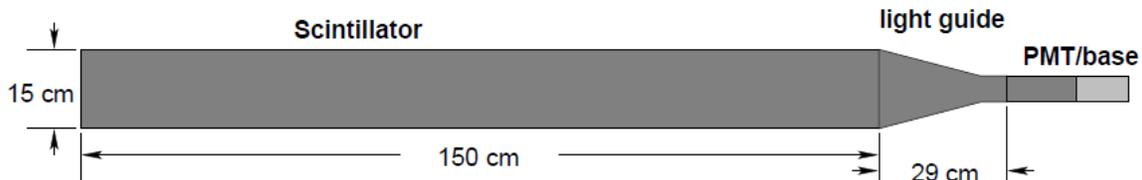


counters are made of Bicron BC-412 scintillator [5] and have an active volume of $1.3 \times 15 \times 150 \text{ cm}^3$. The scintillator is glued to a wedge shaped, lucite light guide which is in turn glued to an EMI-9954KB photomultiplier tube [6]. The PMT bases were designed and built at Fermilab.

[5] Bicron Photonics Division,
Saint Gobain Crystals & Detectors,
12345 Kinsman Road,
Newbury, Ohio 44065, USA.

[6] Electron Tubes Inc. (formerly Thorn-EMI),
100 Forge Way, Unit F
Rockaway, NJ 07866, USA.



NIM A506 (2003) 7-19 describes counters in detail.

A high voltage power supply (Power Designs model 1570, max 3012 V 40 mA, FNAL property number 18367) provides voltages for all the counter PMTs. More details can be found at <http://www-esd.fnal.gov/esd/catalog/main/powerdes/1570-spec.htm> and the contents of this web page are in Appendix A.

The individual values are set by a Berkeley high voltage zener divider box. (FNAL property number 5615).

http://cdorg.fnal.gov/ese/prep/catalog/hardware_info/fermilab/rackmount/es7092.html

The connection to the PMTs is through coaxial RG58 cable and BNC SHV connectors. The signals exit the PMTs with BNC connectors and pass through RG58 cable to the trigger electronics. The trigger electronics are housed in two standard NIM crates in a single rack that also contains the HV supply and divider box. A list of NIM modules utilized for the trigger logic is attached.

NIM modules for FNAL counters:

LeCroy 623 Octal Discriminator Qty 5

LeCroy 612 12 Channel PM Amplifier Qty 2

LeCroy 622 Quad Coincidence Qty 4

LeCroy 380A Multiplicity Logic Unit Qty 2

LeCroy 429 Logic Fan In Fan Out Qty 2

LeCroy 364 4-fold Logic Unit Qty 2

LeCroy 222 Dual Gate Generator Qty 3

NIM modules for MSU counters (3 standard NIM crates):

LeCroy 364 4-fold Logic Unit Qty 4

LeCroy 4616 ECL-NIM-ECL convertor Qty 3

LeCroy 622 Quad Coincidence Qty 9

FNAL 1880 Dual Channel BCD Scaler Qty 6

Appendiz A: Specifications on HV power supply

GENERAL DESCRIPTION

The Model 1570 is a calibrated, high voltage power source designed to supply closely regulated DC to critical circuits where stability, low noise and reliability are prime considerations. This instrument replaces Models 1544 and 1547 and offers new technology reflecting field experience with more than 7,000 units in service over ten years. The Model 1570 offers twice the current out- put of the Model 1544 at a modest increase in cost and the equivalent current output of the Model 1547 at a lower price.

High voltage components including plate, heater trans- formers, voltage multiplier assemblies, etc. are environmentally isolated in vacuum-encapsulated epoxy modules.

FEATURES

- * Calibrated control of the output voltage in 500V, 100V, 10 V steps and a continuously adjustable vernier potentiometer. This potentiometer has a range of 11 V and a resolution of 10 mV. Calibrated accuracy is better than 0.25% of the dial settings above 250 V, 1 % or 1 00 MV below 250 V.
- * Continuously adjustable front panel current limiter permits adjustment of the maximum output current from 5 to 40 mA. Screw slot access avoids accidental misadjustment. Electronic current limiting system permits continuous operation into an overload or short circuit with automatic restoration upon fault clearance. Output condition is periodically sensed and normal function restored automatically upon fault clearance. Pulsating meter signals malfunction.!
- * Solid state control amplifier employing a new low noise zener voltage reference with a temperature co- efficient of better than 10 ppm. Parallel high voltage vacuum tubes are used for the regulator series control element.
- * Rear panel polarity reversing switch provides operation with either positive or negative terminal at ground potential. An option is available for operation of the normally grounded terminal at potentials up to 500 VDC from chassis.

ELECTRICAL SPECIFICATIONS

OUTPUT: 1 Volt to 3012 Volts D-C, continuously. adjustable 0-40 MA.

INPUT: 105-125 Volts, 47-440 Hz, 230 Watts.*

REGULATION: 0.001% plus 2 millivolts for line or load variations over the operating range.

RIPPLE: 1 millivolt peak to peak, maximum.

RESPONSE TIME: Less than 50 microseconds to return to within regulation limits for 100% step change in rated load.

STABILITY: Less than .005% drift in output voltage per hour; less than 0.01% drift per 24 hour period at constant ambient temperature after warm-up.

VOLTAGE CONTROLS: Precision calibrated voltage divider:

0 to 2500 Volts in five 500 Volt steps

0 to 400 Volts in four 100 Volt steps

0 to 100 Volts in ten 10 Volt steps

1 to 12 Volts fine adjustment potentiometer

CALIBRATION ACCURACY: 0.25% of the voltage control dial readings from 250-3012 Volts; 1.0% or 100 millivolts (whichever is greater) from 1-250 Volts.

RESOLUTION: 10 millivolts (fine adjustment potentiometer).

RESETTABILITY: .01% or 100 millivolts.

TEMPERATURE COEFFICIENT: 25 parts per million per 'C change in ambient after warm-up.

OPERATING TEMPERATURE: Continuous duty at full load from 0-50'C ambient.

OUTPUT TERMINALS: Two SHV (BNC) safety high voltage receptacles on rear chassis surface.

POLARITY REVERSING SWITCH: Panel reversing switch permits operation with either positive or negative output terminal at ground potential.