HEWLETT®
PACKARD

Quick Start
Guide

HP 81101A 50 MHz
Pulse Generator

Front Panel Display and Softkeys

Mode / Parameter Area

Use the CURSOR keys to move the entry focus to a mode, parameter format, or parameter value

Entry Focus

Modify / Enter Area

Use the KNOB to select a mode or modify parameters and formats

Press ENTER or a UNIT key to confirm parameter changes

```
   Per 1.000µs Normal    OFF  1  ◐MODIFY

Delay        0ps Offset    +0.0mV *OFF
Width   100.0ns Amplit      1.00V  ON
LeadE    5.00ns 50Ω into 50.0Ω
TraiE   =LeadE

  MODE/TRG  │  OUTPUT  │  LIMITS  │  TRG-LEV
```

GRAPH

MORE

Press a SOFTKEY to access the required entry screen

Press MORE key to access the additional screen menus:

MODE/TRG   TRG-LEV   MEMCARD   CONFIG

Screen Selection Area

Quick Start Guide

HP 81101A 50 MHz
Pulse Generator

Notice

Copyright

Warranty

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About this Book

This quick start guide helps you to quickly get familiar with the features and the user interface of the HP 81101A Pulse Generator.

Chapter 1 "Introducing the HP 81101A Pulse Generator" on page 15 gives a general overview of the HP 81101A, its features, the user interface, and the steps required for operating the instrument.

For getting started *Chapter 2 "Getting Started" on page 29* gives the setup information for some real-world signal examples, which can easily be used by varying only some parameter values.

Chapter 3 "Using the HP 81101A" on page 43 provides complete information on the user interface screens.

Installation and maintenance are described in *Appendix A "Installation & Maintenance" on page 75*.

For specifications and information on operating the instrument by means of remote control, please refer to the *Reference Guide*, p/n 81101-91011.

Conventions Used in this Book

This book uses certain conventions to indicate elements of the
HP 81101A's user interface. The following table shows some examples:

Softkeys	Press the MODE/TRG softkey to access the Mode/ Trigger screen.
Hardkeys	Press the MORE key to switch to the alternative softkey layout.
Alternate Keys	Press SHIFT + 0 (ON/OFF) to switch on the output. The alternate key label—which is selected by pressing the SHIFT key—is given in parentheses.
Screen Quotes	Move the entry focus down to PULSE-PERIOD and turn the knob to select INTERNAL PLL.
Entry Focus	The highlight field, that can be moved with the cursor keys, to change modes, parameters, or parameter formats.

Safety Information

Safety

This is a Safety Class 1 instrument (provided with terminal for protective earthing). Before applying power, verify that the correct safety precautions are taken (see the following warnings). In addition, note the external markings on the instrument that are described under Safety Symbols. Do not operate the instrument with its covers removed. Replace fuse only with specified type.

Warning

Before turning on the instrument, you must connect the protective earth terminal of the instrument to the protective earth conductor of the (mains) power cord. The mains plug must only be inserted in a socket outlet with a protective earth contact. Do not negate the protective action by using an extension power cord without a protective grounding conductor. Grounding one conductor of a two-conductor outlet is not sufficient protection.

Service instructions are for trained service personnel. To avoid dangerous electric shock, do not perform any service unless qualified to do so. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

If you energize this instrument using an auto-transformer (for voltage reduction), make sure that the common terminal is connected to the earth terminal of the power source.

Whenever it is likely that the ground protection is impaired, you must make the instrument inoperative and secure it against any unintended operation.

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.

Do not install substitute parts or perform any unauthorized modification to the instrument.

Capacitors inside the instrument may retain a charge even if the instrument is disconnected from its source of supply.

Safety Symbols

Instruction Manual symbol: The instrument is marked with this symbol when it is necessary for you to refer to the instruction manual in order to protect against damage to the instrument.

Protected conductor symbol.

In the manuals:

WARNING   **Warnings call attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury or loss of life. Do not proceed beyond a Warning until the indicated conditions are fully understood and met.**

CAUTION   Cautions call attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the equipment. Do not proceed beyond a Caution until the indicated conditions are fully understood and met.

Safety Information

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Chapter 3   **Using the HP 81101A**

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1 Introducing the HP 81101A Pulse Generator

The purpose of the introduction chapter is to give a general overview of the HP 81101A.

The main features and use models are described in *"What you can do with the HP 81101A" on page 16*.

Operating the instrument via the front panel user interface is described in *"The Front Panel" on page 18* and *"Operating the HP 81101A" on page 20*.

"Help is Available" on page 27 shortly introduces the HP 81101A's on-line help system.

Finally, *"The Rear Panel" on page 28* takes a look at the back of the HP 81101A.

What you can do with the HP 81101A

This section introduces the basic features and use models of the
HP 81101A Pulse Generator.

Basic Features

The HP 81101A is a single-channel pulse generator with variable
transition times. It is capable of generating all standard pulses and bursts
of pulses needed to test current logic technologies (for example, TTL,
CMOS, ECL, PECL, LVDS, GTL) and other digital designs up to 50 MHz.

The instrument features two internal oscillators:

- a synchronously triggerable internal oscillator
- an accurate, stable internal PLL

For even more accuracy, an external frequency reference can be
connected.

Any timing parameter can be varied without glitch or drop out. This
contributes to more accurate and confident characterizations of the
device under test (DUT).

Complete signal setups can be stored locally (9 internal non-volatile
registers available) or on a memory card.

Benchtop Testing

The HP 81101A features a graphic display showing all pulse parameters
at a glance. The cursor keys and the modify knob allow fast and simple
operation.

The user interface is designed to minimize the time invested in getting
familiar with the instrument. After familiarization, the instrument
supports quick setups of signals. This leaves you free to concentrate on
the measurement task and testing of the DUT.

Automated Testing

The HP 81101A features an HP-IB/SCPI-conform command structure for all features. Using this programming interface, the instrument can be easily integrated into all phases of test system development such as planning rack integration and test program generation.

Programs designed for the HP 81101A are compatible with all other models of the HP 81100 family.

NOTE   For a command reference list, please refer to the *Reference Guide*, part number 81101-91011.

The Front Panel

When used for benchtop testing, the instrument is mainly operated from the front panel.
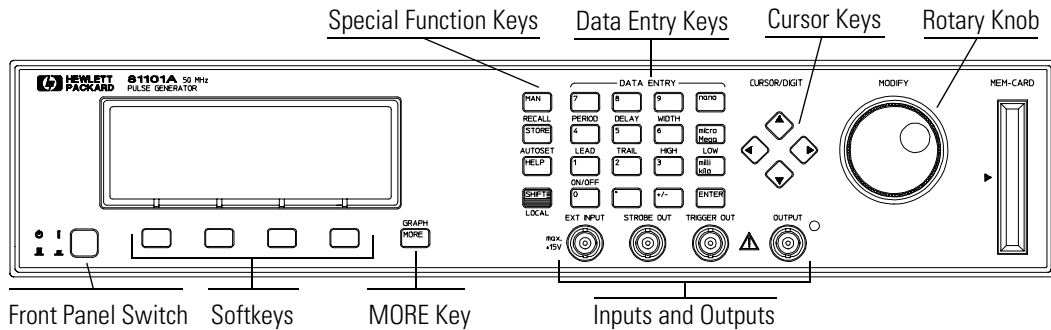
The **front panel switch** is used to switch on and off the instrument.

NOTE
When the front panel switch is off, the instrument is in "standby" mode. The instrument is disconnected from the AC line power *only* by disconnecting the power cord.

The four keys below the display are the **softkeys** (software-controlled keys). The current function of each softkey is indicated in the corresponding box on the display.

Pressing the MORE key changes the softkey layout.

The other keys (**special function keys**, **data entry keys**, **cursor keys**) and the **rotary knob** are used to select and modify parameters when operating the instrument (see *"Operating the HP 81101A" on page 20*).

The major inputs and outputs of the instrument are available at the front panel:

- The external input (EXT INPUT) can be used to connect an external arming source (triggered or gated modes), or to perform pulse recovery (external width mode). For details, please refer to *"The Mode/Trigger Screen" on page 44*.

- The strobe output (STROBE OUT) provides a signal indicating the duration of a burst.

  In burst mode, the STROBE OUT signal marks the start and end of each burst of pulses generated. The rising edge of the STROBE signal is synchronized to the start of the first pulse period in a burst, the falling edge is synchronized to the start of the last pulse period in the burst. (see *"The Mode/Trigger Screen" on page 44*).

  You can set the output levels to TTL or ECL (see *"The Trigger-Level Screen" on page 65*)

- The trigger signal (TRIGGER OUT) marks the start of each pulse period (see *"The Mode/Trigger Screen" on page 44*). You can set the output levels to TTL or ECL (see *"The Trigger-Level Screen" on page 65*).

- The OUTPUT provides the signal output, the indicator shows the current state of the output (on or off).

NOTE   An input connector for external frequency reference (CLOCK/REF INP.) is available at the rear panel (see *"The Rear Panel" on page 28*). When the rear panel option UN2 is ordered, all input and output connectors are available at the rear panel.

NOTE   For information on the use of the memory card slot, refer to *"The Memory Card Screen" on page 67*.

Operating the HP 81101A

This section guides you through the first steps when operating the HP 81101A via the user interface.

NOTE   For information on operating the HP 81101A via remote control, please refer to the *Reference Guide*, part number 81101-91011.

Switching On the Instrument

After switching on the instrument the display indicates that the instrument selftest is running. This can take several seconds to complete.

If the selftest fails, you see a flashing E at the bottom of the screen. Press the HELP key to see a list of the selftest error messages. Use the knob or the cursor keys to scroll through the list if necessary.

To return to normal operation press HELP again. Note that the selftest error messages are removed from the error queue after this.

The Basic Screens

The major parameters for pulse generation can be set up in only two screens.

The **Mode/Trigger screen** allows you to set the fundamental operating and trigger modes with respect to the signal required.

```
CONTINUOUS PULSES
              Single-Pulses at Out1    ◑ MODIFY
                                       *PulseStrm
                                        Burst
Pulse-Period: internal Osc

   MODE/TRG    OUTPUT     LIMITS     TRG-LEV
```

*Press the MODE/
TRG softkey to
access this screen.*

In this screen, you can set up the signal to be triggered or continuous, and to be a pulse stream or a burst (several pulses followed by a pause) consisting of single or double pulses.

In the lower section you can specify the frequency source for the pulse period and the trigger source.

The **Output screen** allows you to specify timing and level parameters
for the signal to be generated.

Press the OUTPUT softkey to access this screen. In the left part of this screen, you can set up the timing for the signal
(period, pulse width, transition times, ...). The right part is for the levels
(normal or inverted signal, offset and amplitude, impedance, ...).

Furthermore, you can switch on and off the output.

Pressing SHIFT + MORE (GRAPH) when the Output screen is displayed,
toggles between the textual display and a graphical representation of the
parameters. Depending on the current cursor position (left or right part),
the timing parameters or the level parameters are visualized.
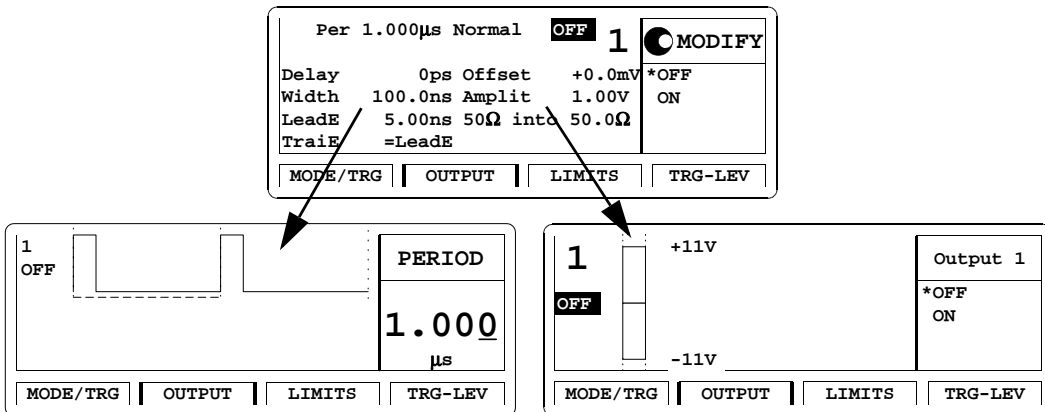
Adjusting Parameters

Adjusting parameters within a screen, requires two steps:

- selecting the parameter
- adjusting its value

Some parameters allow different formats of their values. For example, the pulse width can be displayed and entered as an absolute value, as duty cycle (percentage of the period), or as the delay of the trailing edge.

The following sections show the standard procedure for adjusting parameters, and list some features useful for the advanced user.

Standard Procedure

To experience the standard procedure for adjusting parameters, consider the following example where the duty cycle is set to 50%.

1 Press the OUTPUT softkey to access the Output screen.

2 Use the cursor keys to select the WIDTH parameter.

Selection Cursor   Modify/Enter Area

```
   Per 1.000µs Normal    OFF  1  ( )MODIFY

Delay      0ps Offset   +0.0mV *Width
Width   100.0ns Amplit    1.00V   DutyCycle
LeadE    5.00ns 50Ω into 50.0Ω   TrailDel
TraiE    =LeadE

 MODE/TRG    OUTPUT    LIMITS    TRG-LEV
```
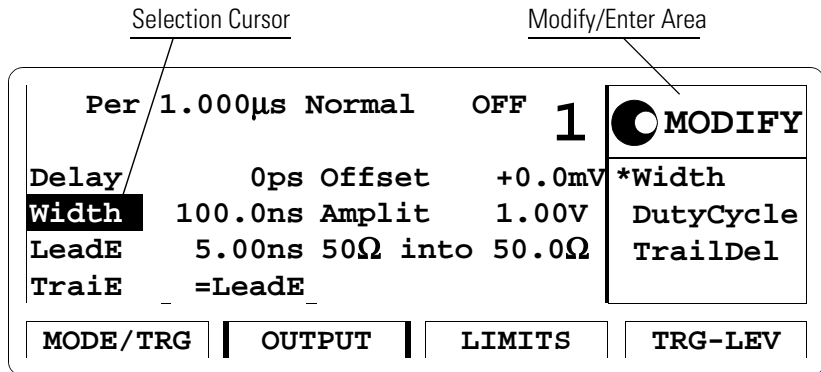
The available formats for the pulse width parameter are displayed in the Modify/Enter area.

When changing the
parameter format,
the instrument
automatically
recalculates the
value.

3   Turn the knob to select DUTYCYCLE.
The selected setting is indicated by an "*".

4   Move the cursor to the right to select the duty cycle value.

5   Use the data entry keys or the knob to enter the required value: 50.

6   Press the ENTER key to confirm your selection.

```
┌──────────────────────────────────────────────────┐
│   Per 1.000µs Normal    OFF  1  ⬤MODIFY           │
│                                                    │
│ Delay     0.0ps Offset   +0.0mV                    │
│ DtyCyc  ▐50.00%▌ Amplit   1.00V  50.00             │
│ LeadE   6.00ns 50Ω into 50.0Ω                      │
│ TraiE   =LeadE                      %              │
│ ┌──────────┐ ┌────────┐ ┌────────┐ ┌──────────┐   │
│ │ MODE/TRG │ │ OUTPUT │ │ LIMITS │ │ TRG-LEV  │   │
│ └──────────┘ └────────┘ └────────┘ └──────────┘   │
└──────────────────────────────────────────────────┘
```

If you need to specify a unit for a parameter, simply press the appropriate
unit key (NANO, MICRO/MEGA, MILLI/KILO) instead of the ENTER key.

With this small example, you have learned the basic steps required for
adjusting parameters. For a complete reference of parameters and
formats available in the individual screens, refer to *Chapter 3 "Using the
HP 81101A" on page 43*.

Advanced Procedures

The following features can be used to make operation more comfortable.

- **Selecting parameters**

SHIFT

Most keys of the front panel have an additional function. The SHIFT key provides fast access to the additional functions of the data entry keys and the special function keys.

For example, it is possible to quickly access the pulse width parameter by pressing SHIFT + 0 (WIDTH). The entry focus will be positioned on the corresponding editing field.

- **Changing the step size**

SHIFT ◇

When modifying a value in the Modify/Enter area, pressing the SHIFT key followed by cursor left/right moves the cursor to a different digit in the displayed number.

Thus, you can change the step size for parameter change before you vary the value either with the up/down cursor keys or the knob.
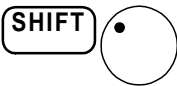
- **Overprogramming**

SHIFT ●

Pressing the SHIFT key while turning the knob, it is possible to exceed specified parameter ranges to utilize the instrument to its limits.

NOTE   Proper operation of the instrument outside of the specified ranges is not guaranteed. It is recommended to have the output switched on when overprogramming to have the internal error check system activated. This error check system warns you about impossible settings.

Switching the Output On and Off

When you switch the instrument on, the output is switched off to protect the device under test. The LED indicator next to the output connector indicates the output state.
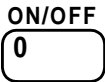
ON/OFF
0

To switch the output on or off

- either press SHIFT + 0 (ON/OFF),

- or move the cursor to the ON/OFF parameter in the Output screen and select the appropriate value by turning the knob.

Using the Special Function Keys

The instrument provides the following special function keys:

MAN

- The MAN key can be used in triggered or gated mode to manually trigger the instrument if there is no other source available (see *"The Mode/Trigger Screen" on page 44*).

RECALL
STORE

- The STORE key can be used to store/recall to/from 1 to 9 individual settings in the instrument memory.

  In the internal memory location 0 there is a default setting stored. Pressing SHIFT + STORE (RECALL) and selecting 0 resets the instrument to the default setting.

SHIFT
LOCAL

- The SHIFT key provides fast access to additional functions.

  When the front panel controls are locked in remote control, pressing the SHIFT key unlocks the front panel controls.

HELP

- The HELP key provides access to the instrument's on-line help or in warning or error state, access to Warning/Error Report screen.

  Pressing SHIFT + HELP (AUTOSET) sets the instrument to a valid setting based on the current period setting.

Help is Available

Whenever you are in doubt or the instrument signals warnings or errors, press the HELP key.

Help   If there are *no warnings or errors* pending, pressing the HELP key displays information on the currently selected parameter, the parameter help. More information is available within the help system:

- **Parameter Help**

  The help information gives a short description of the parameter or setting options and the corresponding SCPI command(s) syntax for programming the parameter or setting.

  If there is more than one screen available (indicated by small arrows), use the knob or the cursor keys to scroll through the help information.

  To access parameter help from other screens of the help system, press the ON FIELD softkey.

- **Concept Help**

  Pressing the CONCEPT softkey within the help system displays a short description of the instrument.

- **Serial Numbers and Software Revision**

  Pressing the SERIAL # softkey within the help system displays information on serial numbers and software revision codes of the instrument.

Warnings and Errors   If there *are warnings or errors* pending (indicated by a flushing W or E), pressing the HELP key displays a list of the current messages. Using the ERROR QU and WARNING softkeys, you can toggle between both lists. For more information on warnings and errors, see *"Warnings and Errors" on page 72*.

Exit Help   To exit from the help system, press the HELP key again, or press the EXIT HELP softkey.

The Rear Panel

The rear panel always provides two connectors:

- The input connector for external frequency reference (CLOCK/REF INP.). This input can be used if a higher frequency accuracy is required, or if you need frequency locking.

- The HP-IB connector providing the interface for remote control.

The following figure shows the rear panel view with the option UN2.
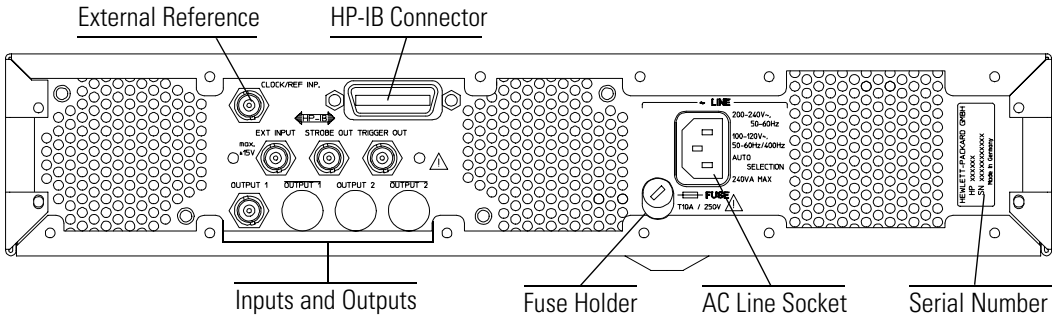
With option UN2 the major inputs and outputs of the instrument (as described in *"The Front Panel" on page 18*) are available at the rear panel:

- external input (EXT INPUT)

- strobe output (STROBE OUT)

- trigger signal (TRIGGER OUT)

- signal output (OUTPUT)

2   Getting Started

The intention of this chapter is to give the necessary steps to set up generic signals for first-time users of the HP 81101A.

This chapter provides examples for the following types of signals:

- *"Setting Up a Clock Signal" on page 30*

- *"Setting Up a Pulse Signal" on page 35*

- *"Setting Up a Burst Signal" on page 39*

At the end of each example, the required set of device commands is listed to provide programming examples. For further information on the commands and a complete command reference please refer to the *Reference Guide*, p/n 81101-91011.

The examples are intended to be performed one after the other. Therefore, the first example provides the most detailed instructions, while the other examples are described on a higher level.

Setting Up a Clock Signal

Task

Set up a continuous clock signal with 25 MHz frequency with PLL accuracy, a duty cycle of 50 %, 6 ns transition times, a high level of 2.5 V and low level of 0 V.
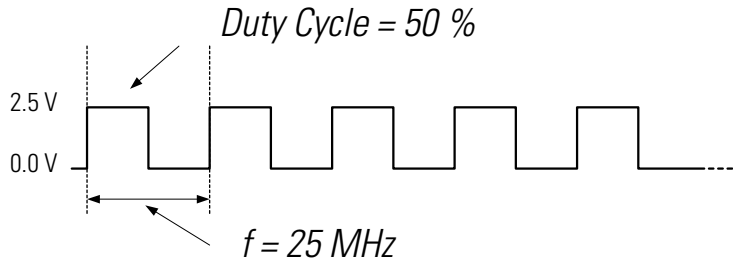
Instructions

To set the **operating mode and trigger mode** as required:

1 Reset all parameters and modes by pressing SHIFT + STORE (RECALL) + 0.

2 Press the MODE/TRG softkey to enter the Mode/Trigger screen. Trigger mode CONTINUOUS and operating mode PULSES are selected by default.

3 Move the entry focus down to PULSE-PERIOD and turn the knob to select INTERNAL PLL.
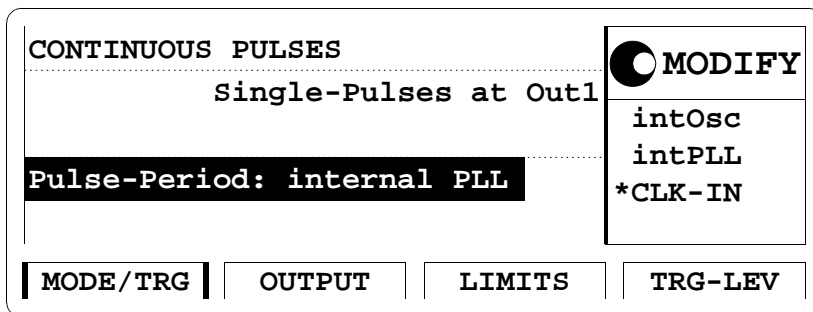
To set the **timing parameters** as required:

1 Press the OUTPUT softkey to enter the Output screen.

2 Press SHIFT + 0 (ON/OFF).

This turns on the Output and activates the internal error check to detect parameter conflicts.

3 Move the entry focus to PER and turn the knob to select FREQ.

4 Move the entry focus to the right (to the frequency entry field) and enter a value of 25 MHz by pressing 2 + 5 + MICRO/MEGA.

A warning is displayed, indicating a potential conflict in your settings. You can ignore this, because the conflict will be solved in the next steps.

**5** Move the entry focus down to WIDTH and select DUTYCYCle.

6 Move the entry focus to the right and enter 50 % by typing 5 + 0 + ENTER.

7 Move the entry focus down to the leading edge entry field and press 6 + NANO.

The trailing edge is set to be the same as the leading edge (TRAIE = LEADE) by default.

```
┌─────────────────────────────────────────────────────────┐
│  ┌──────────────────────────────────────┐ ┌──────────┐  │
│  │ Freq 25.00MHz Normal   ON   1        │ │●MODIFY   │  │
│  │                                      │ │          │  │
│  │ Delay      0.0ps Offset   +0.0mV     │ │          │  │
│  │ DtyCyc    50.00% Amplit    1.00V     │ │ 6.00     │  │
│  │ LeadE     6.00ns 50Ω into 50.0Ω      │ │          │  │
│  │ TraiE     =LeadE                     │ │     ns   │  │
│  └──────────────────────────────────────┘ └──────────┘  │
│  ┌──────────┐ ┌──────────┐ ┌──────────┐ ┌──────────┐    │
│  │ MODE/TRG │ │ OUTPUT   │ │ LIMITS   │ │ TRG-LEV  │    │
│  └──────────┘ └──────────┘ └──────────┘ └──────────┘    │
└─────────────────────────────────────────────────────────┘
```

8 Press SHIFT + MORE (GRAPH) to see a preview of your signal.

```
 1                                          LeadEdge1
 ON

                                              6.00
                                                 ns

  MODE/TRG     OUTPUT      LIMITS      TRG-LEV
```
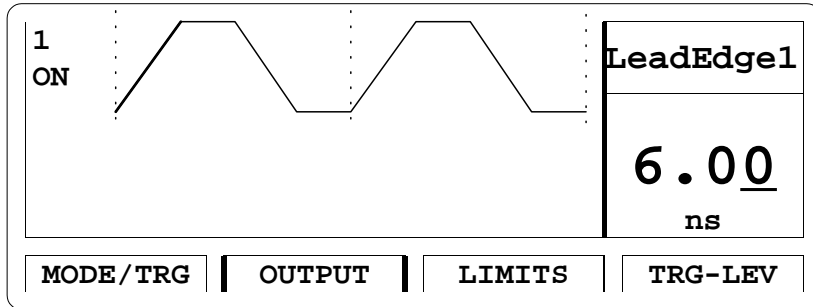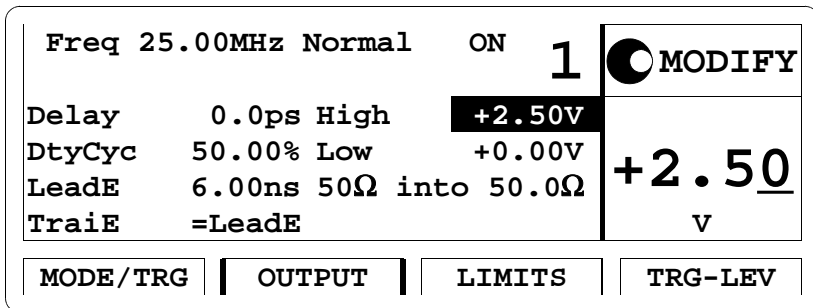
You can modify the parameter displayed in the Modify/Enter area, and immediately check how your changes affect the signal. Use the cursor keys to switch to another parameter.

9 Press SHIFT + MORE (GRAPH) to return to the textual screen.

To set the **level parameters** as required:

1 Move the entry focus to OFFSET/AMPLITUDE and turn the knob to select HIGH-LOW.

2 Move the entry focus to the high level entry field, enter 2.5 and press the ENTER key.

In the same way, enter 0 for the low level. The impedance is 50Ω source into 50Ω load by default.

```
  Freq 25.00MHz Normal    ON  1  ◑MODIFY

 Delay      0.0ps High    +2.50V
 DtyCyc    50.00% Low      +0.00V  +2.50
 LeadE     6.00ns 50Ω into 50.0Ω
 TraiE     =LeadE                     V

  MODE/TRG     OUTPUT      LIMITS      TRG-LEV
```
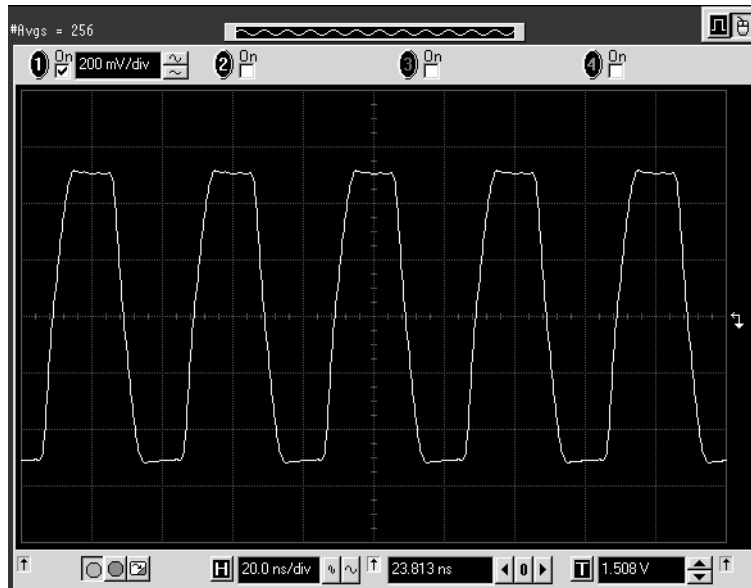
NOTE   There is also a graphical screen available for the level parameters.

Here is the signal as displayed on an HP 54810A Infinium oscilloscope.
Use the generator's TRIGGER OUT to trigger the scope.

**Programming
Example**

If you want to include this clock signal in your HP-IB program, use the
following command lines. The comment lines starting with a # are not
required.

```
# Reset the instrument to start from a defined, default status.
*RST

# Switch off the automatic display update to increase programming
# speed.
:DISPlay  OFF

# Internal PLL has to be set as period source.
:ARM:SOURce  INT2

# Set the frequency to 25 MHz, the duty cycle to 50 % and the
# leading and trailing edge to 6 ns.
:FREQuency  25 MHZ
:PULSe:DCYCle  50
:PULSe:TRANsition  6NS

# Set the high level to 2.5 Volts, the low level to 0.0 Volts.
:VOLTage:HIGH  2.5V
:VOLTage:LOW  0V

# Enable the output.
:OUTPut  ON
```
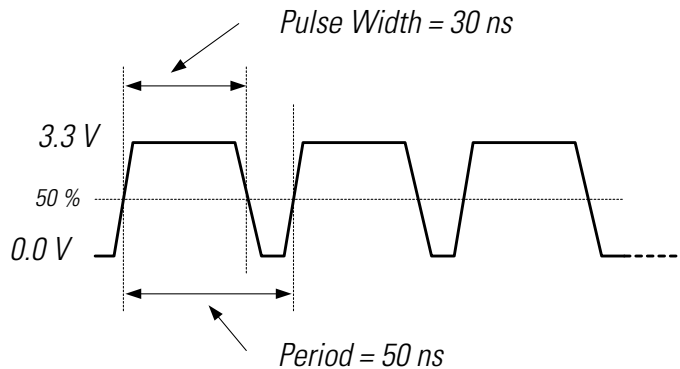
Setting Up a Pulse Signal

Task Set up a continuous pulse signal with 50 ns period, a pulse width of 30 ns, a leading edge of 6 ns, a trailing edge of 10 ns, an amplitude of 3.3 V and an offset of 1.65 V (high level 3.3 V, low level 0.0 V).

Instructions To set the **operating mode and trigger mode** as required:

1 Reset all parameters and modes by pressing SHIFT + STORE + 0.

2 Press the MODE/TRG softkey to enter the Mode/Trigger screen.

The default settings can be used for this example. For reference the Mode/Trigger screen is displayed. There is nothing to change.

To set the **timing parameters** as required:

1 Press the OUTPUT softkey to enter the Output screen.

2 Switch on the output.

3 Enter a period of 50 NS.
A warning is shown, which you may ignore, because the parameter conflict will be solved in the next steps.

4 Enter a pulse width of 30 NS.

5 Enter 6 NS for the leading edge.

6 For the trailing edge, select ABSOLUTE and enter a value of 10 NS.

```
    Per 50.00ns Normal    ON   1  ◖MODIFY

Delay      0.0ps Offset   +0.0mV
Width   30.00ns Amplit    1.00V
LeadE    6.00ns 50Ω into 50.0Ω    10.0
TraiE    10.0ns                     ns

 MODE/TRG     OUTPUT      LIMITS     TRG-LEV
```

To set the **level parameters** as required:

1 Enter an offset of 1.65 V.

2 Enter an amplitude of 3.30 V.

```
    Per 50.00ns Normal    ON   1  ◖MODIFY

Delay      0.0ps Offset   +1.65V
Width   30.00ns Amplit    3.30V    3.30
LeadE    6.00ns 50Ω into 50.0Ω
TraiE    10.0ns                      v

 MODE/TRG     OUTPUT      LIMITS     TRG-LEV
```
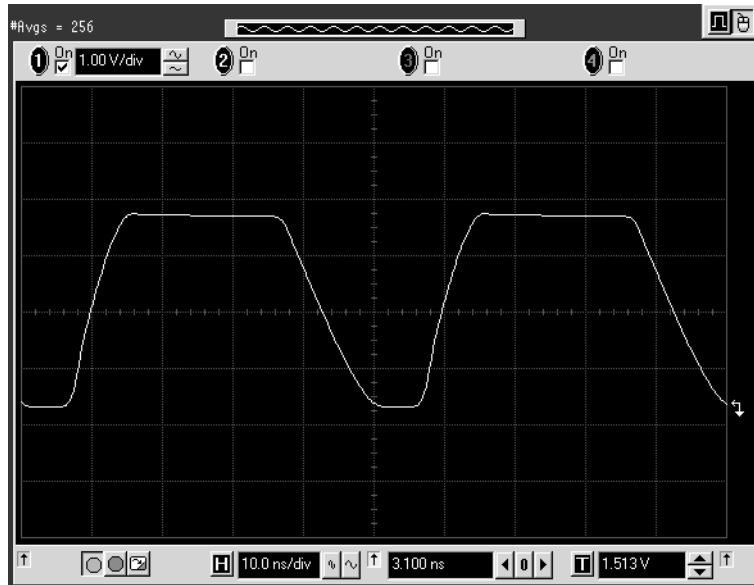
Here is the figure as displayed on the HP 54810A Infinium oscilloscope.
Use the generator's TRIGGER OUT to trigger the scope.

Programming Example   If you want to include this pulse signal in your HP-IB program, use the following command lines. The comment lines starting with a # are not required.

```
# Reset the instrument to start from a defined, default status.
*RST

# Switch off the automatic display update to increase programming
# speed.
:DISPlay  OFF

# Pulse stream operating mode is required, but as we start
# from a default status it is not necessary to send a command for
# setting the instrument into pulse stream operating mode.
# Set the period to 50 ns, the pulse width to 20 ns, the leading
# edge to 6 ns and the trailing edge to 10 ns.
:PULSe:PERiod  50NS
:PULSe:WIDTh  30NS
:PULSe:TRANsition  6NS
:PULSe:TRANsition:TRAiling:AUTO  OFF
:PULSe:TRANsition:TRAiling  10NS

# Set the amplitude to 3.3 Volts, the offset to 1.65 Volts.
:VOLTage  3.3V
:VOLTage:OFFSet  1.65V

# Enable the output
:OUTPut  ON
```
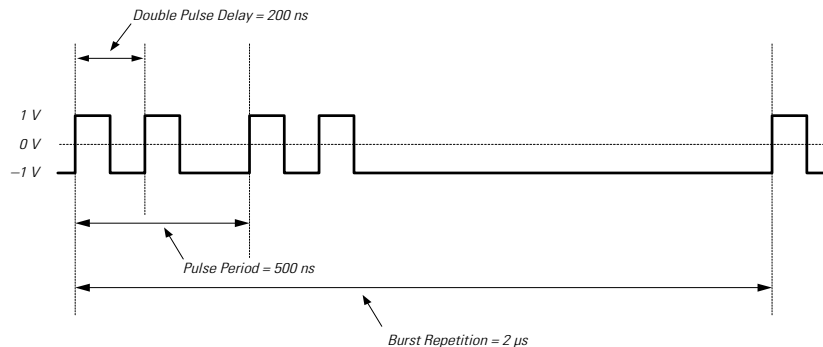
Setting Up a Burst Signal

Task

Set up a burst signal with a burst repetition of 2 µs. Each burst consists of two double-pulses at a period of 500 ns. The pulse width is 100 ns, the delay between the two pulses of a double-pulse is 200 ns. The levels are 2 Vpp amplitude and 0 V offset.

Instructions

To set the **operating mode and trigger mode** as required:

1   Reset all parameters and modes by pressing SHIFT + STORE + 0.

2   Press the MODE/TRG softkey to enter the Mode/Trigger screen.

   The internal PLL is used to trigger the startable internal oscillator. The PLL defines the burst repetition, the oscillator generates the pulse period. This requires the following settings:

3   Move to CONTINUOUS and turn the knob to select TRIGGERED.

4   Move to PULSES and select BURST.

5   Move down and select DOUBLE (DOUBLE-PULSES AT OUT 1).

6   Move left and select a burst length of 2.

7   Move down and select TRG'D BY: PLL and set the period to 2.000 µs (burst repetition).

```
┌────────────────────────────────────────────────────┐
│ TRIGGERED BURSTS OF              ● MODIFY           │
│          2-Double-Pulses at Out1                    │
│ ...................................                 │
│ Pulse-Period: internal Osc      2.000               │
│ Trg'd by: PLL -> [Per 2.000 µs]    µs               │
│ ┌─────────┐ ┌─────────┐ ┌─────────┐ ┌─────────┐     │
│ │MODE/TRG │ │ OUTPUT  │ │ LIMITS  │ │ TRG-LEV │     │
│ └─────────┘ └─────────┘ └─────────┘ └─────────┘     │
└────────────────────────────────────────────────────┘
```

To set the **timing parameters** as required:

1   Press the OUTPUT softkey to enter the Output menu.

2   Switch on the Output.

3   Enter a pulse period of 500 NS.

4   Enter a double-pulse delay (DBLDEL) of 200 NS.

To set the **level parameters** as required:

1   Enter an amplitude of 2.00 V.

```
┌────────────────────────────────────────────────────┐
│   Per 500.0ns Normal    ON    1  ● MODIFY           │
│                                                     │
│ DblDel  200.0ns Offset    +0.0mV                    │
│ Width   100.0ns Amplit   [2.00V]                    │
│ LeadE    5.00ns 50Ω into 50.0Ω   2.00               │
│ TraiE   =LeadE                     V                │
│ ┌─────────┐ ┌─────────┐ ┌─────────┐ ┌─────────┐     │
│ │MODE/TRG │ │ OUTPUT  │ │ LIMITS  │ │ TRG-LEV │     │
│ └─────────┘ └─────────┘ └─────────┘ └─────────┘     │
└────────────────────────────────────────────────────┘
```

The following figure shows the signals as displayed on the HP 54810A
Infinium Oscilloscope if you connect OUTPUT to channel 1,
STROBE OUT to channel 2, and use the generator's TRIGGER OUT to
trigger the scope.
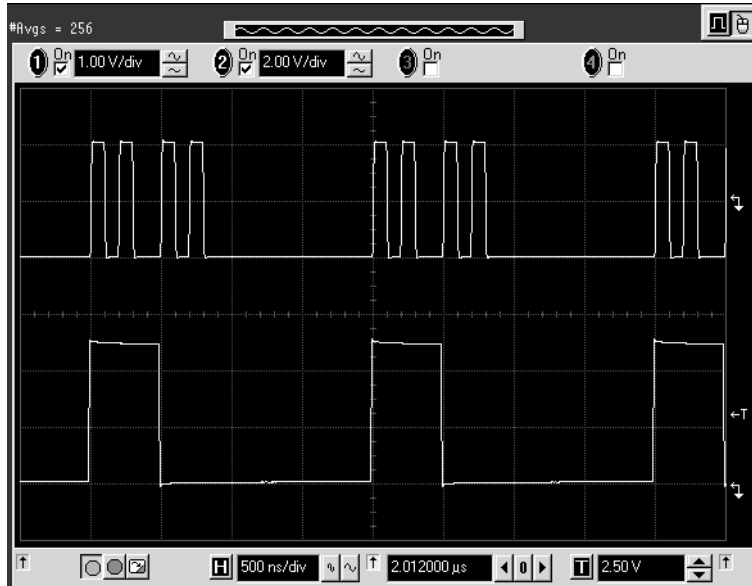
Programming example   If you want to include this burst signal in your HP-IB program use the following command lines. The comment lines starting with a # are not required.

```
# Reset the instrument to start from a defined, default status.
*RST

# Switch off the automatic display update to increase programming
# speed.
:DISPlay   OFF

# Set the instrument to burst mode by selecting a burst count
# of 2. Choose double pulses. Select triggered mode by selecting
# PLL as the trigger source and set the burst repetition to 2 µs.
:TRIGger:COUNt  2     # Set Burst mode with burst count of 2
:ARM:SOURce   INT2    # Set Triggered mode with PLL as
                      # trigger source
:ARM:PERiod  2US      # Set burst repetition of 2 µs
:PULSe:DOUBle  ON     # second channel generates double pulses
                      # per period

# Set the double pulse delay to 200 ns and the width to 100 ns.
:PULSe:PERiod   500NS
:PULSe:WIDTh   100NS
:PULSe:DOUBle:DELay   200NS

# Set the output amplitude to 2 Volts and the offset to
# 0.0 Volts.
:VOLTage   2V

# Enable the output.
:OUTPut   ON
```

3　Using the HP 81101A

This chapter provides complete reference information for using the HP 81101A by means of the user interface screens.

Each screen is described in detail. To access the individual screens, use the softkeys below the screen. There are two softkey layouts:

- the default layout

MODE/TRG	OUTPUT	LIMITS	TRG-LEV

- the alternative layout displayed after pressing the MORE key

MODE/TRG	TRG-LEV	MEMCARD	CONFIG

At the end of this chapter, *"Warnings and Errors" on page 72* provides details on the instrument's warning and error messaging system.

NOTE　For general information on using the HP 81101A and information on the instrument's hardkeys, please refer to *Chapter 1 "Introducing the HP 81101A Pulse Generator" on page 15*.

NOTE　For information on using the HP 81101A via remote control, please refer to the *Reference Guide*, part number 81101-91011.

The Mode/Trigger Screen

This section describes the Mode/Trigger screen, starting with an overview of the available parameter combinations, followed by detailed descriptions of each combination.

Overview

To access the Mode/Trigger screen, press the MODE/TRG softkey.

The following figure shows a typical Mode/Trigger screen, where the individual parameters are indicated. The parameter combinations are listed in the table on the next page.
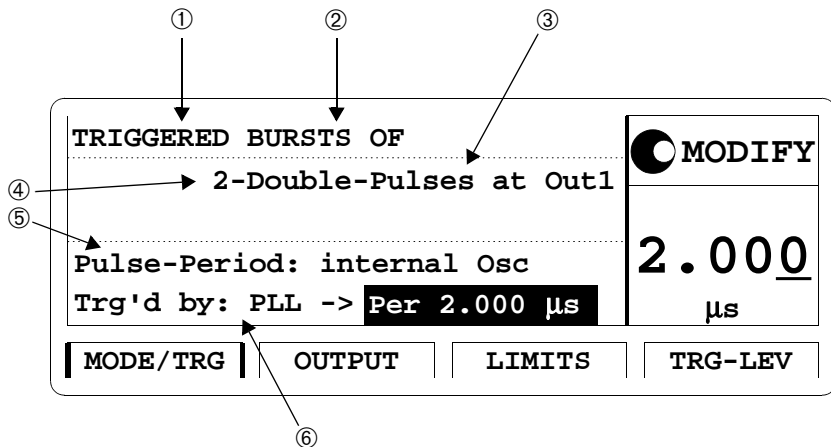
In this screen, you can set up the signal to be triggered or continuous, and to be a pulse stream or a burst (several pulses followed by a pause) consisting of single or double pulses.

Furthermore, you can specify the pulse and trigger sources.

The following table provides a list of possible parameter combinations. The rows refer to the numbers in the figure.

① **Trigger Mode**	**Continuous**		**Triggered**		**Gated**		**Ext. Width**
② **Pulse Mode**	**Pulses**	**Burst**	**Pulses**	**Burst**	**Pulses**	**Burst**	
③ **Pulse Type**	Single/Double		Single/Double		Single/Double		
④ **Length**		2–65536		2–65536		2–65536	
⑤ **Period Source**	internal Osc. internal PLL CLK-IN			internal Osc. internal PLL CLK-IN	internal Osc. internal PLL CLK-IN		
⑥ **Arming Source**			MAN key Ext. Input	MAN key Ext. Input PLL	MAN key Ext. Input	MAN key Ext. Input	
Trigger Out	marks each pulse period generated						
Strobe Out	not used	↑on 1st ↓on last	not used	↑on1st ↓on last	not used	↑on 1st ↓on last	not used

The pulse period source can be selected from internal oscillator, internal PLL, and external CLK-IN:

- If you have to trigger after an external event, use the startable oscillator (**internal Osc.**), which starts on the external signal with a fixed latency.

- If you do not have to trigger but need a high accuracy frequency, then use the **internal PLL** clock generation circuitry.

- For even more accuracy, you can use the external CLK-IN.

In triggered/gated mode the internal PLL can be used as an arming source. However, the internal PLL cannot be used as pulse and arming source at the same time.

The following sections explain the individual mode combinations in more detail. For each combination of trigger mode and pulse mode, typical timing diagrams are provided, showing single and double pulses.

Continuous Pulses Mode

The following figure shows typical timings for trigger mode
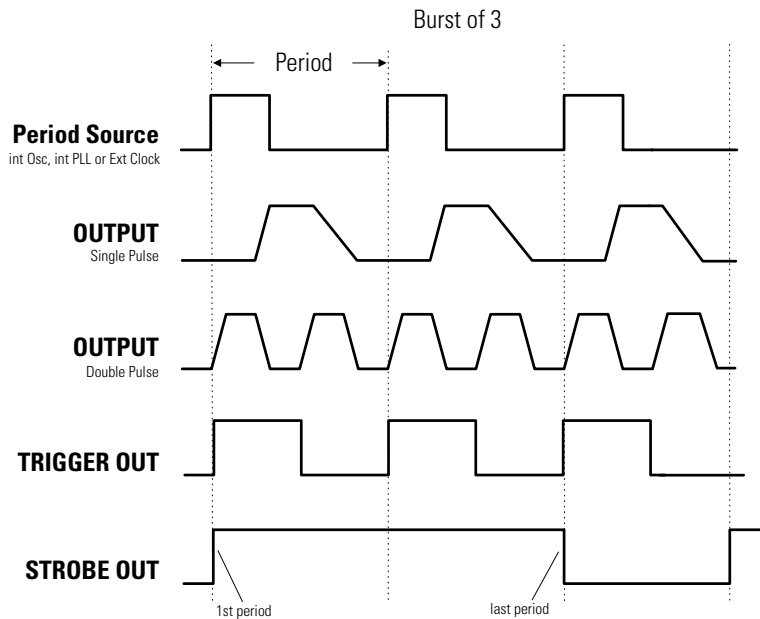CONTINUOUS and pulse mode PULSES.
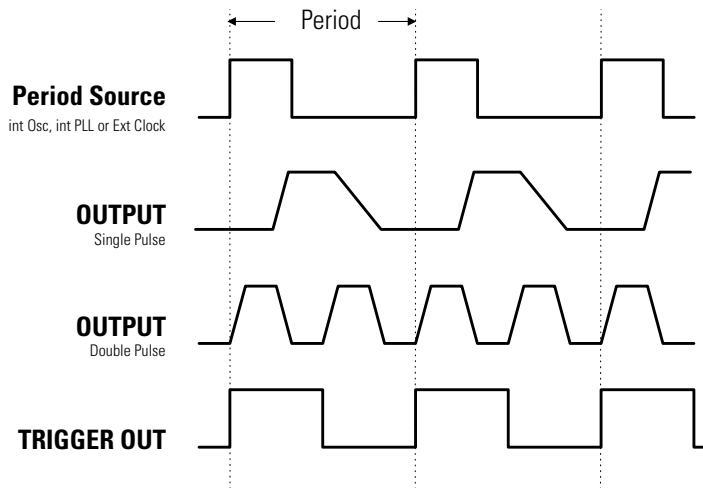
Characteristics
- Pulse periods are generated continuously.

- You can select single pulses or double pulses per pulse period.

- For the pulse period source you can select from
    - internal Osc (VFO)
    - internal PLL (higher accuracy)
    - external CLK-IN (external signal), synchronize to rising or falling
      edge

- TRIGGER OUT marks each pulse period.

NOTE   STROBE OUT is not used in continuous pulse mode.

Continuous Burst Mode

The following figure shows typical timings for trigger mode
CONTINUOUS and pulse mode BURST.

Characteristics
- A burst of pulse periods is repeated continuously.

- You can select the number of pulse periods per burst in the range of
  2–65536.

- You can select single pulses or double pulses per pulse period.

- For the pulse period source you can select from
  - internal Osc (VFO)
  - internal PLL (higher accuracy)
  - external CLK-IN, synchronize to rising or falling edge.

- TRIGGER OUT marks each pulse period.

- STROBE OUT rises at the start of the first pulse period in a burst, and
  falls at the start of the last pulse period.

Triggered Pulses Mode

The following figure shows typical timings for trigger mode TRIGGERED
and pulse mode PULSES. The pulses are triggered by the rising edge of
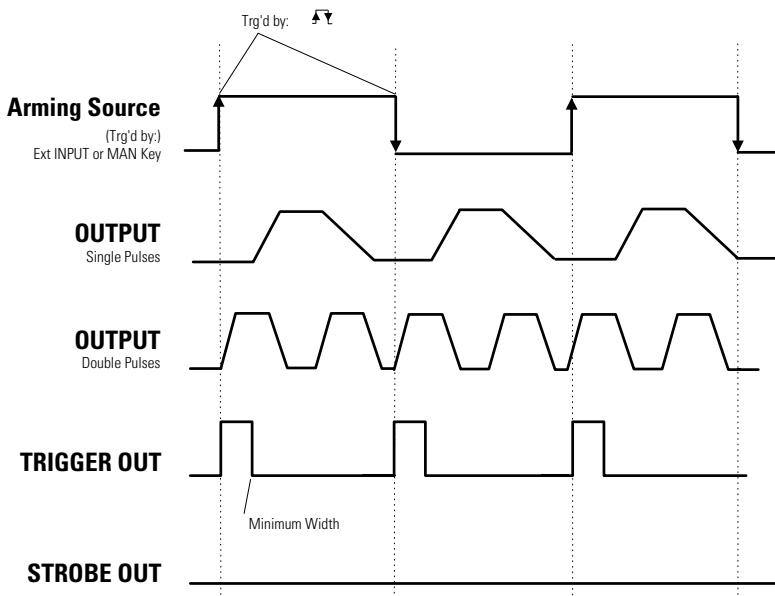the arming source.
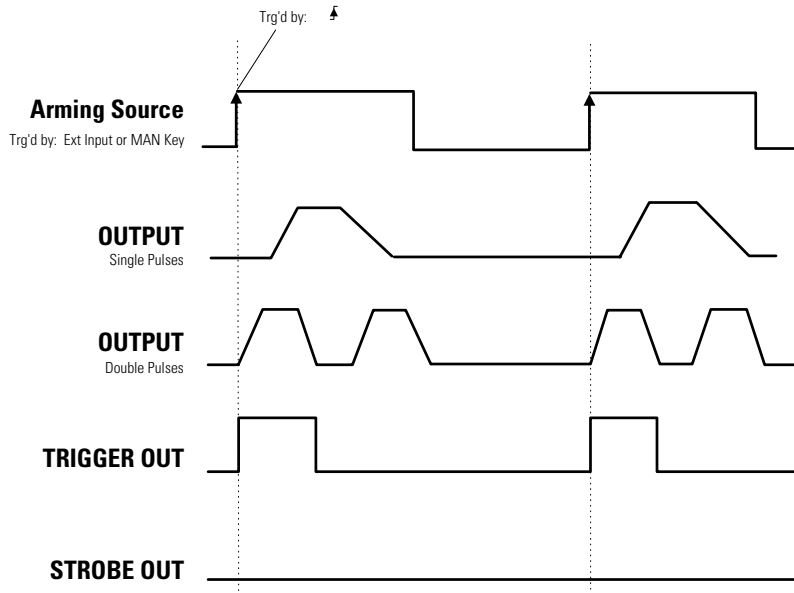
Characteristics
- Single pulse periods are triggered by (TRG'D BY) an active edge at the selected arming source:
  - MAN key on front panel, triggered by press or release or both.
  - EXT INPUT triggered by rising or falling or both edges.
- You can select single pulses or double pulses per pulse period.
- TRIGGER OUT marks each pulse period.
- STROBE OUT is not used in triggered pulse mode.

NOTE
The PLL *cannot* be selected as the arming source. Select continuous
pulse mode with the PLL as period source to achieve the same result.

In contrast to the previous figure, this figure shows a timing diagram where the pulses are triggered by both rising and falling edges of the arming source.

Triggered Burst Mode

The following figures show typical timings for trigger mode TRIGGERED and pulse mode BURST. The bursts are triggered by the rising edge of the arming source.

For the first example, the *synchronously triggerable* internal oscillator is used to source the period.
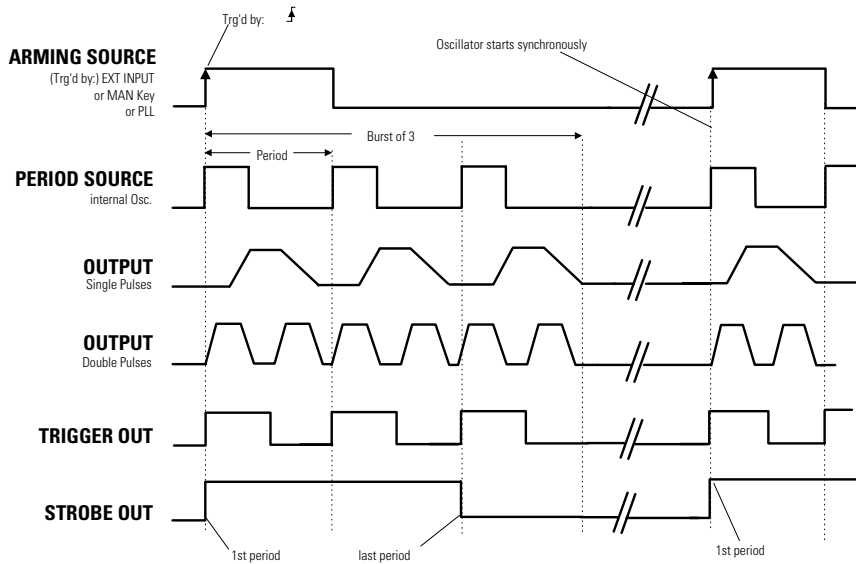

Characteristics
- A burst of pulse periods is triggered by an active edge at the selected arming source
  - MAN key on front panel, triggered by press or release or both.
  - EXT INPUT triggered by rising or falling or both edges.
  - PLL (internally triggered bursts)

  When using the internal PLL as the arming source, you must specify the triggering period.

- You can select the number of pulse periods per burst in the range of 2–65536.

- You can select single pulses or double pulses per pulse period.

- TRIGGER OUT marks each pulse period.

- STROBE OUT rises at the start of the first pulse period in a burst and falls at the start of the last pulse period.

For the second example, either the internal PLL or an external CLK-IN are used to source the period—both cannot be triggered synchronously.
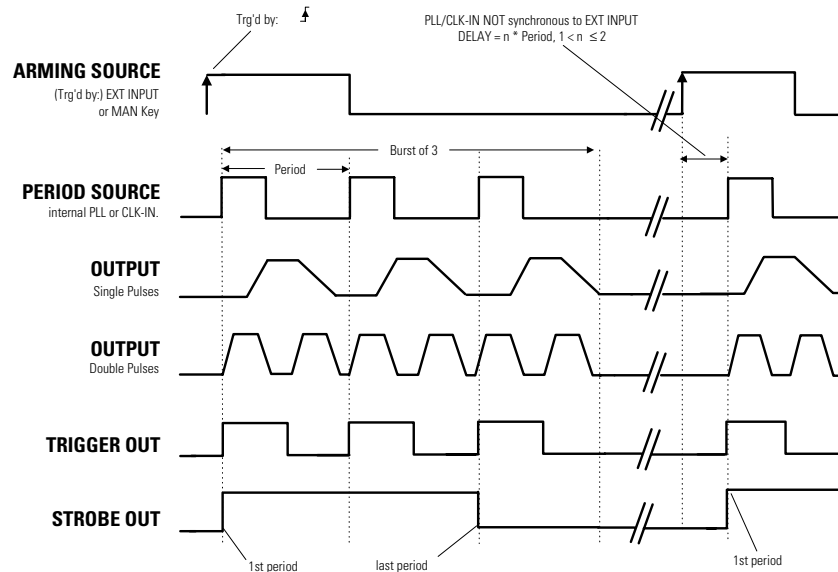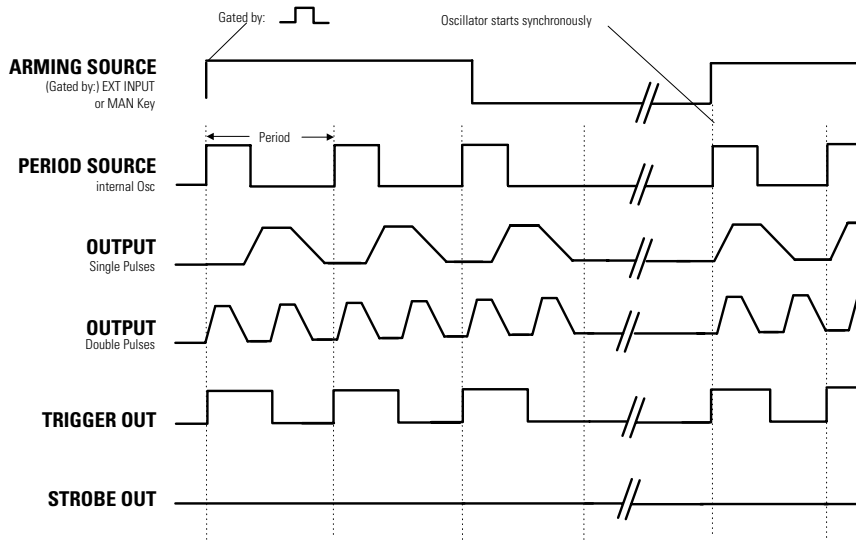

NOTE   You cannot use the PLL as both pulse period source and arming (TRG'D BY) source at the same time.

Gated Pulses Mode

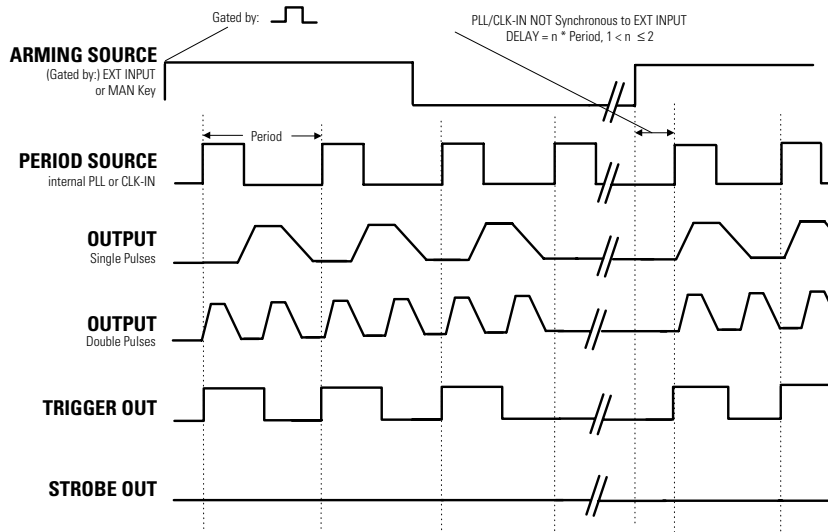The following figures show typical timings for trigger mode GATED and pulse mode PULSES.

For the first example, the *synchronously triggerable* internal oscillator is used to source the period.

Characteristics

- Pulse periods are gated by (enabled by) an active level at the selected arming source:
    - MAN key on the front panel, gated while pressed or released or both.
    - EXT INPUT (external signal) gated by high, low or both levels.
- You can select single pulses or double pulses per pulse period.
- TRIGGER OUT marks each pulse period.
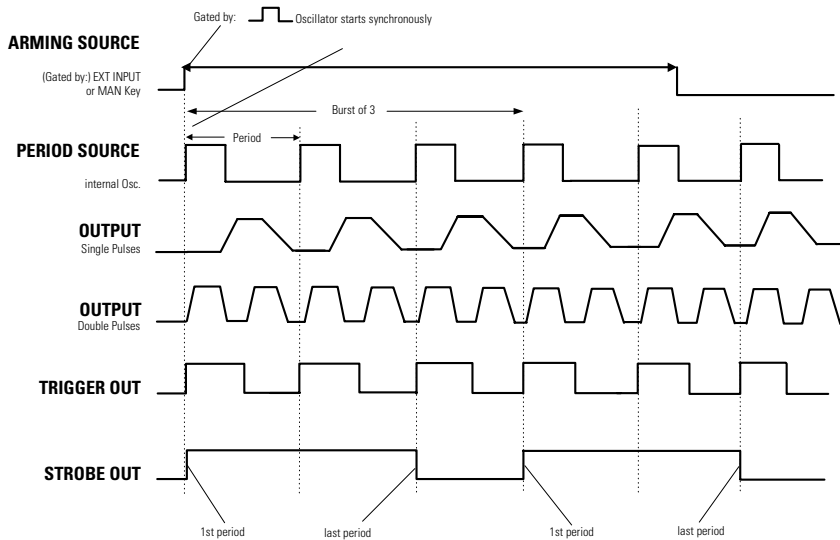- STROBE OUT is not used in gated pulses mode.

For the second example, either the internal PLL or an external CLK-IN
are used to source the period—both cannot be triggered synchronously.

Gated Burst Mode

The following figures show typical timings for trigger mode GATED and
pulse mode BURST.

For the first example, the *synchronously triggerable* internal oscillator is
used to source the period.

Characteristics
- Bursts of pulse periods are gated by (enabled by) an active level at
  the selected arming source:
  - MAN key on the front panel, gated while pressed or released or
    both.
  - EXT INPUT (external signal) gated by high, low or both levels.
- You can select single pulses or double pulses per pulse period.
- TRIGGER OUT marks each pulse period.
- STROBE OUT rises at the start of the first pulse period in a burst and
  falls at the start of the last pulse period.

For the second example, either the internal PLL or an external CLK-IN are used to source the period—both cannot be triggered synchronously.
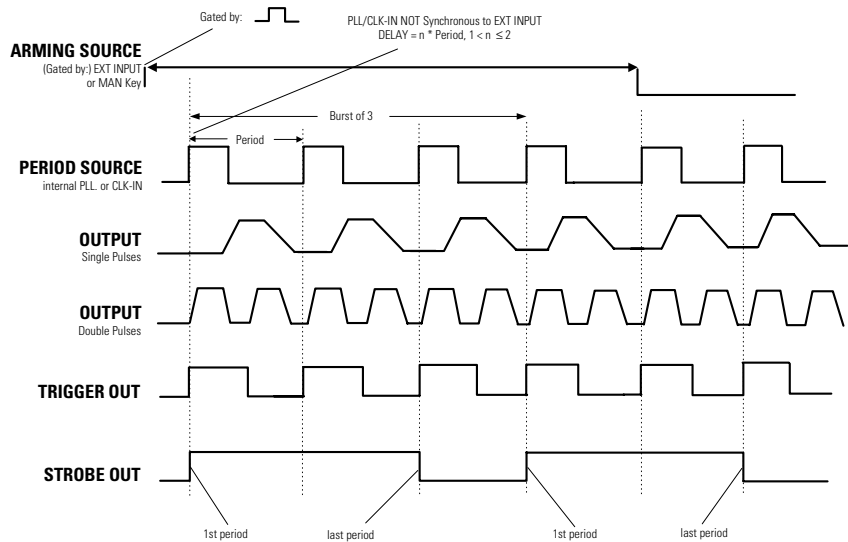
External Width Mode

In external width mode, the pulse width is determined by an external signal. You can choose between:

- MANKEY: Pressing the key generates a leading edge, releasing the key generates a trailing edge.

- EXT-IN: A rising edge at the EXT INPUT generates a leading edge, a falling edge generates a trailing edge.

  The threshold and impedance of the EXT INPUT can be set on the Trigger Level screen.

The period, delay, and width of the output pulse are not programmable in this mode, because they are determined by the external signal.

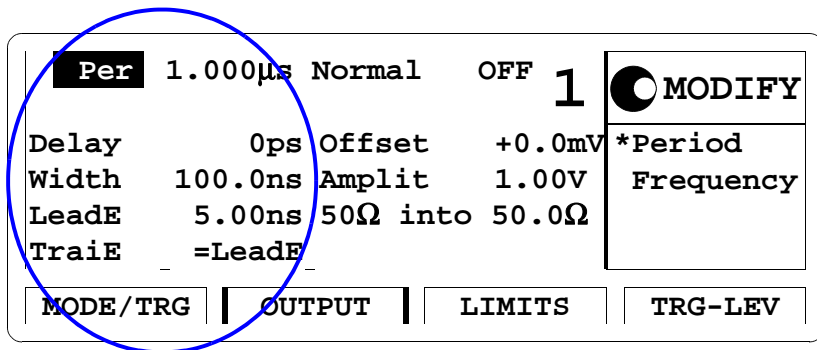The TRIGGER OUT rises and falls parallel to the OUTPUT signal.

The Output Screen

The Output screen shows both timing and level parameters on one screen.

To access the Output screen, press the OUTPUT softkey.

Timing Parameters

You can use the left part of the Output screen to view and control the pulse timing parameters.

The individual timing parameters are described in more detail in the following. All parameters can be entered in different formats.

NOTE   With the HP 81101A you can vary timing parameters without the risk of glitches or drop outs, which could cause measurement errors. This applies to continuous mode with timing values < 100 ms (frequency < 10 Hz), and consecutive values between one-half and twice the previous value.

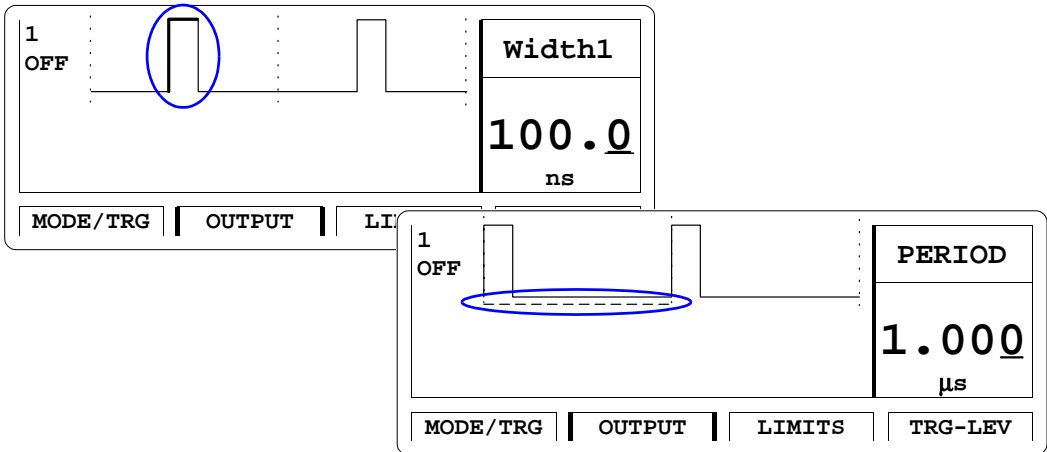When you press SHIFT + MORE (GRAPH) while one of the timing parameters is selected, you will see a graphical representation of the timing parameters. The currently selected parameter is displayed in the Modify/Enter area and is indicated by dashed or bold lines in the graphical display.

Use the left/right cursor keys to toggle between the individual timing parameters.

NOTE   Note that in graphics mode you can only adjust the *values* of each parameter, not the parameter format. If you want to change the format of a parameter, for example WIDTH to DTYCYC, you must be in text mode to select the parameter name with the cursor.

Pulse Period Parameter

Set the pulse period as either PERIOD or FREQUENCY.

If you select the CLK-IN as the pulse period source on the Mode/Trigger screen, the pulse period/frequency is determined from the signal applied to the CLOCK/REF INP. connector:

• MEAS ONCE

The external signal is measured only once. Press ENTER to measure again.

- MEAS CONT

    The external signal is continuously measured until the instrument receives a command via HP-IB.

    To invoke continuous measurements again, you have to bring the instrument in local operating mode by pressing SHIFT (LOCAL) and start continuous measurement again.

Pulse Delay Parameter

Delay the leading edge of the pulse within the pulse period. There are three delay formats available:

- DELAY or DBLDEL (select ABSOLUTE)

    DELAY is the absolute delay from the start of a pulse period to the start of the leading edge of the pulse.

    If double pulses are selected on the Mode/Trigger screen, the DBLDEL parameter specifies the delay between the first and second pulse in each pulse period.

    The absolute delay is independent of the pulse period. So the leading edge does not move relative to the start of the period if you change the period.

- DELAY% (select % OF PERIOD)

    The delay from the start of the pulse period to the start of the leading edge expressed as a percentage of the pulse period. In this format, if you change the period, the leading edge moves relative to the start of the period in order to maintain the percentage delay.

- PHASE (select PHASE)

    The phase delay in degrees from the start of the pulse period to the start of the leading edge (360° = 1 pulse period). In this format, if you change the period, the leading edge moves relative to the start of the period in order to maintain the phase delay.

Pulse Width Parameter

Set the width of the output pulse. There are three width formats available:

- WIDTH (select WIDTH)

  The absolute pulse width measured from the start of the leading edge to the start of the trailing edge. In this format, the pulse width is independent of changes in pulse period and delay.

- DTYCYC (select DUTYCYCLE)

  The duty cycle is the pulse width measured from the start of the leading edge to the start of the trailing edge expressed as a percentage of the period. In this format, if you adjust the period, the absolute width is adjusted to maintain the duty cycle.

- TRADEL (select TRAILDEL)

  The trailing delay is the absolute delay from the start of the pulse-period to the start of the trailing edge. In this format the trailing edge remains fixed relative to the start of the pulse period if you adjust the pulse delay (leading edge delay) or the pulse period.

NOTE   You cannot have the width format set to DTYCYC and the leading/trailing-edge format set to percentage of width (LEADED%/TRAILE%) at the same time.

Leading Edge Parameter

Set the leading edge transition time of the pulse, measured from 10% to 90% of the pulse amplitude. There are two formats available:

- LEADE (select ABSOLUTE)

  The absolute transition time measured from 10% to 90% of the pulse amplitude. In this format the leading edge is independent of the pulse width.

- LEADE% (select % OF WID)

  The absolute transition time expressed as a percentage of the pulse width. In this format, if you adjust the pulse width, the transition time is adjusted to maintain the edge time as a percentage of the width.

NOTE   The leading and trailing edges are independently programmable within
certain ranges only, see *"Transition Times"* in the *Reference Guide*.

NOTE   You cannot have the width format set to DTYCYC and the leading/trailing-
edge format set to percentage of width (LEADE%/TRAIE%) at the same
time.

Pulse Trailing Edge Parameter

Set the trailing edge transition-time of the pulse, measured from 10% to
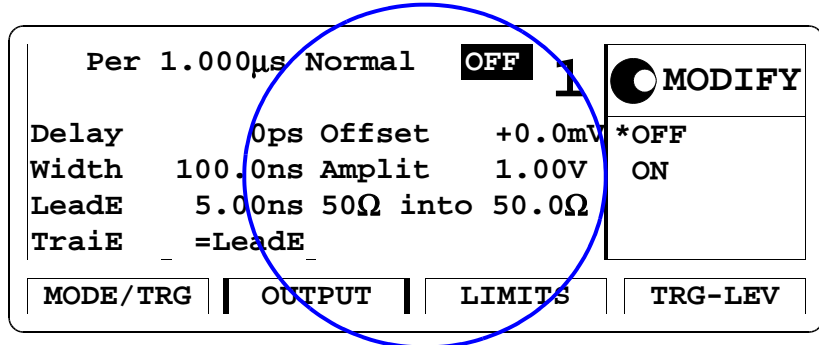90% of the pulse amplitude. There are three formats available:

- =LEADE (select =LEADE)
  The trailing edge transition time is coupled directly to the leading
  edge to maintain a symmetrical pulse.

- TRAIE (select ABSOLUTE)
  The absolute transition time measured from 90% to 10% of the pulse
  amplitude. In this format the trailing edge is independent of the
  leading edge and the pulse width.

- TRAIE% (select % OF WID)
  The trailing edge transition time expressed as a percentage of the
  pulse width. In this format, if you adjust the pulse width, the
  transition time is adjusted to maintain the edge time as a percentage
  of the width.

NOTE   The leading and trailing edges are independently programmable within
certain ranges only, see *"Transition Times"* in the *Reference Guide*.

NOTE   You cannot have the width format set to DTYCYC and the leading/trailing
edge format set to percentage of width (LEADE%/TRAIE%) at the same
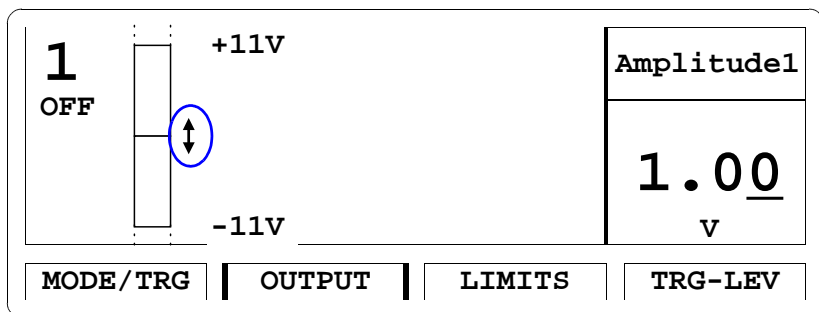time.

Level Parameters

You can use the right part of the Output screen to view and control the
pulse level parameters and to enable or disable the outputs.

```
    Per 1.000µs Normal   OFF  1   ◐ MODIFY

Delay       0ps Offset    +0.0mV  *OFF
Width   100.0ns Amplit    1.00V    ON
LeadE     5.00ns 50Ω into 50.0Ω
TraiE    =LeadE

  MODE/TRG    OUTPUT     LIMITS    TRG-LEV
```

The individual level parameters are described in more detail in the
following. All parameters can be entered in different formats.

When you press SHIFT + MORE (GRAPH) while one of the level parameters is
selected, you will see a graphical representation of the level parameters.
The currently selected parameter is displayed in the Modify/Enter area
and is indicated in the graphical display.

```
 1           +11V         Amplitude1
OFF
             ↕
             -11V          1.00
                             V

  MODE/TRG    OUTPUT     LIMITS    TRG-LEV
```

When output limits are on, the limits are indicated on the Output screen
in graphics mode (see *"The Limits Screen" on page 64*).

NOTE   Note that in graphics mode you can only adjust the *values* of each
               parameter, not the parameter format. If you want to change the format of
               a parameter, for example OFFS-AMPL to HIGH-LOW, you must be in text
               mode to select the parameter name with the cursor.

NOTE   When the output is switched on, the instrument monitors the actual
               voltage and current levels at the output. The output is automatically
               switched off if voltage levels or power dissipation reach levels which
               could damage the output circuits.

Normal/Complement Parameter

Switch the output between normal and complement mode:

- NORMAL

  Pulse leading edge rises from low to high level, trailing edge falls from
  high to low level.

- COMPLMNT

  Pulse leading edge falls from high to low level, trailing edge rises from
  low to high level.

NOTE   This parameter is only available in text mode.

Offset/Amplitude, High/Low Level Parameters

Set and display the pulse levels in terms of either offset and amplitude, or
high and low level. You can quickly set TTL or ECL output levels using
the SET TTL and SET ECL formats.

- SET TTL

  Select high and low level formats and automatically set the levels to
  the default TTL levels:

  TTL-HI: +2.50 V
  TTL-LOW: +0.0 mV

  The default levels are set once and can be adjusted afterwards by
  moving the entry focus to the values as normal.

- HIGH-LOW

  Select high and low level format for the pulse levels.

- OFFS-AMPL

  Select offset and amplitude format for the pulse levels. Offset is measured from 0V to the middle of the pulse amplitude. Pulse amplitude is the difference between the high and low levels of the pulse.

- SET ECL

  Select high and low level format and automatically set the levels to the default ECL levels:

  ECL-HI: −850 mV
  ECL-LOW: −1.80 V

  These default levels are set once and can be adjusted afterwards by moving the entry focus to the value as normal.

Voltage/Current Mode (mV/V/mA/A)

Move the entry focus onto the level units to select between setting the pulse levels IN VOLTS or IN AMPERES.

NOTE   This parameter is only available in text mode.

Output Source Impedance Parameter (50Ω into)

Select an output source impedance of 50 Ω or 1 kΩ

NOTE   This parameter is only available in text mode

Load Impedance Parameter (50.0Ω)

Adjust the load impedance value expected at the output to compensate for non-50Ω loads. The displayed level parameters are then calculated using this value and therefore represent the levels at a non-50Ω static load.
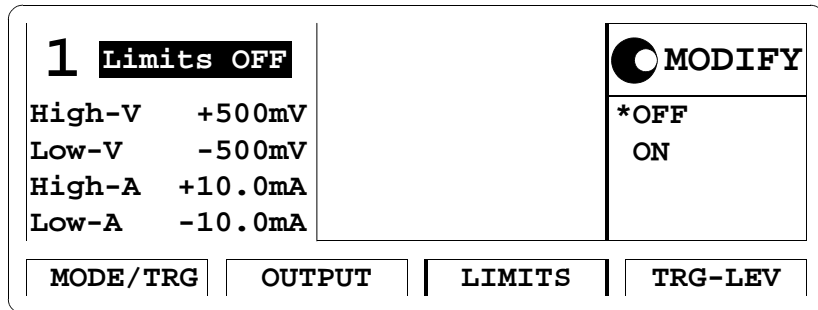
NOTE   This parameter is only available in text mode.
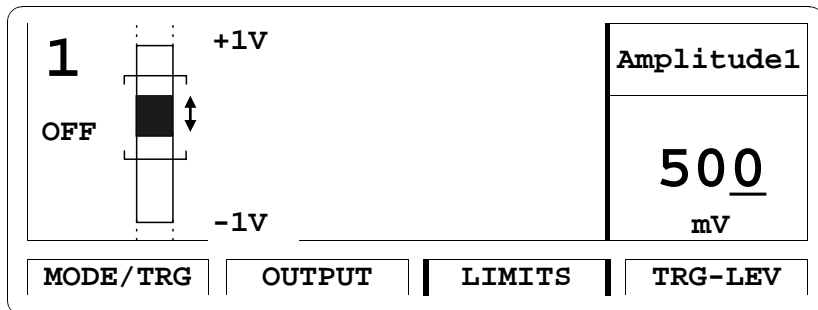
The Limits Screen

Use the Limits screen to set up voltage and current limits for the pulse level parameters to prevent accidental damage of the device under test.

To access the Limit screen, press the LIMIT softkey.

```
┌─────────────────────────────────────────────────────────┐
│                                                           │
│  1  Limits OFF                        ◖ MODIFY           │
│                                                           │
│  High-V    +500mV                     *OFF               │
│  Low-V     -500mV                      ON                │
│  High-A   +10.0mA                                        │
│  Low-A    -10.0mA                                        │
│   MODE/TRG    OUTPUT     LIMITS      TRG-LEV             │
│                                                           │
└─────────────────────────────────────────────────────────┘
```

After you switch on the limits, the pulse level parameters on the OUTPUT screen cannot be adjusted outside the ranges specified on the LIMITS screen if the output is switched on. Note that because current and voltage limits apply, the available ranges of the impedance parameters are also affected.

When output limits are on, the limits are indicated on the OUTPUT screen in graphics mode, and the level bar is scaled accordingly:

```
┌─────────────────────────────────────────────────────────┐
│                                                           │
│  1           +1V                    Amplitude1           │
│                                                           │
│  OFF    ▮ ↕                                              │
│                                        500               │
│              -1V                         mV              │
│   MODE/TRG    OUTPUT     LIMITS      TRG-LEV             │
│                                                           │
└─────────────────────────────────────────────────────────┘
```

The Trigger-Level Screen

Use the Trigger-Level screen to

- set the triggering threshold and input impedance for the EXT INPUT connector,

- set the triggering threshold and input impedance for the CLOCK/REF INP. connector,

- set the output levels for the STROBE OUT and TRIGGER OUT connectors.

To access the Trigger-Level screen, press the TRG-LEV softkey.

```
EXT-IN: Threshold     +1.0V 50Ω  ◑ MODIFY
CLK-IN: Threshold     +1.0V 50Ω
                                  Set TTL
                                  Set ECL
TRIGGER-OUT: TTL                 *Voltage
STROBE-OUT : TTL

  MODE/TRG    OUTPUT     LIMITS    TRG-LEV
```

Threshold and Impedance Parameters

You can individually specify threshold and input impedance of the EXT-IN and the CLK-IN connectors.

EXT-IN and CLK-IN Threshold Parameters

Move the entry focus to EXT-IN or CLK-IN to quickly set the triggering threshold of the external input or the clock input to a TTL- or ECL-compatible level:

65

- SET TTL

  Set the input threshold to +2.5 V.

  You can adjust the threshold by moving the entry focus to the value.

- SET ECL

  Set the input threshold to –1.3 V.

  You can adjust the threshold by moving the entry focus to the value.

- VOLTAGE

  Set any threshold level in the range of –10.0 V to +10.0 V. Move the entry focus to the value to adjust it.

EXT-IN and CLK-IN Impedance Parameters

Toggle the input impedance of the external input connector or the clock input connector between 50 Ω and 10 kΩ.

Trigger and Strobe Level Parameters

You can individually set the output levels of the TRIGGER OUT connector and the STROBE OUT connector.

Set the output levels (into 50 Ω) to

- TTL

  High level: +2.50 V

  Low level: 0 V

- ECL

  High level: –0.85 V

  Low level: –1.80 V

The Memory Card Screen

Use the Memory Card screen to

- store instrument settings to the memory card,

- recall instrument settings from the memory card,

- delete files from the memory card,

- format a memory card.

To access the Memory Card screen, press the MEMCARD softkey. If the MEMCARD softkey is not displayed, press MORE.

```
┌─────────────────────────────────────────────┐
│ Dir Path  \                    ⬤ MODIFY     │
│                                              │
│  Filename   TESTVI.TXT          *BURSTS      │
│  ..........................      PULSES      │
│                                              │
│  Perform Operation                           │
│                                              │
│  ┌──────────┐ ┌──────────┐ ┌──────────┐ ┌──────────┐ │
│  │ MODE/TRG │ │ TRG-LEV  │ │ MEMCARD  │ │ CONFIG   │ │
│  └──────────┘ └──────────┘ └──────────┘ └──────────┘ │
└─────────────────────────────────────────────┘
```

NOTE   Note that the HP 81101A uses DOS-formatted memory cards, and that you cannot create or delete directories using the instrument.

Directory Path Parameter

Move the entry focus to DIR PATH to change the directory on the memory card, or to view the sub-directories of the current directory (the name of the current directory is displayed next to DIR PATH).

All sub-directories of the current directory are listed in the Modify/Enter area.

To change the directory, turn the knob to select the directory name and press the ENTER key.

Note that when you are in a sub-directory you can return to the parent-directory by selecting ".." from the directory list.

Filename Parameter

Move the entry focus to the FILENAME parameter to select a file from the current directory. Use the knob to scroll through the filenames listed in the Modify/Enter area.

Memory Card Operations

Move the entry focus to PERFORM OPERATION and use the knob to select the required operation. Press the ENTER key to perform the operation.

- READCARD

  Read the DOS file system information from the memory card after inserting a new card.

- RECALL

  Recall the selected file as the current instrument setting.

- STORE

  Store the current instrument setting to the memory card.

  Press ENTER once to start editing the filename for the setting in the Modify/Enter area. The currently selected filename is used as default.

CAUTION   If you do not modify the filename, the existing file will be overwritten when you press ENTER.

To modify the filename, move the character cursor with the cursor keys. Modify a character using the knob. When you have finished, press ENTER to store the setting.

The filename can be up to 8 characters long.

Press the cursor up or cursor down keys to cancel the store operation at any time.

Note that the DOS filename suffix ".ST0" is added automatically to the filename when you store the current settings.

- STORE ALL

  Store the current instrument setting and the instrument setting memories 1 to 9 to the memory card. Each setting is stored in a separate file with the same name but different suffixes (".ST0" for the current setting, "ST1" to "ST9" for setting memories 1 to 9).

  Press ENTER once to start editing the filename for the setting in the Modify/Enter area. The currently selected filename is used as default.

CAUTION   If you do not modify the filename, the existing file will be overwritten when you press ENTER.

To modify the filename, move the character cursor with the cursor keys. Modify a character using the knob. When you have finished, press ENTER to store the setting.

The filename can be up to 8 characters long.

Press the cursor up or cursor down keys to cancel the store operation at any time.

- DELETE

  Delete the selected file from the memory card.

- FORMAT

  Format the memory card.

CAUTION   Formatting a memory card destroys any existing files on the card.

The Configuration Screen

Use the Configuration screen to

- set the HP-IB address of the HP 81101A,
- perform a selftest,
- select the frequency reference source and the frequency for the PLL.

To access the Configuration screen, press the CONFIG softkey. If the CONFIG softkey is not displayed, press MORE.

```
┌─────────────────────────────────────────────────┐
│ HP-IB Address:    10        ⬤ MODIFY             │
│ Perform: Selftest                                │
│                                                  │
│ ......................        10                 │
│ PLL-Ref : Internal                               │
│                                                  │
│  ┌─────────┐ ┌─────────┐ ┌─────────┐ ┌─────────┐ │
│  │MODE/TRG │ │ TRG-LEV │ │ MEMCARD │ │ CONFIG  │ │
│  └─────────┘ └─────────┘ └─────────┘ └─────────┘ │
└─────────────────────────────────────────────────┘
```

HP-IB Address

Set the HP-IB address for the instrument in the range of 0 to 30. The default address is 10.

Perform Operation Selftest

Move the entry focus to PERFORM: SELFTEST and press the ENTER key.

If the selftest fails, a flashing E is displayed. Press HELP to see the list of error messages.

PLL Reference

Set the frequency reference source for the PLL:

- INTERNAL

  The internal 5 MHz reference.

- CLK-IN

  An external reference signal at the CLOCK/REF INP. connector. You can set the expected frequency of the external reference to 5 MHz or 10 MHz.

Warnings and Errors

The HP 81101A has two levels of error reporting called "warnings" and "errors". Checking for errors and warnings is always enabled, unless you switch it off via the HP-IB using the `:SYSTem:CHECk` command.

- A **warning** is generated when the output signal *could* be invalid due to a combination of worst case uncertainties at the current settings of all relevant parameters.

  For example, when adjusting the pulse width, all other timing parameters (leading edge, trailing edge, and pulse period) and their uncertainties have to be considered in order to check if the width setting will fits within the pulse period.

  Note that the warning limits are therefore not fixed for a particular parameter, but vary with the settings of the related parameters. It is also possible that the error and warning limits are the same, that is, a warning does not occur before the error limit is reached.

  If a warning occurs, the settings are still implemented in the hardware because the worst-case conditions used to evaluate the warning limits are very unlikely to occur in practice.

  A blinking W indicates that one or more warnings have occurred. Press HELP to view the warning list.

- An **error** is generated when an invalid mode is chosen, or the required parameter settings cannot be implemented in the output hardware. Multiple errors can occur, but only the first error detected is displayed.

  An error is indicated by a blinking error message at the bottom of the screen.

NOTE   If you are using the knob to adjust parameters it is normally not possible to generate warnings or errors. All parameters are automatically limited to settings that guarantee specified operation.

However, if you press the SHIFT key while turning the knob, you can adjust a parameter beyond its warning limits.

NOTE   You can press SHIFT + HELP (AUTOSET) to carry out an autoset. The instrument resets all parameters, based on the current period setting, to remove all warning and error conditions.

An Example of Warning and Error Reporting

1   Switch on the instrument and recall the standard settings by pressing SHIFT + STORE (RECALL) + 0.

The period is now set to 1 μs.

2   Switch on the output by pressing SHIFT + 0 (ON/OFF).

3   On the Output screen, move the parameter cursor to the value of the WIDTH parameter (100NS).

4   Use the knob to make the pulse width as large as possible (approximately 940NS).

This limit is intended to guarantee that the actual output pulse is within specifications, for the actual period.

The limit is calculated taking into account a worst case combination of minimum period from the period setting (1 μS) and maximum width from the width setting (940 NS) together with minimum leading and trailing edge settings (5.00 NS).

NOTE   Note that if you now try to adjust the leading edge from its current setting of 5.00 ns with the knob, it cannot be adjusted. This is because the upper and lower warning limits are currently 5.00 ns. The width is at its maximum value and width + leading edge + trailing edge ≤ period.

5   Press SHIFT and adjust the pulse width above its warning limit. A flashing W appears to indicate that a warning condition has occurred.

NOTE   Note that as long as no errors occur, the output hardware is set up and attempts to generate the required output.

6   Press HELP to see the warning message:

TRAILING EDGE 1 MAY CUT NEXT PULSE

7   Press HELP again to return to the WIDTH parameter.

8 Increase the pulse width further to approximately 980 ns and press HELP to see the current warnings:

WIDTH 1 TOO CLOSE TO PERIOD

TRAILING EDGE 1 MAY CUT NEXT PULSE

9 Press HELP again to return to the WIDTH parameter.

10 Increase the pulse width further until a flashing error message appears (approximately 1.10 µs):

OUTPUT 1: WIDTH > PERIOD

You have reached the current upper error-limit of the WIDTH parameter.

The setting is not implemented in the output hardware.

11 Press SHIFT + HELP to perform an AUTOSET.

A   Installation & Maintenance

Initial Inspection

Inspect the shipping container for damage. If the container or cushioning material is damaged, keep it until the contents of the shipment have been checked for completeness and the instrument has been verified both mechanically and electrically.

WARNING   **To avoid hazardous electric shock, do not perform electrical tests when there are signs of shipping damage to any part of the instrument's outer covers or panels.**

If the contents are incomplete, or there is mechanical damage, or if the instrument does not work as expected within its specifications, notify the nearest Hewlett-Packard office. (Please request the latest performance tests from Hewlett Packard.) Keep the shipping materials for inspection by the carrier. The HP office will arrange for repair or replacement without awaiting settlement.

Standard Deliverables

The HP 81101A shipping container contains the following standard deliverables:

1. The HP 81101A Pulse Generator.

2. The english Quick Start Guide and a Reference Guide.

3. A power cord.

1. HP 81101A Pulse Generator

2. This Quick Start Guide
   and the Reference Guide

3. A Power Cord

Options and Accessories:

Options

Rear Panel Connectors   Option UN2
                             All inputs and outputs are at the rear panel

1 MB SRAM Memory Card   Option UFJ
                             (HP part number 0950-3880)

The following figure shows the instruments rear panel with Option UN2 installed.
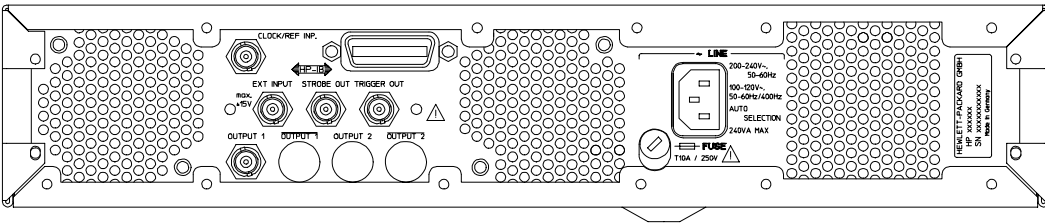
Handle Accessory

Front Handle Kit   HP part number 5063-9226

Rack Mounting Accessories

Rack Mount Kit   HP part number 5063-9212

Rack Mount and Front   HP part number 5063-9219
Handle Kit

Rack Slide Kit   HP part number 1494-0059

Quick Start Guide Language Options

French Guide   Option ABF
                           (HP part number 81101-91210)

Japanese Guide   Option ABJ
                           (HP part number 81101-91510)

Taiwan Chinese Guide   Option AB0
                           (HP part number 81101-91610)

Korean Guide   Option AB1
                           (HP part number 81101-91710)

Chinese Guide   Option AB2
                           (HP part number 81101-91810)

Additional Documentation Options

Service Manual   Option 0BW
                           (HP part number 81101-91021)

Service Documentation   HP part number 81101-91031
(Component Level)

Power Requirements

CAUTION   Before applying AC line power to the instrument, ensure that the correct line fuse is installed in the fuse holder and the correct power cable is fitted.

NOTE   When the front panel switch is off, the instrument is in "standby" mode. The instrument is disconnected from the AC line power *only* by disconnecting the power cord. Please make sure that the power cord is easily identifiable and can quickly be reached by the operator.

The following symbol is close to the 'Standby' switch on the front panel of the instrument.

The instrument can operate from any single-phase AC power source supplying 100–240 V in the frequency range from 50 to 60 Hz, or 100–120 V at 400 Hz. The maximum power consumption is 300 VA with all options installed. When the instrument is switched on the power supply adapts automatically to the applied AC power (Auto Selection) and monitors the AC power range during operation.

Replacing the Fuse

1   **Remove the power cord.**

2   Unscrew the fuse cap at the rear of the instrument beside the power-inlet socket.

Fuse Holder and
Fuse Cap
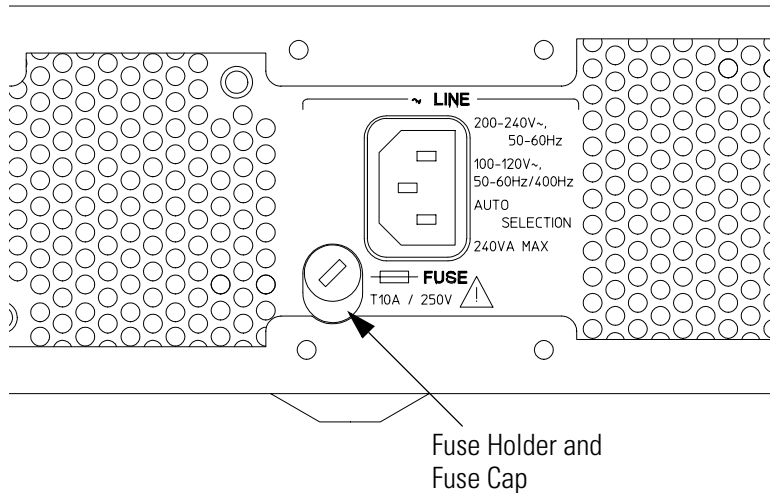
3   Replace the fuse with the equivalent part:

Line Voltage	Fuse Type	HP Part Number
100–240 V~	T 10A, 250 V	2110-0720

4   Refit the fuse cap.

Power Cable

In accordance with international safety standards, this instrument is equipped with a three-wire power cable. The figure below shows the part numbers of the power cables available. When connected to an appropriate AC power receptacle, this cable grounds the instrument cabinet.

Australia
8120-1369

Denmark
8120-2956

Europe
8120-1689

Great Britain
8120-1351

South Africa
8120-4211

Switzerland
8120-2104

United States 120V
8120-1378

Japan 120V
8120-4753
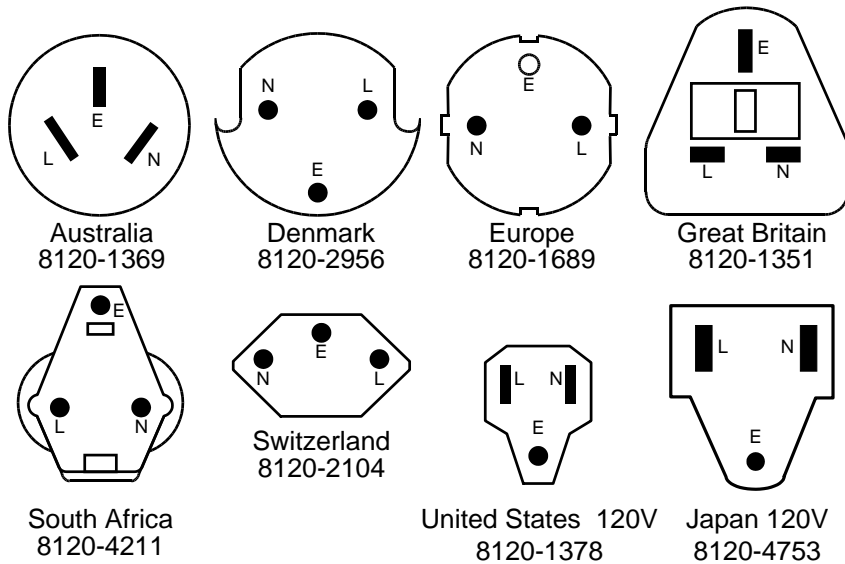
Ventilation Requirements

The instrument is fitted with three cooling fans. Make sure that there is adequate clearance of 80 mm at the rear and 25 mm at the top and bottom to ensure adequate air flow. If the air flow is restricted, the internal operating temperature will be higher, reducing the instrument's reliability or causing the instrument's thermal-protection circuits to automatically switch off the instrument.

NOTE   Do not cover the ventilation holes.

Thermal Protection

Overheating Detection

The instrument monitors its internal temperature. If the temperature exceeds approximately 80°C, the power supply is switched off. The instrument will switch on again if the temperature falls below approximately 77°C.

Fan Failure

If a fan is broken or prevented from operating by a blockage, the temperature will increase. When the temperature exceeds approximately 80°C the overheating detection switches off the instrument for safety reasons. For reliability it is recommended to send instruments with broken or defective fans immediately to HP Service for repair.

Battery

This instrument contains a lithium battery. Typical life time of the battery is about 5 years.

NOTE Recycle or dispose used batteries according to local regulations. Or contact your Hewlett-Packard representative for information on battery recycling.
(In the USA and Canada, call 1-800-333-1917)

The battery is replaceable. Replacement should only be carried out by *qualified service personnel*.

NOTE There is a danger of explosion if the battery is incorrectly replaced.

The battery must be replaced with the same or equivalent battery type:

A **Lithium CR2477-N** type battery.

The HP replacement part number is: **1420-0557**.

The battery is protected against charging.

CAUTION Do *not* crush, puncture, or incinerate the battery. Do *not* short the battery's external contacts.

⚠

Battery Replacement

NOTE   Disconnect the power cord from AC line voltage to avoid electrical
shock.

1 Remove the bumper which is fitted to the front panel.

2 Remove the strips on the left and right side of the front panel.

3 Remove the front panel which is secured with two screws at each
side.

4 Disconnect the flat cable which connects the front panel to the
chassis.

5 On the right side of the chassis there is a cover secured with one
screw. Remove this cover.

6 Now the battery can be removed from the battery holder. It is
recommended to push the battery on the top, and to pull the battery
on the bottom with one finger for easier removal.

7 Fit the new battery in the holder, take care to not short current the
battery on the chassis.

8 Fit the cover again and secure it with the screw to the chassis.

9 Re-connect the flat cable of the front panel again to the chassis
connector. Make sure that the pin one (red wire) is pointing to the
mid of the chassis.

10 Re-assemble the front cover.

11 Fit the strips to the sides of the front panel, again.

12 Fit the bumper to the front panel.

Operating Environment

Storage Temperature	–40 °C to +70 °C
Operating Temperature	0 °C to 55 °C
Humidity	95% R.H. (at 40 °C)
Altitude	Up to 2000m
Installation	Category II
Pollution	Degree 2

WARNING   **The instrument is not designed for outdoor use. Do not expose the instrument to rain or other excessive moisture. Protect the instrument from humidity and temperature changes which could cause condensation within the instrument.**

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

Cleaning Recommendation

WARNING   **To prevent electrical shock, disconnect the instrument from mains before cleaning. Use a dry cloth or one slightly dampened with water to clean external case parts. Do not attempt to clean internally.**

Acoustic Noise Emission

Acoustic Noise Emission

For ambient temperatures up to 30°C, under normal operation and at the typical operator position:

LpA = 52 dBA

Measured in accordance with ISO 7779 / EN 27779.

Geräuschemissionswerte

Bei einer Umgebungstemperatur bis 30°C

LpA = 52 dBA

am Arbeitsplatz, normaler Betrieb.

Angabe ist das Ergebnis einer Typprüfung nach ISO 7779 / EN 27779.

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Front Panel Controls

DATA ENTRY

MAN	7	8	9	nano
RECALL	PERIOD	DELAY	WIDTH	
STORE	4	5	6	micro / Mega
AUTOSET	LEAD	TRAIL	HIGH	LOW
HELP	1	2	3	milli / kilo
ON | OFF				
SHIFT	0	.	+/-	ENTER
LOCAL				

CURSOR/DIGIT

MODIFY

**DATA ENTRY /
QUICK ACCESS
Keys**

**CURSOR
Keys**

**Special
FUNCTION
Keys**

**ENTER &
UNIT Keys**

KNOB