

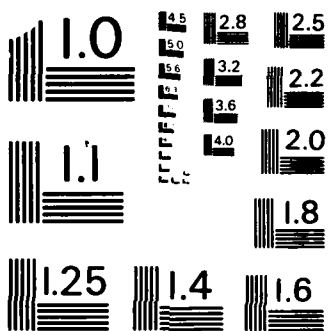
AD-R169 619 TESTING AND PROGRESS OF MODULATOR(U) PULSE SCIENCES INC 1/1
SAN LEANDRO CA L SCHLITT 03 JUN 86 N00014-86-C-2020

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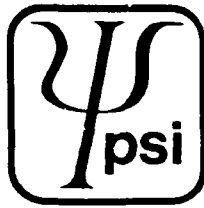
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS - 1963-A



PULSE SCIENCES INC.

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Tel: (415) 895-2984

AD-A169 619

3 June 1986

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Naval Research Laboratory
4555 Overlook Ave., S.W.
Washington, D.C. 20375

Subject: Quarterly Status Report No. 2 (25 January 1986 to
25 April 1986), Contract N00014-86-C-2020

Gentlemen:

The assembly of the modulator itself was nearly completed during February. The installation of the input filter capacitor and the filament stepdown transformer on the modulator output were delayed until March due to late delivery of the components which did not impact the overall schedule of the project. The construction of the thyratron cathode/reservoir power supply, thyratron trigger generator, and the power distribution chassis was completed in February. These chassis are the only ones which are absolutely needed before modulator testing is initiated. The design of the master controller was completed in February except for the fault detection circuitry.

The assembly of the modulator was completed in March with the exception of details which have nothing to do with the operation of the system.

Testing was initiated without the master controller. The self-inductance of the pulse forming network (PFN) capacitors was not determined by the manufacturer until after the final design of the high power modulator (HPM) was completed. The self-inductance was much larger than originally estimated and, therefore, required a much more aggressive taper of the PFN impedance to obtain a flat output pulse. The tuning of the PFN was complicated by an error in the installation of the PFN fault protection diodes which was identified and corrected. An eighth stage had to be added to the PFN in order to meet the pulse length specification. This possibility was anticipated and required only minor modifications to the hardware, though it did decimate the supply of spare PFN capacitors.

Initial problems with flashover of the ceramic high voltage vacuum bushing were resolved by replacing the elastomer o-rings to eliminate leaks. A base pressure of 2×10^{-6} Torr was obtained with a 4" untrapped diffusion pump, and was probably limited by

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the buna-n seals used throughout the system. Occasional flashovers occurred after replacement of the seals. These flashovers had no permanent effect on the performance of the system. (Ultimately the bushing was able to repeatedly withstand short transients in excess of 450 kV followed by 350 kV microsecond pulses during open circuit fault mode tests.)

Little difficulty was encountered during the initial continuous pulse train or "slow-rep" mode of operation. Pulse sequences were limited to 2000 shots because the output of the machine had to be monitored visually. The fault detection circuits were not available at this time.

Burst mode operation was initiated in April without the master controller. The number of pulses per burst was limited to two to minimize damage in the event of a fault. It was apparent that the Peschel power supply would not be capable of providing acceptable shot-to-shot repeatability; factors of two in output pulse amplitude were observed from shot-to-shot. However, no problems were encountered with the modulator itself in this mode.

The master controller was installed in April without the fault detection circuitry (initially). This permitted easy control of operating mode, pulse repetition frequency, and pulse quantity in the burst mode.

A Peschel engineer was sent to PSI to try to bring the power supply within specifications. His attempts failed and he returned to the factory without a plan to fix the supply. PSI personnel then addressed the power supply problem and made a number of modifications to the SCR phase control and feedback circuits to improve their response time which resulted in acceptable performance though the power supply still failed to meet the specifications written by PSI. These modifications have been approved by Peschel who will continue to honor their warranty. The shot-to-shot voltage repeatability is plus or minus 4% at 100 Hz and is approximately plus or minus 2% at 1 Hz.

The fault detection circuitry was installed in the master controller later in April and its performance was demonstrated. This permitted extended operation of the HPM in the continuous



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and burst modes, since the danger of repetitive faults was removed. This capability was essential to testing of the Peschel supply.

As of 25 April 1986, a total of \$191,793 has been expended on this contract.

Sincerely,

A handwritten signature in cursive script, appearing to read "Leland Schlitt".

Leland Schlitt
Program Manager

LS/sc

END

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