

ORTEC[®]

INSTRUCTION MANUAL MODEL 403 A TIME PICKOFF CONTROL

Serial No. _____

Purchaser _____

Date Issued _____

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STANDARD WARRANTY FOR ORTEC ELECTRONIC INSTRUMENTS

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, notify ORTEC of the circumstances so that we may assist in damage claims and in providing replacement equipment when necessary.

WARRANTY

ORTEC warrants its electronic products to be free from defects in workmanship and materials, other than vacuum tubes and semiconductors, 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 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, as 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 the methods of installation, or 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.

REPAIR SERVICE

ORTEC instruments not in warranty may be returned to the factory for repairs or checkout at modest expense to the customer. Standard procedure requires that returned instruments pass the same quality control tests as those used for new production instruments. Please contact the factory for instructions before shipping equipment.

ORTEC[®]

MODEL 403A

**TIME PICKOFF
CONTROL**

DISC. LEVEL



DISC.



ZERO



INPUT

NEG.



OUTPUT 1

NEG.



OUTPUT 2

POS.



OUTPUT 3

+12V 15mA
-12V 40mA
+24V 15mA
-24V 35mA



ORTEC 403A
TIME PICKOFF CONTROL

1. DESCRIPTION

The 403A Time Pickoff Control provides control and fan-out buffering for time derivation units such as the 260, 264, and 268. Dc supply voltages and a discriminator level control current for the time derivation unit are provided via a multiconductor shielded cable.

The fan-out buffer accepts the Type I (fast negative) logic signal from the time derivation and derives from it three separate output signals. Two are Type I logic and one is Type II logic (slower positive).

The 403A receives its power from an ORTEC 401/402 Bin and Power Supply.

2. SPECIFICATIONS

Input Signal: 0.3V minimum (protected to $\pm 100V$) (this signal conforms to the Preferred Practices of TID-20893 (Rev.) normally the output signal from the 260 Time Pickoff, 264, or 268 Photomultiplier Timing Discriminator and Pre-amplifiers).

Input Impedance: 50 ohms $\pm 10\%$, dc.

Input - Output Count Rate: 100 MHz maximum (fast negative).

Outputs:

Output 1: Fast logic, negative, 15 mA on 50 ohms, current drive, $T_r \cong 2.5$ nsec for input signal of 2X threshold, Width \sim width of input signal at 250 mV level, amplitude limited at $\sim 1.5V$ when unterminated, dc coupled.

Output 2: Same as 1 above.

Output 3: Slow logic, positive, 5V, $T_r \cong 10$ nsec, Width ~ 0.5 nsec, $Z_o \cong 10$ ohms.

Connectors:

Signal: All BNC

Power and Bias: Amphenol 126-198.

Power Connection Cable: The appropriate connecting cable will be furnished with the 260 Time Pickoff, 264, or 268 Photomultiplier Discriminator and Preamplifiers.

Power Required:	+24V - 15 mA	+12V - 15 mA
	-24V - 35 mA	-12V - 40 mA

3. INSTALLATION INSTRUCTIONS

Insert the 403A into the 401/402. Connect the time derivation unit (ORTEC 260, 264, etc.) to the 403A by the appropriate control cable, 260-C1 or 260-C2. This cable is provided with the time derivation unit.

Connect a 50-ohm coaxial cable between the output of the time derivation unit and the input of the 403A. The outputs of the 403A may now be connected to the desired inputs and the system should be ready for operation.

4. OPERATING INSTRUCTIONS

The only two controls associated with the 403A are the DISC ZERO adjustment R11, and the DISC LEVEL control R12. The DISC LEVEL control varies the threshold in the associated time derivation unit. The DISC ZERO adjustment provides a means of normalizing the DISC LEVEL at one set-point. Normally this set-point will be that of maximum sensitivity, for which the adjustment procedure is:

1. Monitor the output #3 of the 403A with an appropriate oscilloscope.
2. Set the DISC LEVEL control R12 to 0.0.
3. Adjust the DISC ZERO control R11 clockwise until output signals appear (this indicates self trigger of the time derivation unit).
4. Turn R11 counter clockwise just enough to cause the signals to disappear.

The system is now adjusted for maximum sensitivity.

5. CIRCUIT DESCRIPTION (See Drawings 403A-0101-S1 and 403A-0101-B1)

5.1 Power and Control Bias

The 403A furnishes the power and control bias for a time derivation unit by direct access via the bias and power output jack (J2).

5.2 Fan-out Circuit

The input signal to the 403A is regenerated in the fan-out circuit to produce three separate outputs. The input signal passes through the current limiter circuit composed of IC-1 and D3 to the input of the dc coupled amplifier composed of Q1, Q2, and Q3. The output current signal from Q3 collector triggers the tunnel diode D4 from the low state to the high state. It will remain in the high state until the input signal decreases to less than 250 mV.

The voltage signal from D4 drives the two fast output current switches Q5-Q6 and Q8-Q9 via two emitter followers Q4 and Q10. These switches drive 15 mA of current on Outputs 1 and 2. Also a signal is derived from the collector of Q10 which triggers the trigger pair Q11-Q12. This trigger pair generates a positive signal of approximately 5V, 500 nsec wide. Q13 is a cutoff emitter follower which is driven into the conduction state by this 5V signal and thereby presents this signal to Output 3.

6. MAINTENANCE INSTRUCTIONS

6.1 General Maintenance Instructions

The operation of the DISC LEVEL control is a simple shorting rheostat in series with a current sensitive device which exists in the associated time derivation device, e.g., ORTEC 260. The operation of the DISC ZERO control is the same and is covered in Section 4 of this manual.

The fan-out buffer may be tested with a signal from a pulse generator or from a time derivation unit. The input signal is regenerated in the 403A to a standard output amplitude, but having a width approximately equal to the input signal at a level of -250 mV.

6.2 Calibration Adjustments

The operation of the DISC ZERO control is covered in Section 4 and is the only calibration associated with the unit.

6.3 Troubleshooting Suggestions

In situations where the 403A is suspected of malfunction, it is essential to verify such malfunction in terms of simple pulse generator pulses at the input and output. For this reason, the 403A should be disconnected from its position in the system, and routine diagnostic analysis performed with a test pulse generator and oscilloscope. The guide plate and shield cover may be completely removed from the module to enable oscilloscope and voltmeter observation with a minimal chance of accidentally short-circuiting portions of the etched board. The 403A may be returned to ORTEC for repair service at nominal cost; our standardized procedure requires that each repaired instrument receive the same extensive quality control tests that a new instrument receives.

6.4 Tabulated Test Point Voltages

The following voltages are intended to indicate typical dc voltages measured on the etched circuit board as an aid in troubleshooting.

Table of Typical Voltage for ORTEC 403A

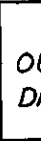
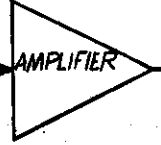
+24V buss	23.8
-24V buss	23.6
+12V buss	11.9
-12V buss	11.6
Q1b	+ 0.014V
Q1e	- 0.74V
Q2e	- 0.67V
Q2c	+ 1.02V
Q3c	- 0.0015V
Q4e	- 0.71V
Q5e	- 1.45V
Q6b	- 0.9V
Q7e	- 0.7V
Q8e	- 1.45V
Q9b	- 0.71V
Q9c	- 0.73V
Q10e	- 0.71V
Q11e	- 11.9V
Q12b	- 11.2V
Q12c	- 0.027V
Q13c	+11.9V

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

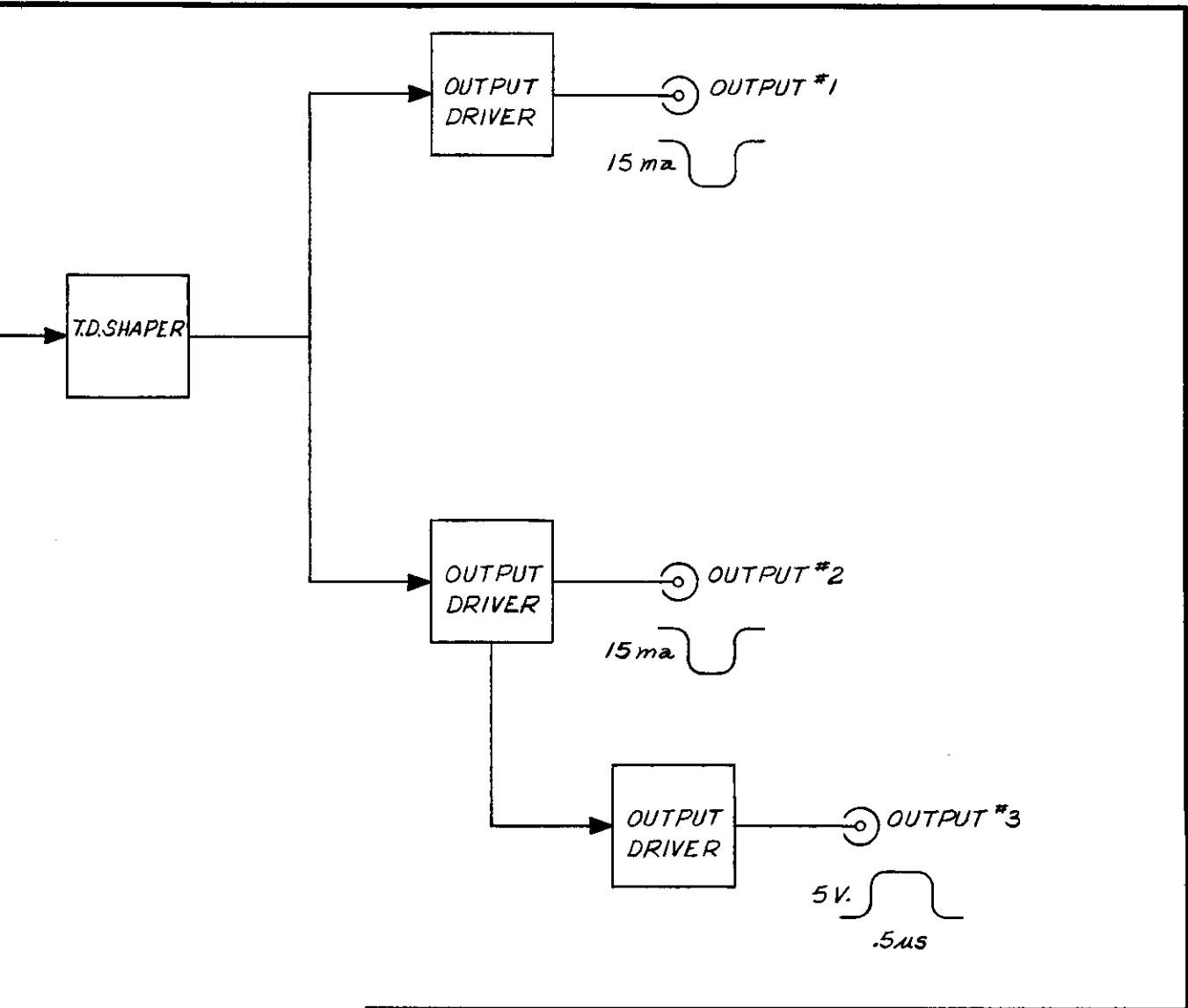
Pin	Function	Pin	Function
1	+3 volts	23	Reserved
2	-3 volts	24	Reserved
3	Spare Bus	25	Reserved
4	Reserved Bus	26	Spare
5	Coaxial	27	Spare
6	Coaxial	*28	+24 volts
7	Coaxial	*29	-24 volts
8	200 volts dc	30	Spare Bus
9	Spare	31	Carry No. 2
*10	+6 volts	32	Spare
*11	-6 volts	*33	115 volts ac (Hot)
12	Reserved Bus	*34	Power Return Ground,
13	Carry No. 1	35	Reset
14	Spare	36	Gate
15	Reserved	37	Spare
*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		


**These pins are installed and wired in parallel in the ORTEC Model 401 Modular System Bin.*

.3V. MIN.

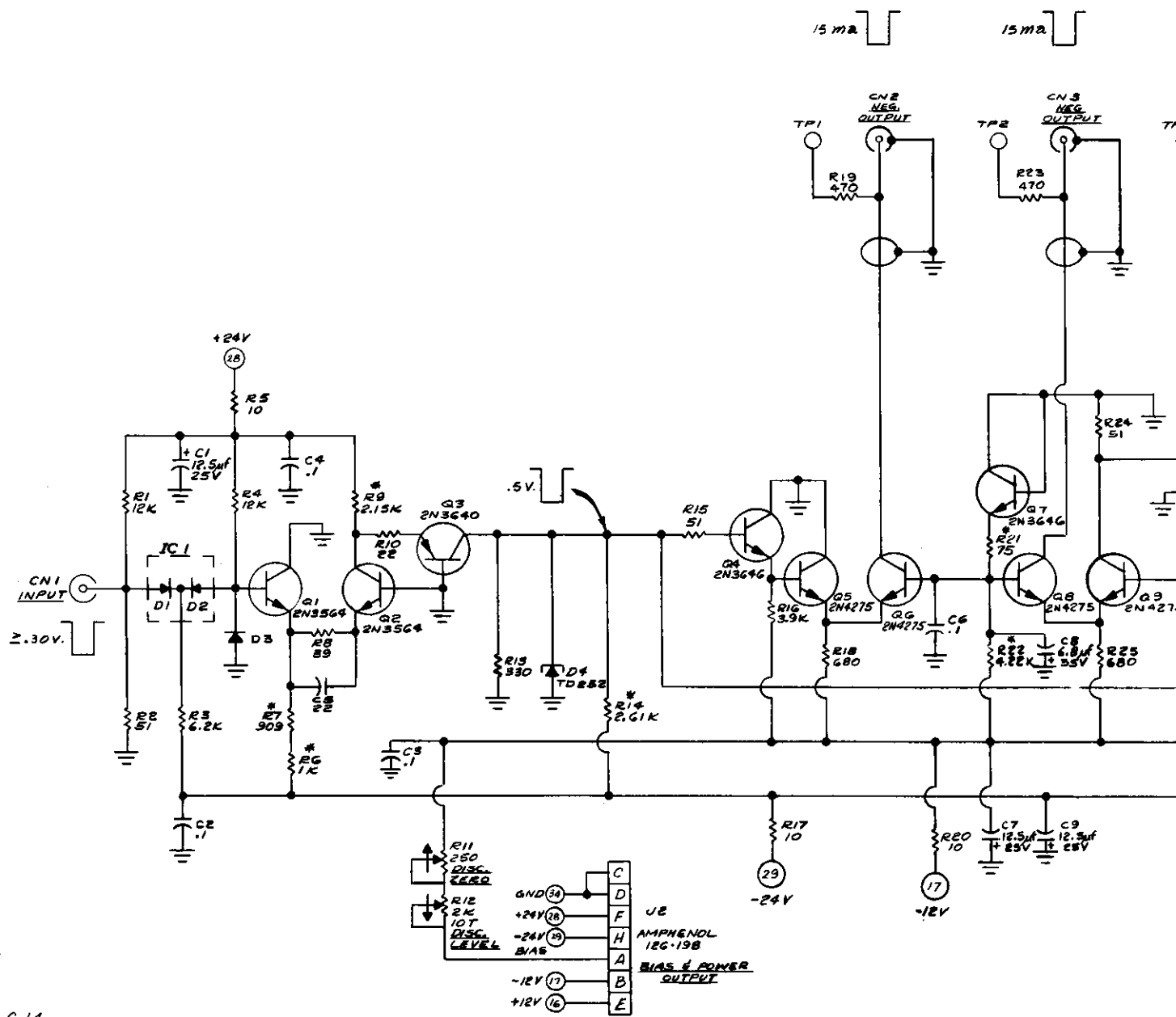


REV.	ECN. NO.	DATE	BY	APPD.	UN
					DR
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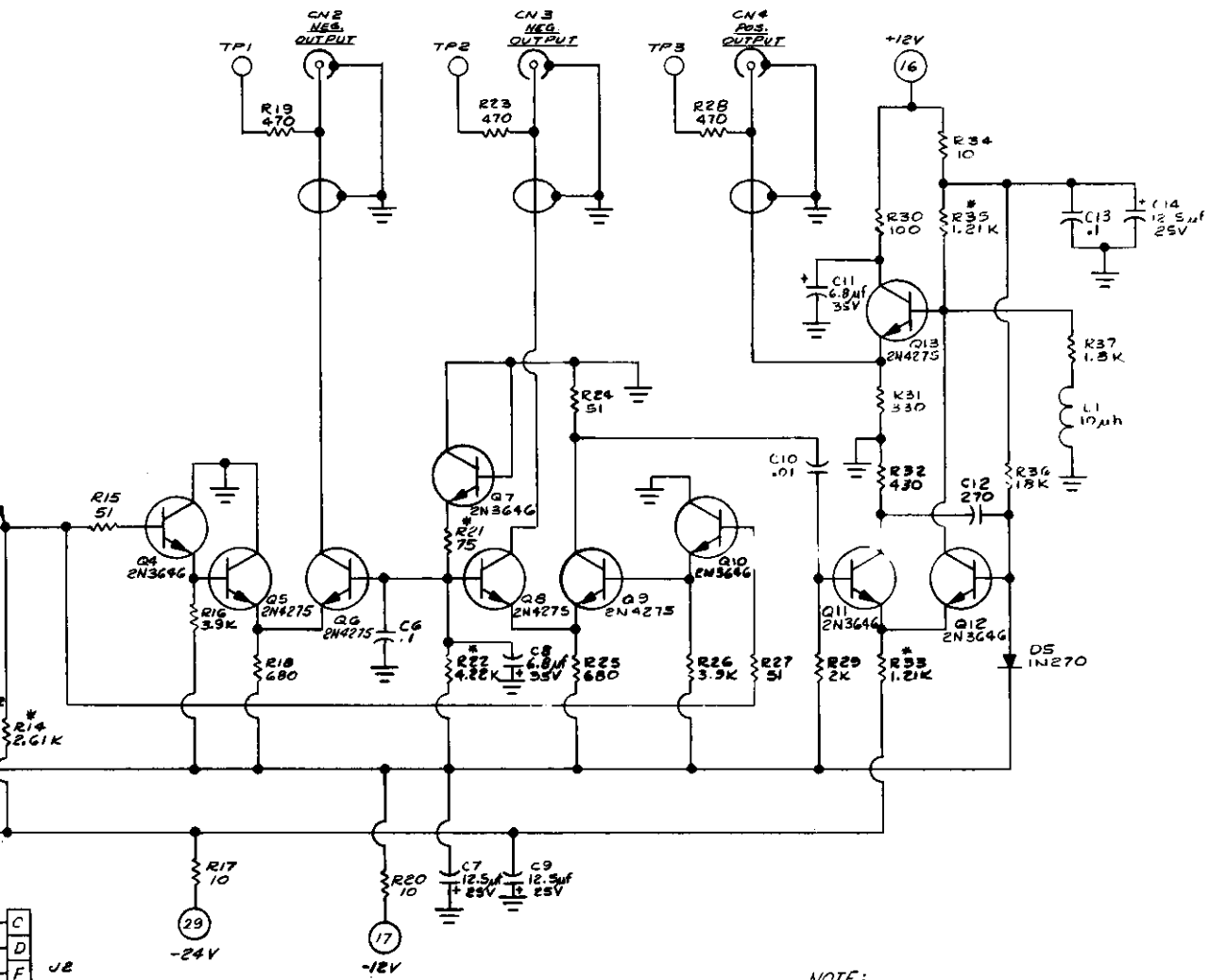
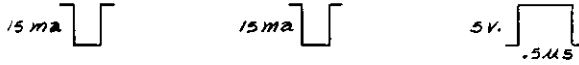


REV.	ECN. NO.	DATE	BY	APPR.	REVISIONS	UNLESS OTHERWISE SPECIFIED		ORTEC OAK RIDGE TECHNICAL ENTERPRISES CORPORATION OAK RIDGE TENNESSEE		
						DIMENSIONS IN INCHES				
						TOLERANCES		TITLE		
						FRACTION ± _____ DECIMALS ± _____ ANGLES ± _____ SURFACE FINISH ✓ RMS APPLIED PRACTICES		MODEL 403 A TIME PICKOFF CONTROL		
						DRAFTSMAN W.S.W.	DATE 2-9-67	ENG. APPROVAL C.P.A.	DATE 3-7-67	RESP. ENG. C.W. WILLIAMS
						CHECKED	DATE	MFG. APPROVAL		DRAWING NO.
						SCALE		DWG. ISSUED B.L.	DATE 3-13-67	403A-0101-B1

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.



C-14
 D-5
 L-1
 R-37



- C
 - D
 - F
 - H
 - A
 - B
 - E
- J2
AMPHENOL
126-198
BIAS & POWER
OUTPUT

NOTE:
1. * INDICATES MF (T-O)

A 403A-1 3-13-67 JWB REV. TECH. NO. DATE BY	UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES TOLERANCES	 ORTEC OAK RIDGE TECHNICAL ENTERPRISES CORPORATION OAK RIDGE, TENNESSEE	TITLE
	FRACTION ±		MODEL 403A TIME PICKOFF CONTROL
	DECIMALS ±		DRFTSMAN 2-8-67 DATE 3-7-67
	ANGLES ±		ENG. APPROVAL C.W. WILLIAMS
SURFACE FINISH ✓ RMS	APPLIED PRACTICES	CHECKED	DRAWING NO.
		SCALE	403A-0101-51