

ELECTRONICS & Wireless World

JUNE 1986 £1.25



**Frequency
allocations
wallchart
inside**

Faster Fourier transforms • Low-cost filter design

VHF preamplifier • Relativity simplified

Automatic coin recognition • Digital altimeter

ELECTRONIC BROKERS THE SMART CHOICE FOR THE SMART SCOPE

PHILIPS PM 3055 50MHz Scope



Electronic Brokers
Special Introductory
Price
£795
For orders received by May 31st, 1986

Philips' all-new PM 3055 is the smart scope – in more ways than you'd think! First, it's smart in performance. With an advanced-technology 16 kV CRT, versatile triggering functions up to 100 MHz, and fast computer hook-up via an IEEE option.

And it's smart in simplicity, with Autoset, right-every-time micro-computer control and full modular design for fast, easy service.

But most of all it's smart in price, at Electronic Brokers' special introductory offer of only £795!

ELECTRONIC BROKERS THE FIRST CHOICE FOR A FULL RANGE OF PHILIPS T & M EQUIPMENT



PM3267 HIGH PERFORMANCE 100MHz SCOPE WITH D.T.B. £1,345

- Wide input voltage range
- Trigger view third channel display
- Alternate main and delayed time bases
- Automatic triggering
- Independent MTB and DTB triggering



PM3256 FULLY RUGGEDIZED PORTABLE 75MHz SCOPE £1,550

- Designed for harsh field environments
- Dual timebase with independent triggering
- Alternate display of main and delayed timebase
- Trigger view as third channel display
- Tough compact unit with strap.



PM3206 COMPACT LOW COST PORTABLE 15MHz SCOPE £295

- Automatic triggering for stable trace
- Easily portable and lightweight
- TV triggering on line and frame
- Dual trace with 5mV sensitivity
- X-Y measurement facility



PM3302 DIGITAL STORAGE SCOPE WITH TWO MEMORIES £1,450

- Max sampling frequency 20MHz
- Maximum resolution 50ns
- 2K x 8 bit memory
- 2K back-up memory
- X-Y recorder output for hard copy



PM3219 STORAGE AND REAL-TIME 50MHz SCOPE £2,995

- Analogue storage with variable persistence
- Auto erase and auto store facilities
- High 2mV sensitivity across full bandwidth
- Alternate display of main and delayed timebases
- Easy auto mode triggering with level control

DIGITAL MULTIMETERS

PM2534 System DMM, IEEE, 0.005% accuracy, true RMS	£795
PM2521 Multifunction, 4½ digit, auto/manual ranging	£475
PM2519/51 Auto/manual, 4½ digit, true RMS, IEEE	£495
PM2519/01 Automatic, 4½ digit, bar graph, rel readings	£299
PM2718X/01 Multifunction, min/max measurements, data capture	£225
PM2618X/01 Auto/manual ranging, bar graph, logic view function	£195
PM2518X/11 True RMS, 4 digit, backlight, relative ref	£199
PM2518X/01 Portable, auto/manual ranging, dB, continuity	£149

FUNCTION GENERATORS

PM5134 0.001Hz to 20MHz, sine, square, triangle, pulses	£1625
PM5133 0.01Hz to 2MHz, sine, square, triangle, pulses	£1235
PM5132 0.1Hz to 2MHz, sine, square, triangle, pulses	£648
PM5131 0.1Hz to 2MHz, sine, square, triangle, pulses	£425

R. F. GENERATORS

PM5193 0.0001Hz to 50MHz, synthesised, IEEE, FM/AM	£3225
PM5326 100kHz to 125MHz, AM/FM, sweep facility	£1275

PATTERN GENERATORS

PM55151 PAL/NTSC, synthesised, 70 combination patterns	£1050
PM55151+RGB Generator with RGB output for monitors	£1245
PM55151T+RGB Generator with 5 teletext pages and RGB	£1420
PM5503 PAL I, 5 test patterns, video and RF output	£175

PULSE GENERATORS

PM5712 1Hz to 50MHz, fast rise time, duration, delay	£995
--	------

COUNTER/TIMERS

PM6672/01 0.1Hz to 1GHz, period, pulse width, single, average	£995
PM6671/01 0.1Hz to 120MHz, trigger outputs, burst, frequency average	£775
PM6670/01 0.1Hz to 120MHz, period, pulse width, single, average	£595

FREQUENCY COUNTERS

PM6668/01 10Hz to 1GHz, 7 digit, auto triggering, high sensitivity	£495
PM6667/01 10Hz to 120MHz, high stab oscillator, self diagnosis	£349

X-Y RECORDERS

PM8134 A3, two pen, sensitivity 50µV to 20V/cm	£2595
PM8133 A3, single pen, 5 speed time base unit	£1900
PM8043 A4, single pen, sensitivity 2mV to 1V/cm	£1245

GRAPHICS PLOTTERS

PM8154B Multipen, A4, six pen, IEEE interface	£1195
PM8154S Intelligent, A4, six pen, RS232 interface	£1195

LINE RECORDERS

PM8252A Two pen, 12 speeds, sensitivity 1mV to 50V	£1050
PM8251A Single pen, dip marker and inverter switch	£750

ANALOGUE MULTIMETERS

PM2505 Electronic with 62 ranges, auto polarity, audible continuity	£185
---	------

RCL BRIDGES

PM6303 Automatic display of measurement unit, menu selection	£825
--	------

WOW & FLUTTER METER

PM6307 Crystal oscillator, separate drift and flutter indication	£525
--	------



Electronic Brokers Ltd., 140-146 Camden Street, London NW1 9PB.
Tel: 01-267 7070 Telex 298694 Fax No: 01-267 7363

For further information contact our Sales Office. All prices exclusive of carriage and VAT. Prices correct at time of going to press. A copy of our trading conditions is available on request.

CIRCLE 1 FOR FURTHER DETAILS

ELECTRONICS & Wireless world

over 70 years in independent electronics publishing

CONTENTS

June 1986
Volume 92
Number 1604

Editor
PHILIP DARRINGTON

Deputy Editor
GEOFFREY SHORTER, B.Sc.
01-661 8639

Technical Editor
MARTIN ECCLES
01-661 8638

Projects Editor
RICHARD LAMBLEY
01-661 3039 or 8637 (lab.)

News Editor
DAVID SCOBIE
01-661 8632

Art Editor
ALAN KERR

Drawing Office Manager
ROGER GOODMAN
01-661 8690

BETTY PALMER

Advertisement Manager
ASHLEY WALLIS
01-661 3130

MICHAEL DOWNING
01-661 8640

Classified Executive
SUSAN PLATTS
01-661 3033

Advertisement Production
BRIAN BANNISTER
(Make-up and copy)
01-661 8648

Electronics & Wireless World
is published monthly USPS 687-540

Current issue price £1.25, back issues (if available) £1.06 at Retail and Trade Counter, Units 1&2, Bankside Industrial Centre, Hopton Street, London SE1 tel: 01-928 3567.

By post, current issue £1.30, back issues (if available) £1.40, order and payments to EEP Sundry Sales Dept, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Editorial & Advertising offices:
Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Telephones: Editorial 01-661 3614.
Advertising 01-661 3130 01-661 8469

Telex: 892084 BISPRS G (EEP)

Facsimile: 01-661 2071 (Groups II & III)

Beeline: 01-661 8978 or 01-661 8986.
300 baud, 7 data bits, even parity, one stop-bit.

Type control-Q, then EWW to start;
NNNN to sign off.

Subscription rates: 1 year £18 UK and £23 outside UK.

Student rates: 1 year £11.40 UK and £14.10 outside UK.

Distribution: Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Telephone: 01-661 3248.

Subscriptions: Oakfield House, Perrymount Road, Haywards Heath, Sussex RH16 3DH. Telephone: 04444 59188. Please notify a change of address.

USA: \$49.40 surface mail, £102.60 airmail. Business Press International (USA). Subscriptions Office, 205 E. 42nd Street, NY 10117.

Overseas advertising agents:
France and Belgium: Pierre Mussard, 18-20 Place de la Madeleine, Paris 75008.

United States of America: Jay Feinman, Business Press International Ltd, 205 East 42nd Street, New York, NY 10017 - Telephone (212) 867-2080 - Telex: 23827.

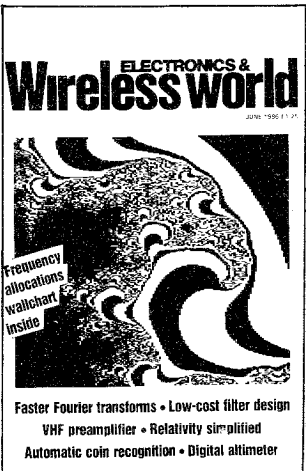
USA mailing agents: Expeditors of the Printed World Ltd, 515 Madison Avenue, Suite 917, New York, NY 10022, 2nd class postage paid at New York, Postmaster - send address to the above.

©Business Press International Ltd 1986.
ISBN 0043 6062

FEATURES

Mobile radio on the move 15 Reports from mobile radio events cover BandIII use, channel tunnel communications and the German cellular system.	Low-noise vhf preamplifier 39 by R.A.Sansoni Designed for Oscar 10 working this 145MHz pre-amp is very tolerant of modification.
Low-cost low-pass filter design 20 by T.F.Scharf Circuit realisations that offer optimum trade-off between hardware simplicity and design complexity.	Relativity simplified 41 by M.H.Butterfield Aiming to demystify relativity, Prof. Butterfield also suggests how other phenomena can be explained.
Faster Fourier transforms 23 by W.Omer Machine language implementation of FFT algorithm evaluates 128 sampled data points with 32bit accuracy in about one second.	Introduction to wire-frame graphics 44 by Hugh Gleaves Part two gives software for visualizing objects in perspective with a QL microcomputer.
Improving 4000 series oscillators 34 by J.H.Owens Enhanced cmos oscillator circuitry has application in tv, data processing and facsimile transmission, as well as automatic keying.	Using SmartWatch 46 Software for the BBC computer puts time and date on-screen.
Digital altimeter 36 by Frank Ogden Improved temperature compensation and a liquid crystal display for the electronic altimeter.	Coin recognition in vending machines 57 by Bob Deane Inductive sensors and custom l.s.i. combine to reject dud coins.

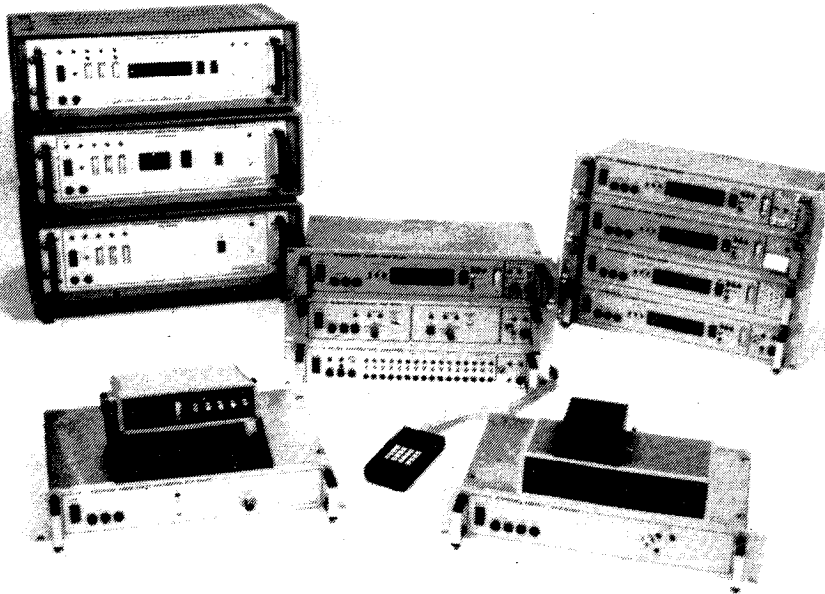
REGULARS

News commentary 4 Radio lans at 60GHz? Switched-polarization radar 75MHz crystal fundamental Mandelbrot patterns	New products 65 68000 for BBC computer Z80000 m.p.u. Oscilloscopes	 <p>Frequency allocations wallchart inside</p> <p>Faster Fourier transforms • Low-cost filter design VHF preamplifier • Relativity simplified Automatic coin recognition • Digital altimeter</p>
Communications commentary 9	Wallchart of frequency allocations Pull-out supplement covers UK radio, radar and tv allocations as well as satellite transmissions. See also page 58	
Feedback 28 Intelligent machines DTMF dialling Telephone recording	Literature received 30	
Circuit ideas 49 Telephone recording 16bit Z80 d.m.a. S100 interface	Events 42	
Applications summary 61 12bit analogue i/o port Gas pressure switch Video d. to a. converters	Appointments 73	
	Advertisers index 80	

This example of a Mandelbrot Set is described in News commentary, page 5

RADIOCODE CLOCKS LTD

SPECIALISTS IN ATOMIC TIME, FREQUENCY AND SYNCHRONISATION EQUIPMENT



NEW PRODUCTS

- **MINIATURE RUBIDIUM OSCILLATOR MODULE**
Lower power, fast warm up, optional output frequencies, programmable frequency offsets.
- **RUBIDIUM FREQUENCY STANDARD**
High performance, compact and rugged instrument. 2U rack or 1/4 ATR case options.
- **INTELLIGENT OFF-AIR FREQUENCY STANDARDS**
Microcomputer controlled instruments, directly traceable to N.P.L., precision ovened local oscillator, comprehensive monitoring and status information, real time synchronisation.
- **LOW COST MSF FREQUENCY STANDARD**
Instant operation, directly traceable to N.P.L., self-contained portable unit, no scheduled frequency changes, 24 hr transmission, real time synchronisation

- Off-air frequency standards
- Intelligent time systems
- Caesium/Rubidium based clocks & oscillators
- Master/slave systems
- Time code generators/readers
- Record/replay systems
- Intelligent display systems
- Precision ovened oscillators
- Time/frequency distribution systems

Radiocode Clocks Ltd*

Unit 19, Parkengue, Kernick Road Industrial Estate, Penryn, Falmouth, Cornwall. Tel: Falmouth (0326) 76007

(*A Circuit Services Associate Co.)

CIRCLE 5 FOR FURTHER DETAILS

FIELD ELECTRIC LTD.

3 Shenley Road, Borehamwood, Herts WD6 1AA. 01-953 6009

Official Orders/Overseas Enquiries Welcome/Telephone Orders Accepted.
Open 5 days. 9am/5pm. Please ring for C/P details now shown.
All prices inc. 15% VAT unless stated.

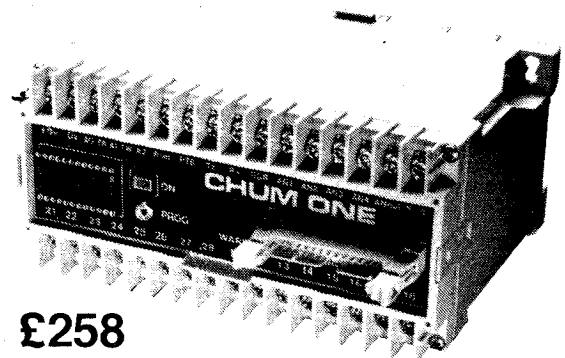
SPECIAL OFFER: Prestel Adaptor Model P1. Complete with remote C/keypad. C/W All electronics. CPU isolation T/x modem 1200 bauds rate. UHF modulator. PSU IC's AY-3-1015D, AY-3-9710HK, PIC 1650A-532, TY16502, AY-3-9725 & Data. **New and boxed. £15.95 C/P £3.0**

Sonnenschein Dryfit A200 Batteries. 12 vdc 5.7ah. New and boxed 151.7 x 65.5 x 94.5mm. Can be used in any position. High impact ABS Case. Charging voltage 13.8V. Max. discharge current 80A. Discharge 20hr 285mA. **£16.95 inc. 15% VAT & C/P**

24V 15 amp Gould switch mode PSU linear PSU. 240V input. New & boxed 215 x 72 x 89mm. 240V 110V input £57.50 C/P 2.50	24V 4.8a Ac/Dc linear PSU. 240V input. New & boxed 227 x 123 x 70mm. £19.95 C/P 3.50	Farnell GG-5m. 6V 5A. 240V input. switch mode PSU. 145 x 88 x 33mm. £20.00 C/P 1.75	19" Rack mount fan unit 3 x 240V. 120 x 120 fans. New unboxed, louvred front. £18.00 inc. C/P	Kingshill linear PSU. 25V. 30A. 240V input £30.00 C/P 20.00
Cherry qwerty keyboard new. IC's SN7493AN, SN74151AN, SN7400N, etc. £12.50 C/P 1.50	Die-cast Alt. Box 4 1/2 x 1 1/8 x 2 1/2" £2.00 C/P 50p	NCR Micro Fiche 390 x 279 x 189mm. New portable 240V Ac. 24/12V Dc input. £69.00 C/P 6.00	PCB 9 x 2532JL45 EPROMS 4K x 8 bits. £12.95 inc. C/P New	22,000ul 25V new Computer Grade caps £1.50 inc. C/P
Bardic/Chloride Safety Handlamp C/W sealed alkaline batt & charger pack. 24V Dc. New & boxed. £34.50 C/P 3.75	Cetronic Ltd. Limb Conditioner 50Hz. input freq. 240V-20A + 10% 5KVA 20 8 Amp. £350.00	Gould Type DC379. 240V input 5V 40A-12V 4A + 15V 11A switch mode PSU. £55.00 C/P 5.00	Hewlett Packard 180A Oscscope C/W 1801A D/C/H 50MHz Vert Amp + 1821 A time base & delay gen. with data rack mount. £550.00	
Cossor CDU150 Dual Trace Oscscope C/W data 35MHz. £165.00	Kingshill Stabilised Metered PSU Type 601 240V input 0-60V 0-1A £50.00	4 x AA Ni-Cads Rechargeable Shrink wrap. Ex-new equipment £2.25 inc. C/P	Voltec Co + 12V 1-5A + 5 30A 12V10A Linear PSU. 115V/230V input. Rack mount. 17 x 14 x 434". £38.00 C/P 5.50 NEW	
Fairchild 8mm Type 7007 Suitcase Projector C/W audio amp. Lens & case 240V £19.95 C/P 3.00	Sodeco 12V Resetable Counter 6 Digit Panel Mounting New. £6.75 C/P 1.25	Universal Coupling Arms ideal for robotics 4" closed. £2.25 inc. C/P	Tektronix Type 454 Oscscope. 150MHz Dual Trace Delay Sweep. £615.00	
Tektronix Type SI Sampling Heads. £200.00	Data Recording Fan Cooled Linear PSU 240V input + 15-158A per output new/boxed. £40.00	120 x 120 x 38mm 115V Fan's new condition £2.50 inc. C/P	Tequipment D67 Dual Trace 25MHz Delay Sweep. £250.00	
Tektronix Linear IC Test Fixture 178. £500.00	12V Dc Q.Halogen 100W 30 x 10mm. £2.00 inc. C/P	Comark Digital Thermometer Type 3000 195 to 1100C data VA. £75.00 inc. Thermal Coup	Tektronix Type 422 Oscscope 15MHz Dual Trace FET Inputs. £300.00	
Tektronix Type 7A12 Dual Trace Amp. £???.00	BNC 50Q Amphenol Surface Sockets. £1.00 inc. C/P	Meter Movement in Plas-Case. Reads 230 C/450 F. 195 x 127 x 500mm case meter 88 x 72mm. £9.95 C/P 1.50	CDC Lark Hard Disk Drive C/W PSU Smoke Damage. £50.00	
Tektronix Type 1A5 Differential Amp. £60.00	12-0-12V 2A Per Winding 230V Prim. £2.50 C/P 1.00	CDC Hawk 5 1.5Mb Hard Disk Drive. New & Boxed C/W Data. £250.00	Coutant Linear PSU. New & boxed with data. GP series 15-18V 10A 240V input. £46.00 inc. C/P	
Tektronix 53/54C Dual Trace Calibrated Pre-Amp. £50.00	9-0-9V 1A 230V Prim. £1.95 C/P 50p	Philips Type PM 3212 Dual Trace Oscscope 25MHz £350.00		
	20/22V 2A 230V Prim. £5.50 C/P 75p			
	Cathoden Crystal Osc 20MHz with data. £2.50 inc. C/P			

CIRCLE 49 FOR FURTHER DETAILS

CHUM ONE A Industrial Computer



£258

- ★ Control BASIC and Z80 Assembler Language
- ★ On Board EPROM Programmer
- ★ Detachable Hand-Held Keyboard and Display
- ★ 4K Bytes of Battery Backed Memory
- ★ Up to 64 Relay Outputs
- ★ Up to 64 Opto-Coupled Inputs
- ★ 4 Analogue Inputs
- ★ 1 Analogue Output
- ★ RS232 Interface
- ★ Cassette Back-Up Memory
- ★ Real Time Clock

The Chum One A offers the complete solution to all measurement and control problems. Programs can be written, tested and modified in RAM then at a touch of a switch blown into an EPROM.

**WARWICK DESIGN GROUP, 12 ST. GEORGE'S ROAD
LEAMINGTON SPA CV31 3AY (0926) 34311**

CIRCLE 99 FOR FURTHER DETAILS

SECOND USER TEST EQUIPMENT

This is just a sample of our huge inventory – contact us with your requirements.

OSCILLOSCOPES

Hewlett Packard		
182T	Scope Mainframe	£1850
1715A opt 101	200MHz Scope	£1950
Tektronix		
212	Miniscope 500KHz	£350
465B/DM44	100MHz Scope OMM	£2000
465B	100MHz Scope	£1450
475A	200MHz Scope	£2350
475	150MHz Scope	£2000
475A/DM44	200MHz Scope/DMM	£2750
485	350MHz Scope	£4950
608	Monitor	£1500
634 opt 1,20	Display Monitor	£750
5223	Scope Mainframe (Mint)	£3600
5441	Scope Mainframe (Mint)	£1950
7603	100MHz Mainframe	£1950
R7603	Scope Mainframe	£2100
7704A	200MHz Mainframe	£2850
7904	500MHz Mainframe	£6850

A large selection of 7000 series plug-ins available at up to 60% saving on list. Please call for quotations.

ANALOGUE METERS

Fluke		
887AB	Differential Voltmeter	£850
931B	Differential Voltmeter	£750
Marconi		
TF 2603	RF Millivoltmeter	£550

ANALYSERS

Anritsu		
MS 62B	Spectrum Analyser 10KHz-1700MHz	£7250
Hewlett Packard		
332A	Distortion Analyser	£600
8568A	Spectrum Analyser	P.O.A.
8903A opt 01	Modulation Analyser	£4800
Marconi		
TF 2330A	Wave Analyser	£850
TF 2337A	Automatic Distortion Meter	£450
TF 2300B	Modulation Meter	£950
TF 2809	Data Line Analyser	£650
Radiometer		
BKF 10	Automatic Distortion Analyser + REC61 Plotter	£1500
Thandar		
TA 2160	Logic Analyser 16 channel. MINT	£950
Tektronix		
308	Data Analyser	£1750

Marconi Instruments
INDUCTOR ANALYSER TF 2702
SPECIAL OFFER £950
0.3μH-21,000 Henries
Int. Freq. 10KHz, 1KHz & Powerline
Ext. Freq. 20Hz-20KHz
6 MONTHS WARRANTY

SIGNAL SOURCES

Hewlett Packard		
214A	Pulse Generator	£750
8007B	Pulse Generator	£950
8011A	Pulse Generator 20MHz	£550
8015A opt 02	Pulse Generator	£1500
8614A	Signal Generator	£3950
8616A	UHF Signal Generator 1800-4500MHz	£2750
86260A	Sweep Generator Plug-in 12.4-18GHz	£3500
8640B 001-002	AM/FM Signal Generator	£4500
8890B	Sweeper Mainframe	£950
4204A	Digital Oscillator	£475
3314A opt 01	Function Generator	£2500
3325A	Function Generator	£1950
Marconi		
TF 2002B	AM/FM Signal Generator	£995
TF 2006	AM/FM Signal Generator 1GHz	£1950
Wavetek		
166	50MHz Pulse/Function Generator	£1500
184	5MHz Sweep Generator	£650
185	Sweep Generator 5MHz	£595

TEKTRONIX G.P.T.E.

ENORMOUS SAVINGS – NEW LOW PRICES – SAVE

UP TO 80%		
DC 504 opt 01	Counter	£95
DC 508A	Counter	£500
DD 501	Digital Delay	£300
FG 501	Function Generator	£95
FG 504	40MHz Function Generator	£1250
PG 502	Pulse Generator	£1000

PG 505	Pulse Generator	£150
PG 506	Constant Amp. Generator	£1500
PG 508	Pulse Generator	£900
RG 501	Ramp Generator	£100
SC 501/2	Scopes	each £350
SG 502	Signal Generator	£325
SG 505	Signal Generator	£260
TG 501	Time Mark Generator	£1350
TM 501	Mainframe	£320
TM 506	Mainframe	£325
TM 515	Mainframe	£400

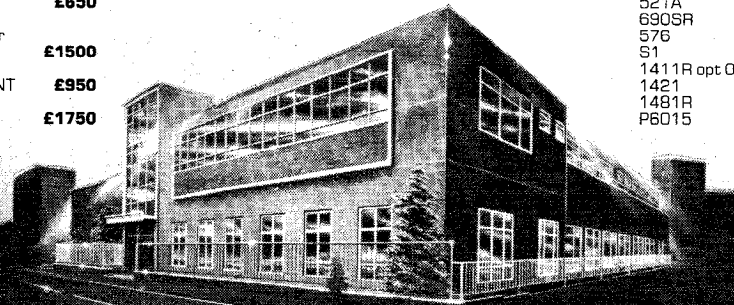
HEWLETT PACKARD COMPUTERS

2631B opt 005, 017, 019	Printer	£650
3497A opt 001	Data Acquisition Unit	£2950
6940B	Multiprogrammer	£1495
7910H opt 015	Disk Drive	£1500
9862A	Plotter	£500
9915A	Computer	£850

Also available: 9816A • 9825S • 9825T • 9826A
• 9835A • 9836A • 9845S • 9845B • 9845C-150
• 9827C • 9827T.

GENERAL PURPOSE T & M

Farnell		
SSG 520 + TTS 520	Transmission Test Set	£4275
Fluke		
887AB	AC/DC Differential Voltmeter	£850
5200A/5215A	AC Calibrator	£7500
7220A	Comms. Freq. Counter	£495
G. P. Industrial		
MFL 373	Fault Locator. MINT	£395
Hewlett Packard		
3437A	High Speed D. V. M.	£1250
3465A	4 1/2 Digit D. M. M.	£350
8746B	S Parameter Test Set	£7500
7475A opt 001	Plotter	£1275
Keighley		
192 opts 1910, 1923	Prog. Systems D. M. M.	£995
Marconi		
TF 1313A	LCR Bridge 0.1%	£750
TF 2702	Inductor Analyser	£950
TF 2807A	PCM Tester	£1350
TF 2905/8	TV Pulse Generator	£750
Tektronix		
148	TV Insertion Signal Generator	£4250
520A	Vectorscope (NTSC)	£3750
521A	Vectorscope (PAL)	£4250
6905R	Colour Monitor	£1500
576	Curve Tracer	£7500
S1	Sampling Head	£850
1411R opt 04	TV Generator	£7500
1421	Vectorscope	£1650
1481R	TV Waveform Generator	£3450
P6015	40KVH. V. Probe (New)	£400



ELECTRONIC BROKERS IS THE SOURCE

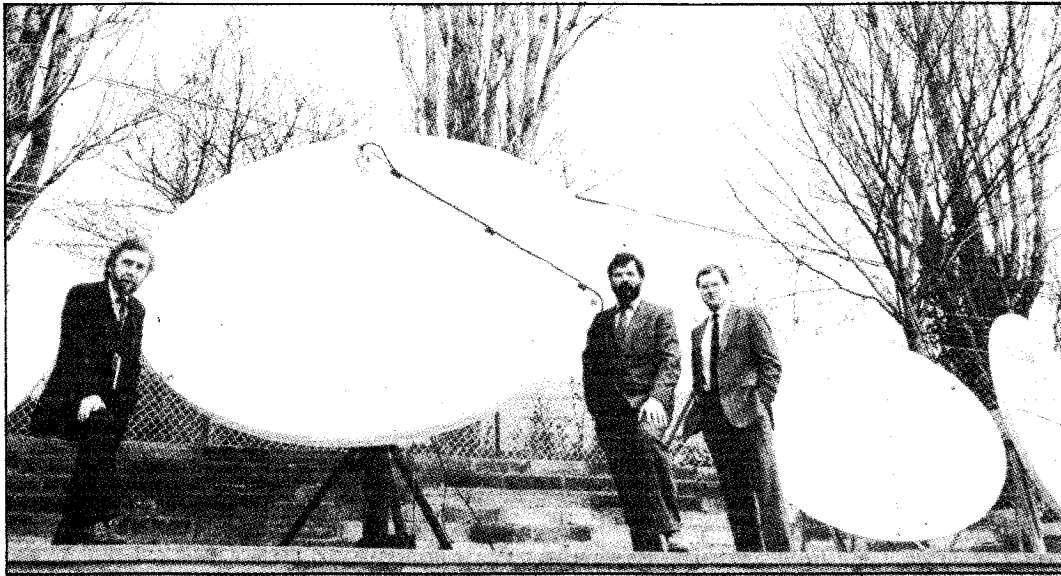
All prices are exclusive of VAT and correct at time of going to press • Carriage and packing charges extra • A copy of our trading conditions is available on request



Electronic Brokers Ltd, 140-146 Camden Street, London NW1 9PB
Telephone: 01-267 7070 • Telex: 298694 • Fax: 01-267 7363

CIRCLE 95 FOR FURTHER DETAILS

NEWS COMMENTARY



STS founding directors left to right: Mike Stone, Roger Ashby and Nick Heckford.

Satellite tv company aims for 25% share

Satellite Technology Systems are set to capture 25% of the UK market for satellite tv and data reception equipment. The company, formed in 1983 and who made their first sale a year ago, hope to sell at least 1,500 systems by the end of the year. They estimate the UK market size this year to be 8,000 units, give or take 2,000, with a value of £9 million and expect that to double in 1987. Speaking at the company's recent product launch, m.d. Roger Ashby expected STS turnover would be £1 million within a year, rising to £10 million after five years. At this sort of level prices could be

expected to fall to £600 for a domestic equipment set-up.

The STS 300 'entry level' domestic system costs around £1000 and comprises a 1.2m dish (for SE England) with 42dB gain, down-converter with a noise figure of typically 1.9 to 2.3dB (2.5dB max) and 50dB gain, and a receiver with 40 preset channel positions, subcarrier tuning from 5 to 8MHz, remote polarization control, and both v.h.f. and baseband video outputs.

"Our domestic product offers very high quality reception" says technical director Mike Stone, "far better than anything else at a comparable

price."

The '600 series' for commercial and educational use has a larger dish diameter and a different receiver, operating with voltage synthesized tuning in 20MHz steps and wide/narrow bandwidth selection. For hotel and club installations receivers would be individually tuned to permit simultaneous reception, and could feed up to 600 tv sets.

The company disclosed that Television South plc had acquired a 47% shareholding in STS with an investment of £440,000.

Good idea – shame about the business sense

"British inventors still don't understand the needs of a start-up business" says Keith Gummery, from Spicer & Pegler, one of the judges in the Internecon IDEA '86 award scheme for new electronic designs or applications. The 100 entrants showed the breadth of creativity available but: "The judges were greatly disappointed by the quality of the plans seen. In spite of the guidelines provided by the organisers, few seemed to take seriously the need to set out the supporting facts for their plan to convince other of their business priorities," he said.

Mr Gummery's company of chartered accountants will be advising the four winners: Brian Payne of Electronics Aids for the Blind for a telecommunications system for the blind/deaf; Mark Hawood of Enigma Electronics for a secure seal for vehicles; John McKechnie, MTS Cambridge for a secure voice transmission system; and Steven Parkes for a Transputer-based music synthesizer.

Radio waves that don't radiate: a new resource?

Research being conducted at Bradford University could lead to a hitherto unused part of the radio spectrum being opened up for public use. The idea is to exploit wavelengths in 4.5 – 5.5mm region (about 55-65 GHz) which normally suffer strong atmospheric absorption by molecular oxygen. At 60GHz, signals suffer an additional propagation loss factor of 20 for each kilometre traversed.

Professor Peter Watson and Dr Andrew Richardson plan to

exploit this limited range in such a way that the same frequency can be re-used more or less *ad infinitum* for short range wideband links. Such links, for local area networks, ENG applications, etc. would for all practical purposes be non-interfering, analogous perhaps with a number of human conversations going on simultaneously in the same room.

Watson believes that these properties make 60GHz uniquely suitable for an

entirely new form of regulation based on land ownership. As with a garden hosepipe, it would be possible to spray one's own property, taking only slight care to avoid it going over the fence.

Their work is directed toward eliminating the bulky precision components at present in use. Gunn oscillators and antennas fabricated with microstrip technology are just two examples of the approach currently being explored.

Fibre Network

London University is to get an interactive video network based on fibre optic links. It will link seven of the University sites, allowing meetings, tutorials, seminars, lectures and conferences to take place between remote sites. The system will use switched-star techniques and the latest generation of optical fibre equipment, developed for transmission in BT networks; each fibre can carry four colour tv channels with the associated sound and an additional 2Mbit/s data channel. The network will be developed by the university in collaboration with the BT Research Labs, Martlesham.