TABLE V. Spectral irradiance of the Kr dimer lamp operated in the VSTOS at an oscillator setting of 28 volts prior to and subsequent to the calibration of the FOS.

λ(nm)	E_λ(μW . cm^{-2} . nm^{-1}) pre-FOS cal.	E_λ(μW . cm^{-2} . nm^{-1}) post-FOS cal.
126.0	.0775	.114
127.0	.0661	.0792
128.0	.0437	.0632
130.0	.0320	.0454
135.0	.0235	.0280
137.5	.0249	.0263
140.0	.0261	.0268
142.5	.0273	.0275
144.5	.0256	.0260
146.0	.0235	.0231
147.5	.0209	.0207
150.0	.0166	.0160
152.5	.0108	.0110
155.0	.00712	.00726
157.5	.00462	.00471
160.0	.00329	.00330
170.0	.00152	.00156
180.0	.000850	.000867
190.0	.000400	.000403
200.0	.000490	.000487
210.0	.000623	.000639

TABLE V. (continued).

λ(nm)	E_λ(μW . cm^{-2} . nm^{-1}) pre-FOS cal.	E_λ(μW . cm^{-2} . nm^{-1}) post-FOS cal.
220.0	.000773	.000836
230.0	.000868	.000943
240.0	.000973	.00107
250.0	.00107	.00116
260.0	.00123	.00127
270.0	.00128	.00140
280.0	.00147	.00160
290.0	.00171	.00187
300.0	.00193	.00204

Appendix:

Summaries of the VSTOS calibration runs.

FORM NBS-569A (9-9-60).

U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

COMPUTATION SHEET

TEST NO. Pt #1 (pre-FOS cal.)

DATE 1984

A Run number	B Date	C Lamp on	D Scan begins	E Warm up time	F	G Ap/Slit	H Diff. In/Out	I Sig. 1524	J Sig. 2144	K Sig. 2930	L Cal.	M	N	O
	5/30	9:31a	9:35a	:04		1.0/1.5	in	.22(-12)	3.85(-12)	1.15(-12)	✓			
	5/25	3:30p	3:47p	:17		0.5/0.8	out	.11(-10)	.84(-10)	.29(-10)				

FORM NBS-569A
(1-8-60)

U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

COMPUTATION SHEET

TEST NO. Hydrogen (pre-FOS cal.) DATE 1984

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Run number	Date	Lamp OK	Scan begins	Warm up time		Ap/Slit	Lamp Temp	Sig 21 to	Cal.					
	5/29	(9:29a)	3:05p	5:36		1.0/1.8	51°C	3.02						
			1:47p	4:18			50°	2.90						
			10:55a	1:26			44°	4.62						
	5/24	8:55a	3:00p	6:05		1.0/1.8	54°	4.18						
	5/25	9:00a	3:45p	6:45		1.0/1.8	49°	4.78						
	5/31	2:07p	3:38p	1:31		1.0/1.8	46°	4.43						
	re-start	2:18p	3:25p	1:18			45.5°	4.49						
	re-start	2:28p	3:14p	1:07			45°	4.54						
			3:04p	:57			44°	4.57	✓					
			2:53p	:41			43°	4.41						
			2:51p	lamp	died and was immediately re-started									
			2:43p	:36			43°	4.69						

FORM NBS-569A
(8-9-60)

U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

COMPUTATION SHEET

TEST NO. Pt #2 (pre-FOS cal.)

DATE 1984

A	B	C	D	E	F	G	N	I	J	K	L	M	N	O
Run number	Date	Lamp on	Scan begins	Warm up time		Ap/Slit	Lamp Temp	Sig 1524	Sig 2144	Sig 2930	Cal.			
	5/30	9:32a	10:32a	1:00		1.0/1.8		5.15	3.43	4.05				
	5/25	—	—	—		0.5/0.8		.12(-10)	.84(-10)	.30(-10)	✓			
	5/24	—	—	—		1.0/1.8		5.4	3.57	4.2				
	5/31	1:18p	2:09p	:51		1.0/1.8		5.13	—	4.02				

FORM NBS-569A (5-5-60)

U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

COMPUTATION SHEET

TEST NO. Argon (pre-FOS cal.) DATE 1984

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Run number	Date	Lamp on	Scan begins	Warm up time		Ap/Slit	Lamp Temp	Sig 2356	Sig 1360	Cal.				
	5/30	9:00a	2:58p	5:58		1.0/1.8	52°C	4.3	1.5					
	5/29	9:10a	3:30p	6:20		1.0/1.8	55°	4.7	1.75					
			12:56p	3:45			52°	4.85	1.7					
			11:15a	2:05			49°	5.1	1.9					
	5/25	8:13a	12:19p	4:06		0.5/0.8	53°	—	.15(-12)					
	5/24	9:45a	2:17p	4:32		1.0/1.8	55°	6.1	2.2					
			2:00p	4:15			55°	6.1	—					
	5/23	4:13p	5:00p	:47		1.0/1.8	50°	—	—					
	5/31	11:47a	1:36p	1:49		1.0/1.8	47°	4.2	—	✓				
			1:25p	1:38			46°	—	1.5					
			1:15p	1:28			45°	—	1.45					
			1:06p	1:19			44°	—	1.45					
			12:56p	1:09			43°	—	1.4					
			12:43p	:56			42°	—	1.5	✓				
			12:33p	:46			40°	—	1.4					
			12:11p	:24			39°	4.1	—					
			12:01p	:14			32°	—	1.45					
			11:51a	:04			28°	—	1.45					
			11:47a	→			20°	—	—					

Form NBS-359A (5-5-50)

U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

COMPUTATION SHEET

TEST NO. Krypton (prec FOS ...)

DATE 1984

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Rec number	Date	Lamp on	Scan begins	Warm up time	Air/Air	Ap/Slit	Lamp Temp	Sig 2450	Sig 1460	Cal.				
	5/30	1:26p	3:43p	2:17		1.0/1.8	49°C	1.4	4.2					
			2:47p	1:21			48°C	1.45	—					
			2:40	1:14			48°	—	4.25					
			2:06	:40			46°	—	4.3					
			1:50	:24			44°	—	4.3					
			1:41	:15			42°	—	4.3					
		V	1:36	:10			—	1.5	—					
		9:00a	11:51a	2:51			48°	1.55	4.45	✓				
	5/29	3:25p	4:10p	:45		1.0/1.8	51°	1.75	4.95					
	5/24	3:55p	4:48p	:53		1.0/1.8	53°	—	5.4					
			4:17p	:22			53°	2.02	5.4					
	5/23	4:14p	4:31p	:17		1.0/1.8	46°	—	—					

C-27

USCOMM-NBS-DC

Form NBS-549A (11-8-69)

U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

COMPUTATION SHEET

TEST NO. Pt #1 with diffuser (pre-FOS cal.) DATE 1984

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Item number	Date	Lamp on	Scan begins	Warm-up time	Ap/Slit	Sig λ1574	Sig λ2144	Sig λ2930	Cal.					
	8/7	1557	1637	40m	1/1.8	4.8(-13)	4.5(-12)	1.25(-12)	✓					
	8/8	1322	1340	18m	1/1.8	4.3	4.45	1.28						
		1822	1912	50m	1/1.8	4.8	—	—						

Form NBS-569A
(6-9-60)

U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

COMPUTATION SHEET

TEST NO. Pt #2 (post FOS cal.) DATE 1984

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Run number	Date	Lamp on	Scan begins	Warm-up time	Ap/Slit	Sig λ1524	Sig λ2144	Sig λ2930	Cal.					
	7/31	1655		~50m	1/1.8	—	—	1.73(-10)						
	8/7	1352		~30m	1/1.8	1.15(-10)	4.17(-10)	1.35(-10)						
	8/8	1024		~20m	1/1.8	—	4.18	1.36						
		1445			.5/0.9	2.46(-11)	1.02(-10)	3.17(-11)	✓					
		1752		~15m	1/1.8	1.18(-10)	—	1.33(-10)						
	8/9	1027		~15m	1/1.8	1.17(-10)	—	1.35(-10)						
				~150m	1/1.8	1.15(-10)	—	1.33(-10)						

FORM NBS-569A
(5-6-50)

U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

COMPUTATION SHEET

TEST NO. Hydrogen (post-FOS [illegible])

DATE 1984

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Run number	Date	Lamp on	Scan begins	Warm-up time	Ap/Slit	Sig λ2170	P.S. Int.	Cal.						
	8/7	1712	1806	54m	1/1.8	3.73(-9)	0.234							
	8/8	0842	0954	72m	1/1.8	6.36	0.240	✓						
			1016	94m	1/1.8	6.20	0.242							
	8/8	1611	1655	44m	.5/0.8	5.98(-10)	0.239							
			1734	83m	1/1.8	5.48(-9)	0.238							
	8/9	0843	1011	88m	1/1.8	5.92(-9)	0.246							

FORM NBS-589A (3-8-60)

U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

COMPUTATION SHEET

TEST NO. Argon (post-FOS cal.)

DATE 1994

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Run number	Date	Lamp on	Scan begins	Warm-up time	Ap/Slit	Sig λ2350	Sig λ1275	Cal.						
	8/7	1634	1730	56m	1/1.8	6.42(-12	2.44(-11)	✓						
	8/8	0947	1104	77m	1/1.8	6.30	2.56							
			1124	97m	1/1.8	6.12	2.53							
	8/9	0956	1058	62m	1/1.8	5.94	2.08							

FORM NBS-569A (9-9-60)

U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

COMPUTATION SHEET

TEST NO. Krypton (post-FOS cal.)

DATE 1994

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Item number	Date	Lamp on	Scan begins	Warm-up time	Ap/Slit	Sig λ2450	Sig λ1440	Cal.						
	8/7	1503	1550	47m	1/1.8	6.18(-11)	4.6(-10)	✓						
			1625	82m	1/1.8	~	4.48							
	8/8	1115	1155	40m	1/1.8	5.70	4.13							
			1215	60m	1/1.8	5.63	4.02							
	8/9	1101	1138	37m	1/1.8	5.36	3.70							

USCOMM-NBS-DC

Illustrations of the VSTOS and the apparatus used in its calibration.

Ill. 1. Rear view of the VSTOS with Pt-Cr-Ne lamps 1 and 2 mounted in its carousel.

Ill. 2. Frontal view of the VSTOS.

Ill. 3. View of the experimental setup showing the front of the vacuum tank.

Ill. 4. View of the experimental setup showing the rear of the vacuum tank.

Ill. 5. View of the rear of the VSTOS mounted in the vacuum tank and ready for operation. The Pt-Cr-Ne lamps are in the lower center and upper right positions in the carousel, the Ar lamp is at lower right, the H_2 lamp is at lower left, and the Kr lamp is at upper left.

Ill. 6. Overall view of the Ar maxi-arc and its experimental setup used in calibrating the VSTOS.

Ill. 7. Close-up view of the maxi-arc showing the meters used to regulate the flow of the Ar gas.

FIGURE C-1

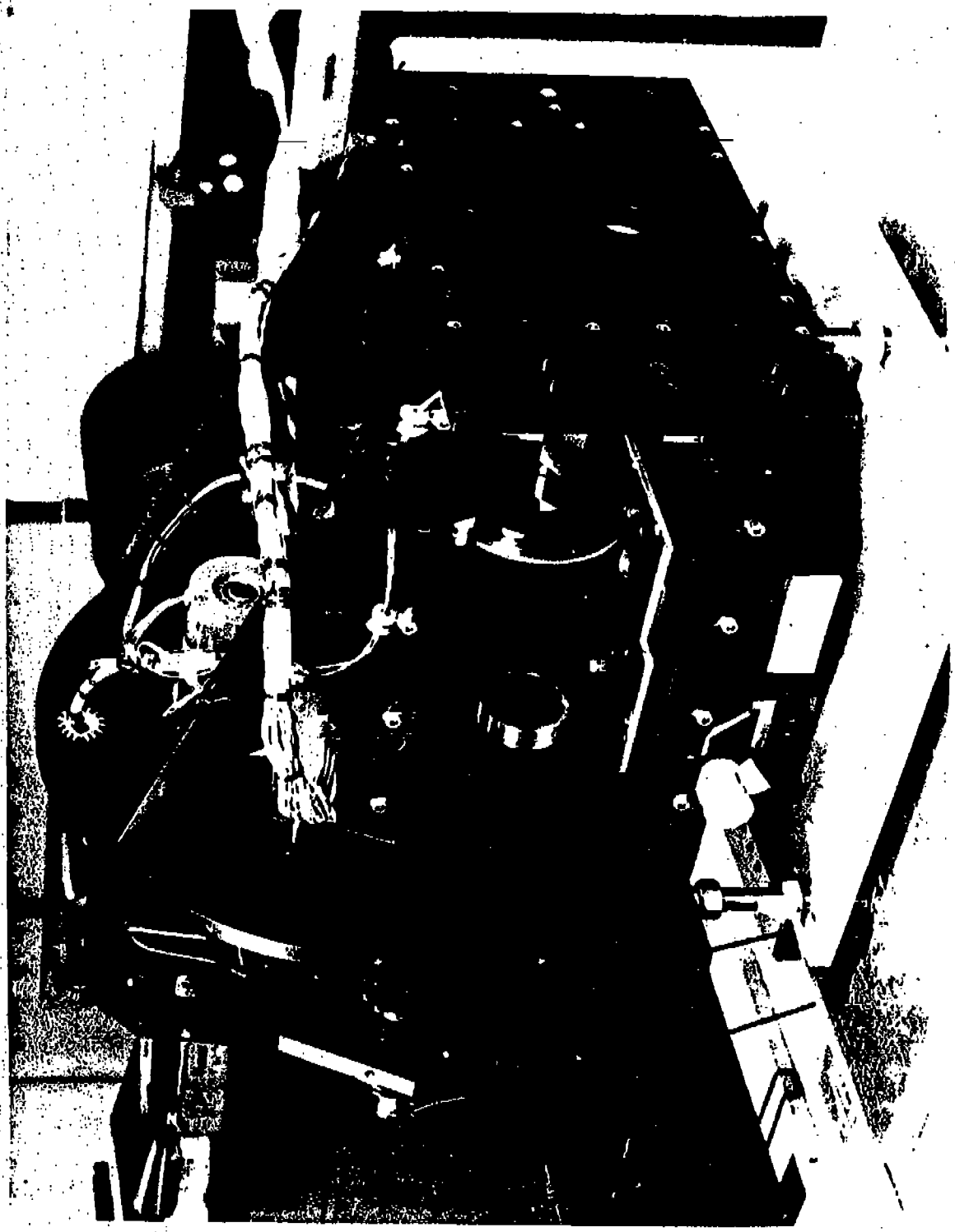


FIGURE C-2

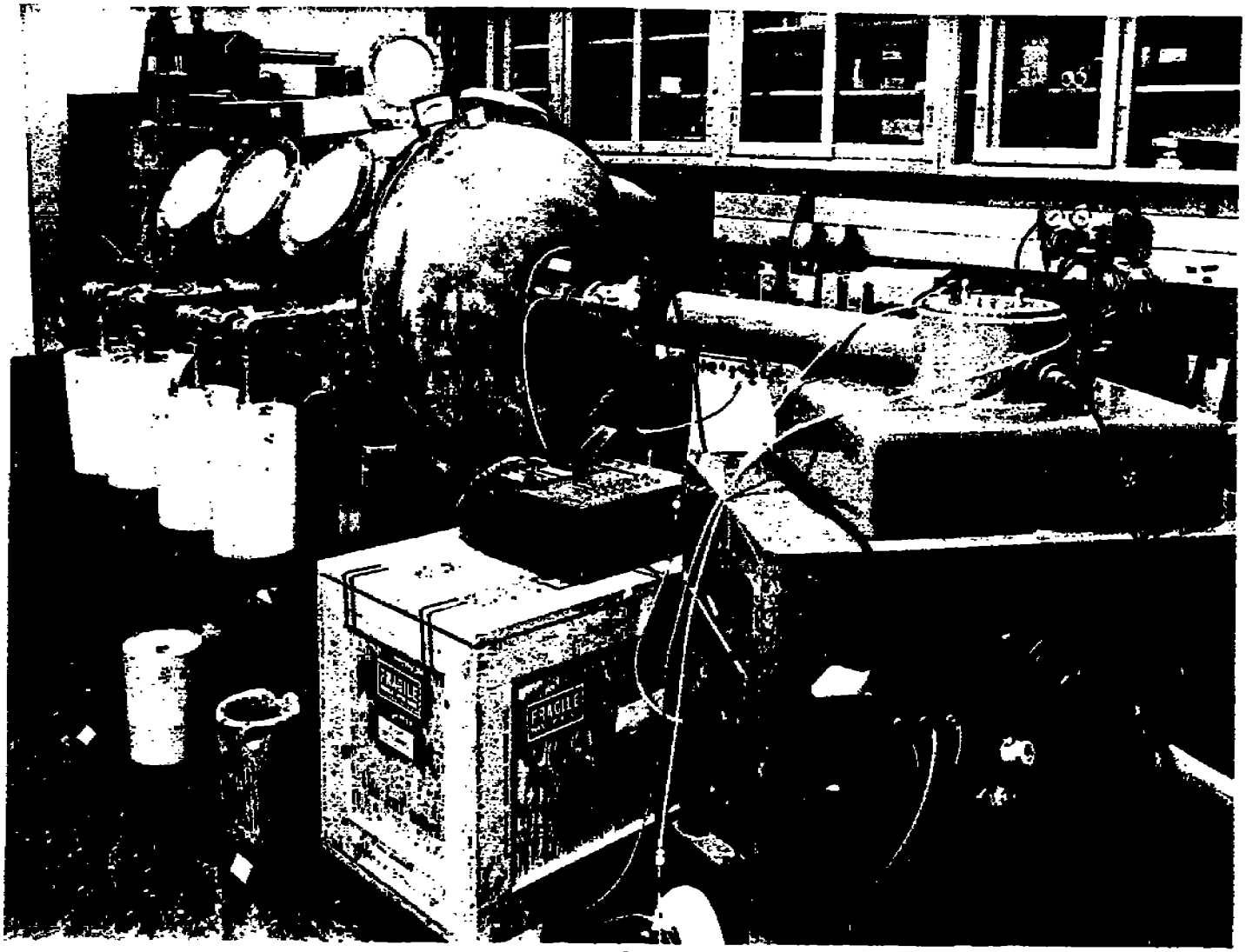
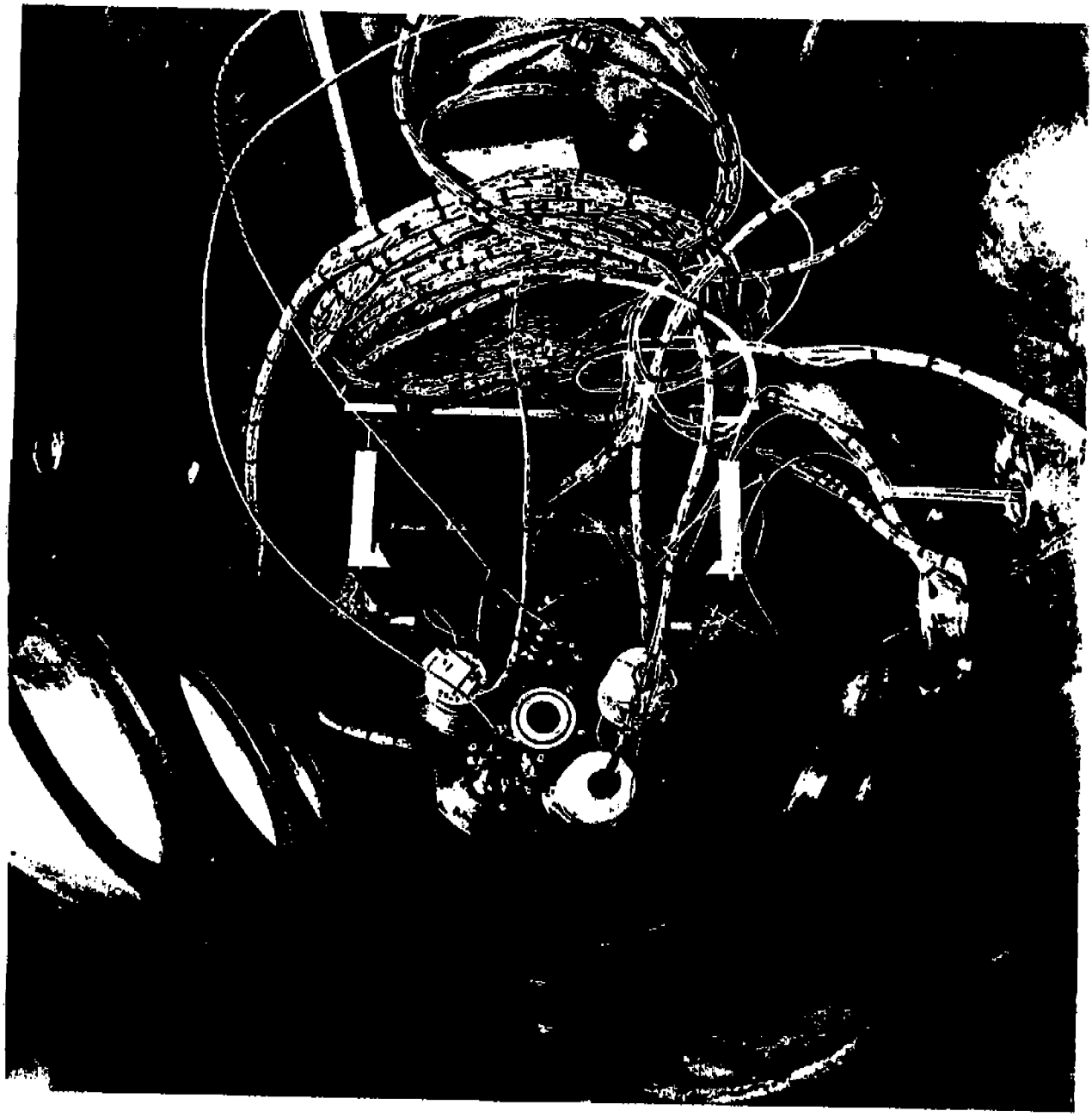


FIGURE C-3

FIGURE C-4



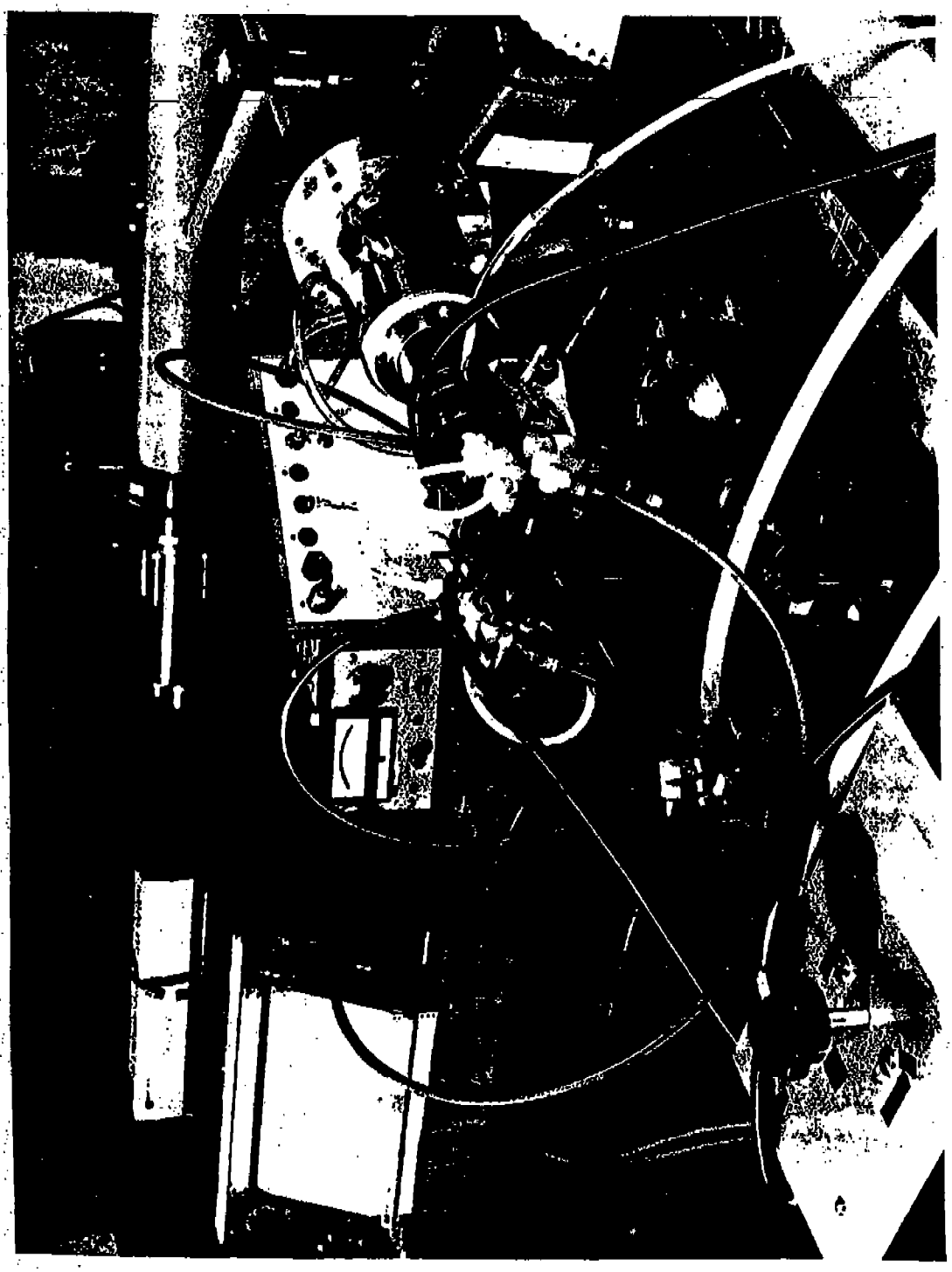


FIGURE C-6

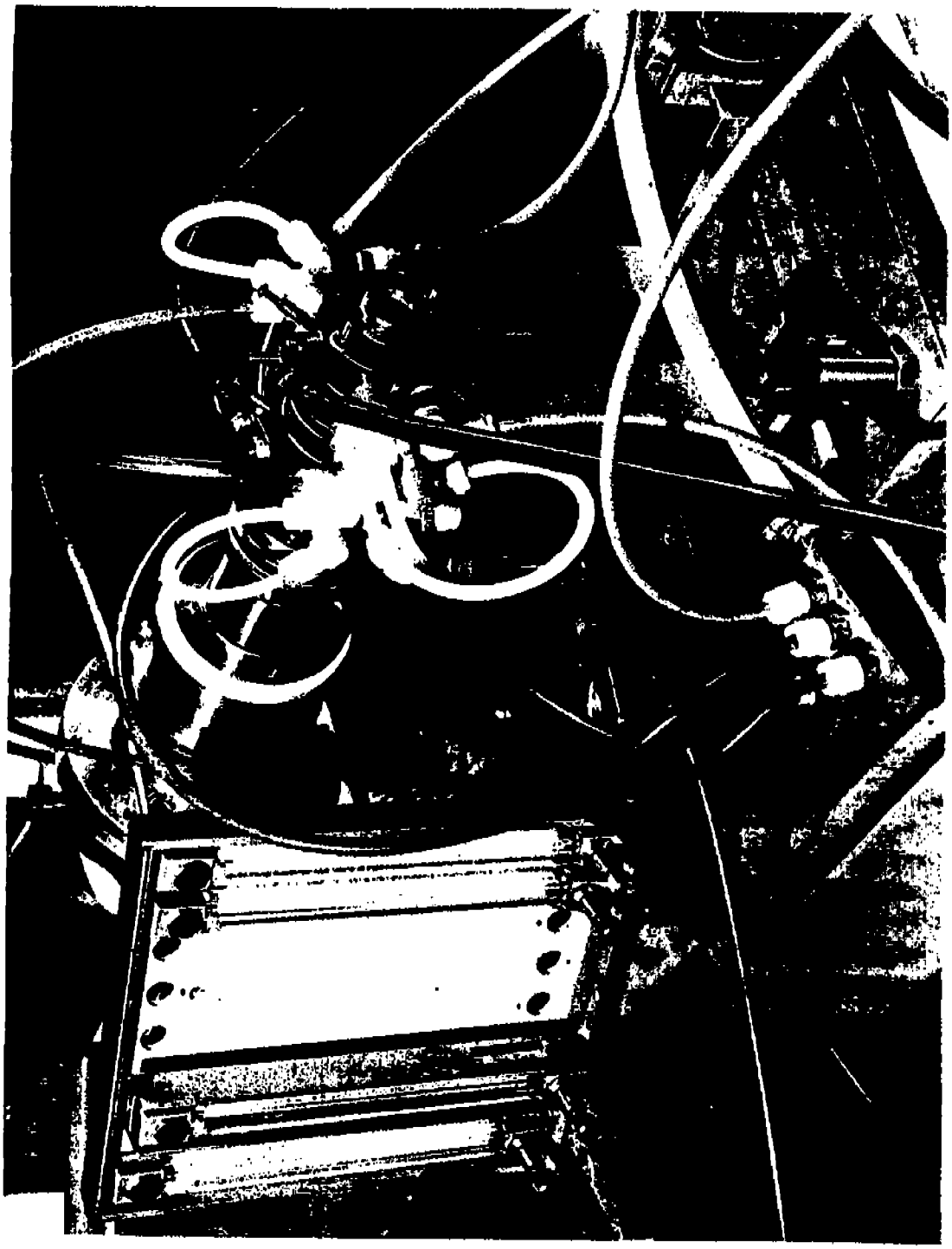


FIGURE C-7

National Bureau of Standards
National Measurement Laboratory

Center for Radiation Research

Characterization of the VSTOS in Air

Contract No. RH4-117766

Martin Marietta Denver Aerospace

May 1984

by

Jules Z. Klose

Fig. 1. Horizontal map of i.c. lamp no. 1 in STOS [illegible]

at 2625 Å

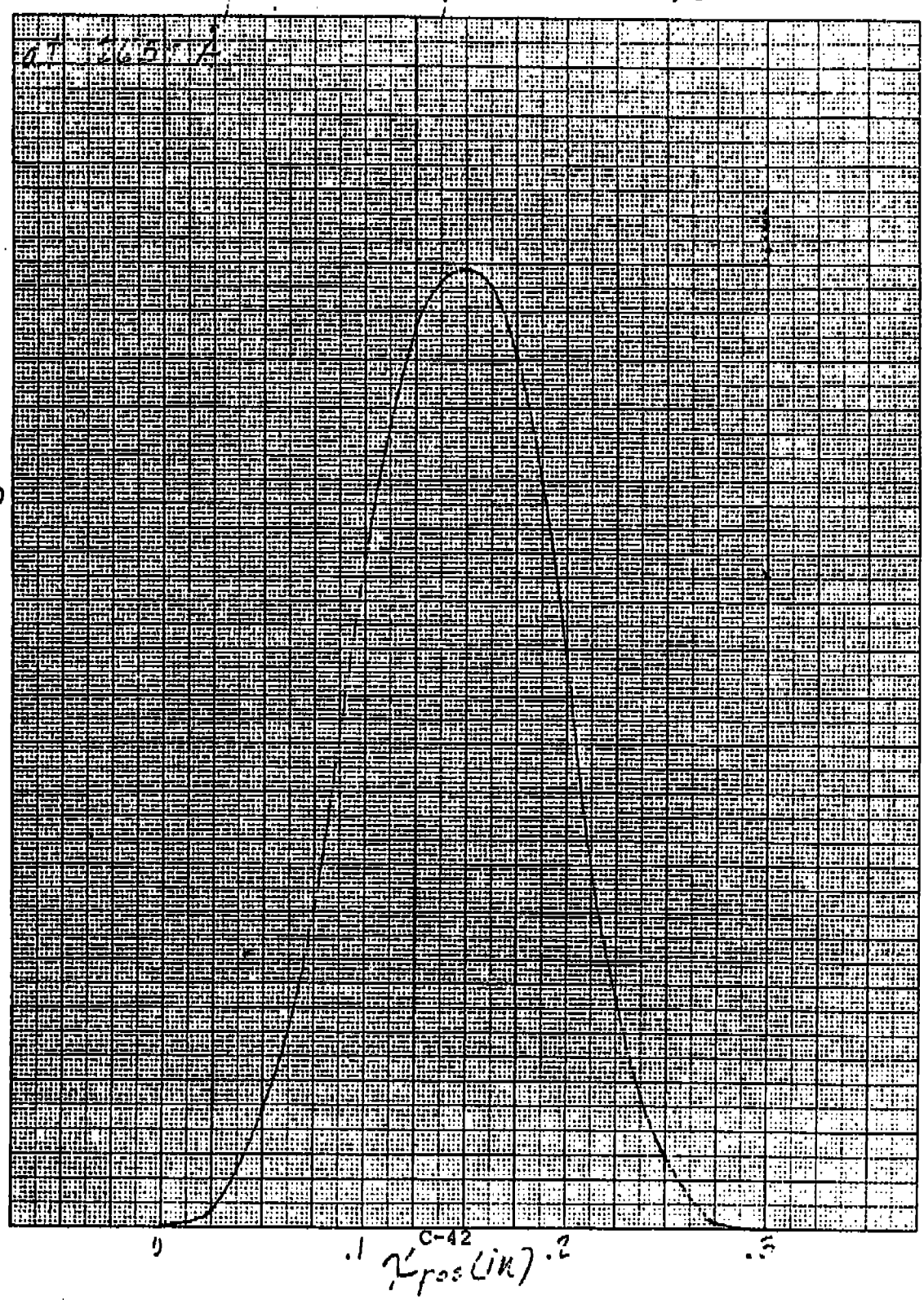


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Fig. 2. Vertical map of h.c. lamp no. 1 in STJS in air at 3659 Å.

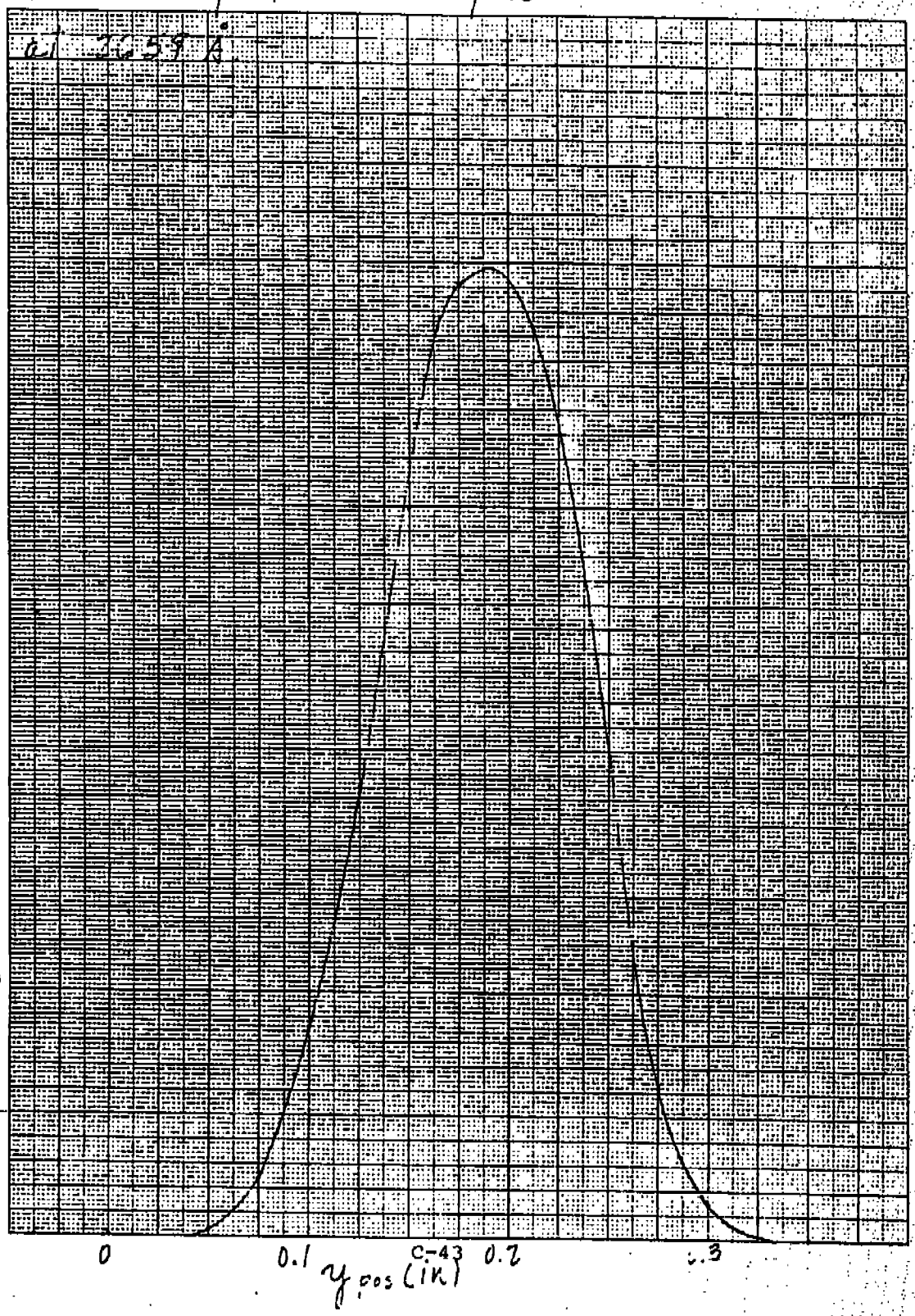

Fig. 3. Angular map of k.c. lamp #1 in STOS at 26.59 Å

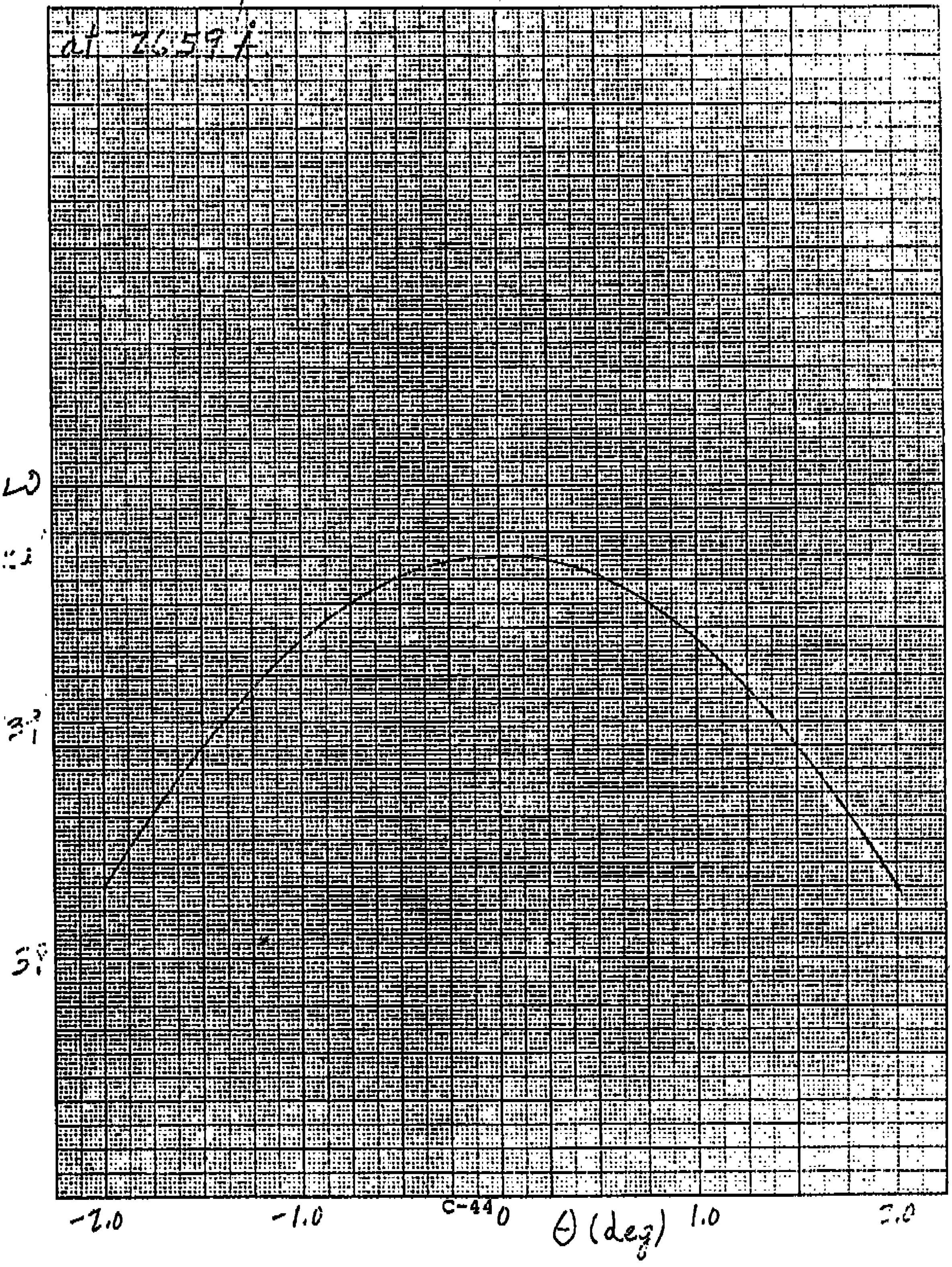

Fig. 3a. Focal map in air of h.c. lamp #1 in STOS at 2659 A.

Moving 0.3 in away from focus in the Z direction produced a drop in signal of 3%.

Fig. 4. Horizontal map in air of h.c. lamp #2 in STJ

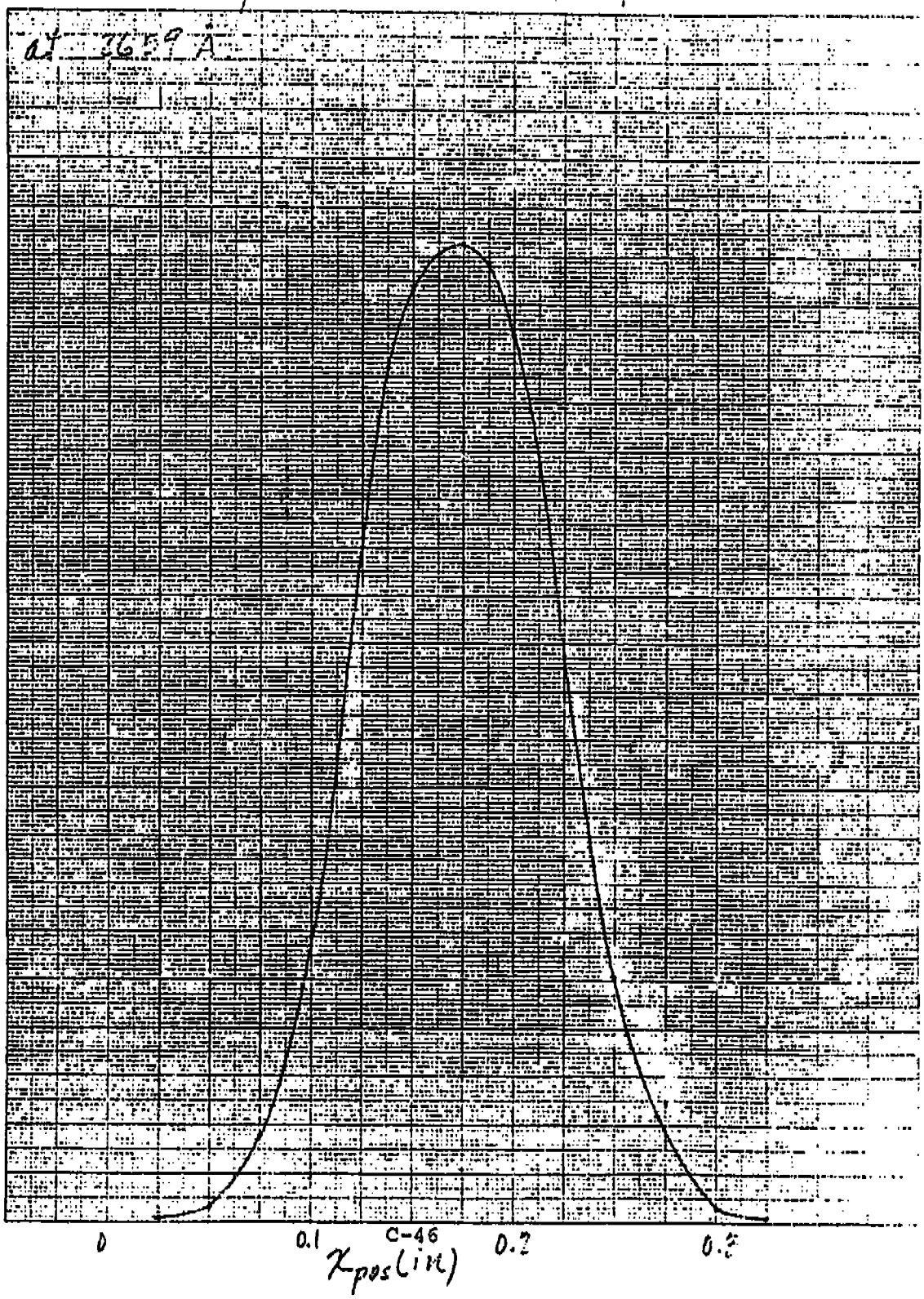

Fig. 5. Vertical map in air of h. c. lamp #2 in STF

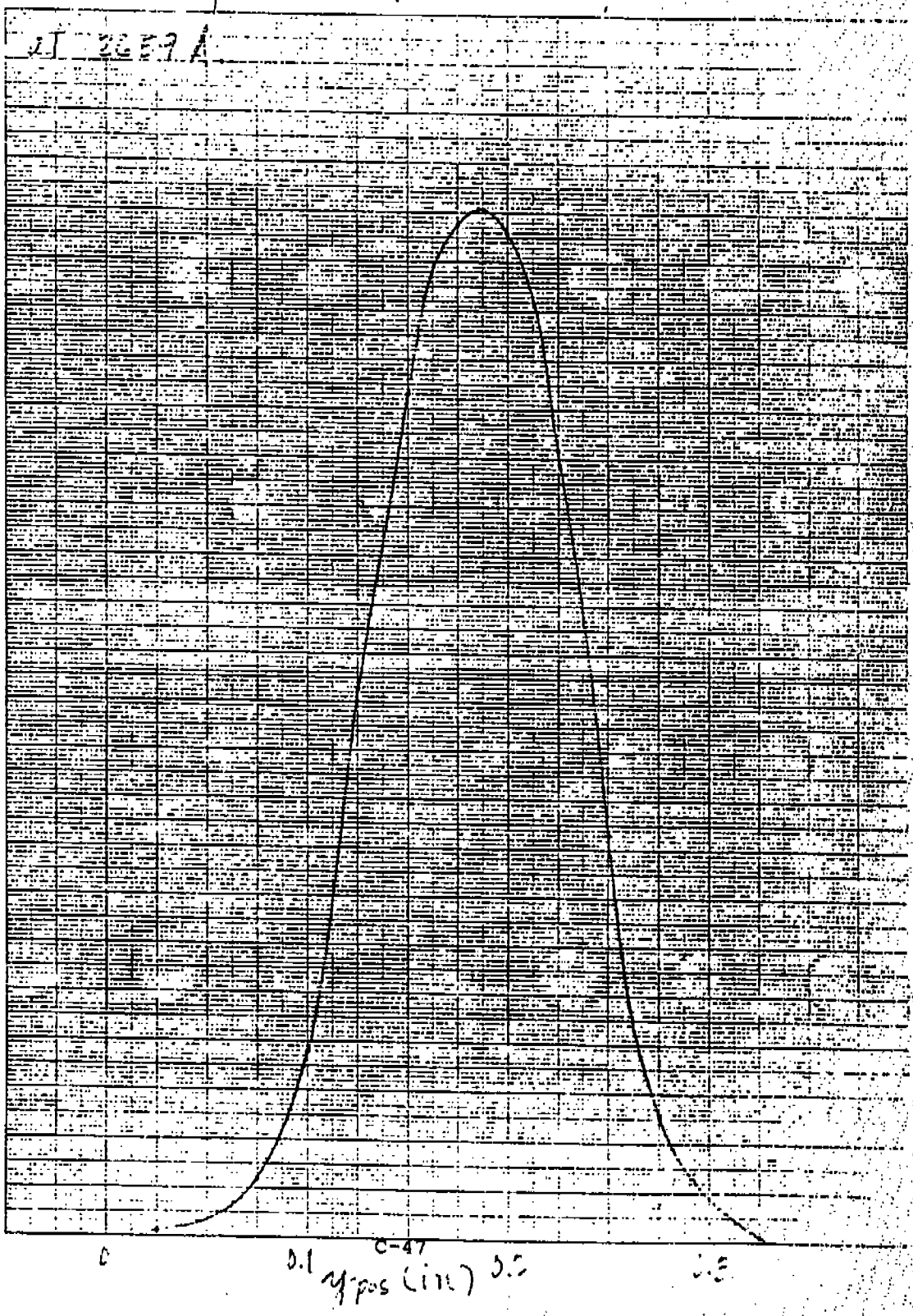

Fig. 6. Angular map in air of h.c. lamp #C in ETOS at 2659 Å

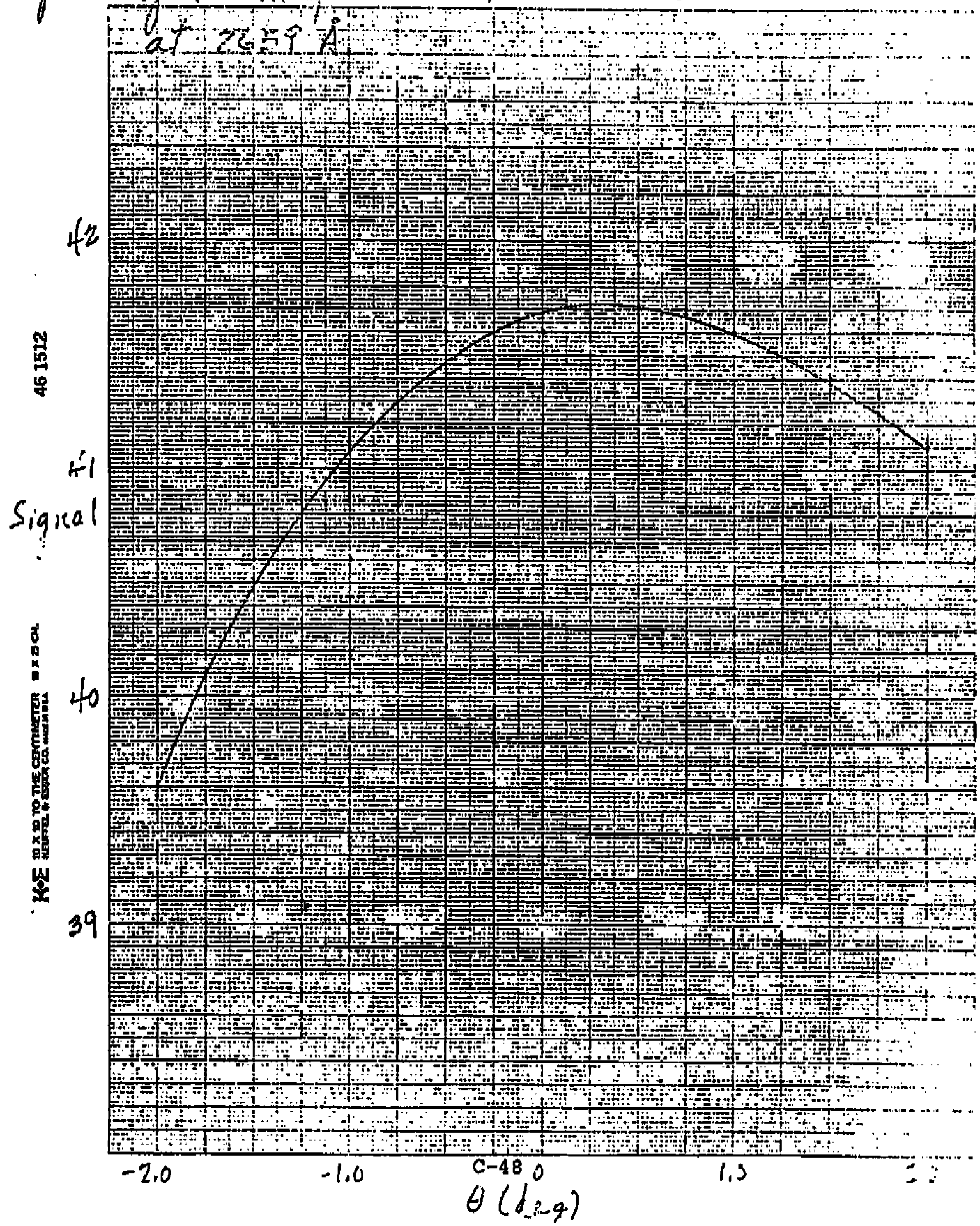

Fig. 7. Horizontal map in air of h. c. lamp #C in STD. at zero order.

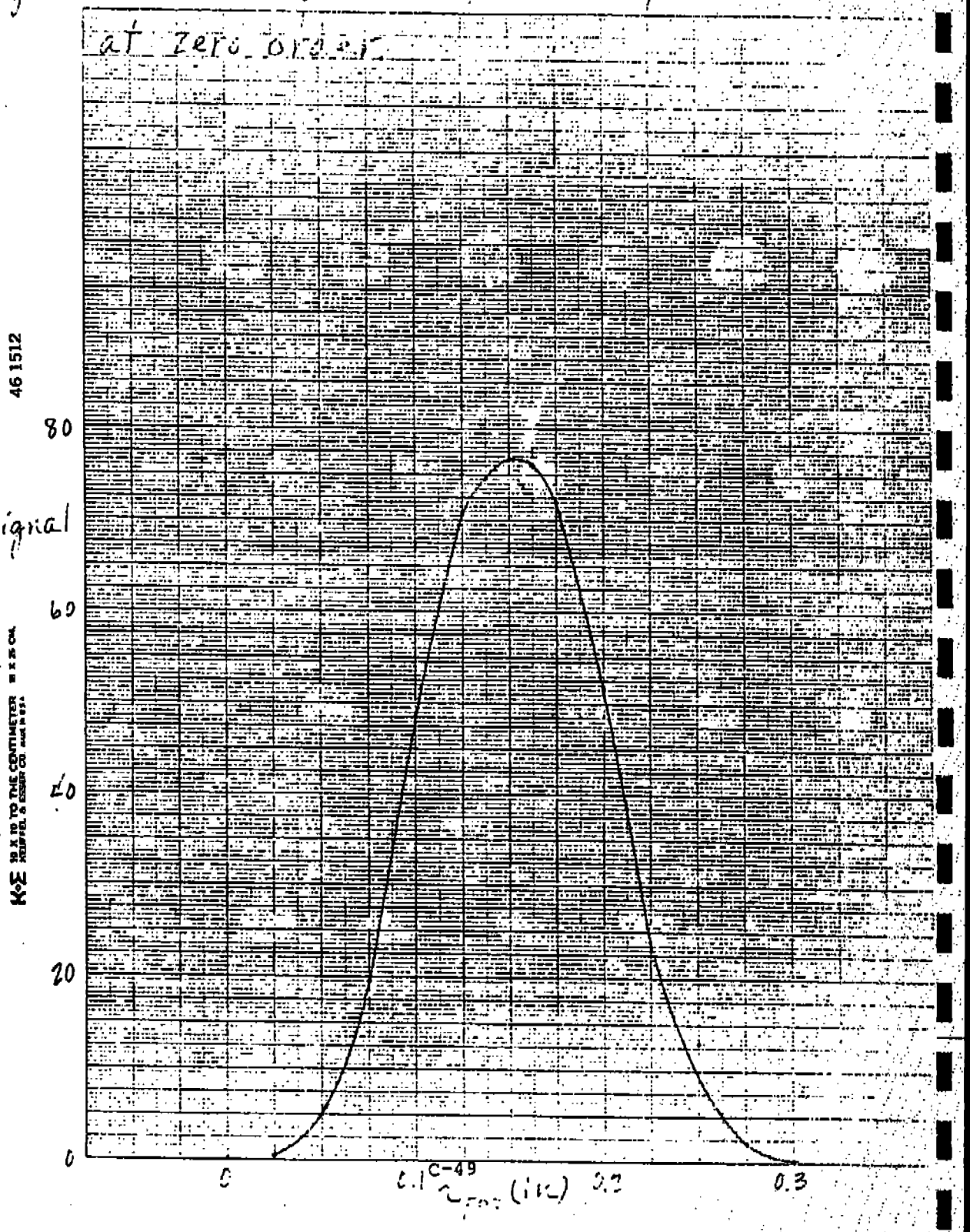

Fig. 8. Angular map in air of h. c. lamp #2 in STDS at zero order

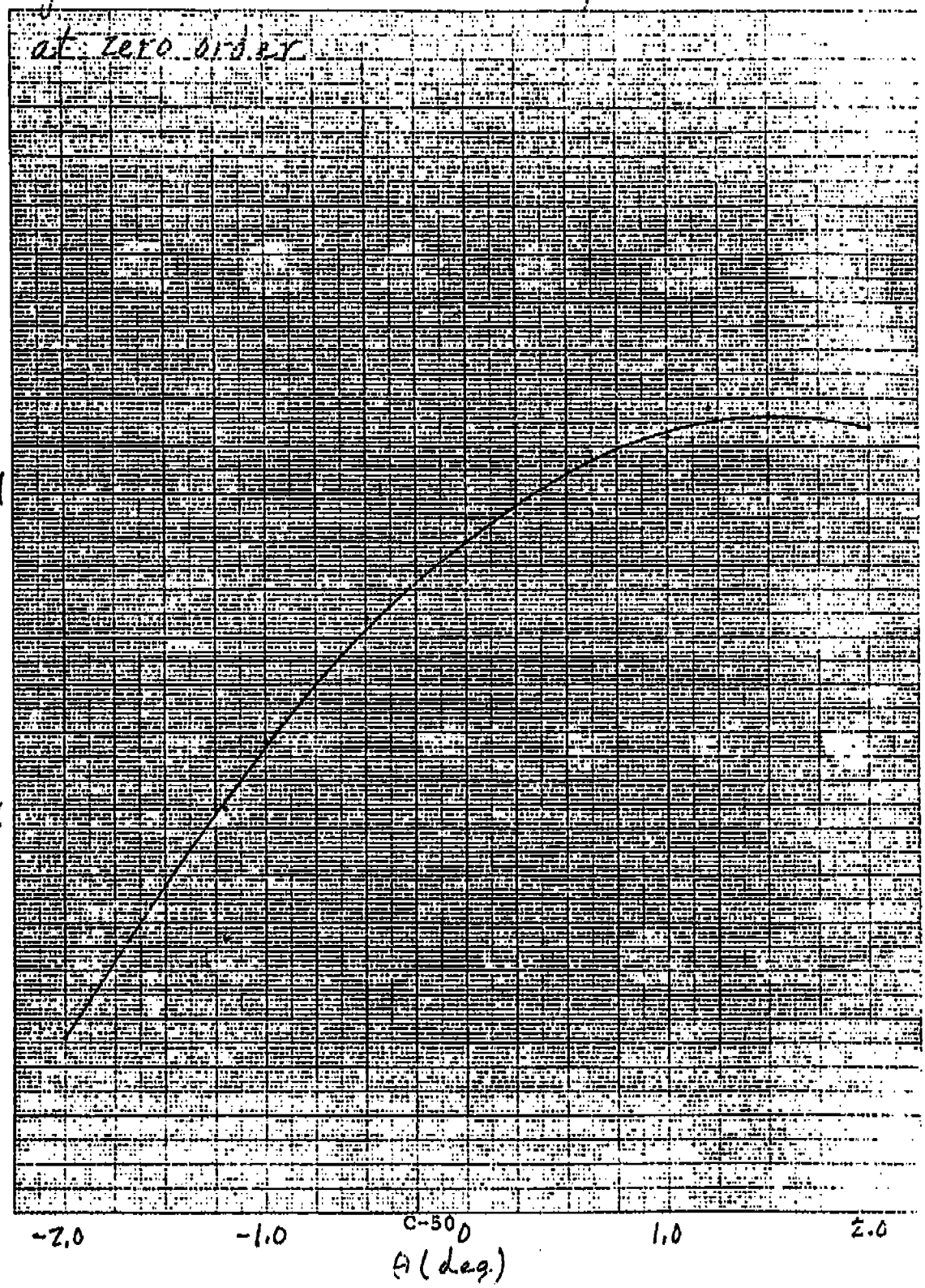

Fig. 9. Horizontal map in air of h.c. lamp #1 in STDS with one 8-μ diffusing surface at zero order

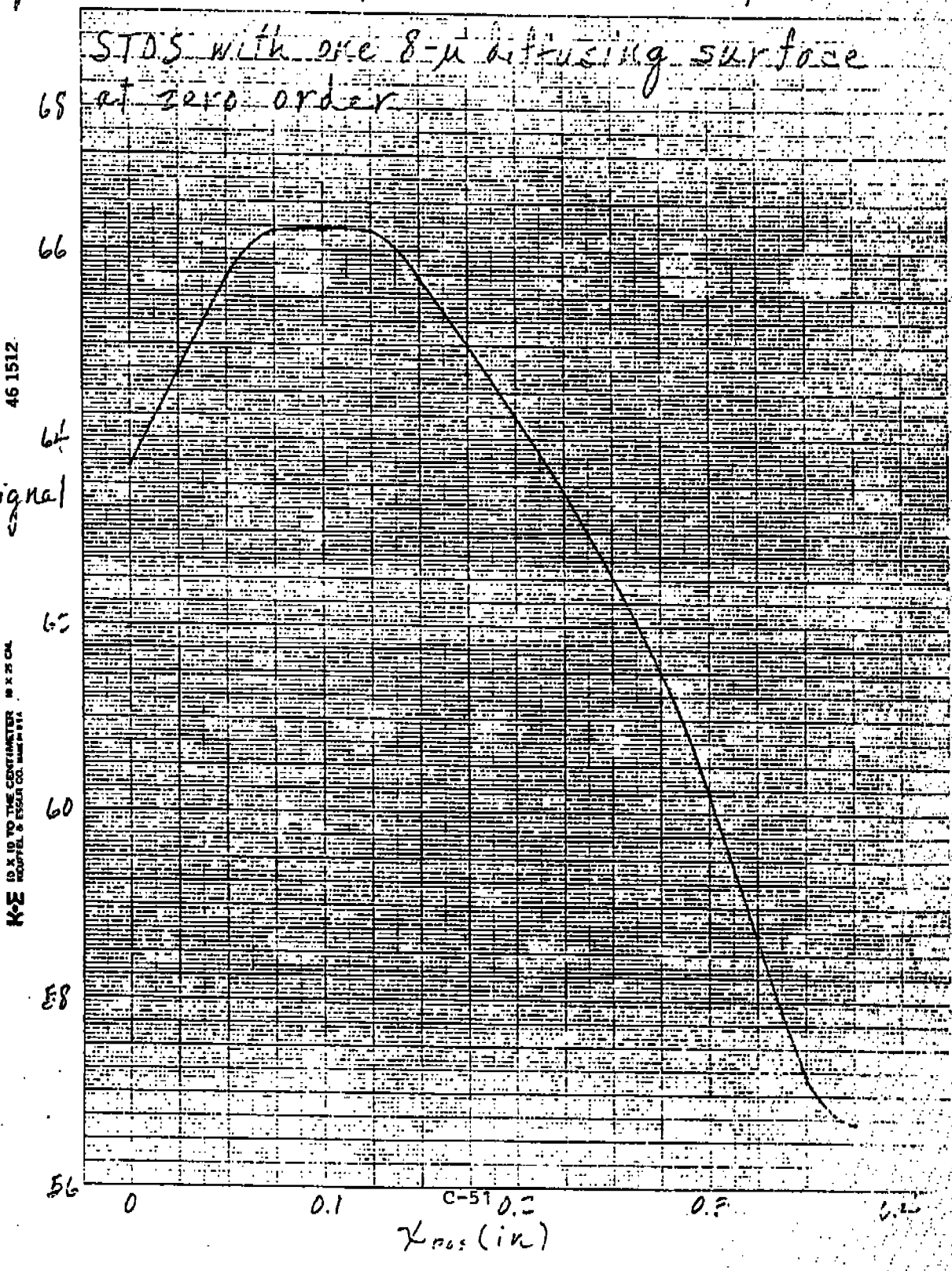

Fig. 10. Angular map in air of h. c. lamp #1 in STOS with one 8-μ diffusing surface at zero order.

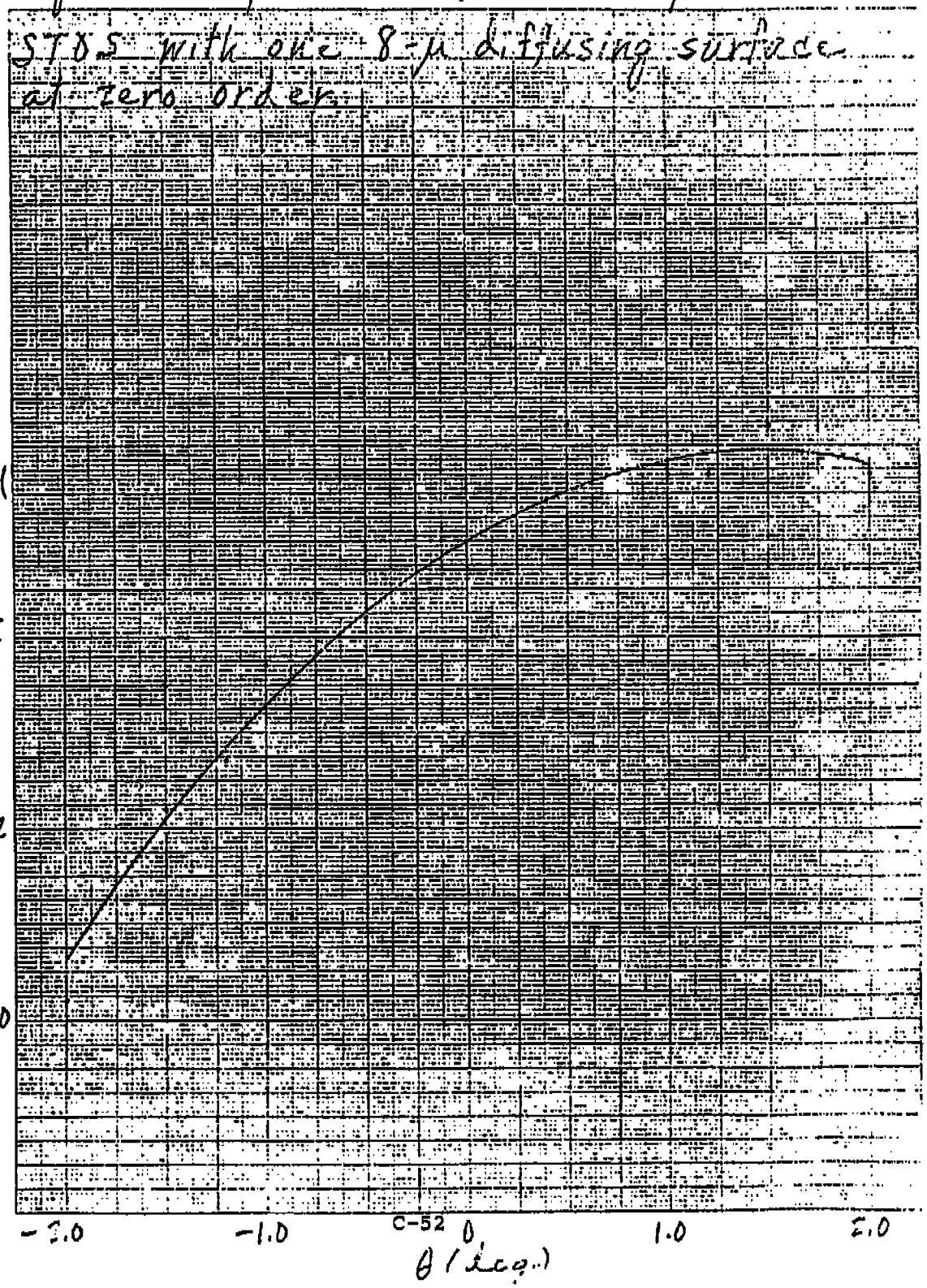

Fig. 11. Horizontal map in air of h.c. lamp #2 in SIOS with one 8-μ diffusing surface at zero order.

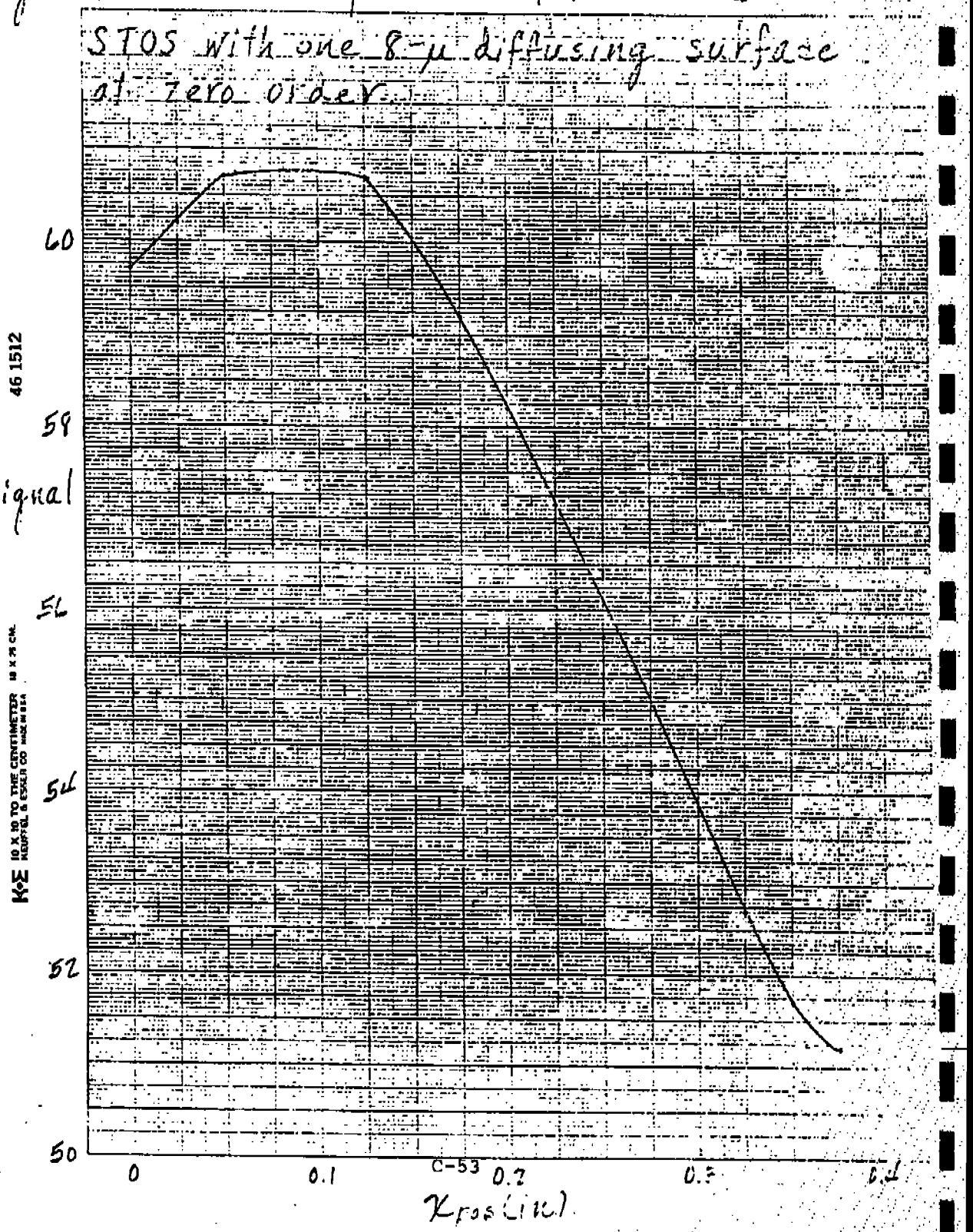

Fig. 12. Angular map in air of h. c. lamp #2 in STOS with one 5 μ diffusing surface at zero order

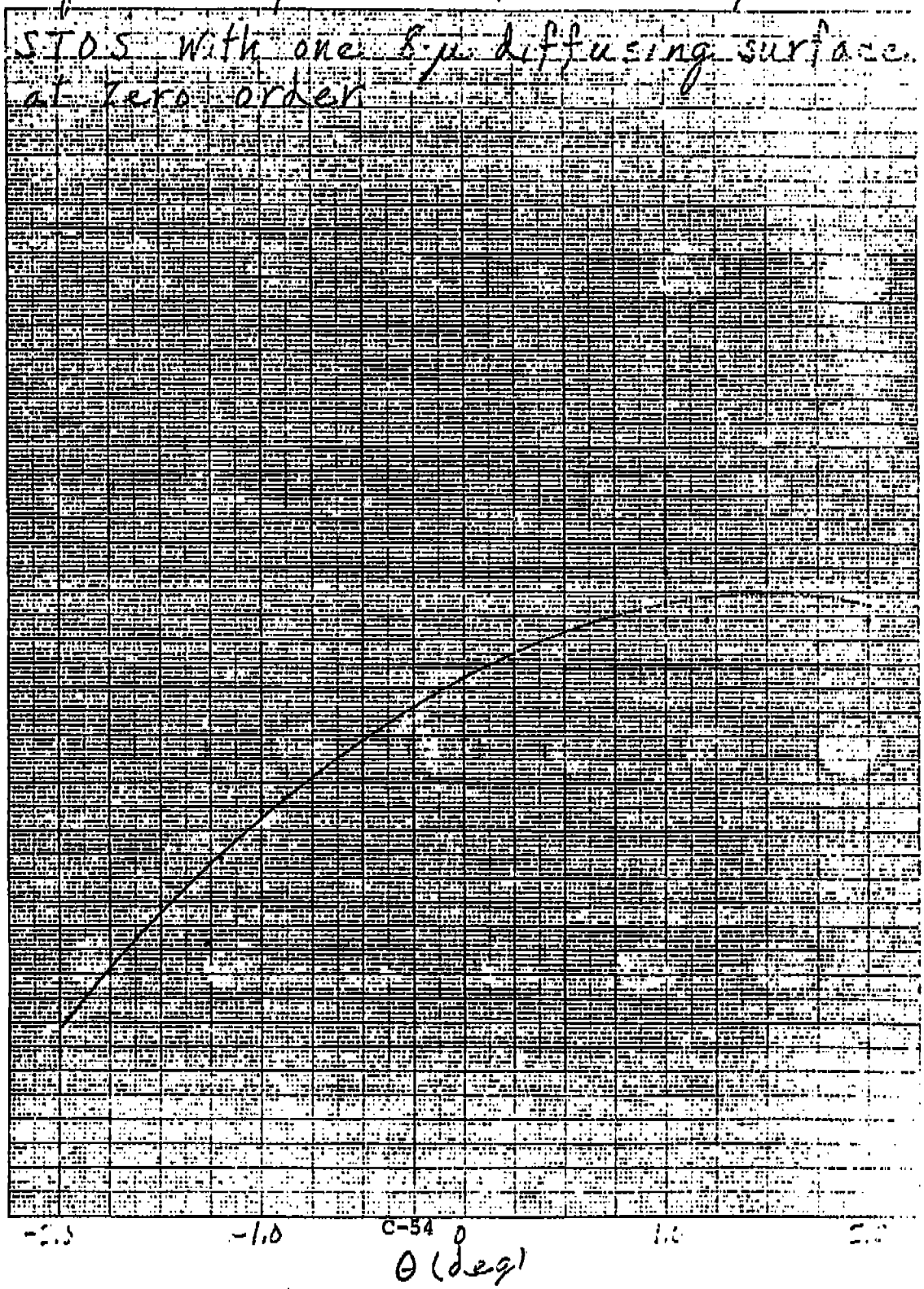

Table I. Reproducibility at 2659 A of positioning of h.c. lamps 1 and 2 using the STOS carousel.

Lamps	Sequence for positioning	Signal at peak	Signal .0375 in off peak
1	1-0-1	38.3	21.5
	1-4-0-1	38.7	21.7
	1-3-0-1	—	21.7
2	1-4	40.4	—
	4-0-4	40.4	27.0
	4-0-1-4	40.5	27.0
	4-0-2-4	40.1	27.0
	4-0-3-4	40.0	27.0

Table II. Line irradiances of Pt-Cr-Ne lamps 1 and 2 operated at 10 mA in the STOS.

λ (nm)	Species	E_1 (μW • cm^{-2})	E_2 (μW • cm^{-2})
191.608	Ne II	0.0309	0.0333
217.467	Pt I	0.0105	0.0113
244.006	Pt I	0.00933	0.00998
246.744	Pt I	—	0.00640
248.717	Pt I	0.0173	0.0184
262.803	Pt I	0.0121	0.0130
273.396	Pt I	0.0164	0.0176
283.030	Pt I	0.0234	0.0251