SECRET
(When Filled In)

25X1

REQUEST FOR TRAVEL AND/OR CONTACT

☐ TRAVEL ☐ CONTRACT CONTACT ☐ BOTH

MODE OF TRAVEL	EXCESS BAGGAGE	BAGGAGE WEIGHT	RENTAL CAR	TRAVEL ADVANCE
POV	☐ YES ☒ NO		☐ YES ☒ NO	☐ YES ☒ NO

COVER ORDERS	TYPE COVER ORDERS	COURIER ORDERS	TYPE COURIER ORDERS
☐ YES ☒ NO	---	☐ YES ☒ NO	---

ID CARD	TYPE ID CARD	CLEARANCE CERTIFICATION	CLEARANCE CERTIFICATION
☒ YES ☐ NO	CIA	☒ YES ☐ NO	

TYPE OF TRAVEL ☐ OPERATIONAL SUPPORT ☐ PROFESSIONAL SOCIETY ☐ TRAINING ☐ EOD
☐ PERSONNEL RECRUITMENT ☒ RESEARCH & DEVELOPMENT ☐ OTHER *(specify)*

DETAILED ITINERARY & PURPOSE *(Name, address & phone of persons & places to be visited and specific purpose & time of each appointment. In contract cases, indicate each company to be visited and whether it is precontract or contract. Al indicate whether contract is SC-0 or SC-1.)*

23 February 1966 - Want to make unclassified visit to Navy Reconnaissance & Technical Support Center, Suitland, Maryland.

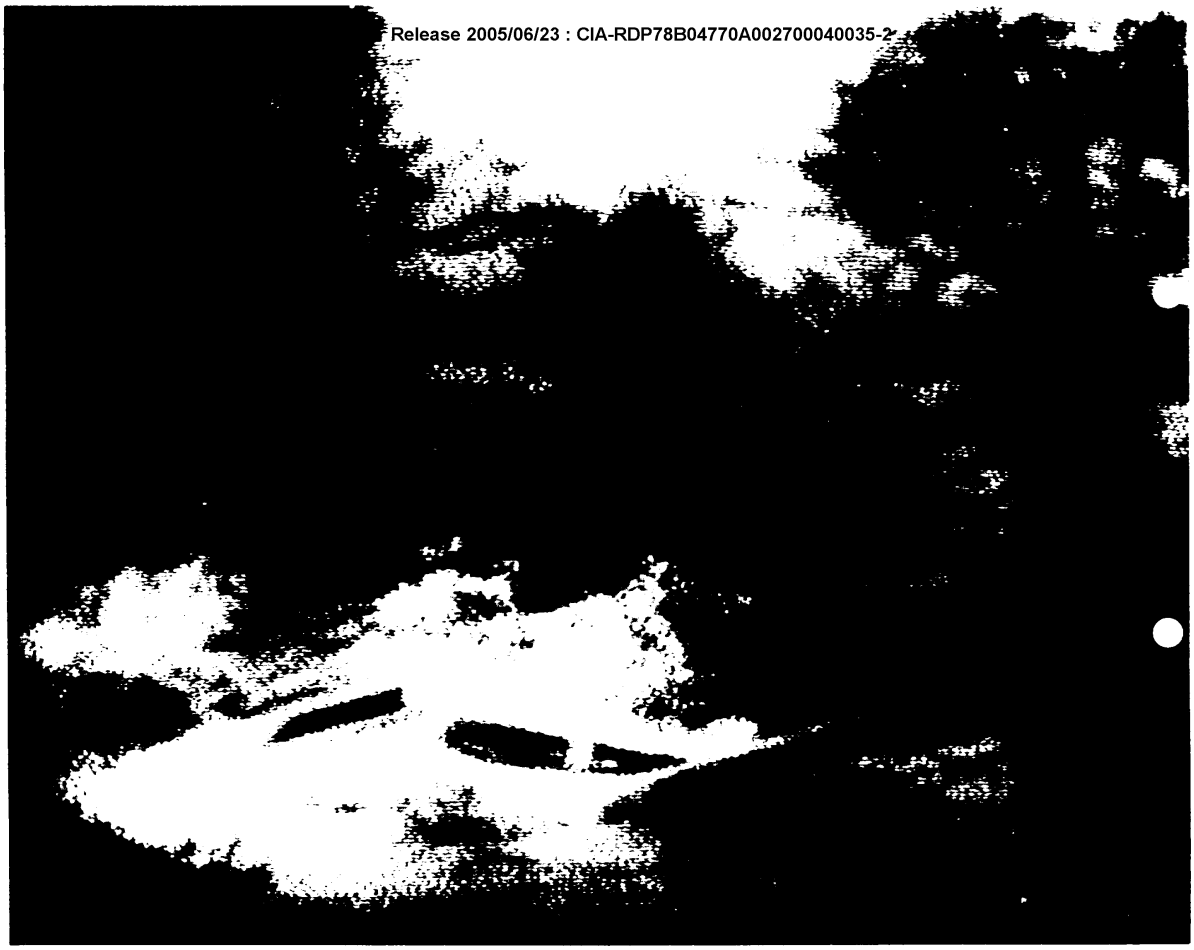
To observe 1000 Scan Line TV System.

Will be with [redacted] Assistant Head Evaluation Dept 25X1

Declass Review by NGA.

25X1

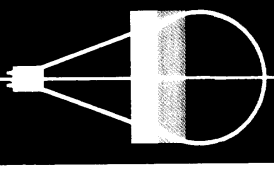
COORDINATION	REQUESTED BY	DATE



ucing PANAURA

"TRANSYLUME"

SCREENS



displays

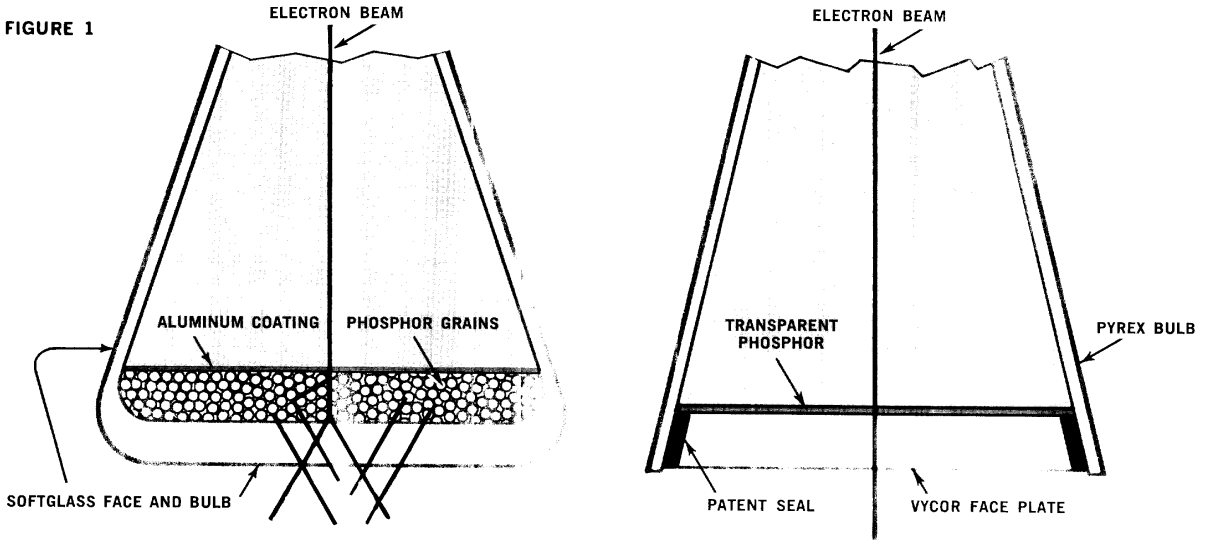
PanAura Corporation has been organized to meet the ever increasing needs for better displays. It is apparent that the **man** in **man-machine** relations must be provided better information, and that it is the display apparatus that is frequently the limiting factor in the **machine.** It is further obvious that simple, effective color, higher resolution, and better visibility in cathode ray tubes can make an important contribution to the solution of the problem.

PanAura Corporation has developed "Transylume" screens to make it possible to build both vivid color and monochrome tubes with improved resolution and daylight viewing capabilities. Today many of the newest radars, data processing systems, avionics systems and oscillography suffer in not being able to reproduce the resolution of the basic systems performance. The "Transylume" screen makes it possible to solve these problems.

PanAura Corporation has improved resolution

The screens are produced by evaporating powdered phosphors and subsequently baking them on a refractory glass substrate. The luminescent films have the same basic properties as the phosphor powders, the same emission color, the same time constants and the same efficiency. The differences are entirely optical arising from the fact that the particles in the film are very small, and therefore absorb, reflect and scatter very little light. On this fact are based the unique properties of the transparent films, their advantages and their limitations. As shown in the first Figure, when an electron beam strikes the conventional powdered phosphor, the light emitted is scattered among a number of particles, reflects from an aluminum backing, and most of it emerges — as a trace considerably broader than the electron beam. When the beam strikes the film, the light generated is emitted in all directions, half of it back into the tube, and an addi-

FIGURE 1



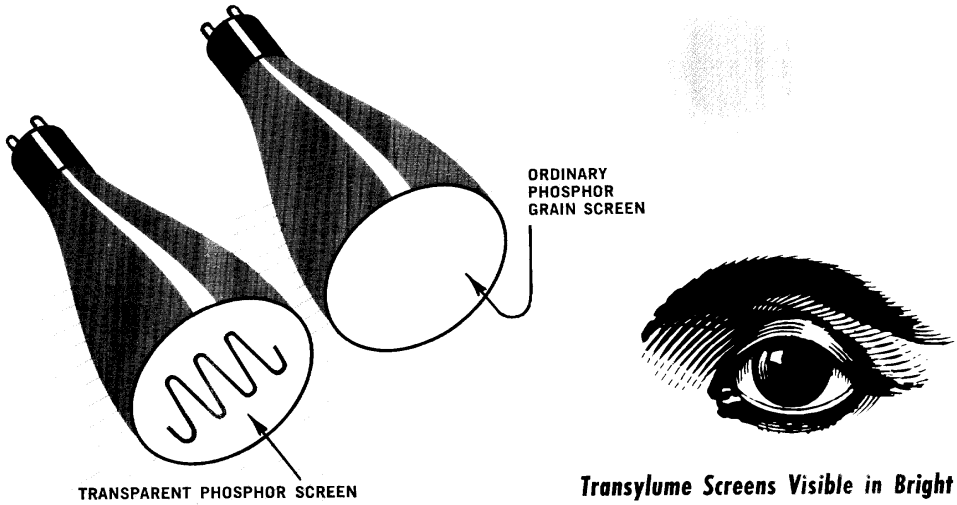
tional fraction (that at greater than the critical angle) trapped in the glass. Therefore, only a fraction emerges toward the viewer, but in a trace just as fine as the electron beam.

A resolution of 5,000 line pairs per inch is readily obtained. Actually the screens are far better than this. Using a new gun structure and focusing principle designed by PanAura, a complete 525 line television picture can be compressed to less than one eighth inch height. All of the details in the picture are readily visible under a microscope, the contrast is excellent, and the image is bright enough to be viewed in high ambient light levels. The limits of resolution which can be obtained cannot be stated—simply because measurements are very difficult beyond 5,000 lines per inch.

PanAura has improved contrast and visibility in high resolution displays

Brightness is reduced by optical losses as previously described, but visibility of the trace is better under most conditions than with powdered phosphors. As shown in the second Figure, ambient light is efficiently reflected from a powdered phosphor screen so that in a well-lighted room, the unlighted background of the screen is about as bright as the luminescent trace of the electron beam, that is, there is not sufficient contrast for the trace to be visible. With the transparent film, ambient light penetrates the screen and is lost in the interior of the tube. Thus, even though the trace on a transparent screen may be only a fraction as bright as the trace on a powdered screen with aluminum backing, the trace on the transparent screen remains easily visible in the brightest light. Neither a six-foot arc searchlight focused on the tube from six feet away or direct sunlight beaming directly into the tube reduces visibility appreciably. "Bright display" which is achieved at the expense of considerable complexity and loss of resolution with powdered phosphor screens is just an inherent characteristic of transparent screens.

FIGURE 2



Transylume Screens Visible in Bright Light

applications

for PanAura Transylume Color Tube Display

ground applications

- Tactical Control Systems
- High Resolution Radar
- Air Traffic Control
- Data Transfer Systems
- CIC Plots

airborne applications

- Countermeasure Displays
- Course and Landing Information
- Reconnaissance
- Target Identification
- Terrain Avoidance Radar

other

- Closed Circuit Television
- Ship Bridge Repeaters
- Multi-Channel Oscilloscopes

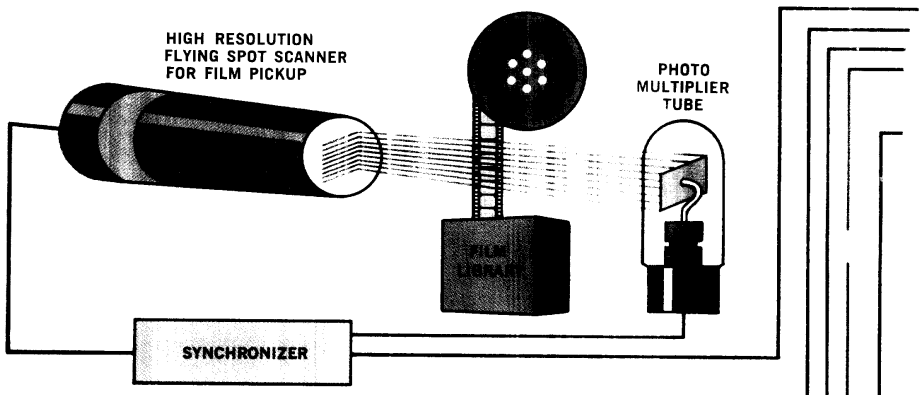
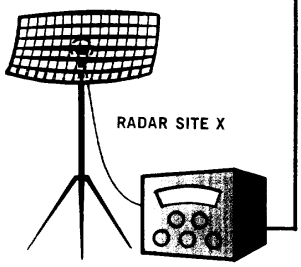


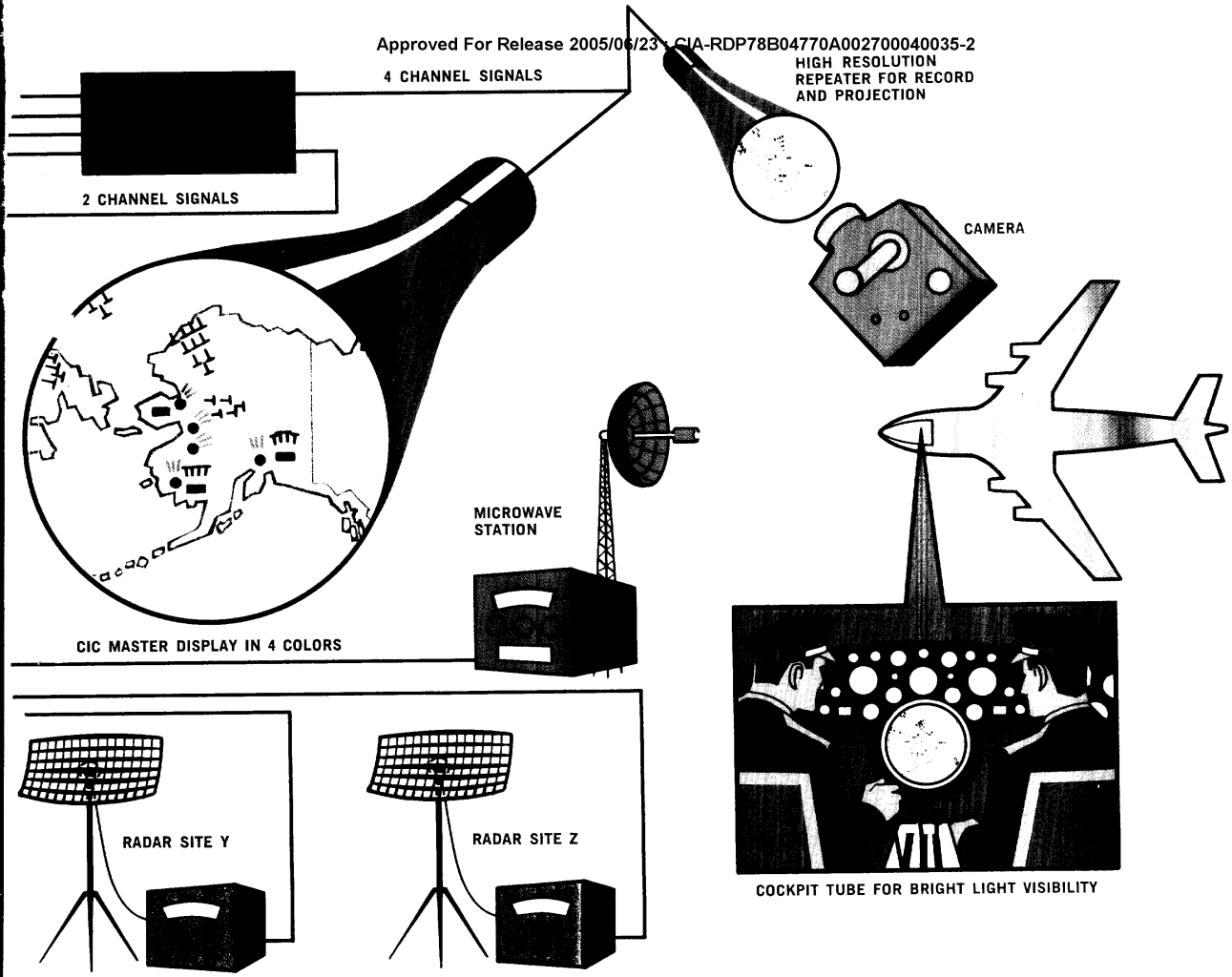
FIGURE 3

applications

for PanAura Transylume Monochrome Tube Display

- Airport Control Towers
- Bright Projection Displays
- Portable Television
- Flying Spot Scanners
- Bright-High Contrast Display





PanAura has
decreased noise

Freedom from noise is another inherent virtue of the evaporated screens. It is difficult to settle powdered phosphors in a perfectly uniform layer, and the difficulty gets worse with small powder settled in a very thin layer as necessary for conventional high resolution tubes. Inevitably the powders are thicker and more tightly packed in some places than in others and consequently more light is emitted from one spot than from a spot immediately adjacent. Evaporated films are inherently more evenly distributed and therefore less "noisy." Measurement techniques commonly used in the CR tube industry to evaluate high resolution screens are, in fact, not adequate to detect any noise in "Transylume" screens. Scanning a three-inch screen with a 0.04" spot detector shows no variation, and more sensitive, higher resolution detectors must be developed to establish the noise limits.

"Transylume" screens can produce
high brightness

Transparent screens have, as previously described, optical losses which reduce brightness compared to powdered phosphors operated under the same voltage and current conditions; but this is a very sensitive function of the degree of transparency. Measurements indicate that two screens which are equally transparent to casual visual examination will differ in brightness by a factor of two. Evaporated screens which are processed to a slightly hazy appearance can have a brightness approaching that of conventional powdered phosphors. Evaporated screens processed to a translucent layer have, in fact, been made which are brighter than settled powder phosphors.

Evaporated "Transylume" screens can thus produce brightness at the expense of transparency and retain an advantage in resolution and low noise compared to settled phosphors. For example, translucent evaporated screens with a brightness approaching that of thinly settled powder phosphors retain a resolution of more than 4,000 line pairs per inch. Screens can thus be tailored for the optimum compromise between resolution and brightness for a particular tube design and performance requirement with the advantage of greatly reduced noise throughout the range of brightness-resolution ratios.

"Transylume" screens
resist burn

Evaporated films after baking adhere very tightly to the glass substrate. The glass thus acts as an efficient heat sink which reduces current saturation due to heating and virtually eliminates phosphor burn. Very unstable phosphors such as some of the fluorides may still deteriorate after a long period at high driving levels; but burn has never been observed in some of the more stable phosphors.

Standard P-1 films have been driven at levels where the electron beam melted the Vycor substrate with no measurable deterioration of the phosphor. Where circuit and electron optics limitations permit, high brightness can be achieved using voltage and current levels that would burn powdered phosphors.

PanAura can
add color
to high resolution displays

Finally, concerning color, evaporated films can be used in any color tube as dots or stripes or whatever geometry is required for existing color tubes — with the advantage of resolution and contrast previously described for single layer films. More unique, however, are the variety of new color systems that can be devised based on tubes in which the screen comprised of multiple layers of transparent films. The color variation depends on the fact that electrons with a particular accelerating voltage all penetrate the luminescent films precisely the same distance, and the depth of penetration varies with voltage by amounts that correspond to reasonable thicknesses of films. Brightness from a particular layer of film therefore increases as voltage is increased to penetrate more of the film. Moreover, as shown in Figure 3, as voltage is increased to the level where electrons penetrate further than the thickness of a particular film, the light output from that film drops off rapidly. Thus, at a relatively low voltage, for example, 4KV, the emission is solely from the top layer of film. At a second voltage, which may be 2 to 4KV higher depending on the thickness of th luminescent films, the emission is virtually the pur spectral emission of the second film. At intermediate voltages the emission is an additive mixture of the two. Thus, if the top layer emits red and the second layer emits green, at intermediate voltages the color emitted changes from red to orange to yellow to green as shown on the additive three color chart in

FIGURE 4

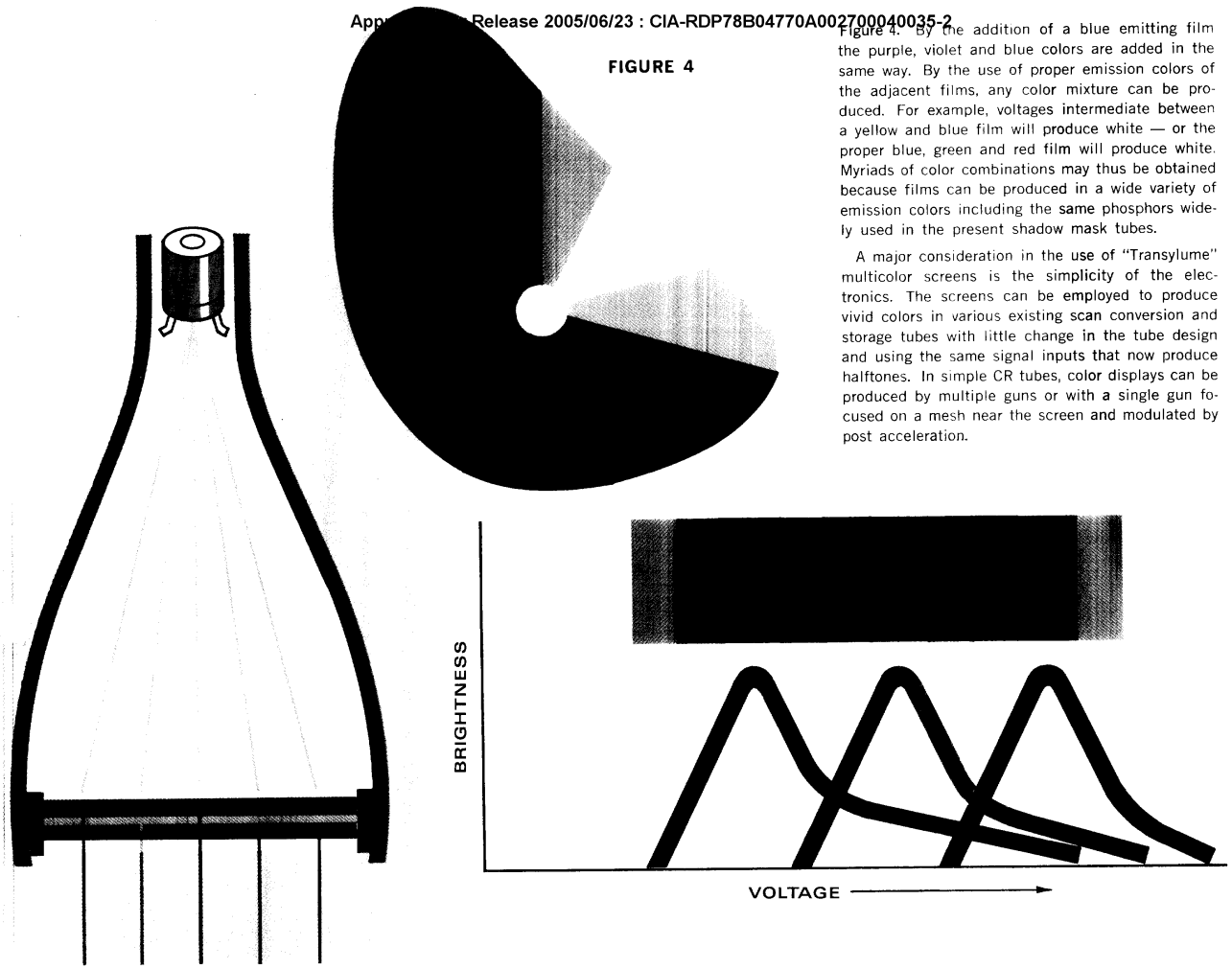


Figure 4. By the addition of a blue emitting film the purple, violet and blue colors are added in the same way. By the use of proper emission colors of the adjacent films, any color mixture can be produced. For example, voltages intermediate between a yellow and blue film will produce white — or the proper blue, green and red film will produce white. Myriads of color combinations may thus be obtained because films can be produced in a wide variety of emission colors including the same phosphors widely used in the present shadow mask tubes.

A major consideration in the use of "Transylume" multicolor screens is the simplicity of the electronics. The screens can be employed to produce vivid colors in various existing scan conversion and storage tubes with little change in the tube design and using the same signal inputs that now produce halftones. In simple CR tubes, color displays can be produced by multiple guns or with a single gun focused on a mesh near the screen and modulated by post acceleration.

PanAura's
contributions
to evaporated CR tube screens

The advantages of transparent screens for high resolution and color change by voltage penetration have been recognized for many years, and numerous efforts were made to produce luminescent glasses and films. Evaporation, sputtering, vapor phase reactions, chemical and electrical deposition were all tried with indifferent success. A big step forward was made by Feldman at the Naval Research Laboratory who first produced bright films in a variety of colors by his process of evaporating and subsequent baking. This work kindled new interest and stimulated considerable effort to copy and modify his process by many organizations but was ultimately abandoned.

It is reasonable, therefore, to ask why "Transylume" screens are useful in the face of limitations which discouraged other organizations in the CR tube industry. The reason lies in a dedicated effort by PanAura scientists which has resulted in solving in a very short period of time a host of critical problems. Contributions have been made in several areas:

(a) Improvements in the process for producing evaporated phosphor screens have improved the quality of screens and increased the number of phosphors available in evaporated form. Many of the standard phosphors and a number not available as powders can be produced.

(b) The important control of the degree of transparency to obtain the optimum brightness — resolution combination was recognized and exploited as previously described.

(c) In contrast to several competing processes, size is no limitation. 21-inch screens of high quality have been demonstrated.

(d) A new gun design and focusing principle have been developed to take advantage of the resolution capabilities of the "Transylume" screens to produce better than 5,000 line pair displays.

(e) A reliable, bakeable, direct seal between a Vycor face-plate with the phosphor screen and soft glass tube necks has been developed for tubes of moderate size.

(f) A compact, reliable voltage modulator has been developed which is capable of several hundred KC color switching, adequate for line or frame sequential systems.

The solution of this battery of problems in phosphor chemistry, evaporation techniques, electron optics, tube construction, and electronic circuitry insures the utility of "Transylume" screens in a variety of applications. It also demonstrates the dedication and capability of PanAura personnel for making contributions to display systems.

applications

PanAura Corporation can meet the needs for the most technically advanced display systems. The corporate capability covers the entire technology associated with displays from the "Transylume" screens through systems design and construction. The screens will be supplied for use in tubes designed by other organizations or tubes of PanAura design can be supplied for systems designed by others. Systems studies and design will also be undertaken by PanAura, particularly in the area of complex display problems where the optimum mixture of color and symbols requires study of human engineering factors.

Some of the obvious applications where display systems would benefit from the extremely high resolution and the rugged, simple color tubes made possible by "Transylume" screens are shown in Figure 4.

PanAura Corporation
CHEMICAL ELECTRONICS
A Subsidiary of The Harshaw Chemical Company

Research Laboratory: ~~946 N. Glebe Road~~ • Arlington, Virginia • Telephone: 525-3374
3105 COLUMBIA PIKE

25X1

SUPPORT SYSTEMS SECTION

[redacted]

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Comments: Does this have anything to do with Dino's problem

JR

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Remarks:

Frank — I received the FBI report from OS — should be forwarded to [redacted]

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REMARKS

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