Approved For Release 2005/11/21 : CIA-RDP78B04770A002900020052-3

STAT

STAT

August 24, 1964

@ file

STAT

HIGH RESOLUTION SCREEN

A special projection lens was required for this program in order to get good resolution on the screen for both ultraviolet (3650A) and visual green (5461A). has completed the design and the order for manufacture of the elements was placed with last week. The lens has an 8.034-inch equivalent focal length and will project a 2-1/4 x 2-1/4-inch format onto a 30 x 30-inch screen.

STAT

STAT

With all spherical elements, the lens must be stopped down to about f/5.6. will use all spherical elements for initial testing and they expect to receive the lens from about October 28. With this lens delivery it will be November before the feasibility demonstration can be made.

STAT

STAT

By aspherizing two elements the lens can be opened up to f/2.8. expects to aspherize the lens after the initial tests if more brightness is needed. The lens has six elements plus a field flattener near the film gate, and hopes to get 35% to 40% transmission efficiency of the UV.

STAT

STAT

has completed his investigation of phosphors and a final report is being prepared. The balance of the work will be aimed at producing samples for the feasibility demonstration.

A mixture of organic dyes was most successful. They produce a green to blue green visual color when excited by UV.

There was considerable discussion regarding requirements of the feasibility demonstration. The chief obstacle to a full-scale demonstration is the size of the screen that can be prepared. The laboratory coating techniques will only produce samples about 2-inches square. With some additional arrangements, they can coat samples up to about 12-inches square, but they will probably not be very uniform.

Declass Review by NGA.

Approved For Release 2005/11/21 : CIA-RDP78B04770A002900020052-3

Approved For Release 2005/11/21 : CIA-RDP78B04770A002900020052-3

It appears that a full-scale 30 x 30-inch screen cannot be prepared without considerable tooling expense, perhaps
STAT on the order of [redacted] which is not within the scope of this contract.

So, the question is: What must the feasibility demonstration demonstrate? In my opinion it must demonstrate:

A. Screen Resolution

This can be done by a reduction projection of a resolution target on a 2-inch square screen sample. The illumination can be from a small UV lamp and the visual light from the screen can be observed with a microscope. It is anticipated that over 100 lines per millimeter resolution at the screen will be obtained.

B. Gray Scale Rendition

This can be done by illuminating a 2-inch square screen sample with UV and placing a standard density step strip over the sample so that it intercepts the UV. It is anticipated that individual density steps will be readily observed over at least half the 21 steps of a standard strip.

C. Brightness Variation with Viewing Angle

A larger screen would be desirable to demonstrate this feature. A continuous tone image could be projected onto 6-inch square (or larger) screen which could be viewed from any angle. It is expected that the brightness will remain almost constant regardless of the angle from which the screen is viewed.

D. Maximum Phosphor Brightness Capability

STAT [redacted] has not found any limitation on how brightly the phosphor will glow. There must be a saturation point, but they have not observed it yet. As the UV brightness increases, the visual brightness also increases. This can be demonstrated by intense UV flooding of a small coated screen and observing the increasing brightness as the screen is moved closer to the source. It is anticipated that phosphor brightness can be increased to the dazzling point.

E. General Suitability for Rear Projection Viewing

For general suitability, the largest possible screen

Approved For Release 2005/11/21 : CIA-RDP78B04770A002900020052-3

Approved For Release 2005/11/21 : CIA-RDP78B04770A002900020052-3

up to 30 inches x 30 inches is desirable. Various people should try viewing to determine qualitatively the effect of the transparent screen, the color, ambient room light levels, group viewing. A very important point to determine is whether a fixed projection magnification can be used for general viewing and a small auxiliary magnifier used to resolve fine detail on the screen.

There are several important items that this program does not do and has not attempted to do. One is the lamp brightness. At present there is no substitute for brute force power and multi-kilowatt lamps are needed for adequate brightness in shadow areas.

Another is automatic projection dodging. The highlight areas may be dazzling bright and the shadow areas under illuminated.

At this point in time, I have reached two conclusions and I will pass them on as recommendations. I am assuming that the feasibility demonstration will be technically successful. This, I believe, is well assured. Whether or not it will be convincing without a large screen display is not at all assured.

Assuming a posture of success, however, there are two areas which urgently need defining.

A. Further phosphor coating investigations.

B. Configuration of an experimental or prototype projector.

Further phosphor coating work I suggest be a long-term program covering:

Theoretical study of the fundamental energy conversion process and its efficiency. (Perhaps some research money should be solicited for support of this phase at a university.)

Search for phosphors of greater brightness and establishment of precision brightness measuring techniques which are simple and quick.

Measurement of phosphor fading and prediction of phosphor life.

Search for color variations and color control by mixing.

Approved For Release 2005/11/21 : CIA-RDP78B04770A002900020052-3

Approved For Release 2005/11/21 : CIA-RDP78B04770A002900020052-3

Preparation of multilayer, multicolor phosphors.

Determination of the effect of different coating techniques.

Comparison of the effect of opaque and transparent phosphors.

An experimental projector perhaps should be a room type installation rather than a machine. I suggest it concentrate on:

Preparation of large screens of uniform quality up to 6-ft high by 12-ft wide.

Utilization of large kilowatt lamps with special heat control and dissipation to keep the film gate cool.

Use an existing film transport.

Production of a large f/stop projection lens with high UV transmission efficiency for UV region only and which will cover a full 9-inch wide aperture.

STAT

Approved For Release 2005/11/21 : CIA-RDP78B04770A002900020052-3