

# MODEL V-211/V-212/V-222/V-422

## OSCILLOSCOPE

### Service Manual

#### 1. SPECIFICATIONS

[     ] : Specifications for V-422

##### **CRT**

Type

Large 6" screen with internal graticule

Approximate 2kV [12kV] acceleration potential

Screen type

P31 phosphor standard

Useful screen area

8 × 10 div

Graticule

Internal graticule with centimeter divisions and 2 mm subdivisions along the central axis, 10 % and 90 % lines are indicated.

Illumination continuously variable. (For : V-222, V-422)

Focussing

Possible (with automatic focus correction circuit : V-222 and V-422)

Trace rotation                      Provided

Scale illumination                      Variable (For : V-222, V-422)

Intensity control                      Provided

##### **Z-AXIS INPUT (INTENSITY MODULATION)**

DC-coupled, positive-going signal decreases intensity: 5 Vp-p signal causes noticeable modulation at normal intensity: DC to 2 MHz.

Input impedance                      47 k $\Omega$  (typ.) [33 k $\Omega$  (typ.) ]

Maximum input voltage              30 V (DC + peak AC)

Coupling                                  DC

##### **VERTICAL DEFLECTION SYSTEMS (2 Identical Channels)**

Bandwidth and rise time

DC to at least 20 MHz [40 MHz] and rise time 17.5 ns [8.8 ns] or less.

DC to at least 7 MHz and rise time 50 ns or less at magnifier extends.

The AC coupled lower -3 dB point is 10 Hz or less.

#### Deflection factor

5 mV/div to 5 V/div in 10 calibrated steps, in a 1-2-5 sequence.

The uncalibrated continuous control extends deflection factor to at least 12.5 V per division in the 5 volts/div position. The  $\times 5$  magnifier increases sensitivity of each deflection factor setting to 1 mV/div.

#### Accuracy

$\pm 3\%$  (+10 to +35 °C)

Additional error for magnifier  $\pm 2\%$

#### Display modes

CH1, CH2 (normal or invert), Alternate, Chopped (Approx. 250 kHz),  
Added

#### Input impedance

1 M $\Omega$   $\pm 3\%$  in parallel with 23  $\pm 3$  pF

#### Maximum input voltage

300 V (DC + peak AC)

#### Input coupling

AC, GND, DC

### HORIZONTAL DEFLECTION SYSTEM

#### Time base

0.2  $\mu$ s/div to 0.2 s/div in 19 calibrated steps, in a 1-2-5 sequence.

The uncalibrated continuous control extends deflection factor to at least 0.5 seconds per division in the 0.2 sec/div position. The  $\times 10$  magnifier extends maximum sweep rate to 100 ns/div [20 ns/div].

#### Accuracy

$\pm 3\%$  (+10 to +35 °C)

Additional error for magnifier  $\pm 2\%$

### TRIGGERING SYSTEM

#### Trigger modes

Automatic, Normal, TV (TV-H or TV-V)

Trigger source

Internal (CH1, CH2, V.MODE), Line, External : V-212, V-222, V-422

Internal, Line, External, EXT-H : V-211

Trigger slope

+ or -

TV sync polarity

TV (-)

Triggering level Internal ;  $\pm 6$  div or more

variable range External ; approx.  $\pm 2$  V

Triggering sensitivity  
and frequency

Frequency	Internal (V. MODE)	External
20 Hz - 2 MHz [ 20 Hz - 5 MHz ]	0.5 div (2.0 div)	200 mV
2 - 20 MHz [ 5 - 40 MHz ]	1.5 div (3.0 div)	800 mV

(Except ; (V.MODE) : V-211)

TV-V, TV-H sensitivity: SYNC level more than 1 div or 1 V

AUTO: Approx. 25 Hz (when time base is 0.1  $\mu$ s/div to 2 ms/div)

Trigger coupling

AC : 25 Hz to full bandwidth

External trigger input impedance

1 M $\Omega$  +20 % in parallel with 25 pF  $\pm 5$  pF

(EXT ☒ ; about 100 k $\Omega$  : V-211)

Maximum input voltage

300 V (DC + AC to 1 kHz or less)

## **X-Y OPERATION**

V·INPUT ; Vert, EXT TRIG IN ; Horiz : V-211

CH1 ; Horiz, CH2 ; Vert : V-212, V-222, V-422

Deflection factor

Same as vertical deflection

(X-axis; about 200 mV/div : V-211)

## Accuracy

Y:  $\pm 3\%$  (+10 to +35 °C)

X:  $\pm 5\%$  (+10 to +35 °C)

Additional error for magnifier  $\pm 2\%$

X-bandwidth

DC to at least 500 kHz

Phase error

3 ° or less from DC to 50 kHz : V-212, V-222, V-422

3 ° or less from DC to 10 kHz : V-211

## CALIBRATOR

An approx. 1 kHz frequency 0.5 V ( $\pm 3\%$ ) square wave.

## POWER SUPPLY

VOLTAGE (50/60 Hz)	FUSE
100 V ( 90 - 110 V)	2A
120 V ( 108 - 132 V)	2A
220 V ( 198 - 242 V)	1A
240 V ( 216 - 264 V)	1A

Nominal voltage  $\pm 5\%$  at 400 Hz

Power supply frequency : 50, 60, 400 Hz

Power consumption : Approximately 30 W

## ENVIRONMENT

Limit of operation temperature 0 - 40 °C

Limit of operation humidity 35 - 85 %

Rated range of use temperature 10 - 35 °C

Rated range of use humidity 45 - 85 %

Storage and transportation temperature -20 - 70 °C

## | | |-----------------------| | DIMENSIONS AND WEIGHT | |-----------------------|

Approx. 310(W)  $\times$  130(H)  $\times$  370(D) mm  
(12.4(W)  $\times$  5.2(H)  $\times$  14.8(D) inch)

Approx. 6 kg (13.5 lbs): for V-211, V-212

Approx. 6.5 kg (14.6 lbs): for V-222, V-422