MASTER

WANL-TMI-263

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WANL PULSE PRE-AMPLIFIER

The WANL pulse pre-amplifier was designed for matching a long (60') co-axial cable to a fission counter of fast rise time and short decay time pulse output. The rise time of the final design exceeds $0.02 \mu \text{sec.}$ and it shapes a pulse for short decay time which permits a high counting rate.

General Electric Ceramic Type 7462 Low Noise, high GM Triodes were used. Figure 4-1 shows the schematic and Figure 4-2 the sine wave response of the pre-amplifier.

The pre-amplifier was improved by adding a 200 ohm resistor in series with first tube grid. This decreased the noise by a factor of four (4). Adding series resistors to 2nd and 3rd stages showed no measurable noise improvement.

Grid current rising while the pre-amplifier was in a radiation environment was observed by others using these tubes and became of some concern to us, so the 2nd and 3rd stage grid resistors (R6 and R10) were changed from 100 K ohms and 51.1 K ohms to both 20 K ohms. To maintain the same time constants the coupling capacitors (C2 and C4) were changed to 600 pf. Figure 4-3 shows sine wave response with these changes incorporated.

It was observed that the gain decreased approximately 25% when filament voltage was decreased from 6.3 to 5.5 volts, therefore the pre-amplifier requires a well regulated filament supply.

Figures 4-4 and 4-5 show photographs of scope traces of pre-amplifier noise, high frequency response and low signal level response. Figure 4-6 shows block diagram of test set up.

A printed circuit lay-out was designed which is 2" x 4".

A radiation resistant pre-amplifier was built and taken to Buffalo for in-reactor tests. The results showed no change in pre-amplifier characteristics after four (4) hours at 1 MW reactor power.

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PULSE AMPLIFIER TEST CIRCUIT
FIGURE 4-1

WAN PULSE PRE-AMP RESPONSE
FIG. 4-2

WAU-1 IMPROVED PULSE ORE AND RESPONSE

FIG. 4-3

WESTINGHOUSE ELECTRIC CORPORATION

PRE-AMP NOISE

.010 V/CM 1.0 μ sec/CM

FIG. 4-4

WESTINGHOUSE ELECTRIC CORPORATION

100 μ volts @ 10 mc
.020 v/cm .1 μ sec/cm

1 mV @ 10 mc
.050 v/cm .1 μ sec/cm

FIG. 4-5