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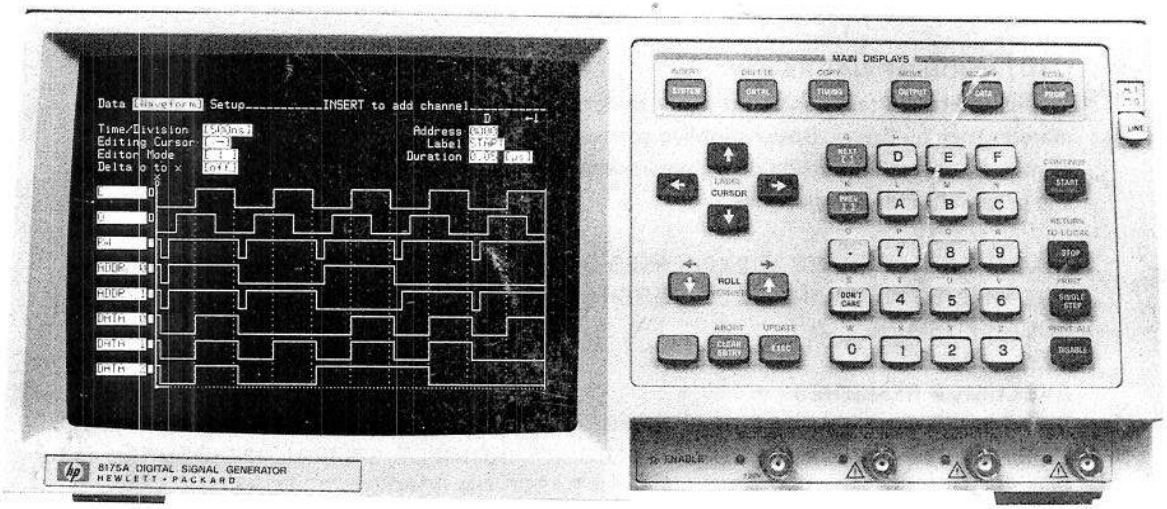
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OPERATING AND PROGRAMMING MANUAL

8175A DIGITAL SIGNAL GENERATOR



HEWLETT PACKARD

HP 8175A

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OPERATING AND PROGRAMMING MANUAL

8175A DIGITAL SIGNAL GENERATOR
(Including Option 001)

This manual applies directly to all instruments.

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HERRENBERGER STR. 110, D-7030 BOBLINGEN
FEDERAL REPUBLIC OF GERMANY

TSC
マスター

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SAFETY SUMMARY

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

GENERAL – This is a Safety Class I instrument (provided with terminal for protective earthing) and has been manufactured and tested according to international safety standards.

OPERATION – BEFORE APPLYING POWER comply with the installation section. Additionally, the following shall be observed:

Do not remove instrument covers when operating.

Before the instrument is switched on, all protective earth terminals, extension cords, auto-transformers and devices connected to it should be connected to a protective earth via a ground socket. Any interruption of the protective earth grounding will cause a potential shock hazard that could result in serious personal injury. Whenever it is likely that the protection has been impaired, the instrument must be made inoperative and be secured against any unintended operation.

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.

Adjustments described in the manual are performed with power supplied to the instrument while protective covers are removed. Energy available at many points may, if contacted, result in personal injury.

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. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation is present. Do not replace components with power cable connected.

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 still be charged even if the instrument has been disconnected from its source of supply.

To prevent CRT implosion, avoid rough handling or jarring of the instrument. Handling of the CRT shall be done only by qualified maintenance personnel using approved safety mask and gloves.

SAFETY SYMBOLS



The apparatus will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the apparatus against damage.



Indicates dangerous voltages.



Earth terminal

WARNING The WARNING sign denotes a hazard. It calls attention to a procedure, practice or the like, which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.

CAUTION The CAUTION sign denotes a hazard. It calls attention to an operating 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 sign until the indicated conditions are fully understood and met.

WARNING

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

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8175A

Accessories

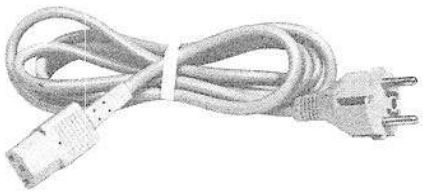
4x HP 15462A
1x HP 15463A

15463A TRIGGER POD (includes 15463-63201 lead set and 10230-62101 probe tips)



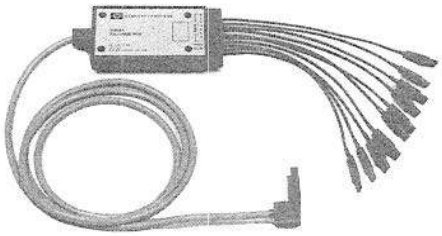


FUSE



POWER CORD

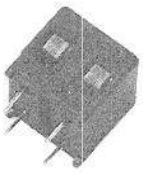
15462A TTL/CMOS POD (progr, high level, includes 1 ea. 15429A)



15463-63201
lead set



15429A
solder-in receptacles for connection to a PC board, 5x2 ea.



10230-62101
probe tip, 1 ea. (10 necessary per POD)

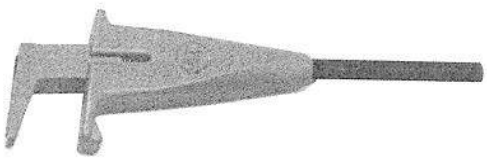
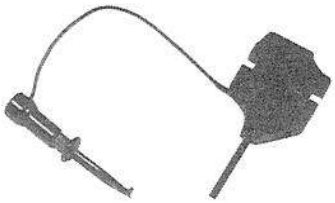


Figure 1-1. 8175A and Supplied Accessories

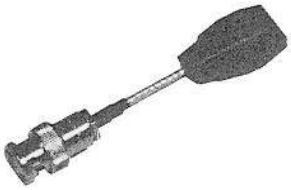
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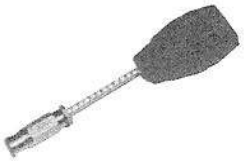
15408A
plug-on grabbers with ground leads, 5 ea.



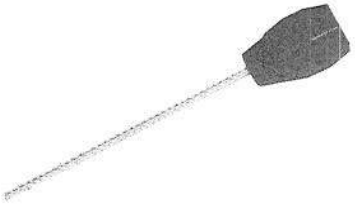
15409A
plug-on BNC adaptors, 5 ea.



15410A
plug-on SMB adaptors, 5 ea.



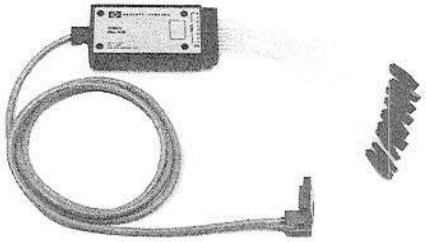
15411A
plug-on coax open-end adaptors, 5 ea.



15415A
plug-on miniprobes, can be used with HP 10024A IC test clip, 5 ea.



15461A ECL POD (fixed ECL level, includes 1 ea 15429A)



HP 15430A
cable for synchronized master slave operation of two ea, HP 8175A

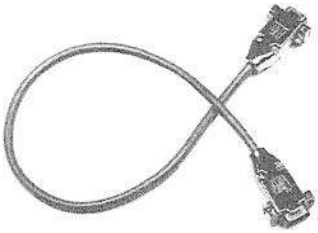
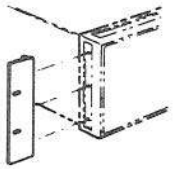


Figure 1-2. Available Connector and Cable Accessories



Rack flange
Order Option 908
(H.P. Part No.
5061–0078)

Figure 1-4. Rack Mounting Accessory

CHAPTER 1
GENERAL INFORMATION

1-1 INTRODUCTION

This Operating Manual contains information required to install, operate and test the Hewlett-Packard Model 8175A. (Service related information is located in the corresponding sections of the complete manual set).

Figures 1-1 and 1-2, show the mainframe, the accessories supplied with each and those available.

Manual Contents

The contents of this manual are as follows:

Chapter 1 covers instrument identification, description, options, accessories, specifications and other basic information.

Chapter 2 provides installation instructions for the 8175A and its accessories. It also includes information about initial inspection and damage claims, preparation for use, packaging, storage and shipment.

Chapter 3 is sub-divided into several sections, the purpose of the chapter is to familiarise you with operation of the 8175A. Manual operation of the 8175A is covered with the aid of a "Getting Started" section which includes several worked examples. The section is designed to help you learn the basics of instrument operation as quickly as possible. Comprehensive descriptions of all Main Displays, their menus, edit capabilites and how to use them are included. Remote (or programmable) operation is described, also with the aid of several worked examples.

Appendices A-1 and **2** Describe all display messages which may appear on the generator screen during operation (A-1) and power-up (A-2).

Appendix B explains how to control a printer.

Appendix C explains how to control the disc memory accessory.

Chapter 4 details performance testing of the instrument.

1-2 SPECIFICATIONS

Instrument specifications for the 8175A are listed in Table 1-2. These specifications are the performance standards or limits against which the instrument are tested.

1-3 SAFETY CONSIDERATIONS

The Model 8175A is a Safety Class 1 instruments (instrument with an exposed metal chassis that is directly connected to earth via the power supply cable).

Before operation, the instrument and manual, including the red safety page, should be reviewed for safety markings and instructions. These must then be followed to ensure safe operation and to maintain the instrument in a safe condition.

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1-4 INSTRUMENTS COVERED BY THE MANUAL

Attached to the rear of the instrument is a serial number plate (Figure 1-3). 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 (or to all instruments if stated).
For instruments with higher serial numbers, refer to the Manual Change sheets supplied with this manual. In addition to change information, the Manual Change sheets may contain information for correcting any errors in the manual.



Figure 1-3. Serial Number Plate

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 by a print date and part number, both of which appear on title page. Complimentary copies of the supplement are available from Hewlett-Packard.

1-5 DESCRIPTION

The 8175A is a digital signal generator which can deliver parallel and serial data with programmable patterns and pattern durations. It can interact with a device under test and so provide simulation of a wide range of data paths in digital systems. Some key features of the 8175A are as follows:

Versatility	**Performance**
Parallel data patterns	24 ch. / 1 kbit ea. / 50 MBit ea.
Serial data streams	2 ch. / 8 KBit ea. / 100 MBit ea.
Virtual Memory Expansion	255 memory segments, can sequence between 2 to 1024 patterns ea.
Programmable Pattern Durations	20 ns to 9.99 s range / 10 ns res., individually programmable
Interaction with DUT	8 Bit Trigger / 8 Flags
Most logic families	TTL/CMOS variable; ECL fixed
Master/Slave operation	2 ea HP 8175A's fully synchronized
Fine Timing option	100 ps delay resolution on 4 channels
Manual and automated operation	large CRT, menu driven; waveform graphics, data editor, mass storage, hardcopy, HP-IB (*) interface

*Hewlett-Packard Interface Bus, Hewlett-Packard's implementation of IEEE Standard 488 "Standard Digital Interface for Programmable Instrumentation.

1-6 OPTIONS

These are as follows:

001 Fine Timing (100 ps resolution on four channels)

D04 Deletes standard POD set (order PODS separately)

908 Rack Flange Kit (PN 5061-9678), see Figure 1-4

910 Additional Operating/Programming/Service Manual (PN 08175-90001)

916 Additional Operating and Programming Manual (PN 08175-90006)

1-7 ACCESSORIES SUPPLIED

The 8175A is supplied complete with the following items (see Figure 1-1):

Fuses (one fitted and one supplied):

4A fuse (F 4A, 250 V) for 230V operation 2110-0055

8A fuse (F 8A, 125 V) for 115V operation 2110-0036

Power Cable (see Figure 2-2)

4 each HP 15462A TTL/CMOS PODS (for all data channel and flag outputs)

1 HP 15463A TRIGGER POD (for trigger input)

1-8 ACCESSORIES AVAILABLE

A Rack Flange kit, HP part number: 5161-9678 is available, see Figure 1-4.

In addition to the PODS supplied with the instrument, various other connector and POD accessories are available for use with it. These are as follows:

PODS
HP 15461A ECL POD (fixed ECL level, includes 1 ea HP 15429A)
HP 15462A TTL/CMOS POD (progr. High Level, includes 1 ea HP 15429A)
HP 15463A TRIGGER POD (includes lead set and 9 probe tips)

Adaptors
The following adaptors, are available: (see Figure 1-2)

Adaptors for HP-15461A and 15462A
HP 15408A plug-on grabbers with ground leads, 5 ea
HP 15409A plug-on BNC adaptors, 5 ea
HP 15410A plug-on SMB adaptors, 5ea
HP 15411A plug-on coax open-end adaptors, 5 ea
HP 15415A plug-on miniprobe, can be used with HP 10024A IC testclip, 5 ea
HP 15429A solder-in receptacles for connection to a PC board, 5x2 ea

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Adaptors for HP 15463A
HP PN 15463-63201 lead set
HP PN 10230-62101 probe tip, 1 ea
(10 ea required per POD)

Miscellaneous
Cable for sychronized master/slave operation
of two ea 8175A's
HP Protective Cover (protects front cover)

The following peripherals are also available:

HP 2225A	Thinkjet graphics printer
HP 9122/D	Dual, double sided 3.5 inch flexible disc drive
HP 92192A	box of ten blank 3.5 inch double sided discs
HP 10833A/D	1 meter (3.5 ft)/0.5 meter (1.6 ft) HP-IB cable

1-9 RECOMMENDED TEST EQUIPMENT

Equipment required to maintain the 8175A is given in Table 1-1. Alternative equipment may be substituted, provided that it meets or exceeds the critical specifications listed in the table.

Table 1-1 Recommended Test Equipment

INSTRUMENT	REQUIRED CHARACTERISTCS	RECOMMENDED MODELS)	USE*
Oscilloscope	275 MHz Bandwidth	HP 1725A/1722B	P,A,T
Probe	10:1 8 pF	HP 10017A	P,A,T
DVM	0.1 V Range, >10 M	HP 3456A/3455A	P,A,T
Counter	50 MHz START/STOP TI A to B	HP 5335A/5345A	P,A,T
Signature Multimeter		HP 5005A/5004A	T
Pulse Gen.	50 MHz, Wid<10 ns	HP 8112A	P
Pulse Gen.	100 MHz	HP 8007B	P
Power Supply		HP 6205A/6237A	A,T
Time Marker	2 ns		P
Logic Probe	ECL	HP 10525E	T
Logic Probe	TTL	HP 10252T	T
Controller	HP 200 Series Basic Compatible HP-IB Interface	HP 9816/9836	P,A
ET's	2 S.A. Extender Boards	HP 08175-66522 HP 08175-66523	T
Torque Indicating Screwdriver		8730-0012, 8830-0013 8710-0902, -0901	T
Solder-in Receptacle		HP 15429A	P
Plug-on BNC adaptor		HP 15409A	P
BNC Tee		HP 1250-0781	P
BNC F to F		HP 1250-0080	P
BNC M to M		HP 1250-0216	P
BNC to Probe Adaptor		HP 1250-1454	P
BNC Connector RF		HP 1250-0018	P
Probe Tip		HP 10230-62101	P
Coax Test PT		HP 1250-1737	P

* P=Performance Test A=Adjust T=Troubleshooting

Specifications describe the instrument's warranted performance. Non-warranted values are described as 'typical'. All specifications are valid at the end of the output pod cables, at the probes of the input pod or at the respective BNC connectors of the mainframe. All specifications are valid in a 0° C to 55° C temperature range.

PARALLEL/SERIAL DATA GENERATOR

Parallel or serial operating mode can be selected.

DATA CAPACITY

	parallel	serial
NUMBER OF CHANNELS:	24	2
BITS PER CHANNEL:	1024	8192
MAX. BIT RATE PER CHANNEL:	50 Mbit/s NRZ	100 Mbit/s NRZ

TIMING

In PARALLEL mode the duration of each individual pattern is programmable. The duration is equal for all data channels. In SERIAL mode the duration of the data bits is programmable with 8 successive bits always having the same duration. The duration is equal for both channels.

PATTERN DURATION (with internal clock):

Range	Resolution
(10)[1], 20 ns — 9.99 µs	10 ns
10 µs — 999 µs	1 µs
1 ms — 99.9 ms	100 µs
0.1 s — 9.99 s	10 ms

[1]) 10 ns in serial mode with fixed timing

Accuracy: ±0.05% of progr. value ±2.5 ns (asynchronous start)
±0.5% of progr. value ±2.5 ns (synchr. start, clock cal.)
±3% of progr. value ±2.5 ns (synchr. start no clock cal.)

Jitter (max.): 0.1% of progr. value + 150 ps

PATTERN DURATION (with external clock):
Period of external clock x m

Range (m = No. of ext. clock cycles)			Resolution
(1)2[2]	to	999 /	1 period
1.000	to	99.900 /	100 periods
100.000	to	9.990.000 /	10.000 periods
10.000.000	to	999.000.000 /	1.000.000 periods

[2]) min. Pattern Duration in serial mode: 10 ns
min. Pattern Duration in parallel mode: 20 ns

CLOCK

The clock has a programmable period. It is available on line 7 of the pod for the output flags. The clock is derived from an internal system clock or from an external clock. See EXTERNAL CLOCK (BNC) and HP 15463A TRIGGER POD specifications.

Note: In serial mode an additional Serial Clock is available on pod 0, channel 1 providing a pulse at every bit.

PERIOD (with internal clock):

Range	Resolution
20 ns - 9.99 µs	10 ns
2 µs - 999 µs	1 µs

Accuracy: ±0.05% of progr. value ±2.5 ns (asynchronous start)
±0.5% of progr. value ±2.5 ns (synchr. start, clock cal.)
±3% of progr. value ±2.5 ns (synchr. start, no clock cal.)

PERIOD (with external clock):
Period of external clock x m

Range (m): 2 ... 999 [x 1]
2 ... 999 [x 100]

SKEW between channels of
ECL pods: ≤ 6 ns; typical ≤ 3 ns
TTL/CMOS pods: ≤ 7 ns; typical ≤ 3 ns

Maximum time difference between the leading or trailing data bit edges of the same memory address with Fine Timing (opt. 001) off.

OPTION 001 FINE TIMING

Option can be retroffitted at HP service office.

PARALLEL DATAGENERATOR

CHANNELS: 0,1,2 and 3 of pod 0

DELAY (range/resolution): 20 ns to 40 ns / 100 ps
vs same channel with Fine Timing 'OFF'

Accuracy: ± 5% of progr. value ± 1 ns

SERIAL DATAGENERATOR

CHANNELS: 0 and 2 of pod 0

DELAY (range/resolution): 0 ns to 20 ns / 100 ps
vs same channel progr. to 0 ns Delay

Accuracy: ±5% of progr. value ± 2 ns

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HP 15462A TTL/CMOS POD
(DATA OR FLAG OUTPUT POD)

NO. OF CHANNELS: 8

MAX. BIT RATE PER CHANNEL: 50 Mbit/s NRZ

LEVELS

Following level specifications apply for pattern durations and clock periods ≥50 ns, into open.

HIGH LEVEL (range/resolution): 2.4 V - 9.9 V/100 mV

Accuracy: ±5% of programmed value ±300 mV

LOW LEVEL: ≤0.7 V

Programmed high level is valid for all pods connected. High level of an individual pod can also track an external voltage applied to this pod. Ext. level overwrites progr. level if greater. The full level ranges can be achieved provided transition times do not violate pattern duration or clock width. To avoid violation transition times have to be shorter than pattern durations or clock width. Transition times depend on load terminations as specified below.

TRANSITION TIMES

into open: ≤3 ns + high level x 1.2 ns / V

into 50 pF: ≤9 ns + high level x 1.8 ns / V

FAN-OUT PER CHANNEL (typical): 10 LS TTL

OVERSHOOT, RINGING ≤ 20% of amplitude (into open)

MAX. EXTERNAL VOLTAGE AT OUTPUTS: -3 V / + 10 V

DISABLE / ENABLE CHARACTERISTICS (TRI-STATE)

T(ON), T(OFF): ≤ 30 ns

(Time difference between occurrence of external ON or OFF signal at an output pod (TRIST) until outputs are disabled or enabled; High level of ext. signal ≤ High level at outputs)

LEAKAGE CURRENT: ≤20 µA

RESIDUAL CAPACITANCE: ≤ 40 pF

TRI-STATE INPUT at the output pod (TRIST)

IMPEDANCE (typical): 10 kOhm / 50 pF

THRESHOLD: 35% of programmed or ext. high level

Min. overdrive: 600 mV

MAX. EXTERNAL VOLTAGE AT INPUTS (TRIST, HIL): 0 V to 10 V

HP 15461A ECL POD
(DATA OR FLAG OUTPUT POD)

NO. OF CHANNELS 8

MAX. BIT RATE PER CHANNEL: 100 Mbit/s NRZ

LOW LEVEL: ≤ -1.60 V

HIGH LEVEL: ≥ -1.02 V

TRANSITION TIMES (20% - 80%; into 22 pF): ≤ 3 ns

FAN-OUT PER CHANNEL (typical): 5 ECL

OVERSHOOT, RINGING: (into 22 pF): ≤ 20% of amplitude

MAX. EXTERNAL VOLTAGE AT OUTPUTS: ±5 V

DISABLE / ENABLE CHARACTERISTICS (ECL common LOW)

T(ON) T(OFF) ≤15 ns

(Time difference between occurence of external ON or OFF signal at an output pod ($\overline{EN}$) until outputs are enabled or disabled.)

ENABLE/DISABLE INPUT ($\overline{EN}$)

IMPEDANCE (typical): 60 kOhm / 50 pF

INPUT CHARACTERISTICS: ECL compatible

MAX. EXT. VOLTAGE AT INPUT ($\overline{EN}$): 0 V to -5 V

HP 15463A TRIGGER POD
(TRIGGER WORD INPUT POD)

This pod is used for external status and/or output flag control. In synchronous mode, it reads trigger words in at positive or negative transitions of a clock applied to this pod. In asynchronous mode it accepts trigger words without clock. The applied clock may be used as an alternative to the internal clock or to the external clock via BNC.

MAX. CLOCK RATE: 25 MHz

IMPEDANCE (typical): 100 kOhm / 5 pF

THRESHOLD (range/resolution): -9.9 V to + 9.9 V / 100 mV

Accuracy: ±2.5% ±120 mV

Min. overdrive: 250 mV or 30% of input amplitude, whichever is greater

Min. swing: 600 mV (P-P)

MAX. INPUT VOLTAGE: ±40 V

EXTERNAL INPUT (BNC)

This is a connector at the front panel which, on application of a suitable signal, can be used to START datacycling on positive, negative or both transitions or, to START and STOP cycling with selectable transitions.

IMPEDANCE: 10 kOhm / 50 pF

THRESHOLD (range/resolution): -9.9 V to + 9.9 V / 100 mV

Accuracy: ±5% of progr. value ±250 mV

Min. swing: 600 mV (P-P)

Min. overdrive: 250 mV or 30% of input amplitude, whichever is greater

MAX. INPUT VOLTAGE: ±20 V

EXTERNAL CLOCK (BNC)

The applied clock may be used as an alternative to the internal system clock or the external clock via the input pod.

CLOCK RATE (range): DC to 100 MHz

All other specifications see EXTERNAL INPUT (BNC).

EXTERNAL REFERENCE (BNC)

The internal timing reference (crystal) can be replaced by an external signal applied to a rear panel connector (1 MHz). Accuracy must be better than 0.01%.

INPUT CHARACTERISTICS: LS TTL compatible

MAX. INPUT VOLTAGE: ±20 V

Supplementary Specifications (describe typical non-warranted performance).

DELAYS

from	to Clock out (pod)	Data out (pod)
Ext. Clock in (pod):	150 ns	140 ns
Ext. Clock in (BNC):	110 ns	100 ns
Clock out (pod):[3])	—	10 ns

[3]) Time positive transition of clock is delayed with respect to a leading data bit transition (clock period = pattern duration).

RESPONSE TIMES (to perform action via pod)

CONT, STOP, TRISTATE ON/OFF: ≤ 170 ns [4]) + trig. word duration

START, JMP A, JMP B: ≤ 170 ns [4]) + trig. word duration + 9 clock periods [5])

OUTPUT FLAGS: ≤ 100 ns [4]) + trig. word duration

[4]) Trigger word duration: 20, 50, 100, 500 ns.
Time window during which a trigger word has to be stable.

[5]) Clock period constant with internal clock: 10 ns; otherwise use clock period of external clock

START via BNC: ≤ 100 ns + 9 clock periods

STOP via BNC: ≤ 100 ns

DATA MEMORY
(LOAD, EDIT, UPDATE, SEQUENCING)

The memory can be loaded, manually or via HP-IB. The following complete data and parameter set-up's are readily accessible: Standard setting (memory cleared), active setting, 2 previously stored settings.
These settings are retained in a battery backed-up memory for up to 3 weeks when power is off.
Various editing functions allow to set, modify, move and copy blocks of data between addresses or channels. The following fixed patterns are available:
Up-counter/down-counter, definable increments and start/stop address; in parallel mode.
PRBS; length is 2 (exp n), n = 3 to 13 in serial mode.
Data codes include BIN, OCT, HEX, DEC

Data can be edited while the instrument is running without affecting the data currently being output. This is also possible via HP-IB. The changes become active after an UPDATE command with status STOP.

Parameters waiting for an UPDATE are: Data patterns and timings, cycling definitions and input trigger/output flag assignments.

1-255 segments can be sequenced; segments are user definable in the 0000 to 1023 address range; segments may overlap.
START, CONTINOUS START, JMP A AND JMP B (BRANCHING) refer to user-assigned segment names.

HP-IB CAPABILITY

The following HP-IB interface functions are implemented:
SH1, AH1, T6, TE0, L4, LE0, SR1, RL1, PP0, DC1, DT1, C0.

HP-IB PROGRAMMING TIMES (typical):
Times are measured by using the HP 9836A as an HP-IB controller. Reloading refers to programming a setting which once was set-up in the HP 8175A and transfered to the controller.

COMPLETE RELOAD TIME: 1.8 s

DATA/TIMING/PROGRAM RELOAD TIME: 800 ms
(Software and hardware update)

DATA/TIMING/PROGRAM RELOAD TIME: 180 ms
(Hardware update only)

FLEXIBLE DISC DRIVE ACCESS

Storage of set-ups and data on a flexible disc. Up to 256 settings can be managed depending on disc space.

HARD COPY

Any display can be copied to a graphics printer.

PARALLEL OPERATION

Two HP 8175A's can be operated in master-slave configuration, thus doubling the channel count to 48 channels. Synchronization is provided by the HP 15430A cable.

GENERAL

ENVIRONMENTAL

STORAGE TEMPERATURE:	- 40 C to + 65 C
OPERATING TEMPERATURE:	0 C to + 55 C
HUMIDITY (0 C to + 40 C):	95% R.H.

CALIBRATION

Within a recalibration period of 1 year the instrument is warranted to meet all specifications described after a warm-up time of 30 min. The pattern duration accuracy and the clock accuracy can be enhanced by the inbuilt autocalibration feature. To stay within that higher accuracy, autocalibration is recommended to be repeated every 0.5 hours and also as soon as environmental conditions have changed.

POWER: 115/230 V ac; - 22% + 10%
48-66 Hz; 630 VA max.

WEIGHT: Net 17,5 kg (38.8 lb)
Shipping 24,0 kg (53 lb)

DIMENSIONS
MAINFRAME: 190 mm high, 426 mm wide, 584 mm deep (7.5 x 16.75 x 23 in)

PODS:

CABLE LENGTH	15461A	15462A	15463A
mainframe to pod:	1.6 m	1.6 m	1.6 m
pod to end of cable:	0.2 m	0.2 m	0.25 m

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CHAPTER 2
INSTALLATION

WARNING

The instrument weighs 17.5 kg (38.8 lbs). Care must be exercised when lifting to avoid personal injury.

2-1 INTRODUCTION

This section provides installation instructions for the 8175A and its accessories. It also includes information about initial inspection and damage claims, preparation for use, packaging, storage and shipment.

2-2 INITIAL INSPECTION

Inspect the shipping container for damage. If the container or cushioning is damaged, it should be kept until the contents of the shipment have been checked for completeness, and the instrument has been verified mechanically and electrically. The contents of the shipment should be as shown in Figure 1-1 plus any accessories that were ordered with the instrument. Procedures for checking the electrical operation are given in Chapter 4. If the contents are incomplete, mechanical damage or defect is apparent, or if an instrument does not pass the operator's checks, notify the nearest Hewlett Packard Office. Keep the shipping materials for carriers inspection. The HP office will arrange for repair or replacement without waiting for settlement.

2-3 PREPARATION FOR USE

WARNING

To avoid hazardous electrical shock, do not perform electrical tests when there are signs of shipping damage to any portion of the outer enclosure (covers, panels, connectors etc).

2-4 Power Requirements

The instrument requires a power source of 115/230 V rms (+10% -22%) at a frequency of 48 - 66 Hz single phase. The maximum power consumption is 630 VA.

2-5 Line Voltage Selection

CAUTION

BEFORE SWITCHING ON ANY OF THE INSTRUMENTS, make sure that they are set to the local line voltage.

Figure 2-1 provides information for line voltage and fuse selection:

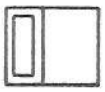
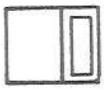
VOLTAGE:	230 V	115V	230V	115V
FUSE:	4 A	8 A		

Figure 2-1 Switch settings for Line Voltages

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2-6 Power Cable

In accordance with international safety standards, this instrument is equipped with a three-wire power cable. When connected to an appropriate a.c. power receptacle, this cable grounds the instrument cabinet. The type of power cable shipped with each instrument depends upon the country of destination. Refer to Figure 2-2 for the part number of the power cable available.

WARNING

To avoid the possibility of injury or death, the following precautions must be followed before the instrument is switched on.

a) If this instrument is to be energised via an autotransformer for voltage reduction, ensure that the common terminal is connected to the grounded pole of the power source.

b) The power cable plug shall only be inserted into a socket outlet provided with a protective ground contact. **The protective action must not be negated by the use of an extension cord without a protective conductor.**

c) Before switching on the instrument, the protective ground terminal of the instrument must be connected to the protective conductor of the power cable. This is verified by checking that the resistance between the instrument chassis and the frontpanel and the ground pin of the power cable is zero Ohms.

The following work should be done by a qualified electrician and all local electrical codes must be strictly observed.
If the plug on the cable does not fit the power outlet, or the cable is to be attached to a terminal block, cut the cable at the plug end and re-wire it. The colour coding used in the cable will depend on the cable supplied (see Figure 2-2).

If a new plug is to be connected, it should meet local safety requirements and include the following features:

Adequate load-carrying capacity (see table of specifications in Section 1).

Ground connection.

Cable clamp.

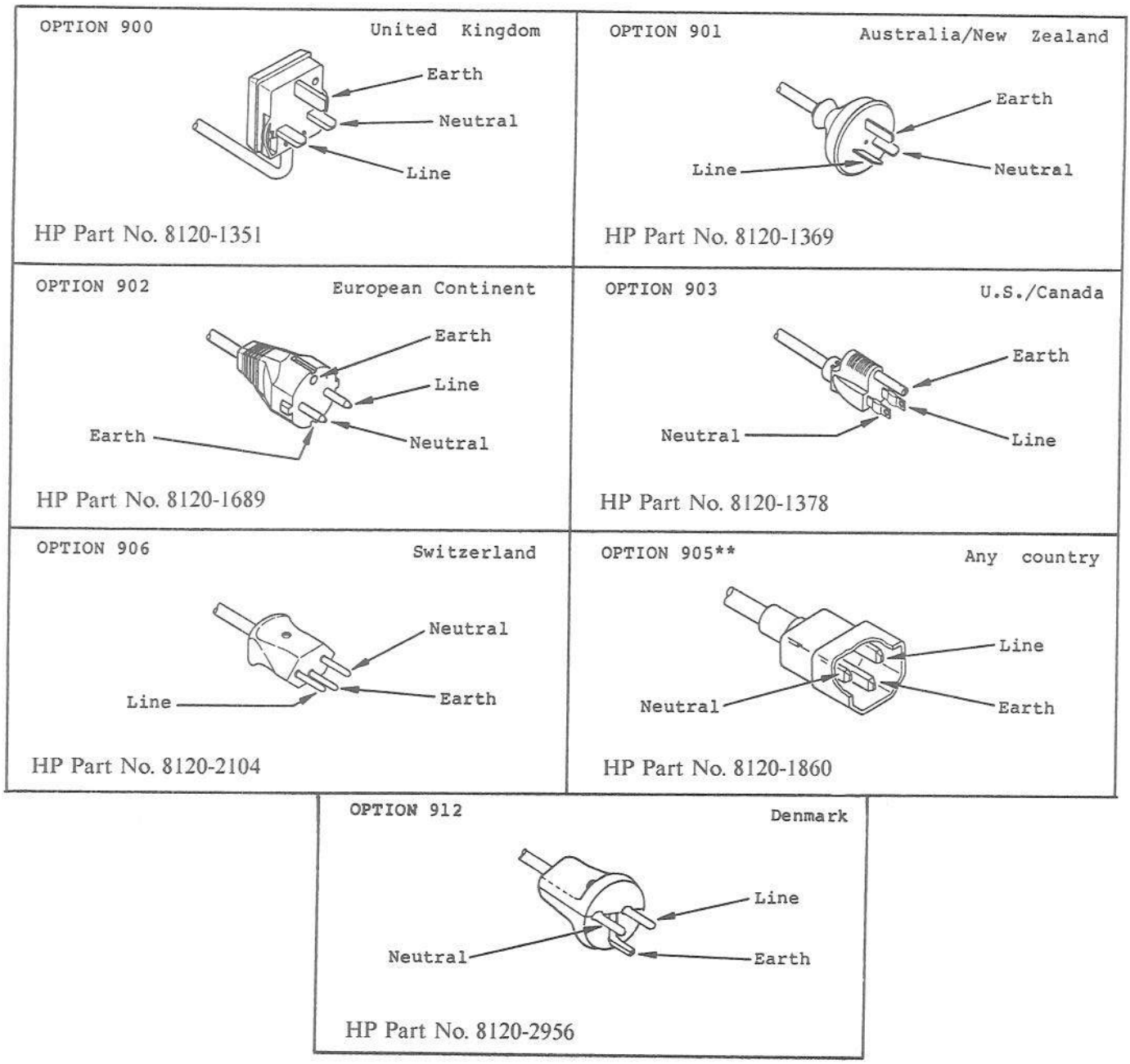


Figure 2-2. Mains Plug Contact Configuration for HP Option Numbers

* In the U.S.A. a 230-volt mains might not include a neutral conductor. In this case it is recommended that the blue conductor of the standard power cord be connected to the terminal normally used for neutral (line 1).

** Plug option 905 is frequently used for interconnecting system components and peripherals.

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2-7 HP-IB Connector

The rear panel HP-IB connector (Fig 2-3), is compatible with the connector on Cable Assemblies 10833A, B, C and D. If a cable is to be locally manufactured, use connector male, HP part number 1251-0293.

2-8 HP-IB Logic Levels

The 8175A HP-IB lines use standard TTL logic, the levels being as follows:

True = Low = digital ground or 0V dc to 0.4V dc,

False = High = open or 2.5V dc to 5V dc.

All HP-IB lines have LOW assertion states. High states are held at 3.0V d.c. by pull-ups within the instrument. When a line functions as an input, approximately 3.2mA of current is required to pull it low through a closure to digital ground. When a line functions as an output, it will sink up to 48mA in the low state and approximately 0.6mA in the high state.

CAUTION

NOTE: Isolation, the HP-IB line screens are not isolated from ground.

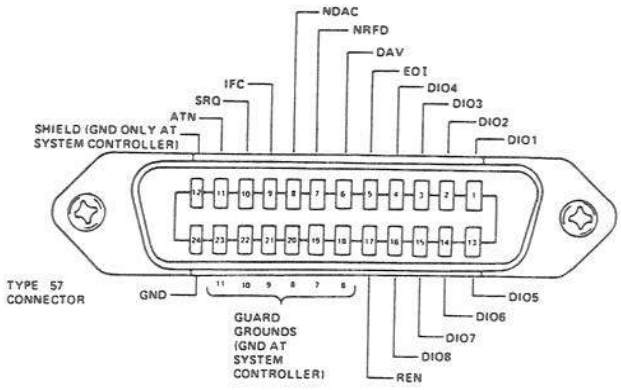


Figure 2-3. HB-IB Connector

2-9 Operating Environment

The operating temperature limits are 0 degrees C to + 55 degrees C. The specifications also apply over this range.

2-10 RACK MOUNTING

Figure 1-4 and paragraph 1-8 details the Rack Flange kit.

2-11 CLAIMS FOR DAMAGE

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

2-12 Storage and Shipment

The instrument can be stored or shipped at temperatures between minus 40 deg C and plus 65 deg C. The instrument should be protected from temperature extremes which may cause condensation within it.

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 packing material may be re-usable. However the Hewlett-Packard Sales/Service Office will also provide information and recommendations on materials to be used if the original packing is no longer 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.

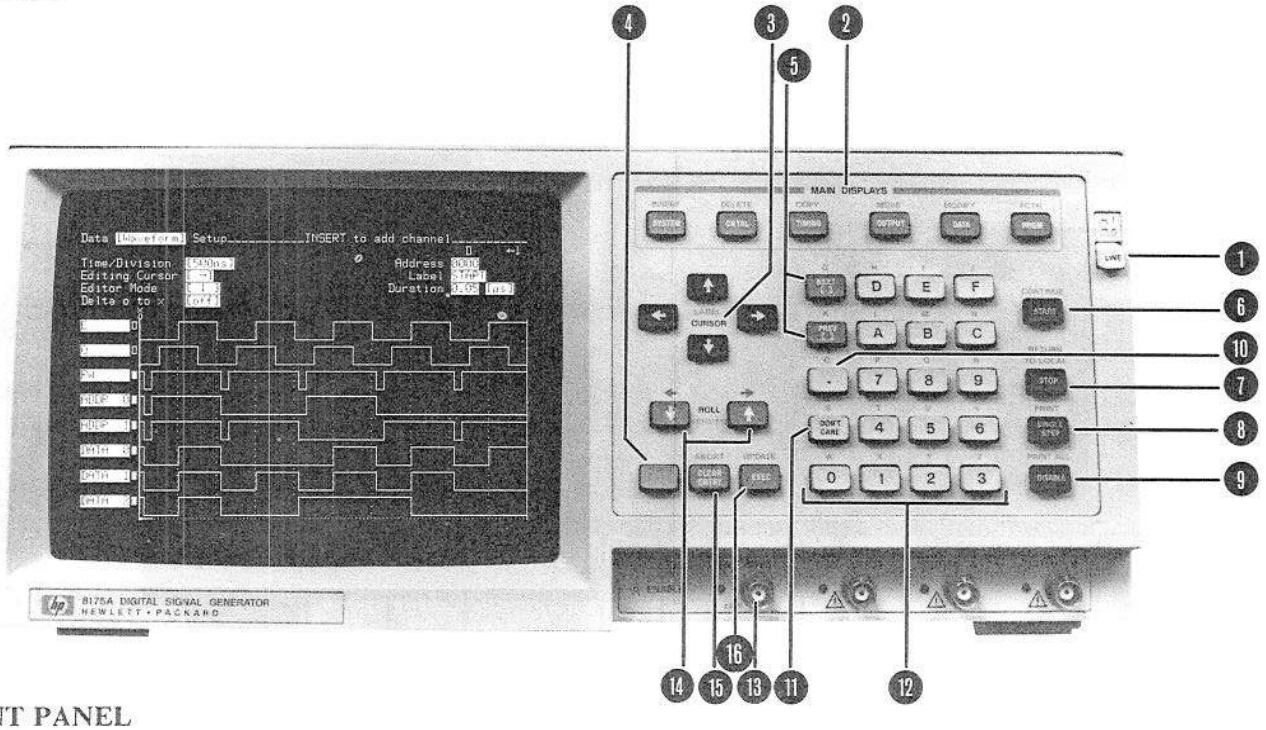
3. Use enough shock-absorbing material (3 to 4 inch layer) around all sides of the instrument to provide a firm cushion and prevent movement inside container. Protect control panel with cardboard.

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 serial number.

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FRONT PANEL

(1) Line power on/off push button swich.

(2) **MAIN DISPLAYS.** Six keys which enable selection of the 8175A "Pages". Each Page comprise one or more sub-pages or "menus". **SYSTEM** comprises three menus. These enable the instrument configuration to be set, status of peripherals to be input, and control of internal and external storage operations. **CNTRL** comprises four menus for setting: clock, input trigger, flag conditions and simulation of trigger functions. **TIMING** enables (in instruments with the Fine Timing Option fitted): delay to be applied to two or four channels (depends on selected configuration). **OUTPUT** enables high level of TTL/CMOS PODS to be set, and provides enable/disable control for all output PODS. **DATA** comprises three menus which enable data to be set up and displayed. The data can be set up and/or displayed as patterns or waveforms (timing diagrams). **PRGM** comprises two menus which enable pattern sequencing to be defined.

All six **MAIN DISPLAYS** keys have secondary functions. They are the "**EDIT**" functions as detailed in blue above the keys. They are accessed via the (blue) SHIFT KEY. Refer to section 3E in this manual for detailed information.

(3) **CURSOR.** These keys enable the flashing cursor to be moved from field to field in the menus. The (blue) SHIFT and CURSOR or keys, allow fast movement of the cursor into the next inverse video field. SHIFT + CURSOR or enables interchange of LABELS (DATA Page menus).

(4) Blue key. This key activates the blue SHIFT function assigned to each keyboard key. A momentary press activates the SHIFT function for the next keystroke. The SHIFT function will continue as long as the blue key is pressed.

(5) **NEXT []** and **PREV []** keys. With these, any setting/value/condition contained within brackets **[]**, can be changed.

(6) **START**, starts data cycling from the program segment defined on the **PRGM** Page menus.
CONTINUE, continues data cycling (after a STOP) from the STOP address (see item 7)

(7) **STOP**, stops data cycling at the address currently being output. This pattern will then be held at the outputs. **RETURN TO LOCAL**, returns the 8175A from HP-IB control to local control.

(8) **SINGLE STEP**, lets you step one address (or program segment) at a time, through a a program. **PRINT**, enables the current display content to be printed on an HP-IB printer.

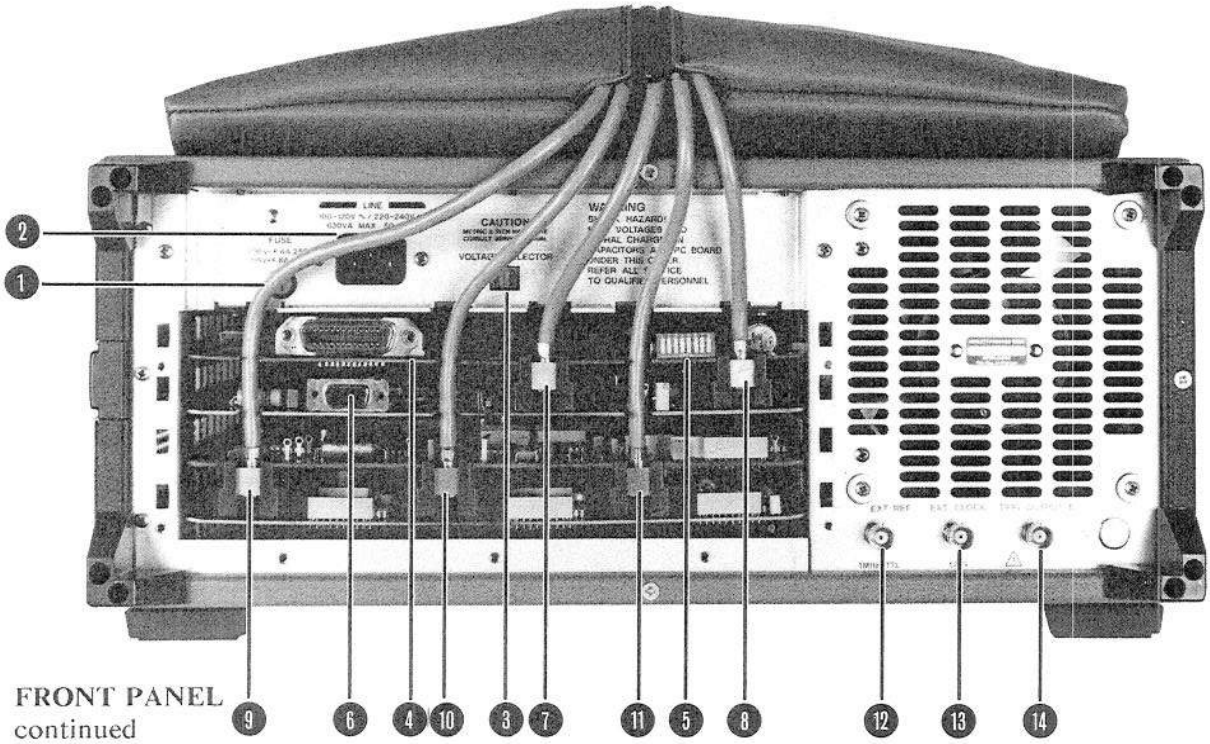
(9) **DISABLE**, disables all output. **PRINT ALL**, enables the a whole page e.g., the whole pattern setup of the Data Page to be printed.

(10) . (decimal point) for normal numeric entry purposes and, (detailed on CNTRL Page - **[Input]** Trig. Word Ass. menu) special function.

Figure 3-1. 8175A Controls, Connectors and Display

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FRONT PANEL
continued

(11) **DON'T CARE.** In a text field enters a space in lieu of a character or, (CNTRL Page **[Input]** Trig. Word Ass. pattern setting menu) an "X" in lieu of a 1 or 0.

(12) Alphanumeric keyboard for data and text entry.

(13) BNC Connector for external Start/Stop control

(14) **ROLL** keys, enable data, waveform and module displays to be moved: left, right, up or down depending on the display. They also provide a vernier increment/decrement function for certain numeric settings. Arrows in the upper right hand corner of the display indicate which ROLL keys are currently operational.

(15) **CLEAR ENTRY**, sets a default (Standard Setting) value in the field. **ABORT** deletes functions without executing them.

(16) **EXEC** executes functions and clock calibration. **UPDATE** enables new settings/data/conditons etc. to be deliverd to the outputs.

REAR PANEL CONNECTORS (Note: rear cover plate removed in this view)

(1) Fuse 4A/230V or 8A/115V

(2) Power line voltage receptacle.

(3) Line voltage selector sliding switch, to be set to local line voltage.

(4) HP-IB interface connector.

(5) Switch for setting HP-IB address and mode.

(6) Connector for interfacing a second 8175A (for master-slave operation).

(7) Connector for Trigger POD.

(8) Connector for Flag output POD.

(9) Connector for Output POD 0.

(10) Connector for Output POD 1.

(11) Connector for Output POD 2.

(12) BNC connector for an external reference clock signal (1 MHz TTL).

(13) BNC connector for inputting an external System clock signal.

(14) This connector not used in current version.

CHAPTER 3
OPERATING

3A
Introduction

The purpose of Chapter 3 is to familiarise you with operation of the 8175A Digital Signal Generator. It includes a "Getting Started" section, this will enable you to start using the 8175A as soon as possible. Operating information for the Fine Timing Option is also included (in section 3D-3).

Briefly, the content of Chapter 3 is as follows: It begins with an overview of the operating information. This is followed by an explanation of front and rear panel controls, operator checks etc. Then, "hands on" operating information, under the title: **Getting Started** is described. This covers the basic requirements for setting up (and outputting) data patterns. Graphical display techniques (how to set up timing diagrams etc.) are covered by a separate section. However, in both cases, worked examples are used to illustrate the various requirements. It is recommended that you work through the two sections in the logical order.

OPERATING INFORMATION OVERVIEW

The operating information is presented, in sub-sections under the following headings.

3A. Introduction

3B. Getting Started (includes Setting up Data Patterns)

3C. How to set up Timing Diagrams

3D. The Menu Map and How to use the Menus

3E. The Edit Capabilities and How to use Them

3F. Operating two 8175A's in Parallel - Points to Note

3G. Programming (HP-IB Controlled Operation) Information

The following appendices are included at the end of Section 3:

Appendix A-1. Error and Status Messages - Instrument use Related
Appendix A-2. Error and Status Messages - Power-up Self Test Related
Appendix B. Using a Printer
Appendix C. Using the Disc Memory Accessory

In sections 3B and 3C, **BOLD** text is used in the examples etc. to highlight certain words. These include specific front panel keys and display fields within menus etc. Also,the symbols: ↑ ↓ → ← , are used to identify which **CURSOR** and/or **ROLL** keys to use.

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If you have operated one of the HP 1630(X) Logic Analyzers, you will already know the basic operating concept of the 8175A. Whatever your previous knowledge, once you have learned the basics (as covered by 3B), you can refer to the other sub-sections as necessary for specific information. They will enable you to quickly locate any particular topic.

A separate section (3G) is included which deals with operating the 8175A on the HP-IB. This includes essential programming information and several worked examples. etc.

3A-1
SPECIAL OPERATING POINTS

DO NOT apply power to an 8175A until you have read (and, as necessary, confirmed) the following points.

CAUTION

a) Read safety summary at front of this manual

b) To avoid instrument damage, ensure that the voltage selector switch is set correctly for the local line voltage. If it is necessary to change the setting at any time, the instrument must be switched off and the power cable disconnected.

/!\ **Maximum allowable voltages at inputs and outputs:**

Refer to the Specifications (Table 1-2) for the maximum allowable external voltages which can be applied to POD inputs and ouputs.

EXT REF: Maximum allowable input voltage: +/- 20 V

The BNC connectors marked with a /!\ symbol are not applicable to this model 8175A. (They are not internally connected.)

3A-2
CONTROLS CONNECTORS AND DISPLAY

A brief explanation of the function of the 8175A controls, connectors and display is given in Figure 3-1. Take time to read through it before continuing with the following paragraphs. Refer to it later as necessary.

NOTE: PODS - Identification and Connection/Disconnection

If you need to connect/disconnect or change any of the PODs, take special note of the rear view of the 8175A. The connection points of all PODs are clearly labelled on the removeable cover plate. Note The two types of data and/or flag output PODs (TTL/CMOS and ECL) and the Trigger POD have identifying legends on their bodies. Self adhesive labels are supplied with the output PODs, these enable you to label them as appropriate.

Connection/disconnection of PODs:
First, the 8175A must be switched **off**.
Unscrew the securing screws identified on the cover plate and remove the plate.
Carefully unplug/plug in (as appropriate) the required POD connectors.
Install the cover plate back in position, taking care to route the POD cables through their corresponding grommets in the plate. Secure the plate firmly with its screws.

3A-3
OPERATING CONCEPT A BRIEF OVERVIEW

The 8175A operates on a "cursor driven" concept. This means that to change any setting, the cursor must first be moved into the field where the current value is displayed. The new value or condition is then input via the keyboard.

Briefly, to change any setting in the 8175A, the procedure is as follows:
First, access the appropriate page or MAIN DISPLAY. Each of these includes one or more sub-pages or menus. Now, select the required menu (each one covers a selection of settings). Once you have selected the menu, the particular setting can be accessed and its value changed via cursor movement etc. as mentioned in the opening paragraph.

A brief explanation of how the MAIN DISPLAYS, menus and their settings interact follows. Note that all the Main Displays and their menus are detailed on the Menu Map in section 3D.

MAIN DISPLAYS
Six MAIN DISPLAYS or **Pages** are available, they are accessed via the correspondingly labelled **MAIN DISPLAYS** keys and are as follows:

SYSTEM CNTRL TIMING OUTPUT DATA PRGM

MENUS
The menus within a page are accessed via the **NEXT[]/PREV[]** keys. The currently displayed menu of any page is always identified by its name in inverse video in the top left hand corner of the screen.

MENU SELECTION
A new menu is called up by positioning the cursor in the current menu label e.g., [**Configuration**], and using the **NEXT[]/PREV[]** keys to select a new one.

SETTINGS FIELDS AND THEIR CONTENTS
A selection of setting fields are available on each menu. The current value or condition of each setting is shown in its corresponding field. The fields (inverse video) are positioned either, directly adjacent to, or below the corresponding setting titles. Values/condition of the settings are displayed on the screen in inverse video.

VALUE/CONDITION CHANGING
To change a setting value or condition, the cursor must first be moved into the corresponding field. Then, either an alphanumeric or **NEXT[]/PREV[]** key as appropriate is used to make the change. Which type of key applies is illustrated by the following examples:

Settings within brackets, e.g., **[Configuration]**, **[enabled]**, are changed via the **NEXT[]/PREV[]** keys.

Settings not within brackets e.g., Address **1000**, are changed via the alphanumeric keys. (Some slight exceptions to this second rule concerning the DATA Page [Waveform] menu, are explained later.)

For the DATA and PRGRM pages, a powerful set of editing capabilities is provided. They enable data to be inserted, deleted, modified etc. Full details of the capabilties and how to use them are given in section 3E.

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3B
Getting Started

INTRODUCTION

This section explain the basics of how to start using the 8175A. It begins with a brief explanation of power up sequence and initial configuration. It then goes on to explain, with the aid of worked examples, how to set up data patterns. (Instructions on using the graphical setting up and display capabilities of the 8175A, are covered in section 3C.) In both cases, worked examples based on the Standard Settings, are used to explain the various steps. It is recommended that after completing those in 3B, you go on to 3C.

For all the examples, the steps to be taken to output the resulting data patterns are also included.

The contents of section 3B are listed under the following headings:

3B-1 Power up and Initial Conditions
3B-2 First Steps
Standard Settings - How to recall them
3B-3 Configuration (Serial/Parallel) and Menu Selection
3B-4 Setting up Data Paterns
Example P-1. Setting up Data - Basic Principles
Example P-2. Data Formatting, Label Creation and Value Changing
3B-5 How to Output Data (Data Cycling)

In order to start using the 8175A, you do not need to know how to use all the menus etc. It is sufficient at first, just to understand the basic principle of how to set up data in pattern form. You can then go on to learn about the graphical capabilities and how to use them.

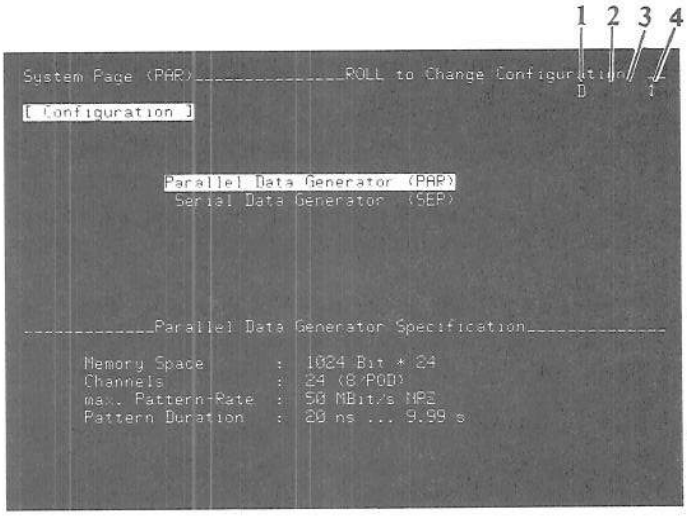
3B-1
POWER-UP AND INITIAL CONDITIONS

Press the **LINE** switch. Do not press any other front panel keys. You will hear the cooling fans start up and the LED's adjacent to the front panel BNC connectors will illuminate. During power-up, an automatic self test routine is performed. The message: **"Self Test Running"** will appear on the screen and remain until the test is completed. If any failure is detected, it will result in an appropriate error message being displayed on the screen. These messages (together with the procedure to follow) are listed in Appendix A-2.

On completion of the power-up sequence, the System Page **[Configuration]** menu will be displayed. This is illustrated in Figure 3B-1. It will include the message **"Power-Up Complete"** on the top line.

Initial Configuration

The configuration at power up is always the same as when last switched off. The position of the bright bar (inverse video) in the center of the display area indicates the current configuration. It is also shown in (), adjacent to every page name, at the top left hand side of the display. The 8175A automatically recalls the complete parameter and data set, which was current at switch off, whenever power is re-enabled. The outputs are automatically disabled. This is indicated by the **"D"** in the top right hand corner of the display.



STATUS INDICATORS Explanation:

1. "**D**" here indicates that the outputs are disabled (explained in 3B-5, point 7).
2. A "**U**" here indicates that an update is necesary (explained in 3B-5, point 6).
3. A ▨ in this location indicates that the 8175A is active (e.g. after START, explained in 3B-5, point 8).
4. If arrow(s) displayed here, it means that **ROLL** (or VERNIER if appropriate) action, via the keys indicated is possible.

Figure 3B-1. Power up Display Details and Explanation of Status Indicators

Note the cursor, this is the flashing block which at present is positioned within the "**[Configuration]**" field. The position of the cursor always identifies a variable. Configuration can be changed by pressing one of the front panel **ROLL** ↑ or ↓ keys. (It can also be changed via the **CURSOR** ↑ or ↓ keys).

3B-2
FIRST STEPS

General Points

When learning how to operate the 8175A, it is best to begin with a set of known parameter values and operating conditions etc. The **Standard Settings** provide the ideal starting values. Therefore you should start by recalling them. The actual values/conditions etc. can be determined by referring to section 3D. It shows all menus as in the "Recall Standard Settings" condition.

How to Recall the Standard Settings

The Standard Settings are accessed via the System Page. To recall them, procede as follows, (If the **SYSTEM PAGE** is currently displayed, start at step 2:

1. Press the **SYSTEM** key. This selects the System Page.
2. Press the **NEXT[]** key one or more times, until the **[Storage]** menu is displayed.
3. Press the **CURSOR** ↓ key once. This positions the cursor in the storage function field.
4. Press the **NEXT[]** key until: **[recall]** Standard Settings is displayed in the field.
5. Press the **EXEC** key, this activates the function. The message: Transfer in Process will be displayed very briefly. When this message is replaced by the original one, ("Press **EXEC** to Activate Function"), you can continue.

With the Standard Settings recalled, you now have a reference point from which to start practising using the keyboard controls. You can recall them at any time to put the 8175A back to a "known condition".

NOTE: When the Standard Settings are recalled, **all data is set to 0.**

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3B-3
CONFIGURATION (PARALLEL/SERIAL) AND MENU SELECTION

The differences between Parallel and Serial Configuration are highlighted on the **SYSTEM** page **[Configuration]** menu. Specific menu differences can be seen in sections 3D-3 and 3D-5, these detail the **TIMING** and **DATA** Page menus respectively. For each Configuration setting, select and examine the menus available via each **MAIN DISPLAY** (Page) key. Within each menu, access some settings and practise changing a few of them.

If you make a mistake which results in an error message being displayed, don't worry. If you cannot understand the meaning refer to appendix A-1 for an explanation. In any case, try to reset a correct or acceptable value. If you are unable to do this, recall the Standard Settings as previously described (steps 1-5). Then try again to change the value.

NOTE: The cursor control and **NEXT[]/PREV[]** keys, can either be pressed several times or, held down until the new position or value is reached.

3B-4
SETTING UP DATA PATTERNS

Introduction

This sub-section describes how to actually set up data patterns. You should note that, irrespective of any other settings to be made, you cannot output any data before you have input some! (Recall of Standard Settings sets all data to 0). The examples, included here therefore concentrate on showing you how to do this. Although at first glance the examples may appear rather long, it is only due to the fact that each individual step is described. They are in fact simple to set up.

NOTE 1: Outputting the example patterns
The examples are designed to explain how to set up the particular pattern etc. in the 8175A. If you also want to output the patterns, the steps to be taken are described at the end of 3B-5.

NOTE 2: Programming the examples
The same examples are also included in the Programming Information section. (They are identified by their corresponding numbers.) This gives you the opportunity to see the benefits of both types of operation.

EXAMPLES: INTRODUCTION
One of the first things you need to learn is how to set up (input) data. This, together with how to allocate labels, identify active Pods etc. is explained in Example P-1. Often,when using the 8175A, it will not be necessary to display all 24 channels of data. By displaying only those required for the particular test setup, data inputting can usually be made easier and quicker. Also, it makes it easier to "read" the display if only those channels required are displayed. Example P-2 includes an explanation of how to display (or Format) specific channels. It goes on to cover data inputting with the new format and, how to change a function value and its units. It is recommended that you try both examples. By doing this, you will see the advantages of re-formatting the data display (part of Example P-2).

Example P-1: Setting up Data - Basic Principles:
The simplest method of setting data is to call up the **Data [Pattern]** Setup menu, then, for each bit to be set, position the cursor at the appropriate Address/Pod/Channel location and set a 0 or 1 as required.
This example explains how to set up data at several addresses of a particular channel, for this case, channel 0 of Pod 0. The resulting pattern, if viewed on an oscilloscope, will appear as a "square wave" with pulse duration 0.02 us. (Standard Setting value). It will be set up between addresses 0000 and 0007. The required pattern is shown in Figure 3B-2.

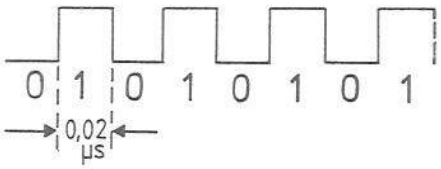


Figure 3B-2 Pattern Details of Example P-1

Procedure (Standard Settings previously recalled):

1. Press the **DATA** key. This accesses the Data Specification **[Format]** menu.

2. Press the **NEXT[]** key once. The Data **[Pattern]** Setup menu will be displayed. This is the menu where data for pattern setups is input.

3. Press the **ROLL ↑** arrow key to roll Address 0001 into the central inverse video field.

4. Press and hold the **CURSOR ↓** arrow key to move the cursor into the Address 0001 field.

NOTE: Alternative Method of Accessing an Address:

You can also access any address as follows:
Press (and hold) the **CURSOR ↓** key until the cursor enters the (inverse video) address field, then either:
a) Input the complete required new address via the numeric keys.
or:
b) Move the cursor (via the **CURSOR →** key) to each number to be changed and input the required new value.

To continue with the example:

5. Press and hold the **CURSOR →** key until the cursor comes to rest in the first data channel. This is channel 0 of Pod 0 at extreme right hand side of display.

6. Press numeric key 1 to set a 1. The display will then auto-roll to Address 0002. The cursor will move left into channel 23 (channel 7 of Pod 2).
(Note that, a "**U**" will appear in the top right hand corner of the display alongside the "**D**". Refer to the note below.)

7. Press and hold down the **CURSOR →** key until the cursor lies in channel 0 again. Leave this data bit as a 0.

8. Press the ROLL ↑ key once. The cursor will now lie in channel 0 of Address 0003.

Repeat steps 6 to 8 four times. You will then have set an 8 bit pattern (01010101) in Pod 0 channel 0, reading from Address 0000 down to 0007 (the addresses will increment sequentially).

The Data **[Pattern]** Setup menu details should now be as shown in Figure 3B-3. Note that the display has been rolled up one address for clarity in Figure 3B-3.

NOTE: "U" significance and how to output the Pattern:
For an explanation of "**U**" (Update required) and how to output the pattern, refer to 3B-5. It is at the end of section 3B.

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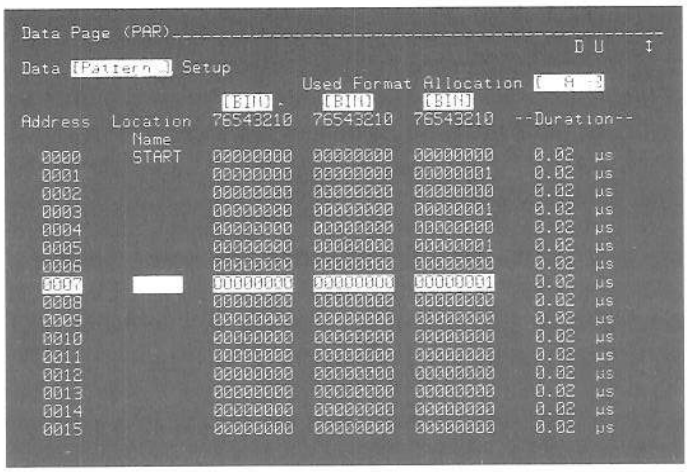


Figure 3B-3 Data [Pattern] Setup Menu Details of Example P-1

Example P-2: Data Formatting, Label creation and Value Changing

This example shows the basics of data formatting and how to change and create labels. This means how specific channels can be selected for display. A slightly different pattern from that for Example (P-1) will be used and also, a different duration (1 us). A new Format, labelled B and including just channel 1 of Pod 0 is to be created. The pattern as shown in Figure 3B-4, is to be set in this channel. The example also explains how to change a numeric setting (Timing) value and its units. One of the uses of the Edit function "INSERT" is explained.

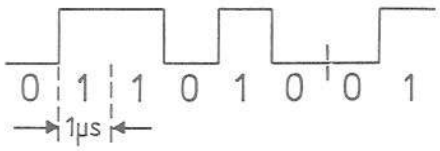


Figure 3B-4 Pattern Details for Example P-2

Procedure:
(If you have just completed Example 1, then procede from instruction 1 below. Otherwise, recall the Standard Settings as described at the beginning of 3B-2, press the **DATA** key then procede from step 2.)

1. Press the **DATA** key (to return the cursor to the menu field) then press the **NEXT[]** key until the Format Allocation menu is displayed.

2. Press the **CURSOR ↓** key to place the cursor in the Period field.

3. Change the value to 1 by pressing numeric 1 key.

The same principle is used for all numeric value changes. To change a units setting, e.g., us, do the following:

Position the cursor in the units field and press **NEXT[]** one time. This changes the µs to ms.

Since we want a 1 µs duration for this example, if you have changed the units to ms, change them back to µs. Do this by pressing **PREV[]** one time.

As already mentioned, data is to be set in channel 1 of Pod 0. Note, in the central part of the display area, details of the POD/channel identifiers. (POD0 1 and 2 and channels: 7.....0)

Data Format Label (A), shows all 24 data channels active*. Use of this label will result in all 24 channels being displayed. This is unnecessary and, in fact, data inputting is easier if only the required one is displayed.

***NOTE: active/inactive channels**
(A "." indicates channel inactive, i.e. not displayed, an asterix (*) means active or displayed.)

It is obviously possible to change the format corresponding to Label A. However, for this example leave it as it is and set up a new one. It is easy to do and will give you some more experience in operating the 8175A.

NOTE: Data Format - its Significance
The actual data format chosen has no effect on the data at the 8175A outputs (pod outputs). Data format relates only to which POD/channel combination will be displayed on,the screen.

To continue with setting up a new data format, procede as follows:

4. Press the **CURSOR ↓** key again to place the cursor in the Data Format Label field.

Creating a New Label:

5. Press the blue **SHIFT** key then the **SYSTEM** key to activate its shift function: **INSERT**. You have now created a new label field. It has no label (name) and all channels are shown as inactive. To allocate a name and activate a Pod, do the following:

Naming a Label:

6. To name the label: "B", press the **B** key. Note that, due to the five positions within the field, up to five different **B** labels are possible e.g., B..., ..B.. etc).

7. Press the **CURSOR →** key and hold down until the cursor lies in channel 1 of POD 0. Press the **NEXT[]** key to change the "." to an "*". The channel is now active.

Figure 3B-5 shows the Data **[Format]** Allocation menu details after Label B has been created.

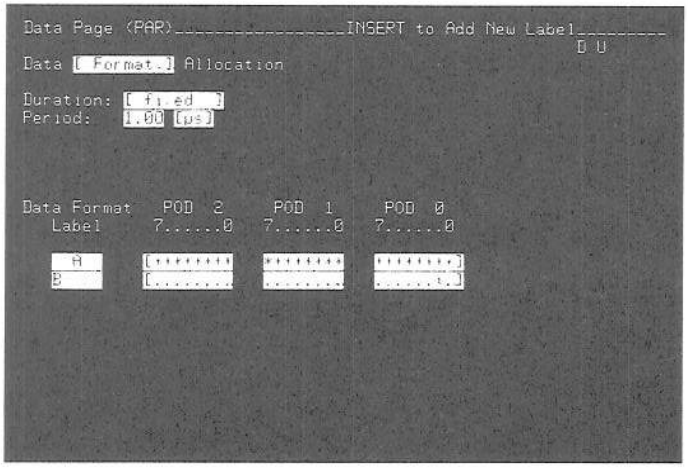


Figure 3B-5 Data [Format] Allocation Menu with Label B

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Inputting the Data:

8. Press the **DATA** key once. This will cause the cursor to move back to the Format field.

9. Press the **NEXT[]** key once. The Data Page **[Pattern]** Setup menu will be displayed. Data patterns are input and displayed on this menu.

You will notice that the current display shows all 24 channels. This is because Data Format A is still allocated as the "Used Data Format". Change it to B as follows:

10. Press the **CURSOR ↓** once. This places the cursor in the Used Data Format field.

11. Press **NEXT[]** once to change the setting to **B**. Note how, at the top of the data column, the number 1 is displayed. This identifies the channel as number 1 of Pod 0.

Steps (12) onwards illustrate how, by displaying only the channel required, data can now be set up very quickly.

12. Press and hold the **ROLL ↑** or **↓** key as appropriate, until Address 0001 appears in inverse video.

13. Press and hold the **CURSOR ↓** key to move the cursor into Address 0001 Address field.

NOTE: Alternative Method of Accessing an Address:

You can also access any address as follows:
Press (and hold) the **CURSOR ↓** key until the cursor enters the (inverse video) address field, then either:
a) Input the complete required new address via the numeric keys.
or:
b) Move the cursor (via the **CURSOR →** key) to each number to be changed and input the required new value.

To continue with the example:

14. Press and hold the **CURSOR →** key to move the cursor into the data channel.

15. Press numeric key 1 to set a 1. The display will then auto-roll to Address 0002.

16. Press the numeric 1 key, the display will then auto-roll to Address 0003.

Continue to input the remainder of the data until you have input: 01101001 between Address 0000 to 0007.

Figure 3B-6 shows how the Data [Pattern] Setup menu should appear on completion of Example P-2.

NOTE: If you wish to output this example, refer to 3B-5. It is at the end of section 3B.

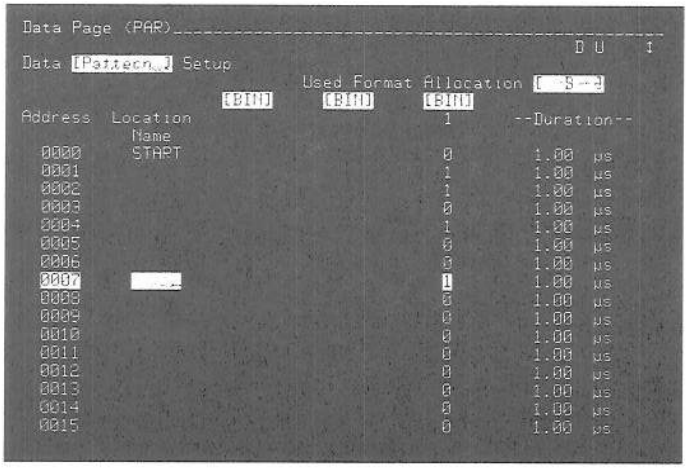


Figure 3B-6 Data [Pattern] Allocation Menu Details for Example P-2.

When you have completed examples P-1 and P-2, you have used most of the Pages, menus and settings associated with pattern setting and display. It is now recommended to proceed to section 3C. It covers the graphical capabilities. (The first example in 3C follow straight on from example P-2 in this section.)

3B-5
HOW TO OUTPUT DATA (DATA CYCLING)

NOTE: If at present, you just want to know how to output the data patterns of examples P-1, 2 and G-1, 2 and 3, refer directly to the end of this sub-section. You can read the following paragraphs later.

To be able to output any data pattern, certain preconditions have to be met. Some data must first be set and in addition, certain specific conditions and controls have to be set. The minimum preconditions to be met, and the appropriate Pages/menus to access, for outputting data are as follows. The Standard Settings value/condition of each of the settings concerned is also given.

Preconditions for Data to be Output

1. **Data:** **(DATA PAGE - [Pattern] or [Waveform] Setup menus)**
   A data pattern or stream must exist. Therefore, some specific data always has to be input to the Data page. (Even though just 0's or 1's alone are in fact data, they cannot be considered to be a pattern!).
   Standard Settings data is all zero.

2. **Mode:** **(CNTRL Page - [Clock] menu)**
   A cycling mode needs to be assigned. For continuous cycling, [Auto Cycle] should be set.
   Standard Settings mode is [Single Cycle], this will only enable one complete cycle of data outputting after a START command.

3. **Clock:** **(CONTRL Page - [Clock] menu)**
   All data cycling requires the presence of internal or external clock pulses. A clock can also be generated manually by pressing the **SINGLE STEP** KEY.
   Standard Settings value for System Clock is [internal].

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4. **Duration:** **(DATA Page - [Format], [Pattern] or [Waveform] Setup menus)**
Depending on the type of output pattern required, either fixed or variable duration must be selected. Then the required value can be input.
Standard Settings for duration are **[fixed]** and **0.02 us**.

5. **Sequencing:** **(PRGM Page - [Module] Assignment menu)**
To enable sequencing to be defined, a Program Module has to be assigned. Also, Trigger Events might need to be assigned. A Program Module must have one or more Segments, each with start and finish addresses and a "Repetition Times" value. The Trigger Event Assignments will be selected from the Program Module Segments.
Standard Settings provide a module (PROG1) with one Segment, running from address 0 to 1023, and repeated one time. All Trigger Event Assignments utilize this module.

6. **Update:** **(Front Panel Key)**
A "**U**" displayed in the top right hand corner of the screen, is a reminder that an "update" is required. A special feature of the 8175A, is that you can preset many settings/conditions e.g. such as data patterns, cycling conditions etc. to a new status while the 8175A is active. These new conditions etc., can then be transferred to the outputs (via an update) when convenient. Until done, the new conditions cannot be output. Update is done via the blue SHIFT and **EXEC** keys. The 8175A must be stopped "STOP" for Update to be done. It is not necessary to do an Update for each individual data/setting change. It is best to wait until you have completed all necessary changes to the current data/settings etc.

7. **POD Outputs:** **(OUTPUT Page)**
Until the output PODS are enabled, no data can be output.
Standard Settings condition is that the outputs are all **[disabled]**. The **[disabled]** status is always indicated by a "**D**" in the top right hand corner of the display.

8. **Start Data Cycling**
To start data cycling, and hence actual outputting of the data patterns, **START** must be initiated. In **[Auto Cycle]** mode (or **[Single Cycle]** with long duration), a small "cycling active" indicator will be displayed in the top right hand corner of the screen.

Settings to be made to Output the Examples:

For the examples in sections 3B and 3C (P-1 to P-2 and G-1 to G-3), almost all pre-conditions for data outputting are automatically met by recalling the Standard Settings. Therefore, provided that only those settings etc. as required for the examples have been made, the additional steps necessary are as follows:

Procedure:

1. Connect the required channels of Output POD 0 to the oscilloscope, and set volts/div and timebase as appropriate. (The specific channels concerned are identified in each example).

2. Set the following Page/menu/setting conditions:

CNTRL->	**[Clock]**	Mode:	**[Auto-Cycle]**
PRGM->	**[Module]** Assignment: set		**[to]** Address: **0007** (0005 for example G-3)
OUTPUT->	All Output PODs are		**[enabled]**

3. Do an "update": Press (blue) SHIFT and **EXEC**. (See precondition (6) above)

4. Press **START**.

3C
How to set up Timing Diagrams (Waveform Setups)

INTRODUCTION

This section explain the basics of using the graphical setting up and display capabilities of the 8175A. This means how to set up and display data/timing relationships in the form of timing diagrams. The basic operating principles of the 8175A are not repeated here. Refer to sections 3A and/or 3B as necessary for such information. Worked examples are used to explain the various procedures.

The information in this section is presented under the following headings:

3C-1 Timing Diagrams: General Points
3C-2 Timing Diagrams for Fixed Durations
Example G-1. Basic Graphical Display Techniques
Example G-2. Basic Graphical Editing Techniques
3C-3 Timing Diagrams for Variable Durations
Example G-3. Variable Durations

3C-1
TIMING DIAGRAMS GENERAL POINTS

Instead of setting up, and/or displaying data/timing relationships in "numeric" form, timing diagrams can be used. This involves the use of the Data [Waveform] Setup menu. The use of this 8175A capability simplifies the inputting, editing and interpretation of complex timing setups. It enables timing diagrams to be represented exactly as they are in logic circuit descriptions. Patterns, which have been set up on the **[Pattern]** menu, are automatically converted into a timing diagram when the **[Waveform]** menu is selected. Switching from **[Waveform]** to **[Pattern]** menus will have the opposite effect. Normally, only a "window" within the complete address range will be displayed. The window can be scaled so that the display can be "stretched or compressed" as wished.

Data can be set up from scratch or edited, by simply moving a cursor to the required address and entering the desired data. In variable duration mode, duration values can be also be set on the **[Waveform]** menu.

NOTE: THE EXAMPLES

As regards setting up and/or editing timing diagrams, the basic techniques are the same. The first two examples (G-1 and 2) are for fixed duration. They require the pattern from Example P-2 in section 3B. G-3 is for variable duration, and does not depend on any other example having been done.

3C-2
TIMING DIAGRAMS FOR FIXED DURATIONS

In the fixed duration mode, all patterns have a common (programmable) duration value. For every separate time interval, a new data memory location has to be used. Therefore, in this mode, the main advantage of using timing diagram representation are that the data/timing relationships can be "seen". Also, unlike [Pattern] menu displays, by using the [Waveform] menu, more than one Format can be simultaneously displayed.

FIXED DURATION EXAMPLES: INTRODUCTION

The first example (G-1) covers basic graphical display techniques. It involves simply displaying the data pattern produced by Example P-2 as a timing diagram. Example G-2 then explains how to edit the timing diagram produced in G-1.

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Example G-1: Basic Graphical Display Techniques
This example explains the basics of displaying a pattern grapically. It makes use of the pattern from Example P-2, therefore, if you have not yet attempted Example P-2, or have deleted the pattern, set/reset it up before proceeding further.

1. Access the DATA Page by pressing the **DATA** key.

2. Press the **NEXT[]** key to access the Data **[Waveform]** Setup menu. This is the menu where data patterns can be graphically set up and displayed.

Display Scaling
Before the existing pattern(s) can be viewed, it is necessary to scale the display area correctly. This involves changing the Time/Division setting. It can be considered as a magnification or "zoom" factor. In addition, some other settings normally need to be made before any pattern can be properly displayed. For this example, it involves changing only the Address setting.

The reason for changing the Time/Division setting is as follows:

Since the screen is divided into 10 divisions, the total width (for the 50 ns/Division) represents:

10x50 ns = 500 ns

The current bit pattern duration is 1 us, (1000 ns) so therefore only half a duration can at present be displayed. To enable the complete pattern to be displayed, change the scaling as follows:

3. Press the **CURSOR ↓** key one time to move the cursor into the Time/Division field.

4. Press the **NEXT[]** key two times to change the value to 5 us.

To change the Address setting, procede as follows:

5. Press the **CURSOR →** key once. This moves the cursor into the Address field.

6. If Address 0000 is not currently displayed, set it via the numeric **0** key. This will cause the first 8 addresses to be "shifted" back into view. The editing cursor will now be positioned at Address 0000 instead of at 0008.

The display details should now be as shown in Figure 3C-1. Note that, if you did Example P-2 by first recalling the Standard Settings, no pattern will exist for label **A 0**.

We want to display the pattern of the single channel of Format Label **B** . At present, the channels displayed are all for Format A. These are identified as **A 0** to **A 15** in the column on the extreme left hand side of the display area. A more detailed explanation of why only "A" channels are currently displayed etc., is given in the corresponding Menu Map section. At present, it is sufficient to know just how to display the channel required. This is done as follows:

Changing a label/channel:
7. Press, and hold, the the **CURSOR ↓** key until the cursor lies in the uppermost pattern-identifying-field. This is at present labelled **A O**.

8. Press the **PREV[]** key twice. This will change the label details to **B**. No numeric identifier is displayed since there is only one channel active. The data/timing relationship of Example P-2 will now be displayed. The display details will be as shown in Figure 3C-2.

NOTE: If you wish to output the pattern of this example, refer to 3B-5. It is the last part of Section 3B.

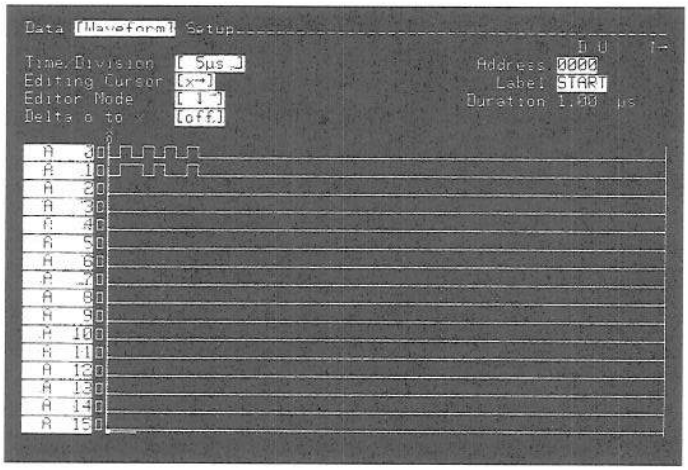


Figure 3C-1. Data [Waveform] Setup at step 6 of Example G-1

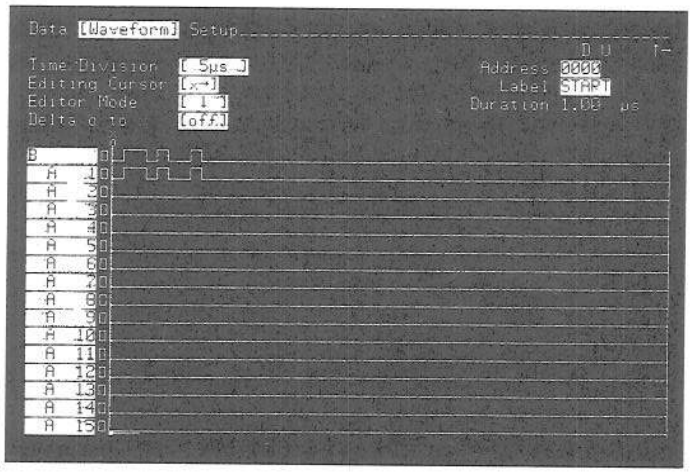


Figure 3C-2. Example G-1 Display Details

As you will notice, the same pattern is displayed twice. This is because Data Format Label A includes all channels, and A 1 is channel 1 of Pod 0 as is B. If you still have the pattern of Example P-1, you can display it instead of A 1. It is done as follows:

Move the cursor one label lower to A 1, then press **PREV[]** one time. The label will change to A 0 and the corresponding pattern will be displayed.

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Example G-1 showed you the basics of how to display a timing diagram, and change some of the menu settings. Once you have mastered the basic settings etc., it is quite easy to move on to editing an existing diagram and/or setting up new one. More detailed information on how to use the features of this menu are given in the corresponding Menu Map section. However, you can familiarise yourself with many of the features without referring to the Menu Map. Example G-2 shows the basic principles of editing an existing timing diagram. The same basic principles also apply to setting up a new one.

Example G-2: Basic Graphical Editing Techniques

This example explains how to change or edit an existing timing diagram. It uses the one produced in Example G-1. Therefore, either ensure that the timing diagram is still available or, re-do Example G-1 before proceeeding further. The object of the example is to produce the timing diagram shown in Figure 3C-3. The duration will be left as "fixed". On the [Waveform] Setup menu, the diagram to be edited is that currently labelled as "**B**".

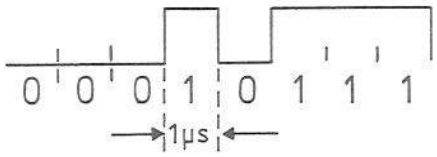


Figure 3C-3. Pattern/Timing Requirements of Example G-2

To edit any timing diagram, the editing cursor must first be positioned at the appropriate address. Note that, the address where the editing cursor is positioned, is always displayed in the Address field. Also, the status or level of each bit is indicated by either:
for 0: an empty [] or, for 1: a filled [].

The bit level indicator is positioned immediately to the left of the Editing Cursor "home position". As the Editing Cursor is moved through the address range, the bit level indicator of each channel will be seen to change accordingly.

The "default" Editing Cursor (Standard Settings) is the "x" one. You do not need to change this at present. However, to make editing of the "**B**" pattern easier, the Editor Mode should be changed to -->. This is done as follows:

Procedure: (Note, this starts at (9) since it continues directly from the end of Example G-1.

9. Position the cursor in the Editor Mode field. Press **NEXT[]** one time. The mode will change to: -->.

The significance of this is that as you input data, the cursor will stay in the horizontal plane. In the previous mode, the cursor would move vertically down after each data input operation.

11. Position the cursor in the (**B**) labelled field. Note the current bit status. Press the **CURSOR →** key one time. This moves the Editing cursor to the waveform transition at Address 0001.

12. Press the **0** key two times. Notice how the Editing Cursor moves one address step after each data change/input.

13. Press the **1** key, then the **0** and finally the **1**, two times. The pattern should now be as shown in Figure 3C-4.

Note that, when you need to move the Editing Cursor to a new position, (no data change) either a step or continuous movement can be made.

NOTE: If you wish to output the pattern of this example, refer to 3B-5. It is the last part of Section 3B.

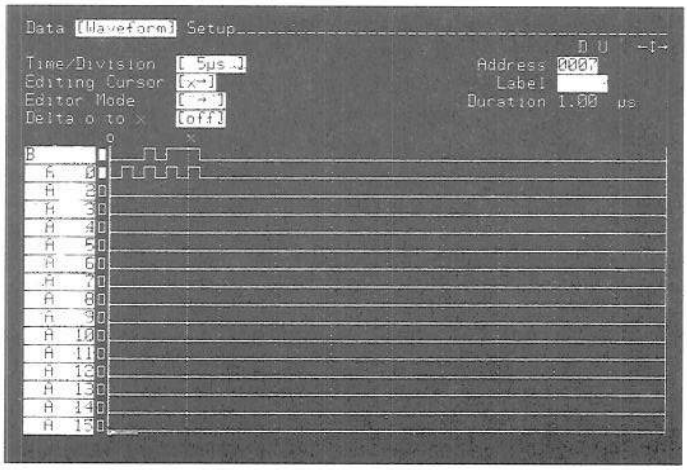


Figure 3C-4. Timing Diagram for Example G-2.

Practise inputting some more data to get familiar with the corresponding controls. To change or input data to the "A 0 diagram", just move the (flashing) cursor into its label field and then use the same techniques as you did for **B** in example G-2.

3C-3
TIMING DIAGRAMS FOR VARIABLE DURATIONS

Introduction

In fixed timing mode (as used for all the previous examples) a new data location is used for every time interval. When variable duration is used, a new data memory location only needs to be used when a channel changes state. Example 3C-3 covers the basics of how to set up a timing diagram involving variable durations. More detailed information on this, plus how to use the related editing features etc., is included in the appropriate Data Page menu descriptions and also in section 3E (Edit Capabilities).

Example G-3: Variable Durations
Waveform patterns which include very short data durations combined with long steady state conditions, are best set up with variable duration. An example of such a waveform pattern is shown in Figure 3C-5. This is the pattern to be set for Example G-3. Note that, for this example, each separate duration requires only one data bit.

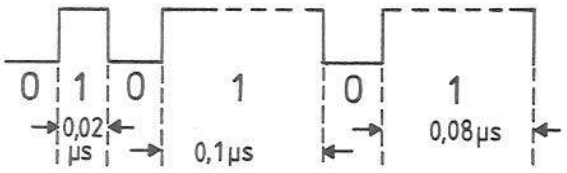


Figure 3C-5. Timing Diagram for Variable Duration Example (G-3)

To set up such a pattern graphically, involves the same basic procedure as for a fixed duration type. The main difference in the procedures are that the following additional settings need to be made:

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[Format] menu:	Duration must be set to: **[variable]**
[Waveform] Setup menu:	The Specific duration values need to be input. (They can of course be input on the Pattern Setup menu, but it is easier and more practical to do it on the Waveform Setup.)

NOTE: General Points
To set up a variable duration timing diagram from scratch, it is best to first set the data, then the individual duration values. To minimise the time needed to set duration values, the most frequently occurring duration should be noted and set first. This can then be taken as a "base" value. The non-base value durations can then be set later. This "base" value can be set either before or after the data has been input. (If several individual base values need to be set, the quickest method is via one of the Edit features (MODIFY). Refer to section 3E for an explanation of how to do this. For this example, the default value (0.02 us) is used as the base value. This value is automatically set when duration is set to variable.

Procedure:

1. Recall the Standard Settings.
2. Select the DATA Page, **[Format] Allocation** menu.
3. Move the cursor into the Duration field. Press **NEXT[]** to change setting to **[variable]**. This will also result in the duration being set to the default value of 0.02 us (not shown on this menu).
4. Press the **DATA** key one time followed by **NEXT[]** two times. The Data **[Waveform]** Setup menu will now be displayed.
5. Change the Editor Mode to -->.
6. Press the **CURSOR** ↓ key until the cursor enters the first waveform label field. This is the one labelled "A 0".
7. Press the **CURSOR** → key one time then set a 1. Input the rest of the data until the pattern: 010101 has been set.

To set the non 0.02 us durations:

9. Move the Editing Cursor back to Address 0003.
10. Move the (flashing) cursor into the Duration field.
11. Set the Duration to 0.1 us.
12. To set the next duration value, leave both cursors where they are. Change the Address by means of the ROLL ← key, to 0005 (Address could also have been changed via the Address field). Note how the current address window moves left. Since only the window moves and not the cursor, it (the cursor) will lie on a different address, in this case 0005.
13. To change the duration, simply set the value to 0.08 us.
14. To display the complete timing diagram, press and hold the **ROLL** → key until it rolls into view.

NOTE: If you wish to actually output this example, refer to 3B-5. It is the last part of Section 3B.

The display details should now be as shown in Figure 3C-6.

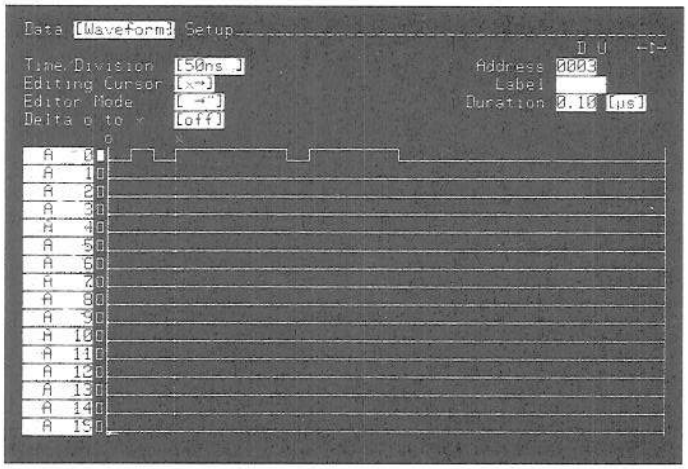


Figure 3C-6. Display Details of Example G-3

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8175A MAIN DISPLAYS MENU MAP

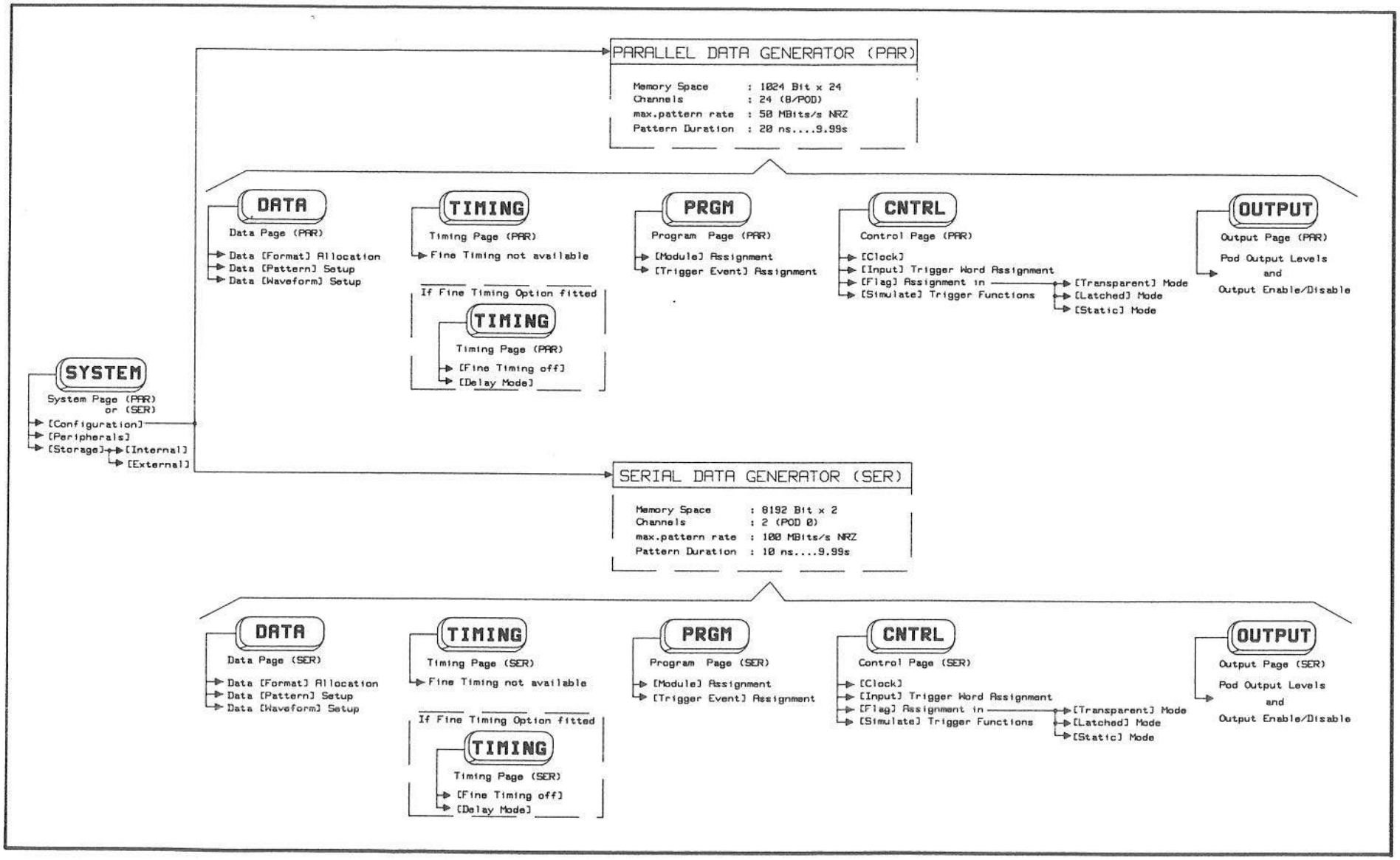


Figure 3D. 8175A Menu Map

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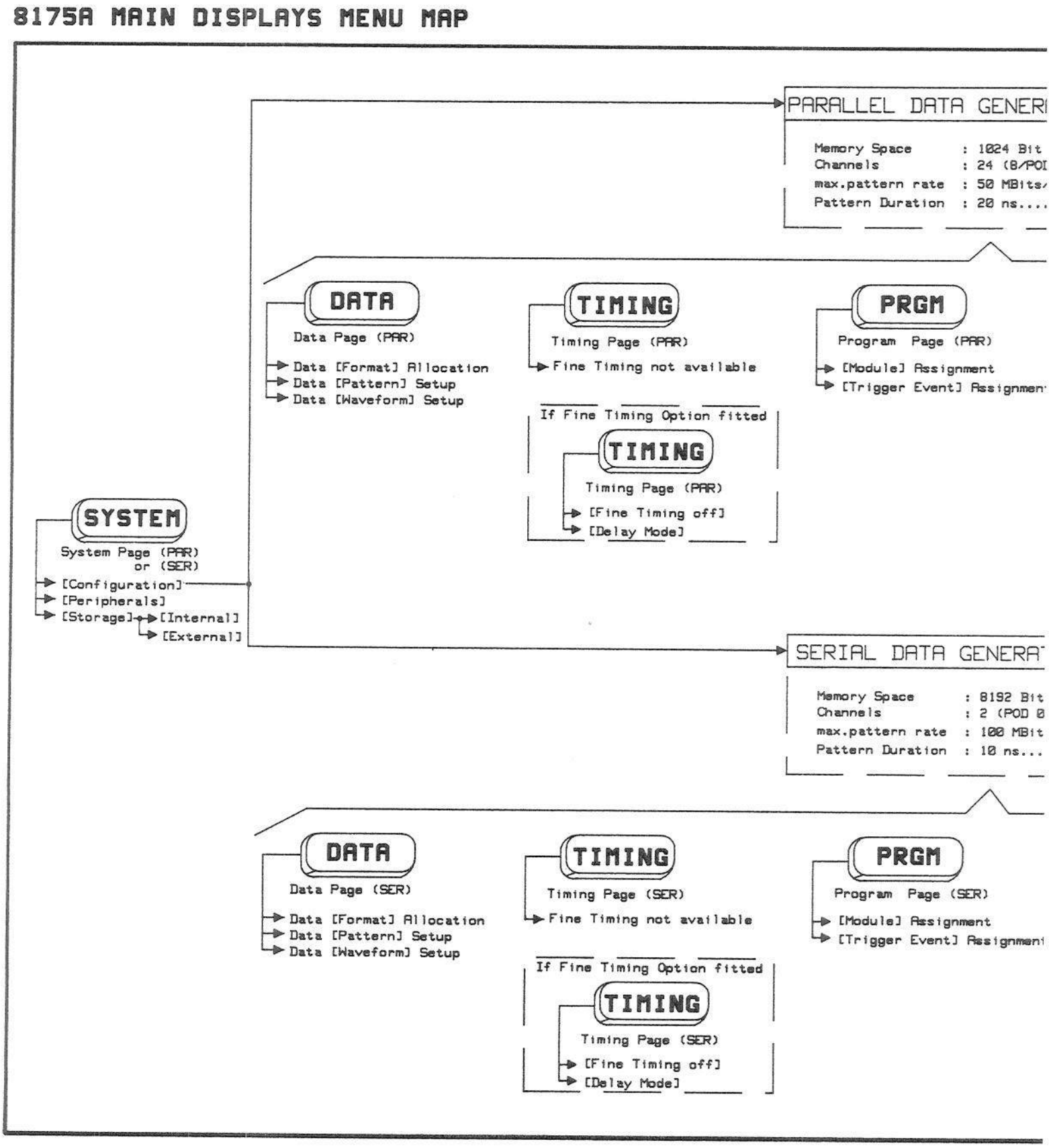
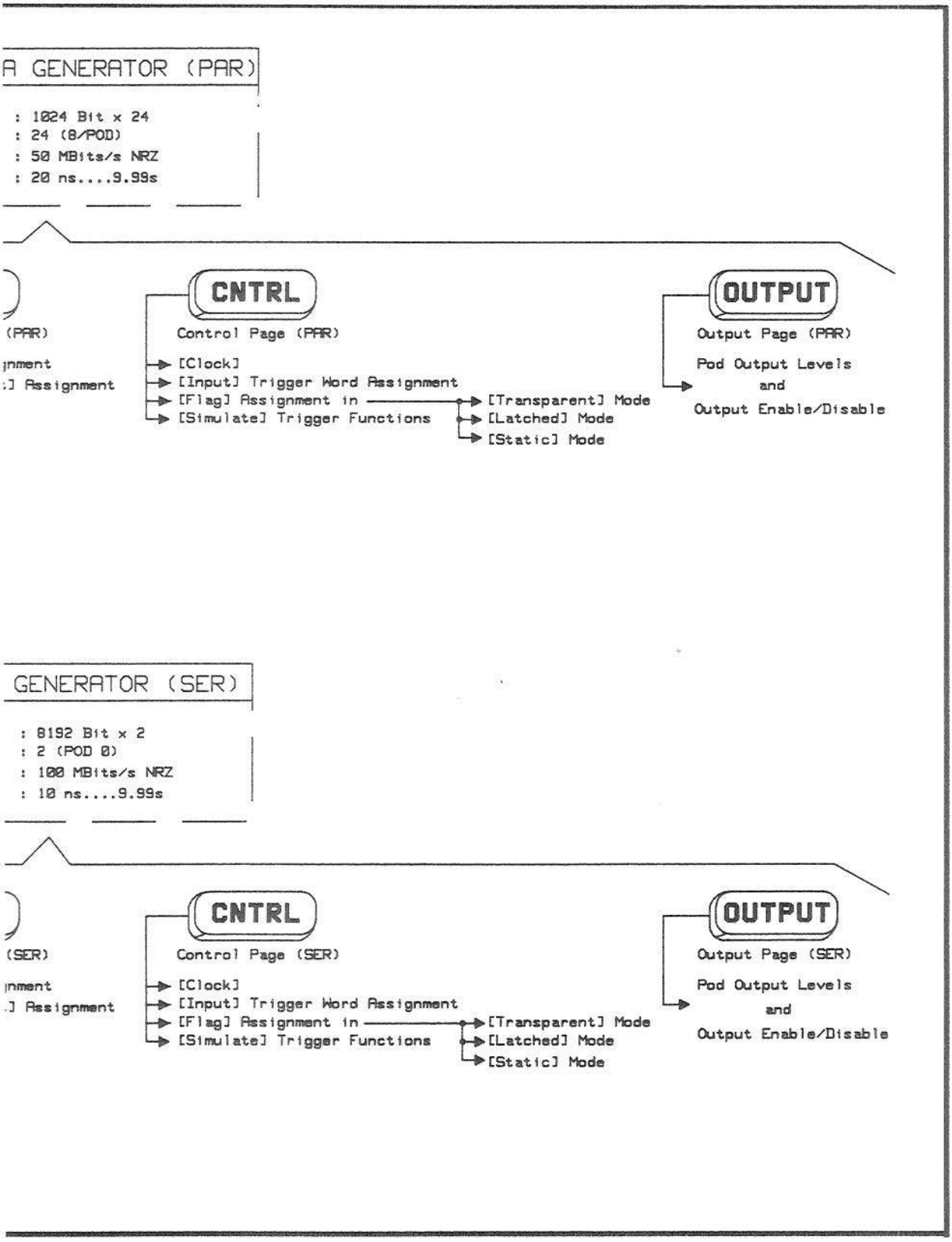


Figure 3D. 8175A Menu Map

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3D
The Menu Map and How to use the Menus

THE MENU MAP

The first part of this section comprises Figure 3D, which is the "Menu Map"of the 8175A. This shows all of the menus available in the 8175A for both Configurations. Each menu is shown below the front panel (MAIN DISPLAYS) key that calls it to the screen. Four of the Pages: **SYSTEM**, **CNTRL**, **OUTPUT** and **PRGM** (and their menus) are configuration independent. This means that their settings fields etc. are the same irrespective of whether Parallel or Serial Data Generator configuration is selected. The **SYSTEM** Page **[Configuration]** menu is always automatically displayed on power up.

Apart from setting the configuration (one of the first steps when using the 8175A), there is no specific sequence of Page/menu selection which should be followed. The sequence reading left to right, as shown on the Menu Map is only a suggested one.

INTRODUCTION TO USING THE MENUS

The menus of the 8175A are accessed via the six **MAIN DISPLAYS** keys on the front panel. Each key accesses the corresponding Page, each Page comprises one or more menus. Once you have learned which menus "belong" to each Page, operation of the 8175A is very easy. This section of the manual gives a comprehensive description of all available menus. It will be of use initially, when learning how to operate 8175A, and also afterwards as a reference .

Some of the menus include settings whose use is explained with the aid of examples. This concerns mainly CNTRL (Control), DATA and PRGM (Program) Page related menu settings.

The Pages and their menus are described in the same order as the **MAIN DISPLAYS** keys front panel identifiers. Refer to the Menu Map as necessary for menu distribution information. Unless otherwise mentioned, all figures showing menu contents are the **Standard Settings** or "default" conditions.

When working with the Data Page menus, section 3E which covers the Edit capabilities is of special significance.

NOTE: Parallel or Serial Configuration

In the following explanations, all main menu views and contents explanations are based on Parallel Configuration. Any differences for Serial Configuration are highlighted. For those cases where major differences apply, a separate sub-section is included at the end of each corresponding menu description. This applies only to the three Data Page menus.

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3D-1
SYSTEM (System Page) Menus

This section describes the SYSTEM (System Page) menus and how to use them. The System Page comprises three menus: **[Configuration]**, **[Peripherals]** and **[Storage]**. The first two menus enable you to set the required configuration, and to input (to the 8175A) data relating to peripherals. The third menu - **[Storage]** - covers internal and external storage capabilities. Details of the menus and how to use them are as follows:

THE MENUS AND HOW TO USE THEM

[Configuration] menu (Refer to Figure 3D-1)

DISPLAY CONTROL FIELDS — SETTINGS EXPLANATION

General information
Whichever configuration is set, the corresponding basic specification will be displayed on the menu. Some further details of configuration are as follows:

Parallel Data Generator
In this configuration, programmable parallel data patterns can be output. Each pattern can be up to 24 channels wide. The available memory depth per channel is 1 kbit. The duration of each individual pattern is programmable.

Serial Data Generator
In this configuration, 2 channels of serial data can be output. The data from each channel, is output in words of 8 successive bits. 16 of the 24 bits corresponding to each address are used for each pair of serial words. This results in an available memory depth per channel of 8 kbit. The duration of the data bits is programmable, each 8 successive bits automatically have the same duration. Each duration value applies across both channels.

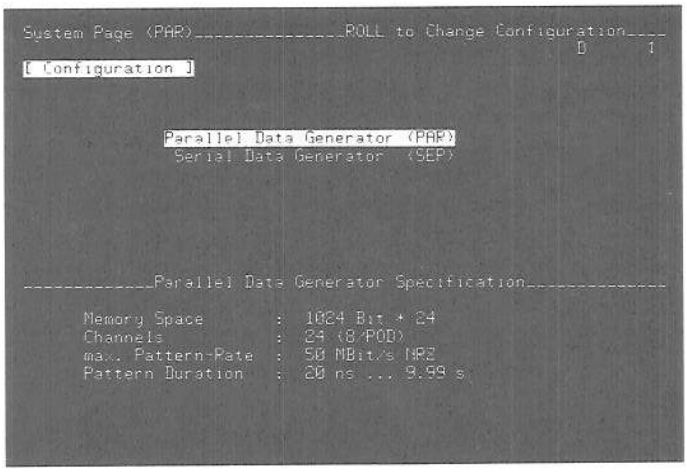


Figure 3D-1. **[Configuration]** menu

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[Peripherals] menu (Refer to Figure 3D-2)

DISPLAY CONTROL FIELDS	SETTINGS EXPLANATION
System Controller:	Either "HP-IB" or, "8175 is controller" will be displayed here. It depends on whether the 8175A is set either, to be controlled (by a system controller) or, to be the (HP-IB) controller. The setting is made on the rear panel mounted HP-IB System switch. Details of the settings are as follows (switch positions for 1 and 0 can be identified in the figure below): for 8175A to be **HP-IB CONTROLLED**, set switch 8 to 1. for 8175A to be the **HP-IB CONTROLLER**, set switch 8 to 0*. The 8175A checks the switch status only during the power on sequence. Therefore, a new setting will not be acknowledged unless followed by a new power on sequence. ***NOTE:** For **manual** operation of the 8175A, if a disc drive and/or printer is to be connected, the 8175A must be set as the "CONTROLLER".

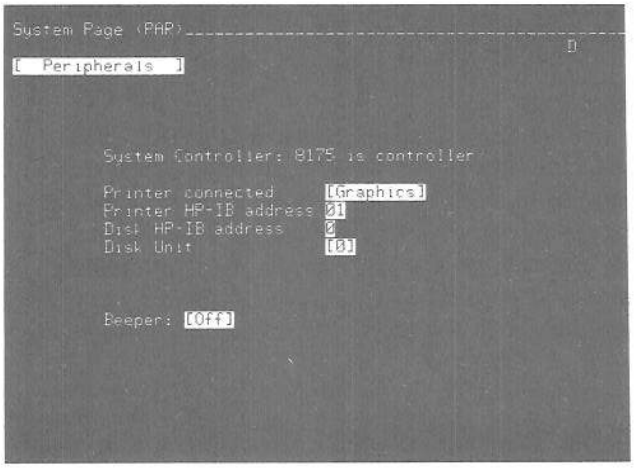
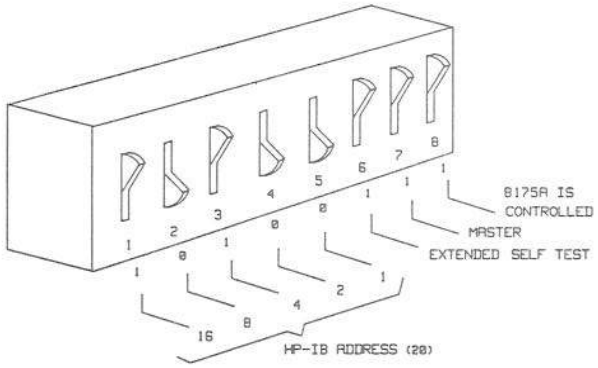


Figure 3D-2. **[Peripherals]** menu



HP-IB Switch: Settings Explanation

Digital Signal Generator HP-IB Address:

This field is displayed only if the 8175A is set to be HP-IB controlled. (Refer to the previous explanation of "**System Controller**"). The value displayed will be the decimal equivalent of the HP-IB Address setting. 5 bits are available on the (rear panel mounted) switch for the address. A value from 0 to 31 is therefore possible. At power on, the 8175A checks the status of the 5 bits and displays their decimal equivalent value.

Printer connected:

[Text] or **[Graphics]** printers are selectable. Note that in Figure 3D-2, "Graphics" is shown. For Standard Settings this will be "None". A **Graphics** printer enables copies of all displays, including Data Page timing diagrams, to be printed. A **Text** printer will not

print any graphics details, including inverse video fields etc. A "Text print" is generally significantly faster than a graphics one. The printer type that you set, determines the code for information transfer from the 8175A to an external printer. Specific information on connection and use of a printer is given in Appendix B.

Printer HP-IB address: This defaults to 01, however it can be manually set to any number between 00 and 31 if no other instrument is assigned to that address. If the 8175A is set to address 01, then the printer defaults to 02. Refer to Appendix B for more information concerning the printer HP-IB address.

Disk HP-IB address: This defaults to the lowest available HP-IB address (i.e., defaults to 2 if the 8175A is set to address 0; otherwise will be at address 0. Any number between 0 and 7 may be manually entered. Ensure that it is the same as the actual HP-IB address on the particular disc drive used.

Disk Unit: This is the specific disc unit number within the disc drive that 8175A is using. It defaults to 0.

Beeper: When **[On]**, this provides an audible indication of an operator caused **ERROR** or **WARNING** condition. When **[Off]**, the beeper is disabled at all times.

[Storage] menu (Refer to Figure 3D-3)

This menu covers all settings associated with storage capabilities. **[internal]** and **[external]** storage submenus are selectable. Internal storage capabilities include store, recall and exchange of complete data and parameter settings. A set of Standard Settings is also available via the internal storage. External storage enables you to store test data on a flexible disc. It involves the use of an HP 9121S/D or 9122S/D Flexible Disc Drive. Fast reloading of test data or reconfiguration of the 8175A is then possible. Specific information relating to the corresponding (**[Storage] [external]**) menu details, and how to use this feature are given in Appendix C.

DISPLAY CONTROL FIELDS	SETTINGS EXPLANATION
[Storage] [internal]	Note: [internal] or [external] fields are selectable only if the 8175A is set as the System Controller. Otherwise, [Storage] is fixed as "internal"

[store] in Location **[LOC1]** Description: The Location can be set as either **[LOC1]** or **[LOC2]** via the NEXT/PREV keys. **[store]** provides storage for two complete data/parameter sets. To store the current set in either location, enter the location number and, if you wish, a description then press **EXEC**.

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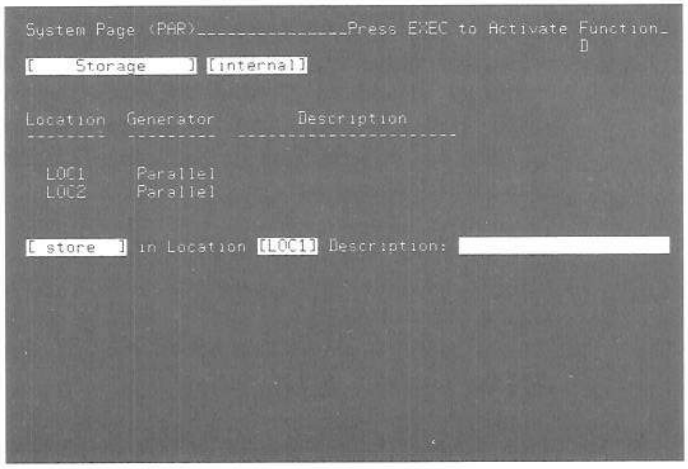


Figure 3D-3. **[Storage] [internal]** menu

[recall] from location **[LOC1]**:

This enables you to recall either of the two sets previously stored.

[exchange] with Location **[LOC1]** Description:

This enables you to exchange the current data/parameter set with one of the stored ones.

[recall] Standard Settings:

This enables you to recall a complete set of known parameter values (data memory will be cleared).

NOTE: When any of the above recall/exchange functions are used, the configuration header (PAR or SER), will be automatically updated according to generator type recalled etc.

3D-2
CNTRL (Control Page) Menus

This section describes the CNTRL (Control Page) menus and how to use them. Due to some special points relating to their use in 8175A operation, a fairly detailed overview is necessary. Therefore, the information is presented under the following two headings:

Overview of the Menus

The Menus and How to Use Them

OVERVIEW OF THE MENUS

The Control Page comprises four menus: **[Clock], [Input], [Flag]** and **[Simulate].** The menu contents are independent of the 8175A configuration. The first menu (**[Clock]**) covers mode, clock and general Input POD related settings. The other three menus enable all settings related to input trigger, trigger conditions simulation and output flag assignment to be set.

If Input Trigger and Output Flag capabilities are not required (for a particular application), then only the **[Clock]** menu needs to be considered. On this menu also, all Trigger POD related settings can be ignored. Cycling (outputting) of data can then be explained as follows:

DATA CYCLING - MODE SIGNIFICANCE

Following a **START** command, irrespective of the mode set, data cycling will commence from the first segment assigned on the Program Page Assignment menu. If **Single Cycle** is set, when the first "end" in the program module is reached, data cycling will stop. It will be started again on the occurance of a new trigger event (this can be via the keyboard or from an external source). If **Auto Cycle** is set, data cycling will continue with the address label assigned to "CONTINUOUS START" on the Program Page, Trigger Event Assignment menu. The significance of "**asynchron**" or "**synchron**" startable etc. is explained later in the detailed description of menus.

INPUT TRIGGER AND FLAG CAPABILITIES:

Input Trigger Word Assignment

Status and data cycling can be externally controlled, e.g., in response to particular DUT output conditions. The interface for this is a Trigger POD, up to eight different actions can be triggered in this way. Each action can be initiated by up to four (8 bit user defined) valid input patterns or words.

Flag Assignment

As well as providing a data cycling and status control capability for the 8175A, each incoming Trigger Word can initiate an 8 bit user defined Output Flag pattern. Using this capability, the occurance of particular signals can be confirmed and, as necessary, feedback provided to the DUT or test system.

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THE MENUS AND HOW TO USE THEM

[Clock] menu (Refer to Figure 3D-4)

The [Clock] menu includes mode, clock and general Trigger POD related settings. The settings are as follows:

DISPLAY CONTROL FIELDS	SETTINGS EXPLANATION
Mode:	This determines whether, after a START command, the 8175A will cycle data only once (**Single Cycle**) or continuously (**Auto Cycle**). Asychronous or synchronous starting can be selected for either mode*. The setting determines for how long (after a START command) Data outputting will be delayed. This is explained as follows: in **[synchron]**, data cycling commences after a specified delay. in **[asynchron]**, an additional delay of up to 1 clock period (10 ns for internal clock) can occur. * These starting capabilities are System Clock source dependent. If externally sourced, only **[asynchron]** is possible. (Refer to the System Clock explanation (page 3-31)for more information.)
Trigger POD	If set to **[enabled]**, then external bit patterns can be read in via the pod, to the 8175A. These can be used to control status, data cycling and also to initiate Flag outputs.
START and/or STOP from:	This setting determines from which additional* source, **START** and/or **STOP** commands will be accepted. If set to **[Trigger POD]**, in addition to START and STOP, six other functions are available. These are all listed on the **[Input] Trigger Word Assignment** menu. * In manual operation, the front panel START and STOP controls are always operative. If **[external input]** selected as source, note the following points: A suitable signal must be applied via the corresponding front panel BNC connector (refer to the specifications for more details). The input must be **[enabled]** via the corresponding field. The LED adjacent to the BNC connector will then illuminate. The required START and/or STOP trigger conditions must be set (or default setting used). Note also, if this mode is set, then Trigger POD derived patterns will be disabled from controlling instrument status etc. Flag Patterns however, can still be obtained if the Trigger POD is set to "**enabled**".
Trigger POD [ ] on [ ] Edge:	When **[synchronous]** set, a clock signal* must be applied to the pod to read in the bit patterns. Patterns are then read in at the [^] or [v] Edge of the clock signal. When **[asynchronous]** set, it accepts bit patterns without a clock signal. * (See also "System Clock" explanation.)

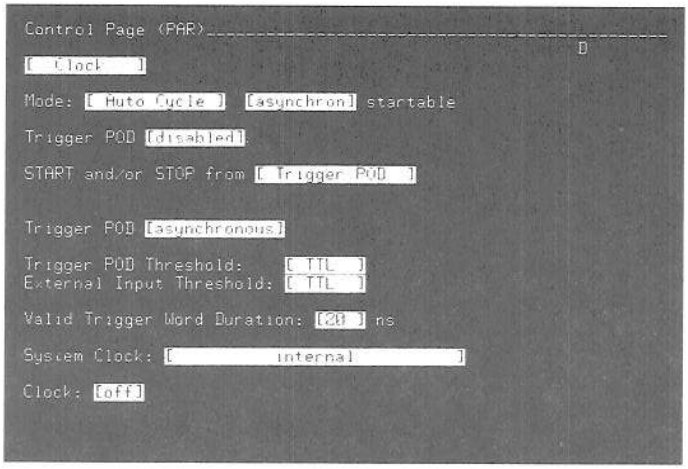


Figure 3D-4. **[Clock]** menu

Trigger POD Threshold:
External Input Threshold:

For each type of input the following thresholds are available: Fixed TTL or ECL, or variable between +/- 9.9 V in 0.1 V increments. Note that, the **VERNIER** function of the **ROLL** keys can be used to set the value.

Valid Trigger Word Duration:

This is a delay, or time during which a valid trigger word (or bit pattern) must be stable. Only then, can it initiate an action. The value can be set (via the **NEXT/PREV** keys) to between 20 ns and 500 ns. For Trigger POD **[synchronous]**, the delay is timed from the appropriate clock signal edge. (See explanation of "Trigger POD **[synchronous]**" etc.) For **[asynchronous]**, the delay is timed from occurance of the new pattern.

System Clock:

This is the clock signal from which all timing related functions including Pattern Duration, Clock etc. are derived. Three alternative sources are available, details are as follows:

[internal]
This is the default source, it is a clock signal of 100 MHz. Note, for this clock source a **[Clock Calibration]** feature is available. It is available only when the operating Mode is set to **[synchron]** startable. (In **[asynchron]** the field is not displayed.) It enables the frequency to be auto-calibrated* so increasing the accuracy of derived signals. (Refer to the specifications for actual values). To calibrate the frequency, move the cursor into the **[Clock Calibration]** field and press the **EXEC** key. The message "**RUNNING AUTOCAL**" will be briefly displayed after the key is pressed.

* In **[asynchron]** mode, the clock frequency is continuously calibrated. Therefore, no additional operator action is necessary.

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[Clock] menu continued

external...
General: If either "external" clock source setting is selected, "**[synchron]** startable" is not possible. This is of significance for the Mode setting at the top of the menu. The corresponding setting field will be deleted from the display.
[external from Input POD]
This enables the System Clock to be supplied, via the Trigger POD. An external source, frequency range from DC to 25 MHz should be applied.

[external from rear panel BNC]
This enables the System Clock to be supplied, via the rear panel **EXT CLOCK BNC** connector. A source of frequency range: DC to 100 MHz should be applied.

For both **[external...]** sources, if frequency is < 4 Hz or >100 MHz, appropriate Warning menssages will be flashed. Refer to the specifications for more information.

Clock:

This is a user clock with programmable period, independent of the data rate. It is available on data line 7 of the Flag Output pod. It is System Clock derived and therefore, its period and accuracy depend upon whether internal or external clock sources are used. The value can be set via either the numeric keys or, the VERNIER function of the **ROLL** keys. Note that, when the System Clock is externally sourced, the period of the (user) clock is determined by setting values in two fields. The first field is for inputting a numeric value, the second is for a multiplying factor of 10 or 100.

Refer to the Specifications for more information.

[Input] Trigger Word Assignment menu (Refer to Figure 3D-5)

This menu enables you to assign the patterns (Trigger Words) which will initiate any of the eight available control functions. It is displayed if "START and/or STOP" (see [Clock] menu description) is set from **[Trigger POD]**. Details are as follows:

DISPLAY CONTROL FIELDS	SETTINGS EXPLANATION
The Trigger is determined by **[n]** Word(s)	The value set here determines how many different words (up to a maximum of 4) can initiate each control function. Note that, if the value is > 1, any word assigned to a function can initiate it.
Start, Stop...Tristate asyn:	The field(s) adjacent to each function are for setting (assigning) a corresponding pattern (Trigger Word). These patterns (if Trigger Word Duration requirement etc. are satisfied) will then initiate the corresponding function. The default condition for each pattern consists of ".....". Such a pattern cannot trigger a function. To trigger a function, a pattern must comprise a combination of 0, 1 or X characters. "X" means that either a 1 or a 0 will be recognised as a trigger input from the POD. "X" is input via the **DON'T CARE** key.

A brief explanation of the functions is as follows:

Start, Stop and Continue

These perform the same function as the corresponding front panel keys. "JMP A and JMP B" refer to program segments (see PRGM Page: Module Assignment menu description).

Tristate on and Tristate off

These provide an alternative (to Output Page menu or front panel control) means of "disabling or enabling" the **data** Output Pods (not the Flag one). In either case, once either function has been initiated, it remains active until the opposite Tristate capability is triggered.

Tristate asyn

This provides another method of Tristating (disabling) the **data** Output Pods. The difference from **Tristate on** is: **Tristate asyn.** remains active only as long as its corresponding Trigger Word is present.

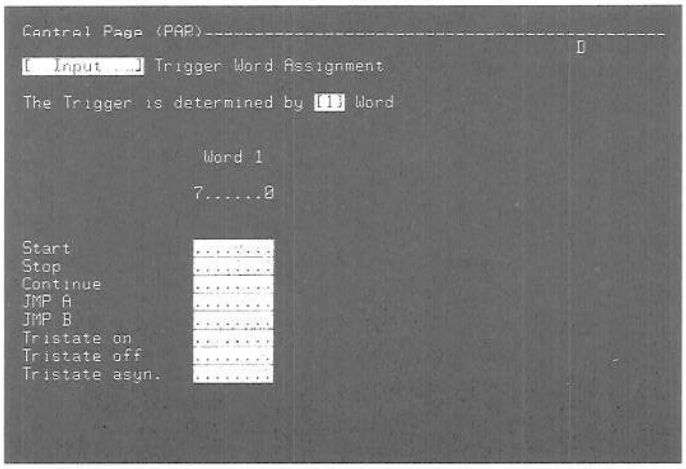


Figure 3D-5. **[Input]** Trigger Word Assignment menu

Error Messages (Pattern related)

When you start to input a trigger pattern, an error message will flash, (and remain) until all eight characters have been input. This is because the pattern will temporarily include a combination of dots (.) and other characters. You cannot exit a pattern field, or update the menu settings, without fixing any current error condition. If you try, a message will be flashed to remind you!

Error Messages (Exclusive function related)

Another possible cause of an error message can be a conflict between fields. This is explained as follows:

All functions except "Tristate asyn." are exclusive. Exclusive functions are ones which should never be initiated by the same trigger word. For example, Start and Stop should never be simultaneously initiated! In other words, a pattern assigned to trigger an exclusive function, should not be assigned to any other exclusive one. If, the same pattern* is assigned to one or more exclusive functions, an error message will be displayed. the message is:

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(ERROR Conflict between Fields)
Exiting, or updating of the menu while an error condition still exists, is not allowed.

* Remember that "X" can be considered as either 0 or 1. Therefore, patterns which contain X's can conflict with others which contain only 0's and/or 1's. An example of this is as follows:

10001XXX will conflict with 10001111, 10001000, 10001101 etc.

Enter field # to show conflicts:

During pattern setting/assignment, it is possible that conflicting patterns will be set. Such patterns will be identified by their reference numbers being displayed to the right of the pattern. (See the note* for explanation of this.) Note that, those patterns first detected as being in conflict with one another, will also all be automatically identified by an an asterix (*). Subsequent "new" conflict patterns will only be identified by their numbers. An example of this is illustrated by Figure 3D-6.

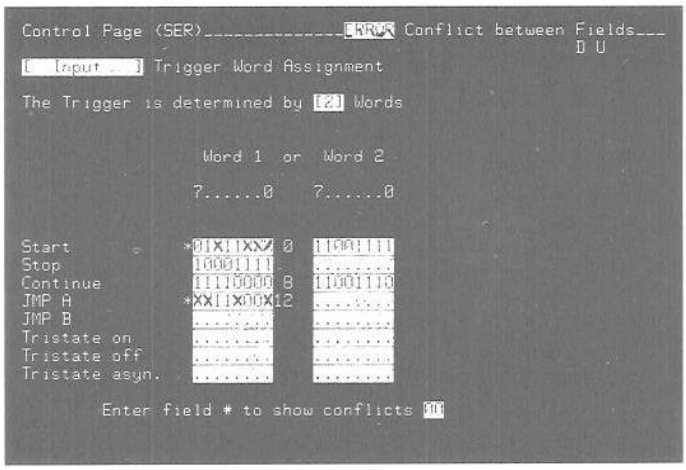


Figure 3D-6. Conflict Patterns (0 and 12) auto-identification

To confirm which patterns are in conflict with one another, is done as follows: Input a suspect conflict pattern number in the field at the bottom of the display. All patterns which are in conflict with it will then be identified by an *. Figure 3D-7 illustrates an example of this. Note that although 8 conflicts only with 12, Figure 3D-6 shows that 12 also conflicts with 0.

***NOTE: Pattern reference numbers**
Each pattern is allocated a number between 0 and 31. Whether or not a pattern is currently displayed has no influence on its number. The numbers run from left to right and top to bottom, across the display as follows: ..... 0 ..... 1 ..... 2 3
..... 4 ..... 5 etc.

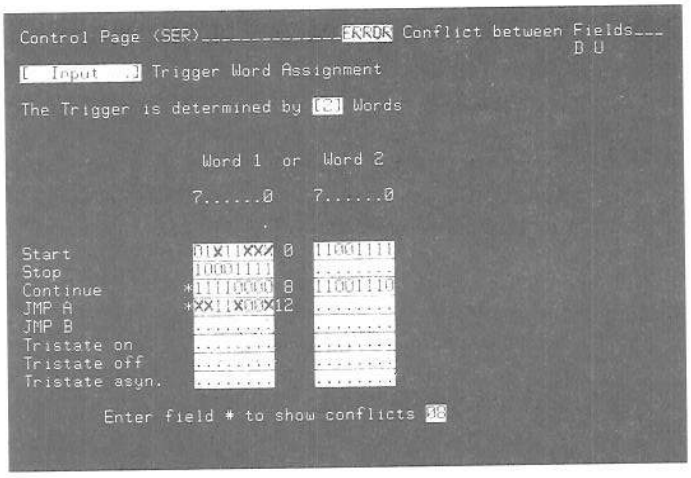


Figure 3D-7 Use of "Enter field#" to Identify Conflict Patterns

[Flag] Assignment menu (Refer to Figure 3D-8)

This menu enables you to assign Flag Patterns. These are patterns which can be output (from the Flag Output POD) on occurrance of the initiating Trigger Words. Each of the 256 Trigger Words can have any one of the 256 Flag Patterns assigned to it. Flag patterns can be assigned for Transparent, Latched or Static outputting. Trigger Words also assigned (on the Trigger Word Assignment menu) to initiate control function(s), will be clearly identified on the display. Specific menu details are as follows:

DISPLAY CONTROL FIELDS	SETTINGS EXPLANATION
[Flag] Assignment in [?] Mode:	**[Transparent]** This means that every Trigger Word can initiate a new Flag Pattern. Each pattern will remain until the next Trigger Word. **[Latched]** This means that only selected Trigger Words will initiate a new Flag Pattern. Each selected (or enabled) pattern remains "latched" at the output until a new one is initiated. An additional "status" column is displayed to identify, and permit selection of, the appropriate Patterns. The default condition is that no patterns are latched and a default Flag Pattern of all 0's is produced. Disabled patterns are indicated by a "." in the status column. To enable a pattern, move the cursor into the status column, then change the "." to a "*" via the **NEXT/PREV** keys. Refer also to the Trigger Word and Flag Pattern explanation later in this description. **NOTE**: When **Transparent Mode** is set, although the additional column is not displayed, the contents are retained. **[Static]** In this mode, Flag patterns are independent of Trigger Words. See the **[Simulate]** menu explanation for information.

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Trigger Word [BIN] Flag Pattern [BIN] References

Trigger Word
The first column (Trigger Words) cannot be changed, only accessed. To access a word, either roll the display or, position the cursor in any word then input the value that you want to access.

Note that, data in each column can be displayed in either, BIN, OCT, DEC or HEX. Use the **PREV/NEXT** keys to change the base code as required.

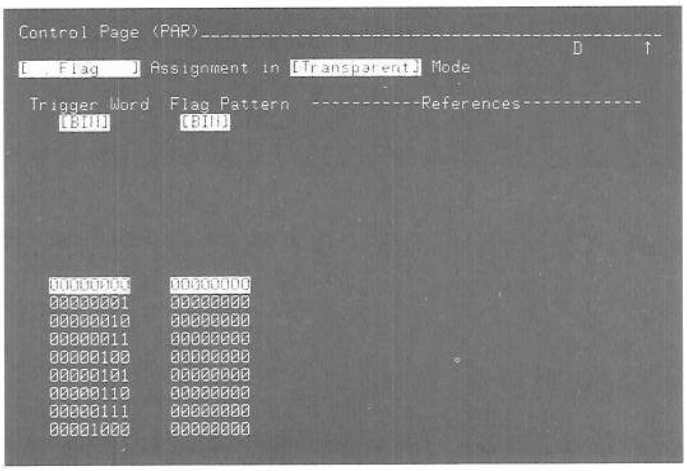


Figure 3D-8. **[Flag]** Assignment menu

Flag Pattern
Up to 256 Flag Patterns are available for assignment. The base code is user settable.

References
Control functions which are Trigger Word assigned, will be displayed under this heading.

Latched Channels Indication
When Latched Mode is set, an additional column of symbols is displayed. The default symbol for each Trigger Word is ".". This means that, the corresponding Flag Pattern is disabled. An "*" indicates that the particular Flag Pattern is enabled (for latching). The symbols can be changed via the **NEXT/PREV** keys, as described under the "Latched Mode" description.

[Simulate] Trigger Functions menu (Refer to Figure 3D-9)

This menu enables you to simulate the effect of Trigger Word occurance for seven Functions. All Functions except Tristate asyn. can be simulated. Simulation lets you "release", or initiate, any of the available functions. This means that program sequences for example, can be tested without having the DUT connected. Flag outputs corresponding to the particular Trigger Function conditions can also be simulated. Output flags so produced will remain active as long as the Function is active.

NOTE: While this menu is displayed, the Trigger POD and EXT INPUT from front panel are disabled.

DISPLAY CONTROL FIELDS **SETTINGS EXPLANATION**

Trigger Function - START...TRISToff

These are the functions available for simulation. To access a function, position the cursor in the appropriate field e.g. **START**, then press **EXEC**.

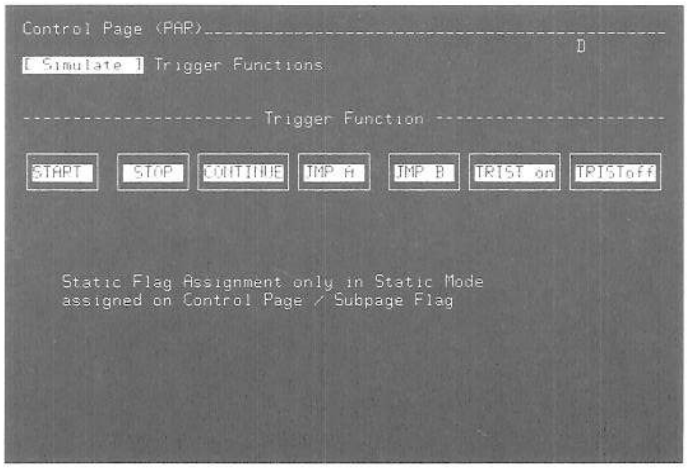


Figure 3D-9. **[Simulate]** Trigger Functions

Static Flag Assignment only in Static Mode
assigned on Control Page/Subpage Flag

This is a default heading. To display the Static Flag Assignment, you need to first access the **[Flag]** Assignment menu and set the mode to **[Static]**. Then, on the **[Simulate]** menu an additional row of setting fields will be displayed. they will appear as follows:

[BIN]

00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000

The input/display code can be set to BIN. HEX, DEC or HEX. To set a Flag Output, position the cursor within the appropriate field and set the pattern as desired. Each Flag Output pattern will then be produced, at the Flag Output POD, whenever the corresponding Function is released.

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