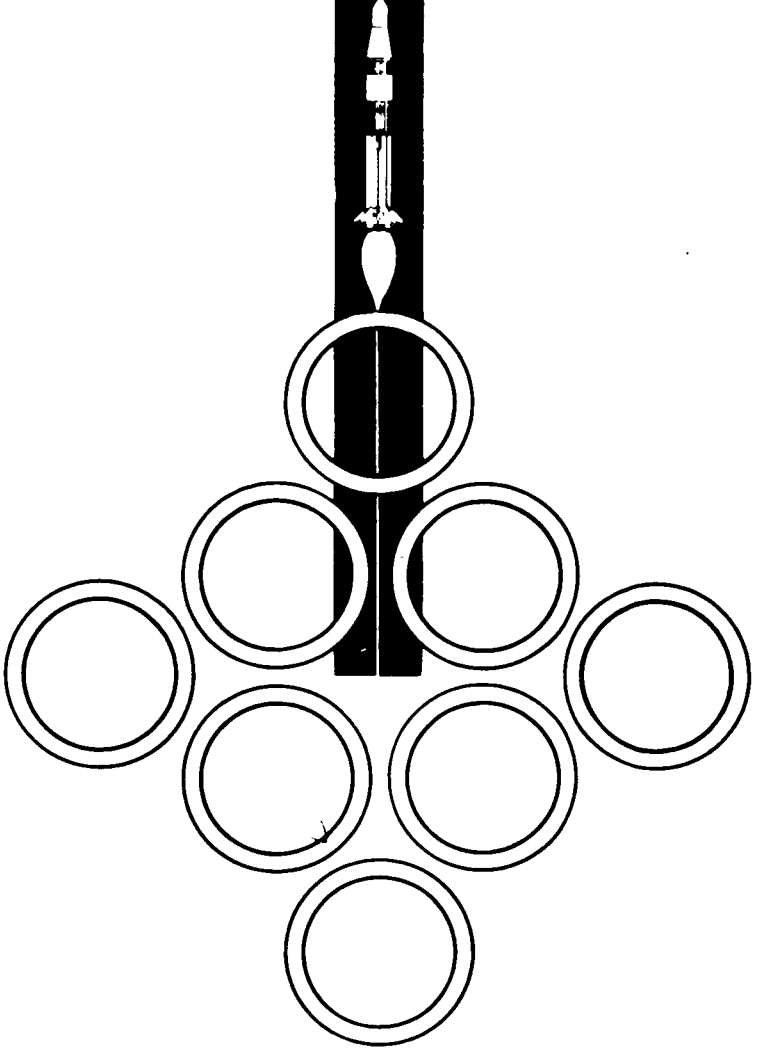

ENGINEERING DEPARTMENT

TECHNICAL REPORT

TR-RE-CCSD-FO-1112-3

December 5, 1966

SATURN IB PROGRAM

TEST REPORT
FOR

COMPOUND PRESSURE AND VACUUM RELIEF VALVE, 2-INCH

Ladewig Valve Company Part Number 3302-F

NASA Drawing Number 75M04406 PRV-3

SPACE DIVISION CHRYSLER CORPORATION

TEST REPORT
FOR
COMPOUND PRESSURE AND VACUUM RELIEF VALVE, 2-INCH

Ladewig Valve Company Part Number 3302-F

NASA Drawing Number 75M04406 PRV-3

ABSTRACT

This report presents the results of tests performed on one sample of Compound Pressure and Vacuum Relief Valve 75M04406 PRV-3. The following Tests were performed:

1. Receiving Inspection
2. Proof Pressure
3. Functional
4. Low Temperature
5. High Temperature
6. Cycle
7. Salt Fog
8. Burst

The vacuum relief valve failed to meet the requirements of the functional test, but maintained its characteristics throughout the test program.

The pressure relief valve was damaged by the salt fog environment. It was repaired and testing completed.

TEST REPORT

FOR

COMPOUND PRESSURE AND VACUUM RELIEF VALVE, 2-INCH

Ladewig Valve Company Part Number 3302-F

NASA Drawing Number 75M04406 PRV-3

December 5, 1966

CHRYSLER CORPORATION SPACE DIVISION - NEW ORLEANS, LOUISIANA

FOREWORD

The tests reported herein were conducted for the John F. Kennedy Space Center by Chrysler Corporation Space Division (CCSD), New Orleans, Louisiana. This document was prepared by CCSD under contract NAS8-4016, Part VII, CWO 271620.

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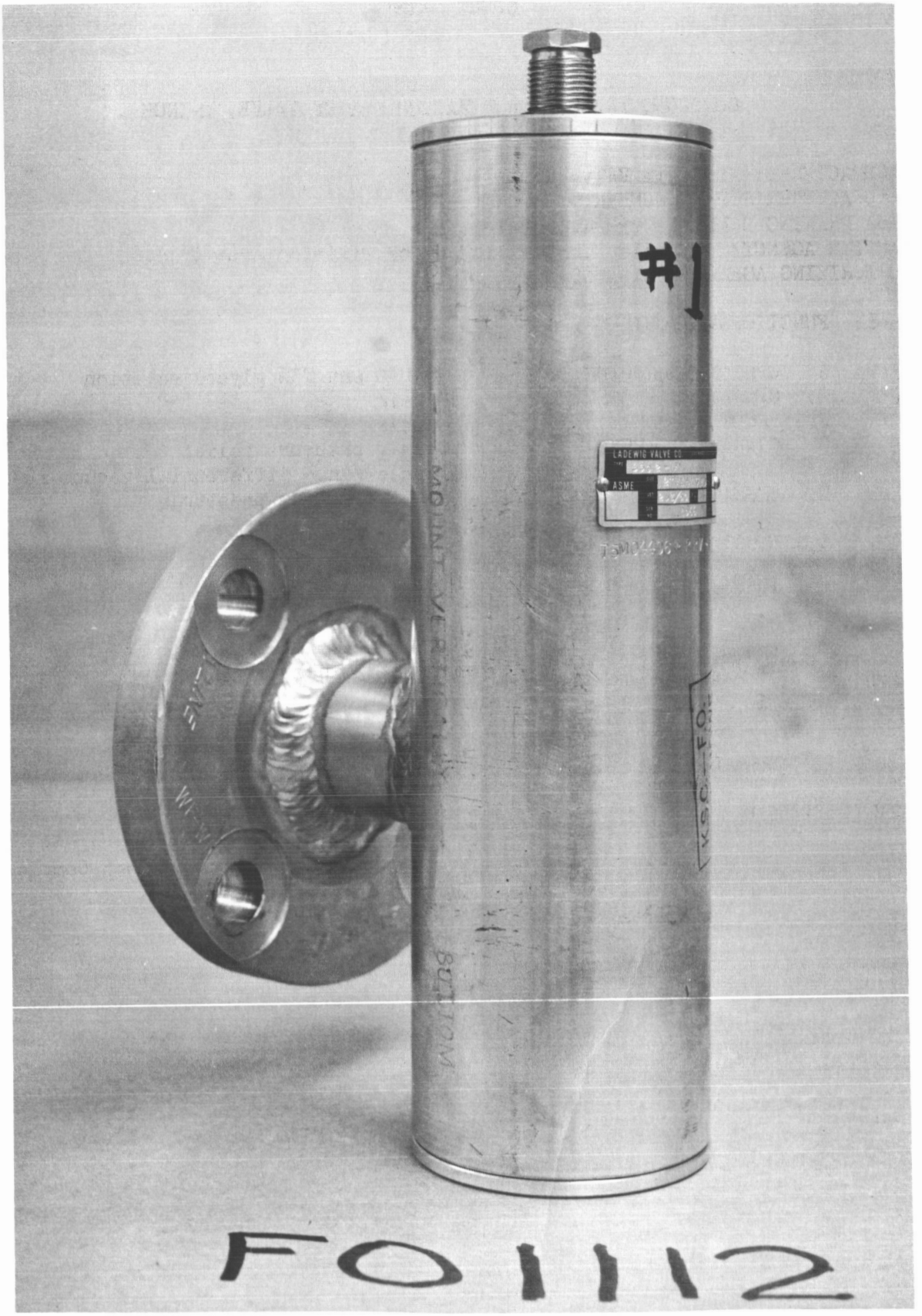


Compound Pressure and Vacuum Relief Valve 75M04406 PRV-3

CHECK SHEET

FOR

COMPOUND PRESSURE AND VACUUM RELIEF VALVE, 2-INCH

MANUFACTURER: Ladewig Valve Co.
MANUFACTURER'S PART NUMBER: 3302-F
NASA DRAWING NUMBER: 75M04406 PRV-3
TESTING AGENCY: Chrysler Corporation Space Division, New Orleans, Louisiana
AUTHORIZING AGENCY: NASA KSC

I. FUNCTIONAL REQUIREMENTS

A.	OPERATING MEDIUM:	25% H_2O and 75% glycol solution
B.	OPERATING PRESSURE:	50 psig
C.	PROOF PRESSURE:	75 psig
D.	CRACKING PRESSURE:	50 psig pressure relief 2 ounces/in.^{2} differential vacuum relief
E.	RESEATING PRESSURE:	95% of cracking pressure

II. CONSTRUCTION MATERIAL

A.	MATERIAL:	Body - aluminum Spring - monel
B.	CONNECTIONS:	Inlet - 2 inch - 150 ASA R.F. flange

III. ENVIRONMENTAL REQUIREMENTS

A.	OPERATING TEMPERATURE:	5 to 125°F

IV. LOCATION AND USE: Used in the water glycol storage tank in the environmental control system at John F. Kennedy Space Center Launch Complexes 34 and 37B.

TEST SUMMARY

COMPOUND PRESSURE AND VACUUM RELIEF VALVE

75M04406 PRV-3

Environment	Units	Operational Boundary	Test Objective	Test Results	Remarks
Receiving Inspection	1	Visual Inspection	Check for conformance with 75M04406-PRV-3	Satisfactory	
Proof Pressure Test	1	75 psig	Check for leakage and distortion	Satisfactory	Leaked 15 drops/min.
Functional Test: Pressure	1	50 psig	Determine cracking and reseating pressure. Check for leakage	Satisfactory	
Vacuum	1	2 ounces per square inch	Determine cracking and reseating vacuum. Check seat leakage	Satisfactory	Poppet will fill with water. Requires 3.48 ounces per square inch to relieve
Low Temperature Test	1	5°F	Determine the effect of low temperature on the specimen	Satisfactory	
High Temperature Test	1	125°F	Determine if specimen operation is impaired by high temperature	Satisfactory	
Salt Fog Test	1	5% solution for 240 hours	Determine if specimen operation is impaired by exposure to salt fog	Failed to function after exposure	Specimen was repaired and testing continued
Cycle Test	1	500 cycles	Determine if specimen operation is impaired by cycling	Satisfactory	
Burst Test	1	125 psig	Minimum burst pressure	Satisfactory	

SECTION I

INTRODUCTION

1.1 SCOPE

This report presents the results of tests that were performed to determine if Relief Valve 75MO4406 PRV-3 meets the operational requirements for John F. Kennedy Space Center Launch Complexes 34 and 37B. A summary of the test results is presented on page viii.

1.2 ITEM DESCRIPTION

1.2.1 Relief Valve 75MO4406 PRV-3 is a 2-inch, flanged, compound pressure and vacuum relief valve which is used in the environmental control system.

1.2.2 The valve is cylindrical and is flange mounted. During normal operation the valve opens when the pressure in the storage tank rises above 50 psig, and vents to prevent a vacuum when a 2-ounce pressure differential is reached.

1.3 APPLICABLE DOCUMENTS

The following documents contain the test requirements for Relief Valve 75MO4406 PRV-3:

a. KSC-STD-164(D), Standard Environmental Test Methods for Ground Support Equipment Installations at Cape Kennedy

b. NASA Drawing 75MO4406 PRV-3

c. Cleaning Standard MSFC-STD-164(D)

d. Test Plan CCSD-FO-1112-1F

e. Test Procedure TP-RE-CCSD-FO-1112-2F

SECTION II

RECEIVING INSPECTION

2.1 TEST REQUIREMENTS

The specimen shall be visually and dimensionally inspected for conformance with the applicable specifications prior to testing.

2.2 TEST PROCEDURE

A visual and dimensional inspection of the specimen was performed to determine compliance with NASA drawing 75M04406 PRV-3 and the applicable vendor drawing to the extent possible without disassembly of the test specimen. At the same time the test specimen was also inspected for poor workmanship and manufacturing defects.

2.3 TEST RESULTS

The specimen complied with NASA drawing 75M04406 PRV-3. No evidence of poor workmanship or manufacturing defects was observed.

2.4 TEST DATA

The data presented in table 2-1 were recorded during the inspection.

Table 2-1. Specimen Nomenclature

Name	Compound Pressure Vacuum Relief Valve
Type	3302-F
Serial No.	114566
Size	2-inch flanged

SECTION III

PROOF PRESSURE TEST

3.1 TEST REQUIREMENTS

The valve shall be pressurized with H_2O to a proof pressure of 75 psig. This pressure shall be maintained for 5 minutes and the valve shall be checked for leakage and distortion.

3.2 TEST PROCEDURE

3.2.1 The specimen was installed as shown in figure 3-1 using the equipment listed in table 3-1.

3.2.2 Hand valves 2 and 3 were opened.

3.2.3 Hand pump 5 was operated to flow H_2O through the specimen for 1 minute. During this time the pressure relief adjustment was set to crack at greater than 75 psig.

3.2.4 Valve 2 was closed and the inlet port of the specimen was pressurized until a pressure of 75 psig was indicated on gage 4. This pressure was maintained for 5 minutes and the specimen checked for leakage. The pressure was vented and the specimen checked for distortion.

3.3 TEST RESULTS

During the initial proof pressure test, the specimen leaked through the vacuum relief valve at the rate of 15 drops per minute. During the initial functional test, the leakage stopped and no further leakage of this nature occurred (see section IV).

3.4 TEST DATA

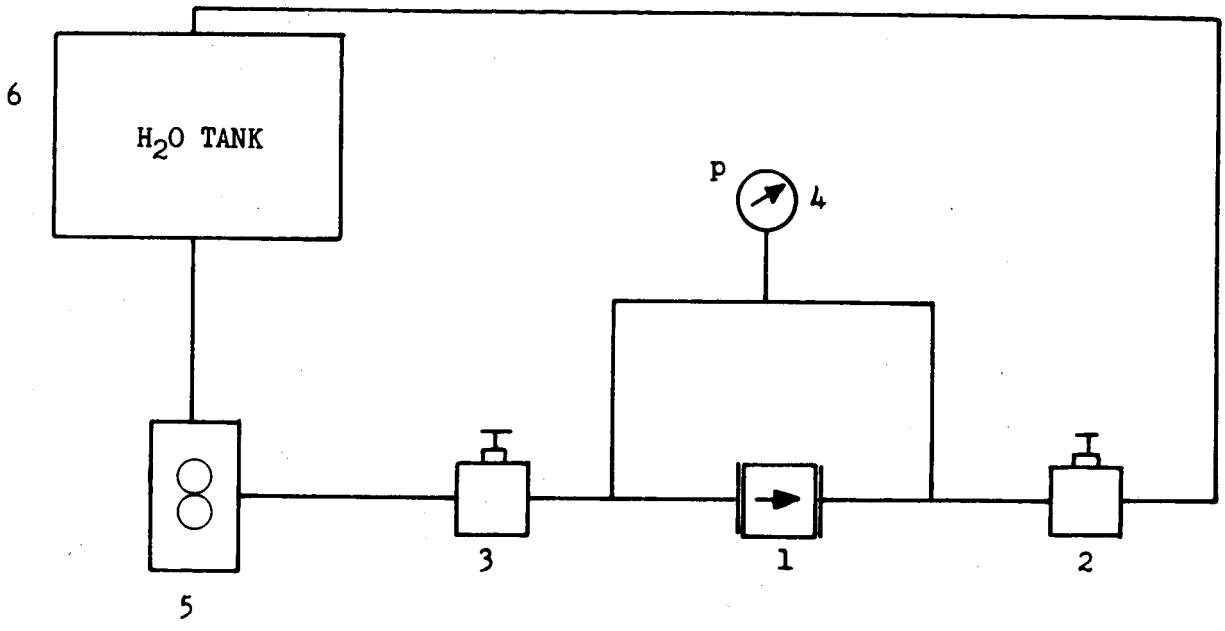
The data presented in table 3-2 were recorded during the test.

Table 3-1. Proof Pressure Test Equipment List

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
1	Test Specimen	Ladewig Valve Co.	3302-F	114566	Pressure-vacuum relief valve, 2-inch
2	Hand Valve	Pressure Products	N/A	N/A	1/4-inch
3	Hand Valve	Grove	N-3	1098 3K A2A	1/4-inch
4	Pressure Gage	Heise	N/A H39952	NASA 014228	0-to 100-psig ±0.1% FS accuracy Cal. date 8-26-66
5	Hand Pump	Pressure Products	N/A	K-750-H-63	0-to 500-psig
6	H_2O Tank	Pressure Products	N/A	N/A	10-gallon

Table 3-2. Proof Pressure Test Results

Pressure	75-psig
Duration	5-minute
Leakage	15 drops/min.
Distortion	None



Note: All lines ¼ inch.
Refer to table 3-1 for item identification.

Figure 3-1. Proof Pressure and Burst Pressure Test Schematic

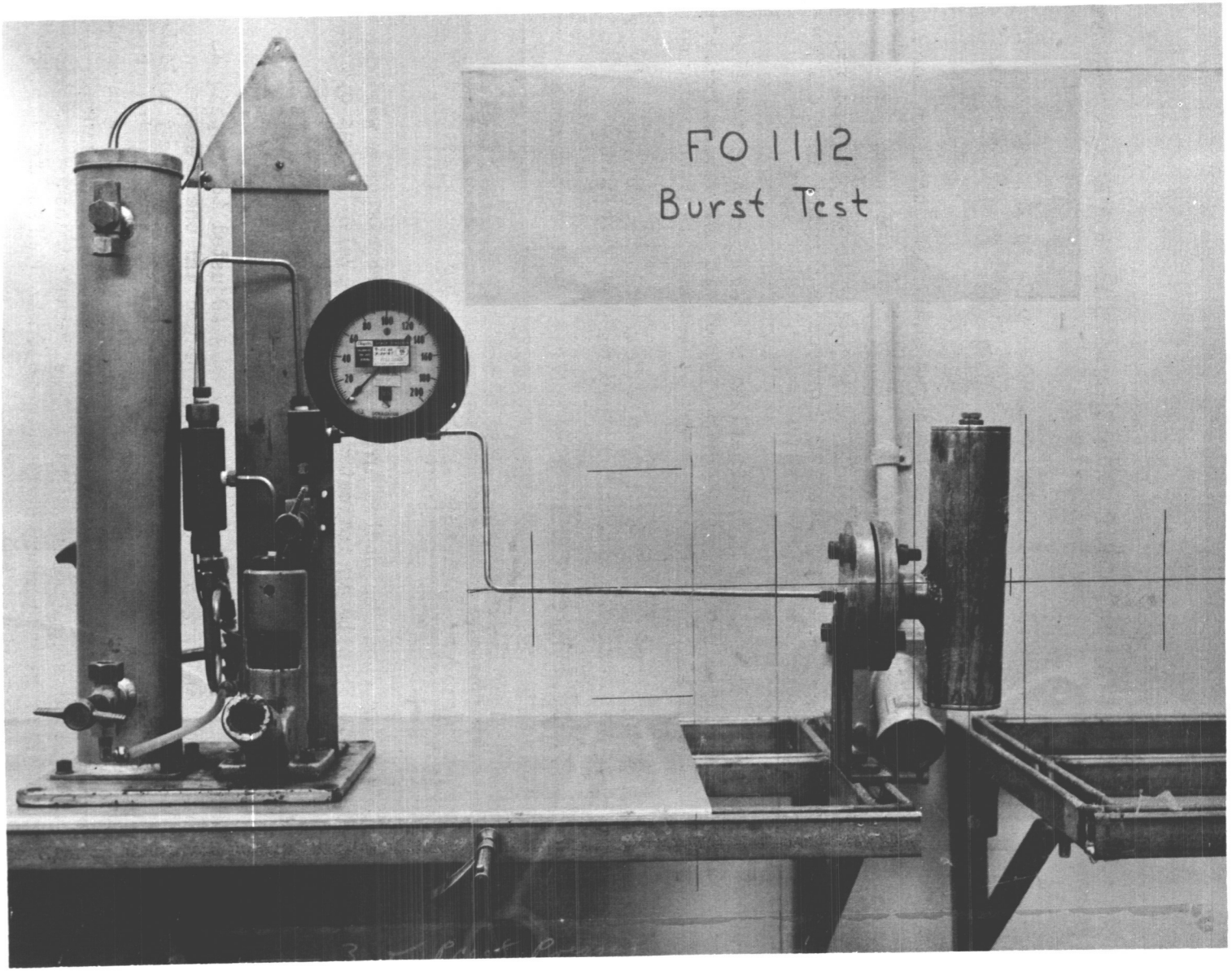


Figure 3-2. Proof Pressure and Burst Test Setup

SECTION IV

FUNCTIONAL TEST

4.1 TEST REQUIREMENTS

4.1.1 The functional test shall be conducted using H_2O as the pressure medium.

4.1.2 The specimen shall be cycled from zero psig to 105 per cent of the cracking pressure of the pressure relief and vacuum relief seats and back to zero.

4.1.3 The cracking and reseating pressures shall be determined for the pressure relief and vacuum relief seats.

4.1.4 The pressure relief seat shall be adjusted to 50 psig and the vacuum relief seat adjusted to 2 ounces per square inch differential.

4.1.5 The inlet port shall be pressurized to 95 per cent of the cracking pressure of the pressure relief and the vacuum relief seats, and all internal and external leakage shall be recorded.

4.1.6 The specimen pressure relief and vacuum relief cracking and reseating pressures shall be determined and recorded.

4.2 TEST PROCEDURE

4.2.1 PRESSURE RELIEF TEST

4.2.1.1 The specimen was installed as shown in figure 4-1 (setup A) using the equipment listed in table 4-1.

4.2.1.2 Air supply 2 was connected and opened and regulator 4 was adjusted to 55 psig as indicated on gage 5. Valve 11 was opened to crack the pressure relief seat. Valve 11 was closed and valve 13 was opened to crack the vacuum relief seat. It was determined that the specimen operated properly.

4.2.1.3 Valve 6 was opened and regulator 4 was adjusted to 20 psig as indicated on gage 5. Valve 11 was opened and the pressure slowly increased to 95 per cent of cracking pressure by adjusting regulator 4. Leakage was observed and recorded. The pressure was slowly increased until cracking occurred. Cracking pressure was indicated on gage 12 as a sudden decrease in pressure. The cracking pressure was recorded. The reseat pressure was indicated on gage 12 when there was no further pressure decay. The reseat pressure was recorded.

4.2.1.4 Valve 11 was closed and the pressure seat of the specimen was adjusted to crack at 50 psig. The procedures described in paragraph 4.2.1.3 were repeated and the cracking and reseating

pressures were recorded. The pressure seat of the specimen was adjusted during the initial functional tests only.

4.2.2 VACUUM RELIEF TEST

4.2.2.1 The specimen was installed as shown in figure 4-1 (setup B).

4.2.2.2 Manometer 19 was installed, and all valves were closed.

4.2.2.3 Valve 11 was opened and the line was filled with H_2O from H_2O supply 17. Valve 11 was then closed. Valve 18 was opened to let the manometer stabilize. Valve 13 was cracked and manometer 19 monitored for fluid level height change. The pressure reading at which the fluid level began to increase was the cracking pressure. The cracking pressure was recorded. The pressure reading at which the fluid level stopped increasing was the reseat pressure. The reseat pressure was recorded.

4.2.2.4 Using valve 13, a pressure equal to 95 per cent of the cracking pressure was set on manometer 19. Valve 13 was closed and manometer 19 was monitored for 3 minutes for indications of leakage. All data were recorded.

4.3 TEST RESULTS

The test specimen met the requirements of the pressure relief test. The test specimen failed to meet the requirements of the vacuum relief test. The test procedure specifies a vacuum relief pressure of 2 ounces per square inch with the valve dry. During the test the valve demonstrated a vacuum relief pressure of 2.72 ounces per square inch with the valve poppet dry. The vacuum relief pressure was measured with the poppet filled with water as would occur in actual service. The poppet relieved at 3.48 ounces per square inch. Testing was continued, but the relief pressure was measured with water in the valve.

4.4 TEST DATA

The data presented in table 4-2 were recorded during the test.

Table 4-1. Functional Test Equipment List

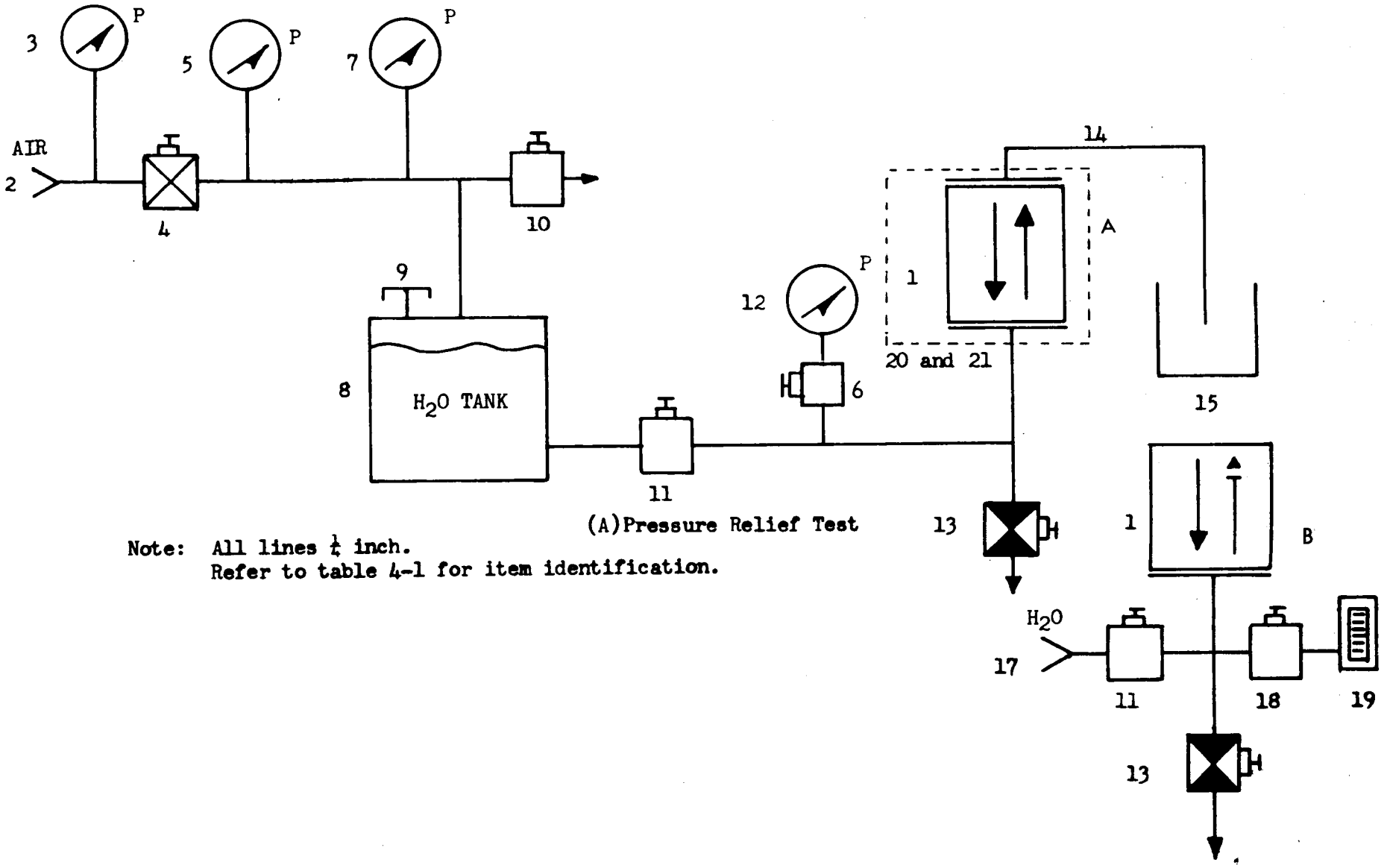
Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
1	Test Specimen	Ladewig Valve Co.	3302-F	114566	Pressure-vacuum relief valve, 2-inch
2	Air Supply		N/A	N/A	0-to 100-psig
3	Pressure Gage	Union Carbide	BU2581	AP23271-1	0-to 3000-psig ±1.0% FS accuracy
4	Hand Regulator	Grove	15KX	104911-1	0-to 100-psig
5	Pressure Gage	Union Carbide	BU2581	AP23218-1	0-to 2000-psig ±1.0% FS accuracy
6	Hand Valve	Robbins Aviation Inc.	SSKG 250-4T	N/A	1/4-inch
7	Pressure Gage	Marsh Instrument	100-4S	N/A	0-to 100-psig ±0.5% FS accuracy Cal. date 10-3-66
8	Water Tank	CCSD	N/A	N/A	5-gallon, 100-psig
9	Cap	N/A	N/A	N/A	2-inch
10	Hand Valve	Robbins Aviation Inc.	SSKG 250-4T	N/A	1/4-inch
11	Hand Valve	Robbins Aviation Inc.	SSKG 250-4T	N/A	1/4-inch
12	Pressure Gage	Heise	H34952	NASA 019228	0-to 100-psig ±0.5% FS accuracy Cal. date 8-26-66
13	Metering Valve	Grove	N-3	10983U A2A	1/4-inch, flow regulating
14	Tube		N/A	N/A	1/8-inch I.D.

Table 4-1. Functional Test Equipment List (Continued)

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
15	Beaker	CCSD	N/A	N/A	100-cc
16	(Not Applicable)	—	—	—	—
17	Water Supply	--	N/A	N/A	0-to 5-psig
18	Hand Valve	Robbins Aviation Inc.	SSKG 250-4T	N/A	1/4-inch
19	Manometer	Meriam Instrument Co.	08 113-95-1625-B	NASA	0-to 10-inch ±0.5% FS accuracy
20	Low Temperature Chamber	Thermotron Corp.	N/A	6219	As specified in KSC-STD-164(D) (temperature tests only)
21	High Temperature Chamber	Conrad	NASA 08-113 Special Equip-ment	200999-1	As specified in KSC-STD-164 (D) (temperature tests only)

Table 4-2. Functional Test Results

Cracking Pressure	50.-psig
Reseat Pressure	47.6-psig
Leakage at 95% of Cracking Pressure	
Internal	None
External	None
Cracking Pressure (Vac)	3.48-ounce per square inch
Reseat Pressure (Vac)	2.72-ounce per square inch
Leakage at 95% of Cracking Pressure (Vac)	
Internal	0.007-ounce per square inch/min.
External	None



Note: All lines $\frac{1}{4}$ inch.
Refer to table 4-1 for item identification.

Figure 4-1. Functional, Low Temperature, and High Temperature Test Schematic

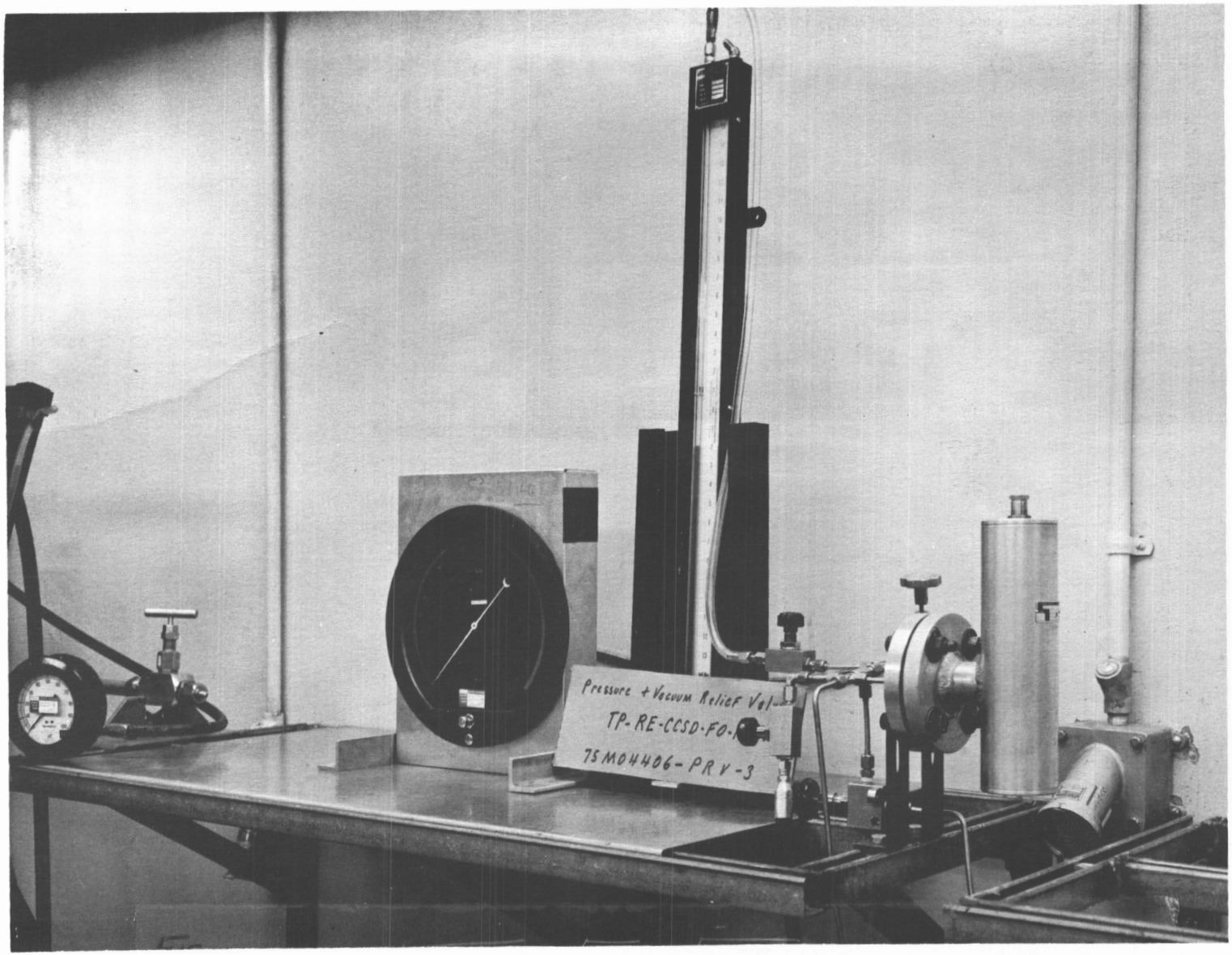


Figure 4-2. Functional Test Setup

SECTION V

LOW TEMPERATURE TEST

5.1 TEST REQUIREMENTS

5.1.1 The test specimen shall be subjected to 5(+0,-5)°F for a low temperature test in accordance with KSC-STD-164(D), section 5.

5.1.2 The specimen shall be functionally tested in accordance with section IV when a stabilized low temperature is reached.

5.1.3 A functional test shall be conducted within 1 hour after the specimen has been returned to room ambient conditions.

5.1.4 The pressure medium shall be a solution of 75 per cent H_2O and 25 per cent ethylene glycol.

5.2 TEST PROCEDURE

5.2.1 The test setup shown in figures 4-1 and 5-1 was assembled and the specimen installed in the low temperature chamber listed in table 4-1.

5.2.2 The temperature of the chamber was lowered to 5°F and allowed to stabilize.

5.2.3 After the chamber temperature had stabilized at 5°F, a functional test as specified in section IV was performed, except that the pressure medium was a solution of 75 per cent H_2O and 25 per cent ethylene glycol.

5.2.4 Upon completion of the functional test, the chamber was returned to ambient conditions.

5.2.5 After the chamber and specimen had returned to ambient conditions, the specimen was visually inspected and a functional test as specified in section IV was performed.

5.2.6 All data were recorded.

5.3 TEST RESULTS

The specimen met the requirements of the low temperature test.

5.4 TEST DATA

The data presented in tables 5-1 and 5-2 were recorded during the test.

Table 5-1. Data Obtained During Low Temperature Test

Temperature	5°F
Cracking Pressure	52-psig
Reseat Pressure	50-psig
Leakage: Internal	None
External	None
Cracking Pressure (vac)	3.49-ounce per square inch
Reseat Pressure (vac)	3.30-ounce per square inch
Leakage: Internal	None
External	None

Table 5-2. Data Obtained After Low Temperature Test

Temperature Cracking Pressure	50.5-psig
Reseat Pressure	48.5-psig
Leakage: Internal	None
External	None
Cracking Pressure (vac)	3.15-ounce per square inch
Reseat Pressure (vac)	3.04-ounce per square inch
Leakage: Internal	None
External	None

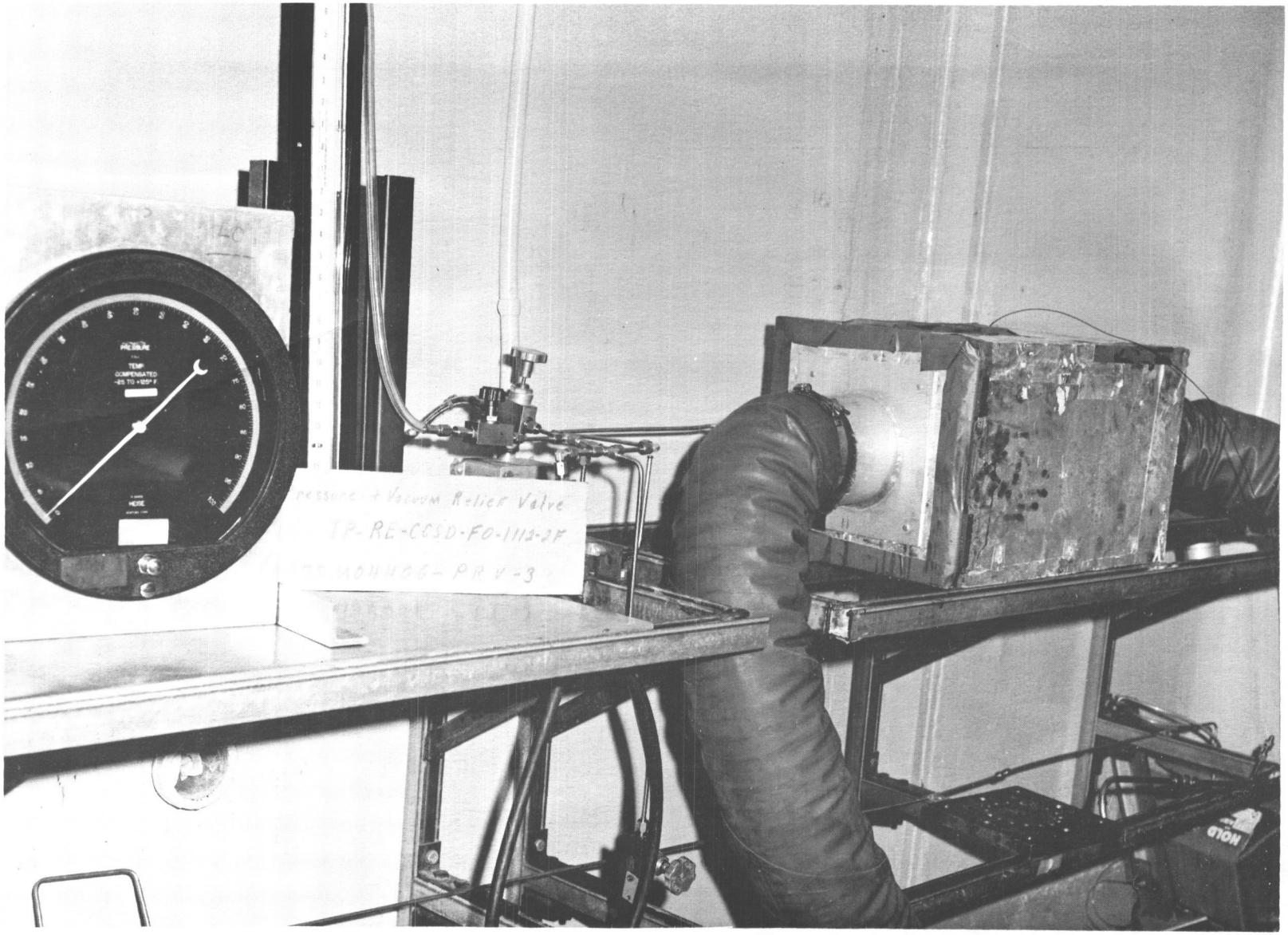


Figure 5-1. Low Temperature Test Setup

SECTION VI

HIGH TEMPERATURE TEST

6.1 TEST REQUIREMENTS

6.1.1 The test specimen shall be subjected to 125 (+4, -0)°F for 72 hours in accordance with KSC-STD-164(D), section 6.

6.1.2 A functional test shall be performed while the specimen is stabilized at 125°F.

6.1.3 Within 1 hour after returning the specimen to room ambient conditions, the specimen will be visually inspected and functionally tested as specified in section IV.

6.1.4 The pressure medium shall be H_2O.

6.2 TEST PROCEDURE

6.2.1 The test setup as shown in figures 4-1 and 6-1 (setup A) was assembled and the specimen was installed in the high temperature chamber listed in table 4-1.

6.2.2 The temperature of the chamber was stabilized at 125°F and maintained for 72 hours.

6.2.3 A functional test, as specified in section IV, was performed while the specimen was stabilized at 125°F.

6.2.4 After 72 hours the chamber was returned to ambient conditions.

6.2.5 Upon reaching ambient conditions the specimen was visually inspected for damage and a functional test, as specified in section IV, was performed.

6.2.6 All data were recorded.

6.3 TEST RESULTS

The specimen met the requirements of the high temperature test.

6.4 TEST DATA

The data presented in tables 6-1 and 6-2 were recorded during the test.

Table 6-1. High Temperature Test Results

Duration		72-hours
Temperature		125°F
Cracking Pressure		50-psig
Reseat Pressure		48.50-psig
Internal and External Leakage		None
Vacuum Cracking Pressure		3.49-ounce per square inch
Vacuum Reseat Pressure		3.24-ounce per square inch
Leakage:	Internal	0.6 inch of H_2O
	External	None

Table 6-2. Post-High Temperature Test Results

Temperature		75°F
Cracking Pressure		50-psig
Reseat Pressure		48.5-psig
Leakage:	Internal	None
	External	None
Vacuum Cracking Pressure		3.56-ounce per square inch
Vacuum Reseat Pressure		3.36-ounce per square inch
Leakage:	Internal	0.009-ounce per square inch/min.
	External	None

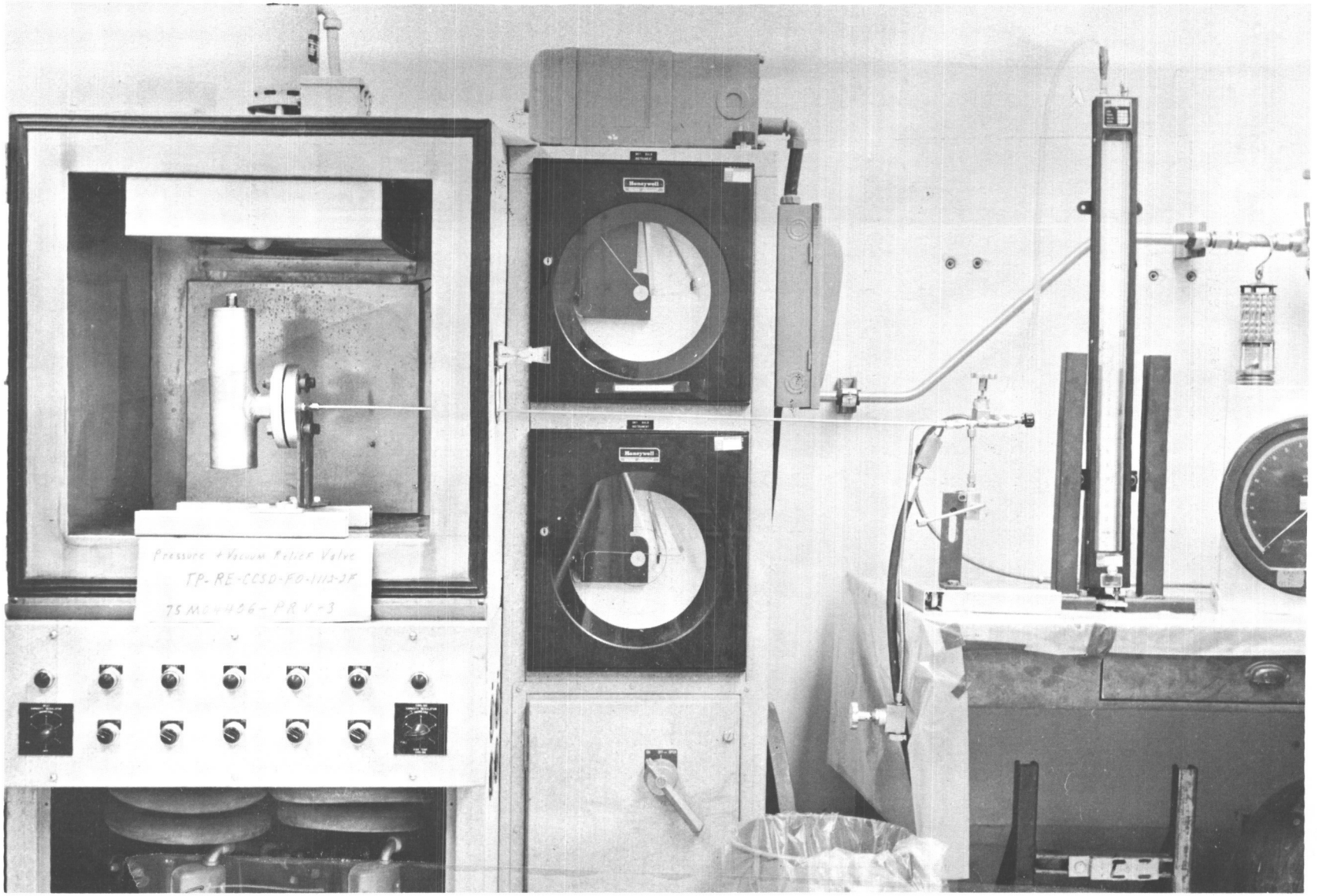


Figure 6-1. High Temperature Test Setup

SECTION VII

SALT FOG TEST

7.1 TEST REQUIREMENTS

7.1.1 The salt fog test shall be performed to determine the resistance of the test specimen to a salt atmosphere.

7.1.2 The salt fog test shall be performed in accordance with KSC-STD-164(D), section 17.

7.1.3 The specimen shall be exposed to the salt fog for 240 (±2) hours. The inlet port only of the specimen shall be capped during exposure to the salt atmosphere.

7.1.4 A functional test shall be performed upon completion of the salt fog test.

7.2 TEST PROCEDURE

7.2.1 The specimen was visually inspected for corrosion, dirt, and oily films. All oily films, other than those required for normal service usage, and dirt particles were removed. The specimen was placed in the salt fog chamber listed in table 7-1.

7.2.2 The temperature in the exposure zone was maintained at 95 F. The salt fog conditions in the exposure zone were maintained such that a clean fog-collecting receptacle placed at any point in the exposure zone would collect from 0.5 to 3 milliliters of salt solution per hour for each 80 square centimeters of horizontal collecting area (10 centimeters diameter), based on an average test of at least 16 hours. The salt solution consisted of five parts by weight of sodium chloride and 95 parts by weight of H_2O.

7.2.3 The specimen was exposed to the salt fog conditions for 240 hours.

7.2.4 Upon completion of the exposure test, the specimen was removed from the chamber and salt deposits removed from the specimen to the extent necessary to make mechanical connections. A functional test, as specified in section IV, was performed within 1 hour (see figure 7-1).

7.2.5 All data were recorded.

7.3 TEST RESULTS

The test specimen failed to operate properly after exposure to the salt fog environment (see figure 7-2). During the functional test after the 240-hour salt fog test, the cracking pressure was 55 psig. The test procedure specifies 50 psig as the cracking pressure. After cracking pressure was reached the valve

failed to reseat and stuck in a relieved position. An examination showed that corrosion of the pressure valve and valve seat was the cause of the difficulty. After extensive cleaning and lapping, the valve and valve seat were operable.

After reworking the vacuum relief unit met the requirements of the salt fog test.

7.4 TEST DATA

The data presented in table 7-2 were recorded during the test.

Table 7-1. Salt Fog Test Equipment List

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
1	Test Specimen	Ladewig Valve Co.	3302-F	114566	Pressure-vacuum relief valve, 2-inch
2	Salt Fog Chamber	Industrial Filter and Pump Manufacturing Co.	411.1C	S-3632	As specified in KSC-STD-164(D)

Table 7-2. Salt Fog Test Results

Duration	240-hours
Cracking Pressure:	
Before Repair	55-psig
After Repair	50-psig
Reseat Pressure:	
Before Repair	No Reseat
After Repair	47.50-psig
Leakage:	
Before Repair	Not Measurable
After Repair	None
Vacuum Cracking Pressure	3.80-ounce per square inch
Vacuum Reseat Pressure	3.78-ounce per square inch
Leakage:	
Internal	None
External	None

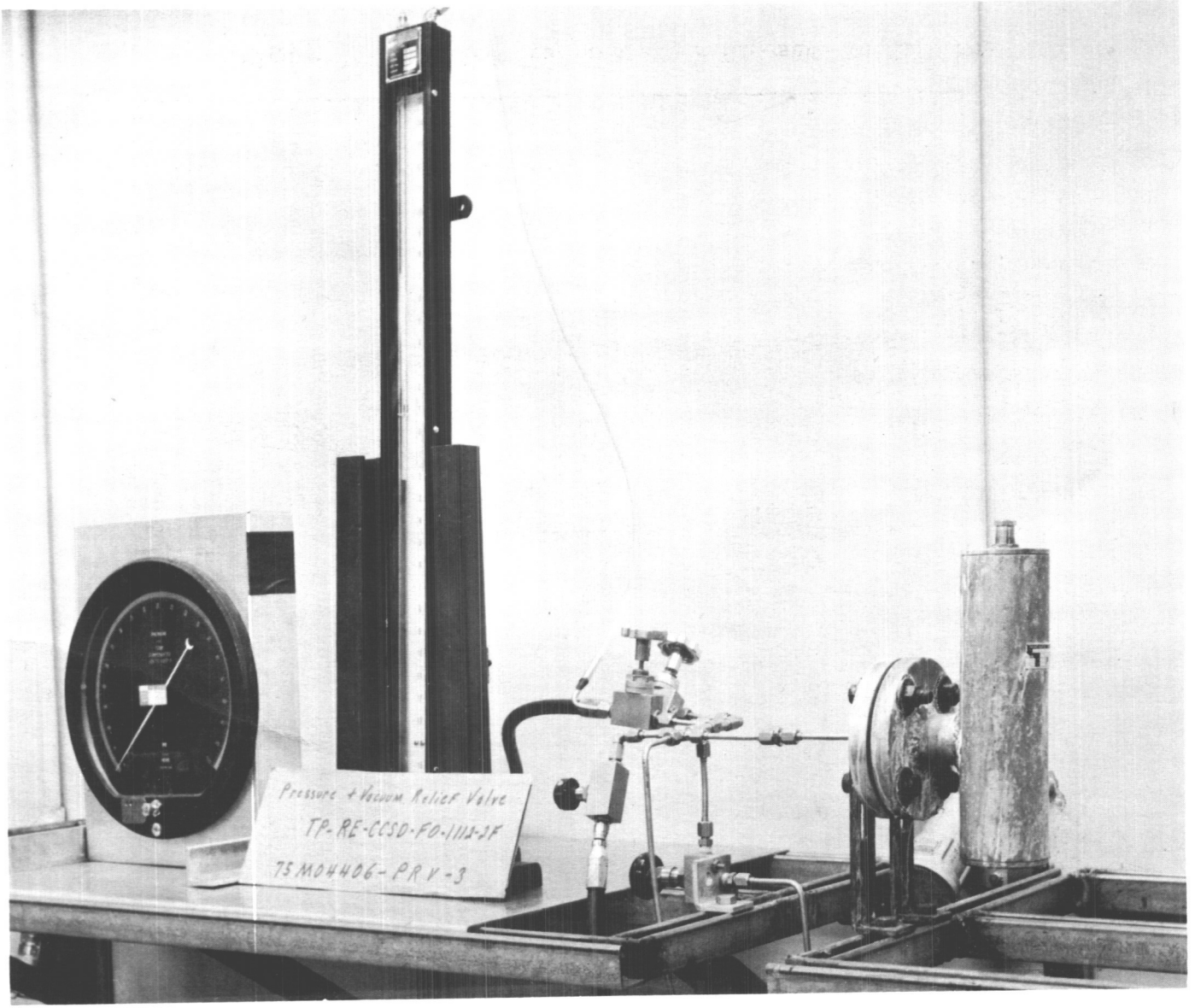


Figure 7-1. Specimen Installed for Functional Test After Exposure to Salt Fog

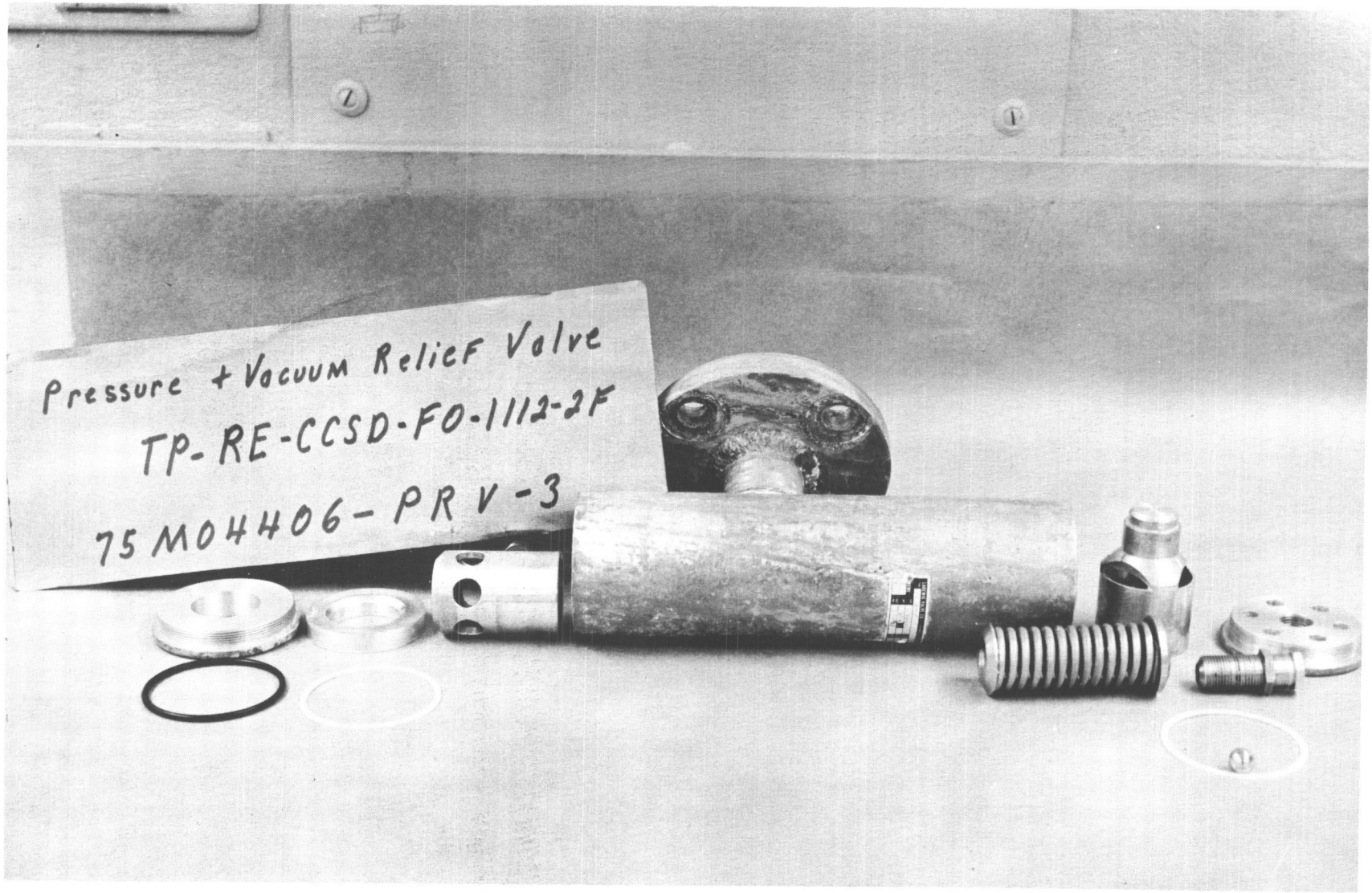


Figure 7-2. Failed Specimen After Exposure to Salt Fog

SECTION VIII

CYCLE TEST

8.1 TEST REQUIREMENTS

8.1.1 The test specimen shall be subjected to 500 operational cycles.

8.1.2 Each cycle shall consist of pressurizing the pressure relief seat from zero to 105 per cent of the cracking pressure, relieving the pressure back to zero; then pressurizing the vacuum relief seat from zero to cracking pressure and relieving the pressure back to zero.

8.1.3 A functional test shall be performed after 50, 100, and 500 cycles.

8.1.4 The pressure medium shall be H_2O.

8.2 TEST PROCEDURE

8.2.1 The test setup shown in figure 8-1 was assembled using the equipment listed in table 8-1. Solenoid valve 8 was connected to the specimen with a vertical tube. All hand valves were closed and the solenoid valve deactuated.

8.2.2 Pressure regulator 3 was adjusted to 70 psig outlet pressure. The inlet of metering valve 6 was pressurized to 105 per cent of the pressure relief seat cracking pressure by adjusting hand valve 4. The pressure was monitored on pressure gage 5.

8.2.3 The specimen was pressurized to 105 per cent of the cracking pressure in 10 seconds by adjusting metering valve 6. The specimen pressure was monitored on pressure gage 7.

8.2.4 Solenoid valve 8 was actuated to vent the specimen relief seat pressure and pressurize the vacuum seat. Cracking of the vacuum seat was indicated by gravity flow of H_2O from vent of valve 8.

8.2.5 Solenoid valve 8 was deactuated when H_2O flow from vent of valve 8 stopped and the vacuum seat reseated.

8.2.6 Actuation and deactuation of solenoid valve 8 by timer 9 constituted 1 cycle. Five hundred cycles were performed.

8.2.7 A functional test, as specified in section IV, was performed after 50, 100, and 500 cycles.

8.2.8 All data were recorded.

8.3 TEST RESULTS

The specimen met the requirements of the cycle test.

8.4 TEST DATA

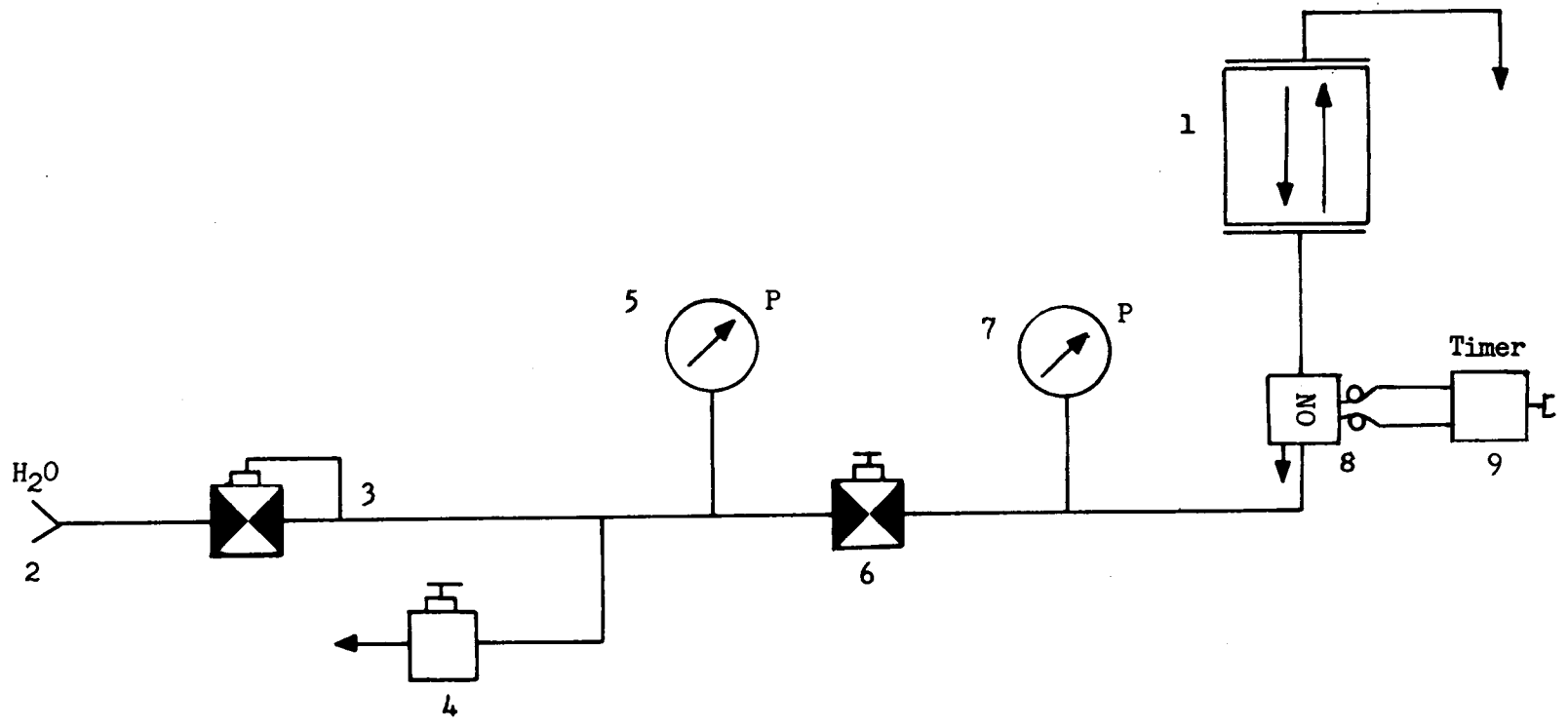
The data presented in table 8-2 were recorded during the test.

Table 8-1. Cycle Test Equipment List

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
1	Test Specimen	Ladewig Valve Co.	3302-F	114566	Pressure-vacuum relief valve, 2-inch
2	H_2O Source	CCSD	N/A	N/A	125-psig
3	Pressure Regulator	Grove	1S-KX	104911-1	
4	Hand Valve	Robbins Aviation Inc.	SSKG250-4T	N/A	1/2-inch
5	Pressure Gage	Marsh Instrument Co.	100-45	N/A	0-to 60-psig 0.1% FS accuracy. Cal. date 10-3-66
6	Metering Valve	Robbins Aviation Co.	SSKG250-4T	N/A	1/2-inch, flow regulating
7	Pressure Gage	Ashcroft Corp.	NASA08-113-95-1208-13	N/A	0-to 60-psig 0.1% FS accuracy. Cal. date 9-15-66
8	Solenoid Valve	Marotta Valve Corp.	MV74	17211	1/2-inch 3-way
9	Timer	G. C. Wilson and Co.	1	N/A	

Table 8-2. Cycle Test Results

	50 Cycles	100 Cycles	500 Cycles
Cracking Pressure (psig)	50	50	50
Reseat Pressure (psig)	47.5	47	47.5
Leakage (psig)			
Internal	None	None	None
External	None	None	None
Vacuum Cracking Pressure (ounces per square inch)	3.88	3.64	3.64
Vacuum Reseat Pressure (ounces per square inch)	3.82	3.52	3.52
Vacuum Leakage:			
Internal	None	None	None
External	None	None	None



NOTE: All lines ½ inch.
Refer to table 8-1 for item identification.

Figure 8-1. Cycle Test Schematic

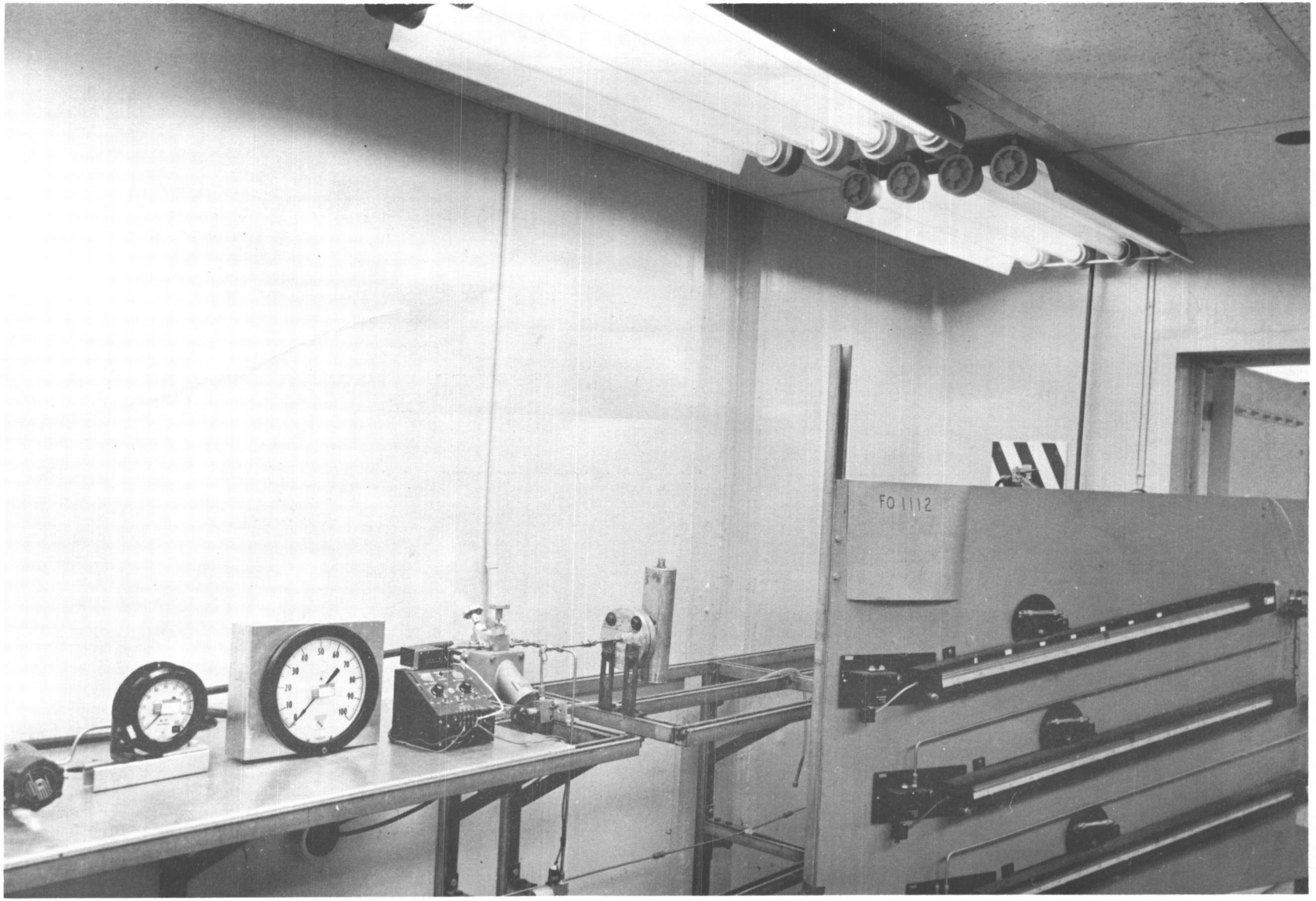


Figure 8-2. Cycle Test Setup

SECTION IX

BURST TEST

9.1 TEST REQUIREMENTS

The test specimen shall be pressurized with H_2O to 125 psig. This pressure shall be maintained for 5 minutes and the valve checked for leakage and distortion.

9.2 TEST PROCEDURE

9.2.1 The specimen was installed as shown in figure 3-1 using the equipment listed in table 9-1.

9.2.2 Hand valves 2 and 3 were opened, and using hand pump 5, H_2O was allowed to flow through the specimen for 1 minute.

9.2.3 Valve 2 was closed and the inlet port of the specimen pressurized until a pressure of 125 psig was indicated on gage 4. This pressure was maintained for 5 minutes and the specimen was checked for leakage. The pressure was vented and the specimen checked for distortion. All test data were recorded.

9.3 TEST RESULTS

The specimen met the requirements of the burst test.

9.4 TEST DATA

The data presented in table 9-2 were recorded during the test.

Table 9-1. Burst Test Equipment List

Item No.	Item	Manufacturer	Model/ Part No.	Serial No.	Remarks
1	Test Specimen	Ladewig Valve Co.	3302-F	114566	Pressure-vacuum relief valve, 2-inch
2	Hand Valve	Pressure Products Inc.	N/A	N/A	¼-inch
3	Hand Valve	Robbins Aviation Inc.	SSKG 250 4T	N/A	¼-inch
4	Pressure Gage	Ashcroft Corp.	NASA08 -113-95-1403-B	N/A	0-to 200-psig ±0.1% FS accuracy Cal. date 9-22-66
5	Hand Pump	Pressure Products Inc.	N/A	KS70-4 -63	0-to 1000-psig
6	H_2O Tank	Pressure Products Inc.	N/A	N/A	10-gallon

Table 9-2. Burst Test Results

Pressure	125-psig
Duration	5-minute
Leakage	None
Distortion	None

APPROVAL

TEST REPORT

FOR

COMPOUND PRESSURE AND VACUUM RELIEF VALVE, 2-INCH

Ladewig Valve Co. Part Number 3302-F

NASA Drawing Number 75M04406 PRV-3

SUBMITTED BY:

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