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DATA ACQUISITION SYSTEMS

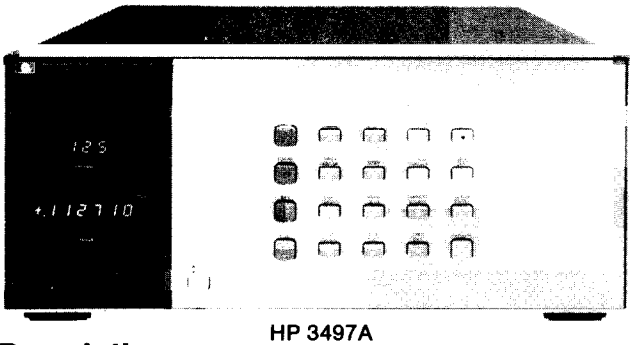
Instruments for Measurement and Control

HP 3497A

- Relay multiplexing
- DVM
- FET multiplexer
- Real time clock
- Bridge completion

DESIGNED FOR HP-IB SYSTEMS

- Digital inputs/outputs
- Counter
- Programmable D/As
- Optional RS-232C interface



HP 3497A

Description

The HP 3497A Data Acquisition/Control Unit combines the capabilities of several instruments and is a basic building block of an automatic data acquisition and control system. The HP 3497A will be used in an HP-IB automated system and can be viewed as a precision measurement and control computer peripheral.

The HP 3497A has been designed to be a very versatile and very powerful instrument. A basic HP 3497A consists of a mainframe that includes a front panel keyboard and display, a non-volatile real time clock, and an HP-IB interface. Available as an option is a 5½ digit integrating digital voltmeter and current source that occupies a dedicated slot in the HP 3497A chassis. Capability is added to the HP 3497A by using any combination of plug-in assemblies. Available plug-in assemblies are:

—Relay Multiplexers with or without thermocouple compensation
—FET Multiplexer
—Digital Input/Interrupt
—Counters
—Strain gage/bridge completion
—Actuators
—Programmable voltage and current D/As
—Breadboard Assembly

Up to 5 assemblies can be added to a HP 3497A and the HP 3498A Extender chassis can hold up to 10 more plug-in assemblies.

High Performance

The HP 3497A DVM can resolve 1 microvolt signals and is ideal for the precise measurement of the outputs of thermocouples, strain gauges and other transducers. Included on the DVM is a programmable current source that allows four-terminal resistance measurements. The multiplexer assemblies switch 3 wires (Hi, Lo, and Guard) and add less than 2 microvolts of thermal offset to the measured signal.

Flexible Hardware Configuration

The HP 3497A card cage can hold 5 of any combination of the plug-in assemblies. This allows the multiplexing of up to 100 3-wire inputs to the DVM in a single HP 3497A or a single HP 3497A might contain 60 multiplexer channels, 16 digital inputs, 16 actuator outputs, and a DVM. By using HP 3498A Extenders, up to 1000 analog channels or 1360 digital channels can be controlled, all at a single bus address.

Ease of Use

The HP 3497A keyboard and display make the HP 3497A very easy to use and make debugging of a HP 3497A based system easy. The calibration adjustments for the HP 3497A DVM are located behind a hinged front panel; this allows complete calibration of the DVM without removing it from the test rack. Connections to all of the HP 3497A assemblies are made using screw terminals, eliminating the need for soldering.

Real Time Clock

The HP 3497A mainframe includes a quartz-referenced, non-volatile, real-time clock. In addition to providing timing data, the clock can measure elapsed time, interrupt at a presettable time, and output a programmable pulse train.

Clock Format

Month:Day:Hours:Minutes:Seconds (U.S. Format)
Day:Month:Hours:Minutes:Seconds (European Format)

Option 001—5½ Digit DVM and Current Source

The HP 3497A DVM assembly is a systems quality, 5½ digit, 1 microvolt sensitive dc voltmeter. The DVM is fully guarded and uses an integrating A/D conversion technique; this yields excellent common and normal mode noise rejection.

Included on the DVM assembly is a three level programmable current source. The current source, when used simultaneously with the DVM, can be used to make high accuracy four terminal resistance measurements with 1 milliohm resolution. Maximum speed is 300 readings per second in 3½ digit mode.

Buffer size: packed format: 100 readings; ASCII format: 60 readings

Scanning Speeds	Number of Digits Selected	Series 200/300	1000A*
Sequential Channels using external increment	5½ digits	39	39 (25)
	4½ digits	103	108 (79)
	3½ digits	123	127 (99)
Random Channels using software	5½ digits	27	24 (20)
	4½ digits	51	41 (34)
	3½ digits	55	43 (36)

*A600+ speeds in FORTRAN

Option 010—20 Channel Relay Multiplexer

This assembly uses reed relays to multiplex signals to the DVM or other instruments. Each assembly switches 20 channels, each channel consists of Hi, Lo, and Guard lines. Two channels may be closed per assembly and relays may be closed in a random sequence or incremented between programmable limits. The low thermal offset of the relays make it suitable for measuring the outputs of strain gage and other transducers. Each channel can be configured with a filter or current shunt for additional flexibility.

Option 020—Relay Multiplexer with Thermocouple Compensation

The option 020 assembly uses the same relay multiplexer as option 010 but incorporates a special isothermal connector block to allow thermocouple compensation. Two types of compensation (selectable by the user) are available. A temperature-dependent voltage is generated for software compensation; this voltage is then used in a computer program to compensate the thermocouple voltage. Hardware compensation involves inserting a voltage in the measurement circuit that automatically compensates the thermocouple voltage.

Option 030—20 Channel FET Multiplexer Assembly

The option 030 assembly is used to multiplex input signals to a DVM in a manner similar to option 010. The option 030 assembly provides high speed, low level multiplexing. Maximum signal levels are 12 volts peak between any high, low or guard input and any other guard input, guard common or chassis ground.

Maximum sequential scanning rate: 4800 readings/s (at 60 Hz) using an HP 3437A Voltmeter and HP Series 200 computer (4000 readings/s at 50 Hz power).

Option 050—16 Channel Isolated Digital Input/Interrupt

The option 050 assembly can sense up to 16 channels of digital data. The first 8 channels can also be used as interrupt lines to detect transient signals. The assembly can accept inputs of 5, 12 or 24 volts and all functions and masks are fully programmable. A five-volt supply is provided for driving external contact closures and open collector outputs.

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Option 060—100 kHz Reciprocal Counter

This option can be used to measure mechanical and low frequency electronic signals. The counter can measure the period of signals up to 100 kHz and the pulse width of signals down to 18 μs. The counter can also count up or down from a programmable start point. It can accept inputs of 5, 12, or 24 volts including CMOS, open collector TTL and passive contact closures.

Option 070—120 Ohm Strain Gage/Bridge Completion Assembly
Option 071—350 Ohm Strain Gage/Bridge Completion Assembly

The option 070/071 assemblies may be used to provide bridge completion for measuring strain gages, RTDs pressure sensors and load cells. Each card uses an internal shared half bridge and can complete 10 channels of ¼ and ½ and full bridges in any combination. When used with a +5 V excitation supply (such as the HP 6214A) and the HP 3497A DVM, the assembly provides 0.1 με sensitivity with 1 με accuracy. Provisions are made for shunt calibration and checking gage leakage and lead resistance.

Option 110—16 Channel Actuator
Option 115—8 Channel High Voltage Actuator

Option 110 consists of 16 mercury wetted form C (single pole-double throw) relays. Each relay can be individually closed and can switch 1A at 100V. The actuator assembly can be used to switch test fixture power or to actuate alarm bells. This flexibility of this assembly allows it to be used as a digital output or matrix switch.

Option 115 is an 8 channel high voltage actuator assembly that can switch voltages up to 252 Vrms and currents up to 2 amperes. The Option 115 assembly is ideal for switching power line voltages to small motors, alarm bells and lights, motor starters and solenoids.

	Option 110	Option 115
Switch Form	C	A
Contact Type	Mercury Wetted	Dry
Number of channels	16	8
Maximum Voltage	100 V Peak	252 Vrms 48 Vdc
Maximum Current	1 A	2 Arms or dc
Maximum Power	100 VA	500 VA ac 60 VA dc

Option 120—Dual Voltage D/A
Option 130—Dual Current D/A

Option 120 consists of two 0 to ±10 V programmable voltage sources. These sources can be used to provide a programmable test stimulus or to control voltage programmed devices like power supplies and VCOs.

Option 130 consists of two 0 to 20 mA or 4 to 20 mA programmable current sources. These sources, especially when using the 4 to 20 mA range, can be used as transmitters in industrial current loops and can drive up to 600 ohms of total loop resistance.

Option 120
Output: 13 bits including polarity
Least significant bit: 2.5 mV
Output range: −10.2375 V to +10.2375 V
Maximum output current: 15 mA (output within specifications)

Option 130
Output: 12 bits
Least significant bit: 5 μA (0 to 20 mA range)
4 μA (4 to 20 mA range)
Output range: 0 to 20.475 mA or 4 to 20.380 mA (each source jumper selectable)
Compliance voltage: 12.0 volts

Option 140 Breadboard Card

Option 140 is a breadboard card compatible with the HP 3497A cardcage. Using this card, HP 3497A users can construct special purpose assemblies that communicate with the HP 3497A backplane.

Option 232—RS232C Interface

Option 232 to the HP 3497A deletes the standard HP-IB interface and adds an RS232C (CCITT/V.24) compatible interface allowing you to remotely program the HP 3497A. The option 232 interface is also compatible with the new RS423 (CCITT/V.10) version of the RS449 interface.

Option 298—HP 3498A Extender

The HP 3498A Extender chassis allows low cost expansion of HP 3497A-based systems. Each HP 3498A can hold up to ten HP 3497A plug-in assemblies. Use of one or more HP 3498As requires an HP 3497A (for control); all required connecting cables are supplied with the HP 3498A. Up to 13 HP 3498As can be controlled by a single HP 3497A.

Software

HP DACQ/PC Data Acquisition Manager (HP 44459A/B/R): Powerful software tools for gathering, storing, analyzing, and presenting measurement data with a Vectra Personal Computer and the BASIC language processor.(see page 600).

HP DACQ/300 Data Acquisition Manager (HP 44458A/B/R): Sophisticated software tools that provide all of the power of HP DACQ/PC plus enhanced data transfer, system configuration routines, and color graphics on Series 300 Technical Computers (see page 600).

General

Size (HP 3497A or HP 3498A): 190.5 mm H x 428.6 mm W x 520.7 mm D (7½″ x 16⅞″ x 20½″).
Net weight: HP 3497A, 20.4 kg (45 lb) and 3498A, 20.4 kg (45 lb) with assemblies in all slots.
Shipping weight: HP 3497A and HP 3498A maximum with assemblies in all slots are 26.3 kg (58 lb.)
Operating temperature: 0°C to 55°C
Non-operating temperature: −40°C to 75°C
Humidity: to 95% at 40°C except as noted
Operating power: switch selection of 110, 120, 220 and 240 volts ±10%, 48-66 Hz, 150 VA 3497A and 3498A.

Ordering Information — Price

Each HP 3497A can hold one DVM assembly (Opt 001) and up to 5 plug-in assemblies. Each HP 3498A (Opt 298) can hold 10 additional plug-ins. To order plug-ins without a mainframe, order as 444XXX Field Installation Kits as shown below.

Clock format and power line frequency and voltage will be set at the factory based on the country from which the order was placed.

HP 3497A Data Acquisition/Control Unit	**$3,890**
Opt 001 or 44420A: 5½ Digit DVM and Current Source	$2,020
Opt 010 or 44421A: 20 Channel Relay Multiplexer Assembly	$830
Opt x20 or 44422x: Relay Multiplexer Assembly Substitute A in place of x for software compensation. For hardware compensation, substitute the thermocouple type B, E, J, K, R, S, or T for x.	$950
Opt 030 or 44423A: 20 channel FET Multiplexer Assembly	$950
Opt 050 or 44425A: 16 channel Isolated Digital Input/Interrupt Assembly	$705
Opt 060 or 44426A: 100 kHz Reciprocal Counter	$810
Opt 070 or 44427A: 120 Ohm Strain Gage/Bridge Completion Assembly	$1,160
Opt 071 or 44427B: 350 Ohm Strain Gage/Bridge Completion Assembly	$1,160
Opt 110 or 44428A: 16 Channel Actuator/Digital Output Assembly	$950
Opt 115 or 44431A: 8 Channel High Voltage Actuator Assembly	$810
Opt 120 or 44429A: Dual Output Voltage DAC Assembly	$1,300
Opt 130 or 44430A: Dual Output Current DAC Assembly	$1,300
Opt 140 or 44432A: Breadboard Card	$215
Opt 232: Delete HP-IB Interface, add RS232C Interface	$405
HP 3498A Extender & Connecting Cables	$2,880

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