

## JACK PLUGS AND SOCKETS

### Description

### Price

#### 1/4" MONO

1/4" JACK PLUG, MONO.  
Plastic Barrel

14p



1/4" JACK PLUG, MONO.  
Screened metal Barrel

25p



RIGHT ANGLED  
1/4" JACK PLUG, MONO.  
Metal Barrel (Guitars etc)

25p



1/4" MOULDED JACK SOCKET.  
Single break contact. MONO

20p



1/4" OPEN, CHASSIS SOCKET  
MONO

13p



1/4" PLASTIC IN-LINE SOCKET,  
MONO

17p



1/4" METAL IN-LINE SOCKET  
MONO (Screened)

26p



#### 1/4" STEREO

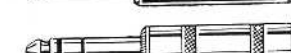
1/4" JACK PLUG, STEREO.  
Plastic Barrel

18p



1/4" JACK PLUG STEREO,  
Screened Metal Barrel

32p



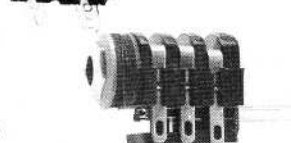
1/4" MOULDED JACK SOCKET,  
Two break contacts. STEREO.

24p



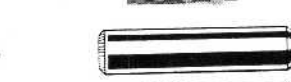
1/4" MOULDED JACK SOCKET  
STEREO, plus two contacts to  
break loudspeaker line etc.

32p



1/4" OPEN CHASSIS SOCKET  
STEREO

15p



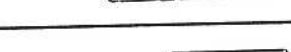
1/4" PLASTIC IN-LINE SOCKET,  
STEREO

22p



1/4" SCREENED METAL IN-LINE  
SOCKET, STEREO.

31p



#### 2.5mm

2.5mm JACK PLUG, MONO,  
Plastic Barrel.

10p



2.5mm JACK PLUG, MONO,  
Screened Metal Barrel.

13p



2.5mm OPEN CHASSIS SOCKET  
Switched.

8p



2.5mm IN-LINE SOCKET.  
Plastic Barrel.

11p



#### 3.5mm

3.5mm JACK PLUG, MONO.  
Plastic Barrel.

10p



3.5mm JACK PLUG, MONO.  
Screened Metal Barrel.  
Long reach.

15p



3.5mm OPEN CHASSIS SOCKET.  
Switched.

8p



3.5mm MOULDED SOCKET,  
MONO. Two break contacts.

30p



3.5mm IN-LINE SOCKET.  
Plastic Barrel

12p



3.5mm IN-LINE SOCKET.  
Screened Metal Barrel.

19p



## HIGH QUALITY AUDIO ADAPTORS

A range of adaptors to convert your existing plugs and sockets to fit other requirements. These adaptors really are a great help when trying to connect up equipment that uses different types of connectors. They have a moulded rubber/plastic body that is strong but attractive. Available to cover most uses.

Type	From	To	Price
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RJ1	Phono	Two phono	30p
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RJ2	Phono	1/4" Jack	30p
-----	-------	-----------	-----



RJ3	Phono	3.5mm Jack	30p
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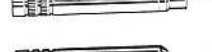
RJ4	Phono	2.5mm Jack	30p
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RJ5	1/4" Jack	Phono	30p
-----	-----------	-------	-----



RJ6	1/4" Jack	3.5mm Jack	30p
-----	-----------	------------	-----



RJ7	1/4" Jack	2.5mm Jack	30p
-----	-----------	------------	-----



RJ8	3.5mm	Phono Jack	30p
-----	-------	------------	-----



RJ9	3.5mm	1/4" stereo jack	30p
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RJ10	3.5mm	2.5mm Jack	30p
------	-------	------------	-----



RJ11	2.5mm	Phono	30p
------	-------	-------	-----



RJ12	2.5mm	1/4" Jack	30p
------	-------	-----------	-----



RJ13	2.5mm	3.5mm Jack	30p
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### Metal Body Adaptors

RJ15	Phono	Two Phono	32p
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RJ16	2.5mm	3.5mm Jack	32p
------	-------	------------	-----

RJ17	3.5mm	3.5mm Jack	32p
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## TERMINATED AUDIO LEADS

Type	From	To	Price
AL1	5 pin DIN plug	5 pin DIN plug	65p
AL2	5 pin DIN plug	5 pin DIN socket	65p
AL3	5 pin DIN plug	Two 3.5mm Jack plugs	65p
AL4	5 pin DIN plug	Two phono plugs	65p
AL5	5 pin DIN plug	Four phono plugs	90p
AL6	2 pin DIN plug	2 pin DIN socket	55p
AL7	2 pin DIN plug	2 pin DIN plug	55p

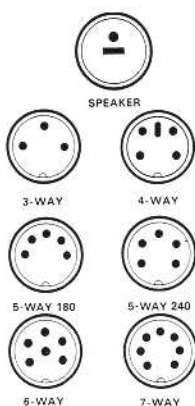
For other terminated leads, including guitar leads please see separate box.

## DIN PLUGS AND SOCKETS

Type	Standard Plug	Panel Socket	In-Line Socket
2 pin L/S	10p	06p	20p
3 pin	13p	10p	20p
4 pin	13p	10p	20p
5 pin	13p	10p	20p
6 pin	15p	15p	23p
7 pin	15p	15p	23p

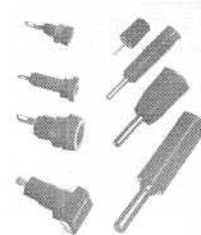
**Please Note :** When ordering 5pin plugs etc. please state 180 or 240 degree spacing. Also available, a **double** spring mounted 2pin DIN loudspeaker socket, ideal for stereo amplifiers. Order as DOUBLE 2 pin DIN loudspeaker socket.

Price 15p each



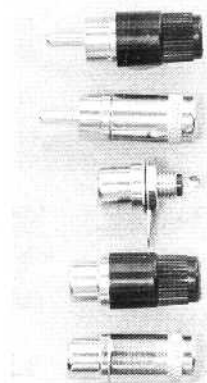
## BANANA TYPE PLUGS AND SOCKETS

Description	Price
1mm Plug, Plastic.	6p
1mm Socket, Plastic	6p
Red and Black.	
2mm plug, Plastic.	10p
2mm Socket, Plastic.	10p
Black, Red, Green, Yellow, Blue,	
3mm Plugs, Plastic.	6p
3mm Sockets, Plastic.	6p
Red, Black,	
4mm Plugs, Red & Black	11p
4mm Sockets, Plastic.	11p
Red, Black, Yellow, Green, Blue and White.	



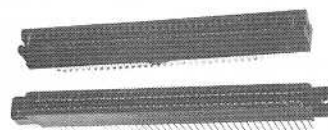
## PHONO PLUGS AND SOCKETS

Description	Price
Phono Plug, Plastic Screw Top, Black, Red, Blue, Yellow, Green, White.	10p
Phono Plug, All Metal Body.	15p
Phono Socket, Chassis mounted	15p
Phono Socket Single	6p
Phono Socket Double	8p
Phono Socket 4 way	15p
Phono Socket 6 way	22p
Phono Socket 8 way	29p
The above 5 sockets are mounted on a paxolin strip.	
Phono in-line Socket, Plastic	12p
Phono in-line Socket, Screened	20p

EDGEWISE CONNECTORS\*  
0.1" pin spacing

Two types are available both with gold plated socket contacts.

Type	Price
2 x 40 way (pins) for soldering to mother board.	180p*
37 way (solder lugs)	180p*
Fixing clips for 37 way	8p*



## COAXIAL PLUGS AND SOCKETS

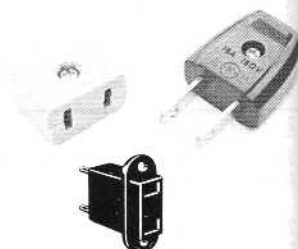
Description	Price
Coaxial Plug, Bakelite.	10p
Coaxial Plug, Metal.	18p
Coaxial Socket, Plastic recessed.	12p
Coaxial Socket Metal.	18p
Coaxial In-Line,	12p

For suitable cables see separate section on cables.



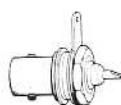
## AMERICAN MAINS PLUG AND SOCKET

A floating 2 flat pin plug and socket usefull for many applications. Rated at 10 amps at 250Volts. Remember to wire mains voltage to the socket and not to the plug. If this policy is not followed it could have shocking results.



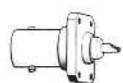
Type	Price
AMP-1 2 pin plug	15p
AMS-2 2 pin socket	15p
AMCS-3 2 pin chassis socket	15p

## B.N.C. CONNECTORS



Bulkhead Socket

Fixing hole :- 9.7mm  
65p



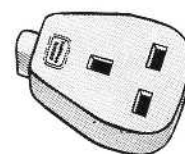
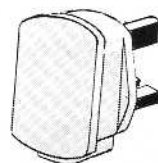
Panel Socket Square

F.C. :- 12.7 x 12.7mm.  
65p

Floating Plug  
65p

50 ohm constant impedance connectors with Beryllium-copper contacts. Silver plated brass bodies. Weatherproof bayonet locking construction. P.T.F.E. insulation for 500V peak working and frequencies up to 10,000 MHz.

## 13 AMP PLUGS &amp; SOCKETS\*



Type	Price
BP13 Bakelite plug	34p*
RP13 Rubber plug	34p*
FS13 Floating Rubber Socket	75p*

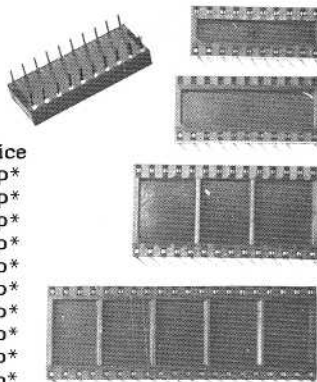
Spare fuses are also available in the normal ranges.

6p\*

## DIL SOCKETS for IC's\* TEXAS low profile

A range of high quality low profile DIL sockets with glass filled nylon body. Contacts are designed to grip both sides of IC pins to ensure positive connection. Available in the following configurations.

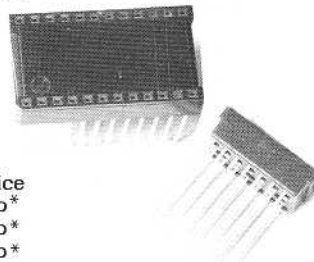
Type	Price
8 pin .. .. .	10p*
14 pin .. .. .	12p*
16 pin .. .. .	13p*
18 pin .. .. .	20p*
20 pin .. .. .	27p*
22 pin .. .. .	30p*
24 pin .. .. .	30p*
28 pin .. .. .	42p*
40 pin .. .. .	64p*
60 pin .. .. .	245p*



## DIL CAMBION SOCKETS\* WIRE WRAP

A high quality wire wrap type socket. See separate section for details of suitable wiring pens and ancillary products. Available in the following configurations.

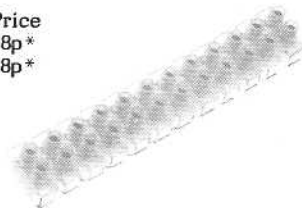
Type	Price
14 pin .. .. .	40p*
16 pin .. .. .	55p*
24 pin .. .. .	80p*



## TERMINAL BLOCKS\* (chocolate blocks)

Known originally as the chocolate block terminal because of its dark brown colour but now made with more modern materials than the old fashioned bakelite. These terminals are available in a twelve way configuration that can easily be cut down to any required length. Connections are made via small screws clamping onto the wire etc.

Type	Rating	Price
12 way	2.5Amp	28p*
12 way	5Amp	28p*



## TERMINAL STRIP\* (Tag type)

An economical way of terminating wires and components by soldering to this tag type terminal strip. The 8 tags are secured to a paxolin strip which in turn can be fixed via its two brackets to convenient position on a chassis etc.

Type	Price
8 way ..	8p*



## SOLDERCON PINS

Soldercon pins are now the accepted way of making up your own low priced DIL sockets. They can of course be used to make up sockets for other types of devices. The pins are supplied in strip form so that they can be cut to the exact length required. To ease fitting cut strip to required length, insert into predrilled holes and solder to copper board. It is then quite easy to flex off connecting strip from pins.

Available in strips of 100 and 1000.

Type	No of pins	Price
Soldercon pins	100	50p*
Soldercon pins	1000	395p*



## TRANSISTOR HOLDERS\*



Type	Suitable for	Price
3 pin	T05.	16p*
4 pin	T092, T018.	16p*

## DC POWER PLUGS AND SOCKETS\*

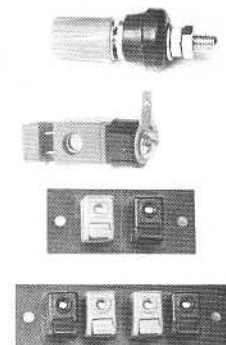
The ideal way of connecting your battery powered equipment to an external power source. i.e. Radios, calculators etc.



Type	Price
Plug 2.5mm	15p
Socket To fit above	16p

## TERMINALS

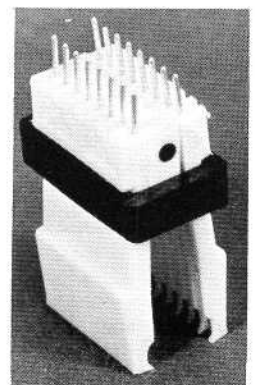
Description	Price
4mm socket/screw type. Plastic. Red, Black, White, Yellow, Blue and Green.	21p*
Spring loaded, (single) Red, Black, White, Blue and Yellow.	20p*
Spring loaded, double mounted on paxolin. 1 Black, 1 Red.	42p
Spring loaded, 4 way, mounted on paxolin. 2 Black, 2 Red.	70p



## IC TEST CLIP\*

A great little tool and a must for checking and monitoring IC's in circuit. The test clip is spring loaded for positive connection to the IC under test and can be used on any DIL package up to 16 pins. Makes voltage checking etc. a very easy task.

Type	Price
IC Test Clip	225p*





The following connectors from the well known BULGIN range have been carefully selected to meet the demand for a range of high quality plugs and sockets.

It should however be noted that before using the following plugs and sockets on mains operated domestic equipment reference should be made to the Electrical Equipment (Safety) Regulations 1975.

#### SIDE ENTRY CONNECTORS

**P360SE**  
(Plug and Socket) **3 Pole plug and socket. (250V @ 1.5Amps)**  
A moulded side entry 3 pin plug and socket with solder tag connections to both members. Fixing hole  $\frac{3}{8}$ " dia plus keyway. Max panel thickness  $\frac{1}{4}$ ". Small physical size makes this an attractive connector.

**P429**  
(Plug)

**P430**  
(Socket)

Price  
**P360SE** 85p\*  
**P429** 30p\*  
**P430** 55p\*

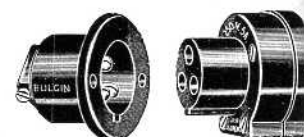


**P73**  
(Plug and Socket) **3 Pole plug and socket (250V @ 5Amps)**  
Heavy duty 5Amp chassis mounted plug ( $\frac{3}{8}$ " fixing hole required) secured by 2 x 4BA nuts and bolts. (not supplied.) Cable terminated by 3 x 6BA screws. Keyway for polarised connection. Side entry floating socket secures cable via 3 x 4BA screws.

**SA1861**  
(Plug only)

**SA2111**  
(Socket only)

Price  
**P73SE** 122p\*  
**SA1861** 39p\*  
**SA2111** 83p\*

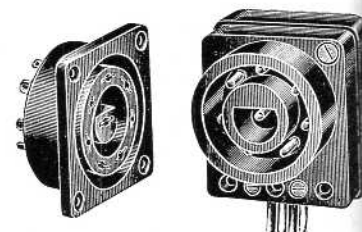


**P550**  
(Plug and Socket) **Octal Plug and Socket (250V @ 6Amps per pin)**  
A unique polarised eight pin inlet/outlet connector which gives 7 poles plus earth. Plug flex is terminated with 4BA screws. Socket wires are secured via 187 series push on tabs or could be soldered direct. The chassis mounted socket requires a fixing hole  $1\frac{1}{2}$ " dia (clear) plus 4 x 6BA holes on  $1\frac{5}{16}$ " centres.

**P551**  
(Plug only)

**P552**  
(Socket only)

Price  
**P550** 196p\*  
**P551** 149p\*  
**P552** 50p\*



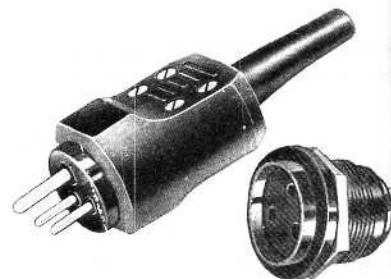
#### STRAIGHT ENTRY CONNECTORS

**P648**  
(Plug and Socket) **3 Pole connector pair (250V @ 1.5Amps)**  
3 pin panel mounted socket secured to chassis via  $\frac{3}{8}$ " dia hole with a nickel plated nut. Also supplied with a back locking nut. Floating plug has a moulded body with two flats for easy grip, with axial entry for cable to 3 solder sockets. Conforms to current safety regulations.

**P649**  
(Plug only)

**P650**  
(Socket only)

Price  
**P648** 102p\*  
**P649** 55p\*  
**P650** 47p\*



**P194**  
(Plug and Socket) **6 Pole connector pair (250V @ 2Amps)**  
The plug is mounted onto the chassis via a  $\frac{3}{8}$ " nut and a keyway provides polarisation. Axial entry of the cable into the floating socket is terminated via 6 solder sockets.

**P427**  
(Plug only)

**P428**  
(Socket only)

Price  
**P194** 105p\*  
**P427** 50p\*  
**P428** 55p\*



**P74**  
(Plug and Socket) **2 Pole connector pair (250V @ 5Amps)**  
Chassis mounted plug is secured via 2 x 6BA screws into a  $1\frac{1}{16}$ " dia hole. The cable to the axial floating socket is secured by 6BA pinch screws.

**SA468**  
(Plug only)

**SA1988**  
(Socket only)

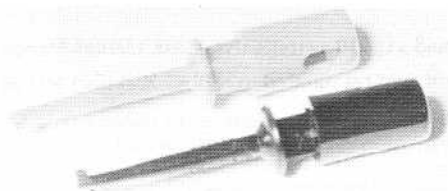
Price  
**P74** 62p\*  
**SA468** 32p\*  
**SA1988** 32p\*







## HOOK - ON TEST PROBES



These fully insulated hook-on test probes are the only satisfactory way of **safely** monitoring the various signals on small components such as I.C's etc. Because of the close spacings between the pins on an I.C. it is so easy for the more conventional type probe to slip off of the pin and possibly touch or short out an adjoining part of the circuit. With these probes the problem is eliminated. The mouldings are made of an acetal plastic with spring loaded contacts. Screw or soldered connections. Supplied in pairs only. One red, one black.

Price : 60p\* per pair

## TPA-2 \* PISTOL GRIP PROBE



A high quality spring loaded pistol grip action probe. Strong jaws ensure positive grip on component to be measured. A 4mm socket is provided to accept test leads. Overall length :- 154mm. One Red, One Black.

Price : 125p\* per pair

## TPA-1 \* TEST PROD



High quality fully insulated test prod, 107mm in length with a 4mm socket in the end of prod for quick connection to various length leads. Supplied in pairs only. One red, one black.

Price : 70p\* per pair

## 33106 \* PROD TIP



Small prod tip with screw-off clamp to grip wire without soldering. Available in pairs, one red, one black.

Price : 28p\* per pair

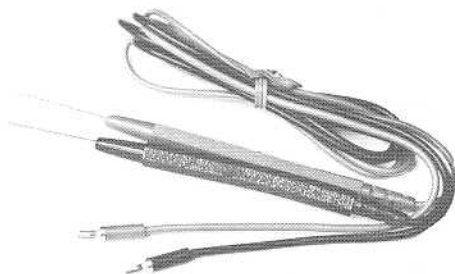
## SUPER FLEX \* 55/0.1mm



A specially flexible cable ideal for various types of test leads, can also be used where there is a requirement for a cable with really flexible properties. Available in red and black only. For use up to 2000V RMS at 6amps.

15p\* per metre

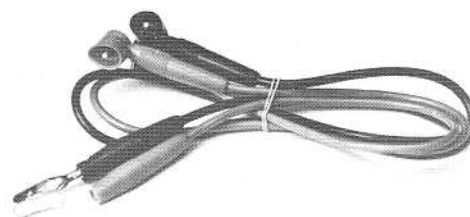
## F294 \* TEST LEADS



A fully insulated set of test leads with flexible moulded prods. Long leads terminated at other end with banana plugs.

Price : 60p\* per pair

## AVO LEADS \* REPLACEMENT TYPE



High quality pair of test leads, make ideal replacements for AVO test meters. Strong heavy duty cables and prods with right angle entry plugs. Supplied as a set of two leads, one red, one black and a crocodile clip.

Price : 250p\* per pair

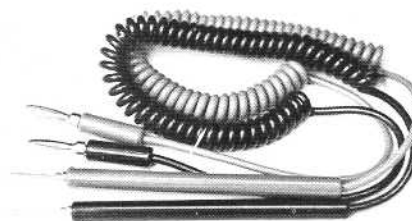
## KJ450 \* TEST LEAD KIT



Complete kit with long reach prods. Supplied with the following alternative ends: Banana plugs, Spade terminals, crocodile clips, Pin plugs. All push-on fittings.

Price : 175p\* per pair

## 012 \* CURLY TEST LEADS



A fully insulated set of test leads with curly type cable and terminated with 2mm banana plugs. One black, one red. Supplied in pairs only.

Price : 150p\* per pair

**Professional Oscilloscope Probes** now available to the amateur. Choice of **x10** and **x1**, **x10** switched versions. Can be compensated to match instruments having an input capacitance of 15-50pF. Probes have a 1.5m screened lead terminated in a BNC 50 $\Omega$  plug and an earth lead with crocodile clip. Supplied complete with accessories and instructions in a PVC zip-bag.

### SP100 OSCILLOSCOPE PROBE ( x1 & x10 )

This passive probe incorporates a three position slide switch in the head.

#### Specification

##### POSITION x1

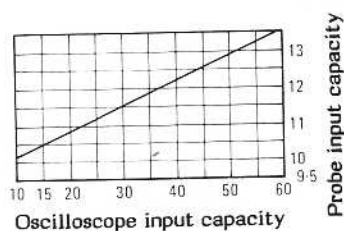
Bandwidth	D.C. to 10MHz
Input Resistance	1M (Oscilloscope Input)
Input Capacity	40pF plus Oscilloscope Capacity
Working Voltage	600Volts D.C. (Including Peak A.C.)
Cable Length	1.5metres

##### POSITION REFERENCE

Probe tip grounded via 9M ohm resistor. Oscilloscope input grounded.

##### POSITION x10

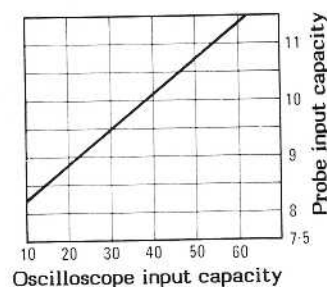
Bandwidth	D.C. to 100MHz
Risetime	3.5 nanoseconds
Input Resistance	10M ohm when used with Oscilloscope which have a 1M ohm input. (Probe resistance 9M ohm $\pm 1\%$ )
Input Capacity	11.5pF when used with Oscilloscopes which have a 30pF input capacity. For other values see graph.
Compensation Range	10-60pF
Working Voltage	600Volts D.C. (including Peak A.C.)



### P100 OSCILLOSCOPE PROBE ( x10 )

#### Specification

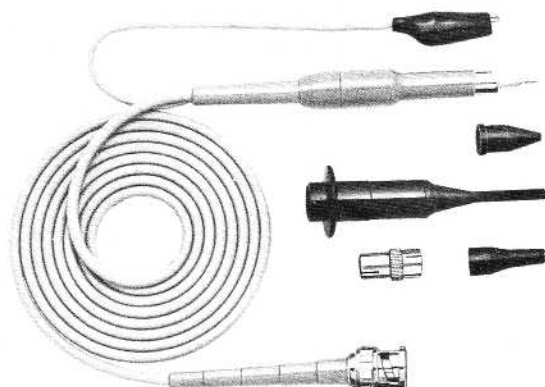
Bandwidth	100MHz
Risetime	3.5 nanoseconds
Input Resistance	10M ohm when used with Oscilloscopes with 1M ohm input (Probe resistance 9M ohm $\pm 1\%$ )
Input Capacity	9.5pF when used with Oscilloscopes which have 30pF input capacity.
Compensation Range	10-60pF
Working Voltage	600Volts D.C. (including Peak A.C.)
Cable Length	1.5 metres



#### Accessories Supplied with Probes

Insulating Tip  
Spring Hook  
Trimmer Tool  
BNC Adaptor  
IC Tip

OSCILLOSCOPE PROBE KIT	SP100	..	..	£12.65*
OSCILLOSCOPE PROBE KIT	P100	..	..	£ 8.75*





## MOVING COIL METERS

### Type A and Type B

For a really professional looking finish this is the meter for you. It offers a wide selection of ranges, enough to cover most needs, and at a price that will not break the bank. And to add a touch of class we can also supply an ILLUMINATION KIT (for type A only) consisting of two small lamps that fit unobtrusively behind the cover. There are two extra terminals at the back of the meter for connecting the supply for the lamps. The meter accuracy is  $2\frac{1}{2}\%$

Type A meter front measures 60 x 45mm, overall depth is 40mm. Fixing hole cutout required = 38mm diameter. Type B meter front measures 108 x 82 mm, overall depth is 40mm. Fixing hole cutout required = 60mm diameter.

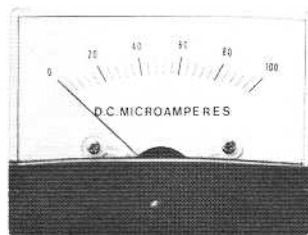
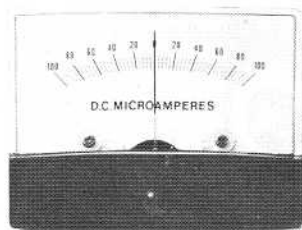
### Type A

Model	F.S.D.	Resistance	Price
T21	0-50uA	1250ohms	475p*
T22	0-100uA	580ohms	475p*
T23	0-500uA	170ohms	475p*
T24	0-1mA	170ohms	475p*
T25	0-5mA	170ohms	475p*
T26	0-10mA	60ohms	475p*
T27	0-50mA	0.5ohms	475p*
T28	0-100mA	0.5ohms	475p*
T29	0-500mA	0.5ohms	475p*
T30	0-1A	0.5ohms	475p*
T31	0-2A	0.1ohms	475p*
T32	0-25Vdc	20K ohms	475p*
T33	0-50Vdc	50K ohms	475p*
T34	0-300Vac	300K ohms	475p*
T35	'S' Meter	170ohms	475p*
T36	'VU' Meter	5250ohms	475p*
T40	50-0-50uA	730 ohms	595p*
T41	100-0-100uA	350ohms	595p*
T42	500-0-500uA	170ohms	595p*

T43	0-30Vdc	33.7K ohms	475p*
Type B			
045	0-50uA	1.4K ohms	595p*
0410	0-100uA	700ohms	595p*
0450	0-500uA	115ohms	595p*

IK1 Illumination Kit (for type A only)

6Volt @ 50mA 70p\*

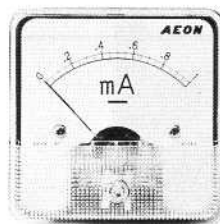


## SQUARE FACED PANEL METERS

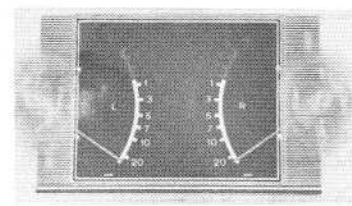
Movement : Moving Coil

Small, rugged meter ideal for various projects where cost is a vital factor. The meter is available in two sizes, the larger being 2" x 2" with a depth of 1.3/8" and requires a fixing hole cutout of 1 1/2" dia. The smaller meter measures 1 1/2" x 1 1/2" with a depth of 1 1/4" and requires a fixing hole of 1 5/8" diameter.

Large Model	F.S.D.	Resistance	Price
LSQ1	0-1mA	5.0ohms	350p*
LSQ2	0-300mA	5.0ohms	350p*
LSQ3	0-5A	0.1ohms	350p*
Small			
SSM	0-500mA	0.5ohms	350p*



Square Faced Meter



Dual VU Meter

### VU METER

Movement : Moving Coil

A single VU Meter economically priced, for use in most recording applications. Very tidy looking scale marked 20 to 0db and then 0 to +3db. Green/Red scale on black background. The size of this meter is 40 x 40mm with a depth of 24mm, requiring a fixing hole 36 x 22mm.

Model	F.S.D.	Resistance	Price
VU-M-1	130uA	640ohms	180p*

### DUAL VU METER

Movement : Moving Coil

A Dual VU Meter tailored for stereo applications, where the need is to monitor both channels. The easy to read scale is an important feature of this meter. The dimensions are 81 x 41mm with a depth of 23mm. The window dimensions are 45 x 36mm approx.

Model	F.S.D.	Resistance	Price
VU-M-2	100uA	1200ohms	550p*
VU-M-4F	500uA	500ohms	550p*

## BATTERY LEVEL METER ROLLER TYPE

A small but robust battery meter for use in numerous portable systems. i.e. radios, cassette players, test equipment etc., The dimensions of this meter are approx 27 x 17mm with a depth of 20mm. The window size is 17 x 11mm.

Model	F.S.D.	Resistance	Price
BLM1	300uA	800ohms	85p*



## BALANCE METER STEREO

A small stereo balance meter to finish off that audio project. The dimensions are as follows : 55 x 22 x 33mm in depth. The window is 35 x 15mm. Fixing centres : 50mm's apart.

Model	F.S.D.	Resistance
BMS1	400uA	640 ohms

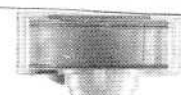


EWM1 .. .. 180p\*

## EDGEWISE METER BLANK SCALE

A small edgewise meter with numerous applications. The scale is blank allowing you to personalise the meter for your own needs. The meter measures : 39 x 14 x 36mm in depth, with a window size of 34 x 14mm.

Model	F.S.D.	Resistance
EWM1	160uA	1.9K ohms



BMS1 .. .. 165p\*



**LT101 \***  
1,000 ohms/volt

Ranges:-  
DC volts:- 0 to 10, 50, 250, 1000.  
AC volts 0 to 10, 50, 250, 1000.  
DC current 0 to 1, 100mA.  
Resistance:- 0 to 3K, 150K.  
Size 2"x3½"x1"

Supplied complete with operating instructions and test probes. A small but handy meter for carrying out basic checks.

Price £5.50\*  
P&P : -



**LT22 \***  
20,000 ohms/volt

Ranges  
AC volts 0 to 10, 50, 250, 1000.  
DC volts 0 to 0.5, 2.5, 10, 50, 250, 1000.  
DC current 0 to 0.05, 25, 250mA.  
Resistance 0 to 300R, 3K, 30K, 50K, 500K, 5M.  
Decibels -20dB to +63dB  
Size 5"x3½"x1¾"

Supplied complete with a soft carrying case and test probes. A sensibly priced multimeter with a very modern looking clear panel face for easy reading.

Price :£11.50\*  
P&P : 50p\*



**IT/2 \***  
20,000 ohms/volt

Ranges  
AC volts:- 0 to 10, 50, 100, 500, 1000.  
DC volts:- 0 to 5, 25, 50, 250, 500, 2500.  
DC current:- 0 to 50uA, 2.5, 250mA.  
Resistance:- 0 to 6K, 6M.  
Decibels:- -20dB to +22dB  
Capacitance:- 10pF, 0.01uF, 0.1uF  
Size:- 4½"x3¼"x1"

Supplied with instructions and a pair of test probes. A robust yet sensitive Multimeter.

Price :£10.95\*  
P&P : 50p\*



**C7200EM \***  
20,000 ohms/volt

Ranges:-  
AC volts:- 0 to 6, 30, 120, 300, 600, 1200.  
DC volts 0 to 6, 30, 120, 600, 1200, 3000, 6000.  
DC current:- 0 to 60uA, 6, 60, 600mA.  
Resistance:- 0 to 6K, 600K, 6M, 30M, 60M ohms.  
Decibels:- -20dB to +63dB  
Size:- 6"x4½"x2"

Supplied with full instructions and a set of test probes etc. This is a very nice meter the handle of which can be folded behind to form a convenient tilted support for horizontal use.

Price :£15.75\*  
P&P : 85p\*





**7081GN \***  
50,000 ohms/volt  
RANGE DOUBLER

**Ranges**

**DC Volts** 0 to 0.5, 2.5, 10, 50, 250, 1,000 at 25K ohms/Volt and  
0 to 0.25, 1.25, 5, 25, 125, 500 at 50K ohms/Volt.

**AC Volts:** 0 to 3, 10, 50, 250, 1,000 at 5K ohms/Volt and  
0 to 1.5, 5, 25, 125, 500 at 10K ohms/Volt.

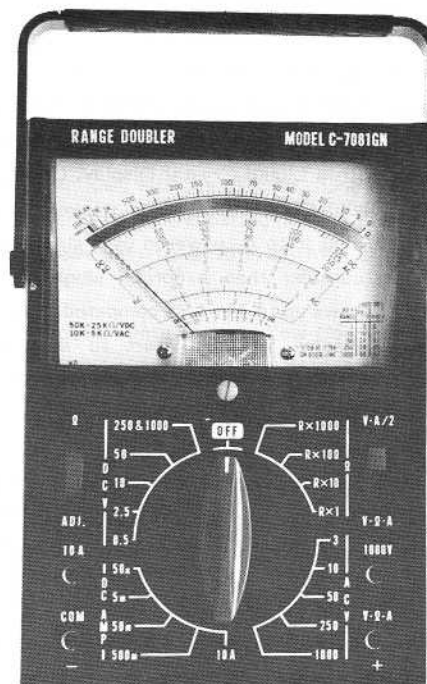
**DC Current:** 0 to 50uA, 5mA, 50mA 500mA, 10A and  
0 to 25uA, 2.5mA, 25mA, 250mA, 5A.

**Resistance :** 0 to 16K, 160K, 1.6M, 16M ohms

**Decibels :** -20 to +62dB (ref 0dB = 1mW in 600ohms)

One of our most popular analogue multimeters, unique in its ability to effectively double the sensitivity of both the voltage and the current ranges. The meter is protected against accidental overload and reverse voltages.

The swivel carrying handle can be folded back to act as an angled rest for easier viewing in the horizontal position. The two coloured mirrored scale also adds to the ease in which meter readings can be taken. The overall dimensions are  $6\frac{1}{2}" \times 4\frac{1}{2}" \times 2\frac{1}{4}"$ . (excluding handle) Supplied complete with extra long test leads and probes. Full operating instructions and two HP7 type batteries.



Price :£19.65\*

P&P : 85p\*

**U4313 \***  
20,000 ohms/Volt

**Ranges**

**DC Volts :-** 0 to 75mV, 1.5, 3, 7.5, 15, 60, 150, 300, 600V.

**AC Volts :-** 0 to 1.5, 3, 7.5, 15, 30, 60, 150, 300, 600V.

**DC Current :-** 0 to 60uA, 120uA, 0.6, 3, 15, 60, 300, 1.5A.

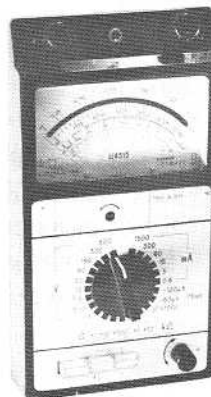
**AC Current :-** 0 to 0.6, 3, 15, 60, 300, 1.5A.

**Resistance :-** 0 to 500R, 5K, 50K, 500K, 5M.

**Capacitance :-** 0 to 0.5uF

**Size :-**  $8\frac{1}{4}" \times 4\frac{1}{2}" \times 3"$

Taut suspension movement. A very robust multimeter from the U.S.S.R. Supplied with a pressed steel carrying case, operating instructions and test leads. This model also has an anti-parallax mirror scale.



Price :£18.90\*

P&P : 75p\*

**U4324 \***  
20,000 ohms/Volt

**Ranges**

**DC Volts** 0 to 0.6, 1.2, 3, 12, 30, 60, 120, 600, 1200.

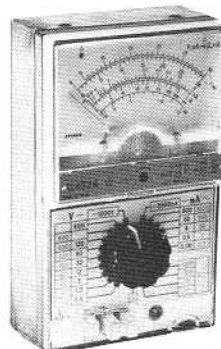
**AC Volts :-** 0 to 3, 6, 15, 60, 150, 300, 600, 900.

**DC Current :-** 0 to 60uA, 0.6, 60, 600mA, 3A.

**AC Current :-** 0 to 0.3, 3, 30, 300mA, 3A.

**Resistance :-** 500, 5K, 50K, 500K.

Taut band suspension movement. The meter will withstand loads of up to 100 times without damage, additional protection is provided via the use of silicon diodes. Complete with test leads, operating instructions and protective carrying case.



Price :£15.50\*

P&P : 85p\*



### DM900 DIGITAL LCD MULTIMETER

To satisfy a constant demand from our customers our own design specialist has produced the DM900. The DM900 is unique amongst other designs in as much that as far as we know it is the only self assembly digital multimeter offering capacitance measuring facilities (4 ranges in fact) as well as the normal choice of voltage, current and resistance. The design uses the very latest C-MOS technology together with a Liquid Crystal Display. One of the big advantages of the Liquid Crystal Display is its very low power consumption thus allowing it to be powered by a single 9volt PP3 battery. When you consider that a normal **single digit** seven segment LED display draws up to 35mA as compared to about 33uA for a **3½ digit** LCD display you can start to appreciate the advantages of LCD's. This low battery consumption makes the DM900 a really worthwhile unit for the service engineer, or for anyone else who may need to use a top quality digital multimeter in places where other power sources are not available. The completed unit offers 5 AC and DC Voltage ranges; 5 AC and DC current ranges; 6 Resistance ranges; and 4 Capacitance ranges; making a total of 30 ranges in all.



DM900 DIGITAL LCD MULTIMETER KIT	£54.50*	P&P 80p*
Calibration charge for working units	£5.75*	
Ready Built and tested units .. ..	£78.50*	P&P 80p*
Optional extras:-		
Test Probes	£1.50*	
Carrying Case	£1.50*	

The design is centred around the Intersil 7106 Intergrated circuit which has excellent linearity and auto zero facilities and directly drives the LCD, further details of which can be found elsewhere in this catalogue.

When constructing this project we recommend that you use extreme care in handling not only the IC's., but also the 1% high tolerance resistors when soldering, as excessive heat can alter their value and consequently this could affect the accuracy of the multimeter. Complete step by step instructions are supplied with each kit and we strongly advise you to follow these if first time sucess is to be achieved. We can of course supply the DM900 ready built, calibrated and tested, for those of you who prefer to buy Readybuilt equipment. A full calibration service is available to all purchasers of the DM900 kit. Come and see a working model at our shop.

### SPECIFICATION OF PROTOTYPE

#### GENERAL

Size overall	160 x 95 x 60 mm
Colour	Grey (standard) optional Black or Orange
Display	0.5" 3½ Digit LCD reflective
Power Supply	Single 9V (PP3 or alternative)
Sampling Rate	Greater than 2 per second
Ranges	30
Display Test Facility	
Critical Input Protection	
True Auto Zero	
Overrange Indication	
Polarity Indication	
Battery Test Facility	
Movable Decimal Point	
Isolated Floating Ground	
Dual Slope A/D Conversion	

#### RANGES

DC Volts	Input Impedance 10M ohm 5 ranges 200mV to 1KV Resolution 0.1mV Protection tested to 240V AC on all ranges Accuracy $\pm 1\% \pm 1$ digit
----------	--

AC Volts	Input Impedance 10M ohm Capacitively coupled to remove DC component 5 ranges 200mV to 1KV Resolution 0.1mV Protection tested to 240V AC on all ranges Accuracy $\pm 1\% \pm 1$ digit within following frequencies, RMS reading on sine waves only Range 200mV 20Hz to 4KHz All others 20Hz to 2KHz
DC Current	5 ranges 200 uA to 2A Resolution 0.1 uA Maximum voltage drop on all ranges 200mV Protection 2A fuse Accuracy $\pm 1\% \pm 1$ digit
AC Current	5 ranges 200 uA to 2A Resolution 0.1 uA Maximum voltage drop on all ranges 200mV Protection 2A fuse Accuracy $\pm 1\% \pm 1$ digit RMS reading on sine waves only within 20Hz to 4KHz
Resistance	6 ranges 200 to 20M ohm Resolution 0.1 ohm Range/Test Current 200/10mA 2K/1mA 20K/100uA 200K/10uA 2M/1uA 20M/100nA Protection 2A fuse. Critical component protection only Accuracy $\pm 1\% \pm 1$ digit
Capacitance	4 ranges 2nF to 2uF Resolution 10pF Accuracy $\pm 1\% \pm 1$ digit

Digital displays have many advantages over their analog counterparts. They are more accurate, and more rugged since there are no moving parts. Equally important, unskilled operators can record accurate data due to the unambiguous nature of the readout. But ready-built digital panel meters (DPMs) are costly and, until recently, designing one's own from scratch was an ambitious undertaking.

Intersil's 7106 and 7107 one chip panel meter ICs have changed all that. By adding only a display and less than 10 passive components, anyone can build a high performance DPM for less than the cost of a good moving-coil meter. All that is needed is Ohm's Law and a soldering iron! The hobbyist can have digital display of his aquarium temperature or the speed of his sailboat, the serviceman or experimentalist can build his own test equipment and the student of physics can measure his plasma potential.

The starting point for designs such as these is one of Intersil's digital panel meter kits. Two kits are offered. One uses a liquid crystal display (LCD), and is intended to be powered by a 9V 'transistor radio' battery. The other uses light emitting diode (LED) displays, and will usually be driven by an external power supply. The kits include all the components necessary to build a 200mV full scale panel meter, including the IC, circuit board, display, passive components and miscellaneous hardware.

Figure 1 shows the component parts of the kit. Included in the kit is a detailed application note entitled Low Cost Digital Panel Meter Designs, which includes assembly instructions and schematics.

## FEATURES

Guaranteed zero reading for 0 volts input on all scales.

True polarity at zero for precise null detection.

1 pA input current typical.

True differential input and reference.

Direct display drive - no external components required.

LCD ICL7106

LED ICL7107

Low noise - less than 15uV pk-pk.

On-chip clock and reference.

Low power dissipation - typically less than 10mW.

No additional active circuits required.

Evaluation Kit available.

## GENERAL DESCRIPTION

The Intersil ICL 7106 and 7107 are high performance, low power  $3\frac{1}{2}$  digit A/D converters. All the necessary active devices are contained on a single CMOS I.C., including seven segment decoders, display drivers, reference, and a clock. The 7106 is designed to interface with a liquid crystal display (LCD) and includes a backplane drive; the 7107 will directly drive an instrument-size light emitting diode (LED) display.

The 7106 and 7107 bring together an unprecedented combination of high accuracy, versatility, and true economy. High accuracy like auto-zero to less than 10uV, zero drift of less than  $1\mu\text{V}/^\circ\text{C}$ , input bias current of 10pA max., and roll over error of less than one count. The versatility of true differential input and reference is useful in all systems, but gives the designer an uncommon advantage when measuring load cells, strain gauges and other bridge-type transducers. And finally the true economy of single power supply operation (7106), enabling a high performance panel meter to be built with the addition of only 7 passive components and a display.

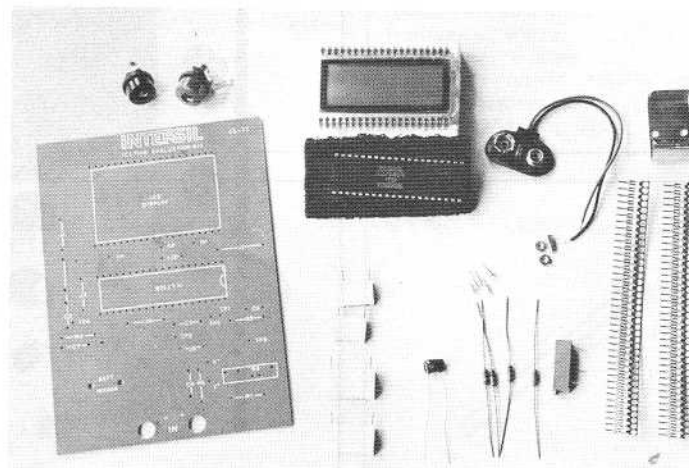
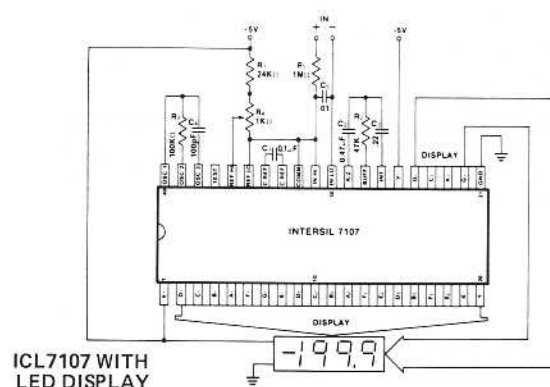
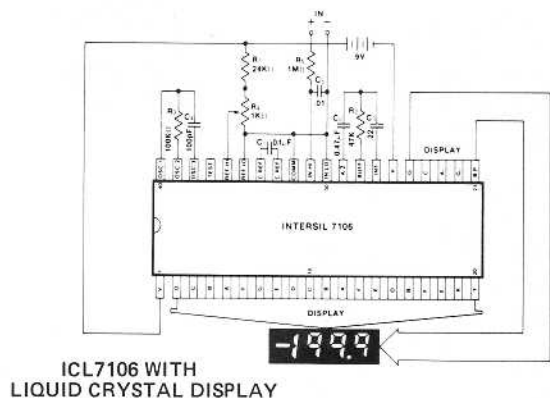


Fig 1

EVALUATION KIT LCD ICL7106	£24.73*
EVALUATION KIT LED ICL7107	£20.62*



The Purbeck Oscilloscope featured in Practical Wireless (April - September 1978), is definitely a "first" among projects published in the amateur press. It supplies the means for the reasonably competent constructor to make himself a fully integrated oscilloscope which is capable of not only displaying waveforms, but of accurate measurement as well. The many features incorporated in the design takes it well into the class of a professional piece of test equipment and indeed boasts facilities not found on ready built units costing considerably more.

A brief specification is as follows:

Y Amplifier	Sensitivity Range
	2.5mV/Div to 200V/Div
	Input Impedance
	1M 30pF Constant
	Bandwidth DC (or 2Hz when AC coupled)
	to 5MHz full screen or to 21MHz for 1 Div.
Timebase Range	50ns/Div to 25ms/Div.

Internal or External Triggering with Trig Level Control plus Polarity Selector.

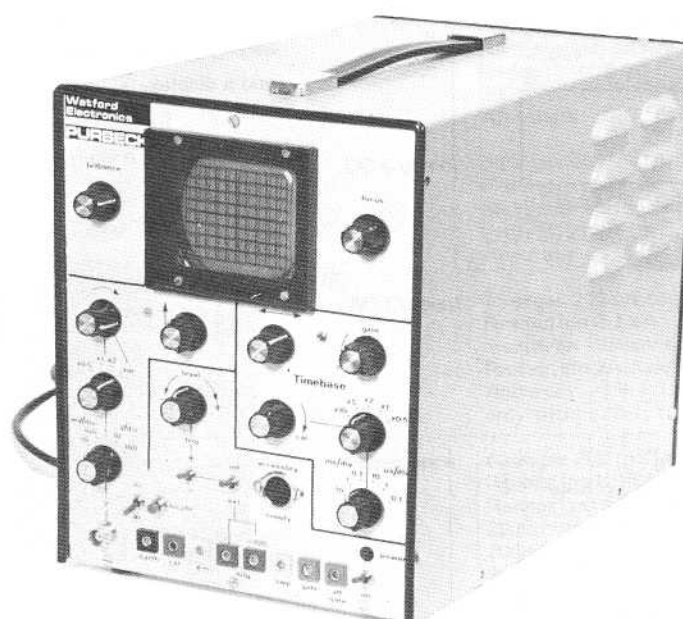
Stabilised Power Supplies giving 3% overall accuracy independent of mains supply variation.

Brilliance and Focus Controls. X and Y shift controls. Timebase output socket. Sweep gate output socket. Alternate Sweep gate output socket. 10 x 8 screen graticule. Probe/Accessory power socket.

To give some idea of the oscilloscope's capability, the cover photograph of the April 1978 issue of Practical Wireless shows a 5MHz square wave. This indicates the extent of the bandwidth of the Y Amplifier. Some non-linearity is present on the timebase at this speed, but on all other ranges the sweep is perfectly linear.

The basic oscilloscope in itself is certainly value for money, considering its specification, but it is worth noting that the author intends to publish designs of various probes, an add-on dual-beam unit, a wobulator for alignment purposes, a transistor curve tracer and other goodies, all of which will be simple inexpensive units, which when used in conjunction with the oscilloscope will provide a complete set-up comparable to commercially available equipment costing many hundreds of pounds.

Apart from a multimeter, an oscilloscope is certainly the most important piece of test equipment for any serious constructor. Its applications are virtually endless and a lot of work is completely impossible without it. **WATFORD ELECTRONICS** are pleased to be able to offer all the components for the "Purbeck" (with the exception of a few nuts, bolts and brackets). The components supplied are all author approved and endorsed by him.

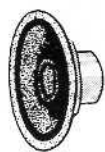


**Price £99.95\***

P&P £4.85\*



## TRANSISTOR RADIO REPLACEMENT LOUDSPEAKERS

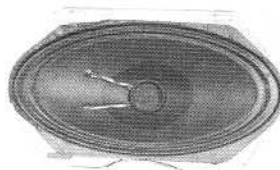


A selection of small loudspeakers ideal for new projects or a replacement for existing equipment.

TYPE	SIZE	IMP	PRICE
TRS1	1½"	8 ohms	65p
TRS2	2"	8 ohms	65p
TRS3	2¼"	8 ohms	65p
TRS4	2½"	8 ohms	58p
TRS5	2½"	40 ohms	65p
TRS6	2½"	64 ohms	65p
TRS7	3"	8 ohms	65p

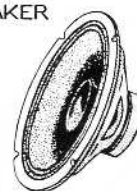
## CAR/GENERAL LOUDSPEAKER

47EM/8 8 ohm  
47EM/16 (16 ohm)



7" x 4" Elliptical  
High flux density ceramic magnet that ensures good frequency response. Power Rating 5 watt.  
Price £2.50 \*

## 8" LOUDSPEAKER ELAC 8 ohm



This 8" Full Range loudspeaker with its high flux density ceramic magnet and long throw twin cone must rate as one of the best buys around today. Ideal for budget Hi-Fi systems.  
Freq Resp :- 18HZ-22KHz  
Power Rating :- 15 watts  
Price £4.30 \*

## FLUSH MOUNTED CAR SPEAKERS

SP525/8 ohm  
SP525/4 ohm

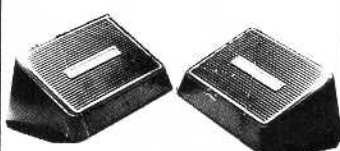


Superb high performance door mounting. 5¼" units with smart front grill. 10oz magnet. 8 and 4 ohm versions available. Power Rating 12 watts.

Price £9.95\* P & P £2

## SHELF MOUNTED CAR SPEAKERS

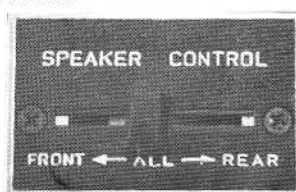
SP3/8 ohm



Good quality pair of shelf mounted loudspeakers with 3oz ceramic magnet. Far superior to the normal 2oz type. Power Rating 5 watts.

Price £4.20\* P & P 75p

## LOUDSPEAKER CONTROL ASC20B



Balance the volume between two pairs of speakers. Although designed for use in the car can be used just as effectively in the home.  
Dims :- 60 x 37mm  
Price 55p

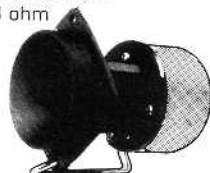
## JUNCTION BOX JB11B



The most popular junction box. Facility for two pairs of headphones or two speakers. 3 position switch selects headphones, loudspeakers or both.

Price £2.30

## HORN TWEETER HT3/8 ohm



A beautiful metal horn tweeter, panel mounting or free standing.  
Dimensions: Baffle cut-out 60mm dia.  
Frequency Response: 3KHz to 20KHz.  
Power Handling: 30W (max.).  
Crossover: 3KHz.  
Price £4.75 \*

## MULTI-CELLULAR HORN HT351F/8 ohm



Multi-Cellular horn tweeter for better dispersion of the higher frequencies. Dimensions: Baffle cut-out 120 x 60mm.  
Frequency Response: 3KHz to 18KHz.  
Power Handling: 30W (max.).  
Price £5.25 \*

## MID RANGE PF5M/ 8 ohm



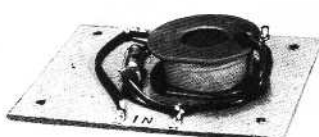
5" diameter mid-range speaker for systems up to 20 watts.  
Frequency Response :- 850Hz-7KHz.

Price £1.95 \*

## 8" BASS LOUDSPEAKER 'ELAC'

A good quality 8" loudspeaker, that will provide those deep bass notes when fitted into a suitable cabinet.  
Response:- 30 - 4000HZ  
Rating:- 40 Watts  
Impedance:- 8 ohms  
Use with either NT206 or NT306 crossovers.  
Price 12.25\* p&p 85p

## CROSSOVER NT206/8 ohm



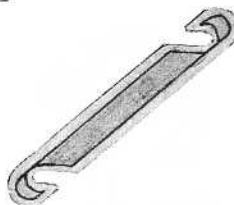
A two-way crossover network for base and tweeter system. Baseboard: 100 x 80mm  
Crossover Frequency: 3KHz.  
Power Handling: 30W (max.).  
Price £1.60 \*

## CROSSOVER NT306/8 ohm



A three-way crossover for base, mid-range and tweeter systems. Baseboard: 130 x 90mm.  
Crossover Frequencies : 1KHz, 5KHz. Power Handling : 30W(max) (max.).  
Price £2.95 \*

## CABLE TIDY CT1



Cable Tidy by 'BIB'. Keep those unsightly loudspeaker cables under control with this handy little gadget.  
Price 12p\* each

## SPEAKER FLEX



Flat twin core cable for loudspeakers. Lies flat under the carpet.  
Price 8p\*/metre



HP110S Stereo £3.25  
HP110SM Stereo/Mono £3.75



HP110S  
Heavily padded stereo  
headphones.  
Response:- 30 - 15KHz  
HP110SM as above but mono.

HP110C Stereo £3.90



Padded headband, earpieces and  
curly lead.  
Response:- 30 - 18KHz

RH301 Stereo £6.80



Padded earpieces, headband and  
curly lead. Separate slider  
volume controls.  
Response:- 20 - 19KHz

Magnetic Earphone EP1 18p



Magnetic earphone with  
2.5mm plug, 8 ohms.

HS310 £8.50



Padded headbands, earpieces  
and curly cord. Mylar  
diaphragms for increased  
frequency response.  
Response:- 15 - 22KHz

SH3300 Stereo £13.50



Very wide, flat headband.  
modern psychedelic appearance.  
Professional performance.

SF20 Mono £2.30



2K ohms. Mono headphones with  
adjustable earpieces.

Magnetic Earphone EP2 18p



Magnetic earphone with  
3.5mm plug, 8 ohms.

EH100 Stereo/Electret £15.95



Built-in power unit. Sensitivity  
95dB. Less than 1% distortion  
at 100dB.  
Response:- 20 - 20KHz.

MD402B Quadraphonic £8.50



The ultimate in four channel  
listening. Padded headband,  
earpieces and curly cord.

RH303 Stereo £6.95



Very comfortable pair of  
headphones with a single padded  
headband, padded earpieces and  
curly cord. Separate volume  
and tone controls are also a  
feature of this model  
Response:- 20 - 18KHz

Crystal Earphone EP3 33p



Crystal earphone with 3.5mm  
plug.

1085 Headphones/Radio £5.75



A great idea for a Birthday/  
Christmas present. A pair of  
headphones with built-in radio.

765 Stereo £7.50



Modern design with wide  
headband, light weight. Mylar  
diaphragms for improved  
frequency response.  
Response:- 25 - 18KHz

M110B Stereo £6.35



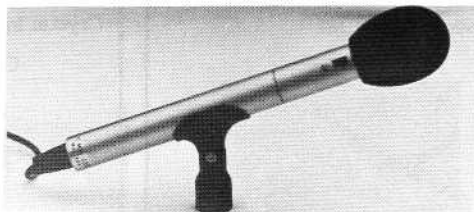
Double headband, padded  
earpieces, curly cord, rotary  
volume controls.  
Response:- 20 - 19KHz

Stethoscope STA 1 47p



Stethoscope attachment for all  
the above earpieces.

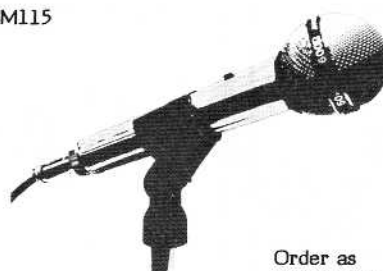
Model ECM-31  
Model ECM-78



Order as  
Microphone ECM-31 £10.50  
Microphone ECM-78 £12.50

A high quality, electret condenser cardioid microphone with on-off switch, in die cast metallic silver finish. Supplied with battery and windproof screen. Ideal for most types of recording and P.A. work where good frequency response is important.  
Impedance :- ECM-31 = 600 ohms. ECM-78 = 600 & 50K ohms.  
Frequency Response :- 20 - 25,000Hz.

Model UDM115



Order as  
Microphone UDM115 £9.85

A dual impedance cardioid uni-directional microphone with on-off switch, finished in a zinc cast satin chrome. This microphone combines performance reliability at a reasonable price.  
Impedance :- 50K and 600 ohms.  
Sensitivity :- 72dB at 600 ohms - 54dB at 50K ohms.  
Frequency response :- 50 - 15,000Hz

Model CCM-2



Order as  
Microphone CCM-2 £4.50

A NEW high quality single impedance condenser microphone for use with tape recorders, especially designed for a superior performance for recording.  
Impedance :- 600 ohms.

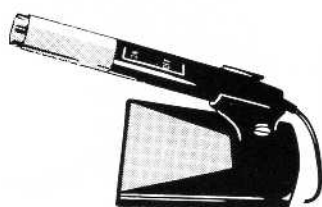
Model UDM-007



Order as  
Microphone UDM-007 £9.85

A robust and stylish uni-directional dual impedance microphone suitable for public address, tape recording, groups, and musical instruments.  
Impedance: 50 K ohms and 600 ohms (dual).  
Frequency response: 50 - 15,000 Hz.

Model V996



Order as  
Microphone V996 £2.95

An economically priced microphone, suitable for general purpose recording. On-off switch fitted to the body of the microphone. Supplied with detachable heavy zinc diecast desk stand.  
Impedance :- 50K ohms.

Model UA-111



Beautifully styled swan neck microphone on small tripod desk stand, which is both removable and collapsible for easy storage. This cardioid and uni-directional microphone is finished in satin chrome. Ideal for P.A. and DJ's.  
Impedance:- 50K ohms.  
Frequency Response:- 60-15,000 Hz.

Order as  
Microphone UA-111 £9.50

Model 228R



Order as  
Microphone 228R £1.30

The popular cassette microphone with a long slim body. Complete with on-off switch to control recorder. Split leads with 3.5/2.5 plugs. Supplied with desk stand.  
Impedance :- 200 ohms.

Model DM350



A dynamic, omni-directional microphone, suitable for use with communications equipment, fitted with a press to talk switch, storage button and clip. The coiled cable is also screened. The insert impedance is 300 ohms with built in transformer giving Impedance :50K ohms.  
Sensitivity :- -54dB at 1KHz.  
Frequency Response :- 300 - 8,000Hz

Order as  
Microphone DM350 £3.50\*



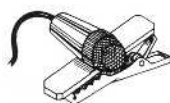
## Microphone ECM101



Price £7.25

Tie clip condenser microphone with lead terminated with jack plug. Similar to type worn in TV studios. Impedance :- 600 ohms

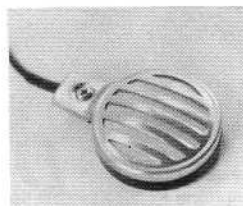
## Microphone DMX1250



Price £7.50

Satin chrome finish omni-directional condenser tie clip microphone Extra long lead with jack plug. Housed in an attractive carrying case. Impedance :- 600 ohms. Response :- 40-15,000Hz.

## Microphone LM1



Price 65p

Small crystal microphone fitted with lapel or tie clip. Protected by a die-cast mask, and plated with chrome. Supplied with cable and plug.

## Crystal Insert C2



Price 38p

Crystal microphone insert 25mm dia by 7.5mm thick. Sensitivity :- -55dB Response:- 30 - 15KHz

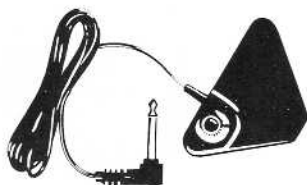
## Crystal Insert CM35



Price 38p

35mm dia by 7.5mm thick crystal microphone insert in metal housing. Sensitivity:- -55dB Response:- 50 - 8KHz

## Guitar Pick-up GMP1



Price £2.40

Converts normal acoustic guitar into an electric guitar by plugging into amplifier. No connections required. Volume control incorporated.

## Windshield WPS1



Price 32p

Foam windshield suitable for most slim line microphones.

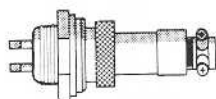
## Windshield YS2



Price 32p

Black foam windshield suitable for most slim line microphones.

Plug/socket 721 (4 pin)  
Plug/socket 719 (2 pin)



Price 2 pin 90p/pair  
Price 4 pin 105p/pair

4 pin plug and single hole fixing chassis socket. All metal. Keyed and locking. Many applications in addition to microphone use.

## Table Stand TTS1203



Price £2.10\*

Beautiful foldaway heavily chromed table stand with standard thread mounting facility.

## Microphone Holder MH600



Price 80p

Plastic holder, suitable for most microphones. Supplied with separate metal adaptor.

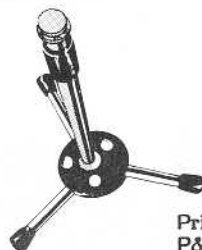
## Swan Necks \*

8"	SN8	£1.40
13"	SN13	£2.10
21"	SN21	£2.80



Heavy chrome plated flexible swan necks with standard brass thread, will fit most microphones, stands and boom arms. Available in 8", 13", and 21" lengths.

## Floor Stand BFS1



Price £8.95  
P&P £1.75

British made heavy chromed floor stand with stowaway feet, whose wide spread and rubber ends give maximum stability. Draws to a height of 5 feet maximum.

## Boom Arm BA179



Price £3.25  
P&P .95

Heavy chrome plated Uncomplicated design. Gives 18" reach from stand.

## Boom Arm BA115



Price £7.75  
P&P .95

British made 36" boom arm finished in chrome. Fully adjustable high quality arm for the most discerning user.

## Microphone Holder YH4



Price £1.95

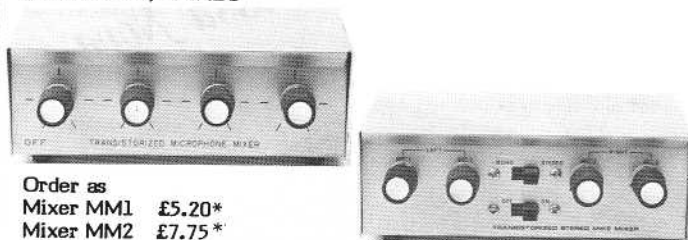
Good quality holder with spring loaded jaws to hold microphone in required position.



## MIXERS\*

### MM1 MONO

### MM2-MONO/STEREO

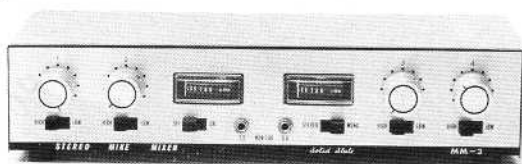


Order as  
Mixer MM1 £5.20\*  
Mixer MM2 £7.75\*

Two very economically priced 4 channel mixers, offering the hobbyist his first introduction into the fascinating world of creative recording. Power is by way of a PP3 9Volt battery, the unit itself has 4 inputs all of which have an impedance of 50K ohms. Gain :- 3dB. Size:- MM1 150 x 55 x 90mm. MM2 150 x 50 x 75mm.

## MIXER\*

### MM3

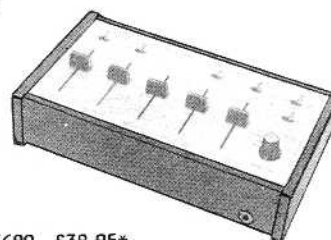


Order as  
Mixer MM3 £17.50\*  
P&P .75p\*

From the same stable as the MM1 and 2 the MM3 offers a more deluxe specification :- 4 stereo channels, with dual input impedances of 600 ohms or 50K ohms. The output impedance will match 10K ohms to 100K ohms load. The maximum input and output voltage is 1Volt rms with a signal to noise ratio of -70dB. Gain:-8dB to 13dB depending on input. Frequency response :- 20Hz to 10KHz.

## STEREO MIXER

### MX680



Order as  
Stereo Mixer MX680 £38.95\*  
P&P £1.25\*

For the more serious minded amateur the MX680 STEREO MIXER must be a good choice as it offers the following inputs :- Microphone, Phono-1, Phono-2, Tape/Tuner-1, Tape/Tuner-2. Their is also a PRE-FADE-LISTEN DEVICE INCORPORATED. Again as with all the mixers on this page it is powered by battery (PP3-9Volt) Size :- 270 x 155 x 60mm.

## STEREO MIXER

### SM3000



Order as  
Stereo Mixer SM3000 £28.50\*  
P&P £1.20\*

Powered by a 9 volt battery this superb desk type stereo microphone mixer offers the following inputs :- Microphone, Phono 1, Phono 2, Tape/Tuner 1, Tape/Tuner 2. A PRE-FADE-LISTEN DEVICE is also incorporated. This is a very easy to use unit. Size :- 250 x 180 x 44mm.

## MINI-PHASER

### PS110



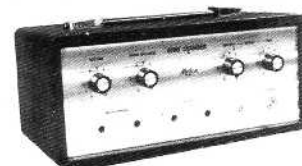
Order as  
Mini-Phaser PS110 £16.50\*

Gives the latest phasing effect for guitar or organ. Fitted with phase control and on-off foot operated switch. Ideal for the budding Eric Claptons.

## ECHO-CHAMBER\*

### MC350

### MC350T (Spare Tape)



Order as  
Echo-Chamber MC350 £62.50\*  
P&P £1.25\*  
Spare Tape MC350T £2.95\*

This dual impedance (600ohm & 50Kohm) High Quality echo chamber specially designed for group work but equally suitable for other purposes offers fantastic value for money. The two outputs feed direct to a main amplifier. Output-1 is high volume whilst output-2 is low volume. The four controls on the front panel are :- Volume, Echo-Balance, Repeat, Time. All input and output sockets are standard jacks. Spare endless loop tapes are also available. Size:- 270 x 165 x 130mm. 240V AC

## FUZ-WAH PEDAL

### WF8

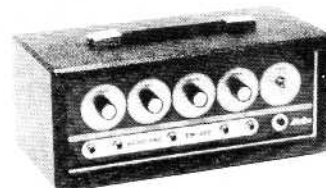


Order as  
Fuz-Wah Pedal WF8 £19.50\*

Variable fuzz and volume controls plus two separate foot-switches fitted to the effect so either WAH or FUZZ can be selected individually or combined.

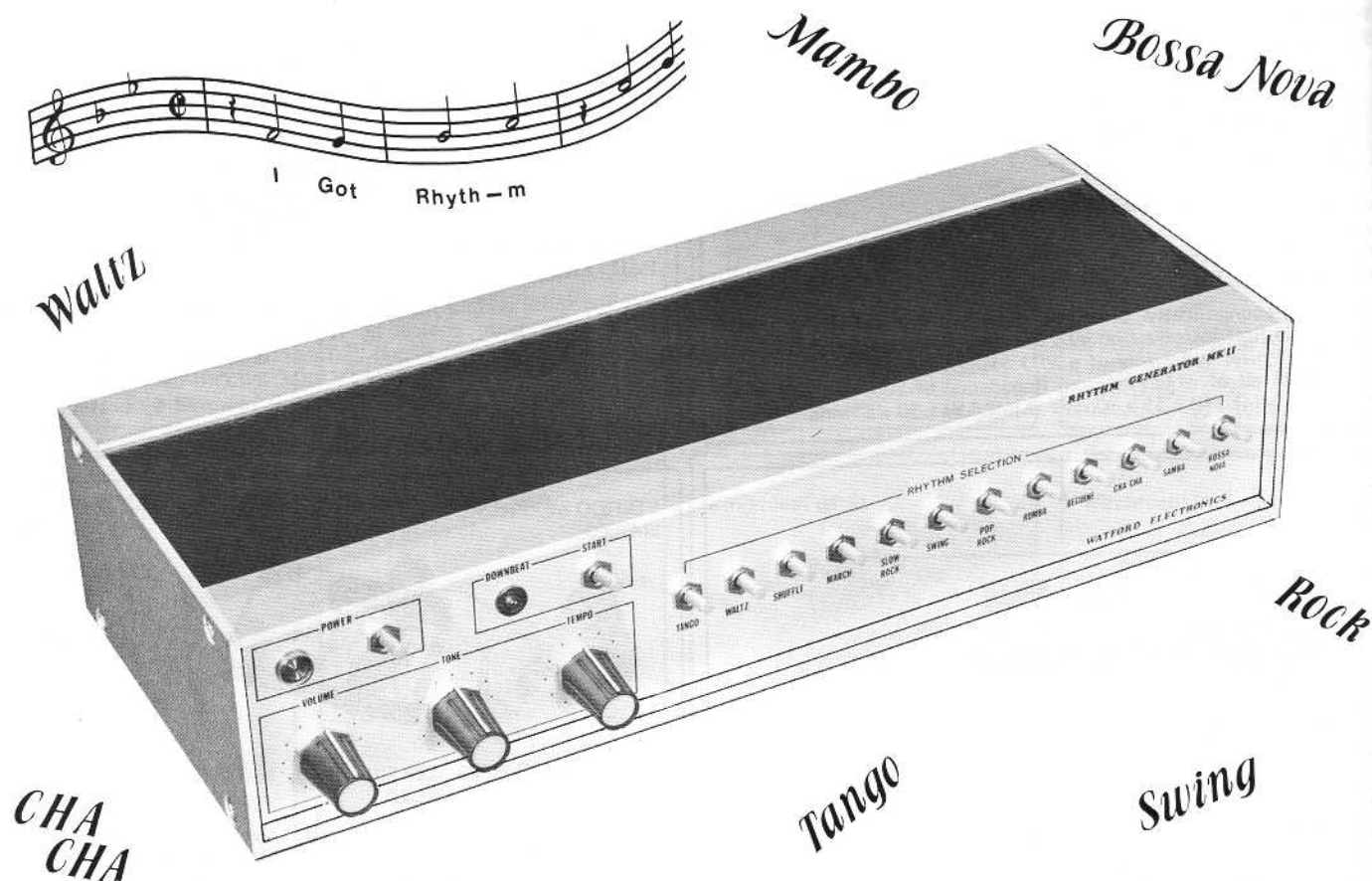
## ECHO-CHAMBER

### EM350



Order as  
Echo-Chamber EM350 £84.50\*  
P&P £1.25\*

MELOS 250v AC. Equipped with tape cartridge lasting longer than loop tape. Stationary record-play heads give high quality reproduction. Echo is varied with electric servo motor. Dimensions :- 320 x 160 x 130mm.



**It's here!** The Watford Electronics Rhythm Generator Mark II as featured in Practical Electronics (January, February 1978 issues).

This low cost Rhythm Generator is housed in an extremely attractive professionally styled low cost case measuring 12" x 5" x 2½". Based on the SGS ATES M253AA Rhythm Generator IC, the unit incorporates twelve basic rhythms which are separately switchable with the added advantage that two or more rhythms may be super-imposed to give more complex rhythm patterns. The individual rhythms are Tango, Waltz, Shuffle, March, Slow Rock, Swing, Pop Rock, Rumba, Beguine, Cha Cha, Samba, Bossa Nova, which are produced by driving a combination of eight simulated percussion instruments. These are Bass Drums, High and Low Bongos, Claves, Short Cymbals, Long Cymbals, Maracas and Snare Drum.

Apart from the Rhythm selection switches the external controls are Volume, Tone, Tempo, Mains Switch and Indicator, Stop/Start Switch with downbeat indicator which lights momentarily at the beginning of a bar. The Stop/Start switch when operated allows the generator to be started at the beginning of the bar. A socket on the back panel wired in parallel with this switch provides the facility for a foot switch to be added, which gives the hands free control of the generator.

The foot switch may be a press to make type (i.e., rhythm stops when switch operated), or, of the press to break type (i.e., rhythm starts when switch is activated). This allows more flexibility in that the Rhythm Generator may be started after an intro has been played and can be stopped during breaks etc. Also, by momentarily depressing the switch, only the first beat of the bar is played (usually the bass drum) and this can be used to accentuate any particular note.

Internal presets allow the setting of the instrument simulators to give the most pleasing sound and the output level may be preset up to a maximum of about 500mV.

Price of complete set of components including screened predrilled front panel and PCB	..	..	..	..	£49.95 inc. VAT
Ready Built and Tested Unit	..	..	..	..	£64.95 inc. VAT
Postage, Packing and Insurance	..	..	..	..	£ 1.10 inc. VAT

Foot Switch enclosed (optional extra)	
Press to make	.. £2.48 inc. VAT
Press to break	.. £2.83 inc. VAT

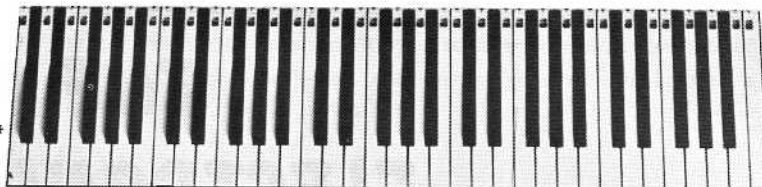
WHY NOT CALL INTO OUR SHOP FOR A DEMONSTRATION

## KEYBOARDS

We can supply a choice of three keyboards as follows:-

- A. Five octave, 61 note, C to C, flat fronted keys suitable for piano.

Price £24.50  
P & P £ 1.95\*



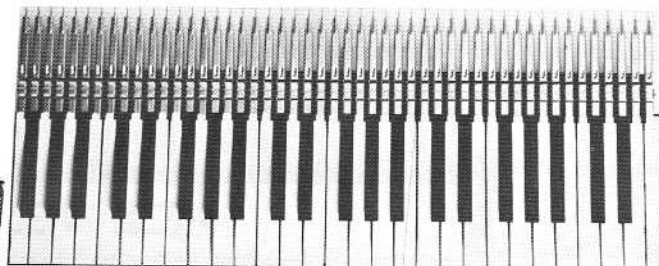
'A' 61 note Keyboard

- B. Four octave, 49 note, F to F, sloping front keys suitable for organ. Horizontal actuators situated behind hinge.

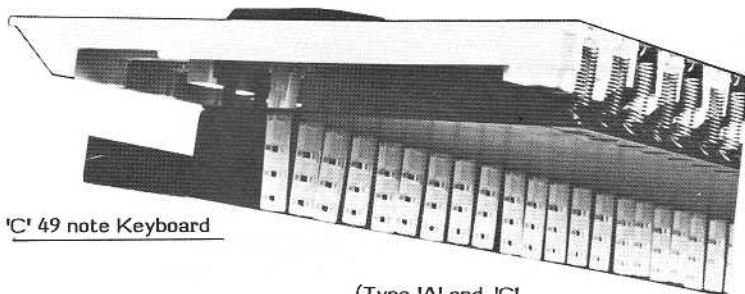
Price £21.95  
P & P £ 1.95\*

- C. Four octave, 49 note, C to C, sloping front keys with vertical actuators beneath the keyboard.

Price £17.30  
P & P £ 1.95\*

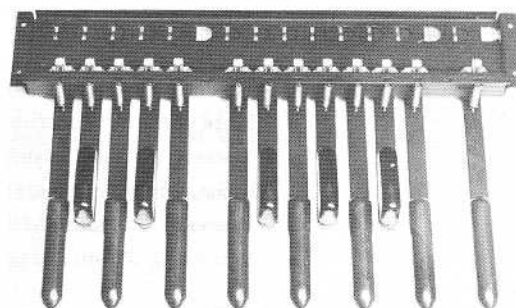


'B' 49 note Keyboard



'C' 49 note Keyboard

(Type 'A' and 'C'  
Return springs and  
contact actuators



13 note Pedal Board

## PEDAL BOARDS

- A. Seventeen note, C to E with D.P.C.O. contacts fitted to each key. Plastic covered steel levers.

Price £19.50  
P & P £ 1.45\*

- B. As above but thirteen note C to C.

Price £17.50  
P & P £ 1.45\*

## CONTACTS (Kimber Allen)

Gold plated, phosphor bronze contact wires spaced 0.04" pitch.

S.P.C.O. 27p  
D.P. make 31p

## GOLD CONTACT WIRE

Gold clad, phosphor bronze wire suitable for making contacts.

Sold in 1 metre lengths only. 32p per length

## PALLADIUM BUSBAR

For use with gold clad wire for making contacts. Sold in 36" lengths only. 130p per length

## FOOTSWELL PEDAL

Keyboards volume control fitted with 10K ohm potentiometer. Designed to be fitted into a console, but could be used free standing.

Size: 25mm x 120mm.

Price £6.95  
P & P 45p\*

## REVERBERATION

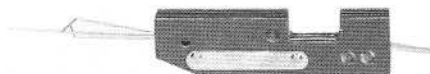
### Spring Line Unit (8" long)

Reverberation is the way that an echo gradually fades in a large building such as a church or a concert hall. A close approximation of this can be achieved with the aid of the Reverberation Spring Line Unit.

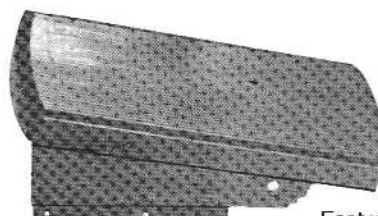
Reverberation time 2½ to 3 seconds. Max. delay 25 to 35 m/secs.

Drive coil 16 ohms. Output coil impedance 10K ohms.

Price £4.48



D.P. make Contact assembly

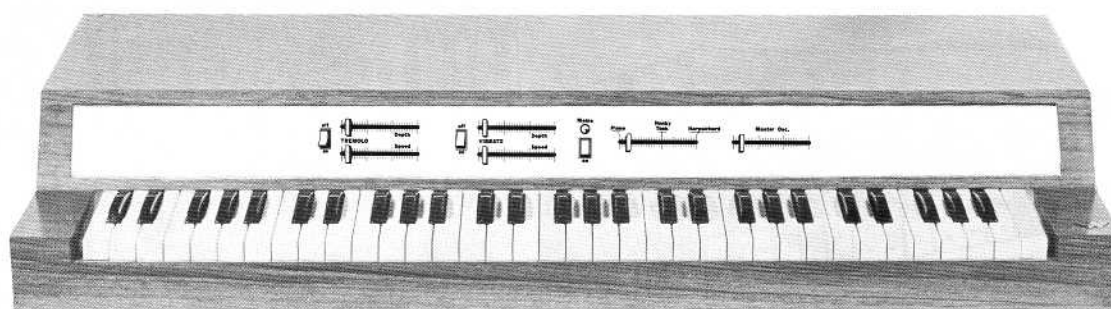


Footswell Pedal



Spring Line Unit

# **COMING SOON** **THE W.E.** **ELECTRONIC PIANO**



## **FEATURING**

- State of the Art Electronics
- 5 octave (61 note) Keyboard
- Piano, Honky Tonk and Harpsichord
- Tremolo ... Depth and Speed
- Vibrato ... Depth and Speed
- Master Oscillator Control
- Easy Build Construction
- Full Technical Back-Up
- Will fit in with most types of furniture

# **PLUS** **THE W.E.** **ELECTRONIC ORGAN**

We feel that to date no designs have appeared in the amateur magazines for a really professional yet easy to build, low cost organ. To meet the requirement of the more serious minded constructor we have commissioned a professional organ builder to design such an organ. It is hoped that a full kit of parts will be available early in 1979.

## **Specification**

- 4 Octave Keyboard F to F
- Optional Table or Free Standing Console.
- Stops as follows:-  
 16' Cello, 8' Flute/Tibia, 8' Violin String,  
 8' Reed, 4' Flute/Tibia, 4' String.
- Tremulant.
- Vibrato . . . Depth and Speed.
- Reverberation with level control.
- Swell (Expression) pedal.
- Bass Volume Control to set level of bass for particular room or hall.
- Lowest 17 notes have an automatic melodic bass with stops:-  
 8' Major Bass 16' Sub Bass.
- A 17 note Pedal Board will be available as an optional extra.
- Output:- 20 Watts from built in P.A. Amplifier.
- A Headphone socket is fitted for private practice.

If you are interested in the above project please keep an eye open for announcement in our advertisement in the Electronics Magazines. It is hoped that we will be publishing constructional details in one of the monthly magazines at which time we will be demonstrating the organ at our shop in Watford so that anyone considering construction can come and see and hear the finished unit.





The ULTRASONIC CERAMIC MICROPHONE is a device for transforming acoustic energy to mechanical energy and then to electrical energy, or vice versa. The microphone presented here has a unique compound vibrator which consists of the PCM piezoelectric ceramic elements of bimorph type, and a conical aluminium resonator featuring higher sensitivity, wider band width, and smaller size, as compared to a conventional microphone.

## FEATURES

1. High sensitivity over - 67dB/V/ubar
2. Superb temperature and humidity durability
3. Stable electrical and mechanical characteristics
4. Small in size

## SPECIFICATION

Maximum input voltage (rmsV)	20V
Centre Frequency	41KHz $\pm 1$ (Transmitter) 40KHz $\pm 1$ (Receiver)
Sensitivity (dB/V/ubar)	-70 min
Band width (KHz)	4.0 min

## APPLICATIONS

For remote control devices,

These microphones can be used both for generating and receiving ultrasonic sounds in remote control devices of television sets, tape recorders and other electronic appliances.

Other interesting examples of application include use in ultrasonic burglar alarm systems.

See Electronics Today International (February 1978) for a suitable circuit.

By employing a ceramic microphone as a transmitter of an ultrasonic remote control instead of a conventional condenser microphone, higher sensitivity can be obtained near the resonant frequency due to its resonant type construction.

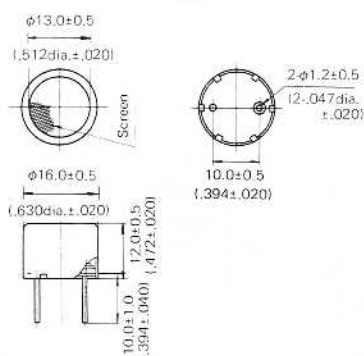
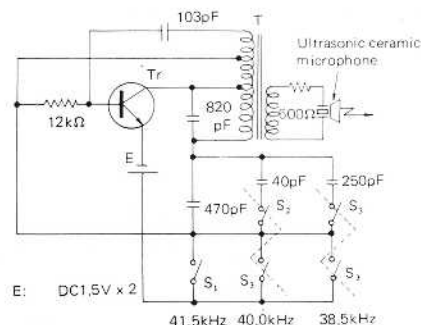
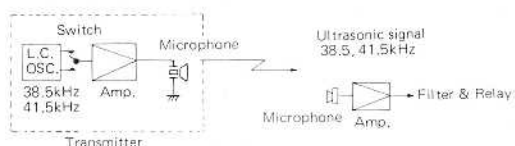
The ultrasonic signal is generated from the ceramic microphone by inputting the electrical signal to the microphone, combining LC oscillator circuit with amplifier.

For a remote control, for instance, the ultrasonic signals of 41.5kHz and 38.5kHz are obtained respectively, for channel selector and for volume and AC line switch control.

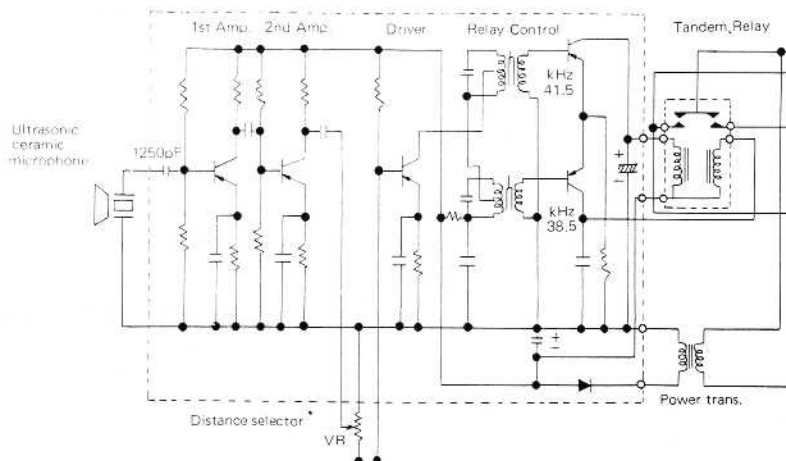
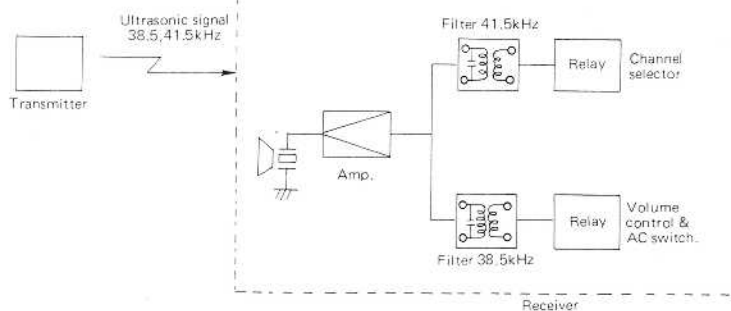
## APPLICATION EXAMPLES

### Remote control of Television

#### TRANSMITTER



#### RECEIVER



#### Model

EFR-OSB40K2 (Transmitter)

EFR-RSB40K2 (Receiver)

#### Price

£3.95\* per pair



Several methods of gas detection, based on various chemical and physical principles are now available. A short list includes:

**DETECTION TUBE:** Based on colour change resulting from a chemical reaction between the gas and the tube contents. This is an accurate quantitative system but each tube can only be used once. It is suitable for spot checking but not for continuous detection.

**INFRA RED/SPECTROPHOTOMETRY/GAS CHROMATOGRAPH:** These systems provide high accuracy continuous detection but costs are high, making them suitable only for specialized industrial applications.

**CATALYTIC COMBUSTION:** One of the original and most widely used systems based on the temperature change produced by catalytic combustion on a platinum wire sensor. It requires a relatively expensive amplifier and the sensor can be poisoned by silicone and halogen gases. Some technical knowledge is required for operation and maintenance and hence it is recommended for industrial rather than domestic applications.

**SEMICONDUCTOR DETECTOR:** Introduced by Figaro Engineering Inc. in 1968, the TGS gas sensitive semiconductor sensor is based on N type sintered SnO<sub>2</sub>. When combustible or reducing gases are absorbed on the sensor surface a marked decrease of electrical resistance occurs. Major features of the TGS sensor include high sensitivity (several hundreds ppm of gas easily detected), low cost associated circuitry and the ability to repeatedly detect gas without deterioration. Some of the original sensors produced in 1968 suffered from insufficient mechanical strength and large sensitivity variations, but these problems have been overcome by a continuous programme of research and improvement carried out by Figaro Engineering Inc. When used in accordance with the manufacturer's data a minimum sensor life of 9 years can be expected. By October 1977 more than 10 million TGS sensors were in use worldwide, mainly as domestic gas detectors, making a significant contribution to improved safety.

#### MAIN COMBUSTIBLE AND TOXIC GASES DETECTED BY THE TGS

**HYDROCARBONS AND THEIR DERIVATIVES:** Methane Propane/ Butane/ Pentane/ Hexane/ Heptane/ Octane/ Decane/ Petroleum Ether/ Petroleum Benzene/ Gasoline/ Kerosene/ Petroleum Naphtha/ Acetylene/ Ethylene/ Propylene/ Butadiene/ Butylene/ Benzene/ Toluene/ o-Xylene/ m-Xylene/ Ethylene Oxide

**HALOGENIZED HYDROCARBONS:** Methyl Chloride/ Methylene Chloride/ Ethyl Chloride/ Ethylene Chloride/ Ethylidene Chloride/ Trichloro Ethane/ Vinylidene Chloride/ Trichloro Ethylene/ Methyl Bromide/ Vinyl Chloride

**ALCOHOLS:** Methanol/ Ethanol/ n-Propanol/ iso-Propanol/

n-Butanol/ iso-Butanol

**ETHERS:** Methyl Ether/ Ethyl Ether

**KETONES:** Acetone/ Methyl Ethyl Ketone

**ESTERS:** Methyl Acetate/ Ethyl Acetate/ n-Propyl Acetate/ iso-Propyl Acetate/ n-Butyl Acetate/ iso-Butyl Acetate

**NITROGEN COMPOUNDS:** Nitro Methane/ Mono Methyl Amine/ Dimethylamine/ Trimethyl Amine/ Mono Ethyl Amine/ Diethyl Amine

**INORGANIC GASES:** Ammonia/ Carbon Monoxide/ Hydrogen/ Hydrogen Cyanide

#### GENERAL APPLICATIONS OF THE TGS

1. Combustible Gas-Leak Alarm
2. Carbon Monoxide Detector
3. Automatic Fan Control
4. Fire Alarm (detecting combustible gases contained in smoke)
5. Alcohol Detector (detector for drunken driver)
6. Air Pollution Monitor

#### SPECIAL FEATURES OF THE TGS

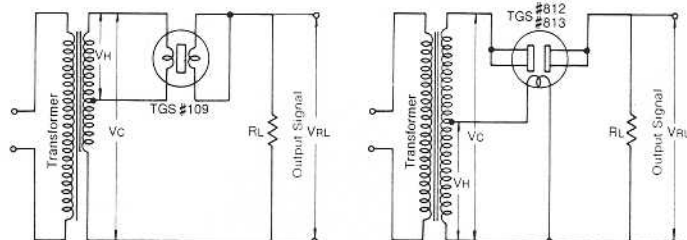
1. Long life. Sensors in continuous use for 9 years are still functioning normally.
2. High reliability even when exposed to toxic gases.
3. No decrease in sensitivity even when stored for a long period in high humidity atmosphere before use.
4. Detects low concentrations of Natural Gas, Carbon Monoxide and a range of toxic gases.
5. Conforms to vibration and drop test standards.
6. Large resistance change at low gas concentrations enables a reliable low cost detector to be designed.
7. No sensitivity loss even when exposed to high gas concentrations accompanied by reduced oxygen level.

#### USERS GUIDE TO THE TGS

1. The sensor is affected to some extent by changes in atmospheric temperature and humidity. For precise work, allowance must be made for these changes.
2. Because the response of the sensor is exponential rather than linear a special circuit must be designed when quantitative measurement is required.
3. The sensor should be powered for several days to ensure it has reached its final stable state i.e. the complete detector should be powered for some days before calibration is carried out.
4. A stabilized sensor requires 1 to 2 minutes recovery time when switched on.

Four models are available. The 109 (high voltage type), 308, 812 and 813 (low voltage types). These sensors differ not only in their voltage ratings but also in their relative sensitivities to different gases. Sensor selection should take all these factors into consideration to ensure reliable and accurate detector design.

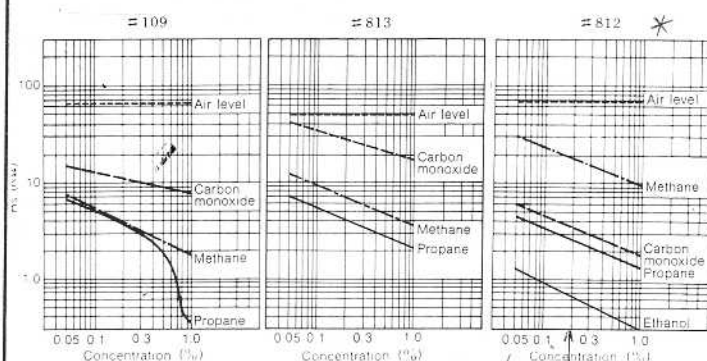
## BASIC MEASURING CIRCUITS



VH: Heater Voltage 1.0V  
VC: Circuit Voltage 100V  
RL: Load Resistance 4KΩ

VH: Heater Voltage 5.0V  
VC: Circuit Voltage 10V  
RL: Load Resistance 4KΩ

## SENSITIVITY CHARACTERISTICS



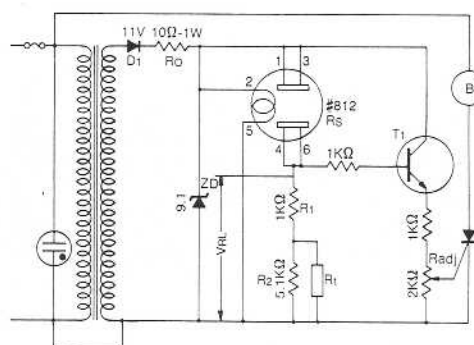
## TYPES OF TGS SENSORS

Sensor Type	Electrical Ratings	Applications
813	VC 24V Max VH 5.0V <i>38.2</i>	High sensitivity to Propane, Butane and Methane. This is the most suitable sensor for residential gas detectors. Its relatively low sensitivity to Alcohol and Carbon Monoxide minimizes the problem of false alarms.
812	VC 24V Max VH 5.0V <i>120mA</i> <i>38.2</i>	High sensitivity to toxic gases, such as Carbon Monoxide, Ammonia, Sulphur Dioxide, etc. and organic solvent vapours such as Alcohol, Benzene, etc. May be used as smoke alarm or alcohol detector.
109	VC 100V VH 1.0V RL 4K ohm	High sensitivity to Propane, Butane and Methane. This is also the most suitable sensor for residential gas detectors. Its large output without the need for an amplifier enables a highly reliable but low cost detector to be produced.

## BOAT AND CARAVAN OWNERS

The 813 is eminently suitable for the detection of Propane (Calor gas) leaks which are particularly dangerous in that this gas is heavier than air and tends to collect in pockets where it would otherwise go undetected.

## PRACTICAL 812 DETECTOR CIRCUIT GAS LEAK DETECTOR



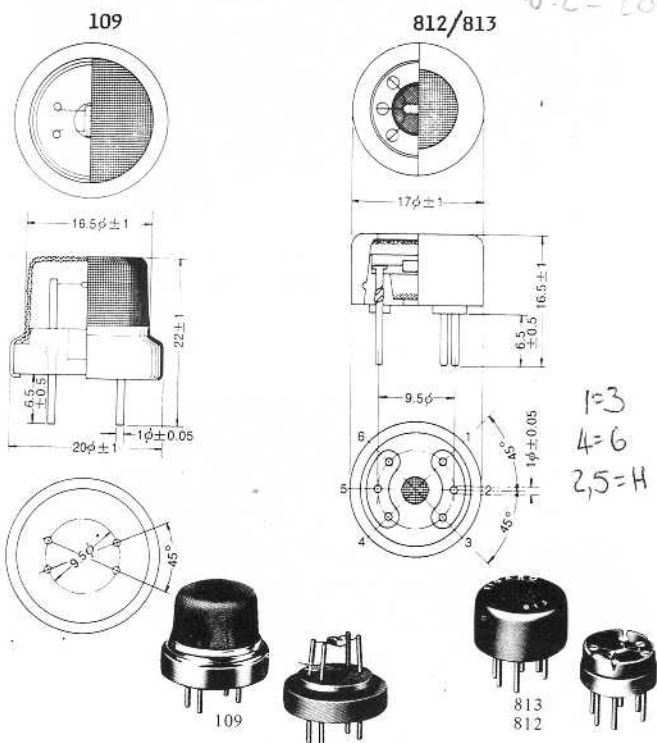
## CIRCUIT DESCRIPTION

The above is an example of a practical domestic gas leak detector circuit using the 812 sensor. For Butane and Propane an alarm level of 2,000p.p.m. isobutane is recommended. To improve accuracy while still using the minimum number of components, a simple temperature compensating circuit and voltage stabilizer are included.

Other practical circuits have been published in E.T.I., and Practical Electronics, that are suitable for boats etc., (i.e., detecting petrol fumes).

TGS  
Model  
109 (High voltage type)  
308 (Low voltage type)  
812 (Low voltage type)  
813 (Low voltage type)  
Sockets

Price  
£4.15\*  
£4.15\*  
£4.15\*  
£4.15\*  
25p\*





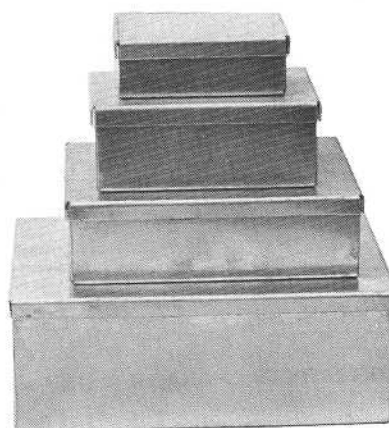
We at WATFORD ELECTRONICS are very proud of the selection of boxes and cases that we can offer our customers. The range extends to over 90 different housings, in varying styles, shapes and sizes, using some of the most modern materials available such as ABS Plastic and Norlin. Both are very tough and durable materials. Some of our cases are made from aluminium or aluminium alloys to be more precise and many offer a Satin Anodised Finish. For a really professional looking housing check out the CLASSIC CASE. This is one of our most popular designs. Other cases are available in PVC clad steel or perhaps you need a diecast box for R.F. projects that require screening. We can offer 10 different size boxes for this purpose. We also stock 30 housings from the superb VERO range.

For those of you looking for low price cases why not consider one of the following aluminium boxes.

#### STANDARD ALUMINIUM BOXES \*

Aluminium box with a slip over lid secured by screws. The most economical range of boxes for almost any project.

Type	Size (in inches)	Size (in mm)	Price	P&P
SAB1	3 x 2 x 1	76 x 51 x 26	48p*	-
SAB2	4 x 2½ x 2	102 x 64 x 51	64p*	-
SAB3	4 x 2½ x 1½	102 x 70 x 38	64p*	-
SAB4	4 x 2½ x 2½	102 x 70 x 64	68p*	-
SAB5	4 x 4 x 1½	102 x 102 x 38	68p*	-
SAB6	4½ x 4 x 2½	114 x 102 x 64	84p*	-
SAB7	5 x 4 x 2	127 x 102 x 51	82p*	10p*
SAB8	5¼ x 2¾ x 1½	133 x 70 x 38	68p*	10p*
SAB9	5¼ x 2¾ x 2½	133 x 70 x 64	88p*	10p*
SAB10	5¼ x 4 x 1½	133 x 102 x 38	78p*	10p*
SAB11	5¼ x 4 x 2½	133 x 102 x 64	88p*	10p*
SAB12	6 x 4 x 2	152 x 102 x 51	88p*	10p*
SAB13	6 x 4 x 3	152 x 102 x 76	102p*	15p*
SAB14	7 x 5 x 2½	178 x 127 x 64	114p*	15p*
SAB15	7 x 5 x 3	178 x 127 x 76	122p*	20p*
SAB16	8 x 6 x 3	203 x 152 x 76	148p*	20p*
SAB17	10 x 4½ x 3	254 x 108 x 76	142p*	20p*
SAB18	10 x 7 x 3	254 x 178 x 76	172p*	30p*
SAB19	12 x 5 x 3	305 x 127 x 76	165p*	25p*
SAB20	12 x 8 x 3	305 x 203 x 76	220p*	40p*

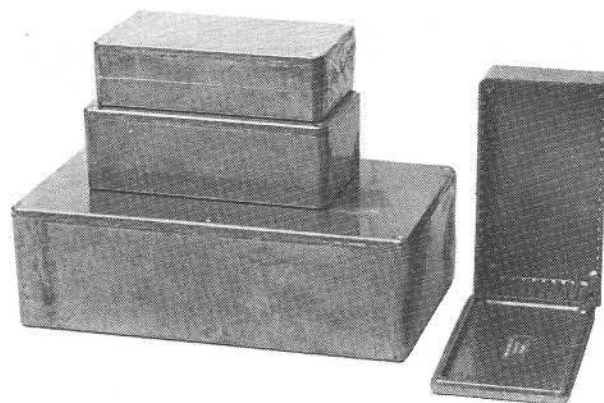


#### DIECAST BOXES \*

Robust high pressure alloy diecast box, with a wall thickness of 1.5mm. Excellent for screening and rugged applications. All boxes are supplied with a close fitting flanged lid secured by screws.

Type	Size (inches approx)	Size (in mm)	Price	P&P
	L x W x H	L x W x H		
DCB1	4 x 2 x 1	100 x 50 x 25	75p*	-
DCB2	4½ x 2½ x 1½	113 x 63 x 31	95p*	10p*
DCB3	4 x 2½ x 1½	121 x 66 x 40	125p*	15p*
DCB4	6 x 3½ x 2	152 x 82 x 50	178p*	20p*
DCB5	7 x 4½ x 2½	192 x 113 x 61	249p*	30p*
DCB6	8 x 5½ x 2½	222 x 146 x 57	505p*	30p*
DCB7	8½ x 5½ x 4½	222 x 146 x 108	621p*	50p*

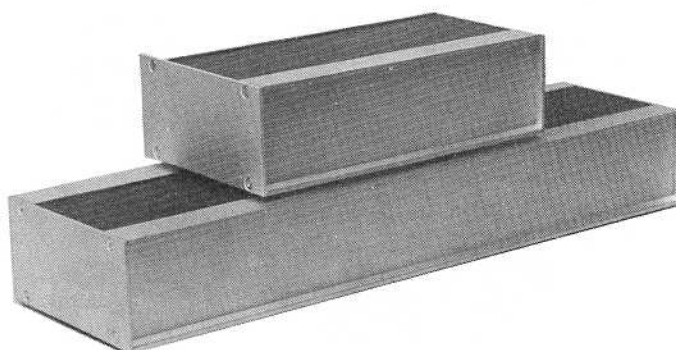
DCB1 to DCB5 have cast slots to accommodate PCB's



#### CLASSIC INSTRUMENT CASES \*

A truly professional and elegant case. This must be one of the smartest cases available today for housing that project which requires just a little extra in appearance. We use the CLASSIC CASE for housing our Mark 2 Rhythm Generator and we are always being complimented on it. The CLASSIC CASE is designed in a satin finished anodised aluminium, with textured black leather effect PVC coated steel top and bottom plates. The case can be dismantled into 10 separate parts.

Type	Size (in mm)	Size (in inches)	Price	P&P
AWAA	216 x 127 x 64	8½ x 5 x 2½	810p*	35p*
AWAB	305 x 127 x 64	12 x 5 x 2½	965p*	55p*
AWAC	432 x 127 x 64	17 x 5 x 2½	1065p*	60p*
AWAD	216 x 229 x 89	8½ x 9 x 3½	1089p*	60p*
AWAE	305 x 229 x 89	12 x 9 x 3½	1250p*	85p*
AWAF	432 x 229 x 89	17 x 9 x 3½	1320p*	85p*

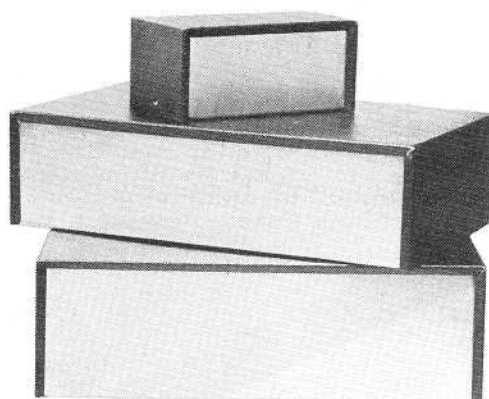




## PJ SERIES METAL INSTRUMENT CASE \*

A strongly made case of two section construction, the base, front and rear being of natural aluminium finish, with the top and sides fabricated in vinyl clad steel. There are seven sizes to choose from in this series to meet most needs.

Type	Size (in mm)	Size (in inches)	Price	P&P
PJ1	127 x 64 x 57	5 x 2½ x 2¼	60p	-
PJ2	152 x 114 x 44	6 x 4½ x 1¾	130p	10p
PJ3	203 x 127 x 51	8 x 5 x 2	178p	20p
PJ4	229 x 133 x 64	9 x 5¼ x 2½	199p	20p
PJ5	280 x 159 x 76	11 x 6¼ x 3	245p	35p
PJ6	280 x 191 x 89	11 x 7½ x 3½	258p	48p
PJ7	305 x 159 x 133	12 x 6¼ x 5¼	340p	55p

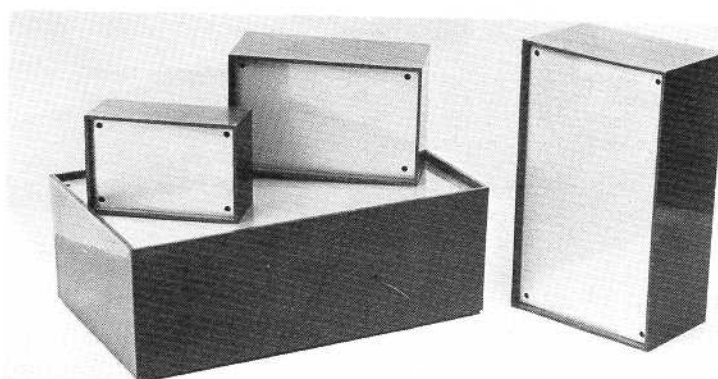


## NJ SERIES PLASTIC MOULDED CASES \*

**NJHC** A module styled case in ABS plastic complete with reversible recessed aluminium panel. The top panel is in a natural lacquered or silver grey finish, secured by four screws.

All sizes have 1.8mm guide slots for the location of P.C. Boards.

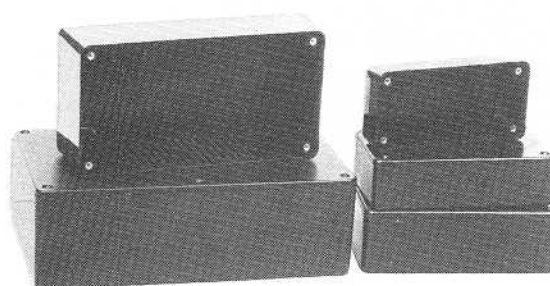
Type	Size (in mm)	Price	P&P
NJHC1	80 x 50 x 30 (Dark sea green)	85p	-
NJHC2	105 x 65 x 40 (Dark sea green)	120p	-
NJHC3	155 x 90 x 50 (Dark sea green)	175p	-
NJHC4	210 x 125 x 70 (Dark sea green)	265p*	-



## RJ SERIES PLASTIC MOULDED CASES \*

A range of five ABS moulded boxes, complete with close fitting flanged lid. Secured by four screws into integral bushes. All boxes have 1.8mm moulded slots on all four sides to accept vertically mounted PC Boards. Available in Tangerine or Black.

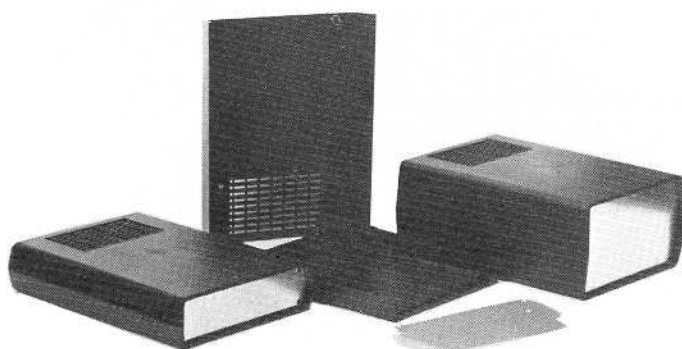
Type	Size (in mm)	Price	P&P
RJPB1	100 x 25 x 50	68p	-
RJPB2	112 x 31 x 62	75p	-
RJPB3	120 x 40 x 65	82p	-
RJPB4	150 x 50 x 80	98p	-
RJPB5	190 x 60 x 110	174p	10p



## ALPHA CASES \*

A very smart ventilated instrument case in ABS Plastic with an aluminium front panel. The top and bottom sections of the case are secured together by four screws. The case also provides the facility to mount PC Boards. The ALPHA CASE is suitable for housing such projects as Clocks, Frequency meters, Mobile test gear etc. Available in black only.

Type	Size (in mm)	Price	P&P
ALPHA 1	173 x 130 x 35	346p	10p
ALPHA 2	173 x 130 x 55	375p	10p
ALPHA 3	173 x 130 x 70	410p	15p

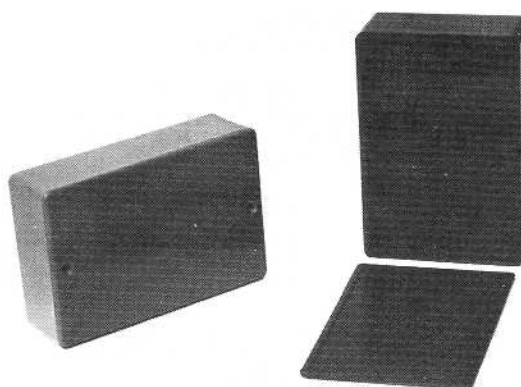




### GEMINI HAND CONTROL BOX \*

A small box suitable for many projects and used by us as the control centres for our TANK BATTLE game. Close fitting lid secured by two screws. Made from high impact plastic, the finish is in a grey colour and with the addition of some form of panel stickers or transfers looks quite smart.

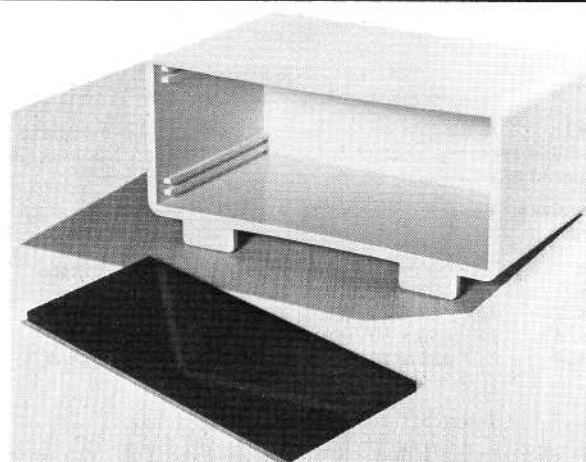
Style	Size (in mm)	Price	P&P
GEMINI	113 x 75 x 34	58p	-



### TIME BOX \*

A stylish case in White ABS plastic with a red perspex front. Designed primarily for housing Digital clocks but of course could easily be used for other projects. Two 8mm high feet moulded in the front edge tilt the case for easy viewing.

Type	Size (in mm)	Price	P&P
TB1	56 x 131 x 71.5	210p	-



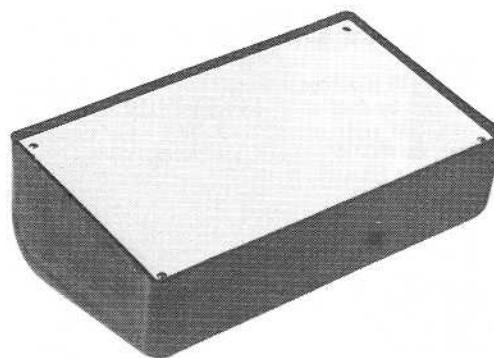
### NJSF SERIES PLASTIC MOULDED CASES \*

**NJSF** A sloping front case moulded in ABS plastic with a sprayed aluminium panel secured by four screws.

All sizes have 1.8mm guide slots for the location of P.C. Boards.

Type	Size (in mm)	Price	P&P
NJSF1	160 x 95 x 60 (rear) x 40 (front)	172p	-
NJSF2	215 x 130 x 75 (rear) x 45 (front)	254p	10p
NJSF3	320 x 170 x 85 (rear) x 50 (front)	530p	20p

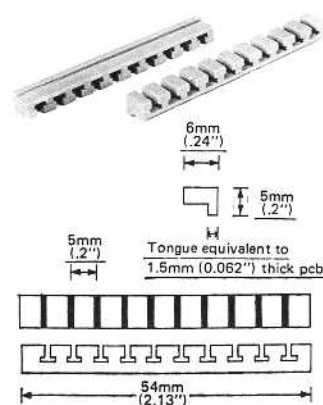
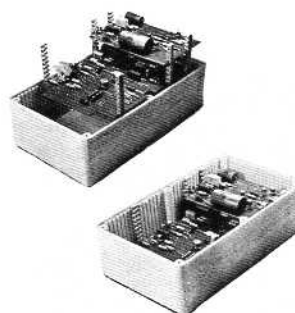
**Colours :-** NJSF1 and 2 Black, Orange or Grey. NJSF3 Grey only.



### PCB GUIDE ADAPTORS\*

Most moulded enclosures of the variety that we stock have some form of PC Board slots or guides, which for most applications are perfectly adequate. There are however, situations where it is more practical to mount a PC Board flat in the bottom of the enclosure, or at right angles to the direction of the slots. In these circumstances the PCB GUIDE ADAPTORS are the ideal solution. Providing that the existing slots in the case will accept boards of 1.5mm thickness then these ADAPTORS can quite easily be fitted. Each adaptor is 54mm long and has 10 slots on 5mm centres. Therefore boards can be mounted in a stacked fashion.

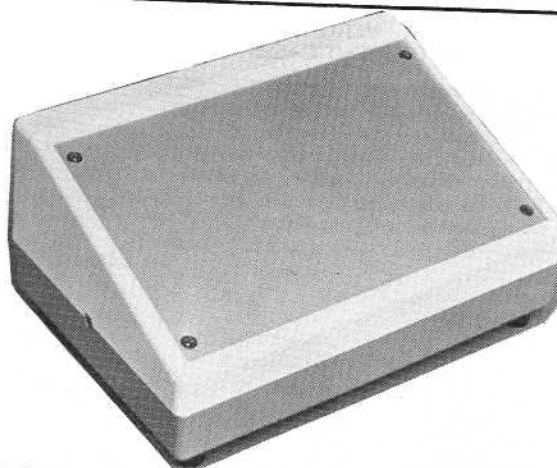
5p each  
40p for 10





## VERO SLOPING FRONT BOXES \*

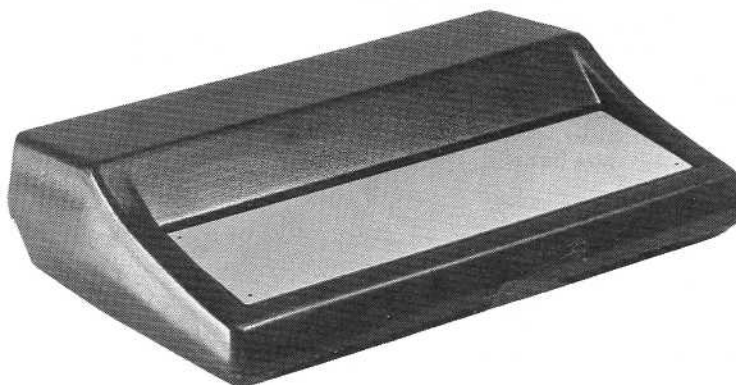
Two versions of this box are available, both in high impact A.B.S. Type 65-2523E has a lower section in dark grey and an upper section in light grey which are screwed together with the back of the box having clearly marked recesses for cable entry. Threaded inserts are provided for holding P.C. Boards. The front panel on the upper section is a removable anodised aluminium plate. Type 75-1798K has a white upper section and a grey lower section. The anodised aluminium front panel being secured by four countersunk screws. Both the above types can accommodate a standard Eurocard (100 x 160mm).



Type	Case Size (in mm)	Price	P&P
65-2523E	220 x 174 x 100 (rear) 52 (front)	683p	20p
75-1798K	171 x 121 x 75 (rear) 37 (front)	425p	20p

## PLASTIC VEROCASE \*

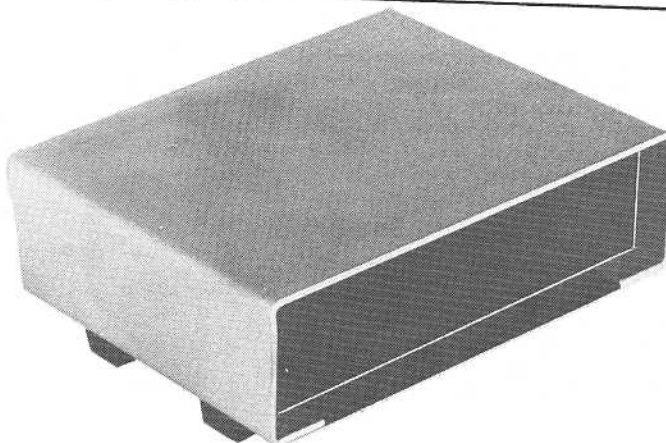
These attractive enclosures, although specially designed for housing keyboards and display panels, have a wide range of applications in the instrument field. The cases are vacuum formed from textured A.B.S. The top and bottom sections are secured by four screws. A clearly defined area at the rear of the case is available for cable entry. The anodised aluminium front panels are pre-pierced at the corners and may be used as a template for drilling the moulding. These cases come complete with self-adhesive moulded rubber feet and all necessary fixings.



Type	Case Size (in mm)	Panel Size (in mm)	Price	P&P
75-1800J	220 x 276 x 100	145 x 152	835p	35p
75-3960E	550 x 340 x 120	430 x 115	2033p	70p

## VERO 'G' RANGE \*

A new range of three unique integrated chassis type cases that provides all round accessibility. The back and front are black PVC clad aluminium alloy, the base is a matt black painted finish whilst the slide on sloping front cover is of a clear etch anodised finish. This slide on cover is attached to the base by four screws that also secure the four moulded rubber feet. Although these cases are made up of four separate sections there are no visible panel fixings. This really is a beautiful case.



Type	Overall Size (in mm)	Price	P&P
91-2672A	44 x 134 x 123	460p	15p
91-2673G	64 x 224 x 176	714p	48p
91-2674B	84 x 304 x 210	969p	75p

## VERO FLIP - TOP BOX \*

A distinctively designed instrument housing for numerous applications i.e. Stop-watch, D.V.M., Radios and electronic games etc. The box is made of moulded Polypropylene, with a matt finish, the anodised aluminium alloy front panel is secured by eight miniature moulded-in plastic clips, thereby eliminating the need for screws. Six internally moulded pillars provide suitable horizontal fixing points for PC Boards using self tapping screws supplied with the kit. The larger box will also accommodate a 100 x 160mm standard Eurocard.



Type	Overall Size (in mm)	Price	P&P
75-3018C	130 x 75 x 34 (black)	195p	-
75-2676J	130 x 75 x 34 (yellow)	195p	-
75-3019J	196 x 127 x 51 (black)	250p	10p
75-2677D	196 x 127 x 51 (yellow)	250p	10p



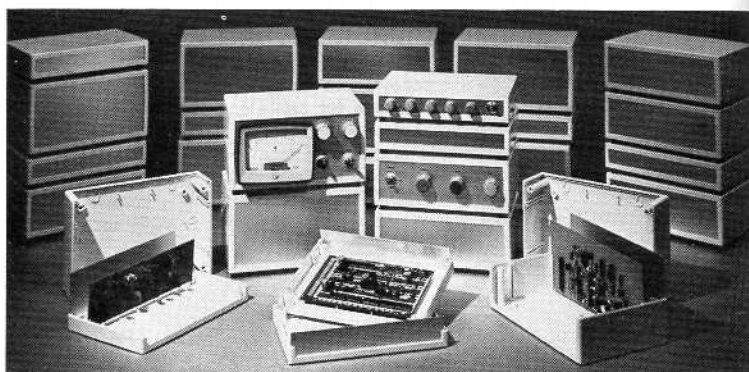


### VERO INSTRUMENT CASES \*

#### STYLE A \*

High impact A.B.S. two tone case with anodised aluminium alloy front and rear panels. The case is held together by four screws inserted from the base, these four screw holes are covered by the four moulded rubber feet. The cases contain both slots and pillars for holding P.C. Boards in the vertical or horizontal position. Horizontal fixing points will accept a 100 x 160mm standard Eurocard or a Vero DIP Board (10-1042D).

Type	Case Size (in mm)	Slots can accommodate P.C. Boards	Price	P&P
75-1410J	205 x 140 x 40	25.6 x 199	355p	15p
75-1411D	205 x 140 x 75	60.6 x 199	395p	15p
75-1412K	205 x 140 x 109	95.6 x 199	515p	20p

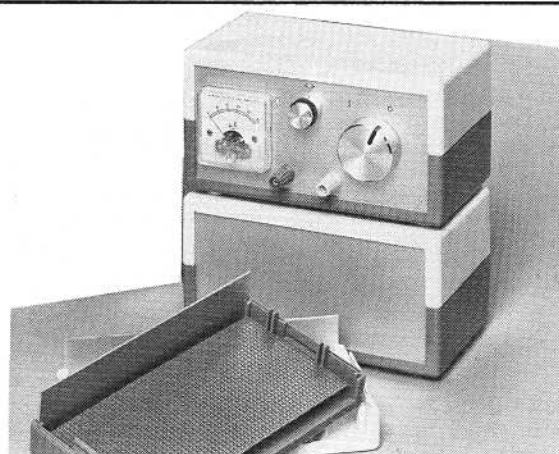


#### STYLE B \*

Very similar to the above but embodies a unique clip-together design so that fixing screws are not required to secure the top and bottom sections to each other. Boxes 75-3007C/8J/9D will also accept a standard 100 x 160mm Eurocard in the horizontal position.

Type	Case Size (in mm)	Slots can accommodate PC Boards	Price	P&P
75-1237J	154 x 85 x 40	33.4 x 148	255p	-
75-1238D	154 x 85 x 60	53.4 x 148	285p	-
75-1239K	154 x 85 x 80	72.4 x 148	340p	10p
75-3007C	180 x 120 x 40	33.4 x 174	325p	10p
75-3008J	180 x 120 x 65	58.4 x 174	345p	15p
75-3009D	180 x 120 x 90	83.4 x 174	370p	15p

75-1238D is also available in a very smart mustard colour.

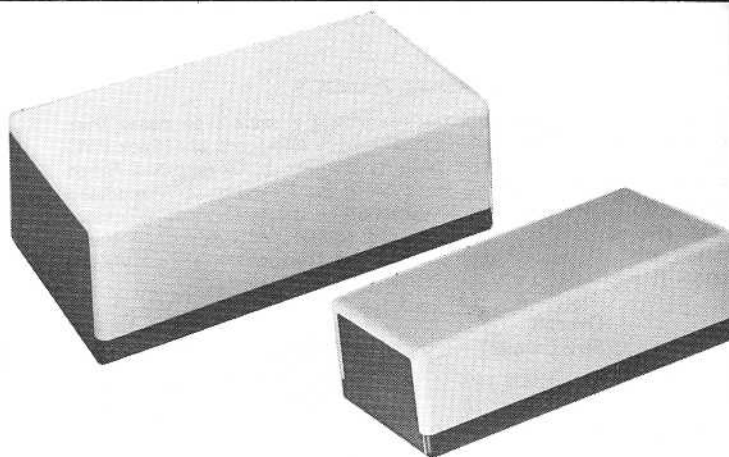


### STANDARD VEROBX \*

This range of boxes is manufactured in dark grey and light grey high impact polystyrene, such that no additional finish is required. Top and bottom are secured by fixing screws. The lower section is provided with threaded inserts for mounting components or P.C. Boards. In the case of the 65-2522K a standard 100 x 160mm Eurocard can be accommodated.

#### Standard Verobox

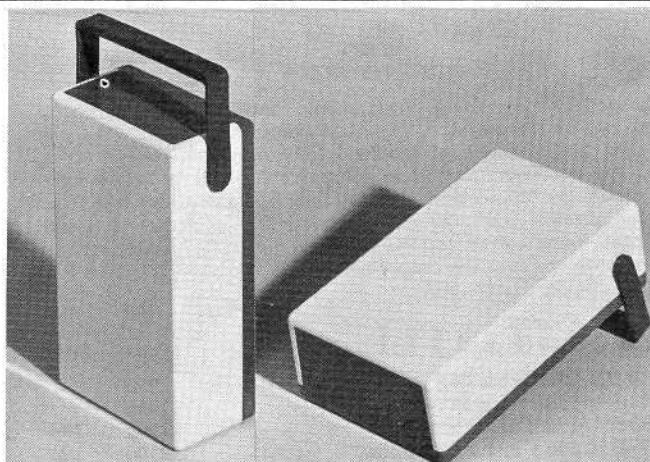
Type	Case Size (in mm)	Price	P&P
65-2514F	100 x 50 x 25	164p	-
65-2516G	100 x 50 x 40	190p	-
65-2518H	120 x 65 x 40	207p	-
65-2520J	150 x 80 x 50	235p	-
65-2522K	188 x 110 x 60	315p	10p



#### Standard Verobox (with handle) \*

This box is identical to the standard box with the addition of a handle. The handle is ideally suited for carrying the box with instruments fitted into it. If the box is then placed on a flat surface it can be angled by using the handle as a stand.

Type	Case Size (in mm)	Price	P&P
65-2759J	150 x 80 x 50	340p	-
65-2760D	188 x 110 x 60	425p	10p

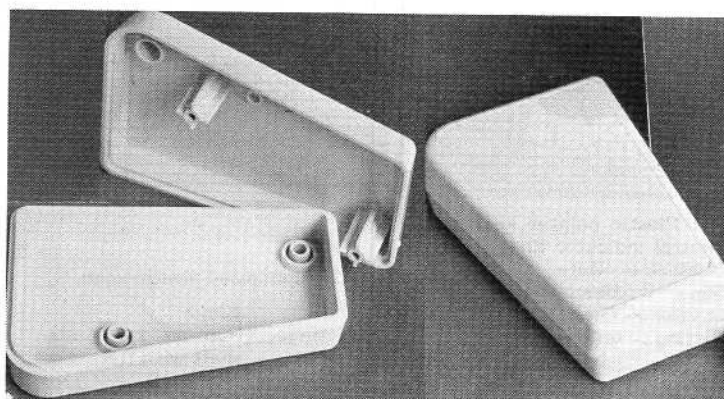




## VERO HAND-HELD CONTROL BOX \*

A stylish hand - held control box in white high impact ABS plastic. This box lends itself ideally for such applications as the control of TV games, remote control of models, ultrasonic transmitters, etc.,. Constructed in two halves and secured by screws, (supplied). A really stylish addition to the range of Vero boxes and cases.

Type	Overall Size (in mm)	Price	P&P
75-1799E	60 x 94 x 27	68p	-



## VERO BOX GENERAL PURPOSE PLASTIC / POTTING BOX \*

A small box in high impact ABS plastic. Suitable for numerous applications, equally suitable as a potting box. The close fitting lid is held in place by four small screws.

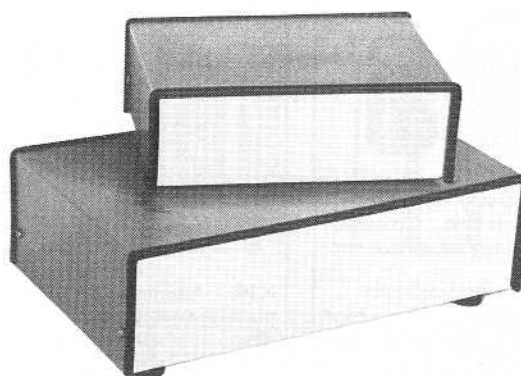
Type	Size (in mm)	Colour	Price	P&P
75-1413E	72 x 48 x 25	Black	41p	-
75-1469L	72 x 48 x 25	White	41p	-



## PW RANGE \*

Beautiful two part instrument case in PVC covered steel and trimmed with black piping. The bottom, front and back section being finished in white whilst the top and both sides are light blue. Mounted on four low profile feet. Available in five different sizes.

Type	Overall Size (in inches)	Price	P&P
PW1	6" x 4" x 2"	210p	20p
PW2	8" x 5" x 2"	260p	35p
PW3	8" x 5" x 3"	295p	45p
PW4	9" x 5 1/4" x 2 1/2"	345p	45p
PW5	12" x 7" x 4"	450p	68p



## MINI PROJECT BOX\*

Small black, textured, lightweight, two piece plastic project box. The upper half forms the sides and top which contains a grill suitable for loudspeaker, microphone, gas sensor etc. The lower half comprises the base with vent slot and moulded feet and two ends incorporating holes suitable for cable entry, fuse, controls etc. Ideal for housing mini power supply, gas sensor, intercom etc. Four self-tapping fixing screws (not supplied).

Type	Size (in mm)	Price	P&P
DC301	123 x 68 x 43	75p	-



K1



K1. Plastic pointer knob with central indicator line. Choice of black or white.

Dia:- 18mm(skirt)  
Pointer:- 31mm(length)

Fitting:- grub screw

Blk 9p\*  
Wht 12p\*

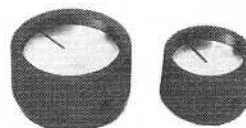
K2



K2. Aluminised plastic knob.

Dia:- 22mm  
Fitting:- Push-on for 6mm shaft with flat.

15p\*

K4  
K4a

K4. Black serrated body with line indicator and metal top.

Dia:- 35mm  
Fitting:- grub screw

22p\*

K4a. As K4 but 25mm dia. 20p\*

K5  
K6

K5. Black fluted, metal top and skirt. Calibrated 0-10.

Dia:- 37mm (skirt)

Fitting:- grub screw

K6. As K5 but with pointer on skirt.

28p\*

K7  
K7a

K7. Black, knurled with tapered grip. Metal skirt and top insert. Calibrated 0-10.

Dia:- 30mm (skirt)  
Fitting:- grub screw

26p\*

K7a. As K7 but with indicator line on skirt.

26p\*

K8



K8. Black or silvered for 60mm slider pots.

Size:- Black  
11 x 20 x 13mm high  
Silver  
11 x 22 x 12mm high  
Fitting:- Push-on

10p\*

K8a  
K8b

K8a. As K8 but smaller. Black wedge shape with chrome edges and indicator line.

Size:- 11 x 15 x 13mm high  
Fitting:- Push-on

K8b. As K8a but smaller. Available in black or silvered.

Size:- 8 x 9 x 11mm high

10p\*

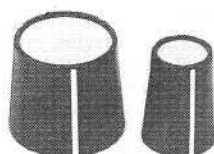
K12



K12. Aluminised plastic for 1/4" shaft with flat.

Dia:- 22mm  
Fitting:- Push-on

16p\*

K15  
K16

K15. Black plastic ribbed body, white indicator line. Coloured top insert in Red, Blue or Yellow.

Dia:- 15 x 19mm (high)  
Fitting:- Push-on

16p\*

K16. As K15 but 23mm dia. plus recessed base.

18p\*

K18

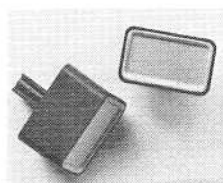


K18. Aluminised plastic for push on switch

Dia:- 10mm  
Fitting:- Push-on

16p\*

K19



K19. Black plastic with silvered insert. Rectangular shape for push button switches.

Size:- 24 x 14mm  
Fitting:- Push-on

15p\*

K24



K24. Beautiful solid aluminium top hat style knob. Looks very elegant on amplifiers. Skirt covers pot nut

Dia:- 22 x 20mm (high)  
Fitting:- grub screw

31p\*

K20



K20. Metalised plastic push on knob with ribbed silver sides and black top.

Dia:- 22mm  
Fitting:- Push-on

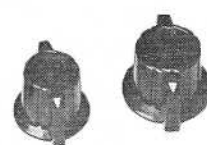
K21



K21. Instrument knob. Double winged with black plastic body and white indicator line and silver top.

Dia:- 20 x 18mm (high)  
Fitting:- grub screw

18p\*

K22  
K23

Double winged, black plastic ribbed body. White pointer arrow. Ideal for instruments.

Size:-  
K22. 21 x 18mm high

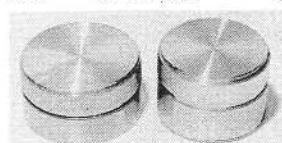
25p\*

K23. 26 x 18mm high

30p\*

Fitting:- Double grub screw.

K25 15mm dia 24p\*  
K26 25mm dia 28p\*  
K27 30mm dia 36p\*  
K28 35mm dia 38p\*



Highly polished metal covered knobs with serrated top edge. Very attractive. Ideal for domestic audio equipment.

Dia:- see above  
Fitting:- Spline. Push-on.

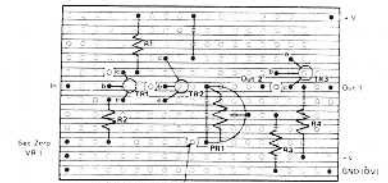
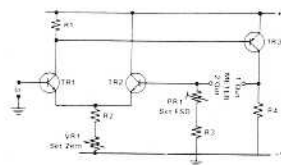
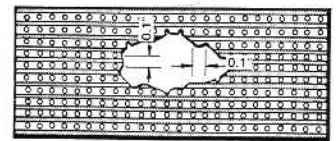
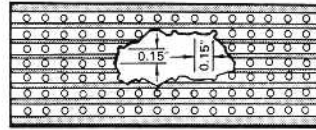


## VERO BOARD \*

VEROBOARD is a copper clad universal wiring board, available in a wide variety of different sizes. They have been punched with a matrix of holes and machined to provide parallel copper tracks. The basic concept in the use of Veroboard is to arrange components such that they are electrically connected by predetermined copper tracks. The copper tracks themselves can be interrupted where necessary by using a spot face cutter or by drilling.

Also available is a similar range of Veroboard but without the copper tracks. This board is called PLAIN VEROBOARD and can be used in the same way but with the aid of VEROPINS that are inserted through the holes in the board and then hardwired between the respective components.

Size (inches)	Number of Strips / Holes		(Copper) Pitch		(Plain) Pitch	
	0.1	0.15	0.1	0.15	0.1	0.15
2.5 x 3.75	24/37	16/25	46p	39p	31p	24p
2.5 x 5.0	24/50	16/33	55p	50p	-	31p
3.75 x 3.75	36/37	-/-	55p	50p	-	-
3.75 x 5.0	36/50	23/33	62p	67p	50p	43p
2.5 x 17	24/170	16/112	169p	135p	-	92p
3.75 x 17	36/170	23/112	218p	180p	141p	120p
4.7 x 17.9	38/179	/112	280p	-	-	183p

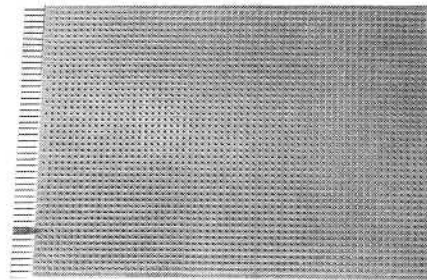


A SIMPLE HIGH IMPEDANCE VOLTMETER

## PLUG-IN VEROBOARD \*

Special gold plated edge connector VEROBOARD. This veroboard has hard gold plated contacts at one end. Available in one size and only in 0.1" pitch. Order as Plug-in VEROBOARD.

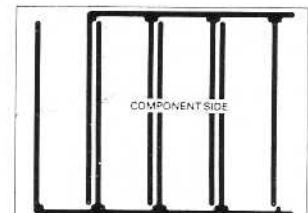
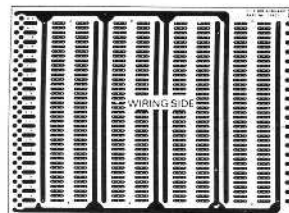
Size	Number of Strips/ Holes		(Copper) Pitch
	0.1"	0.1"	
4.5" x 6.5"	45/60		99p



## VERO DIP BOARD (Double Sided) 0166F \*

Another very handy board that can accommodate up to 20 x 14pin DIL IC's or 16 x 16 DIL IC's. The DIP board is a great idea for both prototype layouts and for final assemblies.

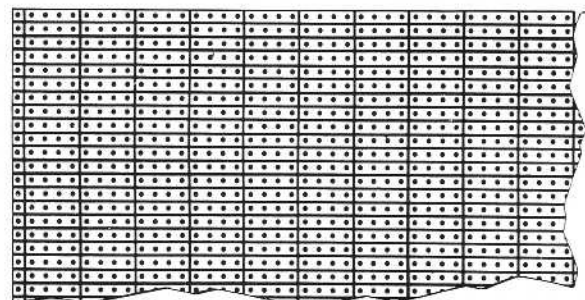
Size	Price
4.5" x 6.0"	268p



## VERO DIP BOARD VQ (Double sided) \*

Accommodates all types of electronic components. Track cutting is unnecessary on this board. The non copper side is marked by white lines denoting the position of the vertical breaks in the copper tracks. A paper layout sheet is also included.

Size	Price
5.75" x 3.0"	90p

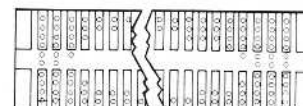


## VEROSTRIP \*

This variant of Veroboard is designed as a terminal strip to provide a simple and inexpensive mounting board for discrete components. Components can be soldered across or along the board either directly to the copper track or to Vero Terminal pins. This board is available in both 0.1" and 0.15" pitch.

Size	Price
8.5" x 1.5"	53p

Please state pitch size when ordering.





### A WIRING SYSTEM THE MODERN WAY

A new type of interconnecting system, particularly suited to the wiring of integrated circuits.

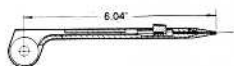
Simply, the polyurethane lacquered insulated wire is routed, using the Wiring Pen, around each component lead that you wish to join together, the connections are completed by soldering, which melts the polyurethane lacquer and at the same time makes a permanent solder joint.

Verowiring allows high packing density to be achieved, irrespective of whether integrated circuits or discrete components or a mixture of both are employed. We can supply the necessary materials and tools to enable you to assess the systems general application.

### VERO PEN\*

With integrated spring wire clamp, for wire retention. The pen has a self contained spool of polyurethane lacquered insulated copper wire. It is easy to use and comfortable to handle.

Order as Wiring Pen 79-1732G  
Price 265p

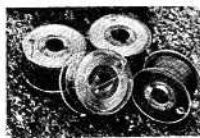


### VERO WIRE\*

Each spool contains 40m of wire 0.15mm dia. The wire is current rated at 0.030amps and has a proof voltage of 600volts. Four different colours are available Pink, Gold, Violet and Green.

Order as Verowire Spool plus colour

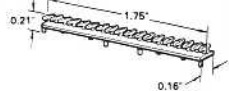
Green	79-1235E	60p
Pink	79-1737D	60p
Gold	79-1739E	60p
Violet	79-1740L	60p



### VERO COMBS\*

Plug in wiring combs can be fitted to any circuit board that has 0.04" dia. holes on a 0.1"x0.1" matrix, i.e. Veroboard, Vero Plain Board, DIP Board, V-Q Board. The combs are fitted to the wiring side of the board between the leads of integrated circuits. Sold separately in ones.

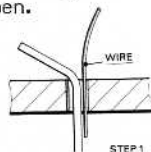
Order as Vero Combs 79-1735C  
Price 6p



### USING THE SYSTEM

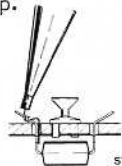
#### STEP 1

With approximately 0.12" of wire protruding from the pen, insert wire into hole containing I.C. lead where first connection is to be made. The wire may be held taut in the pen by depressing the slider/wire clamp with the index finger. It may also be used for advancing or withdrawing the wire through the pen.



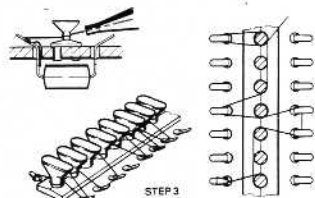
#### STEP 2

Wind at least two turns of wire around I.C. lead to make your first joint. Keep the Verowire pen tip as close to the I.C. lead as possible to ensure a tight wrap.



#### STEP 3

Wind two turns around nearest peg on the wiring comb.



#### STEP 4

From now onwards you may proceed to route the wire to the appropriate pins of the components to be connected. Use the Wiring Combs as a means of holding and controlling the wire so ensuring a neat layout. Generally speaking, multiple turns are only required at the start and end of a number of common interconnection points.

### VERO PINS\*

Two types are available. A half length and a full length pin. For use with both 0.1" and 0.15" pitch boards. When ordering please state type and size when required.

0.1" pitch boards (0.04" dia. hole)  
Order as

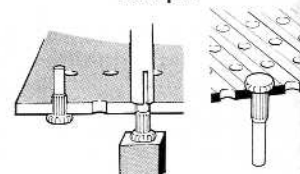
Half pin	18-0223K
Full pin	18-0220C

0.15" pitch boards (0.05" dia hole)  
Order as

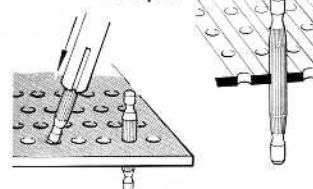
Half pin	18-0217G
Full pin	18-0216A

Pack of 36 pins	30p
Pack of 1000 pins	460p

#### Half pin



#### Full pin



### INSERTION TOOL\*

A handy tool for easy insertion of both types of Veropins. It is strongly recommended that this tool be used. Plastic handle with metal shaft.

Order as  
Insertion Tool

For 0.1" pitch boards 22-0230H  
For 0.15" pitch boards 22-0229B

Both Sizes, same price 120p

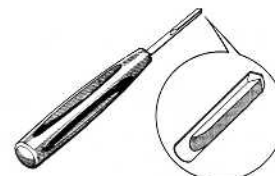


Insertion Tool

### SPOT FACE CUTTER\*

A very useful tool for breaking the copper track on Veroboards. Can be used on both 0.1" or 0.15" pitch boards. Plastic handle with a metal cutting shaft.

Order as	Code	Price
Type		
Spot Face		
Cutter	22-0239G	85p

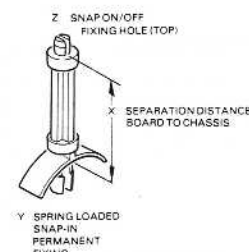


Spot Face Cutter

### VERO PLASTIC STAND-OFFS\*

An economical way to mount your PC Boards. Mounting is via a 5mm diameter hole. The stand-off is a push fit with a spring loaded action to hold stand-off securely. Available in three heights.

Order as	Code	Price
Type		
6mm	22-1417G	3p
15mm	22-1418B	4p
19mm	22-1419H	4p

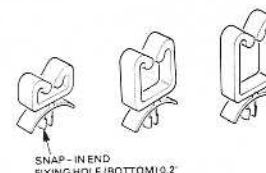


Vero Stand offs

### VERO CABLE RETAINERS\*

A spring loaded push fit retainer in three different sizes to cover a useful range of requirements. A 5mm fixing hole is all that is required.

Order as	Code	Price
Type		
3 x 10mm	22-1414L	5p
8 x 10mm	22-1415F	5p
13 x 10mm	22-1416A	5p



Cable Retainers





## P.C.B. KIT

Why not make your own Printed Circuit Board? Everything you will need is included in this specially made up kit.

### Kit Contains :-

1. Copper clad board
2. Dalo etch resist pen with spare tip.
3. Packet of assorted etch resist transfers.
4. Etching tray 8" x 4".
5. 1lb of Anhydrous Ferric Chloride.
6. Size 60 H.S.S. twist drill.

£3.95\* +45p P&P



### MIXING INSTRUCTIONS

**Please Note :-** Anhydrous Ferric Chloride is a poisonous chemical and as such should be treated accordingly. Solution of ferric chloride to be made up by adding the anhydrous salts slowly and carefully to 1½ pints of cold water, stirring with a wooden or plastic spatula. The addition of approximately 20ml of hydrochloric acid gives optimum solution, although not essential. Solution can be stored in a dark glass or plastic container.

### ANHYDROUS FERRIC CHLORIDE \*

Available in 1lb bags allowing you to make up your own solutions. For mixing instructions see PCB kits on this same page.

1lb Anhydrous Ferric Chloride

65p  
35p P&P

### ETCHING TRAY \* (Plastic)

An orange coloured plastic tray for etching copper laminated boards. It should be remembered that metal trays can not be used as the etching solution is an acid that will attack metal.  
Size:- 8" x 4" x 2"

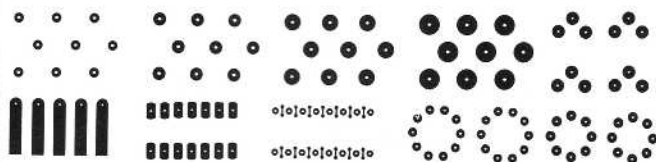
Etching Tray

40p

### DALO ETCH RESIST TRANSFERS\*

Set of 10 different PCB symbols for preparing finished PCB's to professional standards. Just rub down transfers onto pre-cleaned copper laminate. The symbols are then "fixed" by covering with the protective paper strip and polishing lightly. Connect symbols by drawing tracks with Dalo pen. The board is now ready for etching. After etching rinse board and remove transfers with acetone (nail polish remover).

Price 150p\*



### COPPER CLAD BOARD \*

Selection of copper laminated boards for making your own PCB's.

	Single-sided	Double-sided
Fibre Glass :-		
6" x 6",	75p	90p
6" x 12"	130p	175p
S.R.B.P.		
8 3/4" x 8 3/4"	75p	

### DALO PEN \* (Etch Resist)

The Dalo etch resist pen complete with spare tip is an ideal way of drawing out your own printed circuit layouts directly on to PCB'S. With a little practice and perhaps with the aid of a few etch resist transfers a really smart looking board can be achieved.

Dalo Pen

75p

### ALFAC "ETCH RESIST" TRANSFERS\*



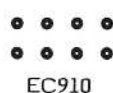
EC950/1



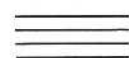
EC994/1



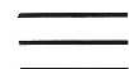
EC964/1



EC910



EC940



EC942

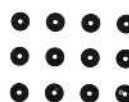


EC950/2



EC964/2

alfac



EC912



EC944

Single sheet 35p\*  
Pack of 5 150p\*  
(same type)



**BLOB BOARD** is a fairly new type of printed circuit board. Designed exclusively for the Home Constructor and Electronics development engineer it allows cheap yet very accurate printed circuit boards to be produced easily and efficiently. The BLOB BOARD itself is a P.C. Board that has been ETCHED AND ROLLER TINNED to specific designs and comes in 3 different ranges.

#### 'V' RANGE

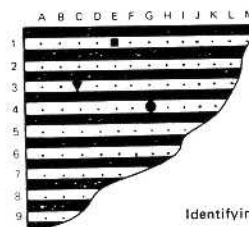
This is similar to a well known matrix board, and has a number of roller tinned copper strips running the full length of the board. The board has dots on 0.1" and 0.15" spacing which could be drilled but is normally not necessary. Each roller tinned copper strip is identified by a number and each row of dots is marked by a letter so every hole on the BLOB BOARD is easy to find and identify.

#### 'V' RANGE 0.1"

	Each	Price per 3
Model ZB1 V 2.5" x 5"	30p	82p
Model ZB2 V 2.5" x 3.75"	24p	62p
Model ZB3 V 3.75" x 5"	46p	119p
Model ZB4 V 10" x 6"	150p	383p

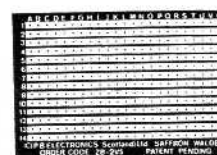
#### 'V' RANGE 0.15"

	Each	Price per 3
Model ZB1 V5 2.5" x 5"	30p	82p
Model ZB2 V5 2.5" x 3.75"	23p	62p
Model ZB3 V5 3.75" x 5"	46p	119p
Model ZB4 V5 10" x 6"	150p	383p



Identifying positions on the board.

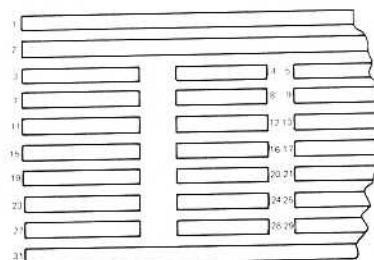
■ is 1E  
▼ is 3C  
● is 4G



#### 'D' RANGE

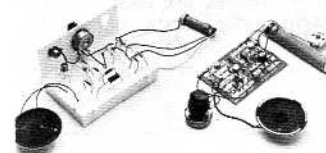
This is mainly for discrete components but has dots on a 0.1" spacing which could be drilled to mount an IC package and is highly recommended for the home constructor. Most will find that this is the best Blob Board to use because:-

- (i) the contact rails are thicker, roller tinned and very easy to solder.
- (ii) most circuits on 'D' range require no cutting or drilling of the contact rails.
- (iii) the layout is carefully engineered to give maximum assembly efficiency.
- (iv) Model "ZB5D" is an exact match to the S-Dec Breadboard layout and many projects are available based on this exact layout. Particularly the recent series of projects in Practical Wireless and the new F39 projects available in book form.



#### 'D' RANGE

	Each	Price per 3
Model ZB5 D 3.6" x 2.4"	20p	56p
Model ZB6 D 2.4" x 7.3"	42p	110p
Model ZB7 D 4.9" x 7.3"	84p	220p
Model ZB8 D 9" x 7.5"	160p	410p

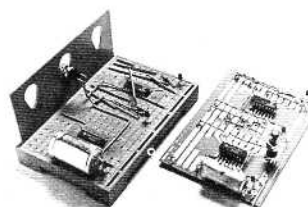
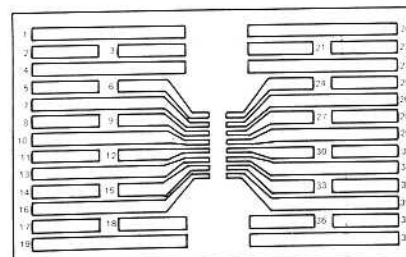


#### 'IC' RANGE

The third type of BLOB BOARD is the "IC" range and is the Blob-Board to use when working with integrated circuits. Model ZB1 IC is an exact copy of the T-Dec Breadboard layout and Model ZB2 IC is an exact copy of the U-Dec A and U-Dec B Breadboard layout. Consequently many projects, teaching aids and instruction books are available for these BLOB BOARDS.

#### 'IC' RANGE

	Each	Price per 3
Model ZB1 IC 4.5" x 3"	74p	
Model ZB2 IC 4.8" x 3.2"	80p	
Model ZB4 IC 4.75" x 7.5"	170p	
Model ZB8 IC 9.5" x 7.5"	342p	



Breadboarding is the technical jargon for the making up of circuits, normally for prototypes or experimental purposes in one-off quantities. DEC is the name given to the specially manufactured breadboards on which components can be arranged in a circuit without soldering. There are four different types and each type can be linked together to form breadboarding areas of any desired size.

The contacts on the DECS are identified by a letter number system, and all linked contacts are shown by lines on the surface of the board, so after deciding on the circuit required just push the wires of the components into the desired contact hole and they are held firm instantly by the specially manufactured double leaf spring contacts of phosphor bronze. To modify the circuit simply pull the components out and plug in again in the correct position. A booklet showing circuits is enclosed with each DEC.

The system was designed in conjunction with practising teachers of Electronics and helps make the learning of basic and Advanced Electronics easier and more enjoyable. The DEC system is used by many schools already as the basis for more practical work in all courses of Electronic Education up to degree level.

## S-DEC

### Model PB11

This, the most popular Board is designed solely for the use of discrete components and is particularly useful for basic educational purposes. Complete with Front panel, ZB5-D Blob-Board and circuit booklet.  
(No. of contacts : 208)

Price  
£3.50 \*

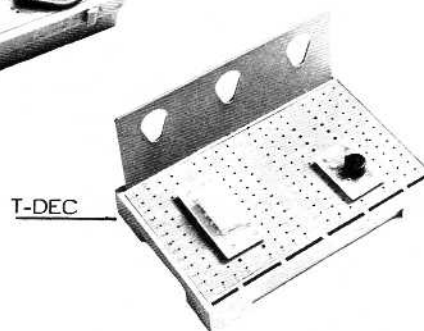


## T-DEC

### Model PB21

This Board allows 2 TO5 or 1 DIL IC Station to be used and so is primarily intended for discrete work or for linear IC application where considerable numbers of discrete components may be required. The T-DEC comes complete with Front panel, ZB5-D Blob-Board plus circuit booklet.  
(No. of contacts 208)

Price  
£4.00 \*

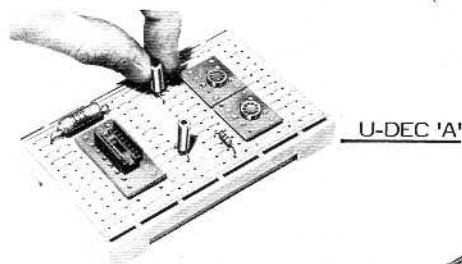


## U-DEC 'A'

### Model PB31

The u-DEC 'A' is specially designed for ease of use with IC's and allows 2 DIL or 4 TO5 stations to be used but will accommodate discrete components with equal facility. Complete with Control panel, ZB2-IC Blob-Board and circuit booklet.  
(No. of contacts :208)

Price  
£4.65 \*

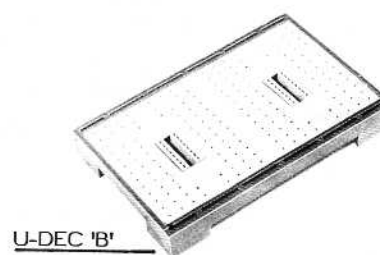


## U-DEC 'B'

### Model PB41

The u-DEC 'B' is for similar uses as u-DEC 'A', but has two 16 lead IC sockets as part of the Board. Complete with Front panel, ZB2-IC Blob-Board, plus circuit booklet.  
(No. of contacts : 208)

Price  
£6.99 \*



The T-DEC and U-DEC 'A' owe part of their versatility to accommodating standard adaptors (carriers). These carriers push directly into the boards and contain a polarizing pin which ensures correct orientation of the carrier when inserted and prevents damage to expensive IC's. The carriers are available either "plain" or with appropriate sockets attached. The "plain" versions have a printed circuit onto which IC packages may be soldered. The carriers with sockets have IC sockets permanently fixed to the same type of board. Patching may be carried out using ordinary solid-core wire. However, accessories supplied include leads terminated at both ends (PB102) by plugs or at one end only (PB101). Leads with plugs on both ends are available in 5 colour coded lengths.

<b>Model PB71</b>	TO5 10 lead plain adaptor	Price 99p *
<b>Model PB72</b>	TO5 10 lead adaptor (with IC socket)	192p *
<b>Model PB61</b>	DIL 16 lead plain adaptor	99p *
<b>Model PB62</b>	DIL 16 lead adaptor (with IC socket)	192p *
<b>Model PB103</b>	1mm connecting plugs (pack of 10)	50p *
<b>Model PB101</b>	Connecting leads single ended type (pack of 10)	100p *
<b>Model PB102</b>	Connecting leads double ended type (pack of 10)	120p *

**Model CX (17 watt) \***

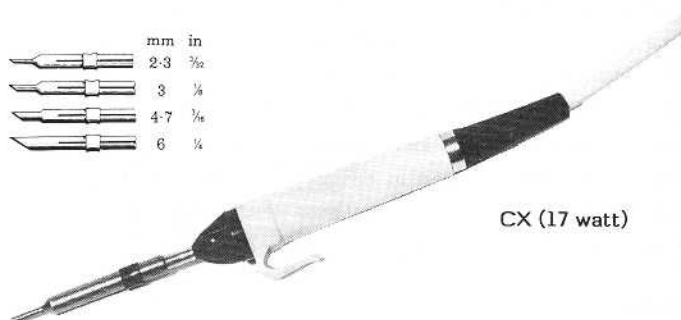
Miniature double shaft soldering iron, the inner shaft is of ceramic for near perfect insulation. Breakdown voltage is 4,000V AC, with a leakage current of 3-5uA. The outer shaft is of steel for added strength (Using a steel shaft also means that the iron requires an earth contact.) The iron is fitted with 3 core cable. Spare elements and iron coated bits are available.

Spare bits are available in the following sizes.

3/32", 1/8", 3/16", 1/4", 1/24",

Model CX .. ..	360p
Spare Elements .. ..	160p
Spare Iron coated bits .. ..	46p

	mm	in
	2.3	3/32
	3	1/8
	4.7	3/16
	6	1/4



CX (17 watt)

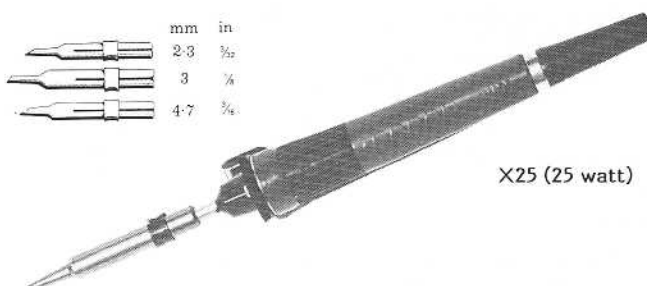
**Model X25 (25 watt) \***

A general purpose iron, again using the double shaft principle. This iron has a breakdown voltage of 1500V AC and a leakage current of 3-5uA. Supplied with a 1/8" Iron coated bit.

Spare bits :- 3/32", 1/8", 3/16",

Model X25 .. ..	360p
Spare Elements .. ..	160p
Spare Iron coated bits .. ..	50p

	mm	in
	2.3	3/32
	3	1/8
	4.7	3/16



X25 (25 watt)

**Model C (15 watt) \***

A very reliable miniature soldering iron. Maximum efficiency in heat transfer from the element to the bit is achieved by fitting the bit over the top of the stainless steel shaft. The leakage current is 10uA. Overall length is 6 1/2". Ideal for beginners.

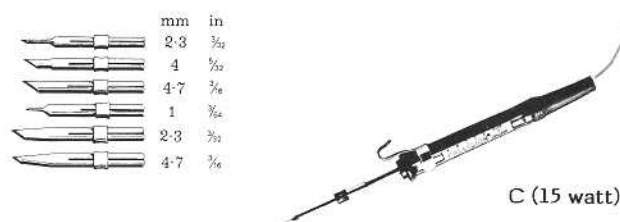
Two types of spare bits are available.

Nickel plated :- 3/32", 5/32", 3/16", 3/64",

Iron coated :- 3/32", 5/32", 3/16", 3/64".

Model C .. ..	360p
Spare Elements .. ..	160p
Spare Iron coated bits .. ..	46p
Spare Nickel plated bits .. ..	46p

	mm	in
	2.3	3/32
	4	5/32
	4.7	3/16
	1	3/64
	2.3	3/32
	4.7	3/16



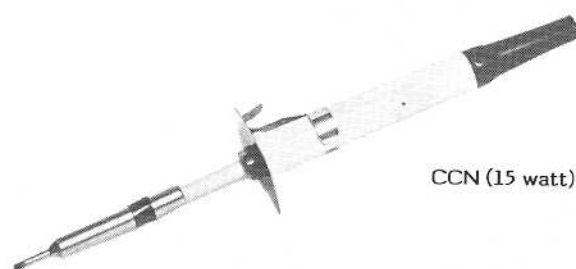
C (15 watt)

**Model CCN (15 watt) \***

This iron is fitted with a ceramic shaft to ensure near perfect insulation. With a current leakage of less than 1uA at working condition, not even the most delicate integrated circuit or transistor can be damaged. The capacitance of this model is 30pF. The breakdown voltage is greater than 2,000V AC. This iron is fitted with a 3/32" iron coated bit.

Spare bits :- 3/32", 1/8", 3/16", 1/4", 1/24".

Model CCN .. ..	380p
Spare Elements .. ..	190p
Spare Iron coated bits .. ..	46p

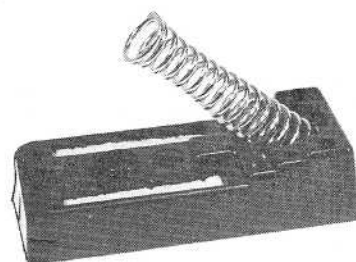


CCN (15 watt)

**Stand ST3 \***

This stand is made from high grade insulation material with a chromium plated strong steel spring. It is suitable for all models and replaces all previous stands. The two sponges at the side which are easily replaceable serve to keep the soldering iron bits clean. Spare bits can be kept in the holes at the back of the base.

ST3 Stand .. ..	150p
-----------------	------



ST3 Stand

**Heat shunt \***

Specially designed and made of aluminium to quickly dissipate heat when soldering small transistors, etc. The small size of the ends of the heat shunt allow it to be positioned in very confined spaces. A must for the inexperienced hobbyist.

Heat shunt .. ..	12p
------------------	-----





Multicore is renowned for its superior flux cored-solders. All cored-solders are self fluxing and have multiple core construction for instant wetting. As a result soldering is achieved more quickly using less heat and less solder.

## 60/40 TIN LEAD ALLOY (Melting temperature 188°C)

	approx length	swg/dia	Price
Handy Dispenser Size PC115	6.4m	22/0.7mm	64p
Size 1 Carton C16014	1.8m	14/20mm	98p
Small Reel Size 10	39.6m	22/0.7mm	220p
Reel 500 grams	190ft	18/1.2mm	525p
Reel 500 grams	540ft	22/07mm	574p

## SAVBIT Alloy (Melting temperature 215°C)

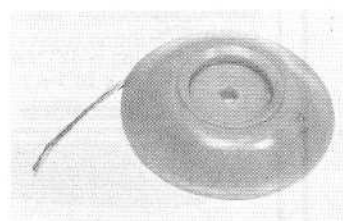
Handy Dispenser Size 5	2.3m	18/1.2mm	54p
Size 1 Carton CISAV18	6.1m	18/1.2mm	98p
Reel Pack Size 12	13.7m	18/1.2mm	220p

## SOLDER WICK (Solda-Mop)

Very easy to use de-soldering aid. Place wick on joint to be de-soldered, apply soldering iron until soldered joint melts (approx. 1 sec), remove iron and wick at the same time. Solder will be drawn up the wick by capillary action.

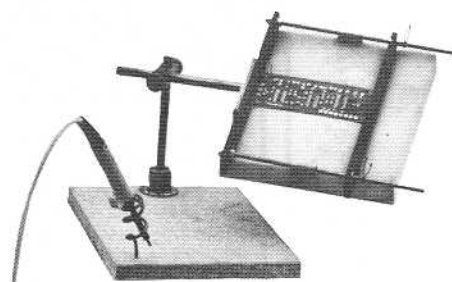
Price  
65p\*

DESOLDERING TOOL see page 83



## SOLDERING JIG

A great 3rd or even 4th hand to assist you in soldering P.C.B's. This jig comes complete with soldering iron holder and really makes light work of soldering components onto a P.C.B. Consists of a base and a reversible adjustable clamp which holds the printed circuit board. Components are inserted into the board and a foam covered plate is clipped on top to hold them in place while the board is turned over for soldering. Allows many components to be inserted and soldered in one operation.



Order as  
Soldering Jig  
plus P&P

£7.50p\*  
85p

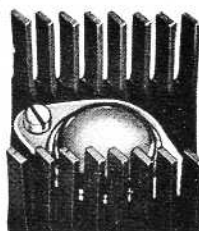


## HEATSINKS

A useful range of heatsinks to cover the more common semiconductors.

## TV SERIES

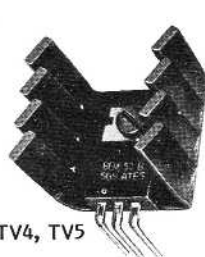
Type	Device	Thermal Rating	Size (mm)	Price
TV2	TO66	10.5°C/W	38 x 27 x 42 high	24p*
TV3	TO3	7.2°C/W	38 x 42 x 25 high	24p*
TV4	TO126	17°C/W	22 x 19 x 25 high	24p*
TV5	TO220	17°C/W	22 x 19 x 25 high	24p* <i>TRIAL</i>
TV17	TO5	7.2°C/W	38 x 42 x 25 high	24p*



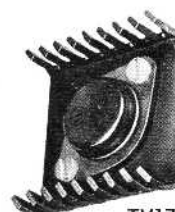
TV3



TV2



TV4, TV5



TV17

## F SERIES (Push-on type)

5F	TO5	80°C/W	15 x 12 high	12p*
18F	TO18	50°C/W	15 x 12 high	12p*
92F	TO92	50°C/W	14 x 7 x 14 high	9p*



5F 18F



92F

## THERMOPATH 167

## Semiconductor Mounting Compound

Essential to thermally efficient transistor mounting. Maintains insulation and improves heat transfer by up to 50%. Available in either syringe or in small tubs.



20ml Syringe

£1.20\*

5ml Tub

48p\*

## INSULATING MICA WASHERS

Essential for mounting power transistors and the like.

## INSULATING BUSHES

Small top hat shaped insulating bushes for mounting in transistor fixing holes, ensures correct insulation. Available in 3 sizes.

TO3	..	..	3p* per set
TO66	..	..	3p* per set
TO220	..	..	3p* per set

## STUDMOUNT HEATSINK

Replaces fixing nut on stud mounted semiconductors. Designated DSF1 it has a thermal rating of 27°C/W

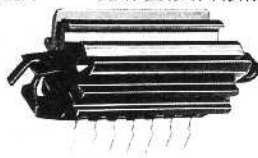


DSF1 .. .. 30p\*

## IC HEATSINK

Clip-on heatsink for DIL packages of up to 16 pins. This new device to the amateur market provides added protection for your costly IC's.

Thermal rating :- 32°C/W  
Size :- 31 x 10.5 x 7.5mm



DIP1490 .. .. 30p\*

## CONNECTING WIRE\*

Card of 10 yards. Assorted colours. Solid or Flexible conductors.

Price 15p\*

Packets of 5 coils, each 5 yards long. 3 coils of flexible and 2 coils of solid conductors.

Price 35p\*

## TO3 TRANSISTOR COVER

Black plastic clip on cover for TO3 case transistors. Prevents short circuits, providing insulation up to 30KV.



Price 14p\*

ENAMELLED COPPER WIRE\*  
(2oz Reels)

14SWG	..	..	50p*
16SWG	..	..	50p*
18SWG	..	..	50p*
20SWG	..	..	65p*
22SWG	..	..	65p*
24SWG	..	..	65p*
26SWG	..	..	65p*
28SWG	..	..	65p*
30SWG	..	..	70p*
32SWG	..	..	70p*
34SWG	..	..	70p*
36SWG	..	..	79p*
38SWG	..	..	79p*
40SWG	..	..	79p*

## FREEZE IT\*

This is a very useful tool carried by many service engineers to help them locate troublesome and often intermittent faults. e.g. Distortion in an audio amplifier can be caused by one of the power transistors overheating. A quick spray with Freeze It will often bring the temperature down so that the distortion will disappear allowing you to identify the faulty transistor.

Contents :- 8ozs/228gms.

Order as Freeze it Price 85p\*

## AERO KLEEN\*

A handy size aerosol containing an efficient degreasing solvent. Ideal for cleaning PCB's, various types of contacts and will also remove etch resist ink. Contents :-170gms.



Order as Aero Kleen Price 65p\*

## SERVISOL\*

A switch cleaner with an added lubricant for most types of switch contacts. Can also be used effectively to quieten down those noisy carbon tracks on potentiometers. Contents :- 8ozs/226gms.



Order as Servisol Price 75p\*

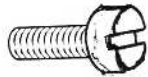
## PLAIN NUTS / WASHERS\*



Available as follows :-

	Nuts	Washers
2BA	1p*	½p*
4BA	1p*	½p*
6BA	1p*	½p*
8BA	1p*	½p*

## CHEESE HEAD SCREWS\*



Available as follows :-

	¼"	½"	1"
2BA	2p*	2p*	
4BA	2p*	2p*	
6BA	1½p*	1½p*	2p*
8BA	1½p*	1½p*	1½p*

Brass nickel plated.

## NYLON NUTS & BOLTS\*



6BA and 8BA 7p per pair

## SOLDER TAGS\*

Hot tinned brass tags as follows :-



0BA	½p*
2BA	½p*
4BA	½p*
6BA	½p*

## SPINDLE COUPLERS / EXTENSIONS\*

### Standard Brass Couplers

Accepts all ¼" shafts. Four grub screws ensure a positive grip.



Price 22p\*

### Extension Spindle (Brass)

Two grub screws secure extension to any ¼" shaft.



Price 30p\*

### Spindle Rod (Aluminium)

12" lengths of ¼" diameter aluminium rod for extending spindles.



Price 38p\*

## 'P' CLIPS\*

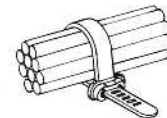
For securing cables etc.



Dia	Price
1/8"	3p*
1/4"	5p*
3/8"	6p*

Black plastic type with fixing hole.

## CABLE TIES\*



Nylon non-release ratchet lock type. Ideal for binding large numbers of cables into a tidy trunk, especially useful to builders of electronic keyboard instruments. Will take a maximum diameter of 16mm. Tie size :- 92 x 2.6mm.

Price 2p\*

## TINNED COPPER WIRE\*

22s.w.g.



200gram reel of 22s.w.g. tinned annealed copper wire on a plastic reel. A must for the hobbyist. Ideal for linking tracks on PCB's.

Price 90p\*

## INSULATING TAPE\*

3/4" wide, 10m reel of self adhesive PVC insulating tape. Available in :- Red, Black, White.



Order as Insulating Tape (plus colour) 22p\*

## GROMMETS\*



Protect and/or insulate those components when they pass through holes or cut outs.

Bore	O/dia	Price
3/16"	7/16"	2p*
1/4"	9/16"	2p*
1/4"	11/16"	3p*
5/8"	Blanking grommet	5p*

## CAPACITOR CLIPS\*



Vertical	25mm dia	9p*
Vertical	45mm dia	12p*
Horizontal	37mm dia	10p*
Tempered steel clips	20mm dia	8p*

## FUSES AND FUSE HOLDERS\*

### FUSES

20mm Quick Blow	160, 250, 500mA, 1, 1.5, 2, 3, 4, 5A.	5p*
1½" Quick Blow	500, 750mA, 1, 1.5, 2, 3, 4, 5, 10, 15A.	5p*
20mm Anti-Surge	100, 250, 500, 800mA, 1, 1.6, 2, 2.5, 3.15, 5A.	8p*
1" Mains	1, 2, 3, 5, 7, 10, 13A.	6p*

### FUSE HOLDERS

20mm, 1½"	Enclosed screw type	..	..	..	..	22p*
20mm, 1½"	Open PCB type	..	..	..	..	6p*
1½"	IN-Line bayonet locking (as used in cars)	..	..	..	..	9p*

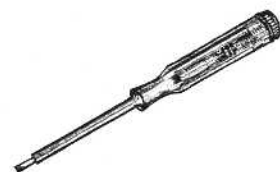
## MULTIMETER CASES\*



Protect your multimeter or other expensive pieces of test equipment with our black P.V.C. collapsible meter case. Press stud fastening, handle.

Size A	5" x 4½" x 1½"	75p*
Size B	8" x 5½" x 2¾"	150p*

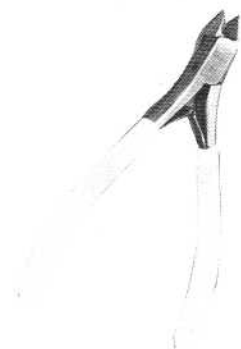
## NEON SCREWDRIVER\*



Neon screwdriver for testing mains or any voltage between 100 and 500Volts. Insulated shaft and handle. Available in two sizes.  
Small 5½" long (with clip) 25p\*  
Large 7¾" long. 35p\*

**Lindstrom Side Cutters \***

Miniature high quality side cutters by Lindstrom (Sweden) These precision box jointed side cutters have insulated handles and a leaf spring return action. Ideal for use on high component density P.C.B's. A real professional tool. 4½" long.



Order as  
Lindstrom Side Cutters £9.95\*

**Long Nose Pliers\***

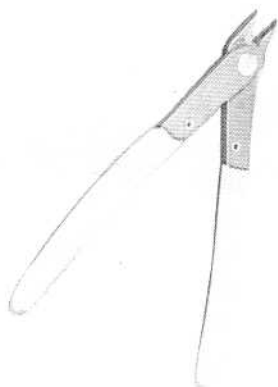
High quality miniature long nose pliers by Lindstrom (Sweden) Box jointed construction, leaf spring return action and insulated handles. A superb pair of pliers for the most intricate types of work as well as the normal run of mill type of jobs. These pliers will take a lot beating. 5¼" long



Order as  
Lindstrom Long Nose Pliers\* £4.95\*

**Microshear Side Cutters \***

These high quality cutters with their unusual design really are a joy to use. Their unique design allows you to cut the wire ends on a P.C.B. etc. flush with the surface. They are spring loaded for quick return and have insulated handles. A safety guard is also available separately to prevent lead end fly-off. 5" long



Order as  
Microshear Side Cutters £2.98\*  
Microshear Side Guard £0.95p\*

**Micro Nose Pliers \***

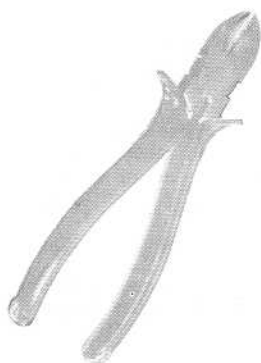
From the same stable as the Microshear cutters. A rather different design to what you normally expect in a pair of pliers. Never the less they perform very efficiently. Spring return action plus insulated handles. 5" long



Order as  
Micro Nose Pliers £2.98\*

**Heavy Duty Cutters \***

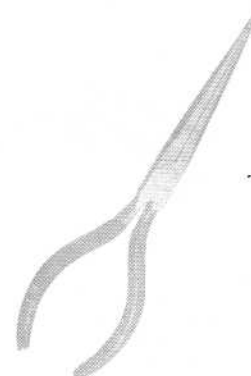
High quality insulated side cutters. Ideal for heavier type of work. Lap joint construction and made from high grade steel alloy. The insulated handles have an anti slip guide design. These cutters are both strong and reliable. 6" long



Order as  
Heavy Duty Cutters £1.50p\*

**Extra Long Nose Pliers \***

These extra long nose pliers by Wilkinson should prove invaluable for getting into those other wise inaccessible places. Box jointed construction with insulated handles. 7¼" long



Order as  
Extra Long Nose Pliers : £4.50p\*

**Snipe Nose Pliers \***

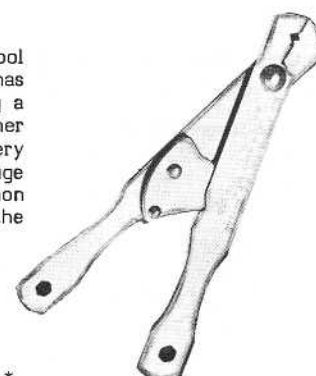
Very high quality snipe nose pliers in a box joint construction with smooth inner jaw faces. Insulated handles and leaf springs for quick return action. These small pliers have a nice feel to them when wiring up most types of project. 4½" long



Order as  
Snipe Nose Pliers £3.90p\*

**Bib Wire Strippers \***

This is really a combination tool as it not only strips wire but has the added advantage of having a pair of cutting blades and spanner in each handle. (4BA & 6BA) Very simple to use with its 4 gauge selector that covers most common gauges of wire used by the hobbyist. 5¼" long



Order as  
Bib Wire Strippers 65p\*

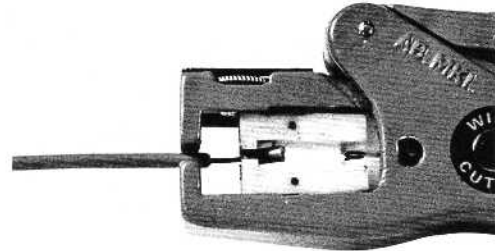
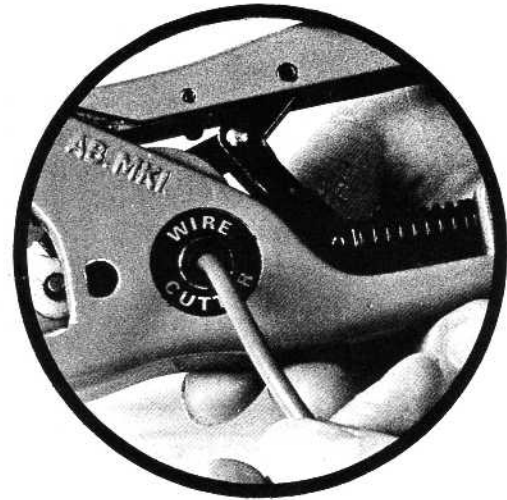


## AB/MK1 Single Action Wire Stripper\*

An absolutely incredible wire stripper. A single squeeze on the handles is all that is needed to strip off the insulation **without** damaging or severing the actual cable. The cutting edge of the "flexi-jaw" consists of a large number of independent leaf blades assembled in the jaw housing and backed by a resilient pad. This construction enables the cutting edge when under pressure to surround each conductor offered for stripping independently, thus utilising its full width (3/8"). Cutting blades self-adjust to wire diameter. There's no need even to know the wire size. They cannot damage the conductor.

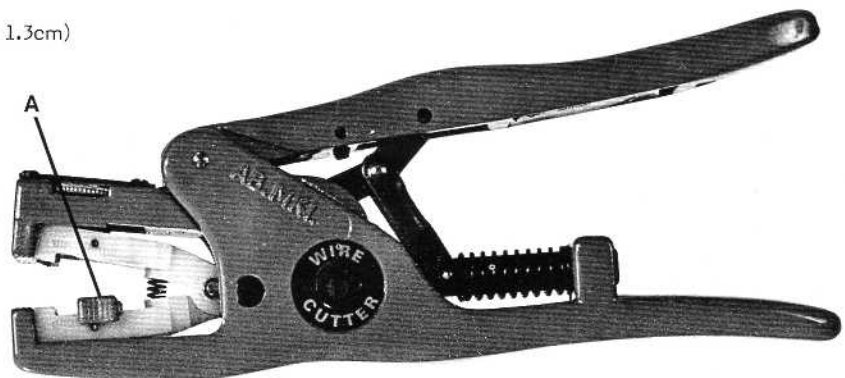
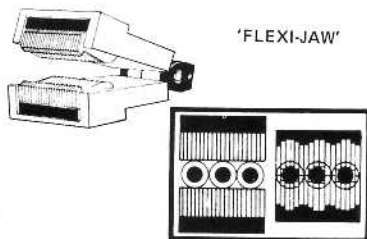
For precise stripping length the wire stop 'A' supplied with the tool is positioned on the lever stripping jaw as shown below. It can be moved to determine the stripping length required. A new feature of the AB stripper is a built-in wire cutter. The wire to be cut is simply fed into the cutter mouth and the handles squeezed. The guillotine action cuts easily and cleanly. Can be used either side of the tool.

For anybody contemplating wiring-up a keyboard instrument then this stripper could save them many long and frustrating hours. An engineer who has recently joined us and who enjoys building electronic pianos has tried one of these strippers and his only objection is that nobody had told him about them a long time ago.



### Technical Data

Capacity	0.005" to 0.150" (O.D. 0.20 - 3.75mm)
Without adjustment	0.01" to 0.1"
Weight	8½ ozs (243gms)
Overall dimensions	6½" x 2½" x 5/8" (16cm x 6cm x 1.3cm)



Order as  
AB/MK1 Single Action Wire Stripper

Price £15.65\*

## Wire Stripper\*

A cleverly designed wire stripper using the multi-leaf cutter principle. 11 separate cutters on each jaw shape themselves around the insulation then penetrate the insulation without damaging the conductor(s). The strippers are of a lap joint construction with well insulated handles. 6½" long.



Order as  
Insulated Wire Strippers

£7.50p\*

## De-soldering Tool\*

Spring loaded piston type de-soldering tool. A small button releases the plunger to suck up the molten solder. The barrel of the tool is made from an aluminium alloy with a steel plunger shaft. The nozzle unscrews for easy cleaning. Spare nozzles are also available.

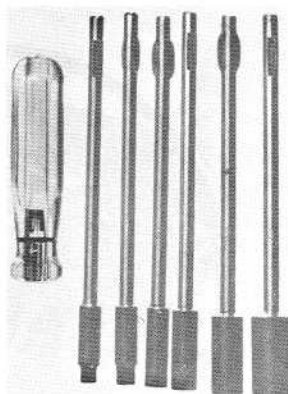


Order as  
De-Soldering Tool  
Spare Nozzle

£5.50p\*  
£0.70p\*

**BA Socket Spanner Set\***

A set of 5 long reach BA nut drivers (0BA to 8BA). Good quality steel with bright nickel chrome plated finish and a plastic handle. Supplied with a plastic wallet. A very useful set of nut drivers.



Order as  
BA Socket Spanner Set £2.98 \*

**BA Spanners\***

BA spanners in the following sizes are available :-

**Open Ended**

(4BA, 6BA) and (8BA, 10BA)

**Ring Spanners**

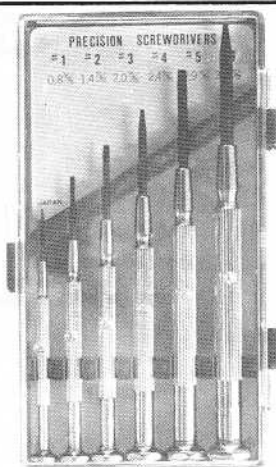
(4BA, 6BA)



Order as  
Open Ended (plus size) 35p\* each  
Ring Spanner 40p\* each

**Precision Screwdriver Set\***

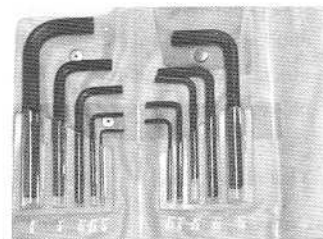
A set of 6 precision instrument screwdrivers in a hinged plastic box. Suitable for numerous applications. Each screwdriver has a knurled body with a rotating head for easy use. Blade widths vary from 0.8mm to 3.8mm.



Order as  
Precision Screwdriver Set £1.65 \*

**Allen Screw Socket Set\***

A set of 10 Allen keys covering 1/64" up to 3/8". made of high quality steel, complete with wrap around plastic wallet.

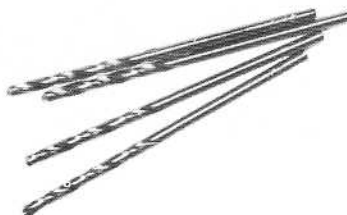


Order as  
Allen Key Set £2.45\*

**Dormer HS Twist Drills\***

A selection of High Speed twist drills, ideal for PCB drilling. Size 60 is approximately equal to 1mm. Size 58 is used for push fit for 0.1" veropins.

Sizes :- 50, 51, 52, 53, 54, 55,  
56, 57, 58, 59, 60, 65.



Order as  
HS Twist Drills plus size 22p\*

**Mini Drill\***

220-240V AC operation. Small but powerful, will accept drills with 1, 2 and 3.2mm dia. shafts. Capable of drilling brass, steel and aluminium as well as PCB's. Weighs less than 250gms. Off load speed 7500rpm. Orange ABS high impact insulated body with spring return on-off switch. Supplied with 2 collets and bar for preventing rotation of spindle.

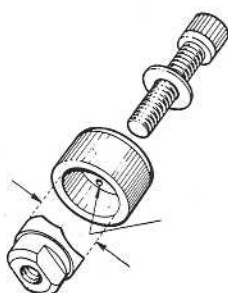


Order as  
240V Mini Drill £8.98 \* (For 12V Mini Drill see page 87)

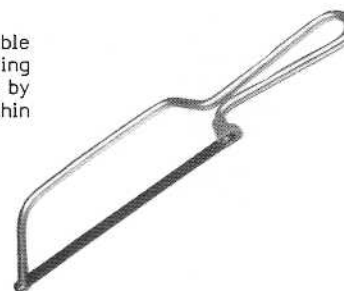
**Q Max Cutters \***

A range of easy to use hole cutters for use on metals up to 16swg mild steel.

Order as			
Q Max Cutter	3/8" dia	£1.30 *	
" "	1/2" dia	£1.50 *	
" "	5/8" dia	£1.75 *	
" "	3/4" dia	£1.80 *	
" "	7/8" dia	£1.98 *	
" "	1" dia	£1.98 *	

**Junior Hacksaw\***

A small useful 6" hacksaw suitable for cutting most metals including mild steel. The blade is secured by two pins and can be replaced within seconds.



Order as  
Junior Hacksaw 70p\*

## POWER SUPPLY\* PC2



Input :- 240V AC. Outputs :- 6v, 9v and 12volts DC at a maximum of 1 amp. Ingenious circuitry limits voltage differential between off load and full load. Illuminated output voltmeter. Dimensions :- 6½" x 3¼" x 2½"

Price 1195p\*

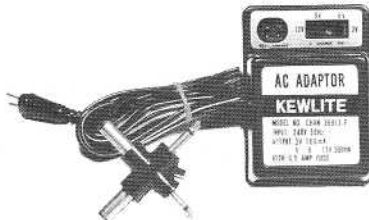
## STABILISED POWER SUPPLY\* HC244R



Input :- 240V AC. Outputs :- 3v, 6v, 7.5v and 9volts DC @400mA. 3 switches control On-Off, Polarity Reverse and Voltage All voltages are regulated to stated outputs from no load to 400mA. Dimensions :- 5" x 3" x 2½"

Price 585p\*

## AC MAINS ADAPTOR\* 36912F



Input :- 240V AC. Outputs :- 3v @ 100mA (fused), 6v, 9v and 12volts DC at 300mA (Unstabilised). Plugs into any 13amp socket outlet. Trailing lead from unit is terminated with a 4 way universal plug for direct connection to many Radios, Cassette Recorders or TV Games etc.,

Price 275p\*

## CB730\* CB930\* CV104\*

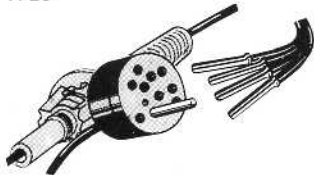


Three units to meet your low voltage power supply requirements when in the car. Can be plugged into Cigar Lighter outlet socket to provide the following output voltages.

CB730 :- 7½ volts @ 300mA.	.. .. .	Price 125p*
CB930 :- 9 volts @ 300mA.	.. .. .	125p*
CV104 :- 6v, 7½v and 9 volts @300mA ( + Polarity Reverse)	.. .. .	225p*

All come complete with lead and 4 way plug.

## UNIVERSAL LEAD RADIO/CASSETTE\* T910



Universal car radio/cassette lead. Connects stereo unit to battery, speakers or switch. The universal plug will fit most stereo units.

44p\*

## MAP LIGHT MP169\*



Fits into cigar lighter aperture Could be used with extension shown alongside.

48p\*

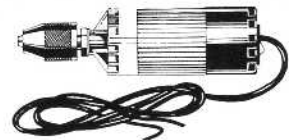
## EXTENSION LEAD CBJ108\*



Adaptor lead to extend cigarette lighter aperture to a distance of 6 feet

185p\*

## MINI ELECTRIC DRILL\* 12Volts DC



Compact powerful electric hand drill with integral on/off switch and 1 metre cable. Supplied with 3 collets to take drills up to 2.4mm diameter.

Price 775p\*

## AERIALS\*



Type	Description	Price
CA101	Stainless steel car aerial. Spring up lock down type. 4 section, 38" extended.	165p*
TA102	9 section telescopic aerial extends from 14cm to 102cm.	85p*
TA69	6 section telescopic aerial extends from 14cm to 69cm.	48p*
FMA1	FM indoor ribbon aerial. 300 ohm. Gives excellent reception.	48p*

## CAR SUPPRESSORS\*

355



351



357



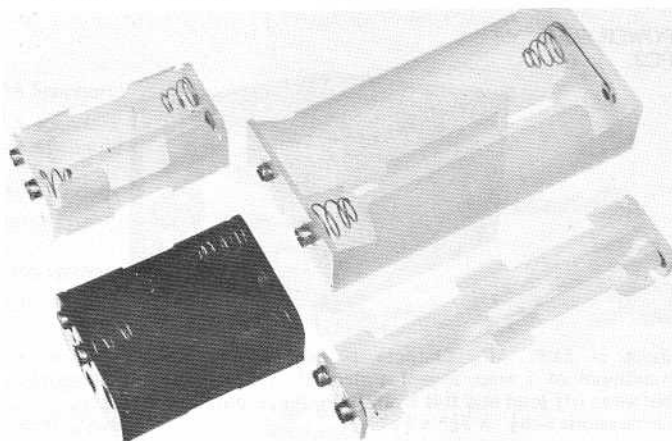
356

Type	Description	Price
CS351	Generator (Condenser)	38p*
CS355	Spark Plug	25p*
CS356	Distributor	22p*
CS357	Screw-in, Distributor	20p*

### BATTERY HOLDERS\* Moulded Plastic

A range of battery holders to cover most needs. We strongly recommend that these holders should be used if your equipment is likely to be moved around a lot as there is nothing more frustrating than to find that your equipment fails to function due to the batteries breaking away from an insecure connection.

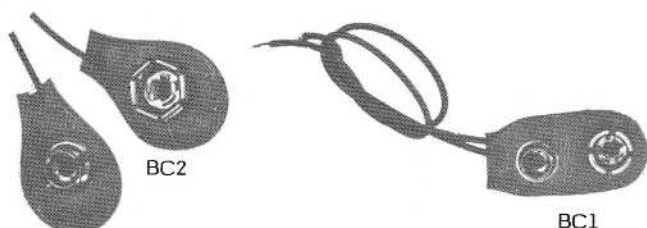
Type	Batteries	Configuration	Voltage	Price
BH1	4/SP11's	In-line	6Volts	28p
BH2	4/SP11's	Side by side in pairs	6Volts	28p
BH3	4/Penlite	Side by side in pairs	6Volts	18p
BH4	4/Penlite	Side by side	6Volts	18p
BH5	6/Penlite	Side by side	9Volts	30p



### BATTERY CLIPS\* Snap-on

Two types are available, both of the polarised snap-on variety.

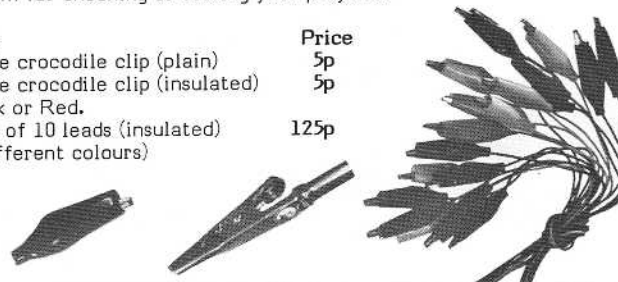
Type	Battery	Configuration	Voltage	Price
BC1	PP3, 6.	Snap-on	9Volts	6p
BC2	PPI, 4, 7, 8, 9.	Snap-on	6Volts	10p/pr



### CROCODILE CLIPS\*

Available as separate clips or in a pack containing 10 leads terminated at each end with an insulated croc clip. These packs rate as exceptional value and will prove invaluable to those of you who require an easy and reliable way of providing a temporary hook up system for checking or testing your projects.

Type	Price
Single crocodile clip (plain)	5p
Single crocodile clip (insulated)	5p
Black or Red.	
Pack of 10 leads (insulated)	125p
(5 different colours)	



## 13amp Mains Connector

Plugless leads rapidly connected to mains

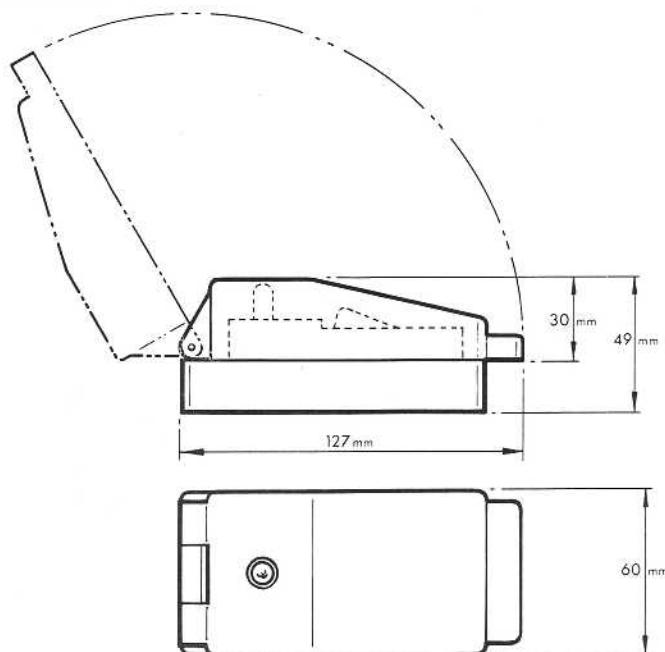
Raised lid cuts current for safety

Tough construction for everyday knocks

Use as wander connector or screw to wall or bench

Neon indicator lamp

Economic cost

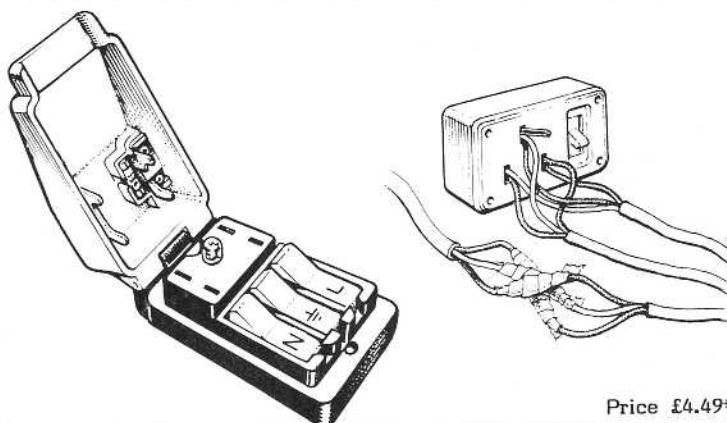


With the lid open the wires of a plugless lead are inserted into the insulated clips. When the lid is closed, current passes to the equipment being used or tested. The lid has a spring latch to hold it open when the QUICKTEST is wall mounted.

A neon light shows that the connector is live and ready for use. The 13 amp fuse (BS1362) is easily accessible for replacement. The connector is made of tough safe materials. The base is Phenolic moulded for insulation and rigidity. The lid is flame retardant glass-filled thermo-plastic.

Two wood screws are supplied for fixing to bench or wall as required. The flexible cable grip will take any normal mains cable. Only one small screwdriver is needed for both the base and the terminal screws.

**An open and shut case for abolishing dangerous connections.**

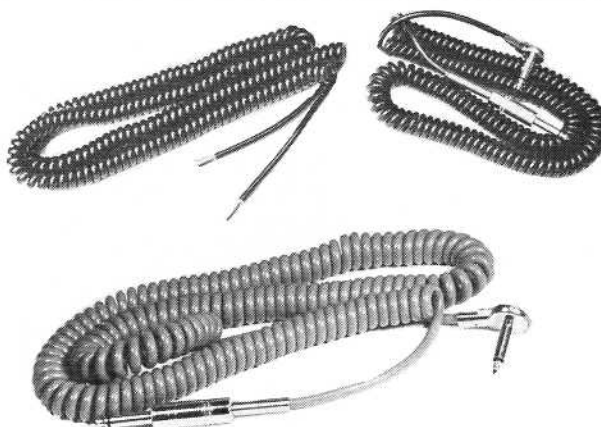


Price £4.49\*

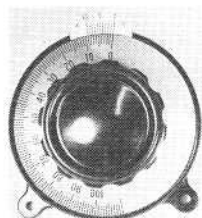


## GUITAR/AUDIO LEADS\*

Type	Description	Length	Colour	Price
HK-9	Coiled Mono Extension. Single screened.	6m	Black	99p*
HK-16	Coiled Stereo Extension. Twin screened.	6m	Black	148p*
HG502	Coiled Mono Guitar Lead. Metal $\frac{1}{4}$ " jack plug to Metal angled $\frac{1}{4}$ " jack plug.	6m	Black, Red	160p*
HG505	Straight Lead. Semi-Rubber sheath. Metal $\frac{1}{4}$ " jack plug to Metal $\frac{1}{4}$ " angled jack plug. This LOW NOISE lead is ideal for the semi-professional guitarist.	6m	Black	295p*
HG700	7mm Straight Lead (NOISELESS) High quality lead ensuring interference free performance. THE PROFESSIONAL'S CHOICE.	7.5m	Black	485p*



## VERNIER DRIVES\*



VD1	8:1 Ratio with black base and nickel silver dial plates with deeply etched scales. Black centre knob with fluted grip. Scale 1 - 10. Can be read to 1/10th degree. Diameter of dial 36mm	..	..	185p*
VD2	As VD1 but with dial diameter of 50mm	..	..	190p*
VD3	As VD1 but with dial diameter of 70mm	..	..	315p*

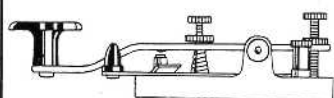
## FM INTERCOM WIRELESS\* LP701F



Delux SINGLE STATION mains operated and mains connected. IC circuit. FM with phase-locked loop. Frequency 230KHz and 280KHz. Use of FM permits communication for greater distances. Any number of stations may be used.

Price £27.65\*

## MORSE KEY\*



All metal morse key, with cast base. Professional high speed key, fine adjustment. Dims: (Base 75 x 50mm)  
Morse Key TK3

235p\*

Morse Key TK4 (economy)

110p\*

## BUZZERS 9201/6, 9201/12\*



Very loud note. Cream plastic case. 50mm diameter by 30mm high. Two versions available 6volt and 12volt.

9201/6volt 65p\*  
9201/12volt 75p\*

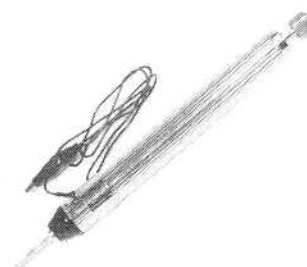
## TELEPHONE PICKUP COIL



Attaches by suction to desk telephones thus enabling conversations to be recorded or amplified. 3.5mm plug.

60p

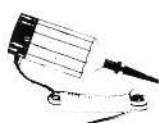
## SIGNAL INJECTOR SE205B\*



An unusually stable trouble shooter. Pen light battery. Dim :- Length 70mm

398p\*

## TAPE HEAD DEMAGNETISER\* NT220



240V A.C. Keep your tape heads in good condition with this Tape Head Demagnetiser.

Price 245p\*

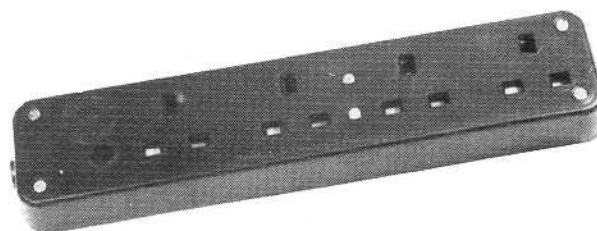
## DIMMER SWITCH WS8006\*



240Volt 800watt dimmer switch. White surface mounting. Fits standard box. Also controls fluorescent light. Built in suppressor.

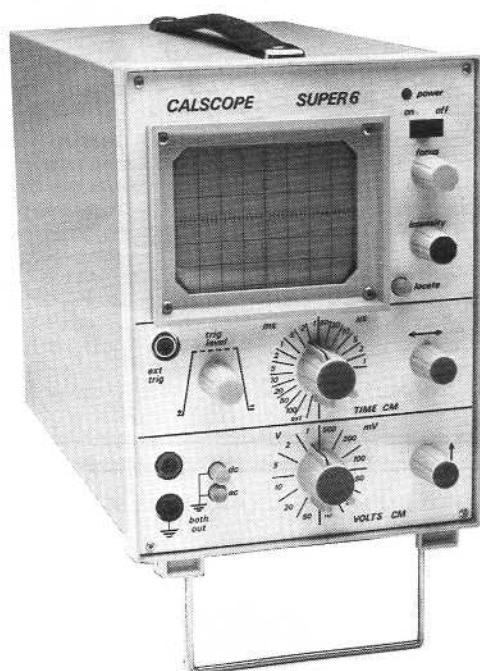
325p\*

## PERMAPLUG\*



A four way 13 amp socket distribution outlet in moulded rubber. Can be used as a floating unit or fixed to wall/floor etc., via four holes in base. Red neon indicator, shuttered sockets and quick release fuse holder.

Price 385p\*  
P & P 30p\*



## CALSCOPE SUPER 6

A BRITISH OSCILLOSCOPE

FULL 6MHz operation

10mV sensitivity

Timebase 1 $\mu$ s to 100ms/cm

ALL solid state circuitry

The CALSCOPE SUPER 6 is a portable single-beam 6MHz bandwidth oscilloscope with easy to use controls. It is ideally suited to schools, technician training and television servicing.

### CALSCOPE SUPER 6

#### Specification

##### Vertical Deflection System

Sensitivity: 10mV/cm - 50V/cm

(12 Calibrated ranges)

Bandwidth:

DC coupled: DC - 6MHz (-3dB)

AC coupled: 3Hz - 6MHz (-3dB)

Input coupling: AC, DC, Ground

Input Impedance: 1M  $\pm$  35pF approx

Input Sockets: 4mm (19mm between centres)

Risetime: 60ns approx

Accuracy:  $\pm$ 5%

Maximum Input Voltage:

400V (DC + AC Peak to 10kHz)

Controls Colour Coded RED

##### Horizontal Deflection System

Sweep Speeds: 1 $\mu$ s/cm - 100ms/cm

(16 calibrated ranges)

Accuracy:  $\pm$ 5%

External Sensitivity: 1V/cm approx

External Bandwidth: DC - 100KHz

Max. External Input: 250V (DC + AC

Peak to 3kHz)

Controls Colour Coded BLUE

##### Trigger Circuit

Sources: Internal, External

Sensitivity:

Internal: 5mm, 10Hz - 1MHz rising to

1.5cm at 6MHz

External: 200mV, 10MHz - 1MHz rising to

500mV at 6MHz

##### Bright Line Auto:

Trace free runs in absence of trigger signal at all sweep speeds (facility to disable)

##### External Selection:

Automatically selected when 4mm plug is inserted into input socket

##### Max. External Input:

250V (DC + AC Peak to 3KHz)

External Input Socket: 4mm Socket

##### Trigger Level and Polarity:

Both functions selected on one continuously variable control

Control Colour Coded YELLOW

##### General Information

##### Display:

Graticule ruled 6cm x 8cm, Cathode Ray

Tube with P31 medium persistence phosphor supplied as standard

##### Dimensions (excluding handle):

H, 8 $\frac{1}{2}$ " (217mm) W, 6 $\frac{1}{4}$ " (159mm)

D, 12" (306mm)

Weight: 10lb (4.5kg)

##### Power Requirements:

105-125, 210-250V AC 48-60Hz, 15VA

**Price £162.00\***

**P & P £2.75\***

## CALSCOPE SUPER 10

The CALSCOPE SUPER 10 sets new standards, probably the highest anywhere, for low cost general purpose oscilloscopes. Accuracy of 3% is achieved by stabilised power supplies, including the EHT. Let your mains supply drift - the SUPER 10 remains rock steady. All this coupled with Scopex expertise for designing a reliable, easy to use oscilloscope makes the SUPER 10 PERFORMANCE YOU CAN AFFORD.

### SPECIFICATION

#### VERTICAL DEFLECTION SYSTEM

##### Channels A & B

Sensitivity	10mV/cm - (12 calibrated ranges)
Accuracy	$\pm 3\%$
Bandwidth to -3db points	DC coupled DC - 10MHz AC coupled 3Hz - 10MHz
Rise Time (calculated)	35ns approx.
Overload protection	Max. 400V (DC + peak AC to 3KHz)
Input impedance	1M ohm $\pm 3\%$ and 33pF approx.
Modes	"A" channel only ALT. (Alternate) CHOP (approx. 100kHz)
Input socket	BNC standard.

#### HORIZONTAL DEFLECTION SYSTEM

Timebase	
Sweep speeds	1us/cm - 100ms/cm (16 calibrated ranges)
Accuracy	$\pm 3\%$
Magnifier	X5 (increases fastest sweep speed to 200ns/cm)

##### X Amplifier

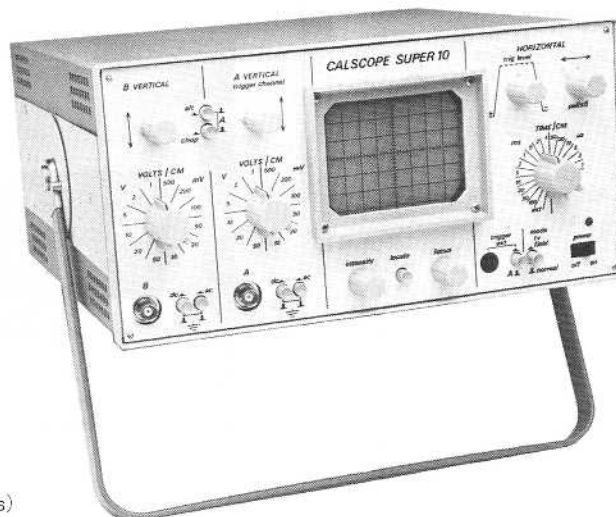
Sweep output	10V negative - going sawtooth symmetrical about earth
External sensitivity	1V/cm approx. (200mV/cm magnified)
External bandwidth	DC - 500kHz
External input impedance	1M ohm approx. and 20pF approx.
Max. external input	250V (DC + peak AC to 1kHz)

#### TRIGGER CIRCUIT

Sources	External input - "A" Channel
Modes	Normal - TV Frame
Sensitivity	Internal 5mm minimum 10Hz - 1MHz rising to 1.5cm at 10MHz External 300mV peak to peak 30Hz - 5MHz 600mV peak to peak 10Hz - 10MHz
Input impedance	220k ohm approx. and 20pF approx.
Maximum input	250V (DC + peak AC to 1kHz)
Bright line auto	In absence of trigger signal at all sweep speeds (facility to disable)
Trace locate	(CRT with P31 phosphor) Returns overscanned trace to display area irrespective of control settings

#### GENERAL INFORMATION

Power requirement	210-250VAC, 48-60Hz, 25VA approx, 105-125VAC
Dimensions (mm) (excluding handle)	H153, W312, D363
Weight	6kg
Ambient operating temp.	$+40^{\circ}\text{C}$ max.



- A BRITISH OSCILLOSCOPE
- 3% MEASURING ACCURACY
- STABILISED POWER SUPPLIES
- DC - 10MHz
- 10mV - 50V/cm SENSITIVITY
- EASY TO USE
- TV FIELD TRIGGER
- LIGHTWEIGHT
- TRACE LOCATE
- PERFORMANCE YOU CAN AFFORD

**Price £219.00\***

**P & P £2.75\***

## CMOS\*

4056	..	..	135p*
4061	..	..	1425p*
4062	..	..	995p*
4425	..	..	412p*
4426	..	..	176p*
4427	..	..	179p*
4452	..	..	TBA

## COMPUTER IC's

2101	..	..	99p*
2102	..	..	100p*
2102-2	..	..	170p*
2111	..	..	175p*
2112	..	..	110p*
2112-2	..	..	TBA
2114	..	..	650p*
2513	..	..	595p*
2516	..	..	1800p*
2532	..	..	4200p*
2708	..	..	650p*
27L08	..	..	995p*
2716	..	..	1650p*
3064	..	..	TBA
RAM4027	..	..	190p*
RAM4047	..	..	750p*
74S188	..	..	165p*
74S262	..	..	875p*
74S287	..	..	325p*
74S470	..	..	325p*
74S475	..	..	825p*
81LS95	..	..	70p*
81LS96	..	..	70p*
81LS97	..	..	109p*
74LS132	..	..	95p*
74LS163	..	..	163p*
71301	..	..	820p*
9900	..	..	3500p*
9980	..	..	1685p*
9985	..	..	TBA
AY-3-1015	..	..	560p*
AY-5-1013	..	..	450p*
MC14411	..	..	1040p*
SFC71301-1-0	..	..	820p*
SF.F96364E	..	..	1175p*
SF.580102	..	..	205p*
TMS 4035	..	..	295p*
TMS 4039	..	..	295p*
TMS 6011	..	..	365p*
SN75450	..	..	120p*
SN75451	..	..	70p*
SN75452	..	..	70p*
SN75454	..	..	125p*
Z80	..	..	1150p*

## LINEAR IC's

710	..	..	53p
720	..	..	120p
AY-5-8100	..	..	735p*
CA3012	..	..	TBA
F944DC	..	..	58p
LD130	..	..	452p*
LM301	..	..	38p
LM308	..	..	83p
LM311	..	..	68p
LM349	..	..	124p
MC663	..	..	TBA
LM1458	..	..	58p*
LM1458(14pin)	..	..	68p
MC1488	..	..	95p*
MC1489	..	..	95p*
MK50253	..	..	656p*
MM5307AA/N	..	..	1260p*
MM57160	..	..	620p
NE543	..	..	210p
NE544	..	..	185p
NE564	..	..	420p*
SG3402	..	..	295p*
TCA965	..	..	210p
TL061CP	..	..	76p*
TL062CP	..	..	125p*
TL064CN	..	..	199p
TL071CP	..	..	76p*
TL072CP	..	..	125p*
TL074CN	..	..	199p*

## DIGITAL ALARM CLOCK

Why not wake up in the morning to the sound of the birds, you can you know. With this beautiful **DIGITAL ALARM** clock every morning is like spring. Instead of that high pitched buzz that most electronic alarm clocks have you can be pleasantly awakened by the chirping sound of a small bird.

This really good looking clock also has an impressive specification including :- Large bright green display, 24 hour alarm with a sleep/snooze timer. i.e. Press the snooze button and nine minutes later be reawakened by those little birds telling you its time to get up. Fast and slow setting buttons for easy adjustment of the Time and/or Alarm. Stylish white case.



£7.95\*

## PROJECTS

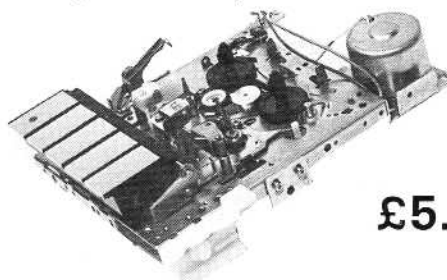
WE can supply components and in some cases PCB's for many of the projects published in the monthly amateur magazines.

Some of the more popular projects that we are currently supplying components for:-

Project	Magazine
Purbeck Oscilloscope	(PW)
DM900 Digital Multimeter	(ETI)
Rhythm Generator	(PE)
String Ensemble	(PE)
Jubilee Organ	(PW)
General Coverage Receiver	(PW)
Digital Stop Watch	(PE)
Gas & Smoke Detector	(ETI)
Chromachase	(PW)
Metal Locator	(ETI)
G.P. Receiver	(PW)
Digital Thermometer	(PE)
Digital Thermometer	(ETI)
Capacitance Meter	(PE)
Complex Sound Generator	(ETI)
Phaser	(ETI)

## CASSETTE MECHANISM

6 Volt cassette mechanism at a real bargain price. Single 6 Volt motor, 2 Heads for Record/Erase and Play back. 5 key lever linkage switches for Record, Fast forward, Fast reverse, Playback and Stop. Belt Drive via a heavy 2" diameter flywheel.



£5.25\*

## C.R.T. Base &amp; Transformer\*

Cathode Ray Tube, Base and Transformer as used in the Practical Wireless 'Purbeck Oscilloscope'.

C.R.T. 3BP1	..	..	775p*
	P&P		90p*
Base	..	..	95p*
Transformer	..	..	575p*

## TEXAS

**TIL32 Infra Red LED**  
A 0.125" infra-red LED in a plastic package with a power output of 0.5mW @ 20mA.

58p\*

## OPTO ISOLATOR\*

**IL74** is a low cost optoisolator in a DIL package.

48p\*

## SQUARE FACED LED\*

Three new devices complete with bush and collar and available in Red, Yellow and green.

48p\*

## E.E.C. TYPE PLUG &amp; SOCKET\*

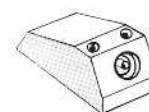


**MS12.** 3 pin floating socket with a 1.5metre lead.

**MC3.** 3 pin chassis mounting plug to accept MS12. Recessed pins.

MS12	..	..	..	74p*
MC3	..	..	..	30p*

## BELLING LEE CO-AXIAL OUTLET BOX\*



Standard 'Belling Lee' co-axial box, suitable for wall or bench mounting.

**Y20524-AT** .. .. 55p\*



## CONDITIONS OF SALE

### PAYMENT

(a) Cash with order. Crossed cheques, postal orders, money orders, Giro Transfer or Bankers Draft made payable to Watford Electronics to accompany order. Cash to be sent by registered mail only. Delivery may be held in certain instances pending cheque clearance. When paying by cheque please write your Bankers Card number on the back.

(b) Accounts. Customers wishing to open a credit account are required to furnish two trade references and a Banker's reference stating amount of credit required. Initially, orders will only be accepted on a cash with order basis until such time as a credit rating has been established. Orders may be placed by telephone by prior arrangement only. Schools, colleges and any other Government establishments will be supplied with components against their official orders without the necessity of formally opening an account.

### PRICES

Prices quoted in this catalogue are current at the time of going to press but we reserve the right to effect changes without prior notice.

### V.A.T.

All prices in this catalogue are exclusive of V.A.T. The current V.A.T. ratings are 8% and 12½%. All items or prices marked with an asterisk (\*) are rated at 8%, the remainder at 12½%.

NOTE: Overseas customers do not pay V.A.T.

### CARRIAGE & PACKING

30p\* should be added to all cash orders under £10 nett value. There is no standard carriage charge for orders over £10. On certain bulky items additional carriage is payable as indicated in this catalogue.

On Overseas orders carriage will be charged at cost (air or surface as required).

On invoiced orders there is a minimum 75p handling and administration charge.

### RETURNED GOODS

Goods incorrectly ordered cannot be accepted for replacement without our prior agreement. Due to high processing costs a 15% handling charge (or minimum 40p) will be levied on any returns or cancelled orders.

### QUERIES ON GOODS RECEIVED

Any query or complaint regarding an order should be made IN WRITING within 7 days of receipt of the order and must be accompanied by the Query Slip. No telephone queries will be entertained.

### DESPATCH

In-stock items are normally despatched by return post. Kits may take a little longer.

### SPECIFICATIONS

Specifications in this catalogue are given in good faith, but to maintain continuity of supply, goods from different manufacturers (with slightly varying specification) may be substituted. In instances where a certain value is temporarily out of stock the nearest value available will be supplied unless the item is clearly marked DO NOT SUBSTITUTE, in which case a credit will be given.

### LIABILITIES

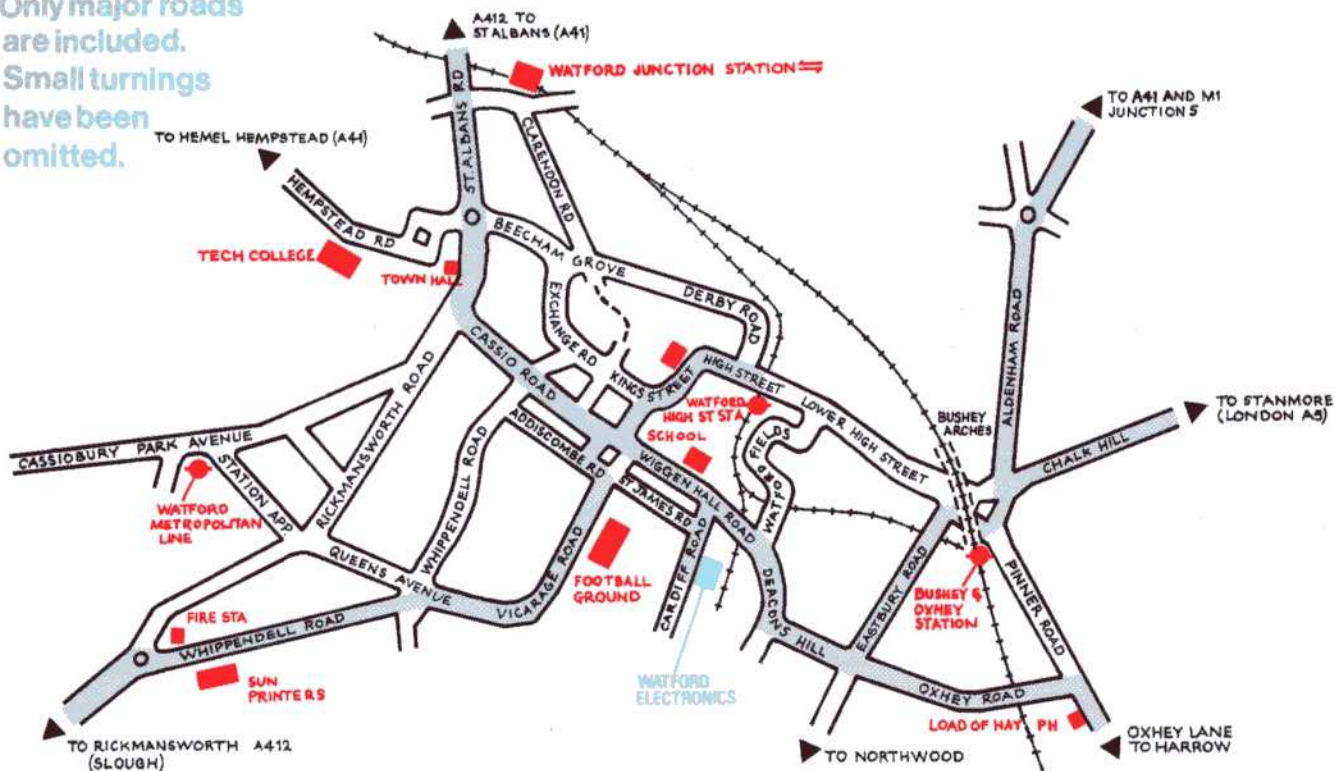
Information given in this catalogue is in good faith and no liability can be accepted for any errors. In addition no liabilities will be accepted for any subsequent damage however caused following the use of our goods either directly or indirectly.

### GUARANTEE

All devices listed in this catalogue are brand new to manufacturer's specification. Watford Electronics guarantee all components they supply and will replace or repair at their own discretion any component or equipment returned by the customer as faulty, provided they have not been misused or damaged in any way.

The above guarantee applies to MOS and CMOS devices only if they have been used with sockets and not soldered directly and are returned to us in their original protective packing.

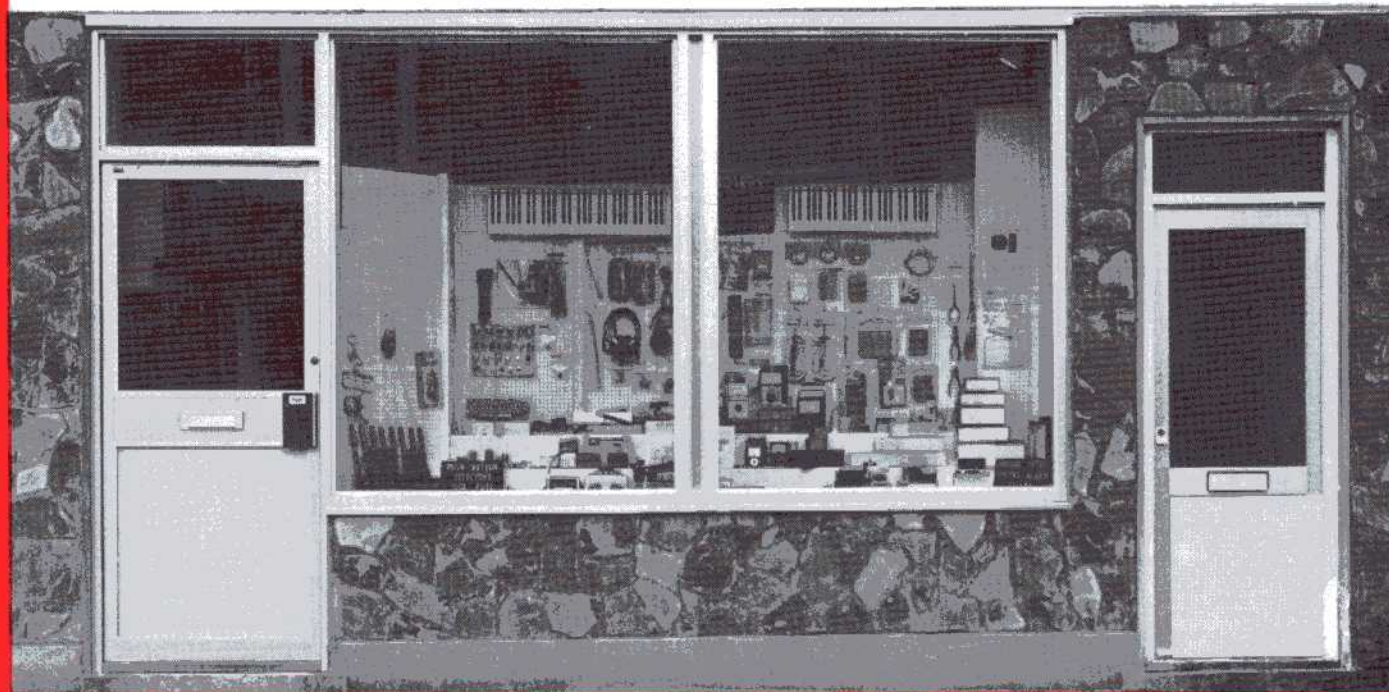
How to find us  
Only major roads  
are included.  
Small turnings  
have been  
omitted.



33

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33



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