ORTEC

Models 775 and 775H Counters

Operating and Service Manual

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1707 05C 0373 02

ORTEC 775 COUNTER

Manual Change Sheet

ECN GC#133
June 20, 1973

In the Replaceable Parts List for 775-0200, page 7, change the following line:

C10 9065 49563 220 µF 20% 10 V Tan 31433 KMT T110227M010AS

ECN GC-144
October 22, 1973

In the Replaceable Parts List for 775-0200, page 7, change the following line:

C10 9065 40953 220 µF 20% 10 V Tan 80183 #D227X00152 SPR

STANDARD WARRANTY FOR ORTEC INSTRUMENTS

ORTEC warrants its instruments other than preamplifier FET input transistors, vacuum tubes, fuses, and batteries to be free from defects in workmanship and materials for a period of twelve months from date of shipment provided that the equipment has been used in a proper manner and not subjected to abuse. Repairs or replacement, at ORTEC option, will be made on in-warranty instruments, without charge, at the ORTEC factory. Shipping expense will be to the account of the customer except in cases of defects discovered upon initial operation. Warranties of vacuum tubes and semiconductors made by their manufacturers will be extended to our customers only to the extent of the manufacturers' liability to ORTEC. Specially selected vacuum tubes or semiconductors cannot be warranted. ORTEC reserves the right to modify the design of its products without incurring responsibility for modification of previously manufactured units. Since installation conditions are beyond our control, ORTEC does not assume any risks or liabilities associated with methods of installation or with installation results.

QUALITY CONTROL

Before being approved for shipment, each ORTEC instrument must pass a stringent set of quality control tests designed to expose any flaws in materials or workmanship. Permanent records of these tests are maintained for use in warranty repair and as a source of statistical information for design improvements.

ORTEC must be informed in writing of the nature of the fault of the instrument being returned and of the model and serial numbers. Failure to do so may cause unnecessary delays in getting the unit repaired. Our standard procedure requires that instruments returned for repair pass the same quality control tests that are used for new-production instruments. Instruments that are returned should be packed so that they will withstand normal transit handling and must be shipped **PREPAID** via Air Parcel Post or United Parcel Service to the nearest ORTEC repair center. Instruments damaged in transit due to inadequate packing will be repaired at the sender's expense, and it will be the sender's responsibility to make claim with the shipper. Instruments not in warranty will be repaired at the standard charge unless they have been grossly misused or mishandled, in which case the user will be notified prior to the repair being done. A quotation will be sent with the notification.

DAMAGE IN TRANSIT

Shipments should be examined immediately upon receipt for evidence of external or concealed damage. The carrier making delivery should be notified immediately of any such damage, since the carrier is normally liable for damage in shipment. Packing materials, waybills, and other such documentation should be preserved in order to establish claims. After such notification to the carrier, please notify ORTEC of the circumstances so that we may assist in damage claims and in providing replacement equipment if necessary.

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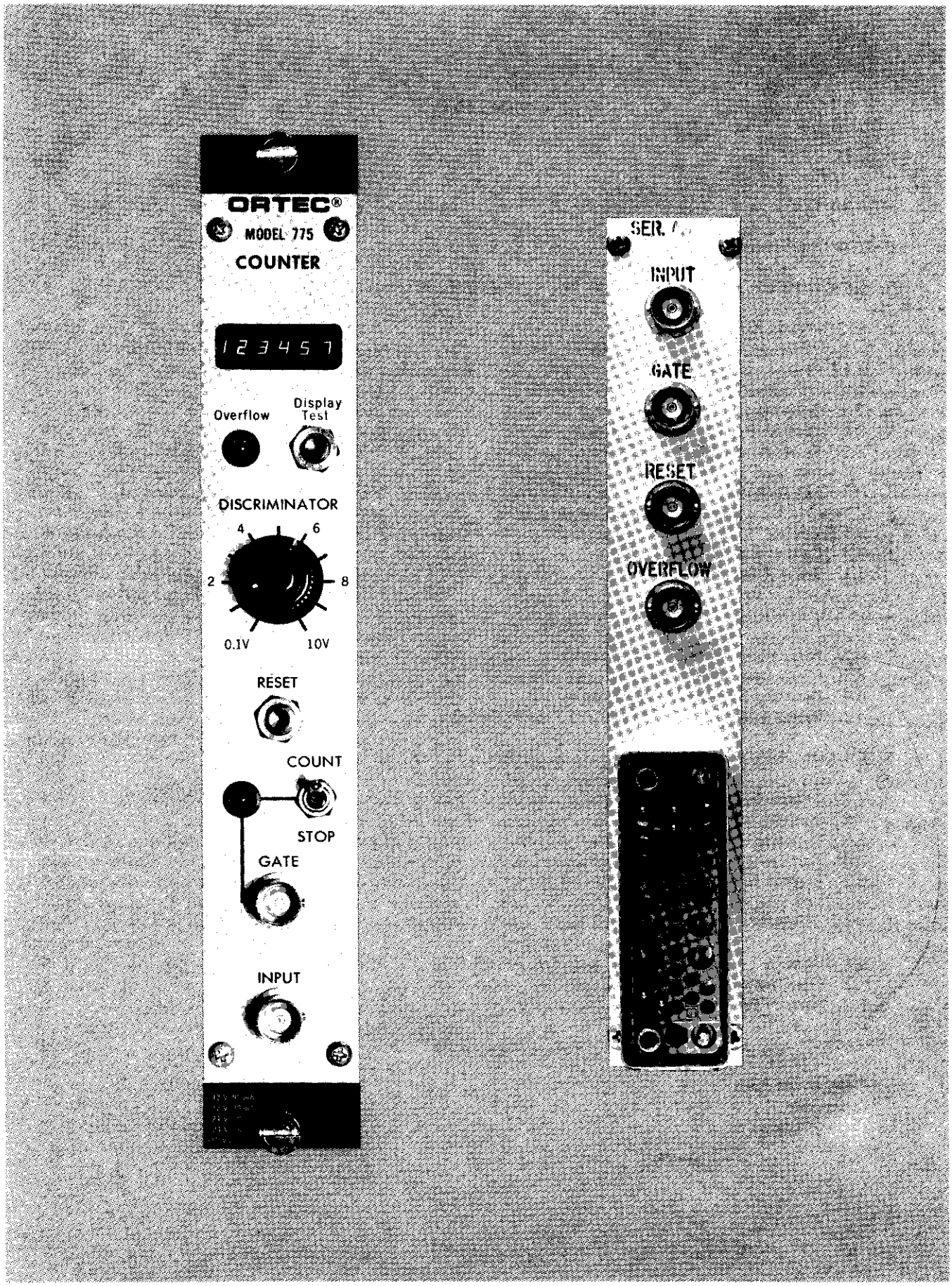

ORTEC®
MODEL 775
COUNTER
Overflow
Display Test
DISCRIMINATOR
4
6
2
8
0.1V
10V
RESET
COUNT
STOP
GATE
INPUT
SER.
INPUT
GATE
RESET
OVERFLOW

ORTEC 775 and 775H COUNTERS

1. DESCRIPTION

The ORTEC 775 Counter is a general-purpose 6-decade scaler with an adjustable input discriminator. It accepts and counts positive pulses if their amplitudes exceed the discriminator threshold setting, which has a range of 100 mV through 10 V. The input pulse pair resolution is <50 nsec, and the maximum counting rate is 20 MHz.

The 775 is packaged in a NIM-standard single-width module. It includes all the connectors and controls for either manual or automatic operation and indicates the accumulated count with 7-segment light-emitting diodes (LED's) in a direct-reading digital display.

A Gate LED indicator lights to show when the 775 is in a counting condition. The gate is controlled by both the manual Count/Stop switch and the Gate signal input circuit, with connectors on both the front and rear panels.

If the counter overflows, this condition is also shown by an LED on the front panel; the indicator remains lit from the first overflow until the unit is reset. At each overflow an output pulse is also furnished through a rear panel connector and may be used for connection into another counter for an increased counting capacity.

Reset is generated automatically when power is first applied and can be provided manually or by a signal through a rear panel connector at any time, whether the unit is or is not in a counting condition.

The 7-segment digital display can be tested at any time by pressing the Test switch on the front panel. When this switch is pressed, all seven segments in each digit should light to provide a reading of 888 888.

The 775H operates identically to the 775 but requires that the bin and power supply in which it is operated furnish +6 V dc as a power source. The ORTEC 401B/402H Bin and Power Supply is typical of the equipment required.

2. SPECIFICATIONS

2.1. PERFORMANCE

Count Capacity 6 decades, for 000 000 through 999 999.

Counting Rate 20 MHz guaranteed.

Input Discriminator Adjustable through range of +0.1 to +10 V; drift <0.01% of full scale/°C, 0 to +50°C.

Automatic Clear Generated when power is turned on initially or after a power failure.

2.2. INDICATORS

Readout Display 6 direct-reading 7-segment LED digits.

Overflow LED illuminated from first overflow until reset.

Gate LED illuminated while unit is in the counting condition.

2.3. CONTROLS

Display Test Push-button switch lights all 7 segments of each digit in the display when it is pressed for a reading of 888 888.

Discriminator Single-turn potentiometer sets the discrimination level for the positive input signal from 100 mV to 10 V.

Reset Push-button switch resets display and internal logic to an initial condition when pressed.

Count/Stop Toggle switch selects counting or noncounting condition of the unit manually.

2.4. CONNECTORS

Input Front and rear panel type BNC connectors accept positive unipolar or bipolar signals to ±25 V maximum. Input amplitude must exceed adjusted threshold level for

20 nsec minimum to be counted. Z_{in} 1 kΩ to ground, dc-coupled.

Gate Front and rear panel type BNC connectors accept standard positive logic signal to control the counter gate and the associated indicator. Open circuit or ≥+3 V to allow counting; ≤+1.5 V to inhibit counting; 25 V maximum; driving source must be capable of sinking 0.5 mA of positive current.

Reset Rear panel type BNC connector accepts standard positive logic pulse to reset the unit to an initial zero condition. ≥+3 V resets; ≤+1.5 V does not reset; 25 V maximum; 100 nsec width minimum. Z_{in} 2 kΩ dc-coupled to ground.

Overflow Rear panel type BNC connector furnishes standard positive logic output, +5 V for 2 μsec, whenever the counter overflows from 999 999 to 0. Driving source impedance ≤10Ω dc-coupled.

2.5. ELECTRICAL AND MECHANICAL

Power Required For the 775 Counter: +25 V, 95 mA; −12 V, 20 mA; 115 V ac, 50 mA, 50 or 60 Hz.

For the 775 H Counter: +12 V, 95 mA; −12 V, 20 mA; +6 V, 550 mA.

Dimensions Standard NIM single-width module (1.35 by 8.714 in.) per TID-20893.

3. INSTALLATION

3.1. GENERAL

The 775 operates on input power that must be furnished from a Nuclear-standard Bin and Power Supply such as the ORTEC 401/402 Series. If any vacuum tube equipment is operated in the same rack with the 775, there must be sufficient cooling air circulating to prevent any localized heating of the integrated circuitry used throughout the 775. The temperature of equipment mounted in racks can easily exceed the maximum limits of 120°F (50°C) unless precautions are taken.

3.2. CONNECTION TO POWER

Turn off the Bin Power Supply when inserting or removing any modules. The ORTEC modules are designed so that it is not possible to overload the Power Supply with even a full complement of modules in the Bin. Since, however, this may not be true when the Bin contains modules other than those of ORTEC design, the Power Supply voltages should be checked after all modules have been inserted. The 401/402 has test points on the Power Supply control panel to permit monitoring the dc voltages easily.

The 775 requires 115 V ac as one of its power inputs. Some bins and power supplies, as well as jumper cables, may not be wired to include this power. In the event that the unit fails to operate in a new installation, check the bin and/or cable to determine whether the 115-V ac circuit is included.

The 775H version requires +6 V at 550 mA. It must be used with an ORTEC 401B/402H Bin and Power Supply or equivalent to satisfy this power requirement. No ac power is required for the 775H.

3.3. SIGNAL CONNECTIONS

Count Input The signal to be counted by the 775 can be connected to either the front or rear panel BNC connector. These two connectors are ***not*** isolated from each other; signals from two sources should not be used and connected simultaneously to the two input connectors.

The input circuit of the 775 is dc-coupled to eliminate baseline shifts associated with changing counting rates. For signals whose average dc level is greater than ±25 V, external capacitive coupling must be provided by the user. For dc levels below 25 V, connection can be made to the input safely without damage to the 775. However, for the scaler to count these signals there must be transitions of the signals within the range of 0.1 to 10 V, since this is the input range over which the discriminator operates.

The flexibility of the 775 makes it possible to count almost any signal wider than 20 nsec and greater than 100 mV in amplitude. There are two important points to remember when supplying signals to the input: (1) The signal should not cross the threshold level more than one time. Signals with overshoot, ringing, etc., will be counted more than once if the discriminator level is raised to the level at which the perturbations occur. (2) Signals with slow rise and fall times should be as clean (noise-free) as possible because of the high gain and bandwidth of the 775 discriminator. As a slow signal approaches the threshold, a small spurious noise pulse can traverse the threshold and return, causing an extra count to be added to the contents of the scaler.

Gate Input The Gate input signal can be connected to the 775 by either the front or rear panel BNC connector. As in

the case of the count input connectors, no isolation is provided between the two inputs; so two signal sources should ***not*** be connected simultaneously. When there is no connection to the Gate input, the scaler gate permits the unit to operate. To cut the gate off, the gate input must be pulled down below +1.5 V but not below −5 V. To do this, the driving circuit must be capable of absorbing 0.5 mA from the gate input circuit. The gate input circuit permits counting when the gate input is at +3 V or greater.

Reset Input A reset input signal can be connected to the 775 through the rear panel BNC connector. To reset the scaler to zero, a positive signal of +3 V or greater originating from zero potential with a minimum width of 100 nsec should be used. The input impedance is approximately 2 kΩ dc-coupled to ground. Negative signals will not perform any useful function at the reset input. The input circuitry will not be harmed as long as the input signal level does not exceed ±25 V.

Overflow Output The overflow signal is available through a rear panel BNC connector. A positive 5-V signal appears at the output each time the contents of the counter change from 999 999 to zero. The output signal width is 2 μsec. Z_O <10Ω, dc-coupled.

4. OPERATING INSTRUCTIONS

4.1. FRONT PANEL CONTROLS AND INDICATORS

The following functions are indicated and controllable from the front panel:

Count/Stop Manually controls counting of the 775; Count position permits counting and Stop position inhibits counting.

Gate Indicator An LED indicates the condition of the input gate. When it glows, the 775 is able to count input pulses. When it is dark, the 775 is inhibited from counting.

Reset A push-button switch resets the contents of the counter to zero when it is depressed.

Discriminator A single-turn potentiometer selects the threshold level of the internal discriminator with a range of 100 mV through 10 V. Normally, for counting logic signals, the level should be adjusted about half way between the lowest expected true signal amplitude and the maximum false signal amplitude. For use with linear signals assure that the signals have only one point of inflection, or some signals may cross the threshold more than one time and produce erroneous results.

Overflow Indicator An LED lights if the counter capacity of 999 999 counts is exceeded, and remains lighted until the unit is reset.

Display Test A push-button switch permits a quick check of the digital display. When it is pressed, all seven segments of each of the six digits will be lighted, regardless of the counter contents, and the display will read all "eights."

Digital Display Six 7-segment characters with logically selected blanking for each segment display the counter contents at all times except during the Display Test interval. Each character can display a digit from 0 through 9.

4.2. INITIAL OPERATION OF COUNTER

1. Install the 775 into a 401/402 Series Bin and Power Supply or equivalent and turn on the power.

2. Press Reset. The display should now indicate that the contents of the counter are zero.

3. Press Display Test. The display should read 888 888, and should return to 0 when the switch is released.

4. Set the Count/Stop switch at Count, and the Gate indicator should light. Set the switch at Stop, and the light should go out.

5. Connect a signal to the Input connector.

6. Set the Count/Stop switch at Count.

7. Turn the Discriminator control counterclockwise until the 775 starts to count.

8. Ground the Gate input and observe that counting stops and that the indicator LED is not lighted. Remove the ground and restore the counting condition.

9. Set the Count/Stop switch at Stop, and counting should stop and the indicator again not be lighted.

4.3. COUNTING SETUP WITH ONE COUNTER

Proceed as outlined in Section 4.2 but omit those steps used in "testing" the instrument. Be sure that the input signals do not exceed the ±25-V maximum limits.

4.4. COUNTING SETUP WITH 775 AND 771 TIMER-COUNTER

An ORTEC 771 Timer-Counter can be used to control the time in a counting interval while input pulses are being counted in the 775. The setup is made by connecting a cable from the Interval output BNC on the rear panel of the 771 to the Gate Input on either the front or rear panel of the 775. This interconnection will allow the 775 to accumulate input counts only during the interval when the 771 is counting time. Use the following procedure:

1. On the 775 set the Count/Stop switch at Count.

2. With no Gate input connection and with the light indicating that the 775 is in a counting condition, check to see that Input pulses are able to be counted. Readjust the Discriminator level if necessary.

3. Set the Count/Stop switch at Stop and press Reset.

4. Connect the Gate input cable from the 771 Interval output to the 775 Gate input.

5. On the 771 set the Count/Stop switch at Stop.

6. On the 775 set the Count/Stop switch at Count.

7. The instruments are ready to be used. When the counting interval is to be started, set the 771 Count/Stop switch at Count, and both modules should be in a counting condition. At the end of the selected time interval on the 771, preset stop will affect both modules. To stop the counting interval manually, use the Count/Stop switch on the 771 and read the time for the interval on the 771.

If in the setup just described the 771 Timer-Counter had been operated as a counter, the 775 data would have represented the number of counts above its threshold per N (preset condition) counts from another source into the 771. The ratio of two counting rates can be determined in this manner.

5. CIRCUIT DESCRIPTION

5.1. GENERAL DESCRIPTION

The ORTEC 775 Counter is a 6-decade ripple scaler preceded by a precise linear discriminator and includes logic for gating. An internal oscillator drives a 7-state ring scanner with a BCD-to-decimal decoder to control the 6-digit LED display. See schematic 775-0101-S1 at the back of the manual for circuit details.

5.2. PULSE INPUT CIRCUIT

Input signals in the range of 0.1 through 10 V can be applied through either the front or rear panel BNC Input connector. They are dc-coupled through divider R41 and R42 to the positive input of comparator IC 24. The negative input to IC 24 is the dc level selected with Discriminator control R65 on the front panel. Each input pulse whose amplitude exceeds the discrimination level will generate a logic output from IC 24-7 to drive IC 9-8. If the 775 is not being reset and its Gate indicator light is lighted, the input pulse becomes a clock pulse into the least significant decade, IC 10, and is counted.

With no Gate input signal and with switch S3 set at Count, IC 19-6 is high and IC 20-8 is low, making IC 19-11 high and permitting IC 9-6 to pass the input pulse. If the switch is set at Stop, IC 20-8 goes high and the gate is inhibiting. Likewise, if there is a Gate input connection and the signal is dropped to $\leq$+1.5 V, IC 20-8 goes high and the gate is inhibited. One of the functions of IC 19-11 is to drive the input to IC 20-12 and light LED 1 when the gate is enabled.

During the interval of a reset signal, IC 21-11 goes low and this drives IC 20-12 high and turns off LED 1; any input during this interval will not be counted because IC 19-3 is low and gate IC 9-6 inhibits the input pulse.

5.3. COUNTING DECADES

The type 7490 circuits, IC 10 through IC 15, are the counting decades. The gated input pulses are used as clock input pulses to IC 10, and the overflow from each of the decades is the clock pulse for the next more significant decade. The overflow output from IC 15 triggers flip-flop IC 22-11 and IC 22-8 to light LED 2 until the next reset. The same pulse is shaped for an Overflow output signal through CN6 by monostable Q16 and IC 23-8 and emitter-follower Q17. If there is more than one overflow, each overflow will generate an output pulse.

The 1-2-4-8 BCD state of each decade is available through four output lines. The states of all four output lines for each decade are gated onto common lines through IC 1 to IC 6. Gating is controlled by a ring scanner, and the coded combination for each digit is gated onto the common lines individually and sequentially.

Oscillator IC 23-2 and IC 23-4 is a free-running multivibrator with a period of about 1 msec. Its output is used to drive the clock input of decade counter IC 16. The BCD output from IC 16 is decoded to decimal numbers in IC 8, and each of the decoded states 0 through 5 enables the gate for a selected decade and enables the comparable character

in LED 3 to display that digit. When IC 16 is advanced to a state of 6, the decade is reset to zero through IC 22-3 and IC 22-6 to start the scan again.

The four common lines will carry the BCD identification for the selected decade into IC 17, which decodes the digit for the 7-segment LED 3 character that is enabled by the selection of IC 8. When all seven segments of a character are lighted, a digit 8 is formed in the display. Selective blanking of the segments ***a*** through ***g*** forms any of the other 9 digits. Segment ***a*** is across the top of the character, with segments ***b*** through ***f*** clockwise around the border and segment ***g*** across the center. When switch S1 is pressed, all seven segments of all characters are lighted for a test of the display. IC 21-3 and IC 21-6 provide blanking for insignificant zeros in the display.

5.4. RESET CIRCUIT

The 775 can be reset at any time by either pressing switch S2 on the front panel or by furnishing a reset input pulse through CN5 on the rear panel. Either of these conditions makes IC 20-6 go high during the reset signal. The LR (Local Reset) signal resets all counting decades to zero, restores the flip-flop for LED 2 if it had been set during the prior counting interval, inhibits acceptance of any input pulses and turns off LED 1 through IC 20-12, and inhibits the generation of an Overflow output pulse by the response through IC 23-6.

5.5. INTERNAL POWER SUPPLY

An internal power supply is included to generate the +5-V source for the integrated circuits. 115 V ac is applied to T1 and full-wave-rectified by D4, filtered by C18 and C19, and regulated by Q18 through Q20. Fuse F1, 1.5 A, is mounted in a fuseholder on the printed circuit board. The fuse protects the +5-V source from overloads due to shorts in the instrument.

The 775H Counter does not contain the portion of this power supply that consists of T1, D4, C18, and C19. It obtains its +5-V power from the +6-V source in the ORTEC 401B/402H Bin and Power Supply. In this version the collector of Q20 is connected to pin 10 of the rear panel module power connector.

6. MAINTENANCE

6.1. GENERAL

The basic performance of the 775 Counter can be tested by following the procedure outlined in Section 4.2. This will not check the unit to its published specifications.

If the unit fails to respond properly during testing, use the information in Section 5 to determine the fault. Schematic 775-0101-S1 at the back of the manual includes all the circuits in the unit.

6.2. FUSE REPLACEMENT (775 Only)

If the front panel display and indicators cannot be lighted, remove the left side panel and inspect fuse F1. This fuse protects the +5-V power source that is used for all the integrated circuits in the instrument, and the indicators cannot be lit unless the integrated circuits are operating. Replace the fuse with a type 3AG fuse with a 1.5-A rating only.

6.3. FACTORY REPAIR

The 775 can be returned to ORTEC for repair service at a nominal cost. Our standard procedure requires that each repaired instrument receive the same extensive quality control tests that a new instrument receives. Please contact our Customer Service Department at (615) 482-4411 for shipping instructions before returning the instrument.

APPENDIX

REPLACEABLE PARTS

ORDERING INFORMATION

The Replaceable Parts List shown below contains information needed for ordering spare and/or replacement parts. Each listing indicates the reference designator number, the part number, a description of the component, and the part manufacturer and manufacturer's part number.

All inquiries concerning spare and/or replacement parts and all orders for same should include the model and serial numbers of the instruments involved and should be addressed to the Customer Service Department at 100 Midland Road, Oak Ridge, Tennessee 37830. The Manager of Customer Services can be reached by telephone at (615) 482-4411. The minimum order for spare and/or replacement parts is $25.00.

ORDERING INFORMATION FOR PARTS NOT LISTED

In order to facilitate the ordering of a part not listed below, the following information should be submitted to the Customer Service Department:

1. the instrument model number,
2. the instrument serial number,
3. a description of the part,
4. information as to the function and location of the part.

Replaceable Parts List

REFERENCE DESIGNATOR	ORTEC PART NO.	DESCRIPTION	MFR.	MFR. PART NO.
775-0100	5004 46193			
CH1	9097 41339	Connector, BNC, UG1094/U	95712	DGE
CH2	9097 41339	Connector, BNC, UG1094/U	95712	DGE
CH3	9097 41339	Connector, BNC, UG1094/U	95712	DGE
CH4	9097 41339	Connector, BNC, UG1094/U	95712	DGE
CH5	9097 41339	Connector, BNC, UG1094/U	95712	DGE
CH6	9097 41339	Connector, BNC, UG1094/U	95712	DGE
R65	9051 40801	1 K 3W 5% Pot.	44655	OHM #RV4NAYSD102A (MIL)
S1	9094 41293	Switch, P-B, SPDT (Red)	82389	SWC #953
S2	9094 41293	Switch, P-B, SPDT (Red)	82389	SWC #953
S3	9094 41277	Swtich, Toggle, SPDT	95146	AEP #MST-105D
LED1	9103 63798	LED Indicator W/Mount	72619	DIL #521-9166
LED2	9103 63798	LED Indicator W/Mount	72619	DIL #521-9166

Replaceable Parts List (continued)

REFERENCE DESIGNATOR	ORTEC PART NO.	DESCRIPTION	MFR.	MFR. PART NO.
775-0100-1	5004 46196			
C18	9067 47378	2200 uf 25V El.	FRAKO	FRAKO #B1735/2200/25(70)
C19	9067 47378	2200 uf 25V El.	FRAKO	FRAKO #B1735/2200/25(70)
D4	9080 44206	F.W. Bridge	27777	VRO #VH247
T1	9090 61173	Transformer	07119	KMC #T-1497
775-0200	5007 46194			
C1	9059 40889	200 pf 500V 2% D.M.	84171	ARC #DM15-201G
C2	9059 40892	470 pf 500V 5% D.M.	84171	ARC #DM15-471J
C3	9065 40942	1 uf 35V 20% Tan.	80183	SPR #150D105X0035A2
C4	9065 40942	1 uf 35V 20% Tan.	80183	SPR #150D105X0035A2
C5	9055 40855	0.01 uf 50V 20% Disc.	80183	SPR #C023K101F103M
C6	9055 40855	0.01 uf 50V 20% Disc.	80183	SPR #C023K101F103M
C7	9065 49542	6.8 uf 35V 20% Tan.	12954	DCK #D68R8G5B35M
C8	9055 40855	0.01 uf 50V 20% Disc.	80183	SPR #C023K101F103M
C9	9055 40855	0.01 uf 50V 20% Disc.	80183	SPR #C023K101F103M
C10	9065 40953	220 uf 10V 20% Tan.	80183	SPR #150D227X00152
C11	9065 40948	6.8 uf 35V 20% Tan.	80183	SPR #150D685X0035B2
C12	9065 40948	6.8 uf 35V 20% Tan.	80183	SPR #150D685X0035B2
C13	9055 40855	0.01 uf 50V 20% Disc.	80183	SPR #C023K101F103M
C14	9055 40855	0.01 uf 50V 20% Disc.	80183	SPR #C023K101F103M
C15	9055 40855	0.01 uf 50V 20% Disc.	80183	SPR #C023K101F103M
C16	9055 40855	0.01 uf 50V 20% Disc.	80183	SPR #C023K101F103M
C17	9055 40855	0.01 uf 50V 20% Disc.	80183	SPR #C023K101F103M
C20	9059 40886	100 pf 500V 2% DM	84171	ARC #DM15-101G
D1	9080 41125	Diode - 1N4009	14433	ITT
D2	9080 41125	Diode - 1N4009	14433	ITT
D3	9080 41125	Diode - 1N4009	14433	ITT
F1	9101 41747	Fuse, 1.5 Amp, 250V	75915	LIT #312001.5
IC-1	9079 44083	IC - SN7403N	27014	NSC
IC-2	9079 44083	IC - SN7403N	27014	NSC
IC-3	9079 44083	IC - SN7403N	27014	NSC
IC-4	9079 44083	IC - SN7403N	27014	NSC
IC-5	9079 44083	IC - SN7403N	27014	NSC
IC-6	9079 44083	IC - SN7403N	27014	NSC
IC-7	9079 44079	IC - SN7404N	27014	NSC
IC-8	9079 49495	IC - SN7442N	27014	NSC
IC-9	9079 44081	IC - SN7410N	27014	NSC

Replaceable Parts List (continued)

REFERENCE DESIGNATOR	ORTEC PART NO.	DESCRIPTION	MFR.	MFR. PART NO.
775-0200	5007 46194			
cont'd.				
IC-10	9079 44072	IC - SN7490N	27014	NSC
IC-11	9079 44072	IC - SN7490N	27014	NSC
IC-12	9079 44072	IC - SN7490N	27014	NSC
IC-13	9079 44072	IC - SN7490N	27014	NSC
IC-14	9079 44072	IC - SN7490N	27014	NSC
IC-15	9079 44072	IC - SN7490N	27014	NSC
IC-16	9079 44072	IC - SN7490N	27014	NSC
IC-17	9079 49522	IC - SN7448N	27014	NSC (Tested)
IC-18	9079 44079	IC - SN7404N	27014	NSC
IC-19	9079 44073	IC - SN7400N	27014	NSC
IC-20	9079 44081	IC - SN7410N	27014	NSC
IC-21	9079 44073	IC - SN7400N	27014	NSC
IC-22	9079 44073	IC - SN7400N	27014	NSC
IC-23	9079 44082	IC - SN7405N	27014	NSC
IC-24	9079 41815	IC - 710	13715	FSC #U5B771039X
Q1	9078 43655	Transistor - MPS6531	80211	MOT
Q2	9078 43655	Transistor - MPS6531	80211	MOT
Q3	9078 43655	Transistor - MPS6531	80211	MOT
Q4	9078 43655	Transistor - MPS6531	80211	MOT
Q5	9078 43655	Transistor - MPS6531	80211	MOT
Q6	9078 43655	Transistor - MPS6531	80211	MOT
Q7	9078 43655	Transistor - MPS6531	80211	MOT
Q8	9078 43655	Transistor - MPS6531	80211	MOT
Q9	9078 43655	Transistor - MPS6531	80211	MOT
Q10	9078 43655	Transistor - MPS6531	80211	MOT
Q11	9078 43655	Transistor - MPS6531	80211	MOT
Q12	9078 43655	Transistor - MPS6531	80211	MOT
Q13	9078 43655	Transistor - MPS6531	80211	MOT
Q14	9078 43655	Transistor - MPS6531	80211	MOT
Q15	9078 43655	Transistor - MPS6531	80211	MOT
Q16	9078 43651	Transistor - MPS3646	80211	MOT
Q17	9078 43655	Transistor - MPS6531	80211	MOT
Q18	9078 41083	Transistor - 2N3643	13715	FSC
Q19	9078 41070	Transistor - 2N3053	86684	RCA
Q20	9078 43682	Transistor - MJE3055	80211	MOT
Q21	9078 43655	Transistor - MPS6531	80211	MOT
R1	9015 40269	180 Ω 1/4W 5% C	01121	ABC CB
R2	9015 40233	2.4 K 1/4W 5% C	01121	ABC CB
R3	9015 40269	180 Ω 1/4W 5% C	01121	ABC CB
R4	9015 40233	2.4 K 1/4W 5% C	01121	ABC CB
R5	9015 40269	180 Ω 1/4W 5% C	01121	ABC CB
R6	9015 40233	2.4 K 1/4W 5% C	01121	ABC CB
R7	9015 40269	180 Ω 1/4W 5% C	01121	ABC CB

Replaceable Parts List (continued)

REFERENCE DESIGNATOR	ORTEC PART NO.	DESCRIPTION				MFR.	MFR. PART NO.
775-0200	5007 46194						
cont'd.							
R8	9015 40233	2.4 K	1/4W	5%	C	01121	ABC CB
R9	9015 40269	180 Ω	1/4W	5%	C	01121	ABC CB
R10	9015 40233	2.4 K	1/4W	5%	C	01121	ABC CB
R11	9015 40269	180 Ω	1/4W	5%	C	01121	ABC CB
R12	9015 40233	2.4 K	1/4W	5%	C	01121	ABC CB
R13	9015 40269	180 Ω	1/4W	5%	C	01121	ABC CB
R14	9015 40233	2.4 K	1/4W	5%	C	01121	ABC CB
R15	9015 40233	2.4 K	1/4W	5%	C	01121	ABC CB
R16	9015 40287	1.3 K	1/4W	5%	C	01121	ABC CB
R17	9015 40233	2.4 K	1/4W	5%	C	01121	ABC CB
R18	9015 40287	1.3 K	1/4W	5%	C	01121	ABC CB
R19	9015 40233	2.4 K	1/4W	5%	C	01121	ABC CB
R20	9015 40287	1.3 K	1/4W	5%	C	01121	ABC CB
R21	9015 40233	2.4 K	1/4W	5%	C	01121	ABC CB
R22	9015 40287	1.3 K	1/4W	5%	C	01121	ABC CB
R23	9015 40233	2.4 K	1/4W	5%	C	01121	ABC CB
R24	9015 40287	1.3 K	1/4W	5%	C	01121	ABC CB
R25	9015 40233	2.4 K	1/4W	5%	C	01121	ABC CB
R26	9015 40287	1.3 K	1/4W	5%	C	01121	ABC CB
R27	9015 40224	820 Ω	1/4W	5%	C	01121	ABC CB
R28	9015 40224	820 Ω	1/4W	5%	C	01121	ABC CB
R29	9015 40231	2 K	1/4W	5%	C	01121	ABC CB
R30	9015 40231	2 K	1/4W	5%	C	01121	ABC CB
R31	9015 40231	2 K	1/4W	5%	C	01121	ABC CB
R32	9015 40231	2 K	1/4W	5%	C	01121	ABC CB
R33	9027 40594	57.6 K	1/8W	1%	MF	24546	CGW C-4
R34	9027 40598	34.8 K	1/8W	1%	MF	24546	CGW C-4
R35	9027 40547	12.1 K	1/8W	1%	MF	24546	CGW C-4
R36	9015 40259	6.2 K	1/4W	5%	C	01121	ABC CB
R37	9015 40238	4.7 K	1/4W	5%	C	01121	ABC CB
R38	9015 40212	200 Ω	1/4W	5%	C	01121	ABC CB
R39	9027 40517	1.47 K	1/8W	1%	MF	24546	CGW C-4
R40	9027 40481	10 Ω	1/8W	1%	MF	24546	CGW C-4
R41	9027 40510	511 Ω	1/8W	1%	MF	24546	CGW C-4
R42	9027 40510	511 Ω	1/8W	1%	MF	24546	CGW C-4
R43	9015 40209	100 Ω	1/4W	5%	C	01121	ABC CB
R44	9015 43951	75 K	1/4W	5%	C	01121	ABC CB
R45	9015 40287	1.3 K	1/4W	5%	C	01121	ABC CB
R46	9015 40220	510 Ω	1/4W	5%	C	01121	ABC CB
R47	9015 40226	1 K	1/4W	5%	C	01121	ABC CB
R48	9015 40232	2.2 K	1/4W	5%	C	01121	ABC CB
R49	9015 40259	6.2 K	1/4W	5%	C	01121	ABC CB
R50	9015 40235	3 K	1/4W	5%	C	01121	ABC CB
R51	9015 40212	200 Ω	1/4W	5%	C	01121	ABC CB
R52	9015 40259	6.2 K	1/4W	5%	C	01121	ABC CB
R53	9015 40226	1 K	1/4W	5%	C	01121	ABC CB
R54	9015 43951	75 K	1/4W	5%	C	01121	ABC CB
R55	9015 40226	1 K	1/4W	5%	C	01121	ABC CB
R56	9015 40238	4.7 K	1/4W	5%	C	01121	ABC CB
R57	9015 40238	4.7 K	1/4W	5%	C	01121	ABC CB

Replaceable Parts List (continued)

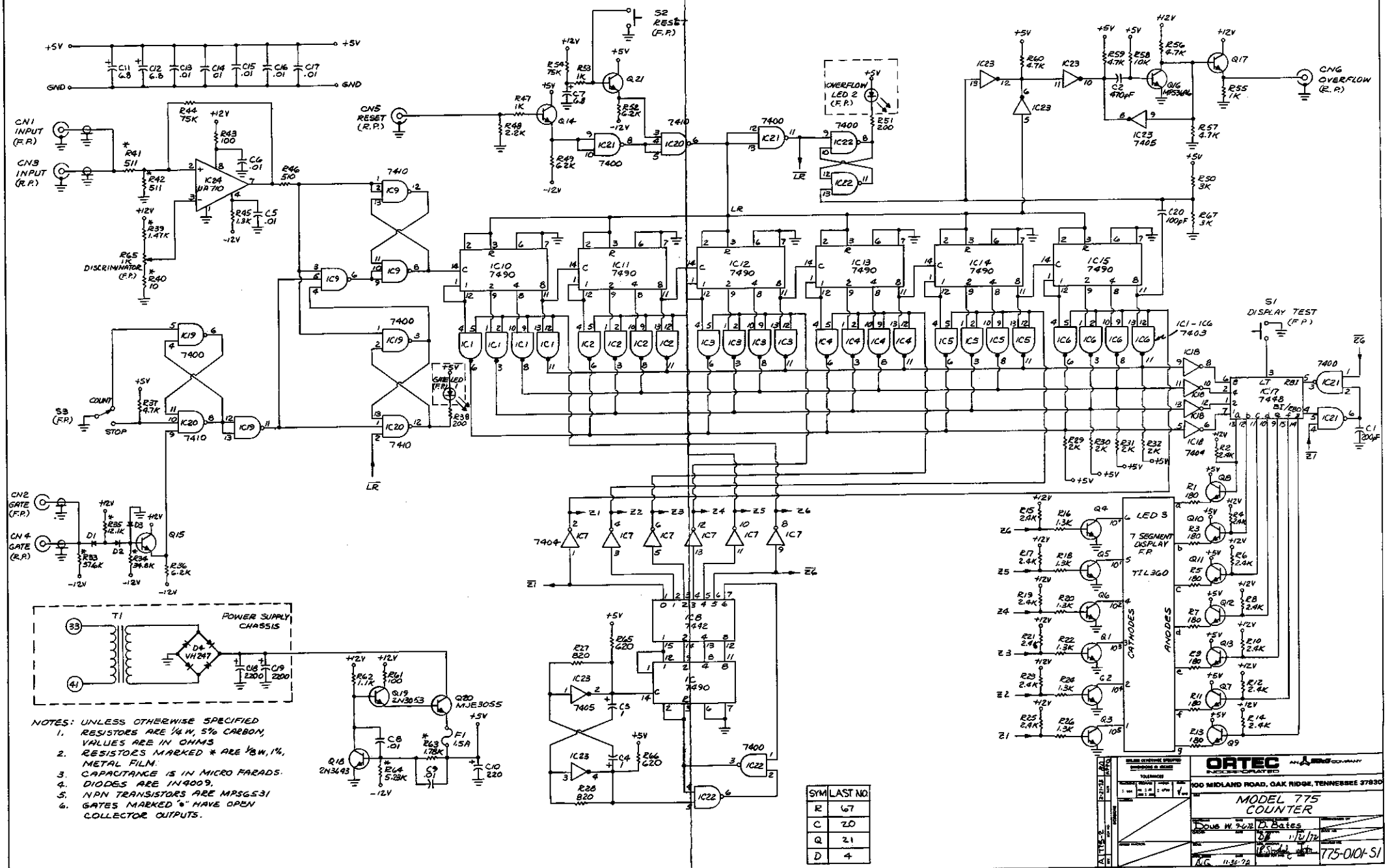
REFERENCE DESIGNATOR	ORTEC PART NO.	DESCRIPTION				MFR.	MFR. PART NO.
775-0200	5007 46194						
cont'd							
R58	9015 40245	10 K	1/4W	5%	C	01121	ABC CB
R59	9015 40238	4.7 K	1/4W	5%	C	01121	ABC CB
R60	9015 40238	4.7 K	1/4W	5%	C	01121	ABC CB
R61	9015 40209	100 Ω	1/4W	5%	C	01121	ABC CB
R62	9015 40227	1.1 K	1/4W	5%	C	01121	ABC CB
R63	9027 40520	1.78 K	1/8W	1%	MF	24546	CGW C-4
R64	9027 43710	5.23 K	1/8W	1%	MF	24546	CGW C-4
R65	9015 40221	620 Ω	1/4W	5%	C	01121	ABC CB
R66	9015 40221	620 Ω	1/4W	5%	C	01121	ABC CB
R67	9015 40235	3 K	1/4W	5%	C	01121	ABC CB
775-0300	5007 46195						
LED3	9103 63800	LED, Numeric Display				01295	TII #TlXL360
		7-Segment					

BIN/MODULE CONNECTOR PIN ASSIGNMENTS FOR AEC STANDARD NUCLEAR INSTRUMENT MODULES PER TID-20893

Pin	Function	Pin	Function
1	+3 volts	23	Reserved
2	−3 volts	24	Reserved
3	Spare Bus	25	Reserved
4	Reserved Bus	26	Spare
5	Coaxial	27	Spare
6	Coaxial	*28	+24 volts
7	Coaxial	*29	−24 volts
8	200 volts dc	30	Spare Bus
9	Spare	31	Spare
*10	+6 volts	32	Spare
*11	−6 volts	*33	115 volts ac (Hot)
12	Reserved Bus	*34	Power Return Ground
13	Spare	**35	Reset (Scaler)
14	Spare	**36	Gate
15	Reserved	**37	Reset (Auxiliary)
*16	+12 volts	38	Coaxial
*17	−12 volts	39	Coaxial
18	Spare Bus	40	Coaxial
19	Reserved Bus	*41	115 volts ac (Neut.)
20	Spare	*42	High Quality Ground
21	Spare	G	Ground Guide Pin
22	Reserved		

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.

The transistor types installed in your instrument may differ from those shown in the schematic diagram. In such cases, necessary replacements can be made with either the type shown in the diagram or the type actually used in the instrument.


CN1 INPUT (F.P.)
CN3 INPUT (R.P.)
CN5 RESET (R.P.)
S2 RESET (F.P.)
S3 (F.P.)
COUNT
STOP
S1 DISPLAY TEST (F.P.)
CN2 GATE (F.P.)
CN4 GATE (R.P.)
CNG OVERFLOW (R.P.)
OVERFLOW LED 2 (F.P.)
GATE LED (F.P.)
DISCRIMINATOR (F.P.)
LR
IC1 - IC6 7403
IC7 7404
IC8 7492
IC9 7410
IC10 7490
IC11 7490
IC12 7490
IC13 7490
IC14 7490
IC15 7490
IC16 7404
IC17 7448
IC18 7404
IC19 7400
IC20 7410
IC21 7400
IC22 7400
IC23 7405
IC24 UA 710
Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 MPS6531
Q14 Q15 Q16 MPS6561
Q17 Q18 2N3643
Q19 2N3053
Q20 MJE3055
D1 D2 D3
D4 VH247
T1
POWER SUPPLY CHASSIS
F1 4.5A
LED 8 7 SEGMENT DISPLAY F.P. TIL360
ANODES
CATHODES
NOTES: UNLESS OTHERWISE SPECIFIED
1. RESISTORS ARE 1/4 W, 5% CARBON, VALUES ARE IN OHMS
2. RESISTORS MARKED * ARE 1/8 W, 1%, METAL FILM.
3. CAPACITANCE IS IN MICRO FARADS.
4. DIODES ARE IN4009.
5. NPN TRANSISTORS ARE MPS6531
6. GATES MARKED "o" HAVE OPEN COLLECTOR OUTPUTS.
SYM LAST NO.
R 67
C 20
Q 21
D 4
ORTEC INCORPORATED
100 MIDLAND ROAD, OAK RIDGE, TENNESSEE 37830
MODEL 775 COUNTER
Doug W. 9-6-72
D. Bates
11/1/72
775-0101-S1