

MIL-STD-1665  
NOTICE 1  
11 July 1979

MILITARY STANDARD  
TEST EQUIPMENT FOR THE  
STANDARD ELECTRONIC MODULES PROGRAM

TO ALL HOLDERS OF MIL-STD-1665:

1. THE FOLLOWING PAGES OF MIL-STD-1665 HAVE BEEN REVISED AND SUPERSEDE THE PAGES LISTED:

NEW PAGE	DATE	SUPERSEDED PAGE	DATE
5	11 July 1979	5	20 January 1978
6	11 July 1979	6	20 January 1978

2. The following pages are to be added:

NEW PAGE	DATE
007-1 through 007-3	11 July 1979
J06-1 and J06-2	11 July 1979
Y06-1	11 July 1979

3. RETAIN THIS NOTICE AND INSERT BEFORE TABLE OF CONTENTS.

4. Holders of MIL-STD-1665 will verify that additions indicated above have been entered. This notice page will be retained as a check sheet. This issuance, together with appended pages, is a separate publication. Each notice is to be retained by stocking points until the Military Standard is completely revised or canceled.

Custodians:

Navy - EC  
Army - ER  
Air Force - 11

Review activities:

Navy - AS, OS, SH  
Army - AT, MI, AR  
Air Force - 13, 17, 19, 85  
DLA - ES

User activities:

Army - AR  
Navy - MC  
Air Force -

Preparing activity:

Navy - EC

Agent:

DLA - ES

(Project 5963-0002)

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## ITEM 007

## OSCILLOSCOPE, HIGH FREQUENCY

TYPE OF EQUIPMENT - - - - - High frequency oscilloscope.

FUNCTION PERFORMED - - - - - Analog display of electrical signals.

SPECIFICATIONS - - - - - All specifications are for an ambient temperature of +15° to +35°C.

General information

Cathode-ray tube - - - - - The cathode ray tube shall present a signal within the accuracy of the horizontal and vertical signal circuits over the full area of 10 cm horizontal by 8 cm vertical. A graticule either external or internal shall be supplied for measurements.

Positioning of trace - - - - - Provision for positioning the trace or spot and determining its location if off screen shall be incorporated.

Controls - - - - - CRT spot size, shape, intensity, graticule brightness, and power on/off.

Calibrator - - - - - 1 kHz (nominal) square wave ranges from 2 mV, 20 mV, 0.2 V, 0.4 V into 50 $\Omega$  and 4 mV, 40 mV, 0.4 V, 4 V, 40 V into an open circuit. Amplitude accuracy is  $\pm 1\%$ .

Z AXIS INPUT - - - - -  $\pm 15$  V MAXIMUM POSITIVE signal decreases intensity.

Horizontal circuits

Internal sweep - - - - - 2 sweep circuits shall be provided.

Time base 1 (main sweep) - - - - - (a) 0.2 s/div. to 10 ns/div. in a 1,2,5 sequence, (accuracy  $\pm 2\%$  from 0.2 s/div. to 20 ns/div.,  $\pm 3\%$  at 10 ns/div.).  
(b) An uncalibrated variable is continuous between steps, and extends sweep rate to at least 0.5 s/div. The variable control is internally switchable between delaying and delayed sweeps.  
(c) Delay time multiplier range - 0 to 9.8 times the DLY TIME/Div. setting from 0.2 s/div. to 10 ns/div. (0 to 1.96 seconds).

Time base 2 (delayed sweep) - - - - - (a) 0.2 s/div. to 0.5 ns/div. in a 1,2,5 sequence, (accuracy  $\pm 2\%$  from 0.2 s/div. to 20 ns/div.,  $\pm 3\%$  from 10 ns/div. to 5 ns/div.,  $\pm 4\%$  from 2 ns/div. to 1 ns/div., and  $\pm 5\%$  at 0.5 ns/div.).  
(b) An uncalibrated variable rate is continuous between steps, and extends sweep rate to at least 0.5 s/div.

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# D07 - Continued

Triggers (Auto, Norm., Single)	- - -	(a) Modes	
		(1) AC	
		(2) AC with low frequency reject.	
		(3) AC with high frequency reject.	
		(4) DC	
		(b) Source/minimum sensitivity from 100 to 500 MHz for any coupling except ac hf Rej.	
		(1) Internal/0.5 div. display amplitude	
		(2) External/100 mV.	
		(c) Polarity	
		(1) Positive	
		(2) Negative	
		(d) Internal Jitter (MAIN and DELAYED)	
		(1) 50 ps or less at 500 MHz	
		(e) EXT $\div$ 10 switch attenuates ext signal 10 times.	
		(f) External Input (MAIN and DELAYED)	
		(1) Selectable 50 $\Omega$ or 1 M $\Omega$ inputs (1 M $\Omega$ is paralleled by approximately 20 pF).	
		(2) MAXIMUM input is 250 V (dc + peak ac) for 1 M $\Omega$ input, and 1 W average for 50 $\Omega$ input.	
		(3) Range of trigger level $\pm$ 3.5 V in EXT and EXT $\div$ 10.	
Horizontal modes (may be mutually exclusive)	- - - - -	(1) A: A horizontal unit only	
		(2) ALT: Dual-sweep, alternates between horizontal units.	
		(3) CHOP: Dual sweep, chopped between horizontal units.	
		(4) B: B horizontal unit only.	
Horizontal outputs	- - - - -	(a) A or B time-base (+) Sawtooth	
		(b) A, B or A Dly'd (+) Gate, rise time is 7 ns or less into 50 $\Omega$ .	
Vertical circuits			
Delay	- - - - -	The vertical signal shall be delayed so that no part is lost due to sweep circuit start-up time.	
Delay time difference between Channels	- - - - -	50 ps or less.	
Accuracy	- - - - -	$\pm$ 2% with gain adjusted at 10 mV/div.	
Rise time	- - - - -	1.8 ns maximum.	
Frequency response	- - - - -	DC to 200 MHz.	
Input voltage	- - - - -	DC coupled: 250 V (dc + peak ac); ac component 500 Vp-p maximum AC-coupled: 500 V (dc + peak ac); ac component 500 Vp-p max.	
Sensitivity	- - - - -	5 mV/Div. to 5 V/Div.; ten steps in 1,2,5 sequence.	
Input impedance	- - - - -	1 M $\Omega$ $\pm$ 2% shunted by 20 pF.	
Number of inputs	- - - - -	Two (2) each having ac or dc couplings.	

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# 007 - Continued

Output - - - - - Derived from vertical signal as selected by  
(a) trigger source switch.

Vertical modes - - - - - (1) LEFT, Left vertical channel only.  
(2) ALT.: Dual-sweep, alternates between vert. units.  
(3) ADD: Added algebraically  
(4) CHOP: Dual sweep, chopped between vert. units.  
(5) RIGHT, right vertical channel only

## EQUIPMENT MEETING ALL SPECIFICATIONS

Manufacturer - - - - - Tektronix  
Any one of the following models:  
(a) 7904  
(b) R7903  
Used in conjunction with the following probe and plug in units:  
(1) 7B92A - Horizontal time base  
(2) 7A26, - Vertical amplifier  
(3) P6106-10X, 1 meter probe.

Exceptions - - - - - None

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GENERATOR, PULSE

TYPE OF EQUIPMENT - - - - - Pulse generator.

FUNCTION PERFORMED - - - - - A versatile pulse generator with very fast variable transition times and repetition rate up to 50 MHz, compatible with MOS and other general purpose circuitry.

## SPECIFICATIONS

Pulse repetition rate  
Single pulse - - - - - 5 Hz to 50 MHz (jitter < 0.1% of period +50 ps)  
Double pulse - - - - - 5 Hz to 25 MHz

Pulse characteristics  
Pulse amplitude - - - - - Pulse high and low levels independently adjustable over a  $\pm 20$  V range from a 50 $\Omega$  low reactance source. Maximum pulse amplitude into a 50 $\Omega$  load is  $\geq 10$  V peak to peak; minimum is <0.5 V peak to peak. Maximum pulse amplitude into an open circuit is  $\geq 20$  V peak to peak; minimum is <1.0 V peak to peak. The preset level controls are adjustable over the same ranges.

Aberrations - - - - - <5%, +50 mV into a 50 $\Omega$  load for pulse levels between  $\pm 5$  V. May increase to <10%, +50 mV for pulse levels outside this range.

Transition times - - - - - Independently adjustable leading and trailing transition times from  $\leq 5$  ns typical ( $\leq 7$  ns at some offset and amplitude levels) to  $\geq 50$  ms, measured from the 10% point to the 90% point, in six decade steps plus variable. Variable controls with 100:1 range (50:1 on 5 ns) provide overlap on all ranges. Transition times longer than 50 ms are obtainable in the custom range position.

Transition linearity - - - - - Deviation from straight line  $\leq 5\%$  between the 10% and 90% point for transition times greater than 10 ns.

Pulse width - - - - - Adjustable from  $\leq 10$  ns to 20 ms.

Pulse delay - - - - - Variable from 10 ns to 10 ms.

Pulse delay (paired pulse mode) - - Variable from  $\leq 10$  ns to  $\geq 100$  ms.

Jitter (all modes) - - - - -  $\leq 0.1\%$  +50 ps.

Input data

Trigger/gate input - - - - - Sensitivity: 80 mV peak to peak to  $\geq 10$  MHz; 250 mV peak to peak to 50 MHz at 50 $\Omega$  input impedance.

Input impedance - - - - - Internally selected, 50 $\Omega$  or 1 M $\Omega$  paralleled by  $\approx 20$  pF.

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Maximum input - - - - -  $\pm 5$  V peak into  $50\Omega$ ,  $\pm 20$  V peak into  $1\text{ M}\Omega$ .

Minimum input - - - - - 10 ns.

Pulse width

Trigger level

Polarity - - - - - Front panel selectable, + or - slope.

Range - - - - -  $\pm 3$  V.

Trigger output data

Trigger output amplitude - - - - -  $\geq +2$  V from  $50\Omega$ .

Trigger source impedance - - - - -  $50\Omega$ .

Trigger duty cycle (internal trig.) = 50%.

Trigger duty cycle (external trig.) Determined by duty cycle of triggering signal.

Pulse delay modes - - - - - Undelayed, delayed, and paired. Paired pulse mode limited to 25 MHz. Minimum pulse separation governed by duration duty factor specification.

Fixed pulse delays

Trigger out to pulse out - - - - - = 23 ns.

Gate input to trigger out - - - - - = 25 ns.

EQUIPMENT MEETING ALL  
SPECIFICATIONS

Manufacturer - - - - - Tektronix Model PG508. When used in conjunction with all Tektronix TM500 series power modules except the TM501.

EQUIPMENT MEETING SPECIFICATIONS

WITH EXCEPTION NOTED. - - - - - (Later)



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## ITEM Y06

PROBE, OSCILLOSCOPE VOLTAGE

TYPE OF EQUIPMENT	- - - - -	General purpose 10X voltage probe
FUNCTION PERFORMED	- - - - -	To enable voltage monitoring with minimum circuit loading and signal distortion.

## SPECIFICATIONS

Input impedance - - - - -	10 MΩ in shunt with an adjustable capacitor.
Input capacitance - - - - -	(1 meter probe) - 10.5 pF (2 meter probe) - 13.0 pF (3 meter probe) - 15.5 pF
Attenuation - - - - -	10X ±3% (oscilloscope input = 1 MΩ±2%)
*Bandwidth - - - - -	(Oscilloscope bandwidth 255 MHz) when used with: (a) 1 and 2 meter probes; at least 250 MHz (b) 3 meter probe; at least 150 MHz.
Maximum input voltage - - - - -	500 V (dc + peak ac) to 1.7 MHz derated to 65 V at 200 MHz.

EQUIPMENT MEETING ALL SPECIFICATIONS

Manufacturer - - - - - Tektronix  
(1) P6106

- \* All three probes are usable on oscilloscopes with bandwidths up to 350 MHz. When the 1 meter probe is used with oscilloscopes having bandwidths of at least 325 MHz the system bandwidth will typically be 300 MHz.