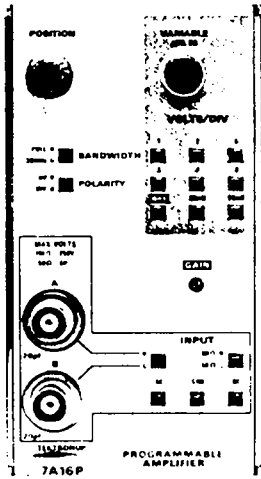


7A16P



Programmable—Dc to 225 MHz Amplifier

7A16P

Fully Programmable Plug-in for  
7912AD or 7612D Digitizers only

10 mV/div to 5 V/div Calibrated  
Deflection Factors

200 MHz Bandwidth (7900 Family)

50 Ω or 1 MΩ Input Selectable

The 7A16P is designed for use only in Tektronix 7000 Series Programmable Digitizers. All of the normal operational features of a high-quality, wide-band 7000 Series plug-in amplifier are provided in the 7A16P. These are available at the front panel for manual selection, or they can be set under program control via a programmable mainframe and the IEEE-488 bus. Whether operated manually or under program control, the front-panel push buttons light to indicate plug-in status. Plug-in status can also be read over the IEEE-488 bus by an external controller for input to instrument set-up and control routines.

Two switch selected input connectors are also provided for selecting input signal source.

CHARACTERISTICS

**Bandwidth** — 225 MHz, plug-in only. 200 MHz in the 7912AD. Bandwidth may be limited to 20 MHz ± 3 MHz by bandwidth limit switch.

**Ac Coupled Lower Bandwidth** — 10 Hz or less

**Step Response** — 50 Ω input plug-in only. 1.8 ns rise time.

**Deflection Factor** — 10 mV/div to 5 V/div, 9 steps in a 1-2-5 sequence. Accuracy is ± 2% of indicated deflection factor with GAIN adjusted at 10 mV/div.

Uncalibrated VARIABLE is continuous between steps and extends selected deflection factor to at least 2.5 times the calibrated value.

**Input R and C** — Selectable. 1 MΩ within 2% and ≈ 20 pF or 50 Ω ± 1 Ω with VSWR < 1.5:1 at 200 MHz or less.

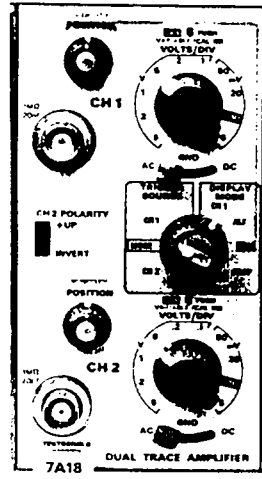
**Inputs** — Selectable A or B signal input connectors.

**Max Input Voltage** — 1 MΩ, dc coupled: 250 V (dc + peak ac), ac component 500 V p-p max, 1 kHz or less. 50 Ω, ac coupled: 500 V (dc + peak ac), ac component 500 V p-p max, 1 kHz or less. 50 Ω 0.5 watts max.

**Programmable Functions** — All functions except VARIABLE, GAIN, and IDENTIFY are programmable.

Order 7A16P Programmable Amplifier ..... \$2200

7A18



Dc to 75 MHz Dual Trace Amplifier

7A18

Dc to 75 MHz Bandwidth

5 mV/div to 5 V/div  
Calibrated Deflection Factors

1 MΩ Input

The 7A18, the basic building block of 3- and 4-trace operation, is a dual-trace plug-in amplifier. The 7A18 features constant bandwidth for all deflection factors, 5 operating modes (Ch 1, Ch 2, ALT, CHOP, ADD), trigger source selectivity and color-keyed control grouping. The 7A18 has a trace identify function. Polarity of channel 2 is selectable.

**Deflection Factor** — 5 mV/div to 5 V/div in 10 calibrated steps (1-2-5 sequence). Accuracy is within 2% with gain adjusted to 10 mV/div. Uncalibrated VARIABLE is continuous between steps to at least 12.5 V/div.

**Input R and C** — 1 MΩ within 2%, ≈ 20 pF

**Max Input Voltage** — Dc-coupled: 250 V (dc + peak ac), ac component 500 V p-p max, 1 kHz or less. Ac-coupled: 500 V (dc + peak ac), ac component 500 V p-p max, 1 kHz or less.

**Dc Stability** — Drift with ambient temperature (constant line voltage) is 0.01 div/°C. Drift with time (ambient temperature and line voltage constant) is 0.02 div in any one minute after 1 hour warm-up.

**Common-Mode Rejection Ratio (ADD, Ch 2 Invert)** — At least 10:1, dc to 50 MHz.

Order 7A18 Amplifier ..... \$1145

DC OFFSET OPTION

Dc Offset is for the user who needs to analyze small signals that are riding on larger signals, such as power supply ripple.

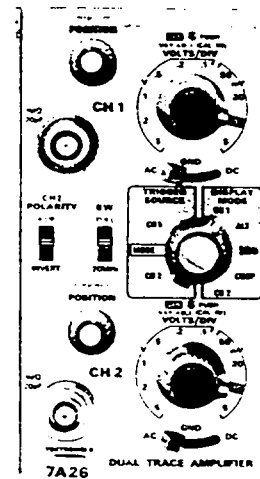
**Option 06, Dc Offset** — Two separate Channel 1 and Channel 2 variable offset controls are concentric with the position controls replacing the identify push-buttons of the standard 7A18. The ac-dc-ground switch of each channel is expanded to accommodate a fourth position for dc offset.

**Offset Range Display** — ± 200 div max, equivalent to ± 1 V at 5 mV/div.

**Accuracy** — When in DC OFFSET the deflection accuracy is derated by 1%.

Order Option 06 Dc Offset ..... Add \$200

7A26



Dc to 200 MHz Dual Trace Amplifier

7A26

Dc to 200 MHz Bandwidth (7900 Family)

5 mV/div to 5 V/div  
Calibrated Deflection Factors

1 MΩ Input

The 7A26, a dual-trace plug-in amplifier, is a basic building block for 3- or 4-trace operation. It features constant bandwidth for all deflection factors, 5 operating modes (Ch 1, Ch 2, ALT, CHOP, ADD), trigger source selection (Ch 1, Ch 2, MODE), and color-keyed control groupings. Polarity of channel 2 is selectable. Bandwidth may be set at FULL or limited to 20 MHz for low-frequency applications.

**Deflection Factor** — 5 mV/div to 5 V/div in 10 calibrated steps (1-2-5 sequence). Accuracy is within 2% with gain adjusted to 10 mV/div. Uncalibrated VARIABLE is continuous between steps to at least 12.5 V/div.

**Input R and C** — 1 MΩ within 2%, ≈ 20 pF

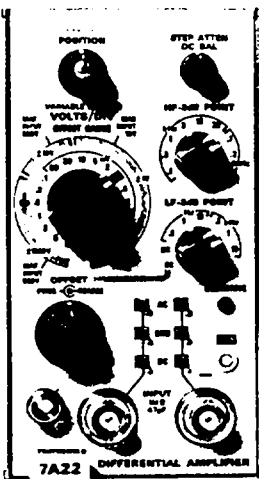
**Max Input Voltage** — Dc-coupled: 250 V (dc + peak ac), ac component 500 V p-p max, 1 kHz or less. Ac-coupled: 500 V (dc + peak ac), ac component 500 V p-p max, 1 kHz or less.

**Common-Mode Rejection Ratio (ADD, Ch 1 Invert)** — At least 10:1, dc to 50 MHz.

**Dc Stability** — Drift with ambient temperature (constant line voltage) is 0.02 div/°C. Drift with time (ambient temperature and line voltage constant) is 0.02 div in any one minute after 1 hour warm-up.

Order 7A26 Amplifier ..... \$1850

7A22



Differential Amplifier

7A22

Dc to 1 MHz Bandwidth

10  $\mu$ V/div to 10 V/div

Calibrated Deflection Factors

100,000:1 Cmrr

Selectable Upper and Lower -3 dB Points

Dc Offset

10  $\mu$ V/Hour Dc Drift\*

1 M $\Omega$  Input

The 7A22 is a differential amplifier well suited for difficult low-amplitude, low-frequency measurements.

High Cmrr Probes for Differential Amplifiers

We recommend the P6055 high cmrr adjustable 10X probes for use with Tektronix differential amplifiers.

When used in pairs, these probes increase the differential input impedance to 20 m $\Omega$  and allow adjustment for maximum common-mode rejection ratio (cmrr).

See page 336 for P6055 characteristics.

\*With constant temperature. See dc stability specifications.

**Bandwidth** — Hf -3 dB point, selectable in 9 steps (1-3 sequence) from 100 Hz to 1 MHz, accurate within 10% of selected frequency, rise time in 1 MHz position is 350 ns  $\pm$  9%. Lf -3 dB point, selectable in 6 steps (1-10 sequence) from 0.1 Hz to 10 kHz, accurate within 12% of selected frequency. The switch also contains dc and dc with OFFSET positions. Ac-coupled at input, 2 Hz or less.

**Deflection Factor** — 10  $\mu$ V/div to 10 V/div in 19 calibrated steps (1-2-5 Sequence). Accuracy is within 2% with gain adjusted to 1 mV/div. Uncalibrated VARIABLE is continuous between steps to at least 25 V/div.

**Input R and C** — 1 M $\Omega$  within 1%,  $\approx$  47 pF.

**Max Input Gate Current** — Differentially measured, 40 pA (+25°C) and 200 pA (+50°C) at 10  $\mu$ V/div to 10 mV/div, 10 pA (+25°C) and 20 pA (+50°C) at 20 mV/div to 10 V/div.

Single ended, one-half the differential measurement. Display shift is  $\pm$  4 div (+25°C) and  $\pm$  20 div (-50°C) at 10  $\mu$ V/div (ac-coupled).

Signal and Offset Range —

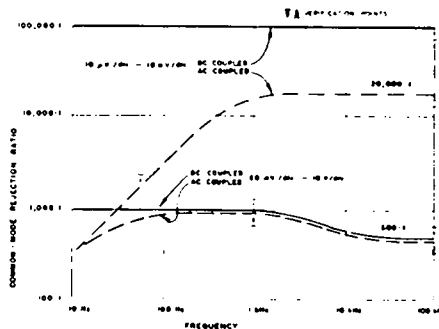
Deflection Factor Settings	10 $\mu$ V to 10 mV/div	20 mV to 0.1 V/div	0.2 V to 1 V/div	2 V to 10 V/div
Common-mode Signal Range	$\pm$ 10 V	$\pm$ 100 V	$\pm$ 500 V	
Max Dc-coupled Input (dc + peak ac at 1 kHz or less)	$\pm$ 15 V	$\pm$ 200 V	$\pm$ 500 V	
Max Ac-coupled Input (dc voltage)	$\pm$ 500 V dc rejection, at least 4 x 10 <sup>5</sup> :1			
Dc Offset Range	+1 V to -1 V	+10 V to -10 V	+100 V to -100 V	+1000 V to -1000 V

**Dc Stability** — Drift with time (constant ambient temperature and line voltage): short term, 5  $\mu$ V (p-p) or 0.1 div, whichever is greater in any minute after 1 hour warm-up. Long term, 10  $\mu$ V (p-p) or 0.1 div, whichever is greater in any hour after 1 hour warm-up. Drift with ambient temperature (constant line voltage) is 50  $\mu$ V/°C or less.

**Displayed Noise** — 16  $\mu$ V or 0.1 div (whichever is greater) at max bandwidth; source resistance 25  $\Omega$  or less measured tangentially.

**Overdrive Recovery** — 10  $\mu$ s or less to recover within 0.5% of zero level after removal of a test signal applied for 1 s (signal amplitude not to exceed differential dynamic range). Front-panel OVERDRIVE light indicates that an overdrive condition is being approached.

**Common-mode Rejection Ratio** (for signals not exceeding common-mode signal range)



Order 7A22 Amplifier ..... \$1410

7A11

Built-in FET Probe

Dc to 250 MHz Bandwidth (7900 Family)

5 mV/div to 20 V/div

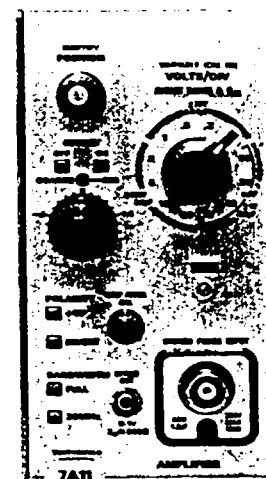
Calibrated Deflection Factors

Dc Offset

1 M $\Omega$  Input

The 7A11 is a wideband plug-in amplifier. The captive FET probe input configuration optimizes signal acquisition with high resistance (1 M $\Omega$ ) and low capacitance (5.8 pF at 5 mV/div), without loss of signal amplitude by probe attenuation. Two 20X attenuators, physically mounted in the probe

7A11



Amplifier

tip, are relay-switched into the input signal path at the appropriate deflection factor. Therefore you need not concern yourself with manual plug-on attenuators and signal dynamic range.

**Deflection Factor** — 5 mV/div to 20 V/div in 12 calibrated steps (1-2-5 sequence). Accuracy is within 2% of gain adjustment at 0.1 V/div. Uncalibrated VARIABLE is continuous between steps to at least 50 V/div.

**Input R and C** — 1 M $\Omega$  within 1%,  $\approx$  5.8 pF (5 mV/div to 50 mV/div),  $\approx$  3.4 pF (0.1 V/div to 1 V/div),  $\approx$  2 pF (2 V/div to 20 V/div).

Signal and Offset Range —

Deflection Factor Settings	5 mV/div to 50 mV/div	0.1 V/div to 1 V/div	2 V/div to 20 V/div
Offset Range	+1 V to -1 V	+20 V to -20 V	+400 V to -400 V
Offset Range to Offset Out	1:1 within 1% +0.5 mV	20:1 within 1.5% +0.5 mV	400:1 within 2% +0.5 mV
Max Dc-coupled Input	200 V (dc + peak ac, ac component to 50 kHz)	200 V (dc + peak ac, ac component to 40 MHz)	200 V (dc + peak ac, ac component to 70 MHz)
Max Ac-coupled Input (Dc Component)	$\pm$ 200 V		

**Dc Stability** — Drift with time (constant ambient temperature and line voltage): short term, 0.1 div or less per minute after 20 minute warm-up. Long term, 0.3 div or less per hour after 20 minute warm up. Drift with ambient temperature (constant line voltage), 200  $\mu$ V/°C or less.

**Displayed Noise** — 0.5 mV or 0.1 div, whichever is greater, in FULL BANDWIDTH mode, measured tangentially.

**Offset Function** — An internal dc source, continuously variable between +1 V and -1 V, may be used to offset the trace. (See chart for offset range.) An OFFSET OUT jack allows for monitoring of the offset voltage. OFFSET OUT source resistance is 500  $\Omega$  within 3%.

**Included Accessories** — Capacitor-coupler head (011-0110-00), retractable hook tip (013-0106-00), probe tip ground adapter (013-0085-00), 3 in ground lead (nose) (175-0849-00); 3 in ground lead (screw-in) (175-0848-00); 12 in ground lead (screw-in) (175-0848-02), three miniature alligator clips (344-0046-00), two insulated sleeves (166-0404-01), probe hook tip (206-0114-00), probe tip to GR 50  $\Omega$  termination (017-0088-00), 18 in cable (offset out) (175-1092-00).

Order 7A11 Amplifier ..... \$2325

**7B90P**

- 500 ps/div to 500 ms/div  
Calibrated Time Base

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- Fully Programmable Plug-in  
7912 AD Digitizer only

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- 400 MHz Trigger Bandwidth

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- Single-Sweep Operation

The programmable 7B90P is designed for use with a TEKTRONIX 7912AD Programmable Digitizer. Its operating functions can be manually selected at the front panel or selected under program control via the IEEE-488 bus. The only nonprogrammable functions are the Sweep Calibration adjustment and the External Trigger Input Terminator Switch.

**CHARACTERISTICS**

**Sweep Rates** — 500 ms/div to 10 ns/div in 24 steps. Magnifier extends fastest calibrated sweep rate to 500 ps/div.

**Sweep Accuracy** — Measured over center 8 div, +15°C to -35°C, with any 7000 Series programmable mainframe. Derate accuracies by an additional 1% for 0°C to +50°C.

Time/Div	Unmagnified	Magnified
500 ms/div to 100 ns/div	2%	3%
50 ns/div to 10 ns/div	3%	4%
500 ps/div	—	5%

**Trigger Holdoff** — Programmable in 62 steps between minimum and maximum.

Time/Div	Min (ccw)	Max (cw)
500 ps/div to 2 μs/div	≤3.5 μs	≥90 μs
5 μs/div to 20 μs/div	≤35 μs	≥900 μs
50 μs/div to 200 μs/div	≤350 μs	≥9 ms
500 μs/div to 2 ms/div	≤3.5 ms	≥90 ms
5 ms/div to 500 ms/div	≤35 ms	≥900 ms

**Triggering Sensitivity** —

**P-P AUTO MODE**

Triggering Frequency Range	Min Signal Required	
	INT	EXT
At least 50 Hz	2.0 div	500 mV
200 Hz to 50 MHz	0.5 div	125 mV
50 MHz to 400 MHz	1.5 div	375 mV

**NORM Mode**

Coupling	Triggering Frequency Range	Min Signal Required	
		INT	EXT*
AC	30 Hz to 50 MHz	0.3 div	100 mV
	50 MHz to 400 MHz	1.5 div	250 mV
AC LF REJ <sup>1</sup>	30 kHz to 50 MHz	0.3 div	100 mV
	50 MHz to 400 MHz	1.5 div	250 mV
AC HF REJ <sup>2</sup>	30 Hz to 50 kHz	0.3 div	100 mV
DC	Dc to 50 MHz	0.3 div	100 mV
	50 MHz to 400 MHz	1.5 div	250 mV

\*EXT — 10 operation attenuates external trigger signal 10 times

<sup>1</sup>Will not trigger on sinewaves or <8 div, INT, or 3 V, EXT, at or below 60 Hz.

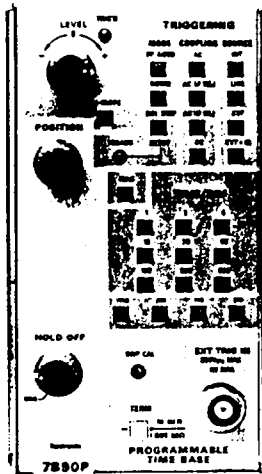
<sup>2</sup>Will not trigger on 50 MHz sinewaves 1.5 div or less, INT, or 0.15 V or less, EXT.

**Single-Sweep Mode** — Same as NORM mode.

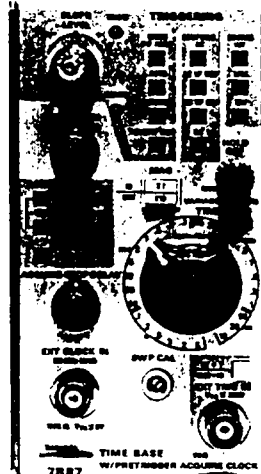
**Trigger Level** — Programmable in 0.05 div steps.

**Horizontal Position** — Programmable in 0.0125 div step unmagnified, 0.125 div step magnified.

**7B90P**



**7B87**



**Internal Trigger Jitter** — 0.1 ns or less at 400 MHz.

**External Trigger Input** — Selectable. 1 MΩ ± 5%, 20 pF ± 10% or 50 Ω ± 5% with 1.22 max vswr at 400 MHz. Maximum input is 250 V (dc + peak ac) for 1 MΩ or 1 watt for 50 Ω or 1 watt for 50 Ω. The level range (excluding p-p AUTO) for a 1 kHz sinewave input is at least ± 3 V in EXT and at least ± 30 V in EXT — 10.

**Order 7B90P Programmable Time Base** ..... \$2650

**7B87**

**1 ns/div to 5 s/div Calibrated Time Bases**

**Triggering to 400 MHz**

**Variable Trigger Holdoff**

**Pretrigger when used with 7854**

The 7B87 is a time base designed for use with the 7854 Mainframe to provide additional pre-trigger capability. The pre-trigger feature is only compatible with the 7854 at this time. When used in the B horizontal of the 7854, the 7B87 provides both single shot and pre-trigger capability to the 7854.

The 7B87 has the same characteristics as the 7B80/7B85 time base plug-ins except for single shot pre-trigger capability. Pre-trigger allows you to view what has occurred before the trigger even in single shot applications. The amount of pre-trigger time is determined by the Acquire-Stop delay time setting. The total amount of pre-trigger is 0.2 to 9.9 times the time/div setting.

The INT + 1000 control reduces the stored time/div to 1000 times slower than the real time display on a 7854. This does not, however, affect the Acquire-Stop delay time. The INT + 1000 control allows stored sweep speeds from 10 ms to 5000 sec/div for slow speed applications.

An EXT CLOCK-IN connector is provided for clock frequencies other than what is offered by the INT clock of the 7B87.

**CHARACTERISTICS**

**Sweep Rates** — 5 s/div to 10 ns/div in 27 steps (1-2-5 sequence). X10 MAGNIFIER extends fastest calibrated sweep rate to 1 ns/div. The uncalibrated VARIABLE is continuous to at least 2.5 times the calibrated sweep rate.

**Sweep Accuracy** — Measured over the center 8 div, +15°C to +35°C, in the 7700, 7800, or 7900 Series Mainframes. Derate accuracies by an additional 1% for 0°C to +50°C.

Time/Div <sup>1</sup>	Unmagnified	Magnified
5 s/div to 1 s/div	4%	Unspecified
0.5 s/div to 50 ns/div	1.5%	2.5%
20 ns/div to 10 ns/div	2.5%	4.0%

<sup>1</sup>Fastest calibrated sweep rate is limited by 7700 and 7600.

**Trigger Holdoff Time** —

Minimum Holdoff Setting	5 s/div to 1 μs/div	2 times TIME/DIV setting or less
	0.5 μs/div to 10 ns/div	2.0 μs or less
Variable Holdoff Range	Extends holdoff time through at least 2 sweep lengths for rates of 20 ms/div or faster	

**Delay Time Range** — 0.2 or less to at least 9.0 times TIME/DIV setting.

**Jitter** — 0.02% of TIME/DIV setting + 0.1 ns, or less.

**TRIGGERING**

**Triggering Sensitivity (Auto and Norm Modes)** — from repetitive signals)

Coupling	Triggering Frequency Range <sup>1</sup>	Min Signal Required	
		Int	Ext
AC	30 Hz to 50 MHz	0.3 div	50 mV
	50 MHz to 400 MHz	1.5 div	250 mV
AC LF REJ <sup>2</sup>	30 kHz to 50 MHz	0.3 div	50 mV
	50 MHz to 400 MHz	1.5 div	250 mV
AC HF REJ	30 Hz to 50 kHz	0.3 div	50 mV
DC <sup>3</sup>	Dc to 50 MHz	0.3 div	50 mV
	50 MHz to 400 MHz	1.5 div	250 mV

<sup>1</sup>Triggering frequency ranges are limited to the frequency of the vertical system when operating in the Internal mode.

<sup>2</sup>Will not trigger on sinewaves of less than 8 div Int, or 3 V Ext, at or below 60 Hz.

<sup>3</sup>Triggering Frequency Range for dc coupling applies to frequencies above 30 Hz when operating in the Auto trigger mode.

**Single Sweep** — Requirements are same as for repetitive inputs.

**Internal Trigger Jitter** — 0.1 ns or less at 400 MHz.

**Sensitivity (P-P AUTO Mode)** — (ac or dc coupling)

Triggering Frequency Range	Min Signal Required	
	Int	Ext
200 Hz to 50 MHz	0.5 div	125 mV
50 MHz to 400 MHz	1.5 div	375 mV
Low Frequency Response: At least 50 Hz	2.0	500 mV

**External Trigger Input** — Max input voltage is 250 V (dc + peak ac). Input R and C is 1 MΩ within 5% and 20 pF within 10%. The level range (excluding P-P AUTO) is at least ± 1.5 V in EXT +1, and at least ± 15 V in EXT +10.

**Internal Clock** — Pre-trigger 0.02048 Hz to 20.45 MHz determined by the time/div, X10 mag, and +1000 switches. Accuracy of Internal + INT + 1000 = 0.1%.

**External Clock** — Max input is 5 V pk. Input R is 100 KΩ within 5%. Threshold voltage TTL compatible. Max input freq. 10 MHz with BNC input. Delay 0.5 μs or less.

**Acquire Stop Delay** — Total range is 0.2 or less to at least 9.9 times Time/Div setting. Jitter from 5 s/div to 10 μs/div 0.07% of time/div setting or less. Delay accuracy (+15°C to +35°C) from 0.5 s/div to 10 μs/div is within 0.5% of measurement plus 5% of time/div setting.

**Single Shot Performance** — Using 7B87 with 7854 Internal Clock.

Fastest Sweep (Time/Div)	Points per waveform
50 μs	128
100 μs	256
200 μs	512
500 μs	1024

**Order 7B87 Time Base** ..... \$1480