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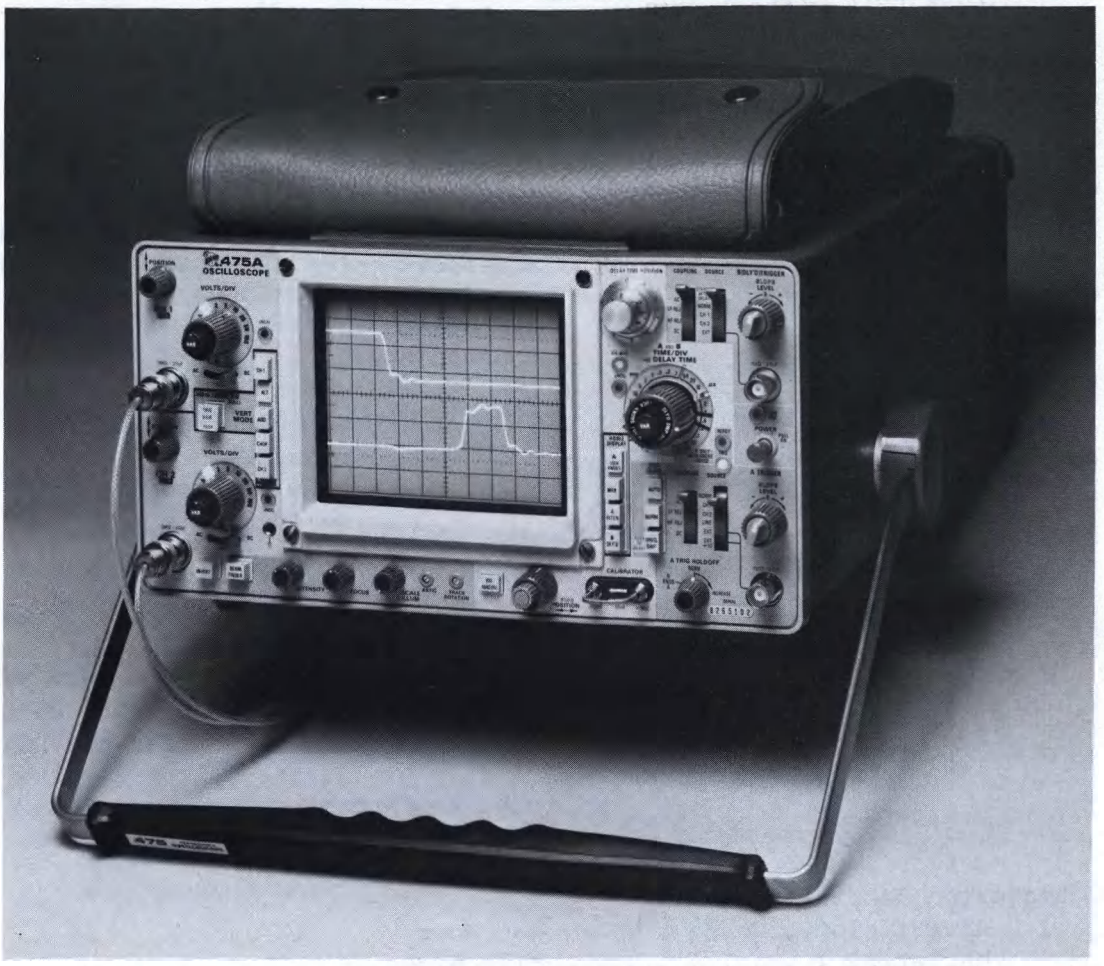
MARKETING SALES RELEASE

FILE

DATE July 16, 1976

475A Portable Oscilloscope



The 475A is an improved performance version of the 475 Portable Oscilloscope. It provides 250 MHz at 5 mV/div and a reduced spot size.

It is intended to be marketed in a performance dollar gap that is currently being exploited by the HP1720A. The 250MHz 475A, priced at $3300, and the 200MHz 475, priced at $3000, will be extremely competitive with the 200MHz HP1710B at $2900 and the 275 MHz HP1720A at $3750. With the DM44, the 475A will have a considerable price performance advantage over the HP1722A. The 475A DM44 will have essentially the same features as the HP1722A and will cost $3710 versus $4900 for the HP1722A.

Announcement (Domestic & International) 8/16/76

U.S. Prices

475	$3000
475A	$3300
R475A	**$3425**
475A DM44 (Order 475A Option 44)	$3710
475A DM44 without temperature probe (order 475A option 45)	$3625
Option 04-Emc Environmental	Add $ 125
Option 07-External dc operation (not available on 475A DM44)	Add $ 125
Option 78-P11 Phosphor	No charge

Included Accessories . . . . . Two 6 ft P6075 Probes (010-6075-13), accessory pouch (016-0535-02), blue crt filter (337-1674-00), clear crt filter (337-1674-01), ground post (134-0016-01)

Customer Availability . . . . . 4 weeks from receipt of order

Demo availability. . . . . 60 U.S. demos to be shipped week 33.

Advertising Support . . . . News Release on 475A distributed to domestic and international trade press. 2 page, 4 color data sheet (AX-3389) available before announcement. The 475A will be covered (together with 465, 475, 466 & 464), in ads and direct mail for the new DM44 starting in mid August. It will also be included in Portables family ads and direct mail planned to start in 9/76.

Beaverton Responsibilities

Advertising	Bob Down
Marketing	Milt Ringe
Service Support	Don Wilson

475A Portable Oscilloscope

SPECIFICATIONS

VERTICAL DEFLECTION
(2 identical channels)

Bandwidth* and risetime (at all deflection factors from 50Ω terminated source)--

-15°C to +40°C	+40°C to +55°C
Dc to 250 MHz, 1.4 ns	Dc to 250 MHz, 1.4 ns

*Measured at -3dB down. Bandwidth may be limited to 20 MHz or 100 MHz by bandwidth limit switch.

Lower-3 dB point	(ac coupling from 50Ω source)--
1X Probe	10 Hz or less
10X Probe	1 Hz or less

Deflection Factor-5 mV/div to 5 V/div in 10 calibrated steps-(1-2-5 sequence), accurate within 3%. Uncalibrated, continuously variable between steps and to at least 12.5 V/div.

Display Modes-Channel 1; Channel 2 (normal and inverted); Alternate; Chopped (approx 1 MHz rate); Added; X-Y (selected by time/div, CH 1-X, CH 2-Y)

Automatic Scale Factor Readout-Probe tip deflection factors for 1X or 10X coded probes are automatically indicated by two readout lights behind the knob skirts. All lights are off when the channel is not displayed. Ground reference display selectable at probe (when dc coupled).

Input R and C-1 MΩ within 2% paralleled by approx 20 pF.

Max Input Voltage-

Dc Coupled	250 V (dc+peak ac) 500 V (p-p ac at 1 kHz or less)
Ac Coupled	500 V (dc+peak ac) 500 V (p-p ac at 1 kHz or less)

Signal Output-CH 2 vertical signal is dc to at least 50 MHz (-3 dB), and approx 20 mV/div terminated into 1 MΩ.

Delay Line-Permits viewing leading edge of displayed waveform.

Probe Power-Connectors provide correct voltages for two optional P6201 FET Probes.

Time Base A and B-0.01 µs/div to 0.5 s/div in 24 calibrated steps (1-2-5 sequence). X10 MAG extends max sweep rate to 1 ns/div.

Variable Time Control; Time Base A-Provides continuously variable uncalibrated sweep rates between steps and to at least 1.25 s/div. Warning light indicates uncalibrated setting.

Time Base A and B Accuracy, Full 10 cm-

	+20°C to +30°C	-15°C to +20°C +30°C to +55°C
Unmagnified	±1%	±2%
Magnified	±2%	±3%

Horizontal Display Modes-A only, Mixed Sweep, A Intensified, B Delayed.

Time Base A Sweep Modes-Auto Trigger (sweep free-runs in absence of triggering signal), Normal Trigger, Single Sweep. Lights indicate when sweep is triggered and when single sweep is ready.

Time Base B Sweep Modes-B starts after Delay Time; B triggerable after Delay Time from selected source.

Calibrated Mixed Sweep-Displays A sweep for period determined by DELAY-TIME POSITION control, then displays B sweep for remainder of horizontal sweep. Mixed sweep measurements utilize portions of the A and B Sweeps. Cumulative accuracy within 3%.

CALIBRATED SWEEP DELAY

Delay Time Range-0 to X10 Delay Time/Div settings of 50 ns to 0.5 s (minimum delay time is 50 ns).

Differential Time Measurement Accuracy-

Delay Time Setting	+15° to +35°C
over one or more major dial divisions	within 1%
less than one major dial division	within 0.01 major dial divisions

Jitter-1 part or less in 50,000 (0.002%) of X10 the A sweep time/div setting. 1 part in 20,000 when operating from 50 Hz line.

TRIGGERING A and B

A Trigger Modes-Normal (sweep runs when triggered), Automatic (sweep free-runs in the absence of a triggering signal and for signals below 30 Hz). Single Sweep (sweep runs one time on the first triggering event after the reset selector is pressed.)

B Trigger Modes-B runs after Delay Time (starts automatically at the end of the delay time) and B triggerable after Delay Time (runs when triggered). The B (delayed) sweep runs once, in each of these modes, following the A sweep delay time.

Time Base A and B Trigger Sensitivity-

	Trigger Mode	To 40 MHz	At 250 MHz
Dc	Internal	0.3 cm deflection	2.0 cm deflection
	External	50mV	250mV
	External ÷ 10	500mV	2.5V
Ac		Requirements increase below 60 Hz	
Ac Lf Reject		0.5 cm with requirements increasing below 50 kHz	
Ac Hf Reject		0.5 cm with requirements increasing below 60 Hz and above 50 kHz	

Jitter-0.2 ns or less at 250 MHz and 1 ns/div (X10 Mag).

A Trigger View-A momentary pushbutton selector overrides other vertical controls and displays the signal being used for A sweep triggering. This provides quick verification of the signal and time comparison between a vertical signal and the trigger signal. The deflection factor is approx 50 mV/div with Ext ÷ 10 source).

Level and Slope-Internal, permits selection of triggering at any point on the positive or negative slope of the displayed waveform.

Time Base Trigger Sources-A: Norm, Channel 1, Channel 2, Line, External, and External ÷ 10. B: starts after Delay, Norm, CH 1, CH 2, and External. Level adjustment through at least ± 20V in External, through at least ±20 V in External ÷ 10.

External Inputs-R and C approx 1 MΩ paralleled by approx 20 pF. 250 V (dc + peak ac) max input.

X-Y OPERATION

Full-sensitivity X-Y (CH 1 Horiz, CH 2 Vert)- 5 mV/div to 10 V/ div in 11 calibrated steps, accurate within 3%. Bandwidth is dc to at least 3 MHz. Phase difference between amplifiers is 1° or less from dc to 1 MHz.

CRT

Crt-5 in rectangular tube; 8 x 10 cm display area. Horizontal and vertical centerlines further marked in 0.2 cm increments. P31 phosphor normally supplied; P11 optional without extra charge. 18 kV accelerating potential.

Z Axis Input-Dc coupled to crt cathode; noticeable modulation at normal intensity with 5 V or more p-p signal; dc to 50 MHz usable frequency range.

Graticule-Internal, nonparallax; variable edge lighting; markings for measurement of rise time.

Beam Finder-Compresses trace to within graticule area for ease in determining the location or relative magnitude of an off-screen signal regardless of vertical and horizontal position controls. A preset intensity level provides a constant brightness.

ENVIRONMENTAL CAPABILITIES

Ambient Temperature-Operating: $-15^{\circ}C$ to $+55^{\circ}C$. Nonoperating: $-55^{\circ}C$ to $+75^{\circ}C$. Filtered forced air ventilation is provided.

Altitude-Operating: to 15,000 ft; max allowable ambient temperature decreased by $1^{\circ}C$/1000 ft. from 5000 to 15,000 ft. Nonoperating to 50,000 ft.

Vibration-Operating: 15 minutes along each of the three axes. 0.025 in p-p displacement (4 g's at 55 Hz) 10 to 55 to 10 Hz in 1 minute cycles.

Shock-Operating and nonoperating: 30 g's, ½ sine, 11 ms duration, 2 shocks per axis in each direction for a total of 12 shocks.

Electromagnetic Compatibility (Option 04 Only) - Meets the emc requirements of MIL-Std-461A, when tested in accordance with the following test methods of MIL-Std-462:

CE-01, CE-03, CS-01, CS-02, CS-06,
RE-02 (limited to 1 GHz), RE-04,
RS-01, and RS-02 (limited to 1 GHz).

Humidity-Operating and nonoperating: 5 cycles (120 hours) to 95% relative humidity referenced to MIL-E-16400F (par. 4.5.9 through 4.5.9.5.1, class 4).

OTHER CHARACTERISTICS

Amplitude Calibrator

Output Voltage	0.3V	1% 0°C to +40°C
Output Current	30 mA	2% +20°C to +30°C
Frequency	Approx 1 kHz	

Signal Outputs-Positive gates from both time bases (approx 5 V), and a vertical signal output from one channel.

Power Requirements-Quick-change line voltage selector provides six ranges: 110 V, 115 V, 120 V, 220 V, 230 V, and 240 V, each ±10%. 48 to 440 Hz. 100 watts (475) max at 115 V and 60 Hz. Operation from 12 or 24 V dc is available with Option 07

Dimensions	Cabinet in	Cabinet cm	Rackmount in	Rackmount cm
Height	6.2	15.7	7.0	17.7
Width (with Handle)	12.9	32.8	19.0	48.3
Depth (with Panel Cover)	18.1	46.0	18.0	45.7
Depth (Handle Extended)	20.3	51.6		
Weights (Approx)	**lb**	**kg**	**lb**	**kg**
Net (without Panel Cover)	22.8	10.3	29.4	13.3
Net (with Panel Cover and Accessories)	25.3	11.5		
Shipping	37.0	16.7	58.0	26.3

Included Accessories=Two 6 ft P6075A Probes with accessories (016-0535-02); blue crt light filter (337-1674.00); clear crt light filter (337-1674-01); ground post (134-0016-01).

INSTRUMENT OPTIONS

Emc Environmentalized Option 04-Includes the features of the 475A, in addition meets electromagnetic compatibility requirements of MIL-Std-461A.

External Dc Operation, Option 07-In addition to the standard ac line operation, Option 07 permits the 475A to be powered from 12 V dc or a 24 V dc source. For battery operation, Option 07 makes these scopes compatible with the 1106 Battery pack.

ORDERING INFORMATION

475A Oscilloscope . . . . . $ 3300

INSTRUMENT OPTIONS

Option 04 Emc Environmental . . . . . Add $125
Option 07 Ext Dc Operation . . . . . Add $125
Option 44 ΔTime and DMM . . . . . Add $410
Option 45 ΔTime and DMM, but without temperature probe . . . . . Add $325
Option 78 P11 Phosphor . . . . . .No charge
Note: Option 07 cannot be ordered with DM44.

OPTIONAL ACCESSORIES

Probes-The probes provided as standard accessories to the 475A are recommended as the best choice for general-purpose applications. The probes listed in the table below are frequently used to provide added convenience and measurement capability. For a complete list of available probes, with full specifications and ordering information, consult the "Probes and Accessories" section of this catalog.

Probe Type	Attenuation	Input Impedance	Bandwidth*
P6063A	1X Switchable 10X	1 MΩ- 105 pF 10 MΩ- 14 pF	6 MHz 145 MHz
P6202 FET Probe 2 Meter	10X	10MΩ- 2 pF	185 MHz
	100X Head	10MΩ- 2 pF	185 MHz
	AC Head	10 MΩ- 4 pF	185 MHz

Current Probe	Calibration	Insertion	Bandwidth*
P6022	1mA/mV 10 mA/mV (Selectable)	.03Ω @ 1 MHz Increasing to 0.2Ω @ 120 MHz	125 MHz

*Bandwidths are measured at the upper -3 dB point, and apply only to the cable length shown. Generally, shorter cable lengths increase bandwidth, longer ones decrease bandwidth.

C-30A-P Option 01 Compact Camera-f/1.9 lens, 0.8 magnification. Polaroid Land Pack Film back for 3000 speed film (includes Adapter Frame/Corrector Lens 016-0301-00), Order C-30A-P Option 01

Camera Adapter and Corrector Lens-Adapts C-30A to 475A, Order 016-0301-00.

Protective Cover-Waterproof, blue vinyl, Order 016-0554-00.

Folding Polarized Viewing Hood, Order 016-0180-00.

Mesh Filter-Improves contrast and emc filtering, Order 378-0726-01.

SCOPE-MOBILE Cart-Occupies less than 18 in aisle space, has storage area in base, Order 200C.

1106 Battery Pack (for use with Option 07)

1105 Battery Power Supply