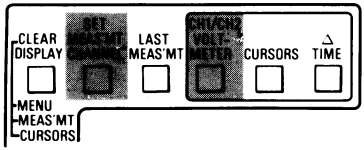
USING THE

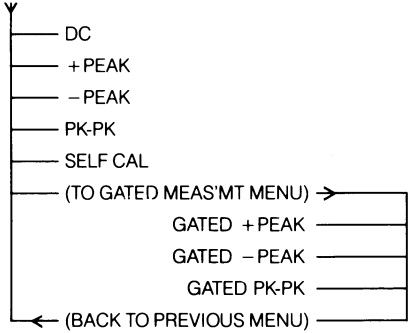
2246

OSCILLOSCOPE

Tektronix®
COMMITTED TO EXCELLENCE

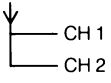


CH1/CH2 VOLTMETER



SET MEAS'MT CHANNEL

(When a VOLTMETER function is active)



CH 1/CH 2 VOLTMETER

Menu Item	Waveform Measurement	Procedure
DC	Average DC value. Accuracy: 0.3%	1. Select: • VOLTMETER • Desired Menu Item • SET MEAS'MT CHANNEL (if needed)[a] 2. Connect probe to measurement point. 3. Read value at top right of crt.
+PEAK	Most positive voltage. Accuracy: 2.0%	
−PEAK	Most negative voltage. Accuracy: 2.0%	
PK-PK	Peak-to-peak voltage. Accuracy: 2.0%	
SELF CAL	No measurement. Initiates self-characterization of the vertical system.	1. Select: • VOLTMETER • SELF CAL. 2. When routine ends, scope returns to mode existing at start.
GATED +PEAK GATED −PEAK GATED PK-PK	Peak value of waveform segment appearing inside intensified zone. Accuracy: 2.0%	1. Select: • VOLTMETER • TO GATED MEAS'MT MENU • Desired Menu Item • SET MEAS'MT CHANNEL (if needed)[a] 2. Connect probe to measurement point. 3. Use DELAY and Δ controls to set intensified zone limits.

[a]Disregard this step when either CH1 or CH2 VERTICAL MODE is singly selected.

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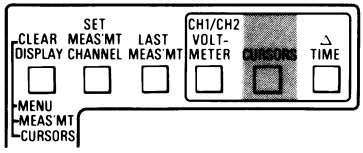
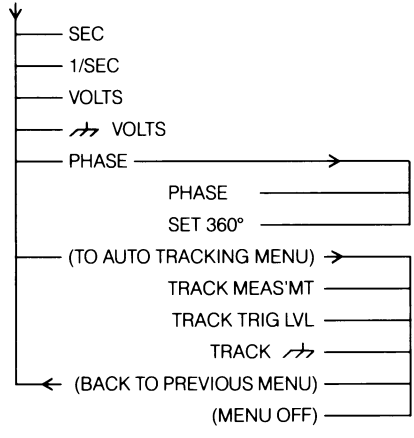


CURSORS



CURSORS

Menu Item	Waveform Measurement	Procedure
SEC	Time difference between two vertical cursors, when in the A Horizontal mode. Accuracy: 0.5%	1. Select: • CURSORS • Desired Menu Item 2. Connect probe to measurement point. 3. Use DELAY and Δ controls to set cursors at measurement points. 4. Read value at top right of crt.
1/SEC	Frequency of waveform segment between two vertical cursors. Accuracy: 0.5%	
VOLTS	Voltage difference between two horizontal cursors. Accuracy: 0.5%	
GND VOLTS	Voltage difference between one stationary cursor (referenced to ground) and one settable cursor. Accuracy: 0.5%	

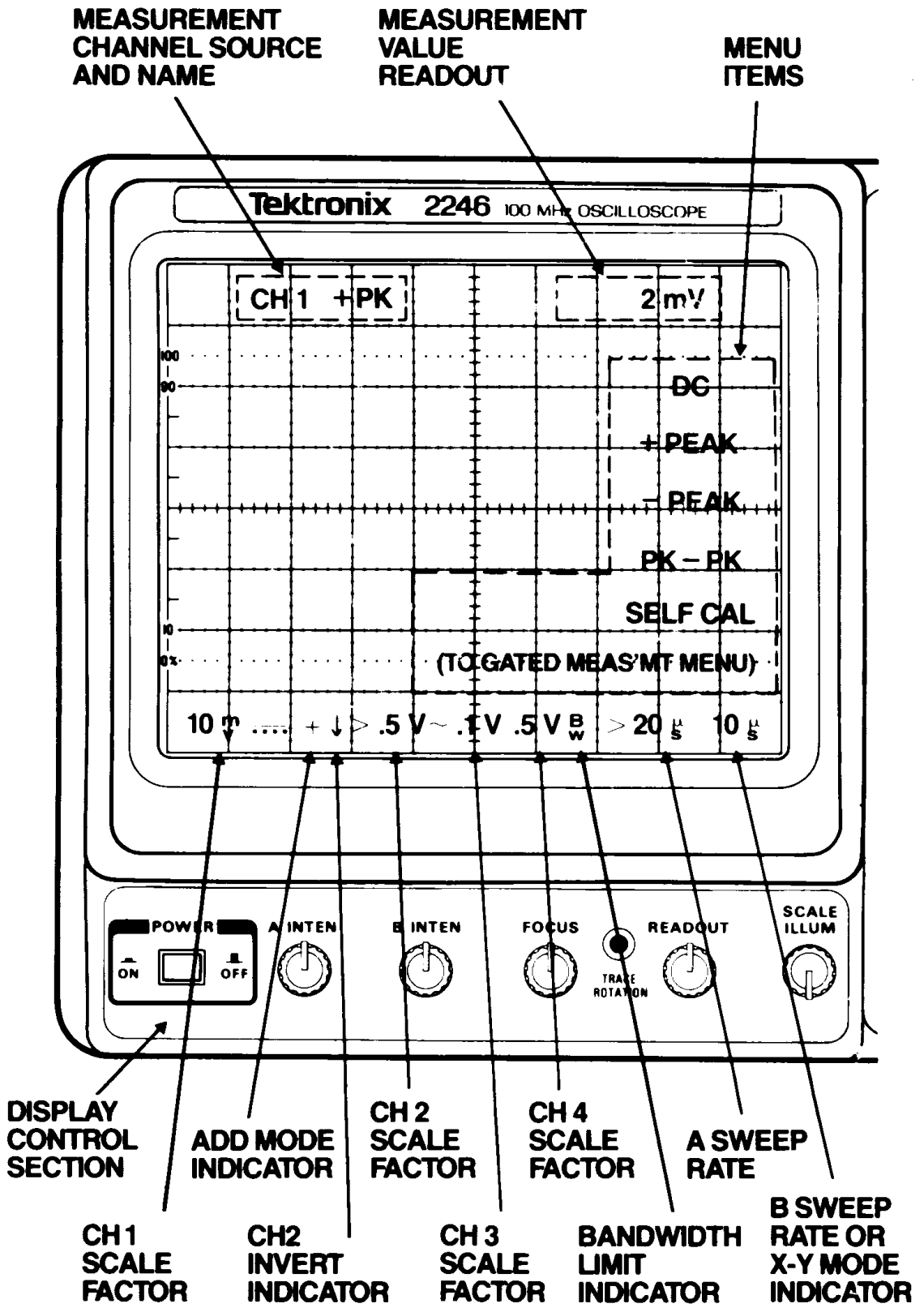
CURSORS (cont'd)

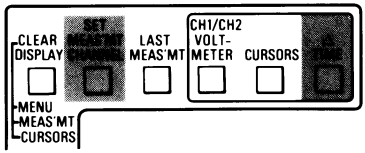
Menu Item	Waveform Measurement	Procedure
PHASE	Phase difference (in degrees) between two vertical cursors. Requires prerequisite setting of 360° reference points on screen. Accuracy: 0.5%	1. Select: • CURSORS • PHASE • SET 360° 2. Use DELAY and Δ controls to set reference points. 3. Select PHASE 4. Use DELAY and Δ controls to set cursors at desired points. 5. Read phase value at top right of crt.
TRACK MEAS'MT	When underlined, cursors track DC, +PK, −PK, or PK-PK measurement value on screen.	1. Select: • CURSORS • TO AUTO TRACKING MENU • Desired Menu Item • MENU OFF 2. Observe tracking cursor(s) and voltage readout.
TRACK TRIG LVL	When underlined, a cursor tracks the trigger level, and a readout displays actual voltage.	
TRACK GND	When underlined, a cursor tracks the ground reference point.	

DISPLAY READOUT SYMBOLS

>	Precedes vertical scale-factor and horizontal sweep-rate readouts when variable control is out of detent.	
⏚	Input coupling grounded.	Immediately follows the CH 1 and the CH2 scale-factor readout
⎓	DC input coupling selected.	
∿	AC input coupling selected.	
+	ADD mode selected.	
↓	CH 2 INVERT mode selected.	
BW	20 MHz BW LIMIT activated.	
|←	DELAY cursor	Appear with menu items to indicate cursors that can be manually set by the DELAY and the Δ controls.
→|	Δ cursor	

DISPLAY READOUT





Δ TIME

- SEC
- 1/SEC
- PHASE → PHASE, SET 360°
- SELF CAL

SET MEAS'MT CHANNEL

(When a Δ TIME function is active)

- CH 1, CH 2, CH 3, CH 4, ADD — Sets reference display for DELAY time (first) intensified zone
- (TO Δ CHANNEL MENU) → Sets reference display for Δ DELAY time (second) intensified zone: CH 1, CH 2, CH 3, CH 4, ADD
- ← (BACK TO DELAY CHANNEL MENU)

Δ TIME

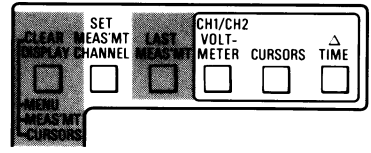
Menu Item	Waveform Measurement	Procedure
SEC	Time difference between leading edges of two intensified zones on either the A sweep or the B sweep displays when in ALT or B mode. Accuracy: 0.5%.	1. Connect probes to test points. 2. Select: • ALT Horizontal Mode • Δ TIME • SEC or 1/SEC • SET MEAS'MT CHANNEL (if needed)[a] 3. Use DELAY and Δ controls to set intensified dots on waveform(s). 4. Use SEC/DIV to expand the B sweep. 5. Use DELAY and Δ controls to fine-adjust the two reference points on the B sweeps to the same spot on the CRT. 6. Read value at top right of crt.
1/SEC	Frequency of waveform bracketed by leading edges of two intensified zones on either the A sweep or the B sweep display. Accuracy: 0.5%	
SELF CAL	No measurement. Initiates self-characterization of the horizontal system.	1. Select: • Δ TIME • SELF CAL 2. When routine ends, scope returns to mode existing at start.

[a]Disregard this step when either CH 1 or CH2 VERTICAL MODE is singly selected.

Δ TIME (cont'd)

Menu Item	Waveform Measurement	Procedure
PHASE	Phase difference (in degrees) between waveforms bracketed by leading edges of intensified zones on the A sweep or the B sweep display. Accuracy: 0.5%	1. Connect probes to test points. 2. Select: • ALT Horizontal mode • Δ TIME • PHASE • SET 360° • SET MEAS'MT CHANNEL (if needed)[a] 3. Use DELAY and Δ controls to set 360° reference points. 4. Select PHASE 5. Use SEC/DIV to expand the B Sweep. 6. Use DELAY and Δ controls to fine-adjust the two reference points on the B sweeps to the same spot on the crt. 7. Read value at top right of crt.

[a]Disregard this step when either CH 1 or CH2 VERTICAL MODE is singly selected.



CLEAR DISPLAY

PRESSING CLEAR DISPLAY turns off the first *active* item in the following sequence:

1. Displayed menu.
2. Active measurement function.
3. Trigger and ground feedback cursors.

Pressing it again turns off the next active item in the list, if any.

And pressing it a third time turns off the remaining active item, if any.

LAST MEAS'MT

Pressing LAST MEAS'MT When	Result
No measurement function is active.	Recalls the measurement function that was last selected.
Any measurement function is active.	Reinitializes the active function. Brings cursors back to positions existing at the time they were last initialized.

TRIGGER MODE

AUTO LEVEL	Range of TRIGGER LEVEL control is limited to remain within signal peaks. Range limits are re-established when: 1. Triggering ceases. 2. LEVEL control is moved to either extreme. 3. MODE up button is pushed with AUTO LEVEL already selected. The initially established trigger level is near the midpoint between signal peaks except as follows: 1. If the LEVEL control is set near its CCW limit, the trigger level is set at about 10% of the peak-to-peak voltage. 2. If the LEVEL control is set near its CW limit, trigger level is set at about 90% of the peak-to-peak voltage.
AUTO	Sweep free-runs in absence of a trigger signal. Trigger level changes only when LEVEL control is rotated.
NORM	Sweep runs when trigger requirements are met.
TV FIELD	Sweep triggers on Vertical Sync pulse embedded in composite video waveform. Set SLOPE to ⎍ for sync tips on waveform top; ⎎ for tips on waveform bottom. Level is set automatically. Sweep does not run in the absence of trigger.
TV LINE	Sweep triggers on Horizontal Sync pulses embedded in composite video waveform. Set SLOPE as in TV FIELD. Level is set automatically. Sweep does not run in the absence of trigger. The B TRIGGER source signal is the same as the selected A TRIGGER SOURCE.
SGL SEQ	Sweep is triggerable once for each selected trace. READY light is illuminated until final trace is completed.

TRIGGER SOURCE

Trigger selection is independent from vertical display selection. With VERT TRIGGER SOURCE selected, triggering-signal sources are as follows:

CHOP/ ALT	TRIGGER MODE	ADD	VERT TRIGGER SOURCE
ALT	AUTO NORM TV LINE TV FIELD	Either ON or OFF	Alternates between displayed channels in the following order: CH 1, CH 2, CH 3, CH 4, ADD
CHOP	Any	ON	Algebraic sum of CH1 and CH2 input signals.
		OFF	Lowest numbered displayed channel.
Either	AUTO LEVEL	ON	Algebraic sum of CH1 and CH2 input signals.
		OFF	Lowest numbered displayed channel.

TRIGGER COUPLING

DC	Normal, unrestricted triggering.
NOISE REJ	Blocks signals less than approximately 0.5 div.
HF REJ	Attenuates signals greater than 50 kHz.
LF REJ	Attenuates signals less than 50 kHz.
AC	Blocks dc signal components.