Enrico Tedeschi

SINCLAIR ARCHEOLOGY

THE COMPLETE PHOTO GUIDE TO COLLECTABLE MODELS

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FOREWORD

This is the book I would have liked to have found in print when I first became interested in the subject.

As it turned out, I had to do my own research and lists by consulting books, advertisements from period magazines, household brochures of the time and instruction booklets of the original products.

I hope that all these efforts into researching and organizing these records will turn the curious person into an interested party or the already interested into a collector. Sinclair products were so advanced at the time and so elegantly designed that they are bound to become collector's pieces. The time to start collecting is NOW when availibility is still good and prices are still low.

I am sure that the interest in this brand of technological products will soon grow so that they may become part of the industrial world heritage.

Happy reading and collecting!

Enrico Tedeschi

sinclair radionics ltd.
22 newmarket road, cambridge
Telephone 52731

CHRONOLOGY

F.J.CAMM/LONDON

1958 (November)=Micro midget receiver (article in P.W.)

BERNARDS RADIO/LONDON

1959=book:Practical transistor receivers 1
1959=book:Practical stereo handbook 1
1960=book:Transistor superhet receivers book 2
1960=book:Transistor circuits manual No2
1960=book:High fidelity tape recorder for the home constructor
1960=book:Transistor circuits manual No3
1960=book:Transistor circuits manual No4
1961=book:High fidelity transistor FM tuner for the home constructor
1961=book:Practical transistor audio amplifiers for the home constructor
1961=book:Transistor subminiature receivers handbook for the home constructor
1961=book:Transistorized test equipment and semiconductors manual

1962=book:Transistor audio amplifier manual
1962=book:Modern transistor circuits for beginners
1963=book:Transistor circuits manual No5
1963=book:22 tested circuits using micro-alloy transistors

SINCLAIR RADIONICS LTD/CAMBRIDGE

1962(November)=Micro-amplifier
1963(February)=Slimline radio
1963(September)=Micro injector
1963=TR.5 quality amplifier

SINCLAIR RADIONICS/ISLINGTON

1963=TR-750 power amplifier
1964(April)=Sinclair News
1964=Micro-6 radio
1965=micro-FM radio

SINCLAIR RADIONICS/COMBERTON

1964(October)=X-10 audio amplifier
1965=X-20 audio amplifier
1966=Z-12 audio amplifier

SINCLAIR RADIONICS/CAMBRIDGE

1966=PZ-3 power supply
1966=Stereo 25 preamp and control unit
1966=PZ4 power supply
1966=Z-120 power amplifier
1967=Micromatic radio
1967=Q-14 loudspeaker
1967(September)=Neoteric 60 integrated stereo amp
1968(June)=IC-4 integrated circuit
1968=IC-10 integrated circuit
1968=Z30 power amplifier
1969=System 2000 hi-fi system
1970=PZ6 power supply
1070=PZ7 power supply
1970=PZ8 power supply
1970=Project 60 hi-fi system

SINCLAIR ELECTRONICS/ST.IVES

1970=Project 604 amplifier
1970(June)=Z-50 amplifier
1970(November)=Stereo tuner
1970(November)=Q-16 loudspeaker
1971(June)=IC-12 integrated circuit amplifier
1971=Project 605 hi-fi pack
1972=System 3000 hi-fi amplifier
1972=DM1 digital multimeter
1972=Q-30 loudspeaker
1972(September)=Executive pocket calculator
1973(August)=Cambridge pocket calculator
1973(November)=Project 80 amplifier

Introducing
Mike Farrard

1973(November)=Executive Memory pocket calculator
1974=Cambridge Memory pocket calculator
1974(March)=Cambridge Scientific pocket calculator
1974=System 4000 amplifier
1975=IC-20 integrated circuit amplifier
1975(January)=DM2 bench multimeter
1975=Gillette GPA (USA) mod.PC-1 pocket calculator
1975(March)=Oxford 100 pocket calculator
1975(August)=Cambridge Scientific Programmable calc.
1975(november)=Black Watch LED wrist watch
1976=Microquartz car clock
1975=Oxford 150 pocket calculator
1975=Oxford 200 pocket calculator
1975=Oxford 300 pocket calculator
1977=Cambridge (pregnant) Programmable pocket calculator
1977=Sovereign pocket calculator
1977=PDM35 digital multimeter
1977=PFM 200 digital frequency meter
1977=TV1A pocket television
1977=Mon1A portable monitor
1978=TV1B pocket television
1978=TV1C American version of TV1B
1978=TV1D European version of TV1B
1978=PP3 9 volt version of Cambridge pocket calculator
1978=President table calculator
1978=Enterprise pocket calculator
1979=Enterprise Programmable pocket calculator
1978=SC110 Portable oscilloscope
1978=DM235 digital multimeter
1978=PFM 200 digital frequency meter
1978=DM350 digital multimeter
1978=DM450 digital multimeter

SCIENCE OF CAMBRIDGE/CAMBRIDGE

1978=DIY Wrist calculator
1978=MK XIV microcomputer
1980(January)=ZX 80 personal microcomputer

SINCLAIR RESEARCH/CAMBRIDGE

1981(March)=ZX 81 personal microcomputer
1982=ZX Spectrum personal computer
1983=ZX Microdrives storage medium
1983(september)=flat screen TV
1984=QL personal computer
1985=ZX Spectrum+
1986=ZX Spectrum+ 128
1985(January)=C5 electric tricycle

SINCLAIR RESEARCH/LONDON

1992=Zyke electric bicycle
1993=ZETA electric byke accessory

Silicon Alley.

Many years ago, a Victorian entrepreneur established a business bottling water from a well in a Cambridge suburb. It's a typical Victorian use of a natural British resource, but alas, the mineral water business just didn't survive the less credulous, more stringent demands of the modern market place.

Today, there is no bottling at Willis Road.

There are no long production lines, no vast warehouses, no goods-in and goods-out. A building in a style between modernist and post-modernist is tucked away among some unassuming terrace houses. There's very little to tell you that this is a power-house of British industry.

Yet this is the home of Sinclair Research Ltd.

The site retains one direct link with its past. The old mineral water well, whether or not it was therapeutic, had one valuable characteristic: it maintains a constant temperature of 12°C all the year round. Today, it's incorporated into a revolutionary heating system for the building, which helps reduce energy costs.

In every other way, this is a business of the future. And if its modest location is slightly surprising, just about everything else is very surprising indeed.

So far, the company has sold nearly two million home computers. *Two million.* It has generated a vigorous British home-computer industry. And it's made Britain one of the most computer-conscious countries in the world.

Yet the company employs only about 60 people, and makes nothing itself (apart from substantial profits, which are reinvested for the future).

The ULA (uncommitted logic array) is made, to a Sinclair specification, by Ferranti. The touch-sensitive keyboard membrane by NEI Timex carry out the assembly in Scotland. Even the processing of orders and enquiries is sub-contracted, to GSI in Camberley.

Sinclair Research simply does what it's good at. It takes as its raw material something in which, Sinclair believes, Britain is particularly rich: original, creative minds. It uses them to produce brilliant, marketable concepts. The rest is delegated to whoever's best at the job.

The computer age, unlike the mass-production age, offers tremendous opportunities to Britain. While British manufacturing industry has languished, British creative talent has flourished. If it doesn't fit into the old patterns, so much the worse for the patterns.

Sinclair Research is a modest model of the way in which original thinking can generate spectacular success. Our business is very different from our Victorian predecessor's. But the way in which we're using an inexhaustible natural resource indicates that we are worthy successors.

sinclair

Willis Road in Cambridge when it was the home of SINCLAIR RESEARCH Ltd.

INTRODUCTION

Sir Clive Sinclair (formerly affectionately known as ***Uncle Clive***) must be one of the most well known personalities in Great Britain (and in the world) to-day.

Why? Because his ideas and products have always been at the forefront of technological advance. He often dreamed up products that were not there (and not even possible at the time because of the technological unavailibility of certain components like the tube for the micro-TV) but he eventually made them happen.

His most important quality must be the fact that he always put ideas before the actual possibility of seeing the product materialize and he pushed and bent the existing technology to its limit so that it could be applied to the actual consumer product (like the pulsating power supply for the pocket calculators). In this sense, even if he did not actually invent anything, he can be called an inventor.

And like all inventors he always had to battle against the psychological resistance of the more conservative people around him more than with the actual hardware limitation. But he also met and joined with some of the most inventive people of his age who were crucial to the design and development of products which made people's dreams come true. Even if his market strategy was really appalling (remember the 28 days delivery time?) for this he can be forgiven because of the large number of innovative products and designs which are now part of the British and world heritage.

When I decided that the time was ripe for this guide to Sinclair's collectable models I adventured into the world of their past to find out all I could and for me it was like digging into a past that, even though it is so recent, appeared as distant as the stone age. So I pictured myself as an archeologist trying to find out and study events and circumstances so near but yet so distant to be rightly regarded as historic. That is why I decided to call this book **SINCLAIR ARCHEOLOGY** and consequently have divided the various chapters as periods (or ages).

I hope you will find this guide as interesting and useful as I enjoyed researching and putting it together.

Thank you for your interest.

sinclair NEWS

APRIL/MAY, 1964

This is what Sinclair service means to you

WORLD LEADERSHIP

SPECIALIST TEAMS

SATISFYING THE CUSTOMER

INSTRUCTION

Introducing Mike Farrard

PUBLISHING AGE

Sir Clive is reported to have always been obsessed with miniaturization.

He unofficially started his electronic designing career at school by designing a miniature one transistor MW receiver in 1958.

This model never materialized but the next one did as an article in the November issue of ***Practical Wireless*** magazine where he was working as an (actually the only) assistant editor of the famous author, editor and publisher F.J.Camm. It consisted in another miniaturized MW receiver this time with 3 transistors.

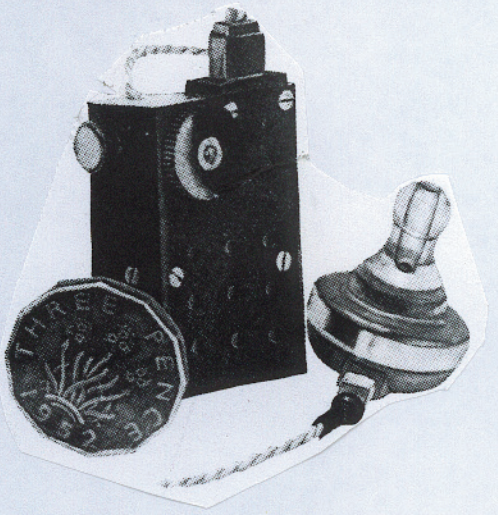
He even appeared on the front cover of the magazine (complete with hair) looking lovingly at his miniature creature which was later to become (with different design) a real commercially available product in February 1963 as the **Slimline** radio (and later the **Micro-6**).

In 1958 he soon moved on to join *Bernards radio books* another book publisher headed by ***Bernard Babani***, whose books are still in print to-day as Bernards Babani (publishing) Ltd. During this period he started writing and editing books on the application of transistors as receivers and amplifiers. He even managed to do a bit of selling by writing a book on how to use the Micro-alloy transistors he was buying cheaply as rejects from *Semiconductors Limited* one of the many firms then concentrating on the manufacture of the relatively new solid-state amplifier.

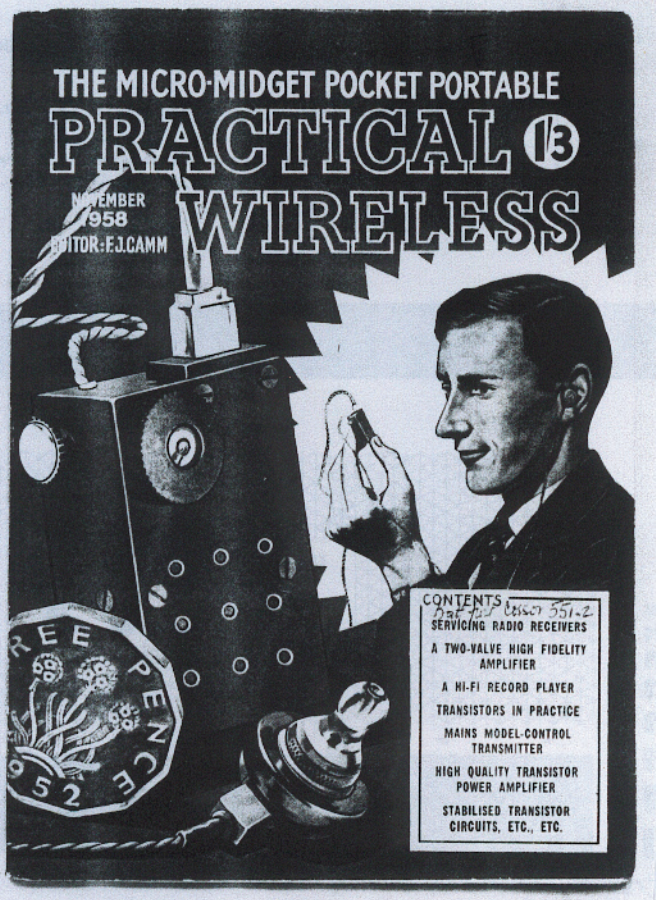
In fact he was buying them cheaply by the thousands and selling them at market value to home experimenters who wanted to build his published projects. His idea was that, although these transistors did not meet the manufacturers specification, they had to have *some* specification. So, having bought an ex-army oscilloscope for £25, he, his wife and Jim Westwood, an early collaborator who remained with Sir Clive for many years, tested about a million of them and remarked them as MAT 100 & 120 and as MAT 101 & 121.

He was then (1962) working with another publisher who put him in charge of *Instrument Practice*, another specialized electronic magazine. But he still had a burning deside to go really commercial and so we come to the Radio period which he started by giving a name (**SINCLAIR RADIONICS**) to his fantasies.

MICRO MIDGET RECEIVER



the first Sinclair product was really an "article"!

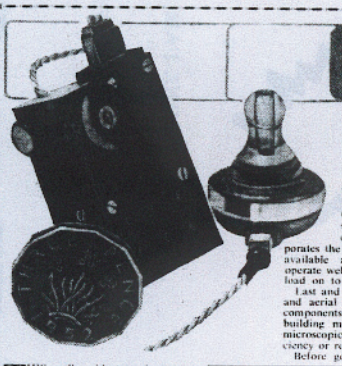


november 1958 issue

712 PRACTICAL WIRELESS November 1958 November, 1958 PRACTICAL WIRELESS 713

The Micro-Midget

PROBABLY THE SMALLEST RECEIVER IN THE WORLD, THIS AMAZING 3-TRANSISTOR POCKET RECEIVER IS CAPABLE OF OPERATING A LOUDSPEAKER



THIS really midget receiver, measuring only 1¾in. × ¾in. × ¾in., or rather less than half the size of a matchbox, has been made possible by the production of really midget components.

In this Lilliputian space is accommodated the 3-transistor, 4-stage, T.R.F. circuit using resistance capacity coupling. The power supply is one of the comparatively new mercury cells only 7/8in. in diameter and 3/16in. high. It should run the set for about 2½ months if used for an hour each day.

The set makes use of permeability tuning and, although designed for use with a deaf-aid earpiece, we found under test that it worked a small speaker at a comfortable volume. It can be built for about £4. It incorporates the sub-miniature transistors now readily available at a reasonable price and which operate well at low voltages and throw very little load on to the resistances and condensers.

Last and least in size comes the minute switch and aerial socket made by Fortiphone. These components, so often the stumbling blocks when building micro-receivers, have been reduced to microscopic dimensions without any loss of efficiency or robustness.

Before going any further it must be pointed out that this is not a suitable project for the average beginner, although those who have built small receivers before should have no trouble, so long as they follow the instructions carefully.

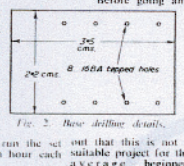


Fig. 2. Base drilling details.

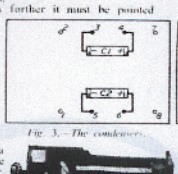


Fig. 3.—The condensers.

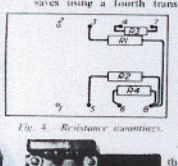


Fig. 4. Resistance quantities.

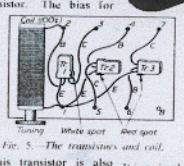


Fig. 5.—The transistors and coil.

The Circuit

The circuit diagram is shown in Fig. 1. As is apparent it consists of three transistors and remarkably few auxiliary components. The set was designed using a minimum, and at first sight there seem to be several important ones missing. This, however, is due to the use of so-called invisible components.

The signal, picked up by the short aerial, is tuned by the variable inductance L. This coil is designed to have sufficient self-capacity to make a tuning condenser unnecessary. The signal is fed from the coil directly into the first transistor, thus saving the space taken up by the usual coupling components. This transistor serves two purposes, first it demodulates the R.F. signal and then amplifies the resultant A.F. The amplified signal is then passed, via C4, to Tr2 for further A.F. amplification. This transistor receives its base bias via R3 which, being taken from the collector of Tr3, applies positive feedback. This considerably increases the gain, and saves using a fourth transistor. The bias for this transistor is also partly supplied by its own collector leakage. The A.F. is now resistance-capacity coupled into the output transistor Tr3 which is biased by R3. The output from Tr3 is directly coupled into a high impedance, hearing-aid type earpiece, thereby avoiding the space taken and the power losses of an output transformer. This earpiece is also of interest as it is very much smaller even than the usual hearing-aid type, and thus fits in well with the small scale of the rest of the receiver. If desired the usual size may be used or even 1 kilohm headphones, in which case slightly more volume will be obtained, but there is plenty to spare anyway.

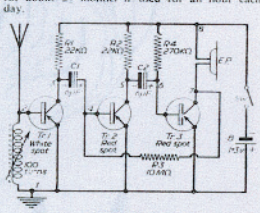
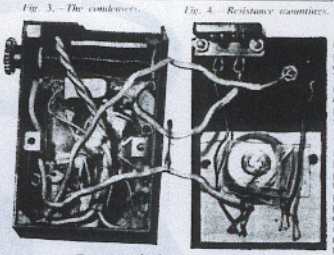


Fig. 1. Showing the circuit diagram.



Top view, showing internal layout.

Construction

To make the constructional directions simple to follow, each connection point in the receiver has been given a number which is printed in both the circuit and wiring diagrams. It is a simple matter to refer from one to the other, and to check the wiring when it is completed.

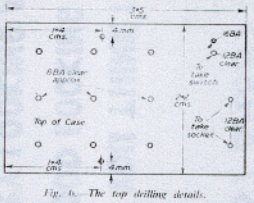


Fig. 6. The top drilling details.

D3

BERNARDS BOOKS

PRACTICAL TRANSISTOR RECEIVERS
BOOK I

30 COMPLETELY DIFFERENT RECEIVERS
by
CLIVE SINCLAIR

Complete Circuit Diagrams with list of British and American Transistors

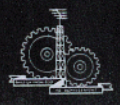
BERNARDS RADIO MANUALS

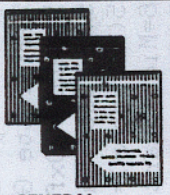
TRANSISTOR SERIES 2

Bernards

1948

RADIO BOOKS





THREE BOOKS OF TRANSISTOR DESIGNS AND CIRCUITS

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S.W. & COMMUNICATIONS
"Tested Superhet Circuits for Short wave and Communication Receivers, using MATs." 6/6 *Post free*

All three ordered together 16/-

BERNARDS RADIO/LONDON

1959=book:Practical transistor receivers 1
1959=book:Practical stereo handbook 1
1960=book:Transistor superhet receivers book 2
1960=book:Transistor circuits manual No2
1960=book:High fidelity tape recorder for the home constructor
1960=book:Transistor circuits manual No3
1960=book:Transistor circuits manual No4
1961=book:High fidelity transistor FM tuner for the home constructor
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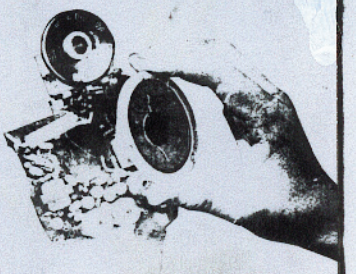
1962=book:Transistor audio amplifier manual
1962=book:Modern transistor circuits for beginners
1963=book:Transistor circuits manual No5
1963=book:22 tested circuits using micro-alloy transistors

TRANSISTOR SUPERHET RECEIVERS



COVERING ALL ASPECTS OF DESIGN, SERVICING AND CONSTRUCTION

INCLUDES CIRCUIT DIAGRAMS OF 50 DIFFERENT RECEIVERS

No. 167 2/6

Eleven Tested Transistor Circuits using Prefabricated Circuit Units

(Transistor Circuits Manual No. 3.)

by

CLIVE SINCLAIR

CIRCUITS AND INSTRUCTIONS FOR BUILDING

1. Transistor 3 wave band Superhet Receiver.
2. Subminiature 1 Watt Transistor Hi-Fi Amplifier.
3. Transistor IF Amplifier.
4. Guitar Amplifier.
5. Stereo Amplifier.
6. Intercom.
7. Baby Alarm.
8. AF Signal Tracer
9. RF Signal Tracer.
10. Telephone Pick-up Amplifier.
11. Loudhailer.

BERNARDS RADIO MANUALS

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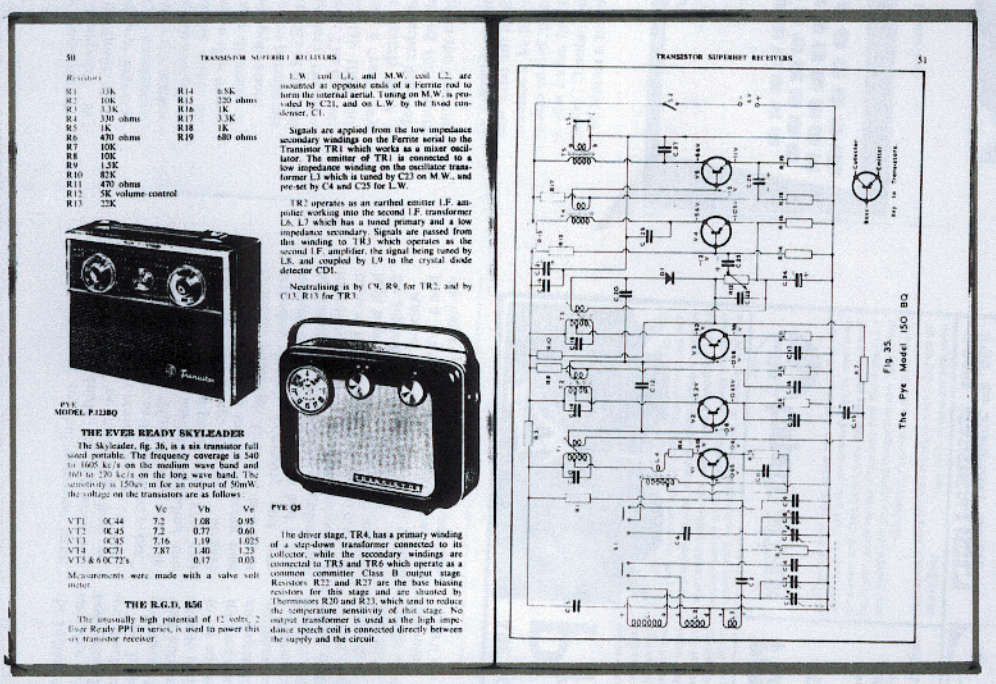
SPECIAL PRICE FOR 3 TOGETHER 16/-



50 TRANSISTOR SUPERHET RECEIVERS

Resistors

R1	33k	R14	6.8K
R2	10k	R15	220 ohms
R3	3.3k	R16	1K
R4	330 ohms	R17	3.3K
R5	1K	R18	1K
R6	470 ohms	R19	680 ohms
R7	10K		
R8	10K		
R9	1.5K		
R10	82K		
R11	470 ohms		
R12	5K volume control		
R13	22K		

PYE MODEL P.123BQ

THE EVER READY SKYLEADER

The Skyleader, fig. 36, is a six transistor full sized portable. The frequency coverage is 540 to 1605 kc/s on the medium wave band and 160 to 230 kc/s on the long wave band. The sensitivity is 150uV/m for an output of 50mW. the voltage on the transistors are as follows:

		Vc	Vb	Ve
VT1	OC44	7.2	1.08	0.95
VT2	OC45	7.2	0.77	0.60
VT3	OC45	7.16	1.19	1.025
VT4	OC71	7.87	1.40	1.23
VT5 & 6	OC72's		0.17	0.03

Measurements were made with a valve volt meter.

THE R.G.D. B56

The unusually high potential of 12 volts, 2 Ever Ready PP1 in series, is used to power this six transistor receiver.

L.W. coil L1, and M.W. coil L2, are mounted at opposite ends of a Ferrite rod to form the internal aerial. Tuning on M.W. is provided by C21, and on L.W. by the fixed condenser, C1.

Signals are applied from the low impedance secondary windings on the Ferrite aerial to the Transistor TR1 which works as a mixer oscillator. The emitter of TR1 is connected to a low impedance winding on the oscillator transformer L3 which is tuned by C23 on M.W. and pre-set by C4 and C25 for L.W.

TR2 operates as an earthed emitter I.F. amplifier working into the second I.F. transformer L6. L7 which has a tuned primary and a low impedance secondary. Signals are passed from this winding to TR3 which operates as the second I.F. amplifier, the signal being tuned by L8, and coupled by L9 to the crystal diode detector CD1.

Neutralising is by C9, R9, for TR2, and by C13, R13 for TR3.

PYE Q5

The driver stage, TR4, has a primary winding of a step-down transformer connected to its collector, while the secondary windings are connected to TR5 and TR6 which operate as a common committer Class B output stage. Resistors R22 and R23 are the base biasing resistors for this stage and are shunted by Thermistors R20 and R21, which tend to reduce the temperature sensitivity of this stage. No output transformer is used as the high impedance speech coil is connected directly between the supply and the circuit.

TRANSISTOR SUPERHET RECEIVERS 51

Fig 35 The Pye Model 150 BQ

No. 173 3/6

Practical Transistor Audio Amplifiers for the Home Constructor

Book 1

by

CLIVE SINCLAIR

Full Circuits for Preamplifiers and Power Amplifiers.

Thirty-two Diagrams and Plans.

Complete Building Data.

Design Suggestions.

Biasing and Power Supplies.

BERNARDS RADIO MANUALS

15. Seal gang trimmers, oscillator coil core and aerial coil trimmer with wax.

Voltage and Current Tables

The figures given below are typical readings which will be obtained using a model 8 Avometer.

Battery Voltage		8.9V	(10V range)
Total Current		10.5mA	(100mA range)
	Ic	0.35mA	(1mA range)
TR1	Ve	1.35V	(2.5V range)
	Vb	1.075V	(2.5V range)
	Ic	0.35mA	(1mA range)
TR2	Ve	0.2V	(2.5V range)
	Vb	0.3V	(2.5V range)
	Ic	2.8mA	(10mA range)
TR3	Ve	0.45V	(2.5V range)
	Vb	0.575V	(2.5V range)
	Ic	6.55mA	(10mA range)
TR4	Ve	1.1V	(2.5V range)
	Vb	1.2V	(2.5V range)
Junction of R6 C9		5.5V	(10V range)

All the above measurements are with no signal. Slight deviation from these figures can be ignored since they will be due to normal tolerances.

Approximate D.C. Resistance Values of Inductors and Transformers

Circuit No.		Ohms
L1, L2 (in series)		1.5
L3		VL
L4		VL
L5		3
T1, T2	Primary (overall)	4
	Primary (2-3)	1
	Secondary	VL
T3	Primary (overall)	3
	Primary (2-3)	0.75
	Secondary	VL
T4	Primary	22
	Secondary	1.25
Loudspeaker		9

VL = Very low (0.5 ohms)

PAM RECEIVERS

Pam manufacture a wide range of transistor receivers most of which employ more or less standard circuitry. Their Model 710, however, which is shown in fig. 34 has several unusual features which make it very interesting.

Instead of the usual autodyne converter a separate oscillator and mixer are used. V1 is the oscillator the output from which is coupled to the mixer, V2, by means of L3. The oscillator signal is fed to the emitter whilst the signal to be received is fed to the base. Two stages of common emitter I.F. amplification are used. These operate at unusual current levels, the emitter currents of V3 and V4 being 0.22ma. and 0.5ma. respectively. V6 is biased so as to operate in a nonlinear portion of its curve so that detection of the I.F. signal takes place in its base emitter circuit. The amplified audio signal is fed to V6 and this is used to drive the output stage. V7 and V8 form a common collector Class B push-pull amplifier. Although this type of output stage gives considerably lower gain than the common emitter type the quality is superior, furthermore, the low output impedance makes it simple to direct couple into a centre tapped speaker.

PYE

Fig. 36 shows the Pye Model 150BQ. This is only one of a fairly large range of transistor receivers made by Pye, but lack of space prevents me from showing more.

The 150BQ is a five transistor superhet of conventional design built into a very attractive leather case which is almost small enough to fit in a pocket.

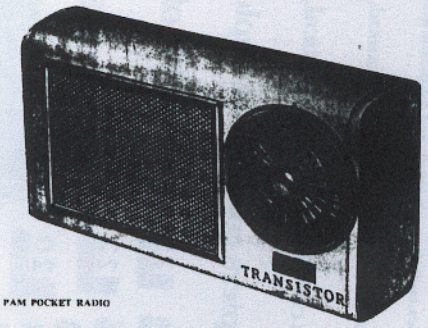
The voltages and currents at which the transistors operate with no signal input are as follows:

Code	Function	EC	IC	Eb	Ee
V1	Freq. changer	3.15	0.6ma	0.65	0.6
V2	1st I.F. Amp.	5.2	1.3ma	0.8	0.63
V3	2nd I.F. Amp.	5.2	0.81ma	0.58	0.38
V4	A.F. Amp.	5.6	1.0ma	1.2	1.05
V5	Output	5.6	15.0ma	1.3	1.1

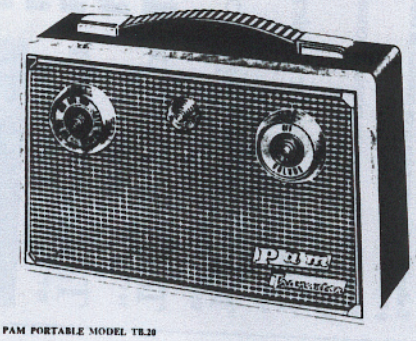
Components List

C1	115pF
C2	0.03uF
C3*	2.15pF
C4	6800pF
C5	0.03uF
C6	140pF
C7	115pF
C8*	2.15pF
C9	176pF
C10†	250pF
C11	0.008uF
C12	Selected between 100 and 160pF
C13	0.03uF
C14†	250pF
C15	8uF
C16	0.03uF
C17	0.03uF
C18†	250pF
C19	0.03uF
C20	Selected between 39 and 62pF
C21	16uF
C22	0.03uF
C23	3uF
C24	1uF
C25	0.01uF
C26	8uF
C27	0.01uF

* Part of Gang capacitor.
† Integral part of I.F. transformer.



PAM POCKET RADIO



PAM PORTABLE MODEL TR.20

D6

MAT TRANSISTORS

MICRO-ALLOY TRANSISTORS

MAT 100 **7/9**
MAT 101 **8/6**
MAT 120 **7/9**
MAT 121 **8/6**

★ Extremely high gains even at very low and high power levels.

TYPICAL BETAS OF 150

★ Cut-off frequencies of 120 Mc/s. Ideal for V.H.F.
★ Gold-plated for easy soldering and protection.
★ Very small size for compact circuits. Low noise levels.
★ **Far and away the best for all A.F., R.F. and V.H.F. applications.**

SEND FOR COMPLETE BOOK ON MICRO-ALLOY TRANSISTORS

22 TESTED CIRCUITS
USING MICRO-ALLOY TRANSISTORS

Only **5/9** including postage

This book includes new circuits for amplifiers, transmitters, micro-radios, F.M. tuners, pre-amplifiers, etc.

☆ **TRADE ENQUIRIES INVITED** ☆

M.A.T. TRANSISTORS
MAKE THIS WONDERFUL PERFORMANCE POSSIBLE

These amazing new Micro Alloy Transistors take transistor performance into entirely new fields by their coverage of A.F., I.F., R.F., and V.H.F. frequency bands. they provide far greater gain for less power consumption so that two MAT Transistors can do the work of three ordinary types with considerable saving in space, components and cost. Each one is carefully tested before leaving the factory. For full description, send for our book "22 TESTED CIRCUITS USING MICRO-ALLOY TRANSISTORS", price 5/9, including postage.

Long gold-plated leads assure perfect contact.

MAT 100 MAT 120 **7/9** each

MAT 101 MAT 121 **8/6** each

SINCLAIR 'MAGNAGAIN'
POWER OUTPUT TRANSISTOR

With a power handling capacity up to 30 watts and twice the normal power gain, the Sinclair "Magnagain" out-performs anything in its class and brings new scope to constructors in hi-fi audio.

18/-

SINCLAIR GUARANTEED TRANSISTORS

MAT 100	High gain low level	7/9
MAT 101	Extra high gain, low level	8/6
MAT 120	High gain, medium and high level	7/9
MAT 121	Extra high gain, medium and high level ...	8/6
ADT 140	For FM, TV, VHF and UHF	15/-

sinclair NEWS

No. 1 APRIL/MAY, 1964

This is what Sinclair service means to you

WORLD LEADERSHIP

Within an amazingly short time, Sinclair Radionics has leapt forward to become a world-leader in its own specialised field of micro-electronic designs for the home constructor. The reasons for this are not hard to find, and even if, at first, they appear simple, they represent as much of a breakthrough in relations between customer and supplier as do the designs which we have introduced.

SPECIALIST TEAMS

Our object is to produce micro-electronic transistor designs which are not simply interesting to build, but which are well ahead of anything offered by our competitors. They are also technically ahead of any available manufactured products. To achieve these standards, we employ our own highly qualified team of electronic engineers, and when they have contributed their share to a design, we "marry" it to the services of an industrial design group to ensure that our cases are both elegant and functionally right. Developments on these lines are going on all the time in the carefully planned Sinclair programme.

INSTRUCTIONS

Presentation of instructions is another Sinclair feature in which we naturally take pride. The experienced builder will readily recognise and appreciate the quality of the circuits shown in the Instructions. Equally important, however, is that anyone with or without technical knowledge can build a Sinclair design with 100% success from the word "Go".

FEATURED ON THE FOLLOWING PAGES:

SINCLAIR MICRO-6
The smallest radio in the world

SINCLAIR SLIMLINE
Designed for easy, high-speed assembly

SINCLAIR MICRO-INJECTOR PROBE
A better instrument for fault finding

SINCLAIR AMPLIFIERS

SINCLAIR TRANSISTORS

CONSTRUCTIONAL BOOKS

With the Micro-6, for example, building is actually proving easier than even we believed at first, and already there are thousands in use.

SATISFYING THE CUSTOMER

How about you, the customer? We insist on your being completely satisfied in all your dealings with us. In fact, we have a special service department run solely to help and advise customers and to correct any errors in assembly which may have inadvertently been made. You need never feel that we will not be interested in your particular problem, no matter how slight it might appear to you. That we are genuinely willing and glad to be of help is something extra which even we cannot properly convey in the unique guarantee offered in our advertisements. We can only tell you of the hundreds of letters which we receive every week from all over the world praising both our service and our designs. *Full details of these appear on the following pages.*

Introducing **Mike Farrard** a rare character created for Sinclair Electronics by Ken Ward

sinclair NEWS

No. 2 MAY/JUNE, 1964

And now an Amplifier for the Micro-6

This month, we announce a new design for constructors—the Sinclair TR.750. Basically, it is intended as a companion power amp for the Micro-6 since so many have asked us for it, but whoever builds this amplifier will find it useful for a lot more applications as well. In common with other Sinclair designs, the TR.750 is a micro-miniature instrument with original features and enormous power. In fact, it is so small, that you could put it together with the Micro-6 into an empty 20-cigarette packet, and have room to spare! Yet the TR.750 incorporates its own volume control and on-off switch, and has an undistorted output of three-quarters of a watt.

Using these two Sinclair units, you can have a first-class car radio which can be fitted with an absolute minimum of inconvenience. Or you can make a unique two-unit portable or home receiver with loudspeaker. You can use your "Slimline" in the same way also, if you wish. By using the appropriate accessories, high-fidelity standards for domestic listening are easily obtained. A pair of TR.750s can be used in stereo. In fact, wherever extreme compactness is required together with power and quality, you will find the Sinclair TR.750 the very job for you.

AFTER THE LAUNCHING, THE DELUGE

The Micro-6 has met with an even more enthusiastic response from set builders than did our original Slimline, which nevertheless continues to be very popular, particularly with newcomers to transistor building. It will come as no surprise, therefore, to constructors who already know what Sinclair stands for, to learn that letters of praise and appreciation are now pouring in daily as more and more builders make and use the smallest radio set in the world.

J. W., Luton writes: "Am very pleased with the quite remarkable results obtained from this very small receiver."

J.L.F.M., London, W.14 says: "The set worked very well indeed and I congratulate you on its performance." Similarly, *D.F., Monkseaton, Northants*, congratulated us on the design of the set, and continues: "The performance is quite unbelievable. I have shown it to a number of my friends and they have all been very impressed."

From *Brendon, Bucks, S.H.L.* recalls difficulties he had with a set three years ago and goes on to state: "Not only was I able to build your set successfully straight off, but the initial price was a pound less, and the performance in the sensitivity, selectivity and indeed every other way was fantastically better. *G.J., Nottingham*, favoured us with detailed observations for which we thank him. "I very much enjoyed the four or five hours work necessary to complete it (the Micro-6) which was accomplished almost without swearing, unlike most other sets I have made," writes *G.J.* "When finished, it worked at once. I consider the conception brilliant and I am very pleased with it. It has, of course, aroused much interest amongst my friends."

"THE FINEST LITTLE SET"

"Having been a transistor fiend for the last eight years, I must say it is the finest little set I have ever constructed. Please send me one more of these marvellous little instruments," writes *R.K., Preston.*

In *Aylesbury, Bucks, J.G.H.* logged "3 B.B.C. programmes and at least 12 foreign stations with good selectivity, more strength than was needed and no fading on Luxembourg."

"LEAVES MY 6-TRANSISTOR SET STANDING"

S.H., Wembley, Cheshire, is "truly amazed at the quality and sensitivity of this set. It leaves my 6 transistor set standing. Volume enables programmes to be heard clearly even in a noisy metal framed department store."

And so we could go on. As with all letters from which we quote, the originals may always be seen at our offices.

TWO-WAY PROTECTION FOR YOU

Remember, when you buy a Sinclair design, you are fully protected by our unique guarantee whereby should you not be immediately satisfied with your purchase, your money is refunded without question. And for those whose building may need some servicing, our own technical service department can quickly put things right for you.

Referring back to letters sent to us, we should point out that we also get our share from constructors who build other Sinclair designs including the Signal Injector, the Micro-Amp Set and the Slimline as shown on the left.

C. M. Sinclair

MICRO-6 A SENSATION AT 1964 PARIS ELECTRONIC COMPONENTS SHOW

When exhibited at the 1964 Paris Electronics Components Exhibition, the Micro-6 created an instant sensation. Nothing like it had ever been seen or heard before in Europe, and now demand for this amazing receiver is growing rapidly on the Continent as well. Next it is expected that the world's smallest receiver will be on show at the New York World's Fair.

Says **Mike Farrard** our favourite customer

"He buries it in the garden if he doesn't like the programme"

THREE MORE PAGES OF SINCLAIR NEWS FOLLOW THIS

sinclair NEWS

No. 3 JUNE, 1964

More Micro-6 Developments

Because of the enormous interest in the Micro-6, we at Sinclair Radionics have been devoting much of our time to the development of accessories which add to its usefulness. The first of these, the TR.750 power amplifier was introduced last month. This remarkably low-priced high performance design has, of course, a great many applications but in conjunction with the Micro-6 or the Slimline it can form a really powerful car, home or portable radio.

The latest Micro-6 accessory is just as exciting! We have designed and produced an elegant nylon wrist strap which clips straight on to the Micro-6, converting it into a wrist radio—the first of its kind in the world! The earpiece lead may then be run up the sleeve and the radio listened to without any trailing wires. The wrist strap may be removed instantly when desired, but in use it is firmly attached and the set cannot come loose. It will add immensely to the pleasure and usefulness of your Micro-6, particularly when out of doors.

THE MICRO-6 CIRCUIT

Many readers may be curious to know how we achieve the high performance we claim for the Micro-6 in a set of such minute dimensions. That our claims are genuine is, of course, proved by the countless commendatory letters we receive, more of which we give below, but you may like to know more about the design. The circuit is a completely new one based on our micro-alloy transistors (MATs). These transistors have higher gains than any other types at low voltage levels and, as they are also very small, are ideal for miniaturised equipment. The Micro-6 has two high gain stages of R.F. amplification, a double diode detector and three stages of A.F. amplification. Thus we have used exactly the same number of stages of gain as are employed in conventional 6 transistor superhets.

We are able to do this because we use genuinely micro-miniature components. For example, all the resistors are only ¼in in length. These tiny components help to make the Micro-6 simple to construct because we don't have to pack them so closely together. If you would like more details just send 1/- for our booklet on the Micro-6 which gives the complete circuit diagram and technical description.

BRITISH BEATS THE WORLD!

We recently launched an export drive for all our products. We have already received enquiries for the Micro-6 from over 30 countries and samples are now going to agents throughout the world. One well-known company in the U.S.A. has ordered 1,000 TR.750 amplifiers and 1,000 Micro-Amplifiers. Naturally, we are particularly pleased by this as the orders were obtained in the face of very tough Japanese competition.

From our Postbag

J.S.P., Wye, Kent, writes: "Just *Hamstone, Middlesex*, writes: "Thank you for the two Micro-6 kits. I have just completed assembly of one of these, and should like to say how satisfied I am. Neither in design nor performance is it in any sense a compromise."

J.A., Warton, near Carnforth, Lancs., tells us—"I have just built the Sinclair Micro-6 with quite remarkable results in an area where M.W. reception is notoriously poor."

W.A.S., Bromsgrove, Worcs., writes: "I have made up two Micro-6 units and am delighted with the performance reproduction is excellent."

Says **Mike Farrard** our faithful enthusiast

"I've made two for me, one for Uncle Bert, one for Mabel, two for the kids and one for Grandma. The dog will have to wait."

ADVERTISEMENT

sinclair NEWS

No. 4 JULY, 1964

We will pay you for your photographs!

Completely built Micro-6 sets are understandably a rarity at head office which is why a couple of our secretaries slipped into the rest room to listen for themselves and got caught in the act by the works manager who had his camera handy. If you have any amusing or interesting pictures of the Micro-6 in use, let us see them. 5 gns. will be paid for each one published. All prints submitted will be returned.

DESIGNS WITH A PEDIGREE

It is but little more than a year ago that the name Sinclair Radionics appeared to the public for the first time, offering entirely new concepts in micro-radio receiver design. The impact was fantastic. There had never been anything like it before. Various other designs were introduced leading up eventually to the world's smallest radio—the Micro-6 and then the TR.750 Power Amplifier. Today, Sinclair is the best known and most quoted name in anything to do with transistor designs for constructors.

TWO-FOLD TRIUMPH

There are two simple, but exclusive reasons behind this triumph—firstly the extraordinary efficiency of Sinclair Micro Alloy Transistors (known as MATs). These make possible standards of performance far ahead of anything the public can obtain from other transistors. Secondly, there are the designs themselves. These come from a team accustomed to working to very high standards in transistorised electronics, for this group is but part of Sinclair Radionics Ltd. who are in fact industrial electronic consultants!

So we are well used to solving problems and every design we produce for you is exhaustively tested long before being advertised. That is why Sinclair Micro Transistor Designs have completely captured the imagination and enthusiasm of constructors everywhere. They have never had the chance to build to these professional levels in the transistor field before, to say nothing of the pleasure and satisfaction to be obtained from the wonderful performance of Sinclair designs.

IT COULD HAPPEN TO YOU!

There are other intriguingly efficient designs using MATs which are well worth trying. These will be found in the three books advertised on the following pages. In the meantime we learn that a number of constructors wearing Micro-6 receivers on their wrists, on being asked the time have replied with a somewhat far away look, "Half past Housewives Choice" or words to that effect. Why not? The Micro-6 on its "Transrista" strap is setting a new and original fashion in listening.

She finds Micro-6 irresistible

A.J.W., Ely, Cambs., who wrote this from hospital, states:

"I have completed one of your Micro-6 receivers but unfortunately I endowed myself in one of my female instincts. I have used, therefore, to build myself another. Although forced to be in bed I found the kit quite easy to assemble and it helped pass a few hours for a number of days. I would appreciate it very much if one could send the kit as soon as possible. With the kit that I completed, I found that the receiving range was quite good."

P.A., Ashfield-cum-Thurlow, Nr. Bury-St. Edmunds, Suffolk, writes:

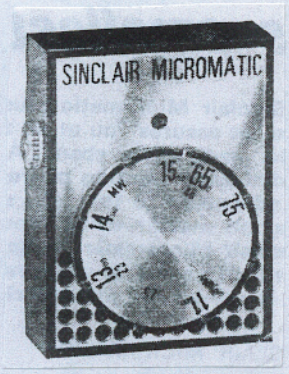
"I have recently constructed a Micro-6 kit and found it a most rewarding experience. Even in this black spot of reception areas the results are truly surprising. I am 50 years of age and this is my first venture in the field of practical electronics! To find you already genius!"

NOW TURN TO NEXT PAGES

SINCLAIR NEWS

Only four numbers of SINCLAIR NEWS have been published in the magazines

D8



RADIO AGE

The first product of the **RADIO AGE** consisted in a **Micro amplifier** (1962) which was claimed to be "*the smallest of its type in the world*" and employed (guess what?) the usual micro alloy transistors which also were used in the following product: the **Micro injector**.

The first proper radio came out in 1963 (the**Slimline)** but the really successful one appeared later in the year as the **Micro-6**. Branded again as the *smallest radio in the world* it was just too late for the revolution in miniaturization which involved USA and Japan and which, at the time, was nearing its historical end. Miniaturized transistor radios *with loudspeaker* like the incredible STANDARD *Micronic Ruby* were far more sofisticated and industrialized products than the pathetic Sinclair radio kits.

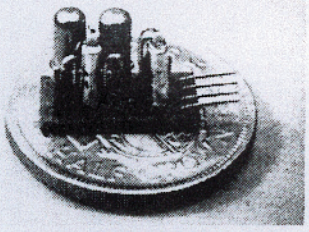
Notwithstanding this the Micro-6 and its subsequent model the **Micromatic** enjoyed a relatively large success in Great Britain alone. Between these two models Sinclair managed to produce and market an FM model called **Micro FM**.

Another more powerful amplifier, the **TR 750** designed especially for the Micro-6, was put on the market in 1963. But this product takes us to the next period of the Sinclair story: THE HI-FI AGE.

MICRO AMPLIFIER

SINCLAIR RADIONICS LTD Dept. C 69 HISTON ROAD CAMBRIDGE
TELEPHONE CAMBRIDGE 53965

Build the Sinclair MICRO-AMPLIFIER



ACTUAL SIZE
ONLY ¾" x ⅜" x ½"

This microscopic amplifier, **the smallest of its type in the world,** out-performs amplifiers 20 times as large.

Power Gain—**60dB (1,000,000 times).**

Frequency Response—**30 c/s to 50 kc/s ± 1dB.**

Output Power—sufficient for any earpiece or small **loudspeaker.**

Simple to build using ordinary tools.

Uses brand new micro-miniature components and **micro-alloy transistors.**

Very low noise level. May be used as tape recorder pre-amplifier.

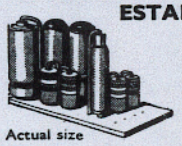
Free applications data supplied with every kit showing how to use the micro-amp in **micro-radios** and **transmitters,** and with high and low impedance pick-ups, microphones and stereo headphones.

28/6 *plus 1/6 postage and packing*

Trade enquiries invited.

SINCLAIR MICRO-AMPLIFIER

AS USED IN LABORATORIES, RESEARCH ESTABLISHMENTS, ETC.



Actual size

Smaller than a 3d. piece.

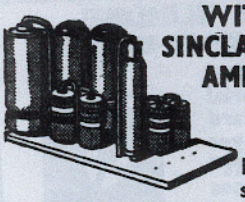
★ *With detailed instructions, applications data and circuitry*

28/6

This fantastically small, powerful amplifier is smaller than a 3d. piece. With a frequency response from 30 to 50,000 c/s ± 1dB, and power gain of 60dB (1,000,000 times) it makes a superb broadband R.F. amplifier as well as a sub-miniature hi-fi amplifier with an output suitable for any earpiece or even loudspeaker. This amplifier makes a valuable tool in the hands of the experimenter, and is widely used in industry, research, etc. With MAT Transistors, micro-miniature quality components, micro-printed circuit and instructions.

40 dB gain at 1 Mc/s.

BUILD AN F.M. TRANSMITTER WITH THE SINCLAIR MICRO-AMPLIFIER



Smaller than a 3d. piece. Frequency response 30 to 50,000 c/s ±1dB, power gain 60dB (1,000,000 times)—can also be used for a broadband R.F. amplifier, or a sub-miniature hi-fi amplifier with an output suited to any earpiece or even loudspeaker. With MATs instructions and all parts. **28/6**

Sinclair Radionics Ltd Micro-Amplifier Instructions/Applications

HOW TO WIRE UP THE SINCLAIR MICRO-AMPLIFIER

First check that you have all the components. These should be as follows:

One printed circuit board
Two transistors (one high-gain type with red spot, one low-gain type with green spot.)

Two Capacitors (C1 - 1 μF
(C2 - 32μF
Four resistors (R1 - 12Kohms
(R2 - 1.2Kohms
(R3 - 1.2Kohms
(R4 - 680Kohms

The colour coding of the resistors is shown on the wiring sheet.

For the assembly you will also require a soldering iron with a finely-pointed bit, a supply of thin cored solder, a small pair of long-nosed pliers and a pair of wire-cutters. Some means of gripping the board firmly but gently during assembly is also helpful, and the work should be carried out under a strong light.

The diagram on the wiring-sheet shows the printed side of the board, and indicates the lay-out of the components. The numbers correspond with those on the circuit diagram.

First, mount the four resistors. Bend the wire at one end of each resistor through 180° as indicated in the sketch of the finished amplifier. Push the wires through the appropriate holes in the board from the blank side. The appropriate holes can be found by reference to the diagrams. It is important that the bent wire and the straight wire should go through their respective holes as indicated; if they are reversed the components will not fit properly onto the board. For example, R3 is seen in the circuit diagram to be connected to points 16 and 17. From the board layout drawing, it will be seen that the resistor sits over hole number 16, and therefore the straight wire goes through hole number 16, and the bent one through hole number 17. Do not cut the wires to length yet. If difficulty be experienced in getting the wires into the holes, the latter may be slightly enlarged with a needle.

C1 and C2 are then mounted, care being taken to observe the polarities. In the case of C1 the positive end goes straight into hole 5, the negative end being bent over into hole 8.

C2 is mounted so that the positive wire goes direct to hole 18, the other wire being bent over to hole 19.

The positive leads of C1 and C2 are those which are insulated from the outer case by a rubber bush, the negative end being connected to the case.

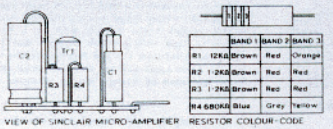
Lastly, the transistors should be mounted. Spread the wires and push them through the holes, which are so placed that if the transistor is correctly connected it will sit right down on the board.

All components should now be correctly placed on the board, with their wires projecting through the holes to the printed side. Make sure that the components are pushed well down, and that the folded-over wires return to the board close to their respective components. The wires may now be cut off 1/32" from the board, and soldered to the copper printed conductors. Use a small iron, preferably with its bit filed to a conical point, and the minimum of solder. The soldering should be carried out as quickly as possible to avoid damaging the transistors. Finally, insert four wires to the input, output, and positive and negative supply points, and solder them into position.

OPERATION

Although the Sinclair Micro-Amplifier will operate on a wide range of supply voltages (1.5 - 9v), there are certain applications where a superior performance may be obtained by a more critical choice of voltage.

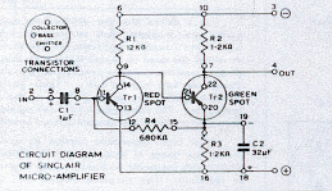
It should be borne in mind that a higher supply voltage gives increased gain and output power, but at the expense of a slightly degraded signal-to-noise ratio and frequency response. In general, therefore, a lower voltage should be used for low-level applications, and when a high-impedance input is used.



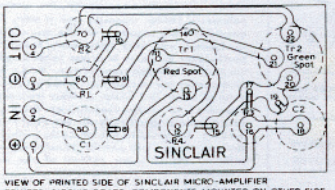
VIEW OF SINCLAIR MICRO-AMPLIFIER

	BAND 1	BAND 2	BAND 3
R1 12KΩ	Brown	Red	Orange
R2 1·2KΩ	Brown	Red	Red
R3 1·2KΩ	Brown	Red	Red
R4 680KΩ	Blue	Grey	Yellow

RESISTOR COLOUR-CODE



CIRCUIT DIAGRAM OF SINCLAIR MICRO-AMPLIFIER



VIEW OF PRINTED SIDE OF SINCLAIR MICRO-AMPLIFIER
PRINTED-CIRCUIT BOARD. COMPONENTS, MOUNTED ON OTHER SIDE, ARE SHOWN DOTTED. HOLE-NUMBERS REFER TO CIRCUIT DIAGRAM

MICRO-AMPLIFIER APPLICATIONS HOME CONSTRUCTOR

The Sinclair Micro-Amplifier is a two stage unit with a power gain of 60 dB (1,000,000 times) and a frequency response extending to several Mc/s. The remarkably high gain and good frequency response are due to the use of specially selected Micro-Alloy transistors with cut-off frequencies in the region of 100 Mc/s. These transistors also have very low levels of saturation voltage making them ideal for use in a.f. amplifiers.

The circuit diagram of the amplifier is shown in fig. 1. The first stage is operated at a collector current of 100μA for low noise operation and the output stage has a collector current which ranges from 0.3mA with a 1.3 volt supply to 2mA with a 9 volt supply. Any voltage supply between 1.3 and 9 volts may be used but, in most applications, there is no advantage to be obtained by using a supply of more than 3 volts

Using the micro-amp. with microphones and pickups

Fig. 2 shows how the micro-amp may be used with magnetic and ceramic or crystal transducers such as microphones and pickups. To avoid the need to repeat the circuit diagram of the amplifier only the connections are shown. These are 'in', 'out', + and -. Their positions on the amplifier are shown in fig. 1 on the right hand side. The connections are also marked on the copper side of the printed circuit board.

With high impedance crystal or ceramic inputs the value of ohms should be 250Kohms whilst with magnetic transducers the best value is 10Kohms. The earpiece may be any type, either crystal or magnetic but, for maximum volume, a 1Kohm magnetic type is best. Two amplifiers may be used to drive a pair of stereo headphones with very satisfactory results. A loudspeaker may also be driven by the amplifier via a suitable output transformer. With a 3ohm loudspeaker the transformer should have a turns ratio of about 20:1 whilst a 10ohm loudspeaker requires a 10:1 output transformer. If the amplifier is built specifically for use with a loudspeaker R2 should be left out as the primary of the transformer will provide the necessary d.c. path for the collector current of the output transistor.

Fig. 3 shows how a volume control may be added to the circuit when amplifying the output from a microphone or a pick-up.

Crystal set tuner circuit for use with Micro-Amp.

Fig. 4 shows a crystal set suitable for driving the micro-amp. The crystal diode may be any germanium point contact type such as the Mullard OA70. L_1 may be an ordinary crystal set coil or a home made coil may be wound on a 2 inch length of 1/4" diameter

ferrite rod. The primary should consist of 50 turns of close-spaced 38 gauge enamelled wire and the secondary of 7 turns of the same wire wound beside the primary as drawn in the diagram. The receiver will cover the whole medium waveband with a 250 pf. capacitor. The output from the micro-amp may be used to drive an earpiece or a loudspeaker.

Pocket size reflex radio

A very small pocket radio may be built using a micro-amp and a single transistor front end. The resulting set requires no aerial or earth and gives good reception over the whole of the medium wave-band. The circuit is shown in fig.5.

Tr1, a MAT 101, available from Sinclair Radionics Ltd., at 8/6d acts both as an R.F. and an A.F. amplifier with detection being performed by D_1 and D_2 which may be any point contact germanium diodes.

The ferrite rod aerial may be home made and is the same as the one required for the crystal set except that the secondary requires only 5 turns instead of 7.

A loudspeaker, with suitable transformer, may be used in place of the earpiece but in this case the battery should be increased to 6 or 9 volts.

Pocket F.M. Transmitter

The Micro-amplifier is ideal as a transmitter modulator. The circuit for an F.M. transmitter, which may be only match box size, is shown in fig.6. An MAT 121 transistor oscillates within the F.M. band providing the output to the aerial. The input is to a magnetic microphone which should have an impedance of 250ohms or more. It is not necessary to speak very close to the microphone as the circuit is very sensitive.

With a good F.M. receiver and a 9 inch aerial the transmitter has a range of about 100 yards.

Simple Hearing Aid

A very simple and compact hearing aid is shown in fig.7. The microphone should be a magnetic hearing aid type with an impedance of about 2.5Kohms. This aid may well be satisfactory for people suffering from slight deafness but it should be realised that the fitting of a hearing aid for an individual is a specialised business and should only be undertaken by a trained audiologist.

Telephone Pick-up circuit

With a telephone pick-up amplifier of the type shown in fig.8, it is possible to hold the unit within a foot of a telephone in use and to hear both sides of the conversation quite clearly in the earpiece. The pick-up coil may be of the type supplied for use with tape recorders.

Pocket Radio using 2 Micro-amps.

The Sinclair Micro-amplifier may be used as an R.F. amplifier just as well as in A.F. applications. This makes it possible to construct a very sensitive pocket radio using one Micro-amplifier for the R.F. amplifier and another one as the A.F. amplifier. Such a circuit is shown in fig.9. The ferrite rod aerial is the same as the one for the crystal set except that the secondary has 5 turns. The diodes are point contact germanium types.

The applications for the micro-amplifier given above are, of course, only a small proportion of the total possibilities. The constructor will probably be able to think of many others for himself.

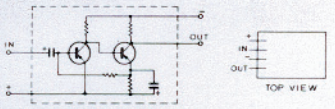


FIG 1 CONNECTIONS TO MICRO-AMP

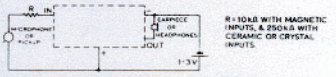


FIG 2 CONNECTION OF HIGH OR LOW IMPEDANCE INPUTS TO THE MICRO-AMP.

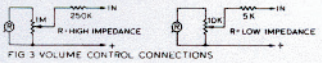


FIG 3 VOLUME CONTROL CONNECTIONS

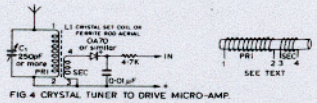


FIG 4 CRYSTAL TUNER TO DRIVE MICRO-AMP.

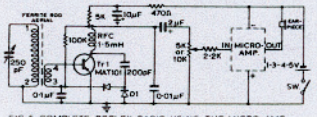


FIG 5 COMPLETE REFLEX RADIO USING THE MICRO-AMP.

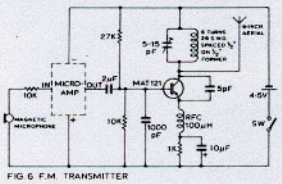


FIG 6 F.M. TRANSMITTER

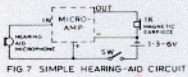


FIG 7 SIMPLE HEARING-AID CIRCUIT

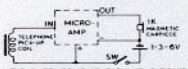


FIG 8 TELEPHONE PICK-UP CIRCUIT

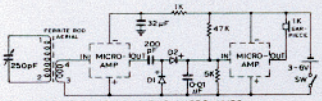


FIG 9 POCKET RADIO USING TWO MICRO-AMPS.

sinclair

COMBERTON CAMBRIDGE

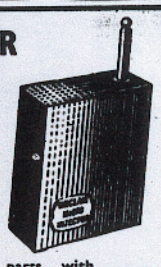
MICRO INJECTOR

GO TRANSISTOR WITH SINCLAIR

BOOKS · CIRCUITS · TRANSISTORS · EQUIPMENT

SINCLAIR MICRO-INJECTOR

THE SMALLEST AND MOST EFFICIENT OF ALL INJECTOR TEST DEVICES



It is amazing how useful this precision instrument is. Using two MICRO-ALLOY TRANSISTORS it generates and injects a test signal into any part of a receiver or amplifier at any frequency from 1 kc/s to 30 Mc/s. By this means the location of faults can be rapidly found.

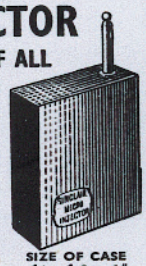
The Sinclair Micro-Injector is powered by a 6d. standard battery which will last for about 6 months. Its size is 14/5" x 13/10" x 1", excluding the probe which is 3/5" long, by far the smallest instrument of its kind available. Assembly is extremely simple.

All parts with instructions come to 27/6

***Ready built and tested* 32/6**

SINCLAIR MICRO-INJECTOR

THE SMALLEST AND MOST EFFICIENT OF ALL – YET IT COSTS FAR LESS



Using two MICRO-ALLOY TRANSISTORS, the Sinclair Micro-Injector is a precision sub-miniature instrument which generates and injects a test signal into any part of a receiver or amplifier at any frequency from 1 kc/s to 30 Mc/s. By this means the location of any fault can be rapidly found.

The Sinclair Micro-Injector is powered by a 6d. standard battery which will last for about 6 months. Its size is 14/5" x 13/10" x 1", excluding probe, by far the smallest and most versatile instrument of its kind available.

Assembly is extremely simple and will take even a beginner only half an hour. Clearly illustrated building instructions are provided together with operating instructions.

SIZE OF CASE $1\frac{1}{5} \times 1\frac{3}{10} \times \frac{1}{2}$"

- **COVERS 1 kc/s TO 30 Mc/s**
- **PERFECT FOR EQUIPMENT OF ALL TYPES**
- **FASCINATING TO BUILD**

Total cost including all parts, MAT Transistors, printed circuit board, plated probe and case in royal blue with gold trim. **27/6**

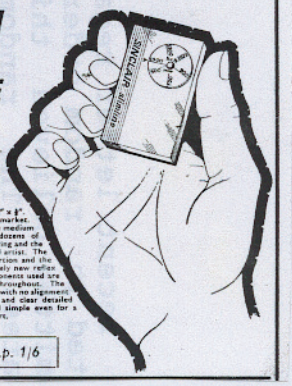
SLIMLINE RADIO

BREAKTHROUGH

★ IN SIZE ★ DESIGN
★ PERFORMANCE
★ QUALITY ★ VALUE

THE

SINCLAIR SLIMLINE



The Sinclair Slimline is the smallest receiver of them all, only 2⅞" x 1⅜" x ⅝". Yet, in performance and design it far surpasses every other set on the market. Using only its internal ferrite rod aerial it will receive all stations on the medium wave band including Home, Light, Third, Luxembourg, and dozens of Continental transmissions. The case is in deep royal blue with gold lettering and the calibrated dial is in gold on white. Both were designed by a professional artist. The earpiece provided gives superb reproduction free from noise or distortion and the volume is sufficient even for use in a car. The receiver uses a completely new reflex circuit developed by engineers at Sinclair Radionics Ltd. All the components used are brand new and MICRO-ALLOY TRANSISTORS are employed throughout. The result is a radio with the sensitivity and selectivity of a good superhet but with no alignment problems. The components are mounted on a printed circuit board and clear detailed instructions are provided. Assembly is perfectly straightforward and simple even for a beginner, yet the brilliant performance will more than satisfy the expert.

TOTAL COST OF ALL PARTS **49/6** p.p. 1/6

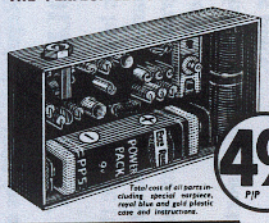
ACCLAIMED THE MOST AMAZING RECEIVER EVER

You've never seen or heard a transistor set design like this before. Small enough to conceal in one hand, the Sinclair "Slimline" gives choice of British and European programmes with staggeringly good quality from its own internal ferrite rod aerial. With its entirely new R.F. Reflex Circuit, superhet selectivity is achieved without any of the latter's problems of alignment. And it's so easy to build with its neat printed circuit board and well illustrated and presented instructions. Success is assured before you begin to build even if you are new to receiver construction.

Such dramatic new standards within even smaller dimensions are made possible through the wonderful new MAT Transistors in circuitry developed exclusively to exploit their amazing characteristics—yet it costs so little to build this minute receiver with its giant performance—so start yours NOW!

THE SINCLAIR "SLIMLINE" MICRO-RADIO RECEIVER

THE PERFECT SET FOR YOUR HOLIDAY!



Total cost of all parts including special earpiece, royal blue and gold plastic case and instructions.

49/6 P/P 1/6

BUILT IN A COUPLE OF HOURS

2¾" x 1⅝" x ⅝" COMPLETELY SELF-CONTAINED

RECEIVES HOME, LIGHT, THIRD AND COUNTLESS EUROPEAN STATIONS WITH FANTASTIC EASE AND QUALITY

Comprises brand new sub-miniature components, genuine MAT TRANSISTORS, elegantly designed plastic case and calibrated tuning control with high-quality featherweight earpiece; also thoughtfully presented step-by-step instructions.

Enthusiastic testimonials continue to pour in. Here are more typical examples:
"A most ingenious set. Having built it for amusement, I find myself using it for serious listening more and more, it is so reliable." *J. A., Wakefield*
"Would never have thought such performance possible from such a tiny set. Log Rome, Moscow, Brussels and many more stations with ease, as well as B.B.C. and Luxembourg." *F.G.M., Lewes*
"Wonderfully easy to build. Please send two more for the rest of the family who are quite converted to this new" ... "sleming." *C.H.L., Norwich*

M.A.T. TRANSISTORS
MAKE THIS WONDERFUL PERFORMANCE POSSIBLE

These amazing new Micro Alloy Transistors take transistor performance into entirely new fields by their coverage of A.F., I.F., R.F., and V.H.F. frequency bands. they provide far greater gain for less power consumption so that two MAT Transistors can do the work of three ordinary types with considerable saving in space, components and cost. Each one is carefully tested before leaving the factory. For full description, send for our booklet "22 TESTED CIRCUITS USING MICRO ALLOY TRANSISTORS". price 2/6, including postage.

Long gold-plated leads ensure perfect contact. MAT 100 7/9 MAT 101 8/6 MAT 120 each MAT 121 each

SINCLAIR radionics LTD
69 HISTON ROAD, CAMBRIDGE

To SINCLAIR RADIONICS LTD., 69 HISTON ROAD, CAMBRIDGE

Please send Parts for building Sinclair "Slimline" Micro-Radio Receiver .....
"22 Tested Circuits Using Micro Alloy Transistors" .....
.....MAT 100 / .....MAT 120 / .....MAT 101 / .....MAT 121 Transistors
for which I enclose Cash/Cheque/Money Order for £.....
Mark off items required

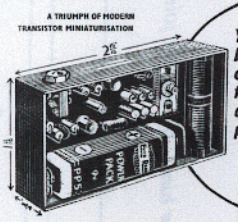
NAME .....
ADDRESS .....
BLOCK LETTERS PLEASE RC7

PRECISION DESIGNED
FOR SUPERB PERFORMANCE

Gives you Europe in the palm of your hand

For POWER, SELECTIVITY and QUALITY, the Sinclair "Slimline" has no equal, yet it is actually smaller than a packet of 20 cigarettes! Such exciting standards are due entirely to exclusively developed circuitry using famous M.A.T. Transistors—even so, it costs so very little to build this superb receiver. It gives you Home, Light and Third Programmes as well as many European stations with amazing ease, playing even in cars and trains. For a brand new concept in radio listening, BUILD A "SLIMLINE" NOW—it's the set you will want to have with you always.

A TRIUMPH OF MODERN TRANSISTOR MINIATURISATION



You can build this set complete with featherweight quality earpiece for only **49/6**

UNIQUE BECAUSE

- ★ It uses M.A.Ts and latest micro-miniature components.
- ★ It gives FULL coverage of the M.W band.
- ★ It gives hi-fi quality with incredible volume.
- ★ It will play in car or train.
- ★ It is completely self-contained with ferrite rod aerial and PP.5 battery in elegant gold-trimmed royal blue case.
- ★ Building is simple—results are fantastically good.

Sinclair '*SLIMLINE*' MICRO RADIO

★ **BREAKING ALL RECORDS**

There is no set to compare with the Sinclair "Slimline" for smallness and efficiency. British designed to the highest standards, many thousands are already in use, and each one's good name is the unanimous letters of praise which enthusiastic constructors send us. It is no wonder this set is breaking all records—there has never been anything like it and more and more are being built all the time.

SINCLAIR Radionics LTD.
69 HISTON ROAD, CAMBRIDGE

If you do not wish to cut out coupon, please mention "Radio Constructor, January" when ordering.

SLIMLINE ORDER FORM

SINCLAIR RADIONICS LTD., 69 HISTON ROAD, CAMBRIDGE

Please send parts for building Slimline(s) for which I enclose £ s d.

Name .....
Address .....

the reference to being able to "give you Europe in the palm of your hand" was really a reference to the fact that many listeners were keen to tune into RADIO LUXEMBURG, a commercial pop music station of the time

EUROPE IN THE PALM OF YOUR HAND with the wonderful *Sinclair Slimline*

MICRO-RADIO RECEIVER

- ★ NEW improved solid dielectric tuning capacitor
- ★ FULL coverage of medium waveband
- ★ USES Micro-Alloy Transistors throughout (MATs)
- ★ TRUE high-fidelity performance with quite incredible volume and quality of reproduction
- ★ EXTREMELY SENSITIVE—pulls in literally dozens of continental stations right across the band
- ★ IDEAL for use in car or train where the tremendous volume is really valuable
- ★ COMPLETELY self contained; uses internal ferrite rod aerial and a PP5 battery
- ★ ELEGANT royal blue case with gold trim and calibrated dial

BUILT IN A COUPLE OF HOURS

success is assured before you begin

TOTAL COST WITH FEATHERWEIGHT QUALITY EARPIECE, INSTRUCTIONS, etc. **49/6**

Size 2½" x 1¼" x ⅝". Comprises brand new sub-miniature components, printed circuit board, genuine MAT transistors, case, earpiece and well illustrated easily followed instructions

FULL SERVICE FACILITIES ALWAYS AVAILABLE

THOUSANDS ALREADY IN USE

. . . and thanks to all the hundreds of enthusiasts who have written to us about the Slimline.

Here are still more typical examples of what constructors write

"The case is superbly designed . . . I have built several other kits and none have been truly successful but yours is a winner." *A.E.C., Leicester*

"I completed assembly of your Sinclair Slimline and I'm really delighted with the quality of reproduction. It's the best small transistor set I have ever heard." *J.D.G., Coventry*

"The performance in a car was remarkable! *F.G.P., Bedford*

"Was honestly amazed at the performance, especially the tone." *F.R.T.H., London, S.W.11*

THE ORIGINALS OF THESE AND COUNTLESS OTHER UNSOLICITED TESTIMONIALS MAY BE SEEN AT OUR OFFICES AT ANY TIME DURING BUSINESS HOURS

POST TO-DAY

TO SINCLAIR Radionics LTD., 69 HISTON ROAD, CAMBRIDGE

Please rush . . . . . Sinclair Slimline (s)

FOR WHICH I ENCLOSE £ . . . . . s. . . . . d.

NAME . . . . . .

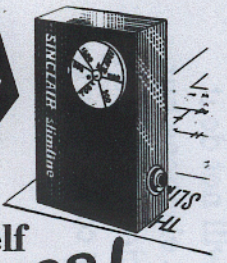
ADDRESS . . . . . .

. . . . . .

BLOCK LETTERS PLEASE RC/9

★ ★ ★ ★ ★ ★ **SINCLAIR "SLIMLINE"**

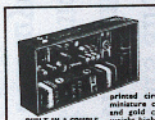
THE SET YOU WILL NEVER WANT TO BE WITHOUT



THE MOST FANTASTIC TRANSISTOR PERFORMANCE YET—GIVES YOU EUROPE IN THE PALM OF YOUR HAND, SIZE 2½" x 1¼" x ⅝"

Build one for yourself *and then* *Give one for Xmas!*

This is the ultimate in personal radio—so small, you can take it with you everywhere—so powerful it will give you many programmes from which to choose and with selectivity and quality that are truly astounding. Once you have heard the "Slimline", you will never want to be without it. Building it is fascinating too, and if you want to give presents that will really be welcome—build and give the Slimline for Xmas. It's so elegant too and takes up no more space than a packet of cigarettes. Tunes over the entire medium waveband.



BUILT IN A COUPLE OF HOURS

A MASTERPIECE OF DESIGN AND PERFORMANCE

The heart of the Slimline is its wonderful MAT Transistors and highly efficient circuitry. Building is so easy, too. With well presented instructions, improved solid dielectric tuning capacitor, printed circuit board, sub-miniature components, blue and gold case and feather-weight high quality earpiece, total cost comes to **49/6**

TAKE IT WITH YOU EVERYWHERE!

LIGHT PROGRAMME TUNED IN 800 MILES AWAY

From M.V. Orelia, E.D.H.W. writes:
"I have just completed your 'Slimline' Receiver and I am amazed at the results. 800 miles from the U.K. I could still hear the light programme. I have built quite a number of receivers in the last few years but none with as good a result as the 'Slimline'. I have now my shipmates interested, and more orders will be forthcoming in the future."

FULL SERVICE FACILITIES ALWAYS AVAILABLE

POST TO-DAY

TO SINCLAIR Radionics LTD., 69 HISTON ROAD, CAMBRIDGE

Please send at once . . . . . .

FOR WHICH I ENCLOSE £ . . . . . s. . . . . d.

NAME . . . . . .

ADDRESS . . . . . .

. . . . . .

BLOCK LETTERS PLEASE RC/11

E6

SUCCESS!

The SINCLAIR SLIMLINE has proved itself. Over a thousand constructors have already built this wonderful little receiver and dozens have written to let us know how pleased they are. The reasons for this enormous success are simple:

1. The Sinclair Slimline is the smallest receiver of them all, only 2¼ x 1¼ x ⅝in. Yet in performance and design it far surpasses sets many times as large.

2. Using only its internal ferrite rod aerial it will receive all stations on the medium wave band including **Home, Light, Third, Luxembourg and dozens of continental transmissions.**

3. Elegant deep royal blue case with gold lettering and calibrated dial in gold on white. Both designed by a professional artist.

4. The earpiece provided gives superb reproduction free from noise or distortion and sufficient volume even for use in a car.

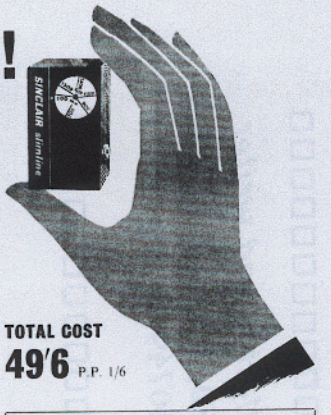
5. All the components are brand new and **MICRO-ALLOY TRANSISTORS** are employed throughout.

6. The completely new reflex circuit developed by Sinclair Radionics engineers results in a radio with the sensitivity and selectivity of a good superhet but with no alignment problems.

7. Well illustrated, superbly clear instructions are provided.

8. A carefully designed printed circuit board, on which all the components are mounted, is supplied.

9. Assembly is perfectly straightforward and simple even for a complete beginner yet the brilliant performance will more than satisfy the expert.



TOTAL COST

49/6 P.P. 1/6

A complete book on MAT's entitled "22 TESTED CIRCUITS USING MICRO-ALLOY TRANSISTORS" is available from us at 5/9 including postage.

Prices of MAT's remain

MAT 100 and MAT 120 7/9 } POST FREE

MAT 101 and MAT 121 8/6 }

JUST TWO OF THE MANY LETTERS WE HAVE RECEIVED. THE ORIGINALS MAY BE SEEN AT OUR CAMBRIDGE OFFICE.

Dear Sirs,

I have just built your Transistor Micro-Radio the "Slimline" and I'm amazed at the results. So far I've got about 18 stations including AFN, Stuttgart and Munich. I've built many sets but this leaves them all standing!

Thanking you,
H.S., Watford.

Dear Sirs,

I have received delivery of the "Sinclair Slimline" and have completed assembly. The quality of reproduction for both voice and music obtained with your circuit is so delightful that I do not overstate when I say that I have lost interest in the other more conventional transistor sets that I have built. I have one good quality sound reproducer, which I described some years ago in the technical press, but have found that I can obtain an equal effect for personal listening with the "Sinclair Slimline".

I should be favoured to receive a further kit when more are available (I assume the demand will be high and shall be glad to take my turn). I enclose a cheque in payment for this further order.

Yours faithfully,
J.F., Glasgow.

We would like to thank all those constructors who have written us such pleasant letters and to apologise for slight delays in delivery which have occurred owing to the otherwhelming demand. However we have now increased our staff to cope with this and can give a very prompt service.

SEND FOR YOUR SLIMLINE TODAY TO:—

SINCLAIR radionics LTD

69 HISTON ROAD
CAMBRIDGE

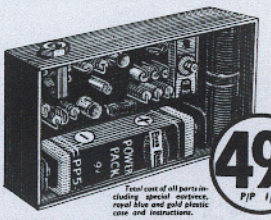
ACCLAIMED THE MOST AMAZING RECEIVER EVER

You've never seen or heard a transistor set design like this before. Small enough to conceal in one hand, the Sinclair "Slimline" gives choice of British and European programmes with staggeringly good quality from its own internal ferrite rod aerial. With its entirely new R.F. Reflex Circuit, superhet selectivity is achieved without any of the latter's problems of alignment. And it's so easy to build with its neat printed circuit board and well illustrated and presented instructions. Success is assured before you begin to build even if you are new to receiver construction.

Such dramatic new standards within even smaller dimensions are made possible through the wonderful new MAT Transistors in circuitry developed exclusively to exploit their amazing characteristics—yet it costs so little to build this minute receiver with its giant performance—so start yours NOW!

THE PERFECT SET FOR YOUR HOLIDAY!

THE SINCLAIR "SLIMLINE" MICRO-RADIO RECEIVER



Total cost of all parts including special earpiece, royal blue and gold plastic case and instructions.

49/6 P/P 1/6

BUILT IN A COUPLE OF HOURS

2¾" x 1⅝" x ⅝" Approx. **COMPLETELY SELF-CONTAINED**

RECEIVES HOME, LIGHT, THIRD AND COUNTLESS EUROPEAN STATIONS WITH FANTASTIC EASE AND QUALITY

Comprises brand new sub-miniature components, genuine MAT TRANSISTORS, elegantly designed plastic case and calibrated tuning control with high-quality featherweight earpiece; also thoughtfully presented step-by-step instructions.

AND STILL THEY COME IN! MORE CONSTRUCTORS WRITE . . .

"Building was quite easy. I have used my 'Slimline' in cars and on trains and it has been remarkably efficient." *C.F.L., Gillingham*

"The quality from the earpiece provided is excellent. Have brought in dozens of stations on this set . . . a most companionable little receiver." *T.L.B., London, N.8*

"Quite fantastic. I would never have thought quality, selectivity and volume could be so good from so small a set. It looks smart, too." *E.K.B., Basingstoke*

M.A.T. TRANSISTORS MAKE THIS WONDERFUL PERFORMANCE POSSIBLE

These amazing new Micro Alloy Transistors take transistor performance into A.F., I.F., R.F. and V.H.F. frequency bands. Only available for greater gain for less power consumption so that two MAT Transistors can do the work of three ordinary types with considerable saving in space, components and cost. Each one is carefully tested before leaving the factory. For full description, send for our book "22 TESTED CIRCUITS USING MICRO-ALLOY TRANSISTORS", price 5/9, including postage.

Long gold-plated leads ensure perfect contact.

MAT 100 7/9 each — MAT 101 8/6 each
MAT 120 each — MAT 121 each

SINCLAIR radionics LTD
69 HISTON ROAD, CAMBRIDGE

To SINCLAIR RADIONICS LTD., 69 HISTON ROAD, CAMBRIDGE

Please send Parts for building Sinclair "Slimline" Micro-Radio Receiver .....

"22 Tested Circuits Using Micro Alloy Transistors" .....

.....MAT 100 .....MAT 120 .....MAT 101 .....MAT 121 Transistors

for which I enclose Cash/Cheque/Money Order for £.....

Mark off items required

NAME .....

ADDRESS .....

BLOCK LETTERS PLEASE RCD

SINCLAIR RADIONICS LTD.

ASSEMBLY INSTRUCTIONS FOR THE "SINCLAIR SLIMLINE"

The Sinclair Slimline is a two transistor reflex receiver of advanced design and very small size. Exceptional sensitivity and selectivity with perfect fidelity, free from noise, have been achieved by the use of micro-alloy transistors in a new circuit. The radio is simple to construct and no previous experience is required but all the instructions should be followed carefully.

First check that you have all the following components:-

R1 22K ohm.	C1 Tuning Capacitor
R2 68K ohm.	C2 5, 000 pF.
R3 68K ohm.	C3 1.25 micro F.
R4 10K ohm.	C4 250 pF.
R5 1 M ohm.	C5 1.25 micro F.
R6 10K ohm.	C6 1, 000 pF.
R7 22K ohm.	L1 Ferrite Rod Aerial.
D1 Diode.	Tr1 MAT 121.
D2 Diode.	Tr2 MAT 120.

Crystal Earpiece and Socket.
One foot of plastic insulated wire.
One 8 B.A. screw and three 8 B.A. nuts.
One case and one calibrated dial.
One pair of battery clips.
One printed circuit board.

You will also need a soldering iron with a small bit, some flex cored solder, a pair of wire clippers and a pair of long-nosed pliers or a pair of tweezers

---

The positions of the components on the board are shown in fig. 3. The resistors, diodes, transistors and capacitors are mounted vertically with the exception of C1, C2 and C6 which are mounted horizontally. Each component is fixed in position by bending its leads, where necessary, and passing them through the appropriate holes in the board. These are then soldered to the copper by holding flux cored solder and a soldering iron onto the lead and copper for as short a time as possible. The leads are then clipped to within 1/10" from the board. Care must be taken to ensure that each joint is a good one making a flux free bond between the component lead and the copper on the board.

The components should be assembled onto the board in the following order:- D1, D2, C4, R3, C3, R2, C2, C5, R4, R1, R6, C6, R5, R7.

D1, D2, C3 and C5 have + signs marked on them at one end. It is essential that this + sign corresponds with the position shown in fig. 3.

C1 has two tags. One tag is made of a single layer of metal and the other of two layers. It is important that the tag made of two layers be nearest the centre of the board when C1 is mounted. After soldering C1 in position clip the tags to within 1/10" from the board.

Cw is a trimming component made of two pieces of insulated wire twisted together. Cut two 1 1/4" lengths of the plastic covered wire supplied. Bare the tip of one end of each wire and solder them into the Cw holes. Now twist them together for half their length.

Solder the four leads of L1 into position. The number of each lead is shown in fig. 7.

Solder Tr1 and Tr2 into the positions shown in fig. 3. making sure that the leads go into the correct holes. The transistor lead positions are shown in fig. 6.

The earpiece socket has a built in switch which is on without the plug in. This must be modified so that it is on with the plug in as shown in fig. 4.

Cut three 3/4" lengths of plastic covered wire and bare the tips of both ends of each wire. Solder one wire to each tag on the earpiece socket and then solder the socket to the board making sure that each lead goes to the correct position as shown by fig. 3. and fig. 4.

Cut two 1" lengths of plastic covered wire, bare both ends of each wire and solder them to the battery clips. Now solder the other end of the wire connected to the socket type clip to the hole marked BATT + and the wire on the plug type clip to the hole marked BATT - .

E8

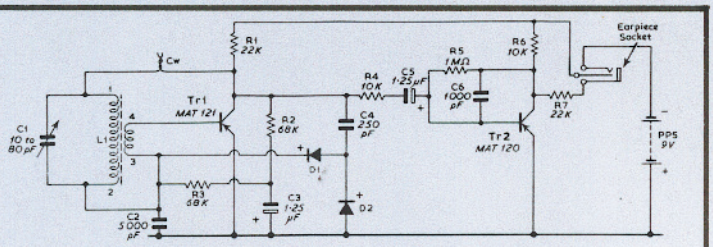


Fig. 1 Circuit Diagram of the SINCLAIR SLIMLINE

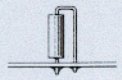


Fig. 2 Component Mounting

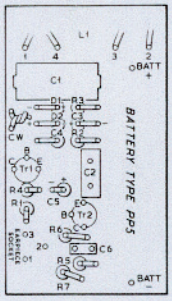
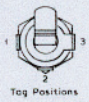


Fig. 3 Component Positions viewed from the Component Side of the Board.



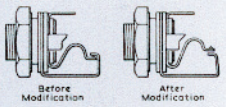


Fig. 4 Earpiece Socket Details

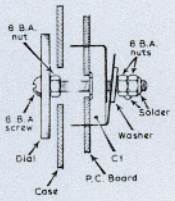


Fig. 5 Assembly Details of Dial and Tuning Capacitor.

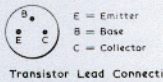


Fig. 6 Transistor Lead Connections viewed from Lead End.

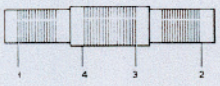


Fig. 7 L1 Connections

R1	Red	Red	Orange
R2	Blue	Grey	Orange
R3	Blue	Grey	Orange
R4	Brown	Black	Orange
R5	Brown	Black	Green
R6	Brown	Black	Orange
R7	Red	Red	Orange

Fig. 8 Resistor Colour Codes

All the components are now mounted on the board and it should be inserted in the case. First remove the nut on the earpiece socket and monoeuvre the socket so that the screw section passes through the hole in the side of the case. Screw the retaining nut back on the socket and check that none of the leads are touching one another. Check that the contacts on the switch touch one another when the earpiece plug is inserted and that they do not touch when the plug is removed.

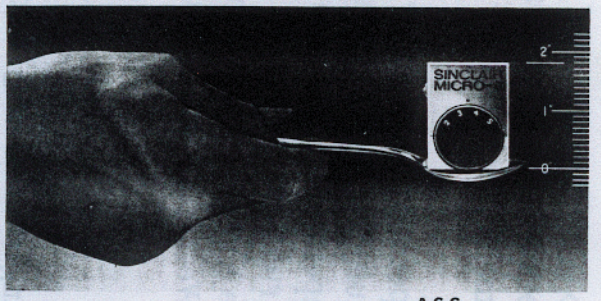
Screw the 8 B.A. screw provided through the hole in the centre of the dial and hold it in place with a nut on the other side. Now remove the screw from the centre of C1 taking care not to lose the two washers underneath it. Screw the dial, from outside the case, into C1 as far as it will go. Now replace the two washers and screw two nuts on top of them until the blades of the capacitor just begin to be depressed. Tighten the nuts onto one another without compressing the blades and seal them in place by soldering them to the screw. Now start unscrewing the dial. This should compress the blades of the capacitor. When they are fully compressed loosen the nut behind the dial and rotate the dial so that the arrow on the case points to 1500 Kc/s. Now tighten the nut again really firmly using pliers or large tweezers. The capacitor and dial assembly is shown in fig. 5.

The receiver is now complete and an Ever-Ready PP5 battery or equivalent should be fitted and the earpiece plugged in. Tune to the high frequency end of the band, that is with the dial screwed right in towards the case, and twist the wires of Cw together until a rushing noise is heard. Now untwist them slightly so that the rushing just stops. It should be possible to receive stations by tuning across the band. Cw may be adjusted slightly for best performance and then bent over so that the lid can be fitted.

Sinclair Radionics Ltd.,
69 Histon Road,
Cambridge.

MICRO-6 RADIO

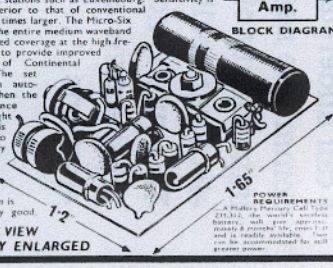
THE SMALLEST



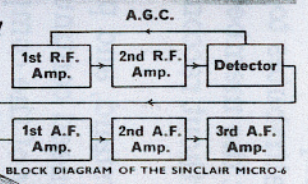
A teaspoonful of power!

TECHNICAL SPECIFICATION

Two stages of R.F. amplification with double diode detector followed by three stages of audio amplification. The application of negative feedback to all A.F. stages ensures ultra-linear amplification, while amplified A.G.C. applied to the first R.F. stage provides fade-free reception from distant stations such as Luxembourg. Sensitivity is actually superior to that of conventional radios many times larger. The Micro-Six tunes over the entire medium waveband with increased coverage at the high frequency end to provide improved separation of Continental stations. The set switches on automatically when the high-impedance featherweight earpiece is plugged into the specially designed micro socket. Quality of reproduction is exceptionally good.



CHASSIS VIEW GREATLY ENLARGED



BLOCK DIAGRAM OF THE SINCLAIR MICRO-6

POWER REQUIREMENTS

A Mallory Mercury Cell Type ZM.312, the world's smallest battery, will give approximately 8 months' life, costs 1/11 and is readily available. Two can be accommodated by self-evident means.

SIX-STAGE SENSITIVITY BETTER THAN MANY SUPERHETS

* * * * *

UNIQUE CIRCUITRY GIVES IMMENSE POWER AND QUALITY

* * * * *

PLAYS IN ANY CAR, TRAIN, BUS, PLANE

* * * * *

SELF-CONTAINED AERIAL AND BATTERIES

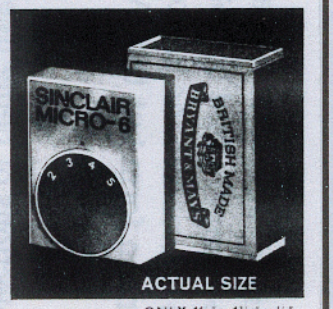
SET IN THE WORLD

A fantastic development in micro-miniaturisation

Just look at the remarkable specification of this latest Sinclair micro-electronic design—and then look at its size—$1\frac{5}{8}$" x $1\frac{1}{10}$" x $\frac{5}{8}$". It is almost unbelievable that a set with these tested and proven standards of performance can be contained within a case considerably smaller than a matchbox. Yet it gives superb results from stations all over the medium waveband with a power and sensitivity placing it years ahead of anything even the Japanese have produced. This is a professionally styled set brilliantly designed by the Sinclair research team to incorporate all the important circuit features of a de-luxe receiver. You will find building the Micro-Six the most absorbing experience you have ever had in electronics. So send for your Micro-Six today, and you will have for your pride and pleasure the smallest and most efficient receiver of its kind in the world.

SINCLAIR GUARANTEE

Should you not be completely satisfied with your purchase (although we are confident that you will be delighted) the full purchase price will be refunded instantly and without question.



ONLY $1\frac{4}{5}$" x $1\frac{1}{10}$" x $\frac{1}{2}$"

ALL YOU NEED TO BUILD THIS AMAZING RECEIVER

All parts necessary to build this wonderful receiver, including MAT transistors, diodes, micro-miniature components, printed circuit board, special ferrite-rod aerial, elegant case and knurled dial and featherweight hi-fi quality earpiece together with well presented instructions come only to

59/6

MALLORY MERCURY CELL TYPE ZM.312—*EACH* 1/11.

FULL SERVICE FACILITIES AVAILABLE TO ALL SINCLAIR CUSTOMERS

SINCLAIR MICRO-6

IMPORTANT NOTICE

The Sinclair Micro-Six is an ultra-small precision designed instrument. As such, previous experience in transistor building will be found helpful. It is imperative that a modern miniature soldering iron be used when building the Micro-Six.

★ MORE SINCLAIR DESIGNS ON NEXT PAGE

SINCLAIR RADIONICS LTD
69 HISTON ROAD · CAMBRIDGE

If you do not wish to cut coupon, mention 'Radio Constructor' when ordering.

To SINCLAIR RADIONICS LTD., 69 HISTON ROAD, CAMBRIDGE

Please send parts for building ... Micro-6 Receiver(s) and ... Mallory Cells Type ZM.312 at 1/11 each for which I enclose £ s. d.

NAME

ADDRESS

RC.2

THE SMALLEST SET IN THE WORLD

SINCLAIR MICRO-6

SIX STAGE RECEIVER

Now over 9,000 built and in use in all parts of the world
Have you built yours yet?

THE SINCLAIR MICRO-6 continues unchallenged as the most remarkable receiver of its kind ever made available to the public anywhere in the world. It has special 6-stage circuitry, and is, at the same time, the smallest set on earth. Everything except the lightweight earpiece is contained in the smart, minute white, gold and black case which is appreciably smaller than a matchbox, as the illustration shows. With vernier-type tuning control, bandspread over the higher frequency end of the medium waveband and powerful A.G.C. to ensure fade free reception of the most distant stations, the Micro-6 provides remarkable standards of performance. Quality of reproduction is outstandingly good, and again and again, the set is reported to give excellent results where other sets cannot be used at all. The Micro-6 cannot be too highly recommended, both as an intriguing design to build, and a most practical radio to use.

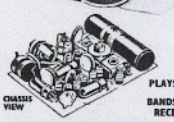
ACTUAL SIZE
$1\frac{4}{5}$" x $1\frac{1}{10}$" x $\frac{1}{2}$"

WEIGHS UNDER 1 oz

TUNES OVER M.W.

PLAYS IN CARS, BUSES, TRAINS

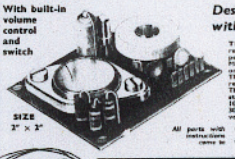
BANDSPREAD TUNING FOR EASY RECEPTION OF LUXEMBOURG



CHASSIS VIEW

SINCLAIR TR750 POWER AMPLIFIER

With built-in volume control and switch



SIZE 2" x 2"

Designed specially for use with the Sinclair Micro-6

THE TR750 (for building yourself or available ready built) measures only 2" x 2". It will provide powerful loudspeaker reproduction from the Micro-6 which can then be used as a car radio or domestic or portable loudspeaker set. The TR750 also has many other applications such as record reproducer, intercom or baby alarm. The output is 750 milliwatts for feeding into a standard 15-3Ω loudspeaker (requires only a 10-20,000 ohms ± 1dB. Power required—9 to 12 volts.

All parts with instructions come to **39/6**

Ready built and tested with instructions **45/-**

Easily built in a single evening

Using components including some never before made available to the public, the Micro-6 is nevertheless easy to build. All parts including light-weight earpiece and clearly detailed and illustrated 8-page instructions manual come to

59/6

"TRANSRISTA" black nylon strap for wearing the Micro-6 like a wrist-watch. **7/6**

MALLORY MERCURY CELL ZM312 (1 required) each **1/11**

Handy pack of 6 cells **10/6**

* ORDER FORM AND X-10 ON PRECEDING PAGES

UNIQUE SINCLAIR Guarantee

The following unconditional guarantee applies to everything you buy from Sinclair Radionics Ltd. If you are not completely satisfied with your purchase (we are confident you will be delighted) your full purchase price will be refunded instantly and without question.

FULL SERVICE FACILITIES ALWAYS AVAILABLE TO SINCLAIR CUSTOMERS

sinclair

SINCLAIR RADIONICS LTD
COMBERTON, CAMBRIDGE
Telephone COMBERTON 682

PUT EUROPE IN YOUR POCKET WITH THE SMALLEST RADIO SET ON EARTH!

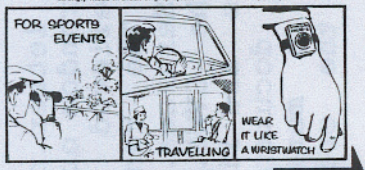
★ AN ALL-BRITISH DESIGN
★ WEIGHS LESS THAN 1 oz
★ ANYONE CAN BUILD IT IN A SINGLE EVENING
★ WITH BANDSPREAD TUNING FOR EASY RECEPTION OF LUXEMBOURG

When you have built your Micro-6, slip it into your pocket or on your wrist by means of the special "Transrista" strap available. No matter where you take your Micro-6 you will be staggered by its performance. In fact it will be so powerful and dependable, you will find yourself using and enjoying it more and more each day. After dark, as you tune by means of the unique vernier-type control, stations simply pour in from all over Europe, and with bandspread tuning at the high frequency end of the medium waveband, Luxembourg comes in like a local station. **THE SINCLAIR MICRO-6 IS A GREAT TRIUMPH OF BRITISH DESIGNING FAR AHEAD OF ANYTHING PRODUCED IN JAPAN, U.S.A., GERMANY OR ANYWHERE ELSE. IT MEASURES ONLY 1⁵/₈ x 1³/₁₀ x ¹/₂in.**

All parts including 8-page instructions manual and earpiece come to **59/6**

"TRANSRISTA" nylon wrist strap with special fitting for holding Micro-6. Strongly made in black or grey nylon. **7/6**

Mallory Mercury Cell Type ZM312 (2 required) each **1/11**



SINCLAIR RADIONICS LTD
COMBERTON, CAMBRIDGE
Telephone: COMBERTON 682

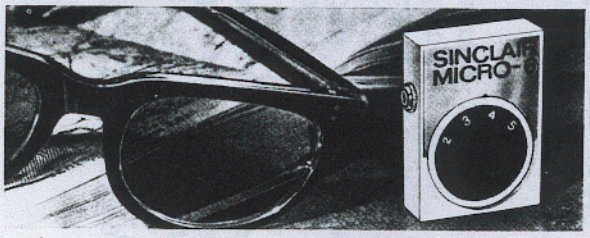
MICRO-6

The Secret is in the Circuit See next pages

5

sinclair Micro-

THE WORLD'S SMALLEST AND MOST EFFICIENT



SINCLAIR MICRO-6 — *the world's smallest Radio*

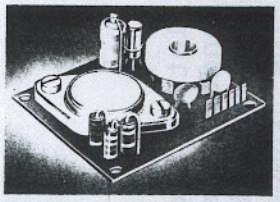
SIZE 1⁴/₅" x 1³/₁₀" x ½"

COVERS M.W. BAND

WEIGHS LESS THAN 1 OZ. COMPLETE WITH SELF-CONTAINED AERIAL AND BATTERIES

When you have built this wonderful set, you will find it your constant companion everywhere—indoors and out—in car, bus, train—wherever you want to listen. Its power is such that it ensures good reception under the severest operating conditions, yet it is so small that you can wear your Micro-6 like a wrist-watch! Tuning covers the entire medium waveband with bandspread over the higher frequency end to ensure better separation of Luxembourg, Continental and other stations. Listening is by means of the lightweight high quality earpiece provided (except when you want to use the set with the TR750 and a loudspeaker). The earpiece switches the Micro-6 on when plugging it in. THE SET IS SO WELL DESIGNED AND THE INSTRUCTIONS SO CLEAR THAT ANYONE CAN BUILD THE MICRO-6 AND HAVE IT WORKING IN A SINGLE EVENING: All parts including earpiece and instructions come to **59/6**

Mallory Mercury Cell Type ZM.312 (2 required)—1/11 ea.



SINCLAIR TR750
POWER AMPLIFIER
MAKES A CAR RADIO OF YOUR MICRO-6

This outstandingly successful power amplifier builds on to a printed circuit board 2" x 2" and includes its own volume control with on-off switch. The TR750 is primarily intended to provide powerful loudspeaker reproduction from the Sinclair Micro-6 or Slimline receivers, thus enabling owners of these sets to use them also for car radios, loudspeaker portables or domestic radios. Amongst many other useful applications, the TR750 makes an excellent record reproducer used singly for mono or paired for stereo.

Frequency response ± 1dB from 30 to 30,000 c/s. Transformerless output of 750 milliwatts for 10mV input into 3kΩ, using standard 25-35Ω speakers. Operates from 9-12V supply.

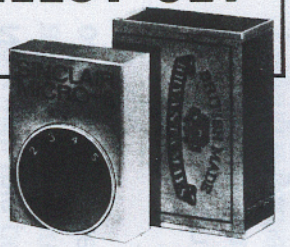
All parts inc. MAT and Magnegain Transistors and instructions come to **39/6**

Ready built for immediate use **45/-**

Supplied with plug for connecting to Micro-6 and Slimline.

SINCLAIR RADIONICS LTD., 69 HISTON ROAD, CAMBRIDGE. *Telephone 53965*

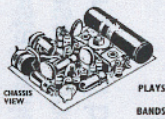
THE SMALLEST SET ON EARTH



SINCLAIR MICRO-6
SIX STAGE RECEIVER

Over 8,000 built and in use in all parts of the world

THE SINCLAIR MICRO-6 continues unchallenged as the most remarkable receiver of its kind ever made available to the public anywhere in the world. It has special 6-stage circuitry, and is, at the same time, the smallest set on earth. Everything except the lightweight earpiece is contained in the smart, minute white, gold and black case which is appreciably smaller than a matchbox, as the illustration shows. With vernier-type tuning control, bandspread over the higher frequency end of the medium waveband and powerful A.G.C. to ensure fade free reception of the most distant stations, the Micro-6 provides remarkable standards of performance. Quality of reproduction is outstandingly good, and again and again, the set is reported to give excellent results where other sets cannot be used at all. The Micro-6 cannot be too highly recommended, both as an intriguing design to build, and a most practical radio to use.



ACTUAL SIZE

1⁴/₅" x 1³/₁₀" x ¹/₂"

WEIGHS UNDER 1 oz

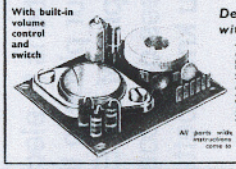
TUNES OVER M.W.

PLAYS IN CARS, BUSES, TRAINS

BANDSPREAD TUNING FOR EASY RECEPTION OF LUXEMBOURG

SINCLAIR TR750 POWER AMPLIFIER

With built-in volume control and switch



Designed specially for use with the Sinclair Micro-6

THE TR750 (for building yourself or available ready built) measures only 2" x 2". It will provide powerful loudspeaker reproduction from the Micro-6 which can then be used as a car radio or domestic or portable loudspeaker. Built by TR750 also has many other applications such as record reproducer, intercom or baby alarm. An output of 750 milliwatts for feeding into a 25-30Ω loudspeaker requires only a 10mV input across 3kΩ. Frequency response 30-30,000 c/s ± 1dB. Power required—9 to 12 volts.

All parts with instructions come to **39/6**

Ready built and tested with instructions **45/-**

Easily built in a single evening

Using components never before made available to the public, the Micro-6 is nevertheless easy to build. All parts including lightweight earpiece and 8-page instructions manual come to **59/6**

"TRANSRISTA" Black nylon strap for wearing the Micro-6 like a wristwatch. **7/6**

MALLORY MERCURY CELL ZM312 (2 required) each **1/11**

Handy pack of 6 cells **10/6**

sinclair

SINCLAIR RADIONICS LTD
COMBERTON, CAMBRIDGE
Telephone COMBERTON 682

UNIQUE SINCLAIR GUARANTEE

The following unconditional guarantee applies to everything you buy from Sinclair Radionics Ltd:
If you are not completely satisfied with your purchase (we are confident you will be delighted) your full purchase price will be refunded instantly and without question.

★ FULL SERVICE FACILITIES ALWAYS AVAILABLE TO SINCLAIR CUSTOMERS

E11

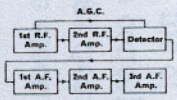
sinclair MICRO-DESIGNS

BUILD A SET TO WEAR LIKE A WRIST WATCH

WEIGHS LESS THAN AN OUNCE

SIZE 1¼"x1"x⅛"

The unbelievably small size and fantastic power of the Micro-6 make it possible to wear this set like an ordinary wrist watch, and for this we now introduce our special "Transrista" reinforced nylon strap. The Micro-6 can be attached to it instantly and removed whenever required. This opens still further new and exciting approaches to radio listening and ensures your obtaining enjoyment such as you have never known before from any radio receiver. You can build the Micro-6 and have it working within the space of a single evening, and with a "Transrista" strap for using your set out of doors you will indeed have the radio of tomorrow today. Tunes over entire medium waveband, with bandspread at H.F. end for good separation.



Circuit comprises two stages of R.F. amplification, double-diode detector and high-gain 3-stage A.F. amplifier. Powerful A.G.C. ensures fade-free reception from distant stations.

6-STAGE CIRCUITRY GIVES POWER AND SELECTIVITY

SPORTS EVENTS

DRIVING

TRAVELLING

SINCLAIR MICRO-6
THE SMALLEST SET IN THE WORLD

Build it in an evening!

Building is simple and straightforward when the meticulously detailed instructions are followed. All parts including MAT transistors, diodes, printed circuit board, lightweight earpiece, case and dial, and well-printed instructions come to 59/6

Two Mallory Mercury Cells in the Micro-6 give it maximum performance. Price 1/11 each.

Sinclair "Transrista" well-styled, strong nylon strap, grey or black. 7/6

CAN BE USED WITH EXISTING MICRO-6 SETS

MALLORY 6-CELL PACK OFFER

Single Mallory Mercury Cells, 1/11 each. Pack of 6, at special price of 10/6

choose SINCLAIR and you choose

SINCLAIR DESIGNS ARE ALL-BRITISH

QUALITY
because only test-selected materials and components are accepted for use in Sinclair designs in order that specifications are fully maintained.

VERSATILITY
You will find whatever Sinclair design you choose far more adaptable to your requirements as well as permitting a much wider degree of experimentation.

ECONOMY
Buying Sinclair is an excellent investment. Performance and quality are of standards found in far costlier equipment. You save with Sinclair—and everything is guaranteed.

sinclair NEWS

No. 3 JUNE, 1964

More Micro-6 Developments

Because of the enormous interest in the Micro-6, we at Sinclair Radionics have been devoting much of our time to the development of accessories which add to its usefulness. The first of these, the TR.750 power amplifier was introduced last month. This remarkably low-priced high performance design has, of course, a great many applications but in conjunction with the Micro-6 or the Slimline it can form a really powerful car, home or portable radio.

The latest Micro-6 accessory is just as exciting! We have designed and produced an elegant nylon wrist strap which clips straight on to the Micro-6, converting it into a wrist radio—the first of its kind in the world! The earpiece lead may then be run up the sleeve and the radio listened to without any trailing wires. The wrist strap may be removed instantly when desired, but in use it is firmly attached and the set cannot come loose. It will add immensely to the pleasure and usefulness of your Micro-6, particularly when out of doors.

THE MICRO-6 CIRCUIT

Many readers may be curious to know how we achieve the high performance we claim for the Micro-6 in a set of such minute dimensions. That our claims are genuine is, of course, proved by the countless constructors' letters we receive, more of which we give below, but you may like to know more about the design. The circuit is a completely new one based on our micro-alloy transistors (MATs). These transistors have higher gains than any other types at low voltage levels and, as they are also very small, are ideal for miniaturised equipment. The Micro-6 has two high gain stages of R.F. amplification, a double diode detector and three stages of A.F. amplification. Thus we have used exactly the same number of stages of gain as are employed in conventional 6 transistor superhets.

We are able to do this because we use genuinely micro-miniature components. For example, all the resistors are only ¼in in length. These tiny components help to make the Micro-6 simple to construct because we don't have to pack them so closely together. If you would like more details just send 1/- for our booklet on the Micro-6 which gives the complete circuit diagram and technical description.

BRITISH BEATS THE WORLD!

We recently launched an export drive for all our products. We have already received enquiries for the Micro-6 from over 30 countries and samples are now going to agents throughout the world. One well-known company in the U.S.A. has ordered 1,000 TR.750 amplifiers and 1,000 Micro-Amplifiers. Naturally, we are particularly pleased by this as the orders were obtained in the face of very tough Japanese competition.

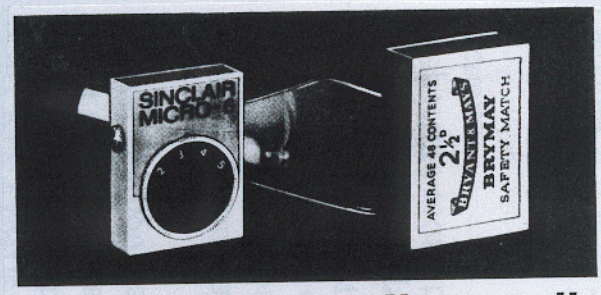
From our Postbag

J.S.P., M.A., M.I.E.E., from Hampton, Middlesex, writes: "Thank you for the two Micro-6 kits. I have just completed assembly of one of these, and should like to say how satisfied I am. Neither in design nor performance is it in any sense a compromise."

J.A., Warton, near Carnforth, Lancs., tells us—"I have just built the Sinclair Micro-6 with quite remarkable results in an area where M.W. reception is notoriously poor."

W.A.S., Beaconsfield, Bucks., writes: "I have made up two Micro-6 units and am delighted with the performance . . . reproduction is excellent."

Says **Mike Farrard** our faithful enthusiast

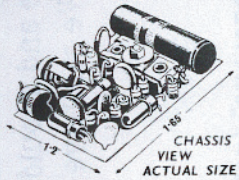


the world's smallest radio

YOU CAN BUILD IT IN AN EVENING

TECHNICAL DESCRIPTION

THE SINCLAIR MICRO-6 uses Micro-Alloy Transistors (MATs) in a completely new circuit comprising six stages. Two stages of R.F. amplification are followed by an efficient double-diode detector which drives a high gain three stage A.F. amplifier. Powerful A.G.C. is applied to the first R.F. stage to ensure fade-free reception of the most distant station, and tuning covers the entire medium waveband. This is widened out at the high frequency end to provide improved separation of Continental stations. The tiny ferrite rod aerial and earpiece socket were both specially designed for this set. This socket incorporates a switch which operates automatically on inserting the earpiece plug, and switches off when the plug is withdrawn. Listening is by means of the high-impedance lightweight earpiece provided. Quality of reproduction is outstandingly good. Instructions for building the Micro-6 set a new standard of clarity and simplicity. The diagrams are a masterpiece of technical illustration and the text contains all the information you require.



CHASSIS VIEW ACTUAL SIZE

PROFESSIONALLY STYLED IN EVERY DETAIL

Outside—a compact elegant case only 1¾" x 1⅛" x ⅛" with positive drive vernier-action tuning dial, the whole trimmed with gold and black.

Inside—beautifully designed printed circuit assembly, a masterpiece of compactness and electronic efficiency, yet building could hardly be easier.

All parts for building, etc., come to 59/6

UNIQUE SINCLAIR GUARANTEE

If you are not completely satisfied with your purchase (we are confident that you will be delighted) your full purchase price will be refunded instantly and without question.

FULL SERVICE FACILITIES AVAILABLE TO ALL SINCLAIR CUSTOMERS

SINCLAIR RADIONICS LTD
69 HISTON ROAD, CAMBRIDGE

If you do not wish to cut coupon, please mention RC.4 when ordering

To SINCLAIR RADIONICS LTD., 69 HISTON ROAD CAMBRIDGE

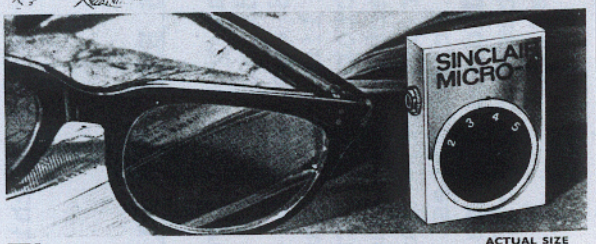
Please send parts for building Micro-6 Receiver(s) and Mallory Cell(s) Type ZM312 at 1/11 each for which I enclose £ s. d.

NAME

ADDRESS

RC.4

BUILD FOR SUMMER DAYS



ACTUAL SIZE

The World's Smallest Radio

When you have built your Micro-6, you will find it a constant companion everywhere—indoors and out—in car, bus, train—wherever you want to listen. Its power and sensitivity are such that it ensures good reception under the severest listening conditions, yet this amazing receiver measures only 1¹/₂" x 1³/₁₆" x ¹/₂" and WEIGHS LESS THAN ONE OUNCE complete with batteries and self-contained ferrite-rod aerial. Tuning is over the entire medium waveband with bandspread over the high frequency end and for better seperation of Continental stations. You listen with the lightweight high-quality earpiece which switches the set on when plugged in. Constructors at every level of experience are enthusiastically building and using this British designed set, acclaimed by all as the smallest and most efficient receiver of its kind on earth.

A.G.C.

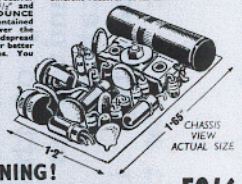
1st R.F. Amp. → 2nd R.F. Amp. → Detector

1st A.F. Amp. → 2nd A.F. Amp. → 3rd A.F. Amp.

6-STAGE POWER AND SELECTIVITY

The Micro-6 uses Micro-Alloy Transistors in a completely new circuit as follows: Two stages of R.F. amplification are followed by an efficient double-diode detector which drives a high-gain 3-stage A.F. amplifier. Powerful A.G.C. applied to the first R.F. stage ensures fade-free reception from the most distant stations tuned in. Everything including ferrite-rod aerial and batteries is contained within the elegant tiny case.

WEIGHS LESS THAN ONE OUNCE COMPLETE IN CASE WITH TWO MALLORY CELLS!



CHASSIS VIEW ACTUAL SIZE

BUILD IT IN AN EVENING!

Although the Sinclair Micro-6 has been designed to standards of compactness never before thought possible, building is simple and straightforward when the meticulously detailed instructions are followed. All parts including MAT transistors, diodes, printed circuit board, lightweight earpiece, case and dial, and well printed instructions come to

MALLORY MERCURY CELL Type ZM-312 1/11d each

There is enough space to accommodate two Mercury Cells in the Micro-6 which will give it maximum performance.

59/6

SINCLAIR MICRO-6

SINCLAIR RADIONICS LTD., 69 HISTON ROAD, CAMBRIDGE. *Telephone 53965*

Masterpieces

TRANSISTORISED DESIGNS FOR CONSTRUCTORS

A.G.C.

1st R.F. Amp. → 2nd R.F. Amp. → Detector

1st A.F. Amp. → 2nd A.F. Amp. → 3rd A.F. Amp.

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CHASSIS VIEW

WEAR IT LIKE A WRIST WATCH

The "Transmista" strap holds the "Micro-6" securely in position when wearing it over the set on the wrist. Elegantly styled in black or grey nylon, made specially to take this famous set.

7/6

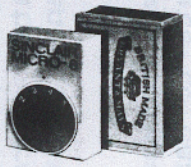
THE MOST OUTSTANDING DESIGNS OF THE YEAR

SINCLAIR

❶ MICRO-6

SIX-STAGE POCKET RECEIVER

The smallest set in the world!
Easily built in an evening!



THE 100% BRITISH DESIGNED SINCLAIR MICRO-6 continues unchallenged as the most remarkable receiver of its kind ever made available to the public anywhere in the world. It has special 6-stage circuitry and is, at the same time, the smallest set on earth. Everything except the lightweight earpiece is contained in the smart, minute white, gold and black case which is appreciably smaller than a matchbox, as the illustration shows. With vernier-type tuning control, bandspread over the higher frequency end of the medium waveband and powerful A.G.C. to ensure fade-free reception of the most distant stations, the Micro-6 provides remarkable standards of performance. Quality of reproduction is outstandingly good, and again and again the set is reported to give excellent results where other sets cannot be used at all. Order yours now and you will at once see why the Micro-6 cannot be too highly recommended, both as an intriguing design to build, and a most practical radio to use.

- SIZE 1⁴/₅" x 1³/₁₆" x ¹/₂"
- WEIGHS UNDER 1 OZ
- BAND SPREAD TUNING FOR EASY RECEPTION FROM LUXEMBOURG
- VERNIER-TYPE TUNING OVER MEDIUM WAVE BAND
- CHOICE OF MANY STATIONS
- BATTERIES AND FERRITE ROD AERIAL CONTAINED IN CASE

A.G.C.

1st R.F. Amp. → 2nd R.F. Amp. → Detector

1st A.F. Amp. → 2nd A.F. Amp. → 3rd A.F. Amp.

SIX-STAGE POWER AND SELECTIVITY

The Micro-6 uses only three Micro-Alloy Transistors in a unique and very efficient circuit as follows: Two stages of R.F. amplification are followed by an efficient double-diode detector which drives a high-gain 3-stage A.F. amplifier. Powerful A.G.C. applied to the first R.F. stage ensures fade-free reception from the most distant stations tuned in. Everything including ferrite-rod aerial and batteries is contained within the elegant tiny case.

Building is simple. All parts including lightweight earpiece, case and dial, and 8-page instructions manual come to

59/6

Sinclair "Transmista" well-styled, strong black nylon wrist strap **7/6**

Mallory Mercury Cell Type ZM312 (2 required) each 1/11 Pack of 6 **10/6**

that is, if you can see it from there . . . !

What is it? It's a radio—a real honest to goodness station-getting six stage British set so small that not even the Japanese, Americans or Germans have got anywhere near it. A gimmick did you say? Indeed not! If you're technical, you'll see on the pages which follow how this cute little Micro-6 works. All I can tell you is that it's loud, it's clear and there seems no end to the stations you can tune in. You have to build it yourself of course, but they say that's half the fun. This one was given to me . . . makes a lovely present for someone, doesn't it?

A BRITISH PRODUCT

ACTUAL SIZE

***It's the* SINCLAIR MICRO-6**
—the smallest set on earth!

All parts including case, earpiece, transistors and 8 p. instructions manual come to

59/6

- SIZE 1⁴/₅" x 1³/₁₀" x ¹/₂"
- WEIGHS LESS THAN 1 oz. INCLUDING SELF-CONTAINED AERIAL & BATTERIES
- YOU CAN BUILD IT IN AN EVENING

Technical details and more Sinclair designs on next pages

Now on to next pages

SINCLAIR RADIONICS LTD., GOMBERTON, CAMBRIDGE Telephone: Comberton 682

SPACE AGE!

sinclair

P.W.M. AMPLIFIERS
MICRO-RECEIVERS
MICRO-DESIGNS

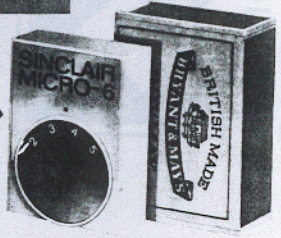
Every constructor should build it

THE SMALLEST RADIO SET IN THE WORLD

SINCLAIR MICRO-6

Fantastic range and power

No set in the history of radio has ever captured constructors' enthusiasm as has the world-famous Sinclair Micro-6. Never was a set so small, never so efficient and powerful. Smaller than a matchbox, the Micro-6 brings in stations from all over Europe and afar for your pleasure and entertainment. It performs with fantastic efficiency in cars, buses, trains as well as steel-framed buildings, yet everything to do with this set except the lightweight earpiece is contained in the minute white, gold and black case, size 1⁴/₅" x 1³/₁₀ x ¹/₂". The many attractive features include a highly stable 6-stage circuit, powerful A.G.C., bandspread for easy Luxembourg reception, vernier-type tuning over the medium wave-band, and three special M.A.T. Transistors.



Build it in a single evening!

All parts including lightweight earpiece case and dial, and exceptionally well prepared 8-page instruction manual come to

Mallory Mercury Cell Type ZM312 (2 required) each 1/11. Pack of 6, 10/6

Sinclair "Transmista" well-styled, strong black nylon wrist strap, 7/6

59/6

Other Sinclair Transistor Designs for you to build

SINCLAIR X-10 COMBINED 10 WATT HI-FI AMPLIFIER AND PRE-AMP

The most advanced amplifier of its type in the world. Uses 11 transistors with Pulse Width Modulation principle and unique output stage. The integrated pre-amplifier enables you to employ tone control system to choice so that any type of input can be correctly matched. The X-10 requires no heat sink, measures only 6" x 3", gives wonderful standards of reproduction with enormous power and can be operated from two 4/- batteries for about 3 months with normal use. Manual available, price 1/-.

Set of parts for building **£5 19 6**
Ready built and tested **£6 19 6**
X-10 Power Pack - - **£2 14 0**

" SLIMLINE " RECEIVER

Size 2.15/16" x 1.11/16" x 3/4", this is a simpler, but highly efficient receiver. Tunes over the medium wave-band, and has self-contained ferrite-rod aerial and space to take standard PP5 battery. Switches on by inserting plug of featherweight earpiece provided. Royal blue case, trimmed gold. Parts and instructions come to **49/6**

MICRO-INJECTOR

Generates a signal at any frequency from 1 Kc/s to 30 Mc/s for injection into radio or audio equipment. By this means the location of any fault can be rapidly found. This is the smallest instrument of its kind you can have. Case size 1.4/5" x 1.3/10" x 1/2" plus probe. Takes standard 6d. battery. Parts and instructions come to **27/6**

Built and tested 32/6

MICRO-AMPLIFIER

Smaller than a 3d. piece. Power gain 60dB. (1,000,000 times). Makes a superb broad band R.F. amplifier. Will even drive a loudspeaker. Suitable for low-output pick-ups, microphones, etc. With instructions, application data including how to make an F.M. Transmitter and all parts **28/6**

BOOKS FOR CONSTRUCTORS

22 tested circuits using Micro-Alloy Transistors 5/6.
Tested short-wave Receivers using M.A.Ts. 5/6.
Tested Superhet Circuits for short-wave and Communication Receivers using M.A.Ts. 6/6.

ALL THREE BOOKS TOGETHER — 16/6.

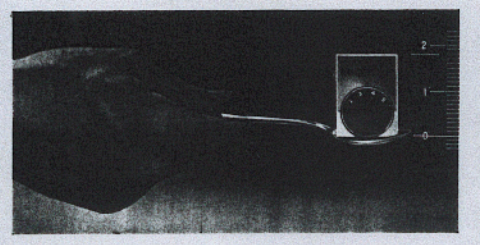
sinclair

SINCLAIR RADIONICS LTD., COMBERTON, CAMBRIDGE
Telephone : COMBERTON 682

AMUM/2341/2M465

PRICE 1/-

THE WORLD'S SMALLEST TRANSISTOR RADIO

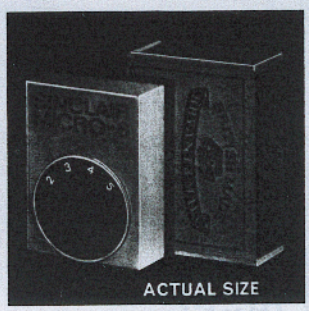


sinclair

MICRO-6

TECHNICAL DETAILS, ASSEMBLY INSTRUCTIONS AND OPERATING NOTES

SINCLAIR MICRO-6



COMPONENTS PRICE LIST

TC1	1	6
R1 to R9 at 6d. each	4	6
C1, C3, and C5 at 1/- each	3	0
C2	2	0
C4		6
C6		9
TR1	8	6
TR2	8	6
TR3	7	9
D1 and D2 1/6 each	3	0
L1	4	0
Printed Circuit Board	3	6
Earpiece and Plug	5	6
Socket	1	6
Case with trim	1	9
Dial and spindle assembly	2	0
Wire		3
Instructions	1	0
Total Cost	**59/6**	

SINCLAIR RADIONICS LIMITED, COMBERTON, CAMBRIDGE

TECHNICAL DETAILS

The Sinclair Micro-6 is the world's smallest transistor radio requiring no external aerial or earth. Although the size is only 1.4/5" x 1.3/10" x 1/2" it has a six stage circuit giving a performance comparable to that of a six transistor superhet.

The circuit diagram of the receiver is shown in Fig. 3. The R.F. signal, picked up by L1 and selected by L1 and TC1, is amplified by Tr1 and Tr2 prior to detection. The gain of Tr1 and the selectivity of the receiver are both increased considerably by CW a semi-variable capacitor formed by twisting two pieces of insulated wire together. CW increases the gain by providing positive feedback or regeneration from the output of Tr1 to the tuned circuit. The level of the regeneration is automatically controlled by the A.G.C. circuit.

The R.F. output from Tr2 is coupled to the double diode detector, D1 and D2, by C4. The output from the detector consists of three parts ; an unwanted residual R.F. signal which is removed by C1, a d.c. voltage which is proportional to the signal strength and which controls the collector current and thus the gain of Tr1 and thirdly the A.F. signal which is fed to the base of Tr1. This A.F. signal is then amplified in turn by Tr1, Tr2 and Tr3.

The reason for the high sensitivity of the Micro-6 is the fact that ***both*** Tr1 and Tr2 are reflexed, that is to say they amplify successively both at R.F. and A.F. Because of the very careful design the quality of reproduction is extremely good and the sensitivity compares very favourably with sets many times as large. The very low current consumption and low battery voltage are made possible by the use of Micro-Alloy transistors.

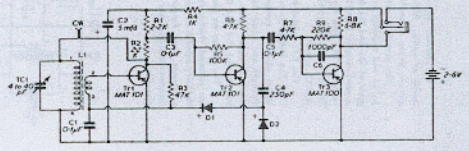


FIG.3 SINCLAIR MICRO-SIX CIRCUIT DIAGRAM

NOTICE

All the components for the Micro-6 are tested before despatch but if you consider that any of them are faulty we will replace them immediately free of charge if you return them to us together with a stamped addressed envelope.

The Micro-6 should work perfectly when completed. If it does not, you may have damaged one or more of the components or your assembly may be incorrect. Should you be unable to cure the fault yourself we can service it for you for a fixed charge of 15/-.

Just send the set together with earpiece and batteries to us with cash, postal order or cheque for 15/- taking care to pack the set so that it cannot be damaged in the post. If the fault is a very minor one your 15/- will be returned to you with the set put right.

ASSEMBLY INSTRUCTIONS

The Micro-6, although minute, is not at all difficult to build but the instructions should be followed exactly. Only the components specified should be used and a miniature soldering iron, such as the Antex 15 Watt model with a small bit, is desirable. You will also require some thin flux cored solder and a pair of side cutters or nail clippers. A small pair of pliers or tweezers will also be useful.

Before starting construction ensure that you have all the following components. The diagrams will help you identify them.

R1	2.2K	TC1	Tuning capacitor	Tr1 MAT10 (red top)
R2	2.2K	C1	0.1 mF, 3 Vw	Tr2 MAT10 (black top)
R3	47K	C2	5 mF elec., 2.5 Vw	Tr3 MAT100 (white top)
R4	1K	C3	0.1 mF, 3 Vw	L1 Ferrite rod aerial
R5	100K	C4	250 pF Polystyrene	Printed circuit board
R6	4.7K	C5	0.1 mF, 3 Vw	Crystal earpiece and socket
R7	4.7K	C6	1,000 pF, disc	Case and dial
R8	6.8K	D1	Diode	4 inches each of single stranded and multi-stranded wire.
R9	220K	D2	Diode	Washer and nut. Labels

Wipe the copper side of the printed circuit board to ensure freedom from grease and dirt.

The positions of all the components are shown in Fig. 2 and details are clarified in Figs. 2a to 2f. It is possible to build the set from these diagrams alone but please read **all** the instructions before starting assembly.

All the components are mounted on the opposite side of the board to the copper and in the following order :—

TC1, C1, R5, C3, R2, R3, R1, R4, R8, R9, R7, TR1, C6, TR2, C2, C5, TR3, R6, D2, D1, C4, battery clips, earphone socket, CW, L1.

It is very important that all the components used to build this set be mounted as closely to the board as possible. The leads must be clipped to within about 1/32" from the board and then soldered. The solder must not protrude from the board more than absolutely necessary. To ensure a good joint the solder should be held against the wire and the copper and the joint made quickly with the iron at full heat. The transistors can be damaged by excess heat and it is wise to grip the transistor lead being soldered with tweezers or pliers to act as a heat sink. It is not essential to hold the solder to the joint in the case of the transistors as the leads are gold plated.

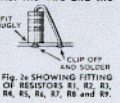
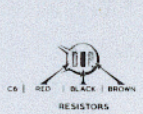


Fig. 2e SHOWING FITTING OF RESISTORS R1, R2, R3, R4, R5, R6, R7, R8 and R9.

CASE AND DIAL

Fix the labels provided to the case and dial so that they appear as shown in the photograph. The labels are self adhesive and care is needed when attaching them. Should you damage them we will be pleased to send you free replacements if you send a stamped, addressed envelope with a note of what you require.



R1	RED	RED	RED
R2	RED	RED	RED
R3	YELLOW	VIOLET	ORANGE
R4	BROWN	BLACK	RED
R5	BROWN	BLACK	YELLOW
R6	YELLOW	VIOLET	RED
R7	YELLOW	VIOLET	RED
R8	BLUE	GREY	RED
R9	RED	RED	YELLOW

FIG. 1 COLOUR CODES

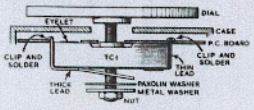


FIG. 2a DIAL AND TUNER ASSEMBLY

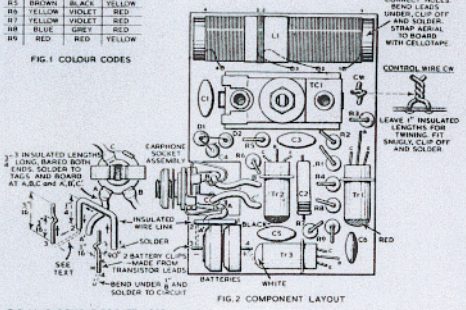


FIG. 2 COMPONENT LAYOUT

FIG. 2b EARPHONE SOCKET ASSEMBLY AND BATTERY CLIPS

Remove any insulation from the leads of C1, C3 and C5 as shown in Fig. 2c.

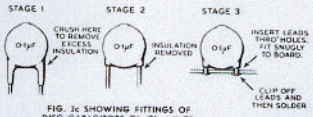


FIG. 2c SHOWING FITTINGS OF DISC CAPACITORS C1, C3 and C5.
C6 IS FITTED IN THE SAME WAY, BUT MAY NEED SOME INSULATION REMOVING.

D1, D2, C4

The assembly of D1, D2, and C4 is shown in Fig. 2d. Take care to ensure that the diodes are inserted the correct way round. The positive end is that which looks like a tiny front arrow inside the glass body of the diode. C4 (250 pf) is mounted flush to bring the top to the level of D1 and D2. The top lead of C4 is wound round the top leads of D1 and D2 as shown in Stage 3. Solder C4 to D1 and D2 as quickly as possible to avoid damaging the diodes and then clip off the rest of the diode leads as close to the diodes as possible. Unless the leads are clipped close to the diodes the final assembly might not fit into the case.

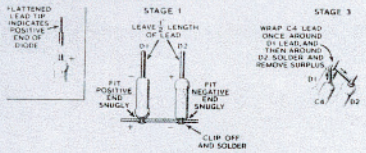


FIG. 2d SHOWING FITTING OF DIODES D1 and D2, AND CAPACITOR C4.

TRANSISTORS

Bend the transistor leads so that they can be assembled onto the board as shown in Figs. 2 and 2f. Clip off the leads after mounting and keep them as two are required to make the battery clips. Remember to make the solder joints quickly and to use a heat sink if possible to avoid damaging the transistors.

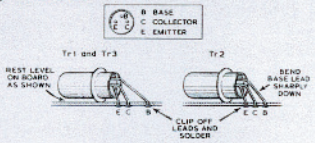


FIG. 2f SHOWING FITTING OF TRANSISTORS Tr1, Tr2 and Tr3.

TUNING CAPACITOR—TC1

TC1, the tuning capacitor, **must** lie flat on the board as shown in Fig. 2. The eyelet and the bush protrude slightly into holes provided on the board. It may be necessary to bend the leads slightly so that they coincide with the copper on the board to which they must be soldered. The leads, when clipped, must not extend more than ⅛" from the board and should be soldered as in Fig. 2a.

FERRITE ROD AERIAL—L1

Mount L1 onto the board as shown in Fig. 2 and then fix it to the board carefully with clear cellotape so that it cannot move. If wished, the aerial may further be glued to the board for extra security.

CW

For CW use two pieces of the single stranded, plastic insulated wire just over 1" in length. Bare one end of each and solder into position as shown in Fig. 2. It is not necessary to twist these wires together at this stage. The single stranded wire is only required for CW.

BATTERY CLIPS

The assembly of the battery clips is shown in Figs. 2 and 2b. These are bent from the transistor leads you will have saved. The positive clip (numbered 4 on the diagrams) requires about ½" of lead. The negative lead (numbered 3) extends under the board, up through the hole numbered 2, across and down again through hole 1. The section between 1 and 2 must be covered with ½" of plastic sleeving taken from the 4" length of single strand wire. This insulated wire link helps to keep the batteries in position. The clips must be soldered very firmly under the board to ensure sufficient rigidity. They must be clean at all times. Corrosion or dirt must be removed by gently filing or scraping.

EARPIECE SOCKET

Solder the earpiece socket to the board using three ½" lengths of the multi-stranded, plastic insulated wire as shown in Figs. 2 and 2b. Be careful to join the tags to the correct holes.

Remove the nut and washer from the earpiece socket and fit the entire assembly into the case passing the threaded neck through the hole on the side. Now replace the washer and nut of the socket on the outside of the case and tighten the screw firmly but carefully.

ASSEMBLY

Remove the screw and two washers from TC1 and screw in the dial from the front of the case until the spindle projects through TC1. Replace the paxolin washer and fit the specially shaped locking washer provided over this and screw the nut provided tightly onto the end of the threaded spindle. The whole assembly should now be as in Fig. 2a. The original metal washer and screw from TC1 are not required.

BATTERIES FOR THE MICRO 6

The Micro-6 uses two Mallory ZM312 (or RM312) mercury cells (these may be obtained from Boots the Chemists, from your local radio shop or, in case of difficulty, directly from Sinclair Radionics. They cost 1/11d. each). Fit the cells between the battery clips being very careful to insert them the correct way round as shown in Fig. 2. You will probably need to bend the battery clips inwards to ensure that they grip the cells tightly enough. Make sure the clips are always clean.

OPERATION

Plug the earpiece into the socket. This automatically switches the set on and you should now be able to tune in a station or two. Tune to the high frequency end of the band, that is with the dial turned clockwise as far as it will go, and twist the wires of CW tightly together until you hear a rushing or whistling noise. Now untwist them slightly so that the noise just stops. CW may be adjusted slightly for best performance and then bent over so that the lid can be fitted. Two lids are provided ; one in white plastic and one in clear to give you a choice. The lid slides into place from the end of the box.

In areas of strong signal strength the Micro-6 may be used with only a single ZM312 cell.

DESIGNS THAT ARE YEARS AHEAD

SINCLAIR
RADIONICS LIMITED
ELECTRONIC ENGINEERING CONSULTANTS

69 HISTON ROAD · CAMBRIDGE

Telephone : Cambridge 53965

DIRECTORS : C. M. Sinclair
A. Trevor-Briscoe
Colin Wadie

Dear Sir,

Thank you for your order. All the components you need to build the Micro-6 are enclosed and I hope that you will enjoy building and using this set as much as we have enjoyed designing it for you.

If, having looked at the parts and read the instructions, you think that you will be unable to build the set, just return everything to us and we will refund your money immediately. We cannot, of course, refund your money once you have built it but the service facilities described in the instruction leaflet are always at your disposal. We will also be very pleased to answer any queries you may have.

Yours faithfully,
SINCLAIR RADIONICS LIMITED.

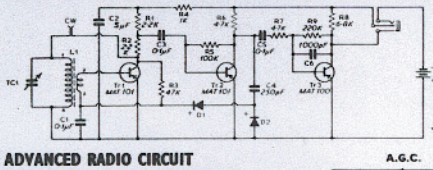
C.M.Sinclair.
Managing Director.

THE WORLD'S SMALLEST RADIO

6 STAGES FROM ONLY 3 TRANSISTORS

IN A CIRCUIT THAT ONLY UNIQUE M.A.Ts AND APPLIED RESEARCH MAKE POSSIBLE

MICRO-6 CIRCUIT AND BLOCK DIAGRAMS



FROM THIS

THE MOST ADVANCED RADIO CIRCUIT EVER MADE AVAILABLE TO CONSTRUCTORS

The Micro-6 uses three Micro-Alloy Transistors (MATs) in a unique double reflex circuit. The signal selected by L1 and TC1 is amplified at R.F. by Tr1 and Tr2. The output from Tr2 is rectified by the detector stage D1 and D2, and the resultant A.F. signal passed back to Tr1. Tr1 and Tr2 then amplify the signal again—this time at A.F. Thus both Tr1 and Tr2 have been used twice and gives a gain normally only obtainable with four transistors.
The output from Tr2 drives Tr3, the output stage, which feeds into the featherweight ear piece (or the TR750 power amplifier). Tuning is over the medium waveband with bandspread for easy reception of Luxemburg and A.G.C. eliminates fading. It is important to realise that the Micro-Alloy Transistors which the Micro-6 uses not only give extremely high gains and low noise levels, but they consume only a fraction of a mA from the two minute batteries used to power the set. Battery working life is over 70 hours!

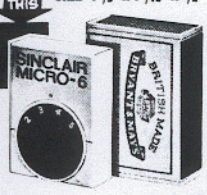
A.G.C.

1st R.F. Amp. → 2nd R.F. Amp. → Detector → 1st A.F. Amp. → 2nd A.F. Amp. → 3rd A.F. Amp.

TO THIS

SIZE 1 4/5" x 1 3/10" x 1/2"

YOU CAN BUILD THIS SET IN AN EVENING!



No Special Tools or Skills Required

The Micro-6 is simplicity itself to build when you follow the meticulously detailed instructions. No special tools are required to build the set. All parts including transistors, diodes, elegant white and gold case, lightweight earpiece and 8-page manual come to **59/6**

"Transistor" strap for wearing your Micro-6 on the wrist. Black or grey nylon. **7/6**

MALLORY MERCURY CELL.—Type ZM1515 (2 required) each 10/6 Pack of 6 **1/11**

USE THIS ORDER FORM

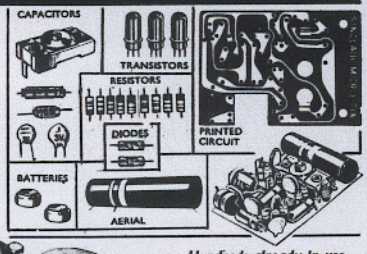
sinclair MICRO-6

SINCLAIR RADIONICS LTD., COMBERTON, CAMBRIDGE Telephone COMBERTON 682

..... AND IT'S BRITISH !

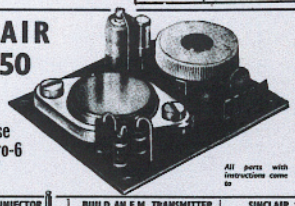
The MICRO-6 uses the smallest components ever

We show here some of the components (except case, dial and earpiece) required for building the Micro-6, drawn to actual size. They include the smallest ever to be made available to domestic set constructors, being of the kind used in space and computer electronics, so they have to be reliable. The tuning system has ingenious vernier control for easy station separation. 8-page fully illustrated instructions manual and all parts including case, vernier dial and earpiece come to **59/6**



SINCLAIR TR750 POWER AMPLIFIER

perfect for use with the Micro-6 and 'Slimline'



Hundreds already in use

Measuring only 2" x 2" and having its own built-in volume control and on-off switch, the TR750 has a full 750 milliwatt transformerless output for 10mV into 10kΩ. Frequency response is from 30 to 20,000 c/s within ±1dB. This amplifier makes a powerful car, domestic or portable radio used with the Micro-6 or Slimline receivers, or a hi-fi record reproducer used singly or paired for stereo. There are many other uses for the TR750 which is available for building or ready built.

All parts with instructions come to **39/6** Ready built and tested **45/-**

SINCLAIR MICRO-INJECTOR

Using two MATs it generates and injects a test signal into any part of equipment at any frequency from 1 m/s to 30 Mc/s to locate faults rapidly. 1⅝" x 1⅛" x ¾", excluding probe. All parts with instructions come to **27/6** Ready built and tested **32/6**

BUILD AN F.M. TRANSMITTER WITH THE SINCLAIR MICRO-AMPLIFIER

Smaller than a 3d. piece. Frequency response 30 to 50,000 c/s ±1dB, power gain 60dB (1,000,000 times)—can also be used for a broadband R.F. amplifier, or a sub-miniature hi-fi amplifier with an output voiced to any earpiece or even loudspeaker. With MATs instructions and all parts **28/6**

SINCLAIR 'SLIMLINE' EXTRA EASY TO BUILD

Has self-contained ferrite rod aerial and takes standard PP5 battery, yet measures only 2⅛" x 1½" x ¾". Tunes over the medium waveband. Great power and quality. Building is particularly easy. All parts, including royal blue and gold case, earpiece, and instructions come to **49/6**

UNIQUE SINCLAIR GUARANTEE

If you are not completely satisfied with your purchase immediately on arrival (we are confident you will be delighted) your full purchase price will be refunded instantly without question if you return the goods as received.

FULL SERVICE FACILITIES ALWAYS AVAILABLE TO ALL SINCLAIR CUSTOMERS

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Please send items detailed below £ s d

NAME

ADDRESS

TOTAL £

For which I enclose cash/cheque/money order

RC.8

MICRO FM RADIO

SINCLAIR MICRO FM

7 TRANSISTOR TWO-OUTPUT F.M. UNIT

THE WORLD'S FIRST POCKET-SIZE FM TUNER-RECEIVER

SIZE
$2\frac{15}{16}$" x $1\frac{5}{8}$" x $\frac{3}{4}$"

- A.F.C.
- NEEDS NO ALIGNMENT
- PULSE COUNTING DETECTOR
- TUNES FROM 88-108 Mc/s
- A GUARANTEED SINCLAIR DESIGN

The SINCLAIR MICRO FM is a high quality FM tuner designed to be used with hi-fi amplifier or tape recorder and as an independent self-contained pocket FM receiver for personal listening anywhere. Barely half the size of a packet of 20 cigarettes, the Micro FM is a fully fledged 7 transistor-2 diode superhet circuit incorporating many unique and original design features to achieve fantastically good standards of performance. Pulse counting detection ensures better linearity than conventional detection methods, and therefore better audio quality. Powerful A.F.C. and good sensitivity make tuning easy. The set's own telescopic aerial suffices almost everywhere. *In styling, this is the most elegant, most professional looking design in miniaturised equipment ever made available to constructors, and is one you will be very proud to possess.* **YET WITH ALL THESE WONDERFUL FEATURES, THE SINCLAIR MICRO FM COSTS POUNDS LESS AND OFFERS ADVANTAGES NOT FOUND IN ANY OTHER F.M. TUNER.**

USE IT AS A TUNER AND A POCKET F.M. RADIO

★ TECHNICAL DESCRIPTION

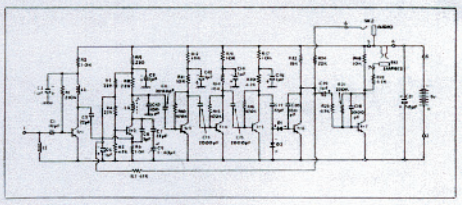
Seven transistor, two diode F.M. superhet. The telescopic aerial is coupled to an R.F. amplifier followed by a self-oscillating mixer. Low I.F. dispenses with the need for alignment. A three stage I.F. amplifier amplifies and limits the signal to produce a square wave of constant voltage which is fed into the pulse counting discriminator, and converted to uniform pulses, the average output from which is directly proportional to the signal frequency, so that the original modulation is reproduced exactly. The signal is fed to the audio output socket for use with an amplifier or recorder and also the receiver's own audio amplifying stage for the Micro FM to be used as an independent self-contained receiver. A.F.C. makes tuning simple. THE SINCLAIR MICRO FM is housed in a neat plastic case faced by an elegant front panel of brushed and polished aluminium with spun aluminium tuning dial to match.

- ★ SUPPLY VOLTAGE—9V from self-contained standard battery
- ★ CONSUMPTION—5mA
- ★ SENSITIVITY—Typically 3 microvolts
- ★ AUDIO OUTPUT—300-MV approx. from 25K ohms
- ★ HIGH LEVEL AUDIO OUTPUT 9V peak
- ★ AUDIO RESPONSE—10 to 20,000 c/s ±1dB
- ★ TUNING RANGE—87.5 to 108 Mc/s
- ★ SIGNAL TO NOISE RATIO—30dB at 30 microvolts

THE COMPLETE KIT OF PARTS for building the SINCLAIR MICRO FM including extending aerial, 7 transistors, case, tuning dial, aluminium front panel, lightweight earpiece, plugs and sockets and instructions cost only **£5.19.6**

GUARANTEE Should you not be completely satisfied with your purchase when you receive it from us, your money will be refunded in full and at once without question.

Sinclair Micro FM



The world's only combined f.m. tuner and pocket receiver £5.19.6.

Beyond all question, this must be the most remarkable frequency modulated receiving unit in the world. The unique design of this 7 transistor f.m. superhet has succeeded in making an F.M. tuner receiver possible for constructors which requires no alignment when built, which uses pulse counting detection and thus assures better audio quality; which is so sensitive that it operates successfully in all but the poorest reception areas on its own telescopic aerial, and which can be used as a tuner for amplifier, tape recorder etc. or as a self-contained pocket F.M. receiver whenever required. All this is contained within a beautifully designed case no bigger than a packet of ten cigarettes. The Micro F.M is professionally styled inside and out. Its brushed and polished aluminium front panel with spun aluminium slow motion dial is strikingly elegant and in keeping with the outstandingly good performance the set provides.

Technical specification

7 transistor, 2 diode superhet F.M with one output for feeding to amplifier or tape recorder and one to enable set to be used as a self-contained pocket FM receiver.

Low I.F. dispenses with need to align set when built. Pulse counting discriminator ensures best possible audio quality.

Telescopic aerial provided, sufficient for good reception in all but the worst reception areas.

Audio response 10-20,000 c/s ± 1dB.

Signal to noise ratio 30dB at 30 microvolts.

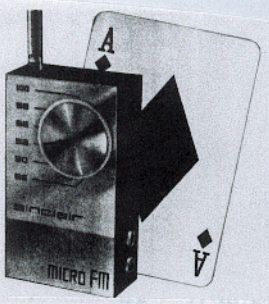
Sensitivity typically 3 microvolts.

Power source self-contained standard 9V battery.

Consumption 5mA.

Size $2\frac{15}{16}$" – $1\frac{11}{16}$" – $\frac{3}{4}$" plus aerial (7·4 – 4·35 – 19·5 cm.).

Case Plastic with brushed and polished aluminium front panel and aluminium tuning control.



SINCLAIR MICRO FM

7 Transistor combined FM tuner-receiver

Needs no alignment when built

This unique, superbly engineered FM superhet is the only set in the world which can be used both as an FM tuner and an independent FM pocket receiver just whenever you wish.

Problems of alignment have been completely eliminated making the Micro-FM ready for use the moment you have built it. The pulse counting discriminator ensures best possible audio quality, sensitivity is such that the telescopic aerial included with the kit assures good reception in all but the very poorest reception areas. The Sinclair Micro-FM will give you all you want from a high quality FM unit. The case is elegantly styled in brushed and polished aluminium with spun aluminium slow motion tuning dial.

Complete kit inc. aerial, case, earpiece and instructions.

SIZE—less than 3 x 1¼ x ¾".

£5.19.6

MICROMATIC RADIO

SINCLAIR MICROMATIC

6 STAGE TRANSISTOR RECEIVER

There could not be a better time than NOW to enjoy using the Sinclair Micromatic. The performance of this British designed and made 6-stage transistor set is fantastic. It assures reception from stations all round the dial and all round the clock with unsurpassed power and clarity, thanks to the new circuitry which this set incorporates. It plays virtually anywhere, indoors and out and you can enjoy your listening without ever disturbing the privacy of others nearby. You will particularly like the fine appearance of the Micromatic—it is completely professional inside and out and you can build it for yourself or buy it complete ready to play at once. The Sinclair Micromatic carries a 5 year guarantee.

Technical description

The Sinclair Micromatic is housed in a neat plastic case with aluminium front panel and spun aluminium calibrated tuning dial.

Special Sinclair transistors are used in a six-stage circuit of exceptional power and sensitivity—two R.F. amplification; double diode detector; a high gain three stage audio amplifier; A.G.C. counteracts fading from distant stations. The set is powered by two Mallory ZM.312 Cells readily obtainable, for 1/7 each.

MICROMATIC KIT PACK with earpiece, instructions, solder, etc.

59/6

Ready built, tested and guaranteed **79/6**

USE THIS ORDER FORM FOR DELIVERY BY RETURN *If you prefer not to cut page, please quote R.C. 6 when writing your order*

SINCLAIR RADIONICS LTD., 22 NEWMARKET RD., CAMBRIDGE

Please send — NAME — ADDRESS

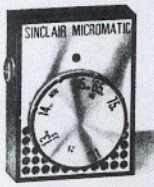
for which I enclose cash/cheque/money order value £ ... s. ... d.

RC6

Guarantee

Should you not be completely satisfied with your purchase when you receive it from us, your money will be refunded in full at once and without question.

NEW FROM SINCLAIR



The World's smallest radio

ACTUAL SIZE

SINCLAIR MICROMATIC

- ★ ONLY ONE CONTROL
- ★ CALIBRATED DIAL
- ★ SIZE—1⅞" x 1⅛" x ¾"
- ★ POLISHED ALUMINIUM FRONT PANEL WITH SPUN ALUMINIUM DIAL
- ★ AMAZING RANGE POWER & SENSITIVITY
- ★ NEW CIRCUITRY
- ★ BANDSPREAD FOR EASY RECEPTION OF 'POP' STATIONS
- ★ A.G.C.
- ★ IN KIT FORM OR READY BUILT
- ★ 5 YEAR GUARANTEE

Here is a brand new design from an organisation world famous for its production of micro electronic equipment for the constructor. This new set, the SINCLAIR MICROMATIC reaches fantastically high standards of performance. In it, we have combined new circuitry with new elegance to make this set professionally right in every detail whether you build it yourself or buy it ready built. It is the perfect personal radio, ready to serve wherever and whenever required. Reception from a wide range of stations is assured with excellent selectivity and quality. The MICROMATIC is a set you will be proud to be seen using—and it makes an excellent gift too.

Six stage transistor circuit of remarkable power and sensitivity. Two R.F. stages are followed by double diode detector and 3 stages of audio-amplification A.G.C. counteracts fading from distant stations. Ferrite rod aerial and two Mallory cells type ZM. 312 are contained in the minute case. Tunes over M.W. Dial marked in Kcs and metres. Inserting plug of earpiece switches set on.

Complete Kit inc. Case, Transistors, earpiece, and instructions. **59/6**

Ready built in presentation case with earpiece **79/6**

Guarantee

Should you not be completely satisfied with your purchase when you receive it from us, your money will be refunded in full and at once without question. Please quote RC167 should you prefer to write your order instead of cutting out this coupon.

FULL SERVICE FACILITIES AVAILABLE TO SINCLAIR CUSTOMERS.

SINCLAIR MICRO FM 7 Transistor FM superhet for use both as tuner and independent pocket radio. Easy to build. Needs no alignment. With telescopic aerial. Case size less than 3" x 2½" x 1". Complete kit inc. earpiece and instructions. **£5.19.6**

SINCLAIR Z.12 AMPLIFIER Measures only 2" x 1½" x ¾" including integrated pre-amp. 12 watts R.M.S. output continuous sine wave. Ready-built with minimal of input matching and control circuits. **89/6**

SINCLAIR STEREO 25 Ow Loss pre-amp/control unit for use with pair Z.12s or any high quality stereo amplifier. Size 6" x 2½" x 2½" with brushed and polished aluminium frame and solid aluminium knobs. Ready built. **£9.19.6**

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SINCLAIR RADIONICS LIMITED
22 NEWMARKET ROAD, CAMBRIDGE
Telephone: OCA3-52731

SINCLAIR MICROMATIC

the world's most successful miniature radio

Considerably smaller than an ordinary box of matches, this is a multi-stage A.M. receiver meticulously designed to provide remarkable standards of selectivity, power and quality. Powerful A.G.C. is incorporated to counteract fading from distant stations; bandspread at higher frequencies makes reception of Radio 1 easy at all times. Vernier type tuning plus the directional properties of the self-contained special ferrite rod aerial makes station separation much easier than with many larger sets. The plug-in magnetic earpiece which matches exactly with the output provides wonderful standards of reproduction.
Everything including the batteries is contained within the attractively designed case. Whether you build your Micromatic or buy it ready built and tested, you will find it as easy to take with you as your wristwatch, and dependable under the severest listening conditions.

Specifications
Size:
$1\frac{13}{16}$" × $1\frac{5}{16}$" × $\frac{1}{2}$" (46 × 33 × 13mm).
Weight incl. batteries:
1 oz. (28·35gm) approx.
Tuning:
Medium wave band with bandspread at higher frequency end.
Earpiece.
Magnetic type.
Case:
Black plastic with anodized aluminium front panel, spun aluminium dial.

Complete kit incl. earpiece, case, solder and instructions in fitted pack. **49/6**
Plus 11d. P.T. surcharge

Ready built, tested and guaranteed, with earpiece. **59/6**
Plus 1/1d. P.T. surcharge

Mallory Mercury Cell RM675 (2 required) each 2/9d.

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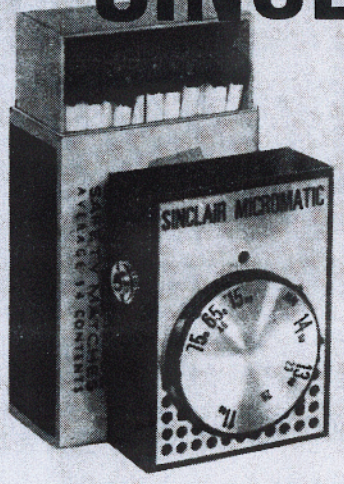
SINCLAIR MICROMATIC



The world's smallest radio

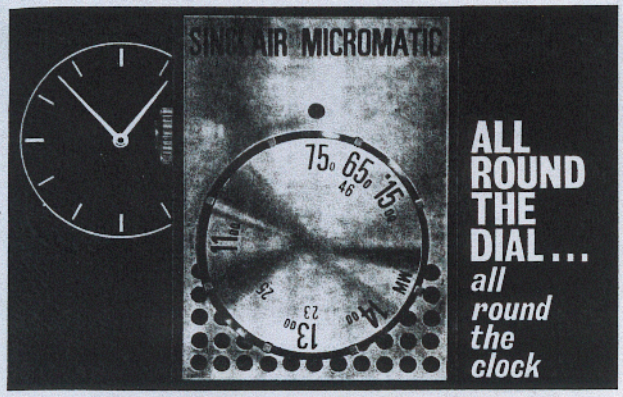
This fantastic little British pocket receiver is available in kit form to build for yourself or ready built, tested and guaranteed. Its range and selectivity must be experienced to be believed; its power and quality everything you could want. The Micromatic tunes over the medium waveband and has A.G.C. to counteract fading from distant stations. Bandpass tuning makes reception of Radio 1 easier; in fact, you will find your Micromatic performing where other sets cannot be heard at all. The neat black case with aluminium front panel and tuning control give the Micromatic elegantly modern appearance.

- High quality magnetic earpiece
- Choice of many stations
- Plays anywhere

Kit in fitted pack with earpiece, solder and instructions. **49/6**

Built, tested and guaranteed. **59/6**

Mallory Mercury Cells RM.675 (2 reqrd) each 2/9



ALL ROUND THE DIAL... *all round the clock*

with the world's smallest radio

Actual Size

- CALIBRATED SLOW-MOTION DIAL
- BANDSPREAD AND A.G.C.
- TUNERS OVER M.W.
- FANTASTIC POWER, SELECTIVITY AND QUALITY
- GUARANTEED 5 YRS.

To the fantastically small size of the Sinclair Micromatic must be added its brilliant performance. This British made set assures you at all times of choice of B.B.C. and many other stations in the medium waveband. After dusk, even more stations come in all around the dial with amazing power and excellent quality. Vernier type tuning takes full advantage of the set's selectivity. This remarkable set provides good listening no matter where you are—indoors, in car, bus, train—everywhere. The Sinclair Micromatic brings a refreshingly new approach to personal listening and for its size, appearance, price and performance, there is nothing to equal it anywhere in the world.

TECHNICAL DESCRIPTION OF THE SINCLAIR MICROMATIC

6-stage receiver having two R.F. stages, a double diode detector and a powerful three stage A.F. amplifier, the output from which feeds into a specially matched high quality lightweight earpiece. The MICROMATIC has its own built-in ferrite rod aerial and uses vernier type tuning over the medium wave band. A.G.C. counteracts fading from distant stations. The beautifully styled case, size $1^1/_8 \times 1^3/_{16}$ x $\frac{1}{2}$in., is faced with an artist designed aluminium front panel of outstanding elegance, with aluminium tuning dial to match. *Available as kit in "see-for-yourself" fitted pack, with earpiece, instructions and solder, or built and ready for use.*

If you prefer not to cut this page, please quote PW9 when writing your order.

Kit as described **59/6**

Built, tested and guaranteed with ear piece and batteries. **79/6**

Guarantee

Should you not be completely satisfied with your purchase when you receive it from us, your money will be refunded in full at once and without question. FULL SERVICE FACILITIES AVAILABLE TO ALL PURCHASERS.

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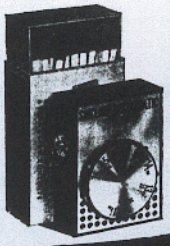


SINCLAIR MICROMATIC

the world's smallest radio set

Down in price!

and UP IN LISTENING QUALITY

SAVE 10/- **BY BUYING THE COMPLETE KIT**

Originally 59/6 complete with earpiece, solder and instructions in pack, the Micromatic Kit now costs **49/6**

SAVE 20/- **BY BUYING A READY BUILT SET**

Originally 79/6, the Micromatic ready built, tested and guaranteed complete now costs

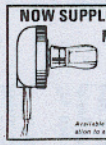
FOR IMMEDIATE DELIVERY **59/6**

Two long-life Mercury cell batteries for either of above 1/10d. each.

With sales and export orders for the Sinclair Micromatic breaking all records, we have changed over to new production methods to meet the ever-increasing demand for the world's smallest radio set. This has enabled us to effect dramatic economies because of the large quantities of materials involved. At the same time, we have appreciably improved the set's quality. We now supply a magnetic earpiece which matches perfectly to the powerful output of the Micromatic, and what was superb performance before, now sounds better than ever. Now that your Micromatic costs you less (49/6, kit: 59/6 built), you can afford not only to have one for yourself, but give them as gifts. But be quick. At the new prices, everyone is going to want the Micromatic. Order yours now.

- PLAYS ANYWHERE
- FANTASTIC POWER & RANGE
- FULLY GUARANTEED
- $1^1/_8 \times 1^3/_{16} \times \frac{1}{2}$in.

NOW SUPPLIED WITH A DE-LUXE MAGNETIC EARPIECE



This new, finely engineered magnetic earpiece has great sensitivity and covers a very wide frequency range. It provides exceptional clarity and quality and is of robust construction. Each one is individually checked before despatch.

Available separately with instruction for association to existing Micromatic Set, post free 15/-

FULL SERVICE FACILITIES AVAILABLE WHEN YOU BUY THE KIT AND BUILD IT YOURSELF

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SEE PAGES 2 AND 3 SINCLAIR ADS

E20

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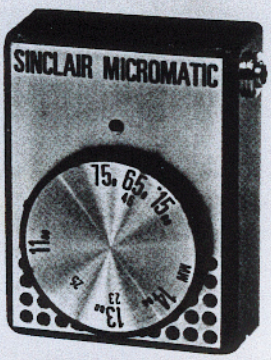
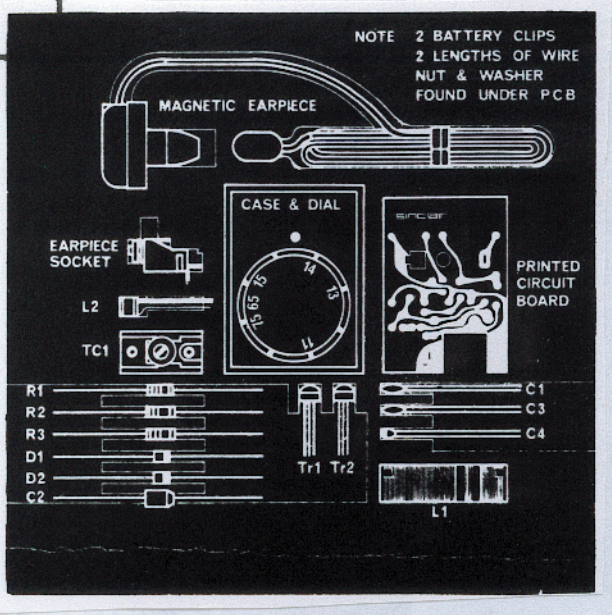


ASSEMBLY INSTRUCTIONS
SINCLAIR MICROMATIC WORLD'S SMALLEST RADIO

5p

COMPONENTS PRICE LIST

R1	1K	2p
R2	150K	2p
R3	470K	2p
Tc1	3–40pF Tuning capacitor	8p
C1	10n, 0.01, 103Z	4p
C2	250pF	4p
C3	47n, 0.047 / 50n, 05Z	4p
C4	1n, 1K	4p
D1	Silicon diode	20p
D2	Silicon diode	20p
Tr1	E5385	25p
Tr2	E5385	25p
L1	Ferrite rod Aerial	25p
L2	Choke	18p
Printed circuit board		25p
Magnetic earpiece		50p
Socket		10p
Case with trim		25p
Dial and spindle assembly		10p
Battery clips, wire, locking washer, nut		10p
Solder		5p
Instructions		5p
	Total	£3.03
	Kit Price	£2.48



E21

TRANSISTORS

The transistor connections are shown in Fig. 8. Make sure that the transistors are positioned as shown in Fig. 2, when the leads will naturally fit into the correct holes.

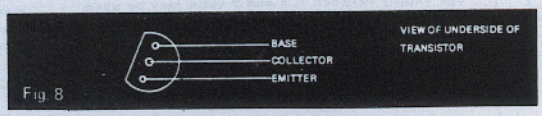


Fig. 8

CHOKE L2

Fit L2 as shown in Fig. 9. Do not fit this flush with the board. Leave plenty of slack in the fine wire lead to allow for adjustment. Always handle the choke by its thick wire support or this will rotate relative to the body, breaking the connection.

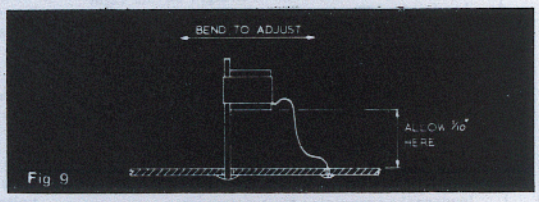


Fig. 9

Spare chokes are available at 3/- each.

EARPIECE SOCKET

This is fitted with contact B, see Fig. 10, through the slot in the board. Contacts A and C are connected with wire to points A and C on the board.

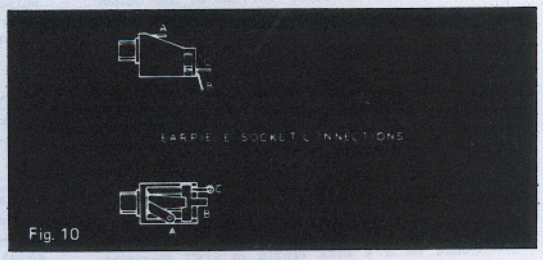


Fig. 10

BATTERY CLIPS

These are fitted as shown in Fig. 11. First tin the board and clips, then solder the two together. Now place the assembly on the edge of the table and anchor the assembly by placing a suitable book on it, leaving room to solder the clips. Holding the clips with the pliers (or tweezers) solder them to the board, but make sure that they are correctly positioned before soldering. Great care should be exercised to avoid overheating the copper print on the board since this can be caused to peel away by overheating.

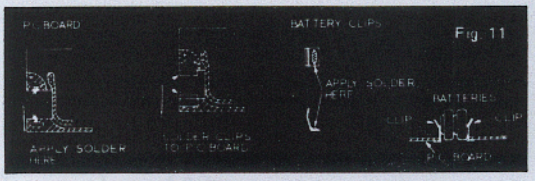


Fig. 11

BATTERIES

The Micromatic uses two RM 675 cells, available from most good chemists and radio shops, or in case of difficulty from Sinclair Radionics Ltd. They cost 14½p. each or 75p. for six. Fit them between the battery clips as shown in Fig. 2 making sure they are the correct way round.

OPERATION

Plug in the earpiece and you should be able to hear a station or two by adjusting the screw in TC1. If so the set is working and can be fitted into its case.

FINAL ASSEMBLY

With the case flat on its face hold the board upright and fit the socket into its hole, then rotate the board which will drop into place. This is shown in Fig. 12.

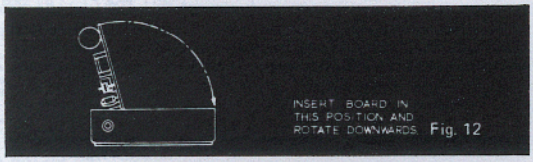


Fig. 12

Remove the screw and washers from TC1, retaining the washers. Screw the dial assembly in from outside the case and fit the paxolin washer brass washer, special locking washer and nut. Screw the nut tightly down.

Tune in a local station of known frequency. Remove the circular metal dial insert, peel off the backing paper and reinsert it in the dial so that the calibrations are correct.

The set's sensitivity can be adjusted by bending L1 sideways as shown in Fig. 9. Always bend this by moving the main support wire, do not touch the ferrite bobbin. As this is bent further from the upright position the sensitivity increases, but if bent over too far the set will start whistling. Do not experiment too much or the support wire will break off.

NOTICE

All components for the Micromatic are tested before despatch, but if you consider any of them are faulty we will replace them free of charge if you return them to us with a stamped addressed envelope.

The Micromatic should work perfectly when completed and if it does not you may have damaged some components or your construction may be wrong. If you cannot cure the fault yourself we can service it for you at a fixed charge of 75p.

Just return the set to us with earpiece and batteries packed in its original box together with a cheque or postal order for 75p. Please use the form supplied with the kit. If the fault is a very minor one we will return your 75p. with the set put right

TECHNICAL DETAILS

The Sinclair Micromatic is the smallest British transistor radio and requires no external aerial or earth. Its high performance is obtained by using the latest high gain silicon planar transistors in a completely new circuit.

The circuit diagram of the receiver is shown in Fig. 1. The RF signal, picked up by L1 and selected by L1 and TC1, is amplified by TR1. The gain of this stage is greatly increased by positive feedback from L2 to L1. The axes of L1 and L2 are normally at right angles but L2 can be bent over to increase the coupling and hence the feedback

The RF output is fed to the double diode detector, D1 and D2, via C2. The detected signal consists of three parts: an unwanted RF signal which is removed by C1; a DC voltage proportional to the signal strength which is used to control the collector current on TR1 and hence the gain of TR1, giving A.G.C.; and an a.f. signal which is fed to the base of TR1. This signal is then amplified, first by TR1 and then by Tr2.

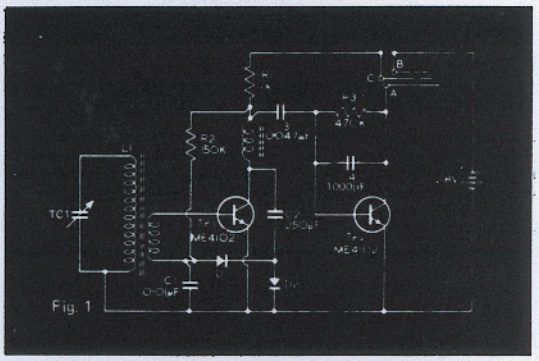


Fig. 1

The Micromatic, although minute, is not at all difficult to build if the instructions are followed carefully. Read the instructions right through before starting construction.

CONSTRUCTION

Use only the specified components. In addition you will need a small soldering iron, such as the Antex 15w model CN or the Adamin model 15 with a $^{3}/_{32}$" bit, a small pair of sidecutters or nail clippers and a small pair of pliers or tweezers.

Before starting check the components list to ensure you have all the necessary components. The diagrams will help you identify them. All the components should be mounted on the opposite side of the board from the printed copper circuit and in the following order:—

L1, TC1, C1, D1, TR1, R2, C4, Tr2, D2, C3, C2, L2, R3, R1, earphone socket and battery clips.

The positions of the components are shown in Fig. 2 and clarified in Figs. 4 to 11.

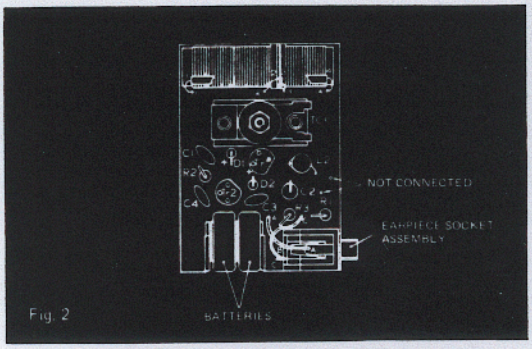


Fig. 2

It is very important that all components, except L2, be mounted as close to the board as possible. The leads should be clipped to within about $^{1}/_{32}$" from the board and soldered. Do not clip the lead off flush with the board. The solder must not protrude further from the board than absolutely necessary.

SOLDERING

Use only the solder supplied with the kit, further packs can be obtained from us at 5p. each. Never use any additional flux as paste or fluid fluxes will cause very serious damage to the board, and we regret that we cannot service sets showing any traces of these fluxes, nor are such sets covered by our guarantee.

To ensure a good joint the solder should be applied to one side of the joint to be soldered and the tip of the bit should be applied to the side of the joint. Leave the iron in contact with the joint long enough for the solder to melt and flow over the joint but no longer as the components may be damaged. Do not run the solder down the iron as the special flux burns away very quickly. Fig. 3. shows the joint before and after soldering.

Please read the notes on soldering. It is a good idea to get a friend to show you how if you are not sure.

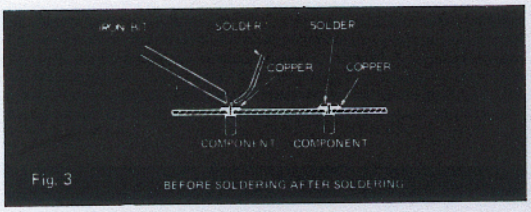


Fig. 3

FERRITE ROD AERIAL L1

Glue L1 to the board using a good quality glue such as Bostik 1 and following the instructions on the glue, make sure you stick it the correct way round on the correct part of the board, as shown in Fig. 2, and make certain that the four leads to the aerial are all free. The fixed aerial is shown in Fig. 4.

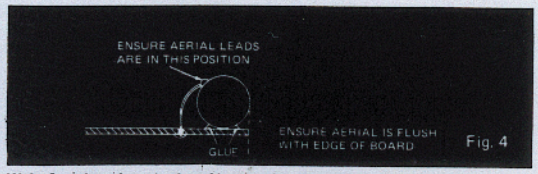


Fig. 4

Wait for the glue to dry. Now, using tweezers, thread the four wires through holes 1, 2, 3 and 4, making sure that you get the correct leads in the correct holes. Make sure that none of the silver end of the lead is left on the component side of the board: solder the lead where the silver section stops, then cut the free ends off.

TUNING CAPACITOR TC1

TC1 must lie flat on the board as shown in Fig. 5. The eyelet and bush protrude slightly into holes on the board and it may be necessary to bend the leads slightly so that they fit the holes properly. The leads, when clipped, should not extend more than $^{1}/_{32}$" from the board, and should be soldered as in Fig. 5.

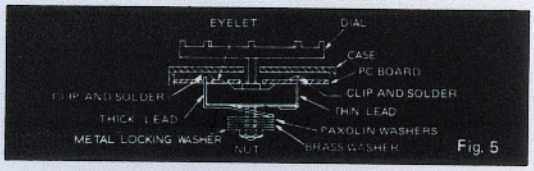


Fig. 5

C1, C3, C4

C1 and C3 are marked with their values. C4 may be either of the types shown in Fig. 6. N.B. 1n=1000pf=0.001μF.

Make sure the body of the capacitor sits well down on to the board and not up in the air. This is shown in Fig. 6.

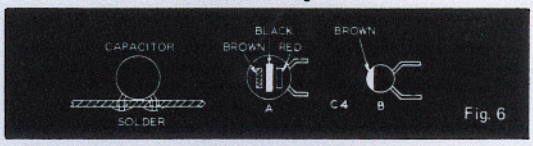


Fig. 6

DIODES, RESISTORS AND C2

Bend one lead over close to the component body and mount flush with the board as shown in Fig. 7.

It is important that the positive lead of the diode be bent over and that the diode be correctly mounted in position. The positive end of the diode is marked yellow on those diodes with a blue painted body or black on those with a clear glass body or yellow on those with a pink body.

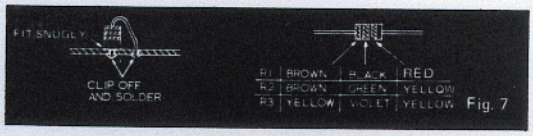


Fig. 7

Sinclair Radionics Ltd., London Rd., St. Ives., Huntingdonshire PE17 4HJ

Should it be necessary to return this equipment to us at any time, for any reason, please fill in this form. Enquiries and orders should be written on a separate letter. Do not write on the back of the form.

Equipment should, where possible, be packed in the original box, and returned using the attached label.

If the set has an earpiece and internal battery these should be included for testing.

We cannot service equipment other than that produced by us, nor can we check customers' additions to the basic units we supply, unless a special agreement has been made beforehand.

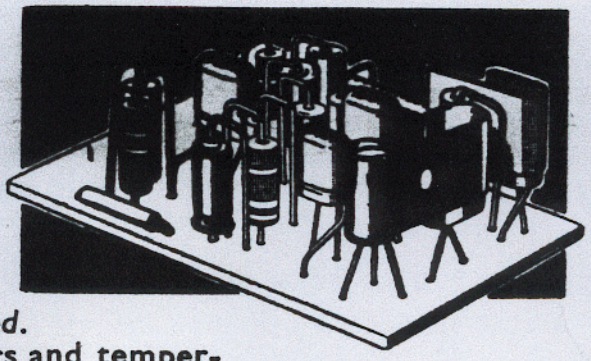
Please include the appropriate service fee.

Model Name or Number	
Date of Purchase	For office use only
Your Name and Address	Job No.
	Date received
Dealers Name and Address	Date serviced
	Serviced by
Previous Reference Nos. Please state your reason for returning this apparatus to us	Job No.
	Date received
	Date serviced
	Serviced by
	Inspection
Your name Your reference	Job No.

Do not write on this section: the engineer will use it to tell you what the fault was.

TR.5 QUALITY AMPLIFIER

VERSATILE ½ WATT AMPLIFIER WITH PRE-AMP STAGE



Will produce a perfectly clean half-watt of audio power from very low output sources such as tape heads, pick-ups and microphones. Ready built with instructions and unconditionally guaranteed.

CIRCUIT—5 matched transistors and temperature compensating diode in a transformerless complementary-symmetry configuration.
POWER OUTPUT—500mW undistorted into 15 ohms.
SENSITIVITY—0.5mV.
POWER GAIN—80dB (100 million times).
RESPONSE—50 c/s to 20 kc/s ±3dB.
SIZE—2½" x 1½" x ¾".
POWER REQUIREMENTS—9 volts.

SINCLAIR TR. 5

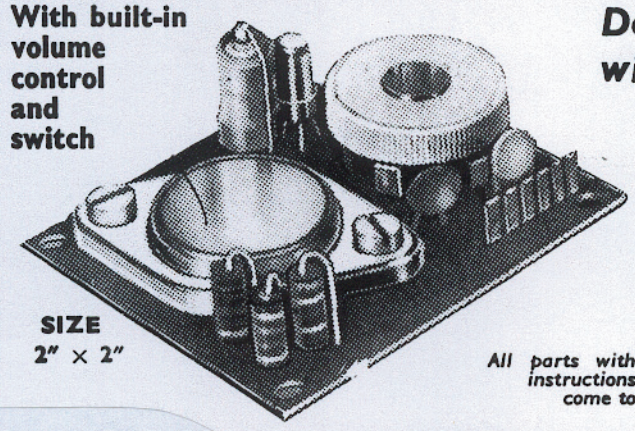
59/6

BUILT AND TESTED

TR-750 POWER AMPLIFIER

SINCLAIR TR750 POWER AMPLIFIER

With built-in volume control and switch



SIZE 2" × 2"

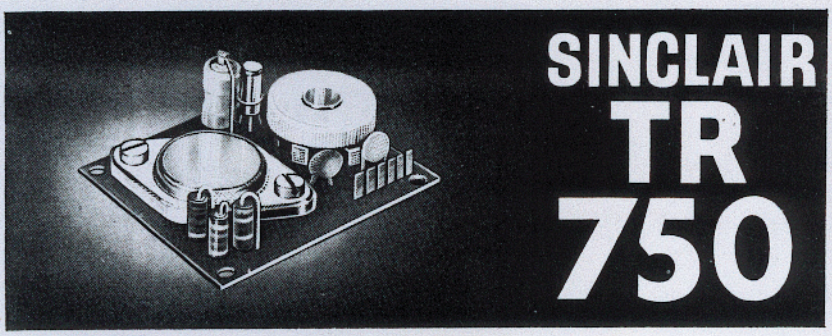
Designed specially for use with the Sinclair Micro-6

THE TR750 (for building yourself or available ready built) measures only 2" x 2". It will provide powerful loudspeaker reproduction from the Micro-6 which can then be used as a car radio or domestic or portable loudspeaker set. The TR750 also has many other applications such as record reproducer, intercom or baby alarm. The output of 750 milliwatts for feeding into a standard 25–30Ω loudspeaker requires only a 10mV input into 2kΩ. Frequency response 30–20,000 c/s ± 1dB. Power required—9 to 12 volts.

All parts with instructions come to **39/6**

Ready built and tested with instructions **45/-**

SUMMER DAYS



SINCLAIR TR 750

ACTUAL SIZE

. . . and a NEW Sinclair Power Amplifier to match the Micro-6

This is a high-quality power amplifier contained within extremely compact dimensions, having sufficient output to drive a full-size loudspeaker with more than enough volume for normal domestic requirements. It includes combined finger-tip operated volume control with on-off switch, and is easily mounted in whichever way is most convenient to the user. Together with the Micro-6 it makes an unusual and thoroughly efficient car radio or portable loudspeaker set. The TR750 can also be used with the "Slimline". Other applications will readily suggest themselves to the keen constructor, ranging from record players, hi-fi installations and intercom systems to baby alarms' Performance characteristics are brilliant—¾ watt transformerless output with response within ±1dB from 30 to 20,000 c/s—hi-fi by any standards! Operating requirements are from 9 to 12 volts. Input 10mV into 2k ohms for 0.75 watts out at 23–35 ohms.

SIZE — 2" × 2" × ½"

750 MILLIWATTS UNDISTORTED OUTPUT

IDEAL FOR USE WITH EITHER THE SINCLAIR MICRO-6 OR SINCLAIR 'SLIMLINE'

MAKES AN EXCELLENT CAR OR PORTABLE LOUDSPEAKER SET

Full building and operating instructions are included with parts for the TR.750, which includes latest type Metal Alloy driver transistor and new Sinclair "Hagnagain" output transistor, micro-miniature components including volume control with on-off switch, and printed circuit board. *Total cost comes to* **39/6**

Ready built and tested 45/-

IT'S ANOTHER WORLD-BEATING SINCLAIR MICRO-DESIGN

UNIQUE SINCLAIR GUARANTEE

If you are not completely satisfied with your purchase (we are confident you will be delighted) your full purchase price will be refunded instantly without question.

FULL SERVICE FACILITIES AVAILABLE TO ALL SINCLAIR CUSTOMERS

If you do not wish to cut coupon from this page, please mention RC.5 when sending us your order on ordinary paper

MORE SINCLAIR DESIGNS ON THE NEXT PAGE

To SINCLAIR RADIONICS LTD., 69 HISTON ROAD CAMBRIDGE

Please send parts for building ..... Micro-6 Receiver(s) and ..... Mallory Cell(s) Type ZM312 at 1/11 each, also ..... TR750 Amplifier(s) for which I enclose £.....s.....d.

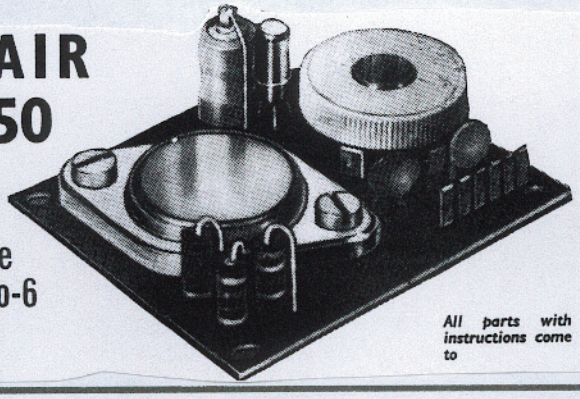
NAME .....

ADDRESS .....

RC.5 ..... **A**

SINCLAIR TR750

POWER AMPLIFIER perfect for use with the Micro-6 and 'Slimline'



Hundreds already in use

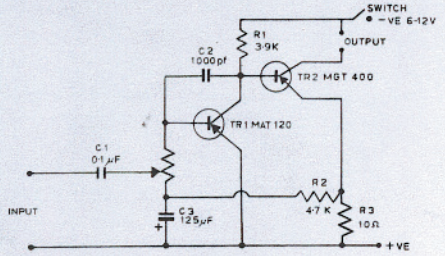
Measuring only 2" x 2" and having its own built-in volume control and on-off switch, the TR750 has a full 750 milliwatt transformerless output for 10mV into 10kΩ. Frequency response is from 30 to 20,000 c/s within ±1dB. This amplifier makes a powerful car, domestic or portable radio used with the Micro-6 or Slimline receivers, or a hi-fi record reproducer used singly or paired for stereo. There are many other uses for the TR750 which is available for building or ready built.

All parts with instructions come to **39/6**

Ready built and tested **45/-**

PRICE 6d.

SINCLAIR TR750 TRANSISTOR POWER AMPLIFIER



TECHNICAL NOTES

The SINCLAIR TR750 Power Amplifier which measures only 2" x 2" x 1" was designed for use with both the SLIMLINE and MICRO-6 receivers. Loudspeakers with an impedance of between 25 and 40 ohms should be used with this amplifier to obtain best results. Two 15 ohm speakers connected in series would be very satisfactory.

The amplifier is of the direct coupled type and, therefore, it is very economical on components. This form of coupling also allows the design of very compact amplifiers.

The signal is amplified by TR1 and is then fed directly into the base of TR2 from the collector of TR1. The biassing for TR2 is obtained from the 3.9K resistor which is connected to negative, this transistor then draws current and produces a voltage across R3. This voltage is in turn fed back through R2 and RV1 to the base of TR1. AC decoupling for TR1 and TR2 is achieved by C3. Both the stability and the gain of the amplifier are excellent. Its undistorted output of 750 milliwatts for 10mV in is more than adequate for comfortable listening.

The TR750 is supplied with a 2½ mm. jack plug which fits directly into the Sinclair Micro-6 or the Sinclair Slimline. However, the amplifier is equally suitable for use as a high quality gramophone amplifier with either a crystal or a magnetic pick-up. With a crystal pick-up a 100K ohms resistor may be added in series with the input.

THIS AMPLIFIER CAN BE SUPPLIED READY BUILT FOR 45/-.

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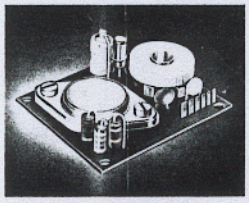
Telephone : Comberton 682

AM M 2410 M865



TR750
TRANSISTOR POWER AMPLIFIER

TECHNICAL DETAILS, ASSEMBLY INSTRUCTIONS AND OPERATING NOTES

SINCLAIR TR750 POWER AMPLIFIER
BUILDING INSTRUCTIONS

The TR750, although small, is not at all difficult to build but the instructions should be followed exactly. Only the components specified should be used. You will also require some flux cored solder and a pair of side cutters or nail clippers.

Before starting construction check that you have all the following components. Fig. 2 will help you to identify them.

R1 3.9K	3d	C1 0.1mfd	1/-	TR1 MAT120	7/9
R2 4.7K	3d	C2 1000pF	9d	TR2 MGT400	18/-
R3 10 ohms	3d	C3 125mfd electrolytic	1/9	Nuts, bolts and	
RV1 5K semi-log with on-off switch	5/-	Printed Circuit Board	4/-	instructions	6d

TOTAL COST WITH INSTRUCTIONS **39/6**

Wipe the copper side of the printed circuit board to ensure freedom from grease and dirt.

The position of all the components is shown in Fig. 2 and details are clarified in Figs. 1, 4 & 5. It is possible to build from these diagrams alone, but please read **all** the instructions before starting assembly.

All the components are mounted on the opposite side of the board to the copper and in the following order :—
TR2, RV1, C1, C2, C3, R1, R2, R3, TR1.

All leads must be bent, clipped and soldered. To ensure a good joint the solder should be held against the wire and the copper, and the joint made quickly with the iron at full heat. All component leads should be cleaned before soldering. TR1 can be damaged by excess heat and it is wise to grip the lead being soldered with a pair of tweezers or pliers to act as a heat sink. It is not necessary to hold the solder to the joints in the case of TR1 as the leads are gold plated. In the case of TR2 the leads must be bent, and then soldered at the farthest end from the transistor (as in Fig. 3). The bolts holding TR2 also connect the transistor chassis to the copper feeding the loudspeaker.

Connect all leads to copper as in Figs. 3 and 4.
Capacitors C1, C2 and C3 are mounted as in Fig. 4.
The can of C3 is the negative end. Correct polarity (see Fig. 4) must be observed.
Resistors R1, R2 and R3 are mounted as in Fig. 4.

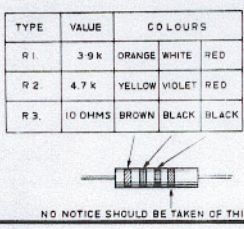
VOLUME CONTROL RV1
Fit tags through board and bend on to copper as in Fig. 3 then solder.

MOUNTING THE AMPLIFIER
This can be in whatever position is most convenient, it being only necessary to ensure access to the combined volume control and on-off switch. A simple way is to mount the TR750 to the front, top or side up close to an adjoining side of the housing, in which latter, a small aperture should be made, about 1" x ½". This allows the volume control to protrude sufficiently for finger tip operation.

BATTERIES FOR THE TR750
Any reasonably sized 6 to 12 volt battery will suffice.

FOR TECHNICAL DETAILS, SEE BACK PAGE.

TYPE	VALUE	COLOURS		
R1.	3·9 k	ORANGE	WHITE	RED
R2.	4.7 k	YELLOW	VIOLET	RED
R3.	10 OHMS	BROWN	BLACK	BLACK



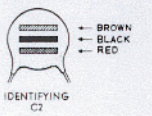


FIG. 1

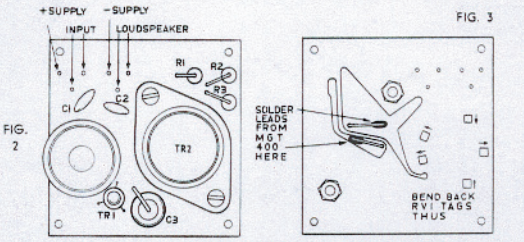


FIG. 2

FIG. 3

Check that all battery and other connections are correct before switching on.

FIG. 4 MOUNTING C1, C2, C3, R1, R2, R3

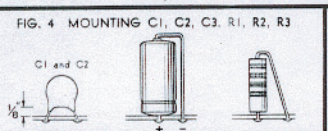


FIG. 5 MOUNTING TR1

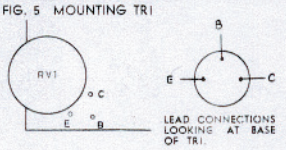
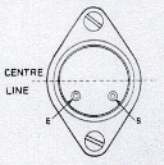


FIG. 6 MOUNTING TR2



TR2 FITS FLUSH WHEN CORRECTLY MOUNTED TO BOARD WITH BOLTS AND LEADS GOING EASILY INTO THEIR PROPER HOLES.

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GO TRANSISTOR WITH SINCLAIR

SINCLAIR MICRO 6

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Reg. no: 699483 England. VAT Reg. no: 213 8170 88.

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Says Mike Farrard our favourite customer

"He buries it in the garden if he doesn't like the programme"

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HI-FI AGE

Notwithstanding the **TR 750 amplifier**, October 1964 officially begins the hi-fi amplifier era which was about to become one of the biggest fads of the electronics lovers' community of the time.

The Sinclair **X10 amplifier** was one of the first to use the all new technique of *pulse width modulation*. It was an immediate success even if its appearance was plagued with design and production problems.

This was the beginning of an avalanche of hi-fi products which soon appeared on the market to satisfy the all new hi- fi craze which shook the market for years to come. Sinclair products like others (QUAD for example) not only were technologically advanced but made use of the then fashionable "*sheerform*" design which commanded a very clean, square and slim design in all sorts of technological products. British hi-fi systems were able to get and maintain their share of the market among the more powerful American and Swiss manufacturers witnessing the transformation between the valve driven era to the solid state amplifiers.

X-10 AUDIO AMPLIFIER

SINCLAIR X-10

A radical departure from conventional design

- Complete with pre-amp
- 11 Transistors
- No heat sink
- 10 watts output

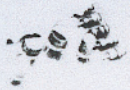
★ Overall size 6" x 1" x 1"
★ Input Sensitivity 1mV into 1KΩ
★ Total harmonic distortion <0.1%
★ Frequency response 5–20,000 c/s ± 0.5dB
★ Speaker impedance 15Ω
★ Damping factor Greater than 100
★ Quiescent consumption 75mA
★ Power requirements 12 volts

A GUARANTEED SINCLAIR DESIGN

If you are not completely satisfied with our purchase (and we are confident that you will be) your money will be refunded in full at once and without question.
Full Service Facilities always available to Sinclair Customers.

ALREADY ACCLAIMED THE GREATEST ADVANCE IN YEARS

The Sinclair X-10 is a high fidelity integrated power amplifier and pre-amp using 11 transistors and having a transformerless output of 10 watts for feeding into a 15 ohm loudspeaker system. It requires only the addition of tone and volume controls plus a twelve volt d.c. power supply to make it a complete mono high fidelity assembly of exceptional quality. Stereo is achieved by using two X-10 amplifiers and ganged or separate controls. Input sensitivity is sufficient for all crystal or magnetic pick-ups and the manual supplied with the X-10 gives detailed instructions for connecting the controls and for using the amplifier in a wide variety of applications.
This radically new transistor amplifier (patents applied for) is the first to be marketed anywhere in the world using the pulse width modulation principle (P.W.M.). This technique permits an enormous reduction in the power dissipation in the output transistors of an amplifier; and in the case of the Sinclair X-10, the output efficiency is about 95% as compared with about 60% for conventional class B output stages. Thus the dissipation is only ¼th or less of that occurring in all other amplifiers. That is why no heat sink is required for the output stage, why small high frequency transistors can be used in place of the conventional low frequency power transistors and why the X-10 will operate from two 4½ batteries with normal use for about 3 months.



UNIQUE 4-TRANSISTOR OUTPUT STAGE

A special feature of the Sinclair X-10 is that the 4 transistors do not get hot even at full output because the circuit converts almost 100% of the power from battery to music and non-useful energy for the loudspeaker.

SINCLAIR X-10 MANUAL

Shows how to add correct tone and volume control systems to suit your requirements. None of these systems will add more than a few shillings to the cost of your X-10. The 12 page manual is included with every amplifier whether purchased complete or for assembling.

TO SINCLAIR RADIONICS LTD., COMBERTON, CAMBRIDGE. Comberton 682

Please send items detailed below — £ s d

NAME

ADDRESS

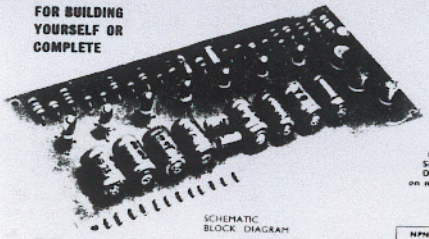
TOTAL £

For which I enclose cash/cheque/money order

AC11

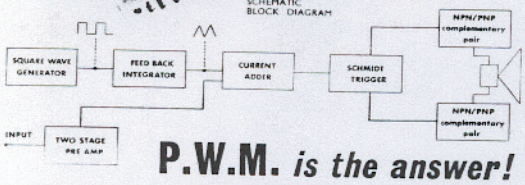
10 WATT INTEGRATED AMPLIFIER USING PULSE WIDTH MODULATION

FOR BUILDING YOURSELF OR COMPLETE



More Sinclair Designs on next page

SCHEMATIC BLOCK DIAGRAM



P.W.M. *is the answer!*

Cost of all parts for building together with the Construction Manual £5.19.6

Parts Built and Tested together with Instruction Manual £6.19.6

Mains power supply unit £2.14.0

The principle of P.W.M. is briefly as follows: A square wave of constant voltage amplitude and with a frequency, in this case of 50 kc/s, is applied to the terminals of the load. As the load has a high impedance at this frequency negligible current flows through the voice coil of the speaker.
In the absence of any input signal, the mark space ratio of the square wave is unity—that is, the current flows for an equal period in each direction. When an input signal is applied, the mark-space ratio changes with the result that there is a net current flowing through the voice coil which deflects the cone. When the input signal is at any frequency up to 20 kc/s the net current is an exact replica of the input signal and is independent of the transfer characteristics of the output transistors. Thus the distortion figures can be incredibly low.

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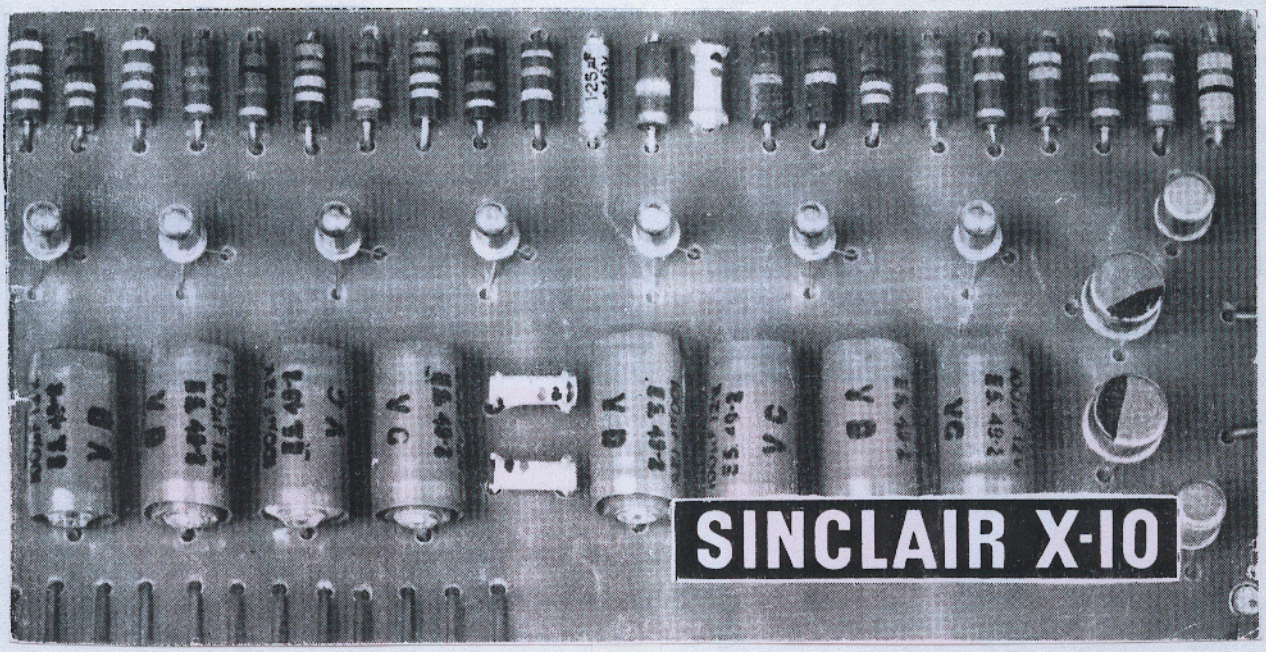

X-20 AUDIO AMPLIFIER

SINCLAIR X-20

SIZE—
8¼" x 3¼" x 1"
WEIGHT—4½ oz.

20 watt combined
P.W.M. AMPLIFIER & PRE-AMP

★ No. of transistors—12.
★ Rise-fall time—less than 0.2 micro-seconds.
★ Frequency response—20 to 20,000 c/s ±1dB.
★ Total harmonic distortion 0.1% at 10 watts R.M.S.
★ Input sensitivity—1mV into 5K ohms.
★ Signal to noise ratio better than 70dB.
★ Output into 7.5 ohms—20 watts R.M.S. music power; 15 watts R.M.S. continuous; into 15 ohms—15 watts R.M.S. music power; 12 watts R.M.S. continuous.

New design—New power!

Here is proof positive of the power and quality that a Sinclair Pulse Width Modulated Amplifier can give you. The new X-20 which is complete with integrated pre-amplifier uses silicon epitaxial planars in the output stage, better than anything ever before offered to constructors in transistorised equipment. Many other refinements have been introduced into this latest Sinclair design. For example, absolute constant amplitude is maintained in the output square wave form irrespective of the extent of the modulation applied. Building this amplifier is unusually easy and the results to be obtained from it are completely rewarding. Unlike many hi-fi amplifiers, the X-20 has power and power to spare. It has superb quality, too, all from a unit measuring only 8¼" x 3¼" x 1"—dimensions which will inspire constructors to build to entirely new concepts of design and layout.

X-10 P.M.W. AMPLIFIER
WHERE LESS POWER IS REQUIRED

Although the X-10 has been superseded in power by the X-20, this superb Sinclair integrated P.W.M. amplifier and pre-amp gives you all the advantages of quality and efficiency which makes these Sinclair designs so outstanding in every way. It is the ideal hi-fi amplifier where superb quality is wanted, with a more moderate output.

£5.19.6 Ready built **£6.19.6** X-10 power supply unit, **£2.14.9**
For 13-15V operation. Tone control system as added in choice

Complete kit of parts and X-20 manual **£7.19.6**
Ready built and tested X-20 Power Unit **£9.19.6** **£4.19.6**

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SINCLAIR RADIONICS LTD.,
COMBERTON, CAMBRIDGE Telephone: COMBERTON 682

20 WATTS R.M.S.
SIZE: 8¼" x 3¼" x 1"
In kit form or ready built

THE NEW APPROACH TO BETTER SOUND

With the SINCLAIR X-20, power is no longer a problem of heat and size, for it requires neither heatsink nor special ventilation. The X-20 will deliver up to 20 watts R.M.S. into a 7½-8 ohms loudspeaker—40 watts output by U.S.A. standards! With the 3-stage integrated pre-amplifier an overall frequency response from 20 to 20,000 c/s well within ±1dB from input to output is achieved. There is also greatly improved transient response. At no point are components overrun. The instrument is both stable and assured of indefinite working life—and it is easier to build and install than any amplifier you have ever owned. Best of all the X-20 costs far less.

The only amplifier in the world to feature

★ Easily built in an evening
★ No. of transistors—12
★ Output stage—silicon epitaxial planars
★ Constant square wave amplitude
★ 95% energy conversion at output
★ Superb quality and reliability
★ Frequency response—from 20 to 20,000 c/s ±1dB
★ Total harmonic distortion—0.1% at 10 watts R.M.S.
★ Input sensitivity—1mV into 5KΩ
★ Signal to noise ratio—better than 70dB
★ Output into 7.5 ohms—20 watts R.M.S. music power 15 watts R.M.S. continuous
★ Output into 15 ohms—15 watts R.M.S. music value 10 watts R.M.S. continuous
★ Makes an ideal guitar or P.A. amplifier
★ Wide tolerance to load at output
★ Requires 36V d.c. at 700mA
★ Add tone and volume control systems for mono or stereo to choice

Weighs only 4½ ozs.

SINCLAIR X-20

THE X-20 MANUAL
Details in full tone and volume control systems to suit the equipment you use with your X-20. Includes stereo, stereo balance and input switching. FREE with all X-20 amplifiers. Available separately 2/- post free.

Complete kit of parts inc. transistors and X-20 manual in sealed carton **£7.19.6**
Built and tested with X-20 manual in sealed carton **£9.19.6**
X-20 Power Pack sufficient to drive two X-20's **£4.19.6**

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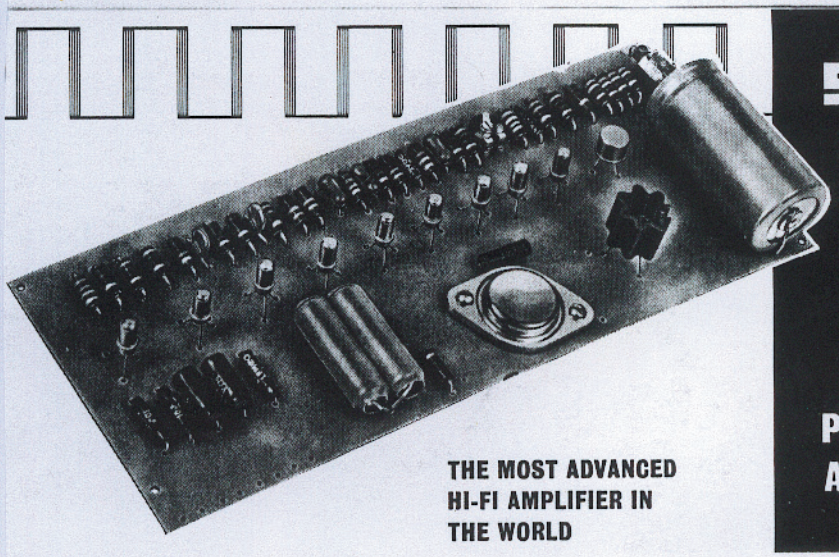


THE MOST ADVANCED HI-FI AMPLIFIER IN THE WORLD

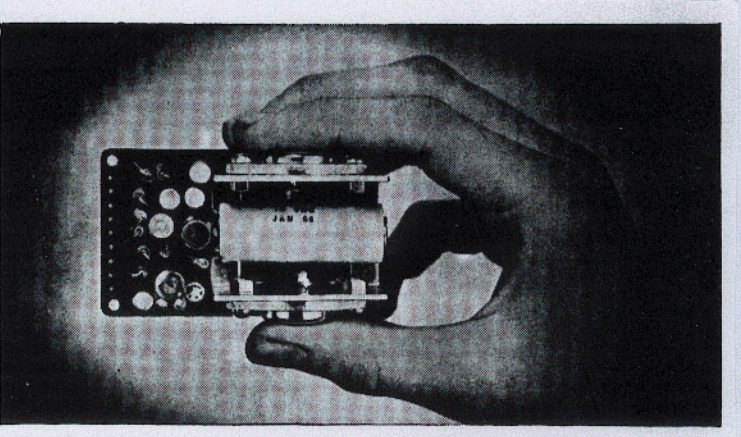
sinclair
X-20
PULSE-WIDTH MODULATED AMPLIFIER AND PRE-AMP

Z.12 AUDIO AMPLIFIER

SINCLAIR Z.12

INTEGRATED 12 WATT AMPLIFIER AND PRE-AMP

For size alone, the Z.12 marks an important advance in quality design, for its amazing compactness opens up exciting new vistas in amplifier housing and application. Combined with this are fantastic power and superb quality which can provide an effortless output of 12 watts R.M.S. continuous sine wave from the unique eight transistor circuit used. Basically intended as the heart of any good mono or stereo hi-fi system, the size and efficiency of this Sinclair unit make it equally useful for a car radio (with the Micro-6 for example), a high quality radio with the Micro FM, in a guitar, P.A. or intercom system, etc. Other applications are certain to suggest themselves to constructors. The manual included with the Z.12 details mono and stereo tone and volume control circuits by which inputs can be matched (and switched in) to the pre-amp. The size, performance and price of the Z.12 all favour the constructor seeking the finest in transistorised audio reproduction—it is in fact today's finest buy in top grade high fidelity.



12 WATTS R.M.S. OUTPUT CONTINUOUS SINE WAVE (24 W. PEAK)

15 WATTS R.M.S. MUSIC POWER (30 WATTS PEAK)

★ Ultra-linear class B output and generous neg. feed back.
★ Response—15 to 50,000 c/s ±1dB.
★ Output suitable for 3, 7.5 and 15 ohm loads. Two 3 ohm speakers may be used in parallel.
★ Input—2mV into 2K ohms.
★ Signal to noise ratio—better than 60dB.

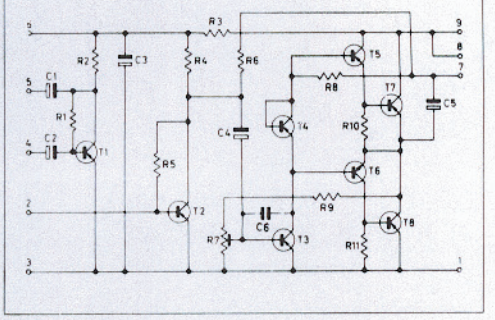
Built, tested and guaranteed.

89/6

Specifications

Number of transistors: 8
Overall size: 3" x 1.8" x 1.3"
Weight: 3 ozs.
RMS Output power into 3Ω load.
5 watts with 12v supply at ½ amp.
8 " " 16v " " ¾ "
13 " " 20v " " 1 "
Output power into 1.5Ω load will be nearly double the above figures.
Damping factor: 15 (1.5Ω load) 150 (15Ω load)
Power response: 1.5 dB below 1K c/s at 20K c/s and 65 c/s
Frequency response: 15 c/s to 50K c/s ± 1 dB
Input sensitivity: 1μA (2mV into 2KΩ).
Quiescent consumption on 12v supply: 15mA
Signal to noise ratio: better than 60 dB
Total distortion: less than 1%

Fig 1



Using the Z 12

All connections to the Z-12 have been brought out to one end of the board for the ease of connection, but for some uses where lowest distortion is required or where working at high power levels, alternative loudspeaker and power connections are provided.
The connections are shown in Fig 2, and the numbering should be noted as these correspond to the numbered points on the circuits, and all connections to the board will be referred to by these numbers.

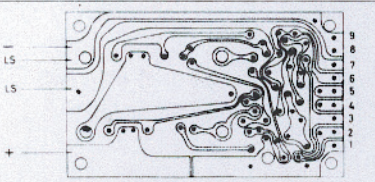


Fig 2 On some units the copper may differ slightly but connections remain unaffected.

Power Supply

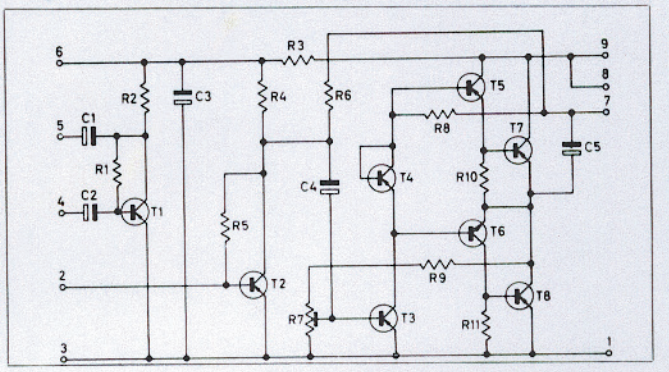
The Z-12 can be used on any supply voltage down to below 6v, or up to 20v. The supply voltage will not affect the Z-12's gain, but the output power at which clipping occurs will be reduced at lower voltages. The supply should be connected with the positive to terminal 1 and negative to terminal 9. It is advisable to connect a 1.5a fuse in series with the negative lead. The fuse rating is not critical and a smaller one will give more protection. It is also advisable where the the power supply leads are longer than a foot or two, or when dry batteries are being used, to connect a 1,000μF capacitor between terminals 1 and 9.

Sinclair Z.12
Integrated 12 Watt Amplifier and Pre-Amplifier 89/6

Eight special H.F. transistors are used in this remarkable integrated twelve watt amplifier. Among its many outstanding features are its great versatility, its great compactness, its power, and brilliant performance and ability to operate satisfactorily on anything from 6 to 20 volts D.C. This makes it equally suitable for use as a true hi-fi amplifier, in an electric guitar, as a P.A. unit, for car radio, in an intercom system or wherever the need is for power, quality and compactness. The input connections of the integrated pre-amplifier can be matched to the requirements of all pick ups, microphones and radio tuners and detailed circuits for appropriate tone and volume controls are given in the manual supplied with every Z.12. The amplifier has an R.M.S. output of 12 watts, continuous sine wave (24 watts peak) and a music power output of 15 watts R.M.S. (30 watts peak). It has no special heating or ventilating requirements when in use. The Z.12 is supplied ready built.

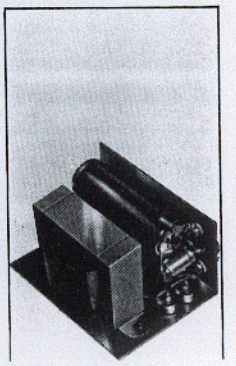
Technical specification

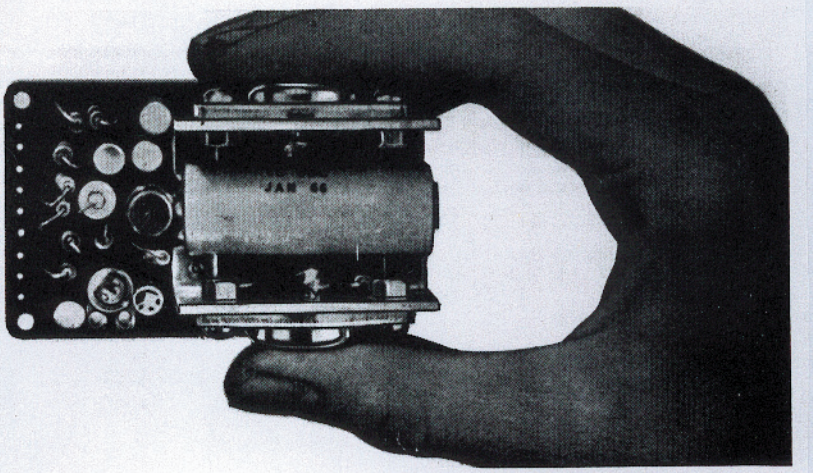
Output — Class B, ultra-linear, with generous negative feed-back.
Output Power — 12 watts R.M.S. continuous sine wave (24 watts peak); 15 watts R.M.S. music power (30 watts peak).
Frequency Response — 15 to 50,000 c/s, ±1dB.
Input Sensitivity — 2 mV into 2 k Ω.
Signal to Noise Ratio — better than 60dB.
Output Impedance — suitable for 3, 7·5 and 15 ohm loudspeakers. Two 3 ohm speakers may be used in parallel.
Power Requirements — 6 to 20 volts D.C. or Sinclair PZ.3 Mains Power Supply Unit.
Quiescent Current Consumption — 15 mA.
Size — 3″ × 1¾″ × 1¼″ (7·6 × 4·45 × 3·2 cm.).
Weight — 3 oz. (85 gm.).



Sinclair PZ. 3 79/6

A transistorized mains power supply unit designed especially for the Z.12. It will easily supply two in stereo, together with the Stereo 25. With a barely measurable ripple of 0·05 V, this power unit is ideal for the exacting requirements of Sinclair Audio Units.





STEREO 25 PREAMP/CONTROL UNIT

Sinclair Stereo 25
De-Luxe Pre-Amplifier and Control Unit £9.19.6.

A first class pre-amp and tone control unit is vital to the performance of any hi-fi system, particularly in cases where modern light-weight stereo pick-ups and quality loudspeakers are used. The Sinclair Stereo 25 has been designed especially to match the excellent characteristics of the Z.12 and at the same time provide an elegantly modern appearance. The controls provide for bass lift and cut, treble lift and cut, volume, stereo balance and input selection. The unit is supplied ready built with a fully descriptive installing and operating manual. The front panel is elegantly finished in brushed and polished aluminium, with well styled knobs in solid aluminium. As with all Sinclair designs, the Stereo 25 is unusually compact and a delight to use.

Technical specification

Performance figures obtained from using the Sinclair Stereo 25, two Z.12's and a PZ.3 Power Supply Unit.

Sensitivity for 10 watts into 1·5 ohms load per channel.
Mic. — 2 mV into 50 K ohms: Pick-up — 3 mV into 50 K ohms: Radio — 20 mV into 10 K ohms.

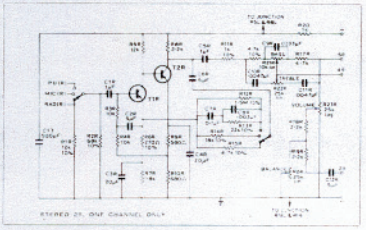
Frequency Response (Mic. and Radio) — 25 c/s to 30 kc/s ±1dB extending to 100 kc/s ±3dB.

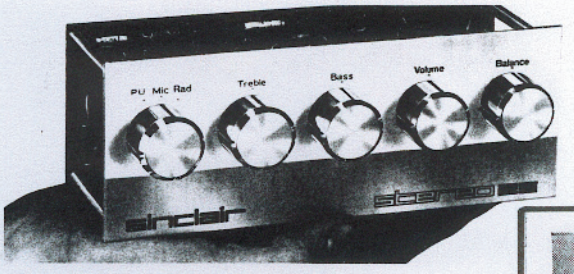
Equalisation for P.U. — Correct to within ±1dB on RIAA curve from 50 c/s to 20 kc/s.

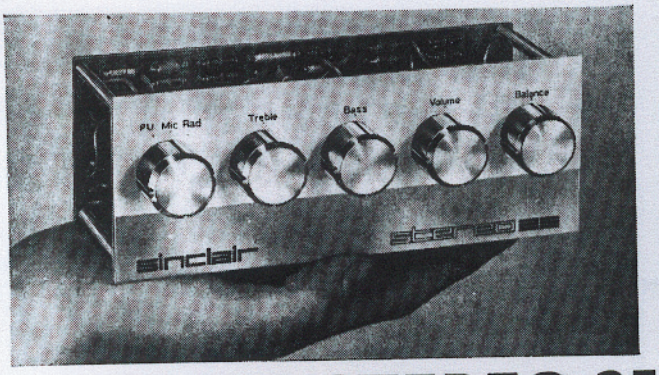
Tone Controls — Treble +12dB to —10dB at 10 kc/s: Bass +15dB to —12dB at 100 c/s.

Size — 6¼" × 2½" × 2½" (14·5 × 6·3 × 6·3 cm.) overall, plus knobs.

Finish — Front panel in brushed and polished solid aluminium with solid aluminium knobs. Black figuring on front panel.







SINCLAIR STEREO 25

Pre-amp and control unit for use with two Z.12s or other stereo amp

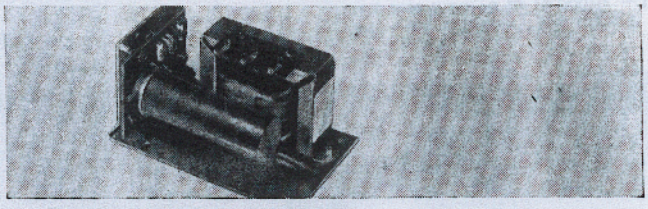
THE SINCLAIR STEREO 25 has been designed specially to ensure the highest possible standards of reproduction when used with two Z.12s or any other first class-stereo power amplifier. The front panel of the Stereo 25 is in solid brushed and polished aluminium with beautifully styled solid aluminium control knobs. Mounting the unit is simple, and power is conveniently obtainable from the Sinclair PZ.3 which can also be used to supply two Z.12s to make a complete stereo assembly.

BUILT, TESTED AND GUARANTEED **£9.19.6**

Performance figures obtained using Stereo 25, two Z.12s and a PZ.3.

- **INPUTS** for P.U., Radio and Mic.
- **FREQUENCY RESPONSE** (Mic. and Radio)— 25 c/s to 30 kc/s ±1dB extending to 100 kc/s ±3dB.
- **EQUALISATION** Correct to within ±1dB on RIAA curve from 50 c/s to 20 kc/s.
- **CONTROLS** Volume, Treble, Bass, Volume, Input
- **SIZE** 6¼ x 2½ x 2½". plus knobs.

PZ.4 POWER SUPPLY



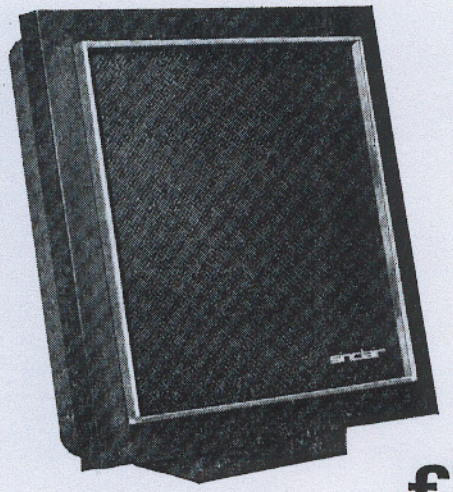
SINCLAIR PZ4

STABILISED MAINS POWER SUPPLY UNIT

Heavy duty transistorised power supply unit to deliver 18V d.c. at 1.5A. Designed specially for use with two Z.12 Amplifiers together with Stereo 25. Built, tested and guaranteed.

99/6

Q-14 LOUDSPEAKER



SINCLAIR Q.14

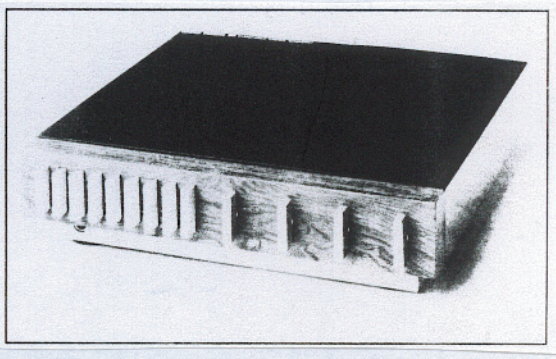
low-priced high fidelity speaker

- Handles up to 14 watts
- 60-16,000 Hz
- 8 ohms impedance

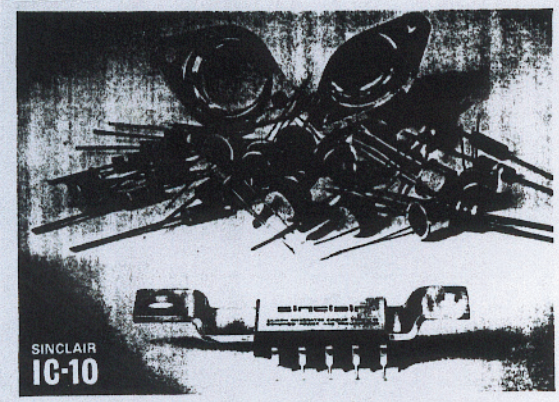
£7.19.6

It costs a quarter of what you would expect to pay for a good stereo speaker system when you choose Q.14s. This is the result of research and experimentation in materials and careful design to make the Q.14 an instrument so outstandingly good that experts, reviewers and the public alike are unanimous in their praise for it. The Q.14 measuring only 9¾" square on its face by 4¾" deep. Its unusual contours permit it to be positioned where no ordinary speaker could be used to advantage. Black matt finish with aluminium bar trim keep this speaker pleasantly in conformity with modern design trends.

NEOTERIC 60 INTEGRATED AMPLIFIER



IC-10 INTEGRATED CIRCUIT



the world's most advanced high-fidelity amplifier

The Sinclair IC-10 is the World's first monolithic integrated circuit high fidelity power amplifier and pre-amplifier. The circuit itself, which has an output power of 10 Watts, is a chip of silicon only a twentieth of an inch square by one hundredth of an inch thick. This tiny chip contains 13 transistors (including two power types), 2 diodes, 1 zener diode and 18 resistors, all of which are formed simultaneously in the silicon by a series of diffusions. The chip is encapsulated in a solid plastic package which holds the metal heat sink and connecting pins.

Monolithic I.C's, were originally developed for use in computer and space applications where their extraordinary toughness and reliability were even more important than their minute size. These same advantages make them ideal for linear applications such as audio amplifiers, but hitherto they have been confined to low power applications. The IC-10 thus represents a very exciting advance. Not only is it far more rugged and reliable than any previous amplifier, it also has considerable performance advantages. The most important are complete freedom from thermal runaway due to the close thermal coupling between the output transistors and the bias diodes and very low level of distortion.

The IC-10 is primarily intended as a full performance high fidelity power and pre-amplifier, for which application it only requires the addition of the usual tone and volume controls and a battery or mains power supply. However, the IC-10 is so designed that it may be used simply in many other applications including car radios, electronic organs, servo amplifiers (it is d.c. coupled throughout) etc.

The photographic masks required for producing monolithic I.C's, are expensive but once made, the circuits can be produced with complete uniformity and at very low cost. So we are able to sell the IC-10 at a price far less than that of the components for a conventional amplifier of comparable power. At the same time, we give a 5 year unconditional guarantee on each IC-10 knowing that every unit will work as perfectly as the original and do so for a lifetime.

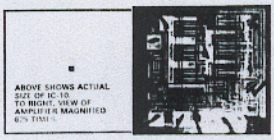
sinclair

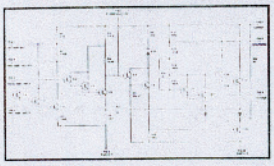
SINCLAIR RADIONICS LTD, 22 Newmarket Rd. Cambridge. Tel: OCA3-52996

10 WATT MONOLITHIC INTEGRATED CIRCUIT AMPLIFIER

■ Specifications

Power Output	10 Watts peak, 5 Watts R.M.S. continuous.
Frequency response	5 Hz to 100 KHz ± 1dB.
Total harmonic distortion	Less than 1% at full output.
Load impedance	3 to 15 ohms.
Power gain	110dB (100,000,000,000 times) total.
Supply voltage	8 to 18 volts.
Size	1 x 0.4 x 0.2 inches.
Sensitivity	5 mV.
Input impedance	Adjustable externally up to 2.5 M ohms for above sensitivity.





■ Circuit Description

The circuit diagram of the IC-10 is shown on the right. The first three transistors are used in the pre-amp and the remaining 10 in the power amplifier. The output stage operates in class AB with closely controlled quiescent current which is independent of temperature. A high level of overall negative feedback is used round both sections and the amplifier is completely free from cross-over distortion at all supply voltages. Thus battery operation is eminently satisfactory.

■ Construction

The monolithic I.C. chip is bonded onto a gold plated area on the heat sink bar which runs through the package. Wires are then welded between the I.C. and the tops of the pins which are also gold plated in this region. Finally the complete assembly is encapsulated in solid plastic which completely protects the circuit. The final device is so rugged that it can be dropped thirty feet on to concrete without any effect on performance. The circuit will also work perfectly at all temperatures from well below zero to above the boiling point of water.

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SINCLAIR RADIONICS LIMITED,
22 NEWMARKET ROAD, CAMBRIDGE
Telephone OCA3-52996

■ Applications

Each IC-10 is sold with a very comprehensive manual giving circuit and wiring diagrams for a large number of applications in addition to high fidelity uses. These include public address, loud-hailers, use in cars, inter-coms, stabilised power supplies, electronic organs, oscillators, volt meters, tape recorders, solar cell amplifier, radio receivers.

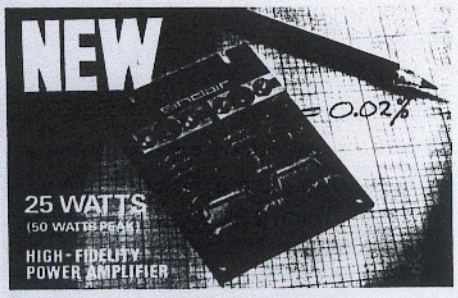
The transistors in the IC-10 have cut off frequencies greater than 500 MHz so the pre-amp section can be used as an R.F. or I.F. amplifier making it possible to build complete radio receivers without any additional transistors.

SINCLAIR **IC-10** *The complete IC-10 with the manual and 5 year guarantee costs just*

59/6 Post free

ORDER FORM AND MORE SINCLAIR DESIGNS OVERLEAF

Z30 POWER AMPLIFIER



Z.30

0·02% DISTORTION AT FULL POWER

OPERATES IDEALLY FROM 8 TO 35 VOLTS

SIZE 3½ x 2½ x ¾ ins.

FREQUENCY RESPONSE FROM 20 Hz TO 30 kHz

USE IT FOR HIGH FIDELITY, MUSIC INSTRUMENTS, ECONOMY RECORD PLAYER, P.A., INTERCOM, ETC.

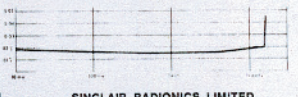
Built, tested and guaranteed, with Z.30 manual

89/6

THE WORLD'S LOWEST DISTORTION HIGH FIDELITY AMPLIFIER

For four years, the Sinclair Z.12 dominated the construction world, being the best selling unit of its kind this side of the Atlantic. Excellent as it was, the new Sinclair Z.30 is still better. Half the size of the Z.12, it has more than twice the power, very much greater gain and a level of distortion 50 times lower. This incredible figure results from using over 60dB of negative feedback with a constant current load to the driver stage obtained by incorporating a two-transistor circuit in place of the more usual bootstrapping. 9 silicon epitaxial planar transistors are used to provide enormous power (up to 25 watts RMS continuous sine wave (50 watts peak). The circuitry of this marvellous amplifier allows it to be operated from any voltage from 8 to 35 to perfection. At all output levels, distortion is only 0.02%. This puts true laboratory standards into the hands of every user of a Z.30. Two Z.30s and a new Stereo Sixty will make a stereo assembly of such perfection that it could not be bettered in its class no matter how much you spent. But the Z.30 has an enormous variety of applications, particularly where quality, precision and reliability are essential. Yet this brilliant new Sinclair design costs not a penny more than its famous predecessor.

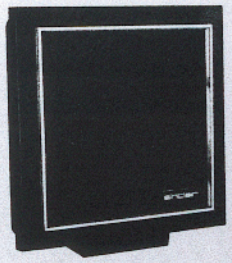
- Input Sensitivity—250 mV into 100 Kohms
- Signal to noise ratio—better than 70dB unweighted
- Class AB output
- Power requirements 8–35 volts from batteries or PZ.5



sinclair

SINCLAIR RADIONICS LIMITED
22 NEWMARKET ROAD, CAMBRIDGE Tel: 0223 52731

Q.14 SPEAKER



SINCLAIR **Q.14**

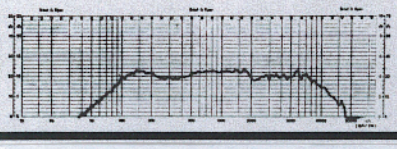
low priced hi-fi speaker

It costs about a quarter of what you would expect to pay for a good stereo speaker system when you choose Q.14s. This is because of the considerable research and experimentation into the acoustic properties of special materials carried out into the design of this excellent speaker. It resulted in an instrument so outstandingly good that experts, reviewers and the public alike were unanimous in their praise for the Q.14 at this year's Audio Fair. The Q.14 is very compact, measuring only 9¾in square on its face by 4¾in deep. Its unusual contours permit it to be positioned where no ordinary speaker could be used to advantage. The neat black matt finish with aluminium bar trim keep this speaker pleasantly in conformity with modern design trends.

Hear the Q.14 in your own home. If you are not delighted with it, send it back, and your money, including cost of return postage to this office will be refunded in full.

60–16,000Hz; 8 ohms impedance: loading up to 14 watts; acoustically contoured pressure chamber; brilliant transient response; polarised connections; detachable base.

£7.19.6



A fantastic performance curve

This independently made B & K curve shows results to compare favourably with much dearer speakers. It shows why the Q.14 performs as well. We cannot show transient response here — this is something you must hear for yourself. The quality is startlingly good. Impedance—8 ohms; loading up to 14 watts R.M.S.

SYSTEM 2000 HI-FI SYSTEM

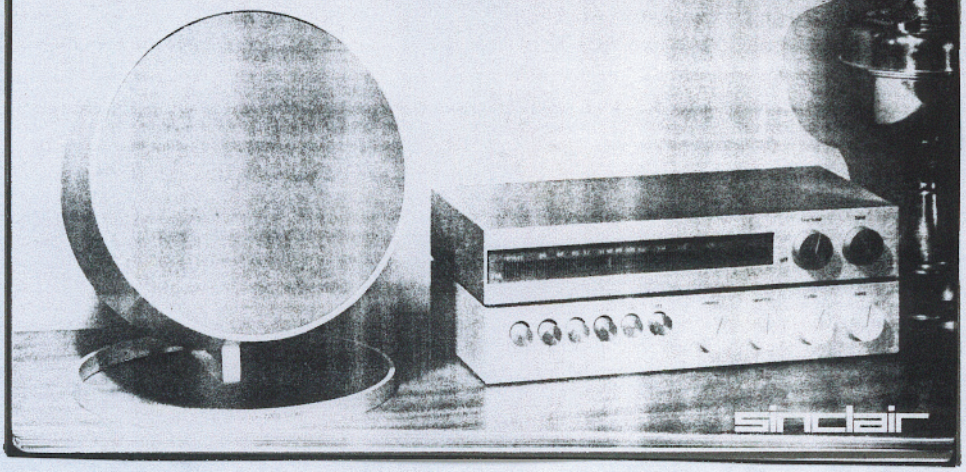
Sinclair launch their System 2000 range with the amplifier, tuner and speaker shown here. The tuner and amplifier are separate units which may be mounted together for convenience. Each is complete in itself and may be used with existing high fidelity equipment. The System 2000 uses new components and ingenious construction in ways which reduce costs, increase performance and improve reliability.

For example look at the circuits of most F.M. tuners and you will find that they vary very little. Look at the System 2000 tuner. You will notice the absence of conventional coils. They have become an integral part of the printed circuit and never need adjustment—another step in increasing reliability and reducing the final price.

Almost all other tuners use the Foster-Seeley discriminator or the ratio detector. The System 2000 tuner uses a pulse counting discriminator. This is free from drift and possesses a lower level of distortion than any other system. Inter-station noise suppression, mains tuning and stereo indicators together with a sensitivity for full limiting of an incredible 3 microvolts are all incorporated. An additional attractive feature is provision for plug-in remote and switched tuning units (available separately). The amplifier and loudspeaker are equally outstanding and well worth comparing for yourself. Ask your dealer for a demonstration or write or ring us for a leaflet.

System 2000 35 watt Integrated Stereo Amplifier 29 gns
System 2000 F.M. Tuner 25 gns
Plug-in stereo decoder 4 gns
System 2000 8 ohm loudspeaker 12 gns

Sinclair Radionics Limited, 22 Newmarket Road, Cambridge. Tel. Cambridge 52996



PZ5/6/7/8 POWER SUPPPIES

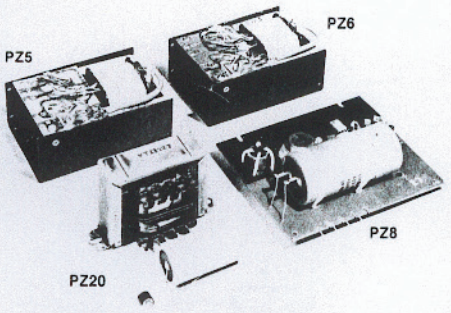
Power supplies

There are four power supplies available from Sinclair. The PZ5, PZ6 and PZ8 are designed for use with the Project 80 range and the PZ20 for use with the IC20.

The power supply selected for the Project 80 modules will depend upon the level of sophistication and power output required. For full output with two Z60s, the PZ8 is necessary.

PZ5
A simple unstabilized supply suitable for a pair of Z40's in a simple set up. Output voltage 30 volts.

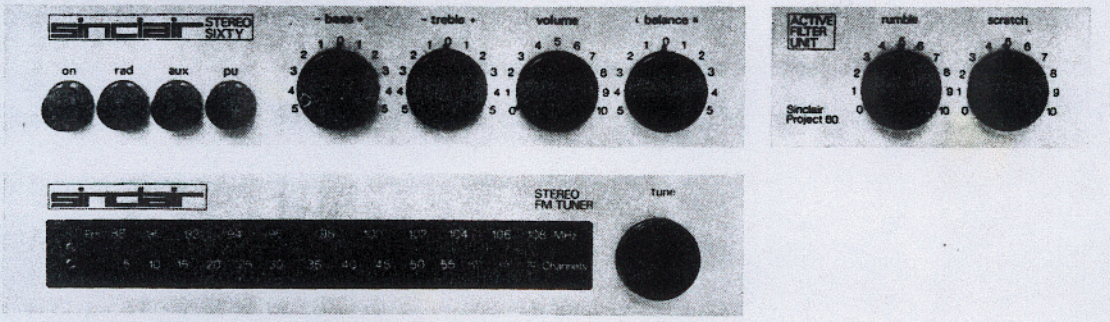
PZ20
This power supply is specifically for the IC20 stereo amplifier, and consists of a transformer, bridge rectifier, and reservoir capacitor. The bridge rectifier and capacitor should be mounted on the IC20 pcb in the positions provided, and the transformer mounted separately, wherever convenient.



PZ6
A 35-volt stabilized supply recommended for set ups which include a tuner.

PZ8
The top-of-the-line power supply from Sinclair. A stabilized 50-volt (adjustable) unit utilising re-entrant current limiting, which makes damage from overload or even direct short circuiting very unlikely. This principle has never before been incorporated in commercially available constructor modules. The PZ8 requires a mains transformer which will supply approximately 2 amps at 40-50 volts ac.

Project 60



the world's most advanced high fidelity modules

With the introduction of an entirely new and original high fidelity stereo F.M. tuner, the Project 60 range can be said at this stage to be complete. It offers the constructor a most attractive choice of modular arrangements whereby a high fidelity system can be selected to suit the user's personal requirements. Equally, it is possible to use any Project 60 modules separately or partially grouped and so benefit greatly from the flexibility in use these modules afford. The chart below shows some of the most popular applications for constructors to assemble. The Project 60 manual (free with the modules) suggests others as well and its 48 pages are packed with valuable information. The new tuner, for example can be used with any good high fidelity system as well as Project 60.

Project 60 now falls into four interdependent groups :– 1. The Z.30 and Z.50 amplifiers which have only 0.02% distortion at all output levels and are useful in a wide variety of other applications. 2. The control units comprising the Stereo 60 preamp and control unit and the Active Filter Unit (A.F.U.) with which both high pass and low pass filtering can be introduced between control unit and power amplifiers. 3. The Stereo F.M. tuner as described opposite ; and 4. The power supply units PZ.5, PZ.6 and PZ.8. For most requirements when using Z.30 power amplifiers, the PZ.5 will be perfectly adequate ; if low efficiency (high quality) loud speakers are used, the PZ.6 stabilised power supply unit will be used. The PZ.8 will be needed with Z.50s which can be used for any Project 60 system.

Project 60 modules incorporate some of the most advanced circuitry in the world to achieve unsurpassed standards of high fidelity and modern manufacturing techniques enable these modules to be sold at exceptionally attractive prices. Assembling the modules requires no skill or previous experience since the manual supplied with the modules explains clearly how everything can be done with nothing more than the simplest of domestic tools.

Project 60 manuals

How to assemble and use Project 60 modules to best advantage in the above and other applications will be found in the fully descriptive Project 60 manual included with Project 60 systems. This 48 page manual is available separately, price 2/6d including postage.

	System	The Units to use	In conjuction with	Cost of Units	+ Project 60 tuner
A	Car Radio	**Z.30**	Existing car radio, Sinclair Micromatic	**89/6**	
B	Simple battery powered record player	**Z.30**	Crystal pick-up, 12V or more battery supply and volume control	**89/6**	
C	Mains powered record player	**Z.30 and PZ.5**	Crystal or ceramic P.U. Volume control etc.	**£9.9.0**	**£34.9.0**
D	20+20 watts R.M.S. stereo amplifier for most needs	**Two Z.30s, Stereo 60 and PZ.5**	Crystal, ceramic or magnetic P.U., most dynamic speakers, F.M. tuner etc.	**£23.18.0**	**£48.18.0**
E	20+20 watts R.M.S. stereo amplifier for use with low efficiency (high performance) speakers	**Two Z.30s, Stereo 60 and PZ.6**	High quality ceramic or magnetic P.U., F.M. Tuner, Tape Deck, etc All dynamic speakers	**£26.18.0**	**£51.18.9**
F	40+40 watts R.M.S. de-luxe stereo amplifier	**Two Z.50s, Stereo 60 PZ.8 and mains transformer**	As for E	**£32.17.6**	**£57.17.6**
G	Outdoor public address system	**Z.50**	Microphone, up to 4 P.A. speakers, 12V car battery with converter, or 45V d.c., controls	**£5.9.6**	
H	Indoor P.A.	**One Z.50, PZ.8 and mains transformer**	Microphone, guitar, heavy duty speakers etc., controls	**£17.8.6.**	
J	High pass and low pass filters	**A.F.U.**	D, E or F as above	**£5.19.6**	

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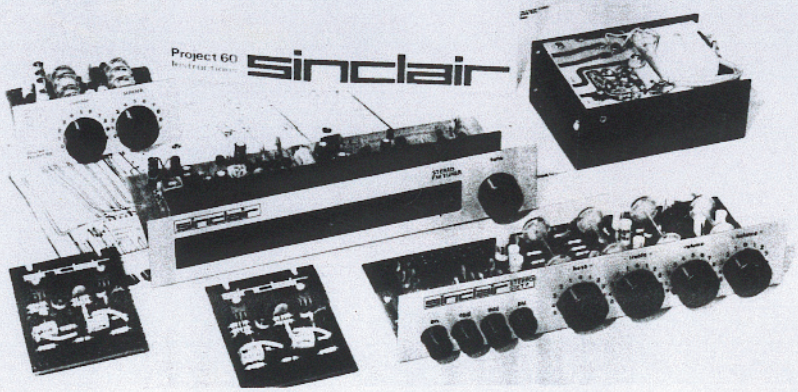
Sinclair Radionics Limited, London Road, St. Ives, Huntingdonshire
Telephone: (04806) 4311

Sinclair Project 60



the world's most advanced high fidelity modules

Sinclair Project 60 presents high fidelity in such a way that it meets every requirement of performance, design, quality and value and now that the remarkable phase lock loop stereo FM tuner is available, it becomes the most versatile of high fidelity systems. With Project 60, it is possible to start with a modest mono record reproducer and expand it to a sophisticated stereophonic radio and record reproducing system of fantastically good quality to hold its own with any other equipment, no matter how expensive. Project 60 is a unique high fidelity module system where compactness and ease of assembly are combined with circuitry that is far in advance of any other manufacturer in the world. Thus it is extraordinarily easy to assemble any combination of modules using nothing more complicated than the simplest of tools, and you certainly do not have to be experienced to build with complete confidence. The 48 page manual free with Project 60 equipment makes everything easy and you can house your assembly in an existing cabinet, motor plinth, free standing cabinet or virtually any arrangement you wish. Once you have completed your assembly you will have superlatively good equipment to give you years of service and enjoyment. You will have obtained superb value for money because Project 60 is the best selling modular system in Europe and can therefore be produced at extremely competitive prices and with excellent quality control.

	System	The Units to use	together with	Cost of Units
A	Simple battery record player	**Z.30**	Crystal P.U., 12V battery volume control	**£4.48**
B	Mains powered record player	**Z.30, PZ.5**	Crystal or ceramic P.U. volume control etc.	**£9.45**
C	20+20 W. R.M.S. stereo amplifier for most needs	**2 x Z.30s, Stereo 60, PZ.5**	Crystal, ceramic or mag. P.U., most dynamic speakers, F.M. tuner etc.	**£23.90**
D	20+20 W. R.M.S. stereo amplifier with high performance spkrs.	**2 x Z.30s, Stereo 60, PZ.6**	High quality ceramic or magnetic P.U., F.M. Tuner, Tape Deck, etc.	**£26.90**
E	40+40W. R.M.S. de-luxe stereo amplifier	**2 x Z.50s, Stereo 60 PZ.8, mains trsfrmr**	As for D	**£34.88**
F	Outdoor P.A. system	**Z.50**	Mic., up to 4 P.A. speakers controls, etc.	**£5.48**
G	Indoor P.A.	**Z.50, PZ.8, mains transformer**	Mic., guitar, speakers, etc., controls	**£19.43**
H	High pass and low pass filters	**A.F.U.**	C, D or E	**£5.98**
J	Radio	**Stereo F.M. Tuner**	C, D or E	**£25.00**

Sinclair Radionics Ltd., London Road, St. Ives, Huntingdonshire PE17 4HJ.
Tel: St. Ives (048 06) 4311

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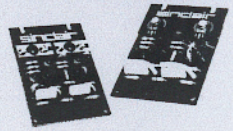
Sinclair Project 60

Z.30 & Z.50 power amplifiers



The Z.30 and Z.50 are of advanced design using silicon epitaxial planar transistors to achieve unsurpassed standards of performance. Total harmonic distortion is an incredibly low 0.02% at full output and all lower outputs. Whether you use Z.30 or Z.50 amplifiers in your Project 60 system will depend on personal preference, but they are the same size and may be used with other units in the Project 60 range equally well.

SPECIFICATIONS ***(Z50 units are interchangeable with Z.30s in all applications).***
Power Outputs
Z.30 15 watts R.M.S. into 8 ohms using 35 volts; 20 watts R.M.S. into 3 ohms using 30 volts.
Z.50 40 watts R.M.S. into 3 ohms using 40 volts; 30 watts R.M.S. into 8 ohms, using 50 volts.
Frequency response: 30 to 300 000 Hz ±1dB.
Distortion: 0.02% into 8 ohms.
Signal to noise ratio: better than 70dB unweighted.
Input sensitivity: 250mV into 100 Kohms.
For speakers from 3 to 15 ohms impedance.
Size 3½ x 2¼ x ½ in.

Z.30
Built, tested and guaranteed with circuits and instructions manual **£4.48**

Z.50
Built, tested and guaranteed with circuits and instructions manual. **£5.48**

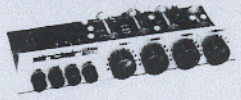
Power Supply Units

Designed specially for use with the Project 60 system of your choice.
Illustration shows PZ.5 to left and PZ.8 (for use with Z.50s) to the right. Use PZ.5 for normal Z.30 assemblies and PZ.6 where a stabilised supply is essential.
PZ-5 *30 volts unstabilised* **£4.98**
PZ-6 *35 volts stabilised* **£7.98**
PZ-8 *45 volts stabilised (less mains transformer)* **£7.98**
PZ-8 *mains transformer* **£5.98**

Guarantee

If within 3 months of purchasing Project 60 modules directly from us, you are dissatisfied with them, we will refund your money at once. Each module is guaranteed to work perfectly and should any defect arise in normal use we will service it at once and without any cost to you whatsoever provided that it is returned to us within 2 years of the purchase date. There will be a small charge for service thereafter. No charge for postage by surface mail. Air-mail charged at cost.

Stereo 60 pre-amp/control unit



Designed for the Project 60 range but suitable for use with any high quality power amplifier. Again silicon epitaxial planar transistors are used throughout, achieving a really high signal-to-noise ratio and excellent tracking between channels. Input selection is by means of push buttons and accurate equalisation is provided for all the usual inputs.

SPECIFICATIONS
Input sensitivities: Radio–up to 3mV. Mag. p.u. 3mV: correct to R.I.A.A. curve ± 1dB 20 to 25,000 Hz. Ceramic p.u.–up to 3mV: Aux–up to 3mV.
Output: 250mV
Signal-to-noise ratio: better than 70dB.
Channel matching: within 1dB.
Tone controls: TREBLE + 15 to —15dB at 10KHz. BASS — 15 to —15dB at 100Hz.
Front panel: brushed aluminium with black knobs and controls.
Size: 8¾ x 1¾ x 4 ins.
Built, tested and guaranteed. **£9.98**

Active Filter Unit

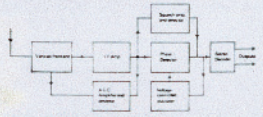
For use between Stereo 60 unit and two Z.30s or Z.50s, and is easily mounted. It is unique in that the cut-off frequencies are continuously variable, and as attenuation in the rejected band is rapid (12dB/octave), there is less loss of the wanted signal than has previously been possible. Amplitude and phase distortion are negligible. The A.F.U. is suitable for use with any other amplifier system. Two stages of filtering are incorporated – rumble (high pass) and scratch (low pass). Supply voltage – 15 to 35V. Current – 3mA. H.F. cut-off (–3dB) variable from 28k Hz to 5kHz. L.F. cut-off (–3dB) variable from 25Hz to 100Hz. Distortion at 1kHz (35V. supply) 0.02% at rated output.

Built, tested and guaranteed **£5.98**

Stereo FM Tuner

first in the world to use the phase lock loop principle
Before production of this tuner, the phase lock loop principle was used for receiving signals from space craft because of its vastly improved signal to noise ratio over other systems. Now, for the first time, the principle has been applied to an FM tuner with fantastically good results. Other original features include varicap diode tuning, printed circuit coils, an I.C. in the specially designed stereo decoder and squelch circuit for silent tuning between stations. Sensitivity is such that good reception becomes possible in difficult areas. Foreign stations can be tuned in suitable conditions and often a few inches of wire are enough for an aerial. In terms of a high fidelity this tuner has a lower level of distortion than any other tuner we know. Stereo broadcasts are received automatically as the tuning control is rotated, a panel indicator lighting up as the stereo signal is tuned in. This tuner can also be used to advantage with any other high fidelity system.

SPECIFICATIONS:
Number of transistors: 16 plus 20 in I.C.
Tuning range: 87.5 to 108 MHz
Capture ratio: 1.5dB
Sensitivity: 2µV for 30dB quieting; 7µV for full limiting.
Squelch level: 20µV.
A.F.C. range: ±200 KHz
Signal to noise ratio: >65dB
Audio frequency response: 10Hz—15KHz (±1dB)
Total harmonic distortion: 0.15% for 30% modulation
Stereo decoder operating level: 2µV
Pilot tone suppression: 30dB
Cross talk: 40dB
I.F. frequency: 10.7 MHz
Output voltage: 2 x 150mV R.M.S.
Aerial Impedance: 75 Ohms
Indicators: Mains on; Stereo on; tuning indicator
Operating voltage: 25-30 VDC
Size: 3.6 x 1.6 x 8.15 inches: 91.5 x 40 x 207 mm



Price £25 built and tested. Post free

To: SINCLAIR RADIONICS LTD LONDON ROAD ST. IVES HUNTINGDONSHIRE PE17 4HJ

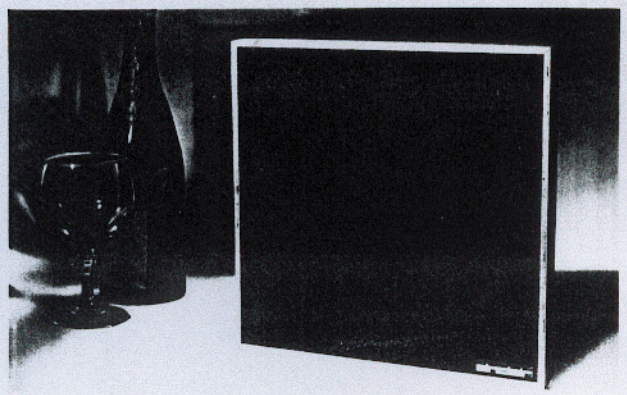
Please send

for which I enclose cash/cheque/money order.

Name

Address

Q-16 LOUDSPEAKER



SINCLAIR
Q.16 new elegance in a loudspeaker of outstandingly fine performance

All the superb features which went to make the Sinclair Q.14 have been incorporated in the new Q.16 which gives an exciting new opportunity for you to match your Sinclair equipment with modern decor. Employing the same well proven acoustic system in which materials, processing and styling are used in such a radical and successful departure from conventional design, the new Q.16 presents an entirely new appearance with its attractive teak surround and all-over special cellular foam front chosen as much for its appearance as for its ability to pass all audio frequencies without loss. The Q.16 is compact and slim. Its new styling makes it eminently suitable for shelf mounting, but it is no less versatile than its famous predecessor. Listen to a pair of Q.16s in stereo and marvel at the standards of quality and clarity they give.

The Q.16 will handle loading up to 14 watts R.M.S. and presents an 8 ohm impedance to the amplifier output. Frequency response extends from 60 to 16,000 Hz, with exceptional smoothness. A specially designed driver system is used in a sealed and contoured pressure chamber to ensure good transient response at all frequencies. Size: 9½" square × 4½" deep from front to back.

£8.19.6

SINCLAIR GENERAL GUARANTEE
Should you not be completely satisfied with your purchase when you receive it from us, return the goods without delay and your money will be refunded in full, including cost of return postage, at once and without question. Full service facilities are available to all Sinclair customers.

SINCLAIR RADIONICS LIMITED
22 NEWMARKET RD., CAMBRIDGE Tel: 0223 52731

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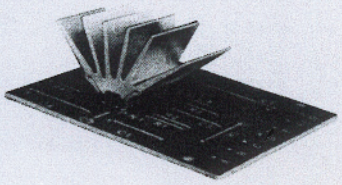
IC-12 INTEGRATED CIRCUIT AMPLIF.

Super IC.12 Integrated circuit high fidelity amplifier



Having introduced Integrated Circuits to hi-fi constructors with the IC.10, the first time an IC had ever been made available for such purposes, we have followed it with an even more efficient version, the Super IC.12, a most exciting advance over our original unit. This needs very few external resistors and capacitors to make an astonishingly good high fidelity amplifier for use with pick-up, F.M. radio or small P.A. set up, etc. The free 40 page manual supplied, details many other applications which this remarkable IC. make possible. It is the equivalent of a 22 transistor circuit contained within a 16 lead DIL package, and the finned heat sink is sufficient for all requirements. The Super IC.12 is compatible with Project 60 modules which would be used with the Z.50 and Z.30 amplifiers. Complete with free manual and printed circuit board.

SPECIFICATIONS

Output power: 6 watts RMS continuous (12 watts peak). 6–8Ω. **Frequency Response:** 5Hz to 100KHz ± 1dB. **Total Harmonic Distortion:** Less than 1%. (Typical 0·1%) at all output powers and frequencies in the audio band (28V). **Load Impedance:** 3 to 15 ohms. **Input Impedance:** 250 Kohms nominal. **Power Gain:** 90dB (1,000,000,000 times) after feedback. **Supply Voltage:** 6 to 28V. **Quiescent current:** 8mA at 28V. **Size:** 22 × 45 × 28mm including pins and heat sink..

Manual available separately 15p post free.

With FREE printed circuit board and 40 page manual.

£2.98 Post free

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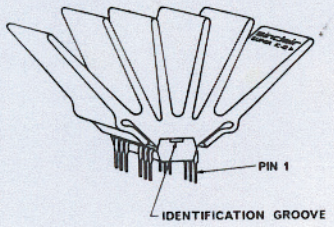
SUPER IC-12 Temporary Instructions

1 PIN IDENTIFICATION



2 IC-12 CIRCUIT DIAGRAM

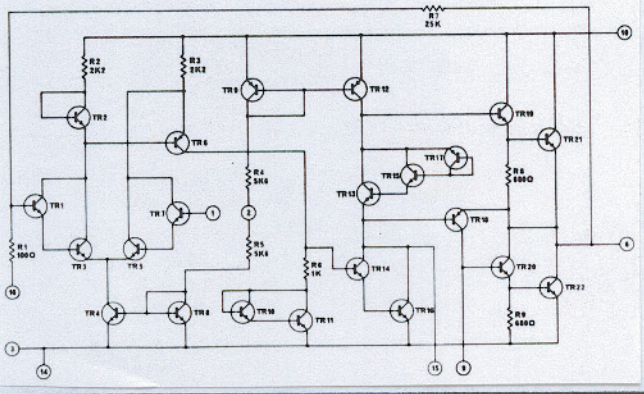
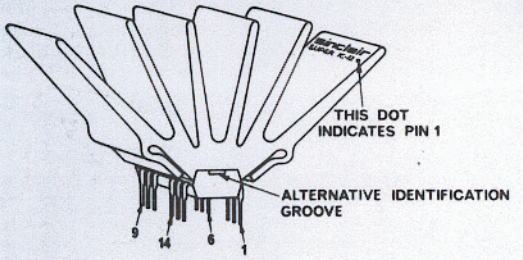


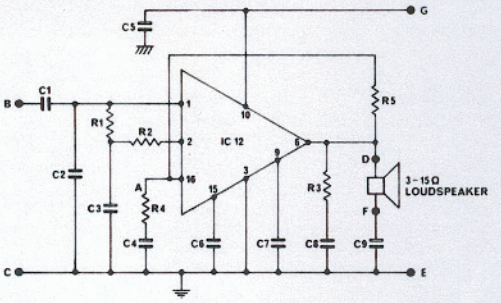
Fig. 1.3.



It is very important that the IC only be used mounted on the printed circuit board which is supplied with it: see section 3.1. and 13.I.

2. PCB ASSEMBLY

2.1. Circuit



(a) TYPICAL OPERATING CIRCUIT

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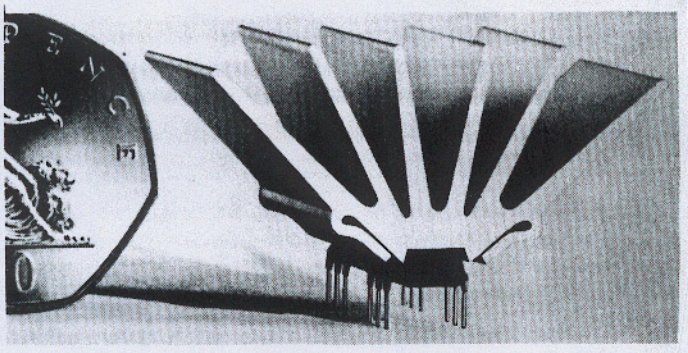
Super IC-12 Instructions



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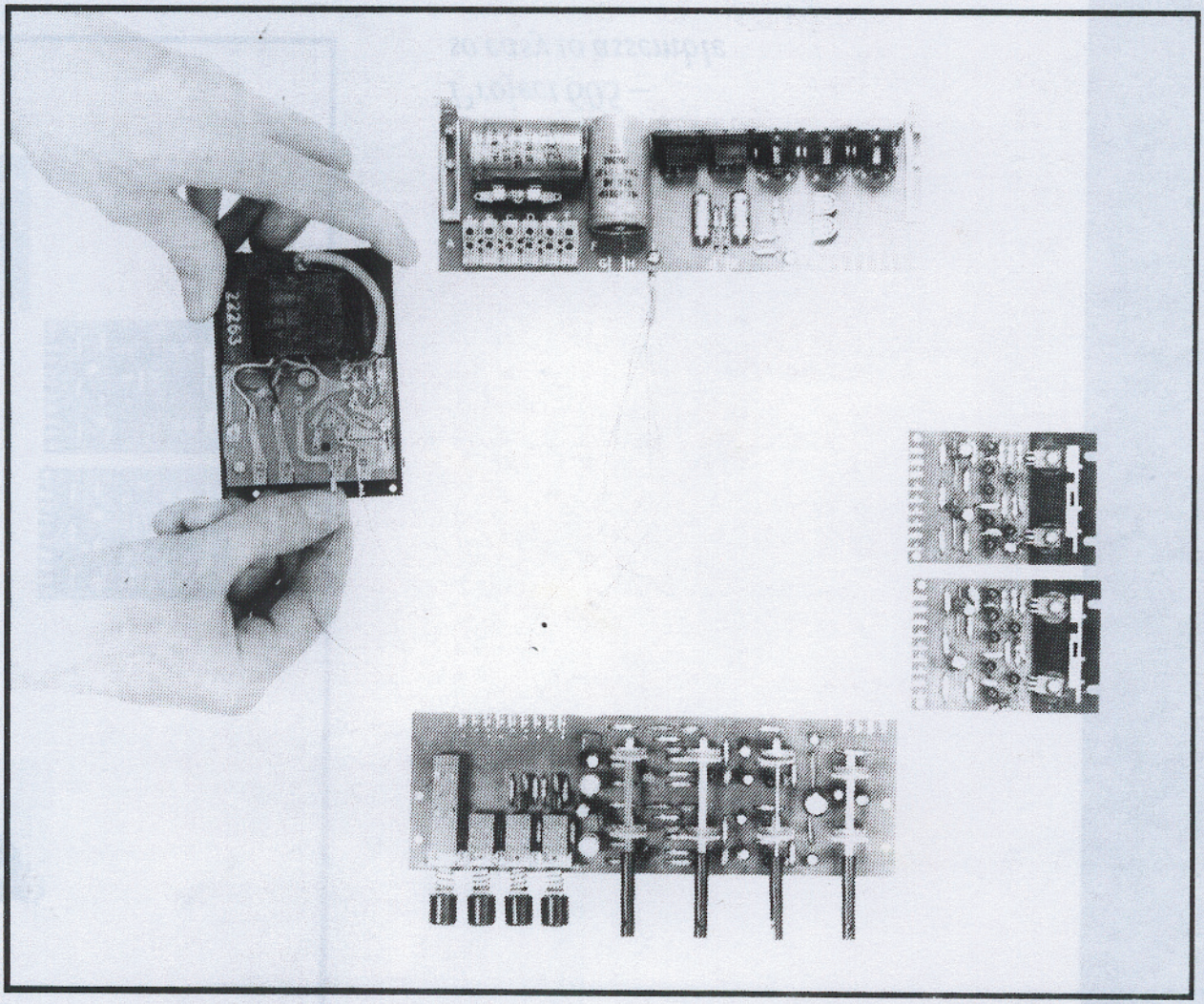
PROJECT 605 HI-FI PACK



Project 605

The easy way to buy and build Project 60

Project 605 is one pack containing: one PZ5, two Z30's, one Stereo 60 and one Masterlink. This new module contains all the input sockets and output components needed together with all necessary leads cut to length and fitted with neat little clips to plug straight on to the modules. Thus all soldering and hunting for the odd part is eliminated. You will be able to add further Project 60 modules as they become available adapted to the Project 605 method of connecting.

Complete Project 605 pack with comprehensive manual, post free £29.95

All you need for a superb 30 watt high fidelity stereo amplifier.

Project 605

the easy way to buy and build Project 60 without soldering

Project 605 in one pack contains: one PZ.5, two Z.30's, one Stereo 60 and one Masterlink, which has input sockets and output components grouped on a single module and all necessary leads cut to length and fitted with clips to plug straight on to the modules thus eliminating all soldering.

Complete with comprehensive manual, post free £29.95

All you need for a superb 30 watt high fidelity stereo amplifier

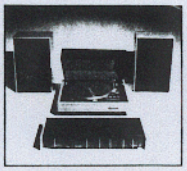
PROJECT 80 AMPLIFIER

An introduction to Project 80

- **Full high fidelity specifications**
- **Easy home assembly modular construction**
- **Expandable to a full quadraphonic system**

Up until now whenever you have felt a need to upgrade your sound quality, you have been faced with the problem of scrapping your existing amplifier and starting from scratch. Not any more. Project 80 expands with your pocket.

Start with a low cost high quality 12 watts RMS mono amplifier, perhaps built into the base of a turntable plinth. By simply adding another Z40 module you have gone stereo.



The next logical step would be to add the pre-amplifier/control unit which allows a wide variety of inputs and has volume, bass and treble controls. This addition also allows you to improve your record deck as it will accept a low output magnetic cartridge.

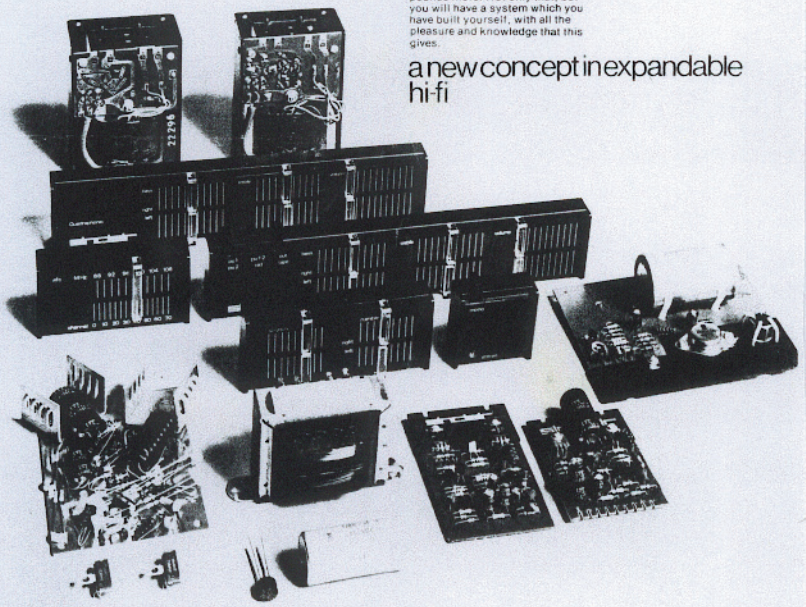
As you can afford it, increase the power either by substituting Z60's for Z40's which can give you 25 watts RMS per channel or by purchasing an additional two Z60's and power supply. Two Z60's per channel connected in 'bridge' formation could result in 30 watts RMS per channel.

And there is still a lot more you can add. A rumble/scratch filter which will improve old worn favourite records beyond belief (and will also help to eliminate rumble sometimes caused by a budget priced record deck). And an FM tuner, which reproduces VHF transmissions superbly, will further extend the range of your hi-fi equipment. No fading, crackles, pops, or other background noises; and combined with the decoder unit – stereo radio.

At this stage you would own a high quality stereo tuner amplifier comparable with the very best made up units costing pounds more. Not only that, but you will have a system which you have built yourself, with all the pleasure and knowledge that this gives.

Converting from stereo to quadraphonics? Nothing could be easier. Just add the Project 80 quadraphonic decoder (based on the CBS 'SQ' system), two more power amplifiers, and a power supply and you have a 'state of the art' audio system.

No good with a soldering iron? Then see page 6 where details are given of the P805 and P805SQ no-solder kits. These are complete modular amplifiers that retain the versatility of the Project 80 system, but each joint is made with ready supplied push-on connectors, with obvious advantages in ease of assembly and predictability of results.

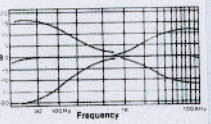


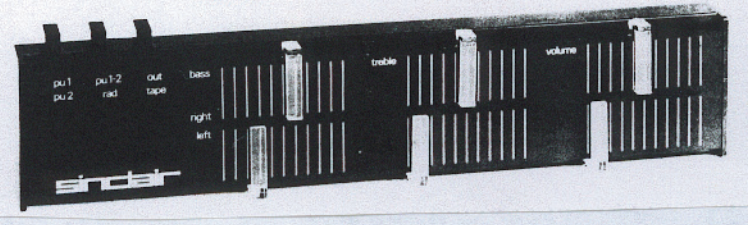
a new concept in expandable hi-fi

Project 80 Pre-amplifier

As with other Project 80 units, the Stereo 80 is mounted by means of bolts fixed at the rear which pass through holes drilled in the wood or plastic on which modules are to be mounted. All the electronics are contained within the 1" deep front panel! Connecting leads are taken away similarly out of sight. Each channel in the Stereo 80 has its own independent tone and volume controls operated by sliders. This enables exceptionally good environmental matching to be obtained. Provision is made for magnetic and ceramic pick-ups, radio, and tape in and out. A virtual earth input stage forms part of the up-dated circuitry of the Stereo 80 to ensure the finest possible quality from all signal sources. Generous overload margins are allowed on all inputs.

Technical specifications
Size 240 x 50 x 20 mm (9½ x 2 x ¾in)
Finish Black, with white markings
Inputs Mag PU3 mV RIAA corrected, ceramic PU 300 mV, radio 100 mV, tape 30 mV
Signal to noise ratio 60 dB
Frequency range 20 Hz to 15 kHz ± 1 dB; 10 Hz to 25 kHz ± 3 dB
Power requirements 20 to 35 volts
Outputs 100 mV + A/B monitoring for tape
Controls Press button for tape, radio and PU selection; volume, bass ± 12 dB to – 14 dB at 100 Hz; treble ± 11 dB to – 12 dB at 10 kHz

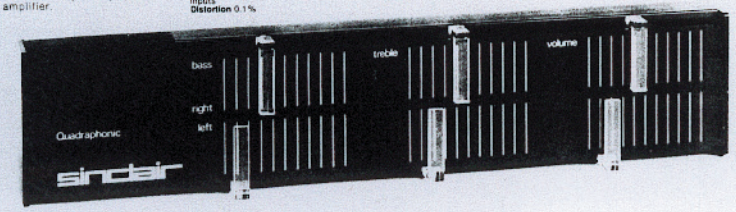




Project 80
Quadraphonic decoder

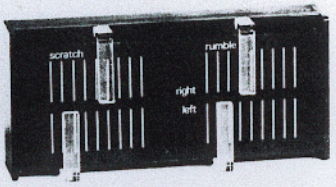
This module contains a quadraphonic SQ decoder and volume and tone controls for the rear two channels. It connects with tape socket on Stereo 80 or similar facility on any stereo amplifier.

Technical specification
Size 240 × 50 × 20 mm
Input sensitivity 40 mV for rated output
Rated output 160 mV
Frequency response 15 Hz to 25 kHz ± 3 dB
Overload factors 20 dB at 1 kHz on all inputs
Distortion 0.1%
Signal to noise ratio 56 dB
Bass control ± 10 dB at 100 Hz
Treble control ± 10 dB at 10 kHz
Output load impedance Not less than 25 kΩ
Power requirements 22 to 35 volts
Current consumption 15 mA at 30 volts
Phase shift network 90° ± 10% 100 Hz to 10 kHz
Provision is included for 4-channel discreet input.
The decoder has 10-40 blend included, which aids front to back separation.



Active filter unit

This efficiently designed unit makes a highly desirable part of any worthwhile system where inputs may be from record, radio or tape. As with the pre-amplifier, separate controls are applied to each channel thereby making it easier to obtain ideal stereo balance in any kind of indoor environment.



Technical specifications
Size 108 × 50 × 20 mm (4¼ × 2 × ¾ in)
Voltage gain Minus 0.2 dB
Frequency response 36 Hz to 22 kHz, controls minimum
Distortion At 1 kHz 0.03% using 30 volts supply
HF cut off (scratch) 22 kHz to 5.5 kHz 12 dB/oct slope
LF cut off (rumble) 28 dB at 20 Hz 9 dB/oct slope

FM tuner

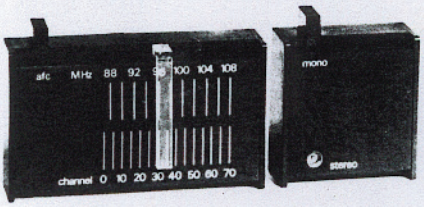
A truly remarkable tuner in every way – its unbelievably compact size – its original circuitry – its dependable performance – all this in a boldly designed modern case measuring 86 × 50 × 20 mm (3⅜ × 2 × ¾ in). To provide this drift-free ultra sharp performance, strong automatic frequency control is coupled with dual varicap electronic tuning, followed by a 4-pole ceramic filter IF section for extra selectivity. Greater adaptability (and possibly financial convenience) results from the tuner and stereo decoder section being made available separately.

Technical specifications
Size 86 × 50 × 20 mm (approx 3⅜ × 2 × ¾ in)
Tuning range 88 to 108 MHz
Detector IC balanced coincidence, for good AM rejection
AFC Switchable, with thermistor control to prevent drift
One 26 transistor IC
Dual varicap tuning
Distortion 0.3% at 1 kHz for 75 kHz deviation
Output 100 mV for 30% modulation
Ceramic filter in IF section
Aerial impedance 75 Ω or 240-300 Ω
Sensitivity 5 microvolts for 30 dB S/N
Power requirements 23-32 volts

Project 80
Stereo decoder

Making the Project 80 decoder separate from the FM tuner gives the constructor a wider choice of systems as well as saving money in cases where stereo reception may not be required. This unit gives a 30 dB channel separation with an output of 150 mV per channel. The gallium arsenide light emitting diode automatically lights up to show when a stereo transmission is tuned in. Designed essentially as an integral part of Project 80 systems, this multiplex stereo demodulator may be used in many cases with existing single channel frequency modulated tuners to provide stereo reception.

Size 47 × 50 × 20 mm (1⅞ × 2 × ¾ in)
One 19 transistor IC
Power requirements 23-30 volts



Power amplifiers

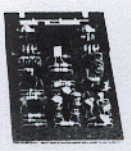
Z40 and Z60
Both the Z40 and the Z60 power amplifiers are intended for use in Project 80 installations, although of course, they are readily adaptable to an even wider range of applications. Both Z40 and Z60 incorporate built-in protection against short-circuiting and risk of damage arising from mis-use is greatly reduced. The very low distortion (0.03% typically for the Z60) gives the Project 80 range its characteristics clean and open sound.

IC20
This is an integrated circuit stereo amplifier which is in true kit form (that is it comes as individual components which have to be soldered onto a printed circuit board). The integrated circuits are fully protected against short circuits and thermal overload.

Z40
Technical specifications
Size 55 × 50 × 20 mm (2⅛ × 1¾ × ¾ in) 8 transistors
Input sensitivity 100 mV
Output 18 watts RMS continuous into 4 Ω (36 volts)
Frequency response 30 Hz-100 kHz ± 1 dB
Signal to noise ratio 64 dB
Distortion At 10 watts into 8 Ω less than 0.1%

Z60
Technical specifications
Size 55 × 98 × 20 mm (2⅛ × 3⅞ × ¾ in) 12 transistors
Input sensitivity 100 mV for rated output ± 1 dB
Output 25 watts RMS into 8 Ω (50 volts)
Distortion Typically less than 0.1%
Frequency response Better than 10 Hz to 200 kHz ± 1 dB
Signal to noise ratio Better than 70 dB
Built-in protection against transient overload and short circuit
Load impedance 4 Ω min

IC20
Technical specifications
Supply voltage Absolute maximum 24 volts
Current consumption 24 volts no signal 20 mA 18 volts 9 watts into 4 ohm 770 mA
Load impedance 4 ohm or 8 ohm
Input sensitivity For 9 watts into 4 ohm 90 mV
Voltage gain × 70 (37 dB)
Frequency response – 3 dB @ 40 Hz and 15 kHz
Distortion 4 ohm load, 50 mW to 5 watts 0.3%
Protection Short circuit and thermal overload



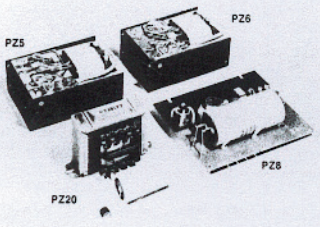
Power supplies

There are four power supplies available from Sinclair. The PZ5, PZ6 and PZ8 are designed for use with the Project 80 range and the PZ20 for use with the IC20.

The power supply selected for the Project 80 modules will depend upon the level of sophistication and power output required. For full output with two Z60s, the PZ8 is necessary.

PZ5
A simple unstabilized supply suitable for a pair of Z40's in a simple set up. Output voltage 30 volts.

PZ20
This power supply is specifically for the IC20 stereo amplifier, and consists of a transformer, bridge rectifier, and reservoir capacitor. The bridge rectifier and capacitor should be mounted on the IC20 pcb in the positions provided, and the transformer mounted separately, wherever convenient.

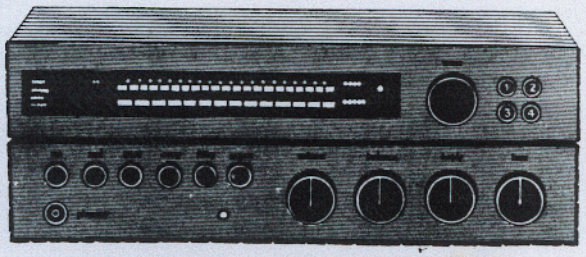


PZ6
A 35-volt stabilized supply recommended for set ups which include a tuner.

PZ8
The top-of-the-line power supply from Sinclair. A stabilized 50-volt (adjustable) unit utilising re-entrant current-limiting which makes damage from overload or even direct short circuiting very unlikely. This principle has never before been incorporated in commercially available constructor modules. The PZ8 requires a mains transformer which will supply approximately 2 amps at 49-50 volts ac.

SYSTEM 4000 AMPLIFIER

Sinclair System 4000



The watts...

Black, beautiful, and incredibly good value. Sinclair's two self-contained hi-fi units – in one handsome, elegant style.

A 17 watts per channel amplifier and a matching FM tuner.

The amplifier offers 17 W RMS per channel output... 0.05% total harmonic distortion... and a price tag of around £50.

The System 4000 tuner completes a handsome, hard-working system.

Engineered and designed to accompany the System 4000 stereo amplifier, the FM tuner matches it in specification and design – and at around £40 completes a system of outstanding value.

and the wherefores.

Get the full technical specifications...

See what impartial hi-fi journals thought of its performance...

And read up on the rest of the Sinclair range...

It's all in the Sinclair hi-fi range fact-file.

Send for Sinclair's fact-file now!

See if the answer's here – the information on the component you've been looking for.

Simply cut the coupon and send it to the no-stamp-needed FREEPOST address below.

We'll send you the Sinclair fact-file – giving you all you need to know about System 4000, and the rest of the Sinclair hi-fi range.

Plus information about a few extras you're sure to find rather interesting.

You've plenty to gain... so cut the coupon now!

Sinclair Radionics Ltd,
London Road, St Ives,
Huntingdon, Cambs., PE17 4HJ
St Ives (0480) 64646

Please send me the Sinclair range fact-file immediately

Name _____

Address _____

_____

EE/9/4K

To: Sinclair Radionics Ltd,
FREEPOST, St Ives,
Huntingdon, Cambs., PE17 4BR

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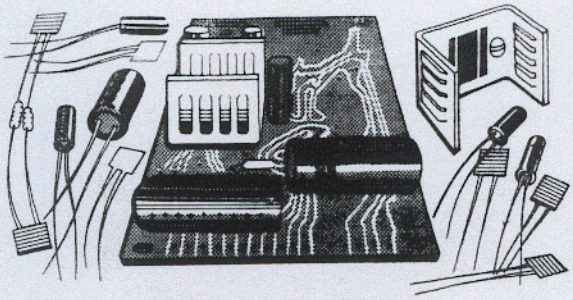
sinclair

Sinclair IC20



The watts...

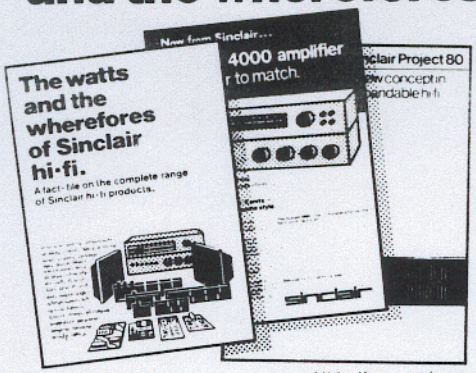
The Sinclair IC20 is a revolutionary new 20 watts stereo amplifier kit.

It incorporates state-of-the-art integrated circuits – two monolithic silicon chips each containing the equivalent of over 20 transistors! These deliver 10 W per channel into 4 Ω speakers.

And the IC20 has integral short-circuit protection and thermal cut-out – it's virtually indestructible. Use it for converting your mono record player to stereo... for upgrading your existing stereo... or for improving your car radio/tape player.

Its cost? Only £7.95 + VAT!

and the wherefores.



Get the full technical specifications...

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St Ives (0480) 64646

Please send me the Sinclair range fact-file immediately

Name

Address

EE/9/1C

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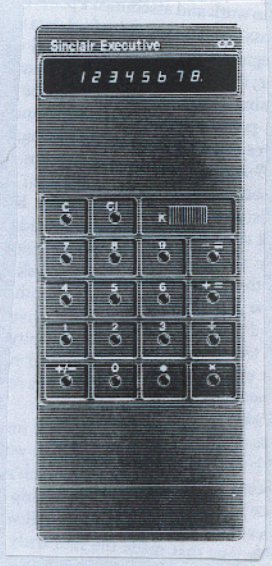


CALCULATORS AGE

The first electronic pocket calculator in the world was put on the market by **HEWLETT PACKARD** an American manufacturer which managed to introduce its ***model 35*** in July 1972 beating the Sinclair **Executive** by some three months. At the time when the smallest portable calculator was of the *palm* size type (SHARP EL-8), both these efforts were a real revolution. The Sinclair revolution was mainly due to a new Texas Instruments chip (TLS 1802) but the real reason was the new kind of *pulsing* power supply which allowed a much smaller and cheaper circuit to be developed and marketed. This was necessary and vital to reduce the power supply to the then current thirsty LEDs (light emitting diodes) used for the display.

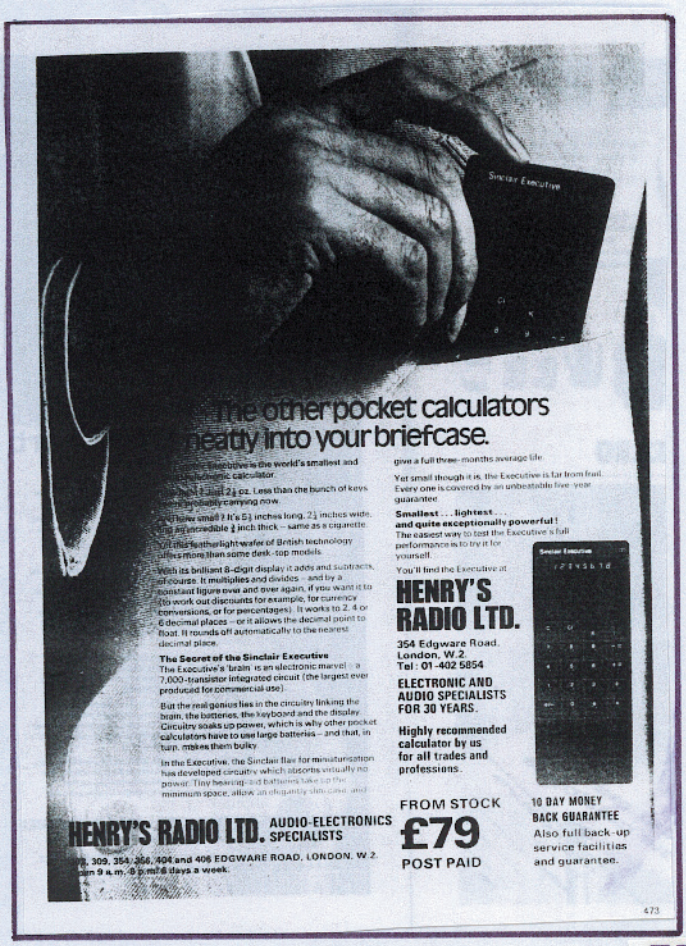
To-day the Executive is on show at the Museum of Modern Art in New York. Even the chip manufacturer was impressed, as their own model using the same chip was larger, thicker, longer and more expensive.

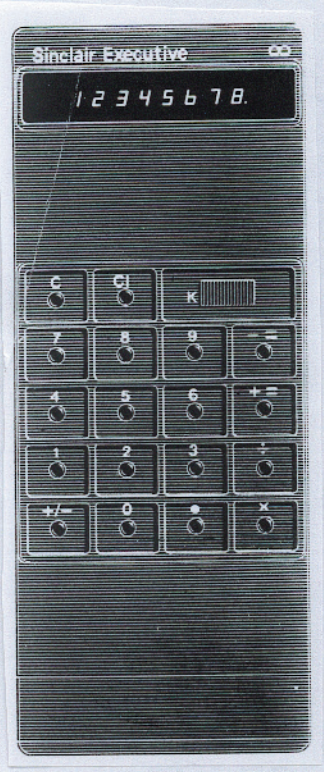
Afterwards the Executive Sinclair produced the **Cambridge** which, with all its variations and models, must have been the most well known pocket calculator in Great Britain at the time (and may be even to-day).

After having produced many more models and even one for the American safety razor manufacturer GILLETTE, (model similar to the **Oxford 100**) sales began to slow down all over the world. Another craze was fading away to leave room for the cheaper and mass produced LCD (liquid crystal display) calculator of to-day.

Soon before abandoning the market for more profitable lines, Sinclair managed to produce the **Enterprise** and the sleek designed **Sovereign** model which won the Design Council Award for 1977.

EXECUTIVE POCKET CALCULATOR





G2

The other pocket calculators fit neatly into your briefcase.

The Sinclair Executive is the world's smallest and lightest electronic calculator.

How light? Just $2\frac{1}{2}$ oz. Less than the bunch of keys you're probably carrying now.

And how small? It's $5\frac{1}{2}$ inches long, $2\frac{1}{4}$ inches wide, and an incredible $\frac{3}{8}$ inch thick – same as a cigarette.

Yet this featherweight wafer of modern technology offers more than some desk-top models.

With its brilliant 8-digit display it adds and subtracts, of course. It multiplies and divides – and by a constant figure over and over again, if you want it to (to work out discounts for example, for currency conversions, or for percentages). It works to 2, 4 or 6 decimal places – or it allows the decimal point to float. It rounds off automatically to the nearest decimal place.

The secret of the Sinclair Executive
The Executive's 'brain' is an electronic marvel – a 7,000-transitor intergrated circuit (the largest ever produced for commercial use).

But the real genius lies in the circuitry linking the brain, the batteries, the keyboard and the display. Circuitry soaks up power, which is why other pocket calculators have to use large batteries – and that, in turn, makes them bulky.

In the Executive, the Sinclair flair for miniaturisation has developed circuitry which absorbs virtually no power. Tiny hearing-aid batteries take up the minimum space and, used from time to time during the day, will last for several weeks.

Yet small though it is, the Executive is far from frail. Every one is covered by a five-year guarantee.

Smallest . . . lightest . . .
exceptionally powerful . . .
and easy to test for yourself!

You'll find the Executive at all of the stores listed, and at other leading shops. Ask to handle one, and put it through any performance test you please. See how easily it slips into a pocket – and compare it with other 'pocket' calculators.

sinclair

Kilroy Brothers Ltd,
Shanower Road, Whitehall, Dublin 9
Telephone: Dublin 379961
Distributors for the Republic of Ireland

CAMBRIDGE POCKET CALCULATOR

The Sinclair Cambridge... no other calculator is so powerful and so compact.

Complete kit–£29·95! (INC.VAT)

The Cambridge – new from Sinclair
The Cambridge is a new electronic calculator from Sinclair, Europe's largest calculator manufacturer. It offers the power to handle the most complex calculations, in a compact, reliable package. No other calculator can approach the specification below at anything like the price – and by building it yourself you can save a further £14!

Truly pocket-sized
With all its calculating capability, the Cambridge still measures just $4\frac{1}{2}$" x 2" x $\frac{11}{16}$". That means you can carry the Cambridge wherever you go without inconvenience – it fits in your pocket with barely a bulge. It runs on ordinary U16 batteries which give weeks of life before replacement.

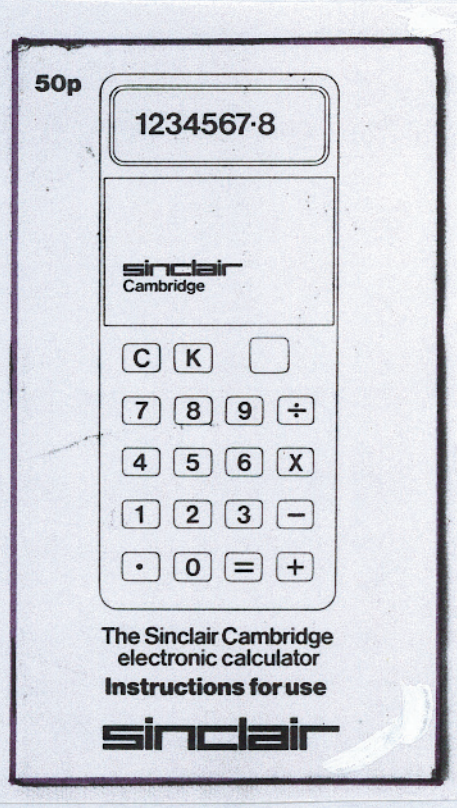
Easy to assemble
All parts are supplied – all you need provide is a soldering iron and a pair of cutters. Complete step-by-step instructions are provided, and our service department will back you throughout if you've any queries or problems.

The cost? Just £29·95!
The Sinclair Cambridge kit is supplied to you direct from the manufacturer – you can't get it anywhere else. Ready assembled, it costs £43·95 – so you're saving £14! Of course we'll be happy to supply you with one ready-assembled if you prefer – it's still far and away the best calculator value on the market.

Features of the Sinclair Cambridge
- Uniquely handy package. $4\frac{1}{2}$" x 2" x $\frac{11}{16}$", weight $3\frac{1}{2}$ oz.
- Standard keyboard. All you need for complex calculations.
- Clear-last-entry feature.
- Fully-floating decimal point.
- Algebraic logic.
- Four operators (+, –, x, ÷), with constant on all four.
- Constant acts as last entry in a calculation.
- Constant and algebraic logic combine to act as a limited memory, allowing complex calculations on a calculator costing less than £30.
- Calculates to 8 significant digits, with exponent range from 10^{-99} to 10^{99}.
- Clear, bright 8-digit display.
- Operates for weeks on four U16 batteries. (Replacement set costs about 15p.)

Sinclair Cambridge
Operations Summary

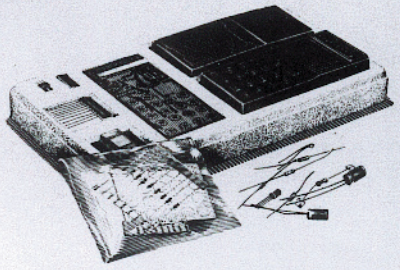
y^n **y = K × × .. × (n–1 times)**
y^{n-m} **y = K × × .. × (n–l) C K × × .. × (m–l)**
l/y y = K ÷ ÷
– y y = K – –
l/(a + b) C a + b = K ÷ ÷
c/(a + b) C a + b – K c ÷
a.b/(a + b) C b ÷ a + l ÷ b = K ÷ ÷
l – y^x C y – K × C K l –
l/y^x – l C y – K ÷ ÷ ÷ C – l
(p × P) + (q × Q)
+ (r × R) + ... P × p ÷ q + Q × q ÷ r + R × r ÷ ...
$p^n + q^n + r^n$ p × p ÷ q + q × q ÷ r + r × r
p/P + q/Q + r/R p ÷ P × Q + q ÷ Q × R + r ÷ R
$a_n + a_n y +$
$a_n y^n + a_n y^n$ **a_n × y + a_n × y + a_n × y + a_n**
√y C z (guess) = K y ÷ + C ÷ 2 –
$y^{1/n}$ C z –
K y ÷ ÷ .. ÷ (n–l) + + .. + (n–l) C ÷ n =
e = 2.7182818
e^y $0 \leq y \leq 1$ $\frac{2.08 + y}{2.08 - y}$
y ÷ 5 + l × y ÷ 4 + l × y ÷ 3 + l × y ÷ 2 + l × y + l =
$\log_e y$ y > e divide by e; add 1 to final result
y < 1 multiply by e; subtract 1 from final result
l ≤ y ≤ e (i) $\frac{y - 1}{y + 1}$ × 2.08
(ii) C 1.1051709 = K y ÷ ÷ .. ÷ y^4 p
C 1.0100501 = K y^4 ÷ ÷ .. ÷ y^{32} q
C 1.0010004 = K y^2 ÷ ÷ .. ÷ y^{128} r
Result: .pqr + y^{127} – l
$\log_{10} y$ $\log_e y \div \log_e 10$
10^ $\sqrt[x]{y - \log_e 10}$
$\log_e 10$ = 2.3025851



A complete kit!

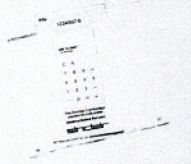
The kit comes to you packaged in a heavy-duty polystyrene container. It contains all you need to assemble your Sinclair Cambridge.
Assembly time is about 3 hours.

Contents:
1. Coil.
2. Large-scale integrated circuit.
3. Interface chip.
4. Thick-film resistor pack.
5. Case mouldings, with buttons, window and light-up display in position.
6. Printed circuit board.
7. Keyboard panel.
8. Electronic components pack (diodes, resistors, capacitors, transistor).
9. Battery clips and on/off switch.
10. Soft wallet.



This valuable book – free!
If you just use your Sinclair Cambridge for routine arithmetic – for shopping, conversions, percentages, accounting, tallying, and so on – then you'll get more than your money's worth.

But if you want to get even more out of it, you can go one step further and learn how to unlock the full potential of this piece of electronic technology.



How? It's all explained in this unique booklet, written by a leading calculator design consultant. In its fact-packed 32 pages it explains, step by step, how you can use the Sinclair Cambridge to carry out complex calculations like:

Logs	Sines	Cosines
Tangents	Reciprocals	nth roots
Currency conversion	Compound interest	

and many others.

sinclair

Sinclair Radionics Ltd, London Road, St Ives, Huntingdonshire
Reg. no. 699443 England
VAT Reg. no. 213 8110 88

AUGUST 1973

Why only Sinclair can make you this offer
The reason's simple: only Sinclair – Europe's largest electronic calculator manufacturer – have the necessary combination of skills and scale.

Sinclair Radionics are the makers of the Executive – the smallest electronic calculator in the world. In spite of being one of the more expensive of the small calculators, it was a runaway best-seller. The experience gained on the Executive has enabled us to design and produce the Cambridge at this remarkably low price.

But that in itself wouldn't be enough. Sinclair also have a very long experience of producing and marketing electronic kits. You may have used one, and you've almost certainly heard of them – the Sinclair Project 60 stereo modules.

It seemed only logical to combine the knowledge of do-it-yourself kits with the knowledge of small calculator technology.
And *you* benefit!

Take advantage of this money-back, no-risks offer today
The Sinclair Cambridge is fully guaranteed. Return your kit within 10 days, and we'll refund your money without question. All parts are tested and checked before despatch – and we guarantee a correctly-assembled calculator for one year.

Simply fill in the preferential order form below and slip it in the post today.

Price in kit form: £27·23 + £2·72 VAT. (Total: £29·95)
Price fully built: £39·95 + £4·00 VAT. (Total: £43·95)

REC 873

To: Sinclair Radionics Ltd, London Road, St Ives, Huntingdonshire, PE17 4HJ

Please send me _____ Name _____

☐ a Sinclair Cambridge calculator kit at £27·23 + £2·72 VAT (Total: £29·95)

☐ a Sinclair Cambridge calculator ready built at £39·95 + £4·00 VAT (Total: £43·95)

Address _____

*I enclose cheque for £_____, made out to Sinclair Radionics Ltd, and crossed.

*Please debit my *Barclaycard/Access account. Account number _____

*Delete as required. PLEASE PRINT

9

The Sinclair Cambridge: more features for your money.

Today you expect certain features in a pocket calculator – 8 digits, a four-function constant, algebraic logic – and yet it's exceptional to find them all in one machine.

Particularly one as handy as the Sinclair Cambridge.

Like every Sinclair calculator, the Cambridge stands out. No other calculator looks like it. No other calculator feels like it.

No other calculator gives you the same refined, comprehensive package of operating features at anything like the price.

It's not surprising that the Cambridge is a world best-seller.

Features of the Sinclair Cambridge

8-digit display. Full zero suppression on results. Exclusive ultra-violet screen gives extra visibility in bright light.

Fully-floating decimal point. Positions itself automatically throughout chain calculations.

C and CE button. To clear machine or clear last entry.

Positive keyboard. Keys operate with an audible click – no need to check display to see whether an entry has registered.

Algebraic logic. Allows completely straightforward entry of calculations – even of the type 10−6=. (Many calculators still require you to enter 10±6≡ or 10+6≡.)

Constant on all four functions. Powerful constant operated by separate 'K' button makes child's play of percentages, VAT (sales tax), metric and currency conversions.

Pocket-sized. $4\frac{1}{3}'' \times 2'' \times \frac{11}{16}''$. Weight: $3\frac{1}{2}$ oz. Trim-fit plastic carrying case.

Battery life. 4 AAA batteries give weeks of normal use.

Comprehensive 1-year guarantee.

EXECUTIVE MEMORY POCKET CALC.

The classic Executive Memory: precise, powerful, elegant.

In its distinctive black-and-white livery, the Executive Memory is still the slimmest, lightest, best-looking pocket calculator in the world.

Features of the Sinclair Executive Memory

8-digit display.

Fully-floating decimal point.

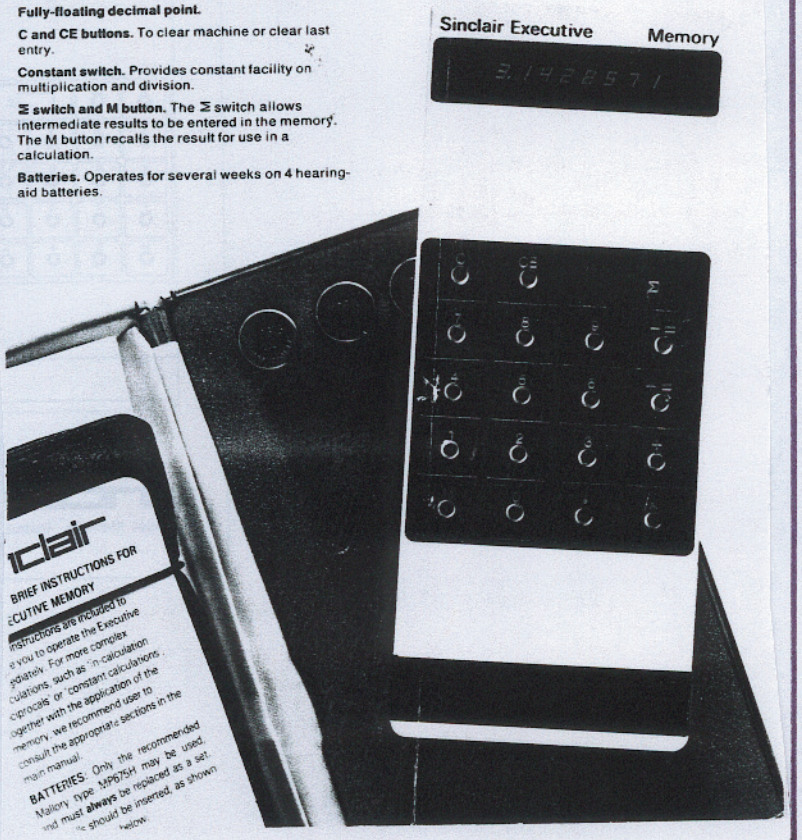
C and CE buttons. To clear machine or clear last entry.

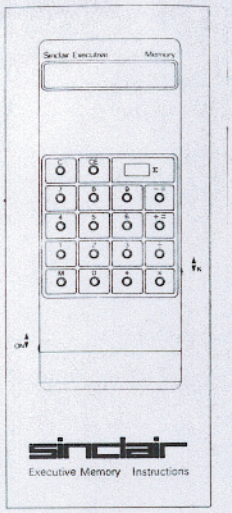
Constant switch. Provides constant facility on multiplication and division.

Σ switch and M button. The Σ switch allows intermediate results to be entered in the memory. The M button recalls the result for use in a calculation.

Batteries. Operates for several weeks on 4 hearing-aid batteries.

Pencil-slim format. 5½" × 2¼" × ⅜". Weight: 2½ oz. Soft leather carrying pouch.





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CAMBRIDGE MEMORY POCKET CALC.

New – the Cambridge Memory: a memory at a common-sense price.

A memory calculator at an economic price? The Cambridge Memory's what you need.

Sinclair have added a memory to their best-selling Cambridge . . . and here's the result – an economy calculator packed with every feature you'll ever need.

Adding, subtracting, multiplying, dividing, implied constant, memory – the Cambridge Memory has it all. And like the basic Cambridge, it's got algebraic logic – means you can enter your calculations straightforwardly.

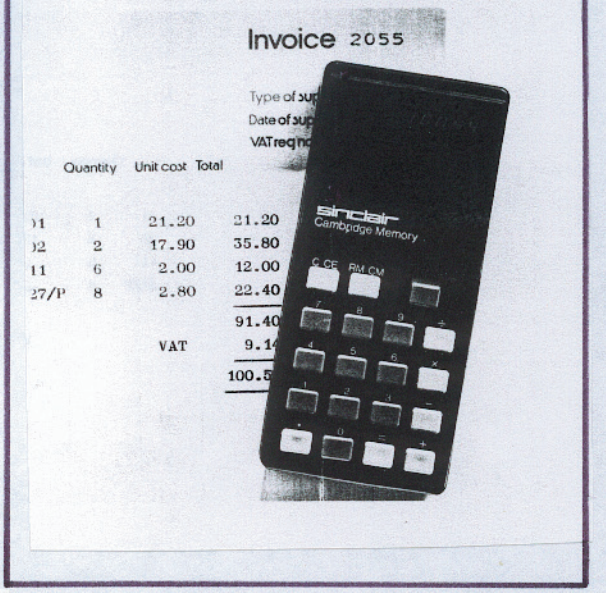
If you find yourself keeping intermediate totals on backs of envelopes . . . if you use the term 'Grand Total' in calculations . . . you want a memory function.

And you get it, at a very reasonable price, in the Cambridge Memory.

Special features of the Cambridge Memory

RM and CM button. To arrive at your grand total, simply press the RM/CM (recall memory/clear memory button). To clear, simply press it again.

Constant on all four functions. Implied constant operates automatically throughout a series of repetitive calculations.



SINCLAIR SCIENTIFIC POCKET CALC

Sinclair Scientific kit

Britain's most original calculator now in kit form

The Sinclair Scientific is an amazing calculator. It offers logs, trig and true scientific notation over a 200-decade range – features normally found on calculators costing around £50 or more.

Yet even ready-built it costs a mere £21.95 (including VAT).

And in kit form, only £14.95!

Forget slide rules and four-figure tables

On the Scientific you can handle directly all three trig functions, their inverses, logs, antilogs (giving quick access to x^y, including square and other roots), plus, of course, the four arithmetic functions and any calculation based on them. In fact, virtually all complex, sensible mathematical calculations can be handled with ease.

Now only £14.95 (inc. VAT)

So is the Scientific difficult to assemble?

No. Powerful though it is, the Sinclair Scientific is a model of tidy engineering. All parts are supplied – all you need provide is a soldering iron and pair of cutters. Complete step-by-step instructions are provided, and our Service Department will back you throughout if you've any queries or problems.

Of course, we'll happily supply the Scientific in the Cambridge already built, if you prefer – they're still exceptional value. Use the order form.

Features of the Scientific

- 12 functions on a simple keyboard
- Scientific notation
- 200-decade range
- Reverse Polish logic
- 25-hour battery life
- Genuinely pocketable

Sinclair Cambridge kit

Astonishingly, we've made the Sinclair Cambridge kit remain unbeatable value.

The Cambridge is now Britain's most popular pocket calculator. And it's not surprising. Check the features – then ask yourself what other calculator offers such a powerful specification at so reasonable a price.

Now only £9.95 (inc. VAT)

Features of the Cambridge

- Only 4¼" × 2" × ½". Weight 3½ oz.
- Fully-floating decimal point.
- Algebraic logic.
- Constant on all four functions (+ − × ÷).
- Constant and algebraic logic combine to act as limited memory.
- Clear, bright 8-digit display.
- Operates for weeks on 4 AAA batteries.

Take advantage of this money-back no-risk offer today

The Sinclair Cambridge and Scientific kits are fully guaranteed. Return either kit within 30 days, and we'll refund your money without question. All parts are tested and are sold to be resalable – and we guarantee any correctly assembled kit (other than one ill-treated or abused) to work to its specification for a full year from purchase. And if you're not satisfied with your kit for any reason, return it within 30 days and we'll refund your money without question.

To: Sinclair Radionics Ltd, FREEPOST, St Ives, Huntingdon, Cambs., PE17 4BR

Please send me:
- Scientific kit £14.95 inc. VAT
- Scientific built £21.95 inc. VAT
- Cambridge kit £9.95 inc. VAT
- Cambridge built £13.99 inc. VAT

I enclose a cheque for ... made out to Sinclair Radionics Ltd. crossed.

Please debit my Access, Barclaycard account number

Delete as required

Signed ... Name ...

Address ...

Please print. BLOCK CAPITALS please.

Sinclair Radionics Ltd.
London Road, St Ives, Huntingdon, Cambs., PE17 4JH. Tel: St Ives (0480) 64646

sinclair

The Sinclair Scientific: logs, trigs, and arithmetic at the touch of a button.

Scientists, engineers, mathematicians . . . they all have specialised requirements of a calculator.

They handle very big, or very small numbers – the sort of numbers that can only be handled by a calculator with genuine scientific (mantissa and exponent) notation.

They need logs and trig instantly available in the course of a calculation – without the need for tables.

Only a handful of pocket calculators in the world can claim to be genuine scientific calculators, offering all these functions.

And only the Sinclair Scientific offers them at a sensible price.

Features of the Sinclair Scientific

Functions summary
Four arithmetic functions: (+, −, ×, ÷).
Sin and Arcsin.
Cos and Arccos.
Tan and Arctan.
Automatic squaring.
Automatic doubling.
Logs and Antilogs, giving quick access to x^y (including square and other roots).

Scientific notation. Display shows 5-digit mantissa and 2-digit exponent, both signable.

200 decade range. 10^{-99} to 9.9999×10^{99}.

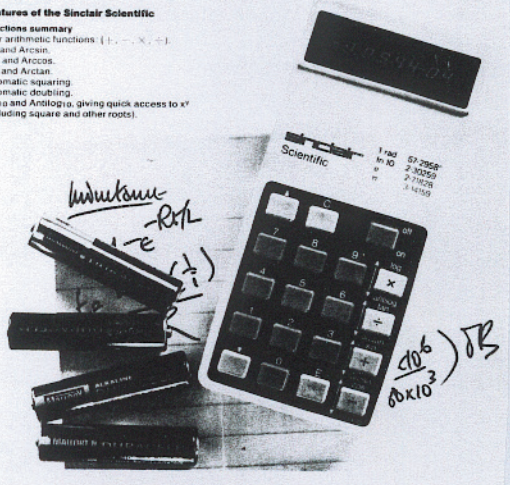
Post-fixed operators. Post-fixed operators (reverse Polish notation); allow chain calculations of unlimited length.

'Upper and lower case' operation. Basic arithmetic keys each have two extra functions.

Pocket-sized. 4¼" × 2" × ½". Weight: 4 oz. Trim-fit plastic carrying case.

Battery life. Low-cost, disposable AAA batteries operate for around 25 hours of continuous use.

Comprehensive 1 year guarantee.



Pocket calculators by Sinclair

There are four Sinclair calculators.
All easy on the pocket.
All easy on the eye.
All tailor-made for particular jobs.
And one of them's right for you.

What else can we tell you?

Sinclair make exceptionally versatile calculators. They make them truly pocketable. And they sell them at astonishingly low prices. But you've read the brochure – you know all that. Now you need to see the real thing . . . to test the calculator you're choosing . . . to see how it fits in your hand . . . to see how ruggedly it's made.

So why not drop into your local retailer's? They're only too pleased to show you round the Sinclair range.

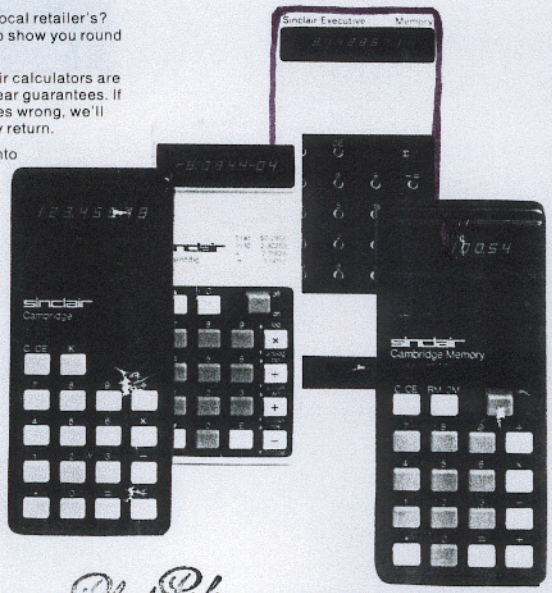
And remember – all Sinclair calculators are covered by no-quibble 1-year guarantees. If anything, *but anything*, goes wrong, we'll despatch a replacement by return.

Seeing's believing. Drop into your Sinclair retailer's – today.

Sinclair Radionics Ltd.
London Road, St Ives,
Huntingdon,
Cambs., PE17 4HJ.
Tel: St Ives (0480) 64646.

Sinclair Radionics Inc.,
375 Park Avenue,
New York, NY10022, USA.
Tel: 212 688 6623.

Sinclair Elektronik GmbH,
Rosenheimer Landstrasse 39,
8012 Munich Ottobrun,
West Germany.
Tel: 089 601 5473



Your Sinclair stockist:

YOUR PHOTOGRAPHIC DEALER
11-12 LITTLE BEDFORD STREET
NORTH SHIELDS NE29 6NW
TELEPHONE 75144

sinclair

The Sinclair Radionics policy is one of continuous development and improvement: any published details are subject to change without notice.
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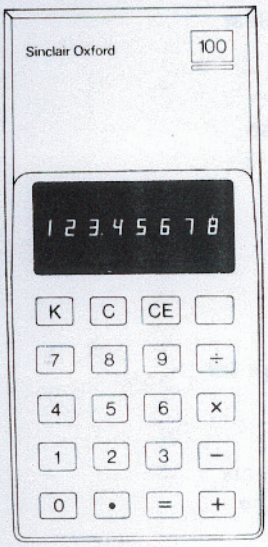
OXFORD 100 POCKET CALCULATOR

Algebraic logic
Allows calculations to be entered exactly as written (e.g. 10−6=, and not, as on some calculators, 10+6=, or 10±6=).

K Constant key
Allows numbers to be stored for repeated use, so that they do not have to be re-entered.

C Clear key
Press to clear display.

. Decimal point key
Press to enter decimal point as required by calculation.



Display
8 digits. Floating decimal point.
Large figures.
Angled for easy reading on a desk.
Unwanted zeros suppressed.

On/off key
When you are working with the battery, always switch calculator off when not in use, even if only for a few minutes. This will greatly increase battery life.

CE Clear entry key
Press to clear incorrect entry.

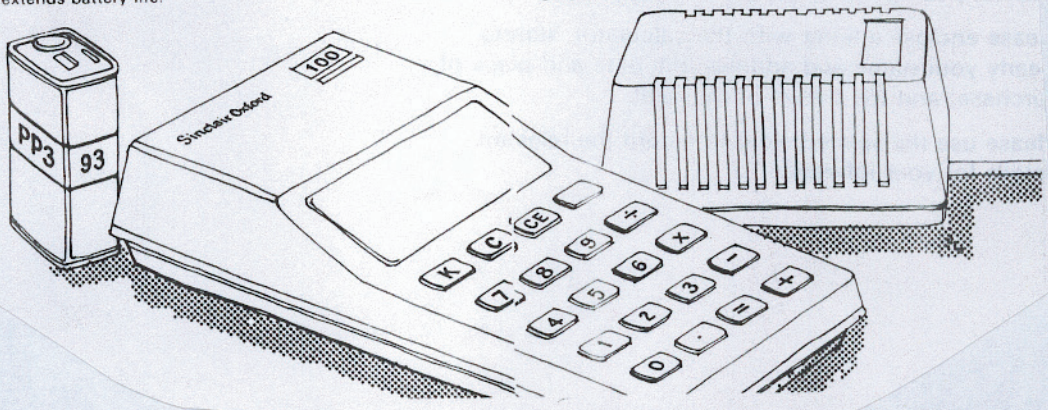
Number keys
Press to enter numbers.

Operator keys
Press to enter calculating instructions.

= Equals key
Press to close a calculation.

Battery
9 V PP3 battery gives weeks of normal use. Switching off calculator when not in use greatly extends battery life.

Mains adaptor—optional extra
Allows day-long desk-top operation. Simply plug in to mains and calculator socket. Available from your Sinclair retailer.



CAMBRIDGE PROGRAMMABLE CALCUL.

PROGRAMMABLE KEYBOARD/VOCABULARY

ON/OFF SWITCH—top right hand corner

DECIMAL POINT AND EXPONENT ENTRY
·/EE/−

TEN DIGITS AND =

ARITHMETIC OPERATORS
+ − × ÷

CONVENIENCE FUNCTIONS (yellow)
Act on result of previous calculation
x^2 $^1/x$ $-x$ $2x$

FUNCTIONS (Basic and program)
Act on display contents

Upper case	Lower case
sin	arcsin
cos	arccos
tan	arctan
ln x	e^x
rcl (memory)	MEx (memory)
( )	R►D
$\sqrt{x}$	
sto (memory)	
ChN	D►R
	+/−

FUNCTIONS WITHIN PROGRAM ONLY

go if neg	▼ (lower case)
stop	# (number)

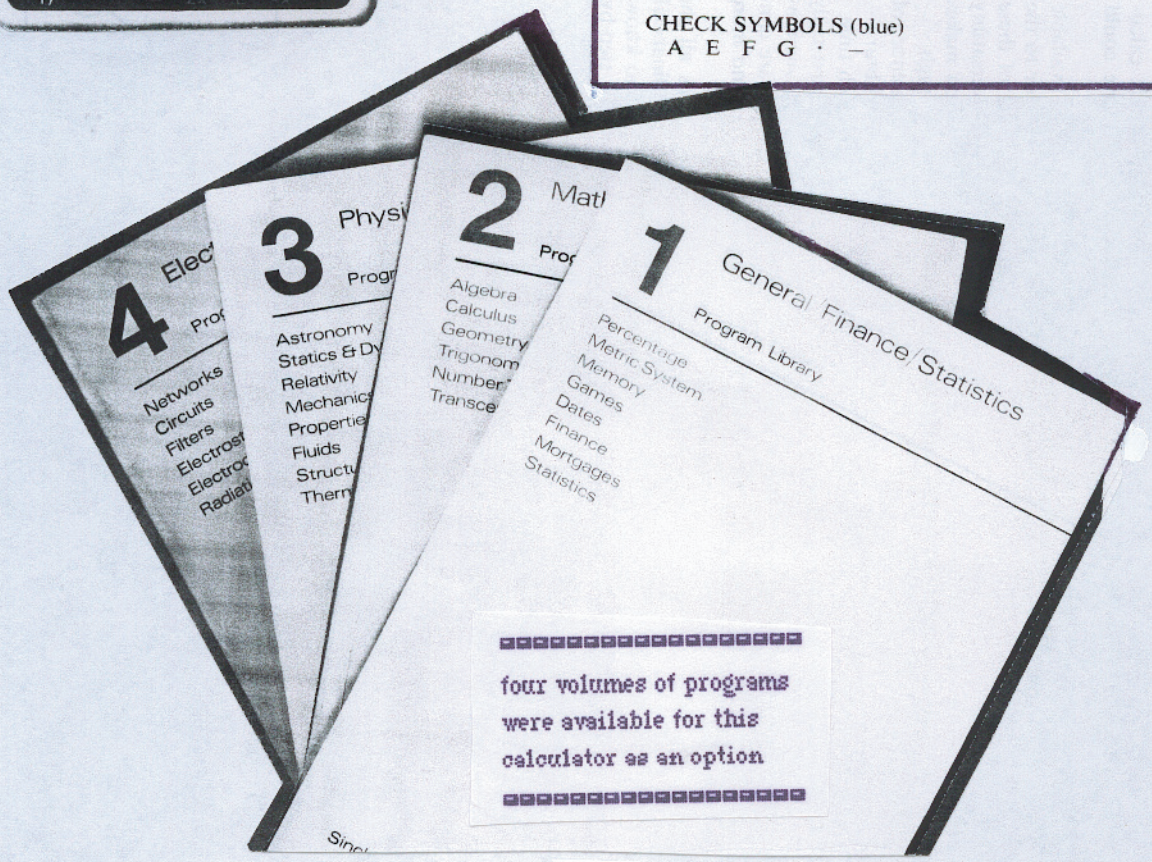
PROGRAM AND CONTROL INSTRUCTIONS

RUN	learn
step	go to

NOT USED WITHIN PROGRAM

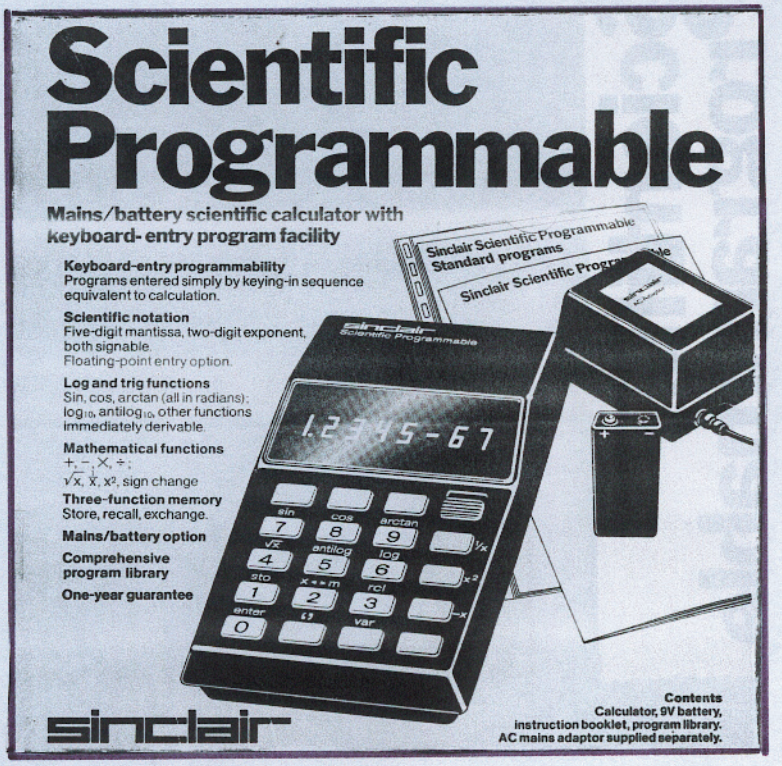
▲/▼ (shift key)	C/CE

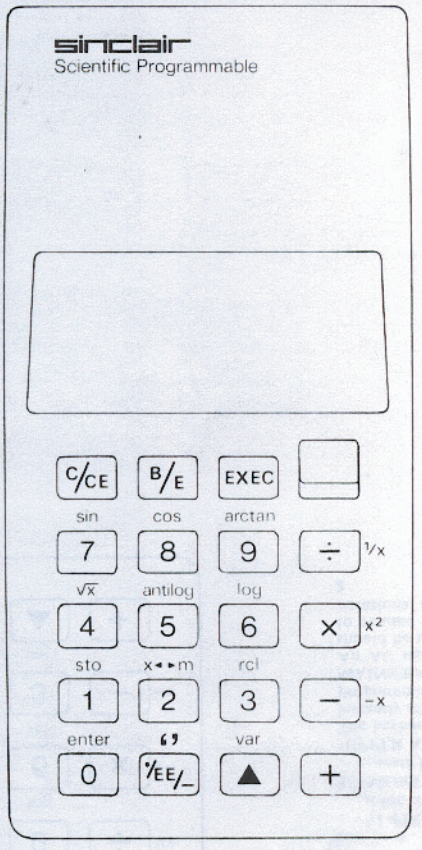
CHECK SYMBOLS (blue)
A E F G · −



four volumes of programs were available for this calculator as an option

SINCLAIR SCIENTIFIC PROGRAMMABLE





THE SINCLAIR SCIENTIFIC PROGRAMMABLE

FUNCTIONS AND FEATURES

24-STEP KEYBOARD-ENTRY PROGRAM FACILITY

The Scientific Programmable is programmed directly through the keyboard. A program of up to 24 steps can be entered simply by keying in a sequence of instructions corresponding to the calculation to be programmed. It is stored ready to operate on any numbers entered. The program can be stopped at any point for variables to be entered.

Switching off the machine automatically clears the program.

SCIENTIFIC NOTATION

5 digit mantissa, 2 digit exponent, both signable. Number entry can be in scientific notation or fully-floating decimal point; all results are automatically displayed in scientific notation.

SCIENTIFIC FUNCTIONS

Directly available: sine, cosine, arctangent (all in radians); $\log_{10}$, antilog$_{10}$ (10^x).

Immediately derivable: arcsine, arccosine, tangent; degree conversion; $\log_e$.

PERMITTED ARGUMENT RANGE:

Logs (base 10)—all positive numbers

Antilogs (base 10)—numbers between −99 and 99

$\sqrt{\ }$ —all positive numbers

Sin and Cos—between 0 and $\frac{\pi}{2}$ radians

Arctan—numbers between 0 and 49.991—results in radians.

MATHEMATICAL FUNCTIONS

x^2, $\frac{1}{x}$; sign change, $\sqrt{\ }$

ARITHMETIC FUNCTIONS

+, −, ×, ÷.

POST-FIXED OPERATORS

Ideal for complex full-flow chain calculation.

MEMORY

3 separate functions: store, recall and exchange.

'UPPER AND LOWER CASE' OPERATION

The keyboard layout is very simple: most keys have two or more functions, instantly selectable. The outcome is a very wide range of functions (including programming) available from just 19 keys.

MAINS/BATTERY OPTION

An AC mains adaptor is supplied with the Scientific Programmable, and should be used where possible. A disposable 9 V cell allows the calculator to be used wherever AC facilities are not available, but is intended only for occasional use, not for continuous operation.

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NEW!
Sinclair Scientific Programmable.
For under £30!

100 programs on cards were available for the scientific programmable calculator

Scientific Programmable

Program Library

sinclair

sinclair

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London Road
St Ives
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Cambs
PE17 4HJ
Telephone: St Ives (0480) 64646

Printed in England

G13

PRESIDENT TABLE CALCULATOR

ENTERPRISE POCKET CALCULATOR

FUNCTIONS AND FEATURES

On/off switch

Display
8 digits plus sign fully floating decimal point, or fixed point scientific notation format. Leading zero suppression.

Arithmetic Functions
+ − x ÷ =

C key
Clears calculator completely (except program or memory)

CE key
Clears last entry

▲ key
Selects upper case functions

Convenience functions
$1/x$, x^2, $\sqrt{x}$, π, $x \leftrightarrow y$, $+/-$.

Brackets
Two sets of brackets provided.

Memories
Seven independent, 3 function memories (sto n, rcl n, M+ n)

Logarithmic functions
Common logs and antilogs, Natural (naperian) logs and antilogs (e^x) together with y^x.

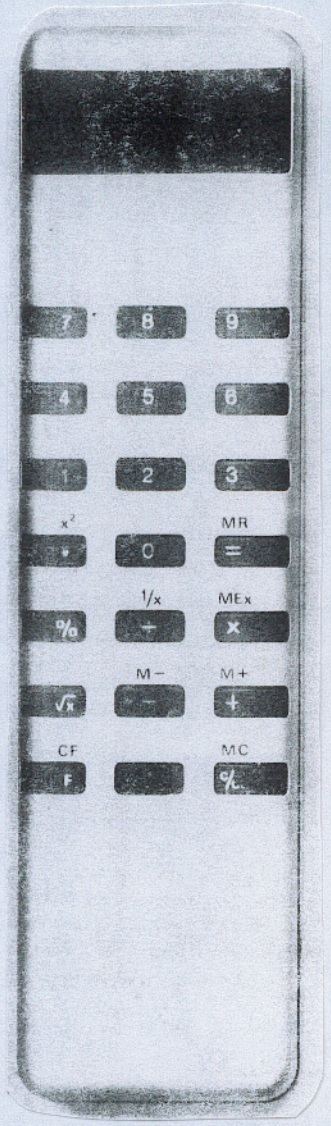
Trigonometric functions
Sin, cos, tan and their inverses, with degree to radian and radian to degree conversions.

Programmability
Full 79 step program with merged upper case functions, forward and backward step facility, conditional and unconditional branches.

Battery
A battery of the manganese alkaline type, such as Mallory Duracell Mn 1604, is required. No other type of battery may be used.

Ac Mains Adaptor
For continuous on-desk use the Ac mains adaptor supplied should be used.
Use of any other adaptor invalidates the guarantee

SOVEREIGN POCKET CALCULATOR



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FEATURES

DISPLAY
8 digits. Floating decimal point. Red LED with wide viewing angle. Unwanted zeros suppressed.

ON/OFF SWITCH
Located in the centre of the bottom row. Sliding it to the right switches the calculator on.

[F] KEY
Several of the keys have a dual function. Normally they will perform the function printed on the key, but if the [F] key is pressed first, they will perform the function printed on the case ('shifted' mode). The [F] key must be pressed each time an upper case function is required. If pressed in error, press again to cancel.

[C/CE] KEY
The 'Clear' key. Pressed once, it clears the last number or cancels the overflow condition. Pressed twice, it clears the calculator, but not the memory. Pressed after [F], it clears the memory, but not the calculator.

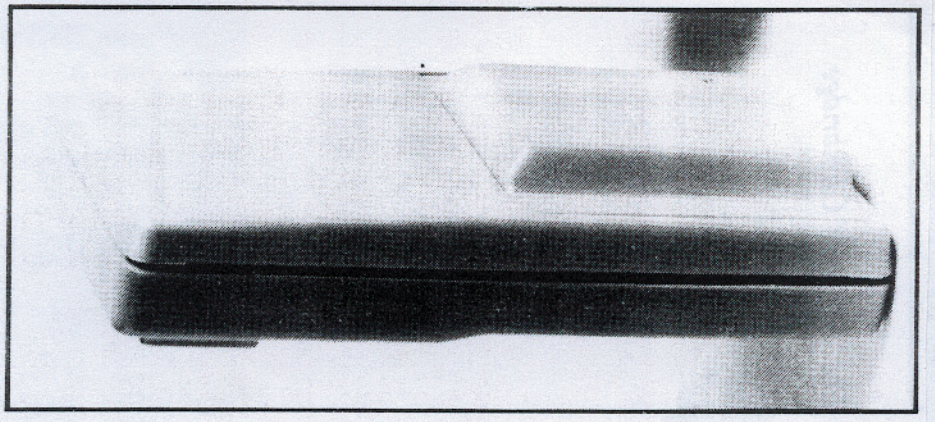
NUMBER KEYS
Press to enter numbers.

OPERATOR KEYS
Press to enter calculating instructions.

BATTERIES
The Sovereign uses two 1.35 V mercury cells. Suitable types are Mallory RM625N or Varta 7002, or any truly equivalent alternative. These batteries are available world wide, but if you experience any difficulty, please write to Sinclair Radionics Ltd, who will despatch batteries to anywhere in the world.

To fit batteries, hold the calculator with the back uppermost and the battery compartment towards you. Slide the cover down and off the case. Fit the batteries so that the battery on the

CAMBRIDGE (PREGNANT) CALCULATOR



the bulge on the back was there to allow a 9 volt PP3 battery to be used

OXFORD 150/200/300 POCKET CALC.

SPECIAL PRODUCT REPORT

sinclair

OXFORD-300

THE "Oxford" series of calculators is Sinclair's bid to increase their penetration of the calculator market. The Oxford 300 is aimed at the growing "electronic slide rule" market and it looks like being a success.

The pocket-size scientific calculator field was pioneered by Hewlett Packard, closely followed by Texas Instruments who have become market leaders in the US. Hewlett Packard's HP35 was the first machine on the market which, competitively priced, virtually overpowered the existing calculator market overnight and made H-P a great deal of money. Since the launch of the HP35 in 1972, the market has expanded to allow prices to fall until today simple calculators start at under £10. Most of the scientific calculators are in the £50 to £150 range, so at £30 plus 8% VAT, the Sinclair Oxford 300 is worth a close examination.

Sinclair have produced three models in the Oxford range, the 100, 200 and 300, in an attempt to capture the market of calculator users from schoolboys and housewives, through commercial and business users, to scientists and engineers. They hope to claim a 35% share of the market by the end of 1975.

CONSTRUCTION

The Oxford 300 consists of a keyboard, a printed circuit board containing the main circuits and a display unit. The keyboard has 19 keys and a switch, all mounted on a paxolin assembly fitted into the case. The keys have a nice positive feel, making a click when operated. Replacement of a faulty keyboard would take enough time to be significant in cost.

The calculating power is contained in a single integrated circuit soldered, together with an interface IC and a few other components on to a neat printed circuit board which is mounted on plastic pillars and retained by three push fit pop studs. With only 17 connections, this board is easily changed but, since it contains the computing IC replacement would be expensive. The display unit is welded to the case and is the most difficult part to remove. The general standard of construction inside this calculator may be described as top domestic quality.

PACKAGING

Whilst one can be reasonably enthusiastic about the Oxford 300's internal construction, the same cannot be said about the outside packaging. According to Sinclair, "final styling of the Oxfords was determined by an exhaustive market research exercise in which a number of alternative case styles were researched for their modern and professional appearance, convenience and customer acceptability". The others must have been bad for this black case can only be described as dull.

A second criticism is the on/off switch, disguised as a function button on the main keyboard. It is a slider switch, rather difficult to operate and a potential failure point. A degree/radian switch is fitted on the back of the case in a position much more suitable for an on/off switch. Swapping these two switches would seem to be both logical and more functional.

The keyboard is of the dual function type in which a "function" key is used to obtain the alternative functions. This type of keyboard has the advantage that price is kept to a minimum as opposed to the discrete function keyboard which may have 40 or more keys for the same capability. The necessity of using a function key in an algebraic machine

not only increases the number of operations necessary when performing calculations but it also means that considerable care has to be exercised as well.

The Oxford range is not designed with pocket use in mind although they should fit the average size pocket. The display is angled in such a way that it can be read with the machine on a desk. The keys are larger than most pocket calculators making desk top operation easier.

All three calculators in the range are mains or battery operated and should not be confused with the rechargeable battery facilities offered on more expensive machines.

FACILITIES

Algebraic logic is used as opposed to reverse Polish scientific notation as employed in the Sinclair Scientific calculator. This simplifies operation for the average user since calculations are carried out in the same way as they are written down. The Oxford provides a constant facility on all four arithmetic functions. There is also a very flexible memory with M+ (add to memory), M− (subtract from memory), MEx (exchange display and memory), MC (memory clear) and MR (memory recall) functions available. Trig functions sin, cos, tan and arcsin, arccos and arctan are provided with a switch to select either degree or radian operation. Other functions provided are log $_e x$, e^x, $\sqrt{x}$, 1_x and a π key. There is no x^2 function which can be rather frustrating at times although squaring can be carried out using the constant facility.

Sinclair provide an adequate booklet showing examples of how to use the calculator. The display gives results in eight digit floating decimal point format or in scientific notation with a five digit mantissa and a two digit signed exponent. Numbers can be entered in either notation, the machine automatically adjusting the notation when the operation key is pressed. There is a machine clear and a last entry clear facility provided by pressing the clear key either once or twice. Each of the four arithmetic functions has the ability to store a constant so that if, for example k x a=is entered then subsequent numbers may be multiplied by k simply by pressing say b= to give k x b.

CONCLUSION

The Oxford 300 is a powerful little package that will appeal to many users at the price offered. The functions provided are more than adequate for the run of the mill scientific problem and the algebraic notation certainly makes it easier to use than the Sinclair Scientific.

Sinclair products were widely reported in electronics magazines of the time.

Unique full-function 8-digit wrist calculator... available only as a kit.

A wrist calculator is the ultimate in common-sense portable calculating power. Even a pocket calculator goes where your pocket goes – take your jacket off, and you're lost!

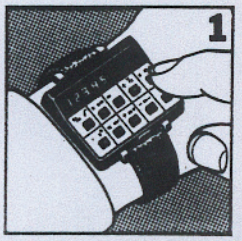
But a wrist-calculator is only worth having if it offers a genuinely comprehensive range of functions, with a full-size 8-digit display.

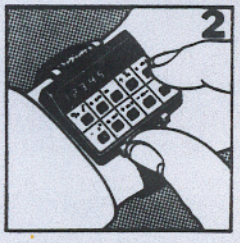
This one does. What's more, because it *is* a kit, supplied *direct* from the manufacturer, it costs only a very reasonable £9.95 (plus 8% VAT, P&P). And for that, you get not only a high-calibre calculator, but the fascination of building it yourself.

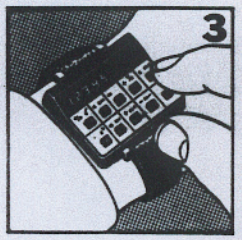
How to make 10 keys do the work of 27

The Sinclair Instrument wrist calculator offers the full range of arithmetic functions. It uses normal algebraic logic ('enter it as you write it'). But in addition, it offers a % key; plus the convenience functions $\sqrt{x}$, $1/x$, x^2; plus a full *5-function memory.*

All this, from just 10 keys! The secret? An ingenious, simple three-position switch. It works like this.







Dimensions:
1 13/16" (46 mm) wide,
1 7/16" (37 mm) deep.
Weight:
less than 1 oz (28 g).

1. The switch in its normal, central position. With the switch centred, numbers – which make up the vast majority of key-strokes – are tapped in the normal way

2. Hold the switch to the left to use the functions to the left above the keys...

3. and hold it to the right to use the functions to the right above the keys.

The display uses 8 full-size red LED digits, and the calculator runs on readily-available hearing-aid batteries to give weeks of normal use.

Assembling the Sinclair Instrument wrist calculator

The wrist calculator kit comes to you complete and ready for assembly. All you need is a reasonable degree of skill with a fine-point soldering iron. It takes about three hours to assemble. If anything goes wrong, Sinclair Instrument will replace any damaged components *free:* we want you to enjoy assembling the kit, and to end up with a valuable and useful calculator.

Contents

Case and display window.
Strap.
Printed circuit board.
Switches.
Special direct-drive chip (no interface chip needed).
Display.
Batteries.

Everything is packaged in a neat plastic box, and is accompanied by full instructions. The only thing you need is a fine-point soldering iron.

All components are fully guaranteed, and any which are damaged during assembly will be replaced free.

The wrist-calculator kit is available only direct from Sinclair Instrument. Take advantage of this 10-day money-back undertaking.

Send the coupon today.

KIT ONLY **£9.95** PLUS VAT, P&P

Sinclair Instrument Ltd,
6 Kings Parade, Cambridge,
Cambs., CB2 1SN.
Tel: Cambridge (0223) 311488.

To: Sinclair Instrument Ltd,
6 Kings Parade, Cambridge, Cambs., CB2 1SN.

* Please send me . . . (qty) Sinclair Instrument wrist-calculator kits at £9.95 plus 80p VAT plus 25p P&P (Total £11).

* I enclose cheque/PO/money order for £.....

* Complete as applicable.

Name _____

Address _____

_____

_____

(Please print)

I understand that you will refund my money in full if I return the kit undamaged within 10 days of receipt.

EE/3

From Sinclair

New calculators... new low prices...

NOW! Sinclair pocket calculators at lowest prices ever!

A million pockets can't be wrong
In March 1975, the millionth Sinclair pocket calculator will slip into somebody's pocket.

What makes pocket calculators so special? And why Sinclair? Here's the way we see it.

What is a pocket calculator, anyway?
A calculator that makes no compromises on functions, yet at the same time not only *fits* a pocket, but can actually *live* there. That means small and light, but still easy to use. And it means complete independence of external power.

Is there any point in it?
If you always work at a desk, no. If you frequently carry out calculations on the move or away from a power source, yes.

Does it matter which pocket calculator?
Yes, it does. There aren't very many real pocket calculators to choose from anyway, and price is absolutely no guide to quality. The thing to remember is – no compromises. Saving a pound or two by cutting down on digits or cutting out a constant just isn't worth it.

So why Sinclair?
Because no other maker offers such a wide range of genuinely pocketable calculators. Because no other pocket calculators offer better value. Because, regardless of range and price, each Sinclair calculator is brilliantly designed and miniaturised, and very well made. Because Sinclair offer a year's truly no-quibble guarantee.

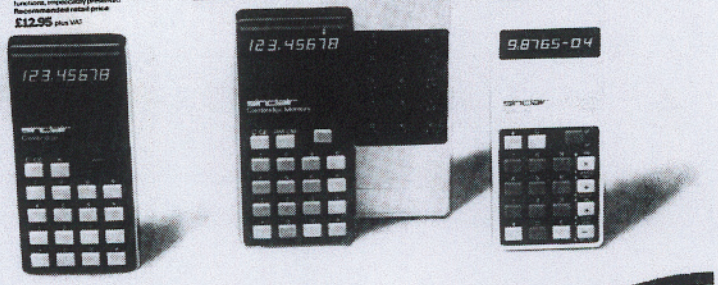
And because a million pockets can't be wrong.

Executive Memory
The Sinclair Executive won a permanent place in the New York Museum of Modern Art. The Executive Memory's available in an unlimited addition. 8 digits. 4 functions. Constant. Memory. The world's slimmest, lightest calculator, in a red, black and gilt presentation case. Instant status, gift-wrapped.
Recommended retail price:
£24.95 plus VAT

Sinclair Cambridge
8 digits, 4 functions. Powerful constant. Carrying case. The most useful functions, impeccably presented.
Recommended retail price
£12.95 plus VAT

Cambridge Memory
8 digits, 4 functions. Automatic constant. Memory. Carrying case.
Recommended retail price
£17.95 plus VAT

Sinclair Scientific
Logs. Trig. Arithmetic. Scientific notation. A specialist's machine at a non-specialist price.
Recommended retail price:
£19.95 plus VAT



NEW! The Sinclair Oxfords at prices to match.

These are new.

They're the Sinclair Oxfords – not pocket calculators, but mains/battery portables.

They're designed to sit on your desk and work on the mains all day. (There's a neat Sinclair mains adaptor available as an optional extra. It costs £2.95 + VAT.)

Or they fit companionably into your briefcase and give you weeks of normal use on a cheap 9-volt battery.

They've got good big keys ... angled displays ... rubber feet ... and a bit of weight and substance – all the things a mains/battery calculator needs.

Sinclair are Europe's largest calculator manufacturers. In the Oxford range, we've taken everything we know and presented it in three handsome, robust packages.

First, there's the Oxford 100. It's a classic 8-digit, 4-function calculator, made a little special by its unusually powerful constant. The Oxford 200 adds a memory and an automatic % key – an extremely useful facility for anybody handling VAT, mark-ups, discounts, or similar calculations.

The Oxford 300 is different. It offers an exceptional array of sophisticated scientific functions, and is one of the very few genuine scientific portables on the market.

All three machines will work with the Sinclair mains adaptor. All three are supplied with 9-volt batteries and full instructions.

All three are covered by Sinclair's no-quibble one-year guarantee. If you buy a calculator from an unknown manufacturer, you may find it very difficult to get service or repairs – or a replacement if the calculator stops working.

Alongside, we've spelt out in detail what they do. As you see, they offer even more than the Sinclair pocket calculators.

Yet they start at the same price: £12.95, plus VAT – and no other range by a reputable maker can beat them for value.

Where to find your Sinclair calculators
Currys, Green's Leisure Centres, Henry's, Laskys, Rymen, J & F Stone, Underwoods; larger branches of Boots and Debenhams; Harrods, Lewis's, Selfridges; and other good stores everywhere.

In case of difficulty, send a cheque or your Access or Barclaycard number direct to Sinclair (remember the mains adaptor for the Oxford range is £2.95). We'll despatch a calculator direct to you.
14-day money-back undertaking, of course.

Optional mains adaptor
Neat low-cost adaptor which plugs into mains and calculator socket. Delivers 9 volts DC.
Recommended retail price:
£2.95 plus VAT.

Oxford 100
Four function portable calculator
Display
Eight digits, floating decimal point; unwanted zeros suppressed. Angled and enlarged for ease of reading on a desk.
Four functions
Adds, subtracts, multiplies, divides.
Algebraic logic
Enter calculations exactly as written.
K constant
Powerful constant on all four functions acts as limited memory.
CE key
Clears incorrect entry – number or operator.
Mains/battery option
Operates for weeks on readily-available 9 V battery (supplied with calculator), or indefinitely on mains power using optional Sinclair mains adaptor.
Easy to operate
Rubber feet and click-action keys encourage accurate, one-hand desk use.
Size
6" x 2¾" x 1⅛". Weight without battery: 5 oz.
Recommended retail price:
£12.95 plus VAT.

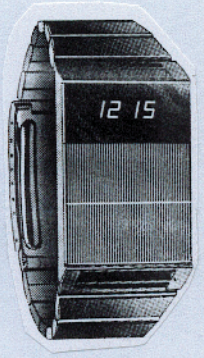
Oxford 200
Five function portable calculator with memory
Display
Eight digits, floating decimal point; unwanted zeros suppressed. Angled for easy reading on a desk.
Five functions
Adds, subtracts, multiplies, divides, plus automatic % key.
Algebraic logic
Enter calculations exactly as written.
Automatic constant
Operates on all four arithmetic functions.
Memory
Simple-to-use full five-function memory stores intermediate results, adds display to memory, subtracts display from memory, exchanges memory contents and display.
Mains/battery option
Weeks of normal use on readily-available 9 V battery (supplied with calculator); or operates indefinitely on mains power using optional mains adaptor.
Easy to operate
Rubber feet and click-action keys encourage accurate one-hand desk use.
Size
6" x 2¾" x 1⅛". Weight without battery: 5 oz.
Recommended retail price:
£19.95 plus VAT.

Oxford 300
Advanced scientific calculator
Basic format size, weight, number of keys, number of digits, battery-mains options as Oxford 100 and Oxford 200.
Functions summary
Scientific and financial notation. For normal calculations, the Oxford 300 uses standard floating point notation, switching automatically to scientific notation for very large numbers, but the user can override the machine to change notation at any time.
Logs base e and 10
Sine and arcsine
Cosine and arccosine
Tangent and arctangent
Four arithmetic functions
Further function-memory facility adds display to memory, subtracts display from memory, exchanges memory and display, recalls memory and clears memory.
Automatic constant on all three basic functions.
$\sqrt{\ }$ $\frac{1}{x}$ x^2
Recommended retail price:
£29.95 plus VAT.

Sinclair Radionics Ltd,
London Road, St Ives, Huntingdon, Cambs., PE17 4HJ.
Tel: St Ives (0480) 64646.

sinclair

Advertisement appearing as whole page in the Daily Telegraph, Sunday Times, Sunday Express, Observer, Financial Times, and as a spread in the Daily Mail.



THE BLACK WATCH

The **Black watch** must be the missing link in this research into Sinclair"s archeology trip. It is, in fact, a unique product both in its singularity and in its number.

The Black watch was one of the first LED (**L**ight **E**mitting **D**iodes) watches on the world market and one of the first electronic watches to be offered in kit form for home assembly.

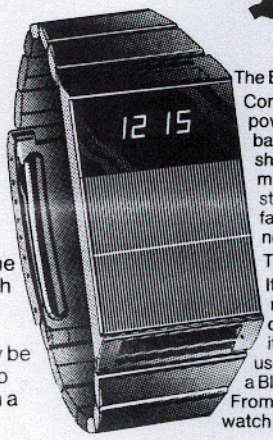
The fact that it was a real failure, does not subtract from the fact that nothing like it had ever been seen before and probably never will ever in the future. Its unconventional design did strike the imagination of many who, having ordered a kit, were never able to assemble it, let alone make it

work. The fact that, if you were lucky enough to make one work, you had to press a button to read the time did not subtract from the lure of the novelty and even the Swiss Horological Society was so impressed by it as to invite Sinclair to exhibit it at their Royal Horological Fair.

So many things went wrong in its production that even to-day people make jokes about the way it was designed to be built by home constructors with the aid of clothes pegs (to keep all the parts together while fitting the batteries) and glue (to keep the plastic case parts together once the building was finished).

BLACK WATCH WRIST WATCH

The Black Watch kit £14.95!



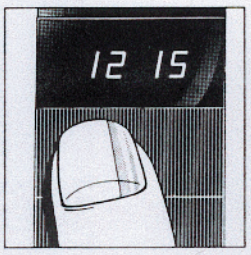
* **Practical**–easily built by anyone in an evening's straightforward assembly.
* **Complete**–right down to strap and batteries.
* **Guaranteed.** A correctly-assembled watch is guaranteed for a year. It works as soon as you put the batteries in. On a built watch we guarantee an accuracy within a second a day–but building it yourself you may be able to adjust the trimmer to achieve an accuracy within a second a week.

The Black Watch by Sinclair is unique. Controlled by a quartz crystal, and powered by two hearing aid batteries, it uses bright red LEDs to show hours and minutes, and minutes and seconds. And it's styled in the cool prestige Sinclair fashion: no knobs, no buttons, no flash.

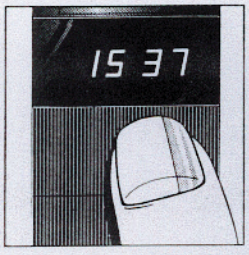
The Black Watch kit is unique, too. It's rational – Sinclair have reduced the separate components to just four–and it's simple: anybody who can use a soldering iron can assemble a Black Watch without difficulty. From opening the kit to wearing the watch is a couple of hours' work.

Touch and tell

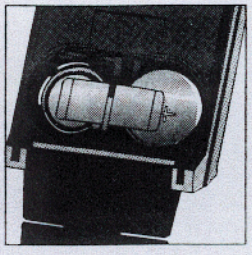
Press here for hours and minutes...



here for minutes and seconds.



Batteries easily replaced at home.



The specialist features of the Black Watch

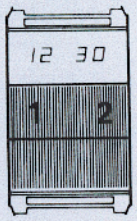
Smooth, chunky, matt-black case, with black strap. (Black stainless-steel bracelet available as extra–see order form.)

Large, bright, red display–easily read at night. Touch-and-see case–no unprofessional buttons.

Runs on two hearing-aid batteries (supplied). Easily re-set using special button–no expensive jeweller's service.

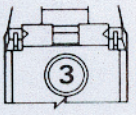
1. Displaying the time

The watch is always working, but displays the time in digital form only when the appropriate area on the front of the watch is pressed. The watch operates on a 12 hour cycle.



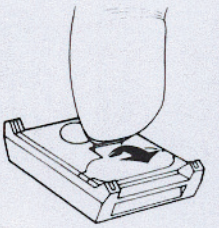
Pressing area 1 displays **hours** and **minutes**. Pressing area 2 displays **minutes** and **seconds**.

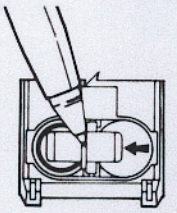
Button 3 on rear of watch is used in setting the time (see section 3).



2. Replacing batteries

Lift the tab on the back of the watch and pull to remove the battery cover.





Slide the spring clip from under the retainer (a ball-point pen may help here) and remove the old batteries.

The Black Watch – using the unique Sinclair-designed state-of-the-art IC.

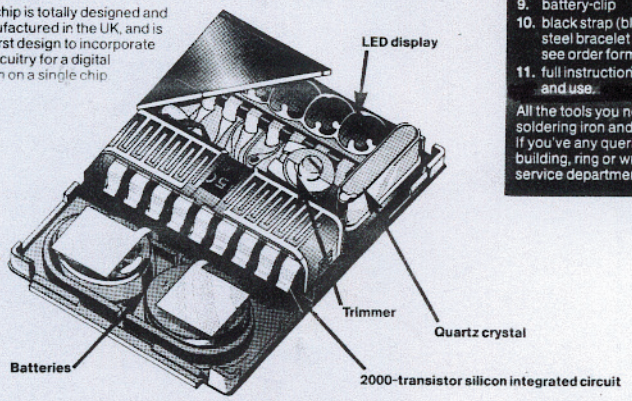
The chip...
The heart of the Black Watch is a unique IC designed by Sinclair and custom-built for them using state-of-the-art technology – integrated injection logic.

This chip of silicon measures only 3 mm x 3 mm and contains over 2000 transistors. The circuit includes

a) reference oscillator
b) divider chain
c) decoder circuits
d) display inhibit circuits
e) display driving circuits.

The chip is totally designed and manufactured in the UK, and is the first design to incorporate *all* circuitry for a digital watch on a single chip.

...and how it works
A crystal-controlled reference is used to drive a chain of 15 binary dividers which reduce the frequency from 32,768 Hz to 1 Hz. This accurate signal is then counted into units of seconds, minutes, and hours, and on request the stored information is processed by the decoders and display drivers to feed the four 7-segment LED displays. When the display is not in operation, special power-saving circuits on the chip reduce current consumption to only a few microamps.



Complete kit £14.95!

The kit contains
1. printed circuit board
2. unique Sinclair-designed IC
3. encapsulated quartz crystal
4. trimmer
5. capacitor
6. LED display
7. 2-part case with window in position
8. batteries
9. battery-clip
10. black strap (black stainless-steel bracelet optional extra – see order form)
11. full instructions for building and use.

All the tools you need are a fine soldering iron and a pair of cutters. If you've any queries or problems in building, ring or write to Sinclair service department for help.

Take advantage of this no-risks, money-back offer today!

The Sinclair Black Watch is fully guaranteed. Return your kit in original condition within 10 days and we'll refund your money without question. All parts are tested and checked before despatch - and correctly-assembled watches are guaranteed for one year. Simply fill in the FREEPOST order form and post it - today!

Price in kit form: £14.95 (inc. black strap, VAT, p & p).
Price in built form: £24.95 (inc. black strap, VAT, p&p).

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Sinclair Radionics Ltd,
London Road, St Ives,
Huntingdon, Cambs., PE17 4HJ.
Tel: St Ives (0480) 64646.
Reg. no: 699483 England. VAT Reg. no: 213 817088.

To: Sinclair Radionics Ltd, FREEPOST, St Ives, Huntingdon, Cambs., PE17 4BR.

Please send me — Total £

..... (qty) Sinclair Black Watch kit(s) at £14.95 (inc. black strap, VAT, p&p). .....

..... (qty) Sinclair Black Watch(es) built at £24.95 (inc. black strap, VAT, p&p). .....

..... (qty) black stainless-steel bracelet(s) at £2.00 (inc. VAT, p&p). .....

*I enclose cheque for £..... made out to Sinclair Radionics Ltd and crossed.

*Please debit my *Barclaycard/Access/American Express account number .....

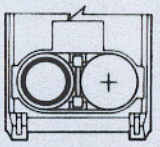
Name (please print) .....

Address .....

Signature .....

FREEPOST – no stamp required. *Delete as required

note that the stainless steel bracelet was an optional extra



Fit new batteries as shown. Make sure that the positive and negative faces correspond with the diagram.

Replace the spring clip by placing on top of batteries as shown and sliding the clip tabs under the retainer pegs. Replace the cover.

Press Areas 1 or 2 to check that the display lights up. If not, check that you have inserted the batteries correctly. The watch will now need setting.

The batteries used should be Union Carbide 386, Mallory 10L124, Ray-O-Vac RW44 and RW24, or National WL-11.

Batteries should be replaced when the display is very dim or does not light up.

Always remove exhausted batteries to avoid damage through leakage.

3. Setting the watch

Start about two minutes before a time signal for ultimate accuracy. To set hours, press Area 1 followed by Button 3 while still pressing Area 1. The hours will count forward at 1 hour per second. When the correct hour is reached, release the buttons.

If the watch is being set for the first time after battery replacement, count the hours through a full 12 hour cycle before stopping at the correct hour.

To set the minutes, press Area 2 followed by Button 3 while still pressing Area 2. The minutes will count forward at 1 minute per second and the seconds will be set to zero, i.e. the exact minute. (If the minutes advance through 59 to 00, the hours will advance by 1.) When the correct minutes are reached, release Area 2.

The set time can now be held by maintaining pressure on Button 3 only. The display will go out but the time is held exactly as set. The watch will start as soon as this button is released.

Check that you have set the time correctly by pressing 1 or 2.

4. Adjustment of the Metal Bracelet (Optional Extra)

The bracelet is adjustable in two ways :

1. The simple, quick adjustment is by moving one side of the strap into the "buckle" by springing out the removable bar with a needle, or similar object, and moving it along inside the outer section of the "buckle". Only adjust the link section; do not alter the folding section of the "buckle".
2. If the adjustment by the above method is insufficient, the links on either side of the "buckle" may be removed. The relevant links have an oblong slot in them and an arrow. Insert a screwdriver or knife into the slot in the link and slide in the direction of the arrow. Repeat for the adjacent link. and remove the link. Clip the links together and push the arrowed bar back into place to remake the connection. There are two removable links on either side of the "buckle".

Service and guarantee

The Sinclair Digital Watch is solid state with the buttons as the only moving parts.

It is fully and unconditionally guaranteed for one year from the date of purchase against defects in materials or workmanship. During this period it will be repaired or replaced (at Manufacturer's Option) without charge to the owner, if it is returned, carefully packed, postage pre-paid, preferably by registered or recorded delivery, to Sinclair Radionics Ltd. Please enclose a letter clearly stating your name and address, the date of purchase, and the nature of the fault. The guarantee is void if the watch has been damaged by accident, unreasonable use, neglect or improper service.

Before returning your watch carefully recheck the instructions and also check that the batteries do not need replacing.

U.K. owners should return their watch direct to :

Sinclair Radionics Ltd.,
Watch Service Dept.,
London Road, St. Ives,
Huntingdon, Cambs. PE17 4HJ.

How to use your Sinclair Digital Watch

Your Sinclair Digital watch is one of the most advanced time-keeping instruments available.

Frequent demonstration of the watch as well as normal time-keeping usage during the first few months of ownership may well result in the initial set of batteries providing a shorter life than expected.

sinclair

INSTRUMENTS AGE

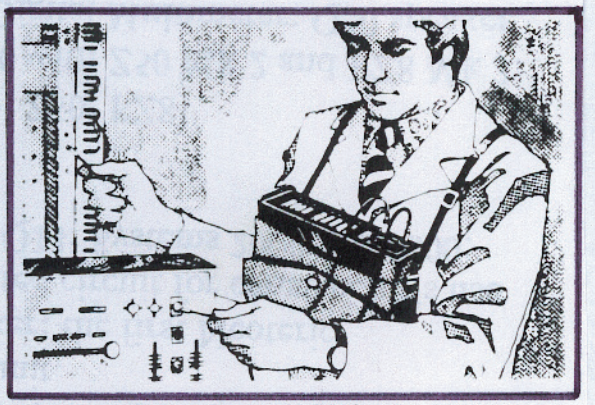
Having dabbled around with electronics since he was young Sinclair had always had a soft spot for the radio experimenter. One of the first integrated circuits on the world market, the **IC-10**, was marketed by Sinclair in 1968.

So it was only natural that, after the crude **Signal Injector** of 1963, he should have turned his attention to the laboratory necessities of the time. The instrument line of **multimeters, oscilloscopes and frequency counters** enjoyed a relatively large success at the time. So much so that some of them are still in production to-day under the name of ***Thandar***.

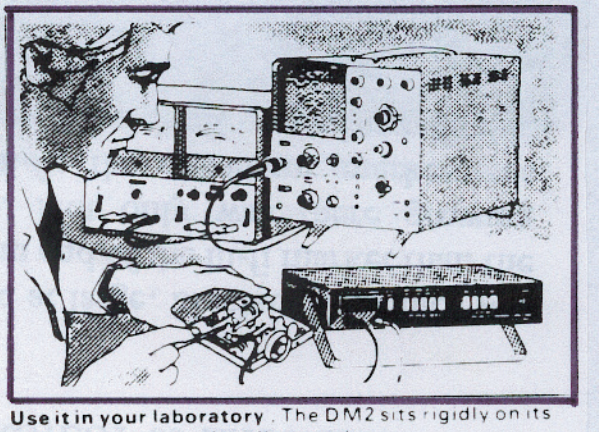
From the LED multimeter model **DM-1** to the more successful LCD **DM-2** and the portable **PDM-35** they all showed the now traditional Sinclair elegance of design and innovative electronic advance.

DM1 DIGITAL MULTIMETER

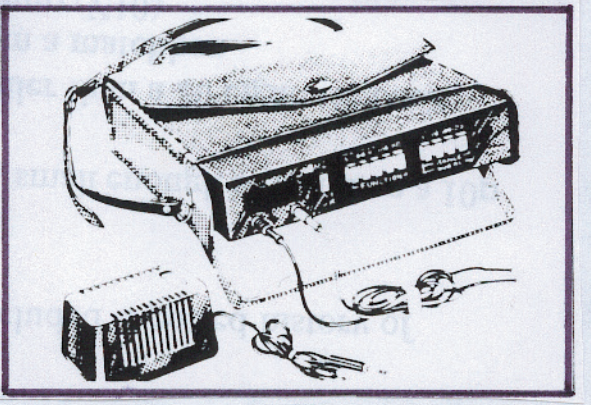
DM2 BENCH MULTIMETER



Use it on the move. Keep the DM2 in its carrying case it's always ready for use

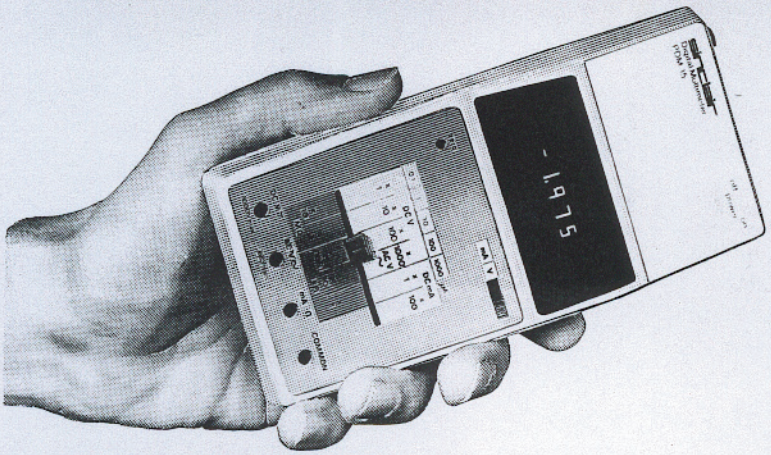


Use it in your laboratory. The DM2 sits rigidly on its combined carrying handle stand



PDM35 DIGITAL MULTIMETER

The Sinclair PDM35.
A personal digital multimeter for only £29.95
(+8% VAT)



Now everyone can afford to own a digital multimeter

A digital multimeter used to mean an expensive, bulky piece of equipment.

The Sinclair PDM35 changes that. It's got all the functions and features you want in a digital multimeter, yet they're neatly packaged in a rugged but light pocket-size case, ready to go anywhere.

The Sinclair PDM35 gives you all the benefits of an ordinary digital multimeter – quick clear readings, high accuracy and resolution, high input impedence. Yet at £29.95 (+8% VAT), it costs less than you'd expect to pay for an analogue meter!

The Sinclair PDM35 is tailor-made for anyone who needs to make rapid measurements. Development engineers, field service engineers, lab technicians, computer specialists, radio and electronic hobbyists will find it ideal.

With its rugged construction and battery operation, the PDM35 is perfectly suited for hand work in the field, while its angled display and optional AC power facility make it just as useful on the bench.

What you get with a PDM35

3½ digit resolution.
Sharp, bright, easily read LED display, reading to ±1.999.
Automatic polarity selection.
Resolution of 1 mV and 0.1 nA (0.0001 μA).
Direct reading of semiconductor forward voltages at 5 different currents.
Resistance measured up to 20 MΩ.
1% of reading accuracy.
Operation from replaceable battery or AC adaptor.
Industry standard 10 MΩ input impedance.

Compare it with an analogue meter!

The PDM 35's 1% of reading compares with 3% of full scale for a comparable analogue meter. That makes it around 5 times more accurate on average.

The PDM35 will resolve 1 mV against around 10 mV for a comparable analogue meter – and resolution on current is over 1000 times greater.

The PDM35's DC input impedance of 10 MΩ is 50 times higher than a 20 kΩ/volt analogue meter on the 10 V range.

The PDM35 gives precise digital readings. So there's no need to interpret ambiguous scales, no parallax errors. There's no need to reverse leads for negative readings. There's no delicate meter movement to damage. And you can resolve current as low as 0.1 nA and measure transistor and diode junctions over 5 decades of current.

Technical specification

DC Volts (4 ranges)
Range: 1 mV to 1000 V.
Accuracy of reading 1.0% ± 1 count.
Note: 10 MΩ input impedance.
AC Volts (40 Hz-5 kHz)
Range: 1 V to 500 V.
Accuracy of reading: 1.0% ± 2 counts.
DC Current (6 ranges)
Range: 1 nA to 200 mA.
Accuracy of reading: 1.0% ± 1 count.
Note: Max. resolution 0.1 nA.
Resistance (5 ranges)
Range: 1Ω to 20 MΩ.
Accuracy of reading: 1.5% ± 1 count.
Also provides 5 junction-test ranges.
Dimensions: 6 in x 3 in x 1½ in.
Weight: 6½ oz.
Power supply: 9 V battery or Sinclair AC adaptor.
Sockets: Standard 4 mm for resilient plugs.
Options: AC adaptor for 240 V 50 Hz power. De-luxe padded carrying wallet. 30 kV probe.

The Sinclair credentials

Sinclair have pioneered a whole range of electronic world-firsts – from programmable pocket calculators to miniature TVs. The PDM35 embodies six years' experience in digital multimeter design, in which time Sinclair have become one of the world's largest producers.

Tried, tested, ready to go!

The Sinclair PDM35 comes to you fully built, tested, calibrated and guaranteed. It comes complete with leads and test prods, operating instructions and a carrying wallet. And getting one couldn't be easier. Just fill in the coupon, enclose a cheque/PO for the correct amount (usual 10-day money-back undertaking, of course), and send it to us.

We'll mail your PDM35 by return!

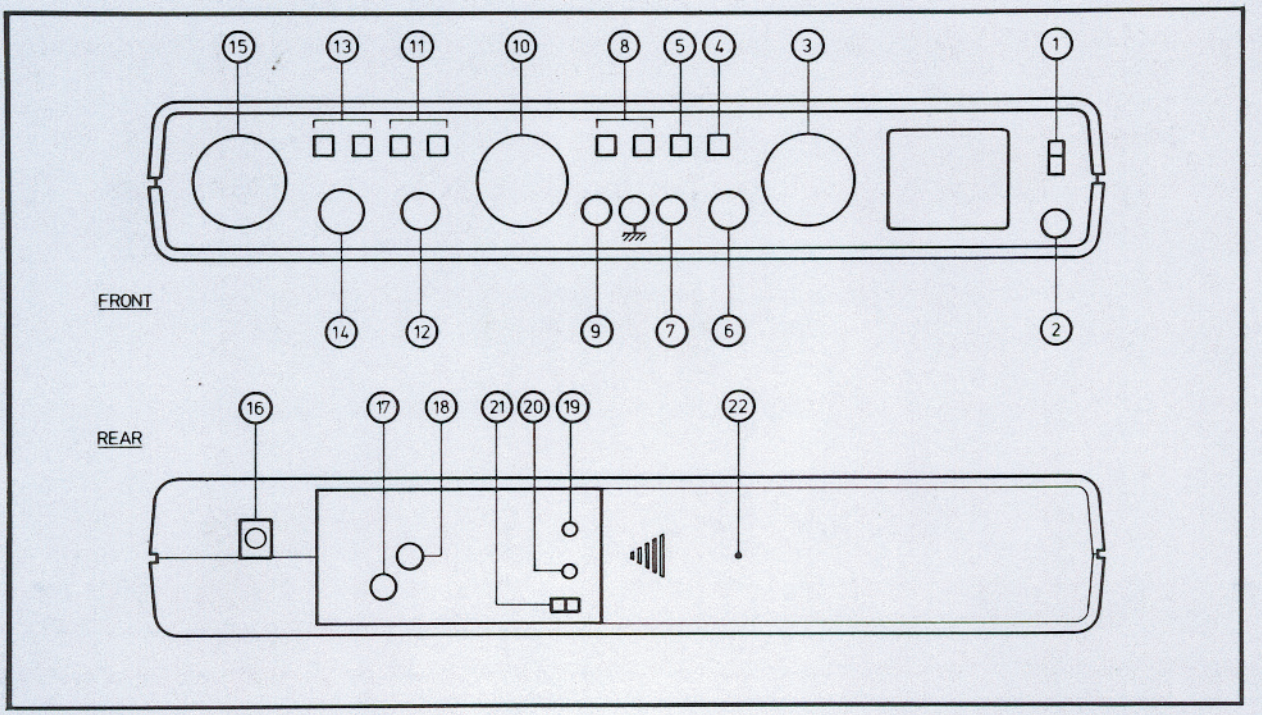
Sinclair Radionics Ltd, London Road, St Ives, Huntingdon, Cambs., PE17 4HJ, England. Regd No: 699483.

To: Sinclair Radionics Ltd, London Road, St Ives, Huntingdon, Cambs., PE17 4HJ.
Please send me _____ (qty) PDM35(s) @ £33.00 (inc £2.40 VAT and 65p P&P) each: £_____
_____ (qty) De-luxe padded carrying case(s) @ £3.00 (inc VAT and P&P) each: £_____
_____ (qty) AC adaptor(s) for 240 V 50 Hz power @ £3.00 (inc VAT and P&P) each: £_____
I enclose cheque/PO made payable to Sinclair Radionics Ltd for (indicate total amount): £_____
I understand that if I am not completely satisfied with my PDM35, I may return it within ten days for a full cash refund.

Name.....
Address.....
.....
.....
EE/12

sinclair
World leaders in fingertip electronics

SC110 PORTABLE OSCILLOSCOPE



PRODUCT SPECIFICATION

Display

Screen dimensions:	32mm x 26mm
Graticule divisions:	5 horizontal x 4 vertical (6mm)
Phosphor:	Blue-white, medium persistence
External Adjustments:	Intensity, Focus, trace rotate

Vertical Deflection (Y input)

Bandwidth:	D.C. to 10MHz ± 3 db at 1 div. deflection
Coupling:	Switchable D.C., A.C. or ground. A.C. coupling — 3 dB at 2 Hz
Sensitivity:	10mV/div to 50V/div in 12 ranges Calibrational accuracy ± 3% of full scale
Input Impedance:	1MΩ in parallel with 47pF
Maximum Input:	350V (D.C. + peak A.C.) provided the component does not exceed 250 volts

Horizontal Deflection (X Input) — switch selectable

Bandwidth:	D.C. to 2 MHz ± 6 db
Coupling:	D.C.
Sensitivity:	Approximately 0.5 volts/div
Input Impedance:	1MΩ in parallel with 10pF
Maximum Input:	2.5 volts, protected to 250V r.m.s. 50/60Hz

Timebase — switch selectable

Sweep times:	0.1u secs/div to 0.5 secs/div in 21 ranges. Calibrational accuracy ± 3% of full scale

Operating Modes: free-running or triggered sweep

Triggering Circuit

Source:	Internal or external switchable.
Coupling:	A.C., D.C., TV Frame, or TV Line filtering
Level:	Continuously variable over waveform
Slope:	+ or – selectable on level control
Sensitivity:	Less than 1 div. for internal trigger Less than 1 volt for external trigger

Modes:

(a) Bright Line: Time base free runs until synchronised by trigger circuit

(b) Trigger: Timebase reset with display blanked until sweep initiated by trigger circuit

(c) Economy: Instrument switches to a power saving mode with display blanked until time-base is started by trigger circuit

(d) External: As for Bright Line but with external trigger input

Calibrator

Square wave output of amplitude 1 volt pk-pk ± 5%. Frequency 1kHz ± 30%.

Power Requirements

4V to 10V D.C. via disposable cells, rechargeable cells, or A.C. adaptor.

Typical Power Consumption:

Bright Line — 900 mW
10 MHz 3 divisions — 1300 mW
Economy — 350 mW

Physical Details

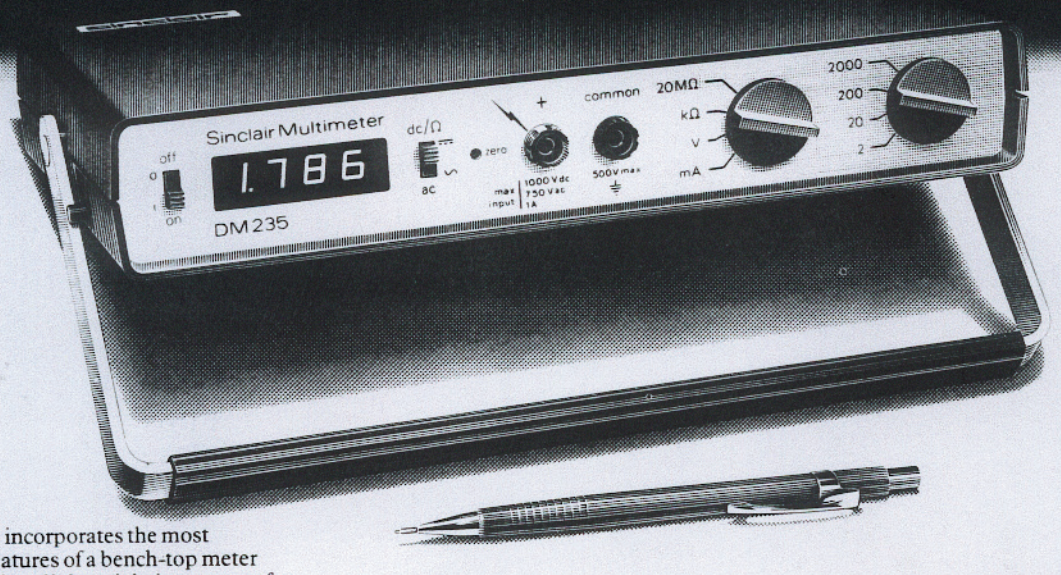
Dimensions:	10" x 5.8" x 1.6" (255 x 148 x 40mm)
Weight:	1¾ lbs (800 gms)
Operating Temperature range:	0°C — 40°C

DM235 DIGITAL MULTIMETER

New Sinclair DM235 digital multimeter.

3½ digits...6 functions...fully portable...

Under £50!



The DM235 incorporates the most important features of a bench-top meter into a rugged yet lightweight instrument for true portability. High accuracy, resolution and input impedance mean superior performance to analogue meters – but at a price significantly lower than many. The DM235's design and specification makes it ideal for all but the most demanding applications.

Big, bright, unambiguous display

Full 3½ digit display, reading to ±1999. 8 mm LEDs, ultra wide angle of view.

Six functions, 26 ranges

DC Volts	1 mV to 1000V
AC Volts	1 mV to 750 V
DC Current	1μ A to 1A
AC Current	1μ A to 1A
Resistance	1Ω to 20 MΩ
Diode test	0.1μ A to 1 mA

10 MΩ input impedance.

High accuracy

Basic accuracy of 0.5% (2 V DC range). Other DC ranges and Resistance 1.0%. AC ranges 1.5% 30 HZ – 10 kHz.

Easy to use, by anyone, anywhere

Automatic polarity operation, automatic decimal point placement, automatic out-of-range indication.

Lightweight but strong

High-impact moulded ABS case, size 10 in x 5.8 in x 1.6 in. Weight less than 1½ lb. Basic operation from disposable cells, for independence from AC supply.
Line operation available via optional AC charger/adaptor.

A full range of optional accessories

DM235 meter complete with test leads and prods	£49.80
AC adaptor/charger 240 V 50 HZ	£3.50
Eveready carrying case with lead stowage compartment	£8. 50
Rechargeable battery units	£8.00
30 KV high voltage probe	£15.00

(All prices subject to 8% VAT)

Find out more!

Sinclair Radionics are one of the world's largest producers of digital multimeters – the DM235 embodies over seven years' expereince. It comes with a full 12 month guarantee. If you'd like to know more about the DM235, send the coupon below. We'll send all the facts (and a list of distributors) by return.

Sinclair Radionics Ltd, St Ives, Huntingdon, Cambs., PE17 4HJ.

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World leaders in fingertip electronics

To: Sinclair Radionics Ltd, St Ives, Huntingdon, Cambs., PE17 4HJ.

Please send me full illustrated details of the new Sinclair DM235.

Name_____

Position_____

Company_____

Address_____

PE/1/79

The Sinclair PFM200 digital frequency meter.

20 Hz-200 MHz... 8 digits ...under £50.

NEW!

The Sinclair PFM200 brings digital frequency measurement within the reach of every engineer. It has a performance comparable with the very best bench-top instruments, but it's packaged in a compact case which is rugged but light, ready for use anywhere.

The PFM200 out-performs many much more expensive instruments. Its 8-digit display and variable gate time give high-resolution coverage of frequencies from 20 Hz to over 200 MHz. It gives you exceptional sensitivity and simplicity, at a fraction of the price of meters with similar specifications!

The PFM200 is ideal for use with audio, video and radio systems, and all electronic and digital circuitry. Now every development engineer, service technician, student and hobbyist can afford to have a personal digital frequency meter.

The PFM200 embodies Sinclair Radionics' seven-year experience in digital test equipment design and production.

PFM200: features

20 Hz-200 MHz guaranteed range (typically better)
Frequency resolution down to 0.1 Hz
High sensitivity (10 mV typical)
High-accuracy crystal timebase
Full 8-digit capacity
Sharp, bright, easily-read LED display
Built-in attenuator
Variable sampling rate
Low-battery indication
Truly portable

Where to use the new PFM200

The PFM200 is useful in every field of electronics, providing the ultra-precise frequency information that an oscilloscope can't give . . .

Transmitter checks: mobiles, ham, radio control – check frequency and stability on Low and High band VHF, etc, up to 200 MHz AM and FM. In most applications, the PFM200's optional telescopic aerial avoids the need for direct connections.

Audio testing and design: check oscillator frequencies, bandwidth limits, crossover frequencies, resonances, etc, with resolution down to 0.1 Hz.

Digital testing: check computer clock frequencies, divider ratios and other digital circuitry.

RF circuit checks: test local oscillators, BFOs, test IF and detector performance.

Video equipment: check syncronised circuits, scanning frequencies, video bandwidths, etc.

Technical specifications

Frequency range: 20 Hz to 200 MHz
Display resolution: up to 8 digits
Lowest frequency resolution: 0.1 Hz
Gate time: decade adjustable from 0.01 secs to 10 secs
Sampling rate: varies with gate time up to 5 per second
Display format: 8 LEDs, direct reading in kHz.
Attenuator: –20 db
Input impedance: 1M in parallel with 50 pF
Timebase accuracy: 0.3 ppm/°C, 10 ppm/ year
Dimensions: 6.2 in x 3 in x 1.25 in
Weight: 6 oz
Power requirement: 9V DC or AC adaptor
Sockets: standard 4 mm for resilient plugs
Standard accessories: test leads and prods, carrying wallet, owner's instruction manual
Optional equipment: AC adaptor for 240 V 50 Hz power; deluxe padded carrying case; connector kit comprising BNC, co-ax, DIN and phono adaptors, plus telescopic aerial for off-air transmitter measurements

Built, tested, ready to go

The Sinclair PFM200 comes to you fully built, tested, calibrated and guaranteed. It comes complete with leads and test prods, operating instructions and a carrying wallet. And getting one couldn't be easier. Just fill in the order form below, enclose a cheque/PO for the right amount (usual 14-day money-back undertaking, of course), and send it to us.

Sinclair Radionics Ltd, London Rd, St Ives, Huntingdon, Cambs., PE17 4HJ, England. Regd. No. 699483.

PFM200 Order Form

Please send me .....(qty) PFM200s at £53.78 (inc 8% VAT) each £.....

.....(qty) De-luxe carrying cases at £3.24 (inc 8% VAT) each £.....

.....(qty) AC adaptors for 240V power at £3.24 (inc 8% VAT) each £.....

.....(qty) connector kits at £10.58 (inc 8% VAT) each £.....

Post & packing (please add) £0.65

I enclose cheque/PO made payable to Sinclair Radionics Ltd for (indicate total amount) £.....

I understand that if I am not completely satisfied with my PFM200, I may return it within 14 days for a full cash refund.

Name .....

Address .....

.....

PW/5

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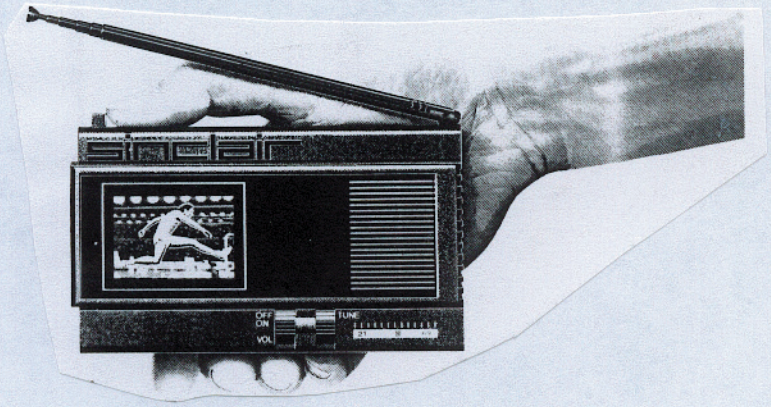
World leaders in fingertip electronics.



MICRO-TV AGE

The pocket TV was another example of (Sir) Clive Sinclair's obsession with miniaturization. Having spent his lust on the pocket radio, the pocket amplifier and the pocket calculator, his dream now was a miniature portable TV.

It took Sinclair 15 years (from 1963 to 1977) to develop and put on the market the **TV1A**, the smallest all standards pocket television of its time. The design and research took so long mainly because he wanted to put a flat screen tube in it but in the end had to compromise with a traditional CRT made by AEG Telefunken. He finally managed to succeed with the flat screen tube only in September 1983 after SONY had already had their model FD-200 on the market for more than a year since February 1982.

The TV 1A was small and good but too costly. Something had to be done so Sinclair marketed model **TV 1B** which was designed for automatic production and so much cheaper to make. The only snag was that it was good for the UK only as the VHF tuner was not, at the time, available or needed in Great Britain. Later a model **TV 1C** for the American market and **TV 1D** for the European market were developed and marketed. A monitor **Mon 1A** with the same Telefunken tube (the coffin tube) was also marketed in 1977.

TV1A POCKET TELEVISION

Tiny Tele!

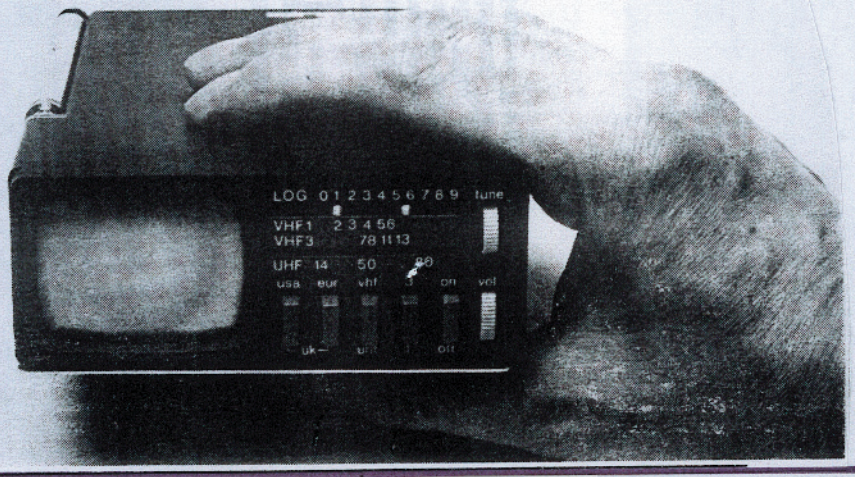
FOR the past four or five years, rumours have been flying around thick and fast concerning the imminent appearance of a pocket sized TV. It's true to say that a couple were produced and shown to the Press, but were never marketed due to some fundamental design fault. There were also more, we are led to believe, that were never revealed to the Press, but were sent back to the "Drawing board" for a further re-think. However, Sinclair—possibly one of the leading exponents of the miniature electronics industry in this country, are now producing a truly tiny TV, which really is "Pocket" size —well large pocket size anyway! —and are claiming a World first.

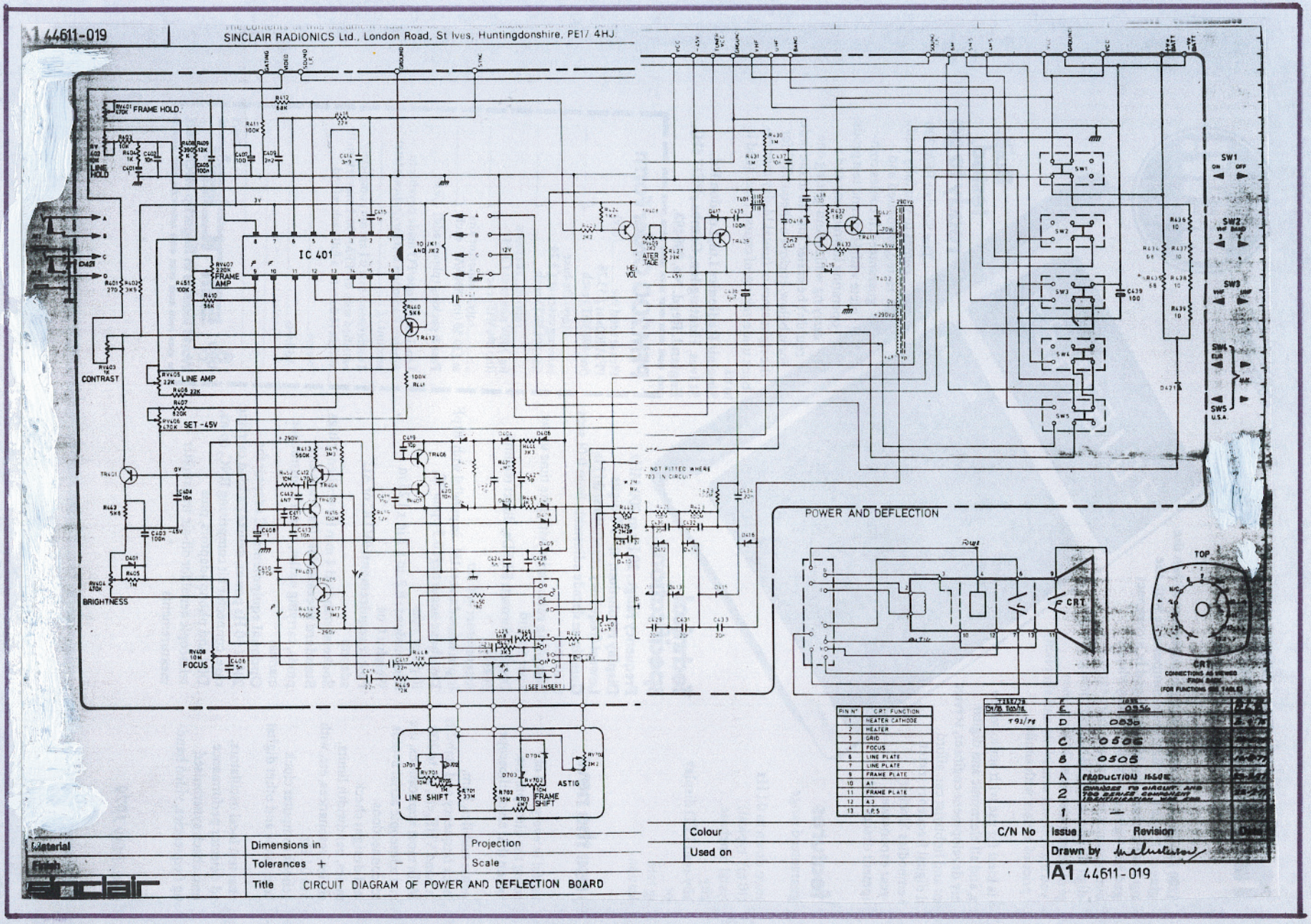
Called the Microvision, it's just 6 × 4 × 1½in with a 2in screen, and is claimed to work just about anywhere in the Western World. It can tune in to any UHF or VHF channel in bands 1, 3, 4 or 5 and consume less power than a large pen torch bulb—to be exact 750mW from 4 AA nickel cadmium rechargable batteries. When fully charged, life is about 4 hours, with a 14-hour recharging cycle. Audio output is 50mW, while EHT to the tiny tube is 2kV.

The Microvision is the result, say Sinclair, of 12 years research and some £500,000 spent in development work alone. Readers may also remember that the NEB granted a large sum of money to Sinclair, which really does prove that some Civil Servants know a good thing when they see it!

Manufactured at Sinclair's Headquarters at St Ives, the Microvision is priced at $300 in the USA or £175·00 plus VAT in the UK.

Sinclair Radionics Ltd., London Road, St Ives, Huntingdon, Cambs PE17 4HJ. Tel: (St Ives) 0480 64646.

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SINCLAIR RADIONICS Ltd., London Road, St Ives, Huntingdonshire, PE17 4HJ.
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FRAME HOLD.
LINE HOLD
FRAME AMP
LINE AMP
CONTRAST
SET -45V
BRIGHTNESS
FOCUS
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FRAME SHIFT
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POWER AND DEFLECTION
CRT
SW1
SW2
SW3
SW4
SW5
TOP
CRT
CONNECTIONS AS VIEWED FROM BASE
PIN N° CRT FUNCTION
1 HEATER CATHODE
2 HEATER
3 GRID
4 FOCUS
6 LINE PLATE
7 LINE PLATE
9 FRAME PLATE
10 A1
11 FRAME PLATE
12 A2
13 H.P.S
Material
Finish
Dimensions in
Tolerances +
Projection
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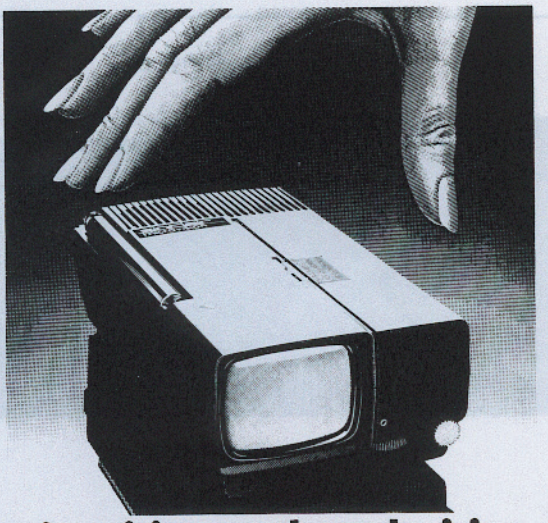
TV1B/C/D POCKET TELEVISIONS



Microvision–pocket television. From Sinclair for just £99.95

There's television. There's portable television. And there's Microvision – *pocket* television, different from anything else in the world.

Microvision works on alkaline penlight batteries. It has its own aerial for all BBC and ITV stations, and a built-in loudspeaker. It has an adjustable stand, a plug-in ear-phone, a screen hood, and a carrying case.

In the office, Microvision brings news, budgets and business programmes right where they're needed.

It's the simplest possible way to watch sport, news and entertainment; indoors, out of doors; at home, in the office, on holiday.

The 2-inch screen that's as clear as a 21-inch screen.

You watch your household TV from ten to fifteen feet away. You'll watch Microvision at normal reading distance. So, to your eyes, the two-inch screen is as big as a full-size screen. And the picture quality is unbelievably bright and sharp.

Pocket TV–the idea that's here to stay.

It's hard to imagine life without transistor radios, or pocket calculators. Yet only a few years ago, they were ideas as breathtaking as pocket television. Soon, Microvision will be just as much part of everyday life.

Yet this world first for Britain costs under £100 – very little for a concept which can transform the way you live.

Microvision–for the first time, television the way you want it, wherever you want it.

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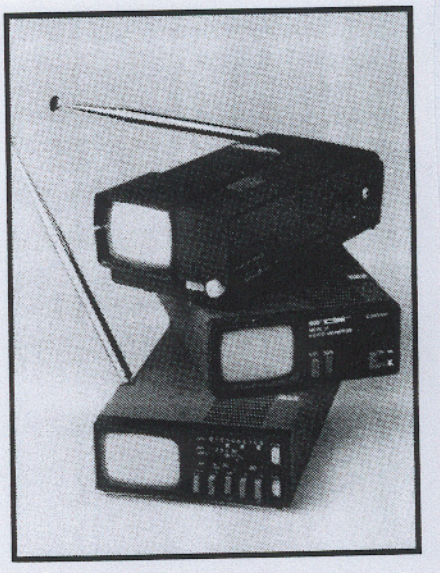
World leaders in fingertip electronics

Sinclair Radionics Ltd. Tel: St Ives (0480) 67414

Take Microvision to the races, to football matches, get a grandstand view, wherever you are.

See Microvision at: Boots Department Stores, Camping International, Currys, Dixons, Eurocalc, Fortnum & Mason, Gailey Caravan Group, Harrods, Kendal Milne, Rackhams, Selfridges, Vallances, Wallace Heaton, also at selected branches of: Allders, Beatties, Binns, Chiesmans, Citer, The Co-op, Dingles, House of Fraser, NEEB, Owen Owen, RSC, SEB, Underwoods, and many local stockists.

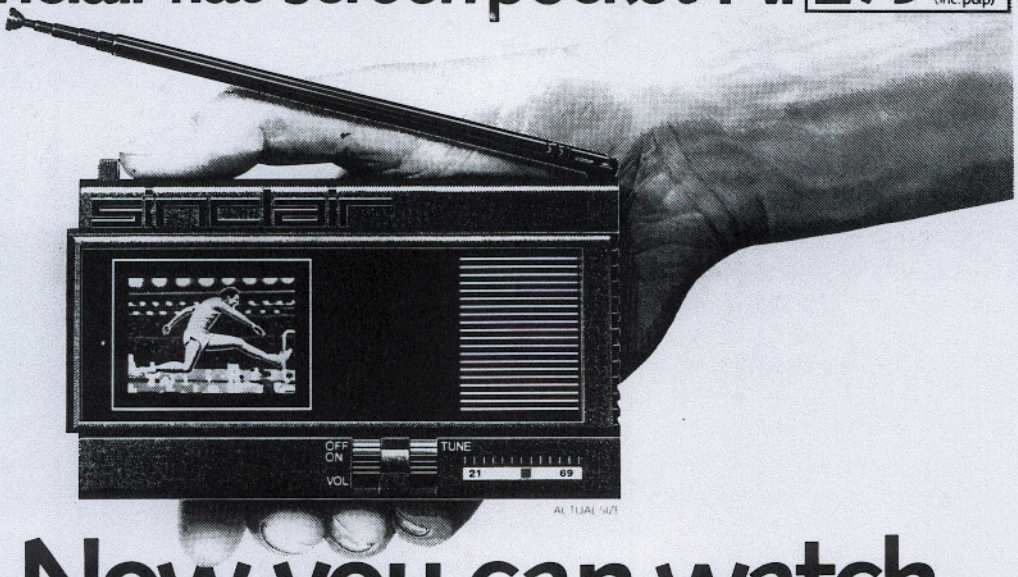
MON1A POCKET MONITOR



the monitor is the one in the middle

FLAT SCREEN TV

Sinclair flat-screen pocket TV. £79.95 (inc. p&p)



ACTUAL SIZE

Now you can watch a little TV anywhere

This is the new Sinclair pocket TV. The first truly pocket-sized television in the world.

It's a stunning example of flat-screen technology – a real, 4-channel television smaller than a paperback book. But it's more than just a brilliant idea.

Sinclair pocket TV is a new and exciting way of looking at the world.

The 2" picture is absolutely pin-sharp. Sound quality is excellent. And the price is pure Sinclair. Just £79.95.

The world of pocket TV

The explosion in TV communications is happening now! Already we have 4 TV channels and 2 breakfast stations. Satellite TV is just over the horizon.

There's more to see and enjoy than ever before – if you have ready access to TV.

Sinclair pocket TV gives you that access. It's television you can watch anywhere. In bed or at the breakfast table, at the office or out of doors.

In fact, virtually anywhere you can take and read a paperback book, you can take – and watch! – pocket TV.

It brings you news, current affairs and sport – as they happen.

It puts the world of TV entertainment in your pocket – ready to enjoy.

Getting down to facts

The truly pocketable TV

The Sinclair pocket TV is just 5½ inches wide, 3½ inches tall and 1¼ inches slim. (So yes, our picture is actual size.)

Compared to the average paperback book, it's 25% smaller and weighs about a third less.

The set is so slim because of advanced flat-screen technology. It eliminates the conventional vacuum tube that makes a domestic TV so bulky.

The picture that thinks it's twelve times bigger

Screen size is just 2 inches, about a twelfth the size of the average domestic TV.

But, compared with them, the same picture is twice as big – about 12 inches. The result is the same as watching your living room TV from your armchair. Except that the picture is brighter, often sharper too.

With flat-screen technology, the picture is up to three times brighter than a conventional mono TV.

Of course, the only real way to appreciate the picture is to see it for yourself. Our 14-day money-back option lets you do just that.

The set you do not adjust

All the TV's routine functions are controlled by a single-purpose made chip. Fifty times a second it checks contrast, brightness and hold.

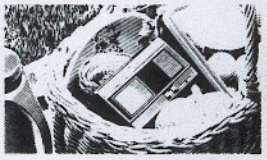
The only functions you control are the ones you need: on-off, volume and station choice.

As a result, the Sinclair TV is at least as reliable as the best conventional TV you can buy. If not more so.

Everything you need for personal, pocketable TV viewing. For £79.95.

The Sinclair pocket TV comes complete with its own integral fold-away aerial. You also get a hi-fi-quality earphone, for truly personal TV, and a smart carrying case.

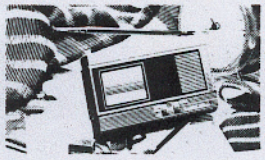
Naturally, a battery is included – enough for 15 hours viewing. And for £7.95 you can add a mains adaptor to save battery power for when you're out and about.



Put Sinclair in your pocket

Sinclair TV. Until now, that pocket-size, flat-screen TV was an impossible breakthrough.

The Sinclair pocket TV took 6 years to develop and cost £4 million. At £79.95 it really is astonishingly good value. And as you'd expect there's a comprehensive, 12-month guarantee. Order your TV today – and make sure you're among the first to own a world first!



How to order

Simply complete the coupon, enclosing the appropriate payment and post it to us.

Orders may be sent FREEPOST (no stamp needed). Access, Barclaycard and Trustcard holders may also order by phone – simply call 0276 24777 (no. 24 hours a day).

There's a 14-day money-back option of course. Please allow 28 days for delivery.

TV Division, Sinclair Research Ltd, Stanhope Road, Camberley, Surrey GU15 3PS. Tel: (0276) 24777

To: TV Division, Sinclair Research, FREEPOST, Camberley, Surrey, GU15 3BR. ORDER FORM

Qty	Item	Code	Item Price	Total
	Sinclair Pocket TV	001	£79.95	
	Extra pack of three batteries	003	£4.95	
	Mains power adaptor	004	£7.95	

Please tick if you require a VAT receipt. Total £ _____

*I enclose a cheque/PO made payable to Readers Account Sinclair Research Ltd for £

Please charge my Access/Barclaycard/Trustcard account no:

*Please delete/complete as applicable

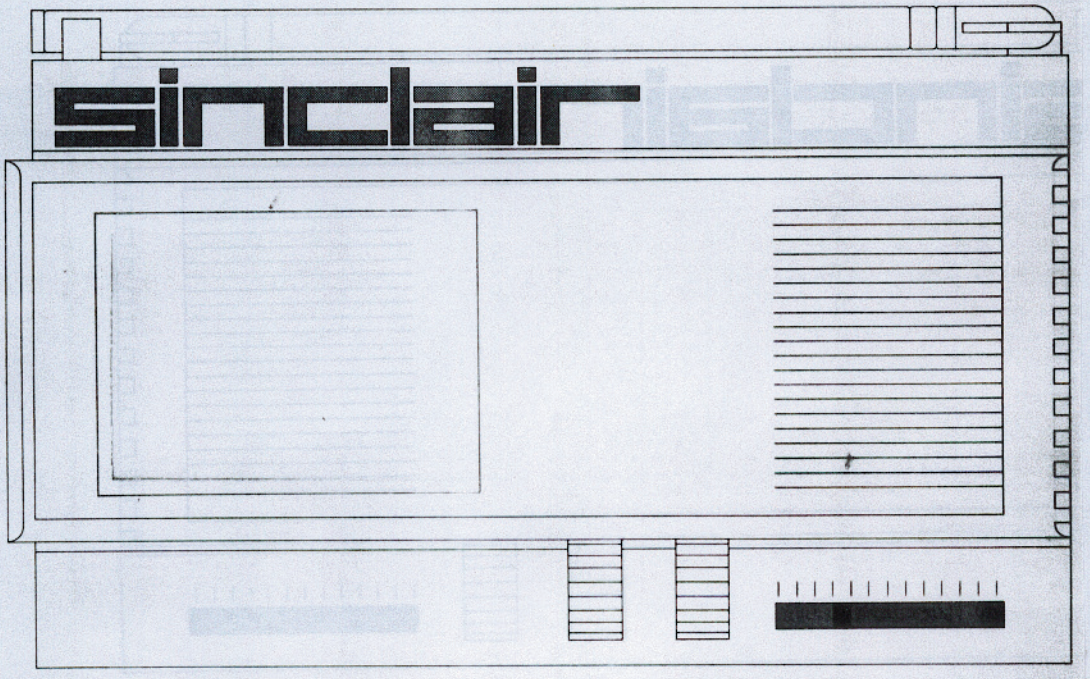
Signature

Mr/Mrs/Miss

Address

All prices include VAT, postage, packing and insurance.

sinclair



FLAT-SCREEN POCKET TELEVISION

Today.

The Sinclair flat-screen pocket television is the latest of these revolutionary products.

It took six years' hard work and over £4 million to develop the most elegant window on the world that the world has ever seen.

The Sinclair flat-screen TV combines analogue and digital techniques in a single, purpose-built integrated circuit. It exploits to the full the revolutionary flat-screen technology. It incorporates the smallest tuner ever developed. And it runs for 15 hours on a slim, credit-card sized battery.

It receives UHF transmissions almost anywhere in the world, switching from standard to standard automatically. It gives you a picture three times brighter than conventional technologies offer, and it monitors and controls its own picture standard automatically. All you do is switch on, and tune to your channel.

The result is a television set which is not merely pocketable, but outstanding in every facet of its performance. For just £79.95.

SINCLAIR FLAT-SCREEN POCKET TELEVISION: ORDER FORM

To: TV Division, Sinclair Research, FREEPOST, Camberley, Surrey, GU15 3BR.

*I enclose a cheque/postal order made payable to Sinclair Research Ltd for £_____

Please charge my Access/Barclaycard/Trustcard account no:

Please send me:

Item	Qty	Item price £	Code	Total £
Sinclair flat-screen TV		79.95	001	
Extra pack of 3 batteries		9.95	003	
Mains power adaptor		7.95	004	
			TOTAL £	

Please tick if you require a VAT receipt ☐

All prices include VAT, postage, packing and insurance.

Signature _____

Mr/Mrs/Miss

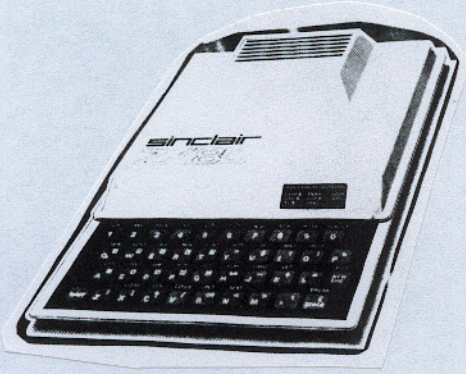
Address

PLEASE PRINT

*Delete/complete as applicable

TVM401

sinclair



COMPUTERS AGE

Like Bill Gates, Steve Jobs and Steve Wozniak, Sir Clive must be considered as one of the great historic personalities who changed the way computers were regarded and accepted not only by users but by all people.

His **ZX 80** was the first computer to be sold in the UK for less than £100 and the following model the **ZX 81** was the first to be sold in the United States for less than $100.

His first model **MK XIV** (which stands for Microprocessor Kit 14th) was the first popular microcomputer kit to be widely sold (by post) in the UK in 1978. It used a National Semiconductor SC MP-11 microprocessor and sported a glorious 256 bytes (sic) of memory .

But the real computer history killer was the **Spectrum** which started with 16k of memory easily expandable to 48K. And it was in colour! Just to figure out its place on the market suffice to say that all that Commodore, the other popular mass producer of home computers, was able to offer at the time was its model VIC-20 with a massive 4K of memory (!?).

Anyway how could *5 million* customers be in the wrong?

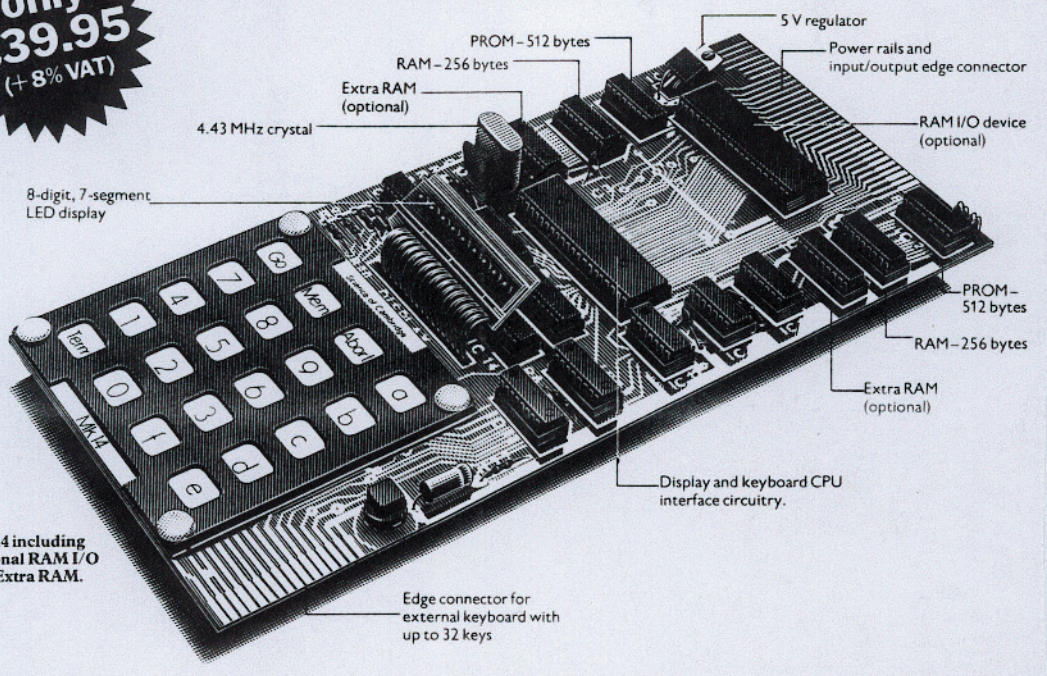
What went wrong was instead the delivery time of the next computer: the ill fated **QL**. Instead of the promised 28 days delivery time, some of the early customers had to wait six/seven months (or more). Sinclair's marketing promises and economic practices were never a model for anybody but this time the dragon had bitten its own tail.

MK XIV MICROCOMPUTER

the MK XIV had a glorious 256 bytes of memory. (but you could have added another 256!)

From Science of Cambridge: the new MK 14. Simplest, most advanced, most flexible microcomputer – in kit form.

only £39.95 (+8% VAT)



MK 14 including optional RAM I/O and Extra RAM.

The MK14 is a complete microcomputer with a keyboard, a display, 8 x 512-byte pre-programmed PROMs, and a 256-byte RAM programmable through the keyboard.

As such the MK14 can handle dozens of user-written programs through the hexadecimal keyboard.

Yet in kit form, the MK14 costs only £39.95 (+£3.20 VAT, and p&p).

More memory—and peripherals!

Optional extras include:

1. Extra RAM – 256 bytes.
2. 16-line RAM I/O device (allowed for on the PCB) giving further 128 bytes of RAM.
3. Low-cost cassette interface module – which means you can use ordinary tape cassettes/recorder for storage of data and programs.
4. Revised monitor, to get the most from the cassette interface module. It consists of 2 replacement PROMs, pre-programmed with sub-routines for the interface, offset calculations and single step, and single-operation data entry.
5. PROM programmer and blank PROMs to set up your own pre-programmed dedicated applications.

All are available now to owners of MK14.

A valuable tool—and a training aid

As a computer, it handles operations of all types – from complex games to digital alarm clock functioning, from basic maths to a pulse delay chain. Programs are in the Manual, together with instructions for creating your own genuinely valuable programs. And, of course, it's a superb education and training aid – providing an ideal introduction to computer technology.

SPECIFICATIONS

●Hexadecimal keyboard ● 8-digit, 7-segment LED display ● 8 x 512 PROM, containing monitor program and interface instructions ●256 bytes of RAM ● 4 MHz crystal ● 5 V regulator ● Single 8 V power supply ● Space available for extra 256-byte RAM and 16 port I/O ● Edge connector access to all data lines and I/O ports

Free Manual

Every MK14 kit includes a Manual which deals with procedures from soldering techniques to interfacing with complex external equipment. It includes 20 sample programs including math routines (square root, etc), digital alarm clock, single-step, music box, mastermind and moon landing games, self-replication, general purpose sequencing, etc.

Designed for fast, easy assembly

The MK14 can be assembled by anyone with a fine-tip soldering iron and a few hours' spare time, using the illustrated step-by-step instructions provided.

How to get your MK 14

Getting your MK14 kit is easy. Just fill in the coupon below, and post it to us today, with a cheque or PO made payable to Science of Cambridge. And, of course, it comes to you with a comprehensive guarantee. If for any reason, you're not completely satisfied with your MK14, return it to us within 14 days for a full cash refund.

Science of Cambridge Ltd,
6 Kings Parade, Cambridge, Cambs., CB2 1SN.
Telephone: Cambridge (0223) 311488

To: Science of Cambridge Ltd, 6 Kings Parade, Cambridge, Cambs., CB2 1SN.

Please send me the following, plus details of other peripherals:

☐ MK 14 Standard Microcomputer Kit @ £43.55 (inc 40p p&p.)

☐ Extra RAM @ £3.88 (inc p&p.)

☐ RAM I/O device @ £8.42 (inc p&p.)

I enclose cheque/money order/PO for £_____ (indicate total amount.)

Name_____

Address (please print)_____

_____

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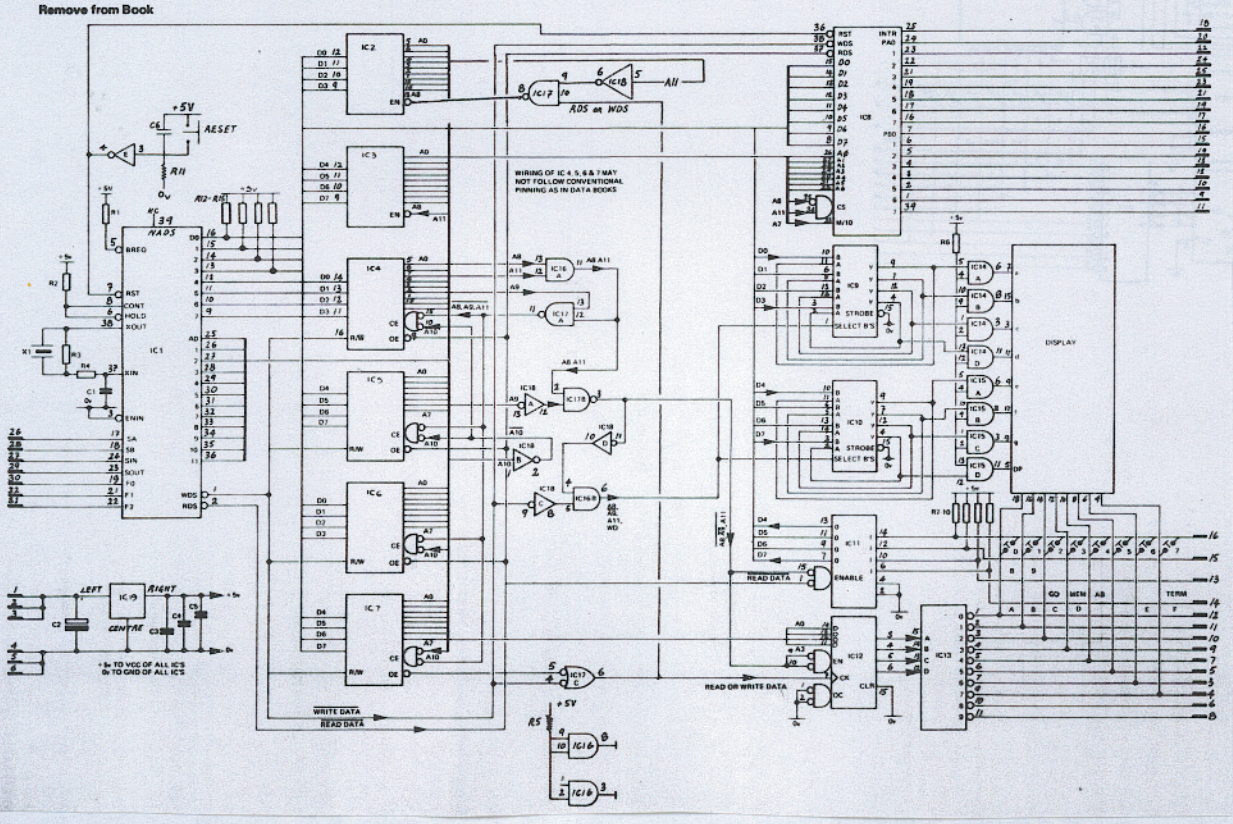
EE/11 Allow 21 days for delivery

Science of Cambridge

the MK XIV was marketed by *Chris Curry* who later left Sinclair to found his own company ACORN (of BBC B fame)

Remove from Book



ZX80 PERSONAL MICROCOMPUTER

Britain's first complete computer kit.

The Sinclair ZX80.

£79.95

Price breakdown
ZX80 and manual £69.52
VAT £10.43
Post and packing FREE

Please note: many kit makers quote VAT-exclusive prices.

You've seen the reviews... you've heard the excitement... now make the kit!

This is the ZX80. 'Personal Computer World' gave it 5 stars for 'excellent value'. Benchmark tests say it's faster than all previous personal computers. And the response from kit enthusiasts has been tremendous.

To help you appreciate its value, the price is shown above with and without VAT. This is so you can compare the ZX80 with competitive kits that don't appear with inclusive prices.

'Excellent value' indeed!

For just £79.95 (including VAT and p&p) you get everything you need to build a personal computer at home – PCB, with IC sockets for all ICs, case, leads for direct connection to a cassette recorder and television (black and white or colour), everything!

Yet the ZX80 really is a complete, powerful, full-facility computer, matching or surpassing other personal computers at several times the price.

The ZX80 is programmed in BASIC, the world's most popular computer language for beginners and experts alike.

The ZX80 is pleasantly straightforward to assemble, using a fine-tipped soldering iron. It immediately proves what a good job you've done: connect it to your TV, link it to an appropriate power source* – and you're ready to go.

Your ZX80 kit contains...

- Printed circuit board, with IC sockets for all ICs
- Complete components set, including all ICs – all manufactured by selected world-leading suppliers
- New rugged Sinclair keyboard, touch-sensitive, wipe-clean
- Ready-moulded case
- Leads and plugs for connection to domestic TV and cassette recorder. (Programs can be SAVEd and LOADed on to a portable cassette recorder.)
- FREE course in BASIC programming and user manual

Optional extras

- Mains adaptor of 600 mA at 9 VDC nominal unregulated (available separately – see coupon)
- Additional memory expansion boards allowing up to 16K bytes RAM. (Extra RAM chips also available – see coupon)

*Use a 600 mA at 9 VDC nominal unregulated mains adaptor. Available from Sinclair if desired (see coupon).

The unique and valuable components of the Sinclair ZX80.

The Sinclair ZX80 is not just another personal computer. Quite apart from its exceptionally low price, the ZX80 has two uniquely advanced components: the Sinclair BASIC interpreter, and the Sinclair 'teach-yourself' BASIC manual.

The unique Sinclair BASIC interpreter offers remarkable programming advantages:

- **Unique 'one-touch' key word entry: the ZX80 eliminates a great deal of tiresome typing. Key words (RUN, PRINT, LIST, etc.) have their own single-key entry.**
- Unique syntax check. Only lines with correct syntax are accepted into programs. A cursor identifies errors immediately. This prevents entry of long and complicated programs with faults only discovered when you try to run them.
- Excellent string-handling capability – takes up to 26 string variables of any length. All strings can undergo all relational tests (e.g. comparison). The ZX80 also has string input to request a line of text when necessary. Strings do not need to be dimensioned.
- Up to 26 single dimension arrays.
- FOR/NEXT loops nested up to 26.
- Variable names of any length.
- BASIC language also handles full Boolean arithmetic, conditional expressions, etc.
- Exceptionally powerful edit facilities, allows modification of existing program lines.
- Randomise function, useful for games and secret codes, as well as more serious applications.
- Timer under program control.
- PEEK and POKE enable entry of machine code instructions. USR causes jump to a user's machine language sub-routine.
- High-resolution graphics with 22 standard graphic symbols.
- All characters printable in reverse under program control.
- Lines of unlimited length.

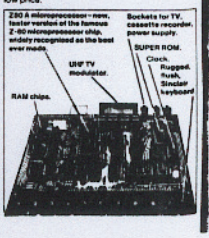
Fewer chips, compact design, volume production – more power per pound!

The ZX80 owes its remarkable low price to its remarkable design: the whole system is packed on to fewer, newer, more powerful and advanced LSI chips. A single SUPER ROM for instance, contains the BASIC interpreter, the character set, operating system, and monitor. And the ZX80's 1K byte RAM is roughly equivalent to 4K bytes in a conventional computer – typically storing 100 lines of BASIC. (Key words occupy only a single byte!)

The display shows 32 characters by 24 lines.

And Benchmark tests show that the ZX80 is faster than all other personal computers.

No other personal computer offers this unique combination of high capability and low price.



The Sinclair teach-yourself BASIC manual.

If the specifications of the Sinclair ZX80 mean little to you, don't worry. They're all explained in the specially written 128-page book free with every kit. The book makes learning easy, exciting and enjoyable, and represents a complete course in BASIC programming – from first principles to complex programs. (Available separately – purchase price refunded if you buy a ZX80 later.)

A hardware manual is also included with every kit.

The Sinclair ZX80. Kit: £79.95. Assembled: £99.95. Complete!

The ZX80 kit costs a mere £79.95. Can't wait to have a ZX80 up and running? No problem! It's also available, ready assembled and complete with mains adaptor, for only £99.95.

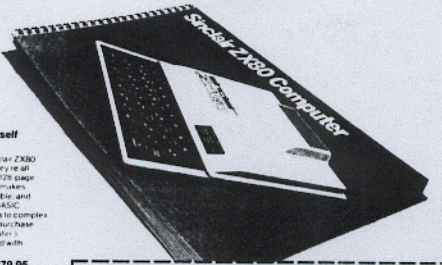
Demand for the ZX80 is very high: use the coupon to order today for the earliest possible delivery. All orders will be despatched in strict rotation. We'll acknowledge each order by return, and tell you exactly when your ZX80 will be delivered. If you choose not to wait, you can cancel your order immediately, and your money will be refunded at once. Again, of course, you may return your ZX80 as received within 14 days for a full refund. We want you to be satisfied beyond all doubt – and we have no doubt that you will be.

sinclair ZX80
Science of Cambridge Ltd
6 Kings Parade, Cambridge, Cambs. CB2 1SN
Tel: 0223 311488

ZX80 software – now available!

See advertisements in Personal Computer World, Electronics Today International, and other journals.

New dedicated software – developed independently of Science of Cambridge – reflects the enormous interest in the ZX80. More software available soon – from leading consultancies and software houses.



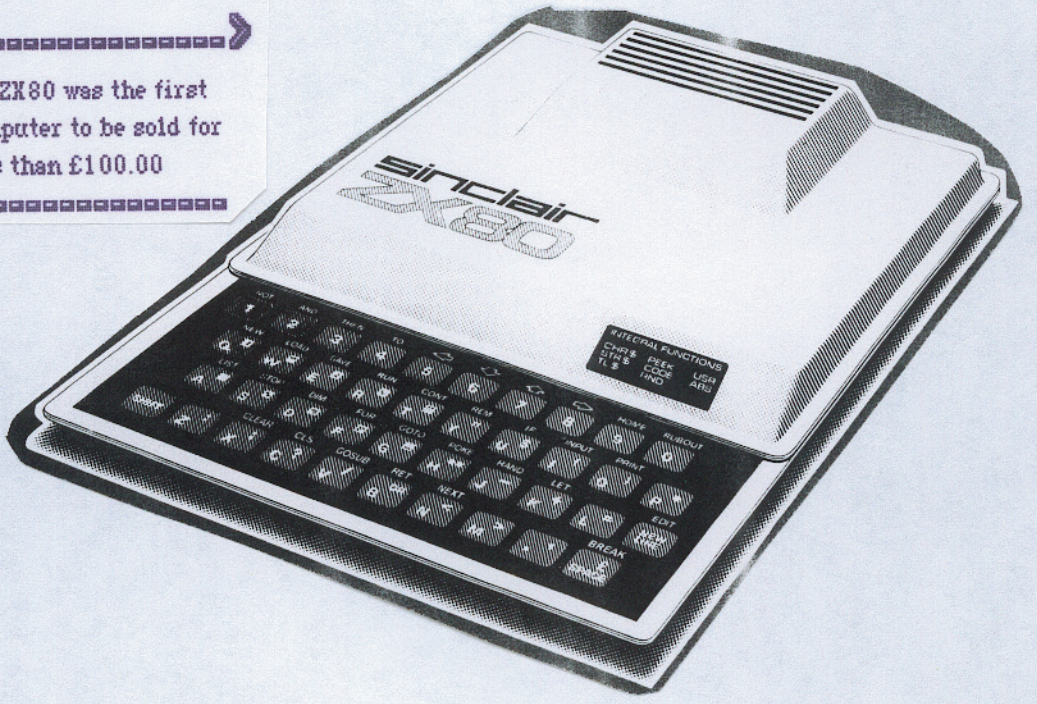
ORDER FORM

To: Science of Cambridge Ltd, 6 Kings Parade, Cambridge, Cambs., CB2 1SN
Remember: all prices shown include VAT, postage and packing. No hidden extras.
Please send me:

Quantity	Item	Item price £	Total £
	Sinclair ZX80 Personal Computer kit(s). Price includes ZX80 BASIC manual; excludes mains adaptor	£79.95	
	Ready-assembled Sinclair ZX80 Personal Computer(s). Price includes ZX80 BASIC manual and mains adaptor	£99.95	
	Mains Adaptor(s) 600 mA at 9 VDC nominal unregulated	8.95	
	Memory Expansion Board(s) (each one takes up to 3K bytes)	12.00	
	RAM Memory chips – standard 1K bytes capacity	16.00	
	Sinclair ZX80 Manual(s) (manual free with every ZX80 kit or ready-made computer)	5.00	
NB: Your Sinclair ZX80 must be fully packaged for overseas despatch.		TOTAL	£

I enclose a cheque/postal order payable to Science of Cambridge Ltd for £
Please print
Name Mr/Mrs/Miss
Address

PW 10/80



A ciascuno il suo computer.

Anche voi avete bisogno del computer personale

Tutti hanno sentito parlare di microelettronica e di microprocessori. Molti ne conoscono i vantaggi ma vorrebbero saperne di più molti amerebbero sapere tutto.

Qui si svela che ZX80 è l'apparecchio più importante del nostro tempo. Ciò che molti anni fa era costosamente consentito solo ai grandi organismi, ora è alla portata di tutti; del professionista, della piccola azienda, del nucleo familiare, persino della persona singola.

Lo ZX80 della Sinclair offre servizi di gran lunga superiori al suo prezzo. Pesa solo 350 grammi. È applicabile a qualunque televisore.

Può essere collegato a un registratore di cassette per la memorizzazione permanente di istruzioni e dati.

È un piccolo apparecchio che può mettere ordine in tutte le vostre cose e aiutarvi più di una schiera di segretari.

Il primo computer personale veramente pratico

ZX80 anticipa i tempi. Le sue qualità colgono di sorpresa anche i tecnici, poichè il raggiungimento delle caratteristiche che lo distinguono sarebbero dovute apparire fra molto tempo.

È conveniente, facile da regolare, da far funzionare e da riporre dopo l'uso. Soddisfa l'utente più preparato.

Esempio di microelettronica avanzata

La semplicità circuitale è il primo pregio dello ZX80, la potenza è il secondo pregio. Insieme, ne fanno l'apparecchio unico nel suo genere.

Alcune applicazioni

A casa memorizza i compleanni, i numeri telefonici, le ricette di cucina, le spese e il bilancio familiare, e altre mille applicazioni di cui si può presentare la necessità.

Per aziende

Piccole gestioni di magazzino, archivio clienti e fornitori eccetera.

Per professionisti

Calcoli matematici e trigonometrici, elaborazione di formule, archivio.

Per il tempo libero

Lo ZX80 gioca alle carte, risolve le parole incrociate, fa qualsiasi gioco gli venga messo in memoria.

sinclair ZX80

SHOP bit primavera

Chiedere opuscolo illustrato a:
GBC Italiana, casella postale 10488 Milano

Dimostrazioni e vendita presso i

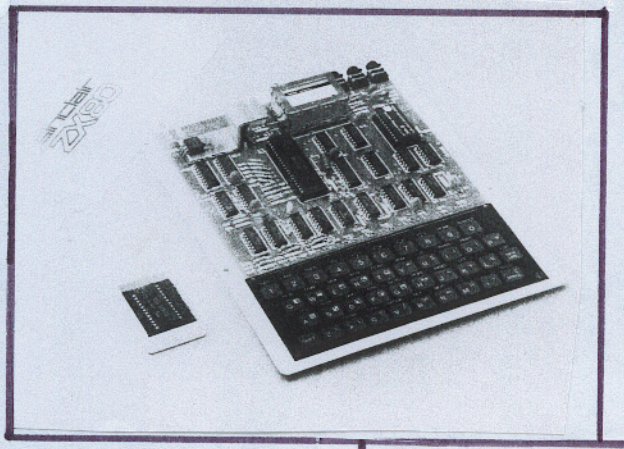
CARATTERISTICHE TECNICHE

MICRO - Z80A
LINGUAGGIO - BASIC
MEMORIA - 1 K RAM ESPANDIBILE A 16 K
TASTIERA - KEYPLATE CON SUPERFICIE STAMPATA
VISUALIZZAZIONE - SU QUALUNQUE TELEVISORE
GRAFICA - 24 LINEE A 32 CARATTERI
MEMORIA DI MASSA - SU QUALUNQUE REGISTRATORE MAGNETICO
BUS - CONNETTORE CON 44 LINEE, 37 PER CPU 0V, 5V, 9V, CLOCK
SISTEMA OPERATIVO - 4K ROM
ALIMENTAZIONE - 220V, 50 Hz CON ALIMENTATORE ESTERNO OPZIONALE

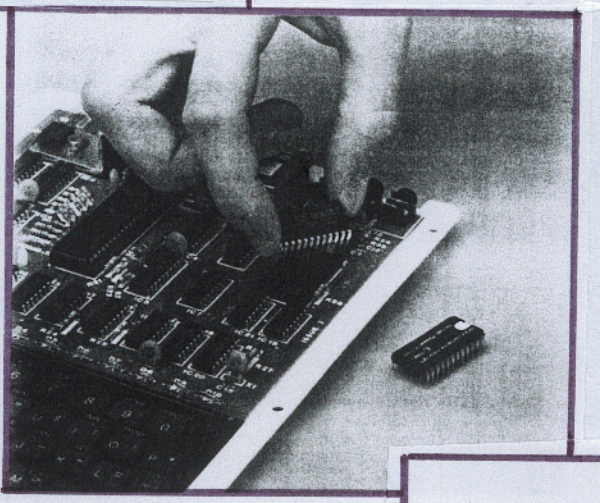
LISTINO PREZZI IVA ESCLUSA

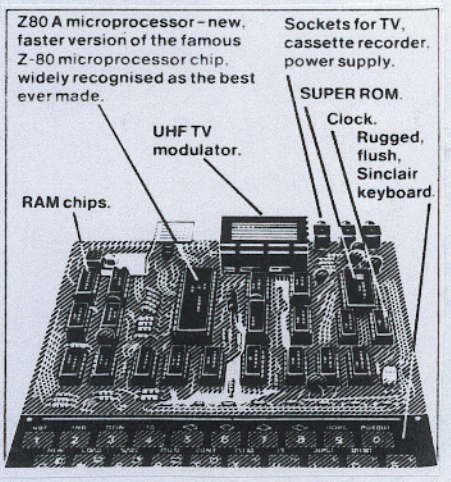
• COMPUTER ZX80	TC/0080-00	**L. 285.000**
• COMPUTER ZX80 KIT	TC/0081-00	**L. 240.000**
• MODULO PER ESPANSIONE DI MEMORIA FINO A 3K RAM	TC/0083-00	**L. 39.500**
• COPPIE DI CIRCUITI INTEGRATI PER OGNI K DI MEMORIA	TC/0082-00	**L. 17.000**
• ALIMENTATORE	TC/0085-00	**L. 12.900**
• LIBRO "IMPARIAMO A PROGRAMMARE IN BASIC CON LO ZX80"	TL/1450-01	**L. 4.400**
• MODULO DI ESPANSIONE DI 16 K RAM COMPLETO DI INTEGRATI	TC/0087-00	**L. 191.500**
• ALIMENTATORE PER ZX80 CON ESPANSIONE DI 16 K RAM	TC/0086-00	**L. 22.000**
• FLOATING POINT ROMS 8K	TC/0088-00	**L. 60.000**

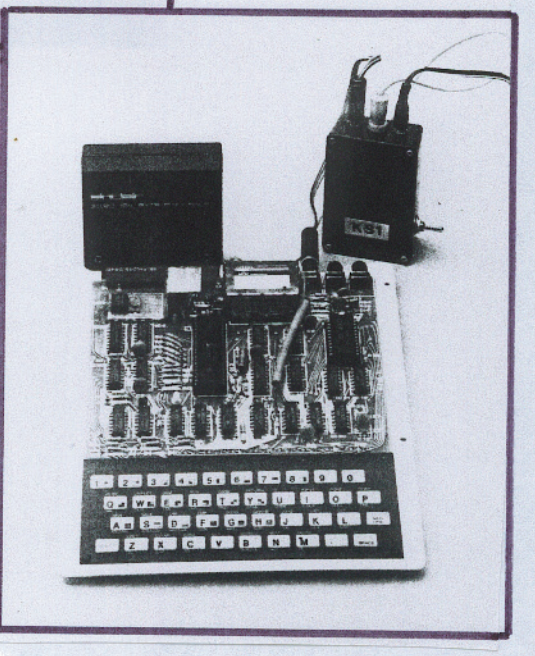
the ZX80 had a good marketing success even overseas. This is the ad. for the Italian version imported by the GBC in Milan

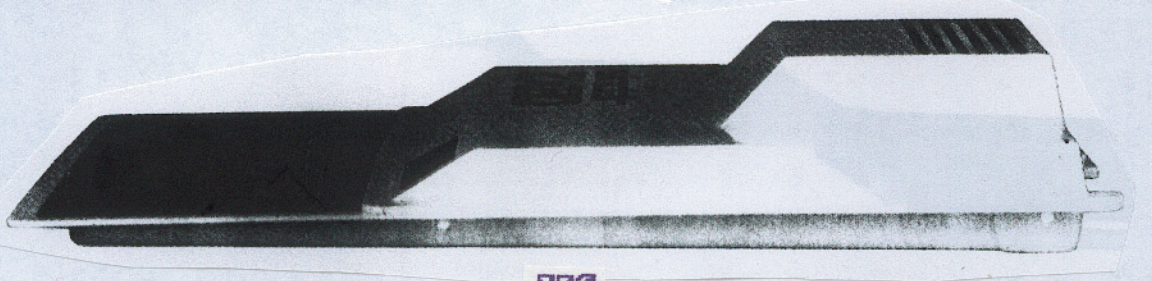


It was possible to upgrade the ZX80 with the new ZX81 ROM. A new keyboard was also supplied in the kit



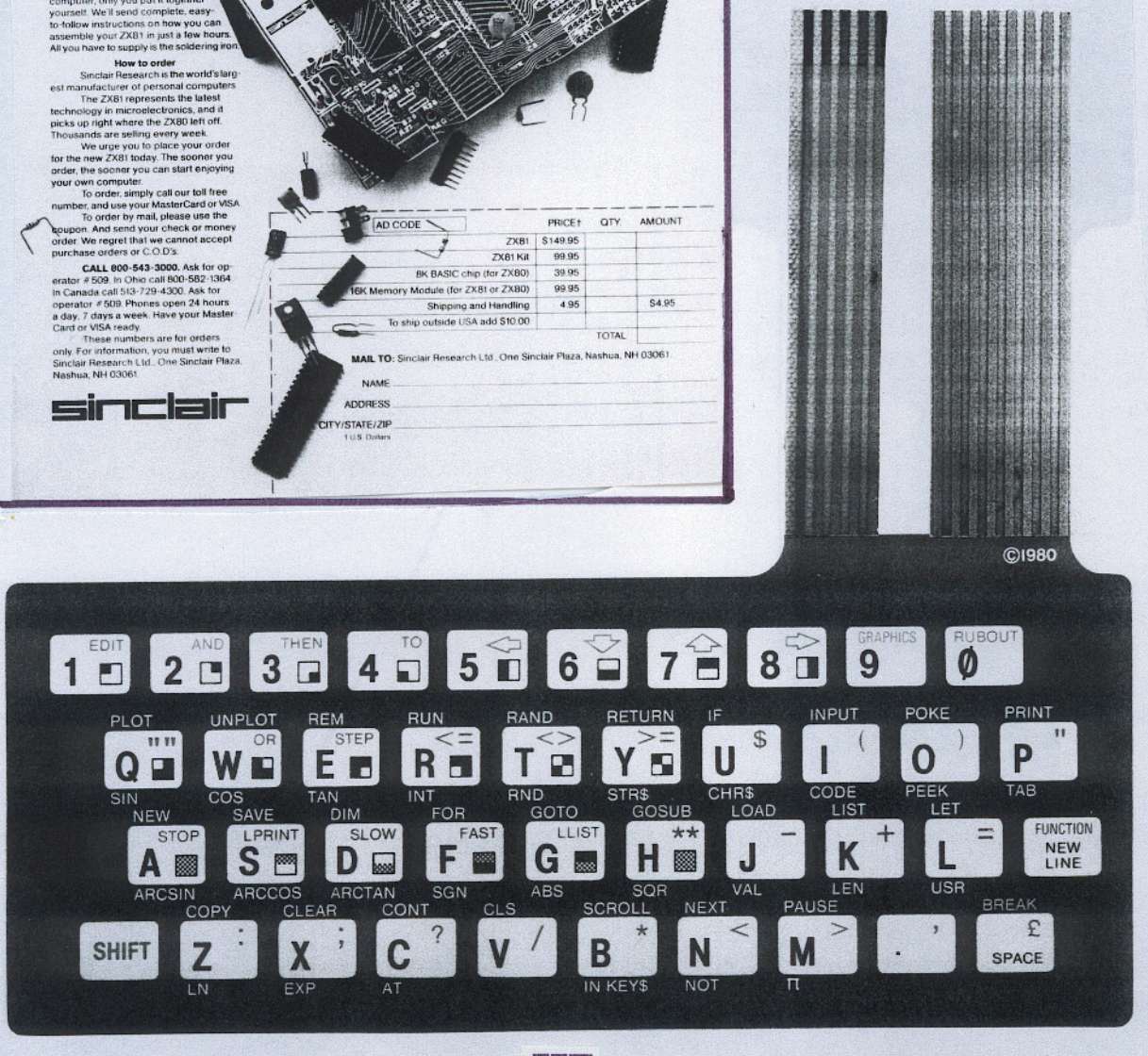




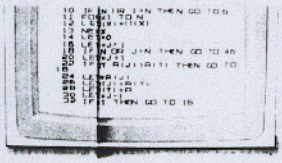


ZX81 PERSONAL MICROCOMPUTER

the ZX81 was the first computer to be sold for less that $ 100.00



New! Sinclair ZX81 Personal Computer. Kit: £49.95 complete



If you own a Sinclair ZX80...

The new 8K BASIC ROM used in the Sinclair ZX81 is available to ZX80 owners as a drop-in replacement chip (Complete with new keyboard template and operating manual.)

With the exception of animated graphics, all the advanced features of the ZX81 are now available on your ZX80 – including the ability to drive the Sinclair ZX Printer.

16K-BYTE RAM pack for massive add-on memory.

Designed as a complete module to fit your Sinclair ZX80 or ZX81, the RAM pack simply plugs into the existing expansion port at the rear of the computer to multiply your data/program storage by 16.

Use it for long and complex programs or as a personal database. Yet it costs as little as half the price of comparable additional memory.

Coming soon – the ZX Printer.

Designed exclusively for use with the ZX81 (and ZX80 with 8K BASIC ROM), the printer offers full alphanumerics across 32 columns, and highly sophisticated graphics. Special features include COPY, which prints out exactly what is on the whole TV screen without the need for further instructions. The ZX Printer will be available in Summer 1981, at around £50 – watch this space!

Reach advanced computer comprehension in a few absorbing hours

1980 saw a genuine breakthrough – the Sinclair ZX80, world's first complete personal computer for under £100. At £99.95, the ZX80 offered a specification unchallenged at the price.

Over 50,000 were sold, and the ZX80 won virtually universal praise from computer professionals.

Now the Sinclair lead is increased: for just £69.95, the new Sinclair ZX81 offers even more advanced computer facilities at an even lower price. And the ZX81 kit means an even bigger saving. At £49.95 it costs almost 40% less than the ZX80 kit!

Lower price: higher capability

With the ZX81, it's just as simple to teach yourself computing, but the ZX81 packs even greater working capability than the ZX80.

It uses the same micro-processor but incorporates a new, more powerful 8K BASIC ROM – the 'trained intelligence' of the computer. This chip works in decimals, handles logs and trig, allows you to plot graphs, and builds up animated displays.

And the ZX81 incorporates other operation refinements – the facility to load and save named programs on cassette, for example, or to select a program off a cassette through the keyboard.

Higher specification, lower price – how's it done?

Quite simply, by design. The ZX80 reduced the chips in a working computer from 40 or so, to 21. The ZX81 reduces the 21 to 4!

The secret lies in a totally new master chip. Designed by Sinclair and custom-built in Britain, this unique chip replaces 18 chips from the ZX80!

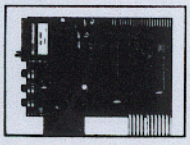
Proven micro-processor, new 8K BASIC ROM, RAM – and unique new master chip.

Built: £69.95 complete

Kit or built – it's up to you!

The picture shows dramatically how easy the ZX81 kit is to build: just four chips to assemble (plus, of course the other discrete components) – a few hours' work with a fine-tipped soldering iron. And you may already have a suitable mains adaptor – 600 mA at 9 V DC nominal unregulated (supplied with built version).

Kit and built versions come complete with all leads to connect to your TV (colour or black and white) and cassette recorder.



New, improved specification

- Z80A micro-processor – new, faster version of the famous Z80 chip, widely recognised as the best ever made
- Unique 'one-touch' key word entry – the ZX81 eliminates a great deal of tiresome typing. Key words (RUN, LIST, PRINT, etc.) have their own single-key entry
- Unique syntax-check and report codes identify programming errors immediately
- Full range of mathematical and scientific functions, accurate to eight decimal places
- Graph-drawing and animated display facilities
- Multi-dimensional string and numerical arrays
- Up to 26 FOR/NEXT loops
- Randomise function – useful for games as well as serious applications
- Cassette LOAD and SAVE with named programs
- 1K-byte RAM expandable to 16K bytes with Sinclair RAM pack
- Able to drive the new Sinclair printer (not available yet – but coming soon!)
- Advanced 4-chip design: micro-processor, ROM, RAM, plus master chip – unique, custom-built chip replacing 18 ZX80 chips.

New Sinclair teach-yourself BASIC manual

Every ZX81 comes with a comprehensive, specially-written manual – a complete course in BASIC programming, from first principles to complex programs. You need no prior knowledge – children from 12 upwards soon become familiar with computer operation.

sinclair ZX81

Sinclair Research Ltd.
6 Kings Parade, Cambridge, Cambs., CB2 1SN. Tel: 0276 66104.
Reg. no. 214 4630 00

To: Sinclair Research Ltd, FREEPOST 7, Cambridge, CN2 1YY.

Qty	Item	Code	Item price £	Order Total £
	Sinclair ZX81 Personal Computer kit(s). Price includes ZX81 BASIC manual, excludes mains adaptor	12	49.95	
	Ready-assembled Sinclair ZX81 Personal Computer(s). Price includes ZX81 BASIC manual and mains adaptor	11	69.95	
	Mains Adaptor(s) (600 mA at 9 V DC nominal unregulated)	10	8.95	
	16K BYTE RAM pack(s)	18	49.95	
	8K BASIC ROM to fit ZX80	17	19.95	
	Post and Packing			2.95
			TOTAL £	

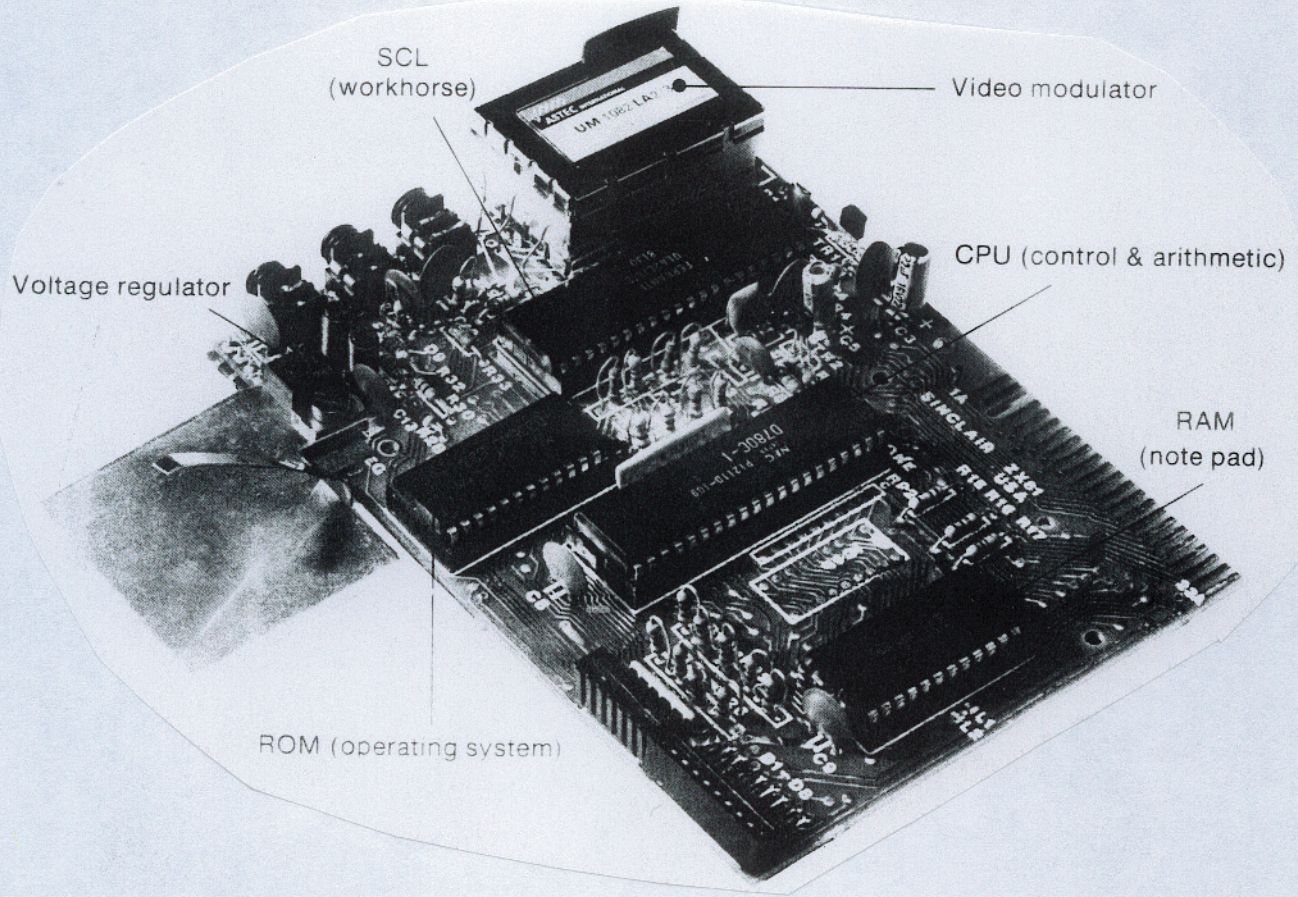
Please tick if you require a VAT receipt.
*I enclose a cheque/postal order payable to Sinclair Research Ltd. for £
*Please charge to my Access/Barclaycard/Trustcard account no.

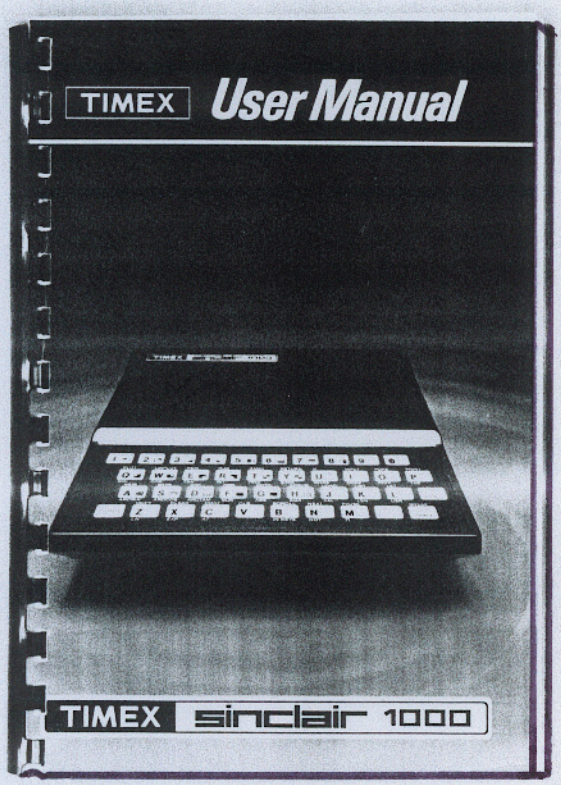
*Please delete/complete as applicable — Please print

Name: Mr/Mrs/Miss

Address

FREEPOST – no stamp needed. PRM08





the American version of the ZX81 had a full (!) 2K of RAM memory and it was named the T/S 1000

New 16K computer is compatible with the T/S1000,ZX81

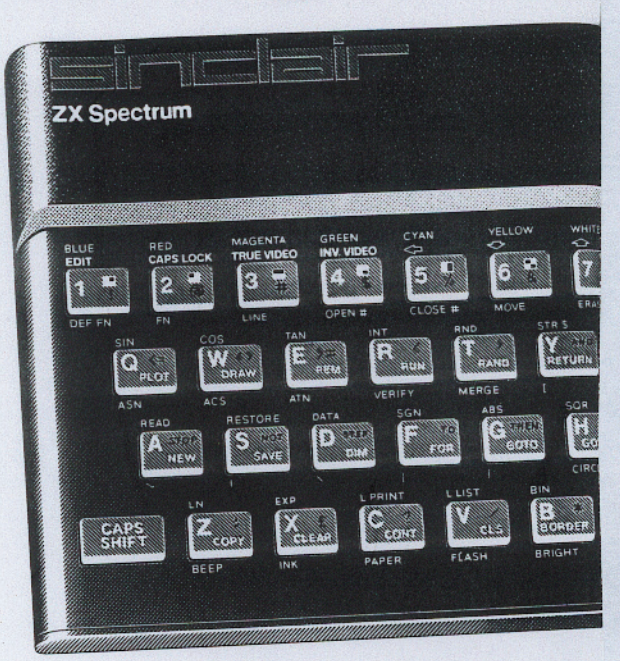
Timex introduces the 1500

the T/S 1500 was the 16K version of the ZX81 in a Spectrum style keyboard

Sinclair ZX Specti

16K or 48K RAM... full-size moving-key keyboard... colour and sound... high-resolution graphics...

From only £125!



First, there was the world-beating Sinclair ZX80. The first personal computer for under £100.

Then, the ZX81. With up to 16K RAM available, and the ZX Printer. Giving more power and more flexibility. Together, they've sold over 500,000 so far, to make Sinclair world leaders in personal computing. And the ZX81 remains the ideal low-cost introduction to computing.

Now there's the ZX Spectrum! With up to 48K of RAM. A full-size moving-key keyboard. Vivid colour and sound. High-resolution graphics. And a low price that's unrivalled.

Professional power– personal computer price!

The ZX Spectrum incorporates all the proven features of the ZX81. But its new 16K BASIC ROM dramatically increases your computing power.

You have access to a range of 8 colours for foreground, background and border, together with a sound generator and high-resolution graphics.

You have the facility to support separate data files.

You have a choice of storage capacities (governed by the amount of RAM). 16K of RAM (which you can uprate later to 48K of RAM) or a massive 48K of RAM.

Yet the price of the Spectrum 16K is an amazing £125! Even the popular 48K version costs only £175!

You may decide to begin with the 16K version. If so, you can still return it later for an upgrade. The cost? Around £60.

Ready to use today, easy to expand tomorrow

Your ZX Spectrum comes with a mains adaptor and all the necessary leads to connect to most cassette recorders and TVs (colour or black and white).

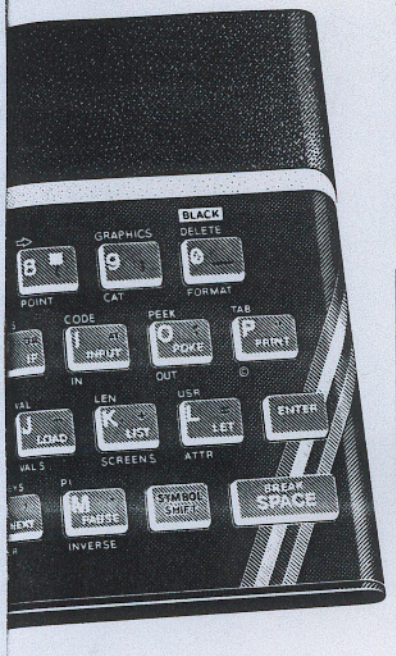
Employing Sinclair BASIC (now used in over 500,000 computers worldwide) the ZX Spectrum comes complete with two manuals which together represent a detailed course in BASIC programming. Whether you're a beginner or a competent programmer, you'll find them both of immense help. Depending on your computer experience, you'll quickly be moving into the colourful world of ZX Spectrum professional-level computing.

There's no need to stop there. The ZX Printer – available now – is fully compatible with the ZX Spectrum. And later this year there will be Microdrives for massive amounts of extra on-line storage, plus an RS232 / network interface board.

Key features of the Sinclair ZX Spectrum

- Full colour – 8 colours each for foreground, background and border, plus flashing and brightness-intensity control.
- Sound – BEEP command with variable pitch and duration.
- Massive RAM – 16K or 48K.
- Full-size moving-key keyboard – all keys at normal typewriter pitch, with repeat facility on each key.
- High-resolution – 256 dots horizontally x 192 vertically, each individually addressable for true high-resolution graphics.
- ASCII character set – with upper- and lower-case characters.
- Teletext-compatible – user software can generate 40 characters per line or other settings.
- High speed LOAD & SAVE – 16K in 100 seconds via cassette, with VERIFY & MERGE for programs and separate data files.
- Sinclair 16K extended BASIC – incorporating unique 'one-touch' keyword entry, syntax check, and report codes.

um



ZX Spectrum software on cassettes – available now

The first 21 software cassettes are now available directly from Sinclair. Produced by ICL and Psion, subjects include games, education, and business/household management. Galactic Invasion... Flight Simulation... Chess... History... Inventions... VU-CALC... VU-3D ...47 programs in all. There's something for everyone, and they all make full use of the Spectrum's colour, sound and graphics capabilities. You'll receive a detailed catalogue with your Spectrum.

RS232 / network interface board

This interface, available later this year, will enable you to connect your ZX Spectrum to a whole host of printers, terminals and other computers.

The potential is enormous. And the astonishingly low price of only £20 is possible only because the operating systems are already designed into the ROM.

sinclair

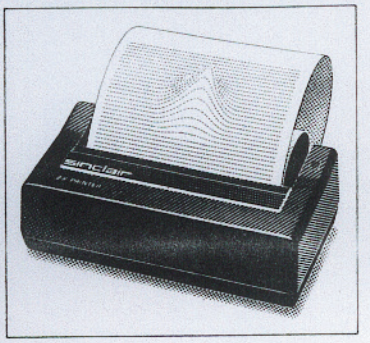
Sinclair Research Ltd, Stanhope Road, Camberley, Surrey GU15 3PS.
Tel: Camberley (0276) 685311.

The ZX Printer – available now

Designed exclusively for use with the Sinclair ZX range of computers, the printer offers ZX Spectrum owners the full ASCII character set – including lower-case characters and high-resolution graphics.

A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions. Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

The ZX Printer connects to the rear of your ZX Spectrum. A roll of paper (65ft long and 4in wide) is supplied, along with full instructions. Further supplies of paper are available in packs of five rolls.



The ZX Microdrive – coming soon

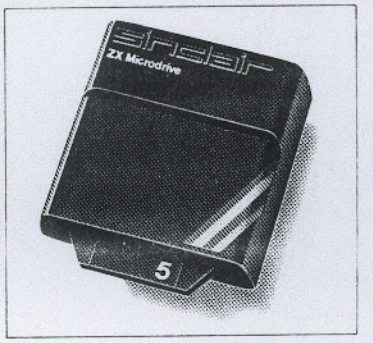
The new Microdrives, designed especially for the ZX Spectrum, are set to change the face of personal computing.

Each Microdrive is capable of holding up to 100K bytes using a single interchangeable microfloppy.

The transfer rate is 16K bytes per second, with average access time of 3.5 seconds. And you'll be able to connect up to 8 ZX Microdrives to your ZX Spectrum.

All the BASIC commands required for the Microdrives are included on the Spectrum.

A remarkable breakthrough at a remarkable price. The Microdrives are available later this year, for around £50.



How to order your ZX Spectrum

BY PHONE – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day. BY FREEPOST – use the no-stamp needed coupon below. You can pay by cheque, postal order, Access, Barclaycard or Trustcard.

EITHER WAY – please allow up to 28 days for delivery. And there's a 14-day money-back option, of course. We want you to be satisfied beyond doubt – and we have no doubt that you will be.

To: Sinclair Research, FREEPOST, Camberley, Surrey, GU15 3BR. **Order**

Qty	Item	Code	Item Price £	Total £
	Sinclair ZX Spectrum – 16K RAM version	100	125.00	
	Sinclair ZX Spectrum – 48K RAM version	101	175.00	
	Sinclair ZX Printer	27	59.95	
	Printer paper (pack of 5 rolls)	16	11.95	
	Postage and packing: orders under £100	28	2.95	
	orders over £100	29	4.95	
			Total £	

Please tick if you require a VAT receipt ☐

*I enclose a cheque/postal order payable to Sinclair Research Ltd for £

*Please charge to my Access/Barclaycard/Trustcard account no

*Please delete/complete as applicable

Signature

PLEASE PRINT

Name: Mr/Mrs/Miss

Address

PCW901

FREEPOST – no stamp needed. **Prices apply to UK only.** **Export prices on application.**

the T/S 2068 was the American version of the Spectrum with 72K colour, sound and cartridge slot

Now from Timex...a powerful new computer.

72K COLOR SOUND UNDER $200*

Timex introduces a second generation of home computers designed with one purpose in mind: to be useful.

With 72K on-board memory, it's powerful enough to solve more problems in your home. Entertain you with brilliant color graphics and 8-octave sound.

Plus do word processing in addition to spread-sheet functions.

And while it does more, it does it with even greater simplicity.

Its one-touch keyboard means you don't have to know typing. New Timex Command Cartridges can be used without any knowledge of programming.

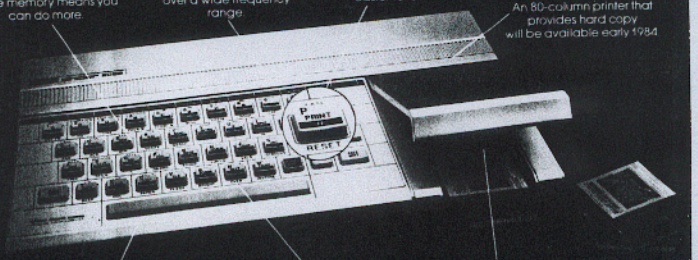
Finally. A home computer you can really use in your home: the Timex Sinclair 2068.

72K on-board memory. More memory than any computer in its class. And more memory means you can do more.

8-octave sound. Can be used to create four sounds simultaneously over a wide frequency range.

Unique one-touch entry. Requires no typing skills, makes programming easier to learn.

Word processing capability. This program provides a 64-character wide screen when used with a video monitor. An 80-column printer that provides hard copy will be available early 1984.



Sleek new compact design. Fits easily on any desk or table.

Raised typewriter keyboard. With full-travel keys is based on world's most popular electronic keyboard design.

Timex Command Cartridges. Provide faster, easier program loading, take up less space.

TIMEX SINCLAIR 2068

To purchase the Timex Sinclair 2068 computer see your local dealer, or call 1-800-24-T-I-M-E-X.

Timex Developments

The printer is out. Three new machines are about to hit the market. Another price reduction is made. These are among the recent developments in the Timex Sinclair computer field.

Timex Sinclair 1000 for $49.95

In our last issue we reported that Timex Computer Corporation had reduced the suggested retail price for the TS1000 to $69.95. On April 28, 1983, Timex announced a further reduction to $49.95. Remember the breakthrough of the original ZX80 for $199.95?

Timex Sinclair 1500 for $79.95

On May 17 Timex announced the introduction of the Timex Sinclair 1500, an enhanced version of the TS1000. Shipment is expected to begin in July.

The most obvious enhancement is a new styled case supporting a full movement keyboard instead of the familiar membrane keyboard. The 40 keys have the same layout, commands, functions, graphics, and characters as the TS1000. The second major enhancement is that the on-board RAM has been increased to 16K and can be expanded to 32K by the TS1016 16K RAM pack.

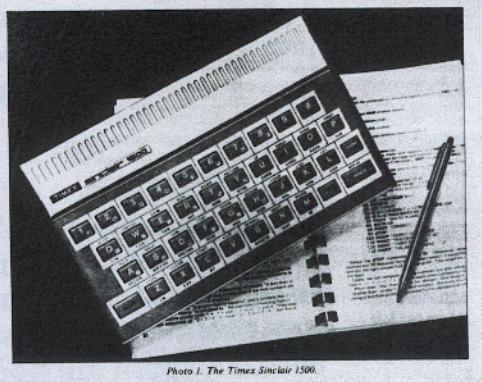


Photo 1. The Timex Sinclair 1500.

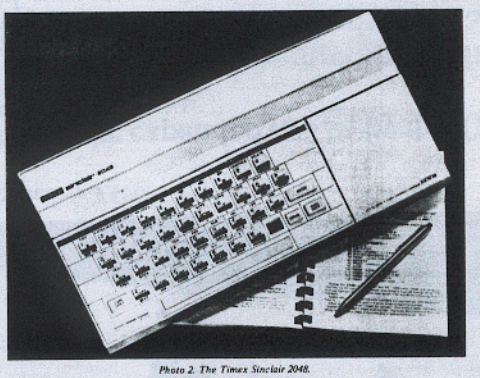


Photo 2. The Timex Sinclair 2048.

The TS1500 is compatible with all TS1000 peripherals and software. Standard cassette recorders are used for saving and loading, but the new instant-load software cartridges being developed by Timex will plug directly into the computer. These palm-sized cartridges are expected to cost from $12.95 to $29.95 and to be available in August.

Timex Sinclair 2000 Series

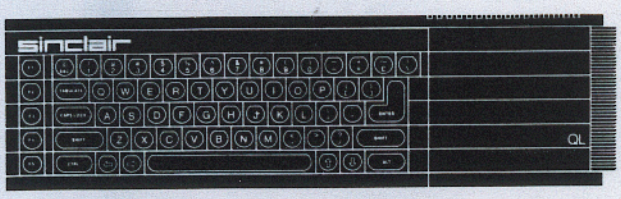
Timex also announced on May 17 that two computers in the 2000 series would be available to retailers in August. One with 72K RAM is priced at $199.95; the other with 40K RAM at $149.95. The video display can be output to most color and black-and-white TV sets as well as to a monitor.

The keyboard has 40 moveable keys arranged in typewriter format with upper and lower case letters, repeat key option for all keys, 16 built-in graphics characters, and 21 user-programmable graphics characters. Each key performs up to six functions. Most of the functions, com-

Continued on page 81

QL PERSONAL COMPUTER

QL Order Form



To order by telephone
— Phone Camberley (0276) 685311. (Please do not use this number for other enquiries. The operators do not have general or technical information).
— Have your credit card number ready. (Access/Barclaycard/Trustcard only)
It may be possible to extend your existing credit limit.
Please ask our telephone staff for more details.

To order by mail
— Complete the form and send it to the address below.
For credit card purchasers it may be possible to extend your credit limit.
Full details will be sent when we acknowledge your order.

Please allow 28 days from receipt of order for delivery. 14-day money-back option.

For general enquiries
— Phone Camberley (0276) 686100 or write to the address below.

Sinclair Research Ltd, FREEPOST, Camberley, Surrey, GU15 3BR.

Send to: Sinclair Research Ltd, Computer Division, FREEPOST, Cambe

Qty	Item	Code
	Sinclair QL Computer	6000
	QLUB membership (one year)	6100
	Postage & packing (any order over £390)	6999

Tick the appropriate box
☐ I enclose a cheque made payable to Sinclair Research Ltd for £_____
☐ Please charge my Access/Barclaycard/Trustcard account number

Signature
Mr/Mrs/Miss
Address

sinclair

Mr E Tedeschi
56 Bolsover Road
Hove
Sussex
BN3 5HP

Sinclair Research Limited
Stanhope Road · Camberley · Surrey · GU15 3PS
Telephone 0276 685311

22nd February 1984

Dear Mr Tedeschi

We are writing to confirm your order for our QL computer. If any of the details shown enclosed - name, address, goods ordered or credit card number, if applicable - are incorrect please let us know immediately by returning this letter showing the changes. If at any time between now and receiving your QL you wish to cancel or make any changes to your order please use this letter to indicate such changes. To avoid any confusion and consequent delays always use this letter to cancel or change your order: please do not telephone us with changes.

If you have applied for QLUB membership, we will be sending your membership card with your QL, and your twelve month period of membership will commence at that time. During your membership you will receive 6 issues of the QL newsletter, the first of which will be sent shortly after your QL.

If you have paid for your QL or QLUB membership by cheque, it has been banked in a Trust Account. Your money is released to Sinclair only after the QL has been sent to you. If you have paid by credit card your account will not be debited until your QL has been despatched.

The demand for the QL has been phenomenal from the day we launched it. We expect to be able to deliver your QL not later than the end of June. We realise that the time between now and then will be frustrating, but we are confident that your QL will be worth waiting for and, of course, we will do everything possible to beat our target date for sending it.

Yours sincerely

Nigel Searle

Nigel Searle
Managing Director

---

the appearance of the QL, like many other Sinclair products, was delayed for many months, giving rise to unhappy customers and bad business reputation

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The Ins and Outs

Two built-in QL Microdrives, each with a capacity of 100K and an average access time of 3.5 seconds. Two slots are provided on the front of the device allowing the QL Microdrive cartridges to be inserted.

Two custom-designed chips, one to control the display and memory, and the other to control the QL Microdrives, the real-time clock, the local area network and RS232C transmission.

The Intel 8049 chip, which controls the keyboard, generates the sound and acts as an RS232C receiver.

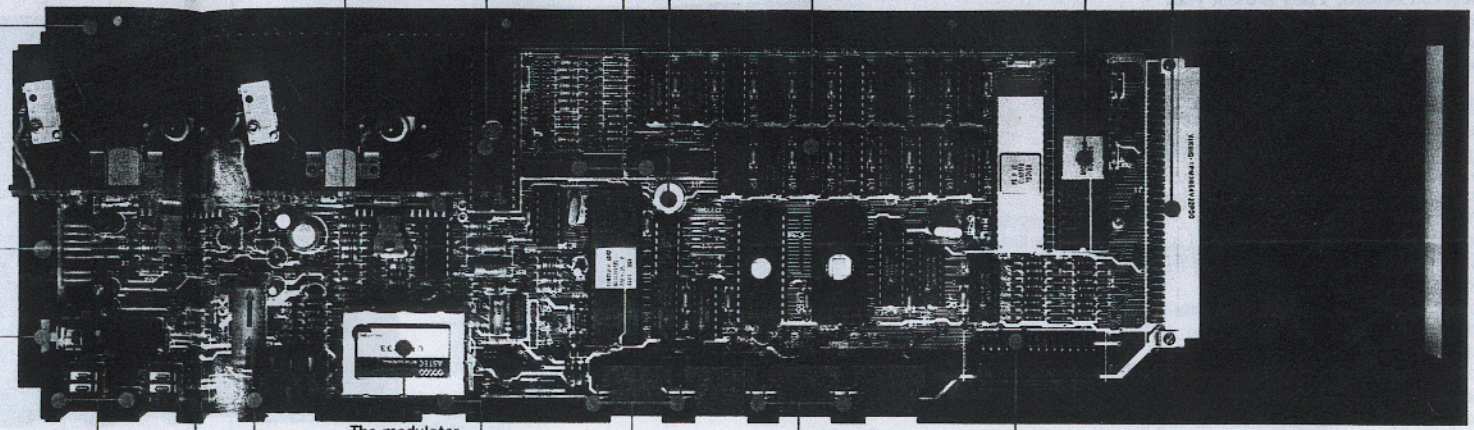
The connectors to attach the keyboard to the circuit board.

The quartz crystal device which generates the clock.

These RAM chips comprise the QL's 128K of internal RAM.

The QL's main processor — the 68008.

The expansion port for the 0.5 Megabyte extension RAM board, which will expand the internal memory to 640K.



An extension slot allowing up to six further QL Microdrives to be attached to the system.

The modulator.

Two slots available for QLAN, providing the potential for a communications link for up to 64 QL and ZX Spectrum computers. Data is passed over the network at 100K baud.

A monitor port, which provides two modes of resolution: 512 x 256 pixels (four colours) and 256 x 256 (eight colours). Both monochrome and colour monitors may be connected.

Two RS232C communications interfaces for peripherals such as printers and modems.

The ROM cartridge slot, which accepts one 32K ROM cartridge.

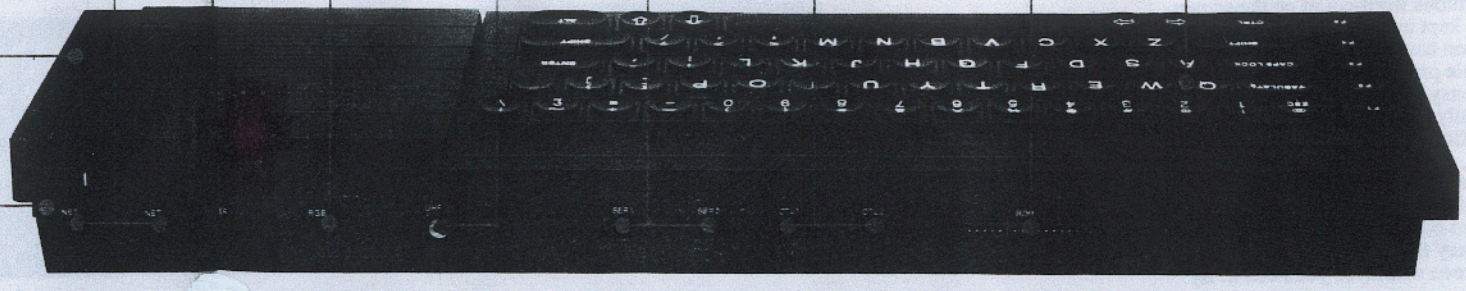
The QL's full-size QWERTY keyboard includes a space bar, left- and right-hand Shift keys, five function keys and four separate cursor control keys. An audible click accompanies a key making contact, and a membrane beneath the keyboard protects the circuit board from dust, etc

A reset button, which enables the computer to be cleared without the need to 'pull the plug'.

The slot to accept the power cable.

A TV port for both monochrome and colour televisions.

Two peripheral slots are allocated for D-type joysticks, to be used for games or cursor control.



M14

ZX SPECTRUM + PERSONAL COMPUTER

*SPECIAL KEYBOARD UPGRADE

Why not upgrade your Spectrum into a new keyboard, we can upgrade your old Spectrum into a new D.K. Tronics keyboard

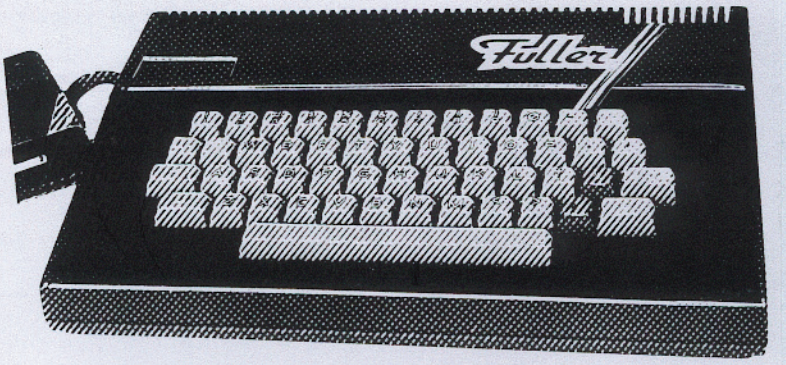
for only **£31.50** which includes fittings + return P. & P. and V.A.T

Normal retail price **£49.95** without fitting

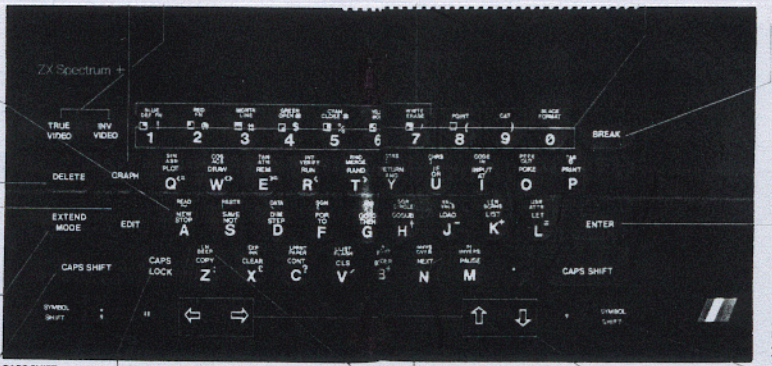
ORDER NOW!

The appalling keyboards of the Spectrum and of the ZX81 sparked a whole lot of cottage industries supplying alternative keyboards with real keys.

£49.95 (inc. VAT) + 80p P&P



Sinclair's answer to this was the **Spectrum +** which was simply a 48K Spectrum with a "tactile" (whatever that means) keyboard. This keyboard was also supplied to be retrofitted to existing Spectrums but it was still a membrane type and therefore not very "user friendly".



NEW
This key clears the computer's BASIC memory area, erasing any program held in it.

DELETE
This key is used if you press a wrong key and want to remove a keyword, letter, number or sign – see page 10.

EDIT
This key is used to change a line in a program without completely rewriting it – see page 21.

EXTEND MODE
This key selects the upper keyword above the raised section of any key. When followed by SYMBOL SHIFT and a key, it selects the sign or keywork immediately above the raised section of the key – see pages 20-21.

BREAK
This key stops a program running. It does not erase the program from the computer's memory.

ENTER
Press this key to make a program line enter the Spectrum's memory. This key is also often used for feeding information into the computer during a program.

SYMBOL SHIFT
Hold down and press a letter or number to select the lower keyword or sign on the raised section of the key. Whe used after EXTEND MODE, it selects the symbol or keyword immediately above the raised section – see pages 20-21.

CAPS SHIFT
Press this key with a letter key to produce a capital letter. If you want a number of letters to appear in capitals, use CAPS LOCK.

CAPS LOCK
Use this key if you want the letter keys to produce capital (upper-case) letters all the time. Press it again to get small (lower-case) letters.

BEEP
This key produces the keyword which controls the Spectrum's sound synthesizer.

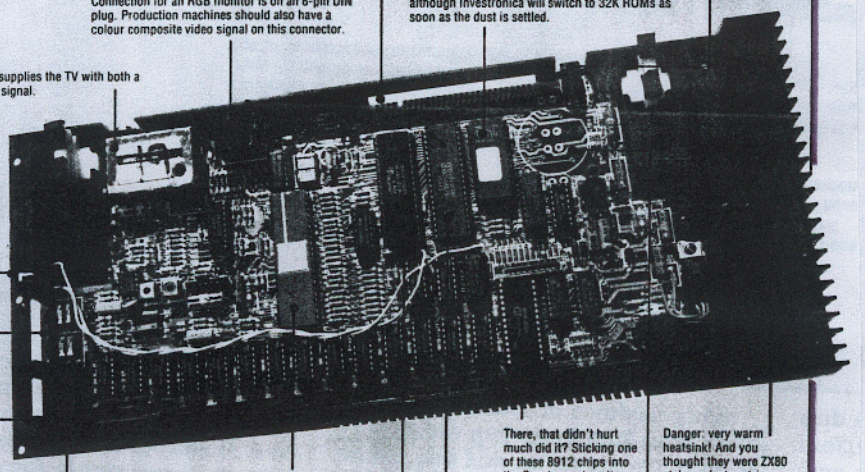
Space bar
This produces a space like the space bar on a typewriter.

Cursor controls
Pressing these keys makes the cursor move in the same direction as the arrows. These keys are often used by programs to control the movement of shapes on the screen. They are also used when editing programs.

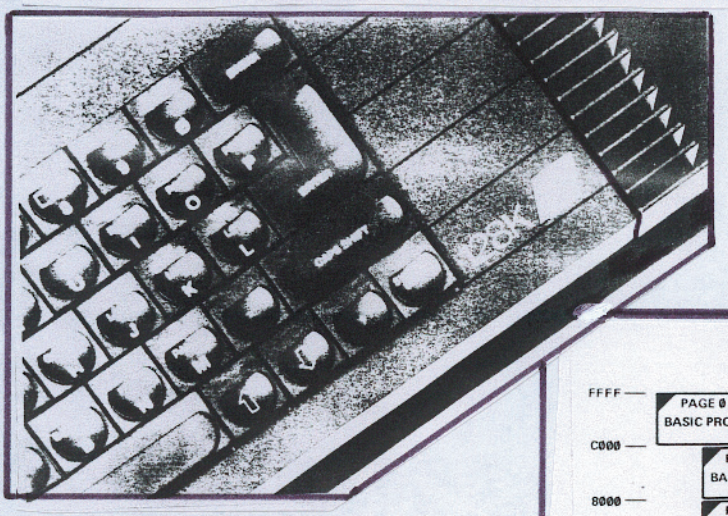
ZX SPECTRUM + 128 PERSONAL COMP.

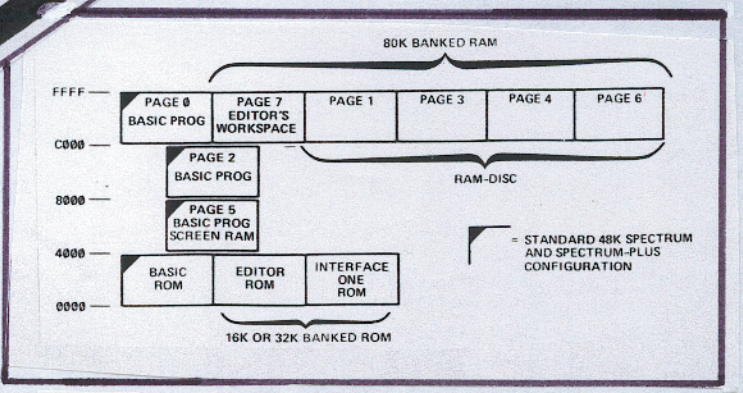
128 WIDE OPEN . . .

Here's your first glimse of the guts of a 128 — sorry about the warranty Investronica! The extra portion of chips makes the board so hot that the heavy metal heatsink on the right is essential . . .



In 1986, while the Sinclair in England was in difficulty, the **SPECTRUM + 128** appeared in Spain with a Spanish keyboard and a separate numeric keyboard. Whilst the keyboard was the same as the **Plus** model with a series of metallic fins added on the right side, the inside was completely different. The memory expansion was handled by the Z80 microprocessor in "pages".



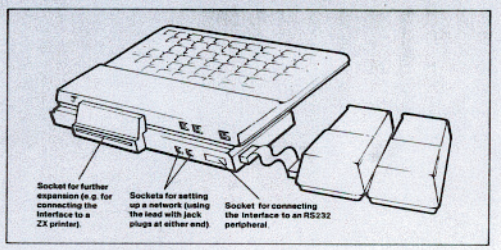


MICRODRIVES STORAGE MEDIUM

ZX Microdrives!

They're here at last – the spectacular ZX Microdrives. And as promised they deliver tremendously fast access to gigantic amounts of program and data on ZX Microdrive Cartridges.

Microdrives are controlled by the new ZX Interface 1, which also provides an RS232 peripheral interface *and* sets up a local area network (the ZX Net) of anything from 2 to 64 Spectrums!



Lightning access to massive storage – save and load in seconds.

ZX Microdrive

Only Sinclair could bring you all the advantages of floppy-disc drives – at a fraction of the cost! You could pay hundreds of pounds more for the facilities the Microdrives give you – and you'd have to give up a lot more desk space.

Just look at the advantages of Microdrives

1. A typical 48K program, which would take several minutes to LOAD from cassette can be LOADed in as little as 9 seconds. Reliably. First time, every time.
2. Data can be SAVEd, LOADed, VERIFYed just as quickly. How often have you skipped the VERIFY function (to save time) only to discover a problem later on?
3. Typical access time to any file is just 3.5 seconds. No more hunting through a pile of cassettes or winding through a seemingly endless cassette.
4. With a minimum of 680K bytes of program/data on line at any time, the scope is enormous. Stock control, word processing, financial modelling, complex accounting – and even a life-long adventure game! The possibilities are limitless.

How the ZX Microdrives work

The ZX Microdrive allows the storage of programs, blocks of code, screens, arrays, and data files on interchangeable cartridges, each with at least 85K bytes

The first Microdrive is connected to the ZX Interface 1 by a Microdrive lead (supplied with Interface 1). Up to 7 further Microdrives may be chained together using a Microdrive connector (supplied with each Microdrive), giving a minimum of 680K bytes of on-line capacity.

Cartridge contents of up to 50 files can be individually identified, sorted automatically, and displayed in alphabetical order or deleted.

Microdrives are powered from the Spectrum's power supply, and have a red indicator light which shows when they are running.

ZX Interface 1

The ZX Interface 1 is a multi-purpose device. It controls up to eight Microdrives. It incorporates an RS232 interface. And it sets up the ZX Net.

The unit screws to the under-side of the Spectrum, raising it to a pleasing ergonomic angle, and duplicates on its rear the peripheral port of the Spectrum, allowing the same expansion potential.

It is supplied with a lead to connect the first Microdrive, and a net lead with jack plugs to set up the first link of the ZX Net.

Microdrive controller

The ZX Interface 1 expands Sinclair BASIC to include file-handling and communications facilities, and by introducing the combined use of BASIC as a programming language and an operating system, it makes the Spectrum

RS232 interface

Incorporated in the ZX Interface 1, the RS232 industry standard serial interface allows the Spectrum to drive full-size printers; to communicate with other computers having the same interface; and to transmit data over telephone lines via modems. Interface 1 allows operation at all standard baud rates up to 19.2 kbaud.

The RS232 employs a special RS232 lead (not supplied, but available from Sinclair as an optional extra).

The ZX Net

The ZX Net is a high-speed communications link between up to 64 Spectrums, transmitting at 100 kbaud. Protocols allow transmitting and receiving stations to be specified by one another, or the data may be broadcast over the net to any open Spectrum. A full screen can be transferred in 3 seconds.

Single Spectrums can act as printer servers to other Spectrums on the ZX Net, driving either a ZX Printer or any other printer using the RS232 interface.

Spectrums may also be dedicated to act as file-servers, exchanging files from their Microdrives with other Spectrums on the ZX Net.

The ZX Net allows games to be played between several players with their own computers – allowing intriguing possibilities!

Each Interface 1 is supplied with one 2-metre ZX Net lead.

Sinclair Research Ltd, (JBS)
Stanhope Road
Camberley
Surrey
GU15 3PS

Telephone: (0276) 685311

sinclair

G109399260

DATE AS POSTMARK

Dear Mr Tedeschi

I am pleased to say that we are now in a position to offer you ZX Microdrives and Interface 1. An order form is enclosed with this letter.

This order form refers to a limit of 2 Microdrives per order and mentions no limit on Interface 1. However, in order to offer products to as many early Spectrum owners as possible, we are having to limit Interface 1 to one per order. The previous limit on Microdrives has been lifted and you are welcome to order as many of these as you require up to a total of 8.

You will receive your products within 28 days of us receiving your order. Please only use the enclosed order form. We cannot accept telephone orders and any other form of order could lead to unnecessary delays in despatching your products.

I am sure you will be delighted with the extra speed, capacity and sophistication which these new peripherals will add to your Spectrum.

I look forward to hearing from you shortly.

Yours sincerely

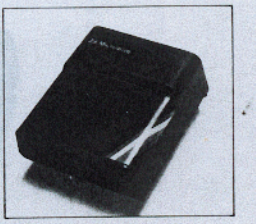
Nigel Searle

Nigel Searle
Managing Director

The microdrive saga became even worse than that of the QL. When they finally became available only two per customers were allowed

Brief technical data and prices

Full data on the ZX Microdrive and the ZX Interface 1 are supplied with the product.



ZX Microdrive
£49.95

Including one cartridge with sample program.

Function: Fast access mass storage device, storing programs, blocks of code, screens, arrays, and data files on interchangeable cartridges, each cartridge with at least 85K bytes capacity.

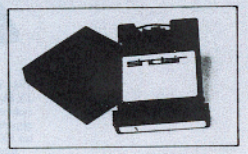
Cartridges are initialised with the FORMAT command, and contents may be read with the CAT command, which displays the cartridge name, up to 50 files on the cartridge in alphabetical order, and the free space in kilobytes. Files may be deleted with the ERASE command.

If the first command entered into the Spectrum after switch-on is RUN, then the Microdrive will automatically load a program.

Physical: the first Microdrive is connected to Interface 1 using the Microdrive lead supplied with the Interface 1. Subsequent Microdrives to a total of 8 in all may be connected using the Microdrive connectors. They are powered from the ZX Spectrum's power supply, and a red indicator lights up to show activity.

Supplied with: Microdrive connector, instructions, and sample cartridge carrying demonstration program (which may be erased), and an order form for blank Microdrive cartridges.

Guarantee: 1 year.

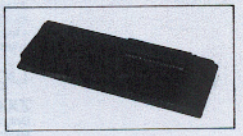


ZX Microdrive Cartridge
£4.95

Function: storage medium for ZX Microdrive. Capacity at least 85K bytes.

Physical: push into Microdrive. Detachable lug prevents erasure of contents if required.

Supplied: singly with an order form for repeat purchases.



ZX Interface 1
£49.95

(£29.95 when bought with Microdrive.) Manual supplied.

Function: allows programs and data to be sent to or received from a ZX Microdrive mass storage device; an RS232 interface; or a Spectrum local network.

In software, these devices are known as channels, and may be accessed from BASIC by using SAVE, LOAD, VERIFY and MERGE, or by OPENing a stream to them and using PRINT, INPUT, INKEYS and LIST. MOVE command moves data from one stream or channel to another stream or channel.

Physical: screwed to base of Spectrum.

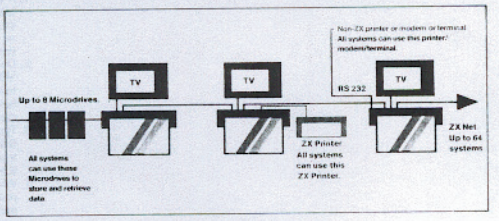
Supplied with: screws, Microdrive lead, Net lead (with jack plugs), manual.

Guarantee: 1 year.

RS232

Function: industry standard serial interface allowing Spectrum to transmit at all standard baud rates (50, 110, 600, 1200, 2400, 4800, 9600, and 19,200 baud). Speed software-selectable. Housed in Interface 1.

Optional extra: special RS232 lead, available from Sinclair at £14.95.



The ZX Net

Function: high speed communications link between up to 64 ZX Spectrums, each equipped with Interface 1. Data is passed over the net at 100 kbaud, and protocols ensure that both stations are ready before data is passed. Data may also be broadcast over the ZX Net to all Spectrums listening.

The ZX Net allows a single Spectrum to act as a printer-server or file-server for other Spectrums, and opens the way to games between two or more Spectrums.

The ZX Net must not form a closed chain.

Supplied as: Net lead, included with Interface 1. Length: 2 metres, with jack plugs at ends.

How to obtain Microdrives and Interface 1

1. If you purchased your Spectrum by mail-order directly from us, you will receive an order form in due course.
2. If you purchased your Spectrum from a shop, send us your name and address and we'll add you to the mailing list. Please send a POSTCARD ONLY, with your name and address clearly printed, to Sinclair Research Ltd, Department M, FREEPOST, Camberley, Surrey, GU15 3BR.
3. In the meantime, the ZX Microdrive/ Interface 1 Manual is available as a separate item from the address below, for £5 – including VAT and p+p.

sinclair

Sinclair Research Ltd.
Stanhope Road, Camberley, Surrey, GU15 3PS

Sinclair Research Ltd, (JBS)
Stanhope Road
Camberley
Surrey
GU15 3PS

Telephone: (0276) 685311

sinclair

MR E TEDESCHI
56 BOLSOVER ROAD
HOVE
EAST SUSSEX
BN3 5HP

VAT RECEIPT

DATE:03/02/84

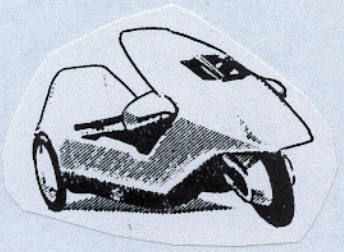
REFERENCE:W553104000

PRODUCT	DESCRIPTION	QTY	VAT%	VALUE
0029	POST AND PACKING (OVER £100)	1	15	4.30
7000	ZX MICRODRIVE	2	15	86.86
7001	INTERFACE 1 WITH MICRODRIVE	1	15	26.04
7200	MICRODRIVE CARTRIDGE	10	15	43.00

PAID

TOTAL GOODS	160.20
TOTAL VAT	24.10
TOTAL	184.30

M18



ELECTRIC VEHICLES AGE

It is often considered that the C5, Sinclair's electric tricycle, was the cause of the Sinclair Research demise and bankruptcy. This might be the case but certainly I think that some sort of greatness and vision peculiar to great minds must be very near to a kind of blindness and stupidity which strikes even the most intelligent of the MENSA members.

In this respect I think that the real cause of the great fiasco must have been his fascination with creating something new even, in this case, against all obvious reason not to do so. I know, in retrospect it is easy to criticize, but I still maintain that even great minds can have temporary lapses of reality at times (or maybe they have them just because they are great minds!).

Not much happier is the situation with his second electric attempt: the **ZYKE** electric bike, still in production to-day (?) and the third one, the electric power package for ordinary bykes called **ZETA**. They must be another really slow moving (in all senses) product of Sinclair time, but how long for?

C5 ELECTRIC TRICYCLE

A new power in personal transport

Congratulations. You're among the first owners of the remarkable Sinclair C5 – the world's first *practical* personal transport powered by electricity.

No petrol, no driving licence, no pollution: and an energy cost of around a penny for five miles (or nearly 1,000 miles for the price of a gallon of petrol!).

Easy to use, easy to maintain, the C5 is a resource for the entire family. The more you use it, the more uses you'll find.

But whatever you do, wherever you go, one thing about the C5 never changes: the sheer fun of driving it!

A vehicle for today – and tomorrow.

The Sinclair C5 is constructed from top quality components, many newly developed specifically for the C5 using state-of-the-art techniques. Each has been rigorously tested and proven.

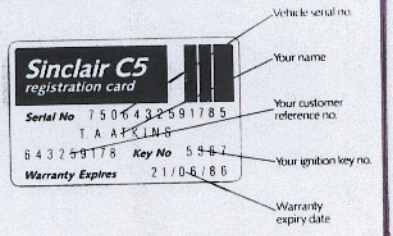
Every C5 is thoroughly checked before despatch, and is backed by a nationwide parts and service organisation.

I hope, and expect, that your C5 will give you years of service and pleasure.

CLIVE SINCLAIR

2

FREE!



HRL532

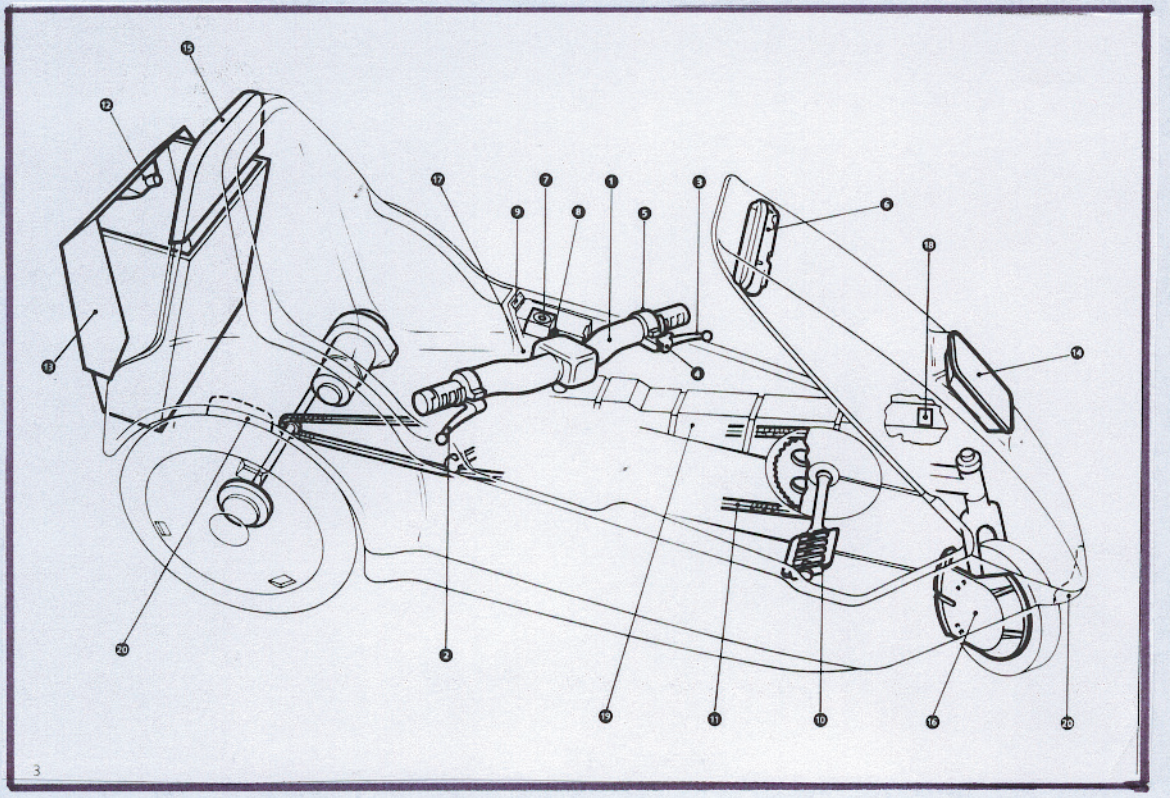
Send for your personal C5 registration card and personal number plate–today!

the ROSPA was not amused by the C5 and raised several safety arguments

The RoSPA guide to safe driving in the Sinclair C5

RoSPA

N2



3

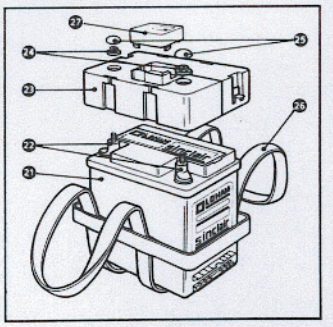
Know your vehicle

Throughout this handbook left and right are as seen from the driving position.

1. Steering bars
2. Front brake lever
3. Rear brake lever
4. Parking brake locking lever
5. Power switch (situated under a rubber moulding on hand grip)
6. Instrument pod
7. Master security switch
8. Cut-out button
9. Lamp switch
10. Pedals
11. Drive chain
12. Boot lock
13. Boot
14. Front lamp
15. Rear lamp
16. Front wheel cover
17. Battery securing straps
18. Vehicle serial number plate
19. Central tunnel
20. Lifting points

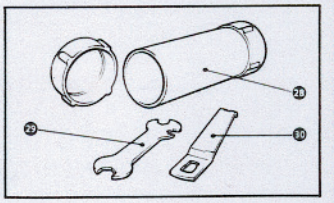
Battery

21. Battery
22. Terminals
23. Battery cover
24. Securing nuts
25. Securing nut covers
26. Carrying strap
27. Contact cover



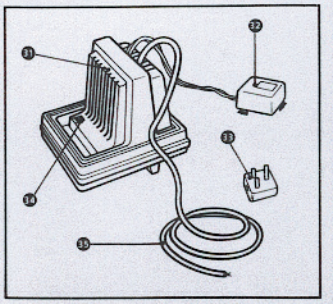
Tools

28. Vehicle support
29. Battery securing nut and hub cone spanner
30. Wheel nut spanner

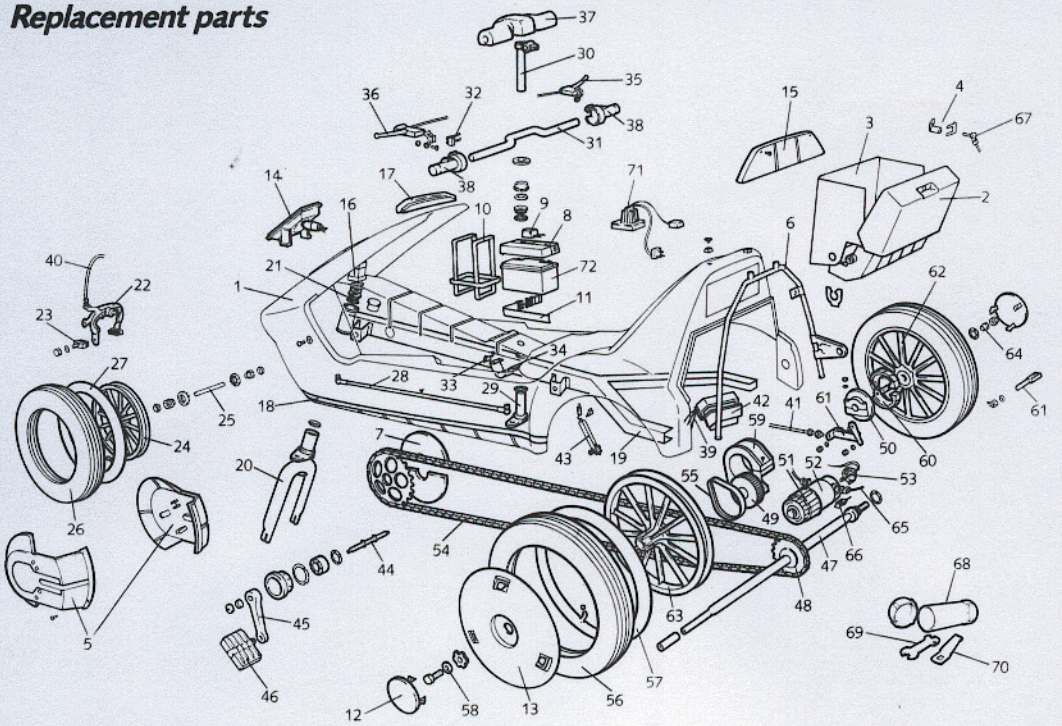


Charger

31. Charger
32. Charger-to-battery connector
33. Mains plug
34. Charge indicator lights
35. Mains lead



Replacement parts



30

Replacement parts

Description	Part No.
1 Bodyshell	C5674 300
2 Boot lid	C5674 301
3 Boot liner	C5674 302
4 Boot lock set	C5674 303
5 Front wheel cover	C5674 304
6 Rear location frame	C5674 305
7 Access covers	C5674 306
8 Battery cover kit	C5674 307
9 Master security switch assembly	C5674 308
10 Battery carrying strap	C5674 309
11 Battery retainer kit	C5674 310
12 Rear wheel centre cap	C5674 311
13 Rear wheel disc	C5674 312
14 Front lamp	C5674 313
15 Rear lamp	C5674 314
16 Bulb access housing	C5674 315
17 Instrument pod	C5674 316
18 Decal kit	C5674 317
19 Chassis	C5674 322
20 Front forks	C5674 323
21 Steering bearing set	C5674 324
22 Front brake	C5674 325
23 Front brake blocks	C5674 326
24 Front wheel	C5674 327
25 Front wheel spindle set	C5674 328
26 Front tyre	C5674 329
27 Front inner tube	C5674 330
28 Steering rod assembly	C5674 331
29 Steering bearing carrier	C5674 332
30 Steering stem	C5674 333
31 Steering bars	C5674 334
32 Power switch	C5674 335
33 Lamp switch	C5674 336
34 Lamp switch bracket	C5674 337
35 Front brake lever	C5674 338
36 Rear brake lever	C5674 339
37 Steering bar cover	C5674 340
38 Steering bar grips	C5674 341
39 Wiring harness	C5674 342
40 Front brake cable	C5674 343
41 Rear brake cable	C5674 344
42 Control box	C5674 345
43 Chain tensioner	C5674 346
44 Crank axle	C5674 347
45 Crank set	C5674 348
46 Pedal set	C5674 349
47 Rear axle	C5674 351
48 Sprocket and freewheel	C5674 352
49 Drive gear	C5674 353
50 Brake back plate	C5674 354
51 Gearbox	C5674 356
52 Motor	C5674 357
53 Heat sensor	C5674 358
54 Chain	C5674 359
55 Drive belt	C5674 360
56 Rear tyre	C5674 361
57 Rear inner tube	C5674 362
58 LH wheel location set	C5674 363
59 Motor support	C5674 364
60 Rear brake shoe set	C5674 365
61 Rear brake fitting kit	C5674 366
62 RH rear wheel	C5674 367
63 LH rear wheel	C5674 368
64 RH wheel location set	C5674 369
65 Motor brushes	C5674 370
66 Thermal trip	C5674 404
67 Replacement key quote (ref no)	+C5674 792
68 Jack tube (Vehicle support)	C5674 408
69 Battery securing nut and hub cone spanner	C5678 407
70 Wheel nut spanner	C5674 406
Fittings kit, body	C5674 319
Fittings kit, flexibles	C5674 318
Owner's handbook	C5674 321
Fixings kit, metal	C5674 355
Emergency kit	C5674 372
Tool kit	C5674 373
Contact cover	C5674 387

Available from Sinclair Battery Centre:
71 Battery charger
72 Battery

Spare battery kit

Special C5 service tools available from Hoover Service Office:

Service frame	C5674 382
Cranked cone spanner	C5674 383
Locking collar release tools	C5674 384
Sprocket remover	C5674 385

Available from your normal tool supplier:
Cotterless crank remover
Chain rivet extractor

To obtain your replacement parts (except battery and charger) contact your Hoover Service Office. (See separate leaflet or refer to your local telephone directory.)
To obtain a battery or charger contact a Sinclair Battery Centre – see separate leaflet.
For approved accessories contact Sinclair Vehicles Ltd.

For your own comfort and safety fit only original Sinclair designed parts to your C5. Not to do so may invalidate the warranty. Please quote the correct part number and the vehicle serial number of your vehicle on orders and in correspondence.

The C5 was assembled by HOOVER (the washing machine people) and they also serviced your vehicle in your home

N4

ZYKE ELETRIC BICYCLE

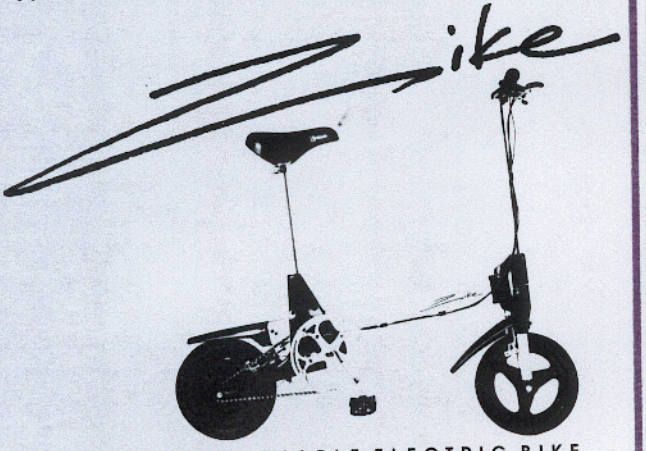
Announcing the greatest invention since the bicycle.

The Zike.™

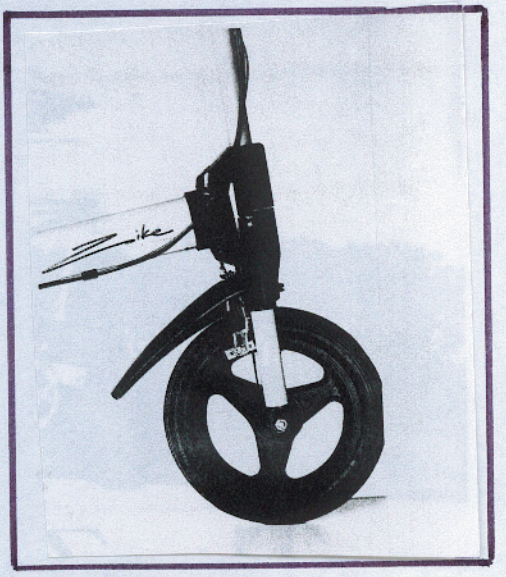
N5

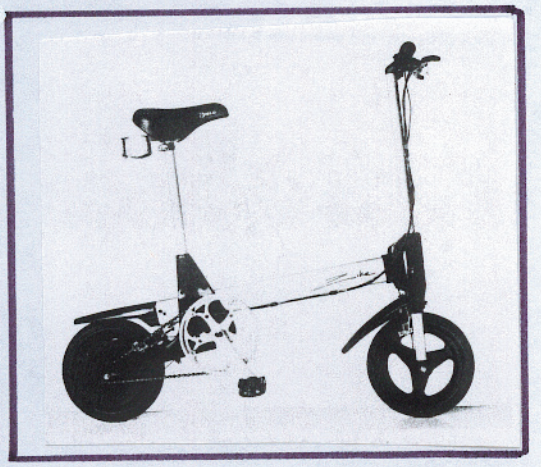
OWNERS HANDBOOK

Zike

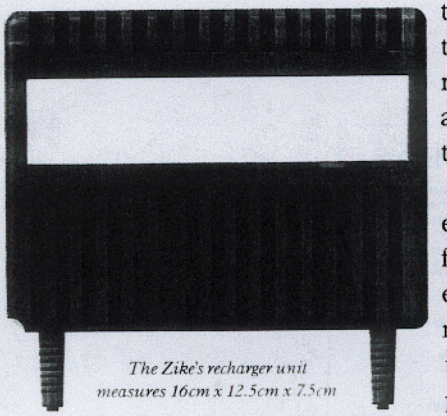


THE WORLD'S FIRST VIABLE ELECTRIC BIKE





The batteries, for instance, are nickel-cadmium cells which are half the weight of the lead acid type, allow four times as many recharge cycles and recharge in a tenth of the time.

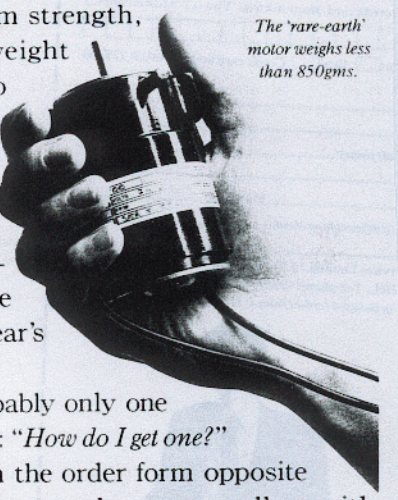


The Zike's recharger unit measures 16cm x 12.5cm x 7.5cm

The motor employs a new form of 'rare earth' magnet, resulting in a unit that can propel a 17 stone man along at 15mph, yet is smaller than a jam jar.

A regenerative braking system has been pioneered, so when you go downhill energy that would normally be wasted in braking recharges the battery.

And the Zike's frame is constructed from aircraft-grade alloys and the latest ICI composites to give maximum strength, yet an all up weight of just 24 lbs - no more than a racing cycle.



The 'rare-earth' motor weighs less than 850gms.

It is built in Birmingham, patents are pending and the Zike comes with a year's warranty.

By now, probably only one question remains: "*How do I get one?*"

Simply fill in the order form opposite and send it with your cheque, or call us with your credit card number.

Not surprisingly, demand for the Zike has been high, so orders will be despatched on a strict rotation basis.

So the sooner you get your order to us, the sooner you'll be on your Zike.

Zike

SINCLAIR RESEARCH

ZETA ELECTRIC BIKE ACCESSORY

ZETA

INSTRUCTIONS FOR USE

1 In the interest of both motor and battery it should be remembered that ZETA should be used as pedalling assistance and NOT as a sole means of power — it is recommended that upon starting, you pedal before switching ZETA on.

2 For improved performance in wet weather the load on the unit can be increased by attaching the load-strap in any hole which is lower than the normal one. (Fig 5).

3 The best way to secure both your bicycle and ZETA is to pass a chain through the U-bracket as well as the rear wheel or stays. For added security you can unplug the battery and remove it.

4 Ensure that ZETA is switched off when the bike is not in motion.

5 When removing the cover after ZETA has been in use, be careful not to touch the heat guard (Fig 7) as it could be hot. DO NOT operate ZETA with the cover removed.

A spare battery will prove to be useful. By keeping a second battery fully charged you can switch batteries in seconds and effectively double your range.

IMPORTANT: Spare batteries should only be purchased from SINCLAIR RESEARCH LTD. as the terminals on other batteries may not fit the battery connector.

CHARGING THE BATTERY

The battery may be charged while still in the unit (in situ) or separately from the unit.

1 Remove the cover by fitting at the rear end below the reflector.

2 Remove the battery connector, taking care not to bend the contacts.

A In situ charging

3A Connect charger to battery

4A Plug charger into mains and switch on.

B Separate charging

3B Undo battery retaining strap and remove battery.

4B Connect charger to battery.

5B Plug charger into mains and switch on.

Charging can take up to 14 hours for a fully discharged battery. Do not leave the charger on for more than 24 hours as this may damage the battery and shorten its effective life.

Sinclair Research Ltd.
15/16 Margaret Street,
London, W1N 7LE
Tel: 071 636 4488 Fax: 071 580 6628

Agent/Distributor

IMPORTANT NOTES

1 ALWAYS CONNECT THE CHARGER TO THE BATTERY FIRST AND THEN PLUG THE CHARGER INTO THE MAINS. WHEN CHARGING IS COMPLETE UNPLUG THE CHARGER FIRST AND THEN DISCONNECT THE BATTERY.

2 WHEN CONNECTING OR DISCONNECTING BATTERY AND CHARGER ALWAYS GRIP THE PLUG — DO NOT PULL ON THE LEAD.

3 THE CHARGER GETS QUITE WARM DURING CHARGING — THIS IS NORMAL.

MAINTENANCE AND SAFETY

Following the basic guidelines set out below will give you many trouble free miles with your Sinclair Research ZETA.

1 Always keep the battery fully charged. You can order a second battery which will then allow you to change batteries in a matter of seconds.

2 The Sinclair Research ZETA is NEITHER a luggage rack NOR a seat. Do not use your ZETA as either. Mis-use will invalidate your warranty.

3 Regularly inspect the underside of the waterguard to make sure that there is no build-up of mud and dirt. If there is, it should be cleaned off with a paper towel. Failure to do so will cause added drain on the battery and a corresponding decrease in range.

4 When refitting the battery always make sure that the longer wire from the battery clip is routed as shown and kept away from the heat guard (Fig 6).

5 Best results will be obtained if your tyres are correctly inflated. Incorrectly inflated tyres will reduce speed and range.

6 ZETA can be decoupled by pivoting on its hinge and repositioning the load strap around the saddle stem.

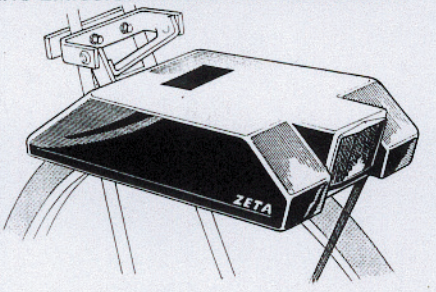
SPECIFICATION

Battery:	12 volt, 7Ah
Motor:	174W — maximum power
Transmission:	HTD toothed belt
Weight:	9.9lbs (approx. 4.5 kg)
Charger:	220/240V input; 12 V, 600mA output
Charging time:	14 hours for fully discharged battery
Cost to recharge:	Approx. 1 penny
Max speed:	14 mph
Range:	10-30 miles, depending on amount ZETA is used as pedalling assistance.

SINCLAIR
RESEARCH

ZETA

ZERO EMISSION TRANSPORT ACCESSORY*



The Sinclair Research ZETA is a power pack designed to drive the rear wheel of a bicycle and so reduce the pedalling effort needed to maintain speed. It can be easily fitted to the majority of bicycles, using simple tools.

The ZETA has an advanced electric motor powered by a rechargeable battery. The drive is transmitted by means of a pulley mounted belt which contacts the tyre.

ZETA is attached to the seat stays by means of a U-bracket and clamp. The U-bracket allows the unit to pivot so that its own weight keeps the drive belt in contact with the tyre. In addition an elastic load-strap is provided to cater for bumping or jolting when riding on rough surfaces.

The unit features a built-in water/mud guard and has a specially styled cover.

ZETA is controlled by means of a handle-bar mounted switch.

*A bicycle powered by ZETA is pollution free.

ZETA

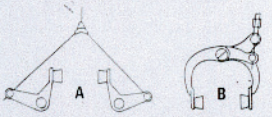
FITTING INSTRUCTIONS

Tools needed: Two 8mm spanners and a small Phillips screwdriver.

1 Remove rear mudguard (ZETA has a built-in mudguard)

2 Undo the battery retaining strap. Unplug the battery connector and remove the battery.

3 If your bicycle has cantilever brakes (A) unhook the cable. Side-pull brakes (B) are not affected.



4 With the pulley resting on the tyre, bring the U-bracket up to the seat stays (Fig 1). Insert the bolts as shown and fit the clamping bar. Now fit the washers and nuts and tighten sufficiently to hold U-bracket in place. There are now 2 things to check:

i) For maximum efficiency it is important to have as much of the driving belt in contact with the tyre as possible (Fig 4). This is achieved by locating the U-bracket as low down on the seat stays as possible – it is important that the small motor drive pulley does NOT contact the tyre. There should be approximately 1/4 inch gap between the pulley and the tyre. (See Fig 4)

ii) The pulley should be aligned with the centre of the tyre. Adjust if necessary by moving the clamp sideways.

With the unit properly aligned the clamp nuts can be fully tightened.

5 If you have cantilever brakes refit the cable.

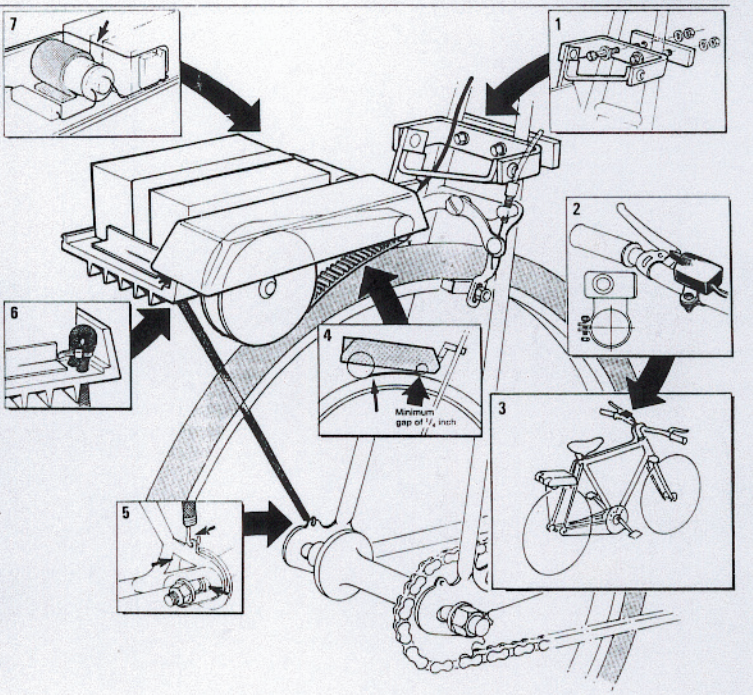
6 Feed the switch and its cable through the U-bracket as shown in the main drawing. Mount the switch on the left handle-bar close to the brake lever (Fig 2/3) Tighten the clamping screw with the Phillips screwdriver – if the clamp is too large for the handlebars, use some of the foam tape supplied to fill up the gap.

7 Attach the load-strap to the wheel bracket (Fig 5). For correct tension the load-strap needs to be stretched by 2 to 2 1/2 inches (50 to 65mm) with 26/27 inch wheels. For smaller wheels the strap will have to be shortened by remaking the retaining knot (Fig 5) to keep the same amount of tension.

8 Replace the battery. Refit the connector, making sure that the longer lead from the connector is routed to avoid the heat guard (Fig 7).

9 Fit the cover by locating the front end first and then pressing the rear end down firmly into place.

Further important information is given on page 4.



TAKE THE SLOG OUT OF CYCLING

THE NEW SINCLAIR ZETA TRANSFORMS YOUR BIKE FROM PEDAL POWER TO ELECTRIC POWER IN MINUTES TO GIVE YOU EFFORTLESS CYCLING. JUST £144.95 DELIVERED.

Have you ever cycled up a hill and had to get off and walk? Or cycled into a stiff breeze, getting nowhere fast?

Have you ever wished someone would come up with an ingenious invention to take the effort out of pedalling when it gets too much?

The device you've been waiting for has just been invented.

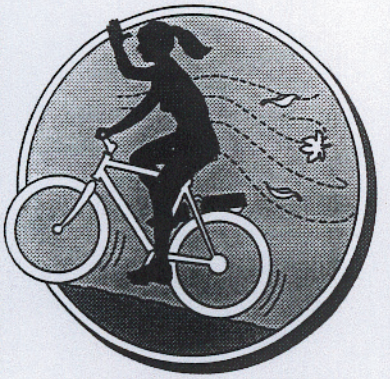
Called The Sinclair ZETA, it's a world's first. The inventor is none other than Sir Clive Sinclair, originator of the pocket calculator.

Like most brilliant inventions, ZETA is simplicity itself. A neat, electric power unit transforms your bike from pedal power to electric power, greatly reducing the amount of effort needed to pedal.

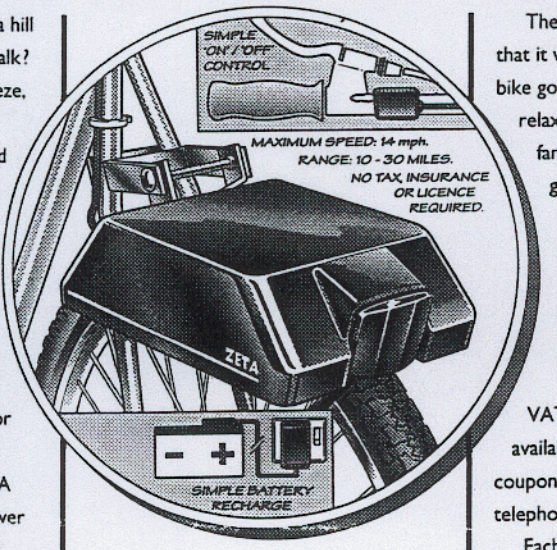
MAINTENANCE FREE

To use ZETA, simply touch the "on/off" switch on the handlebar.

ZETA is so well engineered that it's maintenance free and works well in all weathers. What's more, you can fit it to your existing bike in a matter of minutes.



GRADIENTS DISAPPEAR; HEADWINDS VANISH. CYCLING BECOMES ENJOYABLE AGAIN.



The battery pack and charger are included in the price, and the battery can be fully recharged for less than 1p.

Charging can be carried out in situ, or by removing the battery from the unit. You can also purchase a back-up battery to carry with you to extend your range.

Depending on how much use it gets, one battery can last anything between 3 - 10 years.

SAFE IN ANY WEATHER

The distance you can travel on one battery will vary depending on how much effort you put in. By reserving ZETA for gradients and headwinds, you could get up to 30 miles. If you don't pedal at all and let ZETA do all the work for you, then you can expect to get about 10 miles.

SINCLAIR ZETA

Send to: VECTOR SERVICES LTD., 13 DENINGTON ROAD, WELLINGBOROUGH, NORTHANTS NN8 2RL. TEL: 0933 279300.

SINCLAIR RESEARCH LTD., 15-16 MARGARET STREET, LONDON W1N 7LE.

LESS THAN 1p FOR A RECHARGE

The beauty of ZETA is that it will go wherever your bike goes, making it ideal for relaxed cycling with the family at weekends, or going to and from work without effort. And, just like your bicycle, ZETA requires no licence, tax or insurance. It has a top speed of 14 mph and can be legally ridden by anyone over the age of 14.

Priced at just £144.95 including VAT and delivery, ZETA is not available in the shops. So, fill in the coupon at the bottom of the page, or telephone your order on 0933 279 300.

Each ZETA unit carries an unconditional one year guarantee; and your money will be refunded in full if not totally satisfied.

ENVIRONMENTALLY FRIENDLY

Send to: VECTOR SERVICES LTD., 13 DENINGTON ROAD, WELLINGBOROUGH, NORTHANTS NN8 2RL. TEL: 0933 279300.

Please send me: Sinclair ZETA ..... (Qty) @ £144.95 each.
back-up batteries ..... (Qty) @ £29.95 each.
Total order value: £ .....

Packing and Postage included (UK and Channel Islands orders only).

☐ I enclose a cheque payable to Sinclair Research Ltd. for £ .....

☐ Or debit my credit card: ☐ Visa ☐ Mastercard
Expiry Date: Month ..... Year .....

Card Number:

For telephone orders, call our Credit Card Hotline on 0933 279300.

MOP REG. NO. 8418

SIGNED .....

NAME .....

ADDRESS .....

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TEL NO: .....

Delivery address if different from above:

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THE FUTURE

It is obviously impossible to read the future but I think it is reasonable to think that, not withstanding the C5 failure, Sir Clive will be pursuing his dream to give people an economical means of personal transport to be used locally and beyond. If this project finally materializes then one could still use a large car for longer journeys but use a small, economical, handy electric vehicle for local journeys to the supermarket.

The problem is that, while similar projects have already been pursued casually by some car manufacturers, amazingly there are no known projects for an electric long range car, with serious characteristics and intentions. I know that Sir Clive is working with a major car manufacturer to develop such a vehicle and let's hope that in about three/four years they will be able to come up with an economic and economical practical (and

safe!) electric vehicle with a large popular appeal that would be easy to use and cost near to nothing to run.

If it can be done then I think that Sir Clive can. This will add another product to the already collectable series illustrated in this book.
Good collecting.

Sir Clive

from a flat screen ad.
September 1983

The power to see the future.

This is the world of the next 20 years. The world that began in 1980.

Before that, nothing like these pictures was possible. Computers, printers, networks, software – the whole explosive power of the digital revolution was largely the preserve of big business, with big business budgets.

In 1980, Sinclair made digital power universally available. Suddenly, *everyone* had access to the most powerful and fundamental technology since the invention of printing.

The products in this leaflet demonstrate how far and how fast the revolution has progressed.

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Give me a hand!

this a photocopy of my hand. You could GIVE ME A HAND by letting me have your addendum, corrections or more simply: your comments. Thank you!