

AD-751 768

SHOCK TUBE TEST OF A 36-INCH BLAST VALVE

R. L. Peterson

**Ballistic Research Laboratories
Aberdeen Proving Ground, Maryland**

August 1972

DISTRIBUTED BY:

NTIS

**National Technical Information Service
U. S. DEPARTMENT OF COMMERCE
5285 Port Royal Road, Springfield Va. 22151**

BRL MR 2213

BRL

AD

AD 751768

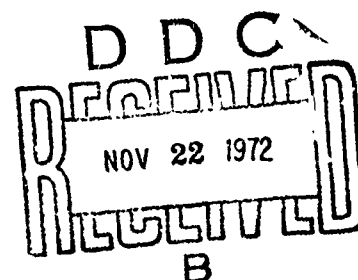
MEMORANDUM REPORT NO. 2213

SHOCK TUBE TEST OF A 36" BLAST VALVE

by

R. L. Peterson

August 1972



Approved for public release; distribution unlimited.

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. Department of Commerce
Springfield VA 22151

U.S. ARMY ABERDEEN RESEARCH AND DEVELOPMENT CENTER
BALLISTIC RESEARCH LABORATORIES
ABERDEEN PROVING GROUND, MARYLAND

UNCLASSIFIED

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)

U.S. Aberdeen Research & Development Center
Ballistic Research Laboratories
Aberdeen Proving Ground, Md. 21005

2a. REPORT SECURITY CLASSIFICATION

UNCLASSIFIED

2b. GROUP

3. REPORT TITLE

SHOCK TUBE TEST OF A 36" BLAST VALVE

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

5. AUTHOR(S) (First name, middle initial, last name)

R.L. Peterson

6. REPORT DATE

August 1972

7a. TOTAL NO. OF PAGES

24 15

7b. NO. OF REFS

0

8a. CONTRACT OR GRANT NO.

b. PROJECT NO.

c. AMCMS No. 5910.22.61252

d.

9a. ORIGINATOR'S REPORT NUMBER(S)

BRL Memorandum Report No. 2213

9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)

10. DISTRIBUTION STATEMENT

Approved for public release; distribution unlimited.

11. SUPPLEMENTARY NOTES

12. SPONSORING MILITARY ACTIVITY

Office Chief of Engineers

P.O. Box 8

Fort George Meade, Md. 20755

13. ABSTRACT

A 36" blast valve was positioned in a duct, branching from an 8 ft diameter shock tube, and subjected to blast in both the open and closed position.

- 1 -

FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS
OBSOLETE FOR ARMY USE.

UNCLASSIFIED

Security Classification

Destroy this report when it is no longer needed.
Do not return it to the originator.

Secondary distribution of this report by originating or
sponsoring activity is prohibited.

Additional copies of this report may be purchased from
the U.S. Department of Commerce, National Technical
Information Service, Springfield, Virginia 22151

ACCESSION for	
RTIS	White Section ☒
D.C.	Buf. Section ☐
UNANNOUNCED	☐
JUSTIFICATION	
BY	
DISTRIBUTION/AVAILABILITY CODES	
Dist.	AVAIL. and/or SPECIAL
A	

The findings in this report are not to be construed as
an official Department of the Army position, unless
so designated by other authorized documents.

*The use of trade names or manufacturers' names in this report
does not constitute indorsement of any commercial product.*

BALLISTIC RESEARCH LABORATORIES

MEMORANDUM REPORT NO. 2213

AUGUST 1972

SHOCK TUBE TEST OF A 36" BLAST VALVE

R.L. Peterson

Terminal Ballistics Laboratory

Approved for public release; distribution unlimited.

Work was supported by Corps of Engineers
on AMCMS No. 5910.22.61252

ABERDEEN PROVING GROUND, MARYLAND

I. INTRODUCTION

At the request of Corps of Engineers, personnel of Ballistics Research Laboratories subjected a blast valve ^{was subjected} to a series of six shock tube generated tests, during the period 22 February through 7 March 1972. The ~~test~~ ^{subjected} valve is a 36 inch butterfly-type designed for installation in air conditioning ducting of hardened underground sites to protect personnel in the event of an nuclear explosion.

II. OBJECTIVES

The test objectives were to determine the structural integrity of the valve body under shock loadings and to dynamically test the automatic valve closure trigger mechanism. Testing parameters as set forth by Corps of Engineers were to be shock levels of 2, 3, 10 and 25 psi overpressure with the valve tested in both open and closed mode. During a planning meeting held with representatives of Corps of Engineers, Aberthau Construction Co. and BRL, it was agreed that BRL would supply the blast environment required to meet Corps of Engineers testing criteria, but would not evaluate the valve's performance.

III. PROCEDURE AND RESULTS

Testing was accomplished utilizing the 8' diameter shock tube at the BRL Dual Shock Tube Facility. The valve was installed with standard flange mounting in a 36" diameter branch duct. Four data channels of shock wave histories were obtained using CEC type 4-316 unbonded strain pressure transducers and recorded on a CEC 12" oscillograph. Angle of valve vane rotation was recorded through use of a rotary potentiometer affixed to the vane shaft. Following each test the valve was operated manually to determine its continued ability to function.

The location of the data acquisition points, valve placement and test layout are shown in Figure 1. Figures 2 through 7 show the pressure time records acquired during the shot condition tested. Table 1 lists pertinent shock data.

TABLE I

Shot No.	Station P-2 P_s	Valve Position at shock arrival	Temp. °C	P_{amb}
8-72-1	28.45*	Closed	1.0	30.27
8-72-2	2.10	Open	10.3	30.09
8-72-3	2.29	Open	12.46	29.95
8-72-4	26.74*	Closed	14.98	29.96
8-72-5	2.22	Open	2.90	29.71
8-72-6	11.49	Open	4.76	30.23

*Shock Reflection

P_s : Shock Overpressure

Valve Position: 5° = open
83°45' = closed

P_{amb} : in. mercury

The valve endured the tests with no apparent damage.

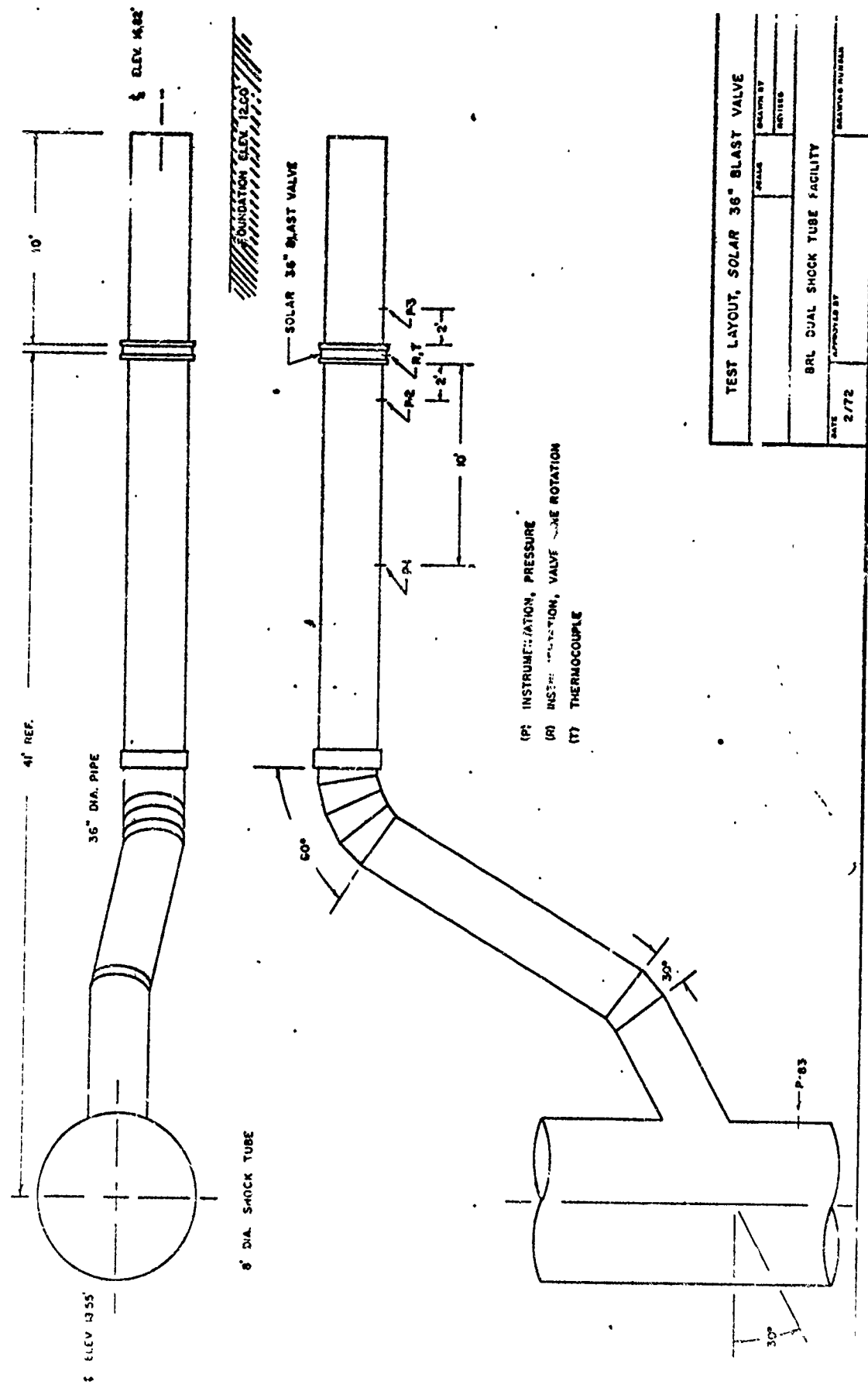


Figure 1. Test Layout

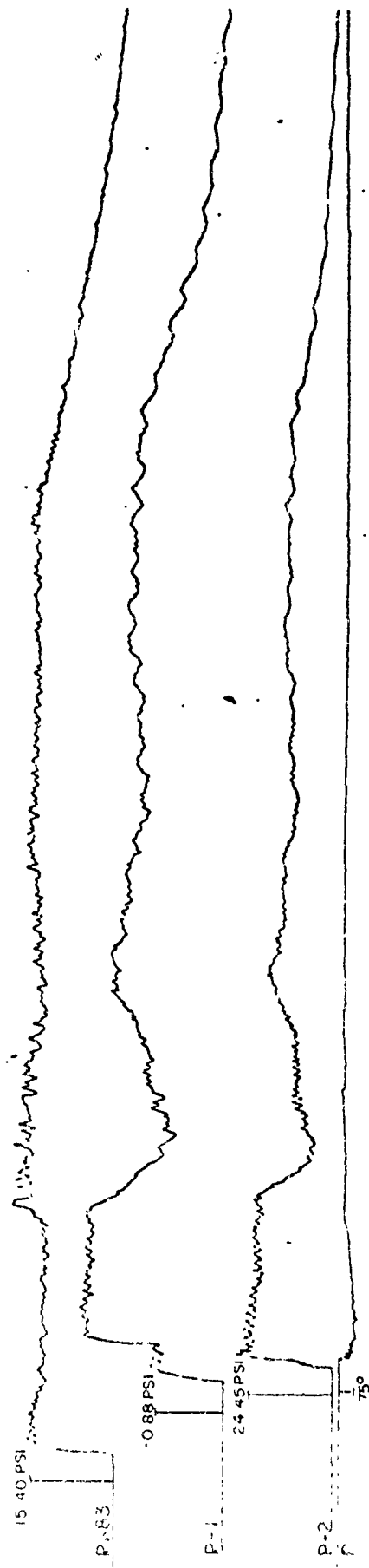


Figure 2. Records

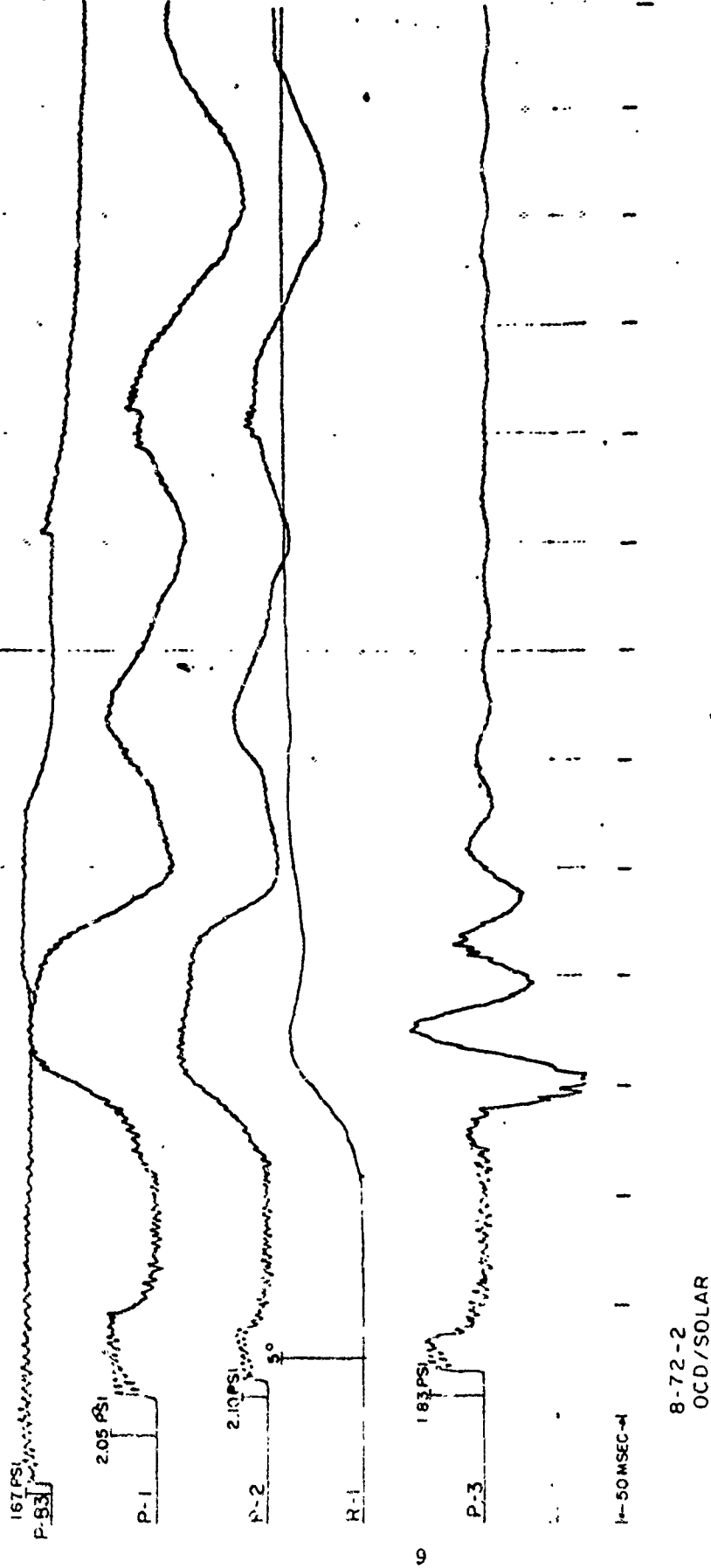


Figure 3. Records

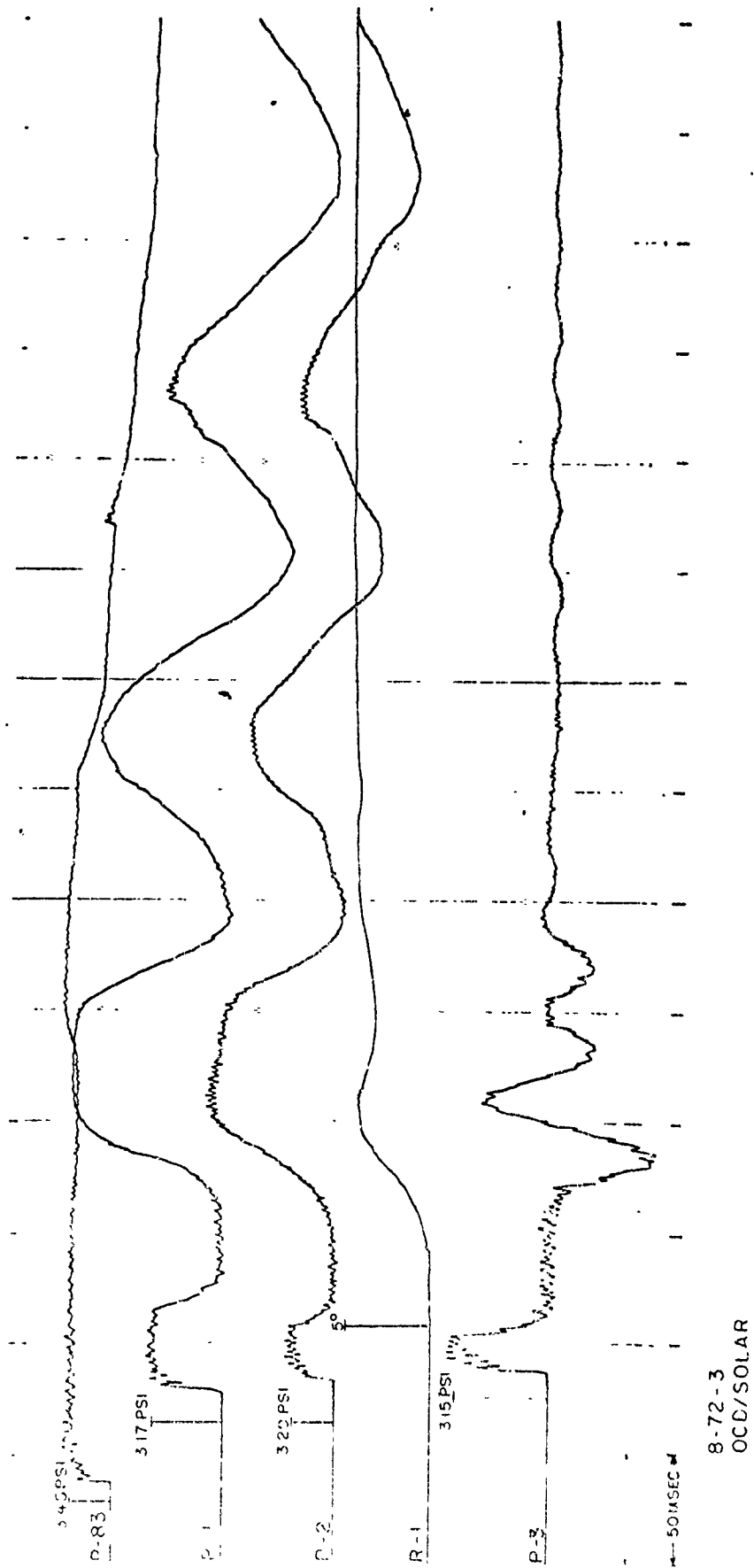


Figure 4. Records

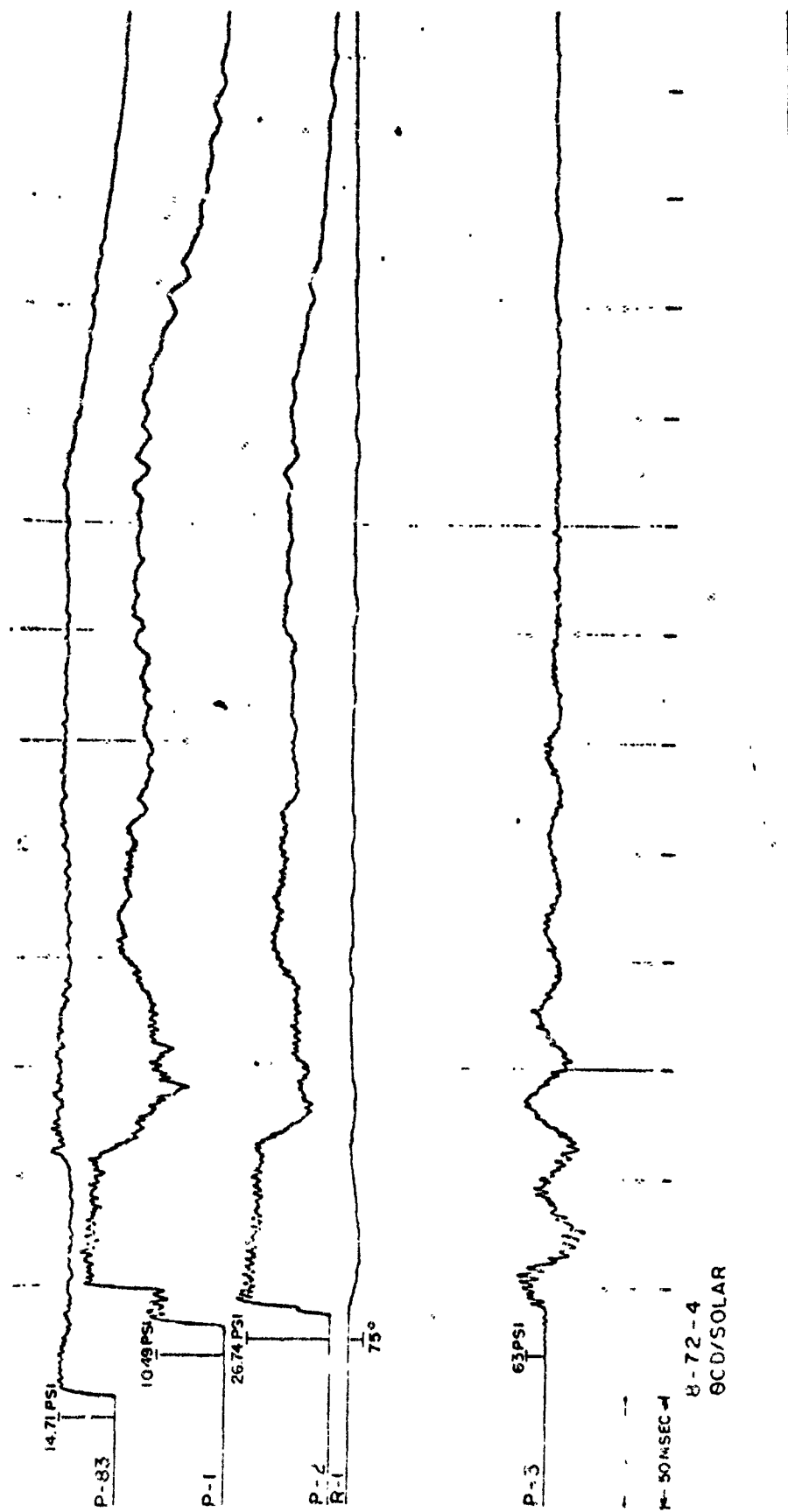


Figure 5. Records

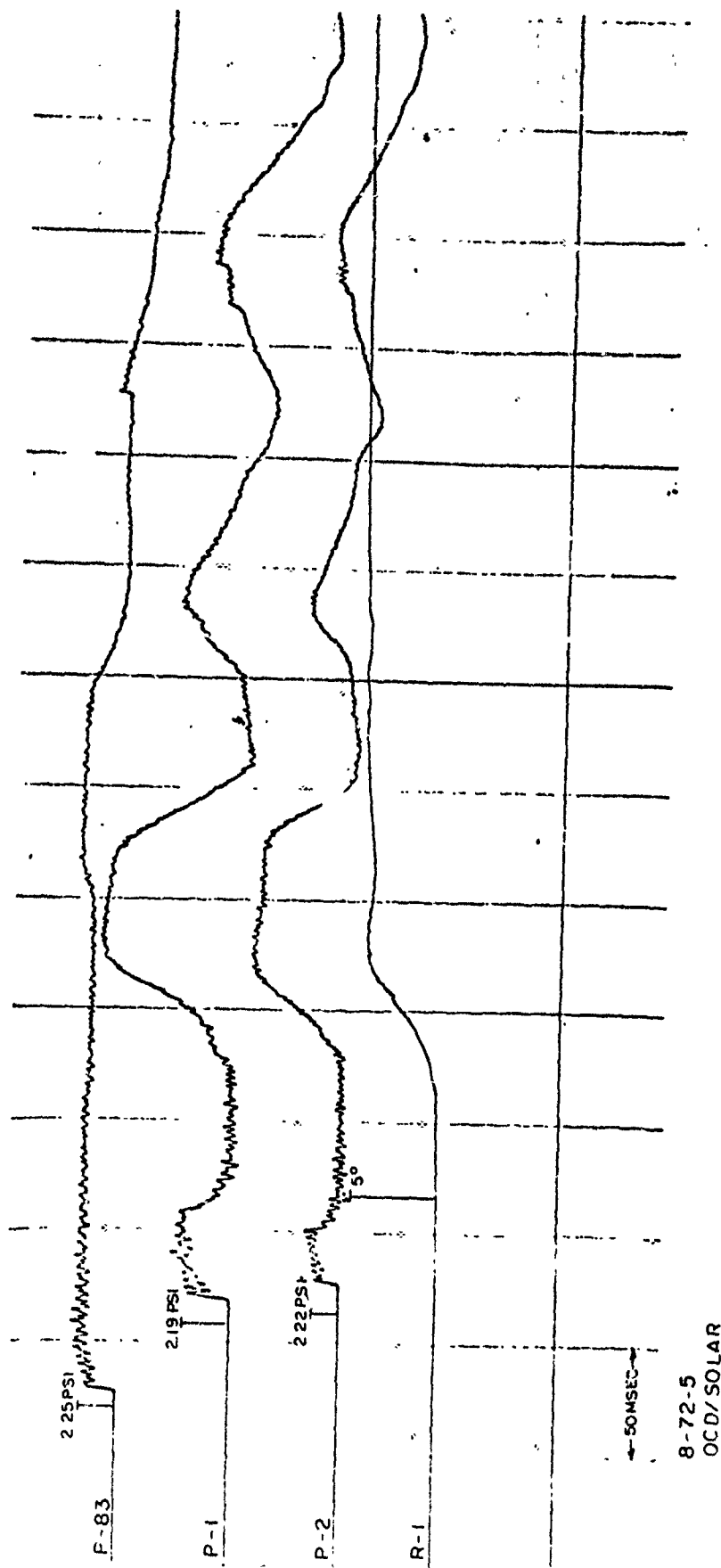


Figure 6. Records

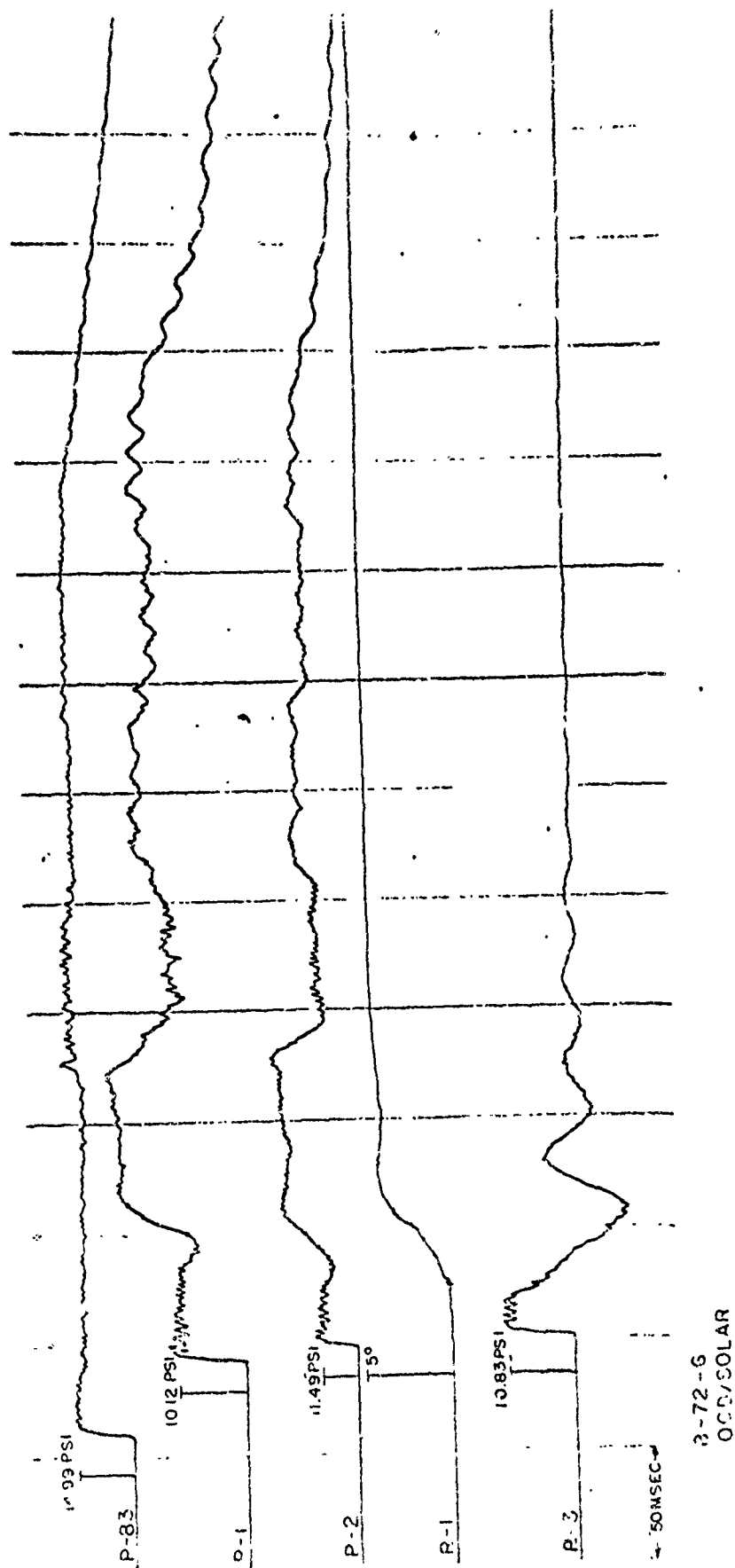


Figure 7. Records