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September 30, 1965

STAT [redacted]

Monthly letter progress report - Contract [redacted] STAT

LOG OF ACTIVITIES

Wednesday, Sept. 1, 1965
Correct final copy of lamp report. Confirm and recalculate ordinate for 6000°K black body radiation. Complete Table I. (Principal Associate, 1 day, Task II)

Thursday, Sept. 2, 1965
Complete final copy of lamp report for mailing. (Principal Associate, ½ day, Task II)

Friday, Sept. 3, 1965
Review technical information and reports in preparation for visitation to Washington, D.C. office of Contracting Officer. (Principal Associate, ½ day, Task I)

Tuesday, Sept. 7 thru Friday, Sept. 10, 1965
Visitation to Washington, D.C. office of Technical Representative of Contracting Officer for orientation and briefing. (Principal Associate, 4 days, Task I)

Monday, Sept. 13, 1965
Library search for data on carbon arc lamp visual efficiency and brightness. (Principal Associate, ½ day, Task II)

Tuesday, Sept. 14, 1965
Review data on floor vibration frequencies. (Principal Associate, ½ day, Task II)

Monday, Sept. 20, 1965
Continue library work on carbon arc lamp data. (Principal Associate, ½ day, Task II)

Thursday, Sept. 23, 1965
Review literature and data on carbon arc lamp brightness and efficiency. (Principal Associate, ½ day, Task II)

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September 30, 1965

Log of Activities (Continued)

Monday, Sept. 27, 1965
Continue work on lamp data and carbon arc brightness.
(Principal Associate, 1 day, Task II)

Thursday, Sept. 30, 1965
Preparation of reports. (Principal Associate, ½ day, Task II)

STAT [redacted]

September 30, 1965

STAT [redacted]

Monthly letter progress report - Contract [redacted] STAT

Comments on Status

Task I - Item 1 "Special Investigations"

A visitation was made to the Washington, D.C. office of the Technical Representative of the Contracting Officer for orientation and briefing.

Task II - Item 1 "Submicron Measurement Error Analysis"

See attached technical note.

Task II - Item 5 "Lamps for Rear Projection Viewers"

A technical report was submitted on September 1, 1965, which presented the findings to date. Of the lamps surveyed, the Mercury-xenon compact arc seemed to have the highest luminous efficiency. Whether or not the color of the mercury xenon lamp is acceptable is questionable. At the request of John R a simple experiment was defined which could be set up by the laboratory branch for evaluating color acceptability of the mercury-xenon lamp as compared to tungsten, xenon and mercury lamps.

Tungsten lamps have a high conversion efficiency of input watts to radiated watts but a low luminous efficiency because their color temperature is relatively low. Compact arc lamps do not have as high a conversion efficiency of input watts to radiated watts but have higher luminous efficiency because their color temperature is high.

What is desired is both a high conversion efficiency and a high color temperature. I believe that the high intensity carbon arc may have the above desirable combination. A search is being made for photometric data on carbon arcs. It has been found in the literature that high intensity arcs can be operated at high color temperatures (5500°K to 6500°K) but data have not as yet been found on the conversion efficiency.

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September 30, 1965

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Task II - Item 1 Submicron Measurement Error Analysis

Comments on some Vibration Measurements

WORK STATEMENT

Evaluate the physical and metallurgical properties of materials used in measuring engine construction to determine comparative suitability to submicron measuring. Materials to be considered are: Meehanite, steel, granite, aluminum, magnesium, and glass, and other materials that may be particularly suitable.

Evaluate physical properties and structural concepts appropriate to achievement of vibration levels and structural rigidity compatible with submicron measuring requirements. Evaluate methods of measuring the small vibration levels expected in a high performance structure.

Reports No. 1 and No. 2 dealt with the physical and metallurgical properties of materials. Report No. 3 dealt with structural rigidity and vibration control of the machine structure. Report No. 4 presented results of a computer analysis of building floor vibration frequency. This technical note contains comments on building floor vibration measurements.

Submitted by:

[redacted] STAT

Technical Note on Building Floor Vibration Measurements

In technical report no. 4, dated July 30, 1965, the results were presented of a computer analysis of the free-vibration mode of a typical bay in the building in which the submicron measuring instrument will be used. The computer analysis indicated that the fundamental mode of the floor slab vibration was 15.6 cps. This is considerably lower than the 20 cps to 65 cps previously estimated from manual calculations. The lower floor slab frequency makes it much more difficult to achieve effective vibration isolation between the floor slab and the measuring instrument. Whereas we had previously believed that an 8 cps mount would be satisfactory (for floor frequencies of 30 cps and higher), it now appears that a 2 cps mount is necessary for 15 cps input from the floor. Fig. 1 illustrates the greater effectiveness of a 2 cps mount.

An attempt was made to detect floor slab resonant frequencies but results were questionable. During the day we were not able to excite the floor slab above the background level. A test was made in the early morning when the background level was low and 30 cps, 60 cps and 90 cps was detected. The results are suspect because we could not be assured that we were not measuring stray voltages from the 60 cps building power.

A report on Bureau of Standards floor vibration measurements made in 1960 was reviewed. The report indicated that on the second floor, the vertical component could go as low as 5 to 7 cps and horizontal components as low as 3 to 5 cps. Effective isolation of frequencies that low is hopeless. In fact we hesitate to recommend a mount as soft as 2 cps. A mount suspended on vibration isolators that soft is awkward for an operator to work on because small forces create large excursions. For an 8 cps mount the 1g excursion is only 0.165

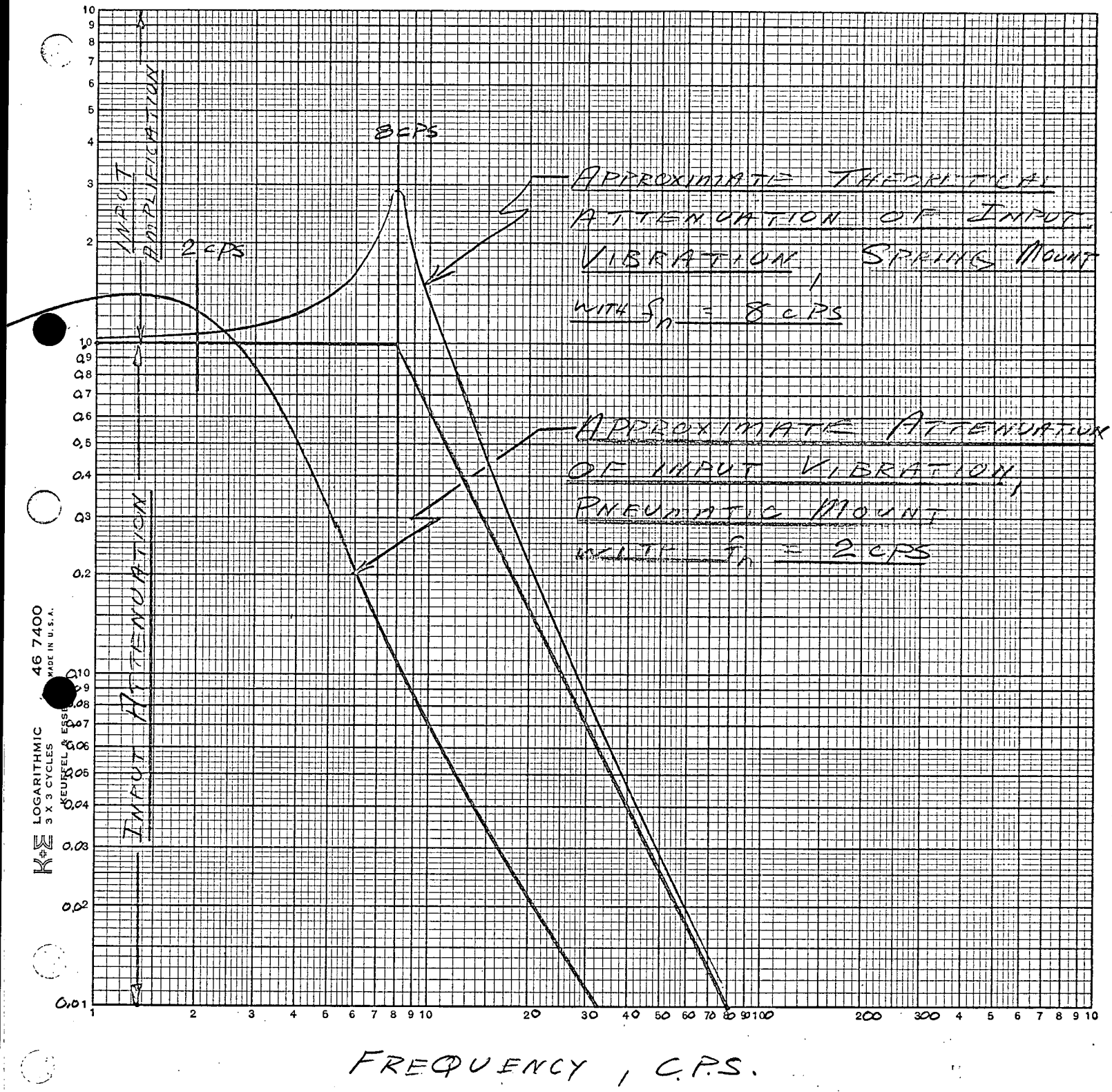

FIG 1,

inches but for a 2 cps mount the 1g excursion is 2½ inches.

Present thinking is that it may be better to use 8 cps pneumatic vibration isolators and design the instrument structure so that it will move as a single mass at 25 cps and below. Pneumatic is emphasized in the above statement because it is one of the few types of support which do not provide a high frequency path (90 cps to 500 cps and up).