MODEL 1880B DUAL READOUT SCALER

The Model 1880 is a dual NIM width module containing two identical channels of eight (8) digit BCD 100MHz scalers. Readout is provided on eight (8) in line LED readouts for each channel.

SPECIFICATIONS

CAPACITY

Eight (8) digits BCD plus overflow.

SIGNAL INPUT (each channel)

- Pulse Repetition Rate: 0 to 100mpps min (125mpps typical)
- Pulse Pair Resolution: 10 ns min.
- Minimum Pulse Width: 3ns FWHM
- Discriminator Level: -500mv (internally adjustable to a min. -300mv)
- Input Impedance: 500ohm 10% D.C. coupled
- Input Reflections: Less than 10% for 1ns rise time of NIM level signals.

GATE (each channel)

- Manual: Front panel three position switch (OPEN, REMOTE, CLOSED) for controlling the counting gate. In the remote position electrical gate signals control the counting gate.
- Electrical: Two bridged LEMO connectors on front panel. Bridged inputs allow daisy chaining of gate signals from scaler to scaler.
- Input Impedance: 5K min.
- Sensitivity: -500mv
- Input Protection: t 50 volts transients
- Response Time: Less than 10nsec.

RESET (each channel)

- Manual: Front panel push button for reset of counter overflow and display.
- Electrical: Two bridged LEMO connectors on front panel. Bridged inputs allow daisy chaining of gate signals from scaler to scaler. The input is biased to a CAMAC logic zero (approx. 3.5v) and a ground or a current sink of 10ma will reset scaler channels to zero.

DISPLAYS (each channel)

- Counter: Eight (8) inline 3/8" high character LED seven(7) segment digits.
- Gate: LED light on when counter gate is
open.

Overflow: LED light on when counter overflows.
Turns off when counter is reset.

OUTPUTS (each channel)

Carry Output: LEMO front panel connector provides
a fast NIM pulse -800mv into 50 ohms
each time counter overflows. A
carry pulse will not be generated
at reset.

POWER REQUIREMENTS: Less than 12 watts
+ and - 6 volts

TEMPERATURE RANGE 0 to 60°C

SIZE Double width 8 3/4 high NIM module.

Up to a higher level directory || For more information
Jorway Scaler

- 2 channel.
- 100 MHz rate.
- 8 digit output.
- Plus overflow.
- Gate control with dual timer unit. (#79-020B)
- Needs ±6V power supply.

Model 1880B
Dual Channel BCD Scaler

Channel 0
8 digit readout

Channel 1
8 digit readout

Ch. O Ch. 1

Overflow
Gate open

Gate
Gate
GATE

Reset/TEST buttons

5V

RESET

5V
(Sink 10mA to ground)

CARRYOUT

Lemo connectors inputs, negative in (min. -0.3V) *only*
Power on lights.
MODEL 1880 DUAL READOUT SCALER

The Model 1880 is a dual NIM width module containing two identical channels of eight (8) digit BCD 100MHz scalers. Readout is provided on eight (8) in line LED readouts for each channel. USED THIS UNIT WITH A DUAL TIMER UNIT. # 79-0208.

SPECIFICATIONS: +6 VOLT SUPPLY NEEDED.

CAPACITY

SIGNAL INPUT (each channel)

- Eight (8) digits BCD plus overflow.
- Pulse Repetition Rate:
  - 0 to 100mpps min (125mpps typical)
- Pulse Pair Resolution:
  - 10 ns min.
- Minimum Pulse Width:
  - 3nsec FWHM
- Discriminator Level:
  - -500mv (internally adjustable to a min. -300mv)
- Input Impedance:
- Input Reflections:

GATE (each channel)

- Manual:
- Electrical:
  - Front panel three position switch (OPEN, REMOTE, CLOSED) for controlling the counting gate. In the remote position, electrical gate signals control the counting gate.
  - Two bridged LEMO connectors on front panel. Bridged inputs allow daisy chaining of gate signals from scaler to scaler.
  - Input Impedance:
  - Sensitivity:
  - Input Protection:
  - Response Time:
  - 5K min.
  - -500mv
  - ± 50 volts transients
  - Less than 10nsec.

RESET (each channel)

- Manual:
- Electrical:
  - Front panel push button for reset of counter overflow and display.
  - Two bridged LEMO connectors on front panel. Bridged inputs allow daisy chaining of gate signals from scaler to scaler. The input is biased to a CANAC logic zero (approx. 3.5v) and a ground or a current sink of 10ma will reset scaler channels to zero.
DISPLAYS (each channel)

Counter:

Gate:

Overflow:

OUTPUTS (each channel)

Carry Output:

POWER REQUIREMENTS:

TEMPERATURE RANGE

SIZE

 Eight (8) inline 1/8" high character LED seven(7) segment digits.

LED light on when counter gate is open.

LED light on when counter overflows. Turns off when counter is reset.

LEMO front panel connector provides a fast NIM pulse -800mv into 50 ohms each time counter overflows. A carry pulse will not be generated at reset.

Less than 12 watts
+ and - 6 volts
Option 1: -12 volts and 115 volt a-c

0 to 60°C

Double width 8 3/4 high NIM module.

* NEED AUX. ±6 VOLT SUPPLY
DUAL TIMER UNIT #79-020B

- **START**
- **STOP**
- **RESET**

- **PRE-SET TIME**
  - **N x 10**

- **CHANNEL A**
  - **COUNT OUT**

- **CHANNEL B**
  - SAME AS A-

- **COUNT OUT**

- **RESET OUTPUT**
  - GOES TO **RESET INPUT ON JORWAY SCALERS**. (BNC)

- **TIMER COUNT OUTPUT**
  - GOES TO **GATE INPUT ON JORWAY SCALERS**. (BNC)

When \(N=0\) PRESET = OFF.
\(N=0-9\)
\(M=0-6\) UNIT DOES NOT WORK ABOVE \#6 FOR \(M\).

\(\frac{1}{2}\) UNIT - DUAL

**TIMER #79-020B.**

* NEEDS ±6 VOLT DC
  NIM BIN POWER.

1980-DJO.
CANBERRA - SCALER UNIT #1772

25 MHz to 30 MHz - COUNT RATE

6 DIGIT READOUT
START STOP RESET
\( N \times 10^M \)

\( M = 0-6 \) only

OVERVOLTAGE INDICATOR (A PROBLEM)

POLARITY OF SIGNAL

BNC CONNECTORS IN & OUT

GENERAL LAYOUT OF SCALER

\( N = 0-9 \)
\( N = 0 \) PRESET OFF

\( \frac{\text{POSITIVE IN}}{0.5-10 \text{ VOLS}} \)
\( 20 \text{ mVAC MIN. WID.} \)
\( \frac{\text{NEGATIVE IN}}{-0.6 \text{ TO } -2.0 \text{ V}} \)

\( Z_{\text{in}} = 51 \Omega (-) \)

\( Z_{\text{in}} \geq 1 \text{ K}\Omega (+) \)

COUNTER/TIMER (SCALER) #1772

(NOT TO SCALE)

1980-DTD.
SECTION 2
SPECIFICATIONS

2.1 INPUTS

POSITIVE SIGNAL IN
Accepts 0.5 to 10 volts (+50 volt maximum) pulses
Rise time: any
Pulse width: 20 nanoseconds, minimum
Input impedance: greater than 1000 ohms, DC coupled, front and rear panel BNC connectors

NEGATIVE SIGNAL IN
Accepts -0.6 to -2.0 volt pulses
Pulse width: 20 nanoseconds minimum
Input impedance: 51 ohms, DC coupled, front and rear panel BNC connectors

GATE IN
+3 to +10 volt DC level or pulses (or open circuit) enables accumulation; less than 0.8 volt DC level or pulse (or short circuit) inhibits accumulation; 3mA current sinking; input impedance greater than 1000 ohms, DC coupled, front and rear panel BNC connectors

2.2 OUTPUTS

OVERFLOW
+5 volt pulses at reset of sixth decade
Rise time: less than 200 nanoseconds
Pulse width: 5 microseconds, DC coupled, rear panel BNC connector

GATE OUT
Provides +5 volt DC level during accumulation, +0.5 volt DC level when not accumulating (except when inhibited by Gate Input)
Rise time: less than 200 nanoseconds; will gate up to 50 compatible scalers and timers; current sinking 150mA, DC coupled; rear panel BNC connector

2.3 FRONT PANEL CONTROLS

START
Pushbutton to renew or begin accumulation

STOP
Pushbutton to terminate accumulation

RESET
Pushbutton to reset all decades to zero

MODE
Toggle switch to select Single or Recycle mode of operation upon reaching a preset condition

PRESET
Two digit thumbwheel switches for the time base; selectable preset limit is \( N \times 10^M \), \( N \) is the 0-9 digit multiplier and \( 10^M \) is the power of ten being multiplied; \( N = 0 \) is preset OFF, disabling the preset functions of the time base
2.4 INTERNAL CONTROLS

PRESCALER
Jumper plugs to insert a decade prescaler in the desired channel; this prescaler is non-displaying.

GATE MODE
Jumper plugs allow the gate input to control either the scaler or timer or both.

2.5 PERFORMANCE

CAPACITY
Six decades; \(10^6 - 1\) counts; a non-displaying decade may be selected by internal jumper, increasing the capacity to \(10^7 - 1\).

COUNT RATE
25MHz minimum, 30MHz typical.

PULSE PAIR RESOLVING TIME
Less than 40 nanoseconds.

TIME BASE ACCURACY
Equivalent to line frequency accuracy.

TEMPERATURE OPERATING RANGE
0 to \(50^\circ\)C.

AUTOMATIC RESET
Initiated when power is first turned on or after power fails.

2.6 INDICATORS

VISUAL DISPLAY
Six solid state numeric indicators; leading zeros are suppressed.

COUNT
Front panel light is illuminated during accumulation and extinguished when Stop command is initiated.

2.7 CONNECTORS

SIGNAL IN, GATE IN
Front and rear, BNC, UG-1094/U.

OVERFLOW, GATE OUT
Rear panel, BNC, UG-1094/U.

2.8 POWER

+24V - 0mA +12V - 50mA
-24V - 0mA -12V - 150mA
115VAC - 200mA

2.9 PHYSICAL

SIZE
Standard double width module (2.70 inches wide) per TID-20893.

WEIGHT
3.2 lbs (1.47 kgs)
SECTION 3
CONTROLS/INDICATORS

3.1 FRONT PANEL

3.1.1 START PUSHBUTTON
When depressed, initiates data accumulation in the 1772. Scaler is not reset to zero.

3.1.2 STOP PUSHBUTTON
When depressed, terminates data accumulation in the 1772.

3.1.3 RESET PUSHBUTTON
When depressed, resets scaler contents to zero. The RESET pushbutton does not terminate data accumulation.

3.1.4 COUNT LAMP
Illuminates while data accumulation is enabled (between START and STOP commands). The COUNT lamp is not inhibited by the GATE input.

3.1.5 SIGNAL INPUT
Accepts positive or negative pulses for accumulation.

3.1.6 POS/NEG SWITCH
Selects polarity of input pulse to be counted and discriminated. If in NEG position, the SIGNAL input is terminated in 51 Ω and the discriminator level is fixed at -.6v. If in POS position, input impedance is 1000 Ω, and a variable discriminator level is enabled.

3.1.7 DISC POTENTIOMETER
When enabled by POS/NEG switch selects discriminator level for positive input pulses. Ten-turn pot gives variation from .5 to +10 volts.

3.1.8 GATE INPUT
When open (or at a HIGH logic level) enables accumulation of input pulses; when grounded (or receiving a LOW logic level) inhibits accumulation of input pulses.

3.1.9 DATA DISPLAY
Provides visual readout of six decades of scaler. If the prescaling decade is employed, it is not displayed. Leading zeros are suppressed.
3.1.10 TIMEBASE SWITCH
Selects timebase to be either .1 sec or .01 min

3.1.11 PRESET THUMBWHEEL SWITCHES
Select counting time, with preset time being \( N \times 10^M \times \) selected timebase. If \( N = 0 \), timer is inhibited.

3.1.12 MODE SWITCH
Selects either single or repetitive (RECYCLE) counting operations. If in RECYCLE, an internally-selected delay of several (≈ 3) seconds separates each counting operation.

3.2 REAR PANEL
3.2.1 SIGNAL INPUT
Identical to Front Panel input

3.2.2 GATE INPUT
Identical to Front Panel input

3.2.3 OVERFLOW OUTPUT
Transmits a 5 \( \mu \)sec positive pulse on the overflow of most significant decade.

3.2.4 FUSE
1/2 A slo-blo inserted in 110 VAC input line.

3.3 INTERNAL
3.3.1 JUMPERS
When the two jumpers shown in Figure 3.1 are in the "7" position, a prescaling decade is inserted in the accumulation path. When in the "6" position, the prescaler is bypassed.

The jumpers shown in Figure 3.1b are used to allow the GATE input to inhibit the scaler or timer. All other jumpers are used for factory-installed options and should not be moved.
4.1 INSTALLATION

The Canberra Model 1400 Bin and Power Supply or other bin and power supply systems conforming with the mechanical and electrical standards set by AEC Report TID-20893 (rev.) will accommodate the Model 1772. The right side cover of the double-width NIM module acts as a guide for insertion of the instrument. Secure the module in place by turning the two front panel captive screws clockwise until finger tight. It is recommended that the NIM bin power switch be OFF whenever the module is installed or removed.

The Model 1772 can be safely operated where the ambient air temperature is between 0°C and +50°C (+120°F Maximum). Perforations in the top and bottom sides permit cooling air to circulate through the module. When relay rack mounted, along with other “heat generating” equipment, adequate clearance should be provided to allow for sufficient air flow through both the perforated top and bottom covers of the NIM bin.

4.2 INITIAL CHECK

With the 1772 installed in a compatible bin/power supply, turn power ON.

Connect a source of +5V pulses to the SIGNAL input, with POS/NEG switch in POS position. Set Preset Switches to 00.

Push the Stop and Reset buttons on the unit being tested.

Then initiate counters by pushing the START button. Set the repetition rate of the pulse generator to about 10 counts per second; observe the unit count the pulses from the test pulse generator.

With the unit being tested accumulating, change the pulser repetition rate to various frequencies and observe the accumulation rate on the Scaler Display.

Push the STOP button and observe the scaler stop.

Push the RESET button and observe the visual display reset to 0.

Push the START button and again begin accumulation; rotate the Discriminator control clockwise until the unit stops accumulation; increase the amplitude of the input pulses and observe accumulation begin again.

Push the Reset button; observe the unit reset to zero and immediately begin accumulation again; the Reset button does not stop the unit but simply resets it to 0; the STOP button must first be pushed if it is desired to stop the unit.

Push the START button again and begin accumulation; using a piece of wire, ground the Gate In connector and observe the scaler cease accumulation; remove the Gate In short and observe the scaler again begin to accumulate.
Allow the scaler to count to its capacity and observe the Overflow pulse on an oscilloscope; compare the pulse observed to the specified shape of +5 volts, rise time less and 100 nanoseconds, width 5 microseconds.

Set POS/NEG switch to NEG. Replace the pulse generator with a source of negative pulses whose width is ≥ 20 nanoseconds.

Observe that all negative inputs above - 0.6 volts will cause the scaler to accumulate regardless of the discriminator setting.

Set MODE switch to Single, TIMEBASE switch to .01 Min and preset switches to 12.

Depress START button and observe that the Model 1772 accumulates counts for 1 min.

Set TIMEBASE switch to .1 sec and preset switches to 11. Depress START pushbutton and observe that the Model 1772 counts for 1 sec.

Set MODE switch to RECYCLE, and depress START pushbutton. Observe that the Model 1772 executes a series of 1 second count cycles, separated by pauses of ≈ 3 seconds.
SCALER
model 873

MODEL 870 IS A LITTLE DIFFERENT,
IT DOESN'T HAVE EXTERNAL DISCRIMINATOR CONTROL.

Features

- All Electronic Decades
- 15 MHz Count Rate Capability (2 MHz; Model 870)*
- Input Discriminator
- Electronic Gating Capability

Description

The Canberra Model 873 is a 15 MHz non-printing scaler which features front panel Start, Stop, Reset, and Discriminator controls. Electronic gating circuitry provides the capability of externally inhibiting the scaler from accumulating counts. This permits simple coincidence experiments without the need for additional gating modules.

A front panel indicator illuminates when the scaler is ready to accept positive (AEC Standard) input pulses.

Specifications

Inputs

COUNT INPUT - from +1.0 volt to +25 volt (Maximum) pulse; minimum width, 30 nanoseconds; input impedance, 1000 ohms; DC coupled
GATE IN - +3 to +10 volts (or open circuit) enables accumulation; less than +1.0 volt inhibits accumulation; input impedance is a current sink of 3.5 ma; DC coupled; front panel BNC connector, MODEL 870 HAS GATE IN ON BACK PANEL.

Outputs

VISUAL DATA DISPLAY - six columnar decades, neon bulbs behind a decimal mask
READY LIGHT - a front panel indicator light which lights when unit is armed to accumulate

Controls

START - front panel pushbutton to begin data accumulation
STOP - front panel pushbutton to terminate data accumulation
RESET - front panel pushbutton to reset all decades to zero
DISCRIMINATOR - front panel single turn potentiometer selects threshold level of input signal; variable from +0.5 volt to +10 volts

Performance

CAPACITY - six decades allowing a count of 10^6
SPEED - 15 MHz minimum, 20 MHz typical
TEMPERATURE - 0 to 50°C

Connectors

INPUT, GATE IN - front panel BNC UG-1094/U

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### Specifications (continued)

#### POWER

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>+24V</td>
<td>0mA</td>
</tr>
<tr>
<td>+12V</td>
<td>60mA</td>
</tr>
<tr>
<td>-24V</td>
<td>0mA</td>
</tr>
<tr>
<td>-12V</td>
<td>10mA</td>
</tr>
<tr>
<td>115VAC</td>
<td>100mA</td>
</tr>
</tbody>
</table>

#### PHYSICAL

- **SIZE**: standard dual width module (2.70 inches wide) per TID-20893
- **WEIGHT**: 3.1 lb.
<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+3 volts</td>
<td>23</td>
<td>Reserved</td>
</tr>
<tr>
<td>2</td>
<td>-3 volts</td>
<td>24</td>
<td>Reserved</td>
</tr>
<tr>
<td>3</td>
<td>Spare Bus</td>
<td>25</td>
<td>Reserved</td>
</tr>
<tr>
<td>4</td>
<td>Reserved Bus</td>
<td>26</td>
<td>Spare</td>
</tr>
<tr>
<td>5</td>
<td>Coaxial</td>
<td>27</td>
<td>Spare</td>
</tr>
<tr>
<td>6</td>
<td>Coaxial</td>
<td>*28</td>
<td>+24 volts</td>
</tr>
<tr>
<td>7</td>
<td>Coaxial</td>
<td>*29</td>
<td>-24 volts</td>
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<tr>
<td>8</td>
<td>200 volts dc</td>
<td>30</td>
<td>Spare Bus</td>
</tr>
<tr>
<td>9</td>
<td>Spare</td>
<td>31</td>
<td>Spare</td>
</tr>
<tr>
<td>*10</td>
<td>+6 volts</td>
<td>32</td>
<td>Spare</td>
</tr>
<tr>
<td>*11</td>
<td>-6 volts</td>
<td>*33</td>
<td>115 volts ac (Hot)</td>
</tr>
<tr>
<td>12</td>
<td>Reserved Bus</td>
<td>*34</td>
<td>Power Return Ground</td>
</tr>
<tr>
<td>13</td>
<td>Spare</td>
<td>**35</td>
<td>Reset (Scaler)</td>
</tr>
<tr>
<td>14</td>
<td>Spare</td>
<td>**36</td>
<td>Gate</td>
</tr>
<tr>
<td>15</td>
<td>Reserved</td>
<td>**37</td>
<td>Reset (Auxiliary)</td>
</tr>
<tr>
<td>*16</td>
<td>+12 volts</td>
<td>38</td>
<td>Coaxial</td>
</tr>
<tr>
<td>*17</td>
<td>-12 volts</td>
<td>39</td>
<td>Coaxial</td>
</tr>
<tr>
<td>18</td>
<td>Spare Bus</td>
<td>40</td>
<td>Coaxial</td>
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<tr>
<td>19</td>
<td>Reserved Bus</td>
<td>*41</td>
<td>115 volts ac (Neut.)</td>
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<tr>
<td>20</td>
<td>Spare</td>
<td>*42</td>
<td>High Quality Ground</td>
</tr>
<tr>
<td>21</td>
<td>Spare</td>
<td>G</td>
<td>Ground Guide Pin</td>
</tr>
<tr>
<td>22</td>
<td>Reserved</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pins marked (*) are installed and wired in ORTEC 401A and 401B Modular System Bins.
Pins marked (*) and (**) are installed and wired in EG&G/ORTEC-HEP M250/N and M350/N NIMBINS.