TEST AND MEASUREMENT

PROMAX

COMMITED TO QUALITY ISO 9001

THE COMPANY

RESEARCH & DEVELOPMENT

PROMAX was founded in 1963 by Jose Clotet in Barcelona. The company's firsts developments included instruments to generate television and radio signals and analysers to check the reception quality.

Today, **PROMAX** is a leading company in providing test and measurement solutions worldwide to support the information technology revolution. The company invests about 15% of its annual turnover in Research & Development.

PRODUCTS

Our products include a wide range of telecomunications test instruments to provide testing solutions for cable, satellite and digital terrestrial television. In this catalogue we have included a new range of fiber optic test equipment which proves our continuous research for new business opportunities.

MANUFACTURING

PROMAX manufactures more than 200 different products in our Barcelona manufacturing facilities. The use of the latests technological resources allows a high efficiency rate.

EXPANSION

The products are distributed worldwide through a mixed of direct and indirect sales network. PROMAX has already set up 18 Calibration Centers and several Service Centers worldwide. Our target is to continue this process to deliver technical support at same time we make the product available to our customers.

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OD-512

OD-515B

OD-540

This new family of Oscilloscopes PROMAX OD-5XX consists of 5 double-trace oscilloscopes. The OD-5XX are sturdy, easy to operate and exhibit high operational reliability, they have got advanced functions and measurement capabilities, such as cursor readout, delay time double-base, on screen alphanumerical indication, trace intensity modulation, the possibility to display TV signal etc.

The next table summarises the principal characteristics of these models, thus it becomes easier to identify the required configuration/specification.

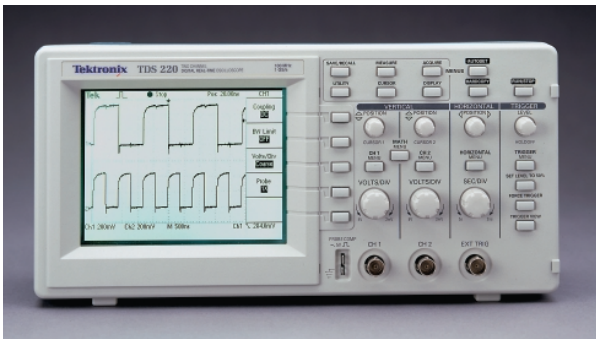
SPECIFICATIONS	OD-512	OD-514B	OD-515B	OD-545B	OD-540
Vertical amplifiers		DC to 40 MHz	DC to 60 MHz		
Bandwidth	DC to 20 MHz	1~2 /div DC to 10 MHz	1~2 mV/div DC to 15 MHz		DC to 100 MHz
Sensitivity	5 mV to 5 V/div 10 steps, sec. 1-2-5	1mV to 5 V/div, in 12 steps sequence 1-2-5 1 mV to 5 mV / div. DC 15 MHz			2mV to 5 V/div, 11steps sequence 1-2-5
Sweep Magnification	x 5 CH1 and CH2	–			
Accuracy	≤3% (x 5 MAG≤ 5%)	5 mV to 5 V/div: ≤ 3%, 1 mV to 2 mV/div: ≤ 5% (10ºC to 35ºC)			± 3% (5 div at Display center)
Variable Attenuator	Continuosly variable (minimum 2.5:1)				
Input voltage	Max. 300 V (DC+peak AC)	Max. 400 V (DC+peak AC)			
Input impedance	1 MΩ // 25 pF approx.				
Operating modes	CH1, CH2 , DUAL (ALT, CHOP) CH1 ± CH2				
Delay	–			Yes	
Coupling	AC-GND-DC				
Dinamic Range	> 5 div to 20 MHz	>4 div to 40 MHz	>8 div to 50 MHz, >5 div to 60 MHz		8 div to 60 MHz, >5 div to 100 MHz
X-Y Operating					
X Axis	Same as CH1 (DC~500 kHz)	same as CH1 (DC-1 MHz)	same as CH1 (DC-2 MHz)		same as CH1(DC-500 kHz)
Y Axis	Same as CH2 (DC~500 kHz)	Same as CH2 (DC-1 MHz)	same as CH2 (DC-2 MHz)		Same as CH2 (DC-500 kHz)
Horizontal Deflection					
A Time base					
Sweep rate	0.2 µs to 0.5 s/div 20 steps seq.1-2-5	0.1 µs/div to 0.5 s/div in 21 steps sequence (1-2-5)			50 ns to 0.5 s/div cont. variable
Hold off time	–	Countinuosly variable ≥ double of the duration of the sweepingin the scales			variable
B Time base	–	–	–	Yes	
Sweep rate	–	–	–	0.1 µs to 5 ms/div	50 ns to 50 ms / div
Accuracy	–	–	–	±3 %	
Delay				1 µs to 5 ms	1 µs to 5 s
Jitter	–	–	–	≤1 / 10000	< 1/20000
Operating modes	A, X-Y			A, A INT, B, B TRIG'D	A, ALT, DELAY (B)
Accuracy	NORM: ± 3%,x10MAG± 5%	NORM: ±3%, x 10 MAG: ± 5% (0.1 µs to 50 ms/div)			
Magnification	x 10				

SPECIFICATIONS

Triggering				
Source	CH1, CH2, LINE, EXT			
Modes	AUTO, NORM, TV-V, TV-H	AUTO, NORM and SINGLE		AUTO, NORM, TV
Couppling	AC, TV/V, TV/H	AC, HF-REJ, TV, DC		AC, DC, HFR, LFR
Slope	+ / -			
Sensitivity			0.5 div (DC to 10 MHz) 1.5 div (10 to 50 MHz) 2 div (50 to 60 MHz)	
Internal	0.5 div (20 Hz to 2 MHz) 1.5 div (2 to 20 MHz)	0.5 div (DC to 10 MHz) 1.5 div (10 to 40 MHz)		0.35 div (10 Hz to 20 MHz) 1.5 div (20 MHz to 100 MHz)
External	0.2 V (20 Hz to 2 MHz) 0.8 V (2 to 20 MHz)	0.1 V (DC to 5 MHz) 0.6 V (5 to 40 MHz)	0.1 V (DC to 10 MHz) 0.2 V (10 to 50 MHz) 0.3 V (50 to 60 MHz)	50 mVpp (10 Hz to 20 MHz) 150 mVpp (20 to 100 MHz)
Z Modulation				
Input voltage	30 V (DC + peak AC)	50 V (DC + AC peak, frequency AC ≤1 kHz)		30 V (DC+AC pp)
Sensitivity	5 Vpp	3 Vpp		5 Vpp
Probe adjustment				
Output voltage	2 Vpp ± 2 %			
Frequency	1 kHz approx.			
Readout function	–		ΔV, ΔV%, ΔVdB,ΔT 1/ΔT, DUTY, PHASE	ΔV, ΔV%, ΔVdB, ΔT, 1/ΔT, ΔT %, Δθ
Indication				
CRT				
Area	8 x 10 div (1 div = 10 mm)			
Acceleration voltage	Approx. 2 kV		Approx.12 kV	
Scale illumination	No		Adjust level scale	No
Intensity control	Yes			
Traze rotation	Yes			
Power supply				
Mains voltage	115 (97 to 132), 230 (195 to 250) V AC	100 / 120 / 220 / 230 V AC, 50-60 Hz with selector		100/120/230 V AC± 10 %
Consumption	35 W	60 W		70 W
Mechanical features				
Dimensions	310 W. x 150 H. x 455 D.			
Weight	8 kg	8.2 kg		9 kg
Included accesories	Mains cable CA-006 2 Probes SA-014	Mains cable CA-006 2 Probes SA-016		Mains cable CA-006 2 Probes SA-017

REAL TIME DIGITAL OSCILLOSCOPES

TDS210, TDS220, TDS224



Digital operation in real time

The TDS series Oscilloscopes offers some excellent capabilities in terms of Bandwidth and Sampling rate. Since the Sampling rate is 10 to 16 times that of the bandwidth on both channels, the oscilloscopes are able to supply exact acquisition in real time on the complete bandwidth.

The Digital Storage technology provides some characteristics which are not available on the analogue oscilloscopes, including the automatic measurements, peak detectors, storage of reference waveforms, automatic adjustment as well as five different instrument configurations. The peak detector and the high Sampling rate, minimise the aliases and are able to capture the details of those waveforms which are invisible for the analogue oscilloscopes.

Specifications	TDS210	TDS220	TDS224
Channels	2	2	4
Bandwidth	60 MHz	100 MHz	100 MHz
Real time sampling rate	1 Gm/s	1 Gm/s	1 Gm/s
Register length	2.5 k	2.5 k	2.5 k
Vertical accuracy	3 %	3 %	3 %
Vertical resolution	8 bits	8 bits	8 bits
Sensitivity range	2 mV to 5 V	2 mV to 5 V	2 mV to 5 V
Max. voltage	300 V CAT II	300 V CAT II	300 V CAT II
PC connection	Yes	Yes	Yes
Dimensions	W. 305 x H. 151x Pr. D mm	W. 305 x H 151x D. 121 mm	W 305 x H 151x D. 121 mm
Weight	1.5 kg	1.5 kg	1.5 kg

OD-563, OD-565, OD-560

OD-560

OD-565

SPECIFICATIONS	OD - 563	OD - 565	OD - 560
Type	**Digital / Analogue**		**Digital**
Vertical amplifiers			
Bandwidth (-3dB)	DC-30 MHz	DC-50 MHz	DC-100 MHz
Sensitivity	1mV-20 V/Div		2mV-20 V/Div
Input voltage	Max. 400 V (DC+peak AC)		Max. 300 V (DC+peak AC)
Attenuator	Steps sequence 1-2-5 + 2, 5:1 Variable		Steps sequence 1-2-5
Operating modes	CH1, ±CH2, ADD (CH1+CH2) DUAL (CHOP/ALT)		CH1, ± CH2, ADD (CH1+CH2)
Horizontal deflection			
Sweep rate	0.2 µs -0.5 s/div in 20 steps sec. 1-2-5		0.2 µs -5 s/div in 20 steps sec. 1-2-5
Magnification	x5, x10, x20		
Triggering			
Triggering mode	AUTO, NORMAL, TV		AUTO, NORMAL, SINGLE, TV, TIME DELAY EVENT DELAY
Source	CH1, CH2, VERT. MODE, LINE (red), EXT		CH1, CH2, LINE (red), EXT
Coupling	AC, LF Rej, HF Rej, TV-V, TV-H		AC, DC, LF Rej, HF Rej, NOISE Rej
X - Y operation			
X axis	Same as CH1 DC - 500 kHz		Same as CH1
Y axis	Same as CH2		Same as CH2
Digital acquisition			
Frequency sampling	20 MS/s (2 channels simultaneous)		100 MS/s
Bandwidth			
Repetitive Bandwidth	30 MHz	50 MHz	100 MHz
Nonrepetitive Bandwidth	5 MHz	5 MHz	10 MHz
Acquisition memory	2 kW/channel (1 kW/channel from 0.2 to 2 µs/div)		125 k Words/channel
Acquisition modes	NORMAL, AVERAGE, SINGLE, ROLL, HOLD		MAIN, WINDOW, DELAY,AVERAGE PEAK DETECT, SINGLE, ROLL, X-Y
Screen indications			
Panel selections	V/DIV (CH1 - CH2), s/DIV, TRIG, Condition		V/DIV (CH1 - CH2), s/DIV, TRIG, condition, MODE
Marker	dV, dT, 1/dT		dV, dT, 1/dT
Automatic measures			Vh, Vl, Vmax, Vmin, Vavg, Vrms, Trise, Tfall Duty cyc. Freq. Period, +Width, -Width
Features extended			
Measurement config.memories	10		15
Automatic adjustment			Horizontal, vertical automatic tuning trigger
Waveform reference			Waveform memorization (2 sets)
Interphases	RS232 output		Paralel printing output, RS232, DB-9 output
			VGA monitor , OPTIONAL: IEEE-488.2
Cathodic ray tube			
Area	8 x 10 divisions (1 div. = 1 cm)		Rectangular 7" 640 x 480 pixels
Deflection - Acceleration	Electrostatics, 1.9 kV	Electrostatics, 10 kV	Magnetic, Raster scan
Power supply			
Mains voltage	100/120/230 VAC + -10% 50/60 Hz		100 a 240 VAC 48/63 Hz
Consumption	50 W		85 W
Mechanical features			
Dimensions and weight	W. 275 x H. 130 x D. 370 mm 8 kg		W. 330 x H. 155 x D. 385 mm 7 kg
Included accsories	2 Probes SA-016, Mains cable CA-006		2 Probes SA-017, Mains cable CA-006

OS-801, OSCILLOSCOPE ACCESSORIES

The **OS-802** polyscope includes two measuring instruments in one: **a digital oscilloscope and a frequency meter.**

Its sturdy construction, size, weight, and battery power supply, make it the ideal portable instrument for taking multiple measurements outdoors, where working with conventional instruments may be awkward.

A thoroughly useful instrument when it comes to the measurement of electrical magnitudes, and the repair of electronic equipment, due to its wide variety of functions, it makes it an indispensable instrument both in laboratories and in maintenance departments.

SPECIFICATIONS	OS-801
DSO	
Channels	2 x 20 MHz (repetitive)
Sample	20.000 S/s
Sensitivity	5 mV/div to 20 V/div (sequence 1-2-5)
Operating mode	CH1, CH2, Dual, Add, Sub (CH1-CH2), X-Y
Screen	12x10 div (320x240 dots), LED backlight
Input coupling	DC, AC, GND
Max. input voltage	400 V (DC+ peak AC)
Accuracy	± 1.8 % ± 1 LSB up to 8 div. (20°C)
Readout function	ΔV, ΔT, 1/ΔT, Vpp
Memory	20 memories
Frequency counter	
Display	7 digits
Functions	Frequency and period
Frequency range	from 5 Hz to 20 MHz
Range	Auto-range or manual, automatic units (Hz, kHz, MHz, sec, msec...)
Gate time	0.1 s (≥ 10 MHz) 1 s (<10 MHz)
Accuracy	1 (count typical)
Time base	10 MHz ±30 ppm (23°C ± 5°C)

Attenuator	0, 20, 40 and 60 dB Selectable
Outputs (PC and printer)	RS-232 and CENTRONIX
Power supply External input DC Battery	Included mains adapter 4 alkaline batteries R14 or NiCd set
Mechanical features Dimensions Weight	W. 287 x H. 152x D. 82 mm 2 kg
Included accessories	Holster DC-812 Carrying case DC-802 Carrier belt CB-802 battery set Oscilloscope probe SA014 Mains adapter DMM Probes
Optional accessories	RS-232 cable (CC-802), control software RM-802, printer cable connection CP-802, logic probe LP-802 (OS-802 only)

OSCILLOSCOPE ACCESSORIES

ATTENUATION PROBES

Specifications		SA014	SA016	SA017	SA019
Attenuation		x1 x10	x1 x10	x1 x10	x100
Input impedance	R (MΩ)	10	1 10	1 10	50
	C (pF)	72 17	<40 <10	55 16	<5.5
Bandwidth (MHz)		15 60	20 150	42 10	400
Rise time (ns)		35 5	17 2.3	12 1.4	0.9
Max. input voltage		500 V AC pp 300 V (DC+pp AC)	600 V (DC+peak AC)	600 V (DC+peak AC)	2000 V 40 V RMS (DC+peak AC)
Compensation range (pF)		15.....40	10.....60	10.....60	15.....50
Cable length (m)		1.4	1.2	1.2	1.2

DETECTOR PROBE

SD012
Pass band
From 100 kHz to 500 MHz ±1dB
From 100 kHz to 800 MHz ± 3dB
Input capacity
5 pF approx.
Driving voltage: 250 mV
Working voltage: 40 V RMS max.
Isolation voltage
230 V (DC+peak AC)

1 2 3 4 5

FD-252, FD-250, FD-130

The FD-250 digital frequency counter is an instrument designed to measure frequencies ranging from 20 Hz to 160 MHz through a high-impedance input.

The FD-252 digital frequency counter is designed for application that require a higher frequency range. For that purpose the instrument is equipped with a second input for measurement up to 2.4 GHz with an impedance of 50 Ω.

Both have an excellent frequency sensitivity and three selectable gate time fixed values: 2 sec., 0.2 sec., and 20 msec., thus enabling the user to obtain an optimum ratio between the measurement time and the resolution. In addition, both have a selectable band-pass filter at input A. In this way it is possible to measure low-frequency signals, removing interferences in the measure.

They are equipped with an 8 digit L.E.D. display which facilitates frequency reading.

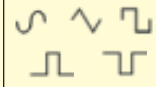
SPECIFICATIONS	FD-250	FD-252	FD-130
Input A Frequency range Maximum measurement frequency Sensitivity Input impedance Maximum input voltage Selectable low pass filter	20 Hz to 160 MHz Selectable at 20 MHz or 160 MHz From 20 Hz to 80 MHz < 15 mV rms. From 80 MHz to 160 MHz < 25 mV rms 1 MΩ // 35 pF 250 V AC (up to 100 kHz) 50 kHz (-3 dB), range selector at 20 MHz		5 Hz to 25 MHz Selectable at 5 Hz to 25 MHz From 10 Hz to 20 MHz < 15 mV rms 1 MΩ // 25 pF 30 V AC (up to 100 kHz) 5 KHz
Input B Frequency range Sensitivity Input impedance Maximum input voltage		100 MHz to 2,4 GHz From 100 MHz to 1 GHz < 10 mV From 1 GHz to 2.4 GHz < 50 mV 50 Ω 100 V DC or peak AC (50 Hz) RF + 18 dBm	20 MHz to 1.3 GHz From 20 MHz to 700 MHz < 10 rms From 700 MHz to 1.3 GHz < 50 rms 50 Ω 30 V DC
General Accuracy	± 1 count ± time base accuracy		
Standard time base Frequency Temperature coefficient	10 MHz 0.2 ppm / ºC from 15 to 45 ºC		0.3 ppm / ºC from 18 to 28 ºC
Optional time base (TCXO) (FD-250/1 or FD-252/1 option) Frequency Stability Ageing at constant temperature Display Selectable gate times	10 MHz ± 1 ppm from 0 to 50 ºC ± 0.5 ppm / month, ± 1 ppm / year 8 L.E.D.digits 2 s - 0.2 s - 20 ms	2 s - 0.2 s - 20 ms (Input A) 4 s - 0.4 s - 40 ms (Input B)	± 2 ppm from 0 to 50 ºC <± 5 ppm / year 8 L.C.D.digits 0.1 s, 1 s and 10 s
Resolution 20 Hz to 20 MHz 20 MHz to 160 MHz 100 MHz to 2.4 GHz (FD-252)100 Hz	1 Hz - 10 Hz - 100 Hz (depending on gate times) 10 Hz - 100 Hz - 1 kHz (depending on gate times) - 1 kHz - 10 kHz (depending on gate times)		Input A from 5 Hz to 25 MHz Resolution 0.0001 Hz to 10 Hz Input B from 20 Hz to 1.3 GHz Resolution 1 Hz to 1 KHz
Power supply Mains voltage Consumption Battery	110-125-220-230-240 V AC / 50-60 Hz 10 W		9 V
Mechanical features Dimensions Weight	W. 212 x H. 102 x D. 241 mm 1.4 kg		W. 81 x H. 178 x D. 30mm 190 g without battery

GF-230, GF-232 FUNCTION GENERATORS

The GF-230 is a function generator covering the frequency range from 0.1Hz to 1MHz in seven decades. It allows to generate sinusoidal, square and triangular waves with continuous control of the output level, fixed 20 attenuator and the possibility to superimpose the signal at a continuous level through the DC OFFSET control. The VCO input located on the rear panel enables the user to control the output frequency and performs FM modulations to any auxiliary signal.

The GF-232 covers from 0.2 Hz to 2 MHz and it is equipped with a 50 Ω output. Also included is a signal symmetry control, allowing to obtain saw-tooth signal, digital frequency indication, a power amplifier up to 4 MHz with a 50 Ω output impedance, a variable-level comparator and frequency meter up to 10 MHz (5 digits).

(Only GF-232)			
Frequency counter			
Max. frequency.	10 MHz	Resolution	100 Hz
Sensitivity	60 mV (5 MHz)	Input impedance	100 kΩ
Amplifier			
Bandwidth	4 MHz	Input amplitude	100 kΩ
Output impedance	50 Ω	Output amplitude	10 Vpp (50 Ω)
Gain	32 dB (40 dB o.c.)		
Level comparator			
Input impedance	100 kΩ	Output amplitude	TTL
Trigger control	± 150 mV variable		

SPECIFICATIONS	GF-230	GF-232
General		
Frequency range	0.1 Hz to 1 MHz in 7 decades	0.2 Hz to 2 MHz in 7 decades
Frequency control		
Continuous variation control	Ratio 10:1, Accuracy ± 5 %	
Frequency indicator		Digital
Resolution		0.1 Hz to 1 kHz
Time between readings		250 ms
External input VCO / FM	0 to 10 V for a 10:1 linear variation Input impedance 15 kΩ	
Output		
Output signals	Sinusoidal, triangular and square	
Continuous symmetry control		10:1 both senses
Output amplitude	20 Vpp (open circuit)	
	10 Vpp (600 Ω)	10 Vpp (50 Ω)
Output impedance	600 Ω	50 Ω
Continuous amplitude control	> 30 dB	
Attenuator	20 dB	
DC offset continuous	± 10 V (open circuit)	
	± 5 V (600 Ω)	± 5 V (50 Ω)
Output voltage without clipping	± 10 V (open circuit) $V_{offset} + V_p = \pm 10$ V max.	
Sinusoidal		
Amplitude response	-1dB at nominal output, ref. 10 kHz	
Distortion	<0.6% nominal output (to 100kHz)	
Triangular	Linearity < 1 %	
Square	Rise time < 80 ns	
TTL Output		
Amplitude	> 3 V (open circuit)	
Symmetry in % of period	Fixed (~ 15)	Var. (15 al 85)
Rise time	< 25 ns	
Power supply		
Mains voltage	110-125-220-230-240VAC / 50-60Hz	
Consumption	14 W	
Mechanical features		
Dimensions	W. 212 x H. 102 x D. 241 mm	
Weight	1.7 kg	

GB-212 LF GENERATOR

The GB-212 oscillator is a versatile generator for frequencies between 20 Hz and 200 kHz, with square and sinusoidal signal outputs. The harmonic distortion of the signal is very low, which makes it very suitable for high fidelity, equalizer testing, RF generator modulation, measurement of resonance frequency of loudspeakers, LC circuit resonance, Servo system analysis, characteristic study of electronic components, analysis and synthesis of basic circuits, amplifier response, analysis of passive networks, (resonant circuits, filters), etc.

SPECIFICATIONS	GB-212
Generator	
Frequency	20 Hz to 200 kHz in 4 decades
Frequency	Digital, ± 3 1/2 digits LCD
Resolution	0.1 Hz to 100 Hz, according to decade
Output	
Internal impedance	600 Ω
Output control	Continuous, attenuator 0 to 60 dB (20 dB steps)
Sinusoidal signal	
Output voltage	5 Vrms (40 mW, 600 Ω) / 10 Vrms (o.c.)
Amplitude response	+ 0.5 dB / 0.2 dB (ref. 1 kHz)
Max. harmonic distortion	0.02%(20Hz to 20kHz) / 0.05%(20kHz to 200kHz)
Square signal	
Output voltage	10 Vpp (o.c.) / Rise time < 100 ns
Output meter	
Type (analogue meter)	e.m.f. sine output and the power in dBm on a 600 Ω (± 2 % accuracy of f.e.)
Power supply	
Mains voltage	110-125-220-230-240 V AC / 50-60 Hz
Consumption	15 W
Mechanical features	
Dimensions	W. 212 x H. 102 x D. 241 mm
Weight	1.7 kg

GFD -917

In addition to the advantages furnished by the range of frequencies covered, from 0.1 Hz to 13 MHz, the GFD-917 generator offers other benefits which provide extraordinary general possibilities for use.

It combines two generators in a single device which allows modulated signals to be obtained in AM or FM, frequency sweeps to be carried out and bursts to be sent from the main generator in the “burst” function.

It includes an output attenuator and offers the possibility of varying signal symmetry as well as adding a continuous current component to the latter and it is equipped with a digital frequency indicator.

SPECIFICATIONS	GFD-917
General	
Output signals	Sine, triangular or square
Functions	Variable symmetry AM - FM modulation Sweep Triggered "Burst"
Frequency	
Range	0.1 Hz to 13 MHz in 8 decades
Control	Continuous in each decade x1 to x10
Indicator	Digital, according to selected value 3 1/2 digits
Accuracy	± 2% of the reading ± 1 digit (x1 to x10)
Output	
Amplitude	20 Vpp at open circuit 10 Vpp (50 Ω)
Output impedance	50 Ω
Amplitude control	By continuous control and attenuador by steps
Attenuador	Up to 63 dB, 3, 20 and 40 dB steps
Symmetry	Continuous variation 20 % to 80 % (up to 1MHz)
DC offset	
Control	Continuous variation 0 to 10 V (open circuit)
Polarity	Selector + / -
Sine	
Amplitude response	(ref 1 kHz)
10 Hz to 100 kHz	≤ 3 %
100 kHz to 10 MHz	≤ 10 %
Distortion	
10 Hz to 50 kHz	- 43 dB (distortion)
50 kHz to 13 MHz	- 30 dBc (harmonics)
Triangular	
Linearity	≤ 1 % (100 Hz)
Square	
Rise time	≤ 18 ns
Distortion	≤ 10 %
AM modulation	
Modulation index	0 to 100 %
Bandwidth (carrier)	100 Hz to 5 Mhz
Distortion	< 2 % (fc 1 MHz - fm 1 kHz, index 70%)
Internal	0.01 Hz to 1 MHz
External	DC to 1 MHz
External sensitivity	< 10 Vpp (100 %)

FM modulation	
Peak to peak desviation	0 to 10 %
Distortion	< 2 % (fc 10 MHz - fm 1 kHz, desviation 10 %)
Modulation bandwidth	
Internal	0.01 Hz to 10 kHz
External	DC to 50 kHz
Sweep	
Sweep width	≥ 100:1 in each decade
Sweep signal	Linear ramp
Asymmetry	About 90 %
Sweep type	Repetitive
Sweep frequency	0.01 Hz to 10 kHz
Triggered "Burst"	
Frequency	0.1 Hz to 1 MHz
Trigger	Continuously variable from 90º to -80 º
Operting mode	Single or multiple period
Trigger signal frequency	
Internal	0.01 Hz to 10 kHz
External	Up to 1 MHz
External input level	TTL
Ext. freq. control (VCO)	
Variation range	100:1 in each decade usable up to 1000:1
Linearity	≤ 0.5 %
Amplitude	0 to -2 V approx.
Input impedance	3 kΩ approx.
Auxiliary generator	
Use	AM, FM, modulation, sweep and burts
Frequency range	0.01 Hz to 10 kHz (4 bands)
Signals	Sine, triangular and square
Symmetry	Continuously variable
Output level	≥ 1.5 Vpp (10 kΩ)
Sine distortion	≤ 2 % (10 Hz to 10 kHz)
Triangular linearity	≤ 1 % (100 Hz)
Synchronism output	
Frequency	From main generator
Output signal	Square
Output level	≥ 0.5 Vpp (50 Ω)
Output impedance	50 Ω
Raise or fall time	≤ 8 ns
Power supply	
Mains voltage	110-125-220-230-240 V AC / 50-60 Hz
Consumption	25 W
Mechanical features	
Dimensions	W. 280 x H. 140 x D. 270 mm
Weight	3.6 kg

MZ-505

The MZ-505 is a very versatile component meter which allows resistance, capacitance and inductance values to be obtained while at the same time being able to measure their quality factor. Measurements are taken at two frequencies: 120 Hz and 1 kHz. It has an auto range function in all measurements, equivalent series and parallel indication, a tolerance function for the selection of components, selectable automatic cut off, etc. The large size LCD display facilitates work in laboratories, schools and production lines.

SPECIFICATIONS	MZ-505
Parameters measured Basic accuracy	L / C / R, D/Q 0.7 %
Resistance Ranges	10 MΩ, 1 MΩ, 100 kΩ, 10 kΩ, 1 kΩ, 100 Ω, 10 Ω (0.001 MΩ - 0.001 Ω res.)
Inductance Ranges	10000 H, 1000 H, 100 H, 10 H, 1 H, 100 mH, 10 mH, 1 mH (1H - 0.1 µH res.)
Capacitance Ranges	10 mF, 1000 µF, 100 µF, 10 µF, 1000 nF, 100 nF, 10 nF, 1000 pF (0.01mF-0.1 pF res.)
Power supply Battery Power adaptader (external) Protections Consumption Protection	 9 V DC DC 12 V min. - 15 V max. minimum load 50 mA Low battery indicator. Min. charge power-off, auto power-off (5 min.) 40 mA approx. By fuse
Mechanical features Dimensions Weight	 W. 90 x H. 37 x D. 192 mm 390 g
Included accessories	Test aligator clips, 9V battery

CP-534C CAPACITANCE METER

The CP-534C digital capacitance meter measures capacitances of up to 20.000 µF with satisfactory accuracy. The instrument is an ideal addition in laboratories in which these types of components are used. It is also highly suitable for production work in both the analysis and the selection of components. For the measurement of low values, it has an end adjustment, which enables the compensation of the residual capacitance between the test cables. The inputs are fuse-protected. It is powered by a 9 V battery, and it can function for 200 hours.

SPECIFICATIONS	CP-534C
Measurement range Zero adjustment Test voltage Protection	200 pF to 20.000 µF f.s. in 9 ranges Residual capacitance adjustment 3.2 V max. By fuse
Presentation Display Overrange	 3 1/2, LCD 13 mm Indication "1" o "-1"
Power features Battery Autonomy	 9V 6F22 type 200 h (alkaline)
Mechanical features Dimensions Weight	 W. 70 x H. 151 x D. 38 mm 200 g
Included accessories	Test leads, 0.1 A / 250 V fuse, battery, instructions manual, holster.

ACCESSORIES

1) PP-009 SMD test probes
2) DC-281 Holster for MZ-505
3) DC-203 Carrying case for MZ-505

DIGITAL MULTIMETER

MD-200

The MD-200 digital multimeter brings together the basic features of a professional instrument such as high accuracy, reliability and a wide range of measurements.

The reading system using an LCD type display and ease of handling means it can be used both in laboratories and on production lines. Its reliability of use also makes it very suitable for training.

It will allow measurements to be taken of current up to 10 A and reading of direct voltage diode drops.

It includes functions such as HOLD, continuity sound signal, AUTO-RANGE and manual range among others. Rear illuminated display makes reading confortable even in the dark.

Input connectors are separated by the measurements of V/W and A respectively.

It can be powered both through the mains supply and by battery and has a compartment for storing accessories possibly needed when used away from the laboratory.

SPECIFICATIONS	MD-200
DC voltage	
Ranges	200 mV - 2 V - 20 V - 200 V - 1000 V
Resolution	100 µV, 200 mV range
Accuracy	± 0.5 % reading ± 2 digits
Input impedance	10 MΩ
Protection	1100 V DC or peak AC
AC voltage	
Ranges	2 V - 20 V - 200 V - 750 V
Resolution	1 mV, 200 mV range
Basic accuracy	± 1.5 % reading ± 5 digits (40 to 500 Hz)
Input impedance	10 MΩ // < 100 pF
Protection	1100 V DC or peak AC
DC current	
Ranges	200 µA - 2 mA - 20 mA - 200 mA - 10 A
Resolution	100 nA, 200 µA range
Accuracy	± 1 % reading ± 2 digits from 200 µA to 200 mA ranges ± 1.5 % reading ± 4 digits, 10 A range
Protection	By fuse mA y A
AC current	
Ranges	200 µA - 2 mA - 20 mA - 200 mA - 10 A
Resolution	100 nA, 200 µA range
Accuracy	± 1.5 % reading ± 5 digits From 200 µA to 200 mA ranges ± 2.5 % reading ± 5 digits (40 to 500 Hz) 10 A range
Protection	Fuse mA and A inputs

Resistance	
Ranges	200 Ω - 2 kΩ - 20 kΩ - 200 kΩ - 2 MΩ - 20 MΩ
Resolution	01 Ω, 200 Ω range
Basic accuracy	± 0.75 % reading ± 2 digits, 200 Ω range to 2 MΩ 2.5 % ± 5 digits, 20 MΩ range
Protection	600 VDC or rms
Test voltage	0.45 V (LO Ω mode) 0.9 V (Ω mode)
Continuity test	50 Ω approx.
Diode test	
Test current	1 mA
O.C. voltage	3.3 V maximum
Presentation	
Display	3 1/2 digits LED, with backlight
Overrange indication	Yes, Blinking digit
DC polarity indication	Automatic
General	
Memory	Holds the value on the display
Reading rate	2 reading / s approx.
Power supply	
Battery	6 x 1.5 V optional. Type AA, LR6 or AM3
Mains voltage	90 to 132 V or 198 to 250 AC / 50 - 60 Hz
Consumption	10 W
Battery life	1200 h without backlight, alkalines
Mechanical features	
Dimensions	W. 218 x H. 73 x D. 195 mm
Weight	1.3 kg
Included accessories	Instructions manual, test leads.

PD-130/131/132

PD-130

¡ECONOMIC!

PD-131

DANGEROUS VOLTAGE INDICATOR

PD-132

¡AUTORANGE!

SPECIFICATIONS	PD-130	PD-131	PD-132
LCD indicator	3 1/2 digits, 1999 points	3 1/2 digits, 1999 points	3 3/4 digits, 3200 points
Analog bargraph	–	–	34 segments
DC voltage	2 V, 20 V, 200 V, 600 V	200 mV, 2 V, 20 V, 600 V	320 mV, 3,2 V, 32 V, 320 V, 600 V
AC voltage	200 V, 600 V	200 mV, 2 V, 20 V, 600 V	320 mV, 3,2 V, 32 V, 320 V, 600 V
DC current	200 µA, 2 mA, 20 mA, 20 mA, 10 A	200 µA, 20 mA, 200 mA, 10 A	320 µA, 3200 µA, 32 mA, 320 mA10 A
AC current	–	200 µA, 20 mA, 200 mA, 10 A	320 µA, 3200 µA, 32 mA, 320 mA10 A
Resistance (Ω)	200, 2 k, 20 k, 200 k, 20 M	200, 20 k, 200 k, 20 M	320, 3.2 k, 32 k, 320 k, 3.2 M, 30 M
Diode test	Yes	Yes	Yes
Battery test	Yes	Yes	Yes
Continuity audible Indication	–	Yes	Yes
Basic accuracy	± (2.0% read. + 1 digit)	± (1.2% read. + 1 digit)	± (0.8% read. + 1 digit)
Data Hold	–	Yes	Yes
Auto power-off	–	–	Yes
Maximum voltage	600 V DC or AC rms	600 V DC or AC rms	600 V DC or AC rms
Input protection	Fast fuse	Fast fuse	Fuse
Dang. voltage indicator		From 70 to 480 V AC	
Battery file	300 hours	200 hours	500 hours
Included accessories	Test leads Instructions manual, 9 V Battery	Test leads Instructions manual, 9 V Battery	Test leads Instructions manual, 9 V Battery

PD-693/695/697

The industrial series of multimeters have been designed in conformity with the strictest quality control requirements in order to comply with the most rigorous safety standards. Their construction in **ABS anti shock material** and an optional shock proof protector guarantees a high resistance to shocks and falls, in compliance with the MIL T28800 standards.

The electrical safety of all the measurement ranges is ensured by a 600 V fast fuse. For safety purposes, the 20 Amp range is protected by a 600 V high energy special ceramic fuse. They are equipped with fast **action diodes and PTC** protection for all the measurement ranges. A spark gap has also been included to absorb transients of up to 6 kV.

The PROMAX Industrial Series complies with the **IEC 348 and UL 1244 standards**. The IEC (International Electrotechnical Commission) is an international body composed by many inspection agencies. One of its tasks is to formulate uniform inspection requirements on electrical safety. Standard IEC determines the explicit safety requirements for electronic measurement instruments.

SPECIFICATIONS	PD-693	PD-695	PD-697
True RMS value	–	–	Yes
LCD indicator	3 1/2 digits	3 3/4 digits	4 1/2 digits
DC voltage	200 mV, 2 V, 20 V, 200 V, 1000 V	400 mV, 4 V, 40 V, 400 V, 1000 V	200 mV, 2 V, 20 V, 200 V, 1000 V
AC voltage	200 mV, 2 V, 20 V, 200 V, 750 V	400 mV, 4 V, 40 V, 400 V, 750 V	200 mV, 2 V, 20 V, 200 V, 750 V
DC current	200 µA, 2 mA, 20 mA, 200 mA, 20 A	40 mA, 400 mA, 20 A	200 µA, 2 mA, 20 mA, 200 mA, 20 A
AC current	20 mA, 200 mA, 20 A	40 mA, 400 mA, 20 A	200 µA, 2 mA, 20 mA, 200 mA, 20 A
Resistence (Ω)	200, 2 k, 20 k, 200 k, 2M, 20 M	400, 4 k, 40 k, 400 k, 4M, 40 M	200, 2 k, 20 k, 200 k, 2M, 20 M
Diode test	Yes	Yes	Yes
Continuity audible Indication	Yes	Yes	Yes
Capacitance	2 nF, 20 nF, 200 nF, 2 µF, 20 µF	4 nF, 40 nF, 400 nF, 4 µF, 40 µF	–
Frequency	–	4 kHz, 40 kHz, 400 kHz, 4 MHz	2 kHz, 20 kHz, 200 kHz
h_{FE} transistors	Yes	Yes	–
Basic accuracy	± (0.5 % read. + 1 digit)	± (0.5 % read. + 1 digit)	± (0.05 % read. + 3 digits)
"Duty Cycle"	–	–	Yes
Logic levels	–	Yes	Yes
Peak Hold	–	Yes	–
Memory reading	–	–	Yes
Auto power of	–	Yes	Yes
IEC 348/UL 1244 standard.	Yes	Yes	Yes
Maximum voltage	1000 V DC / 750 V AC	1000 V DC / 750 V AC	1000 V DC / 750 V AC
Protection	Fuse for mA and A inputs	Fuse for mA and A inputs	Fuse for mA and A inputs
Holster [1]	Yes	Yes	Yes
Raining proof	–	–	Yes
Carriying case	Yes	Yes	Yes
Guarantee	1 year	1 year	1 year
Battery life	200 hours	300 hours	300 hours

[1] Opcional

FP-1b/FP-2b

SPECIFICATIONS	FP1b	FP2b
LCD indicator	3 1/2	3 1/2
DC voltage	200mV, 2V, 20V, 200V, 1000V	200mV, 2V, 20V, 200V, 1000V
AC voltage	2V, 20V, 200V, 750V	2V, 20V, 200V, 750V
DC current	2mA, 20mA, 200mA,10A	2mA, 20mA, 200mA,10A
AC current	2mA, 20mA, 200mA,10A	20mA, 200mA,10A
Resistance	200 Ω, 2 kΩ, 20 kΩ, 200 kΩ, 2 MΩ, 20 MΩ	200 Ω, 2 kΩ, 20 kΩ, 200 kΩ, 2 MΩ, 20 MΩ, 200 MΩ
Diode Test	Yes	Yes
Continuity audible	Yes	Yes
Overload input protector	Yes	Yes
Capacitance	-	2 nF, 20 nF, 200nF, 2 µF, 20 µF
Frequency test	-	2kHz, 20kHz
h_{FE} de transistors	-	Yes
Battery test	Yes	-
Auto power off	-	Yes
Basic accuracy	±(0.5% read. + 1 digit)	±(0.5% read + 1 digit)
Maximum voltage	1000 V DC / 750 V AC	1000 V DC / 700 V AC
Protection	By fuse	By fuse

MULTIMETER ACCESSORIES

1)	SV-013	40 kV CC high voltage probe
2)	SD-014	RF 800 MHz detection probe
3)	PP-008	Elbow-shaped test leads for PD multimeters
4)	CA-4000	100 A AC current clamp
5)	PP-009	SMD test leads
6)	DC-281	Holster for PD-984 / PD-986
7)	DC-213	Carrying case

AL-480

It furthermore has three external clocks (up to 25 MHz), selectable by edge and combinable with each other and three independent clock qualifiers. The units enable the data picked up to be printed for later analysis.

The AL-480 logic analyzer is an instrument that can display simultaneously a large number of digital signals. It is a practical, economical and easy to use instrument especially recommended for universities and R&D centres.

The base model has a data acquisition frequency of 25 MHz and TTL trigger level. Options and accessories are available for a data acquisition frequency of 100 MHz and variable trigger level.

MODEL	AL-480	AL-480 + Option OPT-480-02
Max. nº of channels		
DC to 25 MHz	48	48
DC to 100 MHz	No	12
Trigger level	TTL	Variable
Glitchs capture	No	Up to 5 ns
Memory	8K words of 48 bits	8K words of 48 bits
Non volatile memories	18	18
Computer connection	Yes	Yes
Availability of disassemblers		
Microprocessors 8 bits: Z-80 6502 8085 68000 8086/88		
Microcontrollers 8031/8051		

Easy of use

It is in systems where there is a high degree of complexity where the AL-480 becomes an indispensable tool. These units are equipped with a high resolution graphic display which allows a large number of digital signals to be shown.

Among the new features, worth emphasising are the reference memories, histogram of states, form analysis and an analogue display mode to allow a complete analysis of the systems under study, plus data output shown on the display, formatted in the most convenient form for the user.

The user can define a “tag” and group any number of channels under it. This information can furthermore be displayed on any base.

The equipment comes supplied with an on line instruction manual, pre-programmed configuration examples and a context sensitive help key.

Non volatile memories

The equipment has 4 non volatile memories available with 14 configurations. Storage of data and its configuration is thus ensured for future use.

Multilevel trigger sequence

The AL-480 logic analyser enables the design of complex sequences of up to 12 trigger words, combinable via logic operations up to four depth levels. Likewise, the trace acquisition mode makes it possible to record all the information between the occurrence of two trigger words. These characteristics enable acquisition triggering at very precise moments, assisting the work of the designer and repair technician of digital systems enormously.

Multiples clocks

The AL-480 has an internal clock to synchronize the acquisition, capable of working from 10 Hz to 25 MHz, in sequence of 1:2:5. The AL-480 and OPT-480-02 also enables the acquisition of up to 12 x 100 MHz channels and the pick-up of glitches up to 24 channels.

SPECIFICATIONS	AL-480
Number of channels max.	48 (DC to 25 MHz)
Clock signals	3 independent, level or flank
Data memory	8 K (deep) words (48 bits) 1 K (normal) words (48 bits)
Reference memory	1 K words of 48 bits
Non volatile memory	4 acquisition / 14 set-up
Trigger sequence	4 levels of 4 words (48 bits)
Trigger level	TTL 1,4 V
Channel display	16 channels, simultaneously
Zoom	x1, x4, x16, x64 (normal) x1, x8, x32, x128, x256 (deep)
Groups of channels	7 groups. 16 channels / group
Display format	Binary, Octal, Hex, Dec, ASCII
Power supply	
Mains voltage	95-135V or 180-265 VAC / 48-400Hz
Consumption	65 W

Mechanical features	
Dimensions	W. 315 x H. 190 x D. 268 mm
Weight	5 kg approx.
Options	
OPT-480-02	Up to 100 MHz 48 channels (DC to 25 MHz) 12 channels (DC to 100 MHz) 24 channels (glitchs capture) Variable trigger level from -5 to 10 V
Included accessories	Pod 48 channels, 25 MHz, TTL levels, test leads, instructions manual
Optional accessories	
PA-482	Kit conversion of AL-480 to sampling with 100 MHz with variable trigger level
RM-480	Kit connection to PC
Disassambler	Z-80, 6502, 8085, 8031/8051, 68000, 8086/88

AL-320

The AL-320 logic analyzer is designed for the display and analysis of digital signals. It is a practical, economical and easy to use instrument, especially recommended for teaching institutions and industrial maintenance services.

The base model offers a data acquisition frequency of 25 MHz and a TTL trigger level. Options and accessories are available for a data acquisition frequency of 100 MHz and variable trigger level.

Easy of use

Logic analyzers have always been instruments that are easy to handle. The more sophisticated the instrument the more complex it is to utilize. In Promax we have worked to improve ease of use and minimize the time needed to learn to operate these instruments.

The instruments allow data output to be shown on the display, formatted in the most convenient form for the user (Binary, Octal, Hex Decimal or ASCII). The user can define a "tag" and group any number of channels under it. This information can furthermore be displayed on any base.

Multilevel trigger sequence

One of the features to be highlighted with regards to logic analyzers is the accuracy of the data acquired. In order to be able to call up the desired information at any time, very sophisticated triggering is required.
The AL-320 analyzer is equipped with a trigger controlled by a 4 level sequence (totally addressable at each step), which can be applied individually or in group so that the conditions of triggering may be altered at any time.

Search and compare

The differences between the data and the contents of the reference memories can be shown on the display. Comparison can be conducted on any area of data and acquisition can be delayed where matching/non matching is ascertained.

Non-volatile memories

Each of the two pieces of equipment have 10 non-volatile memories available with 10 configurations. Storage of data and its configurations is thus ensured for future use.

Multiple clocks

The AL-320 is equipped with three external clock inputs, each of them selectable by level or by edge so that synchronous signals of complex variation can be called up.

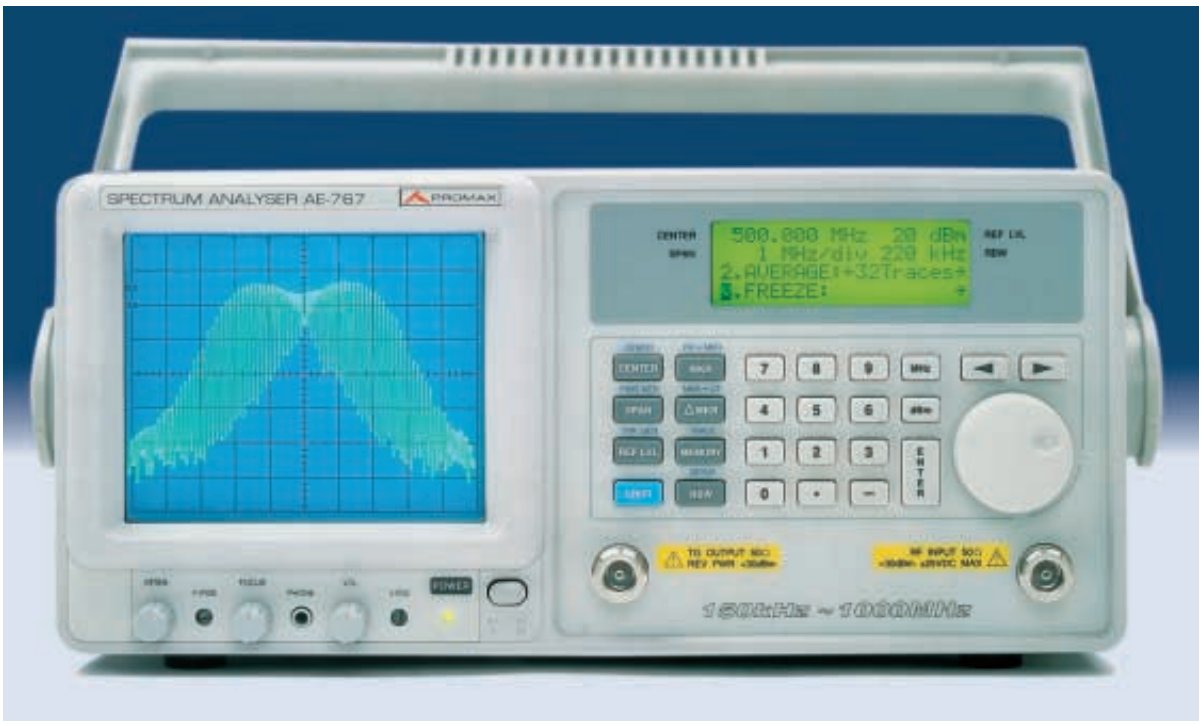
Called up data can be printed for later analysis.

MODEL	AL-320	AL-320 + Option OPT-320-02
Max. nº of channels		
DC to 25 MHz	32	32
DC to 100 MHz	No	8
Trigger level	TTL	Variable
Glitchs capture	No	Up to 5 ns
Memory	2K word of 32 bits	2K word of 32 bits
Non volatile memories	20	20
Computer connection	Yes	Yes
Availability of disassemblers		
Microprocessors 8 bits: Z-80 6502 8085		
Microcontrollers 8031/8051		

SPECIFICATIONS	AL-320
Max. nº of channels	32 (DC to 25 MHz)
Clock signals	3 independient, level or side
Data memory	2 K words of 32 bits
Reference memory	2 K words of 32 bits
Non volatile memory	10 acquisition / 10 set-up
Trigger sequence	4 levels of 4 words (32 bits)
Trigger level	TTL (1,4 V)
Channel display	6 channels, simultaneously
Zoom	x1, x2, x4, x8, x16
Groups of channels	16 groups. 32 channels / group
Display format	Binary, Octal, Hex, Dec, ASCII
Power supply	
Mains voltage	110/120 or 220/240 VAC/50-60 Hz
Consumption	25 W

Mechanical features	
Dimensions	W. 260 x H. 88 x D. 235 mm
Weight	2 kg approx.
Options	
OPT-320-02	Up to 100 MHz 32 channels (DC to 25 MHz) 8 channels (DC to 100 MHz) 16 channels (glitchs capture) Variable trigger level from -2.5 to 7.3 V
Included accessories	Pod 32 channels, 25 MHz, TTL levels, test leads, instructions manual
Optional accessories	
PA-322	Kit conversion of AL-320 to sampling with a 100 MHz with variable trigger level
RM-320	Kit connection to PC
Disassambler	Z-80, 6502, 8085, 8031/8051

AE-766, AE-767



The AE-766 & AE-767 are designed for minimal set-up and adjustment, besides, the user interface allows fast and accurate measurements. The fully synthesised design of the AE-766/AE-767 permits stable operation from 150 kHz to 1 GHz with a span down to 2 kHz/division.

The AE-766 is the basic model whereas the AE-767 includes a Tracking Generator

APPLICATIONS

- Broadcasting systems
- Cellular telephony, paging
- Wireless products analysis
- RF circuits and components characterisation
- EMC pre-conformity test

DESIGNED FOR

- RF and communications labs
- Industry and education
- Technical Support Services specialised in RF
- Wireless Telephony
- Telecommunications Installers

Main Characteristics

- High Frequency Stability: +10 ppm
- High Resolution Frequency Span to Measure the More Detailed Signal: 0, 2kHz ~ 100MHz/Div
  Resolution BW : 3k, 30k, 220k, 4MHz
- Good Noise Floor Performance : -95dBm @30kHz, -100dBm typical / -75dBm : 150kHz ~ 10MHz
- High Input Protection Level : +30dBm, +25VDC
- Reference Level Range : -30dBm ~ +20dBm
- RS232 Interface and Software to Get Trace from PC

Tracking Generator (only AE-767)

Its built-in tracking generator turns the AE-767 into a highly useful tool for the response measurement of any radio frequency system from 10 MHz to 1000 MHz (filters, amplifiers, attenuators, cables ...).

User friendly

- Two markers make easy to carry out absolute and relative measurements.
- Functions to make agile the measurement: Max. Hold, Average (2 ~ 32 traces), Freeze, Peak Search, Markers to Center Function,

configuration memories, etc.

- Large alphanumeric display with information about: CENTRAL FREQUENCY, REFERENCE LEVEL, RESOLUTION BW, SPAN, SIGNAL LEVET AT MARKER FREQUENCY (ABSOLUTE OR RELATIVE), ETC.

AE-766, AE-767

SPECIFICATIONS	AE-766 & AE-767
Frequency	
Frequency range	From 150 kHz to 1 GHz (usable up to 1150 MHz)
Resolution	1 kHz C.F. entry, 40 Hz Sweep resolution at 2 kHz/div
Frequency display	6 1/2 digit setting
Frequency control	Digital phase locked
Frequency stability	± 2 ppm/year aging, ±10 ppm, 0 to 50ºC
Span	Zero, 2 kHz to 100 MHz/div. in a 1-2-5 sequence
Bandwidth	
Resolution bandwidths	3 kHz, 30 kHz, 220 kHz, 4 MHz
Resolution BW accuracy	15 %
Video Bandwidth	1.6 kHz / 90KHz coupled with RBW
Amplitude	
Reference level range	-30 dBm to + 20 dBm
Reference level accuracy	± 1 dB at 80 MHz
Input level range	-100 dBm to +20 dBm
Noise floor	-95 dBm @ 30 kHz RBW, -100 dBm typical -75dBm:150k~10MHz
Amplitude display range	75 dB
Amplitude accuracy	± 1.5 dB typical @ 0 dBm, 80 MHz
Amplitude level linearity	± 1.5 dB over 70 dB
Ref. Level frequency flatness	± 1.5 dB over 100 MHz, ± 2.5 dB typical over entire band ± 3 dB: 150kHz~10MHz
Harmonic spur response	< -40 dBc, RF input < selected reference
Non-harmonic spur response	< -60 dBc typical down from reference level, average, 5 MHz/div
Intermodulation (3rd)	< -70 dBc, @-40 dBm input, 2 tones, 1MHz apart < -45dBc: 150kHz~10MHz
Phase Noise	- 77dBc/Hz @ 1 GHz, 30 KHz offset
Input	
Input overload protection	+30 dBm continuous, ±25VDC
Impedance	50 Ω nominal
Return loss	< 16 dBRL (VSWR < 1.35)
Input attenuation	50 dB to 0 dB in 10 dB steps coupled to reference level

Connector	Type N/BNC female
Marker	
Number of markers	2
Marker resolution	0.1 dB, 1 kHz
Marker mode	Absolute, Relative, PK-->Marker, Marker-->Center
Marker accuracy	0.1dB ± Amplitude accuracy
Functions	
Memory	9 memories of save/recall
Trace	Max. Hold, Average (2~32 traces), Freeze(Hold)
Setup	Access parameters
Tracking Generator (Only AE-767)	
Frequency range	From 10 MHz to 1000 MHz
Amplitude range	From 0 to -50 dBm
Amplitude resolution	1 dB
Amplitude accuracy	±1 dB @ 0 dBm, 80 MHz
Attenuation accuracy	±1 dB @ 50 MHz
Amplitude flatness	±1 dB @ 10MHz/div, ± 1.5dB @0dB, entire band
Harmonics	< -30 dBc
Reverse power	< +30 dBm
Impedance	50 Ω nominal
Return loss	< 10 dBRL (VSWR < 2)
Connector	Type N/BNC female
RS-232 paralel port	For the upset one of the plan to a PC, by means of provided software
Optional accessories	
RM-766	Remote control software by PC
Power supply	
Mains voltage	100-120-220-230 V AC, 10%, 50-60 Hz aprox
Consumption	70 W, 80 VA
Mechanical features	
Dimensions	W 310 x H 150 x D 455 mm
Weight	8.5 kg

GR-104

The **GR-104** is a low cost, synthesised RF signal generator which incorporates the essential features required for most developments: test and service work-frequency accuracy and stability, wide dynamic range, low phase noise and low leak-age.

The generator incorporates both, internal and external FM. It is suitable for FM radio receiver sensitivity measurements, system gain measurements, receiver tuning & alignment, oscillator substitutions, EMC/antenna/field strength measurements and as a signal source for many other RF circuit and system development tasks.

The instrument can be operated manually via the front panel or can be remotely controlled via the RS-232 interface (standard) or GPIB interface (optional). Nine memories are provided for user set-ups.

Main characteristics

- 10MHz to 1000MHz frequency range
- 1kHz setability at any frequency
- ±2 ppm accuracy over 5º C to 40º C
- -127dBm to +7dBm amplitude range
- Amplitude control in 0.1 dB steps
- FM modulation, internal or external
- 80 character back-lit LCD display
- Keyboard and rotary encoder control
- Full remote control via RS-232 or GPIB

Precision and Stability

The **GR-104** uses a fully synthesised source locked to a temperature compensated crystal oscillator. This provides excellent signal frequency stability against temperature and ageing.

Easy to use

Ease of use was a major consideration in the design of the **GR-104**. A simple and straightforward user interface is combined with a comprehensive remote command set.

Programmability for routine testing

The **GR-104** can store nine full instrument set-ups in non-volatile memory. This allows repetitive testing procedures to be undertaken quickly and accurately.

Full remote control

The **GR-104** provides full remote control facilities for all its functions. An RS-232 interface is provided as standard and a GPIB (IEEE-488.2) interface is available as an option.

SPECIFICATIONS

SPECIFICATIONS	GR-104
General	
Frequency Range	10 MHz to 1000 MHz
Frequency control	
Resolution	1kHz by direct keyboard entry, or in user-set increments of 1kHz to 999.999MHz by rotary control or increment-decrement keys
Display	20 character x 4 row backlit alphanumeric LCD
Display Resolution	1 kHz
Accuracy	±2ppm over temperature range 5º C to 40º C
Stability	< 1 ppm/year ageing
Phase Noise:	110dBc/Hz at 25kHz offset, 500MHZ carrier.
Residual FM :	Equivalent peak deviation in a 300Hz to 3.4kHz bandwidth:
(FM off)	10Hz at 100MHz carrier
	35Hz at 500MHz carrier
	180Hz at 1000MHz carrier
Data Entry	Keyboard selection of frequency, amplitude, etc.; value entry direct by numeric keys or by rotary control
Output Level	
Level Range:	-127 dBm to + 7 dBm (0.1µV to 500 mV with 50 Ω impedance)
Setting Resolution	0.1dB (or 0.01mV to 1mV) by direct keyboard entry, or in user-set increments of 0.1dB to 100dB (or 0.01mV to 100mV) by rotary control or increment-decrement keys.
Accuracy:	Better than ±2dBm, except for output levels <-70dBm at 500-1000MHz, ±3dBm
Harmonics:	Typically <-25dBc, maximun -20dBc, any carrier frequency, output level <0dBm
Non-Harmonic Spurii	≤-60 dBc at ≥ 8 kHz offset
Carrier Leakage	< 0.5µV generated into a 50Ω load by a 2 turn 25mm loop, at a distance of 25mm from the generator with the output set to <-10dBm into a 50 Ω sealed load.
Output Impedance:	50 Ω.
Output Connector:	Type N.
Output Switch:	RF OUT on-off switch with LED showing ON status.

FM Modulation	
Peak Deviation	0.5 kHz to 100kHz.
Setting Resolution	0.5 kHz by direct keyboard entry, rotary control or increment-decrement keys
Modulation Frequency:	Internal 1kHz; External 300Hz to 50kHz
Deviation Accuracy	<±10% of setting ±0.5kHz, excluding residual FM, for 1kHz modulation, internal or 1Vrms external.
External Modulation	
Frequency Response:	±1dB from 30Hz to 50kHz relative to 1kHz
Distortion	<2% total harmonic distortion at 1kHz modulating frequency, 100kHz deviation and 500MHz carrier
Input Impedance:	100 kΩ
Input Connector	BNC
Interfaces	230V, 115V or 100V nominal 50/60Hz, adjustable internally; operating range ±14% of nominal; 30VA max. Installation Category IL
	Full remote control facilities are available through the RS232 (standard) or optional GPIB interfaces
RS-232	Variable Baud rate, 19200 Baud maximum, 9-pin D-connector
IEEE-488	Conforming with IEEE488.1 and IEEE488.2
Power supply	
Mains:	230V, 115V or 100V nominal 50/60Hz, adjustable internally; operating range ±14% of nominal; 30VA max. Installation Category IL
Mechanical feratures	
Dimensions:	W. 212 x H.130 x D. 330 mm
Weight	4.6 k

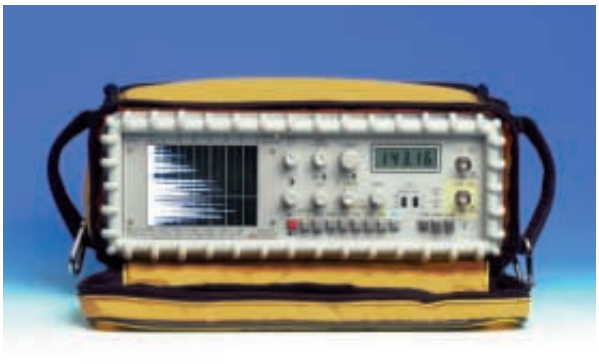
TV & SATELLITE

PROLINK-7

- Tuning range from 5-862 MHz and from 920 to 2150 MHz
- Analogue and digital TV measurements
- 5. 5" B&W monitor
- Image, spectrum and synchronism pulse display
- Direct measurements: level, V/A and C/N ratio for analogue channels, and power into channel bandwidth and C/N ratio for digital channels.
- BER measurement of QAM, QPSK and OFDM modulated signals (optional)
- External units power supply and 22 kHz signal
- 99 memories for measurement configurations
- Data Logger function (more than 9000 measurements can be acquired automatically)
- RS-232C interface to connect a PC or serial printer
- On Screen Display, - FM, TV and NICAM sound, -Scart connector

PROLINK-3

- Tuning range from 5-862 MHz and from 920-2150 MHz
- Tuning modes by frequency, channel or memory
- Channel plan configurable on demand
- Frequency resolution 50 kHz
- 4' B&W or color LCD monitor
- Measurement range terrestrial TV & FM bands, from 20 dBµV to 130 dBµV (10 µV to 3.16 V), Satellite TV band 30 dBµV to 120 dBµV (31.6 µV to 1 V)
- Digital reading in dBµV, dBmV or dBm, Analogue reading relative value through an analogue bar on the screen
- Measurement bandwidth 230 kHz (terrestrial band), 4 MHz (satellite band)
- Sub-band accuracy ± 2.5 dB (50-120 dBµV, 5-45 MHz) (22º C ± 5º C)
- Terrestrial bands accuracy ± 1.5 dB (30-120 dBµV, 48.25-861 MHz (22º C ± 5º C)
- Satellite bands accuracy ± 1.5 dB (40-100 dBµV, 920-2050 MHz) (22º C ± 5º C)
- Sound input scart, Scart connector
- Long life Li+ batteries



MC-377+

- Tuning range from 48 to 855 MHz and 950 to 2050 MHz
- Resolution 10 kHz in VHz and UHF, 100 kHz in SAT
- B&W CRT 4.5"
- Analogue signals level
- Digital channel power
- Measurements C/N ratio of analogue and digital signals
- Reading scale calibrated in dBµV (linear) analogue signals level measurement and digital channel power measurement
- IF bandwidth 250 kHz (TV) and 18 MHz ± 6 dB (SAT)
- Impedance 75 Ω
- Total accuracy TV bands ± 4 dB (from 25ºC to ± 5ºC)
- Total accuracy satellite bands ± 6 dB (from 25ºC to ± 5ºC)
- Scart connector

MC-360B	MC-160B
Tuning range from 46 to 856 MHz and 950 to 2050 MHz Alphanumeric display, it shows the tuned frequency Analogue and acoustic indication of the measured level External units power supply: 13, 15 and 18 V and 22 kHz signal AM & FM sound demodulation	Tuning range from 46 to 856 MHz Alphanumeric display, it shows the tuned frequency Analogue and acoustic indication of the measured level AM & FM sound demodulation

MS-250

- Tuning range from 950 to 2050 MHz
- Analogue and acoustic indication of the measured level
- External LNB powering through the RF line

PRODIG-1 SATELLITE HUNTER

PRODIG-1

- Tuning range from 950 to 2150 MHz, 16 measurement points
- Input impedance 75 Ω
- Universal connector with BNC or F adapter
- Level range 30 dBµV to 90 dBµV
- Maximum signal level 120 dBµV
- QPSK signal parameters, symbol rate 1000 to 30000 kbauds
- Code Rate Auto and 1/2, 2/3, 3/6, 5/6, 6/7, 7/8
- Automatic spectral inversion
- External units power supply, output voltage 13 V, 18 V ±1V
- 22 kHz signal

The PRODIG-1 has been designed to guarantee the maximum number of installations with the best possible quality, thereby helping the installer to evaluate the results.

The instrument directly determines if signal quality is of a sufficient level for reception. This is done on the basis of the internal BER measurement and the signal noise ratio (SNR).

The PRODIG-1 is a very easy to use instrument that guides the user through 3 steps, enabling the desired satellite to be located, guaranteeing its identification and accurately adjusting the receiver antenna to obtain the best possible signal quality.

1.-Detection of satellite.

It works as a wide band detector indicating power of all satellites present on the trajectory of the antenna.

2.- Identification.

The instrument tunes to preset test points, reads the Transport Stream and displays the identification of the service on the display. It allows identification of one specific service or satellite.

3.- Optimisation.

Based on measurements made on the demodulated signal user can optimise the skew and fine-tune the dish.

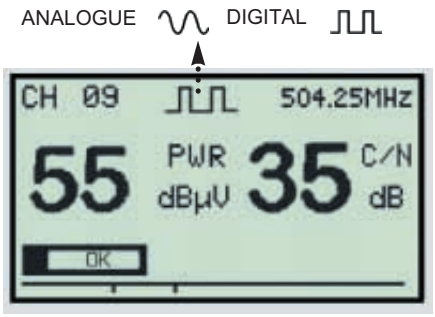
PRODIG-2 ANALOGUE & DIGITAL TV LEVEL METER

PRODIG-2

- Tuning range 45 to 862 MHz
- Standard channel plan: CCIR, FCC and STD L. Special channel plan on request (OPT-202-61).
- Measurement margin analogue signals 20 dBµV to 120 dBµV
- Measurement margin digital signals 30 dBµV to 120 dBµV
- Level and carrier to noise ratio measurements in analogue channels
- Channel power and carrier-to-noise ratio measurements in digital channels
- Numerical reading, absolute value calibrated in dBµV and graphic bar calibrated with marks for minimum and maximum recommended level/power
- Acoustic level indication, Overrange indication, quality diagnosis of measured signal
- Input impedance 75 Ω

The PRODIG-2 is a portable instrument of small scale and minimum weight, ideal for the starting and maintenance of analogue (MATV) and digital (TDT) terrestrial TV installations. It gives a measurement of the Level and the C/N ratio for analogue signals and a measurement of Power and the C/N ratio for digital signals. In addition, it has an output for the 6 dB margin test which is very important in digital TV installations, as it allows correct operation to be guaranteed with a safety margin over the threshold level.

One of the main features of this device is that it is easy to use: tuning is done by channel, the equipment identifies whether the tuned channel is analogue or digital and adjusts all the measurement parameters automatically, shows the Level and C/N (for analogue) or Power and C/N (for digital) measurements numerically and graphically, and also shows whether the tuned channel meets the pre-established quality criteria in the user outlet (indication OK).

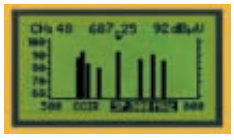


PROMAX-10, PROMAX-8+

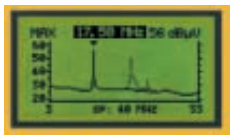
The PROMAX-10 is a QAM analyser for digital and analogue cable TV networks. It has been designed as an all-in-one tool for testing cable TV systems combining all the functions of the PROMAX-8+, such as an analogue and digital channel meter, data logger spectrum analyser, etc., with functions for measuring BER and MER in 64 and 256 QAM signals. The instrument is compatible with European and American QAM signals.

CHANNEL-FREQUENCY
Measurements: Level, C/N and V/A (analogue channels) and power and C/N (digital channels).

SCAN
A bar-graph display shows the level of all the channels of the active channel plan.

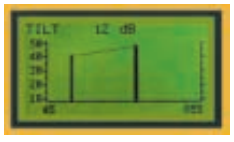


SPECTRUM
Operates as an actual spectrum analyser with variable span.



DATA LOGGER
Allows to acquire/view/print multiple measurements automatically.

TILT
Shows the level difference between two pilot channels defined by the user.



PROMAX-8+, PROMAX-10

Tuning
- Tuning range from 5 to 862 MHz
- Tuning mode switchable by channels or frequency
- Switchable channel plan
- Frequency for fine tuning. 10 kHz resolution
- Graphic display with backlight

Level measurement
- Measurement range from 25 to 120 dBμV (from -35 dBmV to 60 dBmV)
- Digital reading in dBμV, dBmV o dBm and analogue by graphic display with backlight. 1 dB resolution
- IF bandwidth 230 kHz ± 50 kHz
- Input impedance 75 Ω
- Accuracy in analogue channels ± 2dB (from 0 to 40ºC) negative video modulation
- Accuracy digital channels ± 3dB (from 0 to 40ºC) for 8 MHz channel bandwidth

Vídeo / Audio
- Measurement, carrier to noise level ratio measured within required channel
- Measurement range from 0 to 40 dB
- Audio subcarrier frequency from 4-9 MHz
- Accuracy ± 2dB (from 0 to 40ºC) for FM carrier

Carrier / Noise
- Measurement, carrier to noise level ratio measured within required channel
- Measurement range in analogue channels 38-48 dB (for input level between 60 and 70 dBμV), >48 dB for input level 70 dBμV
- Measurement range in digital channels >40 dB for input level> 60 dBmV
- Accuracy ± 2dB (45-862 MHz) ± 3 dB (5-45 MHz)

CSO-CTB Intermodulation (analogue channels)
- CSO; Ratio of the peak level of the video carrier to the peak of the distortion products of second order beat.
- Measuring frequency, from - 2.50 to - 0.50 MHz and from 0.50 to 2,50 MHz
- CTB Ratio of the peak level of the video carrier to the peak of the distortion products of third order beat.

Data logger function
- Max. number of loggers 55
- Number of channels / loggers 140
- Analogue channels, Level C/N and V/A
- Digital channels, Channel power

Sound
- Demodulation AM/FM
- Output, internal speaker

Transient detector
- Detection threshold from 20 to 60 dBμV in steps of 1 dB
- Detection range from 5 to 100 MHz maximum
- Presentation. Number of detected transitory in the measuring time. Present detected level and maximum detected level in the time of the measurement

PROMAX-10 QAM ANALYSER (ONLY PROMAX-10)

MER (Modulation error ratio)
- Measurement range: 22 dB to 34 dB for 64 QAM
- Accuracy: ± 2dB
- Enlistment range: -10 dBmV to 60 dBmV

BER (Bit error ratio)
- Measured before RS decoding
- Measurement range: 10 E-2 a 10 E-8
- Enlistment range: -10 dBmV to 60 dBmV

Symbol rate:
- Measurement range: 1000 to 7000 Msym/s for 16/32/64/128/256 QAM

Data logger
- For each digital channel, the level and the MER can be stored.

Modulation type
- 16/32/64/128/256 QAM ITU J83 annexed a/b/c (switchable)

Bandwidth
- 6/8 MHz (switchtable)

Frequency tuner
- 10 KHz

PROMAX-4, PROMAX- 5, PROMAX-6, PROLINK-1B

The **PROMAX-6 PROMAX-5** and **PROMAX-4** are analysers designed for the **installation** and **maintenance** of systems for the reception and distribution of television signals. They are especially suited to **cable television** systems, since they integrate all the basic functions required for signal analysis in an easy-to-use, accurate, robust and low-cost device..

While the **PROMAX-4** offers coverage of all television channels between 45 MHz and 862 MHz, the **PROMAX-5** and **PROMAX-6** also covers the return channels (5 MHz to 862 MHz)

Both of them enable the signal level to be measured with a high degree of accuracy. They incorporate a series of functions for evaluating the image quality. They include a calculation of the **Video/Audio** (V/A) ratio and the **Carrier/Noise** (C/N) ratio **in the Channel (Patented Method)**.

The implementation of all these functions in instruments which weigh just half a kilo makes them incomparable working tools.

Every detail has been carefully studied in order to achieve optimum balance between the characteristics and their functionality.

The result is a device with advanced functions which is easy to use and can be operated by non-specialist personnel.

PROMAX-4

- Tuning range from 45 to 862 MHz
- Tuning method through channels, frequency or programs
- Channel plan, configurable from PC through RM-006
- Tuning frequency 62.5 kHz
- LCD alphanumeric display with tuning back light
- Measurement range from 20 dBµV to 120 dBµV
- Readout, digital in dBµV or dBmV. resolution 1 dB
- IF bandwidth 230 kHz ± 50 kHz
- Input inpedance 75 Ω
- Typical accuracy , analogue channels ± 2dB (from 0 to 40ºC)
- Video / Audio measurement range from 0 to 40 dB
- Carrier to noise (C/N), measurement range from 40 to 50 dB
- Sound, demodulation AM/FM/Level, internal speaker/ external headphones

PROMAX-5

- Tuning range from 5 to 862 MHz
- Tuning method through channels, frequency or programs
- Channel plan, configurable from PC through RM-006
- Tuning frequency 62.5 kHz
- LCD alphanumeric display with tuning back light
- Measurement range from 25 dBµV to 120 dBµV
- Readout, digital in dBµV or dBmV
- IF bandwidth 230 kHz ± 50 kHz
- Input inpedance 75 Ω
- Typical accuracy , analogue channels de ± 2dB (from 0 to 40ºC)
- Video / Audio measurement range from 0 to 40 dB
- Carrier to noise (C/N), measurement range from de 40 to 50 dB
- Sound, demodulation AM/FM/Level, internal speaker/ external headphones

Direct reading

Both instruments have a dynamic range from 20 dBµV (-40 dBmV) to 120 dBµV (60 dBmV). In order to achieve a **direct reading** of the signal level, the measurement is automatic and the device itself selects the input attenuator most suitable for each signal. In applications for which a value must be set for the attenuators, the Manual mode may be used. The units may be displayed in dBµV or in dBmV.

PROMAX-6

- Tuning range from 5 to 862 MHz
- Tuning method through channels or frequency
- Channel plan, configurable from PC through RM-006
- Tuning frequency 62.5 kHz
- LCD alphanumeric display with tuning back light
- Measurement range from 25 dBµV to 120 dBµV
- Readout, digital in dBµV or dBmV
- IF bandwidth 230 kHz ± 50 kHz
- Input inpedance 75 Ω
- Typical accuracy, analogue channel from ± 2dB (from 0 to 40ºC)
- Typical accuracy, digital channel ± 3dB (from 0 to 40º C)
- Video / Audio measurement range from 0 to 40 dB
- Carrier to noise (C/N) analogue channel from 40 to 50 dB
- Carrier to noise (C/N) digital channel from 15 to 40 dB
- Sound, demodulation AM/FM/Level, internal speaker/ external headphones

PROLINK-1B

- Tuning range from 48,25 to 870 MHz
- Alphanumeric display, it shows the tuned frequency/channel and the measured level (bar graph and numeric indication).
- Direct measurements: video and audio carriers level and V/A ratio for analogue channels and power into the channel bandwidth and C/N ratio for digital channels.
- RS-232C connector to connect the unit to a PC for remote controlling through the RM-101 software (optional) or to a printer to dump: measured level or channel power, spectrum representation and active channels video and audio carriers level in a graph-bar representation.

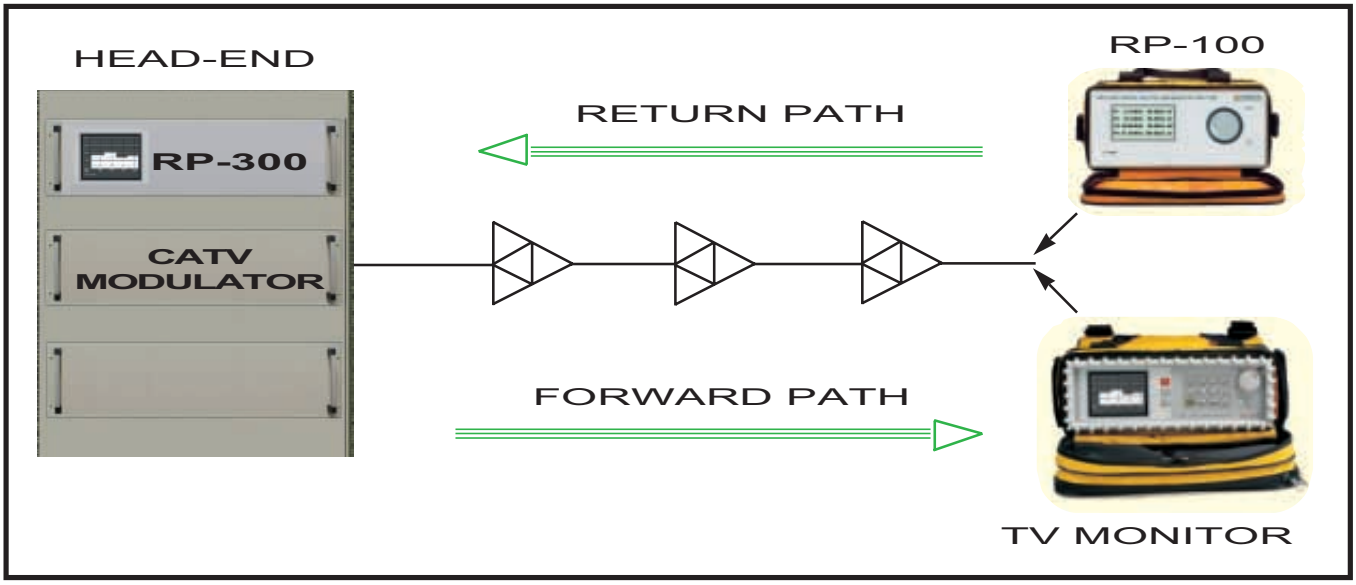
RP-100, RP-300

RP-300

- Tuning range from 45 to 862 MHz
- Standard channel plan CCIR, STD L, OIRT and FCC, Channel plan configurable on demand (OPT-202-61)
- Measurement range in analogue signals, from 30 dBµV to 120 dBµV
- Measurement range in digital signals, from de 30 dBµV to 120 dBµV
- Measurement level, and carrier to noise ratio in analogue channels
- Measurement of the channel power and carrier to noise ratio in digital channels
- Reading, Digital Absolute value calibrated in dBµV, dBmV or dBm, Analogue Relative value through an analogue bar on the screen
- Acoustic indication level, average indication, diagnosis of the quality the mesured signal
- Input impedance 75 Ω

RP-100

- Carrier frequency margin 5 - 100 MHz
- Resolution 10 kHz
- Accuracy < ± 5 kHz
- Number of carriers, 2 (4 with the OPT-100-Q)
- Level of carriers from 30 to 50 dBmV
- Level resolution 1 dB
- Level accuracy ±2 dB
- Impedance 75 Ω
- Insertion losses 1 dB
- Flatness ±1 dB



ST-240 LNBs & Satellite receivers tester

The **ST-240** is a compact, easy to use and low cost signal generator that allows an efficient verification of satellite receivers and LNB's

* 13 V, 18 V LNB power supply test
* 22 kHz switching signal verification
* Video and audio demodulation test
* LNB verification, vertical and horizontal polarizations

TI-340 DiSEqC checker

The **TI-340** permits to check at any point of an installation the presence and the state of DiSEqC signals.

A set of LEDS signals the presence in the coax-cable of the following signals:

-Hi/Lo	- Mini DiSEqC tone
-H/V	- 22 kHz
-Posiotion	- 60 Hz
-Switches	- 13 and / or 18 V

NG-281/NG-282 Noise Generators

The NG-281/NG-282 noise generators are large bandwidth devices especially designed for application in all kinds of television installations, whether terrestrial, cable or satellite distribution. The frequency range of the NG-282 is from 950 to 2000 MHz, and the NG-281 from 5 to 1000 MHz.

Powered by battery or mains adapter, they enable the user to perform measurements in combination with field level meters or spectrum analysers in highly complex installations. Obtaining the frequency responses of active and passive circuits, measuring impedance adaptation and the relation of standing waves in combination with a reflection bridge, and the detection of anomalies in transmission lines, are some of the functions where **NG-281/NG-282** noise generators are of great assistance.

LN-370B Low-Noise Amplifier

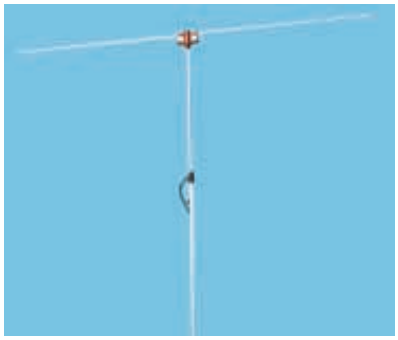
The **LN-370B** is a low-noise amplifier which enables the dynamic range of spectrum analysers and field strength meters to be extended, in order to measure signals with very weak amplitudes.

CV-550 Sub-band Converter

The **CV-550** converts sub-band channels to VHF for their measurement by TV/FM field strength meters.

PC-108 Polarisation Controller

The **PC-108** is a universal magnetic polarisation controller. It is powered by the input connector without interrupting power to the LNB.



AMC/1 Master Aerial

The AMC/1 master aerial is a dipole with interchangeable arms (in function to the band), mounted on a hand-held mast, which, connected to field strength meter, permits the value of the electric field intensity at a particular location to be found.
In order to do this, it is necessary to configure the aerial in function of the frequency, connect it to the field strength meter, and add the corresponding correction factor to the read value.

PROLITE-20, 21 OPTICAL POWER METER

The **PROLITE** range has been developed for the installation and maintenance of optical fibre installations. It is made up of one power meter and two light sources, one LED source (850-1300 nm) and one LASER source (1310-1550 nm).

The **PROLITE-20/21** are two optical power meters with wavelengths between 820 and 1650 nm. The dynamic range of measurement is from -70 dBm to 5 dBm for the **PROLITE-21** and from -50 dBm to 25 dBm for the **PROLITE-20** for Cable TV applications and measurements on EDFA amplifiers (Erbium Doped Fibre Amplifier).

These units offer the acoustic detection of 270 Hz, 1 kHz and 2 kHz signals for optical fibre identification purposes. The measuring mode can be selected as ABSOLUTE or RELATIVE. In the Relative mode, the user acquires the reference level and the rest of measurements are done starting from this value. The readout is shown numerically or by means a bar graph on LCD display, which has a back light.

Wavelength selection is made sequentially by single pressing the rotary selector. The meters are powered by a rechargeable NiCd battery, which can be replaced with extreme ease.

PROLITE-20/21 are ideal tools for working in the field since they are robust, they adapt perfectly to the hand and they have a weight below 500 gr.

PROLITE-80, 81 LIGHT SOURCES

The PROLITE range consists of two light sources.

the PROLITE-80 LASER allows to select wavelengths between 1310 nm and 1550 nm whereas the PROLITE-81 LED allows the selection between 850 nm and 1300 nm.

They have two only controls, one key to select the desired wavelength and another key to activate the modulation.

They are compact and easy to use.

AD-070 ST CONNECTOR
AD-071 E 2000 CONNECTOR
AD-072 SC CONNECTOR
AD-073 FC CONNECTOR

They have two only controls, one key to select the desired wavelength and another key to activate the modulation.

SPECIFICATIONS	PROLITE-20 / 21
Measurement range	
PROLITE- 20	-50 dBm to + 25 dBm
PROLITE- 21	-70 dBm to +5 dBm
Units	dBm, dB
Wavelength range	from 820 to 1650 nm
Indication	Alphanumeric display, 16 digits with back-light
Accuracy	0.2 dB (5%)
Resolution	0.01 dB
Power supply	NiCd battery 7.2 V- 0.8 Ah
Battery charge	Through external charger
Mechanical features	
Dimensions	70 (W.) (90 at the Display) x 218 (H.) x 50 (D.) mm
Weight	495 g (battery included)

SPECIFICATIONS	PROLITE-80 / 81
Wavelength	
PROLITE-80 LASER	1310 nm, 1550 nm
PROLITE-81 LED	850 nm, 1300 nm
Level	
PROLITE-80 LASER	-5 dBm typical (SM 9/125 μm fibre)
PROLITE-81 LED	-15 dBm typical (MM 62.5 / 125 μm fibre)
Modulation	270 Hz, 1 kHz and 2 kHz internal, or through external signal
Stability	± 0.1 dB
Power supply	NiCd battery, 7.2 V- 1.5 Ah
Battery charger	Through external charger
Mechanical features	
Dimensions	84 (W.) x 165 (H.) x 29 (D.) mm
Weight	380 g (battery included)

GV-998

- MPEG-2 format TS generation
- Video and audio included in the TS
- Video and audio inputs
- Moving video patterns to check MPEG-2 decoders
- Generation of a variable frequency sound carrier for decoder verification
- Possibility to edit different fields of the TS database to present the name of the service provider
- Remote control via a personal computer
- Multistandard and multisystem analogue TV signal generation

GV-998 MULTI-STANDARD TV PATTERN GENERATOR WITH VSB

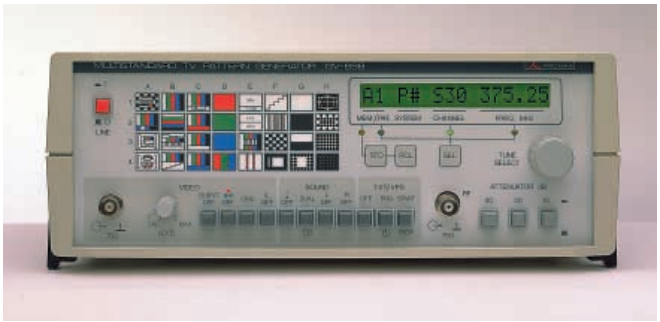
GV-898 / GV-798

- Colour system: PAL, NTSC and SECAM
- Transmission standards B,G, I, D, K, L, M, N
- Composite video output: 1 Vpp (75 Ω)
- Adjustable synthesized RF output from 32 to 900 MHz. DSB or VSB modulation, with progressive attenuation in 1 dB steps
- 22 test patterns 4:3 and 16:9 format
- Outputs: BLACKBURST (PAL and NTSC), RGB, SCART, S-VHS, synchronisms, vertical and horizontal pulses, fixed tones at 1 kHz and 3 kHz
- Inputs: left and right channels sound for Zweiton modulation, video
- Selectable mono multi-standard sound. Stereo/dual Zweiton sound in B, G, D, K, M formats and NICAM sound in B, G, I, L formats
- 99 configuration memories
- Available signals: VITS (Video Interval Test Signals), WSS (Wide Screen Signaling) in 8 formats, FLOP-TELETEXT, VPS and PDC
- Remote control by RS-232

GV-798 MULTI-STANDARD TV PATTERN GENERATOR WITH DSB

GV-698

- Colour system: PAL/SECAM or NTSC (according to version)
- Transmission standards: BG, H, DK, I, L, M, N (according to version)
- Composite video output with variable amplitude between 0 and 1.2 Vpp (75 Ω)
- Synthesized RF output from 37 to 865 MHz, 90 dBμV (75 Ω) with progressive attenuation up to 50 dB in 10 dB steps
- 32 test patterns
- Electronic circle selectable
- Audio and burst signals selectable
- Outputs: S-VHS, Y-C, RGB, synchronisms, oscilloscope trigger, scart
- Video input (external modulation) through scart connector. L and R sound input
- Multi-standard mono sound, stereo/dual standards: Zweiton, Nicam (according to version)
- VPS signal insertion (according to version)
- 32 configuration memories (standard, system, pattern, sound and frequency or RF channel)
- Logotype insertion
- Teletext generator (according to version)



GV-298

- Colour system: PAL
- Transmission standards: BG, H, DK, I, L, M, N (according to version)
- Composite video output, amplitude 1 Vpp (75 Ω)
- Synthesized RF output from 37 to 865 MHz, 90 dBμV (75 Ω) with progressive attenuation up to 50 dB in 10 dB steps
- Mono sound selectable
- Burst signal selectable
- 8 test patterns
- Outputs: S-VHS, Y-C, RGB, synchronisms, oscilloscope trigger, scart and LF signal

GC-981B, VG-90 PORTABLE GENERATOR

GC-981B

PAL B, G, H, (I, D, K, optional)
RF VHF-UHF System

Test patterns: points, grid, grey scale, red screen, green screen, blue screen, magenta screen, cyan screen, yellow screen, colour-normalised bars, electronic circle included in all the images.

VG-90

PAL and RGB video output

GV-241 MONITOR TEST GENERATOR

In the world of monitors for computers, unlike those for television, there is a multiplicity of different systems involved. The scanning frequencies and the resolution, that is, the number of pixels they can displayed, vary widely from one system to another; furthermore they are being developed at a dizzying speed. Thus, for example, it is not difficult to find on the monitor market simple and almost-forgotten models like the Hercules or sophisticated like that `sun 1600 x 1028´.

As a consequence of such a diversity of models, the repair of these monitors poses a major difficulty, and that is why a demand exists for versatile instruments capable of generating all the systems now on the market. To satisfy this demand PROMAX has designed the GV-241, a universal generator for the testing of computer monitors, which greatly facilitates their adjustment, control and repair.

SPECIFICATIONS	GV-241
TEST PICTURES	
Available pattern charts	
1	**Colour bars 100/0/100/0**
2	**Red**
3	**Green**
4	**Blue**
5	**Scale of greys**
6	**Crosshatch**
7	**Multiburst**
8	**White**
R, B outputs	Red and blue signals
Amplitude	0.7 Vpp
Impedance	75 Ω
Connector	BNC
G output	Green signal with or without synchronism
Amplitude	0.7 Vpp
Impedance	75 Ω
Connector	BNC
CVS output	Video signal
Amplitude	0.7 Vpp
Impedance	75 Ω
Connector	BNC
HS output	Horizontal synchronism pulse
Signal	TTL
Connector	BNC
VS output	Vertical synchronism pulse
Signal	TTL
Connector	BNC
CS output	Composite signal (horizontal and vertical) with fixed polarity (negative)
Signal	TTL
Connector	BNC
C1, C2 and C3 outputs	Conectors D9, D15 miniature, and D15 respectively. Direct connection to the monitor. The outputs of the D9 connector are all TTL. When the charts 1 or 5 are selected, a black and white picture will appear. When used with a Hercules monitor, the R,G and B charts will be black.
Power supply	
Mains voltage	AC 110-125-220-230-240 V ± 10%
Frequency	50-60 Hz
Consumption	9 W
Mechanical features	
Dimensions	W. 212 x H. 102 x D. 241
Weight	2.4 kg
Included accessories	Mains cable: CA-005

TA-903B

The TA-903B has been designed to analyse and rejuvenate the cathode ray tubes (CRT) of colour and black and white television sets and monitors.

The user can detect and depending upon circumstances repair the leakage or short circuits, simultaneously measure the current of the RGB cathodes in the cut-off point, trace the voltage/current characteristics and rejuvenate each of the three cathodes independently.

SPECIFICATIONS	TA-903B
Selectable voltages	6.3 V / 1 A max. 12 V / 0.5 A max.
G1 bias	
Selectable voltages	-50 V and -70 V (cut-off)
Variable voltage	-100 V to 0 V (G1 variable)
Range	30 V to 300 V approx. 300 V to 600 V approx.
Emission current	0 to 1.6 mA
Current	25 or 50 mA selecctable
Cycle	70 s approx.
Start cyclo	Manually
Colour tubes	R, G, B selection
Anode voltage	600 V approx.
Power supply	
Mains voltage	220 V AC ± 10 % / 50-60 Hz Adaptable to 110-125 or 230-240 V
Consumption	35 W
Mechanical features	
Dimensions	W. 420 x H. 340 x D. 145 mm
Weight	4.85 kg
Included accessories	Instructions manual, spare fuse, 6 CRT adapter, adapter cable, anode cable, adapter list.
Optional accessories	Other adapter (see adapter list)

TA-901

SPECIFICATIONS	TA-901
Selectable voltages	6.3 V / 1 A max. 12 V / 0.5 A max.
G1 bias	0 to -50 V, regulable
Emission scale	0 to 500 µA / 0 to 2500 µA, selectable
Current	25 or 50 mA selectable
Rejuvenation	Automatic. Start cycle manual
Cycle	70 s approx.
Colour tubes	R, G, B selection
Leakage & shortcircuit	Neon indicators
Power supply	
Mains voltage	110-125-220-230-240VAC±10% /50-60 Hz
Consumption	30 W
Mechanical features	
Dimensions	W. 212 x H. 102 x D. 241 mm
Weight	2 kg
Included accessories	Instructions manual, spare fuse, 6 CRT adapter, adapter cable, adapter list.
Optional accessories	Other adapter (see adapter list)

The TA-901 has been specially designed for the rejuvenation of CRT's in black and white and colour TV, monitors, etc. The user can measure the emission current of each cathode (a selectable function), and can detect leakage and short-circuits. It comes with six adapters and can thus be used with numerous tubes on the market.

ACCESSORIES

Adapters

The TA-903B and the TA-901 include 6 adapters, which means it can function with numerous tubes on the market. More adapters are optionally available, as well as a list of cathode ray tube adapters for PROMAX Analysers-Rejuvenators. All the cathode ray tubes familiar to PROMAX are included on the list, with their respective filament voltages and suitable adapters. It also provides guidelines for the testing of a picture tube that does not appear on the list. This list is periodically updated.

FA-478 PROGRAMMABLE POWER SUPPLY

The FA-478 main output (30 V/5 A is controlled by the panel keyboard and is fully digital, with the corresponding benefit of precision in output, and ease-of-use. Supplied with blockage of the keyboard control by password.

Remote control of the device is optional.

The output voltage and current are presented in an alphanumeric display, together with the incremental voltage value which may be also directly applied from the keyboard.

By combining linear and commutation technology, the FA-478 is of a noticeably reduced size when compared with similar power execution in linear technology, with the corresponding improvement in performance, together with major weight reduction.

Output characteristics equal to those found in linear devices are obtained.

In addition to the main output, an auxiliary one at a fixed voltage of 5 V is provided.

Both outputs are floating.

SPECIFICATIONS	FA-478
Main output	
Output voltage	0 to 30 V
Output current	0 to 5 A max
Load regulation	0.02 % + 5 mV
Mains regulation	0.02 % + 2 mV
Noise and hum	6 mV rms
Technology	Linear with commutated pre-regulator
Output	Floating
Protection	By current limitation Thermal, by device disconnection
Control	Of output voltage and limit current By numerical keyboard
Resolution	100mV and 10mA
Incremental control	Of output voltage
	Programmable, from the keyboard
Control protection	Blocking by numerical password
RS-232 control	Optional
LCD Display	Presentation of output voltage and current, limit current, and incremental voltage.

Auxiliary output	
Output voltage, DC	5 V
Output current	1 A
Load regulation	50 mV
System regulation	50 mV
Technology	Linear
Output	Floating
Operating environmental conditions	
Temperature range	5 ºC to 40 ºC
Relative humidity	Max. 80% (up 31 ºC), decreasing linearly until 50% at 40º C
Power supply	
Mains voltage	230 V AC ±10 % / 50 Hz
Consumption	200 W
Mechanical characteristics	
Dimensions	W. 200 x H. 95 x D. 254 mm
Weight	2.8 kg

FA-363B, FA-376, FA-662B, FA-665, FA-672

FA-376/FA-672 power supplies combine linear and commutation technology in order to provide the best advantages:

Reduced size in comparison with similar power execution in linear technology, and corresponding improved performance, together with major weight reduction.
Output characteristics equal to those found in linear devices are obtained.
The devices are equipped with fine and coarse control to better adjust the voltage, together with a control to pre-set the maximum output current.
In addition to the main output, an auxiliary one at a fixed voltage of 5 V is provided.
Both outputs are floating.

The FA-665 power supply possesses the major advantages given by the use of linear and commutation technology.

It consists of two independent supplies which enable the output to be independently adjusted between 0 and 30 V. In addition, the two supplies are floating with respect to the earth, each one being able to supply up to 5 A.

The “TRACKING” operation mode is included, where both supplies are inter-connected in such a way that they become two equal supplies, of opposite sign with respect to a central point common to both. In this mode of operation, the output voltage is controlled from only one of them, the other being the same value.
Output characteristics equal to those found in linear devices are obtained.

Possibility to shortcircuit all supplies.

SPECIFICATIONS	FA-363B	FA-376	FA-662B	FA-665	FA-672
Main output					
Output voltage DC	0 to 30 V			2 x 0 to 30 V	0 to 60 V
Output Current	0 to 2 A	0 to 5 A	0 to 1 A	0 to 5 A	0 to 2,5 A
Load regulation	≤0.05%+2mV	0.02%+5mV	≤1.5mV	0.02%+5mV	0.02%+5V
Mains regulation	≤0.02%+2mV	0.02%+5mV	≤1mV	0.02%+2mV	0.02%+5mV
Noise and hum	≤2mV rms	6mV rms	≤500mV rms	6mV rms	10mV rms
Technology		Linear with commuta-ted pre-regulator		Linear with commutated pre-regulator	
Output		Floating		Floating	
Readout	Digitals, V and A				
Type	±(0.1% reading±1digit)	3 ½ digits	±(0.1% reading±1digit)	3 ½ digits	
Resolution	100 mV 10 mA				
Protections	Thermal	by current limitation, by device disconnection		by current limitation, by device disconnection	
Auxiliary output					
Output voltage DC	5 V ± 15 V	5V			
Output current	1A ± 0,5A	1A			
Load regulation	50 mV		50 mV		
Mains regulation		50 mV		50 mV	
Technology		linear		linear	
Output		floating		floating	
Operating environmental conditions					
Temperature range	5º C to 40º C				
Relative humidity	Max 80% (up to 31ºC) decreasing linearly until 50% at 40ºC				
Power supply	110-125-220-240 V CA		110-125-220-240 V CA		
Mains voltage	50-60 Hz	230 V CA ± 10% 50 Hz	50-60 Hz	230 V CA ± 10% 50 Hz	
Consumption	120 W	200 W	145 W	380 W	200 W
Mechanical features					
Dimensions W. x H. x D.	230 x 145 x 290 mm	200 x l95 x 254 mm	210 x 185 x 280 mm	300 x l95 x 292 mm	200 x 95 x 254 mm
Weight	6 Kg	2.8 Kg	6.6 Kg	5.4 Kg	2.8 Kg

UNIVERSAL PROGRAMMER

PR-875

CAPABLE OF PROGRAMMING ANY DIL DEVICE WITH UP TO 48 PINS WITHOUT THE NEED FOR ADAPTERS

The **PR-875** is a universal programer which works via a parallel port of your PC, enabling you to program, read, copy or check any DIL device with up to 48 pins without the need for adapters.

The **PR-875** accepts more than 3000 different devices, including logic devices (PAL, GAL, CEPAL, PEEL, FPLA, EPLD, FPGA), memories (PROM, EPROM, E2PROM, Flash, and PROM series) and single-chip microcontrollers.

The following features stand out from among its characteristics:

Ultra-fast programming speed

The intelligent control system of the **PR-875** reduces the complexity of the system to a minimum. The **PR-875** is much faster than its competitors (it only takes 8.5 seconds to program a 1 Mbit EPROM), and so is much more productive with today's high density devices.

Checking the insertion and contact of the device

The **PR-875** carries out a check on the insertion of the device before proceeding to program it. It checks that the device is not badly defined (the actual number of pins differs from that of the device selected), that the insertion is correct (not displaced or inverted), that the connections are correct and that the device is not faulty.

This feature acts as a precaution against costly breakdowns caused by human error or faulty contacts, the latter often being due to aged bases, difficult to detect by other means.

While some up-market programmers offer the possibility of checking the insertion of the device, no other programmer with a cost comparable to the **PR-875** offers this characteristic.

Detection of the identifier of EPROM and Flash memories

Many EPROM and Flash memories have a burnt-in device identifier and manufacturer identifier. The **PR-875** can read these identifiers with the aim of determining the manufacturer and the reference of the device. This characteristic automates the selection of EPROM and Flash memories and is specially useful in the identification of devices which have their code accidentally (or intentionally) erased.

Automatic programming

In order to satisfy production requirements, the **PR-875** incorporates new technologies both in its hardware and in its software. In the Mass Production Mode, the operator inserts a device in the ZIF socket. An LED in the **PR-875** indicates when the device has been satisfactorily programmed, and the operator then removes the device and replaces it with another. The ease of this operation eliminates the need for specialized training, saving time and money. The keyboard and the mouse are deactivated in the Mass Production Mode, eliminating the possibility of involuntary errors.

Storage of the working file

The **PR-875** allows the saving of the working configuration file, which contains the selected device, the buffer data and all the configuration options of the program. This file can be loaded for future use without the need to reselect the configuration options.

Auto-increment function

When the devices programmed require individual serial numbers, the **PR-875** has an auto-increment function: this function increases the serial number whenever a new device is inserted.

Programming and checking voltages

The **PR-875** provides two checking processes: one process with just VDC checking, or two processes with VDC ±5% and VDC ±10%. This characteristic ensures that the device has been properly programmed, preventing faults due to programming errors and ensuring the storage of the data.

SPECIFICATIONS

PR-875

ROM emulation (with optional HW)

The **PR-875** together with the EM-875 option can be used as an EPROMS emulator. The **PR-875** has two expansion ports for the EPROMS emulation.

SPECIFICATIONS	PR-875
Socket and pin driver	48-pin DIL/ZIF socket with receptacle for 8-pin to 48- pin 300/600 mil devices Four DACs for VCC, VPP1, VPP2 and VPP3 with 8-bit resolution. TTL driver supports pull-up/pull-down or tri-state control (software selected) on all 48 pins.
Supported devices	Memory PROM, EPROM, E2PROM, Flash, serial PROM Logic: PAL, GAL, CEPAL, PEEL, FPLA, EPLD, CEPAL, FPGA Others: single-chip microcontrollers
Device operations	Read, blank check, device insertion/contact check, verify, checksum, EPROM ID check, compare, erase chip, function test, program, security fuse, microprocessor configuration, device search, edit buffer, mass production mode, modify vector, auto device ID increment.
PLD vector tester	Accepts JEDEC test vectors up to 48 pins Rise time: 2500 V/ ms
ROMS emulator (optional)	Up to two ROM emulators supported Supports 8-bit EPROMs up to 4 Mbit. Comes with 128k x 8 on-board SRAM, user upgradable to 512 k x 8 by replacing SRAM chips 100 ns access time
File format conversion	JEDEC, POF, Binary, Intel HEX, Intel EXT HEX, MotorolaS, HP 64000ABS, ASCII, Hex and Tektronic Hex.
PC system requirement	Operating system : DOS 3.1 or higher Windows 3.x or Windows 95 Processor 386SX/DX, 486DX/DX2/DX4, Pentium 4 MB RAM minimum, 8 MB RAM recommended Hard disk with 8 MB free space 3.5", 1.44 MB disk drive Microsoft compatibe mouse Parallel port interface
General Power Supply Frequency margin Power consumption Operating temperature CE certified	 100÷240 V AC 47 ÷ 63 Hz 25 W 5 to 45^{o}C
Optional accessories	EM-875 EPROM emulator RM-875 Software for Windows
Mechanical features Dimensions Weight	 W.310 x H. 55 x D. 175 mm 1.8 kg

Adapters for devices with no DIL package

Following table shows the different adapters that PROMAX can supply to program devices with no DIL package.

ADAPTER	MODEL
44 pins PLCC to 44 pins DIL	AD-081
32 pins TSOP to 32 pins DIL	AD-082
20 pins SOIC to 20 pins DIL	AD-083
16 pins SOIC to 16 pins DIL	AD-084
20 pins PLCC to 20 pins DIL	AD-085
28 pins PLCC to 24 pins DIL	AD-086
32 pins PLCC to 28 pins DIL	AD-087
32 pins PLCC to 32 pins DIL	AD-088

UNIVERSAL PROGRAMMER

PR-871B

The PR-871B is a portable programmer aimed at those professionals who do not require such a wide range of devices as offered by the PR-875, without sacrificing the advanced features.

If you only need to program those basic devises like EPROM's, micro-controllers of the 87 and 89C5x or PIC families, FLASH memories, serial PROM's and a limited number of PLD's (16V8, 20V8 y 22V10), the PR-871B is the optimum solution, much more economic than what other competitors have to offer. It can program up to 1300 different devises including 5V, 3.3V and 2.7V chips. (Contact us for more specific information about programmable devises).

Main characteristics
- Easy to use. It operates under Windows 2000/98/95
- It is connected to the parallel port of a PC.
- It does not occupy any groove of the PC
- It supports the used devices more, (more than 1300)
- Fast speed of programming
- 3.3 and 2.7 V Program devices
- Portable, small and with an inferior weight to 500 gr
- Reliable, with antistatic protection in the programming base.
- Versatile, optional Adapters for devices encapsulations
- PLCC, TSOP, SOP, up to 48 pins.

Functions (Additional):
- Verification devices in blank.(Blank check)
- Blockade contained access device (Secure device)
- Detection of mistakes (Checksum)
- Editing and conversion files (JEDEC, BIN, HEX, Motorola S)

SPECIFICATIONS	PR-871B		
System requeriments		**Power supply**	230 V AC, 50-60 Hz through power adapter
Operating system	Windows 2000/98/95	**Included accessories**	CE power adapter Connection cable to the parallel port Family modules CD software programming
Processor	486 DX or higher		
Free RAM	32 MB		
Free hard disk space	50 MB	**Optional accessories**	Non-DIP adapters 20/28/32/44 pin PLCC 28/32/40/48 pin TSOP 44 pin SOP
CD-ROM			
Mouse (optional)			
Parallel port			

BM-130D EPROMS ERASER

The BM-130D is an EPROM memory eraser using ultra-violet radiation. Its main field of application is in the development and manufacture of microprocessor-based products.

The memory container (80 x 330 mm) allows the erasure of up to 40 devices of 24 pins at a time. It incorporates a clock programmable from 0 to 60 minutes with erasure-indicator bell.

It is provided with ultra-violet protection to avoid the emission of light to the exterior. In order to ensure the integrity of the devices to be erased, it is fitted with a carbon foam base, to avoid any possible static electricity discharges.

SPECIFICATIONS	BM-130D
Exposition time	Programmable from 0 to 60 minutes Light radiaton indicator on the front panel Bell indicator at the end of the erasing process
Ultraviolet lamp	
Wavelength	2537 Angstrom
Middle time to failure (MTTF)	7.500 hours
Power supply	
Voltage	230-240 VAC, 50-60 Hz
Consumption	22 W
Mechanical features	
Dimensions	W. 153 x H. 82 x D. 400 mm
Weight	4 kg
Included accessories	CA-05 mains cable

AA-930 AUDIO ANALYSER

The AA-930 has been designed to facilitate the repair, tuning and analysis of audio frequency equipment in general, such as cassette recorders, record players, radio-cassettes, preamplifiers, low-frequency amplifiers, etc. That is why six measurement instruments that are indispensable in an audio service workshop have been combined in one piece of equipment.

The AA-930 is equipped with RCA 600 W and DIN 47 kW connectors for the inputs and outputs. In addition, two BNC connectors on the front panel and two RCA connectors on the rear panel allow the user to view all of the signals measured by the instruments.

LF generator

This produces the most needed frequencies for the checking of sound equipment (315 Hz, 400 Hz, 1 kHz and 10 kHz).

Stereo watt meter

With two sensitivities, 20 W and 2 W on an internal impedance of 4 W, it measures the output stages in car radios, cassette recorders and radio-cassettes.

SPECIFICATIONS	AA-930
Milivolmeter	
Ranges	0 - 2 V 0 to 28 dB (0 dB = 0,707 V) 0 to 200 mV - 20 dB to 8 dB
Pass-band	20 Hz - 20 kHz (-1 dB)
Connector	RCA (600 Ω), DIN (47 kΩ)
Max. input voltage	12 V
Low frequency generator	
Frequencies	315 Hz, 400 Hz, 1 kHz and 10 kHz
Distortion	≤ 0.03 % (0.05 % to 10 kHz)
Output level	0 - 2 V adjustable
Connector	RCA (600 Ω), DIN (47 kΩ)
Oscillator	Internal or external
Distortion meter	
Ranges	10 %, 1 %
Tolerance	± 5 %
Inputs	Left channel, right channel
Input voltage	66 - 200 mV and 0.66 - 2 V - 1.5 to 8.5 dB and 18.5 to 28.5 dB
Connector	RCA (600 Ω), DIN (47 kΩ)
Max. input voltage	12 V
Vattmeter	
Ranges	20 W, 2 W
Load impedance	4 Ω ± 5 %
Pass-band	20 Hz to 20 kHz (-3 dB)
Max. input voltage	12 V
Wow & Flutter	
Ranges	W&F ± 0.2 % and ± 2 %, Drif ± 3 %
W & F measurement	Linear or DIN filter
Connector	RCA (600 Ω), DIN (47 kΩ)
Max. input voltage	12 V
Reference signal	3.150 Hz (Quartz controlled)
Output level	0 - 0.707 mV (600 Ω)
Azimut	
Frequence	315 Hz
Input voltage	0 - 2 V 0 to 28 dB (0 dB = 0.707 V) 0 to 200 mV - 20 dB to 8 dB
Connector	RCA (600 Ω), DIN (47 kΩ)
Max. input voltage	12 V
Oscilloscope & monitor outputs	
Outputs	Left and rigth channels
Output level	1 V RMS f.s.d.
Pass-band	20 Hz to 20 kHz (-1 dB)
Impedance	2 kΩ
Power supply	
Mains voltage	110-125-220-230-240 VAC ±10 % 50-60 Hz
Consumption	10 W
Mechanical features	
Dimensions	W. 210 x H. 185 x D. 265 mm
Weight	4.3 kg

DA-523 DISTORTION METER

- **Automatic tuning and leveler**
- **Response in mean value or rms value**
- **Additional outputs: constat distortion and amplitude**

The entire complicated measurement process of conventional distortion meters is automatized in the DA-523, since both the tuning and the leveler are automatic. The user only has to preselect the approximate level of the inputs signal and of the distortion ranges. The response can be given in mean or RMS value.

SPECIFICATIONS	DA-523
Impedance	200 kΩ on differential mode 100 kΩ on normal mode
Level	Min. 60 mV, max. 200 V (7 steps)
Maximum voltage	300 Vp maximum
Fundamental range	10 Hz to 100 kHz
Measurement ranges	100 %, 20 %, 2 %, 0.2 %, selectable
Digital display	3 1/2 digits, 2000 reading points Overange indication
Response	Selectable average or RMS value Crest factor ≤3
Accuracy 20 Hz to 20 kHz 10 Hz to 100 kHz	(THD ≤ 30 %, ≥ 4 % f.e.) ± 10 % (harmonics ≤ 100 kHz) ± 10 % - 30 % (harmonics ≤300 kHz)
Filters	
400 Hz high pass	400 Hz ± 5 % (-3 dB)
80 kHz low pass	80 kHz ± 5 % (-3dB)
30 kHz low pass	30 kHz ± 5 % (-3 dB)
Auxiliary outputs	
Input monitor (V_i≤50 mV)	1 V_{rms} ± 10 % constant
Output impedance	1 kΩ ± 5 %
Harmonic components	1 V ± 3 % (1000 reading points)
Power supply	
Mains voltage	125-230 V AC ± 10 % / 50 Hz
Consumption	16 VA
Mechanical features	
Dimensions	W. 210 x H. 185 x D. 265 mm
Weight	4.5 kg

PT-121, PT-125 WATTMETER CLAMP

SPECIFICATIONS	PT-125	PT-121
Power measurement	Three-phase, active, reactive, cos φ	Power (AC + DC)
Measurement margin Three phase Single-phase	2000 kW 1200 kW	240 kW AC + DC
Magnitude	V + Hz/ A+Hz/ W+Fp/ kVA+kVAR V+A	W, V, A, Hz
Display	LCD x 4 digits, dual	LCD 3. 3/4 + graph bar 40 seg
Voltage measurement True RMS, crest factor <4	600 V AC 800 V DC	up to 600 V AC, 400 V DC
Current Measurement True RMS, crest factor <4	2000 A AC+ DC	up to 400 A, AC/DC
AC/DC Detection	Automatic	Manual
Sweep Time	0.5 s (V/A), 1.6 s (W)	0.5 s ind. numerical, 0.0 5 s (graph bar)
Frequency	10-400 Hz	Autorange 100 Hz-1000 kHz
Features	4 memory relatives measurements A, W	Memory measurement max/mín relatives measurements DC, A
Max. Conductor diameter	55 mm	23 mm
Battery	1 battery / 9V	2 batteries / 1,5 V
Dimensions	W. 112 x H. 271 x D. 46 mm	W. 183 x H. 35.6 x D. 63.6 mm
Weight	697 g battery included	190 g battery included

Wattmeter Clamp. Three-phase active, reactive PT-125

Wattmeter Clamp. Single-phase PT-121

CT-098/193/195/237 CURRENT CLAMP

The **CT-098, CT-193, CT-195** and **CT-237** clamp meters are an essential instruments for low voltage installers, it offers the accuracy and reliability of a professional instrument under a safe, robust and ergonomic design

SPECIFICATIONS	CT-098		CT-193	CT-195	CT-237
AC current Accuracy 50 / 60 Hz	20 A, 200 A ± (1.5% read.+4d)	700 A ± (3.5% read.+5d)	200 A, 700 A	430 A, 700 A ± (1.75 % read.+5 digits)	40 mA, 400 mA 4 A, 40 A, 60 A ± (1.75% read.+5 digits)
DC current Accuracy			200 A, 700 A ± (1.5% read.+ 5 digits)	430 A, 700 A ± (1.5% read.+ 5 digits)	
DC voltage Accuracy	600 V Range ±(0.5% read.+ 1 digit)		600 V Range ± (0.5% read.+ 1 digit)	430 mV, 4,.3, 43, 430, 600 V ± (0.25% read.+ 1 dig)@ (430 mV to 430 V)	
AC voltage Accuracy	600 V Range ± (1.2% read.+ 4 digits)		600 V Range ± (1.2% read.+ 4 digits)	4,3 V, 43 V, 430 V, 600 V ± (1.2% read.+ 4 digits)@4.3 V	400 V Range ± 1.5% read.+2 dig.@ 50/60 Hz ± 2.0% + 2 digits@ 40/1 kHz
Resistance Accuracy	2 kΩ, 200 kΩ ± (1.2% read.+1 digit)		2 kΩ, 200 kΩ ± (1.2% read.+1 digit)	430 Ω, 4,3 kΩ, 43 kΩ, 430 Ω 4,3 MΩ, 43 MΩ ± (0.5 % read.+1 digit)@ 430 Ω	40, 400Ω ± (1.0% read.+2 digits)
Frequency	Autorange to 20 kHz		Autorange to 20 kHz	430 Hz, 4.3 kHz	
Temperature Accuracy				-20º C to 850º C ± (0.5% read.+3 digits) ºC	
Continuity indicator	Threshold 30 Ω		Threshold 30 Ω	Threshold 50 Ω ± 30 Ω	Threshold 30 Ω
Battery **Ø conductor max.**	9 V, battery IEC 6 F22 46 mm		9 V, battery IEC 6 F22 46 mm	9 V, battery IEC 6 F22 46 mm	2 batteries 1.5 V 30 mm
Dimensions	W. 250 x H.100 x D.46 mm		W. 250 x H.100 x D. 46 mm	W. 250 x H. 100 x D.46 mm	W.210xH.62xD. 5,6 mm
Weight	380 g, battery included		380 g, battery included	380 g, battery included	200 g, battery included

DIGITAL ISOLATION METER PE-451,PE-453, PE-457

Specifications PE-453	ISOLATION METER
Display	LCD 3 1/2 digits (2000 counts)
Accuracy mode Megaohm	
20 MΩ	± 1.5 % reading ± 2 digits
200 MΩ	± 2.5 % reading ± 2 digits
2000 MΩ	± 5.0 % reading ± 3 digits
Test voltage	250 V, 500 V, 1000 V DC ± 10 %
Accuracy mode voltmeter AC	
0 - 750 V	± 1.5 % reading ± 2 digits
Impedance	10 MΩ
Accuracy mode in continuty measure	
0-20 Ω	± 2 % reading ± 4 digits
0-200 Ω	± 1.5 % reading ± 2 digits
0-2 kΩ	± 1.5 % reading ± 2 digits
Short-circuit current	3 mA
Threshold of Beep	
Ranges	20 Ω, 200 Ω, 2 kΩ 8 Ω, 10 Ω, 40 Ω
Auto power off after 5 min. approx.	
Battery	6 batteries of 1.5 V
Dimensions	W. 100 x H. 52 x D. 163 mm

Specifications PE-457	ISOLATION METER ANALOG / DIGITAL AUTOMATIC
Display **Autorange function** **Analog reading**	LCD 3 3/4 digits (4000 counts) Megahom range Display of 50 segments in logarithm / linear scale
AC voltage Range Resolution Accuracy	 600 V ACV 0.1 V 1.5 % reading + 3 digits (1 V ~ 600 V)
Continuity Range Resolution Accuracy	 400 Ohm (Ish>200 mA) 0.1 Ω 1 % reading + 5 digits
MegaOhm Ranges Resolution Accuracy	 4000 MΩ/250 V c/autorange 4000 /400/40/4 MΩ 4000 MΩ/500 V c/autorange 4000 /400 /40 / 4 MΩ 4000 MΩ/1000 V c/autorange 4000 /400 /40 /4 MΩ 1 kΩ in all ranges / voltages 3 % reading + 5 counts (< 1GΩ) 5 % reading + 3 counts (< 4 GΩ)
Battery	8 batteries 1,5 V R3
Dimensions	W. 190 x H. 140 x D. 77 mm
Weight	900 g approx.

Specifications PE-451	ISOLATION METER HANDHELD
Portable and esay to use	
Display	3 1/2 digits
Accuracy	
20 MΩ	± (2 % rdg. + 2 digits)
200 MΩ	± (4 % rdg. + 2 digits)
>500 MΩ	± (5 % rdg. + 2 digits)
Isolation test	500 V
Ranges	20 / 2000 MΩ
Connection for extern battery	
Battery	4 batteries 1.5 V R3
Dimensions W. x H. x D.	44 x 170 x 40 mm
Weight	160 g battery included

EARTH METER PE-331

SPECIFICATIONS	DIGITAL EARTH METER
Measure of Earth Resistence by continuous current	800 Hz, 2 mA
Earth voltage	0 - 200 V AC , 40 ~ 500 Hz
Earth resistance	0 - 20 Ω (res. 0,01 Ω) 0 - 200 Ω (res. 0,1 Ω) 0 - 2 kΩ (res.1 Ω)
Current	2 mA
Battery	6 batteries 1.5 V
General features	Auto power off Hold the value on the display Indication of open circuit Small size and weight IEC-1010 regulation Category of over tension III

MR-273 TACOMETER / IL-185 LUX METER

SPECIFICATIONS	OPTICAL TACOMETER
Measurement range	From 5 to 99999 RPM
Sweep time	1 s (over 60 RPM)
Margin selection of mesure	Automatic
Memory	last, maxim and minim values
Measure distance	50 ~ 150 mm (max 300 mm)
Display	LCD, 18.5 x 48 mm
Battery	4 batteries 1.5 V type AA
Dimensions	W.72 x H.38 x 190 D. mm
Weight	250 g

Specs.	LUX METER
Margin	20 to 200000 Lux
Reading	Digital
Functions	Max. and hold
Battery	4 battery of 1.5 V
Dimensions	W. 44 x H. 170 x D. 40 mm
Weight	220 g batteries included
Generals	Backlight LCD Display Analogue output High diffusion accuracy φ < 2% High accuracy compensation

AR-225 PHASE SEQUENCE INDICATOR

AR-225 3 INSTRUMENTS IN ONE
Indication of open phase, phase sequence and motor rotation.
CROCODILE CLAMP OF BIG SIZE
Permit connecting easily to terminals of conmutation boards.
HIGH RELIABILITY
Identify trifasic frequency and check the open phase.

SPECIFICATIONS	PHASE SEQUENCE METER
Input voltage	100 V AC to 600 V AC max.
Frequency range	from 45 to 70 Hz
Technology	(not mechanical)
Battery	9V type 006P
Valid for insta. with category of overvoltage IEC-1010	

TC-471 CABLE TESTER

The TC-471 cable tester is a portable instrument whose function is to test the wiring in communication networks.
Among its functions we should point out:
- Wiring identification using terminators.
- Short-circuit verification.
- Open circuit verification.

Because of its features, the instrument can recognise multiple UTP (RJ45) and COAXIAL (BNC) network wiring systems, as well as offering the possibility of testing analogue and digital telephone networks (RDSI), enabling up to 4 personalised wiring systems to be memorised, these can be defined manually or using an unknown cable source. Another important feature of the instrument is the ability to test and typologically identify cables on a local basis in installations with a maximum length of 1 Km.

For energy saving, the instrument contains a power supply control in order to lengthen battery life, as well as a "sleep" mode and a "power off" mode, thereby, in large measure, reducing energy consumption.

SPECIFICATIONS	TC-471
LCD indicator	2 lines by 12 characters
Wiring types	T568A/B, USOC, 10BASE-T, BNC/10BASE-2, TOKEN, RING y TP-PMD
Battery	9 V battery
Mechanical features	
Dimensions	W. 6.5 x H. 15.0 x D. 3.5 cm
Weight	180 g
Included accessories	Instruction manual, 9 V battery 2 x BNC-RJ-45 adapters, 2 x LTC-T1 and LCT-TC 16 Terminators 1 x Carrying bag

TC-470 WIRING TRACER

The TC-470 wiring tracer is a modern, easy-to-use instrument made up of a tone generator and an amplification probe which has been specifically designed to easily and unaggressively identify and trace cables (working in conjunction with the tone generator).

Its features enable the user to perform these tasks without need of affecting cable insulation, thereby avoiding any problems this may cause. All this is made possible thanks to the "audible" detection system incorporated in the amplification probe.

Its ease of use and simplicity offers the user an ideal tool that will fit into any situation or working environment he is likely to come up against. The operator's task is made that much easier thanks to a volume control which is easily adjusted to each job at hand, enabling the instrument's sensitivity to be increased or decreased according to the conditions and needs that the user may come across

SPECIFICATIONS	TC-470
Gain probe	
Gain control	In order to increase sensitivity
Battery	9 V battery
Autonomy	100 h
Signal generator	
Wire Test	Red and black
Cable with plug	4 modulated connectors
Connector	TONE / OFF / CONT
LED	3 colours
Accessories	User manual, 9 V battery (within the equipment) Carrying case

IC-001 NETWORK ANALYSER

The network analyser IC-001 (LT-8100) is the perfect tool for the certification of any type of network, the IC-001 is a user friendly instrument that displays the results in an understandable manner. When errors occur, the IC-001 helps locate its origin, as well as their location on the network schemes.

SPECIFICATIONS	IC-001(LT-8100)
Distance	0-330 m
Resolution	0.33
Accuracy	± (3% + 0.3 NVP)
Delay	0-4000 ns
Resolution	1 ns
Accuracy	± (3% + 1 ns)
Average impedance	35-180 Ω
Resolution	0.1 Ω
Accuracy	± (3% + 1 Ω)
Capacity (total)	0-100 nF
Resolution	1 pF or 3 dig
Accuracy	± (2% + 20 pF)
Capacity (by meter)	0-328 pF/m
Resolution	0.1 pF
Accuracy	± (2% + 1 pF)
Feedback resisance CC	0-400 Ω
Resolution	0.1 Ω
Accuracy	± (1% + 2 Ω)
Attenuation	
Resolution	0-70 dB
Accuracy	± 0.6 dB in CAT 5 / D Class
Interference (NEXT)	0-70dB
Resolution	0.1 dB
Accuracy	± 1.6 dB in CAT 5 / D Class

Return losses	0-70 dB
Resolution	0.1 dB
Accuracy	± 2 dB in CAT 5 / class D
Memory capacity	150 autotest
Test standard	TIA TSB-67 III level ISO 11801 EN 50173 E-DIN 44312-1
Cable Types	UTP /ScTP/FTP/ CAT 3,4,5 (basic and channel) IBM STP types 1,2,6 Coaxial: 10 : 10 Base2, 10 Base 5
Mechanical features	
Dimensions W.x H x D.	108 x 250 x . 64 mm
Weight	800 g
Power supply	
Battery pack	NiMH
Battery life	8 h
External power supply	12 v CC, 800 mA DC.

IC-002 MULTI-RANGE RF WATTMETER

The IC-002 (81050) directional wattmeter is an accurate, portable, RF power meter using a Rotary Detection Component to measure Direct and Reflected Power in 5 selectable power ranges. Model 81050 includes "Quick Match" type connectors for greater versatility. The instrument is delivered with a carrying case containing compartments for loads and connectors.

You can use the new 81050 Directional Wattmeter to measure RF Power in coaxial cables and transmission lines of between 50 and 500 W without need of interchangeable detector components.

The model contains a 4-1/2" instrument, "Quick Match" type RF connectors, a high-precision transmission line and a broad band detector component that enables power readings in any of the 5 selected ranges of 5, 15, 50, 150 and 500 W and a frequency range of 25 to 1000 MHz.

SPECIFICATIONS	IC-002 (81050)	
Power ranges	5, 15, 50, 150, 500 W, full scale (150 W maximum from 800 to 1000 MHz)	
Frequency range	25 to 1000 MHz	
Correction accuracy	25 to 100 MHz	± 7 of full scale, using correction chart
	100 to 512 MHz	± 6 of full scale, no correction required
	512 to 1000 MHz	± 7 of full scale, no correction required
Insertion loss	25 to 512 MHz 512 to 1000 MHz	0.10 dB max. 0.15 dB max.
VSWR	25 to 512 MHz 512 to 1000 MHz	1.08 max. 1.12 max.
Element	Broadband (25 to 1000 MHz, 500 W max.), rotable for forward and reflected power measurements, non-removable	
Dimensions	W 127 x H. 185 x D. 102 mm	
Weight	1.8 Kg	
Connectors	"Quick Match", standard N female Type (BNC, UHF, TNC male or female optional)	

IC-500, IC-501, IC-502

COAXIAL LOADS

SPECIFICATIONS	IC-500	IC-501	IC-502
CW power rating	5 W	25 W	150 W
VSWR DC - 1000 MHz	1.05	1.05	1.05
1 to 4 GHz	1.10	1.10	1.10
Frequency range	DC 1- 4 GHz	DC 1- 4 GHz	DC-1000 MHz 1 GHz-4 GHz
Included connector	N (female)	N (female)	N (female)
Dimensions (W) x (H) x (D)	3.18 x 3.18 x 6.98 mm	3.81 x 3.81 x 10.64 mm	8.89 x 8.89 x 19.68 mm
Weight	170 g	235 g	2.27 kg

SC-002 SOUND LEVEL METER

The SC-002 (SC-2C) sound level meter has been specifically designed to provide the user with trouble-free operation. It is particularly recommended for technicians specialising in the installation of sound and audio-visual systems. Its use is also ideal for the acoustic monitoring of local bylaws, ambient noise (bars, discotheques, compressors, boilers), acoustic insulation, etc..

The sound level meters are subject to LEGAL METEOROLOGICAL legislation which, by Ministerial decree of 16 December 1998, requires all sound-meters to enclose an ORIGINAL VERIFICATION carried out by an officially accredited laboratory.

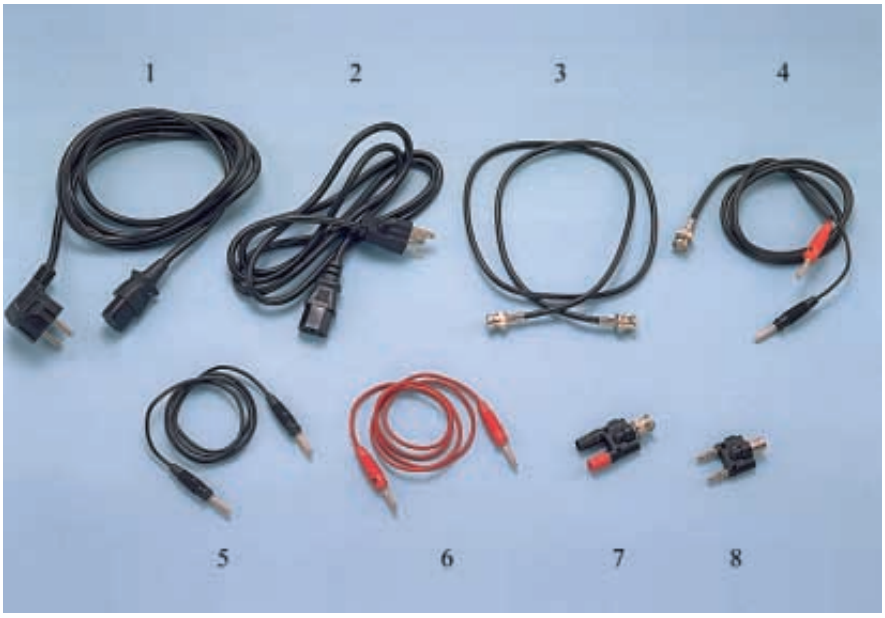
SPECIFICATIONS	SC-002 (SC-2C)
Microphone	1/2 " pre-polarized extractable condenser microphone.
Dynamic range	From 30 to 130 dBA (RMS)
Functions	Fast (LAF) Slow (LAS) and maximum
Frequency consideration	Considered A for all functions
Background noise	< 24 dBA without microphone
Indications	Low battery indication and saturation
Norms	IEC 60651:1979 (A1:1993), UNE-EN 60651: 1994 (A1:1994) all of them as Class 2 B.O.E. Num. 311 of December 29 1998 regarding legal metrology. (Legal approval type nº 99008)
Battery	9 V battery type 6LF22, alkaline or lithium.
Dimensions	W. 82 x H. 260 x D. 19 mm
Weight	600 g including battery
Included accessories	Carrying bag, 9 V battery, wind protection screen

MP-003 IMPEDANCE METER

The MP-003 (MPI-3) is an impedance meter working at a frequency of 1 kHz which, in addition, enables knowing the resistance in DC and the minimum power required by an amplifier to attack this impedance.

SPECIFICATIONS	MP-003
Functions	Measurement Impedance 1 kHz Measurement Resistance Estimation of necessary minimum power
Measurement range Impedance and resistance Power	 0-200 Ω, 0 - 2.000 Ω, 0 - 20.000 Ω 0-2000 W
Maximum error at 25ºC	±2 % ±1 digit
Maximum error in all the margin of temperature	± 5% 1 digit
Operation temperature range	0 - 40ºC
Dimensions	W. 82 x H. 222 x D. 19 mm
Weight	With battery 425 g, Without battery 380 g
Included accessories	Carrying bag, clamps to connect the impedance and battery

GENERAL ACCESSORIES



1)	CA-005	Mains cable CEEE 7-411 (Europe)
2)	CA-007	Mains cable NEMA 5-15P (USA)
3)	CC-003	BNC / BNC coaxial cable
4)	CC-004	BNC / Bananas coaxial cable
5)	CC-012	Banana / Banana black
6)	CC-013	Banana / Banana red
7)	AD-012	BNC (f) / Banana Adaptor
8)	AD-011	BNC (m) / Sockets adaptor

TELECOMMUNICATIONS TEST EQUIPMENT

TV AND MONITOR PATTERN GENERATORS

ELECTRONIC TRAINING EQUIPMENT

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