

OPERATING AND SERVICE MANUAL

**MODEL 8013B
PULSE GENERATOR**

SERIAL NUMBERS

This manual applies directly to instruments with serial numbers prefixed **1441A**.

For additional information about serial numbers see INSTRUMENT AND MANUAL IDENTIFICATION in Section I.

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SAFETY SUMMARY

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Hewlett-Packard Company assumes no liability for the customer's failure to comply with these requirements.

GROUND THE INSTRUMENT.

To minimize shock hazard, the instrument chassis and cabinet must be connected to an electrical ground. The instrument is equipped with a three-conductor ac power cable. The power cable must either be plugged into an approved three-contact electrical outlet or used with a three-contact to two-contact adapter with the grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet. The power jack and mating plug of the power cable meet International Electrotechnical Commission (IEC) safety standards.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE.

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

KEEP AWAY FROM LIVE CIRCUITS.

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

DO NOT SERVICE OR ADJUST ALONE.

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

DO NOT SUBSTITUTE PARTS OR MODIFY INSTRUMENT.

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the instrument. Return the instrument to a Hewlett-Packard Sales and Service Office for service and repair to ensure that safety features are maintained.

DANGEROUS PROCEDURE WARNINGS.

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

WARNING

Dangerous voltages, capable of causing death, are present in this instrument. Use extreme caution when handling, testing, and adjusting.

1-1 INTRODUCTION

1-5 The 8013B will operate in three different modes as follows:

1-2 The 8013B is an extremely versatile, easy to operate pulse generator with a wide range of applications. It has a variable repetition rate of 0-50 MHz and transition times of < 3.5ns which make it ideal for testing digital logic: HTL, RTL, DTL and most ECL can be tested. The simultaneous positive and negative outputs are useful for testing circuits with both positive and negative power supplies. Format changes from normal to complement can be made at the throw of a switch, without having to re-adjust any pulse parameters. This enables changes from positive to negative logic conventions to be made and 100% duty cycles to be obtained very easily.

1-3 The 8013B has a selectable source impedance which makes impedance matching to the circuit under test very simple. It also has a square wave facility that is independent of width and delay settings and a double pulse facility that is useful for testing device recovery times and making noise immunity measurements.

1-4 The front panel of the 8013B has been carefully designed to provide a logical layout of the controls; horizontal controls for pulse timing parameters, vertical controls for pulse amplitude parameters. Also, compatible pulse settings are guaranteed as long as the pulse delay and pulse width controls are either set to the left of the pulse period control or, if set vertically below the period control, that the delay and width verniers are set counterclockwise of the period vernier. This simple, straightforward design enables pulses to be set up extremely quickly and easily.

RZ mode: in this mode external pulses are applied to the input connector on the 8013B rear panel and these pulses trigger the delay generator directly, completely by-passing the internal rate generator. Thus the internal rate generator can be used separately in this mode to provide trigger pulses that are independent of the RZ output.

External width mode: in this mode external pulses applied to the input socket on the rear panel determine the width and repetition rate of the output pulses. In fact the output is a pulse-shaped version of the external input. The pulse available at the trigger output, being derived from the internal rate generator, is independent of the RZ output.

REPETITION RATE AND TRIGGER	PULSE CHARACTERISTICS
<p>Repetition rate: 1 Hz to 50 MHz in four ranges, continuous adjustment within ranges.</p>	<p>Transition times: 3.5ns fixed with INT LOAD switched IN, < 5ns fixed with INT LOAD switched OUT.</p>
<p>Period jitter: < 0.1% + 50ps on any rate setting.</p>	<p>Overshoot and ringing: < ± 5% of pulse amplitude unless INT LOAD is switched OUT and amplitude reduced to 0.4V - 4V when it may increase to ± 10%.</p>
<p>Square wave: 0.5 Hz to 25 MHz in four ranges. Duty cycle 50% ± 5% up to 1 MHz. At 25 MHz tolerance increases to ± 15%.</p>	<p>Freshoot: < ± 5% of pulse amplitude.</p>
<p>Double pulse: up to 25 MHz simulating 50 MHz.</p>	<p>Pulse width: < 10ns to 1s in four ranges. Vernier provides continuous adjustment within ranges.</p>
<p>Trigger output: > +1V across 50 ohms, 16ns ± 10ns wide. Suitable for triggering another 8012B/13B.</p>	<p>Width jitter: < 0.1% + 50ps on any width setting.</p>
<p>Externally Controlled Operation</p>	<p>Maximum duty cycle: > 75% from 1 Hz to 10 MHz, decreasing to > 40% at 50 MHz. Up to 100% in COMPL mode.</p>
<p>External Triggering</p>	<p>Maximum output: with INT LOAD switched IN, output is 5V across 50 ohms, 10V across open circuit. With INT LOAD switched OUT, output is 10V across 50 ohms. Output circuit cannot be damaged by short circuits.</p>
<p>Input Impedance: 50 ohms ± 10%, dc coupled.</p>	<p>Attenuator: 4-step attenuator reduces output to 0.2V with INT LOAD switched IN, or to 0.4V with INT LOAD switched OUT. Vernier provides continuous adjustment within ranges.</p>
<p>Delay: 25ns ± 8ns between leading edge of trigger input and trigger output signals.</p>	<p>Polarity: dual channel, positive and negative outputs simultaneously.</p>
<p>Maximum input amplitude: ± 7V.</p>	<p>Output format: normal or complement selectable.</p>
<p>Trigger input: sinewaves > 1.7 p-p (about zero) or pulses > 0.8V either polarity with a width of > 7ns.</p>	<p>Source impedance: 50 ohms ± 3% shunted by typically 20pF with INT LOAD switched IN, < 50 ohms shunted by typically 20pF with INT LOAD switched OUT.</p>
<p>Repetition rate: 0 to 50 MHz. For square wave output, frequency is divided by 2.</p>	<p>DC offset: with INT LOAD switched IN, offset is ± 2.5V across 50 ohms and is independent of amplitude settings. With INT LOAD switched OUT, offset is automatically switched off.</p>
<p>Gate input: dc-coupled, voltage at open connector approx. +1.8V. Shorting current ≤ 12mA. Input impedance approx. 160Ω.</p>	<p>Pulse delay: < 35ns to 1s (with respect to trigger output) in four ranges. Vernier provides continuous adjustment within ranges. Min. delay 17ns typical.</p>
<p>Synchronous gating: gating signal turns generator on. First trigger output pulse is coincident with leading edge of gate pulse. Last output pulse is always generated with normal width even if the gate pulse ends during the generation of the pulse.</p>	<p>Delay jitter: < 0.1% + 50ps on any delay setting.</p>
<p>Gating</p>	<p>Gate input: dc-coupled, voltage at open connector approx. +1.8V. Shorting current ≤ 12mA. Input impedance approx. 160Ω.</p>

- 1-6 SPECIFICATIONS
- 1-7 Table 1-1 is a complete list of the Model 8013B critical specifications that are controlled by tolerances. Any changes in specifications due to manufacturing, design, or traceability to the U.S. National Bureau of Standards are included in table 1-1 or on a manual change sheet included with this manual. The manual and manual change sheet (if any) supersede all previous information concerning specifications of the Model 8013B.
- 1-8 INSTRUMENT AND MANUAL IDENTIFICATION
- 1-9 Instrument identification by serial number is located on the rear panel. Hewlett-Packard uses a two-

This manual applies to instruments with a serial prefix number as shown on the title page. If changes have been made in the instrument since this manual was printed, a "Manual Changes" supplement supplies with the manual will define these changes. Be sure to record these changes in your manual. Backdating information in Section VII adapts the manual to instruments with serial numbers lower than that shown on the title page. Part numbers for the manual and the microfiche copy of the manual are also shown on the title page.

SPECIFICATIONS

External Width and RZ modes

External width: output pulse width determined by the width of the drive input signal. Amplitude selectable. Trigger pulses, produced by the internal rate generator, are independent of the output pulses.

RZ mode: external input signal switched directly to delay generator. Output pulse period determined by period of RZ input signal. Delay, width, amplitude and output formats are selectable. Trigger pulses, produced by internal rate generator, are independent of the output pulses.

Gate input signal: voltage $> +1.5V$ or resistor $> 1K\Omega$ to ground enables rep. rate generator. Voltage $< +0.8V$ or resistor $< 160\Omega$ disables rep. rate generator. Gate input TTL compatible. Maximum input: $\pm 5V$.

GENERAL

Input signal: input impedance 50 ohms, dc coupled. Signal amplitude $> +1V$, maximum input $\pm 5V$. Width $> 7ns$.

Operating temperature range: $0^{\circ}C$ to $55^{\circ}C$.

Power: 100/120/220/240V +5%, -10%, 48 to 400 Hz, 100 VA max.

Weight: net 4 kg (8.8 lbs); shipping 6.5 kg (14.6 lbs).

Dimensions: 200mm wide, 142mm high, 330mm deep (7.9" x 5.6" x 13").

Accessories: 15179A Adapter frame; rackmount for two units.

Table 1-1. Specifications (cont'd)

SECTION 2

INSTALLATION

2-1 INITIAL INSPECTION

2-2 Inspect the instrument and accessories for physical damage and if damage is evident refer to paragraphs 2-5 to 2-8 for the recommended claim procedure and repacking information.

2-3 The 8013B is delivered complete with the following items:

ITEM	HP Stock Number
0.5A fuse for 220/240V operation	2110-0202
1A fuse for 100/120V operation	2110-0007

2-4 The power cord delivered with the 8013B will be one of the following:

2-7 REPACKING

2-5 If physical damage is evident or if the instrument does not meet specifications when received, notify the carrier and the nearest Hewlett-Packard Sales/Service Office. The Sales/Service Office will arrange for repair or replacement of the unit without waiting for settlement of the claim against the carrier.

2-5 CLAIMS FOR DAMAGE

2-8 If the instrument is to be shipped to a Hewlett-Packard Sales/Service Office, attach a tag showing owner, address, model and serial number and the repair required. The original shipping carton and packing material can be re-used but the Hewlett-Packard Sales/Service Office will also provide information and recommendations on materials to be used if the original packing is not available or re-usable.

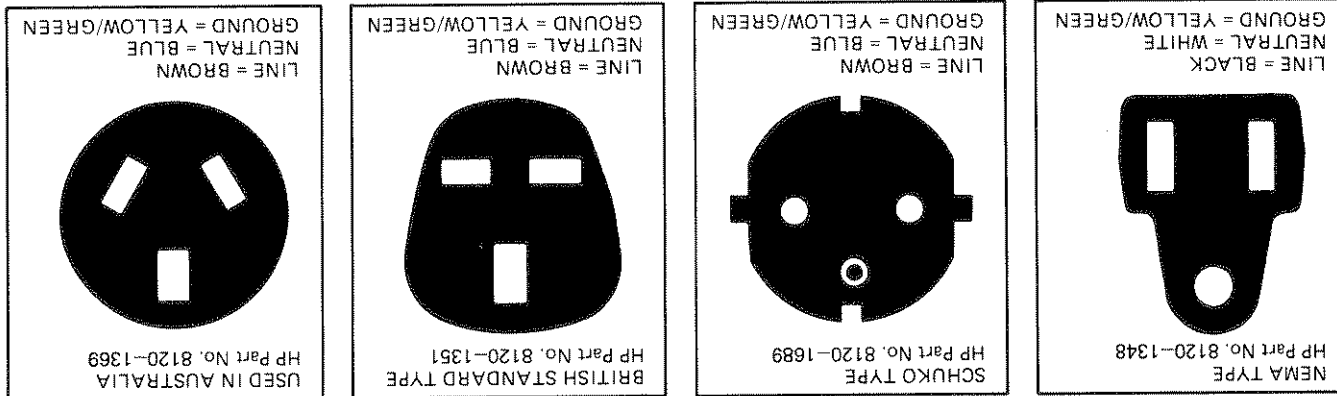


Figure 2-1. Power Cords

2-9 PREPARATION FOR USE

The power dissipation is 100VA max.

2-10 Power Cord

2-11 The 3-wire power cable supplied with the 8013B when connected to the appropriate power outlet, grounds the instrument cabinet and panels. To pre-serve this safety feature when operating the instrument from an outlet without a ground connection use an appropriate adapter and connect the ground lead (green/yellow) to an external ground.

2-12 POWER SOURCE REQUIREMENTS

2-13 The model 8013B will operate from nominal ac line supplies of 100V, 120V, 220V or 240V (-10%, +5%) at 48 Hz to 400 Hz. Two switches on the rear panel allow one of the four voltages to be selected.

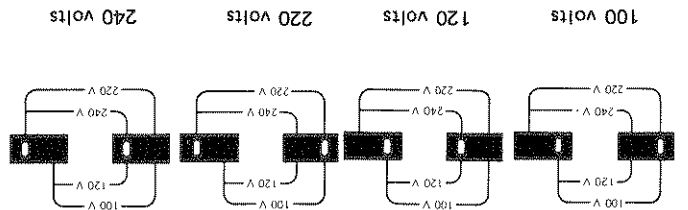


Figure 2-2. Selector settings for the nominal power line voltages

2-15 TEMPERATURE REQUIREMENTS

2-16 The 8013B will operate within specifications when the ambient temperature is between 0°C (32°F) and 55°C (131°F). It can be stored at temperatures between -40°C (-40°F) and 75°C (167°C).

2-17 RACK MOUNTING

2-18 The 8013B can be mounted in a rack using the 15179A Adapter Frame. This frame has space for mounting either one or two 8013B pulse generators alongside each other in a rack.

2-14 Connect the power cable to the rear connector.

CAUTION
Before applying power to the instrument, check on the rear panel that the 8013B is set in accordance with local supply conditions (see para 2-13). If not, use a screwdriver to change the voltage selector positions. Insert the correct fuse into the fuse holder: 1A for 100/120 V Operation; 0.5A for 220/240 V Operation.

OPERATING INSTRUCTIONS

SECTION 3

3-1 GENERAL

3-2 This section gives some general notes on the operation of the 8013B together with operating instructions for each of the operating modes:

- NORM operating mode
- RZ operating mode
- EXT WIDTH operating mode

Full setting up instructions are given for normal internal trigger mode followed by any changes required in the control settings for the following modes. For ease of operation the instructions will refer to Figure 3-1 which shows the controls identified by a reference number in

3-3 OUTPUT FORMATS

3-4 The 8013B has two pulse outputs: one with positive (17) and one with negative (18) output polarity. The normal/complement output formats can be changed using the NORM/COMPL switch (19). Thus logic convention can be changed without having to re-adjust any of the pulse parameters.

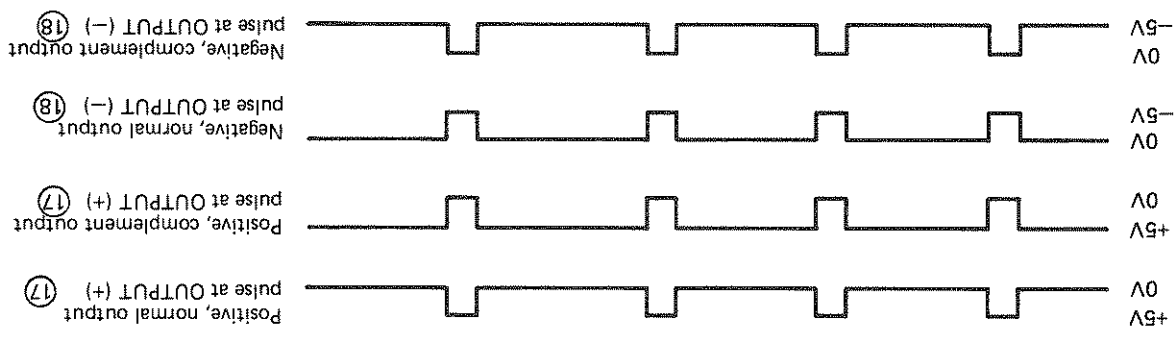


Figure 3-2. Normal/Complement Outputs

3-5 Normal/Complement pulse switching can be used to provide duty cycles of up to 100%.

Note, however, that the DC offset is automatically switched off when the INT LOAD is switched out.

3-8 CONTROL LAYOUT

3-9 The front panel of the 8013B has been carefully designed to provide a logical layout of the controls; horizontal controls for pulse timing parameters, vertical controls for pulse amplitude parameters. Thus a particular pulse can be set up extremely easily and quickly. Also, the pulse period, delay and width controls are designed in such a way that incompatible pulse settings will be noticed immediately (see Figure 3-3).

3-6 INTERNAL 50 OHM LOAD

3-7 The internal 50 ohm load of the 8013B can be switched in or out using the INT LOAD switch (20). This makes impedance matching to the circuit under test much easier and also provides a maximum pulse amplitude of $\pm 10V$ with the load switched out.

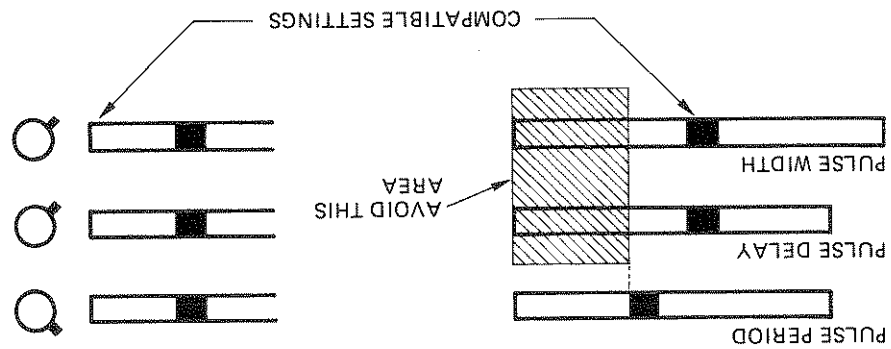


Figure 3-3. Positioning of Controls

3-10 Compatible pulse settings are guaranteed as long as the pulse delay and pulse width controls are either set to the left of the pulse period control or, if set vertically below the period control, that the delay and width verniers are set counter clockwise of the period vernier.

3-11 NORM OPERATING MODE

3-12 There are six ways of operating in the normal mode:

Internal trigger — the repetition rate is determined by the internal rate generator which is internally triggered.

External trigger — the rate generator is disabled and an external signal is used as the trigger source.

Manual trigger — one pulse is produced each time the MAN button is pressed.

Square wave — in each of the above modes a square wave output can be selected (pulse width = pulse period / 2) instead of the variable pulse width output.

3-13 Internal Trigger

3-14 In this mode the 8013B requires no external signal to produce an output signal. Rate, delay, width, amplitudes etc. are all adjustable from the front panel controls. The initial control settings (also shown in Figure 3-1) are given to assist someone unfamiliar with the operation of the 8013B. The positive and negative pulse outputs (17) and (18) and the TRIGGER OUTPUT (21) should be connected to an oscilloscope using a 50 ohm system (as shown in Figure 3-4). The oscilloscope (an HP 180C mainframe with 1801A and 1821A plug-ins) should be set with the sweep time at 20µs/div and the sensitivity at 2V/div.

Gating — Each of the outputs obtained above (except square wave) can be gated using an external input.

Double pulse — this mode can be selected with any of the above outputs(except square wave). Two pulses are produced for each trigger pulse.

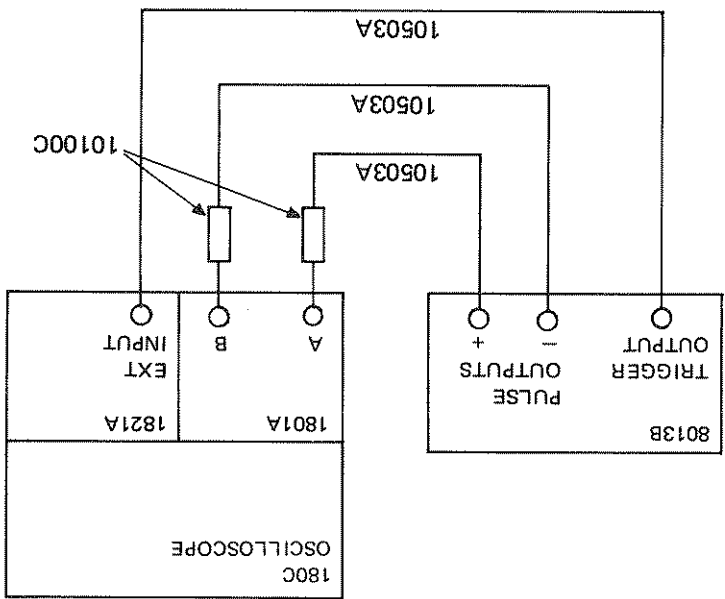


Figure 3-4. Initial control settings and test equipment

3-15 The circuits and controls involved in normal internal trigger mode are shown in Figure 3-5.

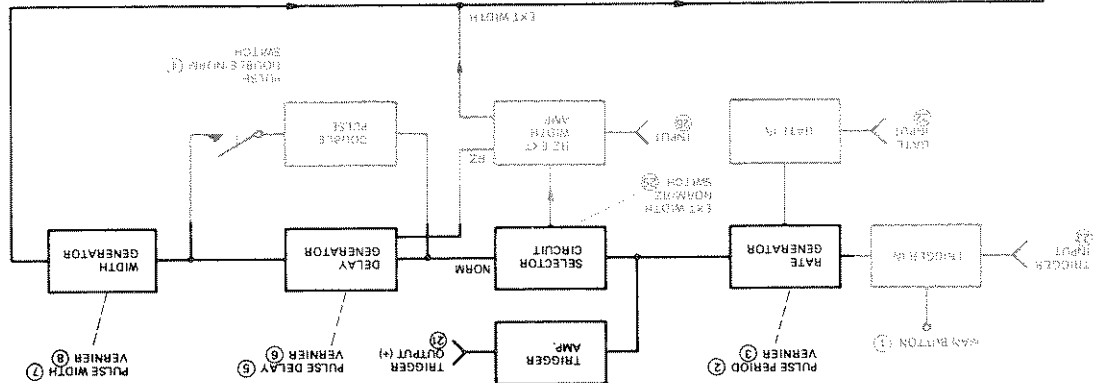


Figure 3-5. Normal internal trigger mode - block diagram

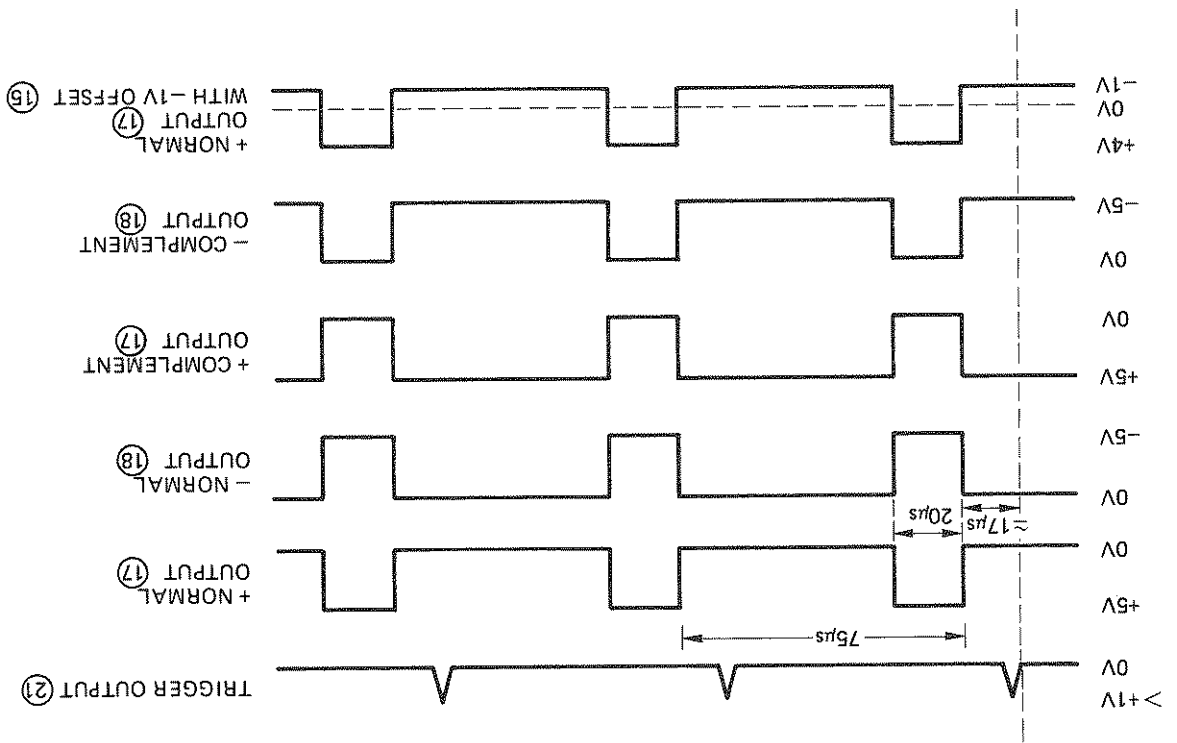


Figure 3-6. Output pulses in normal internal trigger mode

3-16 The output pulses should appear at the pulse OUTPUT (+) (17) and pulse OUTPUT (-) (18) NORM/COMPL switch (19) and the OFFSET verniers (11) and (15)

3-17 If the INT LOAD switch (20) is set to OUT, the internal 50 ohm loads on each of the output amplifiers are switched out and the amplitude of the output pulses doubles (this can only be done if the 8013B has an external 50 ohm load). All other pulse parameters remain the same.

3-18 External Trigger

3-19 In this mode the repetition rate generator is disabled and each trigger pulse is produced by an

3-20 The circuits and controls involved in normal external trigger mode are shown in Figure 3-7.

a. Set the PULSE PERIOD control (2) to EXT (+) to trigger on the positive going slope of the input or to EXT(-) to trigger on the negative going slope.

b. The pulse delay, width, amplitude, etc. are determined by the front panel controls and can be left at the same settings as for normal internal trigger mode.

external signal which is applied at the TRIGGER INPUT connector (23). The input signal can be a sinewave of > 1.7V p-p (about zero) or pulses > 0.8V amplitude (positive or negative) and at least 7ns wide. The amplitude must not exceed $\pm 7V$.

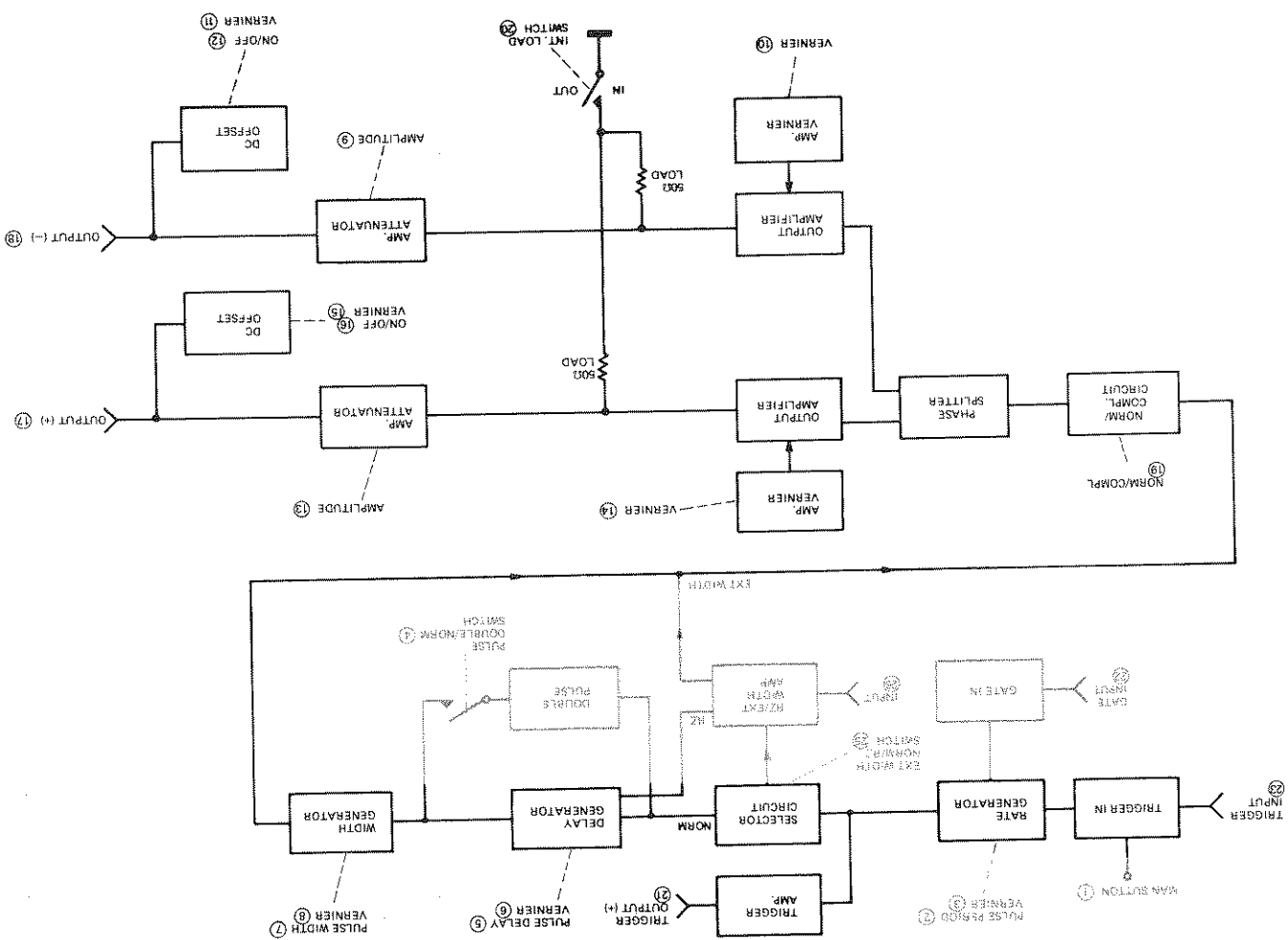


Figure 3-7. Normal external trigger mode - Block diagram

- 3-21 The output pulses should appear at the TRIGGER OUTPUT (+) (17) and OUTPUT (+) (21) connectors as shown in Figure 3-8, according to the applied trigger and the setting of the PULSE PERIOD control (2) (either EXT+ or EXT-).
- 3-22 The output pulse parameters and formats can be varied using the controls shown in Figure 3-7.
- 3-23 Manual Trigger
- 3-24 In this mode the repetition rate generator is again disabled and each trigger pulse is produced by pressing the MAN button (1) once.
- 3-25 The circuits and controls involved in normal manual trigger operation are shown in Figure 3-9.

- a. Set the PULSE PERIOD control (2) to either EXT(+) or EXT(-).
- b. The pulse delay, width, amplitude etc. are determined by the front panel controls and can be left at the same settings as for normal internal trigger mode.
- c. Press the MAN button (1) once for each output pulse.

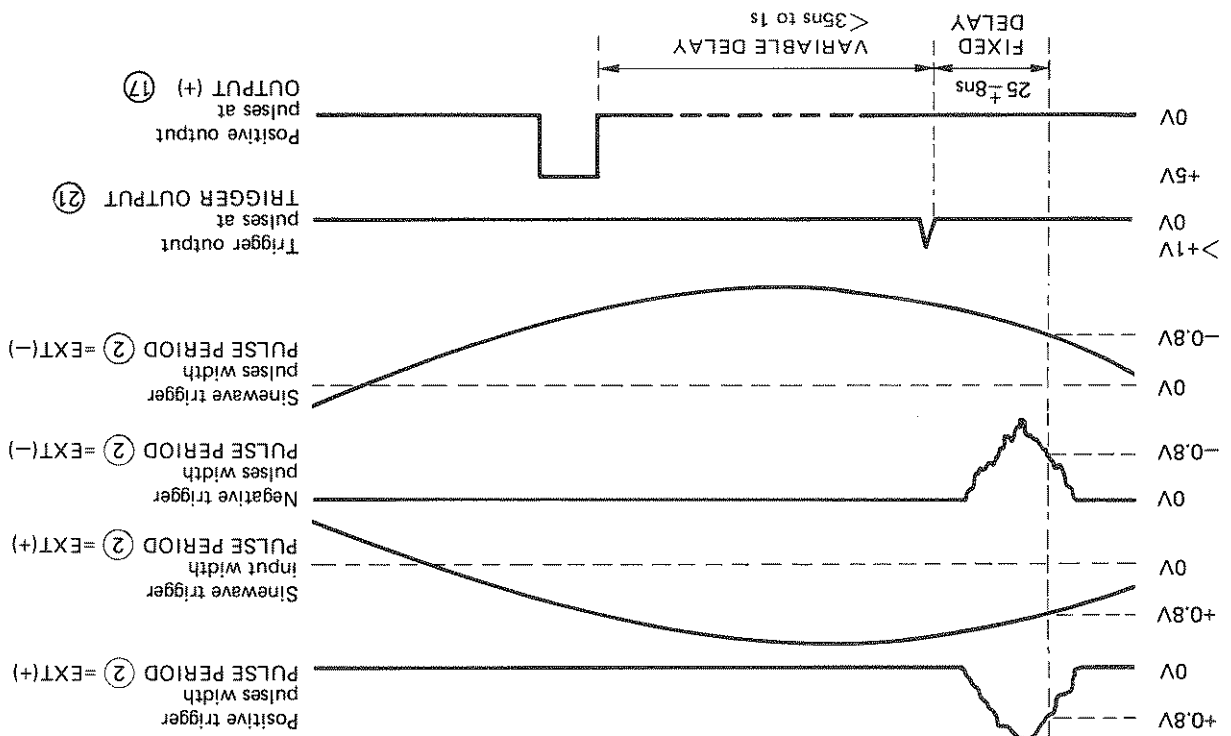


Figure 3-8. Output pulses in normal external trigger mode

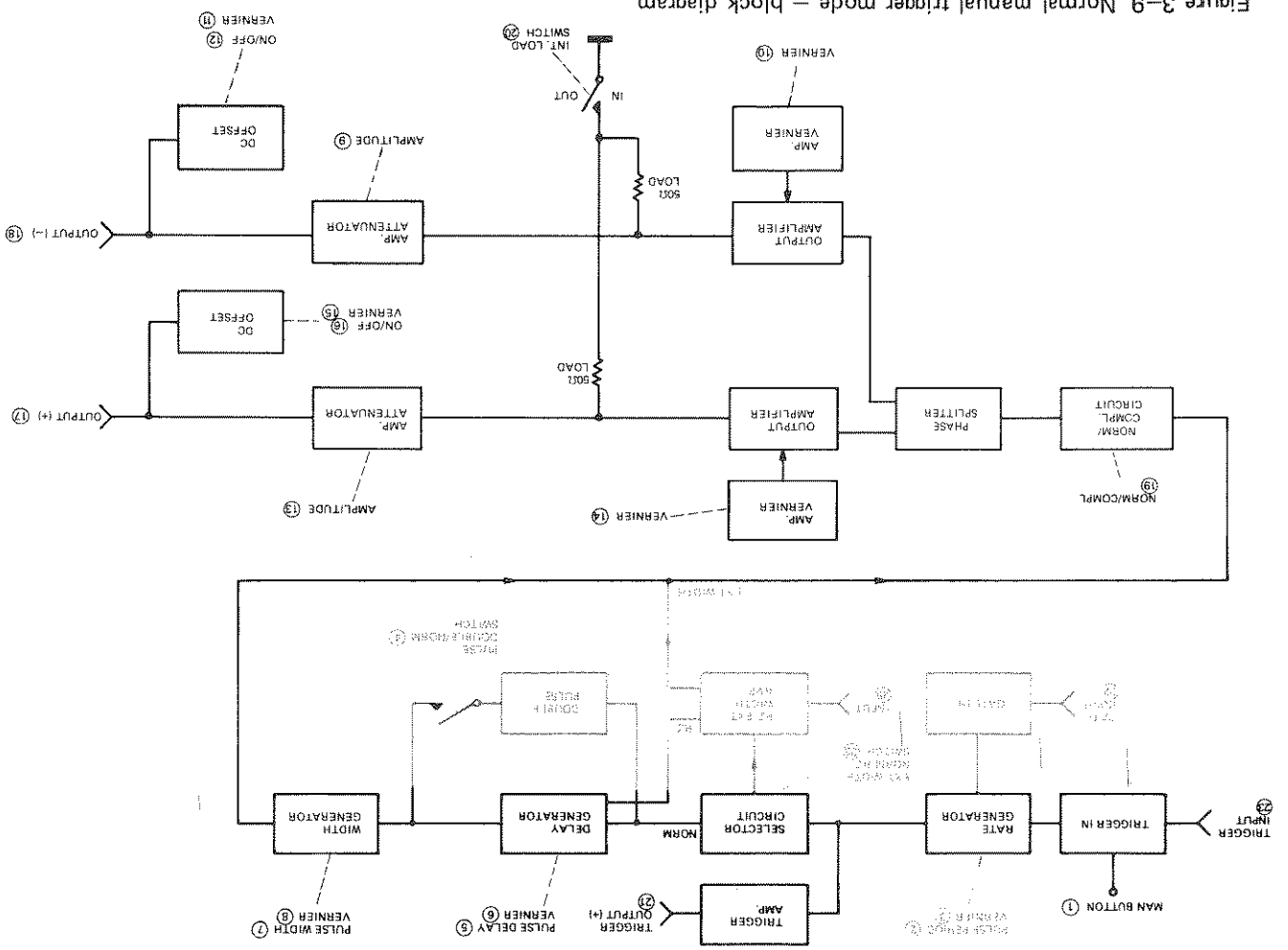


Figure 3-9. Normal manual trigger mode - block diagram

- a. Output pulse has 50% duty cycle.
- b. Output pulse rate is half that of the rate generator (or input trigger pulse).
- c. The delay between input trigger pulse and square wave output is fixed.

3-31 The circuits and controls involved in square wave mode are shown in Figure 3-11.

3-30 The square wave output can be produced as follows:

- a. Set the PULSE PERIOD control (2) to an internal range (as in normal trigger mode) or to EXT and apply external trigger pulses at the TRIGGER INPUT connector (23) in order to determine the repetition rate of the output pulses.
- b. Set the PULSE WIDTH control (7) to SQUARE WAVE.
- c. Set the amplitude etc. of the output pulses as for normal internal trigger mode.

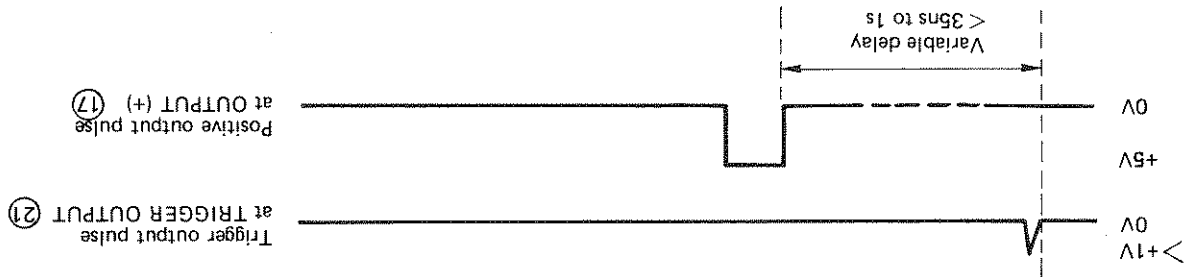
3-28 Square Wave Mode

3-29 In this mode the pulse width is exactly half the pulse period (50% duty cycle). Pulse period, delay amplitude etc. can still be varied using the front panel controls. A square wave output can be selected in any of the preceding operating modes; the following points must, however, be remembered.

- 3-26 The output pulses should appear at the TRIGGER OUTPUT (21) and OUTPUT (+) (17) connectors as shown in Figure 3-10.
- 3-27 The output pulse parameters and formats can be varied using the controls shown in Figure 3-9.

- d. The output pulse is symmetrical above and below the offset level.
- e. Square wave output cannot be gated.

Figure 3-10. Output pulses in normal manual trigger mode



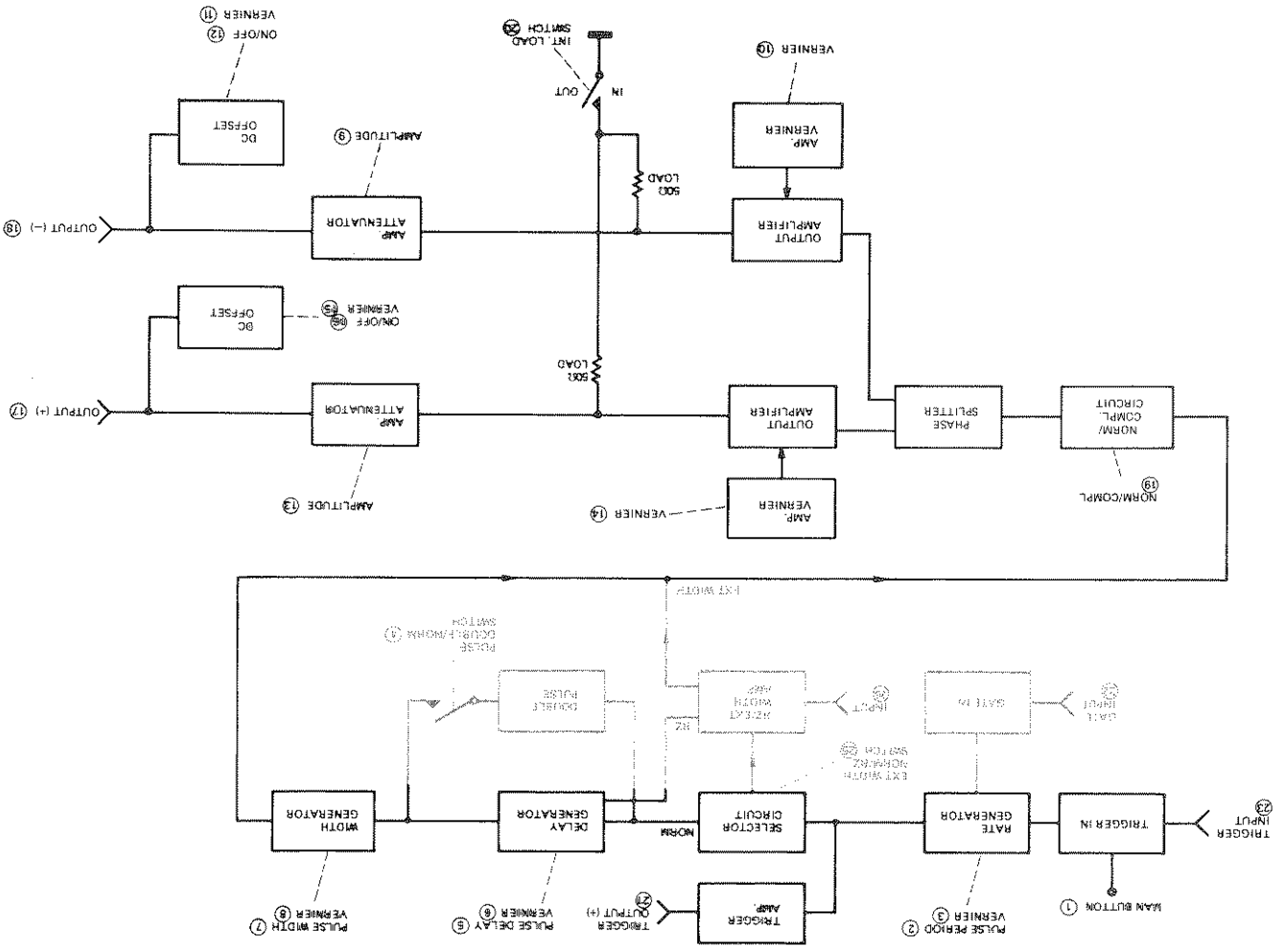


Figure 3-11. Normal square wave mode - block diagram

3-32 The output pulses should appear at the OUTPUT (+) connector (17) as shown in figure 3-12.

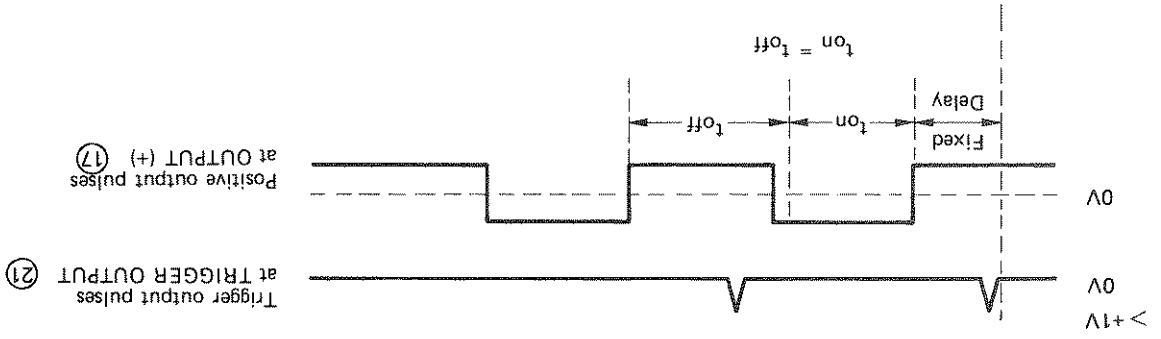


Figure 3-12. Output pulses in square wave mode

3-33 The output pulse can be switched to negative or normal or complement and the offset and amplitude can be varied.

3-34 Gating Mode

3-35 The output pulses obtained in any of the preceding operating modes can be gated by applying an appropriate pulse to the GATE INPUT (22). If square wave mode is gated, the level of the pulse baseline after the gate has closed depends on the number of pulses during the gate 'on' time (see figure 3-15). The gate input must meet the following requirements:

3-36 The circuits and controls involved in gate mode are shown in Figure 3-13.

to enable the rate generator - input voltage > +1.5V or resistor > 1K Ω from gate input to ground.
to disable the rate generator - input voltage < +0.8V or resistor > 160 Ω from gate input to ground.

The gate input is TTL compatible and the input voltage must not exceed $\pm 5V$.

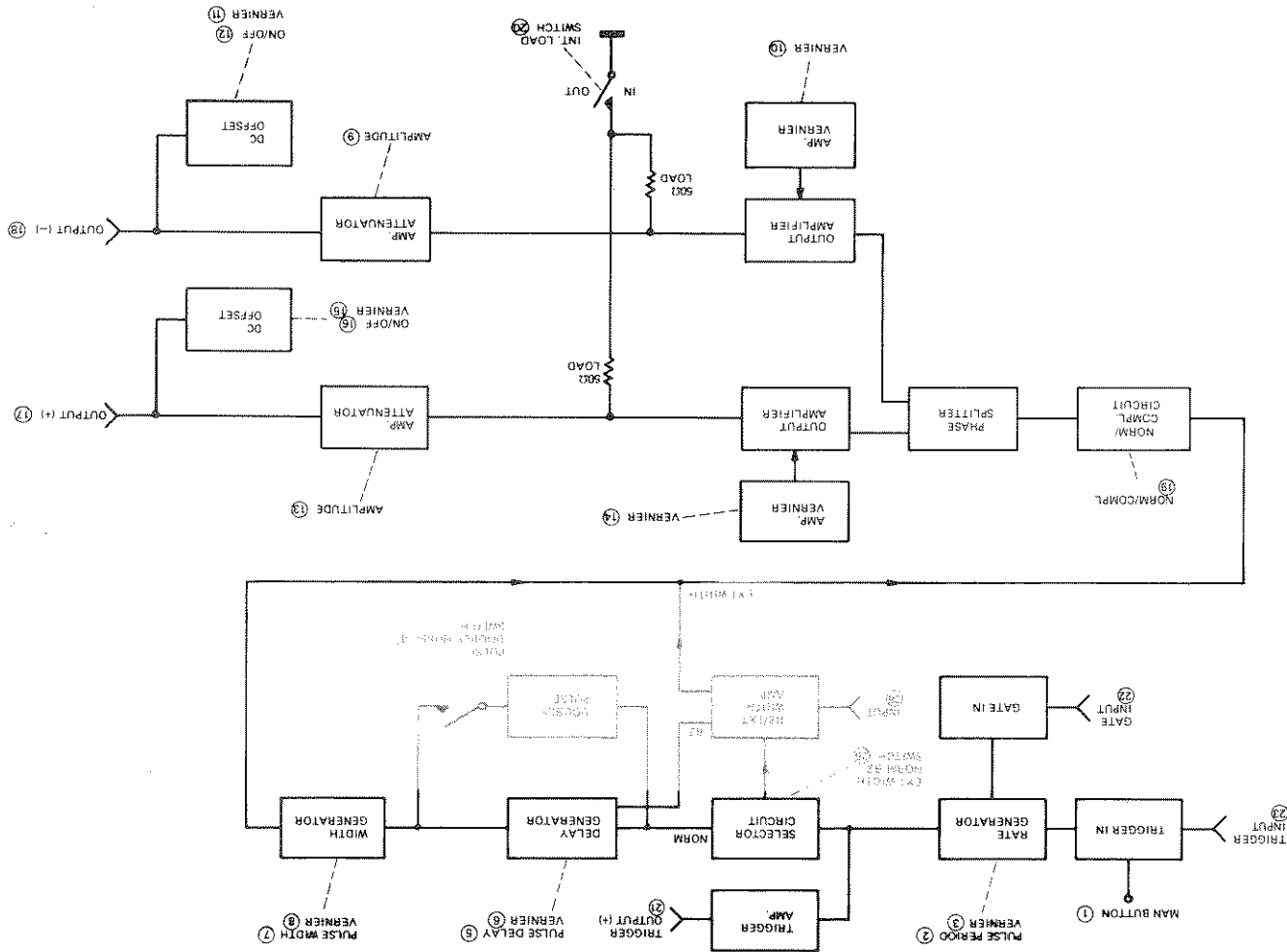


Figure 3-13. Normal gate mode - block diagram

3-37 The output pulses should appear at the TRIGGER OUTPUT (21) and OUTPUT (+) (17) connectors as shown in Figure 3-14.

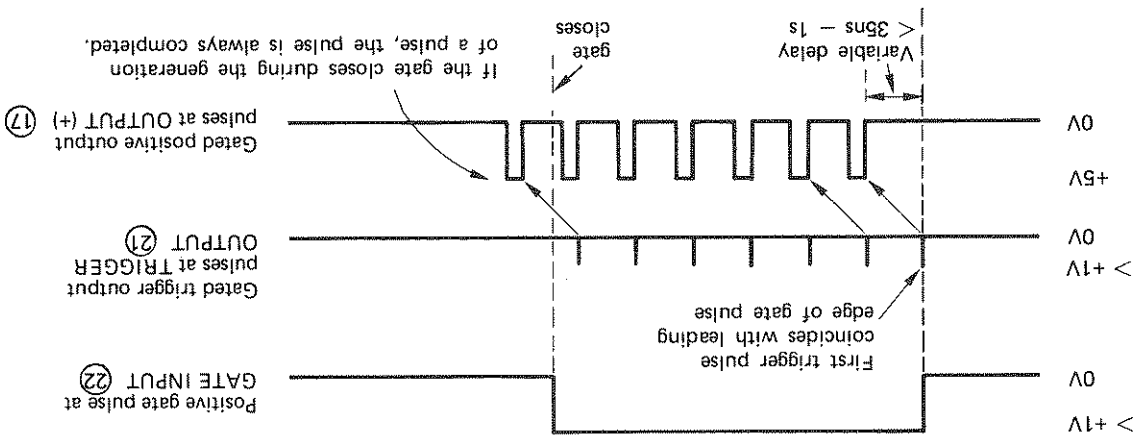


Figure 3-14. Output pulses in gate mode

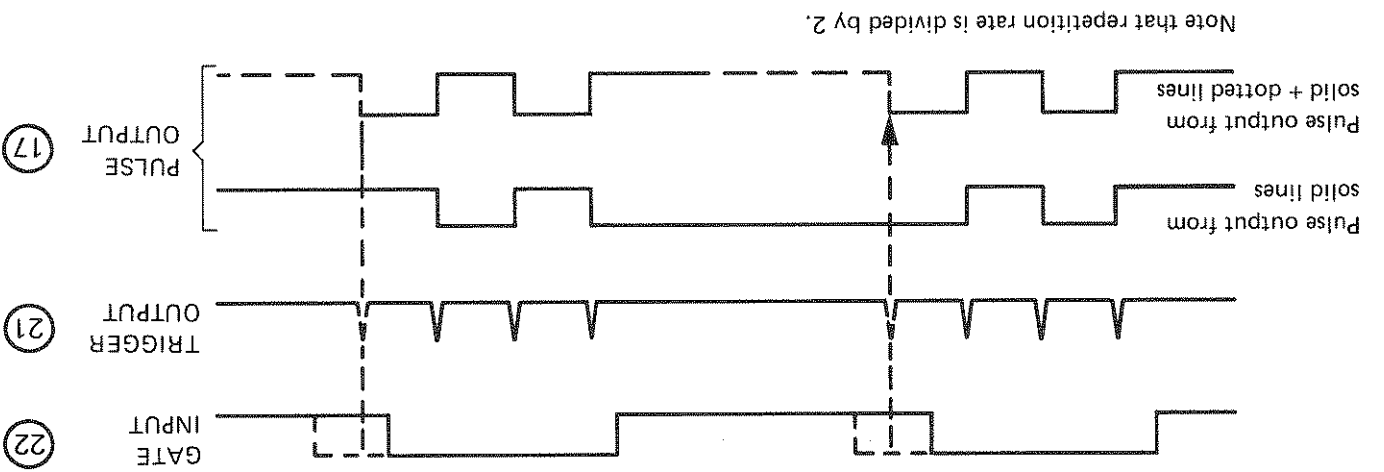


Figure 3-15. Gated output in square wave mode

put amplifiers. The output pulses cannot be gated and are independent of the TRIGGER OUT-

PUT connector (21).

3-40 The circuits and controls involved in RZ mode are shown in figure 3-16.

3-39 In RZ mode external pulses, applied to the INPUT connector (26) on the 8013B rear panel, trigger the delay generator directly (see figure 3-16) and the shape of the output pulses is determined by the out-

3-38 RZ MODE

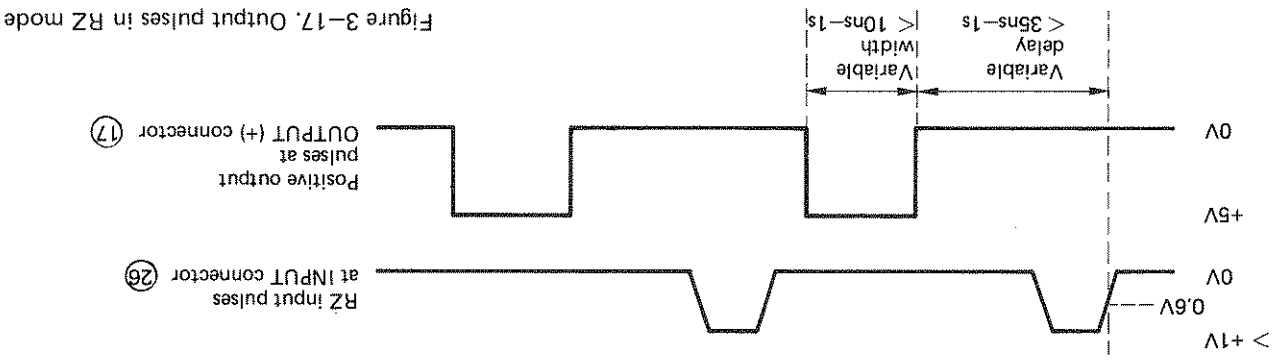
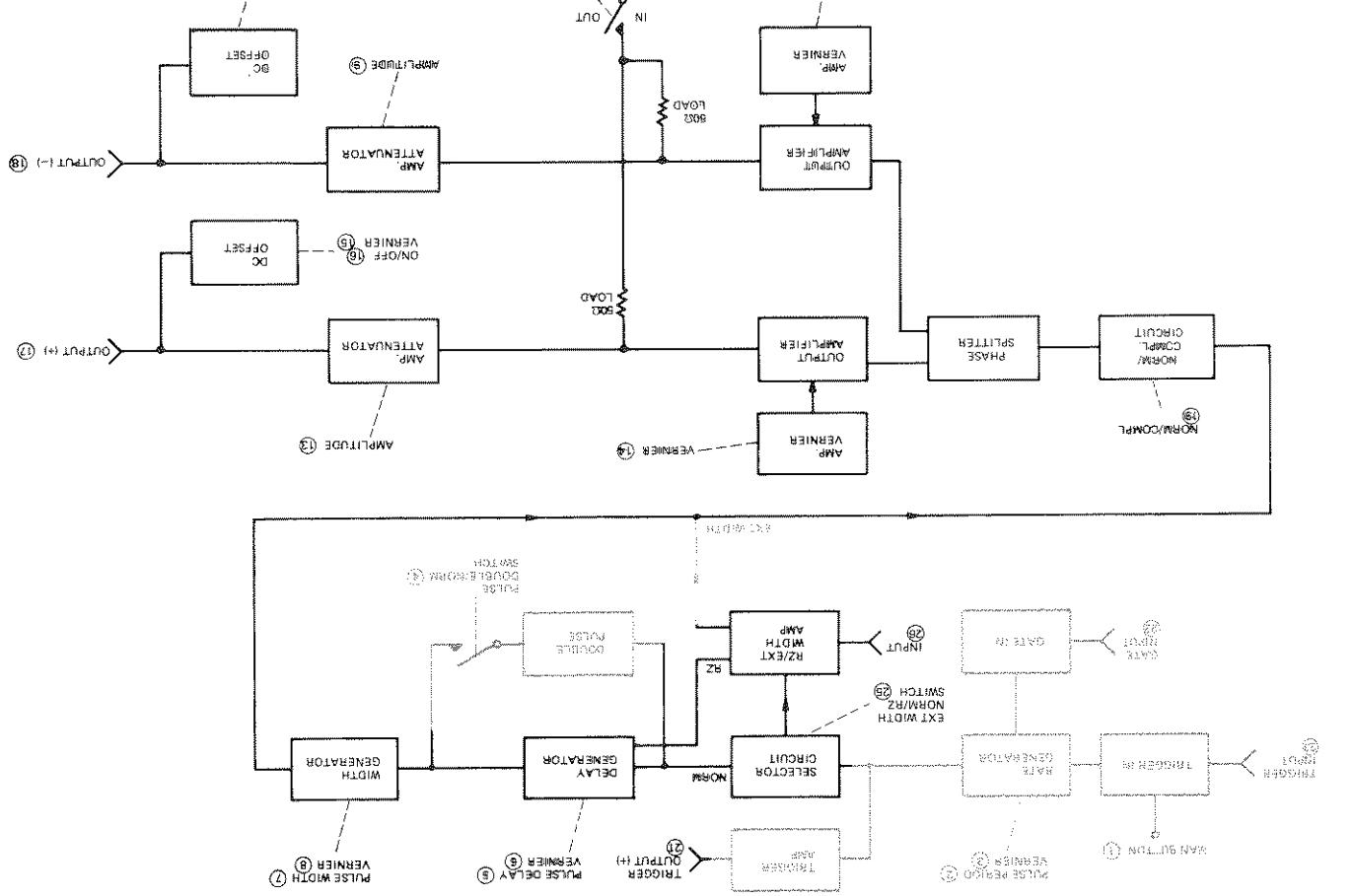


Figure 3-17. Output pulses in RZ mode

- 3-41 The RZ input signal must be $> +1V$ to a maximum of $\pm 5V$ in amplitude and must be at least 7ns wide.
- 3-42 The procedure for obtaining an output in RZ mode is as follows:
 - a. Connect the external signal to the INPUT connector (26) on the rear panel of the 8013B.
 - 3-43 The output pulses should appear at the OUTPUT (+) connector (17) as shown in Figure 3-17.
 - b. Set the Mode Selector switch (25) to RZ.
 - c. Set the pulse delay, width, amplitude, offset and output format as required.

Figure 3-16. RZ mode - block diagram



TRIGGER INPUT (1)
 TRIGGER RATE GENERATOR (2)
 RATE GENERATOR (3)
 SELECTOR CIRCUIT (4)
 DELAY GENERATOR (5)
 DOUBLE PULSE GENERATOR (6)
 AMP (7)
 RZ/EXT AMP (8)
 OUTPUT AMPLIFIER (9)
 PHASE SPLITTER (10)
 NORM/COMPL CIRCUIT (11)
 OUTPUT (+) connector (17)
 AMP (12)
 OUTPUT AMPLIFIER (13)
 OUTPUT (-) connector (18)
 TRIGGER RATE VERNIER (14)
 RATE VERNIER (15)
 PULSE PERIOD VERNIER (16)
 TRIGGER AMP OUTPUT (+) (19)
 TRIGGER AMP VERNIER (20)
 EXT WIDTH VERNIER (21)
 EXT WIDTH SWITCH (22)
 GATE IN (23)
 GATE IN VERNIER (24)
 INPUT (25)
 RZ/EXT AMP VERNIER (26)
 AMP VERNIER (27)
 OUTPUT AMPLIFIER VERNIER (28)
 AMP VERNIER (29)
 DC OFFSET VERNIER (30)
 DC OFFSET (31)
 AMP ATTENUATOR (32)
 AMP VERNIER (33)
 DC OFFSET VERNIER (34)
 DC OFFSET (35)
 AMP ATTENUATOR (36)
 AMP VERNIER (37)
 DC OFFSET VERNIER (38)
 DC OFFSET (39)
 INT. LOAD SWITCH (40)
 INT. LOAD (41)
 LOAD (42)
 BOX LOAD (43)
 IN (44)
 OUT (45)
 PULSE WIDTH VERNIER (46)
 WIDTH GENERATOR (47)
 PULSE WIDTH (48)
 DOUBLE PULSE SWITCH (49)

3-44 DOUBLE PULSE Mode

3-45 In this mode, the 8013B delivers two output pulses for each trigger pulse. One pulse is in phase with the TRIGGER OUTPUT (21); the other pulse is delayed by the time set on the PULSE DELAY controls (5) and (6).

3-46 Double pulse output can be selected in any of the preceding operating modes except square wave. Double pulse output is produced as follows:

3-47 The circuits and controls involved in double pulse mode are shown in Figure 3-18.

3-48 The trigger and output pulses should appear at the TRIGGER OUTPUT (21) and OUTPUT (+) (17) connectors as shown in Figure 3-19.

- a. Set the PULSE DOUBLE/NORM switch (4) to DOUBLE.
- b. The remaining pulse parameters and output format can be set as required.

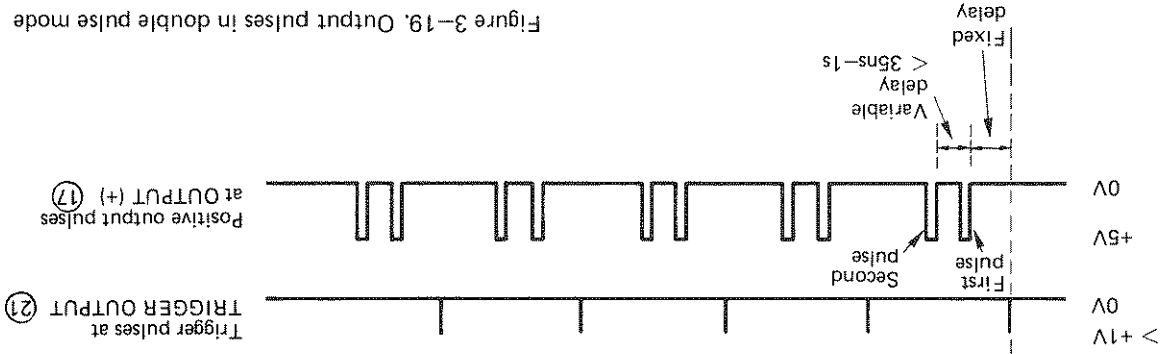
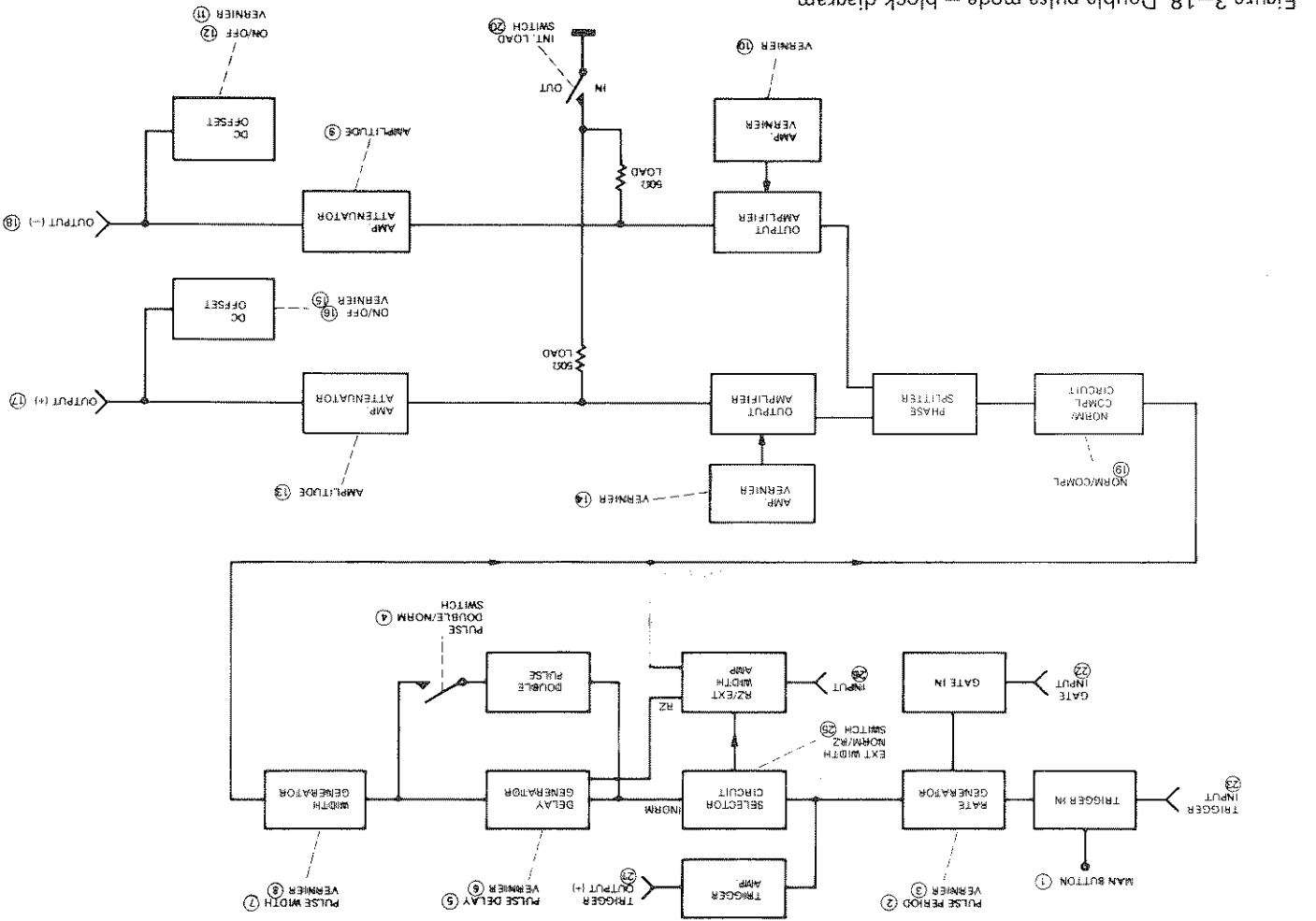


Figure 3-18. Double pulse mode - block diagram

Figure 3-19. Output pulses in double pulse mode

3-49 EXTERNAL WIDTH MODE

3-50 In this mode, external pulses, applied to the INPUT connector (26) on the rear panel, are routed directly to the output amplifiers which are caused to change state at the threshold level of the input signal. Thus the pulse output is a shaped version of the input. It is also independent of the TRIGGER OUTPUT (21).

The external width input signal must be > +1V to a maximum of ± 5V in amplitude and must be at least 7ns wide.

3-51 The circuits and controls involved in external width mode are shown in Figure 3-20.

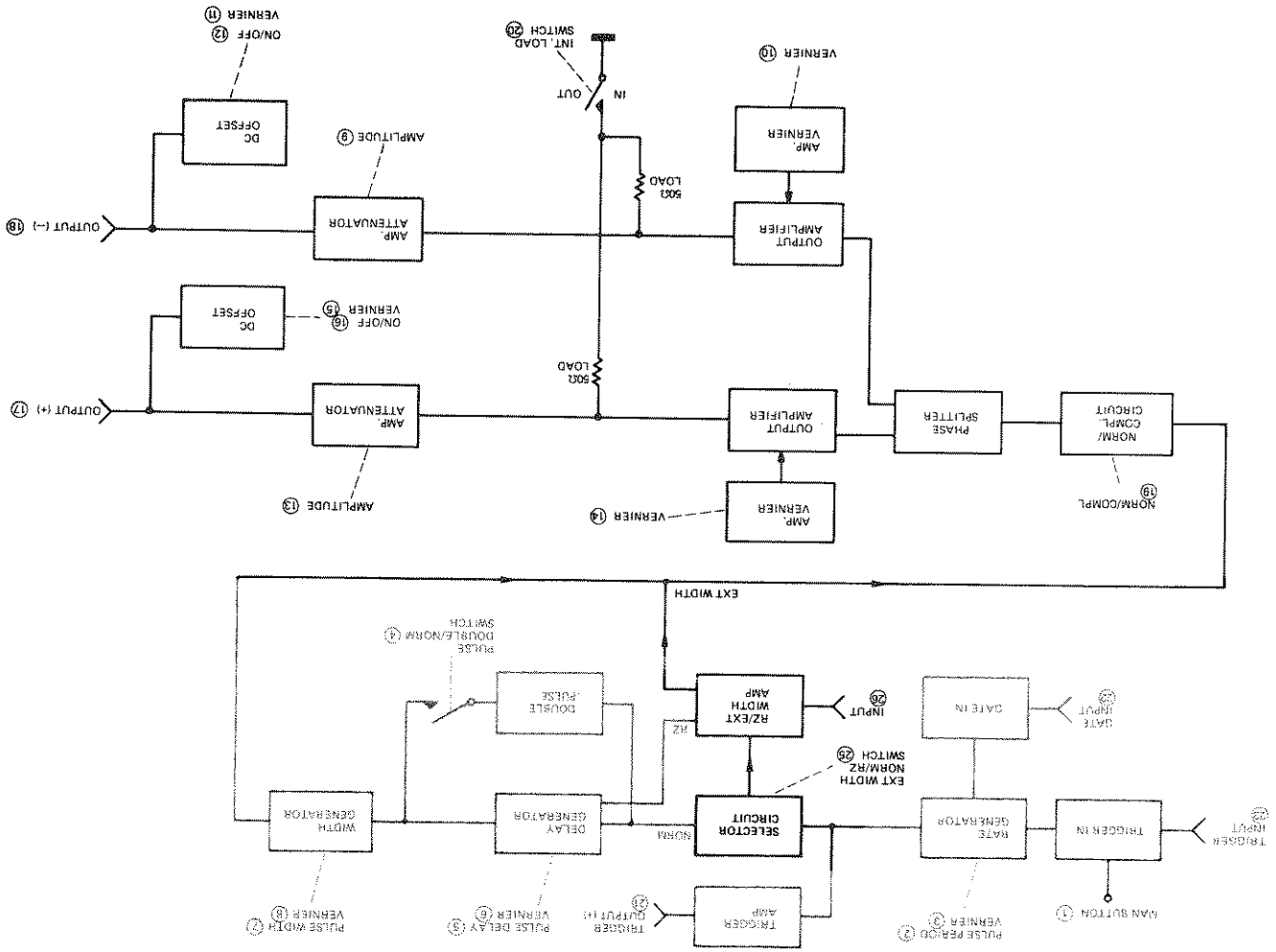


Figure 3-20. External Width mode – block diagram

3-52 The procedure for obtaining an output in external width mode is as follows:

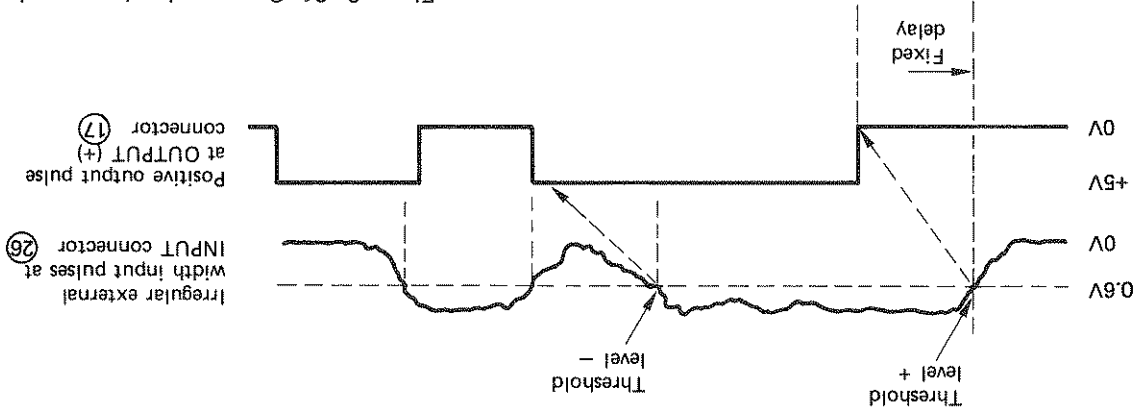
- a. Connect the external signal to the INPUT connector (26) on the rear panel of the 8013B.
- b. Set the Mode Selector switch (25) to EXT WIDTH.

3-53 The output pulses should appear at the OUTPUT (+) connector (17) as shown in Figure 3-21.

3-54 ADDITIONAL FACILITIES IN RZ AND EXT WIDTH MODES

3-55 When operating in RZ or EXT WIDTH modes, the internal rate generator is available as an independent clock generator which provides an output at the TRIGGER OUTPUT connector (21). This output cuts and controls involved in this facility are shown in Figure 3-22.

Figure 3-21. Output pulses in external width mode



3-55 ADDITIONAL FACILITIES IN RZ AND EXT WIDTH MODES

3-55 When operating in RZ or EXT WIDTH modes, the internal rate generator is available as an independent clock generator which provides an output at the TRIGGER OUTPUT connector (21). This output cuts and controls involved in this facility are shown in Figure 3-22.

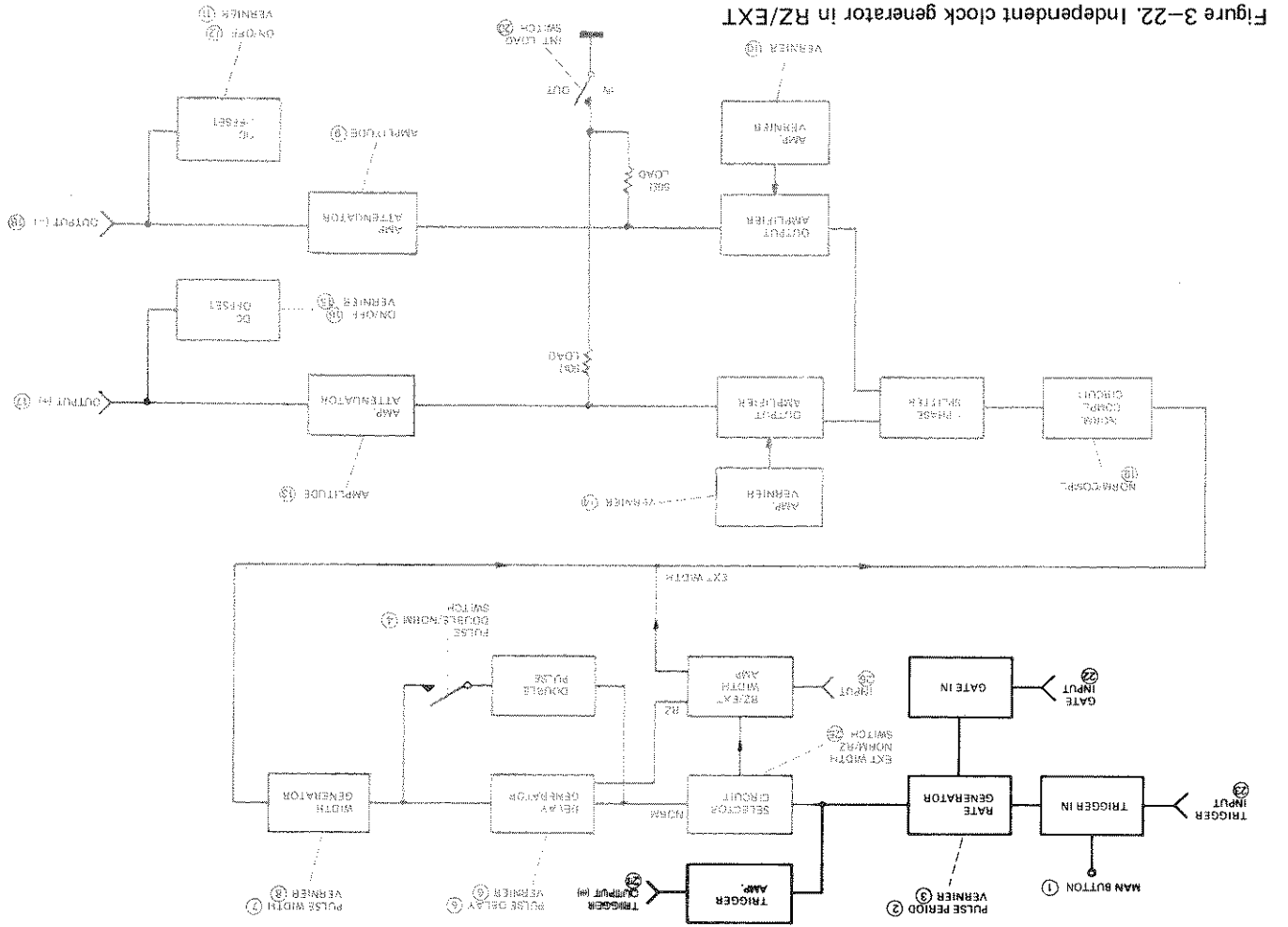


Figure 3-22. Independent clock generator in RZ/EXT WIDTH modes - block diagram