SECTION 1
SPECIFICATION

Change information, if any, affecting this section will be found at the rear of the manual.

General Information

The 7T11 Sampling unit is designed for use in Tektronix 7000-series oscilloscopes. Several plug-in combinations, including a 7T11, are shown in Fig. 1-2. A 7S11 must be in the compartment to the left of, and adjacent to, the compartment in which the 7T11 is operated. Therefore, two 7T11's are not used in the same mainframe.

In Fig. 1-2A the 7T11 is shown in the "A" Horizontal compartment of the oscilloscope. The Vertical Mode and Horizontal Mode pushbuttons, providing useful presentations, are designated for plug-in configurations A, B, and C. For the configuration of Fig. 1-2A, four combinations are shown. Plug-in arrangements other than those shown in Fig. 1-2 are possible.

An alternate to the configuration shown in Fig. 1-2B is with the "LEFT" or "B" or both of these mainframe compartments empty. The 7M11 may be used in any available mainframe compartment or operated out of the mainframe. For further information, see the Operating Instructions section of this manual under the heading of General Operating Information.

Instrument Features

The 7T11 features a wide range of sweep rates using real-time and equivalent-time sampling. Concentric switches select the sweep range and time position range in different combinations for the time/div desired. On equivalent time ranges, either sequential or random sampling is available. Use of random sampling permits display of the leading edge of fast-rise input signals without the use of a signal delay line (such as the 7M11) or a pretrigger pulse from the signal source.

Internal triggering, or any of three modes of external triggering can be selected by using the front panel pushbuttons. A Schmitt trigger circuit is used except when HF SYNC is selected. With EXT 50 Ω input selected, the Schmitt circuit provides jitter free triggering from input trigger signals from DC to 1 GHz. The display is free of trigger jitter or double triggering, even at low trigger repetition rates or when using a square wave as the input trigger signal. A recovery time control is not needed.

Selecting EXT HF SYNC permits using frequencies of 1 GHz to approximately 12 GHz as the trigger input source. With HF SYNC selected, the signal connected to the TRIG INPUT connector is routed to a built-in synchronizer, thus permitting X band signals to be viewed.

Excellent sweep linearity is provided when using the 7T11. The timing circuitry in the 7T11 uses a time measurement rather than a time programming process for horizontal sample positioning on all equivalent-time sweep ranges. During both random and Sequential operation the horizontal position of the dot on the screen is determined by measuring the time interval between strobe and trigger. This method results in improved timing linearity and a reduction in display jitter. The accuracy of sweep timing and linearity make it unnecessary, during equivalent time sampling, to exclude the sweep start from accuracy specifications.

Characteristics

The following characteristics apply over an ambient temperature range of 0°C to +50°C at altitudes up to 15,000 feet and after a five-minute warmup, providing the instrument was calibrated at a temperature between +20°C and +30°C. During non-operation, do not subject the 7T11 to altitudes above 50,000 feet or to temperatures below −55°C.

ELECTRICAL CHARACTERISTICS

Characteristic	Performance Requirement
SWEEP RATES	
TIME/DIV	Calibrated from 5 ms/div to 10 ps/div, selectable in a 1, 2, 5 sequence, using SWEEP RANGE and TIME/DIV controls.

ELECTRICAL CHARACTERISTICS (cont)

Characteristic	Performance Requirement
SWEEP RATES (cont)	
Equivalent Time	5 μs/div to 10 ps/div using the 50 μs to 50 ns Time Position Ranges.
Accuracy	Within 3%.
Real Time	5 ms/div to .1 μs/div using the 50 ms to .5 ms Time Position Ranges.

ELECTRICAL CHARACTERISTICS (cont)

Characteristic	Performance Requirement
SWEEP RATES (cont)	
Accuracy	
On 50 ms TIME POS RNG	Within 3%, beginning 250 μs after undelayed sweep start.
On 5 ms TIME POS RNG	Within 3%, beginning 25 μs after undelayed sweep start.

Plug-In Configuration				Mainframe Switching							
				VERTICAL MODE					HORIZONTAL MODE			
Left	Right	"A"	"B"	LEFT	ALT	ADD	CHOP	RIGHT	A	ALT	CHOP	B
7S11	7S11	7T11	7M11	X					X			
						X			X			
							X		X			
								X	X			
(A)												
7A--	7S11	7T11	7B--	X								X
								X	X			
					X						X	
(B)												
	7S11	7S11	7T11					X	X			
blank								X				X
								X			X	
(C)												

Fig. 1-2. Several plug-in configurations using the 7T11 and a 7000-series oscilloscope.

ELECTRICAL CHARACTERISTICS (cont)

Characteristic	Performance Requirement
SWEEP RATES (cont)	
On 0.5 ms TIME POS RNG	Within 3%, beginning 2.5 μs after undelayed sweep start, or after 500 ns from start of displayed portion of sweep. Does not include 100 ns/div and 200 ns/div positions.
VARIABLE (TIME/DIV) Range	Extends fastest sweep rate to at least 4 ps/div. Permits increasing the speed of all sweep rates to at least 2.5 times the calibrated speed.
TRIGGERING	
Input Resistance	
EXT 50 Ω	50 Ω within 10%.
EXT 1 MΩ	1 MΩ within 5%.
EXT HF SYNC	1 MΩ within 5%.
*Sinewave Triggering	
Internal	
Sensitivity Range	
X1 Trig Amp	125 mV to 1 V P-P at vertical input (5 kHz to 500 MHz).
X10 Trig Amp	12.5 mV to 1 V P-P at vertical input (5 kHz to 50 MHz). *NOTE Trigger circuits will operate to DC with pulse triggering, except for HF SYNC.
External	
50 Ω Input	
Sensitivity Range	
X1 Trig Amp	12.5 mV to 2 V (P-P), DC to 1 GHz.
X10 Trig Amp	1.25 mV to 2 V (P-P), 1 kHz to 50 MHz.
Safe Overload	2 V (DC + peak AC).

ELECTRICAL CHARACTERISTICS (cont)

Characteristic	Performance Requirement
TRIGGERING (cont)	
1 MΩ Input	
Sensitivity Range	
X1 Trig Amp	12.5 mV to 2 V (P-P), DC to 100 MHz.
X10 Trig Amp	1.25 mV to 2 V (P-P), 1 kHz to 50 MHz.
Safe Overload	100 V DC or 100 V (P-P) to 1 kHz; derated 6 dB/octave above 1 kHz to 5 V (P-P).
HF SYNC Input	
Sensitivity Range	10 mV to 500 mV (peak-peak) at 1 GHz; 200 mV to 500 mV (peak-peak) at 12.4 GHz.
Safe Overload	2 V (peak-peak).
Display Jitter	
50 Ω and 1 MΩ Triggering	
Sequential Mode	10 ps or less at fastest SWEEP RANGE position (fully CCW); 0.4 divisions or less at remaining six positions of SWEEP RANGE; measurements made under optimum trigger conditions.
Random Mode	30 ps or less at fastest SWEEP RANGE position (fully CCW); one division or less at remaining six positions of SWEEP RANGE; measurements made under optimum trigger conditions.
HF SYNC	
Random or Sequential Mode	20 ps or less with a 12.4 GHz, 200 mV (peak-peak) signal; measured under optimum trigger conditions.

ELECTRICAL CHARACTERISTICS (cont)

Characteristic	Performance Requirement
TRIGGERING (cont)	
PULSE OUT (into 50 Ω)	
Amplitude	Positive-going pulse of at least 400 mV.
Risetime	2.5 ns or less.
Trigger Kickout	±2 mV or less into 50 Ω (except HF SYNC).
Minimum Trigger Rate in RANDOM Mode	100 Hz.
SLOW RAMP GENERATOR	
Scan Rate	
REPETITIVE SCAN	Continuously variable from less than 2 sweeps/sec to at least 40 sweeps/sec.
HORIZONTAL DEFLECTION SYSTEM	
Deflection Factor	
SWEEP CAL	Permits adjustment of deflection factor for all 7000-series mainframes.

ELECTRICAL CHARACTERISTICS (cont)

Characteristic	Performance Requirement
HORIZONTAL DEFLECTION SYSTEM (cont)	
EXTERNAL INPUT	
Input Resistance	100 kΩ within 10%.
Deflection Factor	Continuously variable from 10 V to 1 V/div.
Maximum Input Voltage	100 V (DC + peak AC).
SWEEP OUT	+5 V to −5 V
MECHANICAL CHARACTERISTICS	
Dimensions	
Height	≈5 inches.
Width	≈2¾ inches.
Length (including front panel knobs and rear connector)	≈14½ inches.
Construction	Aluminum alloy chassis with epoxy laminated circuit boards. Front panel is anodized aluminum.
Accessories	An illustrated list of the accessories supplied with the 7T11 is at the end of the Mechanical Parts List pullout pages.