



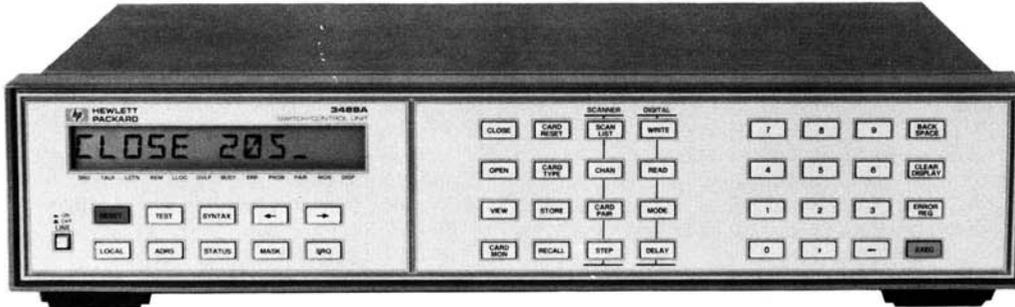
# COMPUTER AIDED TEST

## Low Cost, Versatile HP-IB Switching & Control

### Model 3488A

Test Equipment Depot    www.testequipmentdepot.com  
 99 Washington Street    800-517-8431  
 Melrose, MA 02176-6024    781-665-0780 FAX

- DC—300 MHz signal switching
- Matrix, multiplexer, & general purpose relays
- Digital I/O control & actuation
- Up to 50 channels
- 40 configuration storage registers
- 6 switch & control modules



HP 3488A



### Description

The HP 3488A Switch/Control Unit brings versatile, HP-IB programmable switching to tests requiring multi-channel measurements. The HP 3488A provides signal switching with the integrity and isolation needed for high performance test systems in production. It also offers a flexible, low cost interconnection solution for automating experiments on the bench and for development testing in the lab. The HP 3488A is designed to hold any combination of up to 5 of the following optional switch and control modules:

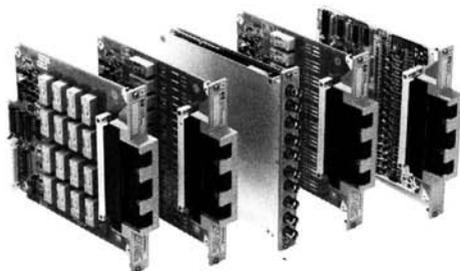
- 10 Channel Relay Multiplexer
- 10 Channel General Purpose Relay
- Dual 4 Channel VHF Switch
- 4 x 4 Matrix Switch
- 16 Bit Digital Input/Output
- Breadboard

### Flexible Switching

The HP 3488A offers an economical approach to switching flexibility through plug-in modules. The user can select the right combination of switching functions to meet both performance and budget requirements. Testing is simplified by having one solution for connections of low level DVM inputs, high level dc and ac power, and VHF signals to 300 MHz. Additional devices such as microwave relays and programmable attenuators are easily controlled with digital I/O functions. Custom circuitry can also be implemented on breadboard modules.

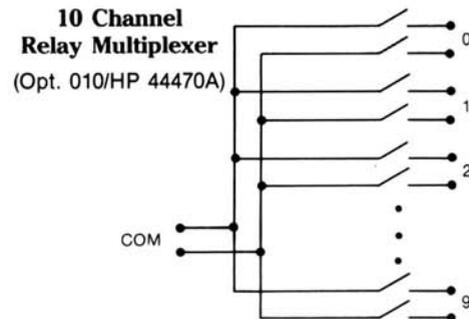
### Versatile Performance

The HP 3488A can store up to 40 complete switch configurations for convenient recall in automated test programs. Switch operation can be with multiple relay closures or with selectable channels in a break-before-make mode. Break-before-make closures and recallable complete switch configurations can be combined in a programmable scan list. The HP 3488A uses removable screw terminal connectors that provide easily interchangeable wiring configurations for each test. Built-in self-test capability assures proper operation.



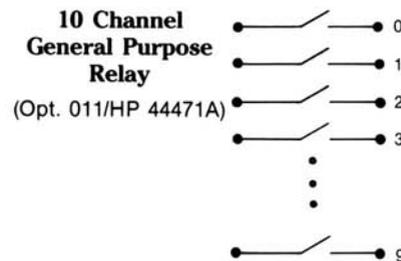
### Multiplexer (Opt. 010/HP 44470A)

Option 010 is a 10 channel multiplexer for scanning or multiple signal connections. Channels switch 2 wires (Hi & Lo) with 2PST relays for DVM inputs and other signals up to 250 V and 2A. This module can also be used to multiplex signals to other switching functions such as the matrix module.



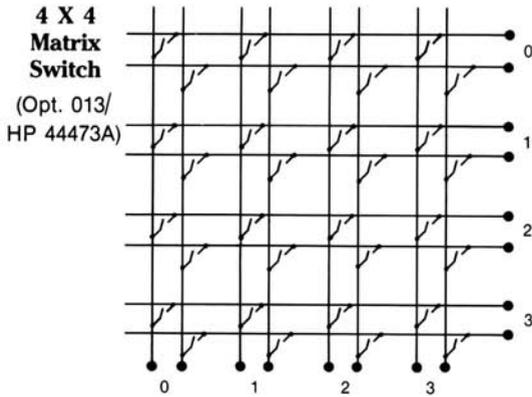
### General Purpose Relay (Opt. 011/HP 44471A)

This module consists of 10 SPST independent relays for general signal switching and control of external devices. The quality connections provided make this module ideal for switching signals when multiplexing isn't required or for supplying switchable power to the device under test.



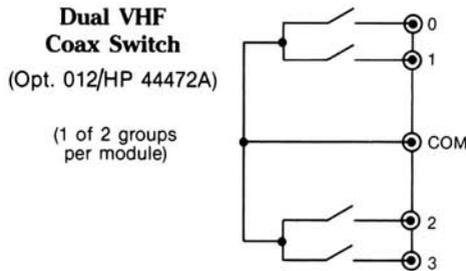
### Matrix Switch (Opt. 013/HP 44473A)

Option 013 offers highly flexible switching with a 4 x 4, 2 wire matrix. Any combination of 4 input channels may be connected to any combination of 4 output channels. Each cross point or node in the matrix uses a 2PST relay to switch 2 lines (Hi & Lo) at a time. Multiple 4 x 4 modules can be connected to form larger matrices. Multiplexers can be used in conjunction with this module to effectively expand the number of inputs and outputs of the matrix.



### VHF Switch (Opt. 012/HP 44472A)

The VHF module provides broadband switching capability for high frequency and pulse signals. The 2 independent groups of bidirectional 1 x 4 switches can be used for signals from dc to 300 MHz. All channels have 50 ohm characteristic impedance and are break-before-make within a group of 4 channels. Each group is isolated from the other and from ground to prevent ground loops. Excellent isolation makes this module ideal for high frequency signal analyzer measurements requiring a large dynamic range.



### Digital I/O (Opt. 014/HP 44474A)

This module offers 16 very flexible bidirectional I/O lines and 4 TTL compatible handshake lines for sensing and control of external devices. The digital inputs can be used to sense contact closures to ground. Each channel provides current sinks for remote switching of external relays such as the HP 33311 series of coaxial switches.

### Breadboard (Opt. 015/HP 44475A)

The breadboard module provides a convenient way to implement custom circuits and special functions that interface directly with the HP 3488A's backplane control signals.

## Specifications for Opt. 010/HP 44470A Multiplexer, Opt. 011/HP 44471A General Purpose Relay, and Opt. 013/HP 44473A Matrix Switch Modules

#### Input Characteristics

**Maximum voltage (terminal-terminal or terminal-chassis):** 250 V dc, 250 Vac rms, 350 Vac peak  
**Maximum current:** 2A dc, 2A ac rms  
**Maximum power:** 60 W dc, 500 VA ac  
**Thermal offset:** < 3  $\mu$ V

#### DC Isolation (40°C, 60% RH)

**Channel-channel, open channel:** > 10<sup>11</sup>  $\Omega$

### AC Isolation/Performance

(50 $\Omega$ termination)	100 kHz	1 MHz	10 MHz
Insertion Loss (dB)	<0.30	<0.35	<0.90
Crosstalk (dB)	<-73	<-53	<-33

## Specifications For Opt. 012/HP 44472A VHF Switch Module

### Input Characteristics

#### Maximum Voltage

Center-center, low-low: 250 Vdc, 30 Vac rms, 42 Vac Peak  
 Low-chassis, low-low: 42 V dc

**Maximum current (per channel):** 30 mA dc, 300 mA ac rms

**Thermal offset:** <15  $\mu$ V per channel

**Characteristic impedance:** 50  $\Omega$

### AC Isolation/Performance

	30 MHz	100 MHz	300 MHz
Crosstalk (dB)			
Chan-Chan	<-100	<-85	<-65
Group-Group	<-85		<-50
Insertion Loss (dB)	<0.5	<0.75	<1.25
VSWR	<1.06	<1.12	<1.43

All channels break-before-make within a group of 4 channels.

## Specifications for Opt. 014/HP 44474A Digital I/O Module

### I/O Lines

**Maximum voltage** = +30 Vdc (line-chassis)

**Output characteristics:** V (high)  $\geq$  2.4 V; V (low)  $\leq$  0.4V

**I (low) maximum** = 125 mA @ V (low)  $\leq$  1.25 V; fused at 250 mA.

**Input characteristics:** V (high)  $\geq$  2 V; V (low)  $\leq$  0.8 V

**External increment:** advances HP 3488A to next programmed configuration on falling edge of TTL pulse.

**Channel closed:** indicates completion of new configuration; TTL pulse.

## General Specifications

### Environmental

Temperature: 0 to 55°C; humidity: 95%, 0 to 40°C

**Power:** 86-132 V/195-250 V, switch selectable; 48 - 440 Hz; 18 VA.

**Interface:** SH1AH1T6TE0L4LE0SR1RL1PP0DC1DT1E2

**Size:** 89 mm H (without feet) x 425 mm W x 292 mm D (3.5" x 16.75" x 11.5"). Allow 76 mm (3") additional depth for wiring.

**Weight:** net: 8.5 kg (18.5 lb). Shipping: 16 kg (36.5 lb).

**Connectors** (all modules except option 012/HP 44472A VHF switch): Removable screw terminal connector. Each terminal accepts 18-26 gauge (16-40 mils) wire, with strain relief for wiring. Option 012/HP 44472A VHF Switch: BNC connectors.

## Ordering and Configuration Information

### Switch Modules-Includes Terminal Connectors Price

**Opt. 010/HP 44470A:** 10 Channel Relay Multiplexer Module \$400

**Opt. 011/HP 44471A:** 10 Channel General Purpose Relay Module \$400

**Opt. 012/HP 44472A:** Dual 4 Channel VHF Switch Module \$600

**Opt. 013/HP 44473A:** 4x4 Matrix Switch Module \$500

**Opt. 014/HP 44474A:** 16 Bit Digital Input/Output Module \$400

**Opt. 015/HP 44475A:** Breadboard Module \$170

### Rack Mounting and Manuals

**Opt. 401:** Side Handle Kit (HP P/N 5061-1171) \$20

**Opt. 907:** Front Handle Kit (HP P/N 5061-1170) \$50

**Opt. 908:** Rack Flange Kit (HP P/N 5061-1168) \$30

**Opt. 909:** Rack Flange with Handles (HP P/N 5061-1169) \$72

**Opt. 910:** Extra Operating & Service Manuals \$75

**HP 3488A Switch/Control Unit** \$1,400