Pulse Generator WR-549A

Instruction Manual

VIZ Test Instruments

VIZ Mfg. Co. 335 E. Price St. Phila., Pa. 19144

Price $1.00

SAFETY PRECAUTIONS

Be careful whenever testing electrical equipment that is operating from an AC power line or other high voltage source. There is always the danger of electrical shock from these circuits. You should become familiar with the equipment before making tests. Keep in mind that voltages may appear at unexpected points in defective equipment.

It is good practice to remove power before connecting test leads to high voltage points. When measuring high AC or DC voltages, do not touch the panel or test leads. Also, it is important to use an isolation transformer such as the VIZ WP-25A, WP-26A, or WP-27A Isotap when working with AC/DC equipment where the chassis is connected to one side of the AC power line.

PATENT STATEMENT

Information furnished by VIZ is believed to be accurate and reliable. However, no responsibility is assumed by VIZ for its use; nor for any infringements of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of VIZ.

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DESCRIPTION

The VIZ model WR-549A Pulse Generator is a compact, easy to use, source of digital pulses. These pulses can be varied continually over the range from 5 Hz to 5 MHz, positive or negative. Both pulse width and repetition rate are independently adjustable making this instrument one of the most useful and versatile available for today's logic designer or digital trouble shooter.

The output is also compatible for both TTL and CMOS, covering a range to 15 volts P-P., at an impedance of 100 ohms. Pulse rise time is held to 20 nanoseconds on all ranges, while frequency (at the calibration points) is within ±5% of the dial setting when the T1 and T2 Control Pots are turned CCW.

SPECIFICATIONS

Frequency Range:	5 Hz to 5 MHz (±5% Accuracy)
Pulse Width:	100 nsec. to .1 sec. (unlimited duty cycle)
Rise and Fall Time:	Less than 20 nsec. on all ranges.
Output Voltage:	0 to 15 volts (Open circuited) 0 to +5V (10 TTL Fanouts)
Input Voltage:	105 to 125 VAC, 60 Hz
Input Power:	5 watts
Operating Temp:	0° C to 50° C: 32° F to 122° F.
Size, Weight:	20.32 cm x 12.7 cm x 7.62 cm; .9 Kg 8″ x 5″ x 3″; 2 lbs.

VIZ REPAIR SERVICE

Authorized VIZ Service Depots throughout the United States are available for repair and calibration of VIZ Electronic Instruments. For up-to-date listings of these depots, contact your VIZ Distributor, or write to VIZ, Electronic Instruments, 335 E. Price St., Phila. Pa., 19144. If it becomes necessary to service this equipment, fill out the Test Equipment Service order form supplied with the instructions:

1. Pack the test equipment carefully. The instrument should be double-packed. It is best to pack the unit in its original carton, or similar container, then "float" this carton in at least a 3-inch layer of suitable packing, such as shredded paper, inside the outer carton.
2. A full description of the problem should be included in the request.
3. Include all probes, cables, and test leads used with equipment.

Attention to these details will help prevent damage in transit and delay in repairs.

THEORY OF OPERATION

The VIZ Pulse Generator is a compact, easy to use, solid state signal source. Available on the front panel is a TTL compatible (0 to approximately 5V) signal. Rather than setting a given pulse repetition frequency and then varying the duty cycle, this instrument uses two separately timed one shots; the one setting off the other. Both pulse widths can be adjusted independently from 100 ns to .1 sec. The maximum and minimum frequencies are 5 MHz and 5 Hz respectively.

In the block diagram, Figure 2, pulse generator one is coupled to a second pulse generator. The trailing edge of the first pulse sets off the second pulse generator. In turn, the trailing edge of the second pulse generator sets off the first one, thus reinitiating the cycle. Both are completely independently adjustable over a range of 100 ns in 6 steps with an interpolating continuously variable potentimeter.

The outputs of the two pulse generators are combined in the output stage. The first generator determines the duration of the positive going pulse, while the second generator determines the duration of the "off" time between two successive positive pulses.

The output of the instrument is TTL compatible, being capable of driving ten 7400 TTL Gates. Rise and fall times are less than twenty nanoseconds.

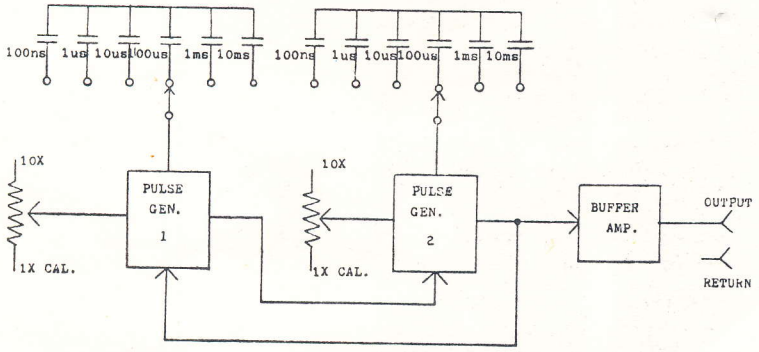


Figure 2: Theory of Operation—Block Diagram

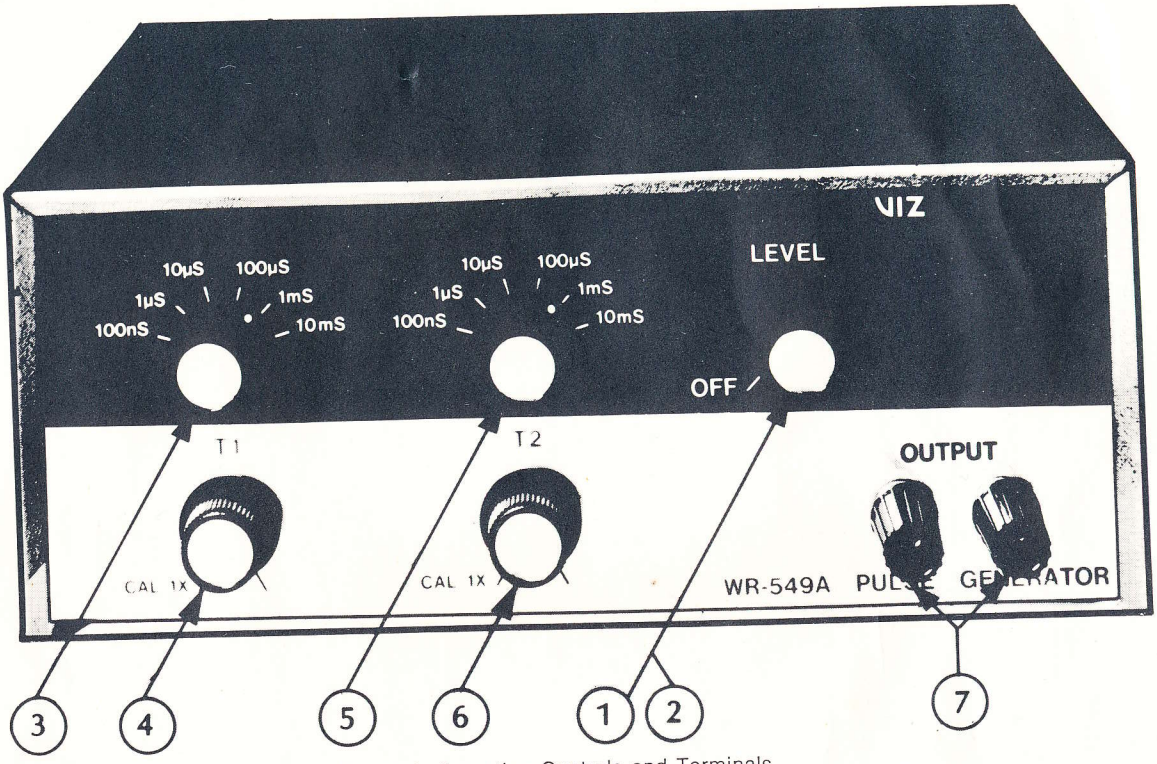


Figure 1: Operating Controls and Terminals

OPERATING INSTRUCTIONS

1. The instrument Power Switch is combined with the Level Control on the front panel. When the Level Control is fully counterclockwise, the instrument is turned off. The first 5 to 10 degrees of clockwise rotation turns the pulse generator on.

2. The *Level Control* adjusts the amplitude of the output pulses at the output binding posts. In the most clockwise rotation position, the maximum amplitude signal is available.

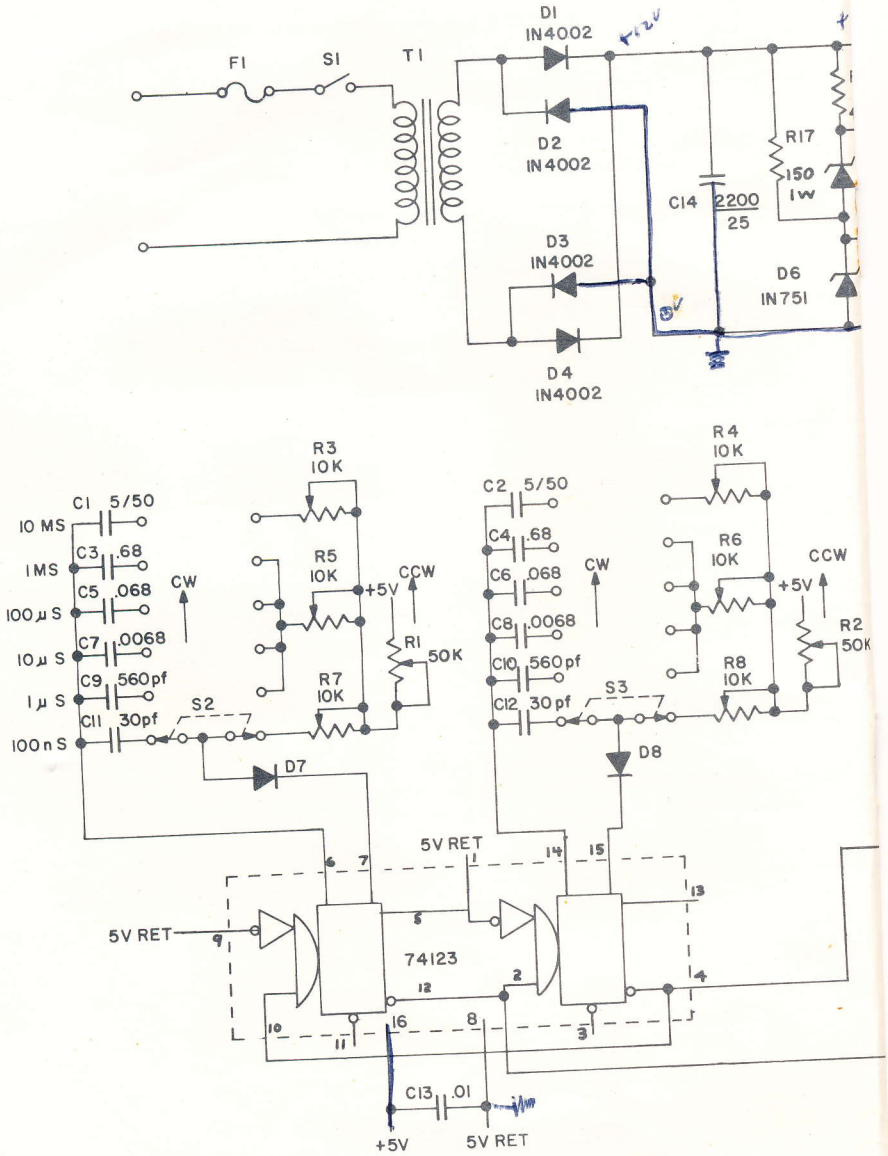
3. The T1 Decade Switch, located *above T1* on the front panel, determines the *minimum* positive pulse time. ("On" time).

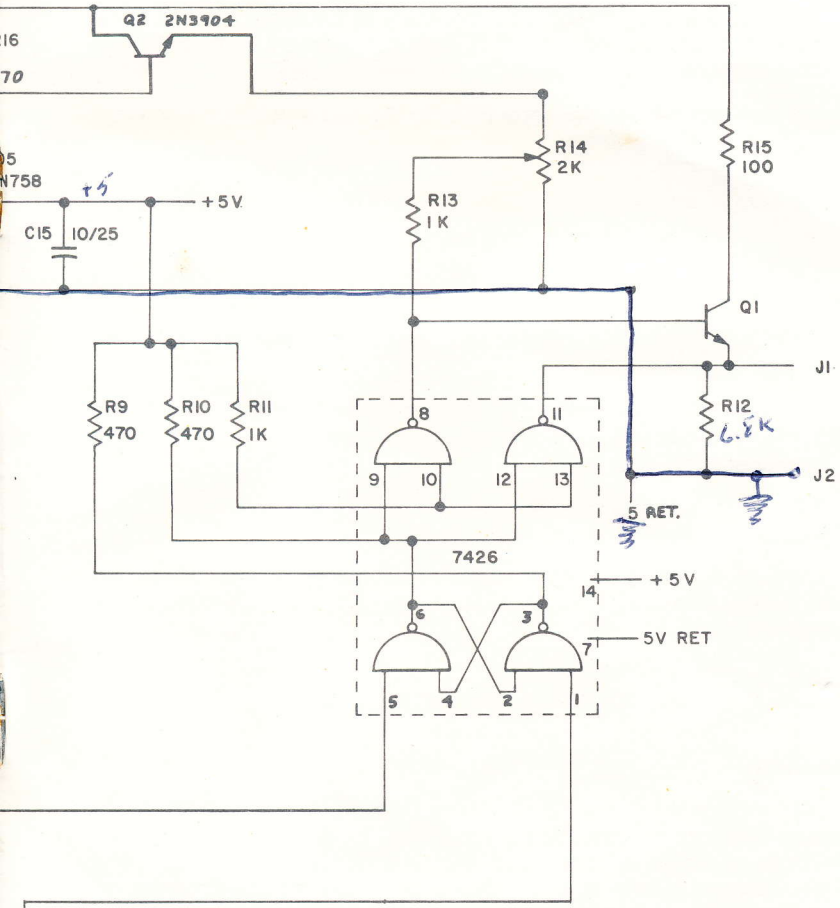
4. The T1 *Control Potentiometer,* located *below T1* on the front panel, provides continuous adjustment of the positive pulse *duration time.* When this control is in the 1X cal. position (most CCW) the output positive pulse is within 5% of the T1 Decade Switch setting. When this control is in the full clockwise position, the output positive pulse is approximately ten times the T1 Decade Switch setting.

5. The *T2 Decade Switch,* located *above T2* on the front panel, determines the minimum *time between* the positive pulses. ("Off" time).

6. The T2 *Control Potentiometer,* located *below T2* on the front panel, provides continuous adjustment of the time between positive pulses. When this control is in the 1X cal. position (most CCW), the time between pulses is within 5% of the T2 Decade Switch setting. When this control is in the full clockwise position, the output positive pulse is approximately ten times the T2 Decade Switch setting.

7. The Red binding post provides the output signal while the Black binding post provides the signal return.


F1
S1
T1
D1
IN4002
D2
IN4002
D3
IN4002
D4
IN4002
C14 2200/25
R17 150 1w
D6
IN751
R3 10K
C1 5/50
10 MS
1 MS
100 µS
10 µS
1 µS
100 nS
C3 .68
C5 .068
C7 .0068
C9 560pf
C11 30pf
CW
R5 10K
+5V
CCW
R1 50K
R7 10K
S2
D7
R4 10K
C2 5/50
C4 .68
C6 .068
C8 .0068
C10 560pf
C12 30pf
R6 10K
R8 10K
S3
D8
5V RET
74123
C13 .01
+5V
5V RET



NOTES:

UNLESS OTHERWISE SPECIFIED:

1. RESISTOR VALUES ARE IN OHMS
2. CAPACITOR VALUES ARE IN MICROFARADS PER RATED VOLTAGE

CALIBRATION

The only piece of equipment necessary to calibrate the VIZ pulse generator is an oscilloscope. The only requirement is that the frequency response be flat from DC to 10 MHz, ± 1dB.

1.0 Connect the oscilloscope input to the red and black terminals.

1.1 Turn S_2 and S_3 to their most CCW positions (100 nsec).

1.2 Turn R_1 and R_2 pots such that they are in their most CCW positions (1 x Cal.)

1.3 Plug in the power cord and observe the high frequency squarewave.

1.4 Adjust R_7 and R_8 such that the "on" time T_1 and the "off" time T_2 equals 100 nsec.

1.5 Adjust R_5 and R_6 such that the "on" time T_1 and the "off" time T_2 in the next four CW positions of S_2 and S_3 equals 1 us, 100 us and 1 ms respectively. The maximum error should be ±5%.

1.6 Adjust R_3 and R_4 such that when S_2 and S_3 are both in their most CW position, T_1 and T_2 equal 10 ms, ±5%.

1.7 Turn S_2 and S_3 through all of their positions and check the designated times with the actual times. All readings should be within ±5%.

FUSE REPLACEMENT

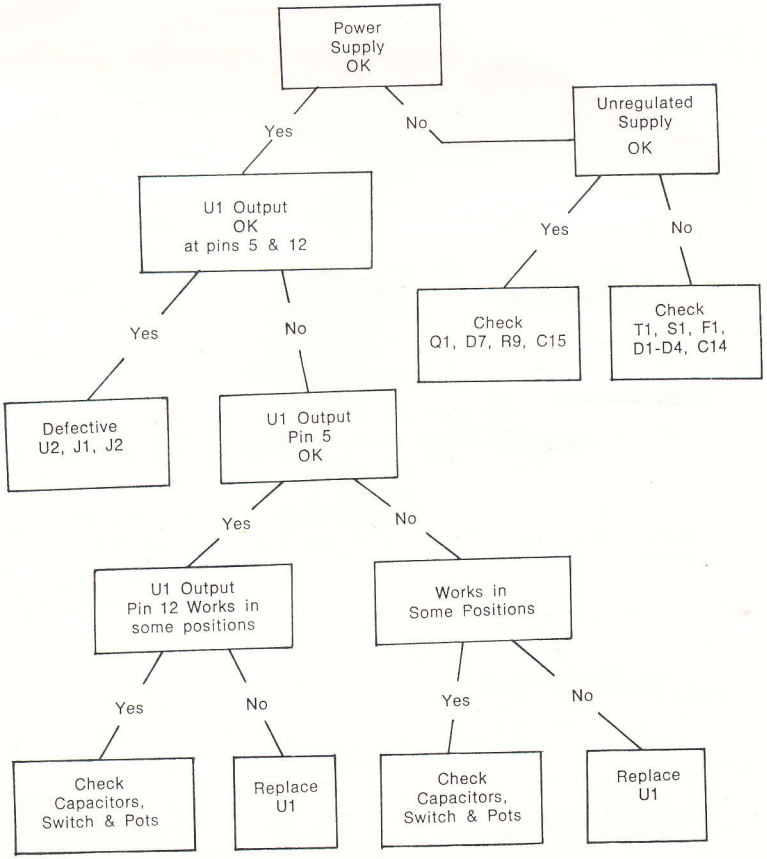
Caution:

This instrument is equipped with a three-wire power cord which connects the metal case and ground lead to the powerline ground. To prevent lethal shocks or equipment damage when servicing equipment equipped with a three-wire servicing cord, ALWAYS ELECTRICALLY ISOLATE SUCH EQUIPMENT WITH AN ISOLATION TRANSFORMER, such as VIZ WP-25A, WP-26A, or WP-27A Isotap.

To take the instrument out of the case, remove the screws on the bottom and sides of the case.

Replace the fuse, with the current and voltage rating as listed in the Replacement Parts List. Refer to Figure 3, for the location of the fuse.

TROUBLESHOOTING GUIDE



APPLICATIONS

1. Clocks for Digital Computers & Microprocessors.
2. Pulse modulation for lasers and light emitting diodes (LED's).
3. Amplifier testing* using square waves and pulse techniques. Frequency response information from time domain data.
4. AC voltage calibration waveforms using low temperature coefficient zener diodes.
5. CMOS, TTL, RTL, I^2L, DTL, ECL, HINL and etc. logic testing.
6. Switching circuits signal sources, i.e. switching regulators, pulsed servo systems and transponders.
7. Dynamic testing of power supplies for determining the transient response.
8. Natural resonances in coils, inductors, capacitors and transformers.
9. Exciting mechanical systems with impulses and determining the natural frequencies.
10. Testing and evaluating ultrasonic transducers for their performance. These would include mechanical, electro-mechanical and optical systems.

*Recommended Reading

Electronic Measurements, McGraw-Hill by Terman & Pettit, Page 257-260, Page 327-333

Electronic Amplifier Circuits, McGraw-Hill by Pettit and McWhorter, Page 121-129

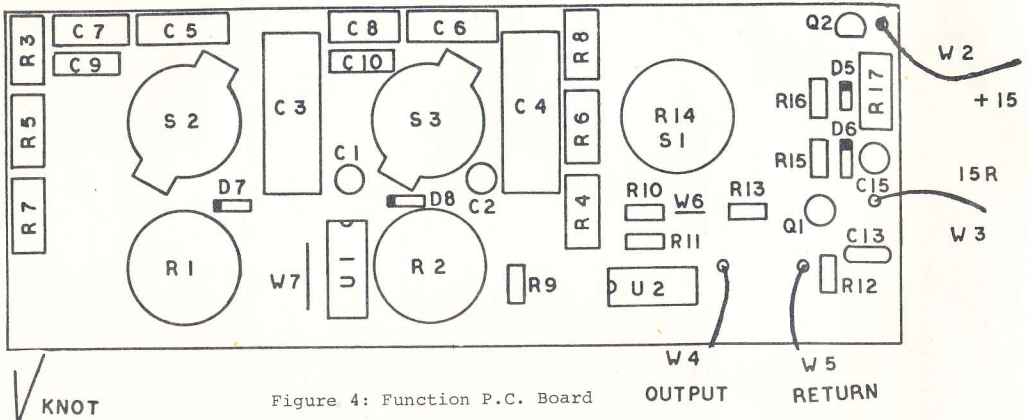


Figure 4: Function P.C. Board

Figure 3: Power Supply P.C. Board

REPLACEMENT PART POLICY

It is VIZ's policy to make replacement parts available to its customers at the least cost and as quickly as possible. All items where a part number is listed in BOLD FACE are available from your local VIZ Distributor. Please use the VIZ part number when ordering.

REPLACEMENT PARTS LIST

Symbol No.	Description	Stock No.
	Resistors	
R1, R2	50K Control (T1, T2)	**9449-1**
R3-R8	10K Control	**9449-2**
R9, R10, R16	470Ω, ½w 5%	16-084710
R11, R13	1K, ½w 5%	16-081020
R12	6.8K, ½w 5%	16-086820
R14	2K Control (Level)	**9449-6**
R15	100Ω, ½w 5%	16-081010
R17	150Ω, 1 watt	16-111020
	Capacitors	
C1, C2	5 μf 50 volt electrolytic	9449-9
C3, C4	.68 μf ±5%	9449-10
C5, C6	.068 μf ±5%	9449-11
C7, C8	.0068 μf ±5%	9449-12
C9, C10	560 pf ±5%	9449-13
C11, C12	30 pf ±5%	9449-14
C13	.01 μf 100v Ceramic	9449-15
C14	2200 μf 25 volt, electrolytic	9449-16
C15	10 μf 25 volt, electrolytic	9449-17
	Diodes	
D1, D2, D3, D4	1N4002	11-400200
D5	1N758	11-075800
D6	1N751	11-075100
D7, D8	1N4148	11-414800

Symbol No.	Description	Stock No.
	Transistors	
Q1	2N3866 or equivalent	12-038660
Q-2	2N3904	12-039040
	Integrated Circuits	
U1	74123	14-741230
U2	7426	14-074260
	Switches	
S1	S.P.S.T. PWR Switch (Located on R14)	**9449-26**
S2, S3	2 pole—6 position switch	**9449-27**
	Transformer	
T1	12.6 VAC RMS Sec.	**9449-28**
	Fuse	
F1	.25 amp	9449-29
H1, H2	Clips	**9449-30**
	Printed Circuit Board Assemblies	
B1	Power Supply P.C.B.	**9449-31**
B2	Main Board P.C.B.	**9449-32**
	Knobs	
K1-4	Alco P.K. 50	9451-38
	Cover	
A1	VIZ Mfg. Co.	**9451-125**

All other items listed are standard parts available at most Electronic Distributors. Please order these parts by the description as listed, from your distributor.