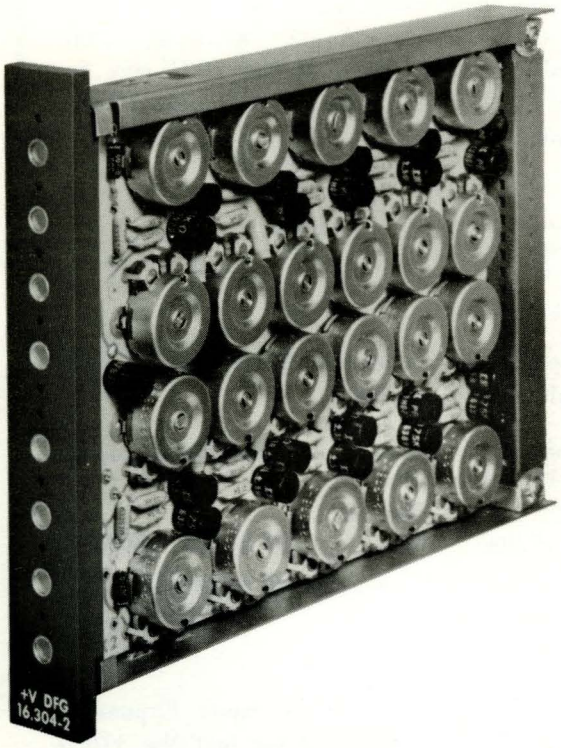
PIR PRODUCT INFORMATION RELEASE

an accessory for PACE® TR-48 Analog Computers

VARIABLE BREAKPOINT, VARIABLE SLOPE DIODE FUNCTION GENERATOR, *TYPE 2.638*

Model 16.304-2; +input voltage *Model 16.306-2; -input voltage*

Model 16.307; ±readout module



VARIABLE BREAKPOINTS

TEMPERATURE COMPENSATION for THERMAL DRIFT in DIODES

PARALLAX ADJUSTMENT

CENTRAL SLOPE ADJUSTMENT

SOLID STATE DESIGN

DIRECTLY INTERCHANGEABLE with EXISTING FIXED BREAKPOINT DFG UNITS

WIDE COMPUTING BANDWIDTH

UNLIMITED RESOLUTION

DESCRIPTION

The advantage of greater flexibility and more accurate display of non-linear functions is achieved with the newly designed Type 2.638 variable breakpoint DFG. Designed for use in the PACE TR-48 Analog Computer, these solid-state function generators provide maximum versatility in obtaining solutions over a broad spectrum of non-linear problems. In addition, unlimited resolution, low-noise level, and wide computing bandwidth make the Type 2.638 a desirable computing component for signal conditioning or data reduction in instrumentation systems.

TECHNICAL DESCRIPTION

The PACE Solid-State VARIABLE BREAKPOINT DFG utilizes ten straight-line segments to generate a segmented, representation of an arbitrary function of input voltage X. This is achieved by changing

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the gain ratio of an operational amplifier as the input voltage changes in value. Diodes are biased to conduct at adjustable values of input voltage (breakpoints)[1] as the input changes from minimum to maximum values. When the diodes conduct they contribute a current to the DFG output amplifier – the current being a function of the input voltage and setting of the "slope" potentiometer associated with each segment. Thus the output voltage of the amplifier changes with the input, producing a sequence of straight-line segments. The slope of each segment is determined by the collective "slope" potentiometer settings associated with each forward biased diode segment.

The MODEL 16.304-2 accepts 0 to +10 volts while MODEL 16.306-2 accepts 0 to -10 input voltages. Each has ten diodes with adjustable breakpoints and slopes. The breakpoint of each diode may be individually set between 0 and 9.5 volts. The slope potentiometers can be adjusted so that the slope of adjacent straight line segments may differ by any value up to ±1 volt per volt. In addition, the slope of the curve at the origin can be set by a CENTRAL SLOPE potentiometer to have any value between plus and minus 2 volts per volt. The value of the output voltage at the origin can be set at any value between -10 and +10 volts by the PARALLAX potentiometer.

PATCHING

Two external operation amplifiers are required for the operation of the DFG's. Input and output terminations for the DFG and associated amplifiers are displayed on the 16.307 readout module located in the non-linear row of the computer. Patching to the readout module is accomplished as follows: the input to IN, the summing junction of the first operational amplifier to S_1 and its output to 0_1, and the summing junction of the second operational amplifier to S_1 and its output to 0_2.

DFG SETUP

The 16.304-2 and 16.306-2 DFG's are contained in pull-out trays located in the upper right section of the TR-48. They plug into the trays and are easily accessible for adjustment. Setting a function into the DFG is done by first adjusting the PARALLAX potentiometer for the desired output voltage with zero volts into IN. From a suitable voltage source such as an operation amplifer, voltages equal to diode breakpoints are applied to IN. The corresponding BREAKPOINT and SLOPE potentiometers, including CENTRAL SLOPE, are then alternately set for the desired DFG output voltage at each breakpoint. The sequence of the BREAKPOINT – SLOPE adjustments should be consecutive, starting from the smallest positive or negative input voltage and proceeding to the maximum. All input and output voltages of the DFG may be precisely monitored with the EDVM on the TR-48 control panel.

INSTALLATION

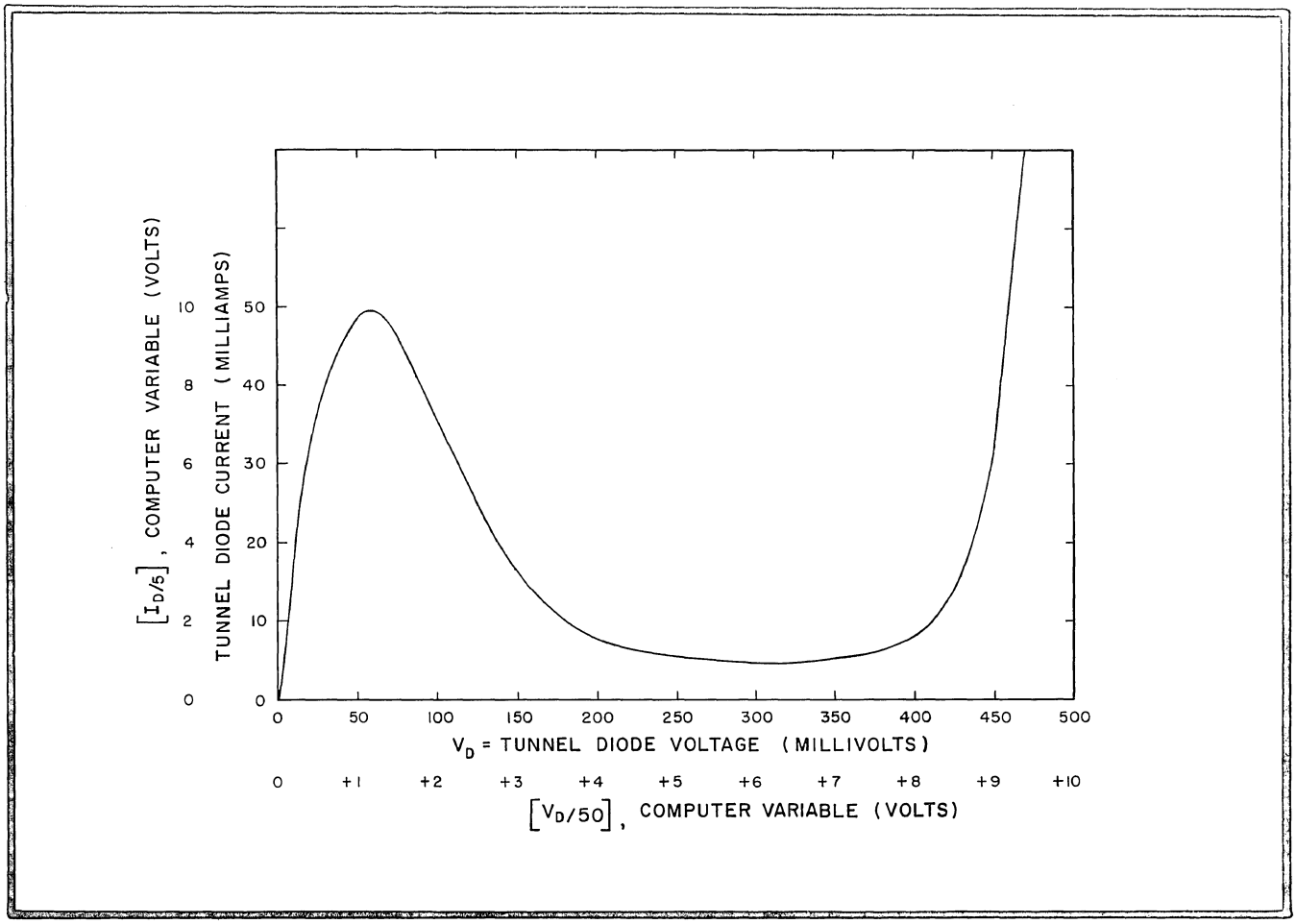
The Type 2.638 Expansion Accessory consists of the following components:

1 each	16.304-2	+DFG	)2.645-1)	
1 each	16.307	+Readout Module	)	)
1 each	16.306-2	-DFG	)2.645-2)	2.645-0

A dash one variation of the basic Expansion Accessory (2.638-1) provides for just the +DFG and +readout module while a dash two (2.645-2) includes only the -DFG and -readout module. TR-48 computers are prewired at the factory to accept two Type 2.638-0 Expansion Accessories and may accommodate a maximum of three.

The new variable breakpoint DFG's are directly interchangeable with the existing fixed breakpoint modules, thus providing additional flexibility. The component assignment for the TR-20 computer is shown below.

	+DFG	Readout	–DFG	Readout
TR-10	16.304	–	16.306	–
TR-20	16.304-1	16.308	16.306-1	16.309



Tunnel Diode Curve Typifies Versatility of Variable Breakpoint Diode Function Generator

specifications

	16.304-2	16.306-2
Input Voltage	0 to +10V	0 to –10V
Output Voltage	±10V	±10V
Input Current Max (at full input ±10V)	6.5 MA	6.5 MA
Max Reference Current:		
From +10V	2.5 MA	6.0 MA
From –10V	6.0 MA	2.5 MA
Max Slope at 0V Input	2 Volts per Volt	
Max Slope Change per Segment*	1 Volt per Volt Typical	
Parallax Range	+10V to –10V Typ	
Variable Breakpoint from	0 to +9.5V	0 to –9.5V
Phase Shift at 1 KC	0.4° Maximum	
Frequency Response	Down 3db at 35 KC Min	

**With the addition of a potentiometer in the second amplifier, feedback slopes in the order of 20V/V or higher may be obtained. Slopes in the tunnel diode curve approach 20V/V.*

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