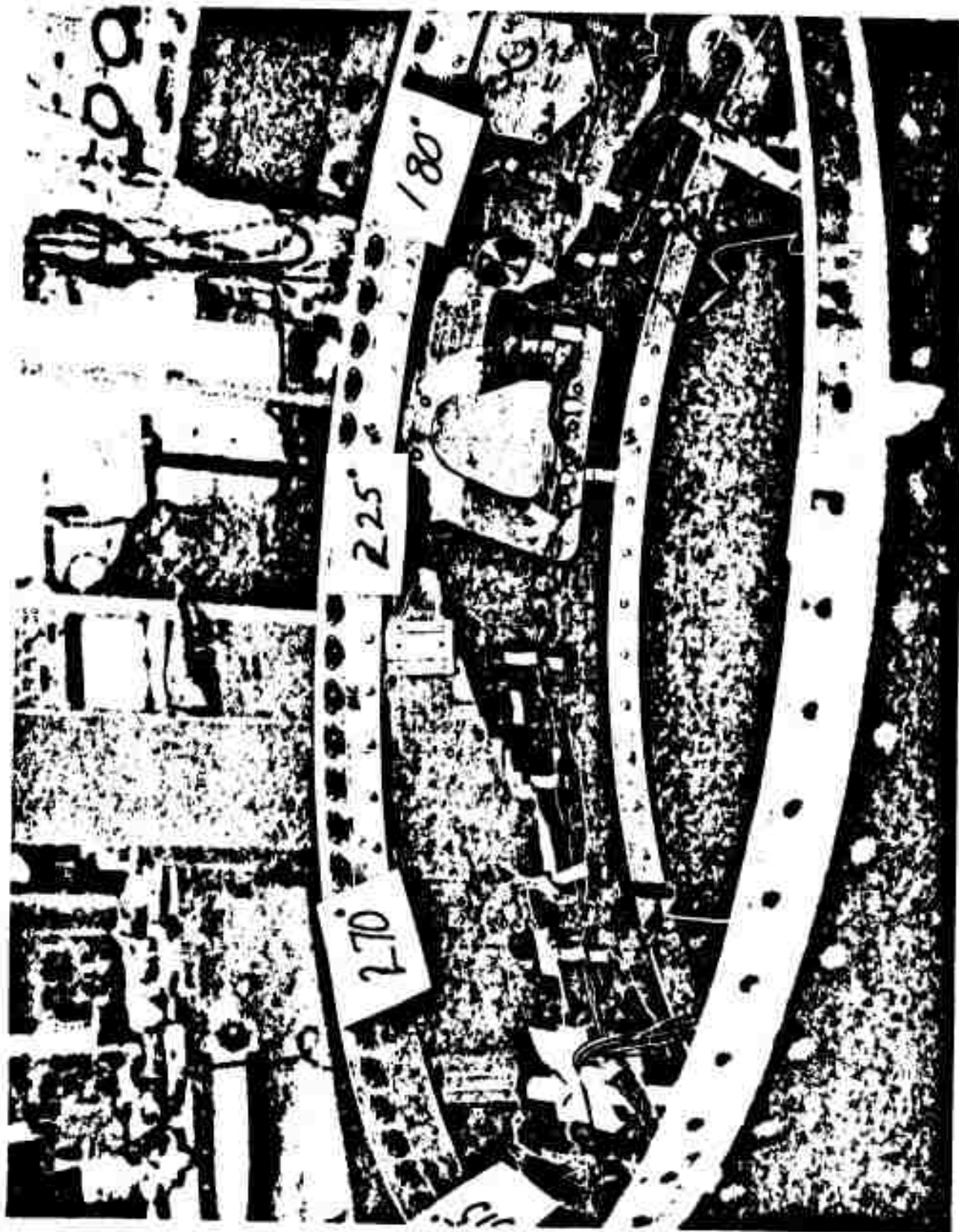


FIGURE 23 Failure Area 225° External, Phase II, W2SD-14A

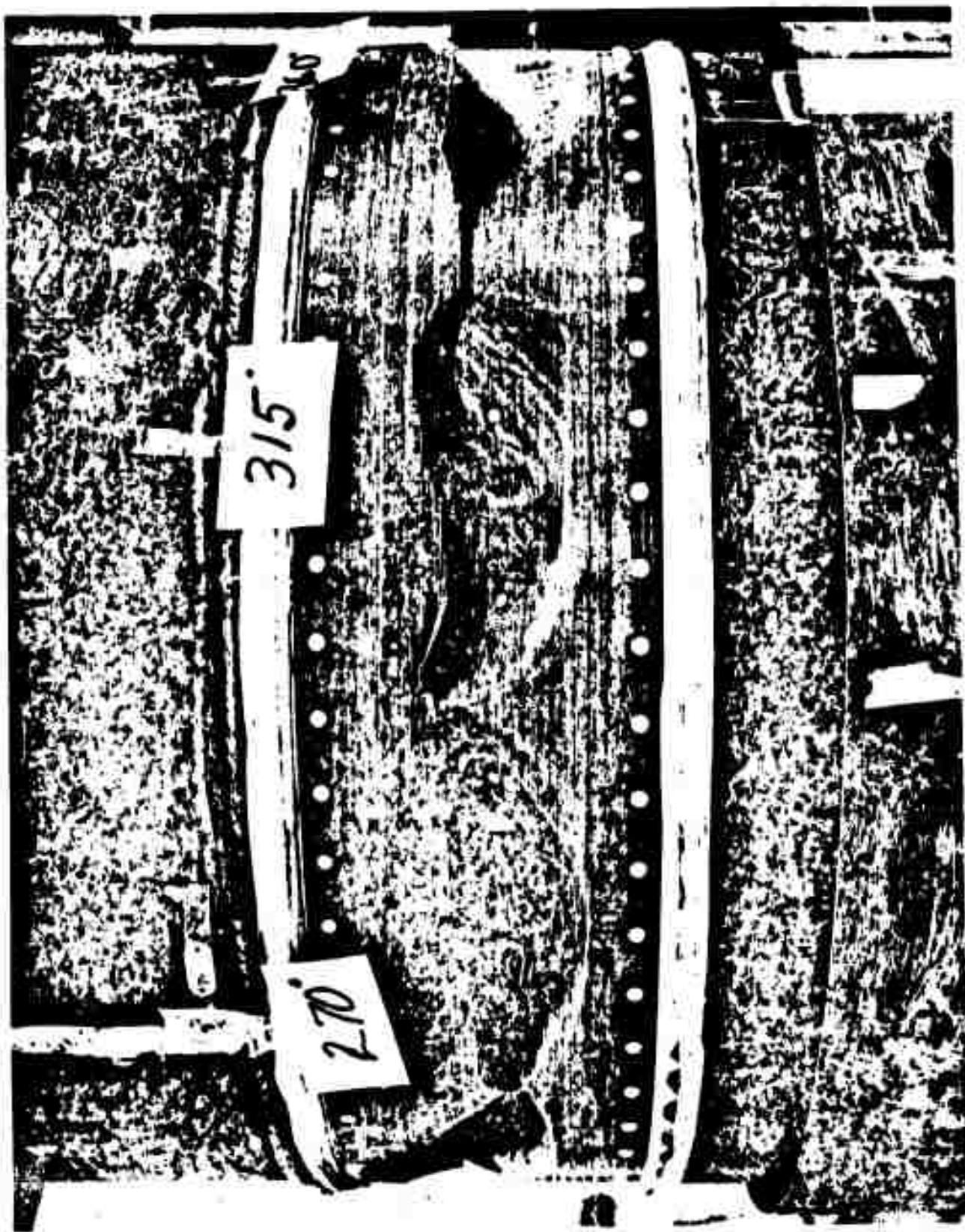


FIGURE 24 Failure Area 315° External, Phase II, W2SD-14A

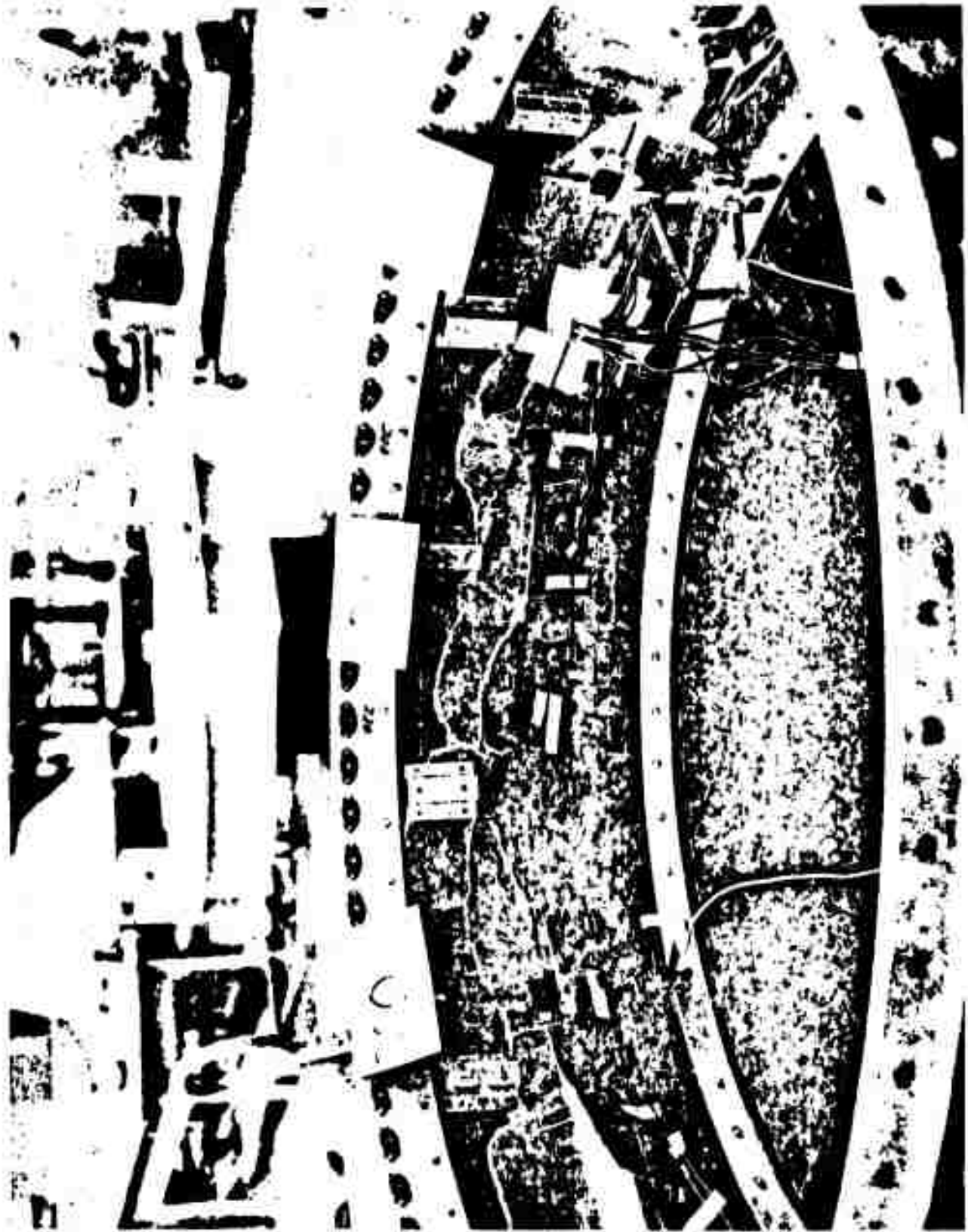


FIGURE 25 Failure Area 315° Internal, Phase II, W2SD-14A

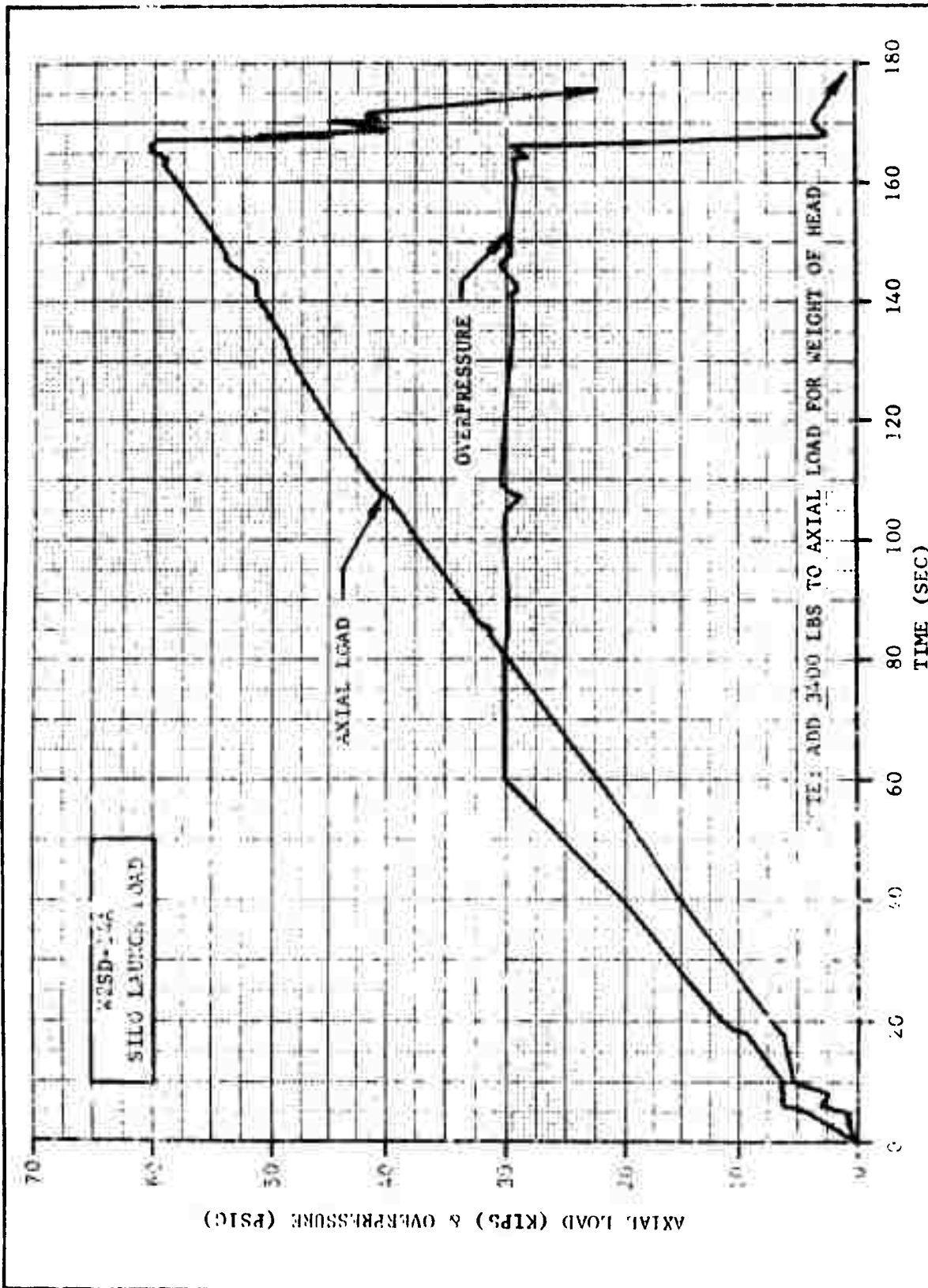


FIGURE 26 Actual Loads, Phase II, W2SD-14A

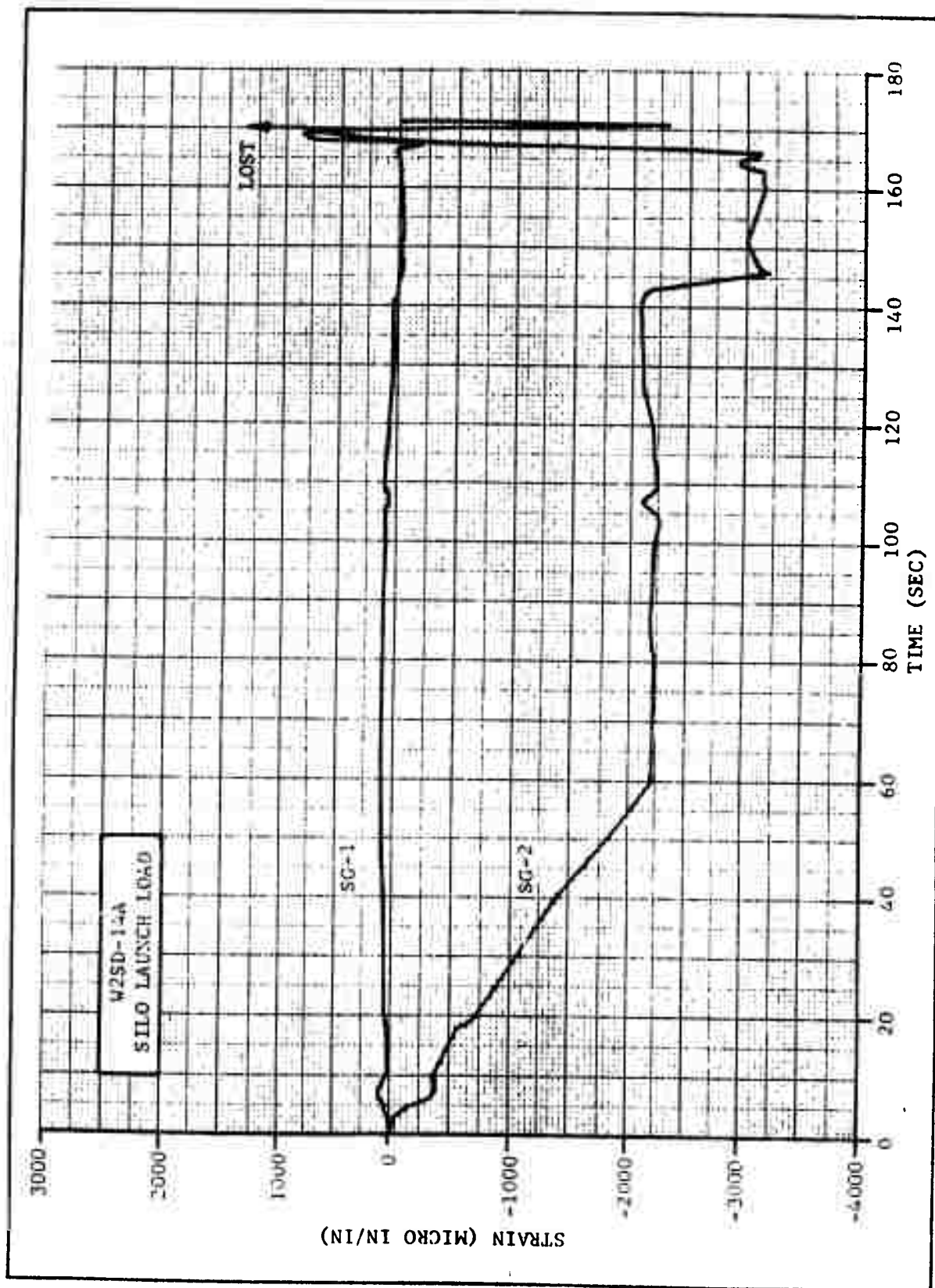


FIGURE 27 Strain Versus Time, Phase II, W2SD-14A, Gages 1 and 2

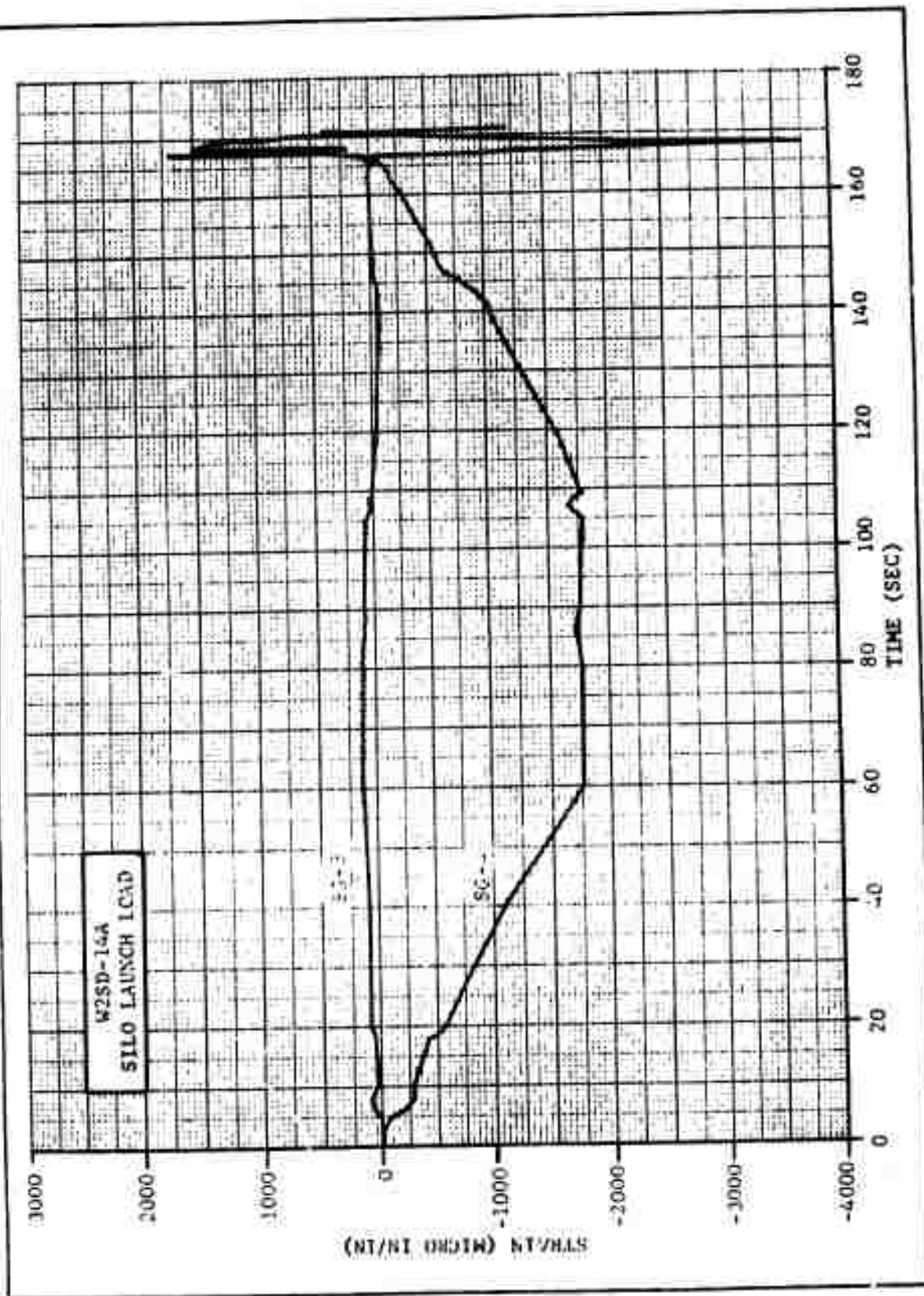


FIGURE 25 Strain Versus Time, Phase II, W2SD-14A, Cages 3 and 4

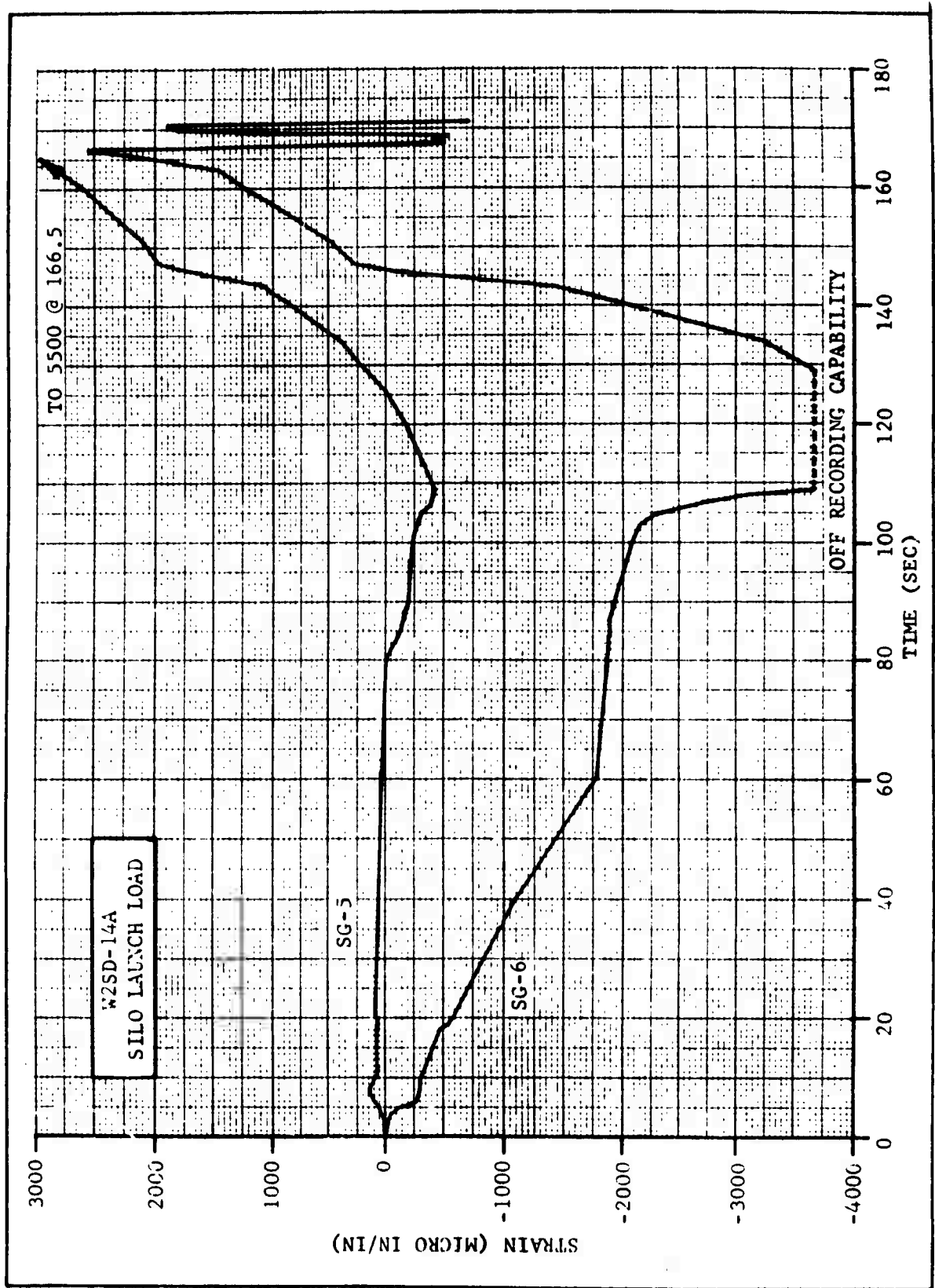


FIGURE 29 Strain Versus Time, Phase II, W2SD-14A, Gages 5 and 6

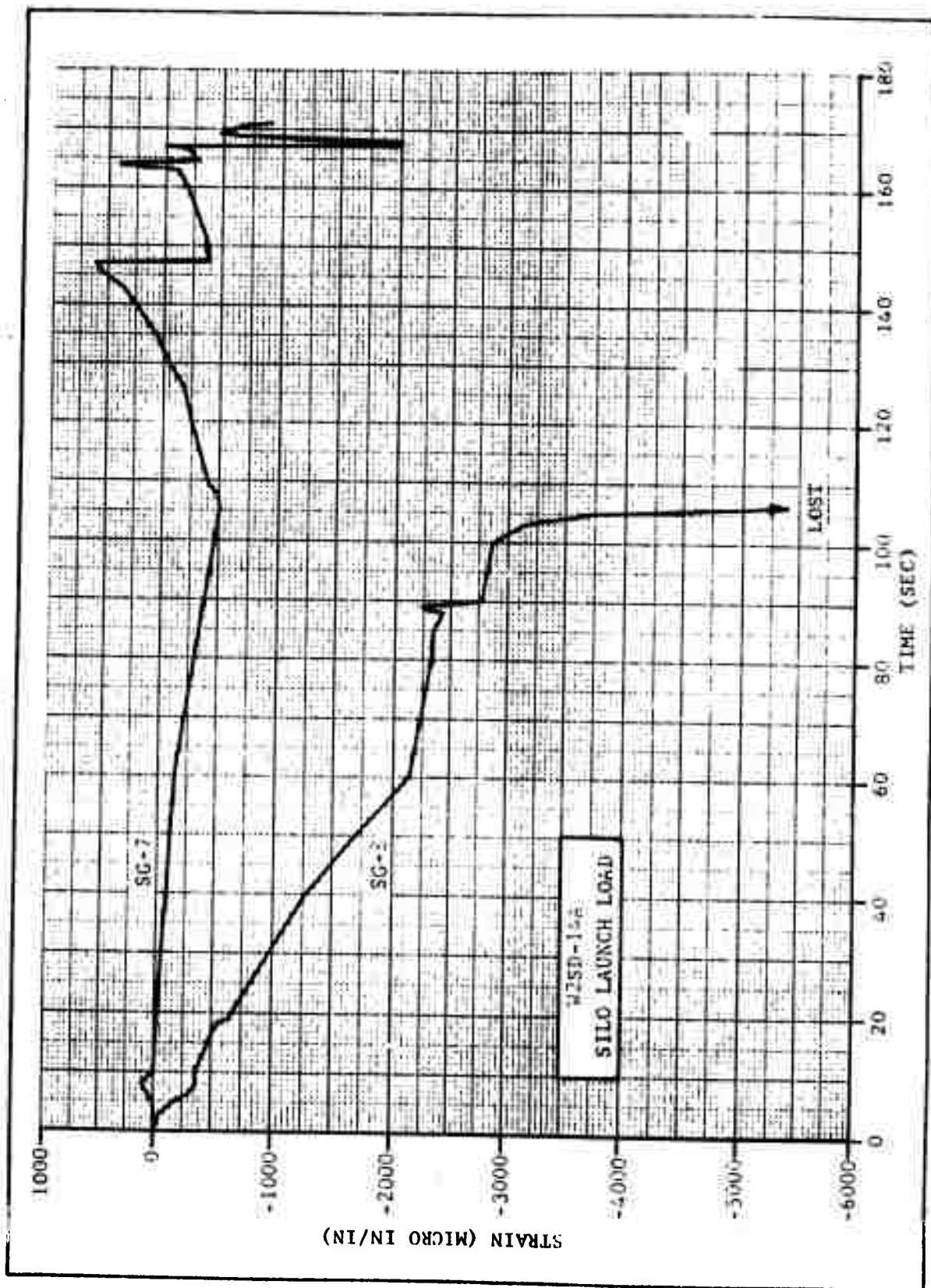


FIGURE 30 Strain Versus Time, Phase II, W2SD-14A, Cages 7 and 8

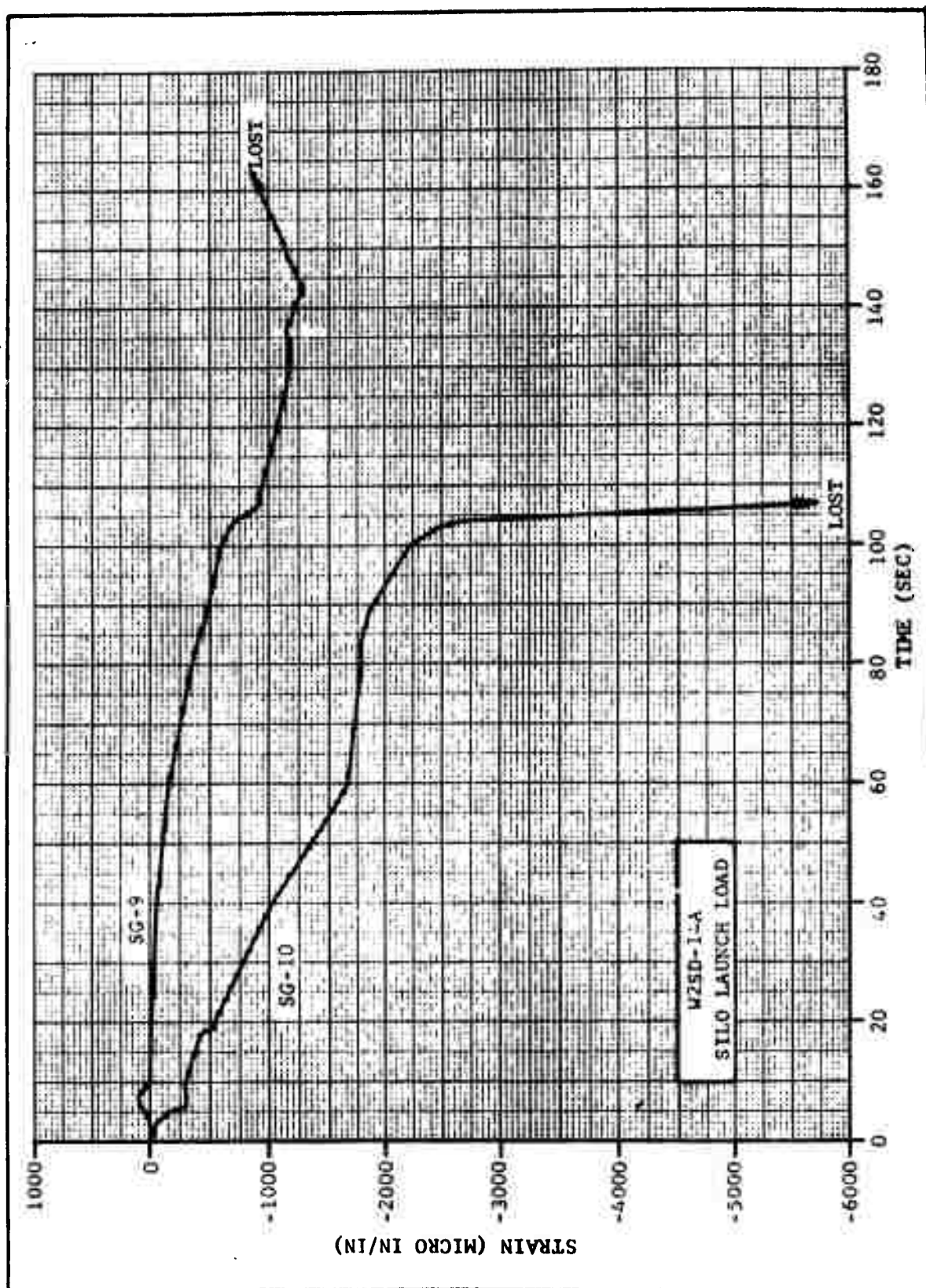


FIGURE 31 Strain Versus Time, Phase II, W2SD-14A, Gages 9 and 10

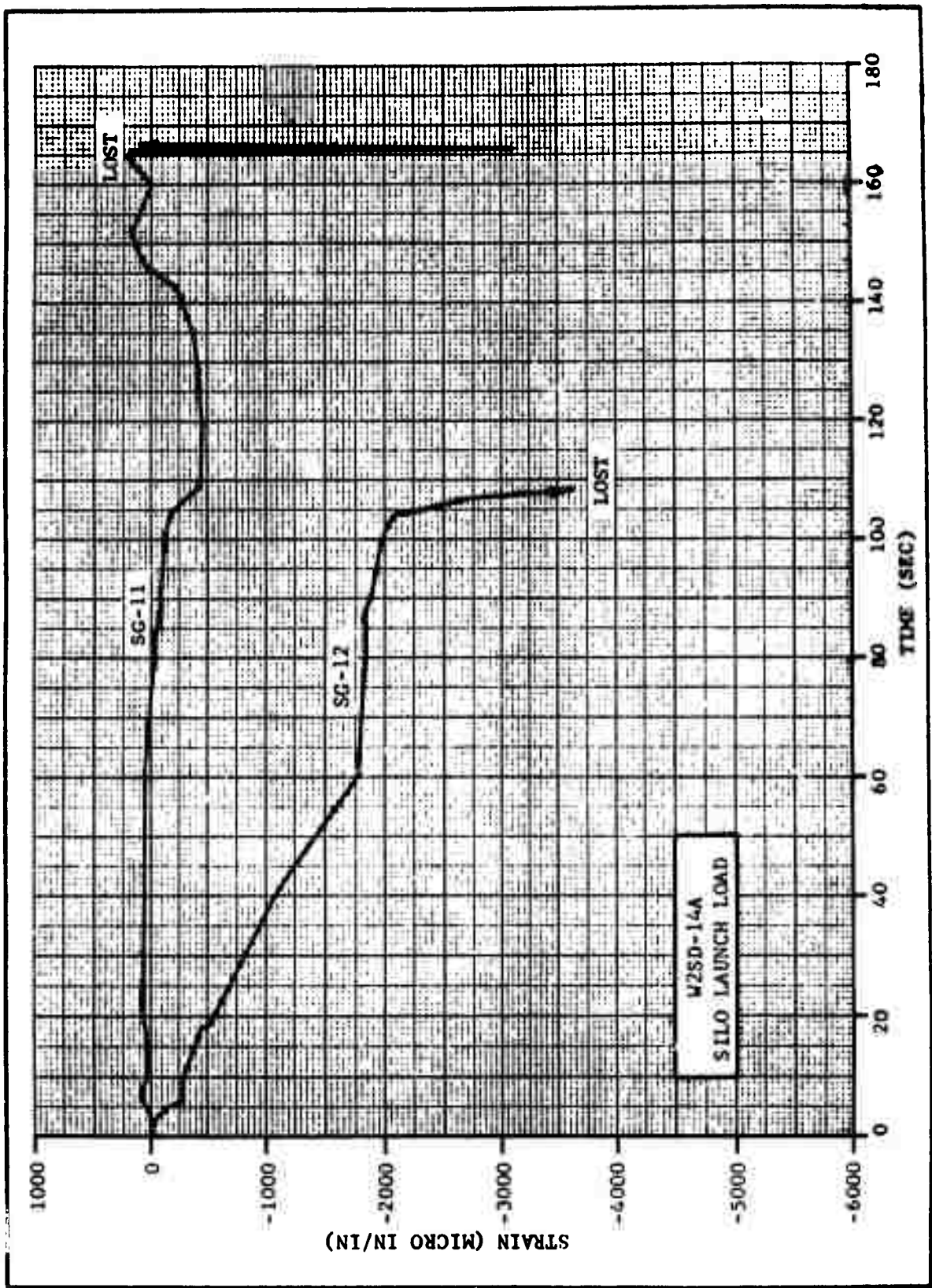


FIGURE 32 Strain Versus Time, Phase II, W2SD-14A, Cages 11 and 12

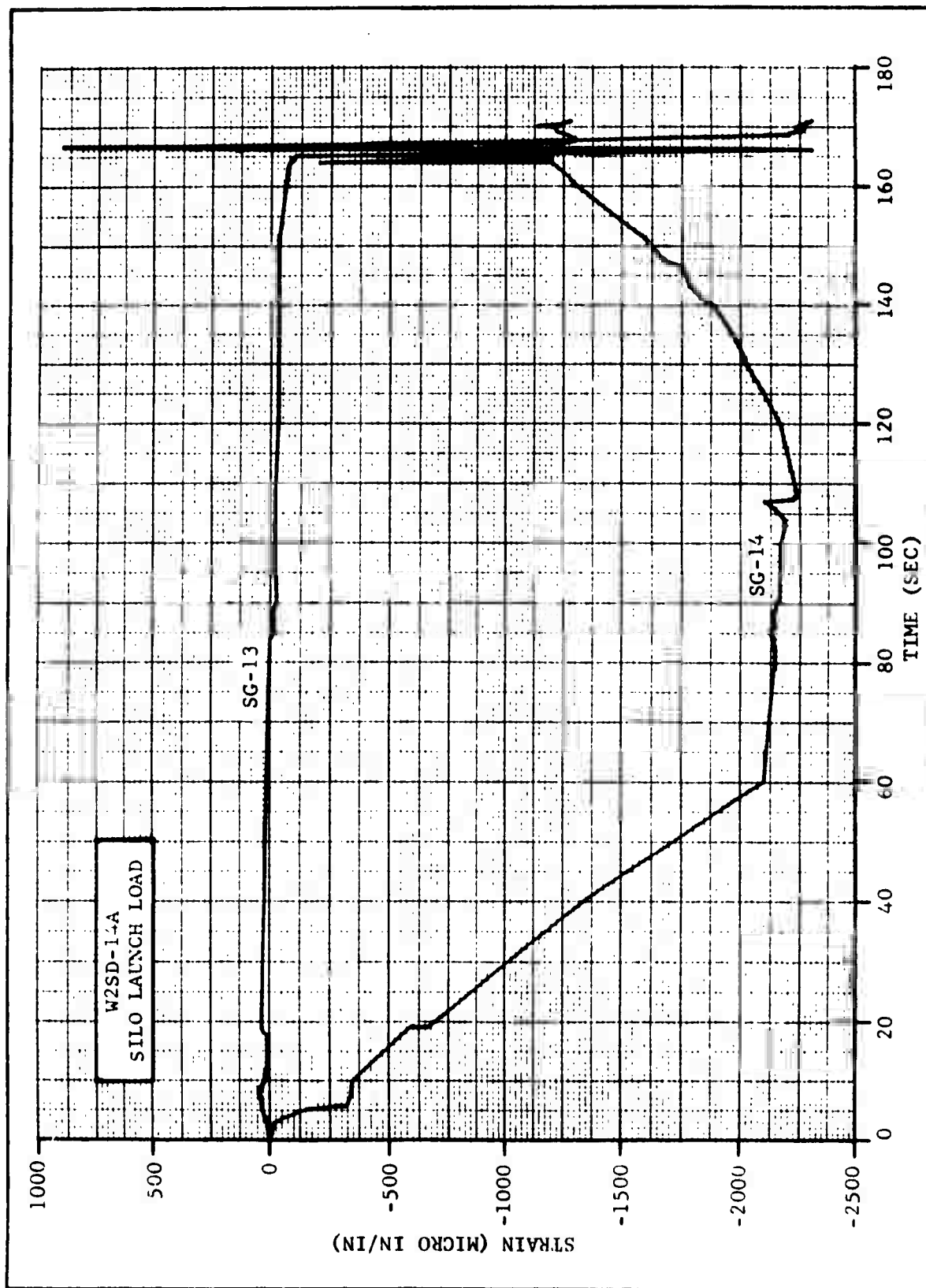


FIGURE 33 Strain Versus Time, Phase II, W2SD-14A, Gages 13 and 14

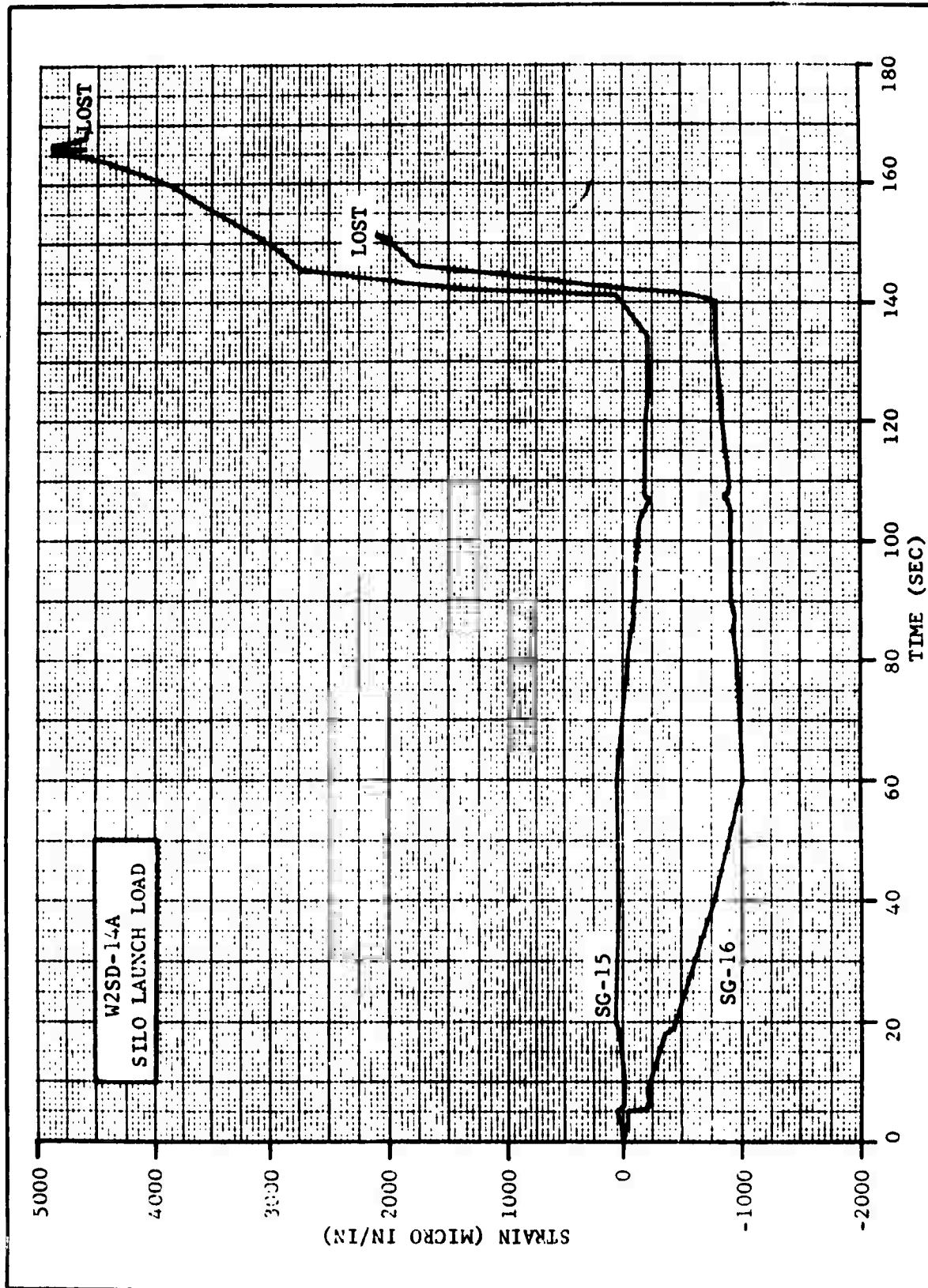


FIGURE 34 Strain Versus Time, Phase II, W2SD-14A, Gages 15 and 16

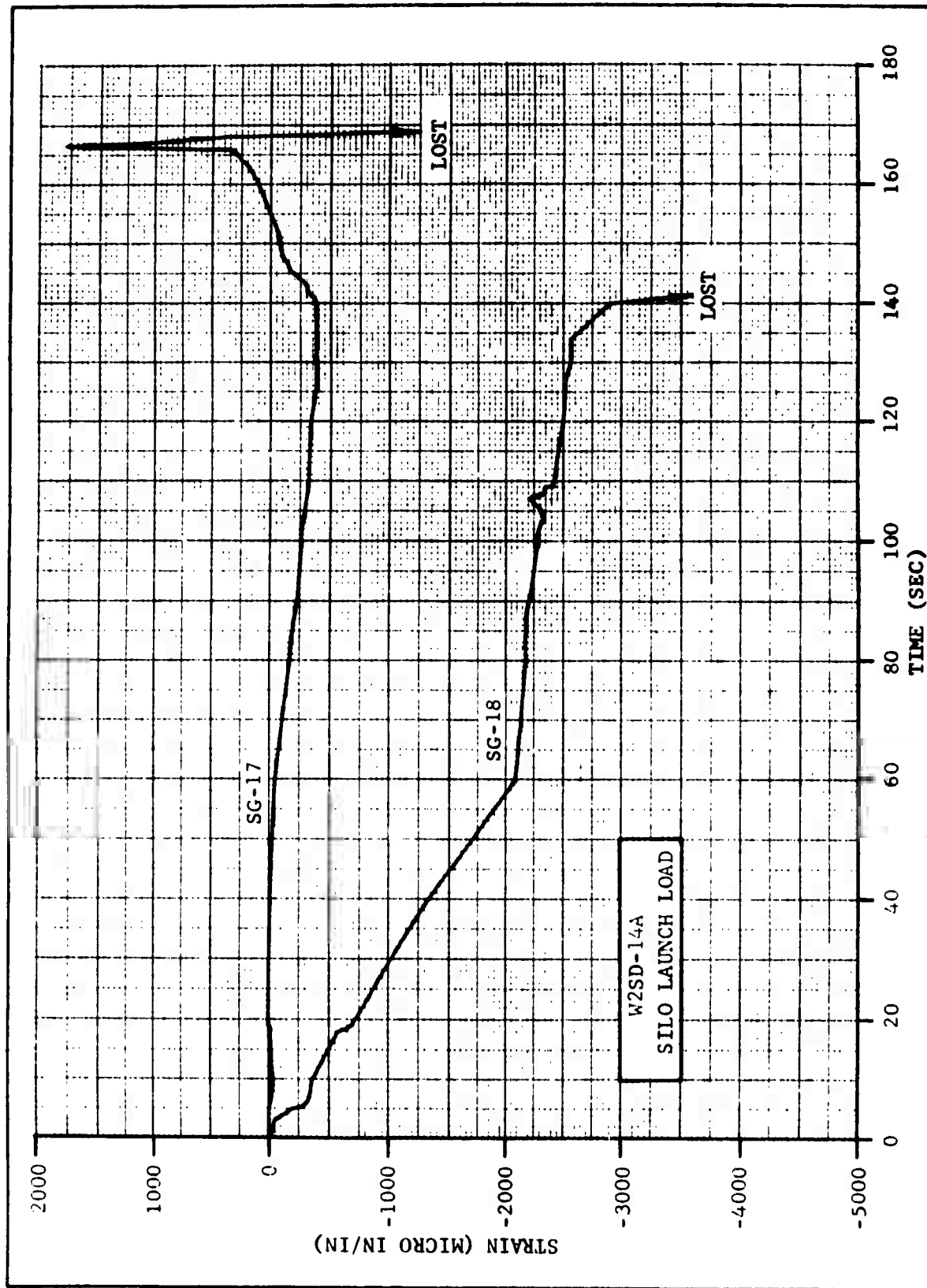


FIGURE 35 Strain Versus Time, Phase II, W2SD-14A, Gages 17 and 18

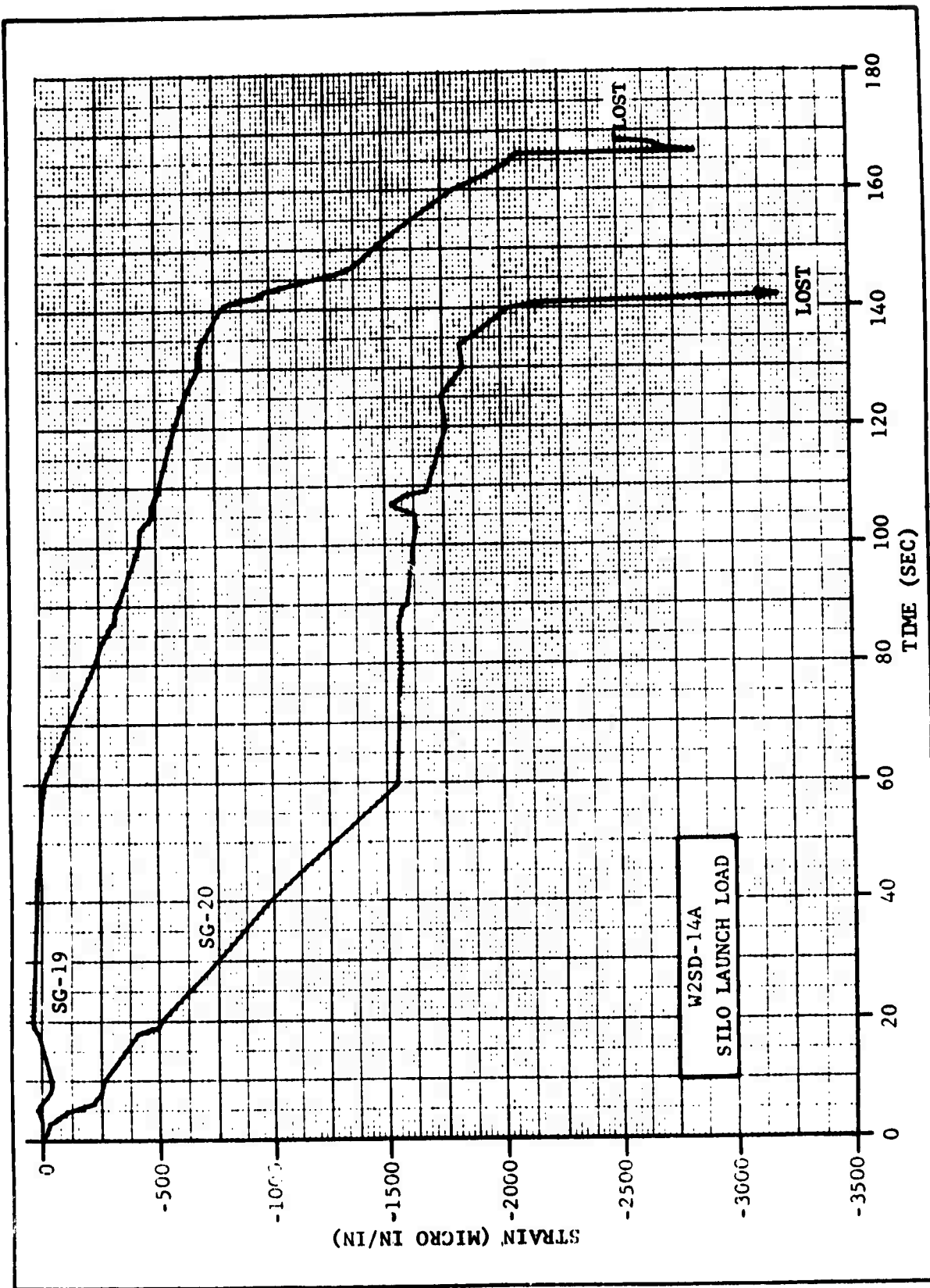


FIGURE 36 Strain Versus Time, Phase II, W2SD-14A, Gages 19 and 20

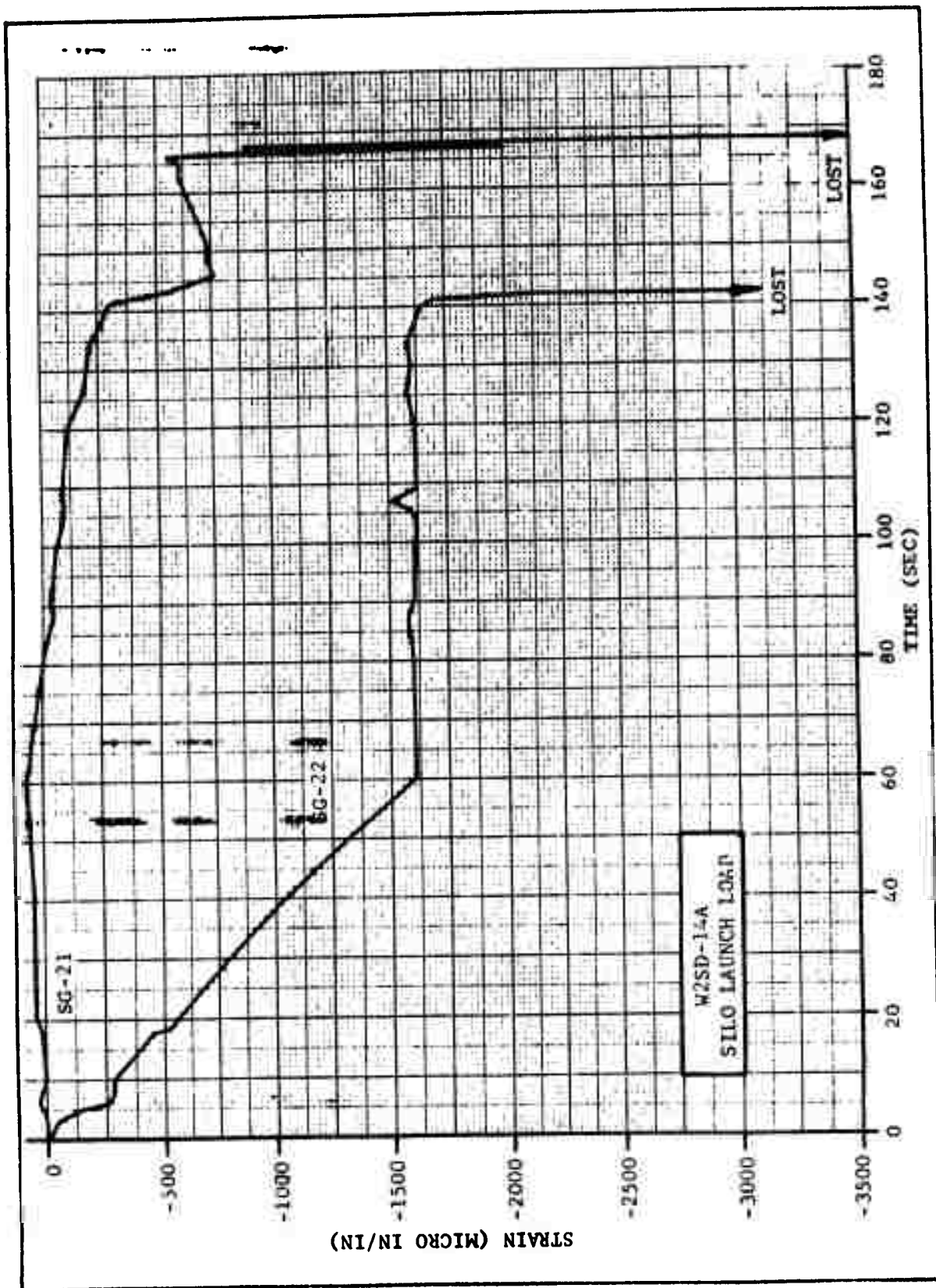


FIGURE 37 Strain Versus Time, Phase II, W2SD-14A, Gages 21 and 22

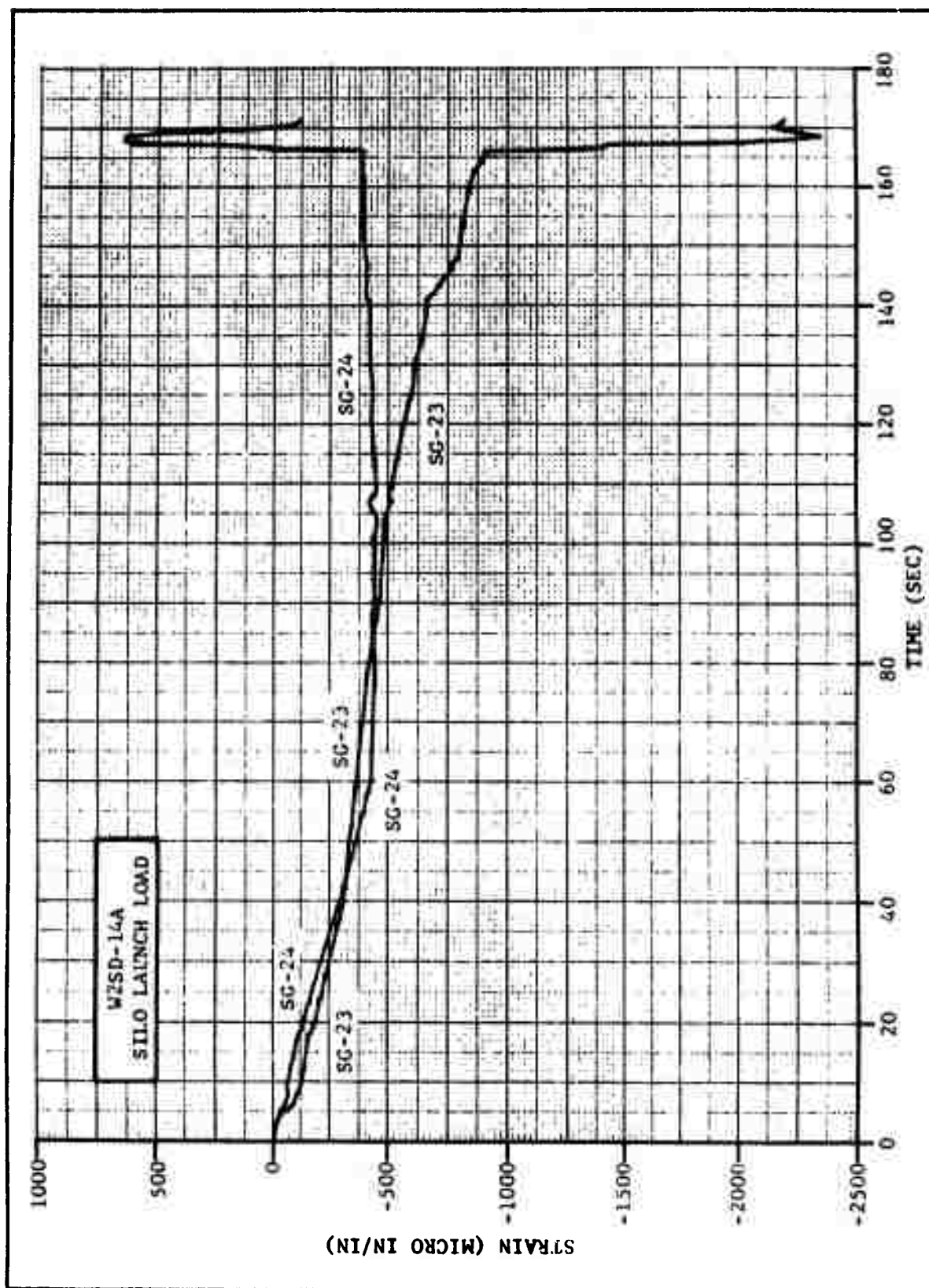


FIGURE 38 Strain Versus Time, Phase II, W2SD-14A, Gages 23 and 24

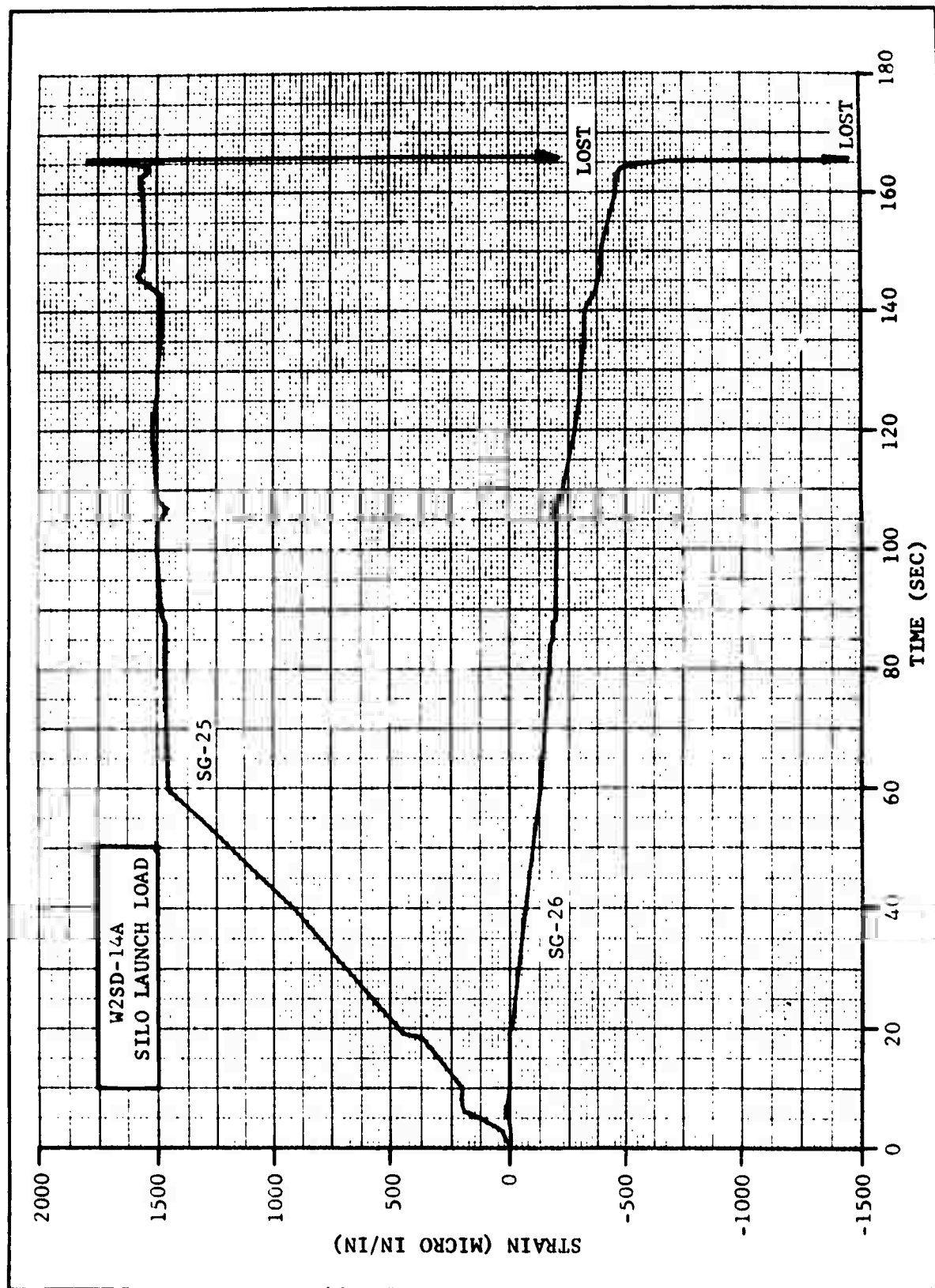


FIGURE 39 Strain Versus Time, Phase II, W2SD-14A, Gages 25 and 26

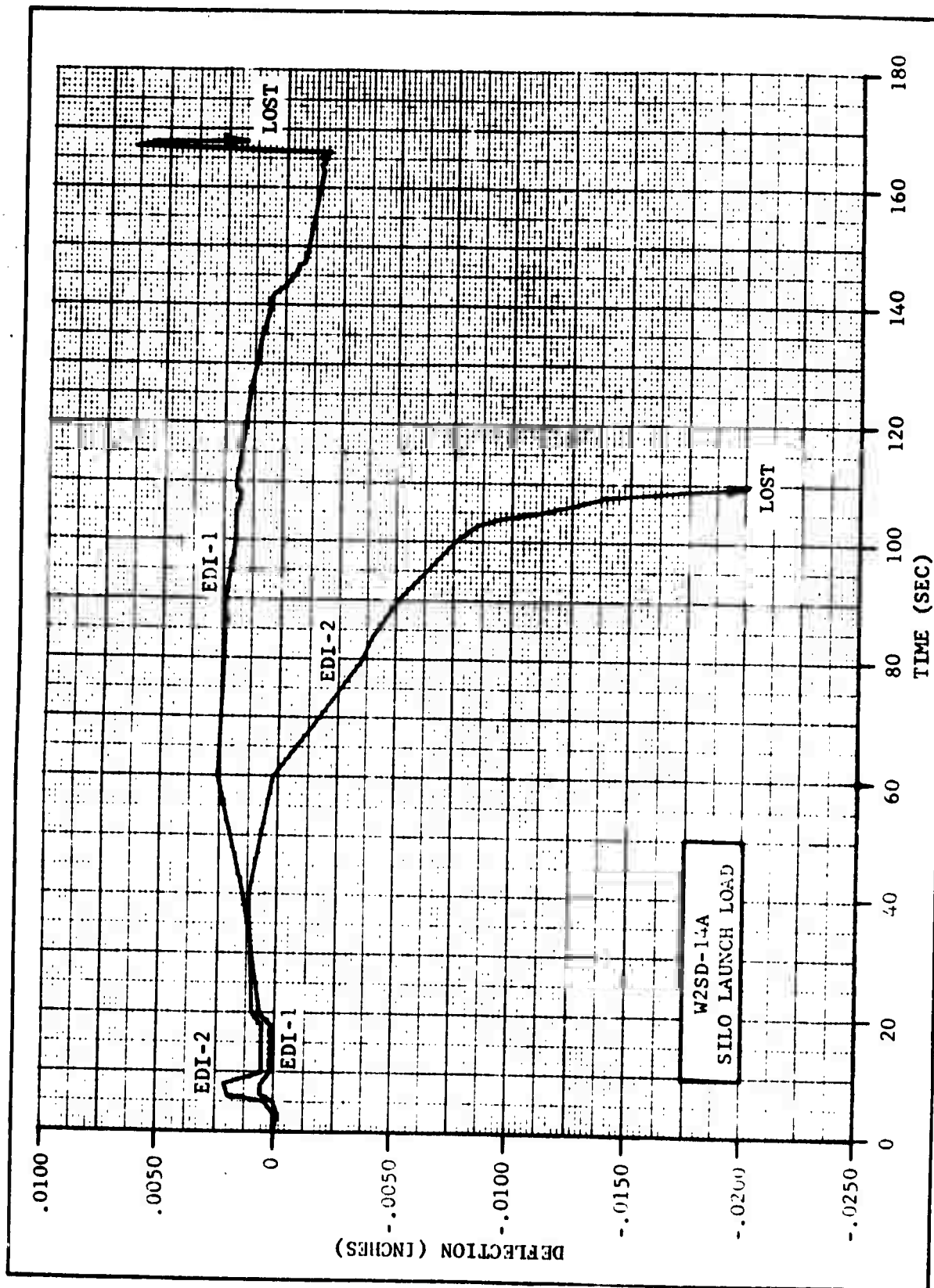


FIGURE 40 Deflection Versus Time, Phase II, W2SD-14A, Gages 1 and 2

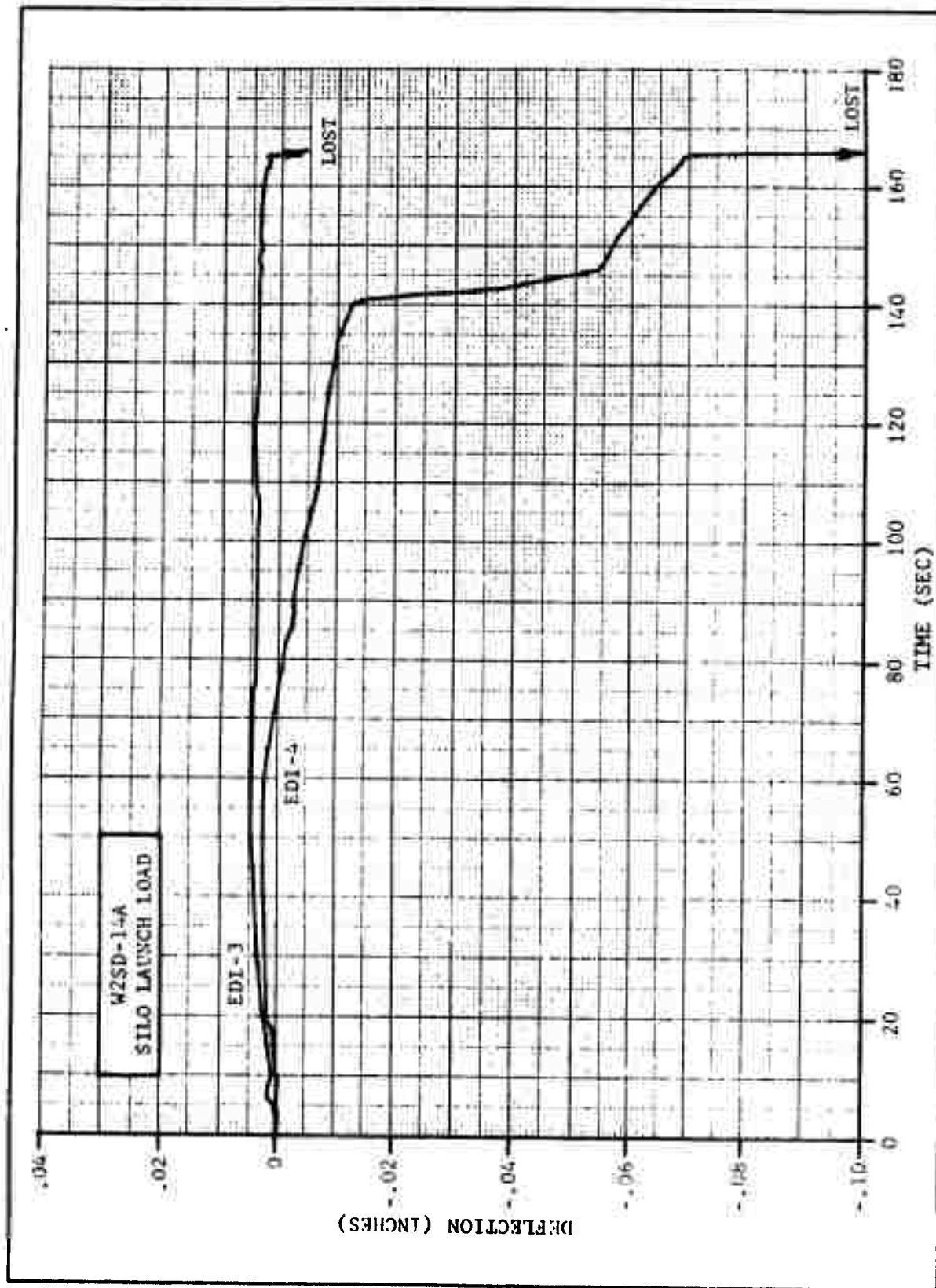
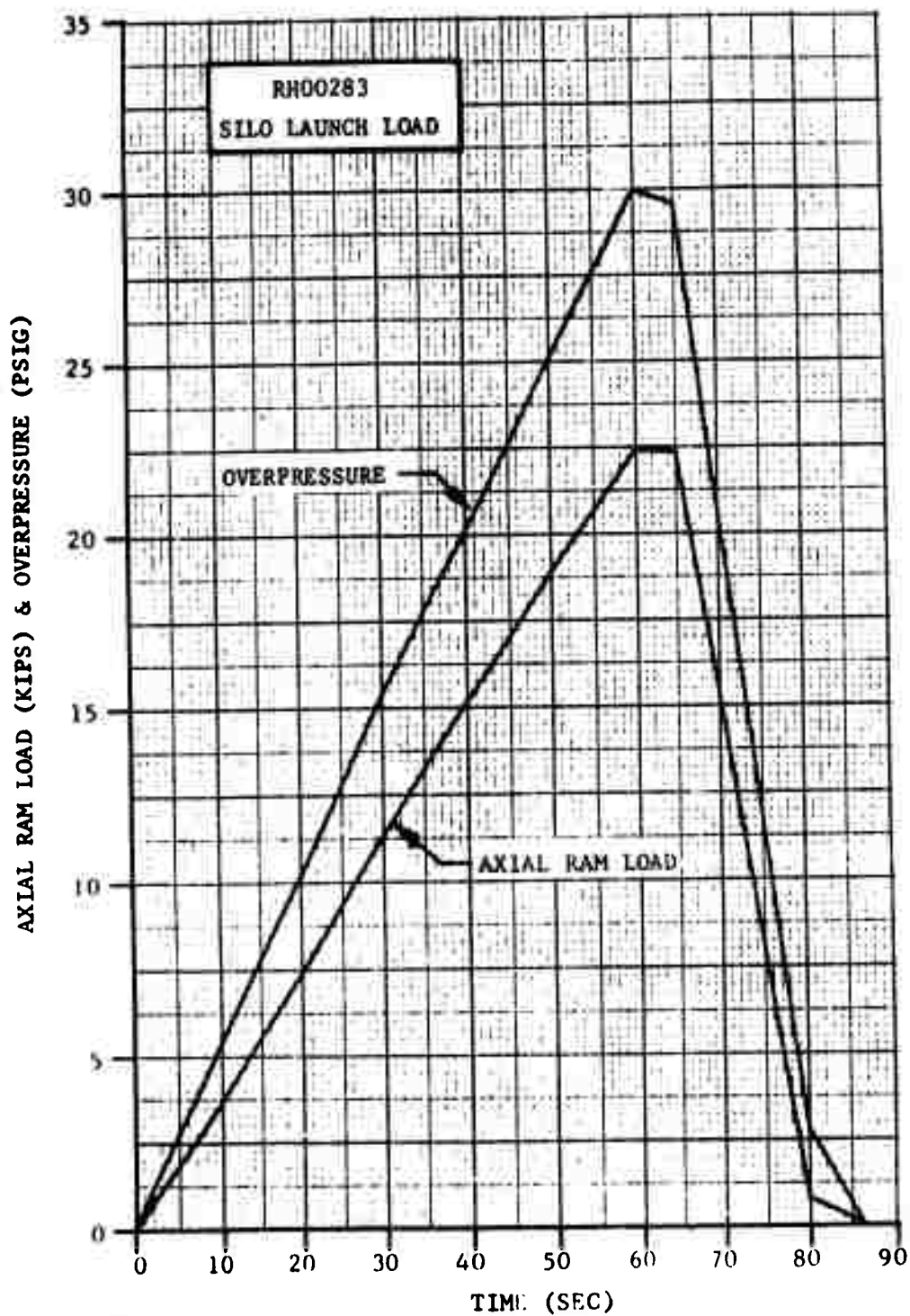


FIGURE 41 Deflection Versus Time, Phase II, W2SD-14A, Gages 3 and 4



NOTE: TO OBTAIN TOTAL AXIAL
MULTIPLY AXIAL RAM LOAD BY
2 AND ADD 3400 LBS HEAD WEIGHT

FIGURE 42 Actual Loads, Phase I, RH00283

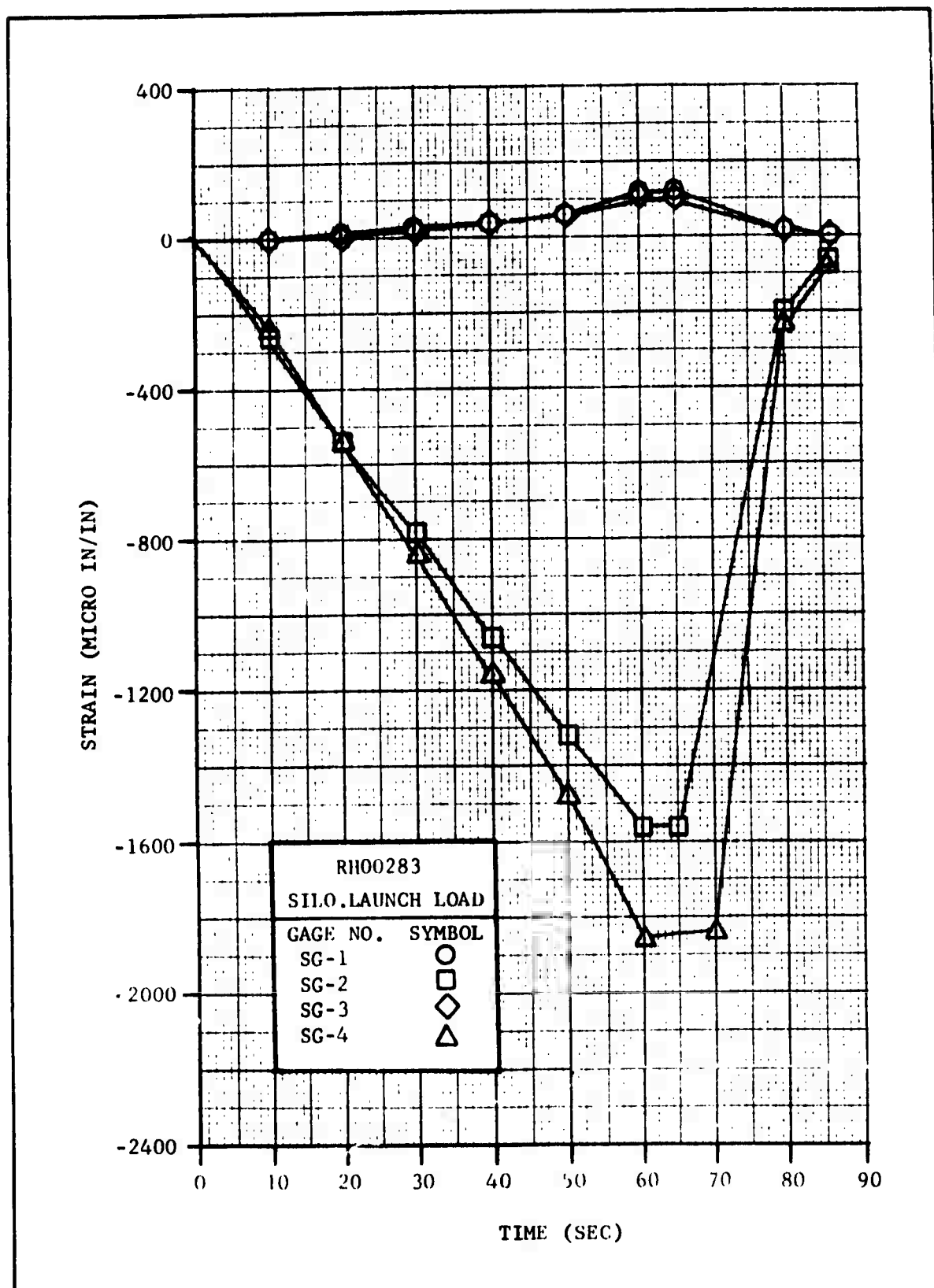


FIGURE 43 Strain Versus Time, Phase I, RH00283 Gages 1, 2, 3 and 4

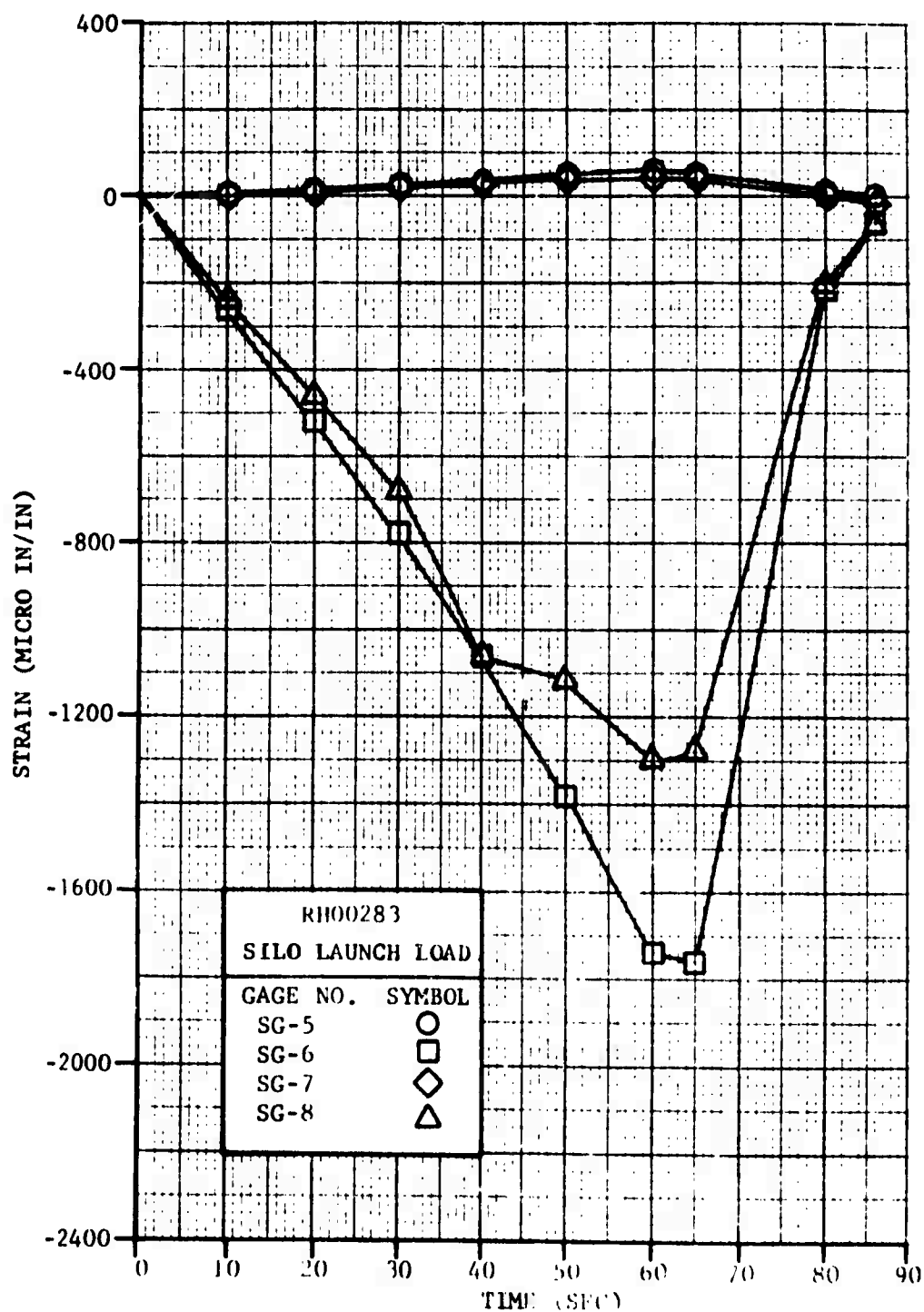


FIGURE 44 Strain Versus Time, Phase 1, RH00283 Gages 5, 6, 7 and 8

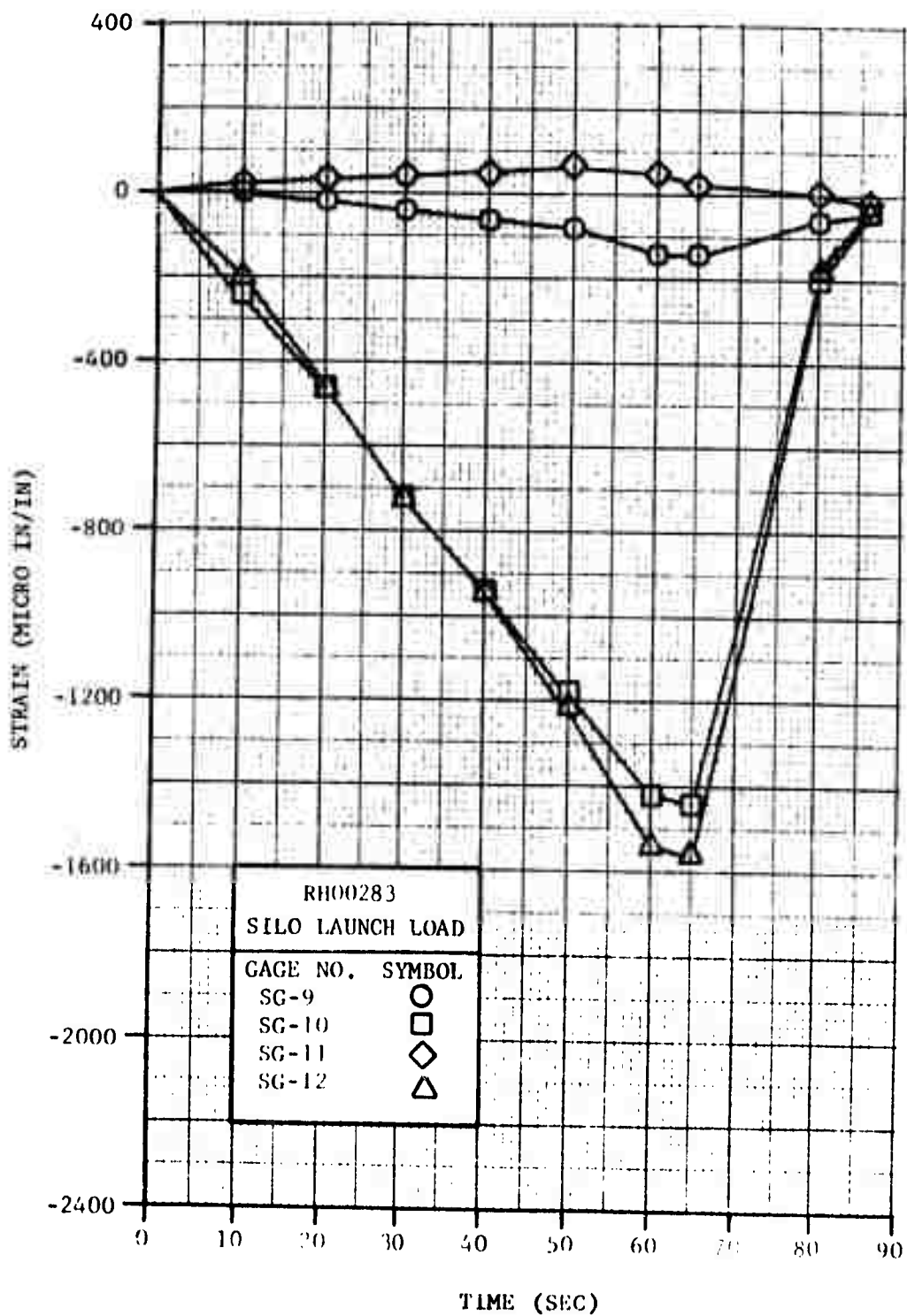


FIGURE 45 Strain Versus Time, Phase I, RH00283 Gages 9, 10, 11 and 12

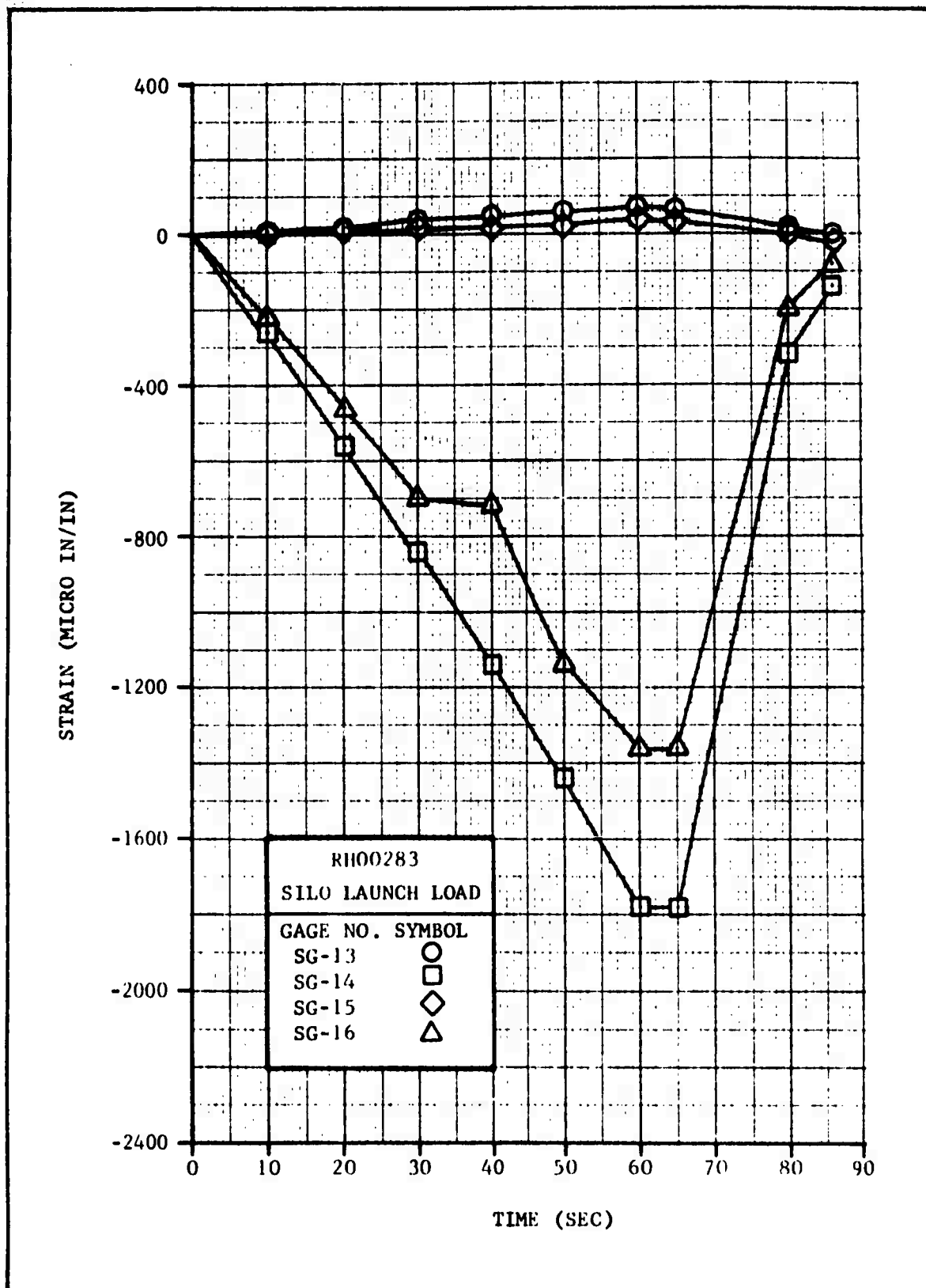


FIGURE 46 Strain Versus Time, Phase I, RH00283 Gages 13, 14, 15 and 16

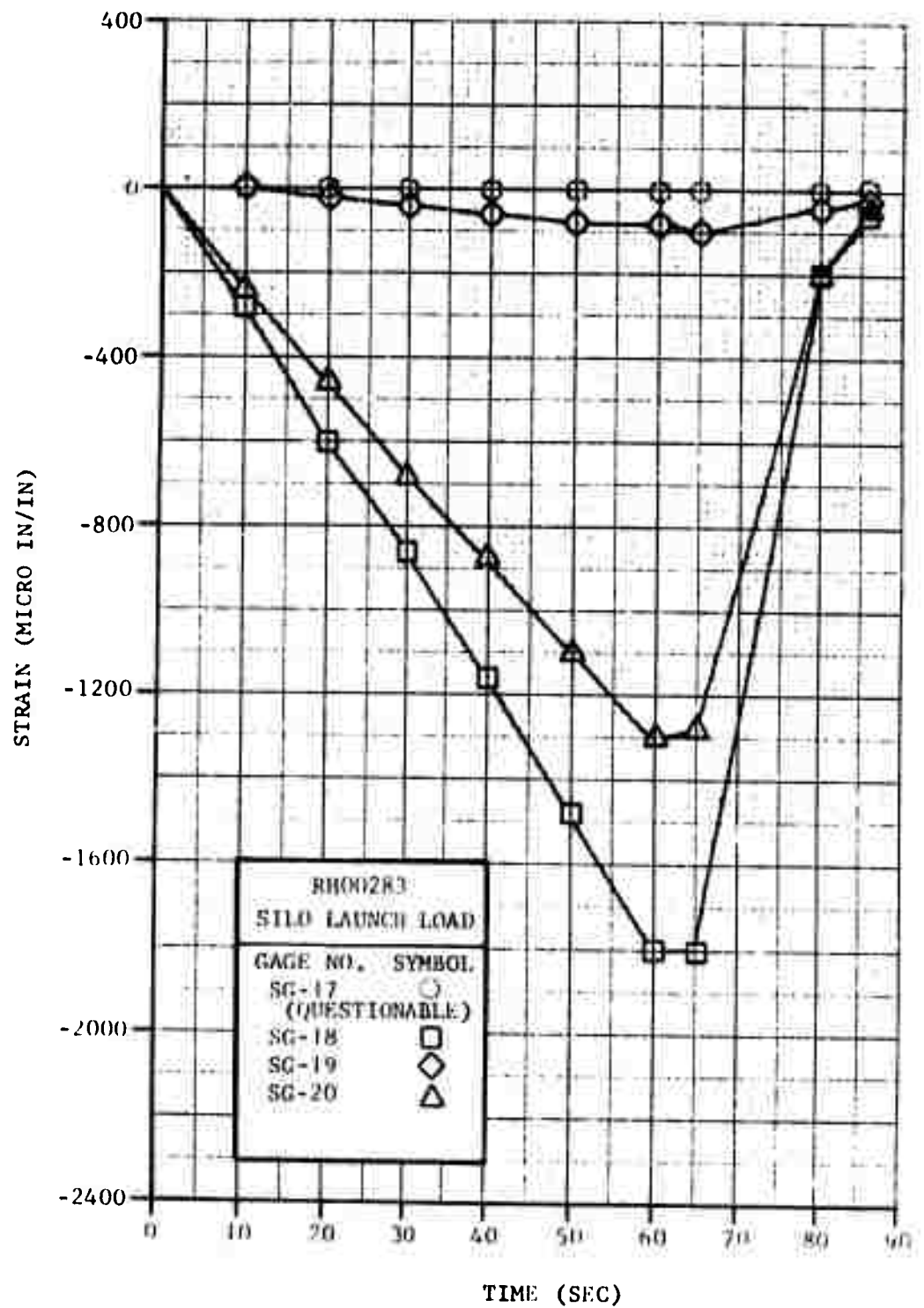


FIGURE 47

Strain Versus Time, Phase I, RH00283 Gages 17, 18, 19 and 20

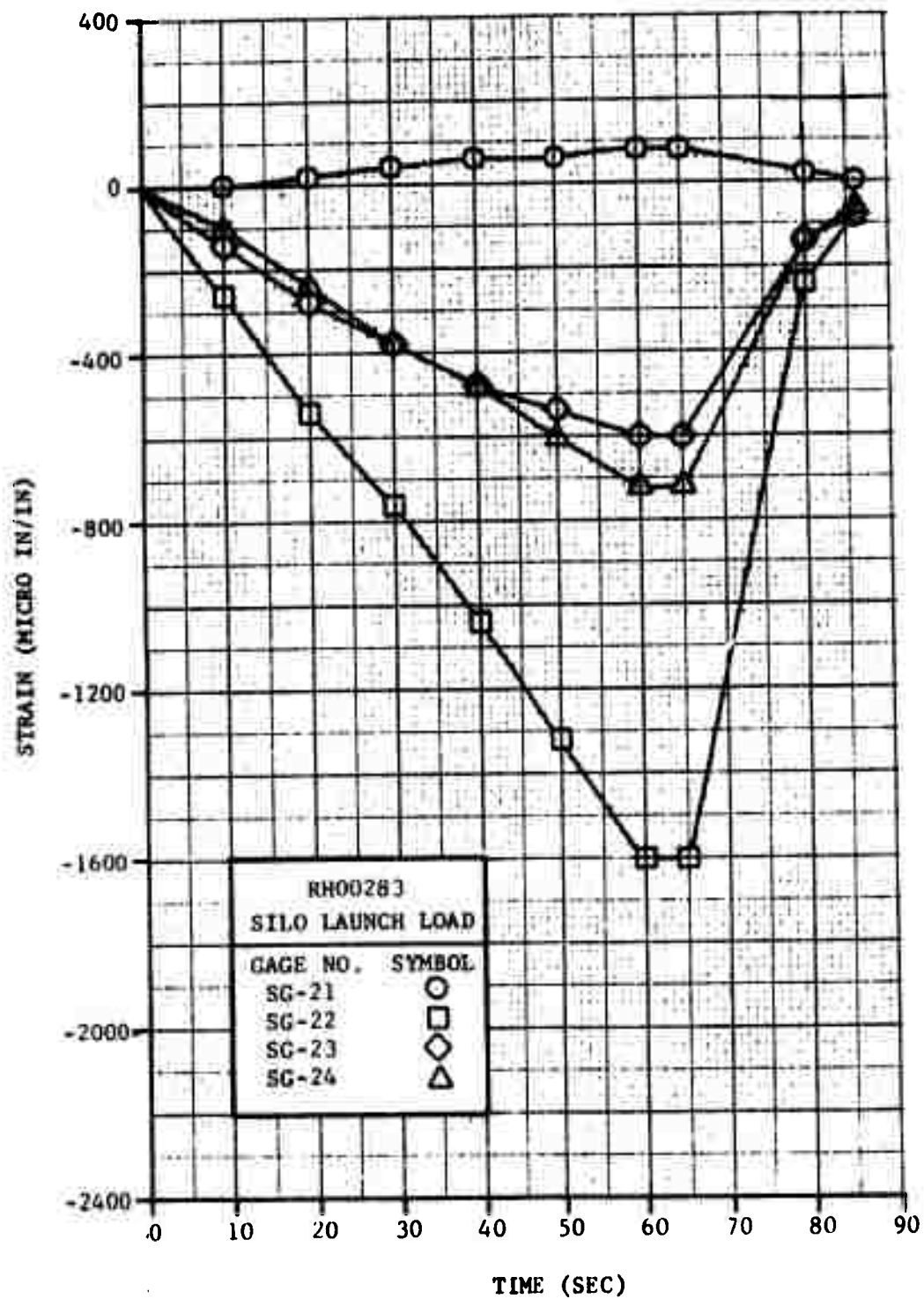


FIGURE 48

Strain Versus Time, Phase I, RH00283 Gages 21, 22, 23 and 24

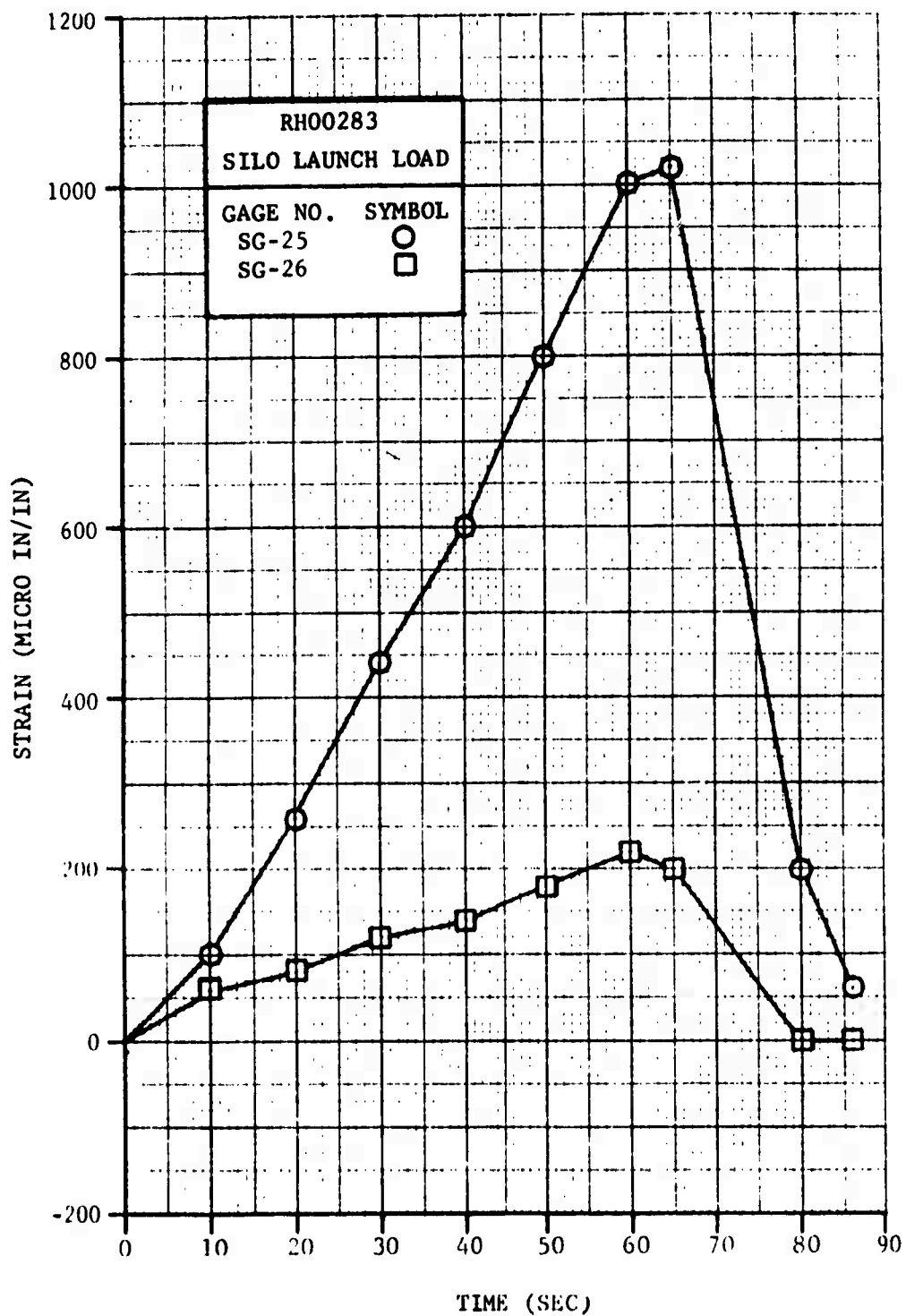


FIGURE 49 Strains Versus Time, Phase I, RH00283 Gages 25 and 26

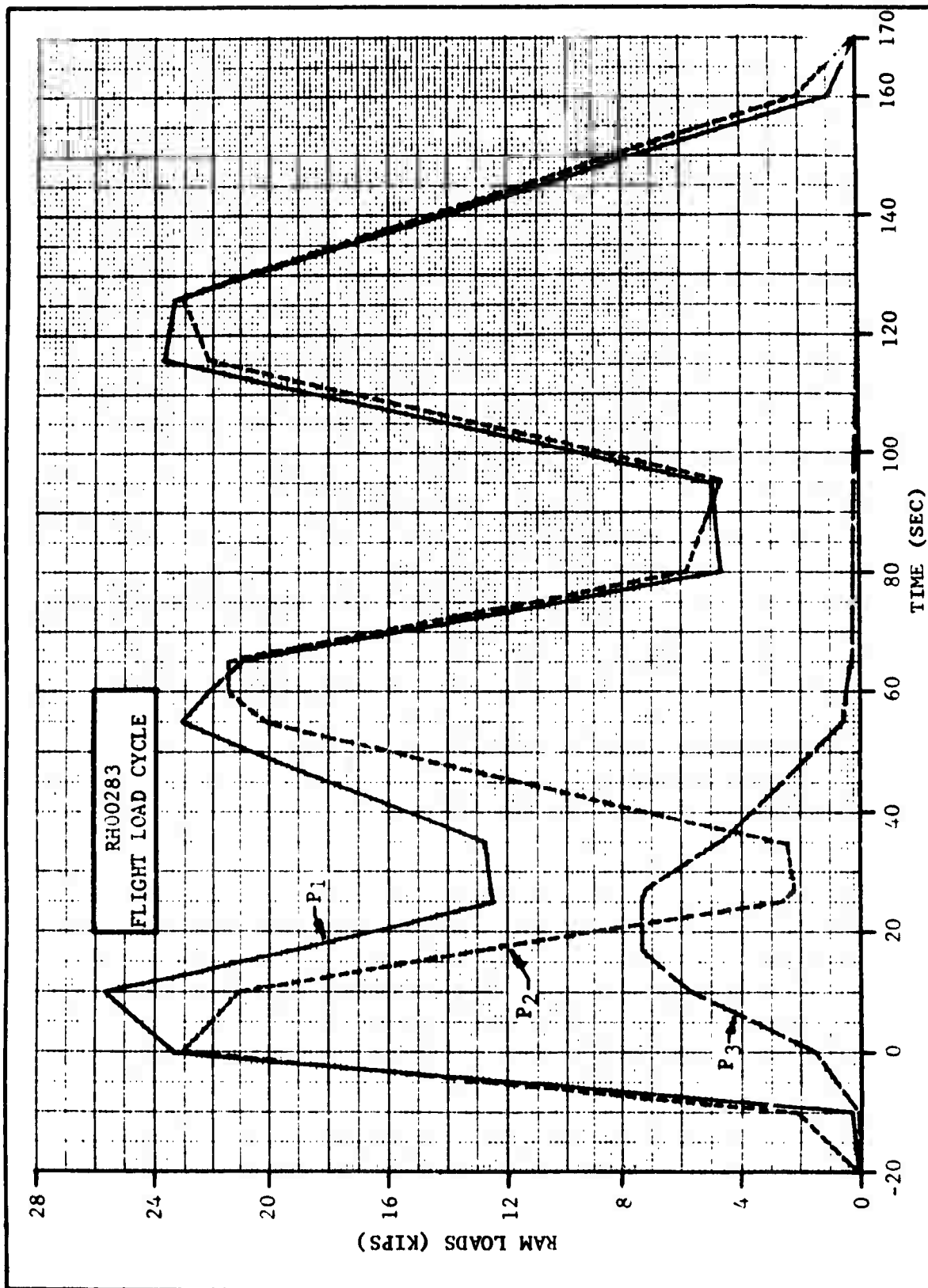


FIGURE 50 Actual Loads, Phase II, RH00283

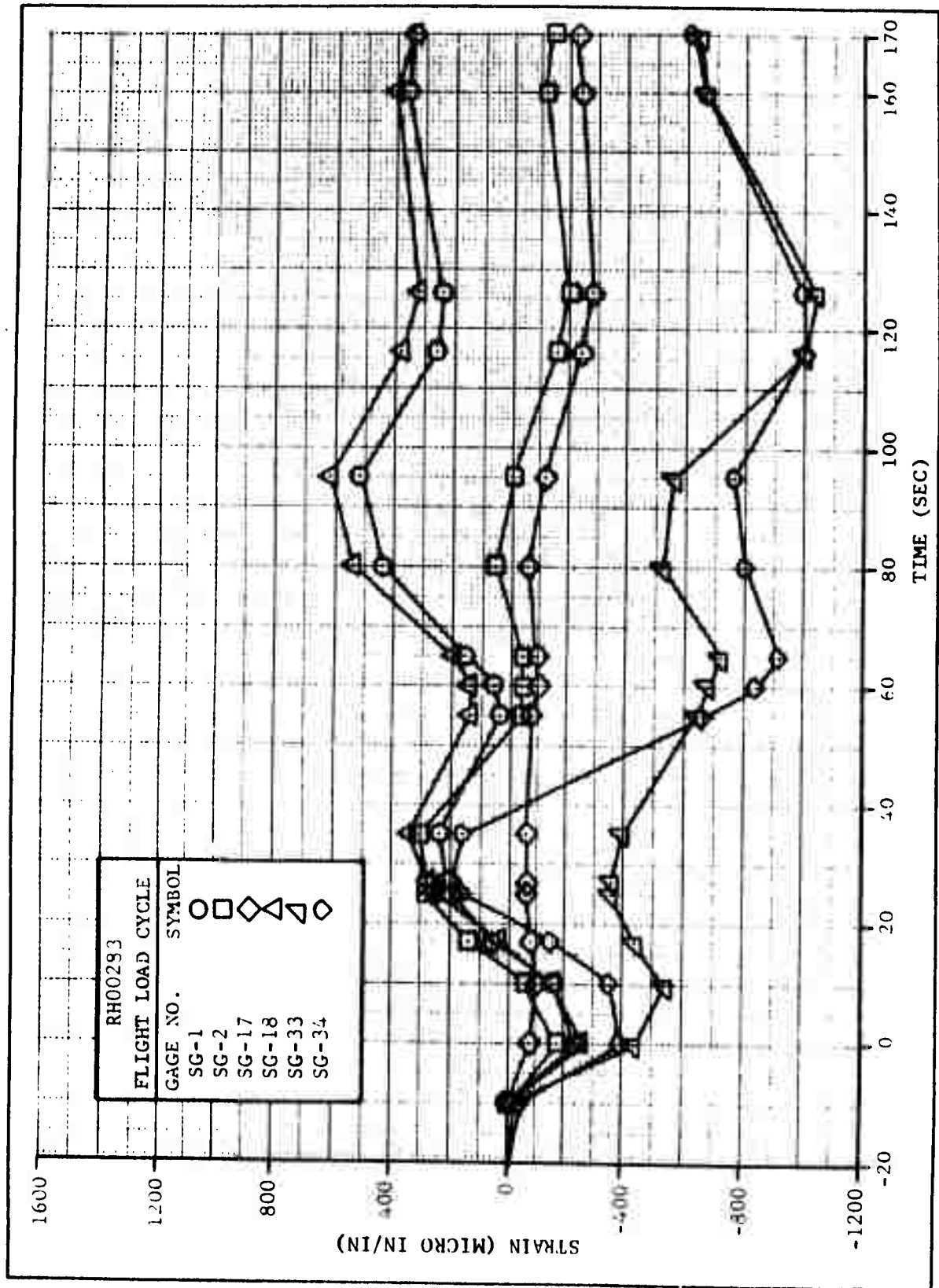


FIGURE 51 Strain Versus Time, Phase II, RH00283 Gages 1, 2, 17, 18, 33 and 34

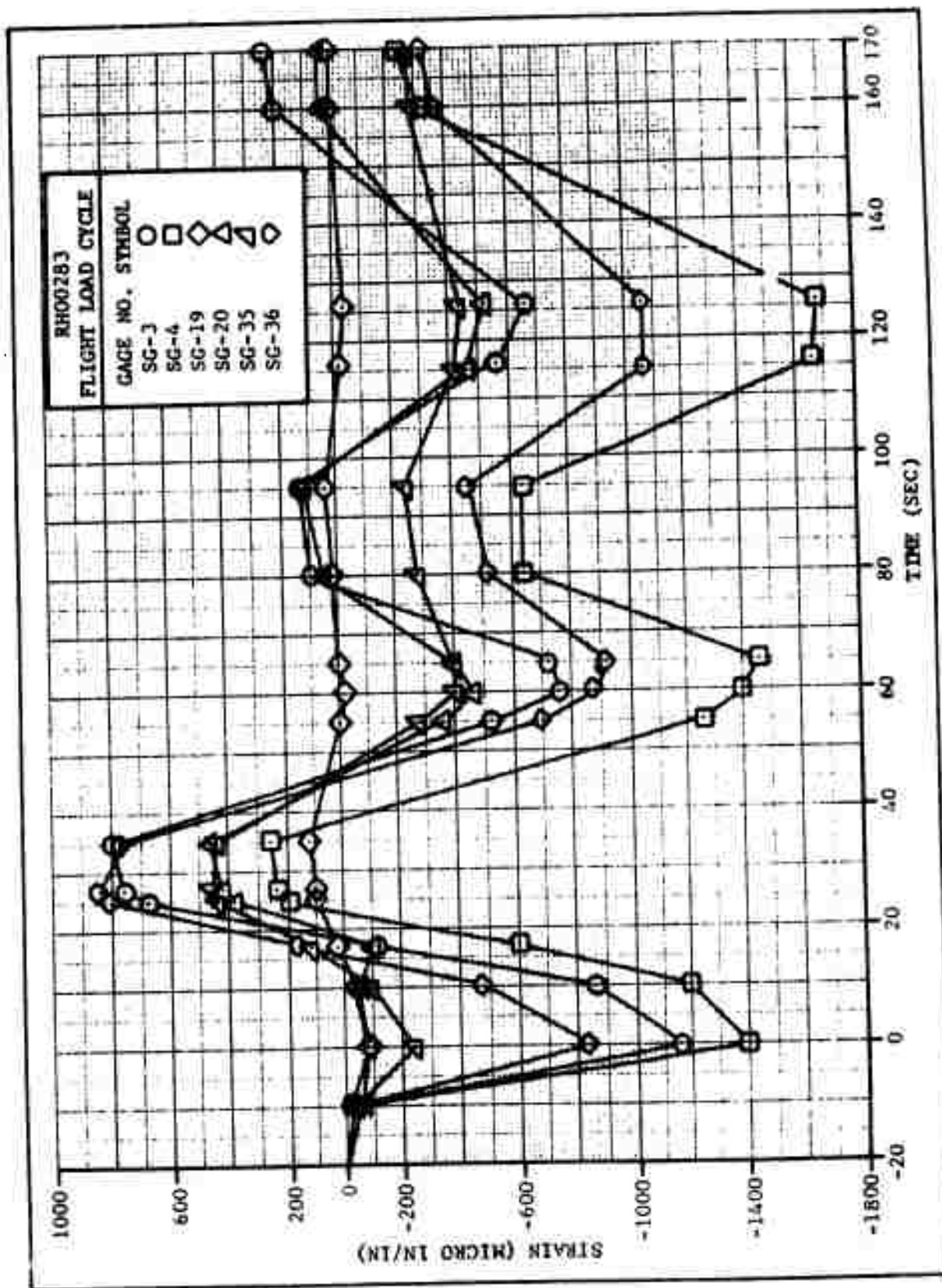


FIGURE 52 Strain Versus Time, Phase II, RH00283 Gages 3, 4, 19, 20, 35 and 36

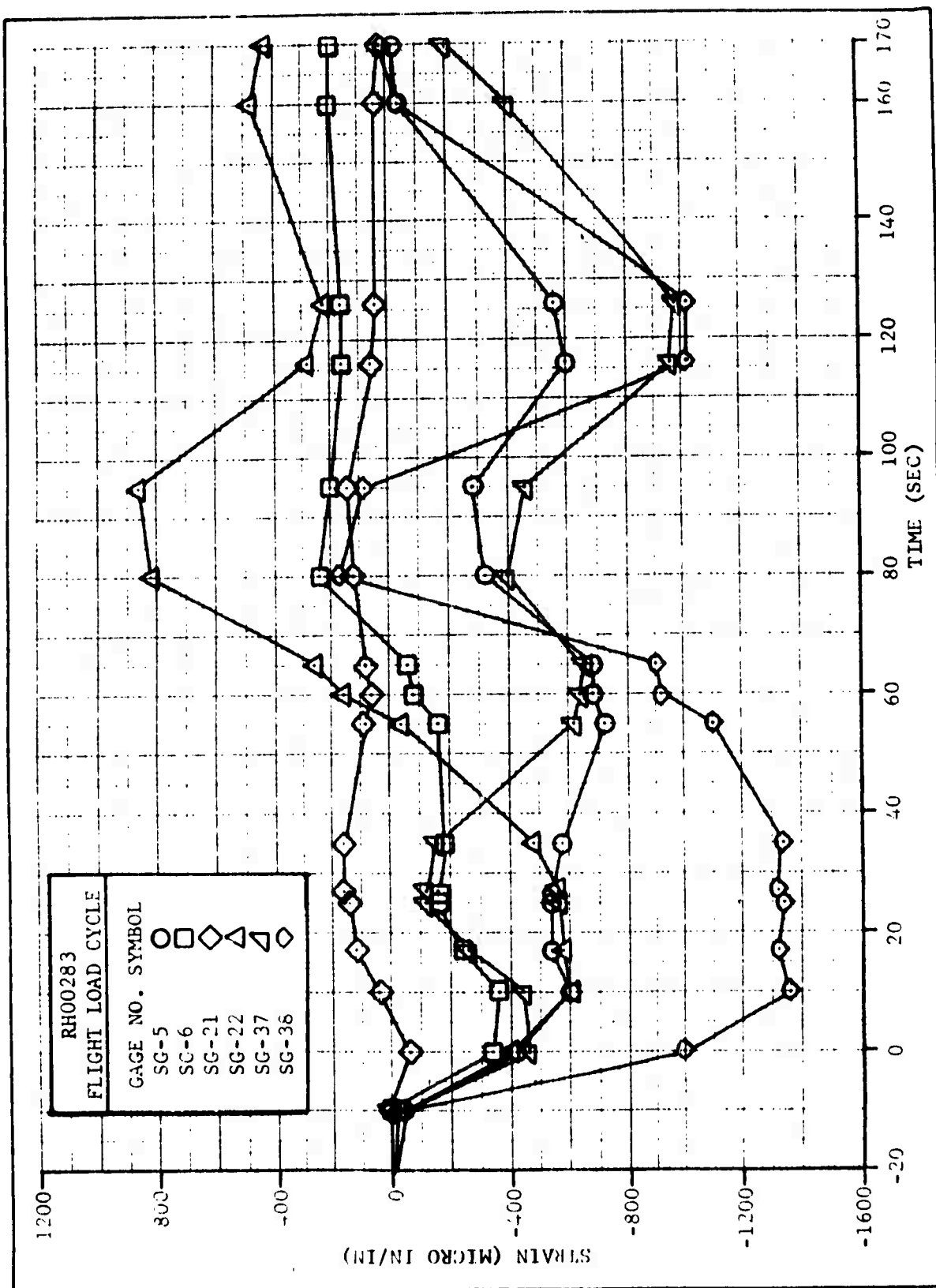


FIGURE 53 Strain Versus Time, Phase II, RH00283 Gages 5, 6, 21, 22, 37 and 38

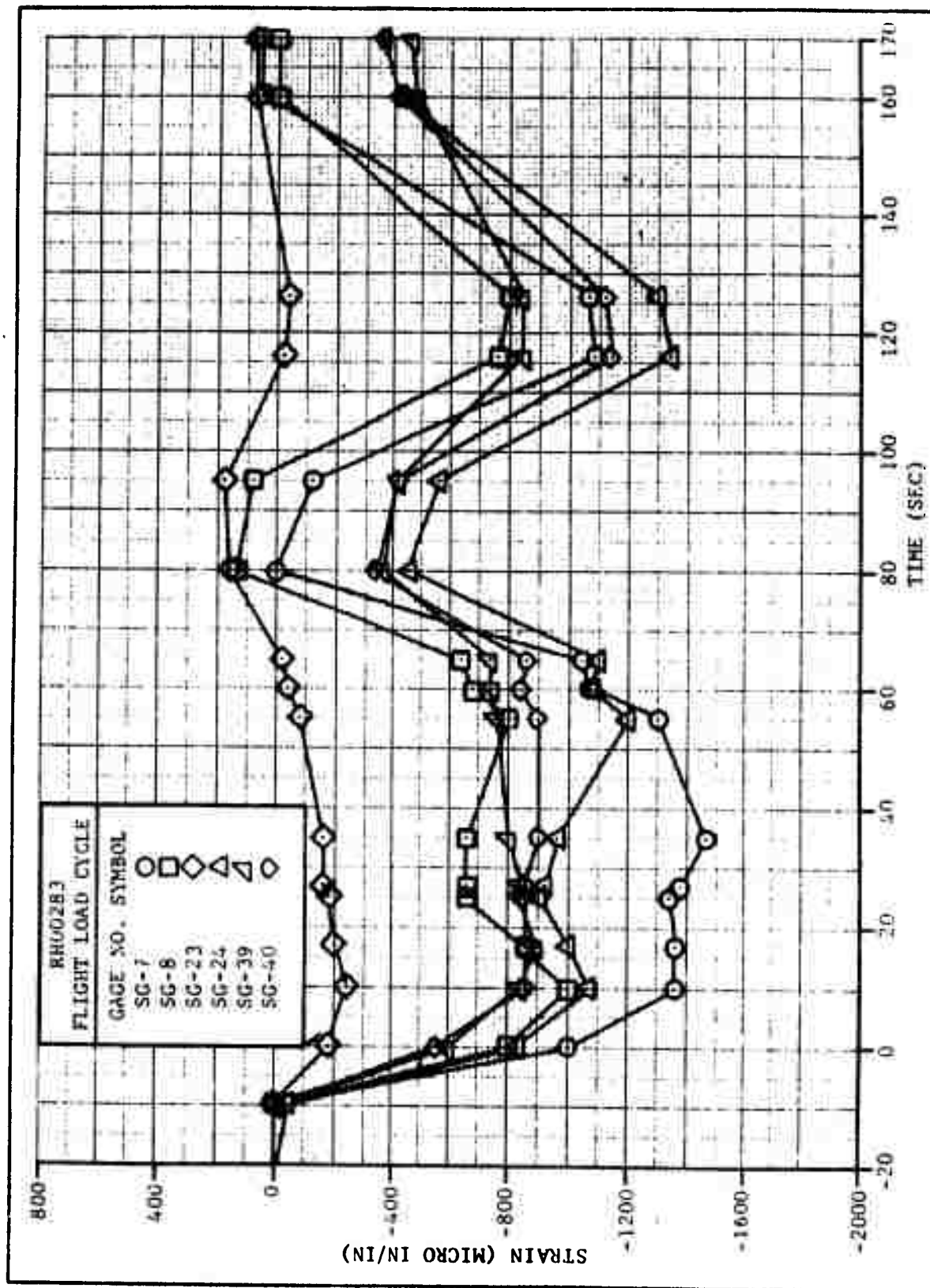


FIGURE 54 Strain Versus Time, Phase II, RH00283 Gages 7, 8, 23, 24, 39 and 40

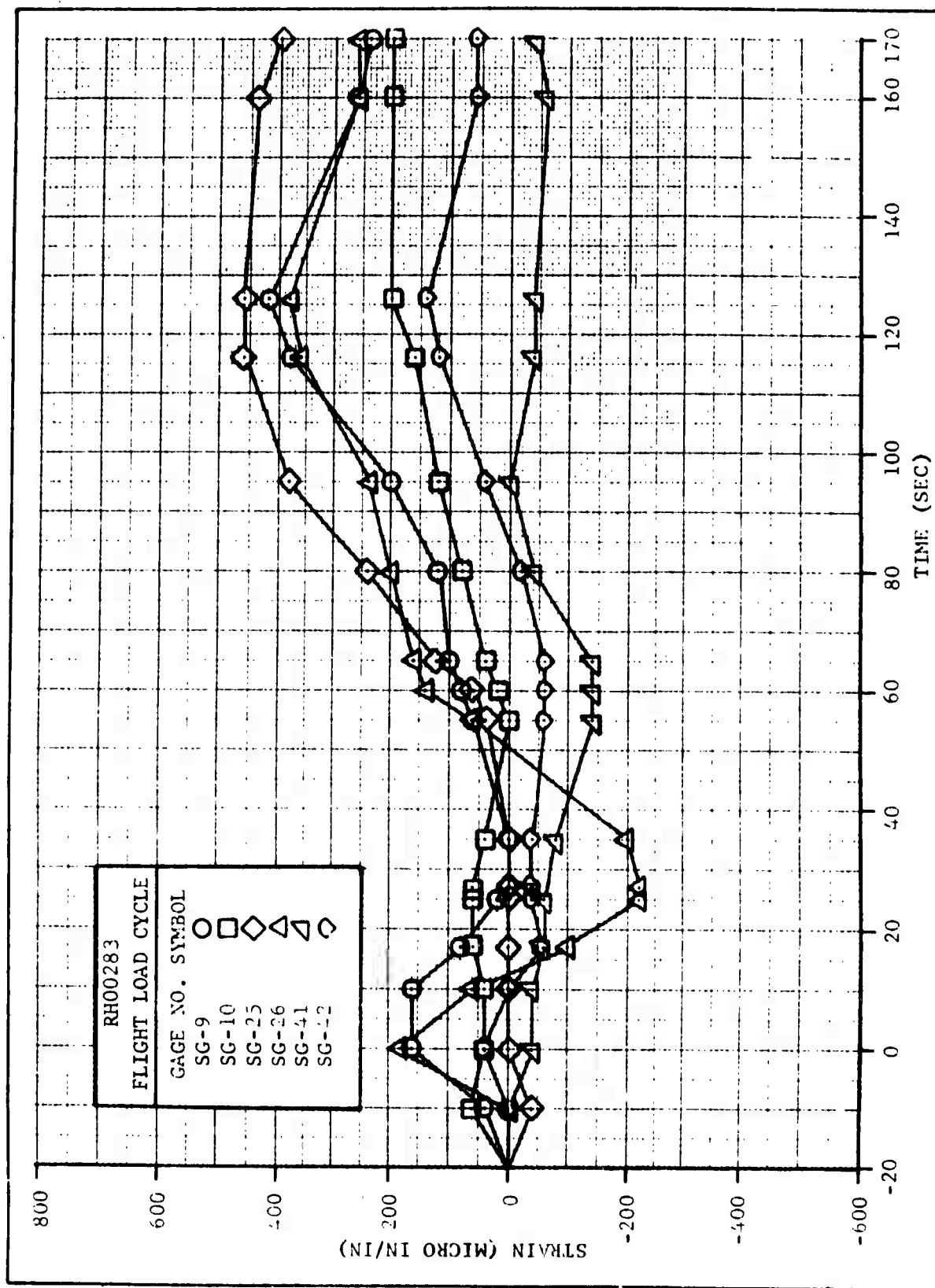


FIGURE 55 Strain Versus Time, Phase II, RH00283 Gages 9, 10, 25, 41 and 42

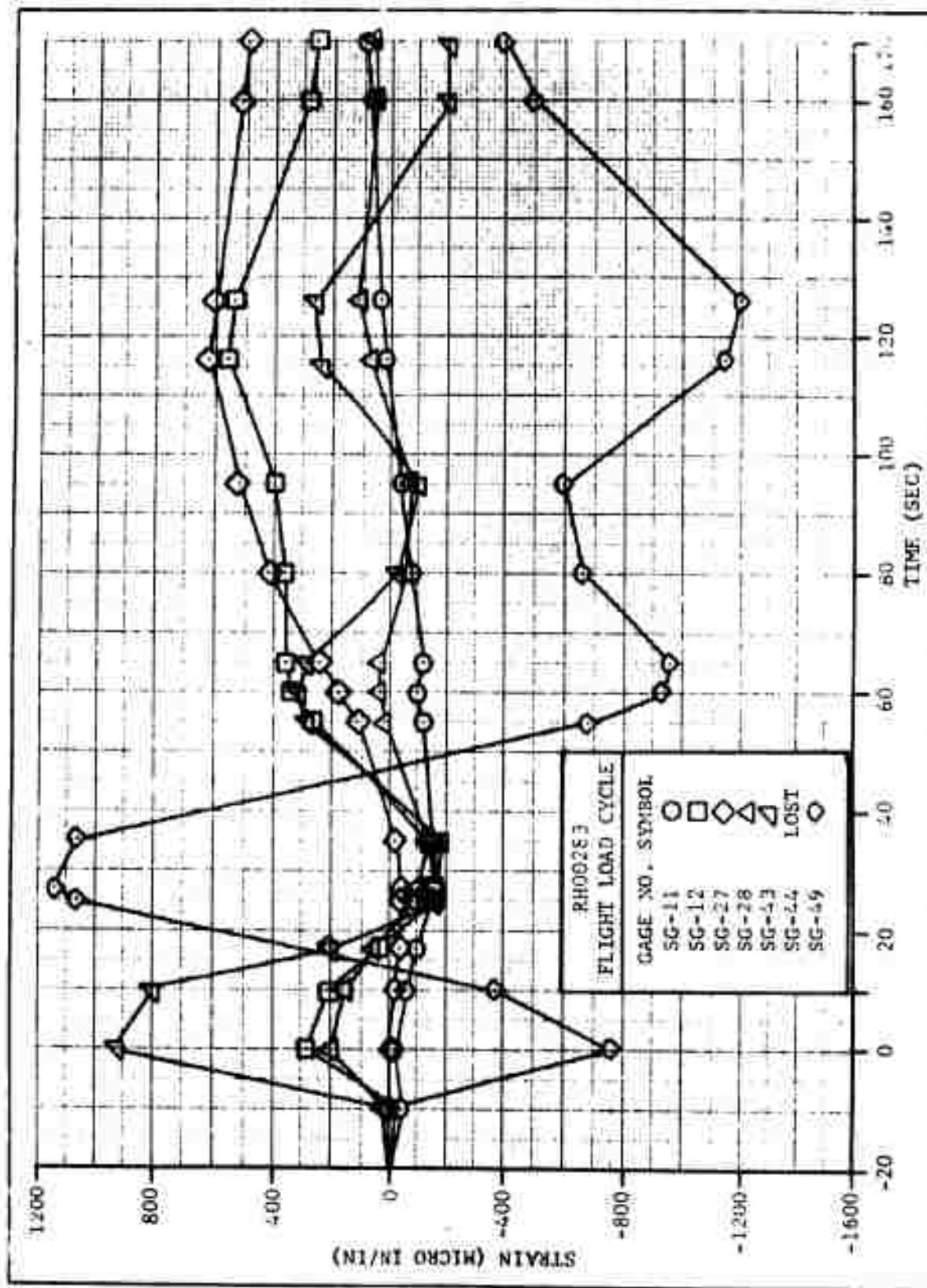


FIGURE 56 Strain Versus Time, Phase II, RH00283 Gages 11, 12, 27, 28, 43, 44 and 49

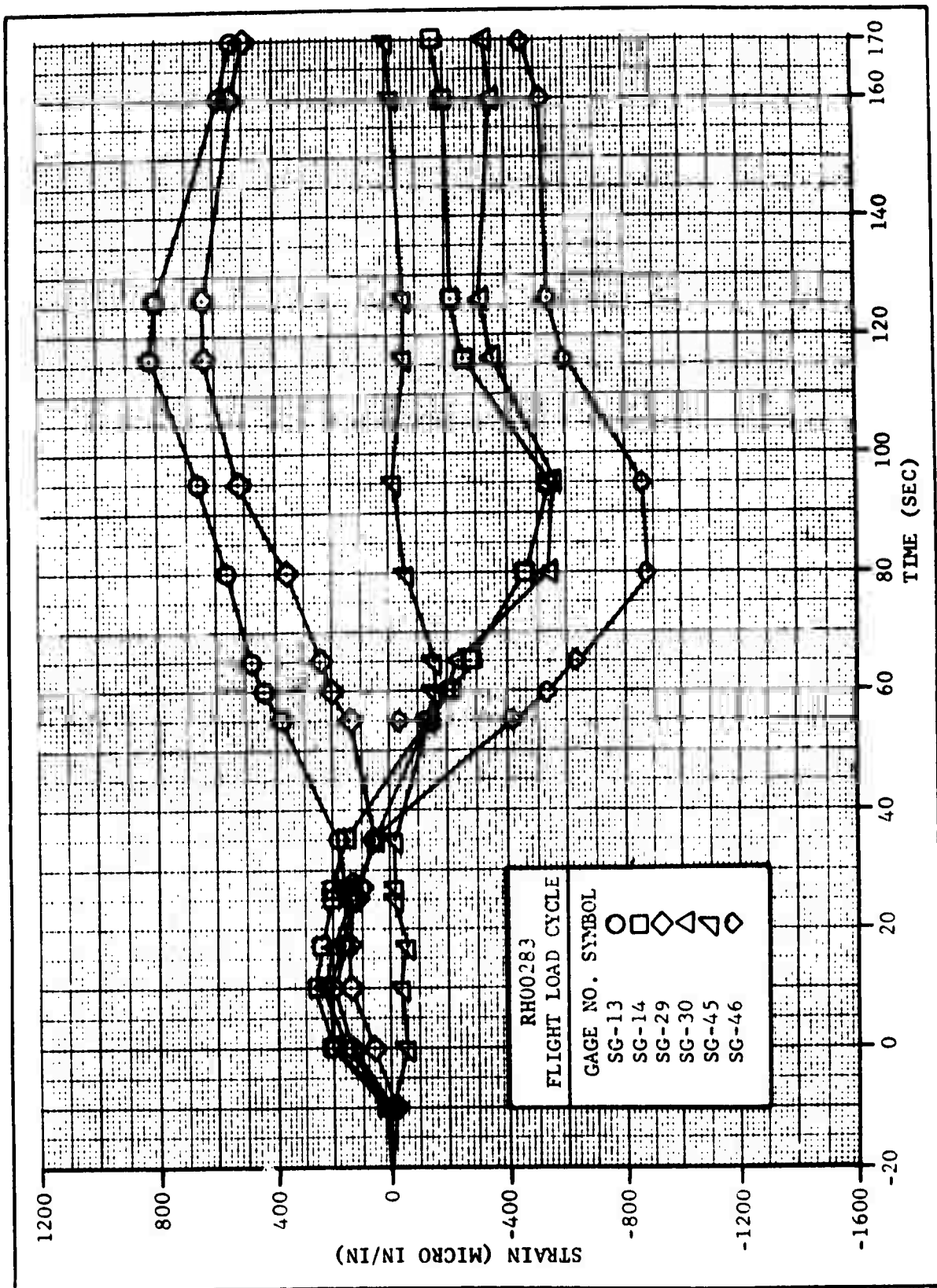


FIGURE 57 Strain Versus Time, Phase II, RH00283 Gages 13, 14, 29, 30, 45 and 46

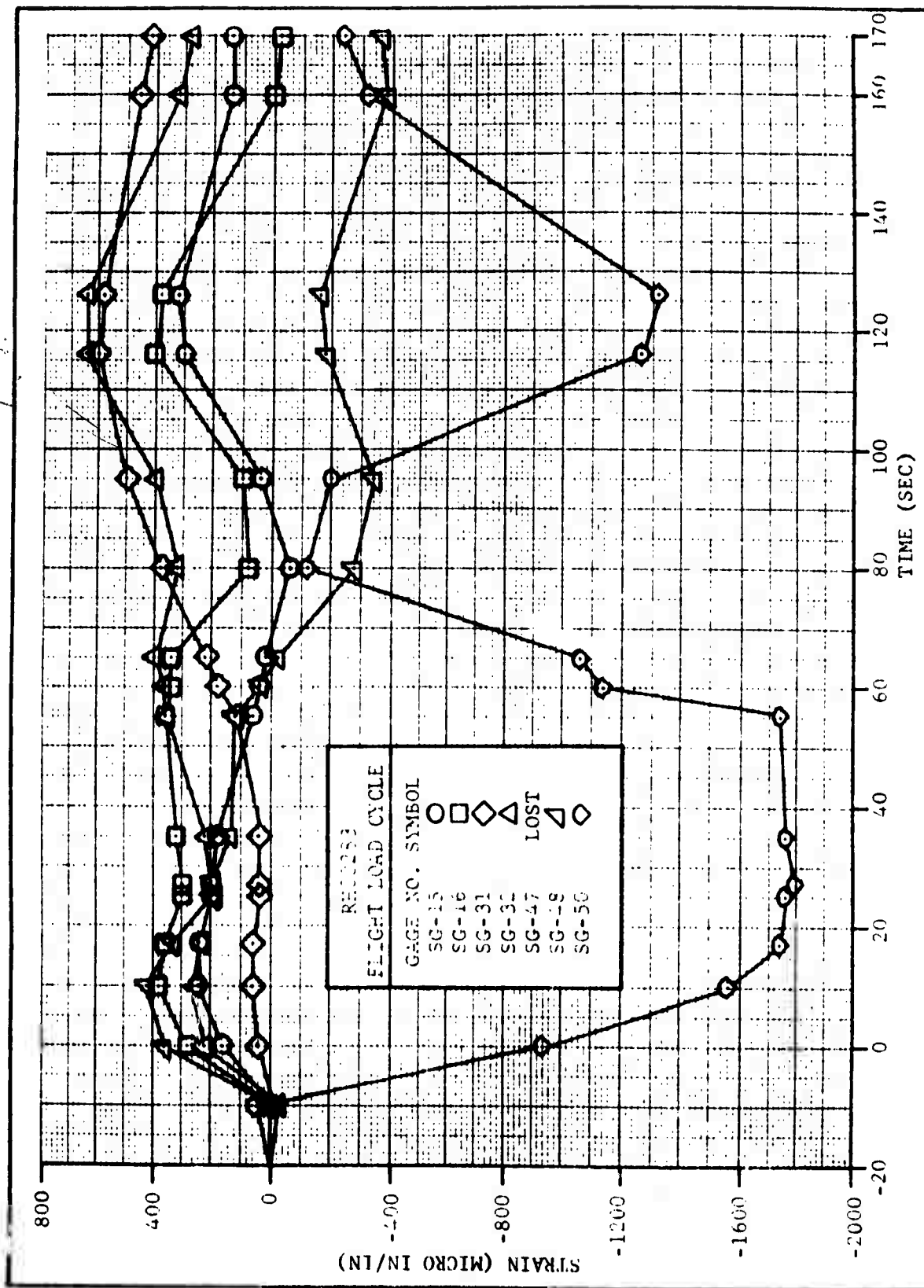


FIGURE 58 Strain Versus Time, Phase II, RH00283 Gages 15, 16, 31, 32, 47, 48 and 50

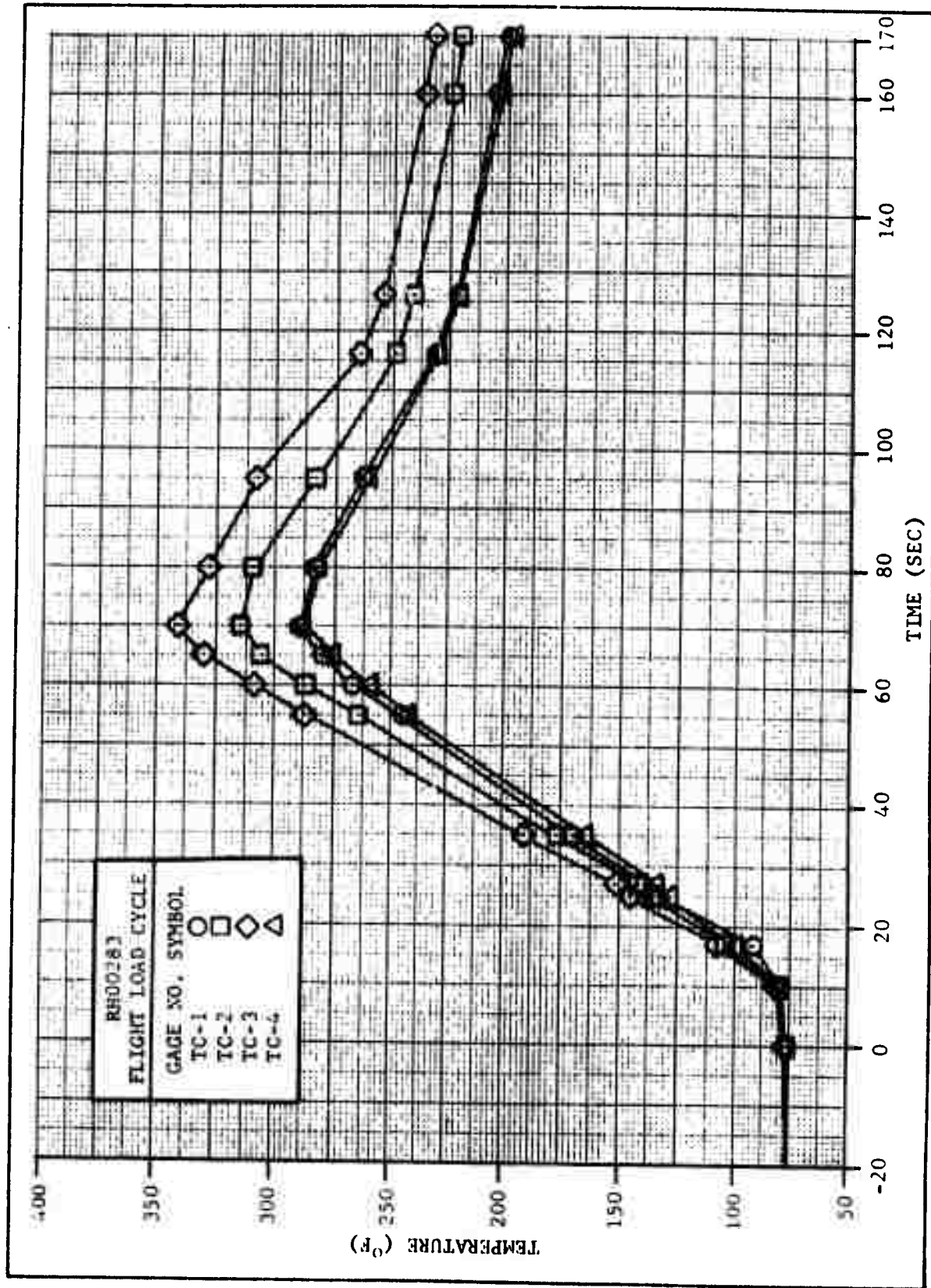


FIGURE 59 Temperature Versus Time, Phase II, RH00283 Gages 1, 2, 3 and 4

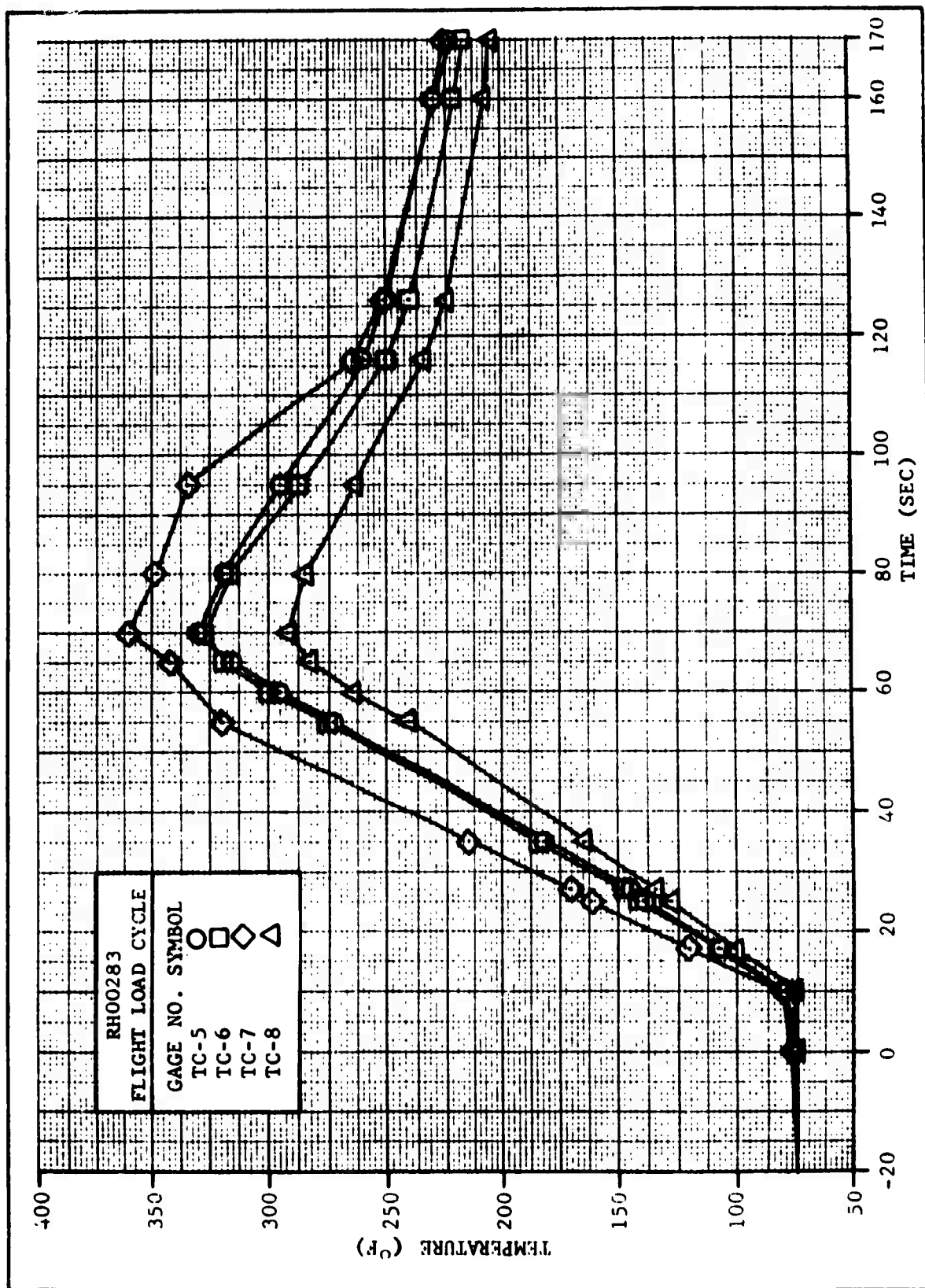


FIGURE 60 Temperature Versus Time, Phase II, RH00283 Gages 5, 6, 7 and 8

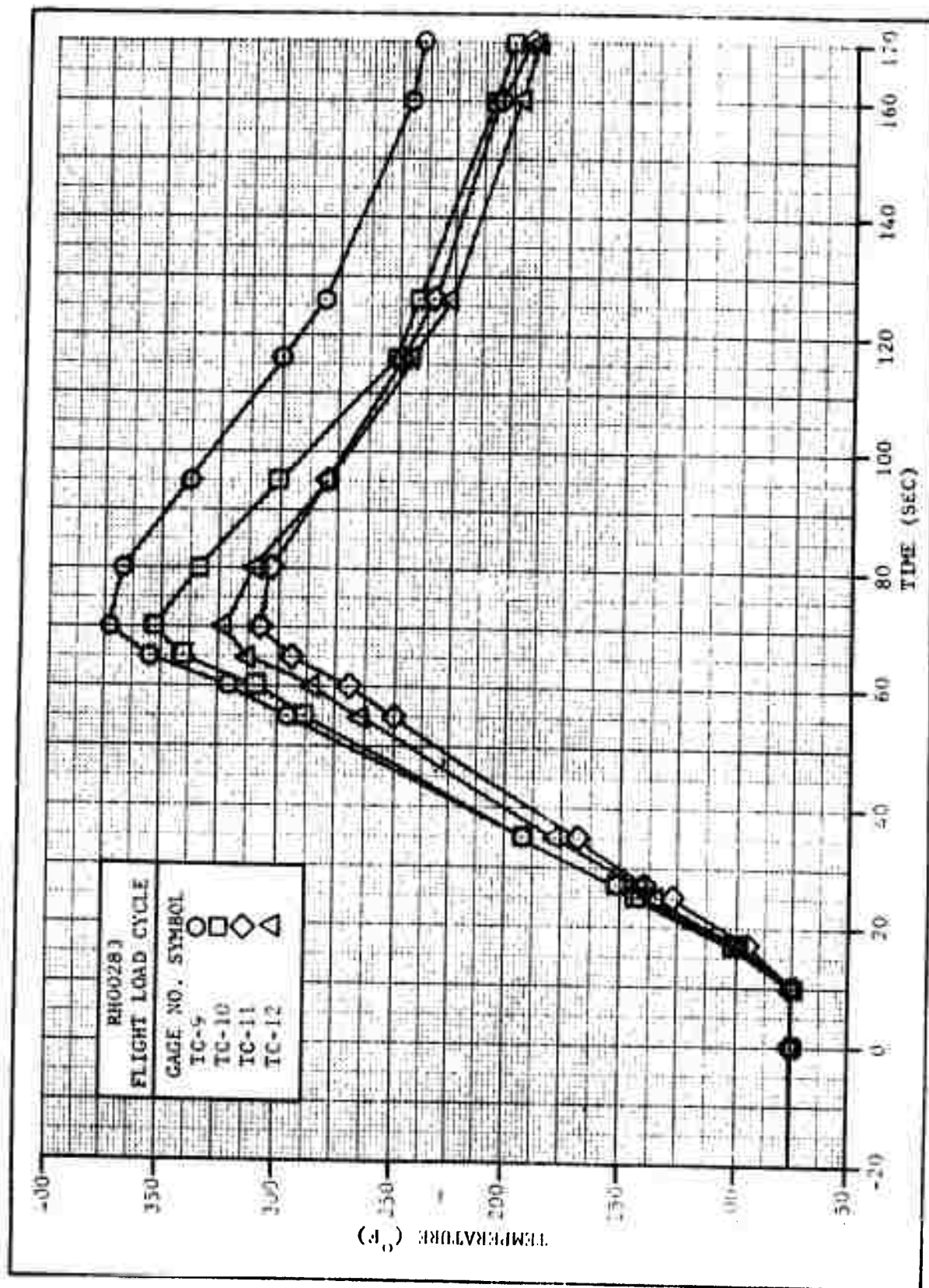


FIGURE 6: Temperature Versus Time, Phase II, RH00283 Gages 9, 10, 11 and 12

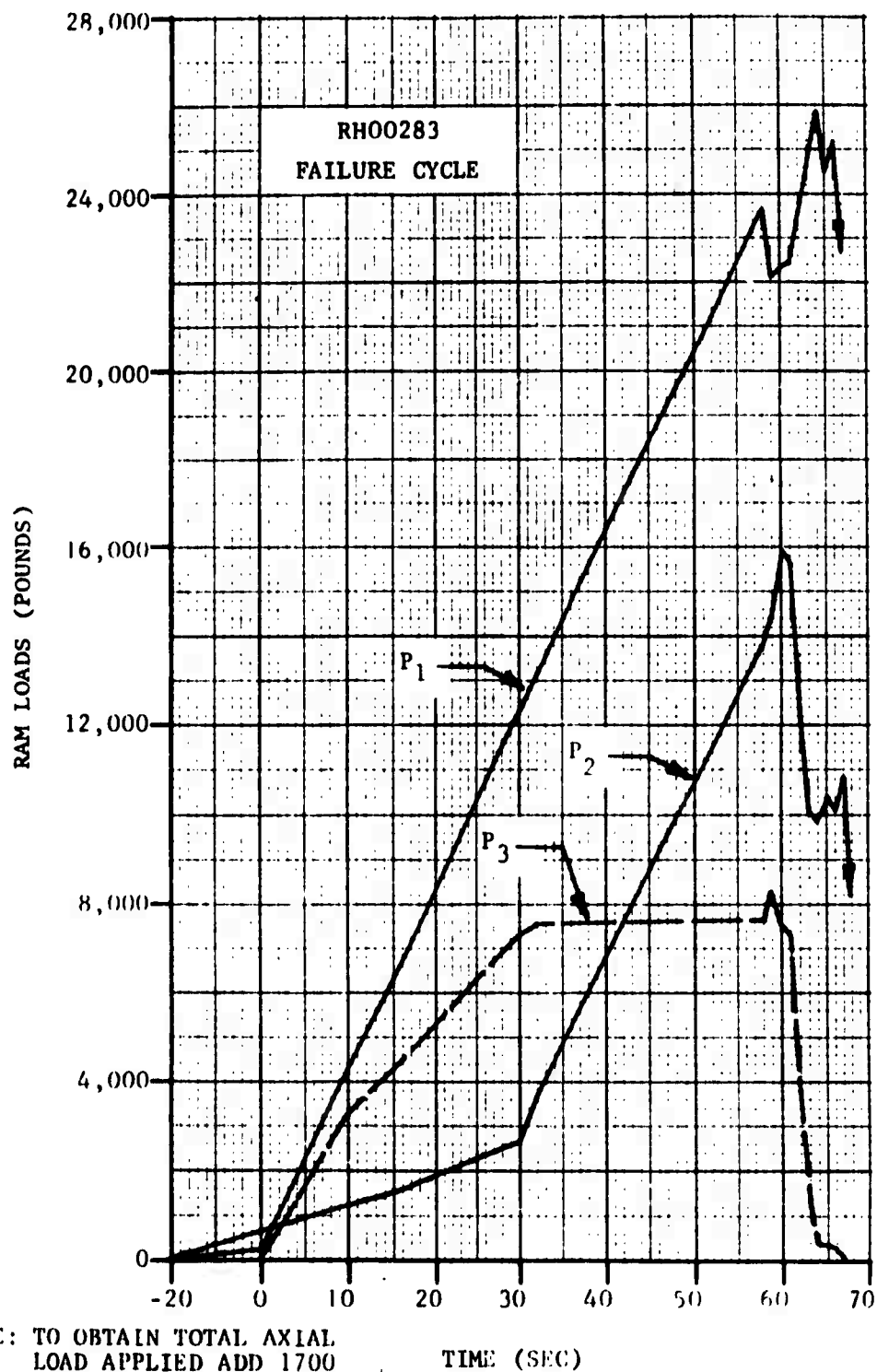


FIGURE 62 Actual Loads, Phase III, RH00283

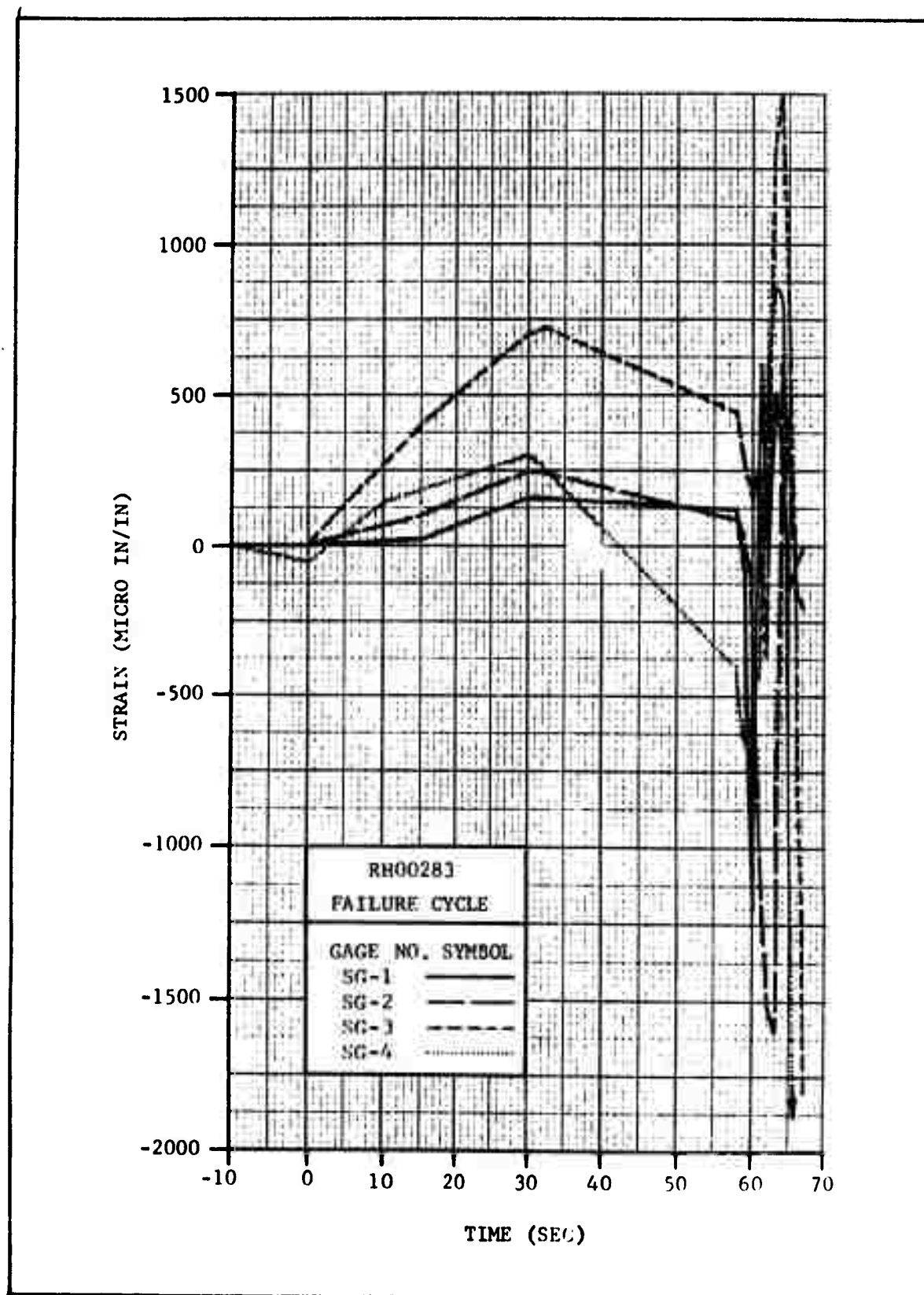


FIGURE 63

Strain Versus Time, Phase III, RH00283 Gages
1, 2, 3, and 4

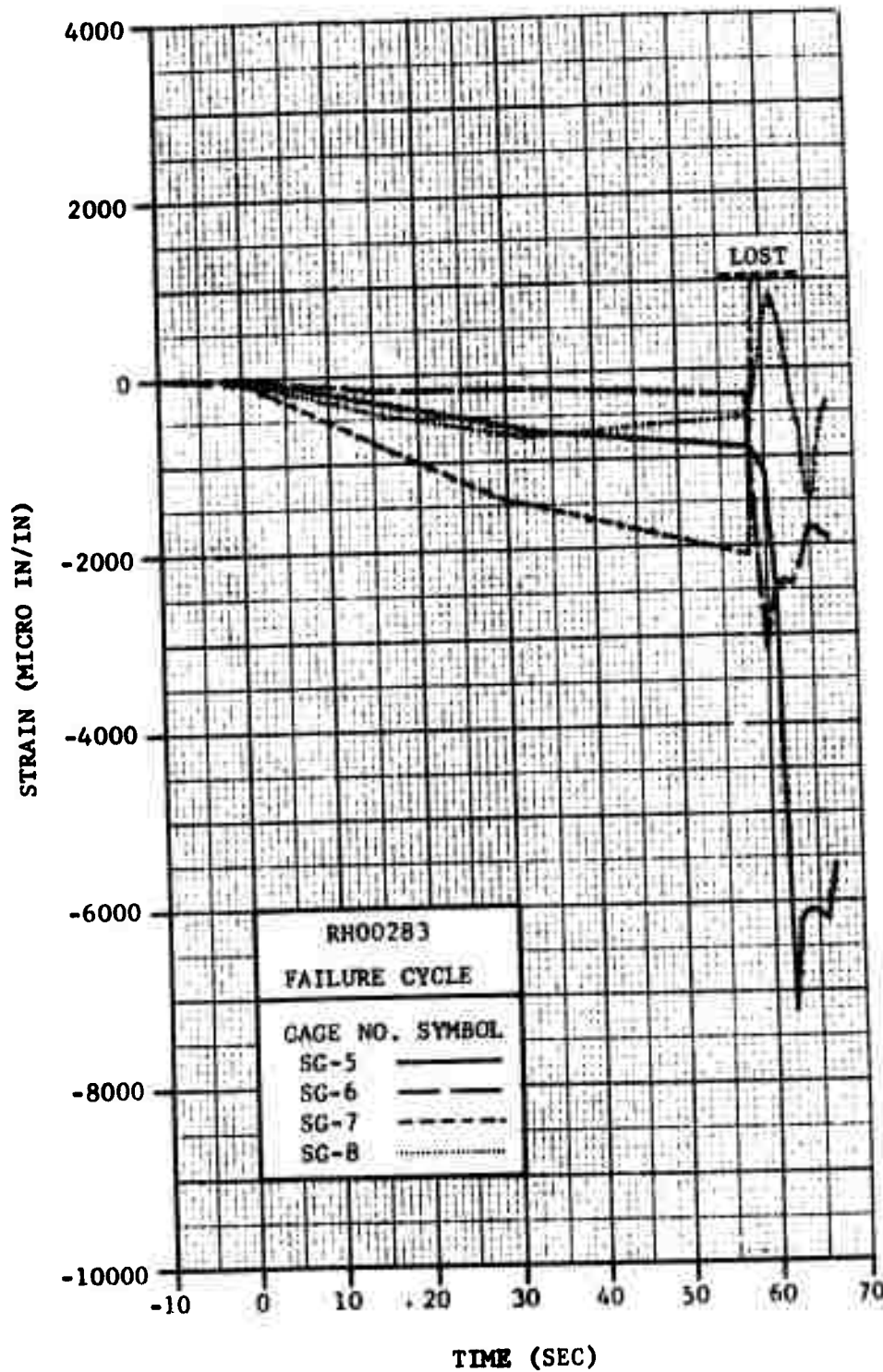


FIGURE 64 Strain Versus Time, Phase III, RH00283 Gages 5, 6, 7 and 8

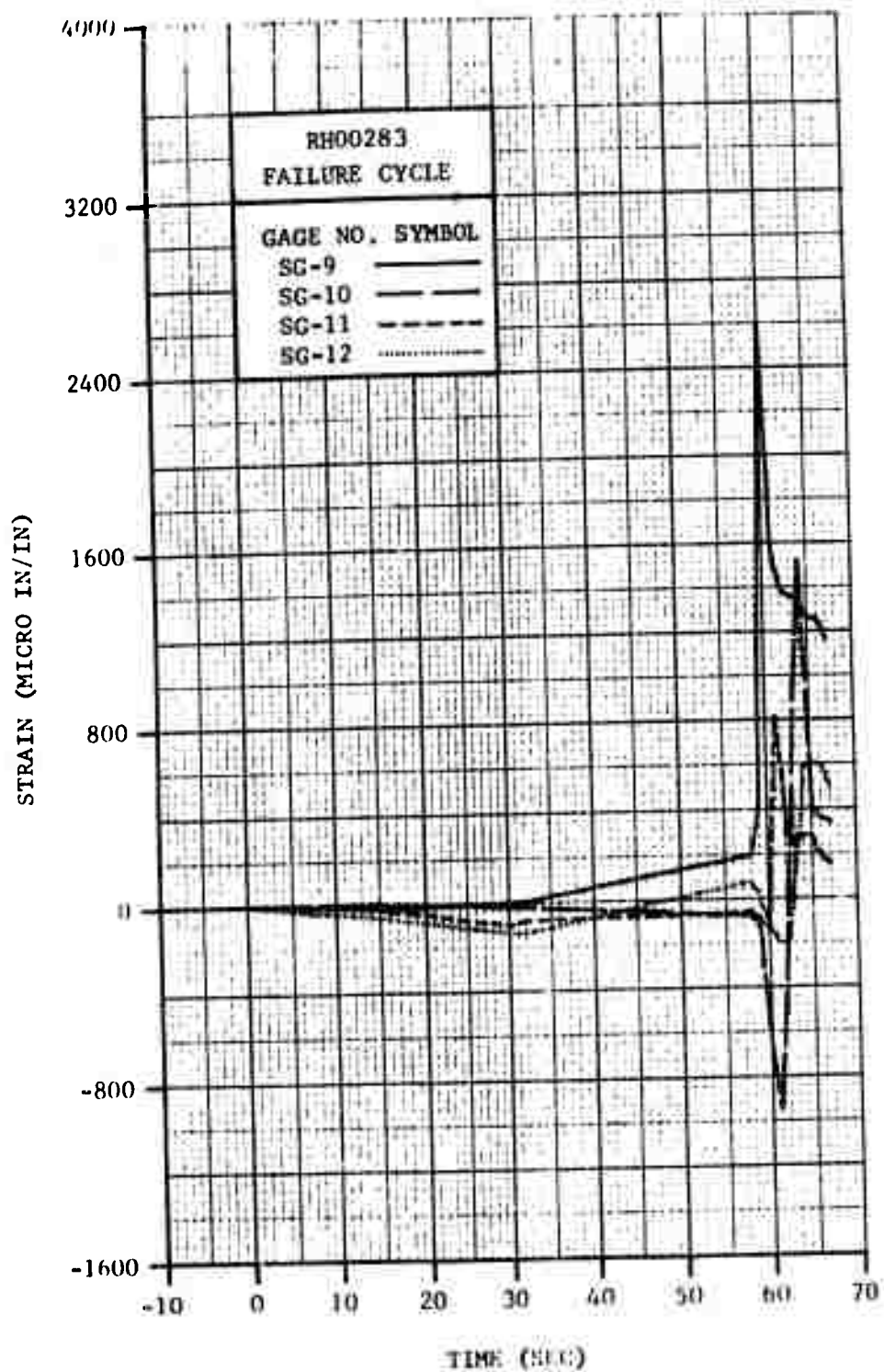


FIGURE 65

Strain Versus Time, Phase III, RH00283 Gages
9, 10, 11 and 12

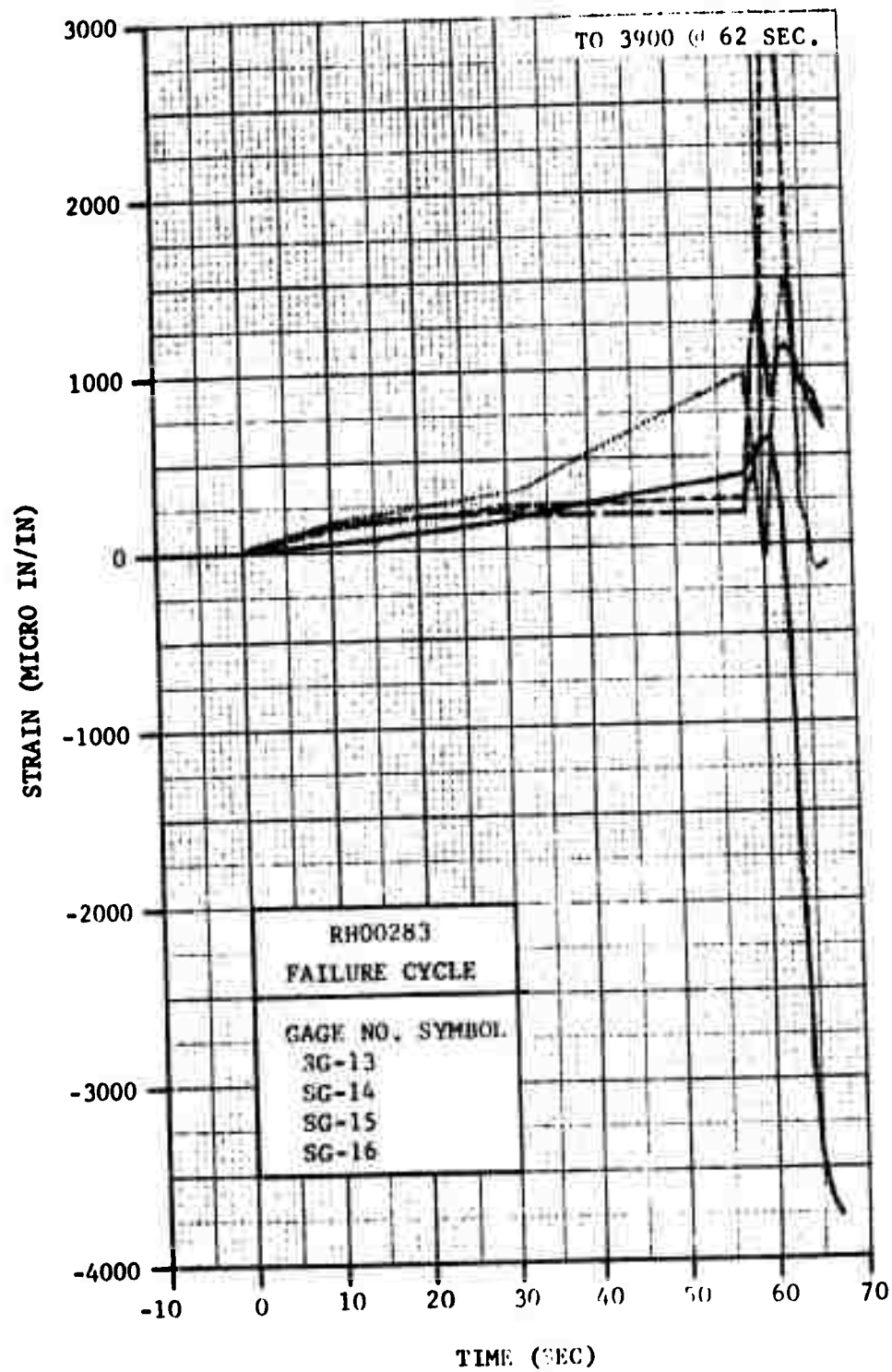


FIGURE 66

Strain Versus Time, Phase III, RH00283 Gages
13, 14, 15 and 16

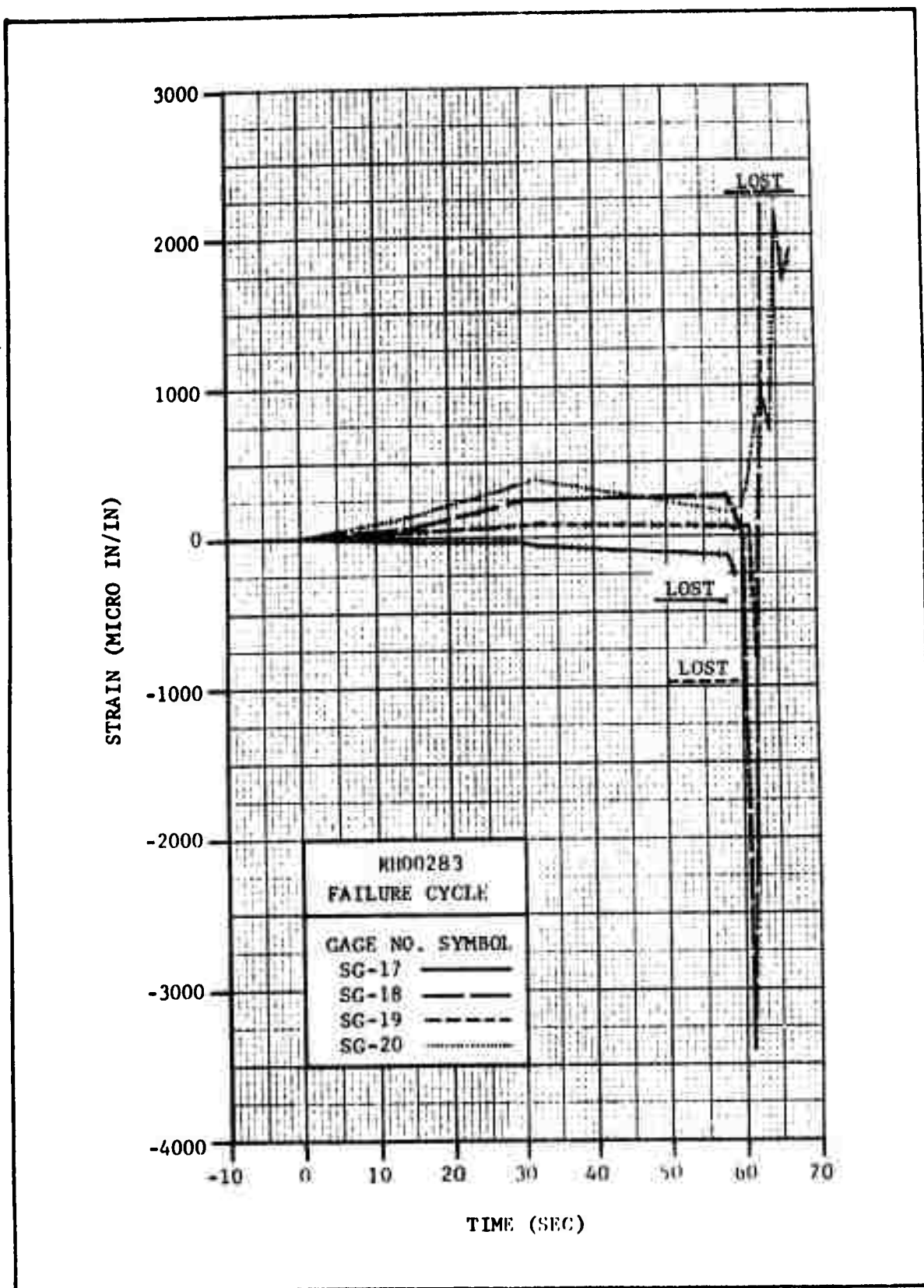


FIGURE 67 Strain Versus Time, Phase III, RH00283
Gages 17, 18, 19 and 20

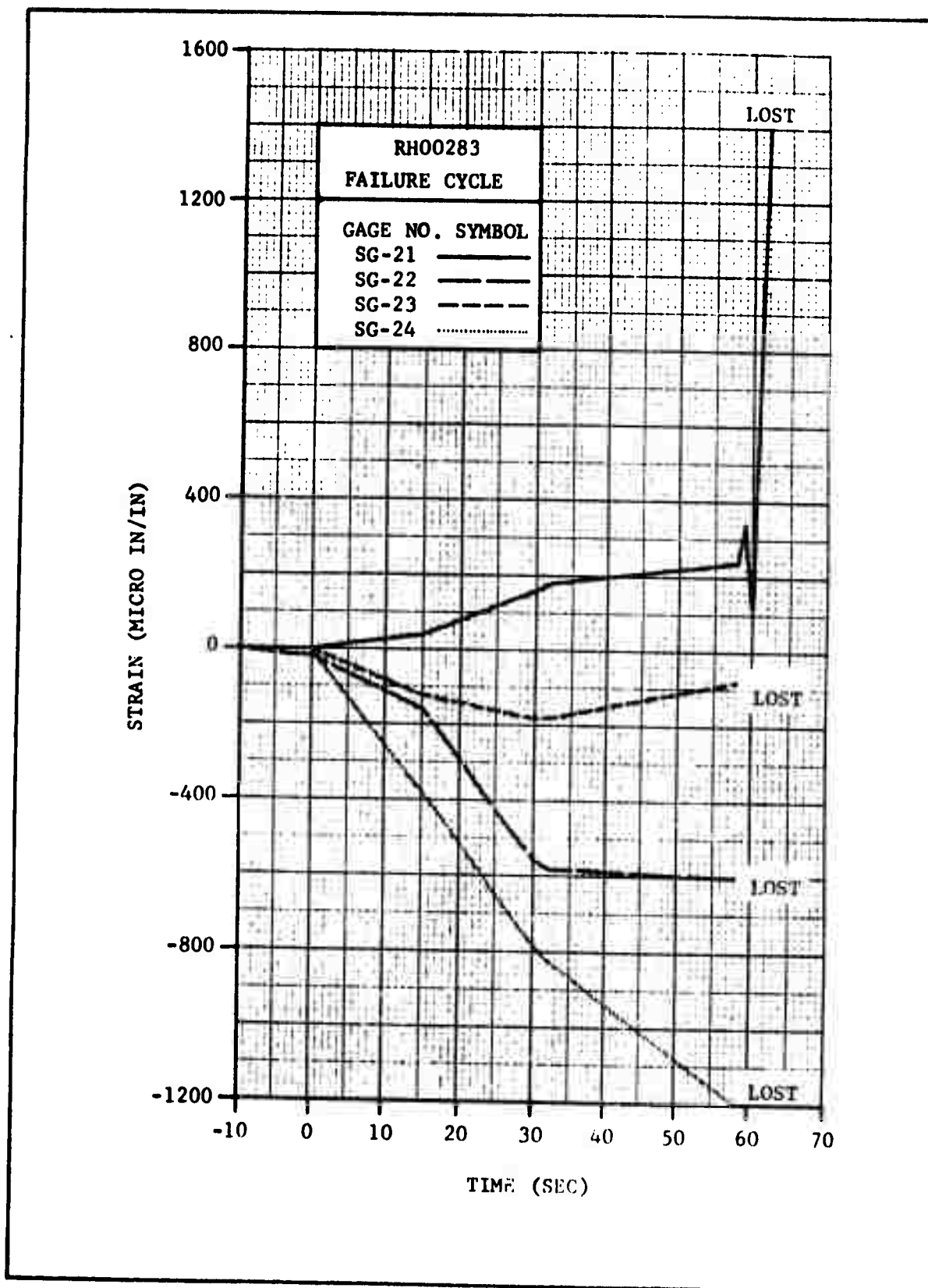


FIGURE 68 Strain Versus Time, Phase III, RH00283 Gages 21, 22, 23 and 24

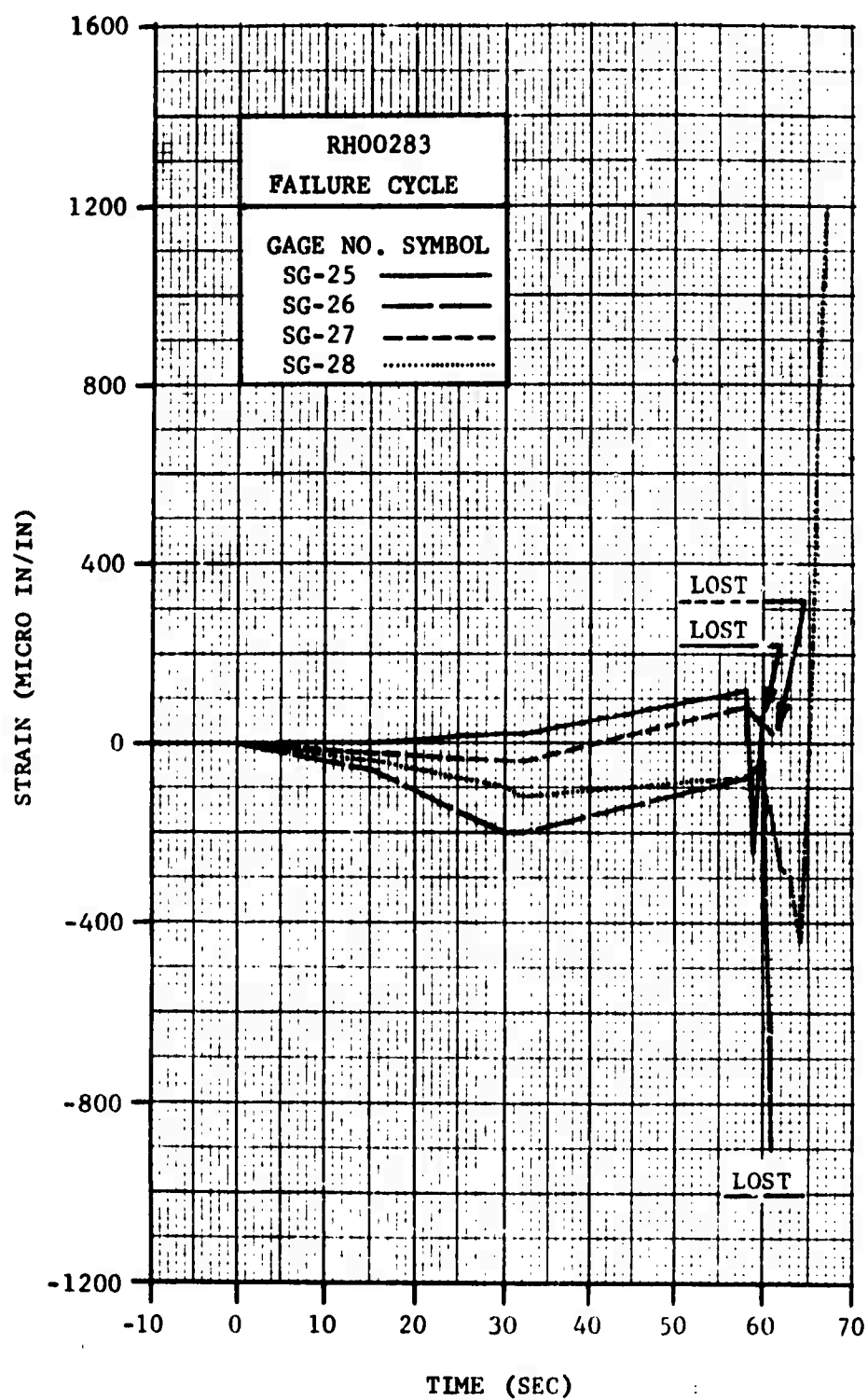


FIGURE 69

Strain Versus Time, Phase IIT, RH00283
Gages 25, 26, 27 and 28

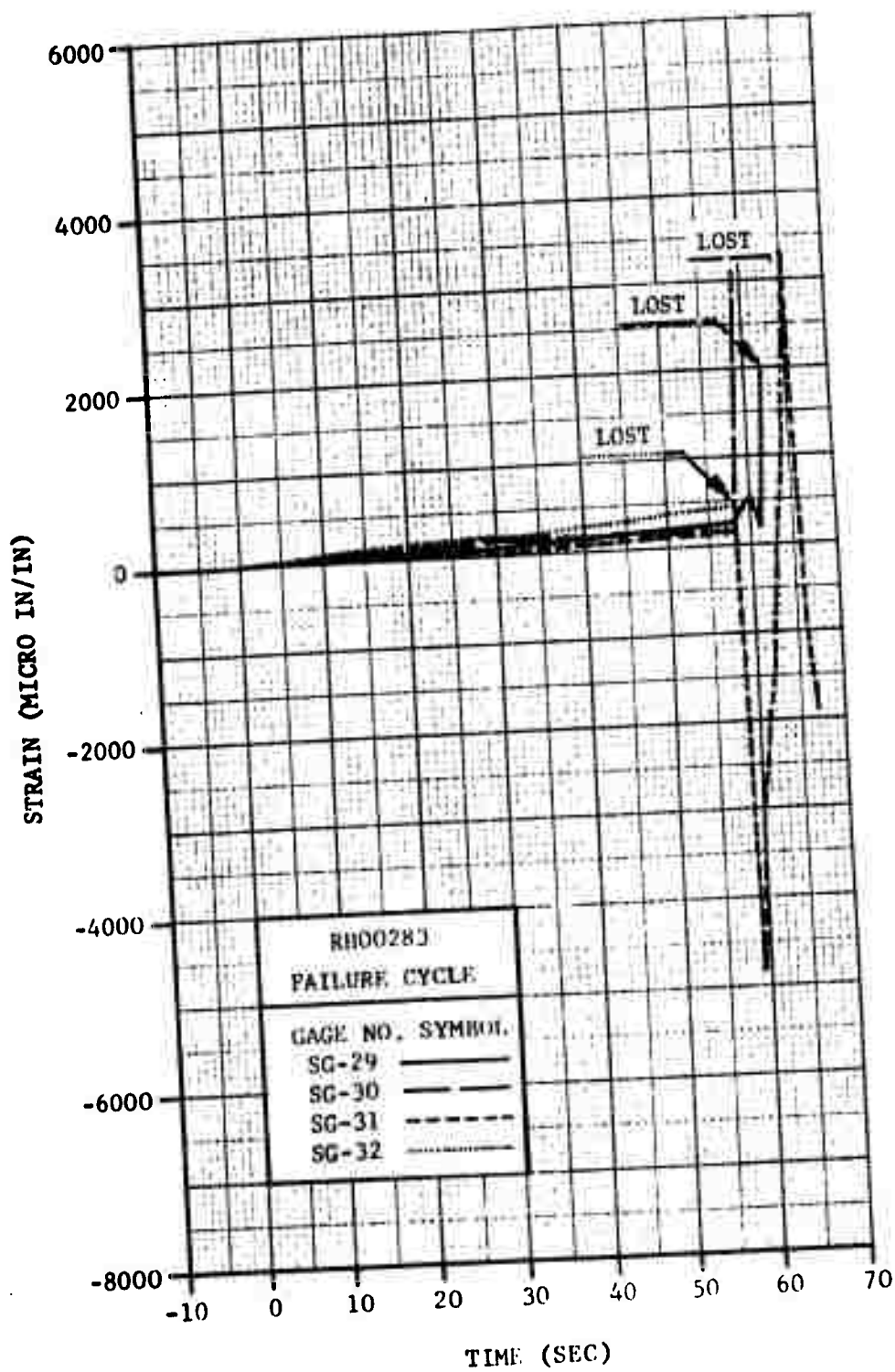


FIGURE 70

Strain Versus Time, Phase III, RH00283
Gages 29, 30, 31 and 32

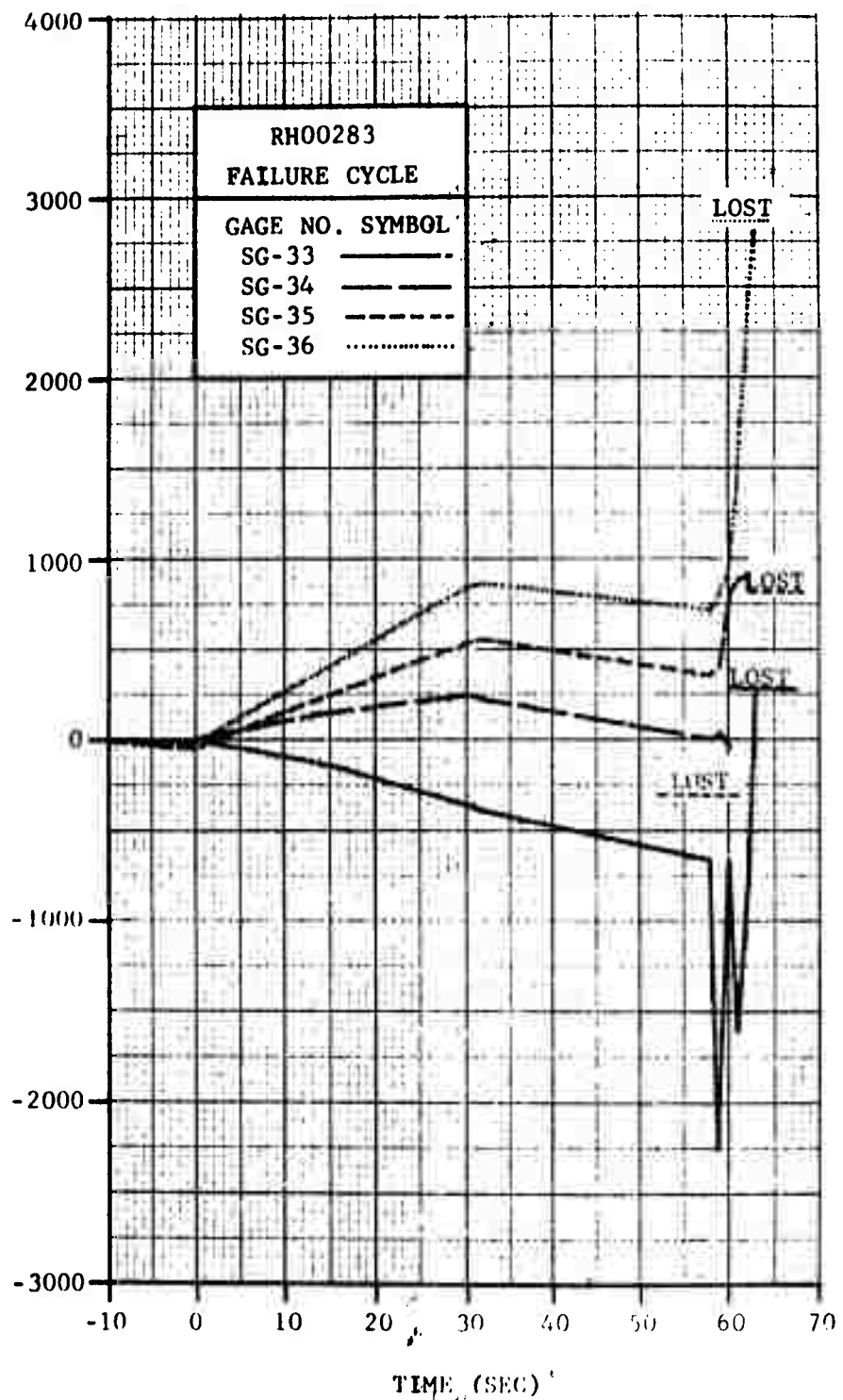


FIGURE 71 Strain Versus Time, Phase III, RH00283
 Gages 33, 34, 35 and 36

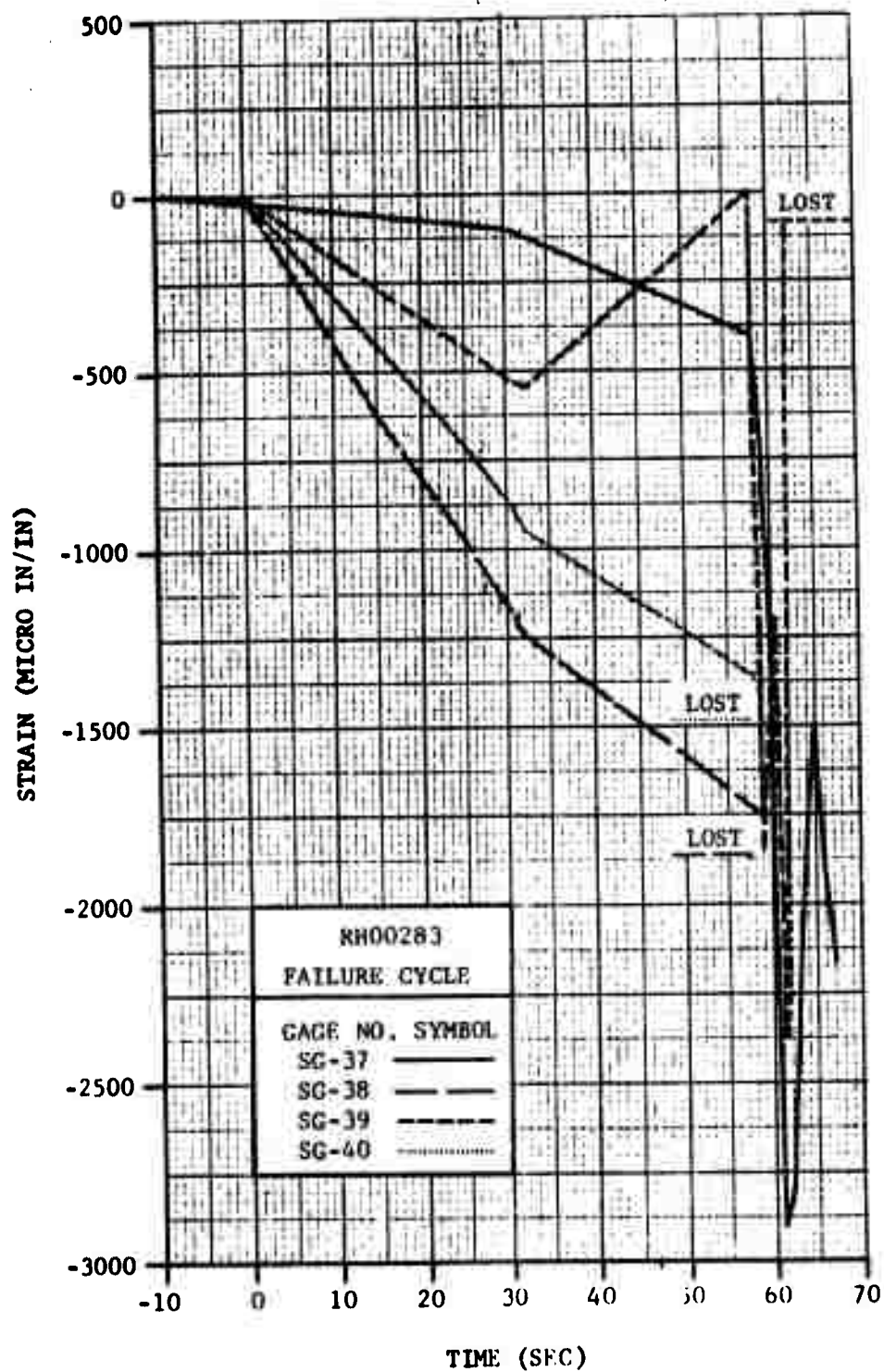


FIGURE 72

Strain Versus Time, Phase III, RH00283
Gages 37, 38, 39 and 40

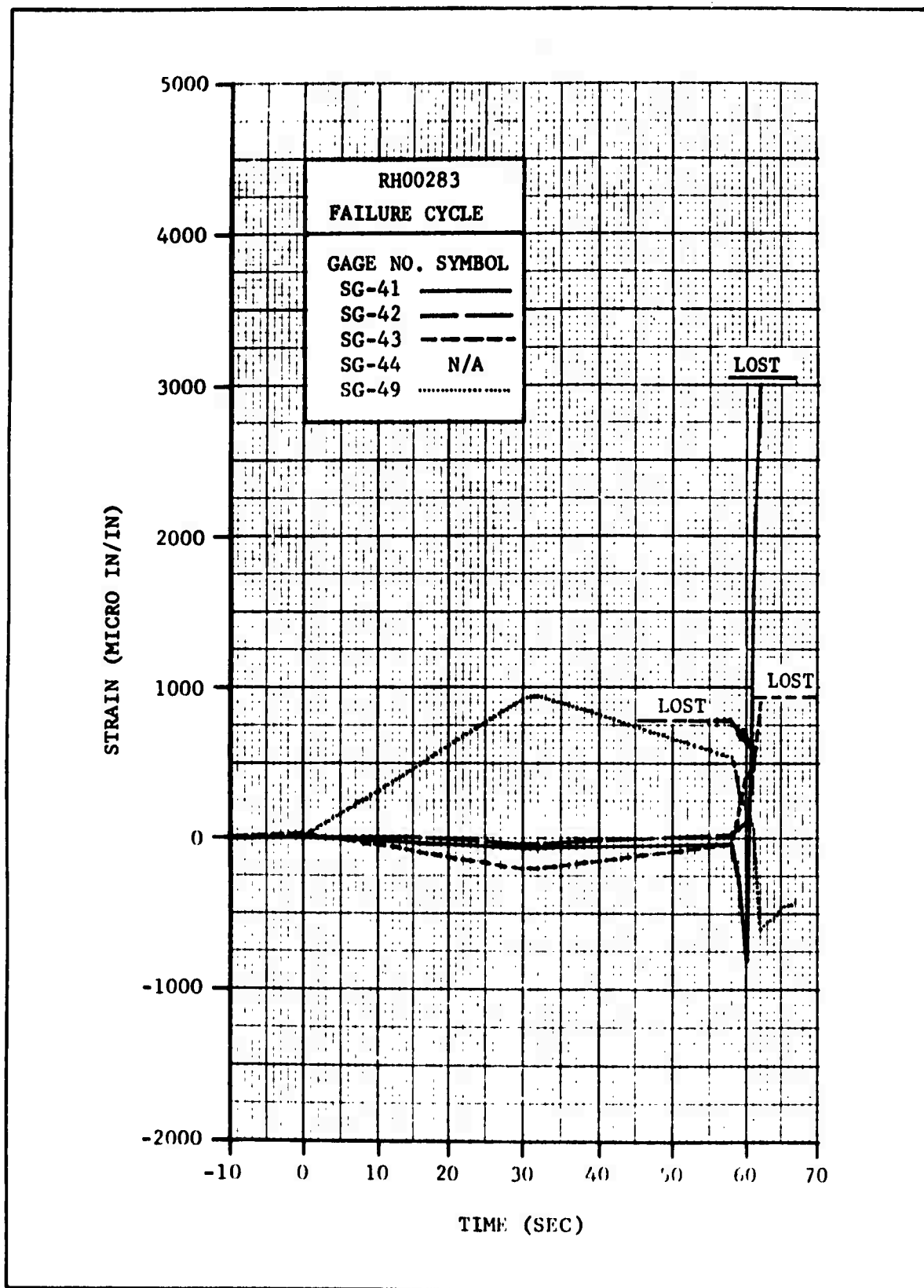


FIGURE 73 Strain Versus Time, Phase III, RH00283
Gages 41, 42, 43, 44 and 49

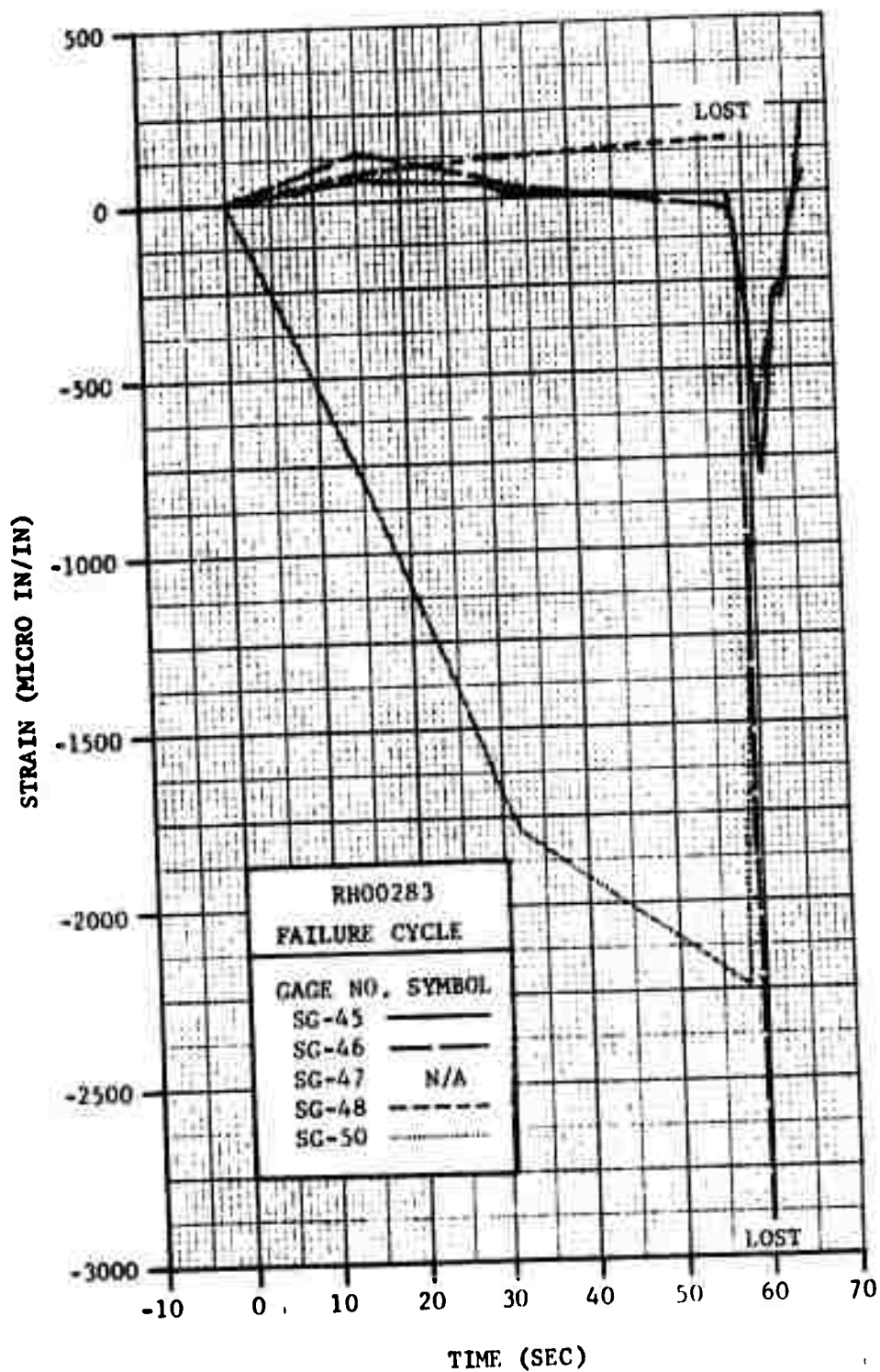


FIGURE 74

Strain Versus Time, Phase III, RH00283
Gages 45, 46, 47, 48 and 50

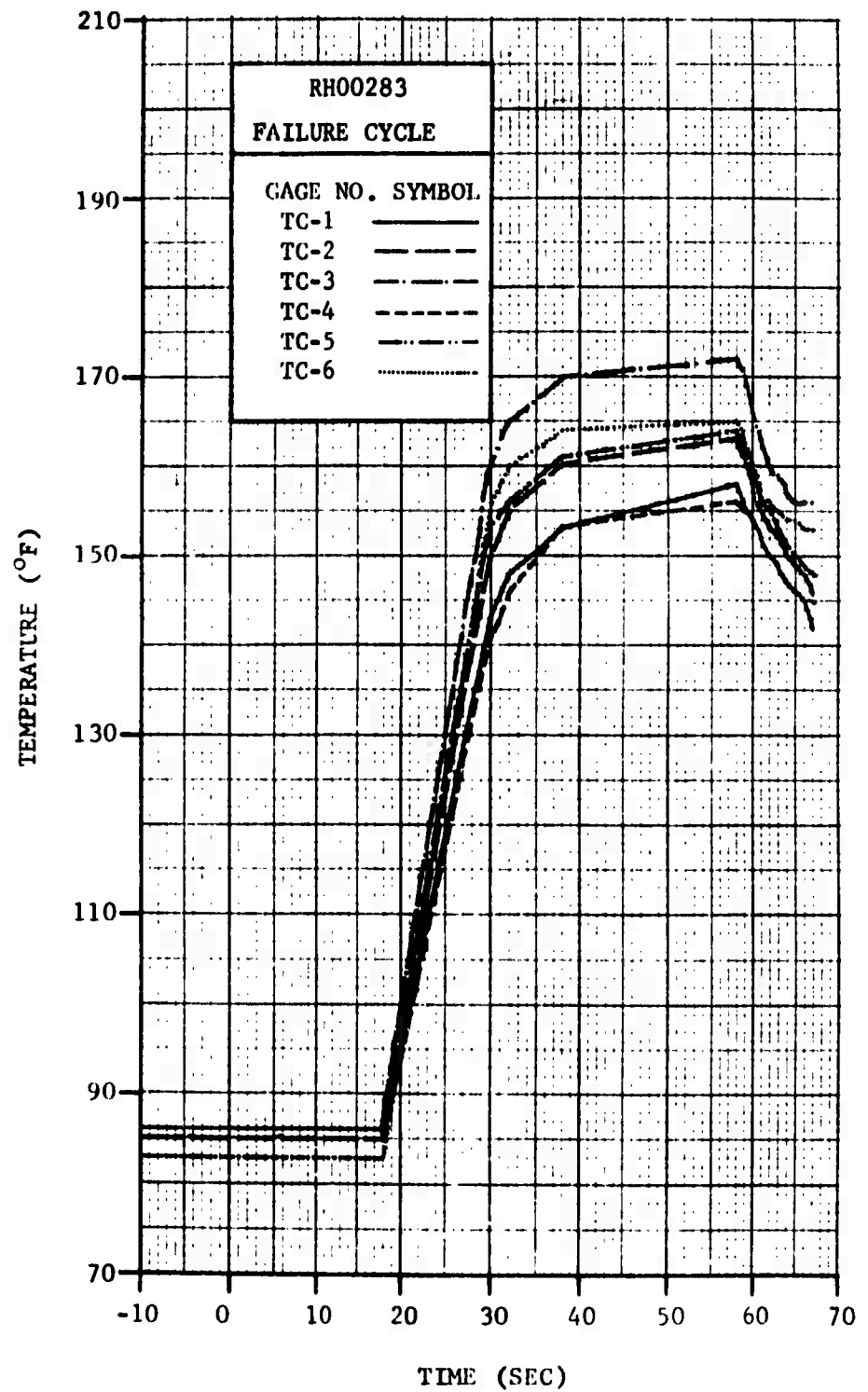


FIGURE 75

Temperature Versus Time, Phase III, RH00283
Gages 1, 2, 3, 4, 5 and 6

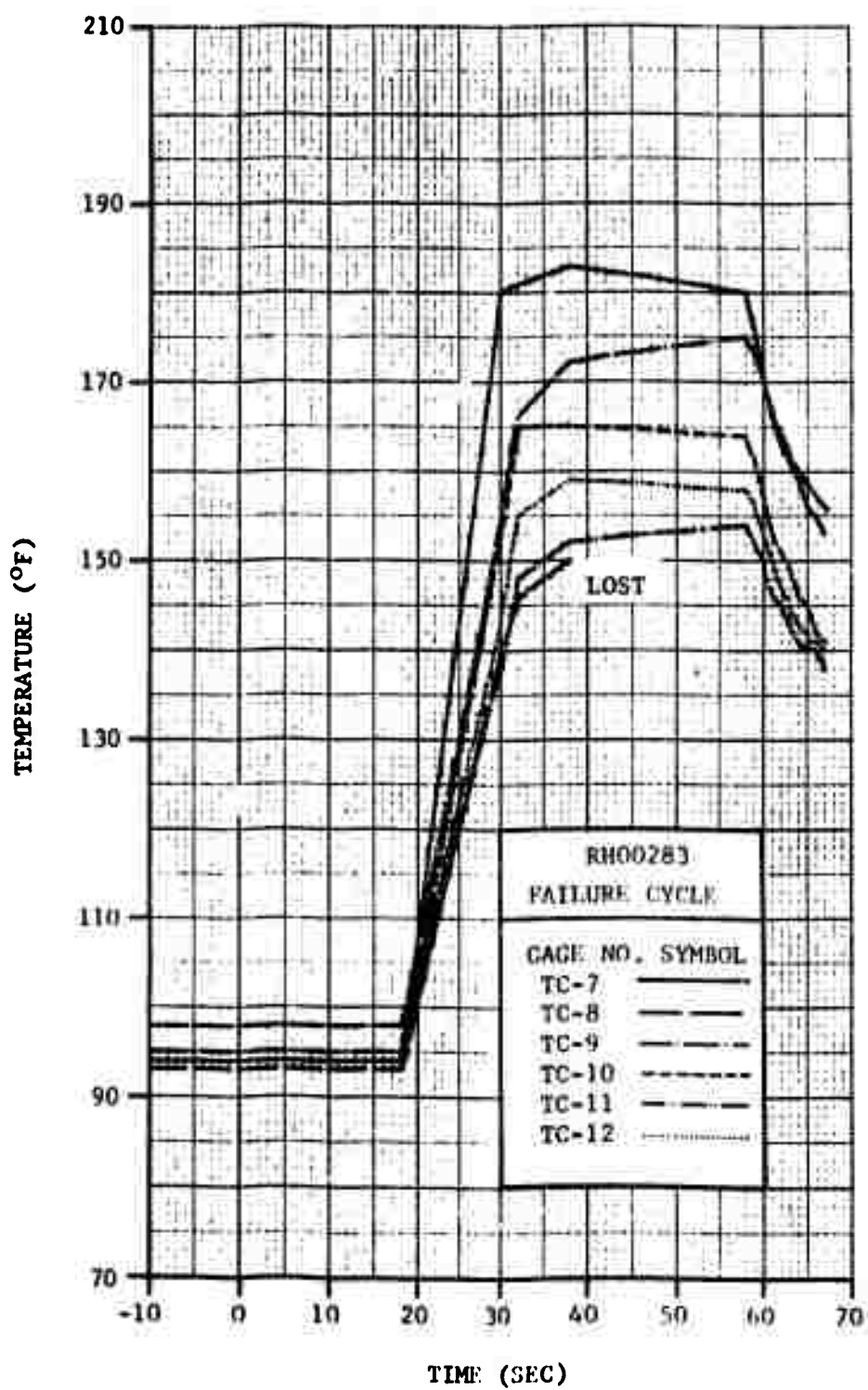


FIGURE 76

Temperature Versus Time, Phase III, RH00283
Gages 7, 8, 9, 10, 11 and 12

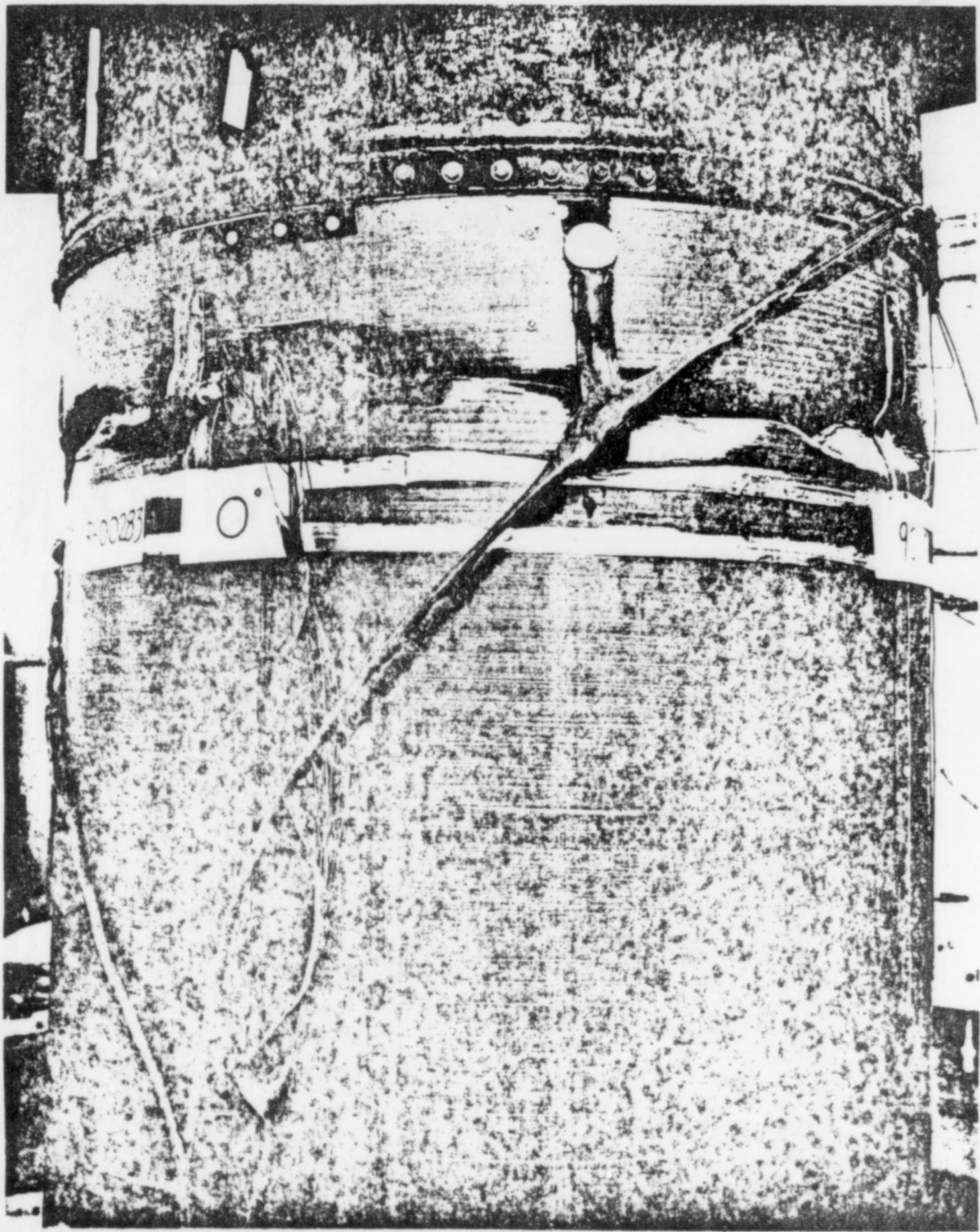


FIGURE 77 Failure Area 0⁰, Phase III, RH00283

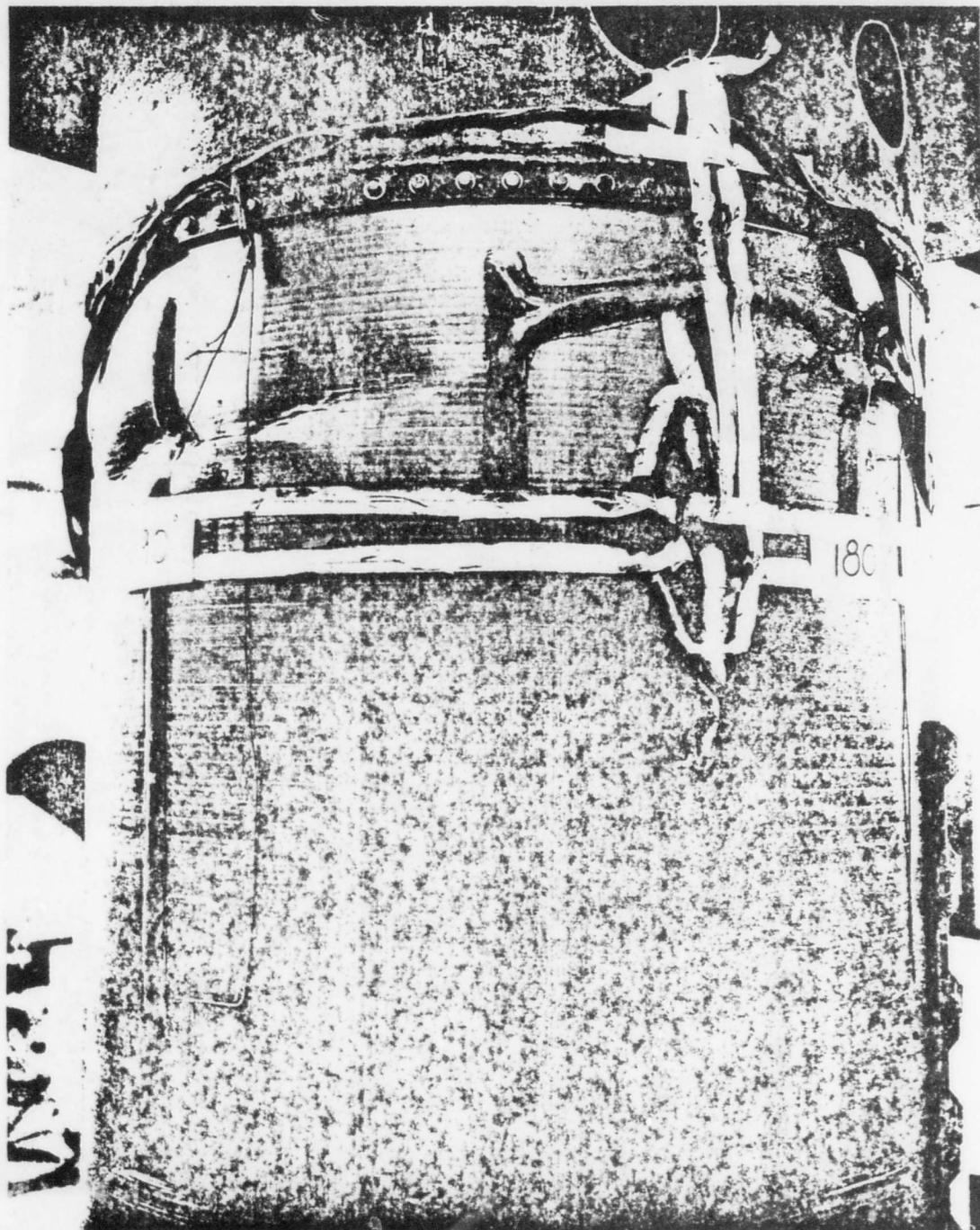


FIGURE 78

Failure Area 90° , Phase III, RH00283

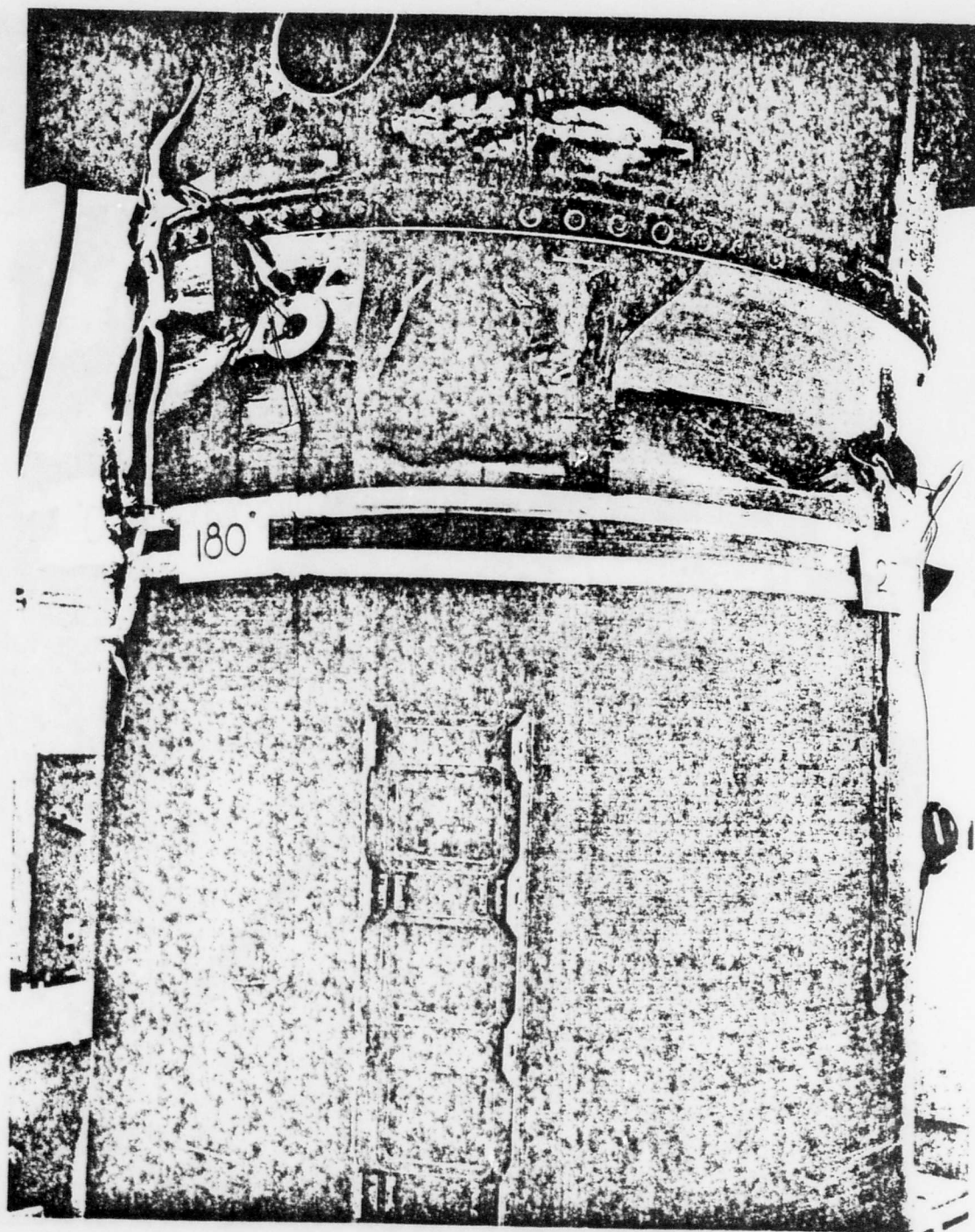


FIGURE 79

Failure Area 180° , Phase III, RH00283

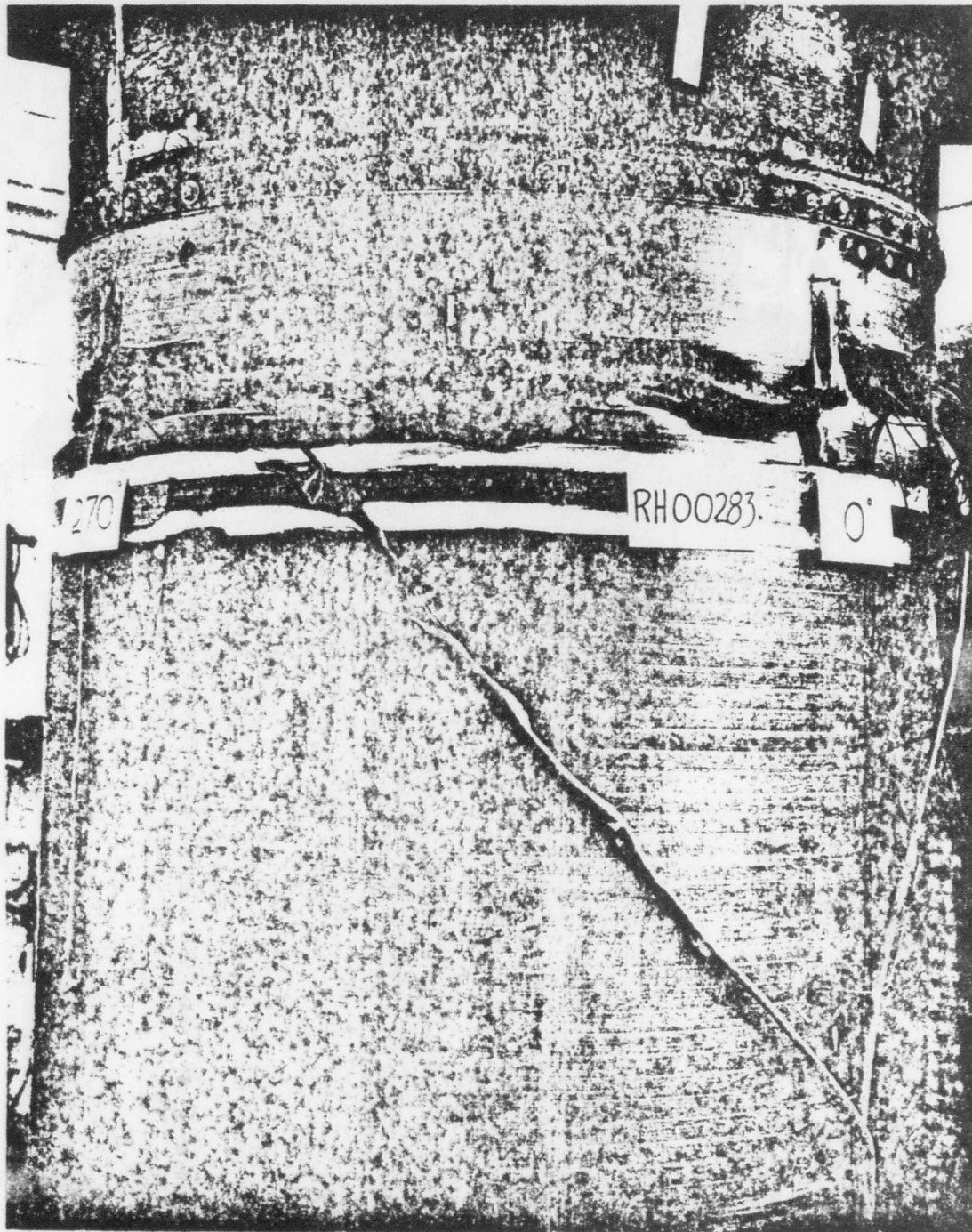


FIGURE 80 Failure Area 270°, Phase III, RH00283

TABLE I
N.C. MACHINE ROVING TENSION CHECK

CHANNEL	METER	BEFORE CUP TENSION	AFTER CUP TENSION	
1	3	3	4.25	FRN 6 and 25% 2 RPM of Mandrel Secs/Rev. = 30
2	3.25	3.5	5	
3	3.25	3.25	4.5	
4	3.25	3.25	5	
7	3.25	3.25	4.75	
8	3.0	3.25	4.5	
11	3.25	3.5	5.5	
12	3	3	4.25	
13	3	3	4.0	
14	3.25	3.5	4.75	
1	3	3	5.00	FRN 6 and 50% 3.2 RPM of Mandrel 18 Secs/Rev.
2	3	3	5.50	
3	3.25	3.25	4.75	
4	3.25	3.25	5.25	
7	3.25	3.25	5.0	
8	3.0	3.25	4.75	
11	3.5	3.5	5.5	
12	3	3.25	4.5	
13	2.75	3	4.25	
14	3.25	3.5	5.25	
1	3.2	3.25	6	FRN 8 and 100% 15 RPM of Mandrel Secs/Rev. = 5/22
2	3.2	3.25	6.5	
3	3.25	3.5	6.25	
4	3.5	3.75	6.75	
7	3.5	3.5	6.5	
8	3.2	3.25	6	
11	3.5	3.75	6.5	
12	3	3.25	6	
13	2.75	3	5.5	
14	3.5	3.5	6.5	
1	3.25	3.5	7.	FRN 12 and 100% 27-1.3 RPM Rev/Sec. = 10/22
2	3.5	4.0	7.5	
3	3.5	3.5	7.0	
4	3.75	4.0	7.5	
7	3.5	3.5	7.0	
8	3.5	3.5	6.5	
11	3.5	4.0	7.0	
12	3.25	3.5	6.75	
13	3	3.25	6.5	
14	3.5	3.75	7.5	

(Cup plug pressure for all tests is 17-3/4 Psig.)

TABLE II

CAM CONTROLLED MACHINE ROVING TENSION CHECK

SPINDLE NUMBER	BETWEEN FAIR LEAD EYE AND CUP		BETWEEN CUP AND UNIT	
	1/2-SPEED RPM:....8	FULL-SPEED RPM:....14	1/2-SPEED RPM:....8	FULL-SPEED RPM:....14
1	4-1/2	3-1/4	4-3/4	5
2	3	3	4	4-3/4
3	2-1/4	2-1/2	3-1/2	3-3/4
4	3	3-1/4	4-3/4	5
5	3-1/2	3-1/2	5-3/4	5-1/2
6	3-1/4	3	4-1/4	4-1/2
7	3-1/4	2-3/4	4-1/4	4-1/4
8	3-1/2	2-3/4	3-1/2	3-1/2
9	2-1/2	2-1/2	4	4
10	3	3	4	4-1/2

TABLE III

FORWARD SKIRT THICKNESS W2SD-14A

SKIRT POSITION DEGREES	Distance from Forward Edge		
	3 INCHES	6 INCHES	9 INCHES
0	.155	.157	.161
15	.154	.157	.160
30	.153	.156	.160
45	.155	.156	.160
60	.153	.158	.163
75	.152	.156	.164
90	.154	.157	.163
105	.153	.156	.164
120	.154	.155	.163
135	.154	.155	.160
150	.153	.156	.160
165	.153	.156	.159
180	.158	.157	.160
195	.152	.152	.157
210	.154	.155	.160
225	.155	.156	.160
240	.156	.156	.165
255	.156	.156	.161
270	.157	.155	.160
285	.154	.155	.160
300	.155	.154	.161
315	.155	.154	.161
330	.156	.157	.162
345	.156	.155	.161

TABLE IV

FORWARD SKIRT THICKNESS RH00283

SKIRT POSITION DEGREES	Distance from Forward Edge		
	3 INCHES	6 INCHES	8.750
0	0.157	0.156	0.157
15	0.158	0.154	0.155
30	0.159	0.154	0.155
45	0.157	0.152	0.154
60	0.158	0.154	0.156
75	0.157	0.152	0.153
90	0.155	0.153	0.153
105	0.155	0.154	0.152
120	0.157	0.153	0.152
135	0.155	0.152	0.151
150	0.154	0.156	0.154
165	0.156	0.153	0.155
180	0.155	0.153	0.153
195	0.153	0.152	0.149
210	0.152	0.152	0.152
225	0.157	0.154	0.153
240	0.164	0.160	0.162
255	0.155	0.151	0.153
270	0.158	0.153	0.154
285	0.156	0.153	0.152
300	0.157	0.153	0.153
315	0.155	0.152	0.155
330	0.158	0.153	0.154
345	0.157	0.155	0.157

TABLE V
W2SD-14A PHASE I
STRAIN AND DEFLECTION

GAGE NO.	TIME (SEC.)							
	0	10	13	15	20	30	40	60
RAM LOADS (POUNDS)								
P1	0	4352	5548	6174	8649	12238	12283	1150
P2	0	820	1060	1428	1640	2516	2535	276
P3	0	2492	3091	4153	5051	7490	7527	133
STRAIN (MICRO IN/IN)								
SG-1	0	- 40	- 30	- 20	- 50	0	20	- 20
SG-2	0	- 20	- 30	- 40	- 40	- 80	- 80	- 70
SG-3	0	- 10	- 10	0	30	80	110	20
SG-4	0	- 20	- 20	- 30	- 40	- 60	- 70	- 40
SG-5	0	60	80	130	230	360	400	130
SG-6	0	- 20	- 30	- 40	- 50	- 80	- 80	- 30
SG-7	0	70	100	170	280	400	420	20
SG-8	0	- 20	- 20	- 30	- 70	- 80	- 100	- 20
SG-9	0	70	100	160	230	350	400	160
SG-10	0	0	0	0	- 10	- 20	- 30	- 10
SG-11	0	0	10	40	20	40	60	- 70
SG-12	0	- 10	- 20	- 30	- 40	- 70	- 70	30
SG-13	0	- 50	- 90	- 140	- 240	- 340	- 340	- 130
SG-14	0	30	20	10	- 10	- 40	- 50	20
SG-15	0	- 130	- 180	- 260	- 350	- 500	- 530	30
SG-16	0	20	40	70	80	120	120	- 20
SG-17	0	- 80	- 120	- 170	- 230	- 370	- 380	- 20
SG-18	0	- 10	- 10	- 20	- 20	- 20	- 10	0
SG-19	0	- 130	- 180	- 260	- 360	- 610	- 670	- 180
SG-20	0	30	40	50	60	120	120	30
SG-21	0	- 10	- 140	- 180	- 280	- 420	- 430	- 200

(-) Negative Sign Indicates Compression

TABLE V (Cont.)
W88-14A PHASE I
STRAIN AND DEFLECTION

GAGE NO.	TIME (SEC.)							
	0	10	13	15	20	30	40	60
STRAIN (MICRO IN/IN)								
SG-22	0	60	60	70	90	130	130	100
SG-23	0	- 80	- 100	- 130	- 190	- 280	- 280	- 120
SG-24	0	40	60	80	120	140	130	80
SG-25	0	- 30	- 30	- 50	- 70	- 110	- 110	- 30
SG-26	0	- 20	0	10	30	130	170	30
DEFLECTION (INCHES)								
ED1-1	0	-.0002	-.0006	-.0006	-.0012	-.0010	-.0010	-.0004
ED1-2	0	.0012	.0014	.0026	.0040	.0044	.0046	.0015
ED1-3	0	-.0012	-.0016	-.0020	-.0028	-.0036	-.0036	-.0015
ED1-4	0	-.0024	-.0034	-.0054	-.0072	-.0112	-.0114	-.0004

(-) Negative Sign Indicates Compression

TABLE VI
W2SD-14A PHASE II
STRAIN AND DEFLECTION

GAGE NO.	TIME (SEC.)														AXIAL LOAD (POUNDS)														OVERPRESSURE (PSIG)														STRAIN (MICRO IN/IN)													
	0	3	5	6	8	10	18	19	20	40	60	80	84	85																																										
AXIAL	0	755	828	3003	2413	5250	6356	6724	7092	15013	22382	29936	31317	31778																																										
O.P.	0	.60	4.01	6.02	6.22	9.03	10.84	11.44	20.27	30.11	30.11	29.90	29.90	29.90																																										
SG-1	0	10	30	70	80	30	30	40	50	70	100	100	100	100																																										
SG-2	0	- 30	- 170	- 320	- 370	- 370	- 580	- 670	- 720	- 1400	- 2220	- 2230	- 2200	- 2200																																										
SG-3	0	0	20	60	80	30	50	70	80	80	130	120	120	110																																										
SG-4	0	- 10	- 100	- 200	- 280	- 280	- 430	- 510	- 570	- 1100	- 1760	- 1770	- 1740	- 1730																																										
SG-5	0	20	60	100	140	80	70	80	80	60	30	- 10	- 120	- 130																																										
SG-6	0	- 30	- 120	- 260	- 300	- 300	- 470	- 550	- 580	- 1100	- 1780	- 1880	- 1870	- 1870																																										
SG-7	0	0	10	50	100	0	- 20	- 20	- 20	- 80	- 140	- 300	- 330	- 340																																										
SG-8	0	- 50	- 170	- 300	- 370	- 360	- 540	- 650	- 670	- 1270	- 2130	- 2330	- 2330	- 2340																																										
SG-9	0	0	30	80	100	0	- 10	- 10	- 10	- 60	- 130	- 350	- 400	- 420																																										
SG-10	0	- 40	- 170	- 300	- 300	- 290	- 430	- 530	- 540	- 1030	- 1670	- 1790	- 1790	- 1800																																										
SG-11	0	10	30	80	90	30	40	50	60	60	60	- 30	- 40	- 50																																										
SG-12	0	- 30	- 150	- 270	- 280	- 290	- 450	- 540	- 550	- 1080	- 1770	- 1830	- 1810	- 1820																																										
SG-13	0	10	30	30	40	10	20	30	30	20	10	0	0	- 10																																										
SG-14	0	- 50	- 160	- 320	- 340	- 350	- 560	- 670	- 690	- 1330	- 2100	- 2140	- 2130	- 2120																																										

(-) Negative Sign Indicates Compression

TABLE VI (Cont.)
WESD-14A PHASE II
STRAIN AND DEFLECTIONS

GAGE NO.	TIME (SEC.)															
	86	87	88	89	90	100	103	104	105	107	108	109	120	126		
AXIAL LOAD (POUNDS)																
AXIAL	32239	32606	32883	33067	33520	37305	38318	38594	39177	39884	40621	41173	45042	47216		
OVERPRESSURE (PSIG)																
O.P.	29.90	29.90	29.90	29.90	29.90	30.11	30.11	30.11	29.90	28.70	29.90	30.31	30.11	29.90		
STRAIN (MICRO IN/IN)																
SG-1	100	100	100	100	100	80	80	80	80	70	70	80	70	40		
SG-2	-2200	-2200	-2200	-2200	-2210	-2230	-2260	-2230	-2230	-2110	-2180	-2240	-2200	-2109		
SG-3	100	110	100	100	100	80	70	70	70	20	30	20	30	40		
SG-4	-1720	-1730	-1730	-1740	-1750	-1770	-1780	-1780	-1780	-1670	-1700	-1790	-1580	-1400		
SG-5	-140	-160	-170	-180	-190	-240	-270	-280	-300	-400	-410	-420	-190	0		
SG-6	-1680	-1880	-1900	-1910	-1920	-2070	-2150	-2210	-2290	-2750	-3200	-3650 @ 108.5 Sec.)				
SG-7	-350	-360	-370	-380	-390	-480	-500	-500	-510	-500	-470	-420	-260	-180		
SG-8	-2370	-2400	-2420	-2440	-2450	-2870	-3130	-3350	-3750	(-5350 @ 106 Sec.)						
SG-9	-430	-450	-460	-470	-480	-600	-670	-700	-800	-920	-910	-930	-1080	-1150		
SG-10	-1810	-1830	-1840	-1870	-1900	-2230	-2450	-2650	-3500	-5700	Lost					
SG-11	-60	-70	-80	-80	-90	-120	-160	-170	-210	-310	-400	-440	-460	-430		
SG-12	-1820	-1830	-1840	-1850	-1870	-1980	-2050	-2100	-2280	-2700	-3600	Lost				
SG-13	-10	-10	-10	-10	-20	-20	-10	-20	-20	-20	-20	-20	-30	-30		
SG-14	-2130	-2140	-2130	-2140	-2150	-2170	-2180	-2180	-2160	-2100	-2240	-2230	-2140	-2080		

(-) Negative Sign Indicates Compression

TABLE VI (Cont.)
W2SD-14A PHASE II
STRAIN AND DEFLECTION

GAGE NO.	TIME (SEC.)											
	130	134	140	141	142	143	146	147	147.5	1-8	151	160
												163
												164
AXIAL LOAD (POUNDS)												
AXIAL	48450	49187	51121	51397	51342	51361	53516	53884	53884	53975	54805	58029
												59319
												58950
OVERPRESSURE (PSIG)												
O.P.	29.70	29.50	29.50	29.70	29.13	29.30	30.51	30.11	29.90	29.70	29.50	29.30
												28.50
STRAIN (MICRO IN/IN)												
SG-1	30	30	30	20	10	0	- 30	- 30	- 30	- 30	- 20	- 20
SG-2	-2100	-2080	-2070	-2080	-2100	-2210	-3180	-3100	-3080	-3070	-3150	-3130
SG-3	- 50	- 50	- 70	- 70	- 70	- 80	- 40	- 30	- 30	- 30	0	10
SG-4	-1300	-1200	-1040	-1042	- 980	- 940	- 740	- 650	- 620	- 600	- 540	- 300
SG-5	230	390	830	920	950	1070	1750	1910	1980	2000	2100	2580
SG-6	-3600	-3250	-2080	-1870	-1630	-1440	- 70	260	300	330	480	1230
SG-7	- 50	30	240	280	320	370	580	610	- 400	- 390	- 370	- 190
SG-8	(-5350 # 106 Sec)	Lost	Lost	-----	-----	-----	-----	-----	-----	-----	-----	-----
SG-9	-1170	-1180	-1220	-1220	-1200	-1280	-1230	-1200	-1190	-1130	- 920	- 860
SG-10	Lost	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SG-11	- 420	- 390	- 290	- 270	- 230	- 190	- 40	80	90	100	180	0
SG-12	Lost	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SG-13	- 30	- 30	- 30	- 30	- 30	- 30	- 30	- 30	- 30	- 30	- 30	- 60
SG-14	-2020	-1980	-1880	-1440	-1810	-1780	-1750	-1690	-1680	-1600	-1300	-1230
												- 210

(-) Negative Sign Indicates Compression

TABLE VI (Cont.)
W2SD-14A PHASE II
STRAIN AND DEFLECTIONS

GAGE NO.	TIME (SEC.)													
	164.5	165	165.5	166	166.5	167	167.5	168	168.5	169	169.5	170	170.5	171
AXIAL LOAD (POUNDS)														
AXIAL	59595	60055	60240	60320	60056	59871	44950	51029	40436	39975	42370	45963	40897	41634
OVERPRESSURE (PSIG)														
O.P.	28.30	28.70	29.10	29.70	20.07	13.05	3.61	2.41	2.41	3.01	3.21	3.61	3.41	3.21
STRAIN (MICRO IN/IN)														
SG-1	0	0	10	20	- 20	- 120	- 200	750	800	850	700	- 200	- 2300	- 30
SG-2	- 2930	- 2970	- 3060	- 3120	- 2500	- 1250	- 270	- 50	320	500	700	830	Lost	-----
SG-3	- 10	- 20	0	30	- 80	- 900	- 1300	- 3750	- 2350	- 1800	- 1150	- 550	- 150	400
SG-4	- 150	- 120	- 80	- 30	60	600	1700	400	1500	1400	1100	700	50	- 1200
SG-5	3050	3160	3250	3400	3530	3620	3400	4500	5550	Lost	-----			
SG-6	1820	1980	2140	2320	2550	420	- 500	- 400	- 550	800	1300	1800	1900	- 700
SG-7	- 280	- 250	- 220	- 200	- 180	C	- 2000	- 2010	- 1100	- 650	- 480	- 600	- 700	- 900
SG-8	Lost	-----												
SG-9	Lost	-----												
SG-10	Lost	-----												
SG-11	180	230	200	- 3200	100	Lost	-----							
SG-12	Lost	-----												
SG-13	- 90	- 100	- 1050	- 2300	900	- 1220	- 1300	- 1300	- 1300	- 1230	- 1220	- 1140	- 1160	- 1240
SG-14	- 1200	- 420	- 1400	260	270	- 500	- 1500	- 1700	- 2200	- 2220	- 22.6	- 22.40	- 22.40	- 22.40

(-) Negative Sign Indicates Compression

TABLE VI (Cont.)
W2SD-14A PHASE II
STRAIN AND DEFLECTIONS

GAGE NO.	TIME (SEC.)											STRAIN (MICRO IN/IN)											DEFLECTION (INCHES)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	0	3	5	6	8	10	18	19	20	40	60	80	84	85	0	20	50	10	20	30	50	70	90	110	130	150	170	190	210	230	250	270	290	310	330	350	370	390	410	430	450	470	490	510	530	550	570	590	610	630	650	670	690	710	730	750	770	790	810	830	850	870	890	910	930	950	970	990	1010	1030	1050	1070	1090	1110	1130	1150	1170	1190	1210	1230	1250	1270	1290	1310	1330	1350	1370	1390	1410	1430	1450	1470	1490	1510	1530	1550	1570	1590	1610	1630	1650	1670	1690	1710	1730	1750	1770	1790	1810	1830	1850	1870	1890	1910	1930	1950	1970	1990	2010	2030	2050	2070	2090	2110	2130	2150	2170	2190	2210	2230	2250	2270	2290	2310	2330	2350	2370	2390	2410	2430	2450	2470	2490	2510	2530	2550	2570	2590	2610	2630	2650	2670	2690	2710	2730	2750	2770	2790	2810	2830	2850	2870	2890	2910	2930	2950	2970	2990	3010	3030	3050	3070	3090	3110	3130	3150	3170	3190	3210	3230	3250	3270	3290	3310	3330	3350	3370	3390	3410	3430	3450	3470	3490	3510	3530	3550	3570	3590	3610	3630	3650	3670	3690	3710	3730	3750	3770	3790	3810	3830	3850	3870	3890	3910	3930	3950	3970	3990	4010	4030	4050	4070	4090	4110	4130	4150	4170	4190	4210	4230	4250	4270	4290	4310	4330	4350	4370	4390	4410	4430	4450	4470	4490	4510	4530	4550	4570	4590	4610	4630	4650	4670	4690	4710	4730	4750	4770	4790	4810	4830	4850	4870	4890	4910	4930	4950	4970	4990	5010	5030	5050	5070	5090	5110	5130	5150	5170	5190	5210	5230	5250	5270	5290	5310	5330	5350	5370	5390	5410	5430	5450	5470	5490	5510	5530	5550	5570	5590	5610	5630	5650	5670	5690	5710	5730	5750	5770	5790	5810	5830	5850	5870	5890	5910	5930	5950	5970	5990	6010	6030	6050	6070	6090	6110	6130	6150	6170	6190	6210	6230	6250	6270	6290	6310	6330	6350	6370	6390	6410	6430	6450	6470	6490	6510	6530	6550	6570	6590	6610	6630	6650	6670	6690	6710	6730	6750	6770	6790	6810	6830	6850	6870	6890	6910	6930	6950	6970	6990	7010	7030	7050	7070	7090	7110	7130	7150	7170	7190	7210	7230	7250	7270	7290	7310	7330	7350	7370	7390	7410	7430	7450	7470	7490	7510	7530	7550	7570	7590	7610	7630	7650	7670	7690	7710	7730	7750	7770	7790	7810	7830	7850	7870	7890	7910	7930	7950	7970	7990	8010	8030	8050	8070	8090	8110	8130	8150	8170	8190	8210	8230	8250	8270	8290	8310	8330	8350	8370	8390	8410	8430	8450	8470	8490	8510	8530	8550	8570	8590	8610	8630	8650	8670	8690	8710	8730	8750	8770	8790	8810	8830	8850	8870	8890	8910	8930	8950	8970	8990	9010	9030	9050	9070	9090	9110	9130	9150	9170	9190	9210	9230	9250	9270	9290	9310	9330	9350	9370	9390	9410	9430	9450	9470	9490	9510	9530	9550	9570	9590	9610	9630	9650	9670	9690	9710	9730	9750	9770	9790	9810	9830	9850	9870	9890	9910	9930	9950	9970	9990	10010	10030	10050	10070	10090	10110	10130	10150	10170	10190	10210	10230	10250	10270	10290	10310	10330	10350	10370	10390	10410	10430	10450	10470	10490	10510	10530	10550	10570	10590	10610	10630	10650	10670	10690	10710	10730	10750	10770	10790	10810	10830	10850	10870	10890	10910	10930	10950	10970	10990	11010	11030	11050	11070	11090	11110	11130	11150	11170	11190	11210	11230	11250	11270	11290	11310	11330	11350	11370	11390	11410	11430	11450	11470	11490	11510	11530	11550	11570	11590	11610	11630	11650	11670	11690	11710	11730	11750	11770	11790	11810	11830	11850	11870	11890	11910	11930	11950	11970	11990	12010	12030	12050	12070	12090	12110	12130	12150	12170	12190	12210	12230	12250	12270	12290	12310	12330	12350	12370	12390	12410	12430	12450	12470	12490	12510	12530	12550	12570	12590	12610	12630	12650	12670	12690	12710	12730	12750	12770	12790	12810	12830	12850	12870	12890	12910	12930	12950	12970	12990	13010	13030	13050	13070	13090	13110	13130	13150	13170	13190	13210	13230	13250	13270	13290	13310	13330	13350	13370	13390	13410	13430	13450	13470	13490	13510	13530	13550	13570	13590	13610	13630	13650	13670	13690	13710	13730	13750	13770	13790	13810	13830	13850	13870	13890	13910	13930	13950	13970	13990	14010	14030	14050	14070	14090	14110	14130	14150	14170	14190	14210	14230	14250	14270	14290	14310	14330	14350	14370	14390	14410	14430	14450	14470	14490	14510	14530	14550	14570	14590	14610	14630	14650	14670	14690	14710	14730	14750	14770	14790	14810	14830	14850	14870	14890	14910	14930	14950	14970	14990	15010	15030	15050	15070	15090	15110	15130	15150	15170	15190	15210	15230	15250	15270	15290	15310	15330	15350	15370	15390	15410	15430	15450	15470	15490	15510	15530	15550	15570	15590	15610	15630	15650	15670	15690	15710	15730	15750	15770	15790	15810	15830	15850	15870	15890	15910	15930	15950	15970	15990	16010	16030	16050	16070	16090	16110	16130	16150	16170	16190	16210	16230	16250	16270	16290	16310	16330	16350	16370	16390	16410	16430	16450	16470	16490	16510	16530	16550	16570	16590	16610	16630	16650	16670	16690	16710	16730	16750	16770	16790	16810	16830	16850	16870	16890	16910	16930	16950	16970	16990	17010	17030	17050	17070	17090	17110	17130	17150	17170	17190	17210	17230	17250	17270	17290	17310	17330	17350	17370	17390	17410	17430	17450	17470	17490	17510	17530	17550	17570	17590	17610	17630	17650	17670	17690	17710	17730	17750	17770	17790	17810	17830	17850	17870	17890	17910	17930	17950	17970	17990	18010	18030	18050	18070	18090	18110	18130	18150	18170	18190	18210	18230	18250	18270	18290	18310	18330	18350	18370	18390	18410	18430	18450	18470	18490	18510	18530	18550	18570	18590	18610	18630	18650	18670	18690	18710	18730	18750	18770	18790	18810	18830	18850	18870	18890	18910	18930	18950	18970	18990	19010	19030	19050	19070	19090	19110	19130	19150	19170	19190	19210	19230	19250	19270	19290	19310	19330	19350	19370	19390	19410	19430	19450	19470	19490	19510	19530	19550	19570	19590	19610	19630	19650	19670	19690	19710	19730	19750	19770	19790	19810	19830	19850	19870	19890	19910	19930	19950	19970	19990	20010	20030	20050	20070	20090	20110	20130	20150	20170	20190	20210	20230	20250	20270	20290	20310	20330	20350	20370	20390	20410	20430	20450	20470	20490	20510	20530	20550	20570	20590	20610	20630	20650	20670	20690	20710	20730	20750	20770	20790	20810	20830	20850	20870	20890	20910	20930	20950	20970	20990	21010	21030	21050	21070	21090	21110	21130	21150	21170	21190	21210	21230	21250	21270	21290	21310	21330	21350	21370	21390	21410	21430	21450	21470	21490	21510	21530	21550	21570	21590	21610	21630	21650	21670	21690	21710	21730	21750	21770	21790	21810	21830	21850	21870	21890	21910	21930	21950	21970	21990	22010	22030	22050	22070	22090	22110	22130	22150	22170	22190	22210	22230	22250	22270	22290	22310	22330	22350	22370	22390	22410	22430	22450	22470	22490	22510	22530	22550	22570	22590	22610	22630	22650	22670	22690	22710	22730	22750	22770	22790	22810	22830	22850	22870	22890	22910	22930	22950	22970	22990	23010	23030	23050	23070	23090	23110	23130	23150	23170	23190	23210	23230	23250	23270	23290	23310	23330	23350	23370	23390	23410	23430	23450	23470	23490	23510	23530	23550	23570	23590	23610	23630	23650	23670	23690	23710	23730	23750	23770	23790	23810	23830	23850	23870	23890	23910	23930	23950	23970	23990	24010	24030	24050	24070	24090	24110	24130	24150	24170	24190	24210	24230	24250	24270	24290	24310	24330	24350	24370	24390	24410	24430	24450	24470	24490	24510	24530	24550	24570	24590	24610	24630	24650	24670	24690	24710	24730	24750	24770	24790	24810	24830	24850	24870	24890	24910	24930	24950	24970	24990	25010	25030	25050	25070	25090	25110	25130	25150	25170	25190	25210	25230	25250	25270	25290	25310	25330	25350	25370	25390	25410	25430	25450	25470	25490

(-) Negative Sign Indicates Compression

TABLE VI (Cont.)
WISD-16A PHASE II
STRAIN AND DEFLECTIONS

GAGE NO.	TIME (SEC.)															
	86	87	88	89	90	100	103	104	105	107	108	109	120	126		
STRAIN (MICRO IN/IN)																
SG-15	- 80	- 100	- 100	- 100	- 110	- 130	- 140	- 160	- 180	- 220	- 180	- 190	- 200	- 220		
SG-16	- 940	- 940	- 940	- 940	- 930	- 920	- 920	- 920	- 910	- 880	- 900	- 900	- 840	- 820		
SG-17	- 200	- 200	- 210	- 210	- 220	- 260	- 280	- 280	- 290	- 300	- 310	- 310	- 340	- 370		
SG-18	-2180	-2180	-2190	-2200	-2210	-2290	-2320	-2330	-2320	-2220	-2330	-2400	-2500	-2510		
SG-19	- 290	- 310	- 320	- 320	- 330	- 430	- 440	- 460	- 480	- 490	- 500	- 510	- 580	- 630		
SG-20	-1560	-1560	-1560	-1570	-1580	-1620	-1630	-1630	-1630	-1530	-1580	-1680	-1770	-1740		
SG-21	- 30	- 30	- 30	- 30	- 30	- 70	- 80	- 80	- 80	- 90	- 80	- 80	- 120	- 180		
SG-22	-1580	-1580	-1580	-1590	-1600	-1620	-1620	-1620	-1610	-1510	-1560	-1620	-1620	-1580		
SG-23	- 440	- 450	- 450	- 460	- 460	- 480	- 490	- 490	- 490	- 510	- 500	- 510	- 570	- 600		
SG-24	- 430	- 430	- 430	- 440	- 440	- 440	- 450	- 450	- 440	- 420	- 430	- 450	- 440	- 430		
SG-25	1470	1470	1470	1480	1480	1500	1500	1500	1490	1460	1480	1500	1520	1500		
SG-26	- 180	- 180	- 180	- 190	- 190	- 200	- 200	- 200	- 200	- 200	- 210	- 220	- 280	- 300		
DEFLECTION (INCHES)																
ED1-1	.0024	.0024	.0024	.0024	.0024	.0020	.0020	.0020	.0020	.0018	.0018	.0020	.0016	.0014		
ED1-2	-.0044	-.0046	-.0048	-.0050	-.0052	-.0076	-.0086	-.0096	-.0110	-.0134	-.0140	-.0194	-.0044	-.0040		
ED1-3	.0042	.0040	.0040	.0040	.0040	.0040	.0040	.0038	.0038	.0038	.0040	.0042	.0044	.0040		
ED1-4	-.0024	-.0024	-.0026	-.0026	-.0026	-.0046	-.0052	-.0054	-.0056	-.0062	-.0062	-.0064	-.0080	-.0044		

(-) Negative Sign Indicates Compression

TABLE VI (Cont.)
N250-14A PHASE II
STRAIN AND DEFLECTIONS

GAGE NO.		TIME (SEC.)														
		130	134	140	141	142	143	146	147	147.5	148	151	160	163	164	
STRAIN (MICRO IN/IN)																
SG-15	- 220	- 210	0	70	1252	1700	2760	2830	2850	2880	3100	3860	4300	4400		
SG-16	- 800	- 790	- 780	- 600	- 280	370	1760	1830	1850	1880	2100	Lost-----				
SG-17	- 370	- 380	- 380	- 370	- 310	- 310	- 150	- 130	- 110	- 100	- 80	100	190	250		
SG-18	-2570	-2560	-2900	-3400	Lost----	-----										
SG-19	- 680	- 690	- 780	- 810	- 940	- 980	-1300	-1370	-1380	-1400	-1490	-1800	-1960	-2000		
SG-20	-1830	-1820	-2040	-2200	-3200	Lost----										
SG-21	- 200	- 220	- 280	- 310	- 380	- 540	- 760	- 740	- 740	- 730	- 730	- 640	- 600	- 600		
SG-22	-1600	-1580	-1650	-1700	-2130	-3100	Lost-----									
SG-23	- 610	- 520	- 660	- 660	- 690	- 710	- 760	- 770	- 780	- 790	- 800	- 840	- 870	- 880		
SG-24	- 420	- 420	- 420	- 410	- 405	- 400	- 410	- 410	- 400	- 400	- 390	- 390	- 380	- 380		
SG-25	1500	1490	1480	1480	1480	1490	1580	1570	1570	1560	1550	1560	1570	1530		
SG-26	- 300	- 310	- 320	- 330	- 350	- 370	- 380	- 390	- 390	- 390	- 400	- 460	- 470	- 480		
DEFLECTION (INCHES)																
ED1-1	.0012	.0010	.0006	.0006	.0006	0	-.0006	-.0006	-.0008	-.0008	-.0010	-.0014	-.0016	-.0014		
ED1-2	Lost----	-----	-----	-----	-----	-----										
ED1-3	.0040	.0040	.0040	.0040	.0038	.0038	.0038	.0040	.0040	.0040	.0038	.0032	.0026	.0022		
ED1-4	-.0094	-.0100	-.0124	-.0160	-.0250	-.0380	-.0540	-.0548	-.0550	-.0552	-.0570	-.0642	-.0676	-.0684		

(-) Negative Sign Indicates Compression

TABLE VI (Cont.)
W2SD-14A PHASE II
STRAIN AND DEFLECTIONS

GAGE NO.	TIME (SEC.)														STRAIN (MICRO IN/IN)													
	164.5	165	165.5	166	166.5	167	167.5	168	168.5	169	169.5	170	170.5	171														
SG-15	4550	4800	4900	4600	4200	4870	4650	4600	4600	Lost	-----	-----	-----	-----														
SG-16	Lost	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----														
SG-17	270	290	310	350	1200	1200	800	400	-1000	Lost	-----	-----	-----	-----														
SG-18	Lost	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----														
SG-19	-2030	-2030	-2060	-2080	-2850	-2750	-2700	-2660	-2500	Lost	-----	-----	-----	-----														
SG-20	Lost	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----														
SG-21	- 600	- 600	- 590	- 550	- 700	-2000	- 900	-3500	Lost	-----	-----	-----	-----	-----														
SG-22	Lost	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----														
SG-23	- 890	- 900	- 900	- 900	-1400	-1420	-2000	-2230	-2350	-2300	-2230	-2150	-2180	-2200														
SG-24	- 380	- 380	- 380	- 380	0	170	600	650	630	500	220	50	- 100	- 100														
SG-25	Lost	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----														
SG-26	- 500	- 600	-2000	Lost	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----														
GAGE NO.	TIME (SEC.)														DEFLECTION (INCHES)													
	164.5	165	165.5	166	166.5	167	167.5	168	168.5	169	169.5	170	170.5	171														
ED1-1	- .0016	- .0014	- .0015	- .0018	- .0019	.0064	.0056	.0022	Lost	-----	-----	-----	-----	-----														
ED1-2	Lost	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----														
ED1-3	.0020	.0022	- .0020	Lost	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----														
ED1-4	.0686	- .0692	- .0700	- .1009	Lost	-----	-----	-----	-----	-----	-----	-----	-----	-----														

(-) Negative Sign Indicates Compression

TABLE VII
RH00283 PHASE I
STRAIN AND DEFLECTIONS

GAGE NO.	TIME (SECONDS)									
	0	10	20	30	40	50	60	65	80	86
AXIAL LOAD (POUNDS)										
AXIAL	0	3730	7424	11266	15200	18968	22496	22404	794	0
OVERPRESSURE (PSIG)										
OVER-PRESSURE	0	5.4	10.2	15.3	20.1	25.1	30.	29.6	2.8	0
STRAIN (MICRO IN/IN)										
SG-1	0	0	14	30	40	60	120	120	20	0
SG-2	0	- 260	- 540	- 780	-1060	-1320	-1560	-1560	- 200	- 60
SG-3	0	0	10	20	40	60	100	100	20	0
SG-4	0	- 240	- 540	- 840	-1160	-1480	-1860	-1840	- 240	- 80
SG-5	0	6	14	26	34	50	60	50	10	0
SG-6	0	- 260	- 520	- 780	-1060	-1380	-1740	-1760	- 220	- 60
SG-7	0	0	- 10	- 20	- 30	- 40	- 40	- 40	0	- 20
SG-8	0	- 240	- 460	- 680	-1060	-1120	-1300	-1280	- 200	- 60
SG-9	0	0	- 20	- 40	- 60	- 80	- 140	- 140	- 60	- 40
SG-10	0	- 240	- 460	- 720	- 940	-1180	-1420	-1440	- 200	- 40
SG-11	0	20	30	40	50	60	50	20	0	- 20
SG-12	0	- 200	- 460	- 720	- 940	-1220	-1540	-1560	- 180	- 40
SG-13	0	10	20	40	50	60	70	66	20	0

(-) Negative Sign Indicates Compression

TABLE VII (Cont.)
RH00283 PHASE I
STRAIN AND DEFLECTIONS

GAGE NO.	TIME (SECONDS)									
	0	10	20	30	40	50	60	65	80	86
STRAIN (MICRO IN/IN)										
SG-14	0	- 260	- 560	- 840	-1140	-1440	-1780	-1780	- 320	- 140
SG-15	0	0	10	14	20	26	40	34	0	- 20
SG-16	0	- 220	- 460	- 700	- 720	-1140	-1360	-1360	- 200	- 80
SG-17	0	0	0	0	0	0	0	0	0	0
SG-18	0	- 280	- 600	- 860	-1160	-1480	-1800	-1800	- 200	- 60
SG-19	0	0	- 20	- 40	- 60	- 80	- 80	- 100	- 40	- 20
SG-20	0	- 240	- 460	- 680	- 880	-1100	-1300	-1280	- 200	- 40
SG-21	0	0	20	40	60	60	80	80	20	0
SG-22	0	- 260	- 540	- 760	-1040	-1320	-1600	-1600	- 240	- 80
SG-23	0	- 140	- 280	- 380	- 480	- 540	- 600	- 600	- 140	- 80
SG-24	0	- 100	- 240	- 380	- 480	- 600	- 720	- 720	- 140	- 60
SG-25	0	100	260	440	600	800	1000	1020	200	60
SG-26	0	60	80	120	140	180	220	200	0	0

(-) Negative Sign Indicates Compression

TABLE VII
RH00283 PHASE II
STRAIN, DEFLECTIONS AND TEMPERATURE

GAGE NO.	TIME (SECONDS)										
	10	20	30	45	60	75	90	105	120	135	150
RAM LOADS (POUNDS)											
P1	0	276	6366	12363	13194	23620	22124	22328	22420	23528	24912
P2	0	644	1565	2671	3684	13815	14459	15933	15657	12526	10131
P3	0	0	3226	7276	7562	7679	8284	7562	7226	4369	1344
STRAIN (MICRO IN/IN)											
SG-1	0	0	20	160	160	120	- 80	-1200	600	- 60	500
SG-2	0	0	100	240	240	80	0	- 100	-1120	-1500	600
SG-3	0	0	400	700	720	440	280	160	240	- 360	1300
SG-4	0	60	140	300	260	- 400	- 640	- 600	- 400	600	860
SG-5	0	0	- 300	- 600	- 640	- 880	-1000	-1200	-2400	-7200	-6200
SG-6	0	- 20	- 180	- 180	- 180	- 280	-1800	-3160	-2580	-2400	-2460
SG-7	0	- 60	- 760	-1460	-1500	-2100	1000	Lost	-----		
SG-8	0	40	- 420	- 700	- 740	- 540	- 200	500	840	440	- 260
SG-9	0	0	- 20	0	0	200	460	2600	1000	1400	1360
SG-10	0	0	0	- 20	- 20	- 80	- 140	- 600	- 940	- 280	700
SG-11	0	0	- 20	- 100	- 80	- 60	- 100	- 140	800	300	260
SG-12	0	0	- 60	- 140	- 140	80	0	- 100	- 200	- 200	100
SG-13	0	0	60	160	180	400	480	560	600	200	-1000
SG-14	0	0	160	200	180	180	1100	1400	840	1080	1120
(-) Negative Sign Indicates Compression											

TABLE VIII (Cont.)
RH0028) PHASE II
STRAIN, DEFLECTIONS AND TEMPERATURE

GAGE NO.	TIME (SECONDS)															STRAIN (MICRO IN/IN)																
	-10	0	15	30	32	58	59	60	61	62	63	64	65	66	67																	
SG-15	0	0	0	140	220	220	260	400	600	2600	3900	2400	1000	900	760	660																
SG-16	0	0	0	160	320	340	960	500	- 80	600	1200	1500	400	100	- 140	- 120																
SG-17	0	0	0	- 20	- 40	- 60	- 120	- 260	Lost	-----																						
SG-18	0	0	0	60	240	240	260	160	0	- 3400	- 1000	2200	Lost	-----																		
SG-19	0	0	0	40	80	80	60	40	60	60	- 800	Lost	-----																			
SG-20	0	0	0	140	360	380	160	60	180	400	800	900	700	2140	1700	1900																
SG-21	0	0	0	40	160	180	220	340	360	120	1400	Lost	-----																			
SG-22	0	- 20	- 160	- 560	- 580	- 580	- 600	Lost	-----																							
SG-23	0	0	- 120	- 180	- 180	- 180	- 80	Lost	-----																							
SG-24	0	0	- 380	- 780	- 820	- 1200	Lost	-----																								
SG-25	0	0	0	20	20	20	120	- 240	60	Lost	-----																					
SG-26	0	0	- 60	- 200	- 200	- 200	- 80	- 60	- 40	- 900	Lost	-----																				
SG-27	0	0	- 20	- 40	- 40	- 40	80	60	40	20	Lost	-----																				
SG-28	0	0	- 40	- 100	- 120	- 120	- 80	- 60	- 80	- 160	- 280	- 300	- 420	0	800	1200																
SG-29	0	0	40	80	100	100	260	400	560	200	2000	Lost	-----																			
SG-30	0	0	80	140	140	140	140	3100	Lost	-----																						
SG-31	0	0	40	40	40	40	140	- 4800	- 3200	- 2100	- 1500	0	1000	3300	- 920	- 1900																
SG-32	0	0	80	180	200	200	420	Lost	-----																							

(-) Negative Sign Indicates Compression

TABLE VIII (Cont.)
RH00283 PHASE II
STRAIN, DEFLECTIONS AND TEMPERATURE

GAGE NO.	TIME (SECONDS)															STRAIN (MICRO IN/IN)									
	-10	0	15	30	32	35	59	60	61	62	63	64	65	66	67										
SG-33	0	0	- 140	- 360	- 390	- 550	-2260	- 660	-1600	- 800	260	Lost	---												
SG-34	0	0	140	240	220	0	40	- 40	Lost	---															
SG-35	0	- 40	240	540	550	550	400	700	860	900	Lost	---													
SG-36	0	- 20	400	840	550	720	620	900	1400	2400	2800	Lost	---												
SG-37	0	- 20	- 60	- 100	- 120	- 400	- 700	-1320	-2900	-2800	-2200	-1800	-1500	-1900	-2150										
SG-38	0	0	- 620	-1160	-1240	-1740	Lost	---	---	---	---	---	---	---	---										
SG-39	0	0	- 260	- 520	- 540	0	-1840	-1200	-2360	- 100	Lost	---													
SG-40	0	0	- 440	- 860	- 940	-1360	Lost	---	---	---	---	---	---	---	---										
SG-41	0	0	- 20	- 60	- 60	- 40	- 240	- 800	1600	3000	Lost	---													
SG-42	0	0	0	- 40	- 40	20	60	100	600	Lost	---														
SG-43	0	20	- 80	- 200	- 200	- 40	200																		
SG-44	Not Available																								
SG-45	0	0	60	40	20	0	- 160	- 340	- 800	- 600	- 300	- 300	- 100	20	---										
SG-46	0	0	140	60	- 40	- 40	- 120	-2900	Lost																
SG-47	Not Available																								
SG-48	0	0	80	120	120	160	Lost	---																	
SG-49	0	0	460	920	940	540	300	200	60	- 600	- 560	- 520	- 460	- 456	- 432										
SG-50	0	0	- 400	-1680	- 440	-2220	-1150	- 760	- 600	- 460	- 320	- 260	- 120	0	0										

(-) Negative Sign Indicates Compression

TABLE VIII (Cont.)
RH00283 PHASE II
STRAIN, DEFLECTION AND TEMPERATURE

GAGE NO.	TIME (SEC.)															
	-10	0	15	30	32	38	58	59	60	61	62	63	64	65	66	67
ED1-1	Not Available	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
ED1-2	Not Available	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

GAGE NO.	TIME (SEC.)														
	-10	+18	30	32	38	58	59	60	61	62	63	64	65	66	67
TEMPERATURE (°F)															
TC-1	86	86	143	148	153	158	156	154	152	150	149	147	146	145	142
TC-2	85	85	150	155	160	163	161	158	155	153	152	150	149	148	146
TC-3	86	86	160	165	170	172	170	166	163	160	159	157	156	156	150
TC-4	85	85	141	146	153	156	155	154	152	150	149	147	146	145	142
TC-5	85	85	153	156	161	164	162	159	156	155	153	151	150	149	148
TC-6	84	83	156	160	164	165	163	160	156	156	155	154	154	153	153
TC-7	84	84	180	181	183	180	176	170	166	163	161	159	150	155	154
TC-8	83	83	140	146	150	lost	-----	-----	-----	-----	-----	-----	-----	-----	-----
TC-9	85	88	154	166	172	175	173	170	166	164	161	160	159	157	150
TC-10	84	84	153	165	165	164	161	157	153	151	149	146	145	143	141
TC-11	85	85	136	148	152	154	152	150	146	145	143	141	140	140	135
TC-12	84	84	143	155	159	158	156	153	150	149	145	143	141	141	140

TABLE IX
RH00283 PHASE III
STRAIN, DEFLECTION AND TEMPERATURE

GAGE NO.	TIME (SECONDS)																
	-20	-10	0	10	17	25	27	35	55	60	65	80	90	116	126	160	170
RAM LOADS (POUNDS)																	
P1	0	276	23343	25650	18914	12425	12548	12732	23066	22144	21959	4613	4982	23712	23343	922	0
P2	0	1125	23025	21183	12433	2753	2210	2486	20078	21459	21459	5602	4605	22104	23025	1031	0
P3	0	33	15011	5024	1360	7324	1226	4769	588	453	235	215	109	0	0	0	0
STRAIN MICRO IN/IN																	
SG-1	0	0	-240	-160	0	200	220	240	40	60	160	440	520	260	240	360	340
SG-2	0	0	-180	-60	140	260	280	300	-40	40	-40	60	0	-160	-200	-120	-140
SG-3	0	-40	-1160	-860	-120	680	760	800	-520	760	-720	100	140	-560	-660	200	240
SG-4	0	-20	-1460	-1200	-600	200	240	260	-1260	-1400	-1460	-640	640	-1660	-1680	-320	-240
SG-5	0	-40	-420	-600	-540	-540	-540	-580	-720	660	-680	-320	-280	-600	-560	-40	-20
SG-6	0	0	-340	-360	-240	-160	-160	-180	-160	80	-60	240	200	-160	-160	200	230
SG-7	0	-1060	-1360	-1360	-1360	-1360	-1360	-1460	-1300	-1060	-1040	0	-120	-1080	-1060	60	60
SG-8	0	-400	-400	-1400	-800	-400	-400	-600	-800	-680	-640	40	80	-760	-800	0	0
SG-9	0	0	0	160	80	20	0	0	60	80	100	120	200	380	-420	260	240
SG-10	0	0	0	0	0	0	0	0	0	20	40	80	120	160	200	200	240
SG-11	0	-20	-20	-40	-40	-40	-160	-160	-120	100	-120	-80	-40	20	40	-20	0
SG-12	0	0	0	0	140	160	160	-140	280	340	360	360	400	560	540	240	260
SG-13	0	0	140	200	160	140	160	140	380	440	480	560	660	820	800	580	540
SG-14	0	0	0	0	200	240	240	260	140	220	-280	-400	-540	-260	-220	-200	-160

(-) Negative Sign Indicates Compression

TABLE IX (Cont.)
RH00283 PHASE III
STRAIN, DEFLECTION AND TEMPERATURE

GAGE NO.	TIME (SECONDS)																
	-20	-10	0	10	17	25	27	35	55	60	65	80	90	116	126	150	170
STRAIN MICRO IN IN																	
SG-15	0	0	160	240	240	200	200	180	60	40	20	- 60	40	300	320	320	140
SG-16	0	0	280	380	360	300	300	320	360	340	340	80	100	400	380	0	20
SG-17	0	0	- 80	- 100	- 80	- 60	- 50	- 60	- 80	- 100	- 40	- 60	- 120	- 240	- 280	- 240	- 220
SG-18	0	0	- 260	- 160	- 40	260	280	340	140	140	200	540	620	380	320	400	340
SG-19	0	- 20	- 80	- 40	20	100	100	120	0	- 20	0	20	40	- 20	- 40	0	0
SG-20	0	- 60	- 70	- 50	- 100	380	420	460	- 360	- 460	- 400	60	120	- 460	- 520	40	40
SG-21	0	0	- 60	40	120	140	160	160	80	60	80	120	140	60	40	40	20
SG-22	0	- 20	- 400	- 600	- 580	- 560	- 560	- 480	- 40	160	260	820	860	280	220	480	440
SG-23	0	0	- 180	- 240	- 200	- 180	- 160	- 160	- 80	- 40	- 20	140	180	- 20	- 40	50	60
SG-24	0	- 40	- 820	- 1060	- 1000	- 900	- 920	- 960	- 1200	- 1070	- 1100	- 460	- 560	- 1340	- 1300	- 420	- 360
SG-25	0	- 40	0	0	0	0	0	0	40	60	120	240	380	460	460	440	400
SG-26	0	0	180	60	- 100	- 220	- 220	- 260	60	140	160	200	240	360	380	240	260
SG-27	0	0	0	- 20	- 40	- 40	- 40	- 20	120	180	240	420	540	620	600	520	500
SG-28	0	20	260	160	60	- 80	- 150	- 140	20	40	40	- 60	- 60	-	120	60	60
SG-29	0	- 20	60	140	140	120	100	60	140	200	240	360	520	640	940	540	500
SG-30	0	0	160	240	200	140	140	60	- 120	- 200	- 240	- 340	- 360	- 460	- 420	- 340	- 340
SG-31	0	0	40	60	60	40	40	40	120	80	220	480	500	600	580	460	440
SG-32	0	- 20	220	160	240	240	240	220	460	60	100	120	100	640	640	420	420

(-) No. 1 to 30 High Tech. Co. Corporation

TABLE IX (Cont.)
RH00283 PHASE III
STRAIN, DEFLECTION AND TEMPERATURE

GAGE NO.	TIME (SECONDS)															
	-10	0	10	17	25	27	35	55	60	65	80	90	116	126	160	170
	STRAIN (MICRO IN/IN)															
SG-33	-20	-440	-540	-440	-340	-360	-120	-640	-680	-720	-520	-560	-1000	-1040	-660	-640
SG-34	-10	-400	-360	-160	0	200	160	-660	-840	-920	-800	-760	-1000	-1040	-660	-620
SG-35	-10	-240	-100	120	-40	-60	-40	-280	-400	-40	-280	-240	-20	-40	-280	-260
SG-36	-10	-840	-480	160	500	840	760	-700	-880	-920	-520	-460	-1060	-1060	-360	-320
SG-37	0	-460	-440	-260	-120	-120	-160	-620	-640	-660	-400	-460	-460	-980	-400	-300
SG-38	-10	-1000	-1360	-1320	-1340	-1320	-1340	-1100	-920	-900	160	80	-1020	-1020	-40	0
SG-39	0	-600	-840	-860	-540	-840	-800	-760	-740	-740	-360	-420	-840	-840	-480	-460
SG-40	0	-560	-860	-560	-560	-560	-900	-900	-840	-860	-340	-420	-1140	-1120	-420	-360
SG-41	0	-40	-40	-40	-40	-40	-40	-140	-140	-140	-40	0	-40	-40	-40	-40
SG-42	0	-40	0	-40	-40	-40	-40	-60	-60	-60	-20	40	120	140	60	60
SG-43	20	-240	900	200	-40	-160	-180	-380	320	280	-20	-100	240	260	-200	-200
SG-44	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40
SG-45	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40
SG-46	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40
SG-47	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40
SG-48	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40
SG-49	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40
SG-50	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40

(*) Values are in micro in/in.

TABLE IX (Cont.)
RH00283 PHASE III
STRAIN, DEFLECTION AND TEMPERATURE

GAGE NO.	TIME (SECONDS)																	DEFLECTION (INCHES)																
	-20	-10	0	10	17	25	27	35	55	60	65	80	90	116	126	160	170																	
ED1-1	Lost Rad	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----																	
ED1-2	Lost Rad	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----																	
TEMPERATURE (°F)																																		
TC-1	75	76	78	104	133	139	170	245	261	280	289	283	263	231	222	205	200																	
TC-2	75	76	80	105	135	142	177	264	287	306	315	309	283	249	241	224	221																	
TC-3	75	77	81	110	145	152	191	287	209	330	342	328	303	265	254	237	232																	
TC-4	75	76	78	100	128	134	165	241	260	276	288	282	260	231	221	202	199																	
TC-5	75	76	80	107	139	145	182	273	296	316	330	319	295	260	250	231	223																	
TC-6	75	76	80	108	142	148	185	276	300	319	327	316	287	250	241	222	217																	
TC-7	75	77	82	120	162	171	215	319	342	361	371	348	309	264	251	231	226																	
TC-8	75	76	78	100	128	134	164	241	264	283	292	285	264	234	226	207	204																	
TC-9	75	76	79	100	142	152	192	296	321	355	373	367	338	300	282	246	240																	
TC-10	75	75	75	102	143	152	192	288	309	340	353	334	301	257	242	208	200																	
TC-11	75	76	76	95	127	124	168	250	269	295	308	302	280	249	235	206	192																	
TC-12	75	76	76	100	134	142	178	264	284	313	322	311	280	244	227	197	190																	

(-) Negative Sign Indicates Compression

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