STAT

August 1, 1970

Ref: W. O. 6847

AIR MAIL

To: U. S. Government

STAT From: [redacted]

Mailing Address: [redacted] STAT

STAT Subject: [redacted]
Improved Lamp Performance

Dear George:

Enclosed are four copies of Monthly Report No. 2 on the subject contract. One copy has been forwarded directly to the Contracting Officer.

Very truly yours,

[redacted] STAT

WAS/ls

August 1, 1970

W. O. 6847

MONTHLY REPORT #2

STAT Contract [redacted]
Improved Lamp Performance

1. Activity

1.1 Luminous Grids

Tests were made on two special phosphors and maximum brightness levels were compared to standard phosphors with all other conditions identical. The phosphors and relative brightness levels were:

	Relative Brightness
Phosphor A	
Standard Lumitone Snow White 6500.	100%
Phosphor B	
Modified Lumitone Snow White 6500, etched.	103%
Phosphor C	
Standard Sylvania Sign White 5500.	100%
Phosphor D	
Modified Sylvania Sign White 5500. Blended with red phosphor additives. No observable color difference.	110%

The phosphors were prepared by MERVAP Cold Light Products, Los Angeles.

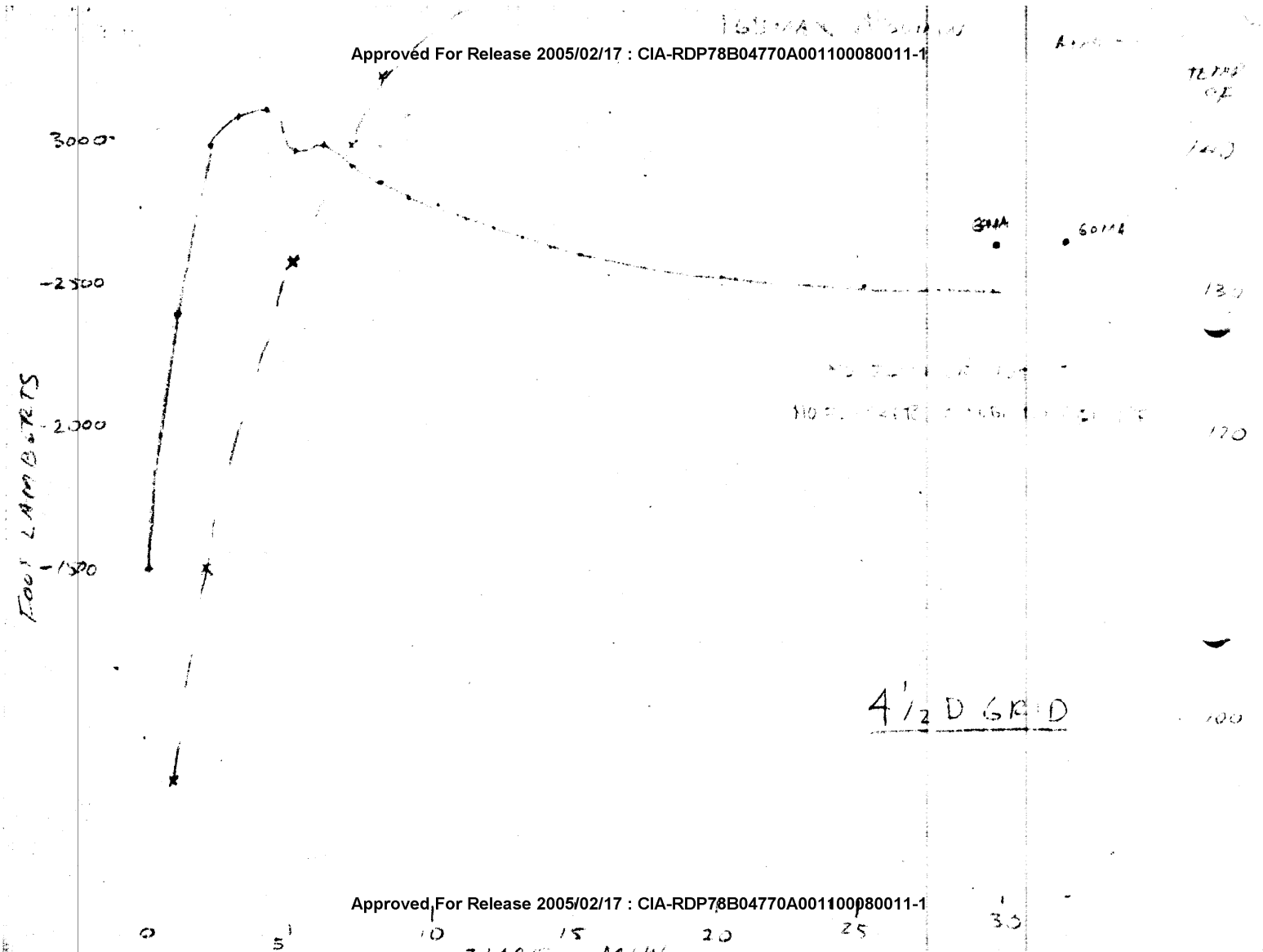
Note that the 6500 and 5500 phosphors were the same efficiency. The 3% improvement obtained by etching the 6500 phosphor is not sufficient to permit recommending it. The 10% improvement obtained by a special blend of the 5500 phosphor is of interest since the cost differential in production is nominal. It is expected to be no more than $5.00 per tube. A special grid has been fabricated which has smaller diameter (consequently higher intensity) outer strands in order to minimize brightness fall off at the edges. Uniformity tests will be conducted next period.

We have found that there are two grid parameters which have a major significance relative to maximum brightness obtainable and dimming without flicker.

These parameters are grid temperature and the partial pressures of the filling gas mixture. Tests have been conducted on 4 grids fabricated to our specifications. The grids of course all have mercury in them as it is the ultraviolet radiation of the mercury vapor which excites the phosphor to radiate visible light. The partial pressures of the additive gases are:

Grid 4½D	1mm Helium 6mm Neon 2mm Argon 9mm
Grid B51	Standard Commercial luminous tube mix. 6mm total partial pressure of additive gases.
Grid 9	9mm Argon
Grid 12	12mm Argon

Preliminary data are presented on enclosed curves.



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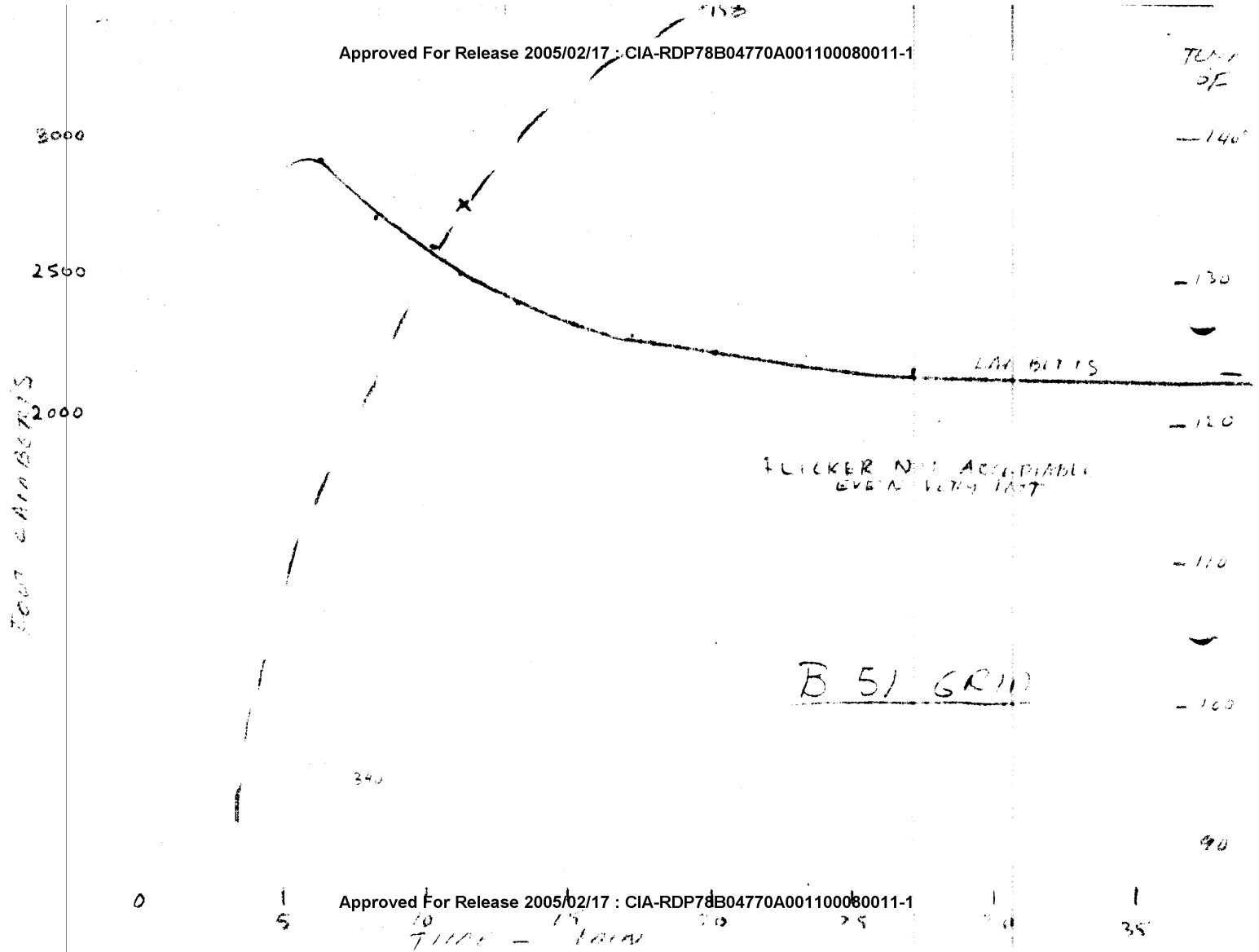

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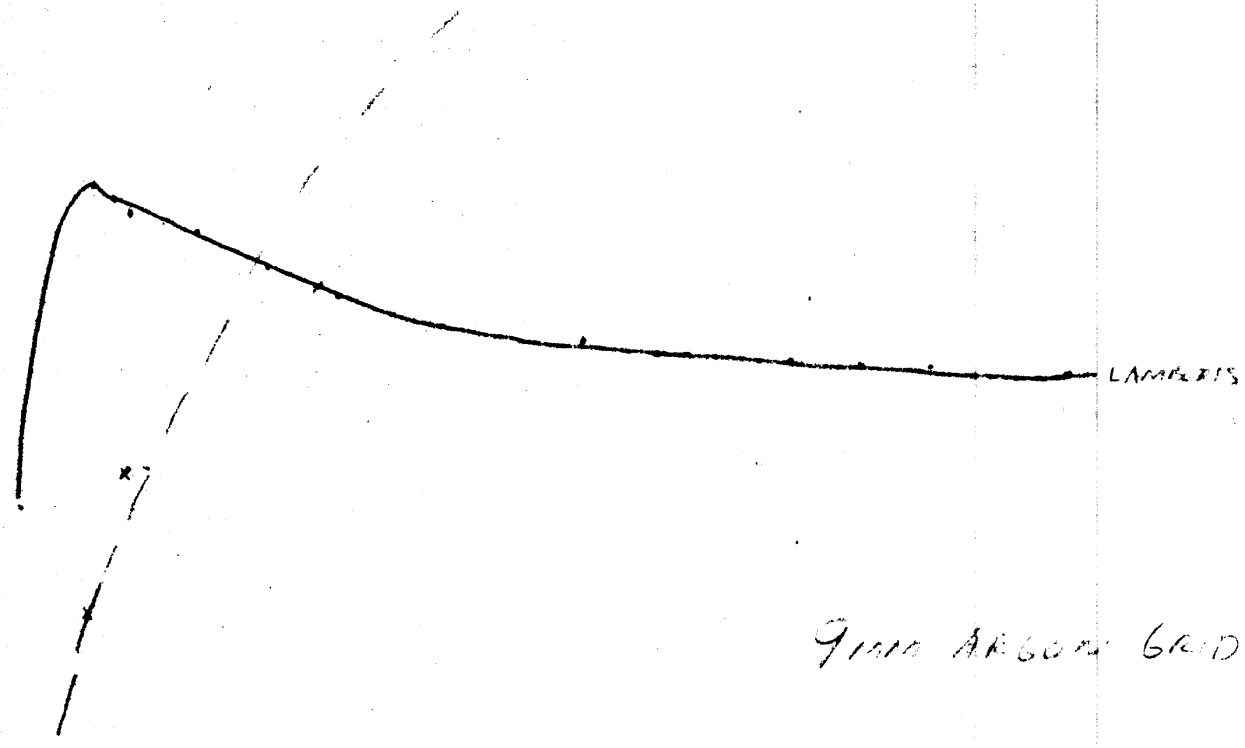

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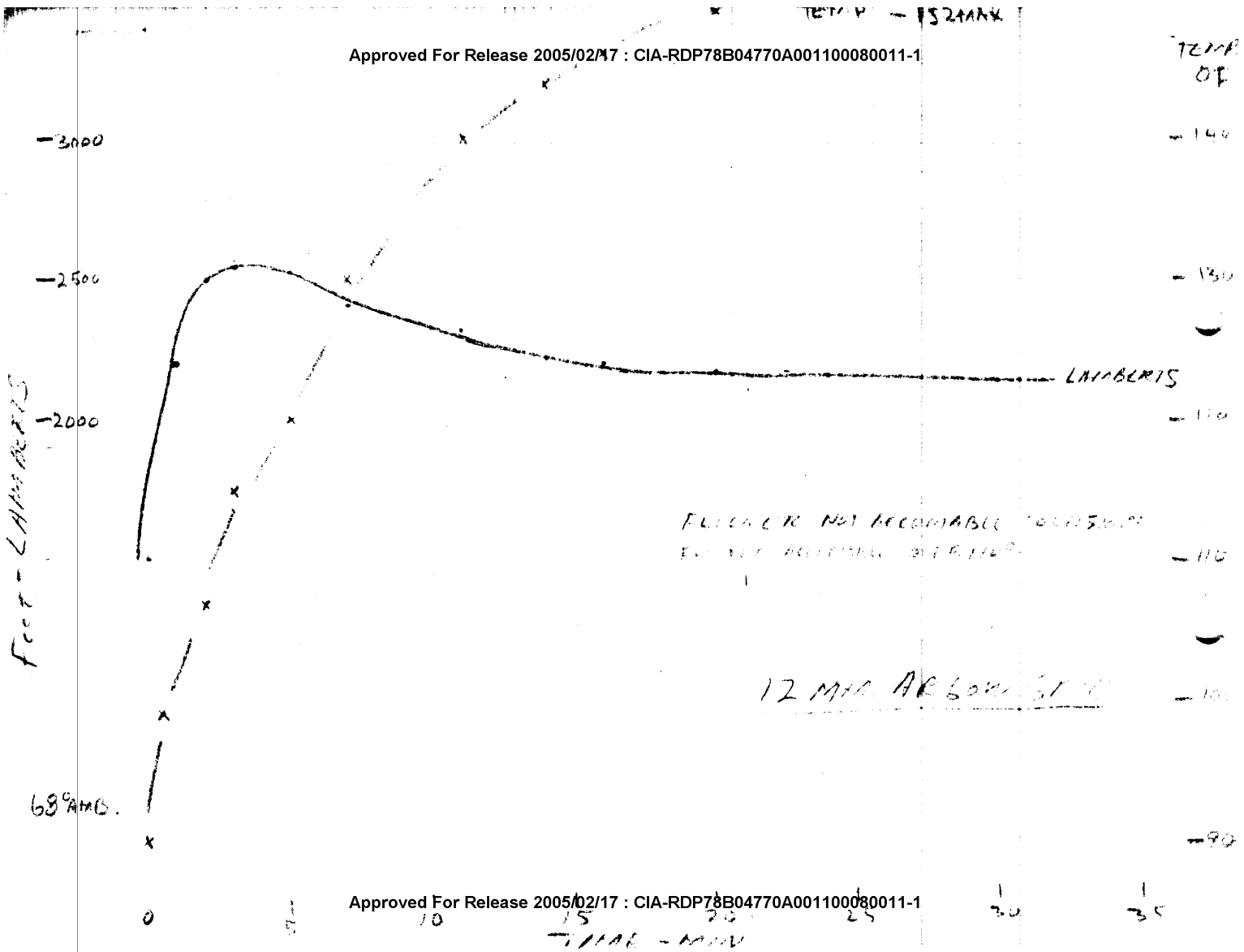


Grid 4½D appears to have the highest steady state brightness and best low level flicker performance. An additional grid is being prepared with the same mixture as grid 4½D but with slightly lower total partial pressure.

Further tests will be conducted on the best performing grid to determine the effect of grid temperature.

1.2 Lamp Box

Tests of high efficiency reflectors were previously reported and no further work is contemplated. This does not appear to be a fruitfull source of improvement in lamp performance.

Design of a lamp box with a special ventilation pattern is being prepared.

Standard design boxes have been received and will be used for uniformity tests.

1.3 Diffuser

Tests of a selection of milk white plexiglass (identical to lucite) diffusers have been conducted with very promising results. The brightness is compared to that of 2447 at 2000 ft. Lamberts.

Formulation	Relative Brightness
#2447	100%
#2159	114%
#2254	113%
#2067	119%
#2075	120%

Formulation #2075 had the highest transmission and brightness however, it was possible to see the individual grid strands through it. For this reason it is not considered satisfactory.

Formulation #2067 had the next highest transmission and provided an excellent improvement in brightness. The diffuser had a uniform appearance and individual grid strands could not be seen trhough it. #2067 is not quite as readily obtained as #2447 but there is no difference in cost. For the above reasons, Formulation #2067 is recommended as a replacement for formulation #2447 for general purpose diffuser use.

1.4 Dimmer

The effect of a step up thransformer was tested with promising results. The response is linear as shown on attached curve. Thus it appears that a step up transformer would be suitable for increasing peak brightness for short periods of time.

1.5 Transformer

As reported previously, half-wave dimmer tests proved disappointing and no further work will be done in that area.

Further consideration has been given to a low cost circuit for high frequency excitation but no circuit has been selected for test.

2. Planned Activity

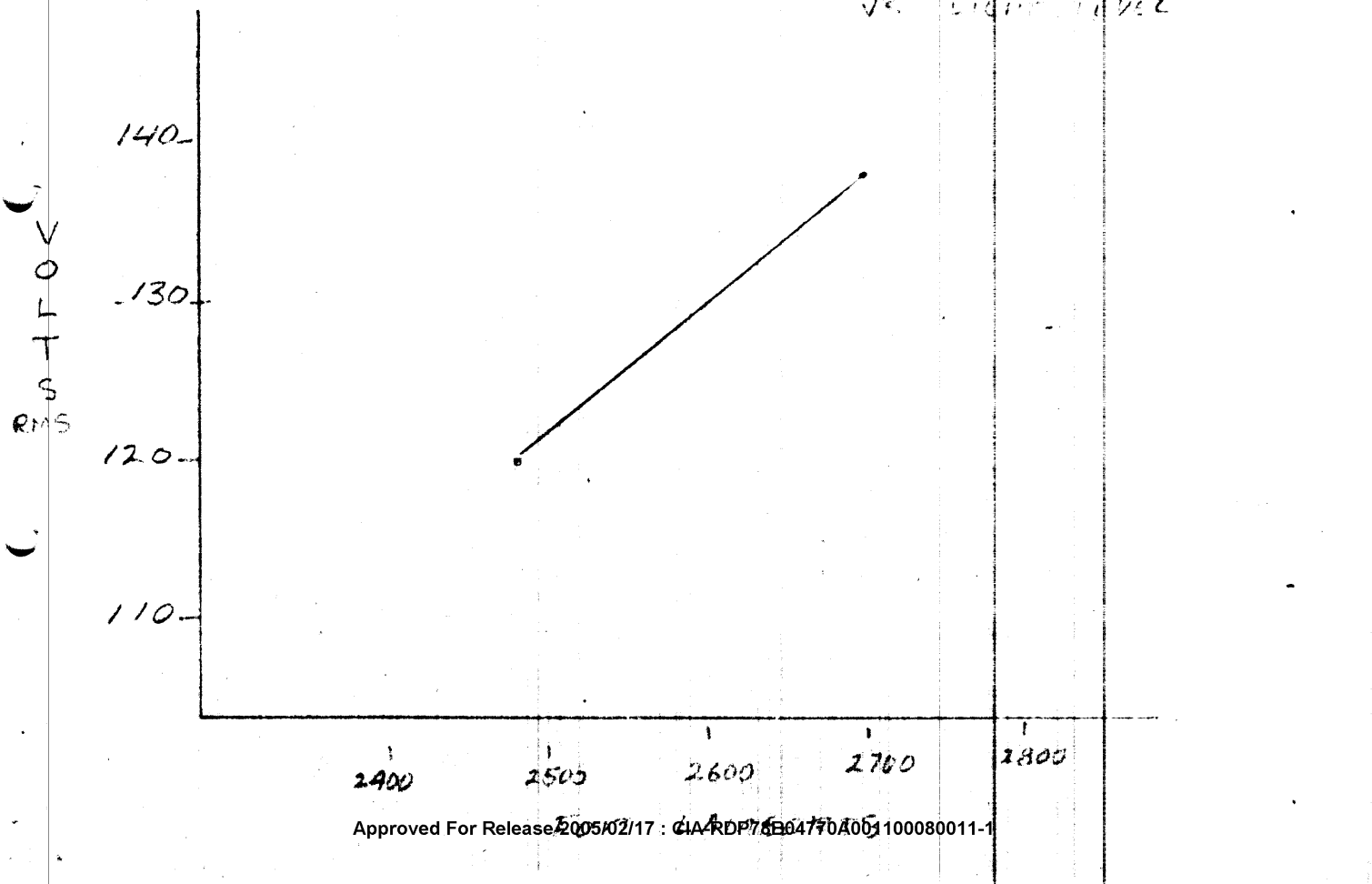
Further tests will be run on various grids for maximum brightness, flicker and uniformity.

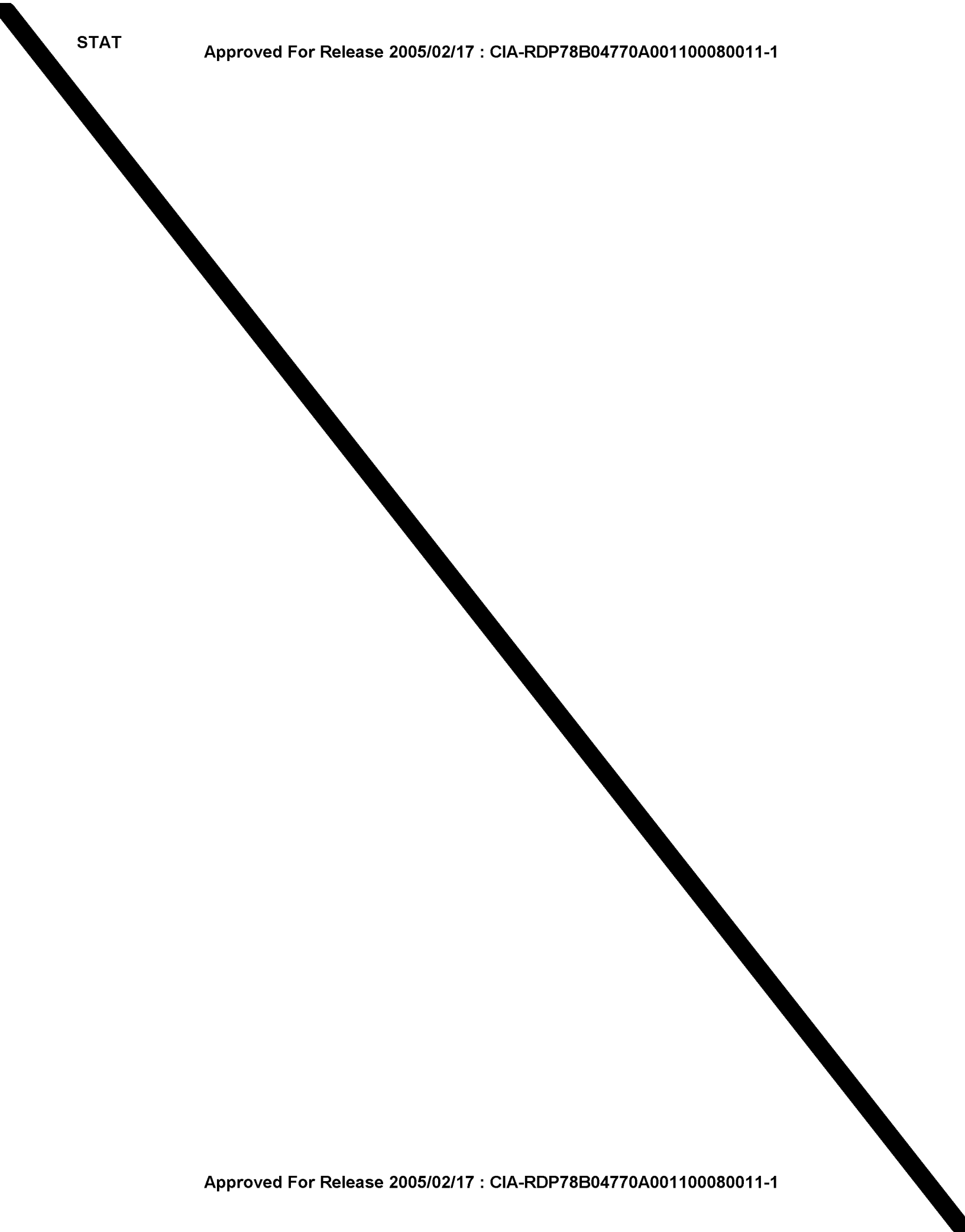
Some convection cooled configurations will be tested. Further consideration will be given to the high frequency chopper.

3. Other Comments

There are no other comments.

TRANSDUCER PRIMARY VOLTAGE VS. LIGHT LEVEL





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STAT

July 16, 1970

W. O. 6847

PROGRESS REPORT

STAT In re [redacted] Improved Lamp Performance

1. ACTIVITY

1.1. Luminous Grids

Tests with standard phosphor luminous grids indicate rather good prospects for improving maximum brightness levels by improving convection cooling. Setting the grids on end for maximum effectiveness of convection currents results in about 5% higher levels as the grid stablizes its temperature with the environment. A grid has been ordered with the outer strands of a smaller diameter than the inner strands to determine whether that will minimize brightness fall off at the edges.

1.2. Lamp Box

Two high efficiency diffuse reflectors have been tested with disappointing results. The 3M Codit reflective white was tested. It is purported to be an extremely high efficiency reflector. The brightness was about 28% less than flat white paint.

The second reflector consisted of a heavy layer of 10 micron diameter glass beads. The brightness through the diffuser was about 1% less than flat white paint. It was noted that on observing the glass beads directly that over a very narrow angle the light reflection was guite bright but fell off rapidly with angle. It is apparent that narrow angle high efficiency reflectors are not effective for grid lamps.

1.3. Diffuser

A report of an extensive study of rear projection screen materials was received through the courtesy of [redacted] We expect this report will be valuable as a guide to selecting the most promising diffuser materials. STAT

1.4. Dimmer

A half wave dimmer was tested with disappointing results. Compared to an identical full wave dimmer it was much more sensitive to flicker at reduced voltage. We were actually able to obtain lower light levels without flicker with the full wave dimmer than with the half wave dimmer. While it may be possible to solve the problem of sensitivity to flicker of the half wave dimmer, it does not appear to be a promising avenue of investigation.

1.5. Transformer

We have been reconsidering the frequency to be used for a high frequency chopper. Since a major goal is to keep the manufacturing cost at a competitive level, we are looking at components made for television flyback sweep generators which operate at a standardized frequency of 15,750 hertz. The cost of the components is low since they are made in high production quantities.

2. PLANNED ACTIVITY

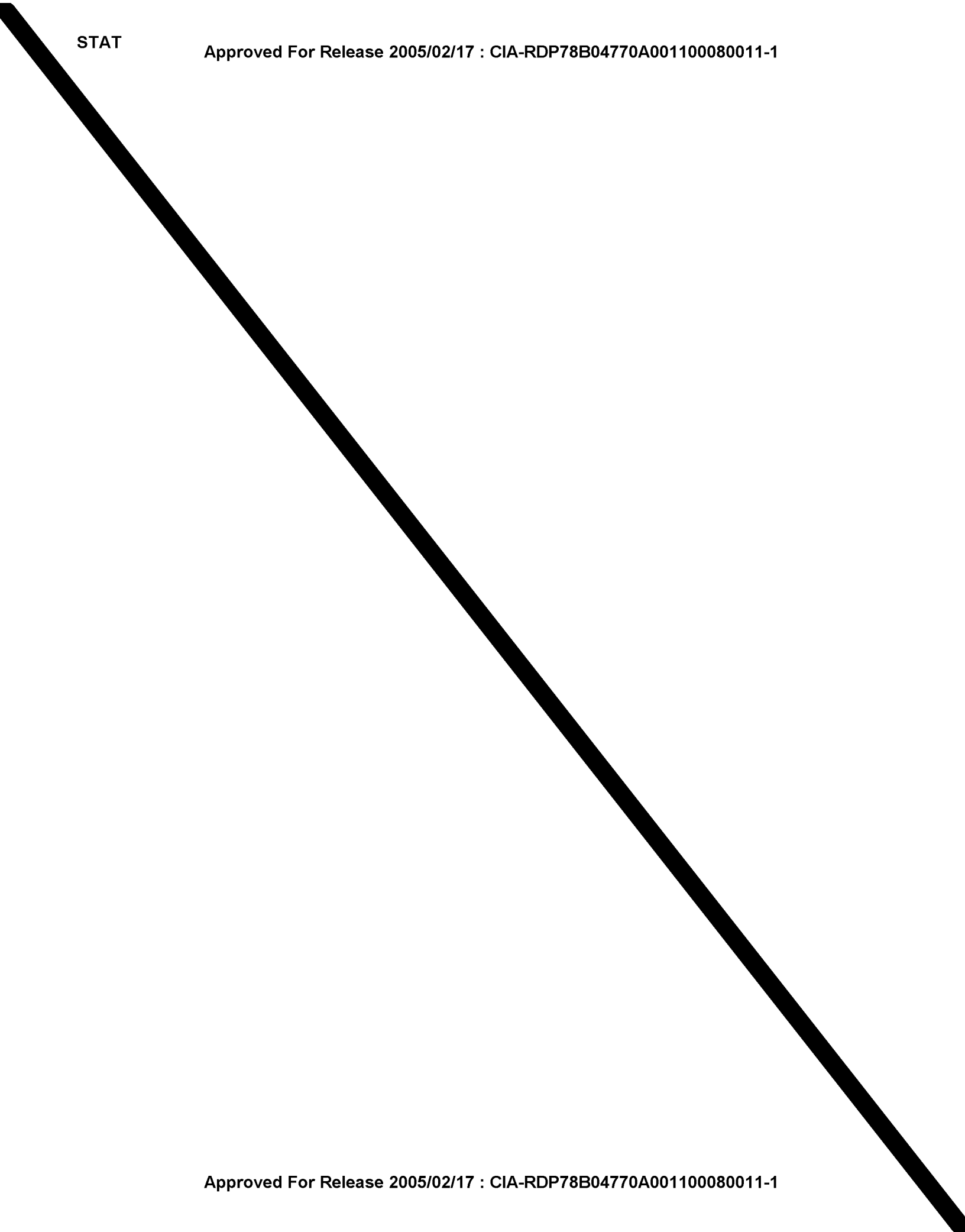
Tests will be run on other grids and other diffusers to increase high level brightness and uniformity.

We will run further tests on convection cooled configurations.

A start will be made on the high frequency chopper.

3. OTHER COMMENTS

There are no unresolved technical problems. There were no oral agreements or understandings or proposed changes to the contract. There are no unanswered or unresolved matters. Status of funds is indicated on the enclosed invoice.



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