FILE
9973 Cg
945

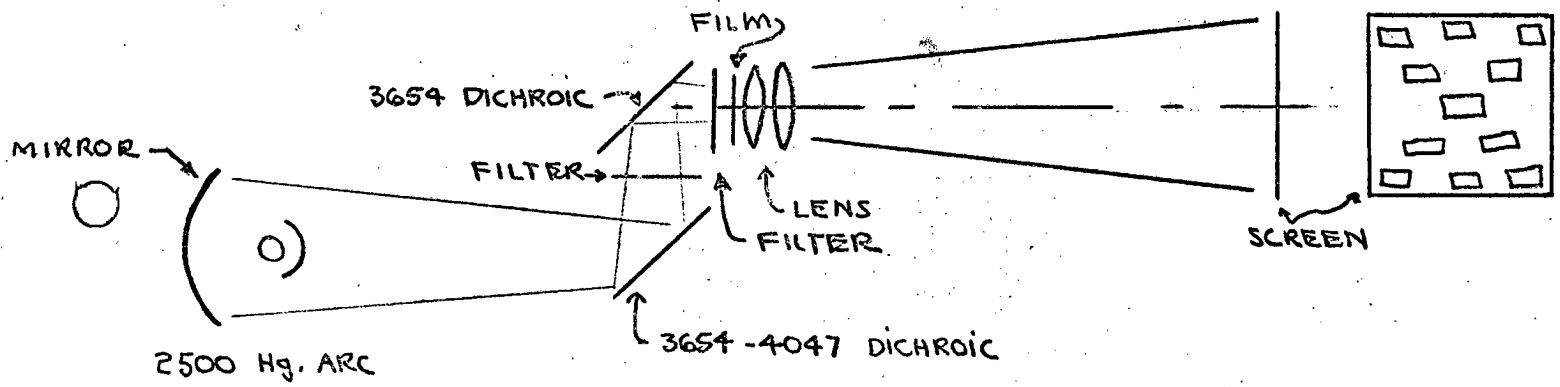
FEASIBILITY TEST OF FLUORESCENT SCREEN

43-1303-37

DONE; 7-8-65

I SYSTEM RESOLUTION

A. THE SYSTEM WAS SET UP AS FOLLOWS:



B. FROM PREVIOUS RESULTS IT WAS DETERMINED THAT SCREEN #175 GAVE THE OPTIMUM RESOLUTION USING THE 70 mm RESOLUTION TEST TARGET SO IT WAS USED TO DETERMINE THE SYSTEM RESOLUTION AT 9 POINTS WITHIN THE 30"x 30" FORMAT. THE TARGET SEEN AND THE CORRESPONDING RESOLUTION FOR EACH POSITION WERE RECORDED. (12X)

7-4 ⇒ 181 ℓ/mm

7-5 ⇒ 203 ℓ/mm

7-5 ⇒ 203 ℓ/mm

7-4 ⇒ 181 ℓ/mm

7-6 ⇒ 228 ℓ/mm

7-4 ⇒ 181 ℓ/mm

7-5 ⇒ 203 ℓ/mm

7-5 ⇒ 203 ℓ/mm

7-4 ⇒ 181 ℓ/mm

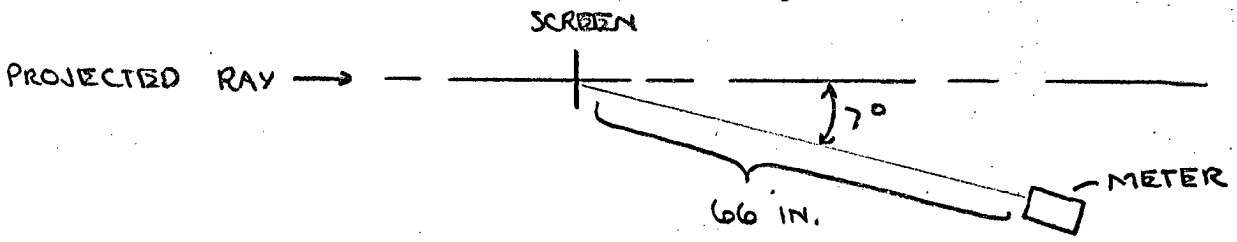
II BRIGHTNESS TEST

A. THE 6 BEST SCREENS AND SEVERAL OTHERS WERE PLACED AT THE IMAGE PLANE AND THE BRIGHTNESS OBSERVED.

EQUIPMENT :

1. SPECTRA BRIGHTNESS SPOTMETER.

SETUP :



RESULTS :

SCREEN	BRIGHTNESS (FT-LAMBERTS)	
160	5.4	(.2 BACKGROUND)
178	5.2	"
175.	5.6	"
172	5.5	"
158	5.1	"
159	5.0	"
25	2.8	"
15	2.3	"

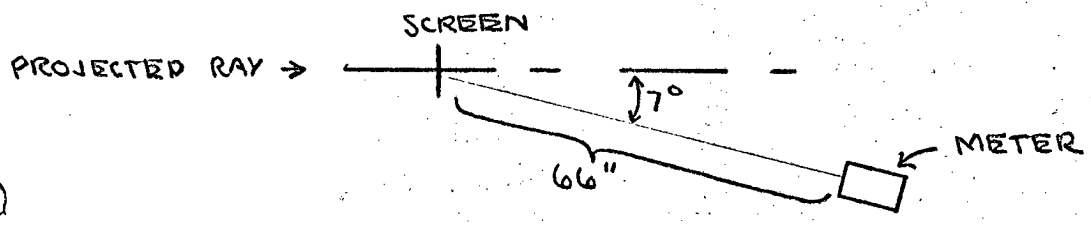
III CONTRAST

A. AGAIN USING SCREEN #175, A STANDARD 21 STEP WEDGE WAS INSERTED AT THE FILM PLANE AND THE FLUORESCENT CHANGE IN FOOT-LAMBERTS READ AS WEDGE WAS MOVED ACROSS THE AXIAL POSITION. WEDGE DENSITY AS A FUNCTION OF SCREEN ILLUMINATION WAS RECORDED.

EQUIPMENT:

1. SPECTRA BRIGHTNESS SPOTMETER
2. SCREEN # 175
3. KODAK STEP TABLET #3

SETUP:



RESULTS:

WEDGE	DIFFUSE DENSITY	READING (FT-LAMBERTS)
0	—	5.6
GLASS	—	5.0
1	.05	3.0
2	.19	2.0
3	.34	1.35

III CONTRAST (CONTD.)

WEDGE	DIFFUSE DENSITY	READING (FT-LAMBERTS)
5	.63	.70
6	.79	.57
7	.94	.50
8	1.09	.45
9	1.24	.40
10	1.40	.40

NOTE; CHANGES TO WEDGE 13 (D~ 1.86) COULD BE SEEN BY THE EYE.

IV RADIATION LOBE

A. 5 OFF AXIS POSITIONS WERE USED TO OBTAIN THE RADIATION LOBE OF SCREEN #175.

EQUIPMENT;

1. SPECTRA BRIGHTNESS SPOTMETER
2. SCREEN #175

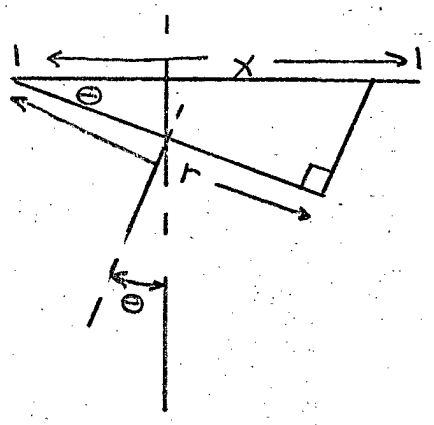
SETUP: . THE METER WAS MAINTAINED 66 IN AWAY FROM THE SCREEN AND THE ANGLE BETWEEN METER AND THE PROJECTOR AXIS VARIED.

IV RADIATION LOBE (CONTD.)

RESULTS:

ANGLE (OFF AXIS)	BRIGHTNESS (FT-LAMBERTS)
7°	5.05
18°	5.15
29°	5.4
42°	5.7
58°	6.0

REVISION: IT WAS NOTICED THAT AS THE ANGLE WAS INCREASED THE SPOTMETER TARGET, CIRCULAR ON AXIS, BECAME ELLIPTICAL OFF AXIS. THIS CAUSED MORE AREA TO BE INCLUDED IN THE BRIGHTNESS MEASUREMENTS AND A CORRECTION MUST BE MADE.



$X = \frac{r}{\cos\Theta}$ WHERE: X = MAJOR AXIS OF ELLIPSE.

r = MINOR AXIS OF ELLIPSE.

Θ = ANGLE OF VIEWING.

AREA OF CIRCLE = $\pi r^2/4$

" " ELLIPSE = $\pi X r/4$

IV RADIATION LOBE (CONTD)

ASSUMING AN ON AXIS CIRCLE OF $X=r=1$ WE HAVE:

$$\frac{\text{AREA OF ELLIPSE}}{\text{AREA OF CIRCLE}} = \frac{\pi r^2/4\cos\theta}{\pi r^2/4} = \frac{1}{\cos\theta}$$

THUS:

ANGLE	$\frac{1}{\cos\theta}$ = RELATIVE AREA OF ELLIPSE.
18°	1.05
29°	1.14
42°	1.34
58°	1.89

BY DIVIDING BY THE ELLIPSE AREA WE OBTAIN A CORRECTED BRIGHTNESS

ANGLE	ORIGINAL BRIGHTNESS (FT-LA)	CORRECTED BRIGHTNESS
7°	5.05	5.05
18°	5.15	4.90
29°	5.4	4.75
42°	5.7	4.25
58°	6.0	3.20

V U-V INTENSITY

A. READINGS WERE TAKEN OF THE U-V INTENSITY AT VARIOUS POINTS IN THE SYSTEM

EQUIPMENT:

1. EPPLEY THERMOPILE
2. MILLIVAC MILLIVOLTMETER
3. BLUE FILTER (USED IN FRONT OF PILE)

RESULTS:

POSITION	FILTERS	READING (MV.)
IMAGE PLANE	0	TOO SMALL
"	BLUE	"
FILM PLANE	0	8.4
"	BLUE	6.1
AFTER LENS	0	1.6
"	BLUE	1.0

CALCULATION OF POWER AT FILM PLANE:

THERMOPILE $\Rightarrow$ .050 $\frac{\text{MICROVOLT CM}^2}{\text{MICROWATT}}$

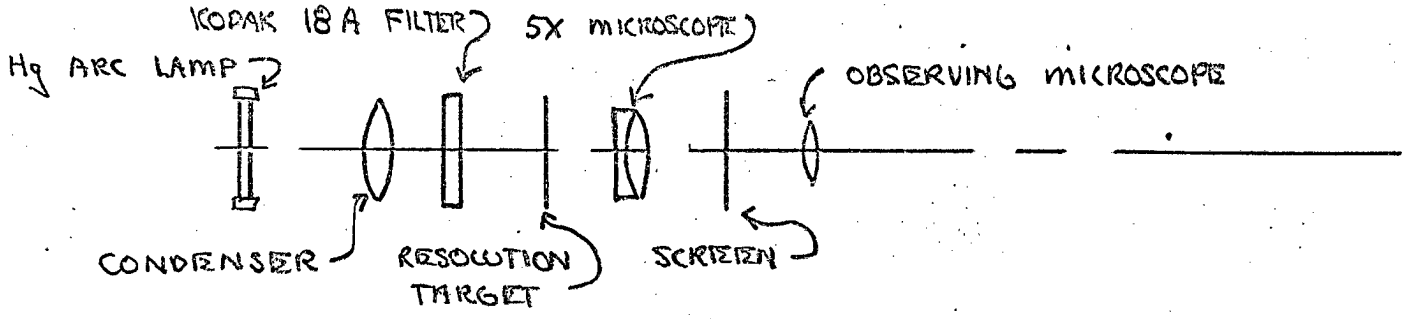
$\therefore$ 8.4 MV = .168 WATTS/CM^2

OUR FORMAT IS 2.25" X 2.25" = 32.8 CM^2

$\therefore$ POWER AT FILM PLANE = (.168)(32.8) = 5.5 WATTS

VI SCREEN RESOLUTION TEST

A. THE TEST EQUIPMENT WAS SET UP AS FOLLOWS:



A STANDARD TARGET IS DEMAGNIFIED 5X AND PROJECTED ON A TEST SCREEN.

RESULTS:

SCREEN	TARGET	L/mm
175	6-4	450
159	5-6	285

STAT