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HP References in this Manual

This manual may contain references to HP or Hewlett-Packard. Please note that Hewlett-Packard's former test and measurement, semiconductor products and chemical analysis businesses are now part of Agilent Technologies. We have made no changes to this manual copy. In other documentation, to reduce potential confusion, the only change to product numbers and names has been in the company name prefix: where a product number/name was HP XXXX the current name/number is now Agilent XXXX. For example, model number HP8648A is now model number Agilent 8648A.

HEWLETT PACKARD

OPERATING AND SERVICE MANUAL
300 MHz RATE GENERATOR
MODULE 8081A

PART OF THE 8080 HIGH FREQUENCY
PULSE GENERATOR SYSTEM

SERIAL NUMBERS

This manual applies directly to instrument serial number

1604G 00101

For instruments with lower serial numbers, refer to the backdating information in Section 8 of this module manual.

For instruments with higher serial numbers, refer to the Manual Change sheets at the end of this module manual.

0265

703 BÖBLINGEN, HERRENBERGER STR. 110, WEST GERMANY.

MANUAL PART NO. 08081–90001
MICROFICHE PART NO. 08081–90501

Printed in West Germany

CERTIFICATION

The Hewlett-Packard Company certifies that this instrument was thoroughly tested and inspected and found to meet its published specifications when it was shipped from the factory. The Hewlett-Packard Company further certifies that its calibration measurements are traceable to the U.S. National Bureau of Standards to the extent allowed by the Bureau's calibration facilities, or to the calibration facilities of other International Standards Organization members.

WARRANTY AND ASSISTANCE

This Hewlett-Packard product is warranted against defects in materials and workmanship. This warranty applies for one year from the date of delivery. Hewlett-Packard will repair or replace products which prove to be defective during the warranty period provided they are returned to Hewlett-Packard. No other warranty is expressed or implied. We are not liable for consequential damages.

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For any assistance, contact your nearest Hewlett-Packard Sales and Service Office. Addresses are provided at the back of this manual.

CONTENTS

TABLES

ILLUSTRATIONS

ILLUSTRATIONS

SCHEMATIC DIAGRAMS

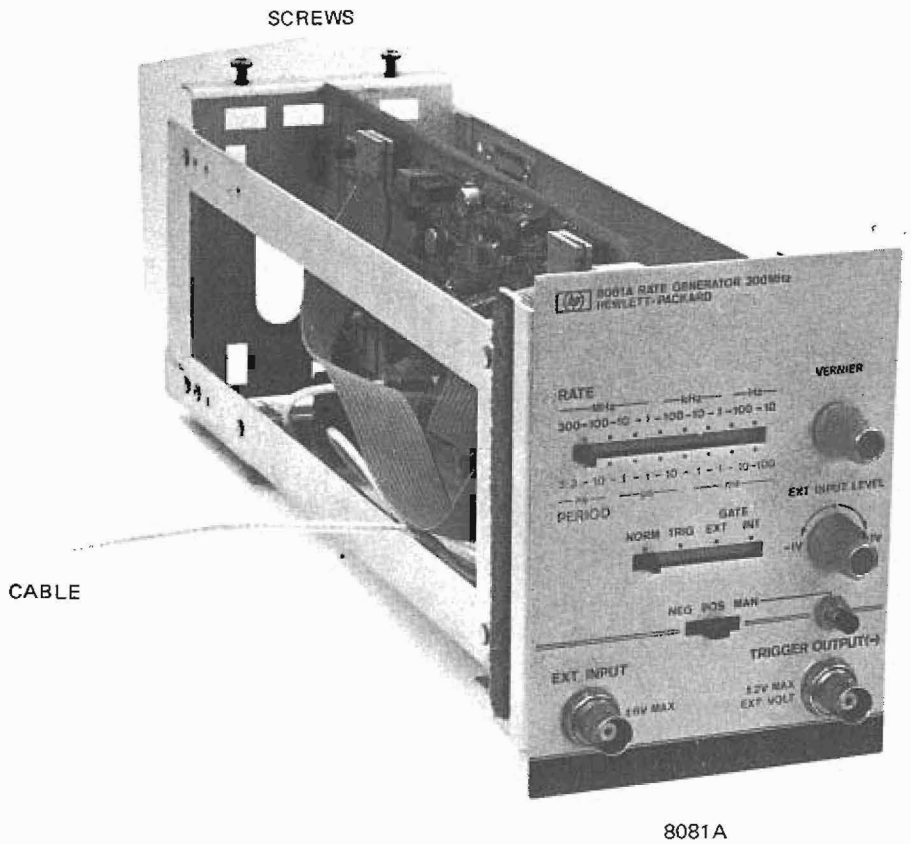


Figure 1–1. 8081A 300 MHz Rate Generator Module and Supplied Accessories.

1–1 INTRODUCTION

1–2 This Operating and Service manual contains information required to install, operate, test, adjust and service the Hewlett-Packard Model 8081A 300 MHz Rate Generator module.
Figure 1–1 shows the module and accessories supplied. This section covers instrument identification, description, accessories, specifications, and other basic information.

1–3 A microfiche version of this manual is available on 4 x 6 inch microfilm transparencies (order number on title page). Each microfiche contains up to 60 photo-duplicates of the manual pages. The microfiche package also includes the latest Manual Changes supplement as well as all pertinent Service Notes.

1–4 SPECIFICATIONS

1–5 Instrument specifications are listed in table 1–2. These specifications are the performance standard or limits against which the instrument is tested.

1–6 SAFETY CONSIDERATIONS

1–7 The Model 8081A is a Safety Class 1 instrument (it has an exposed metal chassis that is connected to earth via the 8080A system mainframe). This instrument has been designed according to international safety standards and has been supplied in a safe condition.

1–8 This operating and service manual contains information, cautions and warnings which must be followed by the user to ensure safe operation and to maintain the instrument in a safe condition.

1–9 INSTRUMENTS COVERED BY MANUAL

1–10 Attached to the inside of the instrument side frame is a serial number plate (figure 1–1). The first four digits of the serial number only change when there is a significant change to the instrument. The last five digits are assigned to instruments sequentially. The contents of this manual apply directly to the instrument serial number quoted on the title page. For instruments with lower serial numbers, refer to the backdating information in Section 8 of this module manual. For instruments with higher serial numbers, refer to the Manual Change sheets at the end of this module manual. In addition to change information, the Manual Change sheets may contain information for correcting errors in the manual. To keep this manual as up-to-date and accurate as possible, Hewlett-Packard recommends that you periodically request the latest Manual Change supplement. The supplement for this manual is identified with this manual's print date and part number, both of which appear on this module manual's title page. Complimentary copies of the supplement are available from Hewlett-Packard.

Figure 1–1. Serial Number Plate

1–11 DESCRIPTION

1–12 The Model 8081A is a 0–300 MHz Rate Generator module designed to provide a clock source for another 8080 system module. The 8081A has four operating modes:

Normal
Trigger
External Gate
Internal Gate

In Normal mode, the rate generator is free-running at the repetition rate selected by the rate controls. In Trigger mode, the rate generator is bypassed and the pulse output is merely a shaped version of a pulse input from either an external source or a manual pushbutton. In External Gate Mode, the rate generator output is gated

by a gate pulse from an external source or a manual pushbutton. Internal Gate mode can only be useed with an 8084A Word Generator module. The trigger slope polarity and threshold level of external gate/trigger inputs is adjustable.

1–13 The power supplies for the 8081A are provided by the 8080A Mainframe.

1–14 OPTIONS

1–15 The only option for the 8081A Rate Generator is a second copy of the operating and service manual which can be obtained by ordering option 910.

1–16 EQUIPMENT REQUIRED BUT NOT SUPPLIED

1–17 To operate the 8081A module, an 8080A Mainframe is required. The 8080A mainframe provides housing and power supplies for the 8081A.

1–18 EQUIPMENT AVAILABLE

1–19 The 8081A is one of a complete range of rep. rate, timing and output modules that form the 8080 high frequency pulse generator system. Repetition rates range from 0–1 GHz and the modules are interchangeable to enable you to purchase a system exactly tailored to your requirements.

1–20 RECOMMENDED TEST EQUIPMENT

1–21 Equipment required to maintain the 8081A is listed in Table 1–1. Other equipment can be substituted if it meets or exceeds the critical specifications listed in the table.

Table 1–1. Recommended Test Equipment

Instrument	Critical Specification	Recommended Model	Used in
Mainframe		HP 8080A	Performance Tests, Adjustments
Electronic Counter	up to 350 MHz frequency	HP 5345A	Performance Tests, Adjustments
Sampling Oscilloscope	> 300 MHz bandwidth; up to 200 mV/div sensitivity; up to 0.5 ns/div sweep speed; 50 ohm input impedance	HP 182C with HP 1810A plug-in	Performance Tests, Adjustments
Real Time Oscilloscope	up to 1 MHz bandwidth; up to 1 V/div sensitivity; up to 10 μs/div sweep speed; four input channels	HP 182C with HP 1804A and HP 1821A plug-ins	Performance Tests
Oscillator	up to 10 KHz frequency; up to 1 V RMS amplitude; 50 ohm output impedance	HP 651B	Performance Tests
Pulse Generator	up to 250 MHz frequency; 2 ns pulse width; 0.5 V amplitude; positive-polarity; 50 ohm output impedance; square wave facility.	HP 8082A	Performance Tests
50 ohm Feedthrough Termination		HP 10100C	Performance Tests
50 ohm Tee Connector		HP 1250–0781	Performance Tests

Table 1–2. Specifications

TIMING

Repetition rate:	10 Hz to 300 MHz in 8 ranges
Period jitter:	⩽0.1 % ± 50 psec

EXTERNAL INPUTS

Repetition rate:	
Trigger mode:	0 to 300 MHz, pulse width ⩾ 1.7 ns
Gate mode:	gate on duration > 1 period of int rep rate, gate off duration > 1 period + 10 ns
Input impedance:	50 Ω typical
Trigger level:	−1V to + 1V
Sensitivity:	200 mV p–p
Slope:	neg/pos selectable
Max. input voltage:	± 6V

INTERNAL GATE INPUT

Gate duration:	on > 10 ns, off > 20 ns
Input impedance:	50 Ω typical
Amplitude:	⩾ 500 mV p–p
High level:	0V ± 100 mV
Max input voltage:	± 1V

EXTERNAL TRIGGER OUTPUT

Amplitude:	⩾ 500 mV p–p
High level:	0V ± 100 mV
Duty cycle:	50% ± 10%
Output impedance:	50 Ω typical
Transition time (10% to 90%):	⩽ 1.2 ns
Max. external voltage:	± 2V

INTERNAL OUTPUT

Fan-out*:	1
Amplitude:	⩾ 500 mV p–p
High level:	0V ± 100 mV
Duty cycle:	50% ± 10%
Output impedance:	50 Ω typical
Transition time (10% to 90%):	⩽ 1.2 ns
Max. external voltage:	± 2V

OPERATING MODES

Norm:	Repetition rate is determined by front panel controls.
External trigger:	Repetition rate is controlled externally. Shaped input signal is output at both internal and external trigger outputs.
External gate:	Gate signal turns repetition rate generator on synchronously.
Internal gate:	External input is disconnected. Generator is gated through internal gate input.
Manual:	All external functions can be triggered manually by pressing a pushbutton.

OPTION 910	Additional instrument operating and service manual.
SIZE	Quarter mainframe width

* Fan-out: max. number of 8080 system modules which can be driven

2–1 INTRODUCTION

2–2 This section provides installation instructions for the Model 8081A 300 MHz Rate Generator module. It also includes information about initial inspection and damage claims, preparation for use, and packaging, storage and shipment.

2–3 INITIAL INSPECTION

2–4 Inspect the shipping container for damage. If the container or cushioning material is damaged, it should be kept until the contents of the shipment have been checked for completeness and the instrument has been checked mechanically and electrically. The contents of the shipment should be as shown in Figure 1–1. Procedures for checking the electrical operation are given in Section 3. If the contents are incomplete, if there is mechanical damage or defects, or if the 8081A does not pass the operator's checks, notify the nearest Hewlett-Packard Sales/Service office. If the shipping container is damaged, or the cushioning material shows signs of stress, notify the carrier as well as the Hewlett-Packard office. Keep the shipping materials for carrier's inspection. The HP office will arrange for repair or replacement without waiting for claim settlement.

2–5 PREPARATION FOR USE

2–6 Installation in 8080A Mainframe

CAUTION

The following installation procedure must only be carried out by qualified service personnel.

2–7 To operate the 8081A, it must first be installed in an 8080A Mainframe as follows:

1. Switch the mainframe LINE OFF/ON switch to OFF. Disconnect the power supply cable from the rear of the 8080A mainframe.

2. Remove the upper two feet from the rear of the 8080A mainframe.

3. Remove the 8080A mainframe top cover.

4. Insert the 8081A in the required position in the 8080A mainframe (there are no electrical limitations on the position).

5. Secure the 8081A to the 8080A mainframe using the two screws provided.

6. Connect the internal coaxial cable from the 8081A to the word generator, delay, output amplifier modules or to remote equipment as required. Connections are Internal Output and Internal Gate. A connecting cable for the Internal Output is supplied.

7. Replace the 8080A mainframe top cover.

8. Replace the two feet on the rear of the 8080A mainframe.

2–8 Operating Environment

2–9 The 8081A will operate within specifications when the ambient temperature is between 0°C and 55°C.

2–10 Storage and Shipment.

2–11 The 8081A can be stored or shipped at temperatures between −40°C and 75°C. The instrument should be protected from temperature extremes which cause condensation within the instrument.

2–12 If the instrument is to be shipped to a Hewlett-Packard Sales/Service Office, attach a tag showing owner, return address, model number and full serial number and the type of service required. The original shipping carton and packaging material may be re-usable 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. General instructions for re-packing are as follows:

1. Wrap instrument in heavy paper or plastic

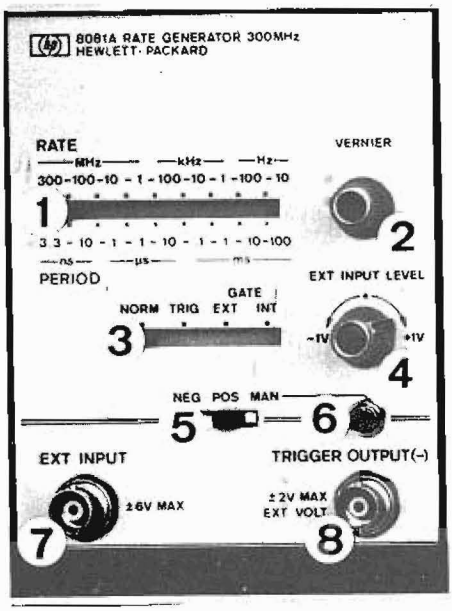
2. Use strong shipping container. A double-wall carton made of 350-pound test material is adequate.

3. Use enough shock-absorbing material (3 to 4 inch layer) around all sides of instrument to provide firm cushion and prevent movement inside container. Protect control panel with cardboard.

4. Seal shipping container securely.

5. Mark shipping container FRAGILE to encourage careful handling.

6. In any correspondence, refer to instrument by model number and full serial number.



(1) RATE switch: for selecting the range of pulse repetition rate.

(2) Rate VERNIER: for continuous adjustment of the repetition rate within the range selected on the RATE switch. Clockwise rotation increases the pulse period (reduces the rate). In TRIGGER mode, the rate controls have no effect.

(3) Mode switch: for selecting the mode of operation of the rate generator:

NORM –
rate generator free-running at selected repetition rate.

TRIG –
rate generator output is shaped version of input. Input is either via the MAN pushbutton or an external signal into the EXT INPUT connector.

EXT GATE –
gate signal turns rate generator on synchronously. Repetition rate as selected on rate controls. Gate signal either via the MAN pushbutton or the EXT INPUT connector. Max. gate frequency 150 MHz.

INT GATE –
external input is disconnected. Gate signal is provided internally by the word generator module and turns the rate generator on synchronously. Repetition rate as selected on the rate controls.

(4) EXT INPUT LEVEL control: determines the threshold voltage of the external trigger input. Adjustable from –1V to +1V.

(5) NEG-POS-MAN switch: for selecting the slope polarity and/or source of external trigger signals. In the POS and NEG positions, signals are applied via the EXT INPUT connector. In the MAN position, the MAN pushbutton is used as the trigger.

(6) MAN pushbutton: for generating external trigger signals when in TRIG and EXT GATE modes. The NEG-POS-MAN switch must be in the MAN position.

(7) EXT INPUT connector: DC coupled input to which external trigger/gate signals are applied. Input impedance is 50 ohms. Maximum input level is ± 6V.

(8) TRIGGER OUTPUT connector: provides negative output pulses in all modes of operation. In TRIG. mode the output pulses are related to the trigger input and not the repetion rate generator. Maximum external voltage is ± 2V.

Figure 3–1. 8081A Controls and Connectors

3–1 INTRODUCTION

3–2 This operating section explains the function of the controls and connectors and describes the operators checks and typical operating modes of the 8081A 300 MHz Rate Generator module.

3–3 Panel Features

3–4 Front panel controls and connectors are shown in figure 3–1. Description numbers match the numbers on the illustration.

3–5 Operator's Checks

3–6 Use the Operator's Checks (paragraph 3–9) to verify that the 8081A is functioning correctly. The 8081A must be installed in an 8080A Mainframe for these checks. Thus it is important to remember that any fault that is found may be in the 8081A Rate Generator or the 8080A Mainframe. If the mainframe is suspected, carry out the 8080A Performance Checks.

3–7 Operating Instructions

3–8 The Operating Instructions (paragraph 3–21) consist of a number of procedures that explain in detail the function of each of the 8081A controls. All operating modes are described. However, Internal Gate mode can only be used if an 8084A 300 MHz Word Generator module is available.

3–9 OPERATOR'S CHECKS

3–10 The test set for the Operator's Checks is as shown in figure 3–2. The 8081A Rate Generator module must be mounted in an 8080A Mainframe.

3–11 Set the LINE switch **9** on the 8080A Mainframe to ON.

3–12 Initial Control Settings

8081A:

1 RATE range switch . . . . . 300–100 MHz
2 Rate VERNIER . . . . . CCW
3 Mode switch . . . . . NORM
5 NEG-POS-MAN switch . . . . . MAN

Oscilloscope:

Sensitivity 100mV/div
Trigger . . . . . Channel A
Timebase . . . . . EXPANDED, 1ns/div

3–13 The repetition rate of the output should be approximately 300 MHz.

3–14 Turn the rate VERNIER **2** fully clockwise. The repetition rate should be approximately 100 MHz.

3–15 Repeat repetition rate checks for RATE ranges 100–10 MHz and 10–1 MHz at the CCW and CW positions of the rate VERNIER. The repetition rates should be approximately as shown on the RATE range switch.

3–16 Switch off the oscilloscope. Replace the oscilloscope sampling plug-in with real time dual channel vertical and timebase plug-ins. Reconnect the TRIGGER OUTPUT **8** to the channel A input and switch on the oscilloscope.

3–17 Repeat repetition rate checks for RATE ranges 1 MHz – 100 KHz, 100–10 KHz, 10–1 KHz, 1 KHz–100 Hz and 100–10 Hz at the CCW and CW positions of the rate VERNIER. The repetition rates should be approximately as shown on the RATE range switch.

3–18 Set 8081A mode switch **3** to TRIG and press the MAN pushbutton **4** several times.

3–19 Output should go high when button is pressed and low when button is released.

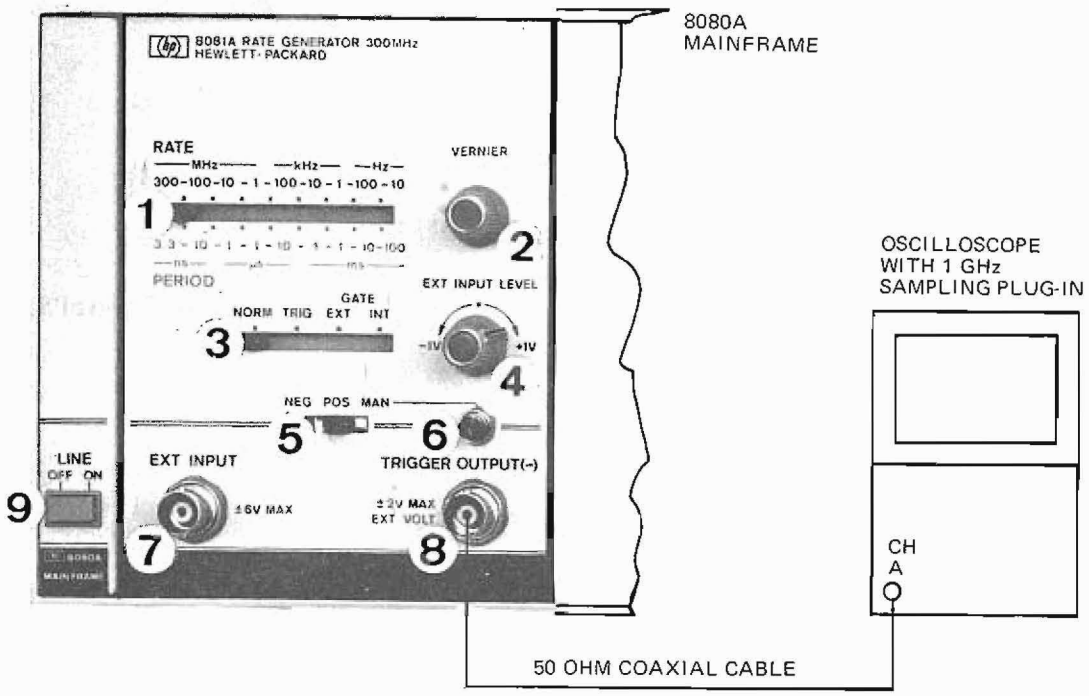


Figure 3–2. Test Set for Operator's Checks

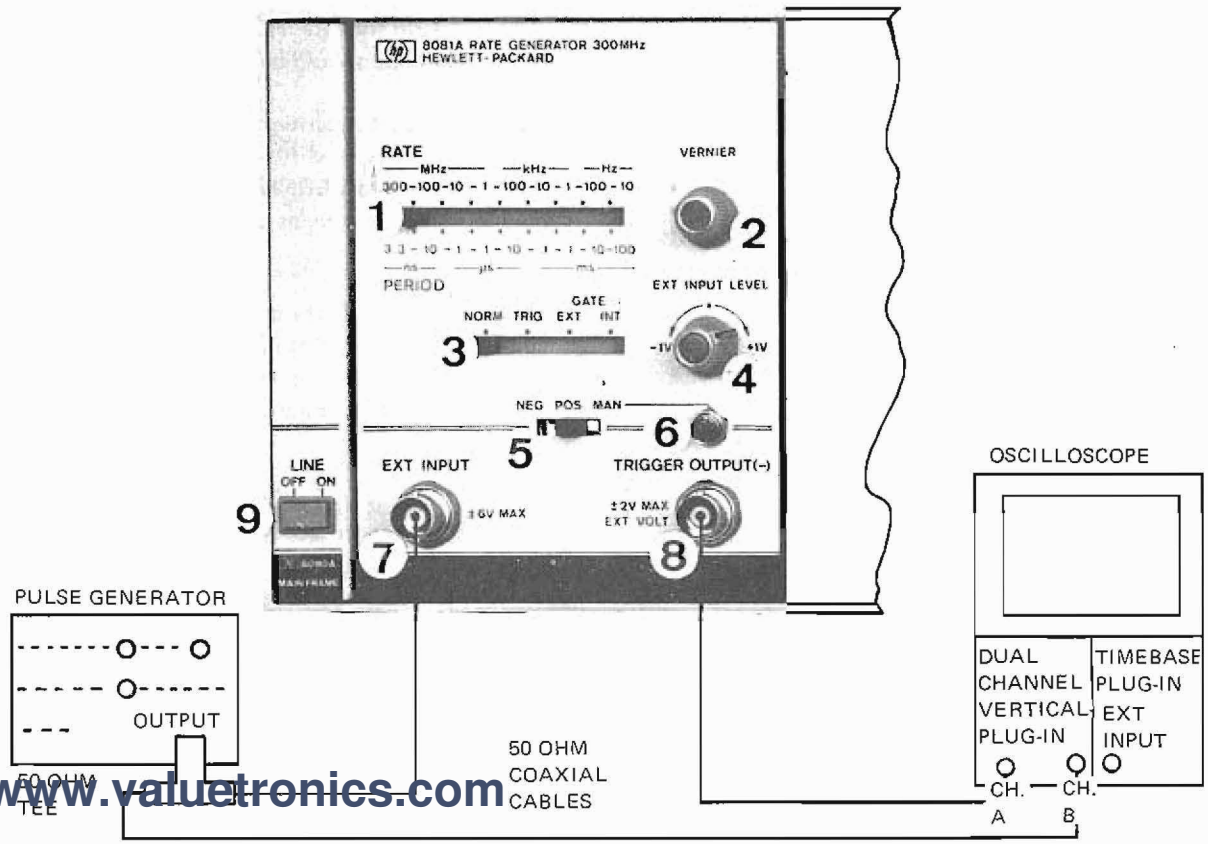


Figure 3–3. Suggested Equipment Setup for Operating Instructions

3–20 Set 8081A mode switch 3 to EXT. GATE and press the MAN pushbutton. The repetition rate should start when the button is pressed and stop when the button is released. When the button is pressed, i. e. when the gate opens, the first pulse should always start at the beginning. However, when the button is released, i. e. the gate closes, the last pulse may be cut short.

3–21 OPERATING INSTRUCTIONS

3–22 A suggested equipment setup for the Operating Instructions is shown in figure 3–3.
The 8081A Rate Generator must be mounted in an 8080A Mainframe. The following procedure is designed to give a full understanding of the function of each of the 8081A operating modes.

3–23 Set the LINE switch on the 8080A Mainframe to ON.

3–24 Initial Control Settings

8081A

① RATE range switch ..... 1 MHz–100 KHz
② Rate VERNIER ..... CCW
③ Mode switch ..... NORM
④ EXT INPUT LEVEL ..... +1V
⑤ NEG-POS-MAN switch ..... POS

Oscilloscope:

Timebase ..... 2 μsec/div
Trigger ..... Channel A internal

Pulse Generator: switched off.

3–25 The 8081A has four different operating modes:

Normal (NORM)
Trigger (TRIG)
External Gate (EXT GATE)
Internal Gate (INT GATE)

3–26 Normal Mode.

3–27 In Normal mode, the repetition rate generator is free-running at the frequency set on the rate controls. The pulse output is the same as on the oscilloscope (the trigger output is identical to the pulse output). The pulse duty cycle is 40–60%.

3–28 Trigger Mode

3–29 In TRIGGER mode, the repetition rate of the output is independent of the internal repetition rate generator. The output is, in fact, a pulse-shaped version of the input signal. The input can be either external via the EXT INPUT ⑦ or local using the MAN pushbutton ⑥ . For external triggering, an external signal source is required. The test set is as shown in figure 3–3. The changes in control settings are as follows.

8081A:

③ Mode switch ..... TRIG
⑤ NEG-POS-MAN switch ..... POS

Pulse Generator:

Switch pulse generator on.
Set pulse period to about 15 μsec.
Set pulse width to about 8 μsec.
Set pulse amplitude to 2V and polarity to POS.
Set the oscilloscope to trigger from channel B internally.

3–30 The oscilloscope display should be as shown in figure 3–4. The 8081A output should only be delayed on the external input by the internal circuitry delay of the 8081A.

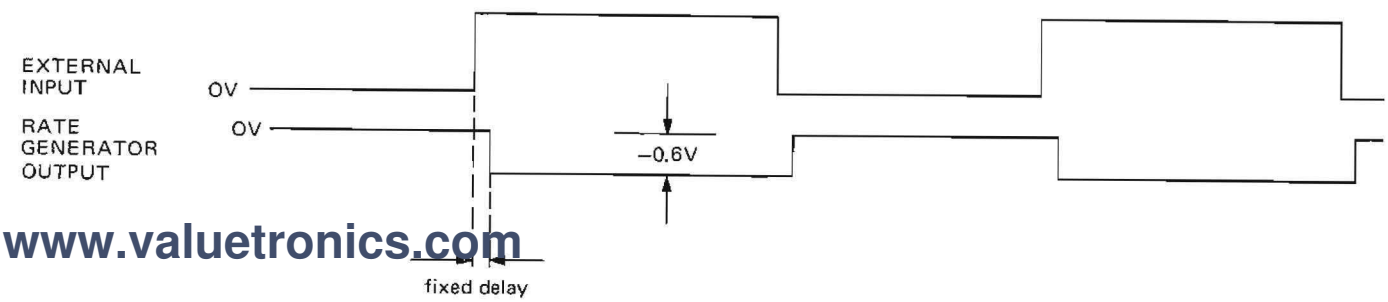


Figure 3–4. Rate Generator Output in Trigger Mode.

3–31 Vary the EXT INPUT LEVEL switch ④ and note that the trigger output disappears when the threshold level reaches approximately +0.2V. Set the external input level to –1V.

3–32 Set the NEG-POS-MAN switch ⑤ to NEG. Set the pulse generator output polarity to negative.

3–33 The oscilloscope display should be similar to that shown in figure 3–4 except that the external input is a negative-going pulse.

3–34 Vary the EXT INPUT LEVEL switch ④ and note that the trigger output disappears when the threshold level reaches approximately –0.2V.

3–35 As mentioned previously, the pulse output in trigger mode can also be produced using the MAN pushbutton ⑥. First set the NEG-POS-MAN switch ⑤ to MAN. This transfers the trigger input from the EXT INPUT connector ⑦ to the MAN pushbutton ⑥. Set the oscilloscope timebase to about 0.2 sec/cm and trigger internally. Press the MAN pushbutton ⑥ and note that the pulse output goes high when the button is pressed and low when it is released. The EXT INPUT LEVEL control ④ has no effect in this mode.

3–36 External Gate Mode.

3–37 In External Gate mode the repetition rate generator output is enabled/disabled by a gate signal. This gate signal can come from either an external source via the EXT INPUT connector ⑦ or locally using the MAN pushbutton ⑥. When the gate signal switches on, the first output pulse is always started at the beginning. When the gate signal switches off, the pulse is terminated immediately, i. e. the last pulse may be cut short.

3–38 Set the Mode switch ③ to EXT GATE. Set the oscilloscope timebase to 2 usec/cm and trigger internally. Press the MAN pushbutton and note that the rep. rate generator runs at the selected rate for as long as the button is held down.

3–39 Set the NEG-POS-MAN switch ⑤ to POS and the EXT INPUT LEVEL control ④ to –1V. Vary the rate VERNIER ②. Note that the last pulse may be cut short by the gate turning off (see figure 3–5).

3–40 Internal Gate Mode

3–41 Internal Gate mode can only be used if an 8084A 300 MHz Word Generator module is available. In this mode of operation the gate pulse for the rate generator comes from the word generator via an internal connection. This gate enables the rate generator output in the same way as an external gate. The purpose of this mode is to enable an exact number of data bits to be gated out of the word generator.

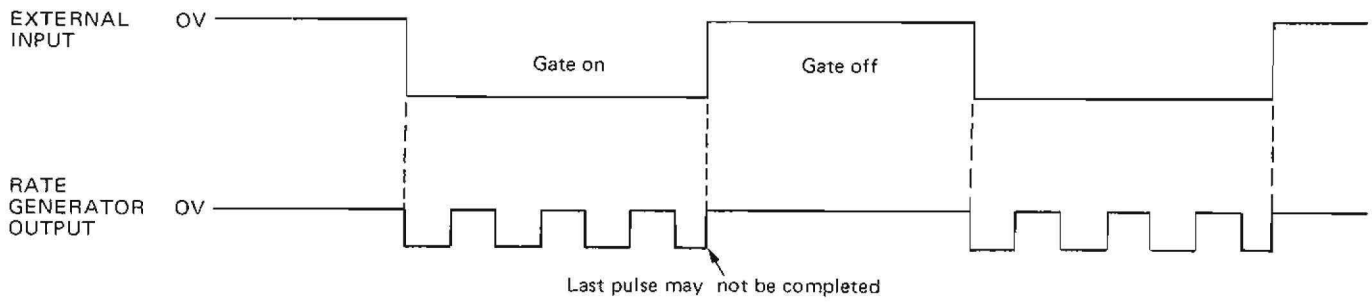


Figure 3–5. Rate Generator Output in External Gate Mode.

4–1 INTRODUCTION

4–2 The procedures in this section test the Model 8081A's electrical performance using the specifications of Table 1–2 as the performance standards. All tests can be performed without access to the interior of the instrument. A simpler operational test is included in section 3 under Operator's Checks.

4–3 EQUIPMENT REQUIRED

4–4 Equipment required for the performance tests is listed in the Recommended Test Equipment table in section 1. Any equipment that satisfies the critical specifications given in the table can be substituted for the recommended model.

4–5 TEST RECORD

4–6 The results of the performance tests can be tabulated on the Test Record at the end of the procedures. The Test Record lists all of the tested specifications and their acceptable limits. Test results recorded at incoming inspection can be used for comparison in troubleshooting and after repairs or adjustments.

4–7 REPETITION RATE TEST

SPECIFICATION

Repetition Rate ..... 10Hz to 300MHz

DESCRIPTION

The output frequency of the Model 8081A is checked over the full repetition rate range.

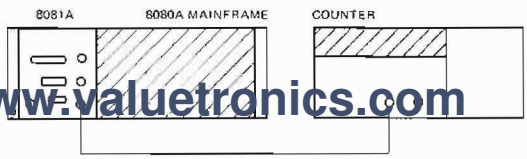


Figure 4–1. Repetition Rate Test Setup

EQUIPMENT

Counter ..... HP 5345A

PROCEDURE

1. Set up the equipment as shown in figure 4–1 and set the controls as follows:

   8081A:

   RATE range 300MHz–100MHz
   Rate VERNIER ..... CCW
   Operating Mode switch ..... NORM
   NEG-POS-MAN switch ..... POS

2. Using the counter, measure the Model 8081A output frequency at the following repetition rate settings.

   8081A

RATE	VERNIER	RESULT
300MHz-100MHz	CCW	>300MHz
300MHz–100MHz	CW	<100MHz
100MHz– 10MHz	CCW	>100MHz
100MHz– 10MHz	CW	< 10MHz
10MHz– 1MHz	CCW	> 10MHz
10MHz– 1MHz	CW	< 1MHz
1MHz–100KHz	CCW	> 1MHz
1MHz–100KHz	CW	<100KHz
100KHz– 10KHz	CCW	>100KHz
100KHz– 10KHz	CW	< 10KHz
10KHz– 1KHz	CCW	> 10KHz
10KHz– 1KHz	CW	< 1KHz
1KHz–100Hz	CCW	> 1KHz
1KHz–100Hz	CW	<100Hz
100Hz– 10Hz	CCW	>100Hz
100Hz– 10Hz	CW	< 10Hz

4–8 TRIGGER OUTPUT TEST

SPECIFICATION

Trigger Output Pulse . . . . . .–.6V ± 50mV to 0V ± 50mV
Duty Cycle . . . . . 50 % ± 10 %

DESCRIPTION

The trigger output pulse parameters are tested.

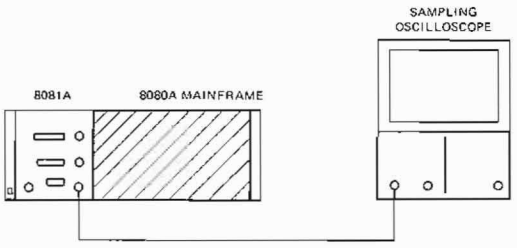


Figure 4–2. Trigger Output Test Setup

EQUIPMENT

Sampling oscilloscope . . . . . HP 182C Mainframe with 1810A plug-in

PROCEDURE

1. Set up the equipment as shown in figure 4–2 and set the controls as follows:

   8081A:

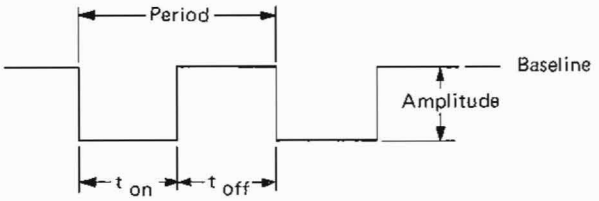
   RATE range 300MHz–100MHz
   Rate VERNIER . . . . . CW
   Operating Mode switch . . . . . NORM
   NEG-POS-MAN switch . . . . . POS

   Oscilloscope

   Sensitivity 200mV/div
   Trigger . . . . . internal
   Timebase mode . . . . . expanded
   Timebase – direct 20ns/div
   Timebase – expanded 2ns/div

2. Set Frequency to 100MHz on screen using Rate VERNIER.

3. Measure Amplitude, Baseline and Duty Cycle.



Amplitude should be . . . . . 6V ± 50mV
Baseline should be . . . . . 0V ± 50mV
Duty Cycle should be . . . . . 50 % ± 10 %

$$\text{Duty cycle} = \frac{t\,on}{period} \times 100\%$$

4–9 EXTERNAL TRIGGER MODE (SLOW) TEST

SPECIFICATION

The repetition rate output is controlled externally. The trigger and internal outputs are pulse-shaped versions of the trigger input.

DESCRIPTION

The function of the Model 8081A is tested in external trigger mode using an external sinewave generator to apply a trigger signal of 10KHz.

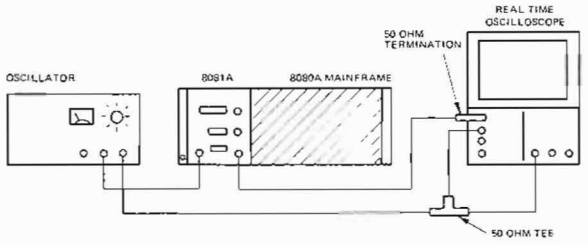


Figure 4–3. External Trigger Mode (Slow) Test Setup

EQUIPMENT

Oscillator . . . . . HP 651B
Real Time Oscilloscope . . . . . HP 182C Mainframe with 1804A and 1821A plug-ins
50 Ohm Feedthru Termination . . . . . HP 10100C

PROCEDURE

1. Set up the equipment as shown in figure 4–3 and set the controls as follows:

   8081A:

   RATE range 100KHz–10KHz
   Rate VERNIER . . . . . CCW
   Operating Mode switch . . . . . TRIG
   EXT INPUT LEVEL . . . . . center
   NEG-POS-MAN switch . . . . . POS

   Oscilloscope:

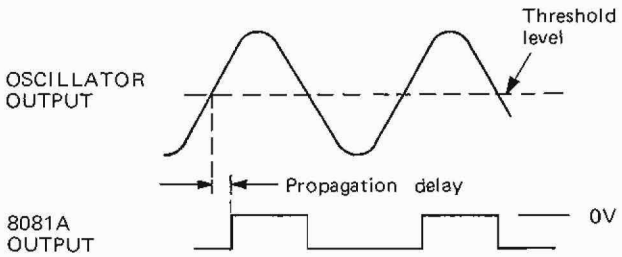
   Sensitivity (both channels) 1V/div
   Trigger . . . . . external
   Timebase main 20μs/div

   Oscillator:

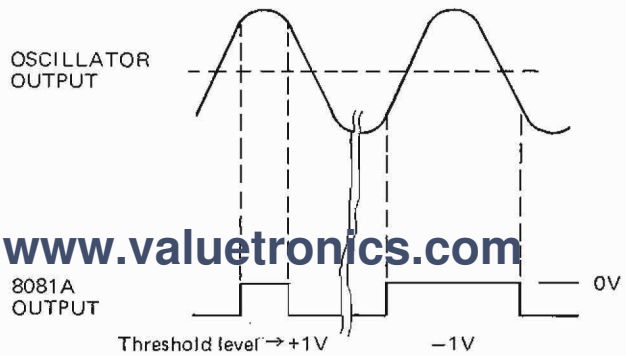
   Frequency 10KHz
   Amplitude 1VRMs

2. Display oscillator output and Model 8081A output on screen

3. Check that during the positive slope of the oscillator output a positive pulse output occurs.



4. Turn EXT INPUT LEVEL control from positive to negative and observe waveforms.



5. Set NEG-POS-MAN switch to NEG and repeat steps 3 and 4 observing the pulses. The Model 8081A output should trigger on the negative half-cycles of the oscillator output.

4–10 EXTERNAL GATE MODE (SLOW) TEST

SPECIFICATION

Gate signal turns rep. rate generator on synchronously.

DESCRIPTION

The function of the Model 8081A is tested in external gate mode using an external sinewave generator to apply a gate signal of 10KHz.

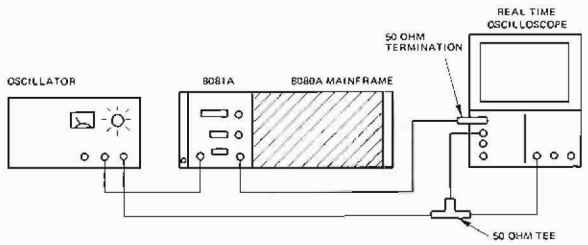


Figure 4–4. External Gate Mode (Slow) Test Setup

EQUIPMENT

Oscillator . . . . . HP 651B
Real Time Oscilloscope . . . . . HP 182C Mainframe with 1804A and 1821A plug-ins.
50 Ohm Feedthru Termination . . . . . HP 10100C

PROCEDURE

1. Set up the equipment as shown in figure 4–4 and set the controls as follows:

   8081A:

   RATE range 100KHz–10KHz
   Rate VERNIER . . . . . CCW
   Operating Mode switch . . . . . GATE EXT
   EXT INPUT LEVEL . . . . . center
   NEG-POS-MAN switch . . . . . POS

Oscilloscope:

Sensitivity (both channels) 1V/div
Trigger ..... external

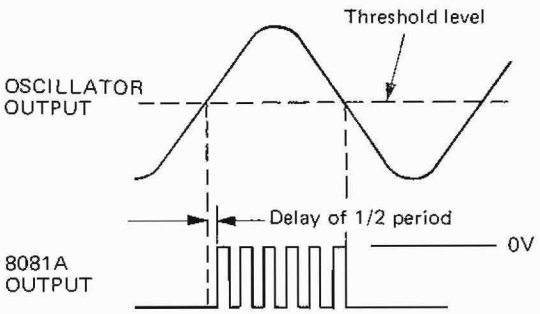
Timebase, main 20μs/div

Oscillator:

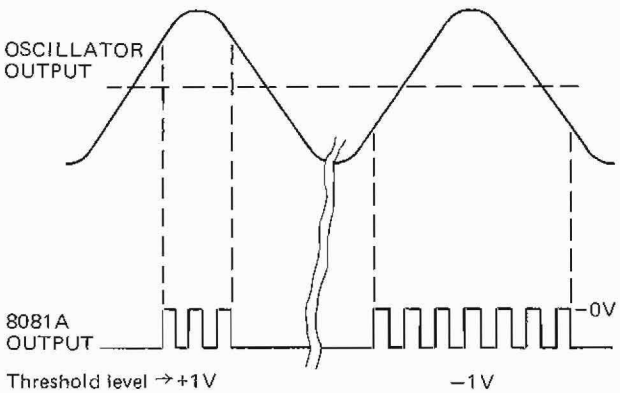
Frequency 10KHz
Amplitude 1VRMs

2. Display oscillator output and 8081A output on screen.

3. Check that during the positive slope of the oscillator output a pulse burst appears.



4. Turn EXT INPUT LEVEL control from positive to negative and observe the waveforms.



Note that the last pulse will be cut off as soon as the gate closes.

5. Set the NEG-POS-MAN switch to NEG and repeat steps 3 and 4 observing the pulses. The 8081A output should be gated on the negative half-cycles of the oscillator output.

4–11 MANUAL FUNCTION TEST

SPECIFICATION

All external functions can be triggered manually by pressing a pushbutton.

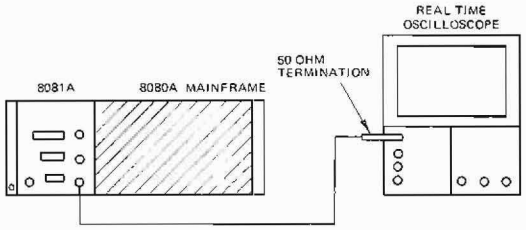


Figure 4–5. Manual Function Test Setup

EQUIPMENT

Real Time Oscilloscope ..... HP 182C Mainframe with 1804A and 1821A plug-ins

PROCEDURE

1. Set up the equipment as shown in figure 4–5 and set the controls as follows:

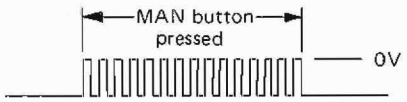
   8081A:

   RATE range 100KHz–10KHz
   Rate VERNIER ..... CCW
   Operating Mode switch ..... GATE EXT
   EXT INPUT LEVEL ..... –
   NEG-POS-MAN switch ..... MAN

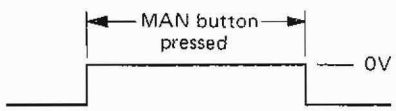
   Oscilloscope:

   Sensitivity 1V/div
   Trigger ..... internal
   Timebase, main 10μs/div

2. Press MAN pushbutton. As long as the Man button is pressed a pulse train should be visible



3. Set the Operating Mode switch to TRIG. Press the MAN pushbutton. As long as the MAN button is pressed the output should be 0V.



4–12 EXTERNAL TRIGGER MODE (FAST) TEST

SPECIFICATION

Same as EXTERNAL TRIGGER MODE (SLOW), paragraph 4–9.

DESCRIPTION

A high frequency test of the Model 8081A external trigger mode using an external pulse generator to apply a trigger signal of 250MHz.

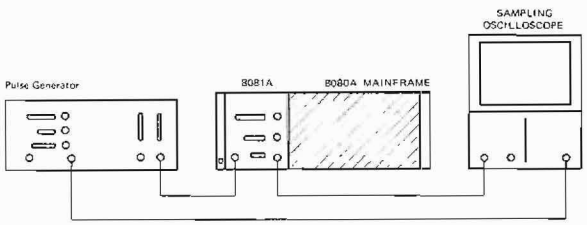


Figure 4–6. External Trigger Mode (Fast) Test Setup

EQUIPMENT

Pulse Generator . . . . . HP 8082A
Sampling Oscilloscope . . . . . HP 182C with 1810A plug-in

PROCEDURE

1. Set up the equipment as shown in figure 4–6 and set the controls as follows:

   Pulse Generator:

   Repetition rate 250MHz
   Pulse width 2ns
   Amplitude . . . . . 0.2 V
   Polarity . . . . . positive

   8081A:

   RATE range . . . . . –
   Rate Knob . . . . . –
   Operating Mode switch . . . . . TRIG
   EXT INPUT LEVEL . . . . . center
   NEG-POS-MAN switch . . . . . POS

   Oscilloscope:

   Sensitivity 200mV/div
   Trigger . . . . . external
   Timebase mode . . . . . expanded
   Timebase – direct 20ns/div
   Timebase – expanded 0.5ns/div

2. Adjust the Model 8081A EXT INPUT LEVEL control to obtain a stable 50% duty cycle display.

3. Each trigger pulse from the pulse generator should release one output pulse from the Model 8081A. Check that the display has a frequency of 250MHz.

4–13 EXTERNAL GATE MODE (FAST) TEST

SPECIFICATION

Same as EXTERNAL GATE MODE (SLOW), paragraph 4–10.

DESCRIPTION

The maximum external gate frequency of the Model 8081A is tested in external gate mode using an external pulse generator to apply a gate signal of 150MHz.

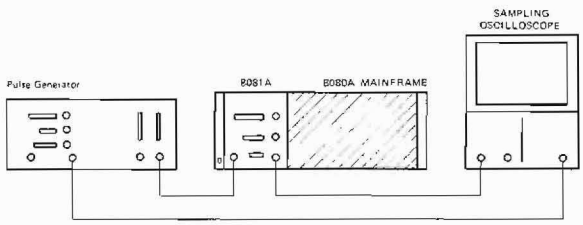


Figure 4–7. External Gate Mode (Fast) Test Setup

EQUIPMENT

Pulse Generator . . . . . HP 8082A
Sampling Oscilloscope . . . . . HP 182C with 1810A plug-in

PROCEDURE

1. Set up the equipment as shown in figure 4–7 and set up the controls as follows:

Pulse Generator:

Repetition rate 150MHz
Pulse width ..... square wave
Amplitude ..... 0.2 V
Polarity ..... positive

8081A:

RATE range 300MHz–100MHz
Rate VERNIER ..... CCW
Operating Mode switch ..... GATE EXT
EXT INPUT LEVEL ..... center
NEG-POS-MAN switch ..... POS

Oscilloscope:

Sensitivity 200mV/div
Trigger ..... external
Timebase mode ..... expanded
Timebase – direct 20ns/div
Timebase – expanded 5ns/div

2. Adjust the EXT INPUT LEVEL control for a stable 150 MHz pulse presentation on the display.

3. Observe that each external gate pulse releases two 8081A pulses.

Table 4–1 Performance Test Record

Hewlett-Packard Model 8081A 300MHz Repetition Rate Generator Serial No.	Tested by Date

Paragraph Number	Test		Results		
			Min	Actual	Max
4–7	Repetition Rate				
	10Hz to 300MHz		< 10HZ		– > 300MHz
4–8	Trigger Output				
	Trigger Output Pulse:	–.6V ± 50mV to 0V ± 50mV	–0.55V –0.05V		–0.65V +0.05V
	Duty Cycle:	50 % ± 10 %	40 %		60 %

5–1 INTRODUCTION

5–2 This section describes adjustments required to return the Model 8081A Repetition Rate Generator to peak operating condition. Included in this section are test setups, and checks and adjustments. Removal and replacement procedures are given in the Disassembly/Assembly procedure in section 7. An adjustment locator diagram is included in this section.

5–3 SAFETY CONSIDERATIONS

5–4 Although this instrument has been designed in accordance with international safety standards, this manual contains information and warnings which must be followed to ensure safe operation and to retain the instrument in a safe condition (see Sections II and III). Service and adjustments should be performed only by qualified service personnel.

WARNING

Any interruption of the protective (grounding) conductor inside or outside the instrument or disconnection of the protective earth terminal is likely to make the apparatus dangerous. Intentional interruption is prohibited.

5–5 Any adjustment, maintenance, and repair of the opened instrument under voltage should be avoided as much as possible and, when inevitable, should be carried out only by a skilled person who is aware of the hazard involved. The opening of covers or removal of parts, except those to which access can be gained by hand, may expose live parts, and also accessible terminals may be live.

5–6 Capacitors inside the instrument may still be charged even if the instrument has been disconnected from its source of supply.

5–7 Make sure that only fuses with the required rated current and of the specified type (normal blow, time delay, etc.) are used for replacement. The use of repaired fuses and the short-circuiting of fuseholders must be avoided.

5–8 Whenever it is likely that the protection has been impaired, the instrument must be made inoperative and be secured against any unintended operation.

5–9 TEST EQUIPMENT REQUIRED

5–10 Table 1–1 contains a list of test equipment and test accessories required in the adjustment procedures. In addition, the tables contain the required minimum specifications and a suggested manufacturer's model number.

5–11 ALIGNMENT TOOL

5–12 A non-metallic alignment tool must be used when making any adjustments to the Model 8081A.

5–13 PERFORMANCE CHECKS

5–14 After making the adjustments, carry out the Performance Checks in Section 4.

5–15 RELATED ADJUSTMENTS

5–16 The following adjustments must be performed in the order indicated in the procedures. The adjustments can not be performed individually because of interaction.

5–17 After making the adjustments the following related adjustments should be checked. If the Model 8081A output is connected to a word generator, the word generator trigger level must be checked and, if necessary, adjusted. If the Model 8081A output is connected to an output amplifier, the output amplifier duty cycle must be checked and, if necessary, adjusted.

5–18 DUTY CYCLE AND FREQUENCY ADJUSTMENTS

DESCRIPTION

These adjustments set up the correct duty cycle at high and low frequencies and calibrate the frequency output. An oscilloscope is used to check the duty cycle and a counter to check the frequency.

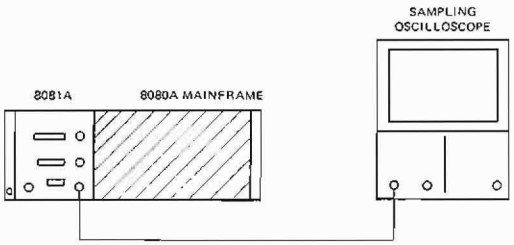


Figure 5–1. Duty Cycle Adjustment Test Setup

EQUIPMENT

Sampling Oscilloscope . . . . . HP 182C Mainframe with 1810A Sampling plug-in
Counter . . . . . HP 5345A

PROCEDURE

1. Set up the equipment as shown in figure 5–1 and set the controls as follows:

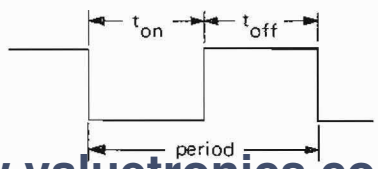
   8081A:

   RATE range 300–100MHz
   Rate VERNIER . . . . . .Clockwise
   Operating Mode . . . . . NORM

   Oscilloscope:

   Sensitivity 200mV/div
   Trigger . . . . . .internal
   Timebase mode . . . . . .expanded
   Timebase – direct 20ns/div
   Timebase – expanded 1ns/div

2. Adjust A2R16 for a duty cycle of . . . .50 % ± 10 %



$$\text{Duty Cycle} = \frac{t_{on}}{\text{period}} \times 100\%$$

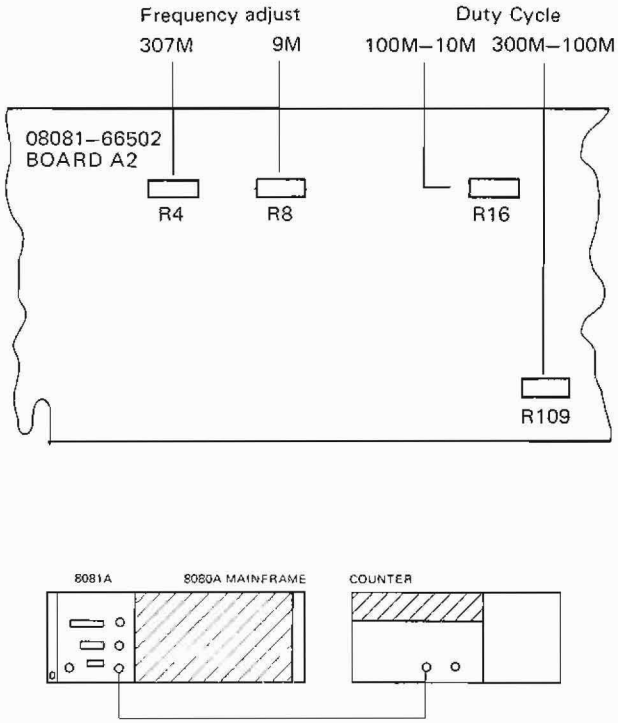


Figure 5–2. Frequency Adjustment Test Setup

3. Set up the equipment as shown in figure 5–2 and set the controls as follows:

   8081A:

   RATE RANGE 300–100MHz
   Rate VERNIER . . . . . .CCW
   Operating Mode . . . . . NORM

   Counter:

   Frequency 350MHz

4. Adjust A2R4 to a frequency of 307MHz ± .5MHz

5. Set the Model 8081A RATE to 100–10MHz. and rate VERNIER to CW.

6. Adjust A2R8 to a frequency of . . .9MHz ± .1MHz

7. Reconnect the equipment as in figure 5–1 and set the controls as follows:

   8081A:

   RATE range 300–100MHz
   Rate VERNIER . . . . . .CCW
   Operating Mode . . . . . NORM

Oscilloscope:

Sensitivity 200mV/div
Trigger ..... internal
Sweep Mode ..... expanded
Timebase – main 20ns/div
Timebase – expanded 0.5ns/div

8. Adjust A2R109 for a duty cycle of .. 50 % ± 10 %

9. Connect an external pulse generator to the Model 8081A EXT INPUT connector and set the controls as follows:

External Pulse Generator:

Repetition Rate 50MHz
Operating Mode ..... square wave
Amplitude 1V
Polarity ..... positive

8081A:

RATE range 300–100MHz
Rate VERNIER ..... CCW
Operating Mode ..... GATE EXT
Input Polarity ..... POS
EXT INPUT LEVEL ..... approx +0.5V

Oscilloscope: same settings as for previous adjustment (step 7).

10. Check the duty cycle of the first pulse on the display. If necessary, readjust R109 slightly to set the duty cycle to
..... 50% ± 10%

6–1 INTRODUCTION

6–2 This section contains information for ordering parts. Table 6–1 lists abbreviations used in the parts lists and elsewhere in the manual. Table 6–2 lists all replaceable parts in reference designator order. Table 6–3 contains the names and addresses that correspond to the manufacturer code numbers.

6–3 ABBREVIATIONS

6–4 Table 6–1 lists abbreviations used in the parts lists, schematics and elsewhere in the manual. In some cases two forms of the abbreviation are used, one all in capital letters, and one partial or no capitals. This occurs because the abbreviations in the parts lists are always all capitals. However, in the schematics and other parts of the manual, the same abbreviations may have upper and lower case letters.

6–5 REPLACEABLE PARTS

6–6 Table 6–2 is the list of replaceable parts and is organised as follows:

a. Illustrated parts breakdowns for chassis mounted parts.
b. Chassis mounted parts in alphanumerical order by reference designator.
c. Electrical assemblies and their components in alphanumerical order by reference designator.

6–7 The information given for each part consists of the following:

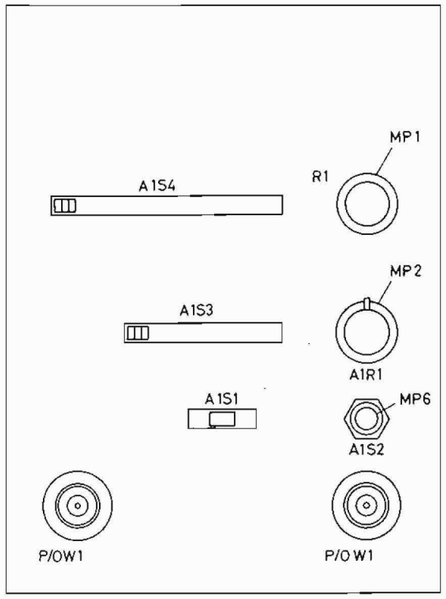
a. The Hewlett-Packard part number.
b. The total quantity (Qty) in the instrument. This is given only once for each part – at the first appearance of the part in the list.
c. The description of the part.
d. A typical manufacturer of the part in a five-digit code.
e. The manufacturers' code number for the part.

6–8 ORDERING INFORMATION

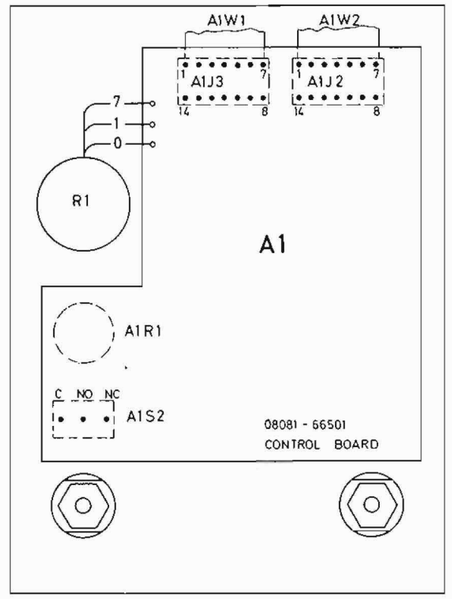
6–9 To order a part listed in the replaceable parts table, quote the Hewlett-Packard part number, indicate the quantity required, and address the order to the nearest Hewlett-Packard office (list of Sales/Service offices at the rear of the 8080A Mainframe manual).

6–10 To order a part that is not listed in the replaceable parts table, include the instrument model number, instrument serial number, the description and function of the part, and the number of parts required. Address the order to the nearest Hewlett-Packard office.

FRONT PANEL (MP5)



FRONT PANEL (INSIDE)



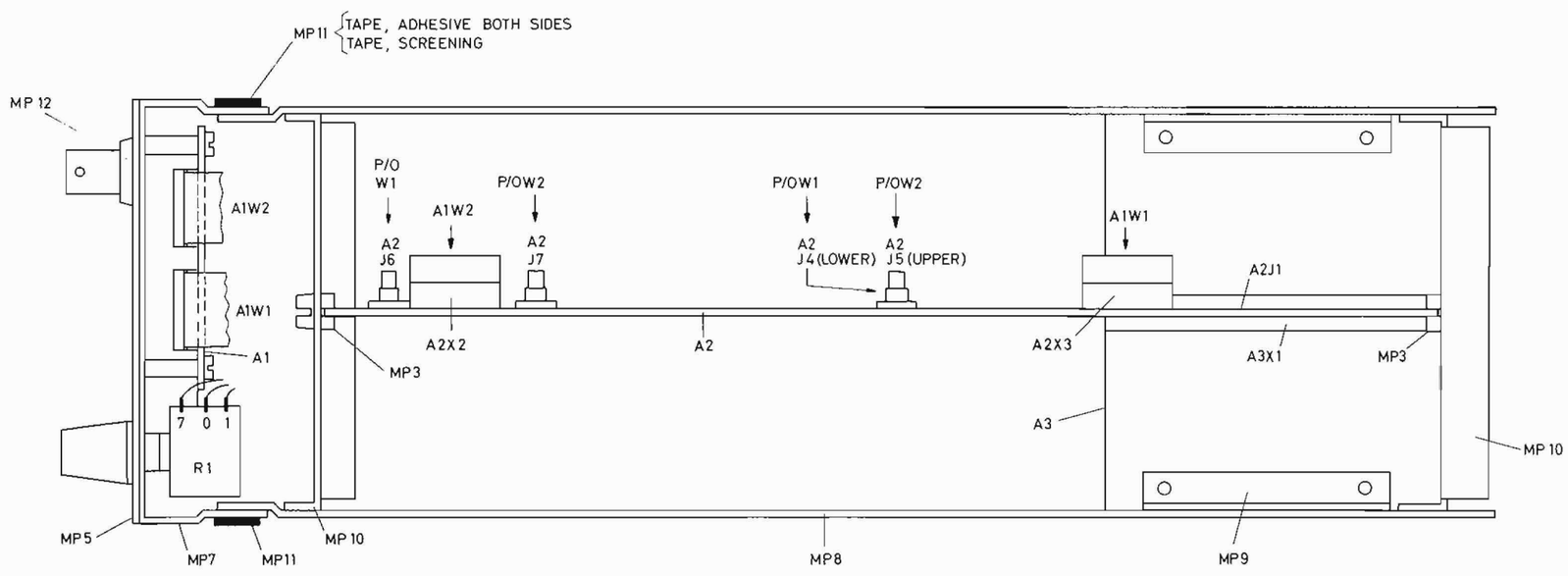


Figure 6–1. 8081A Replaceable Parts

Table 6–2. Replaceable Parts

MODEL 8031A

INSTRUMENT SERIAL PREFIX

FRAME

REFERENCE DESIGNATOR	H-P PART NUMBER	DESCRIPTION
A1	08031-66501	BD AY-CONTROL
A2	08031-66502	BD AY-RATE
A3	08031-66503	BD AY-MOTHER
MP1	0370-1001	KNOB
MP2	0370-1005	KNOB
MP3	0403-0104	GLIDE PC
MP5	08031-00201	PANEL FRONT
MP6	3101-0851	CAP PUSH BUTTON
MP7	5020-8922	PANEL-SUB
MP11	0460-1076	TAPE-INDL .75W
R1	2100-2944	R-VAR 10K 5% 1W
A2	08031-61601	CBL AY-INTL CUT

R1 2100-3652 RATE VERNIER

Table 6–2. Replaceable Parts (cont'd)

MODEL 8C81A

INSTRUMENT SERIAL PREFIX

A 1 08081-66501 BD AY-CONTROL

REFERENCE DESIGNATOR	H-P PART NUMBER	DESCRIPTION
A1 R1	2100-2492	R-VAR 5K 20% .5W
A1 S1	3101-1558	SW SLIDE DPDT
A1 S2	3101-1221	SW PBTN SPDT
A1 S3	C8C15-61502	SLIDE AY
A1 S3	5020-3440	SPRING DETENT
A1 S4	08015-61903	SLIDE AY
A1 S4	5020-3440	SPRING DETENT

MODEL 8C81A

INSTRUMENT SERIAL PREFIX

A 2 C8C81-66502 BD AY-RATE

REFERENCE DESIGNATOR	H-P PART NUMBER	DESCRIPTION
A2 C1	0160-2055	C-F .01UF 100V
A2 C2	0180-0251	C-F 1UF 35V
A2 C3	0180-0251	C-F 1UF 35V
A2 C4	0180-0229	C-F 33UF 10V
A2 C5	0180-0229	C-F 33UF 10V
A2 C6	0180-0229	C-F 33UF 10V
A2 C7	0180-0229	C-F 33UF 10V
A2 C8	0160-3470	C-F .01UF 50KV
A2 C9	0160-3816	C-F 47 PF 200VDC
A2 C10	0160-3174	C-F .47UF 25V
A2 C11	0160-3470	C-F .01UF 50KV
A2 C12	0160-3470	C-F .01UF 50KV
A2 C13	0160-3470	C-F .01UF 50KV
A2 C14	0160-3470	C-F .01UF 50KV
A2 C15	0160-3470	C-F .01UF 50KV
A2 C16	0160-3470	C-F .01UF 50KV
A2 C17	0160-3470	C-F .01UF 50KV
A2 C18	0160-0557	C-F 1500PF 400V
A2 C19	0160-3716	C-F .022UF10%250
A2 C20	0180-1735	C-F .22UF 35V
A2 C21	0180-0197	C-F 2.2UF 20V
A2 C22	0180-0228	C-F 22UF 15V
A2 C23	0180-0208	C-F 2200UF10% 10V
A2 C24	0160-2055	C-F .01UF 100V
A2 C25	0160-3470	C-F .01UF 50KV
A2 C26	0160-2055	C-F .01UF 100V
A2 C27	0160-3470	C-F .01UF 50KV
A2 C28	0180-1704	C-F 47UF 6V
A2 C29	0160-3470	C-F .01UF 50KV
A2 C31	0160-3470	C-F .01UF 50KV
A2 C31	0160-2055	C-F .01UF 100V
A2 C32	0160-2055	C-F .01UF 100V
A2 C33	0160-2261	C-F 150PF 500V
A2 C34	0160-3470	C-F .01UF 50KV
A2 C35	0180-0045	C-F 20UF 25V
A2 C36	0180-0045	C-F 20UF 25V
A2 C37	0180-0045	C-F 20UF 25V
A2 C38	0180-0045	C-F 20UF 25V
A2 C40	0180-1704	C-F 47UF 6V
A2 CR1	1901-0050	DIO SI 80V .2A
A2 CR2	1901-0050	DIO SI 80V .2A
A2 CR3	1901-0040	DIO SI .05A 30V
A2 CR4	1901-0040	DIO SI .05A 30V
A2 CR5	1901-0040	DIO SI .05A 30V
A2 CR6	1901-0040	DIO SI .05A 30V
A2 CR7	1901-0040	DIO SI .05A 30V
A2 J4	1200-0835	JACK RECEP STRAI
A2 J5	1200-0835	JACK RECEP STRAI
A2 J5	1820-1982	IC AMPL LIMITER
A2 J6	1200-0835	JACK RECEP STRAI
A2 J7	1200-0835	JACK RECEP STRAI
A2 L1	9100-1614	COIL CORE .82 UH
A2 L2	9100-1614	COIL CORE .82 UH
A2 L3	9100-1616	COIL CORE 1.5 UH
A2 L4	9100-0346	COIL FXD
A2 L5	9100-0346	COIL FXD
A2 L6	9170-0029	FERRITE BEAD
A2 L7	9170-0029	FERRITE BEAD
A2 L8	9170-0029	FERRITE BEAD
A2 L9	9170-0029	FERRITE BEAD
A2 L10	9100-3147	COIL-F MF 10UF
A2 L14	9100-3147	COIL-F MF 10UF
A2 L15	9100-3147	COIL-F MF 10UF
A2 L16	9100-3139	COIL INDUC 75UH
A2 L17	9100-3147	COIL-F MF 10UF
A2 Q1	1855-0284	TRANSISTOR
A2 Q2	1853-0284	TRANSISTOR
A2 Q3	1854-0215	XSTR SI NPN
A2 Q4	1854-0392	XSTR SI NPN
A2 Q5	1853-0086	XSTR SI PNP
A2 Q6	1854-0392	XSTR SI NPN
A2 Q7	1853-0066	XSTR SI PNP
A2 Q8	1854-0392	XSTR SI NPN
A2 Q9	1854-0215	XSTR SI NPN
A2 Q10	1853-0036	XSTR-PNP SI CHIP
A2 Q11	1853-0036	XSTR-PNP SI CHIP
A2 Q12	1853-0036	XSTR-PNP SI CHIP
A2 Q13	1853-0036	XSTR-PNP SI CHIP
A2 Q14	1853-0036	XSTR-PNP SI CHIP
A2 Q15	1853-0036	XSTR-PNP SI CHIP
A2 Q16	1853-0036	XSTR-PNP SI CHIP
A2 Q17	1853-0036	XSTR-PNP SI CHIP
A2 Q20	1853-0036	XSTR-PNP SI CHIP
A2 Q21	1853-0036	XSTR-PNP SI CHIP
A2 Q22	1853-0036	XSTR-PNP SI CHIP
A2 Q23	1853-0015	XSTR SI PNP
A2 Q24	1853-0015	XSTR SI PNP
A2 Q25	1854-0215	XSTR SI NPN
A2 Q26	1854-0215	XSTR SI NPN
A2 Q27	1854-0215	XSTR SI NPN
A2 Q28	1854-0215	XSTR SI NPN
A2 Q29	1854-0215	XSTR SI NPN
A2 Q30	1854-0215	XSTR SI NPN
A2 Q31	1853-0036	XSTR-PNP SI CHIP
A2 Q32	1854-0215	XSTR SI NPN
A2 Q35	1854-0345	XSTR 2N5179 SI
A2 R1	0698-4501	R-F 59K1% .125W
A2 R2	0757-0443	R-F 11K1% .125W
A2 R3	0698-4483	R-F 18.7K1%
A2 R4	2100-3353	R-VAR 20K .5W
A2 R5	0698-4424	R-F 1.4K1% .125W
A2 R6	0757-0280	R-F 1K1% .125W F
A2 R7	0698-3156	R-F 14.7K1%
A2 R8	2100-3274	R-VAR 10K 10%
A2 R9	0698-4424	R-F 1.4K1% .125W
A2 R10	0757-0443	R-F 11K1% .125W
A2 R11	0757-0438	R-F 5.11K1%

MODEL 8C81A

INSTRUMENT SERIAL PREFIX

A 2 08081-66502 BD AY-RATE

REFERENCE DESIGNATOR	H-P PART NUMBER	DESCRIPTION
A2 R12	0757-0279	R-F 3.16K1%
A2 R13	0757-0438	R-F 5.11K1%
A2 R14	0757-0421	R-F 825 1% .125W
A2 R15	0757-0421	R-F 825 1% .125W
A2 R16	2100-3349	R-VAR 100 +10%
A2 R17	0698-3446	R-F 383 1% .125W
A2 R18	0757-0412	R-F 365 1% .125W
A2 R19	0698-4455	R-F 536 1% .125W
A2 R20	0698-4455	R-F 536 1% .125W
A2 R21	0757-0421	R-F 825 1% .125W
A2 R22	0757-0421	R-F 825 1% .125W
A2 R23	0698-3444	R-F 316 1% .125W
A2 R24	0698-3444	R-F 316 1% .125W
A2 R25	0757-0465	R-F 100K1% .125W
A2 R26	0757-0443	R-F 11K1% .125W
A2 R27	0757-0283	R-F 2K1% .125W F
A2 R28	0757-0438	R-F 5.11K1%
A2 R29	0698-4479	R-F 14K1% .125W
A2 R30	0757-0424	R-F 3.09K1%
A2 R31	0698-3378	R-F 51 5% .125W
A2 R32	0757-0225	R-F 160 5% .25W
A2 R33	0698-3378	R-F 51 5% .125W
A2 R34	0698-3378	R-F 51 5% .125W
A2 R35	0698-3378	R-F 51 5% .125W
A2 R36	0698-4479	R-F 14K1% .125W
A2 R37	0698-4479	R-F 14K1% .125W
A2 R38	0698-4479	R-F 14K1% .125W
A2 R39	0698-4479	R-F 14K1% .125W
A2 R41	0698-4479	R-F 14K1% .125W
A2 R42	0757-0424	R-F 1.1K1% .125W
A2 R43	0757-0424	R-F 1.1K1% .125W
A2 R44	0757-0424	R-F 1.1K1% .125W
A2 R45	0757-0424	R-F 1.1K1% .125W
A2 R46	0757-0424	R-F 1.1K1% .125W
A2 R47	0757-0424	R-F 1.1K1% .125W
A2 R48	0698-4426	R-F 1.69K1%
A2 R49	0698-3251	R-F 150 5% .125W
A2 R50	0683-8245	R-F 820K5% .25W
A2 R51	0683-8245	R-F 820K5% .25W
A2 R52	0683-8245	R-F 820K5% .25W
A2 R53	0683-8245	R-F 820K5% .25W
A2 R54	0683-8245	R-F 820K5% .25W
A2 R55	0683-8245	R-F 820K5% .25W
A2 R56	0757-0396	R-F 75 1% .125W
A2 R57	0757-0422	R-F 909 1% .125W
A2 R58	0757-0422	R-F 909 1% .125W
A2 R59	0698-4418	R-F 205 1% .125W
A2 R60	0757-0273	R-F 3.01K1%
A2 R61	0698-4479	R-F 14K1% .125W
A2 R62	0698-4479	R-F 14K1% .125W
A2 R63	0757-0420	R-F 750 1% .125W
A2 R64	0698-3378	R-F 51 5% .125W
A2 R65	0757-0279	R-F 3.16K1%
A2 R66	0757-0417	R-F 562 1% .125W
A2 R67	0698-4425	R-F 1.54K1%
A2 R68	0757-0453	R-F 30.1K1%
A2 R69	0757-0420	R-F 750 1% .125W
A2 R70	0757-0394	R-F 51.1 1%
A2 R71	0698-6324	R-F 187 1%
A2 R72	0698-3381	R-F 150 5% .125W
A2 R73	0698-3381	R-F 150 5% .125W
A2 R74	0698-4130	R-F 39 5% .125W
A2 R75	0698-4130	R-F 39.5% .125W
A2 R76	0698-3258	R-F 5.36K1%
A2 R77	0698-3258	R-F 5.36K1%
A2 R78	0757-0283	R-F 2K1% .125W F
A2 R79	0757-0419	R-F 681 1% .125W
A2 R80	0757-0419	R-F 681 1% .125W
A2 R81	0757-0412	R-F 365 1% .125W
A2 R82	0757-0412	R-F 365 1% .125W
A2 R83	0698-3446	R-F 383 1% .125W
A2 R84	0698-4479	R-F 14K1% .125W
A2 R85	0698-4479	R-F 14K1% .125W
A2 R86	0698-3378	R-F 51 5% .125W
A2 R87	0698-3378	R-F 51 5% .125W
A2 R88	0698-3378	R-F 51 5% .125W
A2 R89	0698-3378	R-F 51 5% .125W
A2 R90	0698-4428	R-F 1.69K1%
A2 R91	0757-0433	R-F 3.32K1%
A2 R92	0757-0433	R-F 3.32K1%
A2 R93	0698-3444	R-F 316 1% .125W
A2 R94	0698-4493	R-F 402 1% .125W
A2 R95	0698-1021	R-F 1K10% .125W
A2 R96	0757-0405	R-F 162 1% .125W
A2 R97	0757-0405	R-F 162 1% .125W
A2 R98	0757-0273	R-F 3.01K1%
A2 R99	0757-1094	R-F 1.47K1%
A2 R100	0757-0424	R-F 1.1K1% .125W
A2 R101	0757-0438	R-F 5.11K1%
A2 R102	0757-0438	R-F 5.11K1%
A2 R103	0698-0084	R-F 2.15K1%
A2 R104	0698-4428	R-F 1.69K1%
A2 R105	0757-0422	R-F 909 1% .125W
A2 R106	0698-4479	R-F 14K1% .125W
A2 R107	0757-0417	R-F 562 1% .125W
A2 R108	0698-4479	R-F 14K1% .125W
A2 R109	2100-3349	R-VAR 100 +10%
A2 R110	0698-7463	R-F 82.5K1% .125W
A2 R111	0698-3111	R-F 30 5% .125W
A2 R112	0698-3379	R-F 68 5% .125W
A2 R113	0698-3379	R-F 68 5% .125W
A2 R114	0698-3111	R-F 30 5% .125W
A2 R115	0698-5172	R-F 13 5% .125W
A2 R116	0698-5172	R-F 13 5% .125W
A2 R117	0757-0438	R-F 5.11K1%
A2 R118	0757-0438	R-F 5.11K1%
A2 R119	0698-3378	R-F 51 5% .125W
A2 R120	0698-3378	R-F 51 5% .125W
A2 R121	0698-3442	R-F 287 1% .125W
A2 R122	0698-3443	R-F 287 1% .125W
A2 R123	0757-0440	R-F 7.5K1% .125W
A2 R124	0698-3518	R-F 4.02K1%
A2 R126	0757-0394	R-F 51.1 1%
A2 R127	0757-0394	R-F 51.1 1%
A2 R128	0757-0410	R-F 301 1% .125W
A2 S1	3101-1341	SW SLIDE SPDT
A2 U1	1826-0111	IC-DUAL OP AMPL
A2 U2	1826-0111	IC-DUAL OP AMPL
A2 U3	5081-3011	IC DIG REP RATE
A2 U4	1820-0269	IC DIG TTL
A2 U6	1858-0015	XSTR ARRAY
A2 VR10	1901-0460	DIC SI 15V .15A
A2 VR11	1901-0460	DIC SI 15V .15A
A2 W1	8159-0005	WIRE 22GA W PVC
A2 X2	1200-0547	LOCK DIP-IC
A2 X2	1200-0548	SOCKET-IC
A2 X3	1200-0547	LOCK DIP-IC
A2 X3	1200-0548	SOCKET-IC

7–1 INTRODUCTION

7–2 This section contains the component layouts and schematic diagrams for the Model 8081A Rep. Rate Generator. Tables listing the reference designators and schematic symbols used are also given. Refer to section 6 for the replaceable parts information.

7–3 RECOMMENDED TEST EQUIPMENT

7–4 Test equipment and test equipment accessories required to maintain the Model 8081A are listed in table 1–1. Equipment other than that listed can be used if it meets the listed critical specifications.

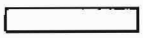
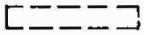
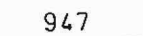
Table 7–1. Reference Designators

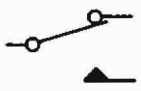
A	=	assembly	U	=	micro-circuit
B	=	motor	P	=	plug
BT	=	battery	Q	=	transistor
C	=	capacitor	R	=	resistor
CP	=	coupler	RT	=	thermistor
CR	=	diode	S	=	switch
DL	=	delay line	T	=	transformer
DS	=	lamp	TB	=	terminal board
F	=	fuse	V	=	vacuum, tube, neon
FL	=	filter			bulb, photocell, etc.
HR	=	heater	VR	=	voltage regulator
J	=	jack	W	=	cable
K	=	relay	X	=	socket
L	=	inductor	Y	=	crystal
M	=	meter	TP	=	test point

Table 7–2 Schematic Diagram Symbols

The following symbols conform, as far as possible, with ANSI Y32.2, IEEE No. 315 and ANSI Y32.14 (for the logic symbols). These standards should be consulted when further information is required.

Resistance values are in ohms, capacitance values in microfarads and inductance values in microhenries unless otherwise noted!

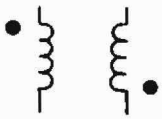
P/O	Part of
	Asterisk denotes a factory selected value. The value shown is the nominal value.
	Encloses front panel nomenclature
	Encloses rear panel nomenclature
	Heavy line indicates signal path
	Heavy dashed line indicates primary feedback path
	Wire colour code. Same as resistor colour code. First number is wire body colour.
	Wire our plug used as link.
	Test point in a circuit. Point may/may not be identified on P. C. board.
	Used with trimmer potentiometers or capacitors to indicate screwdriver adjustment.
	Direct connection to earth.
	Ground connection to instrument chassis or frame.
	Used when a number of common-return connections are at the same potential. If there is more than one such system in the same circuit, numbers are written in the triangles so that all connections with the same potential have the same number.
	Specific potential difference with respect to a potential reference level, eg. +10V
	Normally open toggle switch. Circles (○) are used for the contacts to indicate a locking type switch.



Spring return, 2-position transfer switch. Triangles (▲) are used for the contacts to indicate a non-locking type switch.

2-position, 2-pole slide switch.

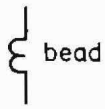
Air cored inductor.



Air cored transformer. The dot (●) is used, when necessary, to indicate instantaneous polarity.

Iron core

Ferrite core



Ferrite bead

Varactor diode

Multi-junction diode

Diode

Zener diode

Schottky diode

Light Emitting Diode (LED)

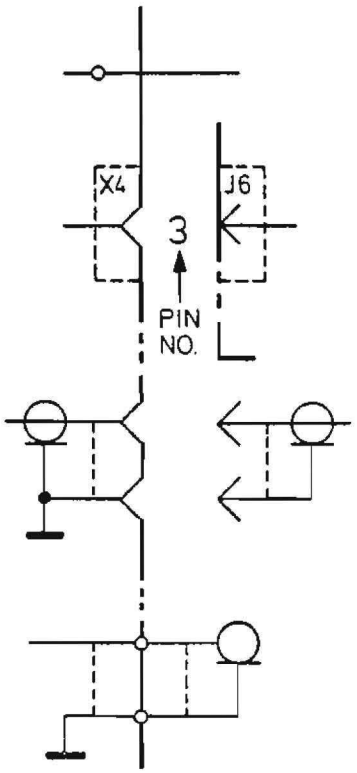
Photodiode

Fuse

Neon

Filament lamp

Terminals and Connectors



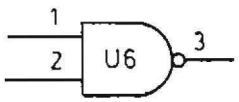
Soldered connection.

Example of fixed male and female connectors with plug and socket and contact designators, eg. P. C. board edge connector and socket.

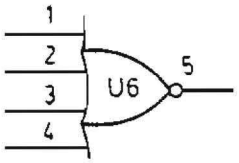
example of bulkhead mounted coaxial socket with free coaxial plug and cable.

example of coaxial cable with termination soldered to P. C. board.

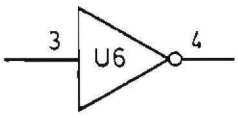
Analog/Digital logic symbols



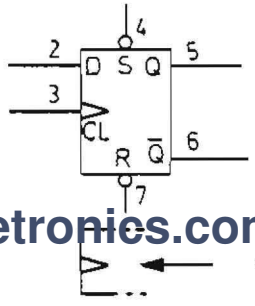
2-input NAND gate



4-input NOR gate

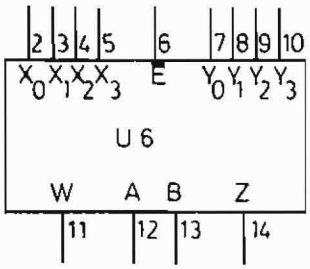


Inverter

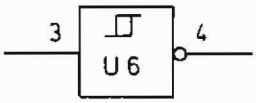


Flip-flop.

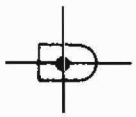
The dynamic indicator denotes that this is a dynamic input and operates on a transition, not a level.



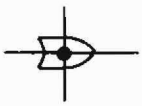
Complex functions represented by rectangular box. Letters can be used inside the rectangle to clarify the function. A truth table should be included, as close as possible to the circuit.



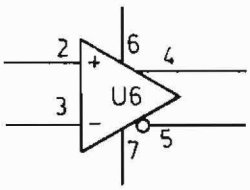
Schmitt trigger



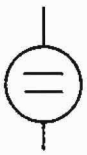
Wired AND connection



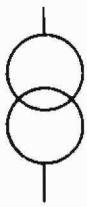
Wired OR connection



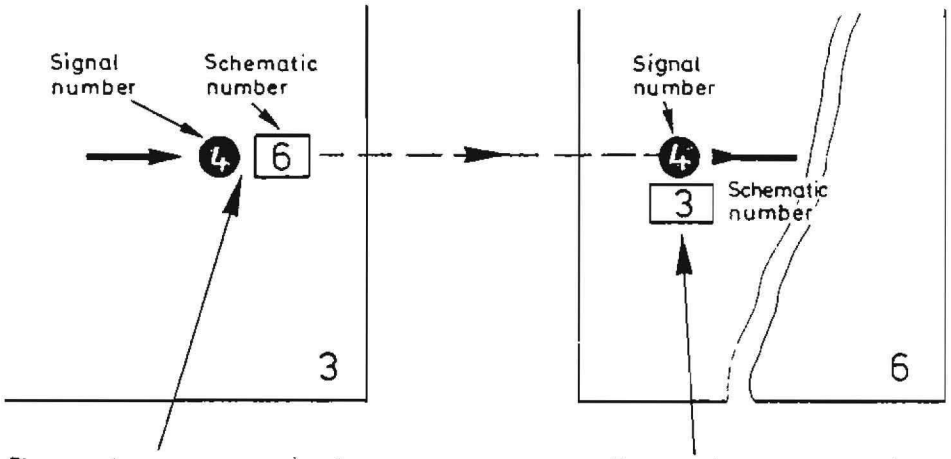
Operational amplifier



Voltage source



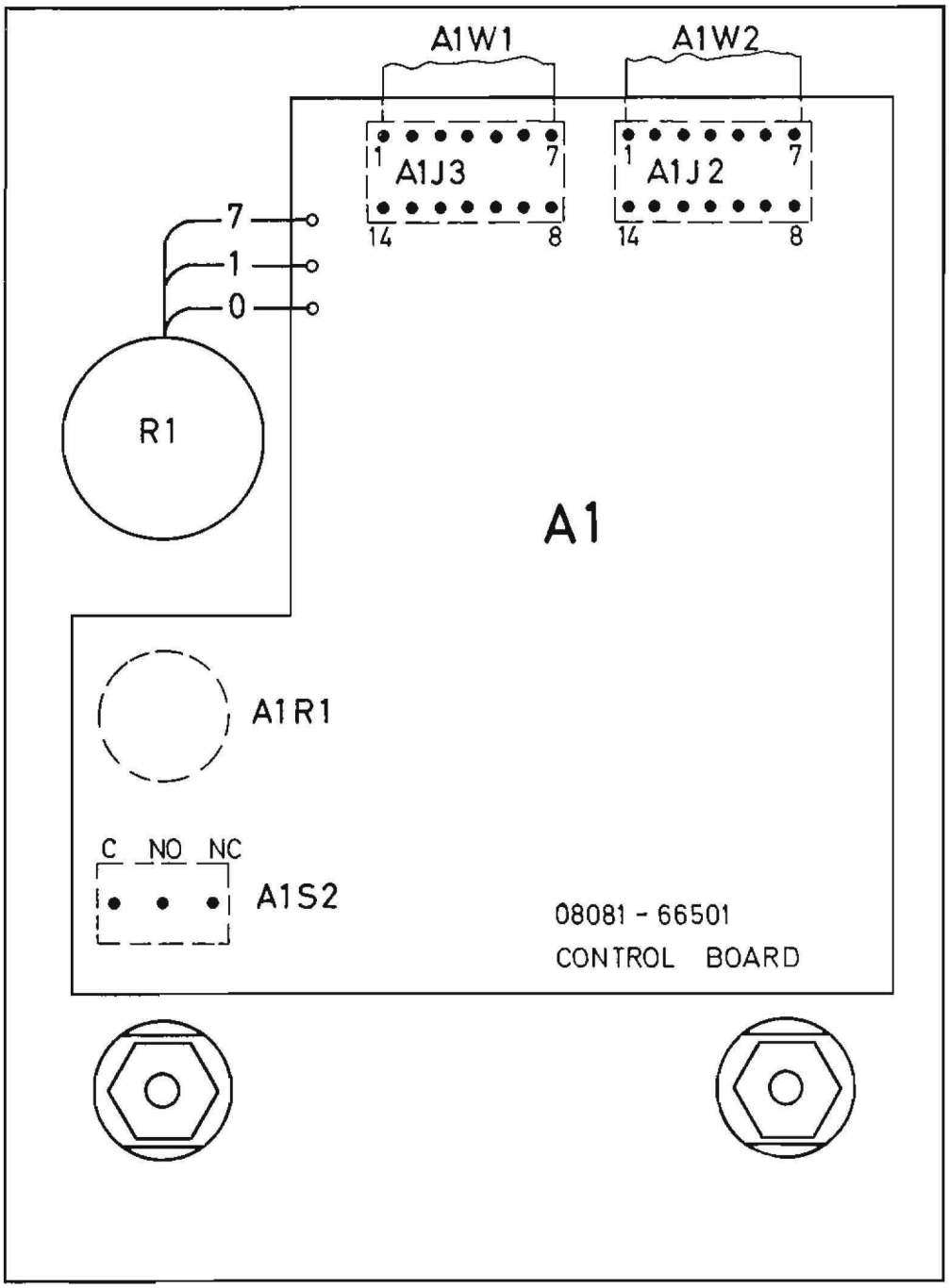
Current source

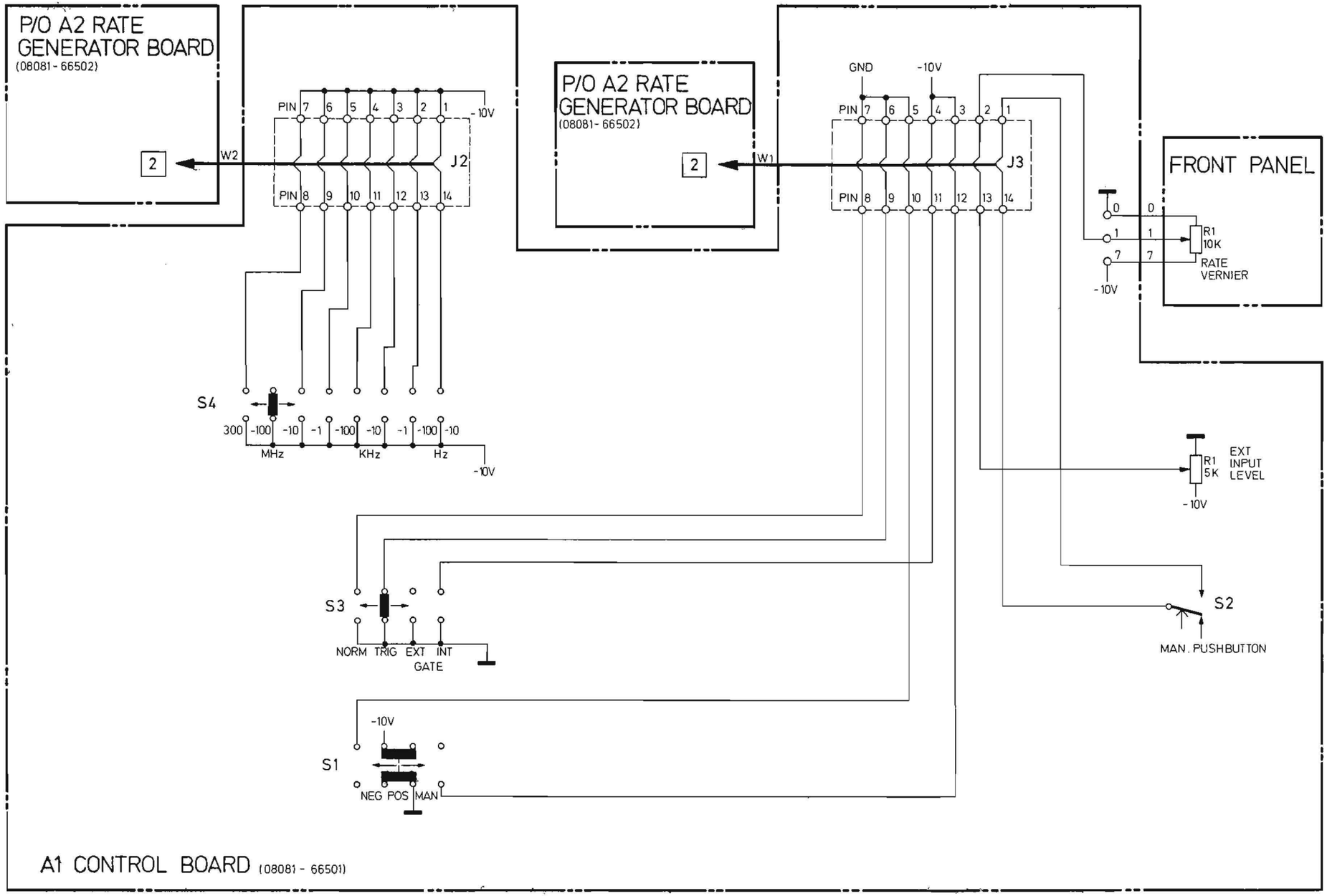


These references on a signal leaving a schematic diagram indicate the signal destination. The circle contains the signal number and the square contains the number of the schematic to which that signal goes.

These references on a signal entering a schematic diagram indicate the signal origin. The circle contains the signal number and the square contains the number of the schematic on which that signal originates.

FRONT PANEL (INSIDE)





08081-66502 300 MHz RATE GENERATOR BOARD A2