1.0 GENERAL

1. Description

The Model 805 Scintillation Preamplifier is a charge sensitive, all silicon transistor device which integrates the charge output signals from scintillation/photomultiplier detectors, for presentation to pulse shaping main amplifiers such as the Canberra Model 810 or Model 815.

The Model 805 Preamplifier contains an operational type amplifier, whose feedback from output to input is through a capacitor. The voltage developed across this capacitor is proportional to the charge from the detector. The operational amplifier is followed by a White Emitter Follower, which has been designed to drive low impedance lines (such as RG 62/U) terminated in their characteristic impedance. The Preamplifier should be placed as close to the photomultiplier as possible to minimize stray capacitance.

The Model 805 requires no additional power supply, as it draws all necessary power directly from the associated Model 810 or 815 Linear Amplifier (or from any other main amplifier that can supply $\pm$24 and $\pm$12 VDC), through the ten foot compatible cable provided with the preamplifier.

.2 Applications

The Model 805 Scintillation Preamplifier is used primarily to convert the charge output of a photomultiplier tube to a voltage signal more suitable to the instrument performing the functions of amplification, timing, counting or pulse height analysis. The photomultiplier tube output can be taken from the anode or last two dynodes.

The 805 will operate successfully with a variety of detectors, such as GM tubes, gas flow counters or surface barrier detectors. However, there are other charge sensitive preamplifiers like the Model 806 Proportional Counter or Model 808 FET preamplifiers which may be better suited to detectors other than scintillation/photomultipliers.

The Model 805 contains a White Emitter Follower which enables it to drive long lengths of cable. This makes it particularly useful in those applications where instrumentation is located long distances from the detector.

2.0 SPECIFICATIONS

2.1 Performance

Integral Nonlinearity: less than 0.3% for 0 to ±1.3 volts output into 100 ohms

Stability: better than 0.02% per °C

Detector Bias Isolation: 3000 VDC

Noise: less than 70 mV RMS including the contribution of the main shaping amplifier at a gain of 500; less than 140 microvolts referred to the input of the main shaping amplifier

2.2 Inputs, Outputs

2.2. Inputs

Signal Input: charge pulse from scintillation/photomultiplier detector, input impedance 100K

Test Input: tail pulse from test pulse generator; positive or negative tail pulses with rise time less than 500 nsec. and fall time greater than 40 nsec.

Power: supply voltages from associated main amplifier such as Canberra Model 810 or 815; ±12 and ±24 volts DC

2.2.2 Output

Preamp Output: tail pulse, rise time less than 50 nanoseconds, 70 microsecond fall time; up to 1.5 volts at end of long terminated 93 ohm cable; output impedance 100 ohms

3.0 INITIAL OPERATION

3. Setup

Insert power connector cable from power source (810, 815, etc.) into power connector of Model 805; turn on the power switch of Preamplifier Power Supply or AEC compatible base unit/power supply housing the amplifier from which DC power is being derived

Connect negative input of approximately 1/2 volt from tail pulse generator into test input of Model 805

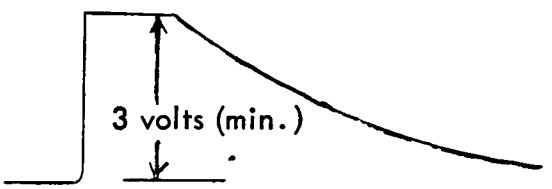
Connect output of Model 805 into oscilloscope (0.5v/cm, 10 usec/cm)

3.2 Initial Checkout

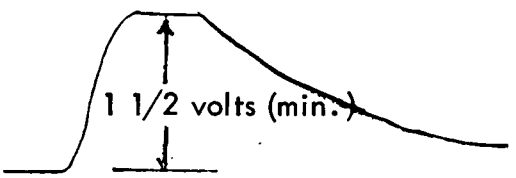
Output pulse shape from the Model 805 should appear as follows. The pulse height should be approximately twice the input pulse height. SEE ERRATA SHEET

Increase voltage of pulser until output from preamplifier saturates. On the oscilloscope saturation will look something like the following:

Open Circuit



Into 93 ohms



Decrease input voltage to a point where output voltage is unsaturated

Set oscilloscope scale on 1v/cm, 0.1 usec/cm

Check rise time of Model 805 (10% and 90% points of voltage rise) to be in the order of 40 to 50 nanoseconds

Disconnect input from pulse generator

Test noise by taking output of Model 805 into Canberra Model 815 Linear Amplifier

Set gain controls of amplifier to maximum settings

Connect output of Model 815 to Hewlett Packard Model 400H noise meter (or comparable noise meter). The RMS noise output should be less than 70 millivolts, or 117 microvolts referred to the preamp output (amplifier input)

4.0 MODULE OPERATION

4.1 Control Functions

There are no switches or controls, as such. There are some simple internal component substitutions that can allow the tail pulse time constant or preamplifier gain to be changed. These changes must be accomplished at our factory for the warranty to remain in effect. Contact the factory for instructions if field modification is desired.

4.2 Input Requirements

Signal Input: charge pulse from anode or last two dynodes of scintillation/photomultiplier detector. The input is protected for up to 3000 VDC and uses an MHV connector. The 805 should be placed as close as possible to the detector to minimize stray capacitance.

Test Input: negative tail pulse from test pulse generator

4.3 Output Specifications

Preamplifier Output: tail pulse, rise time less than 50 nanoseconds, 70 microseconds fall time; up to 1.5 volts before saturation at end of long terminated 93 ohm cable; output impedance 100 ohms. With unterminated cable the output saturation level will go to 3.0 volts. The output signal is inverted with respect to the charge input signal. Thus, positive high voltage will yield negative charge and a positive preamplifier signal.

4.4 Power Connector

The 805 derives its three DC supply voltages of $\pm$12 volts and -24 volts through an Amphenol connector type 17-20090. All of the 800 Series Amplifiers use compatible Amphenol connectors. Recent versions of the 1400 Series Amplifiers also use compatible Amphenol connectors. Earlier versions of the 1400 Series Amplifiers, however, use AMP connectors which will not mate directly with the 800 Series Preamplifiers.

The Amphenol connector on the rear of 805 requires the following voltages:

Pin	Voltage	Wire Color
1	Ground	Black
4	+12	Red
6	-24	White/Blue
9	-12	White/Red

CANBERRA INDUSTRIES, INC.
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Gentlemen:

Effective 15 June 1967, all Canberra Industries, Inc. Preamplifiers and Amplifiers which accept or provide the AEC standard operating voltages (±12, ±24 VDC) through Amphenol 17-10090 or 17-20090 nine pin connectors will do so through the following pin connections:

Pin #	
1	Ground
2	Clean Ground
4	+12 VDC
6	-24 VDC
7	+24 VDC
9	-12 VDC
Others	No connection

In particular, the following models are affected:

Model	Serial No.
805	6714 and up
806	674 " "
808	678 " "
810	6713 " "
815	6724 " "

All earlier models should be field modified to conform by interchanging the connections to pins 4 and 9.

We are also incorporating the Amphenol connectors noted above into the 1400 Series amplifiers, preamplifiers and preamp power supplies, as new production runs are started. When 1400 Series instruments with the Amphenol connectors are shipped, the pin connections will be as listed above. No modification will be needed.

In the 1400 Series models affected are: 1405, 1406, 1408, 1408A, 1408B, 1409, 1410, 1411, 1415, 1416 and 1417.

These Amphenol connectors and pin assignments are compatible with those selected by ORTEC. Thus, Canberra amplifiers can provide operating power for ORTEC preamplifiers and vice versa. One precaution must be taken, however. Most ORTEC Model 410 Multimode Amplifiers in the field provide only the ±24 VDC voltages through the preamp power connector. When this is the case, Canberra preamplifiers (which require ±24 and ±12 VDC) cannot be powered from the ORTEC Model 410.

Interface cables between our preceding AMP preamp power connectors and our present Amphenol preamp power connectors are available at a charge of $25. The user must specify which unit (amplifier or preamplifier) has the AMP connector and which has the Amphenol.

Sincerely,

CANBERRA INDUSTRIES, INC.

Orren Tench,
Engineering Manager.

OT/bkw