

A 6K7 SUPERHET

PRACTICAL 16

FEBRUARY

1960

WIRELESS



CONTENTS

TEST PANEL FOR TRANSISTORS

VALVE CODING SYSTEMS

A VERSATILE V.F.O.

BEGINNERS' TEST METER

A QUALITY F.M. RECEIVER

ETC. ETC. ETC.



RADIO & TV TABLES

"NEWSTEAD" (as illustrated). This contemporary "Slimline" T.V. Table is finished in highly polished walnut veneer. Measures 19" x 13" x 20" high.

Price £3.7.6 (inc. P.T.)

"CHATSWORTH." Finished in highly polished walnut veneer. Measures 19" x 14" x 21" high.

Price £4.0.0 (inc. P.T.)

"WELBECK" (as illustrated) measures 20" x 20" x 20" and is fitted with self-adjusting gliders.

Price £3.15.0 (inc. P.T.)

"SHERWOOD" will accommodate the largest television receivers; measures 23" high x 25" wide x 22" deep.

Price £5.5.0 (inc. P.T.)

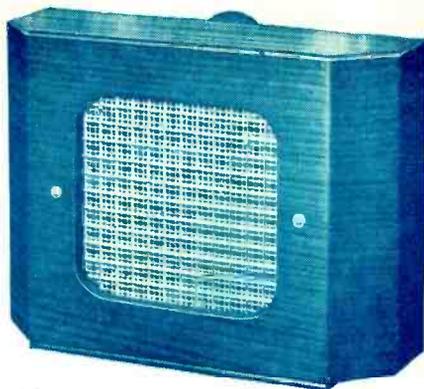
"SENIOR," of ample dimensions (18" x 24" x 25" high).

Price £4.18.9 (inc. P.T.)

All are supplied packed flat ready for instant assembly and with the exception of the Welbeck and the Chatsworth have easy running 2" castors.



*The symbol
of extra
High Quality*



Stentorian

EXTENSION SPEAKERS

These well designed speakers demonstrate the traditional Whiteley quality at really competitive prices. This range of extension speakers has finger-tip volume control, is superbly finished in polished walnut veneer and provides excellent reproduction.

WHITELEY ELECTRICAL RADIO CO. LTD.
MANSFIELD · NOTTS

**WITH THE
EXCLUSIVE
FINGER-TIP
VOLUME
CONTROLS**

- 'BUDE' 60/-
- 'BEDFORD' 72/-
- 'BRISTOL' 86/6

Prices include P.T.



**For Safety's Sake
use**

AVO Prodclips



Pat. No. 749811

...with Trigger-Action Spring-Loaded Clips

PRESS TRIGGER TO OPEN

RELEASE TO GRIP

Safety first every time with these patented spring-loaded AVO Prodclips.

Cleverly designed for use as insulated prods, they are invaluable for reaching and holding test points which are difficult of access.

Post Free
15/-
per pair.

AVO LTD · AVOCET HOUSE,
92-96 VAUXHALL BRIDGE ROAD, LONDON, S.W.1.
VICtoria 3404 (12 lines)

A MEMBER OF THE METAL INDUSTRIES GROUP OF COMPANIES.

ADCOLA

(Regd. Trade Mark)

SOLDERING EQUIPMENT

THE INSTRUMENTS CREATED FOR THE DISCRIMINATING USER.

British & Foreign Pats., Regd. Designs, etc.

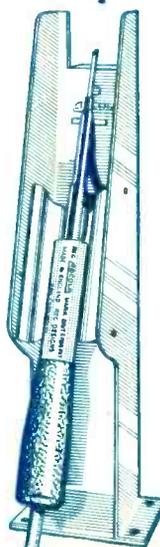
- ILLUSTRATED Protective Shield (Cat. No. 68)
- Instrument $\frac{1}{8}$ " Bit (Cat. No. 70)

The ideal combination for transistor and other intricate work.

Apply direct for catalogues:—

ADCOLA PRODUCTS LTD.,
GAUDEN RD.,
CLAPHAM HIGH ST.,
LONDON, S.W.4.

Telephones
MACaulay 4272 and 3101



Tel : Mitcham 6201
Open Daily to Callers



All Valves Brand New
and Fully Guaranteed

211, STREATHAM ROAD, MITCHAM, SURREY

Special 24 Hour Express Mail Order Service.

0Z4	5/9	6CH6	12/-	10C2	27/10	30P16	10/-	B719	9/6	ECH81	9/-	HL23	12/6	PCF80	10/6	U147	7/-
1A5	6/-	6E5GT	10/-	10F1	26/2	30PL1	13/6	CBL1	17/6	ECH35	9/-	HL23DD		PCF82	11/6	U153	9/-
1A7	14/6	6F1	15/6	10F3	17/6	32	13/6	CBL31	21/-	ECL80	9/-		10/6	PCF83	12/6	U191	20/-
1D5	14/-	6F6	6/9	10F9	12/6	35A5	10/6	CCH35	14/6	ECH82	12/6	HL41	12/6	PEN44	17/6	U251	17/6
1D6	10/-	6F7	15/-	10LD3	12/6	35L6GT	15/-	CL4	12/6	EF9	21/-	HL41DD		PEN84	17/6	U281	20/6
1H5	10/6	6F12	5/-	10LD11	15/-	35W4	8/-	CL33	18/6	EF22	17/6		13/6	PEN4DD		U282	22/-
1L4	6/-	6F13	17/6	10P13	21/-	35Z3	10/-	CY1	15/9	EF36	7/6	HL42DD			22/6	U301	22/6
1LLN5	4/6	6F14	17/6	10P14	20/-	35Z4	7/6	CY31	15/9	EF37	8/6		13/6	PL33	18/6	U329	17/6
1N5	10/6	6F15	14/9	11D3	17/6	35Z5	9/6	D41	12/6	EF37A	8/6	HY90	8/-	PL38	23/9	U339	19/-
1R5	9/-	6F17	12/-	11D5	17/6	40SUA	15/-	D42	12/6	EF39	5/-	IW4/35010/-		PL81	14/9	U403	11/6
1S4	8/6	6F33	5/6	12A6	6/6	41STH	23/6	D63	3/6	EF40	15/-	IW4/500 10/-		PL82	8/-	U404	10/-
1S5	9/-	6H6	2/6	12AH8	10/-	42	15/-	D77	6/-	EF41	9/3	KBC32	9/6	PL83	10/6	U801	29/-
1T4	5/6	6J5GT	4/6	12A7	6/-	43	15/-	D152	6/-	EF42	10/6	KF35	8/6	PL820	21/-	U4020	15/6
1U5	10/-	6J6	7/6	12A7	8/-	50CS	15/-	DAC32	10/6	EF80	7/-	KL32	10/6	PM2A	12/6	UABC80	8/-
2D21	8/6	6J7GT	9/6	12A7	9/-	50CD6G		DAF91	7/6	EF85	7/6	KLL32	11/6	PM2HL	14/-	UAF42	9/6
2X2	5/-	6K7GT	10/6	12AX7	9/6		21/-	DF33	10/6	EF86	11/-	KL35	9/6	PM22A	13/6	UB41	9/6
3A5	12/6	6K8GT	12/6	12BA6	9/6	50L6GT	9/-	DF91	5/-	EF89	10/-	KT2	7/6	PM24M	21/6	UBC41	9/6
3D6	14/6	6K25	19/6	12BE6	9/6	61B1	17/6	DF92	7/-	EF91	5/-	KT32	10/-	PM202	16/-	UBF80	9/6
3Q4	8/-	6L1	15/6	12EJ	17/6	61SPT	17/6	DF96	9/6	EF92	5/-	KT33C	10/-	PM21	16/6	UBF89	8/6
3Q5	10/6	6L6	7/6	12J7GT	9/6	62BT	17/6	DF97	9/6	EF93	7/6	KT36	28/6	PY32	15/6	UCC85	10/6
3S4	8/-	6L18	12/6	12K7GT		75	12/6	DH63	10/6	EF95	15/-	KT41	22/6	PY80	8/-	UCH42	9/6
3V4	9/-	6L19	21/-		8/6	77	12/6	DH76	7/6	EL31	12/6	KT44	13/6	PY81	7/6	UCH81	9/6
5R4GT	9/-	6L34	10/-	12K8GT	12/6	78	12/6	DH77	8/3	EL32	5/-	KT55	22/6	PY82	8/-	UCL82	12/6
5U4G	7/6	6/30L2	10/-	12Q7GT	8/6	80	10/-	DH107	13/6	EL33	18/6	KT61	18/6	PY83	8/6	UCL83	23/6
5V4	9/6	6LD3	9/6	12SA7	8/6	85A2	12/6	DH719	7/6	EL35	12/6	KT63	8/6	PZ30	18/6	UF41	9/6
5Y3GT	8/6	6ND20	15/6	12SC7	8/6	150B2	12/6	DK91	9/-	EL38	18/6	KT66	17/6	QP25	14/6	UF42	11/6
5Z3	10/6	6GTG7	7/6	12SG7	8/6	150B3	15/6	DK92	9/6	EL37	23/9	KT71	9/-	QP230	17/6	UF80	9/6
5Z4G	10/-	6M1	10/6	12SH7	8/-	185BT	32/-	DK96	10/-	EL41	10/6	KT74	12/6	QP21	12/6	UF85	9/6
6A7	18/6	6M2	10/6	12S17	8/-	303	7/6	DL32	9/-	EL42	10/-	KT76	12/6	R10	21/-	UF89	8/-
6A8	10/-	6P1	17/6	12SK7	8/-	304	7/6	DL35	12/6	EL81	14/9	KT101	25/-	R19	19/6	UL41	9/-
6A8B	12/6	6P25	19/6	12SQ7	11/6	305	7/6	DL92	8/6	EL84	7/6	KTW61	7/6	SD6	8/6	UL44	24/6
6A18	9/6	6P28	26/-	12SN7	17/6	328	7/6	DL94	9/-	EL85	10/6	KTW62	7/6	SP4	14/6	UL46	21/6
6AK5	7/6	6Q7GT	10/6	12Z3	15/-	329	7/6	DL96	9/6	EL90	8/6	KTW63	7/6	SP41	3/6	UL84	9/6
6AK8	8/6	6SA7GT	7/6	13D3	12/6	807	7/6	EA50	2/-	EL91	5/-	KTZ41	8/-	SP42	12/6	U6	20/11
6AL5	6/-	6SG7	7/6	14H7	12/6	955	4/-	EABC80	7/6	EM80	10/-	KTZ63	10/-	SP61	3/6	U07	15/-
6AM5	5/6	6SH7	6/6	14R7	12/6	5763	7/6	EAC91	7/6	EM81	10/-	L63	4/9	T41	22/6	U08	26/-
6AM6	5/6	6SJ7	5/6	14S7	21/-	9002	7/6	EAF42	10/-	EY81	10/6	LN309	15/-	TDD4	17/6	U09	15/6
6AN5	7/6	6SK7	7/6	15A2	17/6	9003	7/6	EB41	7/6	EY84	10/6	LZ319	12/6	TDD13C		U11	7/6
6AQ5	8/3	6SL7GT	6/6	15D2	23/9	AC4/PEN		EB91	5/-	EY86	9/6	MH4	8/6		17/6	UY85	7/6
6AQ8	9/3	6SN7GT	5/6	19AQ5	10/6	25/-		EBC41	9/6	EY91	9/6	MHD4	17/6	TH41	23/9	VP28	17/6
6AT6	8/3	6U4GT	11/6	19BGG	24/4	AC5/PEN		EBF80	9/6	EZ35	7/6	MHL4	10/-	TP22	17/6	VP48	17/6
6AU6	10/-	6U5	7/6	20D1	12/6	22/6		EBF89	9/6	EZ40	7/6	MKT4 (5/7)		TP25	17/6	W17	8/6
6B7	10/-	6U7	7/6	20D2	23/-	AC6	21/-	EBL21	22/-	EZ41	7/6		17/6	U14	15/9	W76	7/6
6B8	4/-	6V6G	5/-	20F2	26/6	ACTP	32/-	EBL31	21/6	EZ80	7/6	MS4B	17/6	U16	10/-	W77	5/-
6BA6	7/6	6V6GT	8/-	20L1	26/6	ACHL	12/6	EC90	9/6	EZ81	7/6	MSP4	17/6	U18/20	10/-	W142	9/6
6BE6	7/6	6X4	5/-	20P1	26/-	AC/PEN		EC91	9/6	EZ90	7/6	MU14	9/-	U22	10/-	W719	7/6
6BG6G	21/-	6X5GT	5/6	20P3	23/-	17	6	ECC31	10/-	FC2	21/-	MX40	17/6	U24	29/6	W727	7/6
6B6	7/6	7B7	8/-	20P4	16/-	ACTH1	34/9	ECC32	10/-	FC13	17/6	N18	8/-	U25	16/6	X18	11/6
6BR7	15/-	7C5	8/-	20P5	22/6	ACVP1	17/6	ECC33	8/-	FC13C	21/-	N19	8/-	U26	12/6	X61M	21/-
6BW6	8/6	7C6	8/-	25L6GT	9/6	ACV2	17/6	ECC34	15/-	FW4/500		N37	18/6	U31	9/6	X65	23/9
6BW7	6/6	7D5	15/-	25Y5	10/-	AC2/PEN		ECC35	8/6		10/-	N78	17/6	U33	21/-	X66	21/-
6BX6	7/6	7D6	15/-	25Z4	9/6	21/-		ECC40	21/-	FW4/800		N108	18/-	U35	21/-	X78	21/-
6BY7	7/6	7D8	15/-	25Z5	9/6	AC2/		ECC81	8/-		10/-	N142	9/6	U37	25/-	X79	21/-
6C4	6/6	7H7	8/-	25Z6	10/6	PENDD	21/-	ECC82	9/6	GZ30	10/6	N147	18/6	U45	21/-	Y61	10/6
6CSGT	8/-	7K7	10/6	27SU	17/6	AZ1	15/6	ECC83	9/6	GZ32	11/6	N150	10/-	U47	21/-	Y63	9/6
6C6	6/6	7Q7	11/6	30	13/6	AZ31	10/6	ECC84	9/6	GZ34	13/6	N153	11/6	U50	8/6	Z21	12/6
6C9	12/6	7R7	12/-	30C1	12/6	B36	21/-	ECC85	9/6	H30	5/6	N309	11/6	U52	7/6	Z63	7/6
6C10	12/6	7S7	10/6	30F5	11/6	B65	8/6	ECC91	5/6	H63	9/6	N329	10/6	U76	7/6	Z66	19/6
6CD6G	27/6	7Y4	7/6	30FL1	10/6	B152	8/6	ECF80	12/6	HBC90	9/6	N727	7/6	U78	7/6	Z77	5/-
6D1	8/-	8D3	5/6	30L1	11/6	B309	9/6	ECF82	12/6	HL92	6/6	N729	8/-	U78	7/6	Z152	8/6
6D2	5/-	9BW6	14/9	30P4	22/-	B329	9/6	ECH21	22/-	HL133DD		P2	10/-	U142	8/-	Z719	7/6
6D3	15/-	10C1	18/-	30P12	11/6	B339	9/6	ECH42	10/-		10/-	PCC84	9/6	U145	15/-	ZD152	9/6

METAL RECTIFIERS

RM1	6/-	18RA	1-1-8-1	4/6	16RE	2-1-8-1	8/6
RM2	8/-	18RA	1-1-16-1	6/6	18RA	1-2-8-1	11/-
RM3	9/-	16RC	1-1-16-1	8/6	14A86		17/-
RM4	16/6	14RA	1-2-8-2	18/-	14A97		23/6
RM5	22/-	14RA	1-2-8-3	21/-	14A100		24/-

CATHODE RAY TUBES

Type 43/69 £10.0.0
Type 36/44 £8.10.0

TERMS OF BUSINESS C.W.O. or C.O.D.
2/9 PACKING CHARGE ON ALL C.O.D.
ORDERS. POSTAGE 3d. PER VALVE.

OBsolete VALVES A SPECIALITY
QUOTATIONS GIVEN ON ANY TYPE
NOT LISTED.

Training in Radio and Television Servicing

The Pembridge College of Electronics provides a full-time One Year course in the basic principles of Radio and Television for prospective servicing engineers. It is also suitable for those wishing to become proficient in the maintenance of all types of industrial electronic equipment.

The next course commences on 26th April, 1960 and enrolments are now being accepted. The following course will commence on 6th September, 1960.

HOME-STUDY COURSES AND KITS-OF-PARTS

We are the only organisation with a full-time technical staff, backed by laboratories, offering these courses and kits.

Kits-of-Parts

1. 2000 ohms/volt Multimeter for Kit Assembly.

These kits provide a unique opportunity to construct a first-class instrument at a reasonable price. Our instructions place success well within the capabilities of the average constructor.

Simple tools only required, no calibration necessary.

£7.10.0d. cash with order. Postage and packing 3/- (U.K. only).

2. Transistor Receiver.

A six-transistor superhet radio receiver of high sensitivity and excellent reproduction is available with full constructional details. This receiver is a current model from a well-known manufacturer.

Other kits available in the near future.

All our kits are provided by manufacturers who are leaders in their field. The parts are drawn directly from their stocks for their current models.

Home-Study Courses

Available now—

a. Course for Intermediate examinations of the new City and Guilds' Telecommunication Technicians' Course. (New Scheme)

b. "Transistors for the Radio Servicing Engineer", including assembly and testing of a six-transistor receiver.

c. "Basic Electricity and Magnetism", including Multimeter assembly kit-of-parts and basic experiments and measurements.

d. "Basic Mathematics and Mechanics for Radio".

In preparation—

a. Course leading to City and Guilds' Final Certificate.

b. "Elements of Radio Servicing" with constructional kit.

c. Advanced Radio Servicing.

d. Basic Television.

Our courses are prepared by lecturers whose daily work is to teach Radio, Television and Telecommunications at all levels to full-time and part-time students. They have an intimate knowledge of student problems and requirements beyond that found in ordinary correspondence course work.

For our Prospectus on the One Year course, admission forms and details of our activities, write to:

The Principal, P.10,

THE PEMBRIDGE COLLEGE OF ELECTRONICS

34A, Hereford Road, London, W.2.

BAYswater 9117

Stern's "fidelity" TAPE EQUIPMENT

YOU CAN BUILD A COMPLETE TAPE RECORDER

for **£36.0.0**

A SELECTION OF HIGH FIDELITY PORTABLE TAPE PREAMPLIFIERS

Adds "Hi-Fi" TAPE RECORDING TO YOUR EXISTING AUDIO INSTALLATION

IN ALL MODELS WE INCORPORATE THE TYPE "C" PREAMPLIFIER

AND OFFER IT COMPLETE IN CASE WITH...

- (a) The new COLLARO "STUDIO" 3 Speed Deck H.P. Deposit, £7.6.0, 12 months £2.13.6. **£36.10.0**
- (b) The COLLARO Mk. IV "Transcriptor" 3 Speed Deck H.P. Deposit, £8.6.0, 12 months £3.0.11. **£41.10.0**
- (c) The New TRUVOX Mk. VI, Tape Deck, H.P. Deposit £9.14.0, 12 months £3.3.10. **£43.10.0**
- (d) The BRENNELL Mk. V 3 Speed Deck H.P. Deposit £10.6.0, 12 months £3.15.7. **£51.10.0**
- (e) The WEARITE MODEL 4A, Tape Deck Deposit, £12.4.0, 12 months £4.9.5. **£61.0.0**

STERN'S MULLARD TYPE "C" TAPE PREAMPLIFIER-ERASE UNIT

INCORPORATING THE NEW FERROXUCUBE POT CORE PUSH-FULL OSCILLATOR and 3-SPEED TREBLE EQUALISATION by means of the latest FERROXUCUBE POT CORE INDUCTOR. PRICES INCLUDING SEPARATE SMALL POWER SUPPLY COMPLETE KIT OF PARTS **£14.0.0** ASSEMBLED AND TESTED **£17.0.0**

Dep. £3.8.0 and 12 of £1.4.11. ALSO AVAILABLE EXCLUDING POWER SUPPLY UNIT FOR £11.15.0 and £14.10.0, respectively.

WHEN ORDERING PLEASE STATE MAKE OF TAPE DECK TO BE USED. We present this "Hi-Fi" Preamplifier strictly to Mullard's specification incorporating ONLY NEW HIGH-GRADE COMPONENTS and the SPECIFIED NEW MULLARD VALVES. It comprises a COMPLETELY SELF-CONTAINED UNIT, neatly finished in Hammered Gold with a very attractively engraved PERSPRX FRONT PANEL.

FOR PERMANENT HIGH QUALITY INSTALLATIONS WE ALSO OFFER (excluding case)

- (a) The COLLARO "STUDIO" TAPE DECK and our Mullard Type "C" PREAMPLIFIER and Power Unit Assembled and Tested **£32.10.0**
- (b) As above but TYPE "C" PREAMPLIFIER supplied as complete KIT OF PARTS **£29.0.0**
- (c) The COLLARO Mk. IV TAPE DECK and the MULLARD TYPE "C" PREAMPLIFIER & Power Unit assembled, tested **£35.0.0**
- (d) As (c) but Type "C" as COMPLETE KIT OF PARTS **£32.0.0**
- (e) The TRUVOX Mk. VI DECK and the assembled Type "C" Preamplifier and Power Unit **£40.0.0**
- (f) As above but TYPE "C" as complete KIT OF PARTS **£36.10.0**
- (g) The BRENNELL Mk. V DECK and the assembled Type "C" PREAMPLIFIER and POWER UNIT H.P. Deposit £9.4.0, and 12 months £2.18.3. **£46.0.0**
- (h) As (g) but Type "C" as complete KIT OF PARTS **£43.0.0**
- (i) The WEARITE 4A DECK with TYPE "C" assembled and tested **£56.0.0**

H.P. Deposit, £11.4.0 and 12 months £4.2.1.

(Carriage and Insurance on above quotes 10% extra.) PLEASE ENCLOSE S.A.E. WITH ALL CORRESPONDENCE.



H.P. TERMS Deposit £7.4.0. 12 months £2.12.10.

FOR THIS WE SUPPLY:

- ★ COMPLETE KIT OF PARTS TO BUILD THE HF/TR3 TAPE AMPLIFIER.
- ★ THE NEW COLLARO "STUDIO" TAPE DECK.
- ★ PORTABLE CARRYING CASE (as illustrated).
- ★ ROLA/CELESTION 10in. x 6in. P.M. LOUDSPEAKER.
- ★ ACOS CRYSTAL MICROPHONE, 1.200ft. SPOOL E.M.I. TAPE. For those who prefer another type of TAPE DECK we will supply precisely as above—but IN PLACE OF THE COLLARO "STUDIO" DECK—we INCLUDE:

- (a) The Mk. IV COLLARO "TRANSCRIPTOR" DECK H.P. Deposit £8.0.0 and 12 months £2.18.2. (£1 extra if we are required to wire up the Transcriptor Switch Banks.) **£45.0.0**
- (b) The New TRUVOX Mk. IV DECK H.P. Deposit £9.0.0, and 12 months £3.6.0. (Carriage and Insurance on all above is 12% extra.) For Constructors with their own Cabinet WE OFFER:
 - (a) COMPLETE KIT to build the HF/TR3 Amplifier, together with the COLLARO "STUDIO" DECK... **£28.0.0**
 - (b) As above but with HF/TR3 supplied ASSEMBLED and TESTED H.P. Deposit £8.6.0, and 12 months £2.6.0. **£31.10.0**
 - (c) COMPLETE KIT to build the HF/TR3, together with the Mk. IV COLLARO "TRANSCRIPTOR" TAPE DECK (£1 extra if we are required to wire up Deck Switch Banks.) **£30.15.0**
 - (d) As above but HF/TR3 supplied ASSEMBLED and TESTED (£1 extra if we are to wire up Deck Switch Banks.) **£34.10.0**
 - (e) COMPLETE KIT to build the HF/TR3, together with the NEW TRUVOX Mk. VI TAPE DECK... **£36.0.0**
 - (f) As above but HF/TR3 supplied ASSEMBLED and TESTED H.P. Deposit £7.18.0, and 12 months £2.17.11. **£39.10.0**
 - (g) COMPLETE KIT to build the HF/TR3 AMPLIFIER with the BRENNELL Mk. V TAPE DECK... **£41.10.0**
 - (h) As above but HF/TR3 supplied ASSEMBLED and TESTED H.P. Deposit £9.0.0, and 12 months £3.6.0. Carriage and Insurance on each above is 10% extra. **£45.0.0**

Attractive PORTABLE CASE is available to accommodate the TRUVOX or COLLARO TAPE DECKS and we offer it, together with ROLA/CELESTION 10in. x 6in. LOUDSPEAKER—ACOS CRYSTAL MICROPHONE—and 1.200 ft. SPOOL E.M.I. TAPE—ALL FOR £9.0.0, Carriage and Insurance 5% extra.

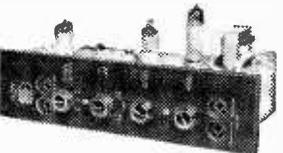
WE HAVE THE NEW 2 SPEED TWIN TRACK TRUVOX Mk VI TAPE DECK IN STOCK £26.5.0
DEPOSIT : £5.5.0 and 12 MONTHS : £1.18.6

THE MODEL HF/TR3 TAPE AMPLIFIER

INCORPORATING 3-SPEED TREBLE EQUALISATION by means of the latest FERROXUCUBE POT CORE INDUCTOR.

PRICE FOR COMPLETE KIT OF PARTS **£12.15.0**

PRICE FULLY ASSEMBLED & TESTED **£16.10.0**



HIRE PURCHASE. Deposit £3.6.6 and 12 monthly payments of £14.2. A very high-quality Amplifier based on the very successful TYPE "A" design completed in the MULLARD LABORATORIES. ONLY NEW HIGH-GRADE COMPONENTS are incorporated including MULLARD VALVES and a GILSON OUTPUT TRANSFORMER. Other features are—Magle Eye Recording hand indicator—Effective Tone Control—Monitoring and Extension Speaker Sockets—Has own Power Supply and can be used as Independent Amplifier for direct reproduction of Gram Records or from Radio Tuner. Overall size 11in. x 6in. x 6in. Can be supplied for use with Truvox—Collaro—Lane—Brenell or Motok Decks. Please specify which. Send S.A.E. for leaflet or 2/6 for complete Assembly Manual.

STERN RADIO LTD.
109 & 115 FLEET ST., LONDON, E.C.4
Telephone: FLEET STREET 5812/3/4

MULLARD DESIGNS

*Still by far the
finest value*

Designed by MULLARD—presented by STERNS strictly to specification.
COMPLETE KIT OF PARTS—

MULLARD "5-10" MAIN AMPLIFIER

For use with the MULLARD 2-stage pre-amplifier (described below) with which an undistorted power output of up to 10 watts is obtained. This combination is thoroughly recommended to "HI-FI" enthusiasts who contemplate a versatile and very high quality home installation. We supply SPECIFIED COMPONENTS and NEW MULLARD VALVES, including PARMKO MAINS TRANSFORMER (which has extra Power available to drive Radio Tuner) and the choice of the latest Ultra-Linear PARMKO or the PARTRIDGE Output Transformer. PRICE COMPLETE KIT (PARMEKO £10.00 Alternatively we supply ASSEMBLED Output Trans) £11.00 and TESTED, £11.00.

ABOVE INCORPORATING PARTRIDGE OUTPUT TRANSFORMER, £1.60 EXTRA.

MULLARD'S PRE-AMPLIFIER TONE CONTROL UNIT

Employing two EF86 valves, and designed to operate with the MULLARD 3-3 and 5-10 MAIN AMPLIFIERS, but also perfectly suitable for other makes. PRICE, COMPLETE KIT OF PARTS, £6.60 Alternatively we supply ASSEMBLED AND TESTED £8.00 (Carriage & Insurance, 5/- extra.)

Our kit is strictly to MULLARD'S SPECIFICATION and incorporates:

- Equalisation for the best R.I.A.A. characteristics.
- Input for Crystal Pick-ups, and variable reluctance magnetic types.
- Input. (a) Direct from High Imp. Tape Head. (b) From a Tape Amplifier or Pre-amplifier.
- Sensitive Microphone Channel.
- Wide range BASS and TREBLE Controls.

COMPLETE MULLARD 5-10

The popular and very successful complete "5-10" incorporating Control Unit providing up to 10 watts high quality reproduction. Input channels for high output pick-ups and all modern Radio Tuning Units only Specified Components and new MULLARD VALVES are supplied, including PARMKO MAINS TRANSFORMER and choice of the latest PARMKO or PARTRIDGE ULTRA-Linear Output Transformers. £11.10.0

Adequate power available to drive Radio Tuner. £13.10.0
HIRE PURCHASE (Assembled Amp. only) DEPOSIT: £2.14.0.
12 MONTHS: 19/10.
ABOVE incorporating PARTRIDGE OUTPUT TRANS., £1.6.0 extra.

MULLARD—STERN STEREO DESIGNS

DUAL "3-3" MAIN AMPLIFIER

Comprises two "3-3" MAIN AMPLIFIERS (described above) on one chassis and is designed to operate with our DUAL CHANNEL PRE-AMPLIFIER for both STEREO PHONIC or MONAURAL operation. PRICE: COMPLETE KIT OF PARTS £10.0.0

Alternatively ASSEMBLED AND TESTED £11.15.0 H.P. Terms: Deposit £2-7-0 and 12 months at 17/4. Its output power is 6 watts (3 watts per channel) and together with our PRE-AMPLIFIER provides a very acceptable STEREO installation.

COMPLETE STEREO AMPLIFIER

A thoroughly recommended design that very effectively meets the many requests for a low-priced but good quality DUAL CHANNEL STEREO PHONIC AMPLIFIER. PRICE: COMPLETE KIT OF PARTS £8.10.0

Alternatively ASSEMBLED AND TESTED £10.10.0
Two MULLARD ECL82 Triode Pentode Valves are incorporated in the design; they form a "CLASS A" single-ended output stage in each channel. The input sensitivity is 300 mV/ohms, therefore when used with most STEREO Crystal Pick-Ups or Radio Tuning Units, an output of 2 watts per channel is achieved, or similarly when switched to MONAURAL Pick-Up position a combined output of 4 watts is produced.

DUAL CHANNEL PRE-AMPLIFIER

This model incorporates two 2-valve Pre-Amplifiers (described above) combined into a Single Unit, enabling it to be used for both STEREO PHONIC or MONAURAL operation. It is designed primarily to operate with our range of MULLARD MAIN AMPLIFIERS but will also operate equally well with any make of Amplifiers requiring an input of 250 mV/ohms.

COMPLETE KIT £12.10.0 ASSEMBLED AND TESTED £15.0.0
It will operate equally well for MONAURAL only operation with one "5/10" Main Amplifier to which the second Main Amplifier can at any time be added, thus very easily providing for both STEREO or MONAURAL reproduction. Recommended combinations for STEREO operation:

- The DUAL CHANNEL PRE-AMPLIFIER together with the Dual "3/3" MAIN AMPLIFIER.
 - The DUAL CHANNEL PRE-AMPLIFIER together with two "5/10" MAIN AMPLIFIERS.
- THE ASSEMBLY MANUAL is available for 3/-.

Please enclose S.A.E. if ILLUSTRATED and DESCRIPTIVE LEAFLETS are required... alternatively the COMPLETE ASSEMBLY MANUALS are available at 1/6 each.

STERN RADIO LTD.



Stern's "fidelity" TAPE RECORDERS

**BEFORE YOU BUY
—YOU SHOULD
HEAR THESE**

**REGORDERS. THEY ARE COMPARABLE
TO THE MUCH HIGHER-PRICED MODELS**

There are no better value for money Tape Recorders on the market—if you can't call and hear them, send S.A.E. for fully descriptive leaflets.

MODEL CR3/S. Incorporates the New COLLARO "STUDIO" TWIN TRACK 3-Speed Deck H.P. Terms: Deposit £8.4.0 and 12 months of £30.2.

All prices quoted provide for the COMPLETE RECORDER including CRYSTAL MICROPHONE and 1,200 ft. Spool of Tape.

Each Model incorporates the highly successful HF/TR3 Amplifier (described opposite) thus ensuring truly "Hi-Fi" record and playback facilities.

MODEL CR3/T. Incorporates the very popular 3-Speed COLLARO MK. IV "TRANSCRIPTION" Deck £49.10.0 which has both upper and lower tape tracks..... H.P. Terms: Deposit £9.18.0 and 12 months of £32.12.7.

MODEL TR3/Mk. VI. Incorporates the New TRUVOX MK. VI TWIN TRACK 2-Speed Tape Deck £49.10.0 H.P. Terms: Deposit £9.18.0 and 12 months of £32.12.7.

!! RADIOGRAM CHASSIS !!

ARMSTRONG MODEL AF/208..... £23.2.0
7 valve AM/FM Chassis producing Max. 5 watts output.

ARMSTRONG "STEREO TWELVE"..... £37.16.0
The most complete AM/FM unit yet produced for Stereo, giving 6 watts high-fidelity push-pull output on each channel. 12 watts for monaural.

ARMSTRONG "JUBILEE"..... £29.8.0
An AM/FM chassis with nine valves and with push-pull output stage providing 6 watts.

ARMSTRONG AM/FM "STEREO 44"..... £28.7.0
Provision is made for Stereo and monaural playback from pick-up or tape. Outputs provided for Stereo or Monaural tape recordings.

RADIO TUNING UNITS

DULCI MODEL FMT/2..... £19.17.6
A complete self-powered F.M. Tuner incorporating automatic frequency control.

ARMSTRONG "S.T.3" AM/FM UNITS..... £27.6.0
A self-powered high-fidelity Tuner covering full VHF, medium, and long wavebands with automatic frequency control on VHF.

DULCI "H/4" AM/FM UNIT..... £23.15.8
A 4 waveband self-powered high-fidelity tuner covering the VHF/FM transmissions plus the long, medium and short wavebands.

NEW HIRE PURCHASE TERMS are available on all above. Illustrated leaflets available—send S.A.E. (Carr. and Ins. 5/- extra.)

A SPECIAL CASH ONLY OFFER !!

This very attractive **PORTABLE AMPLIFIER CASE** together with a good quality **GRAM AMPLIFIER** and a matched **P.M. SPEAKER**

ALL FOR ONLY £8.7.6 (Plus 7/6 Carr. & Ins.)

The Amplifier consists of a 2-stage design incorporating 3 modern B.V.A. valves and has separate **BASS** and **TREBLE** CONTROLS. The Portable Case will also accommodate almost any make of Autochanger and is attractively finished in Mushroom Grey Rexine. **WE ALSO SUPPLY SEPARATELY—**

(a) The 2-stage (plus Rectifier) **AMPLIFIER £4.2.6** (b) The **PORTABLE CARRYING CASE £3.17.6**

— SPECIAL CASH ONLY BARGAIN —

A bulk purchase enables us to offer a very useful **INTERCOM SET OR BABY ALARM for only £5.5.0**

(Plus 5/- carriage & Insurance).

Consists of **MASTER UNIT** and one **EXTENSION**, providing 2-way TALK-LISTEN facility. Complete in polished wood cases, size of each only 7 1/2 x 4 1/2 x 3 1/2 in. high.

STERN'S MK. II "fidelity"

F.M. TUNING UNIT

PRICE £14.5.0 (Plus 5/- Carr. and Ins.)

HIRE PURCHASE: Deposit £2.17.0 and 12 Monthly Payments of £1.0.11.

Incorporates the latest **MULLARD PERMEABILITY TUNING HEART** and the corresponding **MULLARD VALVE LINE-UP**. A really first-class Tuner, very attractively presented and comparable to many offered at much higher prices. Power consumption is only 15 amps. at 6.3 volts and 25 ma at 250 volts.

HOME CONSTRUCTORS! YOU CAN BUILD THIS TUNING UNIT FOR ONLY £10.10.0 (Plus 5/- Carr. & Ins.) Please send S.A.E. for fully descriptive leaflet or the Assembly Manual is available for 1/6.

109 & 115 FLEET ST., LONDON, E.C.4

Telephone: FLEET STREET 5812/3/4

PLEASE ENCLOSE S.A.E. WITH ALL ENQUIRIES.

!! RECORD PLAYERS !! THE LATEST MODELS ARE IN STOCK MANY AT REDUCED PRICES !!

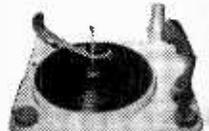
SEND S.A.E. FOR ILLUSTRATED LEAFLET

B.S.R. MONARCH CAB
4-speed mixer Autochanger with Crystal Pick-up

£6.12.6

The **NEW COLLARO MODEL RP594** 4-speed Single Record Player. Studio Cartridge

£9.18.9



The **COLLARO "CONQUEST"** 4-speed Autochanger, Studio Pick-up

£7.10.0

The latest **COLLARO "CONTINENTAL"** 4-speed

MIXER Autochanger Studio "O" Pick-up

£8.10.0

The **COLLARO** 4-speed Single Record Player, Studio Pick-up

£6.6.0

The **NEW B.S.R. Model UA12** is in Stock. A 4 "SPEED" MIXER AUTOCHANGER

£8.7.6

UA12 also available incorporating the **B.S.R. STEREO** Pick-up, plays L.P. and 78 Records

£10.10.0

B.S.R. MODEL TU9 4-speed Single Record Player, complete with separate Crystal Pick-up

£4.4.0

GARRARD MODEL TA/Mk. 11 4 Speed Player fitted high output Crystal Pick-up

£8.10.0

GARRARD MODEL RC121/4. Autochanger 4 speeds. High Output. Crystal Pick-Up

£10.0.0

Carriage and Insurance on each above, 5/- extra.

"Hi-Fi" LOUDSPEAKERS

WE HAVE IN STOCK A COMPLETE RANGE BY GOODMANS—WHARFDALE—W.B.

And will be pleased to send you Illustrated and Priced Leaflets. Recommended Types are:

GOODMANS "AXIOM 900". The Best 12in. Seller.

15 ohms V/Coil **£11.5.9**

GOODMANS "AXLETTE" 8in. 3 or 15 ohms **£6.12.0**

W.B. "STENTORIAN" H.F. 8in. 8in 3 or 15 ohms. **£6.10.6**

W.B. "STENTORIAN" H.F. 10in. 10in. 3 or 15 ohms. **£7.12.3**

W.B. "STENTORIAN" H.F.12in. 12in. 15ohms. **£9.15.6**

WHARFDALE "SUPER 8 FS/A1" 8 in. **£6.19.11**

WHARFDALE "GOLDEN FSB" 10in. **£7.13.3**

3 or 15 ohms. Voice Coil

WHARFDALE "W12/FS" 12in. 15 ohms. **£10.5.9**

Voice Coil

WHARFDALE "SUPER 12/FS/AL" 12in. **£17.10.0**

15 ohms. Voice Coil

LOUDSPEAKER ENCLOSURES, TWEETER UNITS, CROSSOVER UNITS are also available.

HOME CONSTRUCTOR

A RANGE OF "EASY TO ASSEMBLE" PREFABRICATED CABINETS. Designed by the W.B. "STENTORIAN" COMPANY for "Hi-Fi" Loudspeaker systems or to accommodate high-quality equipment. The acoustically designed Bass Reflex Cabinets containing the very successful "Stentorian" Speakers give really first-class reproduction and are well recommended. Models are also available to accommodate high-quality Amplifiers, Pre-amplifiers, Tuning Units, Record Players, etc. All models are very easily assembled, in fact, only a screwdriver is required. Fully illustrated leaflets are available, including complete specifications of the various STENTORIAN LOUDSPEAKERS.

BENTLEY AUSTON CORPORATION LTD.

THE VALVE SPECIALISTS. 38 CHALCOT ROAD, LONDON, N.W.1. Telephone: PRIMROSE 9090

EXPRESS POSTAL SERVICE! ALL ORDERS DESPATCHED SAME DAY AS RECEIVED. FOR ONLY 2/6 EXTRA TELEPHONE FOR THAT URGENT ORDER TO BE DESPATCHED IMMEDIATELY BY OUR SPECIAL C.O.D. SERVICE.

ANY ORDER INSURED		AGAINST		DAMAGE IN TRANSIT		FOR ONLY 6d. EXTRA.				
0B2	17/6 6C8	12/6 6X4	4/6 198B6G	9/002	5/6 DL96	9/- EL34	15/- KT263	10/6 Q510/15	1/CL82	11/6
0Z4	6/- 6C9	12/6 6XS7	6/-	23/3 AC/PEN	DM70	7/6 EL38	26/6 L63	6/-	10/6 UCL83	19/3
1A3	3/- 6C10	10/6 6/30L2	10/-	19/1 10/-	5-pin 23/3	EA50	2/- EL41	9/- LN152	10/6 R12	9/-
1A5	6/- 6C10	12/6 7A7	12/6 20D1	15/3 7-pin	15/- EABC80	9/- EL42	13/11 LN309	11/6 R18	14/- UF42	12/6
1A7	21/11 6C15	12/6 7B6	21/3 20F2	26/6 AC2PEN	EAC91	7/6 EL81	12/6 MH4(C)	7/- R19	19/11 UF80	10/6
1C5	12/6 6D3	19/11 7B7	8/6 20L1	26/6 23/3	EAF42	9/6 EL84	8/6 MHL4	7/6 SD6	12/- UF85	10/6
1D6	10/6 6D6	6/6 7C5	8/- 20P1	26/6 AC2PEN/	EB34	2/6 EL85	13/11 MHLD6	12/6 SP4(7)	15/- UF86	17/11
1H5GT	11/- 6E5	12/6 7C6	8/- 20P3	23/3 DD	26/6 EB41	8/6 EL91	5/- ML4	12/6 SP41	3/6 UF89	9/-
1L4	6/- 6F1	26/6 7D8	23/3 20P5	23/3 AC4PEN	EB91	5/6 EL95	10/6 MU14	9/- SP42	12/6 UL41	9/-
1LD5	5/- 6F6G	7/- 7H7	8/- 25A6G	11/-	26/6 EBC3	23/3 EM34	10/- MX40	15/- SP61	3/6 UL44	26/6
1LN5	5/- 6F6GTM	8/- 7R7	12/6 25L6GT	10/- AC5PEN	EBC33	7/- EM71	23/3 N37	19/11 SU25	26/6 UL46	14/6
1NSGT	11/- 6F8	12/6 757	10/6 25U4	16/7 23/3	EBC41	8/6 EM80	9/6 N78	19/11 SU61	9/6 UL84	8/6
1R5	7/6 6F11	17/3 7V7	8/- 25Y5	10/6 AC6PEN	7/6 EBC81	8/- EM81	9/6 N108	19/11 T41	23/3 UM4	17/3
1S4	9/- 6F12	5/6 7Y4	8/- 25Y5G	10/- AC/SG	23/3 EBF80	10/- EM84	10/6 N308	20/7 TDD4	24/7 URIC	9/-
1S5	7/6 6F13	11/6 7Z4	18/7 25Z4G	9/6 AC/TP	33/2 EBF83	13/11 EN31	37/- N339	29/10 TH4B	15/- U06	19/11
1T4	6/- 6F14	26/6 8D2	3/6 25Z5	10/6 AC/VP1	15/- EBF89	9/6 EY51	9/6 P61	3/6 TH41	26/6 U07	16/7
1U5	10/- 6F15	15/3 8D3	5/6 25Z6G	10/- AC/VP2	23/3 EBL21	23/3 EY83	16/7 PABC80	TH233	33/2 U08	26/6
2A7	10/6 6F16	9/6 9B8V6	15/3 25Z6GT	ATP4	5/- EBL31	23/3 EY84	14/-	13/11 TH2321	20/- U09	7/6
2P	26/6 6F17	12/6 9D2	4/-	16/7 AZ1	18/7 EC52	5/6 EY86	10/- PCC84	8/- TP22	15/- YJIN	18/7
2X2	4/6 6F32	10/6 10C1	12/- 27S0	19/11 AZ31	10/- EC54	6/- EZ35	6/- PCC85	9/6 TP25	19/6 UY21	16/6
3A4	7/- 6F33	7/6 10C2	26/6 28D7	7/- AZ41	13/11 EC70	12/6 EZ40	7/6 PCC88	23/3 TP2620	33/2 UY41	7/6
3A5	10/6 6G6	6/6 10D2	12/- 30C1	8/- B36	24/7 EC92	13/3 EZ41	7/6 PCC89	14/- TY86F	13/3 UY85	7/-
3B7	12/6 6H6GTG	3/- 10F1	17/6 30F5	7/- BL63	7/6 ECC32	10/6 EZ80	7/- PCF80	8/- U12/14	12/- VMS4E	23/3
3D6	5/- 6H6GTM	3/6 10F9	10/6 30FL1	10/- C1	12/6 ECC33	8/6 EZ81	7/- PCF82	11/6 U16	12/- VP2(7)	12/6
3Q4	7/6 6J5G	5/- 10LD3	8/6 30L1	8/- C1C	12/6 ECC34	24/7 FC2A	24/7 PCL82	12/6 U18/20	9/- VP4(7)	15/-
3Q5GT	9/6 6J5GTG	5/6 10LD11	30P12	8/- CBL1	26/6 ECC35	8/6 FC4	15/- PCL83	11/6 U22	8/- VP25	14/6
3S4	7/6 6J5GTG	6/-	15/11 30P16	8/- CBL31	23/3 ECC40	23/3 FC13	26/6 PCL84	12/6 U25	29/10 VP4B	23/3
3V4	7/6 6J6	5/6 10P13	15/6 30PL1	11/6 CK506	6/6 ECC82	7/6 FW4/500	26/6 PEN4DD	U25	13/6 VP13C	7/-
5R4G	17/6 6J7G	6/- 10P14	19/3 31	7/6 CL33	19/3 ECC83	8/-	9/- PEN25	19/11 U31	9/6 VP23	6/6
5U4G	8/6 6J7GT	10/6 11D3	24/7 33A/158M	30/- CV63	10/6 ECC84	9/- FW4/800	9/- PEN36C	U33	26/6 VR75/30	
5V4G	11/- 6K6GT	8/- 12A6	6/6 30-	CV271	10/6 ECC85	8/6	9/-	10/6 U35	26/6	17/6
5X4G	12/6 6K7G	5/- 12A6C	15/3 35A5	12/6 CV428	30/- ECC86	11/6 G230	10/6 PEN40DD	U37	26/6 VR105/30	
5Y3G	8/- 6K7GT	6/- 12AD6	17/3 35/51	23/3 CV1	18/7 ECF80	10/6 G232	12/-	25/- U43	9/6	9/-
5Y3GT	7/6 6K8G	8/- 12A6E	13/11 35L6GT	9/6 GY31	16/7 ECF82	10/6 G234	14/-	PEN44	26/6 U45	9/6 VR150/30
5Y4	12/6 6K8GTG	12AH7	8/- 35W4	7/6 D1	3/- ECH3	26/6 H30	5/-	PEN45	19/6 U50	8/-
5Z3	12/6	12/6 12AH8	12/6 35Z3	10/6 D15	10/6 ECH21	23/3 H63	12/6	PEN45DD	U52	8/6 VT61A
5Z4G	10/6 6K25	19/11 12AT6	7/6 35Z4	6/6 D16	5/- ECH35	9/6 HABC80	26/6 U54	19/11 VT501	5/-	
5Z4GT	12/6 6L1	23/3 12AT6	7/6 35Z4	6/6 D17	5/6 ECH42	10/6		PEN46	7/6 U76	6/6 W61M
6A7	26/6 6L6G	9/6 12AU7	7/6 42	23/3 DAC32	11/- ECH81	9/- HL23	10/6	PEN383	23/3 U78	6/6 W66
6A8	10/- 6L5M	12/6 12AU7	7/6 42	23/3 DAF91	7/6 ECH83	13/11 HL23DD		PEN453DD	U107	16/7 W81M
6A8B	8/- 6L7GT	12/6 12AV6	12/7 43	12/6 DAF96	9/- ECL80	10/6	17/3	33/2 U191	16/7 W107	15/3
6A87	10/6 6L18	13/- 12AX7	8/- 50C5	12/6 DD41	13/11 ECL82	10/6	HL41	12/6 PEN/DD	U201	16/7 W229
6AC7	6/6 6L19	23/3 12BA6	8/- 50C6DG	36/6 DF33	11/- ECL83	19/3	HL41DD	40/20	33/2 U251	14/- X24M
6AG5	6/6 6L3D	8/6 12B6E	10/-	DF66	15/- EF9	23/3	19/3 PL33	19/3 U281	19/11 X31	26/6
6AK5	8/- 6L20	15/11 12B7H	21/3 50L6GT	9/6 DF70	15/- EF22	14/-	HL42DD	14/- U282	22/7 X41	15/-
6AL5	5/6 6N7	10/- 12E1	30/3 53KU	19/11 D0F51	6/- EF36	6/-		19/3 PL38	26/6 U301	23/3 X42
6AM6	5/6 6P1	19/13 12J5GT	4/6 72	4/6 DF96	9/- EF37A	8/-	HN309	24/7 PL81	12/6 U329	14/- X61(C)
6AQ5	8/6 6P25	12/6 12J7GT	10/6 75	24/7 DF99	9/- EF39	5/6	HVR2	20/- PL82	8/- U339	16/7 X61M
6AT6	8/6 6P28	26/6 12K5	17/11 77	8/6 DF97	9/- EF40	15/-	HVR2A	6/- PL83	9/- U403	16/7 X63
6A06	10/6 6Q07G	8/- 12K7GT	6/6 78	8/6 DH30	15/6 EF41	9/6	FKF3	8/6 PL84	12/6 U404	8/6 X65
6AV6	12/7 6Q07GT	11/- 12K8GT	14/- 80	9/- DH63	(Met) EF42	11/6	KK32	21/11 PL820	18/7 U801	29/10 X66
6B7	10/6 6R7G	10/- 12Q7GT	6/6 83	15/- DH63	(Met) EF50(A)	7/-	KL35	8/6 PM2B	12/6 U4020	16/7 X78
6B8G	4/6 6SA7GT	8/6 12SA7	8/6 83V	12/6 DH76	6/6 EF50(E)	5/-	KLL32	24/7 PM12	6/6 U4ABC80	9/- X78
6B8GT	5/- 6S7C	10/6 12SC7	8/6 85A2	15/- DH77	8/6 EF54	5/-	KT2	5/- PM12M	6/6 UAF42	9/6 X79
6BA6	7/6 6S7GT	8/- 12SG7	8/6 15082	15/- DH101	28/6 EF73	10/6	KT33C	10/- PM24M	21/3 U841	12/- X101
6BE6	7/6 6SH7GT	8/- 12SH7	8/6 185B2	33/2 DH107	13/11 EF80	7/-	KT39	29/10 PX4	10/6 UB4C1	8/6 X109
6BG6G	23/3 6S7GT	8/- 12S7	8/6 185BTA	33/2 DH107	13/11 EF85	7/-	KT41	26/6 PX25	59/8 UB81	11/4 XD(1.5)
6BH6	9/- 6S7GT	8/- 12SK7	8/6 304	10/6 DK32	21/11 EF86	12/6	KT44	15/- PY31	16/7 UB80	9/- XFG1
6B16	7/6 6S7GT	8/- 12SQ7	12/6 305	10/6 DK40	21/3 EF89	9/-	KT61	12/6 PY32	11/7 UB89	9/6 XFY34
6BQ7A	15/- 6NS7GT	6/6 12SR7	8/6 402Pen(A)	DK91	7/6 EF91	5/6	KT63	7/- PY80	7/6 UBL21	23/3 XH(1.5)
6BR7	23/3 6S7GT	9/- 12YA	10/6	23/3 DK96	9/- EF92	5/6	KT66	15/- PY81	9/- UCC84	14/7 XSG(1.5)
6BW6	10/6 6S7GT	8/- 14B6	19/3 807	7/6 DL33	9/6 EF97	13/3	KT88	22/6 PY82	7/- UCC85	9/6
6BW7	7/- 6U4GT	12/6 14H7	23/3 956	3/- DL66	15/- EF98	10/6	KT86	8/6 PY83	9/6 UCC86	16/7 Y63
6BX6	7/- 6U5GT	7/6 1457	27/10 1821	16/7 DL68	15/- EK32	8/6	KTW61	8/- PZ30	19/11 UCH21	23/3 Z63
6C4	7/- 6U7G	8/6 15D1	26/6 5763	12/6 DL92	7/6 EL32	5/6	KTW62	8/- QP21	7/- UCH42	9/6 Z66
6C5G	6/6 6V6G	7/- 18	23/3 7193	5/- DL94	7/6 EL33	12/6	KTZ41	8/- QP25	15/- UCH81	9/6 Z77
6C6	6/6 6V6GTG	8/- 19AQ5	10/6 7475	7/6 DL94	7/6 EL33	12/6	KTZ41	8/- QP25	15/- UCH81	9/6 Z77

FULL RANGE OF TRANSISTORS AND GERMANIUM DIODES IN STOCK. TECHNICAL DATA AND PRICES FREE ON RECEIPT OF SELF ADDRESSED ENVELOPE.

NEW METAL RECTIFIERS—FULLY GUARANTEED

DRM-1B	15/4	RM-1	7/-	WX3	3/6	14A100	27/-	14RA 1-2-8-2	17/6	16RE 2-1-8-1	8/6
DRM-2B	16/2	RM-2	7/-	WX4	3/6	14A124	28/-	14RA 1-2-8-3	21/-	18RA 1-1-8-1	4/6
DRM-3B	23/3	RM-3	9/6	WX6	3/6	14A163	38/-	14RA 2-1-16-1	21/-	18RA 1-1-16-1	6/6
LW7	21/-	RM-4	16/-	14A86	17/6	14B130	35/-	16RC 1-1-16-1	8/6	18RA 1-2-8-1	11/-
RM-0	7/11	RM-5	19/6	14A97	25/-	14B261	11/6	16RD 2-2-8-1	12/-	18RD 2-2-8-1	15/-

VOLUME CONTROLS Standard Can **ELECTROLYTIC CONDENSERS** Wire-ended Tubular

All with long spindle and 8 x 8 mfd., 400 v. 3/6, 100 x 400 mfd., 275 v. 12/6, 32 mfd., 350 v. 2/6, 8 x 8 mfd., 450 v. 3/6, double-pole switch, 4/6 each, 32 x 32 mfd., 450 v. 5/9, 100 mfd., 275 v. 2/6, 8 mfd., 450 v. 1/9, 16 x 16 mfd., 450 v. 4/6, 10K, 25K, 50K, 100K, 64 x 120 mfd., 350 v. 8/3, 200 mfd., 275 v. 3/6, 16 mfd., 450 v. 2/9, 32 x 32 mfd., 350 v. 4/6, 1/2 meg., 1 meg., 1 meg., 2 meg., 60 x 250 mfd., 275 v. 9/6, 100 x 200 mfd., 275 v. 9/6, 32 mfd., 450 v. 3/9, 8 x 16 mfd., 450 v. 3/9

TERMS OF BUSINESS: CASH WITH ORDER OR C.O.D. ONLY. POST/PACKING CHARGES 6d. PER ITEM; C.O.D. 2/6 EXTRA. ORDERS VALUE £3 UPWARDS POST FREE. ALL VALVES BOXED. FULLY GUARANTEED. AND SPECIALLY SELECTED FROM THE WORLD'S FINEST MANUFACTURERS. PERSONAL SHOPPERS WELCOME FROM 8.30 TO 5.30, SATURDAYS 1 p.m. CATALOGUE OF OVER 1,000 DIFFERENT VALVES, WITH FULL TERMS OF BUSINESS PRICE 6d. PLEASE ENQUIRE FOR ANY ITEM NOT LISTED WITH S.A.E.

EASY AS A.B.C. TO BUILD

The new, exciting De Luxe "Gold Star" Pocket Radio in beautiful moulded plastic case—This model is a highly sensitive, self-contained set covering all medium waves. Uses modern miniature button-base valve and specially designed high efficiency coil. Exceptionally easy to build from our step-by-step plans—the case is supplied ready drilled! Size of radio only 4 1/4 in. x 2 1/4 in. x 1 1/4 in.!

37/6

—and batteries fit inside. We can supply all parts including case, detachable aerial, instruction book, wire, screws, etc. for only 37/6, plus 2/6 Post and Packing. C.O.D.

2 - extra. (Parts sold separately, priced parts list 1/6.)



Our engineers have designed a novel Wrist-Watch Radio using latest Transistor Technology. Size only 1 1/4 in. x 1 in. x 1 in.!!!—yet gives clear, crisp, personal-phone reception over all medium waves. Tiny battery inside lasts months—costs 5d. No Snags, anyone can build it in an hour or two using our pictorial step-by-step simple plans. All parts supplied (including case and strap) for only 29/6 (add 2/6 Post, etc.). C.O.D. 2/- extra. (All parts sold separately, priced parts list 1/6.) Send Now!

Can Be Built for 47/6. Build this exceptionally sensitive high efficiency personal phone radio. Uses unique assembly system and can be built by anyone without any radio knowledge whatever in 45 minutes. Handsome black-crackle steel case with specially made black and gold dial with stations printed. Size of radio only 6 1/4 in. x 5 in. x 3 in. Covers all medium and long waves. H.T. consumption only 1 to 1.5 mA. Ideal for Bedroom, Garden, Holiday, etc. BUILD THE "SKY-ROMA" NOW! Total building cost—everything down to the last nut and bolt. 47/6 (Postage, etc., 2/-)—with full set of clear, easy-to-follow plans. (Parts sold separately. Priced parts list and plans 1/6.) C.O.D. 2/- extra.



47/6



THE SENSATIONAL POCKET RADIO!

29/6

The sensational "Silver-tone" model! A highly compact self-contained miniature "button-base" valve pocket radio at absolute "rockbottom" building cost! Covers all the medium waves with the very latest circuitry bringing in stations from all over Europe—without fuss. Easy as A.B.C. to assemble, using our step-by-step instruction manual. Size only 4 1/4 in. x 2 1/4 in. x 1 1/4 in.—a fascinating little pocket radio. We can supply all the parts including beautiful two-tone case, detachable aerial, instruction book, screws, wire, etc., for only 29/6, plus 2/- post and packing). C.O.D. 2/- extra. (Parts sold separately, priced parts list. 1/9.)

THIS TRANSISTOR SET Can Be Built For Only 29/6. The "Sky-Scout" Pocket two-stage transistor set, size only 1 1/4 in. x 3 1/4 in. x 1 1/4 in. Covers all medium waves and works entirely off tiny "penlight" battery which costs 6d. and fits inside case. All parts tested before despatch. Can be built for 29/6, plus 2/- Post and Packing. INCLUDING CASE, TRANSISTOR, STEP-BY-STEP PLANS FOR ABSOLUTE BEGINNERS, nuts, bolts, etc. (C.O.D. 2/- extra.) Parts sold separately, priced parts list and plans, 1/6. VERY SIMPLE TO BUILD.

29/6



MATCHBOX SIZE RADIO!

15/-

This amazing "Tiny-Tim" model—no larger than a matchbox—costs nothing to run—ever! No batteries! No Valves! No electricity! Will never run down or burn out. Uses the latest TRANSISTOR TYPE GERMANIUM DIODE, receives local stations anywhere—without extra aerial. Clear, Crisp Tone. No snags, anyone can build it within an hour using our step-by-step instruction book, etc., for only 15/-, plus 2/- Post and Packing (C.O.D. 2/- extra). (Parts sold separately, priced parts list 1/9.)



Anyone can build this beautiful precision Pocket Radio in an hour or two. No knowledge whatever needed. Our simple pictorial plans take you step-by-step! Remarkably sensitive—covers all medium waves, inc. Luxembourg, Home, Light. Size only 2 1/4 in. x 3 1/4 in. x 5 1/4 in.—Not a Toy! But a Real Personal-Phone Valve Radio With Detachable Aerial! IDEAL FOR BEDROOM, GARDEN, etc. We supply ALL parts necessary, together with plans, etc., for the special price of 39/6, plus 2/6 post and packing. (C.O.D. 2 - extra.) BUILD YOURS NOW! (All parts sold separately, priced parts list 1/9.) Send Today! Money refunded if parts returned intact within 7 days

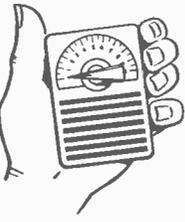
39/6

Choice of beautiful walnut cabinet or ivory bakelite. This is the lowest possible price consistent with high quality. No radio knowledge whatever needed... can be built by anyone in 2-3 hours, using our very simple, easy-to-follow diagrams. The terrific new circuit of the "Ocean-Hopper" covers all medium and long waves, has razor-edge selectivity and exceptionally good tone. Price also includes ready drilled and punched chassis, set of simple-to-follow plans—in fact everything! Parts tested before despatch! Uses standard octal-base valves. (Low running costs—approximately 18 watts.) Size 1 1/2 in. x 6 in. x 5 in. Build this long-range powerful midget NOW. TOTAL BUILDING COST INCLUDING PLANS, ETC., 55/7/6. (Post and Packing 3/6.) Parts sold separately. Priced parts list and plans. 1/9. C.O.D. 2/- extra.



107/6

under 7 ozs.—yet it is a THREE-STAGE receiver covering all medium waves, working entirely off a "penlight" battery. Every part tested before despatch! ABSOLUTE BEGINNERS. Total building cost including case, transistors, etc., everything down to the last nut and bolt—ONLY 45/- with plans. Postage, etc., 2/- (C.O.D. 2/- extra.) (Parts sold separately. Priced parts list and plans 1/6.) RUSH YOUR ORDER TODAY!



45/-

TWO-TRANSISTOR POCKET SET. Can Be Built for 45/- BUILD THE "SKY-GNOME", VEST-POCKET TWO TRANSISTOR RADIO which gives a superb performance and is highly sensitive. Weight under 7 ozs.—yet it is a THREE-STAGE receiver covering all medium waves, working entirely off a "penlight" battery. Every part tested before despatch! ABSOLUTE BEGINNERS. Total building cost including case, transistors, etc., everything down to the last nut and bolt—ONLY 45/- with plans. Postage, etc., 2/- (C.O.D. 2/- extra.) (Parts sold separately. Priced parts list and plans 1/6.) RUSH YOUR ORDER TODAY!



CONCORD ELECTRONICS
210, Church Road, Hove, Sussex

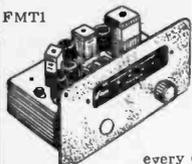
Dept. PW15

Orders receive prompt attention. Cheques accepted. Cash on delivery 2/- extra. Please print name and address in block letters. Suppliers to Schools, Universities, Government and Research Establishments. Complete range of components and valves stocked. Regret no C.O.D. abroad.

RETURN-OF-POST SERVICE

JASON FM TUNER

FMT1

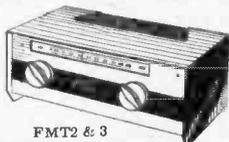


There are no less than four different Jason FM Tuner Kits now available to the Home Constructor. Brief details are given here and individual lists on any are available free.

MOST IMPORTANT. We take great pains to see that the kits we supply are *absolutely complete* in every detail and also that all components

supplied are entirely suitable in every way. This accounts for differences in price you may notice between our prices and those of some of our competitors. **THIS SHOULD BE BORNE IN MIND WHEN COMPARING PRICES.**

Hire Purchase Terms available.



FMT2 & 3

STANDARD TUNERS

STANDARD TUNER, FMT1. The very popular tuner which is supplied with a chassis assembly fitted with a gold hammer finish front panel and glass dial. Employs four EF91 valves. External power supply is required. Complete kit £6.19.6 Power pack kit 39/-.

STANDARD TUNER IN SHELF MOUNTING CASE, FMT2. This is a new version of the above tuner. The circuit has been brought up to date and is built into the very attractive shelf mounting case of the new Fringe Tuner mentioned below. The circuit uses four EF80 valves and the power supply can be built into the case if desired. Complete Kit £7.17.6 without power supply components. £9.18.0 with power supply.

MERCURY SWITCHED TUNER. This is a tuner in chassis form which has a three position switch for the three BBC programmes. Uses one ECF80 and four EF80 valves. External power supply is required. Complete Kit £9.18.0. Power Pack Kit 39/-.

FRINGE TUNERS

NEW FRINGE TUNER IN SHELF MOUNTING CASE, FMT3. This is an entirely new Fringe Tuner and is supplied complete with a very attractive green shelf mounting case with Perspex dial. The tuner is fitted with variable AFC. Internal power supply if desired. Valves used are one ECF80 and five EF80. Complete Kit £9.19.6 without power supply components. £11.18.0 with power supply.

INSTRUCTION MANUALS

All our kits include the appropriate instruction manual. All available separately as follows:— Manual covering both Standard Tuners and the new Fringe Area model 2/10; "Mercury," 2/3; All post free.

TRANSISTORISE YOUR CRYSTAL SET

A kit to construct a single transistor amplifier for any Crystal Set. Increases the volume many times. No soldering required and full instructions supplied. Complete kit with brand new Transistor, 2/16. Post free.

LATEST AVO TEST METERS



AVOMETER MODEL 8. The finest multi-range meter available. 20,000 ohms per volt on D.C. ranges. Eight D.C. Voltage ranges 2.5 v. to 2,500 v. Seven D.C. current ranges 50 microamps. to 10 amps. Seven A.C. Voltage ranges 2.5 v. to 2,500 v. Four current ranges 100 mA. to 10 amps. Three resistance ranges. Fully detailed leaflet available. Price £23.10.0. H.P. Deposit £4.14.0 and 12 monthly payments of £1.14.6. Price with leather carrying case, £27.8.0. H.P. Deposit £5.8.0 and 12 payments of £2.0.4.

Other AVO Meters available include the Model 7, £19.10.0. H.P. Deposit £3.18.0 and 12 payments of £1.8.8 and the Multimir price £9.10.0. H.P. Deposit £1.18.0 and 12 monthly payments of 14/4.

NEW ILLUSTRATED LISTS

New illustrated lists are available on all the following. Any will be sent free upon request.

GRAMOPHONE EQUIPMENT. Details of many types of Auto Changers, Single Record Players and Transcription Units including all the latest models. Many at special prices.

TEST GEAR. Test meters, Signal Generators, etc., by AVO, Jason, Pullin and Taylor.

LOUDSPEAKERS. Full details of Goodmans, Whiteley, Wharfedale and Elac types.

TAPE DECKS. All popular makes with a special offer.

RECORDING TAPES. A very wide range of all tapes and accessories.

MULLARD TAPE PRE-AMPLIFIER

This unit is intended for use with an existing amplifier and provides all the circuits necessary for tape recording and playback. Instruction manual, giving full constructional information is available price 2/10, post free.

COMPLETE KIT containing every item required down to the last nut and bolt. First-class items only included. £14.7.0. H.P. Deposit £2.17.0 and six monthly payments of £2.2.6. Kit less valves, £10.19.6. H.P. Deposit, £11.19.6 and six payments of £1.13.4. Power Unit kit, £3.19.6.

AMPLIFIER KITS

We carry in stock all the items needed for the following amplifiers. Fully detailed lists are available.

MULLARD 3-3 and 510 Amplifiers. Two- and Three-valve Pre-Amplifiers. Four Channel Mixer Unit.

G.E.C. 912 Plus Amplifier.

JASON. Jupiter and JSA2 Stereo Amplifiers.

Publications giving full details of the above are available as follows: Mullard Circuits for Audio Amplifiers, 9/4; G.E.C. 912, 4/6; Jason Jupiter, 2/10; Jason JSA2, 2/4. All post free.

TRANSISTORS

All at the new reduced prices.

AUDIO. B.T.H. Red Spot, 7/6. G.E.C. Yellow/Green, 7/6.

BRIMAR. TS1, 5/-; TS2, 2/-; TS3, 13/6.

EDISWAN. XB102, 10/-; XB104, 10/-.

MULLARD. OC70, 14/-; OC71, 14/-.

GOLDTOP. V101A, 15/-.

AUDIO OUTPUT. Matched Pairs. Mullard OC72, 24/-; Ediswan XC101, 32/-.

R.F. G.E.C. Yellow/Red, 15/-. GOLDTOP V6/R2, 24/-.

EDISWAN. XA101, 23/-; XA102, 26/-; XA103, 15/-; XA104, 18/-.

MULLARD. OC44, 26/-; OC45, 23/-.

All transistors post free.

OUTPUT TRANSFORMERS

We can supply a wide range of High Quality Output Transformers and full details are given below. All are fitted with sectionalised secondaries and can be connected for either 3 or 15 ohm speakers.

PARTRIDGE

P3591A. Ultra Linear. Push Pull EL84. 20% Taps. 7,000 ohm load. Specified for GEC 912, 99/-.

P5202. Ultra Linear. Push Pull EL84. 43% Taps. 7,000-9,000 ohm load. Suitable for the Mullard 510, 95/-.

P5203. Ultra Linear. Push Pull EL84. 20% Taps. 5,000-7,000 ohm load. Suitable for the G.E.C. 912, 95/-.

P4014. "C" Core. Push Pull Ultra Linear EL84. 8,000 ohm load. 43% Taps. Specified for the Mullard 510, 98/6.

P4131. Push Pull Ultra Linear EL84. 43% Taps. 8,000 ohm load. Specified for the Mullard 510, 60/-.

P3667. Push Pull EL84. 8,000 ohm primary tapped at 6,000 ohms. Specified for the Mullard 510, 52/6.

GILSON

W0696A. Push Pull EL84. Load 8,000 ohms. Specified for the Mullard 510, 50/6.

W0696B. Push Pull EL84. Load 6,000 ohms. Specified for the Mullard 510, 50/6.

W0710. Push Pull Ultra Linear EL84. Load 7,000 ohms. 20% Taps. Specified for the G.E.C. 912, 55/6.

W0710/8K. Push Pull Ultra Linear EL84. Load 8,000 ohms. 43% Taps. Specified for the Mullard 510, 55/6.

W0892. Push Pull Ultra Linear EL84. Load 8,000 ohms. 43% Taps. Specified for the Mullard 510, 62/6.

ELSTONE

OT/ML. Push Pull Ultra Linear EL84. 8,000 ohm load. 43% Taps. 45/-.

OT/3. Single EL84. 5,000 ohm load. Specified for Mullard 5-3, 25/-.

PARMEKO

P241. Single EL84. Load 5,000 ohms. Potted. Specified for the Mullard 3-3, 27/-.

WATTS RADIO (MAIL ORDER) LTD.

We offer a really efficient Mail Order Service on all items stocked. All cash orders are dealt with on the day of receipt. Hire Purchase orders are subject to slight delay but this is kept to the absolute minimum.

MULLARD LUMENAR CATHODE RAY TUBES

● ATTRACTIVE PRICE ● 12 MONTHS' GUARANTEE. ● AVAILABLE ON HIRE PURCHASE
 12in. MW31/74. 14in. MW36/24. MW36/24. AW36/20. AW36/80. ● 17in. MW43/69. MW43/80. AW43/80. All £10.7.6.
 All £8-19.6. Hire Purchase Deposit £1.15.6 and 12 monthly payments of 13/8. Deposit £2.1.6 and 12 monthly payments of 15/6.
 ALL OTHER TUBES can be supplied at list prices. Many recently reduced. Send for free list or ask for quotation.
 H.P. available. ALL SENT CARRIAGE AND INSURANCE FREE.

AMPLIFIER BARGAINS

LEAK TL12 PLUS AND VARISLOPE III PRE-AMP. Very slightly used. Fully guaranteed by us. List Price £34.13.0. OUR PRICE £34.19.6.
LEAK POINT ONE PLUS PRE-AMP. Brand new in maker's carton. List £12.12.0. OUR PRICE £11.0.0.
QUAD MAIN AMPLIFIER WITH PRE-AMPLIFIER. Brand new in maker's cartons. List £42.0.0. OUR PRICE £34.0.0.
 Only one each of the above available. Any can be supplied on H.P. Terms.

LOUDSPEAKERS

	Cash Price	Hire Purchase		
		Deposit	Mthly.	Pmts.
GOODMANS				
New Axiom 110 10"	£5. 0.0	£1.10.0	3 of	£1.6.8
New Axiom 112 10"	£8.10.0	£1.14.0	6 of	£1.6.0
Axiom 300 12"	£11. 5.9	£3. 5.9	12 of	16.8
Axiom 400 12"	£16. 1.0	£3. 4.0	12 of	£1.3.7
Axiote 8"	£6. 2.0	£1. 6.0	6 of	£1.1.0
Troxax Tweeter	£6. 4.0	£1. 4.0	6 of	£1.0.0
WHITELEY				
X05000 Crossover Unit	£1.19.0			
HF1016 10"	£7.12.3	£1.10.3	6 of	£1.3.8
HF1012 10"	£4.15.0	£1.10.0	3 of	£1.5.0
HF816 8"	£6.10.6	£1. 6.8	6 of	£1.0.8
HF817 8"	£10.16.6	£2. 3.8	12 of	16.1
T816 Cone Tweeter	£6. 3.9	£1. 3.9	6 of	£1.0.0
T10 Tweeter	£4. 4.0	£1. 4.0	3 of	£1.3.4
T359 Cone Tweeter	£1.13.3			
Crossover CX3000	£1.10.0			
Crossover CX1500	£1.18.3			

Other Goodmans and Whiteley Speakers available, also full range of Wharfedale.

CRYSTAL DIODES

Brimar. G.D3. G.D4. G.D5. G.D6. G.D8. 7/6.
 G.R.C. GEX34. GEX35. 4/- Surplus type. 1/3.
 Mullard. OAT8. OA81. 4/-

GRAMOPHONE EQUIPMENT

	Cash Price	Hire Purchase		
		Deposit	Mthly.	Pmts.
RECORD CHANGERS				
COLLARO Conquest (Studio O PU) ...	£7.19. 6	£1.12. 0	6 of	£1. 4.7
GARRARD RC121 (GC8 PU) ...	£9.19. 6	£1.19. 6	12 of	15/-
GARRARD RC88 (GC8 PU) ...	£16. 8. 0	£3. 6. 0	12 of	£1. 4.0
GARRARD RC98 (GC8 PU) ...	£18.12. 8	£3.15. 8	12 of	£1. 7.3
B.S.R. UA8 Monarch (TC8 PU) ...	£7. 5. 0	£1. 9. 0	6 of	£1. 2.8
BSR UA12 Monarch (TC8 PU) ...	£9.19. 6	£1.19. 6	12 of	15/-
BSR UA12 Monarch (TC8 PU) ...	£10.17. 6	£2. 3. 6	12 of	16/2
SINGLE RECORD PLAYERS				
GARRARD TA (GC8 PU) ...	£8.10. 0	£1.14. 0	12 of	13/-
BSR TU9 (TC8 PU) ...	£4.10. 0	£1. 5. 0	3 of	£1. 5.0
COLLARO RP594 (O. P or T PU) ...	£8.18.11	£1.15.11	12 of	13/7
COLLARO RP594 (O. P or T PU) ...	£9.18. 9	£1.18. 9	12 of	15/-
E.M.I. (Acos Stereo P.U.) ...	£6.15. 0	£1. 7. 0	12 of	10/8
TRANSCRIPTION UNITS				
COLLARO 4T/200 (TX88 PU) ...	£18.13. 0	£3.15. 0	12 of	£1. 7.4
COLLARO 4TR/200 Motor only ...	£13.18. 3	£2.15. 3	12 of	£1. 0.5
GARRARD 4HF (GC8 PU) ...	£18. 9. 9	£3.15. 9	12 of	£1. 7.0

M-nv of the above can be supplied for £18.9 working. See our Gramophone Equipment List for details.

RECORDING TAPE

DOUBLE PLAY
BASEF. 200ft. (3in.) 14/-; 600ft. (4in.) 25/-; 1,200ft. (5in.) 42/-; 1,800ft. (5 1/2in.) 52/6; 2,400ft. (7in.) 77/6.
SCOTCH BOY 200. 400ft. (3 1/2in.) 17/-; 1,200ft. (5in.) 45/-; 2,400ft. (7in.) 80/-
TELEFUNKEN. 1,200ft. (5in.) In plastic container. 40/-; 2,400ft. (7in.) 75/-
LONG PLAY
BASEF. 210ft. (3in.) 9/-; 850ft. (5in.) 28/-; 1,200ft. (5 1/2in.) 35/-; 1,800ft. (7in.) 50/-
EMITAPE 99. 250ft. (3in.) 9/6; 850ft. (5in.) 28/- In Emicase. 90/6. 1,200ft. (5 1/2in.) 35/- In Emicase. 37.6. 1,800ft. (7in.) 50/- In Emicase. 52/6. 2,400ft. (8in.) 72/6.
GELONAR. 430ft. (3 1/2in.) 16/-
GRUNDIG. 1,200ft. (5 1/2in.) 35/-; 1,800ft. (7in.) 50/-
MSS. 225ft. (3in.) 8/6; 450ft. (4in.) 14/6; 850ft. (5in.) 28/-; 1,200ft. (5 1/2in.) 35/-; 1,800ft. (7in.) 50/-; 2,400ft. (8 1/2in.) 70/-
PHILIPS. 850ft. (5in.) In plastic container. 28/-; 1,800ft. (7in.) 50/-
SCOTCH BOY 150. 300ft. (3 1/2in.) 9/6; 900 ft. (5in.) 28/-; 1,275ft. (5 1/2in.) 35/-; 1,800ft. (7in.) 50/-
SPECIAL OFFER. 1,200ft. Standard Tape. Brand new. Famous maker. Fully guaranteed. 25/- Four for 95/- Full range of standard tape and accessories also stocked. Send for list. All tape post free.

STEREO PICK-UP CARTRIDGES

RONETTE DC284. For all Collaro Models to replace the Studio Cartridge. Turn-over for 78/LP/Stereo. £3.19.6.
B.S.R. TC8M. Will replace the TC8H or TC8M in any Monarch Changer. Plays 78/LP Stereo records. £3.6.0.

LATEST CABY TEST METERS

Now in stock. CABY SUPREME MULTI-RANGE METERS. Made abroad. We can confidently recommend these meters as being accurate, well made and very good value for money.

MODEL A-10. Sensitivity 2,000 ohms per volt A.C. and D.C. Five voltage ranges 10-1,000 volts A.C. and D.C. Three D.C. current ranges 5-250 ma. Two resistance ranges. Size 5 1/2in. x 3 1/2in. x 1 1/2in. Price £4.17.6. H.P. Deposit £1.7.6 and three monthly payments of £1.8.8.

MODEL B-20. Sensitivity 4,000 ohms per volt A.C. and D.C. Voltage ranges—Five D.C. 10-1,000 volts. Four A.C. 10-1,000 volts. Four D.C. current ranges. 5-250 ma. Four resistance ranges. Price £8.10.0. H.P. Deposit £2 and three monthly payments of £1.13.4.

Illustrated leaflet giving full details of both models free upon request.



HIRE PURCHASE

H.P. Terms are available on any item. Repayments may be spread over 3, 6 or 12 months. Details as follows: Three months: Deposit 6/- in the £. Service charge 5% but minimum charge 10/- Six and Twelve months: Deposit 4/- in the £. Service charge 10% but minimum charge 20/-

Terms of Business.—Cash with order or C.O.D. Postage extra under £3. We charge C.O.D. orders as follows. Up to £3. postage and C.O.D. fee minimum £2/8. Over £3 and under £5. C.O.D. fee only 1/6. Over £5 no charge.

54 CHURCH STREET, WEYBRIDGE, SURREY. Telephone: Weybridge 4556

PLEASE NOTE: POSTAL BUSINESS ONLY FROM THIS ADDRESS.



FOR VALVES - TUBES AND COMPONENTS - BY RETURN POST SERVICE

AC6PEN	EF89	8/9	PCC88	23/11	UF41	9/-	6AT6	8/6	788	6/-	10P14	19/3	12SL7	8/-	30F5	10/6		
ATP4	6/6	EF91	5/9	PCC89	19/11	UF42	17/3	6AU6	10/6	7C5	8/-	12A6	6/6	12SN7GT	30FL1	10/6		
AZ1	10/-	EF91(BVA)	7/6	PCF80	9/6	UF80	13/11	6B8G	4/-	7C6	8/-	12AT6	7/6	12SQ7	15/-	30L1	19/11	
AZ31	10/-	EF97	13/3	PCF82	12/6	UF85	9/-	6BA6	7/6	7D6	13/6	12AT7	10/6	1457	17/-	30L15	23/3	
AZ41	13/11	EL32	5/6	PCF81	16/7	UF86	17/11	6BE6	8/-	7H7	9/-	12A06	8/-	15D2	7/9	30P4	15/-	
B36	15/-	EL33	14/6	PCL82	12/-	UF89	9/-	6BG6G	23/3	7Q7	9/-	12A07	8/-	19AQ5	9/9	30P12	12/6	
CB1	26/6	EL34	15/-	PCL83	14/6	UL41	10/-	6BH6	9/-	757	9/6	12AX7	8/-	19BGGG	30P16	30P1	9/6	
CB13	23/3	EL35	15/-	PCL84	16/7	UL44	26/6	6B16	9/-	7Y4	8/6	12BA6	9/-	20D1	23/3	30PL13	12/6	
CCH35	23/3	EL36	19/11	PL36	15/-	UL46	26/6	6BR7	12/6	9D2	2/9	12BE6	9/-	20D1	15/3	35L6GT	21/11	
CL4	12/6	EL37	19/11	PL38	17/6	UL84	9/-	6BV6	9/-	9D2	3/6	12C8	9/-	20F2	26/6	25Y5	9/9	
CL33	19/6	EL41	10/6	PL81	12/6	UU6	19/11	6BV7	8/6	10C1	17/3	12H6	3/6	20L1	26/6	35W4	7/6	
CL39	12/6	EL42	10/6	PL82	8/6	UU8	26/6	6C4	6/-	10C2	17/6	12J5GT	3/-	20P3	23/3	35Z4GT	8/-	
CY1	16/7	EL43	15/-	PL84	12/7	UY11	12/6	6C5GT	6/6	10F1	12/6	12J7GT	10/6	20P5	23/3	42	8/-	
CY11	18/7	EL44	10/6	PL820	18/7	UY95	7/6	6C9	5/-	10F3	23/3	12K8GT	7/6	25A6G	10/6	35Z3	16/7	
CV73	6/-	EL83	19/11	PX25	12/6	VP13C	3/6	6C31	7/6	10F9	15/3	13/6	25A6G	10/6	35Z5GT	9/-		
C36A	6/6	EL84	9/-	PY32	17/11	VR22(PM2A)	15/-	6CD6G	29/10	10F18	15/3	12Q7GT	7/6	25Z4	9/6	50C5	11/6	
DAF96	8/9	EL821	26/6	PY80	7/6	3/-	6D6	5/-	6CH6	10/6	15/11	12SH7	6/-	25Z5	8/-	50CD6G	29/10	
DF96	8/9	EM34	9/6	PY81	8/6	VP23	6/6	6F6G	7/6	10M2	23/3	12S7	6/-	25ZU	10/6	50L6GT	8/6	
DH63	7/6	EM80	10/6	PY82	7/6	VP41	8/6	6F6M	7/6	10P13	17/6	12SK7	6/-	30C1	10/6	75	11/6	
DK96	8/9	EM81	10/6	PY83	8/6	VR105/30	8/6	6F1	14/-									
DL96	8/9	EY51	10/6	PEN4DD	26/6	VR116	4/6	6F14	14/-									
DM70	7/6	EY81	13/3	PEN4VA	12/6	VR150/30	7/6	6F15	14/-									
EA50	1/6	EY86	10/-	PEN25	6/-	VUI120A	3/6	6F18	15/3									
EAB80	9/-	EZ35	16/7	PEN46	7/6	VU39	8/9	6F23	18/7									
EAF42	16/6	EZ40	7/6	PEN383	23/3	(MU12/14)	8/9	6F33	7/6									
EB34	2/-	EZ41	7/6	PEN220A	4/-	VUI11	2/6	6H6GT	2/6									
EB41	8/6	EZ80	7/-	PEN45DD	26/6	W76	7/6	6J5GT	5/6									
EB91	5/-	EZ81	7/6	PEN4A	15/-	W77	8/6	6J5M	6/6									
EBC33	6/9	EZ90	7/6	PEN12M	8/-	W79	10/6	6J6	6/6									
EBC41	9/6	E1148	2/-	PM12M	8/-	X78	16/-	6J7G	6/6									
EBC81	11/4	FC4	26/6	QP21	5/-	Y63	9/6	6K7G	4/-									
EBC90	12/7	FC13	6/6	SP41	3/-	Z359	7/6	6K7M	6/9									
EBC91	12/7	FW4/500	10/-	SP45	10/6	IA3	3/6	6K8G	7/6									
EBF80	9/9	GT1C	27/6	SP47	10/6	IA7GT	12/6	6K6GT	7/6									
EBF89	9/6	GZ32	12/-	T41	23/3	IC25	12/6	6K7GT	5/9									
EBL21	23/3	H30	5/6	TDD13C	7/6	ID5	12/6	6K8GT	10/11									
EBL31	23/3	H63	10/-	TH233	18/6	ID6	12/6	6L6G	8/-									
EC31	7/6	HL23DD	8/6	IH5GT	9/6	ID7	12/6	6L6M	9/6									
ECC40	23/3	HL22	6/6	IL4	6/6	IL5	3/6	6L7G	7/6									
ECC81	8/-	HN309	24/7	IL6	8/6	IL8	5/6	6L8L	11/6									
ECC82	7/6	K40N	9/6	IL9	12/6	IR5	7/6	6L19	23/3									
ECC83	9/-	KF35	8/6	IS4	10/6	IS5	10/6	6LD20	15/11									
ECC84	10/-	KK32	21/11	IS5	14/-	IS6	6/6	6M1	17/3									
ECC85	9/6	KL32	24/7	IT4	6/-	IT6	6/-	6N7GT	7/6									
ECF80	12/-	KT2	5/7	IT6	15/-	IT7	15/-	6P1	19/3									
ECF82	13/-	KT2	5/7	IT6	26/6	IT6	26/6	6P26	19/11									
ECH3	26/6	KT2	5/7	IT6	26/6	IT6	26/6	6P28	26/6									
ECH21	23/3	KT2A	5/-	IT6	26/6	IT6	26/6	6Q7G	7/6									
ECH35	23/3	KT33C	8/6	IT6	26/6	IT6	26/6	6Q7GT	9/6									
ECH42	9/6	KT36	29/10	IT6	26/6	IT6	26/6	6SA7GT	8/6									
ECH81	9/-	KT61	13/6	IT6	26/6	IT6	26/6	6S7	7/6									
ECH83	13/11	KT63	7/6	IT6	26/6	IT6	26/6	6SH7	6/-									
ECL80	10/-	KT66	17/6	IT6	26/6	IT6	26/6	6S7J	8/6									
ECL82	12/6	KT88	22/6	IT6	26/6	IT6	26/6	6SK7	6/-									
ECL83	19/3	KTW61	6/6	IT6	26/6	IT6	26/6	6SL7GT	7/6									
EF9	23/3	KTW63	7/6	IT6	26/6	IT6	26/6	6SN7GT	8/6									
EF22	8/6	KT241	3/6	IT6	26/6	IT6	26/6	6SQ7	9/3									
EF36	5/-	MH41	7/9	IT6	26/6	IT6	26/6	6U4GT	12/-									
EF37	15/-	ML4	8/6	IT6	26/6	IT6	26/6	6U5/6G5	8/6									
EF39	5/9	MSP4/5	7/6	IT6	26/6	IT6	26/6	6U5	17/3									
EF40	14/6	MSP4/7	7/6	IT6	26/6	IT6	26/6	6U5G	8/6									
EF41	9/9	N37	19/11	IT6	26/6	IT6	26/6	6U7G	8/6									
EF42	11/-	N78	19/11	IT6	26/6	IT6	26/6	6V6G	6/-									
EF50	4/-	N39	22/6	IT6	26/6	IT6	26/6	6V6GT	7/9									
EF50SYL	7/-	OZ4	5/6	IT6	26/6	IT6	26/6	6X4	7/6									
EF54	6/-	P61	3/6	IT6	26/6	IT6	26/6	6X5G	7/-									
EF55	10/-	PABC80	13/11	IT6	26/6	IT6	26/6	6X5GT	7/-									
EF80	7/6	PCC84	9/-	IT6	26/6	IT6	26/6	6/30L2	12/6									
EF85	7/6	PCC85	14/7	IT6	26/6	IT6	26/6	7B6	10/6									
EF86	13/-			IT6	26/6	IT6	26/6	7B7	8/6									

LOUDSPEAKER UNITS

All brand new. ★ Note special prices. ★ All permanent Magnet 3 ohms impedance. 5in. Units by Plessey, Goodmans, Lectra. 17/6 each. 8" Loudspeaker Units 3 ohms Impedance with a matching Output Transformer suitable for 6V6. Brand new but soiled, offered at a Special Price of 11/6 each. Postage 2/6.

AUTOMATIC CHANGER UNITS

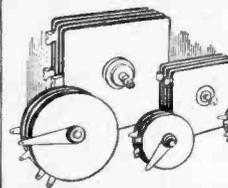
The latest Collaro Conquest 4-speed auto-changer, in cream with Studio "O" fully insert. Brand New. Fully guaranteed. £7.19.6. plus packing and postage, 3/6. Collaro 4-speed single player unit with automatic stop, cream, turnover crystal cartridge, brand new and guaranteed. £6.19.6. Garrard Automatic Record Changer, 4-speed, type RC120/D/Mark 1. Price £8.17.6. packing and post 3/6.

YAXLEY SWITCHES.

4P 3W 3/-; 4P 4V. 4/6; 3P 3W 3/-; 3P 4W 3/-; 1P 12W 3/-; 2P 6W 3/-;

RECTIFIERS FOR BATTERY CHARGES.

12v. 1 amp. ... 4/3
12v. 2 amp. ... 7/-
12v. 3 amp. ... 10/6
12v. 4 amp. ... 12/-
12v. 5 amp. ... 14/6



ACOS MICROPHONE.

Acos Mic 39/1. Crystal Stick Microphone for use as a hand, desk or floor stand unit, for high quality recording, broadcasting and public address work. List Price £5.5.0. OUR PRICE 39/6. With stand 47/6, with floor stand adaptor 52/6, postage 1/6.

CRYSTAL TURNOVER CARTRIDGES.

Types HGP 37/1. HGP/59/5C GC2. TC8 Power Point, etc., 15/6 each. Acostereo. Type 73 35/- each.

TELEVISION TUBES.

Regunned. 12 Months Guarantee. Most types available E.G. MW 43164 66. CRM 141 55.10.0. CRM171 £60.0. Carriage and Insurance 10/-.

CATALOGUE.

Our 1960 catalogue is now available, please send 1/- in stamps for your copy. Trade Catalogues also available, please attach your Business Letter Heading.

TRANSISTORS.

Red Spot 5/-; White Spot 7/6; XB102 EDISWAN 10/-; XA104 EDISWAN 18/-.

VOLUME CONTROLS.

D.C. OSCILLOSCOPE

A.C. MAINS 200-250 VOLTS



SIMPLIFIED SERVICING PROBLEMS WHEN USING THE

'TESTGEAR' SCOPE

3in. D.C. OSCILLOSCOPE

Engineered to precision standards, this high-grade instrument is made available at the lowest possible price, incorporating the essential features usually associated with luxury instruments.

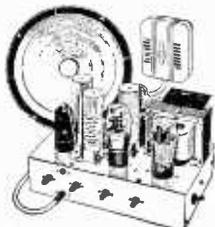
This "SCOPE" will appeal particularly to Service Engineers and Amateurs. A high gain, extremely stable differential

Y-amplifier (30 mV/C.M.). Provides ample sensitivity with A.C. or D.C. inputs. Especially suitable for measurement of transients for operating conditions where maintenance of D.C. levels is of paramount importance. Push-pull X amplifier; Fly-back suppression; Internal Time-base Scan Waveform available for external use; pulse output available for checking T.V. Line O/P Transformers, etc.; Provision for external X I/P and CRT. Brightness Modulation. Size 10in. high, 6in. wide, 9in. deep. Wgt. 11 lb. £15.0, plus P. & P. 7/6, or 30/- deposit, plus P. & P. 7/6 and 12 monthly payments of 26/6.

FULL 12 MONTHS' GUARANTEE INCLUDING VALVES AND TUBE.

8-WATT PUSH-PULL AMPLIFIER

COMPLETE WITH CRYSTAL MIKE AND 8in. LOUSPEAKER



A.C. mains 200-250 v. Size 10in. x 6in. x 2in. Incorporating 6 valves, H.F. pen., 2 triodes, 2 output pens and rectifier. For use with all makes and type of pick-up and mike. Negative feed back. Two inputs, mike and gram, and controls for same. Separate controls for Bass and Treble lift. Response flat from 40 cycles to 15 Kcs..

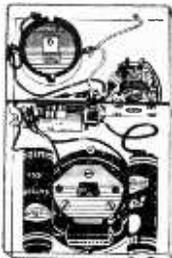
+ 2 dB; 4 db down to 20 Kcs. Output 8 watts at 5%. Total distortion. Noise level 40 db down all hum. Output transformer tapped for 3 and 15 ohm speech coils. For use with Std. or L.P. records, musical instruments such as Guitars, etc. £4.19.6 Plus P. & P. 7/6. Or 20/- deposit Plus P. & P. 7/6, and 4 monthly payments of 23 -

2-TRANSISTOR POCKET RADIO

Plus Germanium diode, fully tuneable over medium and long waves. Size 3 1/2in. x 4 1/2in. x 1in. Complete set of components including case, 2 transistors and earpiece (less batteries).

19/6 Plus P. & P. 1/6.

Point to point wiring diagram 1/6 free with kit



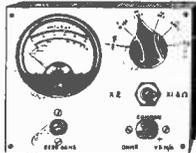
PUSH-FULL OUTPUT STAGE

Inclusive of transistors with input and output transformers to match 3 ohms speech coil, suitable for use with the above kit. Complete kit of parts including transistors.

19/6 Plus P. & P. 1/6.

Point to point wiring diagram 1/6 free with kit

AC/DC POCKET MULTI-METER KIT

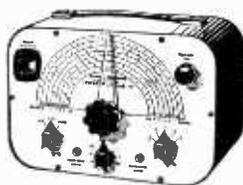


Comprising 2in. moving coil meter, scale calibrated in AC/DC volts, ohms and milliamps. Voltage range AC/DC 0-50, 0-100, 0-250, 0-500. Milliamps 0-10, 0-100. Ohms range 0-10,000. Front panel, range switch, wire-wound pot (for ohms zero setting), toggle switch, resistor and rectifier. In grey hammer finish case.

19/6 Plus P. & P. 1/6 Built and tested 7/6 extra.

Point to point wiring diagram 1/-, free with kit.

SIGNAL GENERATORS

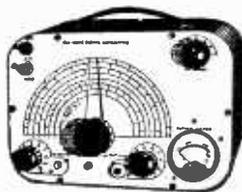


Cash £6.19.8 or 25/- deposit and 6 monthly payments of 21/6. Post and Packing 5/- extra.

Coverage 100 Kc/s-100 Mc/s on fundamentals and 100 Mc/s to 200 Mc/s on harmonics. Metal case 10in. x 6 1/2in. x 5 1/2in., grey hammer finish. Incorporating three miniature valves and Metal Rectifier. A.C. Mains 200/250 v. Internal Modulation of 400 c.p.s. to a depth of 20%; Modulated or unmodulated R.F. output continuously variable 100 millivolts. C.W. and mod. switch, variable A.F. output. Incorporating magic eye as output indicator. Accuracy plus or minus 2%.

Cash £4.19.6 or 25/- deposit and 4 monthly payments of 21/6. Plus Postage and Packing. 5/-.

Coverage 120 Kc/s-84 Mc/s. Metal case 10in. x 6in. x 4 1/2in. Size of scale, 6 1/2in. x 3 1/2in. 2 valves and rectifier. A.C. mains 230-250 v. Internal modulation of 400 c.p.s. to a depth of 30%, modulated or unmodulated R.F. output continuously variable 100 millivolts. C.W. and mod. switch variable A.D. output and moving coil output meter. Grey hammer finished case and white panel. Accuracy plus or minus 2%.



B.S.R. MONARCH UA8 WITH FUL-FI HEAD



4-speed plays 10 records 12in., 10in or 7in. at 16, 33, 45 or 78 r.p.m. Intermixes 7in., 10in. and 12in. records of the same speed. Has manual play position; colour brown. Dimensions: 12 1/2in. x 10 1/2in. Space required above baseboard 4in., below baseboard 2in. Fitted with Full-Fi turnover crystal head.

£6.19.6 Plus 5/- Postage & Packing

With Stereo Head, £7.19.6, plus 5/- P. & P.

CHANNEL TUNER

Will tune to all Band I and Band III stations. BRAND NEW by famous manufacturer. Complete with FCC84 and PCF80 valves (in series) I.F. 16-19 or 33-38. Also can be modified as an aerial converter (instructions supplied). 22/6 Plus 3 6 P. & P.

HEATER TRANSFORMER to suit the above. 200-250 v., 6 - Plus 1 6 P. & P.

MAINS TRANSFORMERS

All with tapped primaries. 200-250 volts, 0-160, 180, 200 v., 60 ma., 0.3 v. 2 amps, 10/6, 320-0-320 v. 75 ma., 5.3 v., 2.5 amp., 5 v., 2 amp., 10/6, 280-0-280, 80 ma. 6.3 v. 2 amp., 6.3 v. 1 amp., 10/6. Postage and packing on the above 3/-.

F.M. TUNER UNIT

Permeability tuned, by famous German Manufacturer. Coverage 88-100 Mc/s. Complete with ECC85. Size 4in. x 2in. x 2in.

25/- Plus P. & P. 1/6.

Circuit diagram 1/-, free with unit. 10.7 Mc/s I.F. and Discriminator Coil, 2/6 pair.

IMITATION LOG FIRE EFFECT IN FIBRE GLASS

Size 14 inches x 11 inches

19/6 Plus P. & P. 2/6.

RADIO CHASSIS

A.C. MAINS 200/250 v. Medium & Long Wave Superhet.

4 valve and rectifier. Complete with 8in. P.M. speaker. Valve line-up 6K8, 6K7, 6Q7, EL32 and rectifier. These have been used but fully serviced with new Electrolytics and valves. FULLY GUARANTEED.

42/6 Plus 7/6 P. & P.

RADIO & T.V. COMPONENTS (Acton) LTD.

23 HIGH STREET, ACTON, LONDON, W.3.

All enquiries S.A.E.

Goods not dispatched outside U.K.

NO DEPOSIT - INTEREST FREE - 20 or 36 WEEKS TO PAY!

AMPLIFIERS

12 Months Guarantee
ALL PORTABLE

AMPLIFIER Mk. D.1. 59/6

Brand new. Latest design with printed circuit. Dimensions 7 x 2½ x 5in. A.C. only. Mains isolated 2-3 watts output. Incorporating EL84 as high gain output valve. Volume and tone controls. Knobs 2/6 extra. P. & P. 3/6.

AMPLIFIER Mk. D.2 79/6

Printed circuit. Latest design. Dimensions 7 x 2½ x 5in. A.C. only. Mains isolated. 3-4 watts output. Incorporating the latest ECL82 triode pentode output valve giving higher undistorted output. Volume and tone controls. Knobs 2/6 extra. P. & P. 3/6.

AMPLIFIER Mk. D.3 89/6

De-luxe model. Printed circuit. Latest design. Dimensions 7 x 2½ x 5in. A.C. only. Mains isolated. 3-4 watts output. Incorporating the latest ECL82 triode pentode output valve, giving higher undistorted output. Volume, treble and bass control. Knobs 3/6 extra. P. & P. 3/6.

AMPLIFIER Mk. D.5 39/6

Simple circuit employing ECL80 triode pentode output valve giving 2-3 watts output. A.C. only. Mains isolated. Single control for volume and on/off switch with knob. P. & P. 3/6.

3 TRANSISTOR AMPLIFIER 79/6

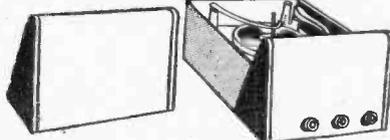
6 volts. 1 control. P. & P. 3/6.

STEREOPHONIC PLAYER CABINET

6/1

DEPOSIT

Balance at 4/11 for 19 weeks.



S.T.1
99/6
Cash

Continental style cabinet including extra clip-on speaker cabinet. 15½ x 10½ x 24½in. deep. Takes B.S.R. 4-speed stereo autochanger. Printed circuit amplifier. Two Bin. speakers. Carr. & Ins. 6/6.

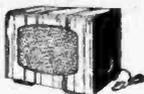
STEREOPHONIC AMPLIFIER

9/1 **DEPOSIT.** Balance at 7/11 for 19 weeks.

12 MONTHS GUARANTEE

Beautifully made for portable stereophonic record players. Latest design with printed circuit. Dimensions 3 x 5½ x 9½in. A.C. only. Mains isolated. Twin amplifiers each side giving 3-4 watts output. Incorporating ECL82 triode pentode valve. Full tone, volume and balance controls. Complete and ready to fit. Knobs 3/6 per set extra. Carr. & Ins. 3/6. Cash price £7.19.6.

EXTENSION SPEAKERS



19/9

Polished oak cabinet of attractive appearance. Fitted with 8in. P.M.L. speaker W.B. or Goodmans of the highest quality. Standard matching to any receiver (2-5 ohms.) Switch and flex included. Ins. carr. 3/9.

8in. P.M. SPEAKER 8/9
Std; 2-5 ohms. With O.P. Trans., 10/- P. & P. 2/6.

Elliptical SPEAKER 19/6
7" x 4"

Elliptical SPEAKER 22/6
9½" x 4½"

B.S.R. FUL-FI Crystal Turn-over cartridges 19/6

Brand new, including sapphire needles for L.P. and Standard, giving fullest range and finest tone obtainable for any player. Can be fitted to all standard pick-up arms. P. & P. 9d.

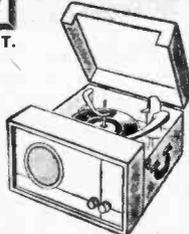
DUKE & CO.

(Dept. D1),
621/3 ROMFORD ROAD,
MANOR PARK, E.12.
Tel.: ILF 6001-3.
Stamp for FREE catalogue.

4/7

DEPOSIT.

Balance at 3/5 per week for 19 weeks.



R.P.3.

A delightful looking cabinet 14½ x 17½ x 8½in. in 2-tone leatherette. Will take a B.S.R. Monarch 4-speed autochanger and 6in. round speaker. Carr. & Ins. 4/6. Cash price 6/9.



B.S.R. MONARCH U.A.8 4-SPEED AUTOCHANGER £6. 19. 6

U.A.12 LATEST B.S.R. MONARCH 4-SPEED MIXER £8/9/6
COLLARO CONQUEST 4-SPEED AUTOCHANGER £6/19/6
COLLARO CONQUEST STEREO AUTOCHANGER 11 gns.
P. & P. on all the above 5/6.

LOOK! AT THE LOW PRICES OF OUR MODERN cloth covered RECORD PLAYER CABINETS

T.W.1. CABINET 79/6

Similar cabinet to the S.T.1 less extra clip-on speaker cabinet. Size 15½ x 19½ x 10½in. Takes B.S.R. U.A.8 4-speed autochanger, twin speakers 3 control amplifier. Ins., carr., 4/6.



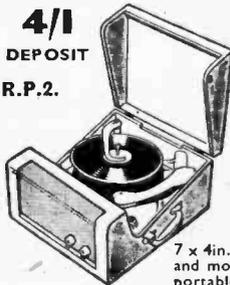
RP6 29/6

Elegant cabinet, cloth covered in grey or red with sunken control panel and speaker fret. Size 13 x 17 x 8in. deep. Takes a B.S.R. Monarch 4-speed autochanger. 7 x 4in. elliptical speaker and most of the modern portable amplifiers. Carr. & ins. 4/6.

4/1

DEPOSIT

R.P.2.



Balance at 2/11 per week for 19 weeks.

A beautifully styled cabinet. Made by a famous manufacturer. In polka dot cloth with clipped lid and carrying handle. Size 16 x 14½ x 8½ deep. Will take B.S.R. Monarch 4-speed Autochanger and 7 x 4in. elliptical speaker and most of the modern portable amplifiers. Carr. & Ins. 4/6. Cash price 5/6.

TAPE RECORDER CABINET

19/6



A MUST if you are building your own tape. Suitable for the Truvox Tape Recording Deck. Less front cast speaker panel. Size 13½ x 15 x 8½in. deep. Detachable lid with compartment for spare tape. Covered in green washable plastic material. P. & P. 4/6.

P.L.10 CABINET

Size 14½ x 12½ x 6in. Takes B.S.R. T.U.9 4-speed record player unit. 8 x 3in. elliptical speaker. Single control amplifier. Carr. & Ins. 4/6.



39/6



**REPLACEMENT
RE-BUILT
T/V TUBES**

Yours for initial
payment of

8/6

Balance at 8/6 for 19 weeks.

12 months' Full Guarantee

All sizes except 10in. Completely rebuilt gun assembly new cathode, heaters, etc., giving the high standard required for long picture life, quality and value. Carr. & ins. 15/6.

EXPRESS DESPATCH SERVICE

Please phone to confirm Tube in stock. Send Telegraph Money Order. Tube despatched Passenger Train same day. This service only available with remittance by a Telegraph Money Order and cash sales, not terms.

**A CHASSIS FOR SPARES ALL
THIS FOR ONLY 9/6**

56 Resist; incl. 7 variable. Controls. Condensers, incl. electrolytics. Coils, 7 I.F. and R.F. Trans. 14 valve holders. 9 B7G, 5 B5G, 3 octal, 4 Trans. Mains—O.P.P.—Line—Frame. Chokes. 250 m.a. Metal rec. 300 volt 250 m.a. Fuse panel—scanning coils—focus magnet. Plugs—sockets—switch—chassis screws—tag strips, etc. I.F. strip in separate Power Pack can be used without dismantling. Chassis has been used, but were working when stored. 7 pages of circuits and instructions showing position of each component. Carriage. 15/6.

**MODERN
17" T/V
CHASSIS
COMPLETE
AND
WORKING
24 GNS.**

Complete chassis including 17in. tube, permanent magnet speaker, 13 channel Turret Tuner (any two selected channels fitted). Other channels supplied on request at 7/6 each. 13 valves. Chassis and valves guaranteed for three months. MW. CRT. 2 months' full guarantee. Sound I.F. 19.5 Mc/s. Vision 16 Mc/s. A.C. only. Ready and working to fit into your own cabinet. Carr. & Ins., 25/-. As above, with 14in. tube, complete and working. £19.19.0.

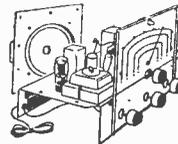
SOLO SOLDERING TOOL

110 v. 6 v. 12 v. (special adaptor for 200/250 v., 10/- extra). Automatic solder feed including a 20ft. reel of Ersin 60/40 solder and spare parts. It is a tool for electronic soldering or car wiring. Revolutionary in design. Instantly ready for use and cannot burn. In light metal case with full instructions for use. Post 3/6.

12/6



SUPER CHASSIS 3/11 PER WEEK



On the initial payment of 5/11 plus carr. of 5/6, this chassis will be despatched. Balance at 3/11 for 19 weeks. Cash Price 79/6. 5-valve Superhet chassis including 8in. P.M. speaker and valves. Four control knobs (tone, volume, tuning, w/change switch). Four wavebands with position for gram p.u. and extension speaker. A.C. Ins., carr. 5/6.

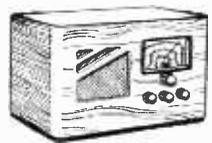


**SUPER SUPERIOR
RADIO 89/6**

4 waveband. 5 valve superhet radio. 2-tone covered metal cabinet size 24 1/2 x 12 x 10in. deep. 4 control knobs. Positions for gram., p.u. and extension speaker. A.C. only. Ins. carr. 8/6.

**HOME RADIO
A.C. or Universal 79/6**

A.C./D.C. Universal mains 5-valve octal superhet. 3 waveband receiver can be adapted to gram p.u. In attractive wooden cabinet. 9 1/2 x 18 1/2 x 11 1/2 in. Ins., carr., 4/6. Terms available.



T.V. AERIALS 23/6

For all I.T.A. channels. Outdoor or loft. 3 elements. P. & P. 2/6

T.V. AERIALS 15/6

B.B.C. indoor type. Folded dipole with 12ft. co-ax. cable fitted. Post 1/9.

T.V. AERIALS 35/-

COMBINED I.T.A. or B.B.C. New. L/SD. P. & P. 2/6.

CAR AERIAL 6/9

Plated. Whip antennae. 50in. long collapsing to 11in. One hole fixing P. & P. 1/-. (Not telescopic.)

SOUND/VISION and I.F. STRIP 7/9

Plessey. I.F.s 10.5 Mc/s sound. 14 Mc/s vision. 8 valve holders. Less valves. Size 8 1/2 x 5 x 4 1/2 in. Circuit incl. The tuner unit plugs directly into this chassis. P. & P. 2/6.

SOUND/VISION and I.F. STRIP 2/9

Salvaged. Complete sound and vision strip. 8 valve holders. Less valves. I.F.s 16-19.5 Mc/s. Size 8 1/2 x 4 1/2 x 4 1/2 in. Drawings free with order. P. & P. 2/6.

TIMEBASE 2/9

Containing scanning coils, line transformer, etc., less valves. Drawings free with order. P. & P. 2/6.

CO-AX. CABLE, 6d. YARD

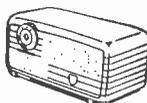
Good quality. Cut to any length. 1/6 post on 20 yds.

INSULATING TAPE 1/6

75ft. x 3/4 in. In sealed tins. Post 9d.

BAKELITE CABINETS 5/9

Brand new. Colour brown. Attractive design. Size 12 x 7 x 5 1/2 in. Ideal for small receivers, converters, etc. P. & P. 3/9.



FOCUS MAGNETS 9/9

Brand new. 38 mm. incorporating picture shift control. P. & P. 1/3.

FOCUS MAGNETS 12/6

38 mm. Brand new. P. & P. 1/3.

SCANNING COILS 10/6

Low impedance. 38 mm. Brand new. P. & P. 1/3.

SCANNING COILS 15/9

Wide angle 90 deg. 38 mm. Low impedance. P. & P. 1/3.

T.V. MASKS 2/9

Gold plastic for 15in. tubes. Post 1/3.

CHASSIS 1/-

6 or 8 valve latest type midget valve design for A.M. or F.M. Brand new. Cadmium plated. Size 12 1/2 x 7 1/2 x 2 1/2. P. & P. 1/9.

MAINS TRANSFORMERS 7/9

Primary 200-250. Secondary 300-300. 6 v. at 3.3 amps. P. & P. 2/9.

MAINS AUTO 0-205-225-245 VOLTS AT 300 m.a. 8/9

Isolated windings of 6.3 v. at 2-6 amp. 6.3 volt at 3-6 amp. 2 v. 1-4 amp. P. & P. 3/9.

O.P. TRANSFORMERS 1/3

Standard size. 2-5 ohms. P. & P. 1/-. 20 for £1. P. & P. 5/6.

DUKE & CO. (Dept. D.1),
621, ROMFORD ROAD, MANOR
PARK, E.12. ILF 6001-3

★ CARRIAGE AND INSURANCE MUST BE SENT WITH
INITIAL PAYMENT. WEEKLY EASY PAYMENTS.
Details on Request.

The decision is YOURS. To be a success in your chosen career; to qualify for the highest paid job . . . to control a profitable business of your own. ICS home-study courses put your plans on a practical basis; teach you theory and practice; give you the knowledge and experience to take you, at your own pace, to the top.

Choose the *RIGHT* course:

RADIO & TELEVISION ENGINEERING
INDUSTRIAL TELEVISION
RADIO & TELEVISION SERVICING
RADIO SERVICE AND SALES
VHF/FM ENGINEERING : ELECTRONICS
COMPUTERS & PROGRAMMING

ICS provides thorough coaching for professional examinations:

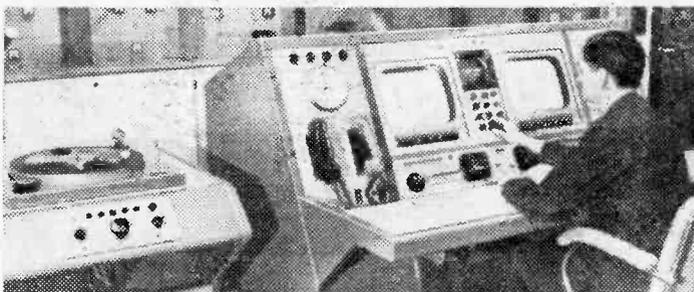
Brit. I.R.E., City and Guilds Telecommunication Technicians. C. & G. Radio Servicing (R.T.E.B.); C. & G. Radio Amateurs.

LEARN AS YOU BUILD

Practical Radio Courses

Gain a sound up-to-professional-standards knowledge of Radio and Television as you build **YOUR OWN** 4-valve T.R.F. and 5-valve superhet radio receiver, Signal Generator and High-quality Multi-tester. At the end of the course you have three pieces of permanent and practical equipment and a fund of personal knowledge and skill. ICS Practical Radio courses open a new world to the keen Radio amateur.

Technical Training in Radio, Television and Electronics Engineering with



THERE ARE ICS COURSES TO MEET YOUR NEEDS AT EVERY STAGE OF YOUR CAREER. FILL IN AND POST THIS COUPON TODAY.

You will receive the **FREE** 60 page ICS Prospectus listing examinations and ICS technical courses in radio, television and electronics **PLUS** details of over 150 specialised subjects.

Other ICS courses include:
MECHANICAL, MOTOR,
FIRE, ELECTRICAL &
CHEMICAL ENGINEERING.
FARMING, GARDENING.
ARCHITECTURE &
WOODWORKING.
SELLING & MANAGEMENT.
ART. PHOTOGRAPHY,
etc., etc.

**PLEASE STATE ON COUPON
SUBJECT YOU ARE
INTERESTED IN . . .**



INTERNATIONAL CORRESPONDENCE SCHOOLS

(DEPT. 170 M), INTERTEXT HOUSE, PARKGATE RD., LONDON, SW11

PLEASE SEND FREE BOOK ON

NAME

ADDRESS

OCCUPATION

AGE

2.50



Complete station (as illus.) comprising: 19 Set, Supply Unit, Control Box, Headphones, Microphone, Morse Key, Variometer, Short Wave and V.H.F. Aerials and Bases and full set of leads. All for only £9. Carr. 25/-

WIRELESS SET No. 19. MK. II.

This most famous Army Trans/Receiver covers 2-8 Mc/s. (150-37 metres) in two bands and 230-240 Mc/s. V.H.F. Has an intercom. amplifier. Designed for 12 and 24 volt operation. Uses a 6-valve superhet receiver. I.F. being 465 kc/s, and a 6-valve transmitter designed for voice and C.W. operation. Incorporates test and tuning meter for voltages, aerial loading and current tests. Panel Controls: Frequency tuning, P.A. tuning, Gain control, M.C.W., C.W., R/T. switch. Het-tone, netting, off-on, Quench, aerial—A.V.C.—L.T.—H.T.—Drive tests. Supplied complete with 15 valves and instruction book.

SET ONLY
65/-
Carr. 10/-

LIGHT-WEIGHT HEADSET
These H.S. 30 phones are the smallest used by the U.S. Air Force. 250 Ω imp. using soft rubber miniature ear moulds for maximum music and voice reproduction of the finest quality. Supplied free is a small transformer unit with cord and plug which steps impedance up to 4,000 Ω . **ONLY 15/- P. & P. 2/6.**

MICROPHONES — BRAND NEW. Throat magnetic 4/6; Throat carbon 3/6; No. 8 carbon with switch 6/6; No. 7 moving coil 6/6. Tannoy power mikes only 5/-.

POCKET MULTIMETER

2,500 o.p.v. Multi range 6/30/120/300/1,200 v. A.C. ditto D.C. 0-1 K., 0-1 megohm; 400 Micro-A., 12 mA., 300 mA., -40 to +64 db 5 ranges; 3in. x 4 1/2 in. x 1 1/2 in. Large clear dial. Leads supplied. **List Price £6.19.6. OUR PRICE: £4.7.6. Saving you £2.12.0. P. & P. 2/6.**

CONVERT TO V.H.F.

With in minutes you can extend the frequency of your receiver to cover V.H.F. by using our brand new V.H.F. Converter. **It-28** covers 50-65 Mc/s. vernier calibrated tuning. **20/-**. **R.F.25** covers 40-50 Mc/s. Switched tuning. 8/6. Circuits supplied. P. & P. 3/6 each.

MORSE CODE SET WITH HEADPHONES!

Complete morse code set, includes headphones, morse key, buzzer, pitch control, internal battery. Magnificent appearance and housed in portable wooden case with carrying strap. A wonderful instrument to thrill boys of all ages! Supplied complete and ready for immediate use. Original cost over £8.

ONLY 15/- P. & P. 3/6



T.C.S. RECEIVER

1.5 to 12 Mc/s. 7-valve superhet, built like a dream. 12SK7-EF, 12SA7 Mixer, 12A6 Oscillator, 12Q7 Detector, AVC-BFO-1st AF, 12SK7-1, F.s. The 12A6 final puts 1.4 watts into 500 ohms with an input modulated only 30%. Panel controls: switch, power switch, ground and aerial posts, M.O. or crystal frequency switch, speaker jack, card holder to log 30 stations, hand vernier tuning knob turning a large etched calibrated plate behind hair lined window, anti-backlash gears used. Used condition, £8.10.0. Carr. 15/-.

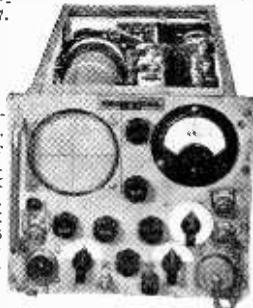
R.F. Gain, A.F. Gain, C.W. Pitch, band-switch, mod-C.W. switch, power switch, ground and aerial posts, M.O. or crystal frequency switch, speaker jack, card holder to log 30 stations, hand vernier tuning knob turning a large etched calibrated plate behind hair lined window, anti-backlash gears used. Used condition, £8.10.0. Carr. 15/-.

T.C.S. TRANSMITTER available at £9.10.0. Carr. 15/-.

Note.—If both items purchased together, £17. Carr. 25/-.

MONITOR TYPE 28.

Consists of VCRI38, 6-SP61, 1-5U4, 1-VU120, 3-EA50. 1 m/a meter scaled 100-100 volts. Incorporates Y shift. X shift in μ secs. Focus, sync. bias. Input to X plates switched X 20, X 5 and direct, requires only suitable power pack for use as oscilloscope. carr. 10/- **70/-**



ACCUMULATORS. 2 volts 16 A.H. (unspillable). Ideal for 6 and 12 volts supply, etc. Brand new Original cartons. Size 4in. x 7in. x 2in. 5/6 each. P. & P. 1/6. 3 for 15/-, P. & P. 3/6. 6 for 27/6. P. & P. 5/-.



BUILD AN F.M. TUNER with this miniature 9.72 Mc/s. I.F. Strip. Has 6 modern miniature valves, I.F.T.'s, etc., supplied with full F.M. Tuner conversion details. Hailed by all our previous purchasers as a wonderful F.M. Tuner. Brand new, only 40/- P. & P. 3/6.

MARCONI CR100 RECEIVER 60 kc/s-30 Mc/s. Internal A.C. power supply, crystal and audio filters, variable selectivity. Output for phones and speaker. Fully guaranteed. **£19.10.0. Carr. 30/-.**

SIGNAL GENERATOR Coverage 100 kc/s-100 Mc/s. on fundamentals and 100 Mc/s. to 200 Mc/s. on harmonics. Metal case 10in. x 6 1/2in. x 5 1/2in. Grey hammer finish. Incorporating three miniature valves and Metal Rectifier. A.C. Mains 200/250 v. Internal Modulation of 400 c.p.s. to a depth of 30%; modulated or unmodulated R.F. output continuously variable 100 millivolts. C.W. and mod. switch, variable A.F. output, incorporating magic eye as output indicator. Accuracy plus or minus 2%. **ONLY £8.19.6. Carr. 5/-.**

BRAND NEW VARIABLE TRANSFORMERS. Input 230 volts. Output 0-240 volts, 5 amps. Brand new, only £8. Carr. 12/6.

HIFI CO-AX SPEAKERS BRAND NEW—U.S.A. MADE 1 1/2 in. Co-axial Speaker. The woofer uses 6.9 oz. Alnico 5 magnet. Has 3in. tweeter and an electronic crossover network to separate the speaker functions. Frequency response: 40-17,000 cycles. Output 12 watts, impedance 8 ohms. **ONLY 160/-**. 3in. 2 1/2in. tweeter 10 watts, etc., 90/- P. & P. 4/- on each.



PORTABLE TRANSMITTER RECEIVER No. 18

Entirely self contained 6-valve Transmitter Receiver for voice and C.W. Frequency: 6-9 Mc/s. (50-33 metres). The Transmitter signal is generated by a master oscillator circuit followed by a power amplifier. The aerial is auto-coupled to the power amplifier by aerial taps to a parallel tuned output circuit. The Receiver is a 4-valve superhet, comprising signal frequency amplifier, frequency changer, I.F. amplifier, 2nd det.—A.V.C.—A.F. Stage. Selectivity: The resonance curve of the I.F. amplifier has a width of 7 kc/s. with

an average cut-off of 5 db/kc/s. Full netting facilities. circuit set for full modulation operated by standard dry batteries, range approximately 10 miles. Incorporates Test Meter for aerial loading, H.T. & L.T. readings. Supplied Brand New complete with Power Microphone, Headphones, Morse Key, Aerials, Webbing and Full instruction book all for only 60/- Carriage 10/-.



80/-
Carr. 10/-



Callers: 87, Tottenham Court Road, London, W.1.
Mail orders: (Dept. P), 32a, Coptic Street, London, W.C.1.
Telephone: MUSEUM 9607

FULLY ILLUSTRATED CATALOGUE.
1/3 Post Free.

R.S.C. HI-FI TAPE RECORDER KIT

REALISM AT INCREDIBLY LOW COST. CAN BE ASSEMBLED IN 1 HOUR!
The Recorder incorporates the Latest Collaro Mark IV Tape Transcriber listed \$25. The Linear L745 High Quality Tape Amplifier listed \$12.19. High Flux P.M. Speaker listed 30¢, empty Tape Spool, a Reel of Best Quality Tape listed 2/6, and a Handsome Portable carrying Cabinet finished in veneered walnut, size 18in. x 13in. x 9in. high, listed 14 10/0, and circuit. Total cost if purchased individually approx. \$45. Performance equal to units in the £80-£90 class. Send S.A.E. for leaflet.

29 1/2 GNS. H.P. TERMS. Deposit 3 gns. and 12 monthly Carr. payments 5/9. Cash 17/6 price if settled in 3 mths.

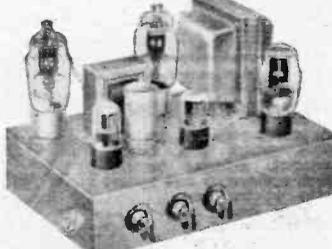
HI-FI 10 WATT AMPLIFIERS

Slightly store soiled but guaranteed unused and in perfect order. Fitted Mullard valves. Dual inputs for "mike" and gram. etc. Bass and Treble Controls. High sensitivity and quality. For 200-250 v. A.C. mains.

£5-19-9 Carr. 7/6

R.S.C. A8 HIGH FIDELITY 12 WATT AMPLIFIER

Ultra Linear Push-Pull Amplifier with "Built-in" Tone Control. Pre-amp stages, high sensitivity, includes 5 valves (807 outputs). High Quality sectionally wound output transformer, specially designed for Ultra Linear operation, and reliable small condensers of current manufacture. **INDIVIDUAL CONTROLS FOR BASS AND TREBLE** "Lift" and "Cut." Frequency response ± 3 db. 30-30,000 c/s. Six negative feedback loops. Hum level 71 db. down. **ONLY 70 millivolts INPUT required for FULL OUTPUT.** Suitable for use with all makes and types of pick-ups and practically all microphones. Comparable with the very best designs.



For STANDING or LONG PLAYING RECORDS. For MUSICAL INSTRUMENTS such as **STRING BASS, GUITARS, etc.** **OUTPUT SOCKET** with plug provides 300 v. 30 mA. and 6.3 v. 1.5a. For supply of a **RADIO FEEDER UNIT.** Size approx. 12-9 1/2 in. For A.C. mains 200-230-250 v. 50 c/s. Outputs for 3 and 15 ohm speakers. Kit is complete to last nut. Chassis is fully punched. Full instructions and point-to-point wiring diagrams supplied. Unapproachable value, at £7/15/- or factory built 45/- extra. Carriage 10/-.

£7-15-0

carrying handles can be supplied for 18/9. Additional input sockets, with associate Vol. control so that two different inputs such as Gram and 'Mike' or Tape and Radio can be mixed, can be provided for 13/- extra. Guaranteed 12 months. **TERMS** on assembled two input model: **DEPOSIT** 18/9 and 12 monthly payments 18/9. **HIGH FIDELITY MICROPHONES and SPEAKERS** in stock. Keep cash prices or credit terms if supplied with amplifier.

STAAR GALAXY 4-SPEED MIXER AUTO-CHANGERS

Brand new, cartoned. Turnover sapphire styl. Many exclusive features. Unique design motor virtually free from rumble. For 200-250 v. A.C. mains. Only £5.19.8.

PORTABLE CABINETS
Full range of attractive designs from **15/9**

SPECIAL OFFER. Two tone Portable cabinet. Gram amplifier, Staar, Changer and 7in. x 4in. P.M. speaker. 10 gns. Carr. 10/- or with B.S.R. UA8. 12 gm.

THE SKYFOUR T.I.F. RECEIVER.

A design of a 3-valve Long and Medium wave 200-250 v. A.C. Mains receiver with selenium rectifier. High gain I.F.F. stage and low distortion detector. Power pentode output. Valve line-up 8K7, SP6L, 6V6G. Selectivity and quality are well up to standard, and simplicity of construction is a special feature. Point-to-Point wiring diagrams, instructions and parts list. 1/9. Maximum building cost £4.19.6, inc. attractive Walnut veneered wood cabinet 12in. x 6 1/2in. x 5 1/2in.

R.S.C. PORTABLE TAPE RECORDER

A completely assembled unit in attractive two-tone rexine covered carrying case. Excellent frequency response. Auto-erase. Fast rewind. Takes up to 5 1/2 in. tape spools. High Flux speaker. 3 watts output. Inputs for Carr. 10/6 Radio/Gram and 'Mike'. For 230/250 v. 50 c/s. A.C. mains. Sensational value! Price, including 'Mike' Reel of best quality tape and empty spool. Usual 12 months' guarantee. H.P. Terms: Deposit 4/- and 12 monthly payments of 3/4.

19 GNS.

PICK-UP ARMS complete with HI-FI turnover crystal head. Acos GP34. Limited number brand new, perfect, at approx. half price. Only 29/11.

ACOS CRYSTAL MICROPHONES. Mic 40 hand or desk. Listed 45/-. Only 29/9. Type 33-1, hand or desk. List price 50/- Brand new, cartoned. 35/9. 39-1 Stick type, list price 5 gns. Brand new. 39/6.

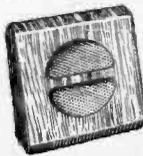
COSSOR VHF/FM RADIO RECEIVER KITS

Including 6 valves, Printed Circuit and Goodman's 10" x 6" Elliptical Speaker. Pre-aligned I.F.T.s. Made to retail at 15 GNS. **£8-19-6** limited number at

Excellent frequency response. Auto-erase. Fast rewind. Takes up to 5 1/2 in. tape spools. High Flux speaker. 3 watts output. Inputs for Carr. 10/6 Radio/Gram and 'Mike'. For 230/250 v. 50 c/s. A.C. mains. Sensational value! Price, including 'Mike' Reel of best quality tape and empty spool. Usual 12 months' guarantee. H.P. Terms: Deposit 4/- and 12 monthly payments of 3/4.

EXTENSION SPEAKERS

Ready for use in walnut veneered cabinet.
6 1/2 in. 2-3 ohms, 29/11.
8 in. 2-3 ohms, 35/9.
10 in. 2-3 ohms, 55/9.
Very limited number.



SENSATIONAL TRANSISTOR OFFER 3 For 10/9. A huge purchase enables us to offer Bran 7S1 Audio Transistors at a small fraction of list price.

R.S.C. MAINS TRANSFORMERS (GUARANTEED)

Interleaved and Impregnated. Primaries 200-230-250 v. 50 c/s. Screened. TOP SHROUDED DROP THROUGH

250-0-250 v. 70 mA. 6.3 v. 2 a. 5 v. 2 a. ... 17/9
250-0-350 v. 80 mA. 6.3 v. 2 a. 5 v. 2 a. ... 18/9
250-0-250 v. 100 mA. 6.3 v. 4 a. 5 v. 3 a. ... 25/9
300-0-300 v. 100 mA. 6.3 v. 4 a. 5 v. 3 a. ... 25/9
350-0-350 v. 100 mA. 6.3 v. 4 a. 5 v. 3 a. ... 25/9
350-0-350 v. 100 mA. 6.3 v. 4 a. 4 a. C.T. ... 25/9
0-4.5 v. 3 a. ... 25/9
350-0-350 v. 150 mA. 6.3 v. 4 a. 5 v. 3 a. ... 29/9

FULLY SHROUDED UPRIGHT

250-0-250 v. 60 mA. 6.3 v. 2 a. 5 v. 2 a. ... 17/9
Midjet type 21-3-3in. ... 17/9
250-0-250 v. 100 mA. 6.3 v. 4 a. 5 v. 3 a. ... 26/9
300-0-300 v. 100 mA. 6.3 v. 4 a. 5 v. 3 a. ... 26/9
350-0-350 v. 100 mA. 6.3 v. 4 a. 5 v. 3 a. ... 26/9
300-0-300 v. 130 mA. 6.3 v. 4 a. 6.3 v. 1 a. ... 26/9
For Mullard 510 Amplifier ... 35/9
350-0-350 v. 150 mA. 6.3 v. 4 a. 5 v. 3 a. ... 35/9
425-0-425 v. 200 mA. 6.3 v. 4 a. C.T. ... 35/9
6.3 v. 4 a. C.T. 5 v. 3 a. Suitable Williamson Amplifier, etc. ... 49/9

R.S.C. BATTERY TO MAINS CONVERSION UNITS

Type BM1. An all-dry battery eliminator. Size 5 1/2 x 4 1/2 x 2 1/2 in. approx. Completely replaces battery supplying 1.4 v. and 90 v. where A.C. mains 200-250 v. 50 c/s is available. Suitable for all battery portable receivers requiring 1.4 v. and 90 v. This includes latest low consumption types. Complete kit with diagrams, 39/9. or ready to use, 46/9.



Type BM2. Size 6 x 5 1/2 x 2 1/2 in. Supplies 123v. 90 v. and 80 v., 40 mA. and 2 v. 0.1 a. to 1 amp fully smoothed. Thereby completely replacing both H.T. batteries and I.F. 2 v. accumulators when connected to A.C. mains supply 200-250 v. 50 c/s. **SUITABLE FOR ALL BATTERY RECEIVERS** normally using 2 v. accumulator. Complete kit of parts with diagrams and instructions, 49/9. or ready for use, 59/8.

ELIMINATOR TRANSFORMERS

Primarys 200-250 v. 50 c/s. ... 15/9
120 v. 40 mA. 5-0-5 v. 1 a. ... 15/9
90 v. 15 mA. 4-0-4 v. 500 mA. ... 9/9

OUTPUT TRANSFORMERS

Midjet Battery Pentode 66:1 for 354, etc. ... 3/9
Small Pentode, 5000 Ω to 30 Ω ... 3/9
Small Pentode 7/8,000 Ω to 30 Ω ... 3/9
Standard Pentode 5,000 Ω to 3 Ω ... 5/6
Standard Pentode, 7/8,000 Ω to 30 Ω ... 5/6
10,000 Ω to 30 Ω ... 5/6
Push-Pull 10-12 watts 6V6 to 3D or 15D ... 18/9
Push-Pull 10-12 watts to match 6V6 to 3-5-8 or 15D ... 18/9
Push-Pull EL84 to 3 or 15 n ... 18/9
Push-Pull 15-18 watts, 6L6, KT66 ... 22/9
Push-Pull for Mullard 510 Ultra Linear ... 29/9
Push-Pull 20 watts, sectionally wound 6L6, KT66, etc., to 3 to 15 Ω ... 47/9

SMOOTHING CHOKES

150 mA. 7-10 H 250 ohms... ... 11/9
100 mA. 10 H 200 ohms... ... 8/9
80 mA. 10 H 350 ohms... ... 5/9
60 mA. 10 H 490 ohms... ... 4/11

CHARGER TRANSFORMERS

All with 200-230-250 v. 50 c/s Primaries: 0-9-15 v. 1 a. 12/9. 0-9-15 v. 3 a. 16/9. 0-9-15 v. 5 a. 19/9. 0-9-15 v. 6 a. 23/3.

AUTO TRANSFORMERS. 50 watt

0-110/115-230/250 v. 8/11 each.

COLLARO CONQUEST 4-SPEED AUTO-CHANGER with high fidelity Studio pick-up. Latest model. Brand new. Cartoned. For 200-250 v. 50 c/s. A.C. mains. Our price £7.19.8 Carr. 5/6.

COLLARO 4-SPEED SINGLE PLAYER UNITS. Type AC4/564 with turnover crystal head. £6.12.6 Carr. 4/5.

R.S.C. A12 STEREOPHONIC AMPLIFIER KIT

A complete set of parts to construct a Stereo amplifier with an undistorted output total 6 watts. For A.C. mains input of 200-250 v. Outputs for matched 2-3 ohm speakers. Sensitivity 130 m.v. Ganged Vol. and Tone Controls. Preset balance control. Full instructions and point-to-point wiring diagrams supplied. Only good quality Carr. and pkg. 5/- components and latest high grade valves used. Exceptionally realistic reproduction can be obtained at ample volume for the home as can be demonstrated in typical surroundings at our County Arcade premises. A really sensational offer.

£3-19-6

STEREO EQUIPMENT OFFER.
Comprising A12 Kit, 2 matched 8in. L/Speakers, and Acos T10 Stereo head with diamond stylus suitable most pick-ups.
£6-19-6 Carr. 7/6

BUILD A TRANSISTORISED RECORD PLAYER to operate from 6 v. Dry Batteries. Total cost of parts Only **£7-19-6**
Unit is housed in attractive portable cabinet and will play standard 7in. 45 r.p.m. records at ample output level. All parts available separately, i.e. Garrard Player Unit with pick-up, £3.19.6. Portable Cabinet 29/6.

R.S.C. 30 WATT ULTRA LINEAR HIGH FIDELITY AMPLIFIER A10

A highly sensitive Push-Pull high output unit with self-contained Pre-amp. Tone Control Stages. Certified performance figures compare equally with most expensive amplifiers available. Hum level 70 db. down. Frequency response 43 db. 30-30,000 c/c.s. A specially designed sectionally wound ultra linear output transformer is used with 807 output valves. All components are chosen for reliability. Six valves are used. EF86, EF88, ECC83, 807, 807, GZ33. Separate Bass and Treble Controls are provided. Minimum input required for full output is only 12 millivolts so that ANY KIND OF MICROPHONE OR PICK-UP IS SUITABLE. The unit is designed for CLUBS, SCHOOLS, THEATRES, DANCE HALLS or OUTDOOR FUNCTIONS, etc. For use with Electronic ORGAN, GUITAR, SPRING BASS, etc. For standard or long-playing records, OUTPUT SOCKET PROVIDES L.T. and H.T. for a RADIO FEEDER UNIT. An extra input with associated vol. control is provided so that two separate inputs such as Gram and 'Mike' can be mixed. Amplifier operates on 200-250 v. 50 c/c.s. A.C. Mains and has output for 3 and 15 ohm speakers. Complete kit of parts with fully punched wiring diagrams and instructions. If required cover as for A8 can be supplied for 18/6. The amplifier can be supplied, factory built with 12 months' guarantee, for £13.19.6. TERMS: DEPOSIT 24/9 and 12 monthly payments of 24/9.

11 GNS.

Carr. 10/-
The amplifier can be supplied, factory built with 12 months' guarantee, for £13.19.6. TERMS: DEPOSIT 24/9 and 12 monthly payments of 24/9.

LINEAR 'DIATONIC' 10-14 WATT HIGH FIDELITY PUSH-PULL ULTRA LINEAR AMPLIFIER. For 200-250 v. A.C. mains. Valves ECC83, ECC83, EL84, EL84, EZ81. Self-contained Pre-amp Tone Control stage, Separate Bass and Treble Controls. Independent 'Mike' and Gram input sockets. Outputs for 3 and 15 ohm speakers. Only 12 GNS. or Deposit 22/3 plus 10/- carr. and 12 monthly payments of 22/3. Send S.A.E. for leaflet.

LINEAR L50 50 WATT P.A. AMPLIFIER. High quality and sensitivity. 19 GNS. Send S.A.E. for leaflet.

GARRARD 4-SPEED AUTO-CHANGERS. Type RC120H. Very limited number at only £9.19.6. Carr. 5/6.

R.S.C. 3-4 WATT A7 HIGH-GAIN AMPLIFIER

For 200/250 v. 50 c/c.s. Mains input. Appearance and specification, with exception of output wattage, as A5 amplifier. Complete Kit with diagrams. £3.15.0. Carr. 3/6.

R.S.C. BRADFORD, MANCHESTER and LEEDS
(Leeds) Ltd.

LINEAR L45 MINIATURE 4/5 WATT QUALITY AMPLIFIER. Suitable for use with any record playing unit, and most microphones. Negative feedback 12 db. Separate Bass and Treble Controls. For A.C. mains input of 200-250 v. 50 c/c.s. Output for 2-3 ohm speaker. Three miniature Mullard valves used. Size of unit only 6-5-3in. high. Guaranteed for 12 months. Only £5/19/6. Send S.A.E. for illustrated leaflet. Terms: Deposit 22/6 and 5 monthly payments of 22/6.

R.S.C. 45 WATT A5 HIGH-GAIN AMPLIFIER



A highly-sensitive 4-valve quality amplifier for the home, small club, etc. Only 50 millivolts input is required for full output so that it is suitable for use with the latest high fidelity pick-up heads, in addition to all other types of pick-ups and practically all 'mikes'. Separate Bass and Treble Controls are provided. These give fully long-playing record equalisation. Hum level is negligible being 71db. down, 15 db. of negative feedback is used, H.T. of 300 v. 25 mA. and L.T. of 6.3 v. 1.5 a. is available for the supply of a Radio Feeder Unit, or Tape-Deck pre-amplifier. For A.C. mains input of 200-250 v. 50 c/c.s. Output for 2-3 ohm speaker. Chassis is not available. Kit is complete in every detail and includes fully punched chassis (with baseplate) with Blue hammer finish and point-to-point wiring diagrams and instructions. Exceptional value at only £4/15/-, or assembled ready for use 25/- extra, plus 3/6 carr. or Deposit 22/6 and 5 monthly payments of 22/6 for assembled unit.

R.S.C. PORTABLE GUITAR AMPLIFIERS

Junior 5 watts High Quality output. Separate Bass and Treble 'Cut' and 'Boost' controls. Sensitivity 15 m.v., Twin inputs. High Flux 8in. Loudspeaker 'built-in'. Handsome, strongly made Cabinet (size approx. 14 x 14 x 7in.) finished in satin walnut, and fitted carrying handle. H.P. Terms. Deposit £1 and 9 monthly payments of £1.

£8-19-6 Carr. 7/6

Senior 10 watts High Fidelity output. Separate Bass and Treble 'Cut' and 'Boost' controls. Twin separately controlled high gain inputs so that two instruments such as Guitar and String Bass can be used at the same time. Two loudspeakers are incorporated, a high Flux 12 in. for Bass notes and 7 x 4 in. elliptical for Treble. Cabinet is well made and finished satin walnut. Size approx. 18 x 18 x 8 in. H.P. Terms. Deposit 25/6 and 12 monthly payments of 25/6. Both models for 200-250 v. A.C. mains. Carr. 10/-

15 GNS.

12in. 10 WATT HIGH QUALITY LOUD-SPEAKERS IN POLISHED WALNUT FINISHED CABINET
Gauss 12,000 lines. Speech coil 3 ohms or 15 ohms. Only £4.19.6 Carr. 5/-
Terms: Deposit 11/- and 9 monthly payments of 11/-

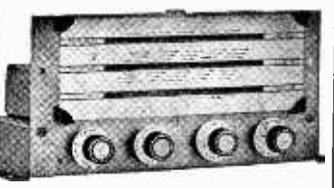
12 in. 20 WATT HI-FI LOUD-SPEAKERS IN CABINETS. Size 18 x 18 x 8 in. Finish as above. Terms: Deposit 13/10 and 12 monthly payments of 13/10. Only £7.19.6. Carr. 8/6.

PHILIPS CONCENTRIC (Dual One) 10in. P.M. SPEAKERS. 3-5 ohms. Limited number at only 29/9.

TERMS: C.W.O. or C.O.D. under £1. Post 1/9 extra under £2: 2/9 extra under £5. Open 9 to 6; Weds. until 1 p.m. Trade supplied. S.A.E. with all enquiries.

AM/FM RADIOGRAM CHASSIS HIGH QUALITY 6-8 WATT PUSH-PULL OUTPUT

For 200-250 v. Mains. Long wave, Medium, F.M. and Gram. Complete with 3 B.V.A. valves. Guaranteed 12 months. Only 22 GNS. Or Deposit £2.12.0 and 9 monthly payments of £2.12.0.



PLESSEY DUAL CONCENTRIC 12in. 15 ohms HIGH FIDELITY SPEAKER (12,000 lines) with built-in tweeter (completely separate elliptical speaker with choke, condensers, etc.), providing extraordinarily realistic reproduction when used with our A8 or similar amplifier. Rated 10 watts. Price only 25/17/6.

HI-FI CRYSTAL PICK-UP HEADS. (Turnover type with sapphire stylus). HGP69. Standard replacement for Garrard and B.S.R. B.S.R. Ful-in, Garrard CC2. 19/9.

POWER PACK KIT. Output 250 v. 50 mA. fully smoothed and 6.3 v. 1.5 a. Consisting of Mains Trans., Selenium Rectifier, Smoothing Choke, Double Electrolytic Condenser. Chassis 6in. x 9in. and Circuit. Only 18/9.

P.M. SPEAKERS. 2-3 ohm, 2 1/2 in. Perdio 2/9, 5in., 17/9, 6 1/2 in., 16/9, 8in., 19/9, 8 x 5in., 25/9, 10in., 26/9, 10 x 6in., 29/9, 12in., 29/11. 10in. W.B. "Stentorian" 3 or 15 ohm, type HF1012 10 watts, hi-fidelity type. Recommended for use with our A8 Amplifier, £4.10.9. 12in. Plessey 3 ohms 10 watts (12,000 lines), 59/6.

TWEETERS. Plessey 3 ohms 19/9.

L63 MINIATURE 2-3 WATT GRAM AMPLIFIER. For use with any single or auto-change unit. Output for 2-3 ohm speaker. For 200-250 v. 50 c.p.s. A.C. mains. Over-all size 6 1/4 x 4 1/4 x 2 1/4 in. Controls: Vol. and Tone with switch. Guaranteed 12 months. Only 57/9.

SUPERHIT FEEDER UNIT. Design of a high quality Radio Tuner Unit, specially suitable for use with any of our Amplifiers. Delayed A.V.C. employed. The W.Ch. Sw. incorporates Gram position. Controls are Tuning, W.Ch. and Vol. only 250 v. 15 mA. H.P. and T. of 6.3 v. 1 amp. required from amplifier. Size of unit approx. 9-6-7in. high. Simple alignment procedure. Point-to-Point wiring diagrams. Instructions and priced parts list with illustration 2/6. Total building cost £4/15/-. For descriptive leaflet send S.A.E.

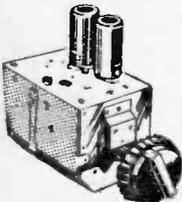
E.M.I. 4-SPEED SINGLE RECORD PLAYER UNITS with turn-over crystal head for Stereo and Monaural. Only 29/19/9. Carr. 4/6.

Mail Orders to 29-31 Moorfield Rd., Leeds 12.
Callers to 5 and 7 County (Mecca) Arcade, Briggate, Leeds 1, and 8-10 Brown St. (Market St.), Manchester 2, or 56, Morley Street, (Next to Majestic Ballroom) Bradford.

For Your Lab.

Resistance substitution boxes are great time savers and you really cannot have too many of them; here then is an opportunity to acquire these at a very low rate. Our R.S. kit available for only 8/6 plus 1/6 postage, comprises one 50 W. precision variable resistor 0-100 K., six 2-3 watt fixed resistors, one 6-position switch, one pointer knob and one ordinary knob and instructions. This unit when made up will give an infinite variability over the range 100 ohm to 2 meg.

12-CHANNEL TURRET TUNER



Ideal for converting an old or building into new T.V. These are brand new stock, not surplus, supplied complete with valves and coils for local Band I and Band III stations. Model 1. I.F. Output 33/38 Mc/s

series heaters (parallel heaters. 5/- extra). Model 2. I.F. Output 16/19 Mc/s parallel heaters (series heaters. 5/- extra). With instructions and circuit diagram. 79/6. knobs 3/6 extra. postage and insurance 2/6.

Avo Proclips

The advantage of these test prods is that by pressing the trigger at the side they become crocodile clips and can be left in circuit. This is a great time saver when servicing. Price 15/- Pair.



Our 68-page Hi-Fi Catalogue is now being sent out to customers — gives details of the latest and best Hi-Fi equipment with over 400 illustrations. Price 2/6 per copy which is refundable from purchases.

A.C./D.C. Multimeter Kit

Ranges : D.C. volts 0.5, 0.50, 0.100, 0.500, 0.1-0.00, A.C. volts 0.5, 0.50, 0.100, 0.500, 0.1-0.00, D.C. milliamps 0.5, 0.100, 0.500, Ohms 0.50, 0.000 with internal batteries. 0.500, 0.000 with external batteries. Measures A.C./D.C. volts, D.C. current and ohms. All the essential parts including metal case, 2in. moving coil meter, selected resistors, wire for shunts, range selector, switches, calibrated scale and full instructions price 19/6. plus 2/6 post and insurance.

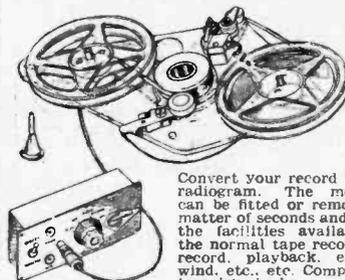


Miniature Microphone

American made. Dynamic type. Real bargain at 2/6. plus 6d. postage.



Your Radiogram into Tape Recorder



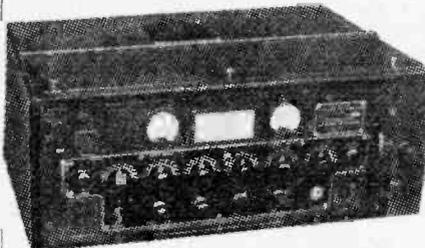
Convert your record player or radiogram. The mechanism can be fitted or removed in a matter of seconds and gives all the facilities available with the normal tape recorder, i.e., record, playback, erase, re-wind, etc., etc. Complete with transistorised pre-amp as illustrated or with Acos pick-up, £15.12.0. H.P. terms available.

Unique Opportunity to build Fine Transistor Set

Constructor's parcel : to build Pocket 6 Transistor Set as currently being sold at £17.17.0. Parcel comprises Motified two-tone cabinet as illustrated, tuning dial, two gang tuning condenser, combined bakelite chassis / printed circuit and easy to follow circuit. Costing value 57/6—offered while supplies last at only 29.6. plus 2/6 post. Suitable for your own circuit or to build original circuit. All parts available at highly competitive prices. Do not miss the tremendous bargain.



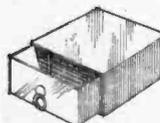
American Receiver C646068



This is a 12-valve receiver originally designed for military operation on the 60-80 Mc band. One stage of R.F. and three stages of I.F. with additional stages for noise suppression and A.V.C. make this an extremely versatile receiver, also crystal in oscillator provides highest stability. On the front panel are all controls and moving coil input and output meters. Complete with its own power supplies, these, however, are intended to operate on American voltage 115 V. So with each receiver we supply a step down transformer. A limited quantity only of these offered at the extremely low price of 26.10.0. Plus 12/6 carriage and packing. Size approx. 20in. x 9in. x 17in. Note : These sets are unused but have been in store for some years and may therefore require servicing before being put into operation. At the low price charged we cannot test these nor do we give any guarantee. Complete with valves and one crystal. Circuit diagram and technical notes free with equipment or separately price 2/6.

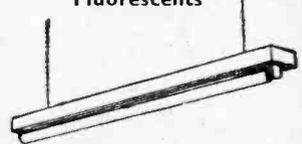
Component Storage Drawers

Stout board construction these drawers are ideal for small parts. Supplied complete with simple erection instructions—1/6 each or 12 drawers each 6 x 2 1/2 x 6 1/2in. 13/6. post 2/-.



FOR ADDRESS SEE OPPOSITE PAGE

Fluorescents

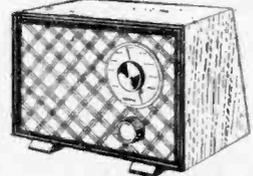


All complete with polyester filled choke and interference suppressors, starters and fluorescent tube—all ready, in fact, to switch on. 5ft. 80 watt, 54/9 plus 5/6 carriage and insurance. 4ft. 40 watt, 39/6 plus 5/6 carriage and insurance. 3ft. 40 watt, 39/6 plus 4/6 carriage and insurance. 2ft. 20 watt, 39/6 plus 4/6 carriage and insurance. Circular 40 watt, 87/- plus 5/6 carriage and insurance. Circular 80 watt, 104/6 plus 5/6 carriage and insurance. These fittings are suitable for hanging or direct fixing—carriage and insurance applies for distances up to 250 miles, over and above this carriage will be extra.

Connecting Wire



P.V.C. covered in 100ft. coils—2/9 a coil or four coils different colours, 10/-, post free.



New Improved Circuit for the 1960 Skysearcher

This is a three valve receiver kit using modern circuitry. Ideal as a second set for the bedroom, workshop, etc. All parts including mains transformer, valves, resistors, coils, etc., but not cabinet, chassis or speaker, 29/6. plus post and ins. 3/6. Data free with parts or available separately 1/6.

Battery Charger Rectifier. Selenium 12.15 v., 5 amp., 12/6.

Metal Chassis. Purched for Mullard 510 Amplifier, complete with inner screening sections and stove enamelled, 12/6 set.

Geiger Counter Tubes. 20th Century type. Type No. G24, with circuit of geiger counter, 29/6.

Heavy Duty Test Prods. Red and black with plug-in lead attachments, 8/6.

Metal Rectifier

80 mA. 300 volt, 5/6 each, plus post 1/-.

Novelty Radio

Completely wired tunable medium and long wave, originally intended for B/G valves and external batteries but could easily be converted for transistors with internal batteries. Less valves and speaker, otherwise complete. 15/-, plus 1/6 postage.



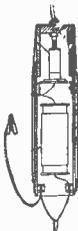
Wondergram



This is a record player which operates from torch batteries. It is amazingly small and can, in fact, be carried in the pocket—it weighs only about 2lb. Despite its small size it will play all modern records, 7in., 10in. and 12in. at 33 r.p.m. or 45 r.p.m. Completely transistorised, it gives 100 milliwatt undistorted output. Price £15.15.0. H.P. terms available.

Radio Stethoscope

This can be slipped into the pocket rather like a fountain pen. With it in most districts a receiver can be checked from the grid of the first valve right through to the output without a signal generator, the stethoscope will operate in both L.F. and R.F. circuits without alteration. It is a complete fault-finder. All the necessary parts to make this tracer 9.6. post 1/-.



Crystal Mike by Acos



Model 39/1, this is ideal for tape or general amplifiers, complete with screened lead 39.6. plus 1. post.

“Dim and Full” Switch

Particularly useful for controlling photo-flood lamps which have only a short life at full brilliance. This toggle switch has three positions: the first position puts two lamps in series at half brilliance for setting up, the second position is off and the third position full brilliance for the operation shots. Also useful for controlling night lights, heaters, etc. Price 3/9 each, post 9d. Circuit diagram included.

**Hi-Fi Snip
Infinite Wall Baffle**



Nicely veneered and polished. Corner fitting (attaches to picture rail). Takes up no floor space. Gives really fantastic results with only low-priced 8 in. speaker. Fitting for tweeter. Only 45/- each, carriage and insurance 3/6.

ASSURE YOUR FUTURE

The ownership of a good instrument has been the turning point in many a career. It could easily be yours, for you can own the latest Avo Test Instrument for the initial payment of only 10/-. This test instrument is ultra-modern, has a sensitivity of 10,000 Ohms per Volt, measures A.C. Volts 0-1,000 in 5 ranges, D.C. Volts 0-1,000 in 7 ranges, D.C. current at 1 Amp. in 5 ranges and resistance up to 2 Megs. in two ranges.



Free Gift To extend the uses of this instrument, for instance, to measure capacity, inductance, E.H.T., etc., we have developed a range extender scale and operating notes, these will be sent free to purchasers of this instrument. All sent immediately for 10/- deposit, balance by 21 payments of 10/-, which includes free insurance against accidental damage for 12 months. Non-callers add 3/6 post and insurance. Cash price, £9.10.0.

Components Would Cost More

Car Battery Charger—ready-made high output battery charger in stove enamelled sheet steel louvered case. New, complete and ready to work. Rated at 12 v. 4 amps, and variable rate selector for trickle charging, also a meter to show charging rate. Suitable for 230/250 A.C. mains. Special snip price of 55/-, plus 3/6 post and ins.



Philips AG2009 Transcription Unit

Philips AG2009 Record Player, a modestly priced 4-speed unit with many outstanding features. It is ideal for the enthusiast who is assembling his own equipment or modernising an older installation. The pick-up arm is wireless for stereo and the Philips stereo head is available as an optional extra.



Eddy Current Brake gives ±2% fine adjustment on all four speeds. Continuously variable pick-up playing weight (2-12 gms.). Supplied with Philips Hi-Fi crystal head, type AG3019 for microgroove and 78 r.p.m. Frequency response 30-15,000 c/s. Pick-up lifting and lowering device. Individually balanced heavy turntable. Muting switch fitted. Can be used with any amplifier or radio set. Complete with monaural pick-up, £10.10.0, or £1 deposit and 21 fortnightly payments of 10/-. Available also with stereo head, diamond or sapphire stylus. Prices on request.

Here is a present that will be really appreciated

Motorised food mixer with no irksome lead hanging out and which does not have to be plugged into the mains as it works off three 1 1/2 v. cells in its handle. A really useful mixer ideal for kitchen or anywhere about the house and can also be taken on barbecues, picnics, etc. Price 35/-, plus 2/6 post and packing.



For Your Service Department

An invaluable tool for working inside a dark cabinet or cupboard. This is a screwdriver with torch and has four interchangeable bits, two for the ordinary slotted screws and two for Philips heads. The torch section operates from 1 1/2 v. batteries in the handle and will save its cost in frayed tempers alone. Why not treat yourself to one of these now? Only 10/6, plus 1/6 post and packing.

Morganite Potentiometers

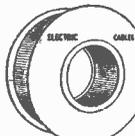
Single and 2-gang types available, standard size with good length spindle, all new and boxed. Single types, 1/- each, values available: 5K, 10K, 25K, 50K, 100K, 250K, 1 meg., 2 meg. Gang type 3/- each—values available: 5K + 5K, 100K + 100K, 1 meg. + 1 meg., 2 meg. + 2 meg.



This Month's Snip

8in. P.M. Speaker in fabric-covered cabinet—size 10in. x 8in. x 4in. Price 29/6, plus 2/6 post and insurance.

Versatile Wire



Single-strand 18-gauge with P.V.C. covering which makes it rustproof. Extra strong, will stand tremendous strain. Ideal for gardening, clothes lines, indoor aerials, etc.

etc. Also being steel alloy and having a resistance of approximately 1 ohm per yard this can be used for electrical work, oil heating, wrapping round water pipes, etc. New on drum containing 3,000ft. Price 8/6, plus 3/6 carr.

T.V. Service Sheets

200 sheets covering most popular post-war televisions by leading makers—Cosor, Ekco, Ferguson, Eys, etc. £2, post free. PREVIOUS PURCHASERS OF THESE SHEETS PLEASE NOTE: WE CAN SUPPLY SHEETS Nos. 100-200, £1, or 150-200, 10/-.

All items advertised can be obtained from the following Companies.
 If ordering by post, address your order to the Company nearest to you and please include postage.
 Electronics (Manor Park) Ltd. Electronics (Ruislip) Ltd. Electronics (Croydon) Ltd. Electronics (Finsbury Park) Ltd.
 520, High St. North, 42-46, Windmill Hill, 286, London Road, 29, Stroud Green Rd.,
 Manor Park, E.12. Ruislip, Middx. Croydon. Finsbury Park, N.4.
 Phone: RUISLIP 5780. Phone: CRO 6550. Phone: ARCHWAY 1049.
 Half day Wednesday Half day Wednesday Half day Thursday

Here are some new models



F.M. TUNER
£13.12.6

R.F. TUNING UNIT and I.F. AMPLIFIER AVAILABLE SEPARATELY

F.M. TUNER. Tuning range 88-108 Mc/s. Three I.F. stages with pre-aligned transformers. Complete R.F. Unit is despatched wired, pre-aligned and tested. Built-in power supply. 7 valves. Sensitivity $2.5\mu\text{V}$ for 20 dB. noise quieting.



RP-1U
£12.10.0

TRANSCRIPTION RECORD PLAYER. Embodies new Collaro RP594 unit with the Ronette Stereo Pick-up. Gives excellent results on stereo or mono. (16, 33, 45 L.P. or 78 r.p.m.) discs. Detachable head and supplied with wooden plinth.

THE 'COTSWOLD.' An acoustically designed 3-unit Speaker System capable of doing justice to finest programme sources. Range 30-20,000 c/s. All parts left "in the white" for finish to personal taste.

THE "GLOUCESTER" cabinet has been specially designed to meet the varying needs of different homes. Mk. I houses Record Player Stereo Amplifier, F.M. Tuner and records, etc. The Mk. II will house a Tape Deck in addition.

“PACKAGED DEALS”

The above models and others, can be obtained as parts of "packaged deals" of **MATCHED STEREO HI-FI EQUIPMENT**, thereby saving you additional money.



THE "COTSWOLD"
£19.18.6



THE "GLOUCESTER"
Mk. I £15.18.6
Mk. II £17.8.6

FREE DELIVERY IN U.K. DEFERRED TERMS AVAILABLE OVER £10.

Why not send for Free Catalogue !

Other models include

TRANSISTOR PORTABLE model UXR-1. This dual-wave, 6 transistor portable radio, strikingly styled in handsome solid leather case, is universally admired. The tone is rich and brilliant and it performs well everywhere, including in a car. Easily built in 6 hours.....**£15.18.6**
(Car aerial attachment available 5/- extra)

TRANSISTOR JUNIOR RADIO model UJR-1. Ideal for youngsters. Novel circuit gets lots of stations.....**£2.16.6**
Suitable for headphones. (Additional amplifier stage, 16/6 extra)

HI-FI 16 W. STEREO AMPLIFIER model S-88. World's finest 16 Watt Stereo amplifier regardless of price. 0.1% distn. at 6 W./chnl. The attractively styled S-88 has many excellent features**£25. 5.6**

HI-FI 6 W. STEREO AMPLIFIER model S-33. World's best value in low-price Stereo. 0.3% distortion at 2.5 W./chnl. ideal for average room.....**£11. 8.0**

HI-FI SPEAKER SYSTEM model SSU-1. Ideal for Stereo in average living-room where cost must be low. Two speakers in the enclosure. Legs, £1.7.0 optional extra**£10. 5.6**

R/C BRIDGE MODEL C-3U. Measures Capacitance, 10 pF (0.00001 μF) to 1,000 μF ; Power Factor; Resistance, 100 Ω to 5 M Ω and indicates leakage. Automatic Discharge Safety-Switch.....**£7.19.6**

AUDIO SIGNAL GENERATOR model AG-9U. 10 c/s to 100 Kc/s. Sine-wave output 10V f.s.d. down to 3 mV f.s.d. Less than 0.1% distortion (20 c/s to 20 Kc/s). Decade frequency selection. Decibel ranges, -60 to +22. 1% precision resistors**£19. 3.0**

VALVE VOLTMETER model V-7A. World's most popular VVM. Measures volts, ohms and decibels. D.C. sensitivity 7.3 megohms per Volt. D.C. input resistance 11 megohms.....**£13. 0.0**

5 in. OSCILLOSCOPE model O-12U. This fine general-purpose 'scope has "Y" sensitivity of 10 mV/cm, and covers 3 c/s to over 5 Mc/s. Rise time is 0.08 μ secs or less. Timebase 10 c/s to 500 Kc/s in 5 steps. Electronically stabilised. Voltage calibrator**£34.15.0**

DIRECT READING CAPACITANCE METER model CM-1U. 4 $\frac{1}{2}$ in. meter scale calibrated in μF and pF. Full scale deflection 100 micro-microfarads, 1,000 micro-microfarads, 0.01 microfarad, 0.1 microfarad**£14.10.0**

DX-100U AMATEUR TRANSMITTER. The most popular Amateur transmitter in the world. 100-140 watts output. 160, 80, 40, 20, 15 or 10 metres.....**£78.10.0**

DX-40U AMATEUR TRANSMITTER. 40 Watts to aerial. Input power 75 W. C.W., 60 W. pk. C.C. 'phone. Provision for V.F.O. Designed by "Hams" for "Hams"**£29.10.0**

VARIABLE FREQUENCY OSCILLATOR model VF-1U. 10V output. Covers 10 to 160 metres.....**£10.12.0**

Without obligation please send me **FREE CATALOGUE (Yes/No)**.....

Full details of model(s)..... **Deferred Payments (Yes/No)**.....

NAME
(BLOCK CAPITALS)

ADDRESS

DAYSTROM LTD., DEPT. PW. 2,
GLOUCESTER, ENGLAND

A member of the Daystrom Group, manufacturers of
THE LARGEST-SELLING ELECTRONIC KITS IN THE WORLD.

Practical Wireless

VOL. XXXV, No. 636, FEBRUARY 1960

Editorial and Advertisement

Offices :

PRACTICAL WIRELESS

George Newnes, Ltd., Tower House,
Southampton Street, Strand, W.C.2.

© George Newnes Ltd., 1960

Phone : Temple Bar 4363.
Telegrams: Newnes, Rand, London.
Registered at the G.P.O. for trans-
mission by Canadian Magazine Post.

SUBSCRIPTION RATES

/ including postage for one year
Inland - - - - £1.3.0 per annum
Abroad - - - - £1.1.6 per annum
Canada - - - - 19s per annum

Contents

	Page
Editorial	829
Round the World of Wireless	830
Beginners' Test-Meter...	832
A 6K7 Superhet	835
A Transistor Reflex Receiver	838
Versatile V.F.O.	843
A Quality V.H.F., F.M. Receiver	845
On Your Wavelength	851
Valve Coding Systems	852
Using High-Cycle Trans- formers	854
Experimental S.W. Three ...	856
Test Panel for Transistors ...	859
Becoming an Amateur	865
Improving Amplifier Quality	869
Learning Morse	873
Club News	877
Indoor Aerials	878
Increasing Signal - to - Noise Ratio	881
News from the Trade	885
Open to Discussion	889

The Editor will be pleased to consider articles of a practical nature. Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed The Editor PRACTICAL WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

Copyright in all drawings, photographs and articles published in PRACTICAL WIRELESS is specifically reserved throughout the countries signatory to the Berne Convention and the U.S.A. Reproductions or imitations of any of these are therefore expressly forbidden. PRACTICAL WIRELESS incorporates "Amateur Wireless."

PARLIAMENTARY BROADCASTS

THE question of broadcasting Parliamentary proceedings has been raised again recently. It has been mooted that the proceedings should be televised but there are a number of technical difficulties. It would be far easier, however, to provide sound broadcasting coverage, although wavelengths would have to be freed for the purpose. In our opinion, any attempt to broadcast all the proceedings of Parliament would be money wasted; the potential audience is far, far smaller than that at present enjoyed by the Third Programme. It would be more sensible to broadcast only a selection of the more interesting Debates in the course of, say, the Home Service Programme. The expense incurred would be of the same order as those of normal programmes. However, we think, that in view of the present-day apathy towards Parliamentary activity, it would hardly be worthwhile to increase the present coverage.

RADIOS IN CARS

THE number of car owners in this country is rising steadily and many wish to be able to listen to radio programmes while travelling. Several years ago the only method of achieving satisfactory radio reception was to install a "car radio" with all the associated equipment including a power pack for obtaining H.T. from the normal 6 or 12V car battery. Such radios were frequently difficult to fix in position, large in size, and caused a heavy drain on the battery. However, with the advent of the transistor, conventional portable radio receivers can be sufficiently sensitive to work satisfactorily inside most cars and form a convenient source of entertainment.

Some car owners, particularly radio amateurs, have improved reception by employing a standard car radio aerial with these portable receivers and from correspondence we have received it is clear that the majority do not appreciate the radio licence regulations. Provided a normal wireless licence is possessed a battery portable receiver can be used in a car without the need of any other licence, but if any form of car aerial is used in conjunction with the receiver, or the receiver can in any way be said to become a fixture in the car, then a separate car radio licence is required.

THE "P.W." AND "P.T." FILM SHOW

ANOTHER film show, sponsored by this journal and our companion journal *Practical Television*, is to be held at Caxton Hall, Westminster, as previously announced, on Friday, January 22nd, at 7.30 p.m. The Editor will take the chair and admission will be by ticket only. The event is being arranged in conjunction with Mullard Limited. The films are entitled, "Mirror in the Sky", "From Us to View", and "Photo Emission." There is still a small number of tickets remaining and applications for these should, therefore, be made now. Please mark your envelopes "Caxton Hall" in the top left-hand corner, and include a stamped, addressed envelope for the tickets.

Our next issue, dated March, will be published on February 5th

Round the World

of

Wireless

POTENTIAL AND CURRENT NEWS

Broadcast Receiving Licences

THE following statement shows the approximate number of Broadcast Receiving Licences in force at the end of October, 1959, in respect of wireless receiving stations situated within the various Postal Regions of England, Wales, Scotland and Northern Ireland. The numbers include licences issued to blind persons without payment.

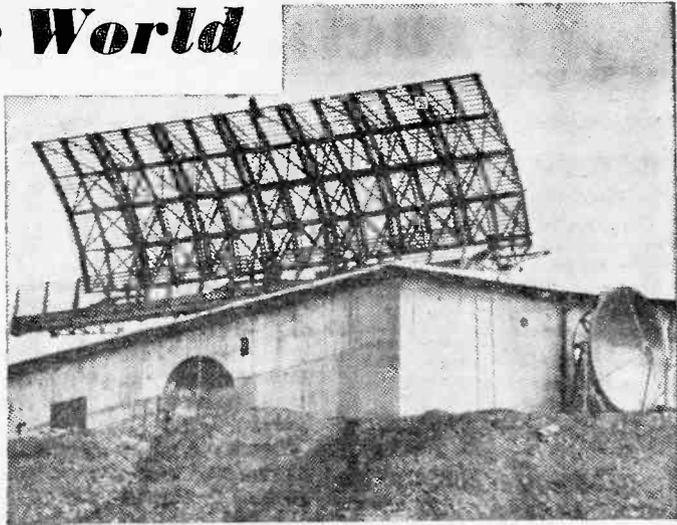
Region	Total
London Postal ...	860,803
Home Counties ...	836,989
Midland ...	620,487
North Eastern ...	710,288
North Western ...	571,594
South Western ...	500,205
Wales and Border Counties ...	308,125
Total England and Wales ...	4,408,491
Scotland ...	523,970
Northern Ireland ...	151,919
Grand Total ...	5,084,380

Radio Research Station

THE Council for Scientific and Industrial Research has authorised changes in the terms of reference of the Radio Research Station, D.S.I.R., and has appointed Mr. J. A. Ratcliffe, C.B.E., F.R.S., to be the new Director from October 1, 1960, when the present Director, Dr. R. L. Smith-Rose, C.B.E., retires.

The Radio Research Station has earned for itself an international reputation for its detailed studies of the propagation of radio waves by way of the ionosphere and the troposphere. Recently the programme has been reviewed and its scope has been extended so as to take advantage of the new techniques provided by rockets and artificial earth satellites.

Under its new terms of reference the station will undertake investigations of the upper atmosphere and outer space by both radio and non-radio methods. Half the total staff effort of the station (amounting to about 80 scientists and assistants) will be made available for this purpose. The



Wellington (New Zealand) Airport, which has just been officially opened, is the first in the world to have a high-power (500kW) 50cm radar installation. This, together with a similar one at Ohakea Airfield, has been supplied and installed by Marconi's.

The Wellington installation posed many unusual engineering problems. The radar head, with duplicated transmitter/receivers, was sited on the highest point of a razor-back ridge, 1,630ft. high, control being effected from the Airways Control Centre four miles away, via a microwave radio link.

The received radar signals are also sent by microwave radio link to the airport and by a separate radio path to the Airways Control Centre for display on the radar screens.

necessary additional staff is being recruited.

Electronic Control Systems

A NEW electronically controlled positioning system, which when used in conjunction with a conventional drill, or other tool, enables very high degrees of accuracy to be obtained without a skilled operator, has been producing jet engine components at the Derby factory of Rolls-Royce Limited's Aero Engine Division for the past five months.

The system, which has been developed by E.M.I. Electronics Ltd., in collaboration with Optical Measuring Tools Ltd., uses a 30in. rotary table, and results obtained have been so satisfactory that Rolls-Royce has now placed orders for two more.

The new equipment allows work to be carried out to accuracies never before possible, and because it dispenses with expensive jigs and templates is particularly suitable for small batch working.

BBC's Sound Services

THE BBC issued the following statement on Friday, November 27th:

"The BBC has been considering for some time the development of its sound services in general, and their extension into local broadcasting. Any major extension of the existing services, particularly for local broadcasting, depends, in the first instance, on the allocation of additional frequencies in the V.H.F. Band. The BBC has already made known to the Post Office its desire to use further V.H.F. frequencies to fill gaps in its present V.H.F. coverage and for local broadcasting. These frequencies, which are allocated internationally for broadcasting, are at present used in this country by other services, and their release for broadcasting is problematical. Until this question is resolved it is not possible to proceed with detailed plans."

Agreement

AN agreement has been concluded between Marconi's Wireless Telegraph Company

and the Government of India (Ministry of Defence) for the manufacture under licence in India of Marconi V.H.F. Multi-channel Radio Terminals and Repeaters, and ancillary equipment. The agreement underlines the importance the Indian Government places on the development and expansion of internal communications.

Under the terms of the agreement Marconi's are to supply all necessary technical assistance for indigenous manufacture.

Dounreay's "Hot" Laboratory

ONE of the world's most elaborate "hot" radio-activity laboratories is a vital feature of Britain's new fast breeder reactor at Dounreay, Caithness. No similar reactor has ever operated before and, because of its unusual features, it is essential for nuclear scientists to carry out laboratory examination of intensely radioactive fuel elements.

Everything in the laboratory is done by remote control, using closed-circuit television and protective windows. Engineers and scientists operate the complicated equipment from behind concrete walls. Mechanical hands, called Master Slave Manipulators, follow precisely the movements of an operator's fingers and are sufficiently sensitive to pick up a pin.

Appointment

IT is announced by the Plessey Co. Ltd., that Mr. R. G. Kenwright has joined the Company as Chief Engineer, Television Components Division, Components Group, Ilford.

Mr. Kenwright joined Pilot Radio Limited in 1940 and was appointed Chief Engineer of that Company in 1946. In this capacity he was responsible for the complete production programme for radio, television and other equipment.

Before joining Pilot Radio Limited, Mr. Kenwright was a radio design engineer with The Plessey Company Limited.

Sales and Production of Gramophone Records in September

MANUFACTURERS' sales of gramophone records in September were valued at £1,290,000 which was 3 per cent. higher than in September 1958. Total sales for the third quarter

of last year were 1 per cent. higher than in the corresponding quarter of 1958 but export sales were 6 per cent. lower.

In September the production of 45 rev./min. records was 51 per cent. greater and 33½ rev./min. records 23 per cent. greater than in September 1958 but 60 per cent. fewer 78 rev./min. records were produced.

The total production of gramophone records during the third quarter of last year was 5 per cent. higher than the third quarter of 1958; 66 per cent. fewer 78 rev./min. records, 56 per cent. more 45 rev./min. records and 11 per cent. more 33½ rev./min. records were produced than in the corresponding quarter of 1958.

Trade Fair in Moscow

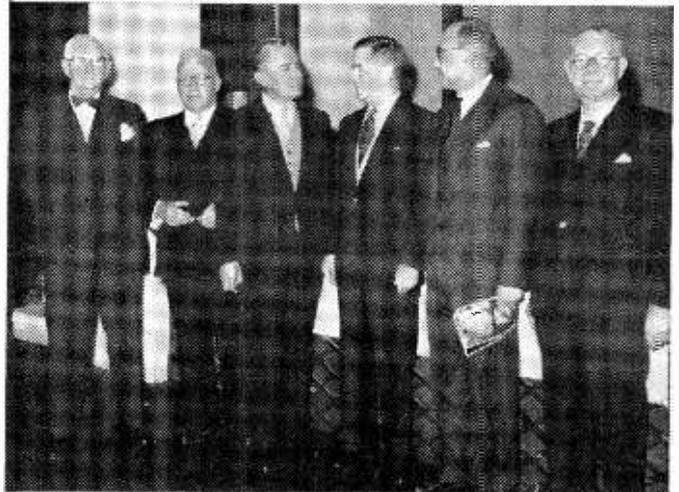
AN Advisory Council of leading industrialists with wide experience of trading with the

Fair is organised in the best interests of British industry.

Mr. V. G. Sherren, Managing Director of Industrial & Trade Fairs Limited, organisers of the Fair, and Chairman of the Working Committee, said at today's first meeting of the Joint Committee that the response from British industry to the Anglo-Russian Trade Agreement signed last year has been immediate and a large number of British companies regard the Fair as the ideal "stepping-off ground" for future trade relations.

Tape Services for the Sick and the Blind

ON Friday, 30th October, the arrangements for the first steps in the co-ordination of tape-recording services for the sick and the blind were formally agreed on at the offices of the



Top telephone men of Britain get together. Left to right in this group, seen at the G.P.O.'s Dollis Hill, London, Research Station, when Britain's first experimental electronic telephone exchange was opened on November 10th, are: Sir Thomas Eades, Chairman of the Automatic Telephone and Electric Co.; Sir Lionel Harris, Engineer-in-Chief of the Post Office; Mr. J. R. Bevins, Britain's new Postmaster-General; Dr. J. N. Aldington, Group Managing Director of Standard Telephones and Cables; and Mr. R. Robinson, Director in Charge of G.E.C.'s Telephone, Radio and Television Works.

Soviet Union has been set up to advise on the organisation of the British Trade Fair to be held in Moscow in 1961. The Council will hold joint meetings at regular intervals with the Working Committee on the Fair. It will also act as an Exhibitors' Committee to ensure that the

British Recording Club, 145, Fleet Street, London, E.C.4.

The organisations which will now work in co-ordination with the British Recording Club are The Hospital Broadcasting Services, The Tape Reading Circle for the Blind, and the British Recording Club Braille Services.

Beginners' Test-Meter

No. 6.—THE WIRING OF THE A.C. RANGES OF THE MULTI-METER

By E. V. King

THIS final article will enable the construction of the multimeter to be completed. Few extra parts are required and none of the wiring so far carried out has to be altered or removed.

The A.C. Range (Volts)

In order that the meter may be used for testing the mains side of a receiver, the unrectified transformer output for H.T. or the audio-output, the meter must respond to A.C. voltage. A moving coil instrument will flicker on A.C. so that we must accept A.C. into the test leads, pass it through the dropping resistors and then rectify it to D.C. before application to the meter. Full wave rectification is necessary to obtain a correct deflection and a special "meter rectifier" is usually employed to do the job. The author believes these are of the copper oxide type, but are basically no different from any other rectifier. They are very small and compact, being about the size of six shillings piled one on another. This rectifier must match the full scale deflection of the meter. That is, in our meter, it must be bought as a "one milliamp meter rectifier (bridge type)" (see Fig. 30). These vary in cost between 6s. 6d. and 14s.

The author tried the use of four ordinary

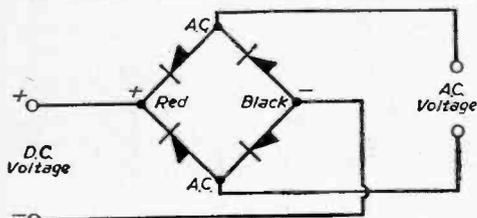
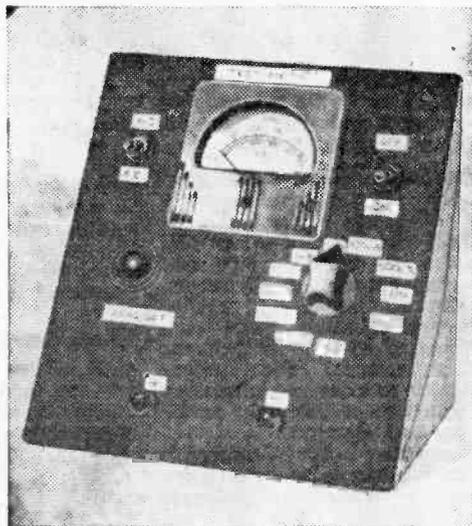


Fig. 30.—Circuit of the meter rectifier.

cheap germanium diodes and had reasonable success, the results of which will be given later. The use of four diodes would, of course, lower the cost considerably as they are very cheaply available on the surplus market. They would probably be harder to burn out than the copper oxide type rectifier which is very easily damaged by overload or by overheating when fixing the wires.

The low ranges of Volts are not accurate when the rectifier is in circuit so a switch is fitted to give direct connection to the meter for ordinary D.C. use, the rectifier being switched in for A.C. operation. The input to the meter at "c" and



The completed meter.

"d" is always connected to the rectifier, but this has no effect on the meter (i.e., does not shunt it) as the rectifier resistance is very high.

Wiring the A.C. Range

The switch S4, which must be a two-pole, throw-over type is fitted as shown in Fig. 31. Find out with a torch battery and lamp or by using the multi-meter on the resistance range when the contacts "a" and "b" are making with "f" and "e" and arrange the switch as shown. Then the down position will be "A.C." and the up or "Off" position will be D.C. If you did make an error, however, it would not be serious and would soon be discovered for the meter would refuse to work on "A.C." but would work on D.C. or A.C. when switched to D.C.

The meter rectifier is attached to the panel with a small bolt as shown in Fig. 31. Do not shorten the leads already attached. Now examine the rectifier. Two leads are green, one is red and one is black, or two tags have no colour, one is red and one is black. Or engraved in the black plastic near each tag is a sign, one +, one -, and two ~. The green leads, the colourless tags or the tags marked ~ are those which accept A.C., the others obviously passing on positive and negative polarity respectively. The rectifier must not on any account be touched with a soldering iron. The leads should have sleeving slipped over them and they may be lengthened as required.

Here is a suggested plan to be carried out with careful reference to Figs. 31 and 27.

1. Unsolder the lead going to plus of milli-

ammeter and solder it to tag "d" on S4.

2. Unsolder leads from negative of meter. join them together and lengthen if necessary (or make fresh connections) so that they connect to "c" on S4. This has been done on Fig. 31 by taking a wire from R5 to "c" and from R5 to pin 6 on S2 and then on to the busbar joining R6, 7, 8 and 9.

All we have done so far is to connect leads which did go to the milliammeter to "c" and "d" on the switch.

3. Join "b" of S4 to plus of milliammeter.

4. Join "a" of switch to minus of milliammeter.

Now put switch in D.C. position and test that the meter still works properly on all ranges as it did before. Do not proceed to wire in the rectifier until you are sure of this.

5. Take the two A.C. leads (green, colourless tags or marked ~) and connect one to the plus terminal in all. Connect the other to the busbar joining R1, 2, 3, 4 and 5 together. Make sure no shorts can occur as the leads will be rather on the long side.

Now put the switch to D.C. as before and check again that the meter still works perfectly on all ranges. If it does not, then the rectifier is faulty unless you have caused other wiring trouble. Again, do not proceed if the meter does not work at this stage.

6. Solder the positive lead from the rectifier to tag "f" on S4.

7. Solder the negative lead from the rectifier to tag "e" on S4.

Now test on D.C. again: there should be no difference. You may now switch to A.C. and try it on a battery or A.C. voltage from a transformer. The same rules apply to this as applied to the D.C. meter, always start with S1 off, and

on the highest range. Never overload the meter.

An interesting point when using a copper oxide rectifier is that if the meter is overloaded on D.C. ranges with the circuit of the multimeter the rectifier is much more likely to break down than the meter. This is a good point as on the whole the rectifiers are cheaper and easier to come by than meters, but it also means that if an obscure

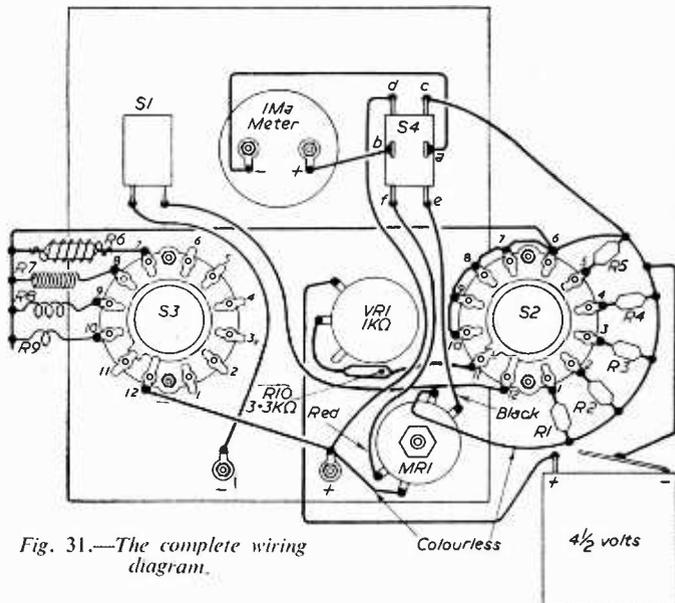


Fig. 31.—The complete wiring diagram.

fault occurs and no deflection can be obtained on any range it could be rectifier trouble. This would soon show up on removal of the rectifier, the remainder of the circuit being left intact and the switch S4 being put on D.C.

Making a Meter Rectifier with Four Germanium Diodes (Fig. 32)

Four diodes are mounted by passing the leads through four holes spaced about 3/4 in. apart in some paxolin. The leads are twisted and soldered at their ends on the other side. Leads coded by colour are taken through four more holes to guard against accidental pulling.

The diodes should be tested on the resistance range and four with the lowest resistance chosen for use. If the meter shows a very high resistance reverse the connections in the above test.

The germanium diodes have an appreciable resistance in the forward direction so that the ranges will read low on A.C. but in ordinary servicing this will not matter.

Full details are given in the sketches of Fig. 32. Some diodes may be coloured the reverse way round so if, when wired in circuit, the meter tends to move backwards, simply change over the red and black leads from the rectifier bridge.

Using the A.C. Ranges in Receiver Testing

The meter is switched to A.C. 1,000V range and the voltage range reduced with caution as each test is in progress. On Fig. 10 the meter may be

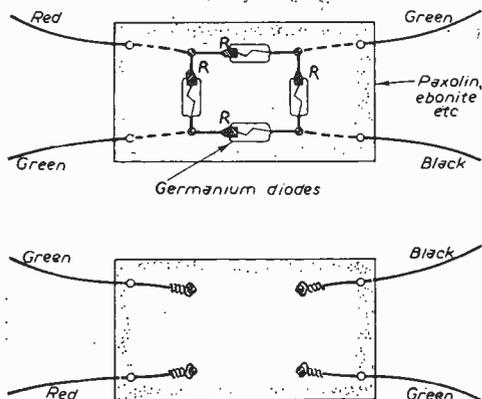


Fig. 32.—Making a meter rectifier from four germanium diodes.

clipped across the mains leads (8 and 9) to test if the voltage is actually there and across at points 7 and 10 to test the switch (e and s).

In Fig 11 the meter would be used across the mains at 18 and 16 and then at 17 and 16 to test the switch. When connected across from 17 to 18 with the switch off it will tell you if the transformer winding is open circuit, it should show the full voltage of the mains. Test the secondary of the transformer by putting the meter between point 15 (usually chassis) and each anode of the rectifier valve at 14 and then 13. The readings should be identical. If not, remove the valve and test again. The voltages will be higher but should be identical. If not H.T. windings are shorting, if they are the rectifier valve is faulty. The reading from 13 to 14 is not of much use but will be the sum of the other two readings. Test here with care as a 500-0-500 transformer will have well over 1,000V on this test.

Filament windings may be tested, but since the filament voltage should be fairly accurate and the meter is not, especially on the low (A.C.) ranges, refer to the graph given (Fig. 33) or test a receiver known to be in working order and note the 5V, 4V and 6.3V positions.

Using the Meter to Test Condensers

The meter is put on D.C. ranges, to resistance test. One lead is clipped to the condenser and the other lead is touched, without contact with the hand, on to the other side of the condenser. For condensers of $0.01\mu\text{F}$ and less, no deflection of the needle should be noticed. If there is, the condenser should be discarded. If the condenser is over $0.01\mu\text{F}$ and up to about $0.1\mu\text{F}$, there should be a very small flick after which the needle should return to zero. If it does not, the

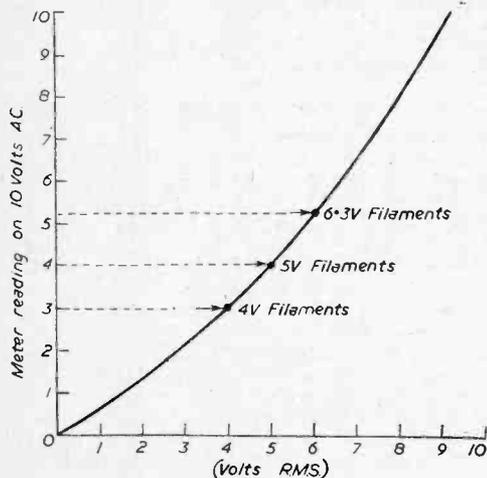
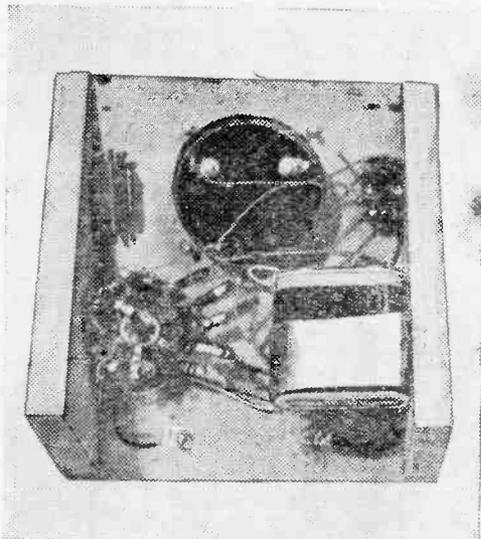


Fig. 33.—Reading filament voltages from a graph.

condenser is no use, having a high leakage value. If the condenser is $0.1\mu\text{F}$ (or over) the flick will be more apparent (about 1/20 full deflection), but should still settle to zero if the condenser is not electrolytic. In testing larger condensers the same idea is applied, but the original deflection



Rear view of the completed meter.

will be greater. This gives a rough estimation of capacity. When testing electrolytics, the meter will probably move right over the scale and should return rapidly to almost zero. The nearer to zero it goes the better the condenser, and the more the initial flick the higher the capacity or the better polarised the condenser is. If the needle moves back slowly, over, say, one minute, it shows usually that the condenser needs polarising on a D.C. source. When testing electrolytics, the plus terminal of the meter should be connected to the minus of the condenser.

Trimmers may be tested for the usual fault of a dead short in the same way. Disconnect from circuit on one side first (as a tuning coil may be shunted across them).

Conclusion

The radio enthusiast will now have a strong, serviceable meter with which he should be able to carry out all normal tests, and fault detection should become much easier. Above all he will, in the construction of the meter, have gained much useful knowledge. If a commercial instrument is overloaded and damage is done it is often necessary to return it to the makers, but the beginner with this meter should be able to trace any damage and repair it himself. Even if it happened to be the movement itself which needed replacing, this would be a small cost compared with a makers' overhaul.

If you are not in the habit of filing your PRACTICAL WIRELESS you should copy out the circuit of the completed meter, put it in an envelope, and pin it inside the meter for reference in the future if necessary. This is always a useful procedure, even if some apparatus is made for a friend, as one's memory of particular jobs often fades surprisingly over a few years.

The author will be pleased to deal with any queries concerning this particular instrument through the usual query coupon service.

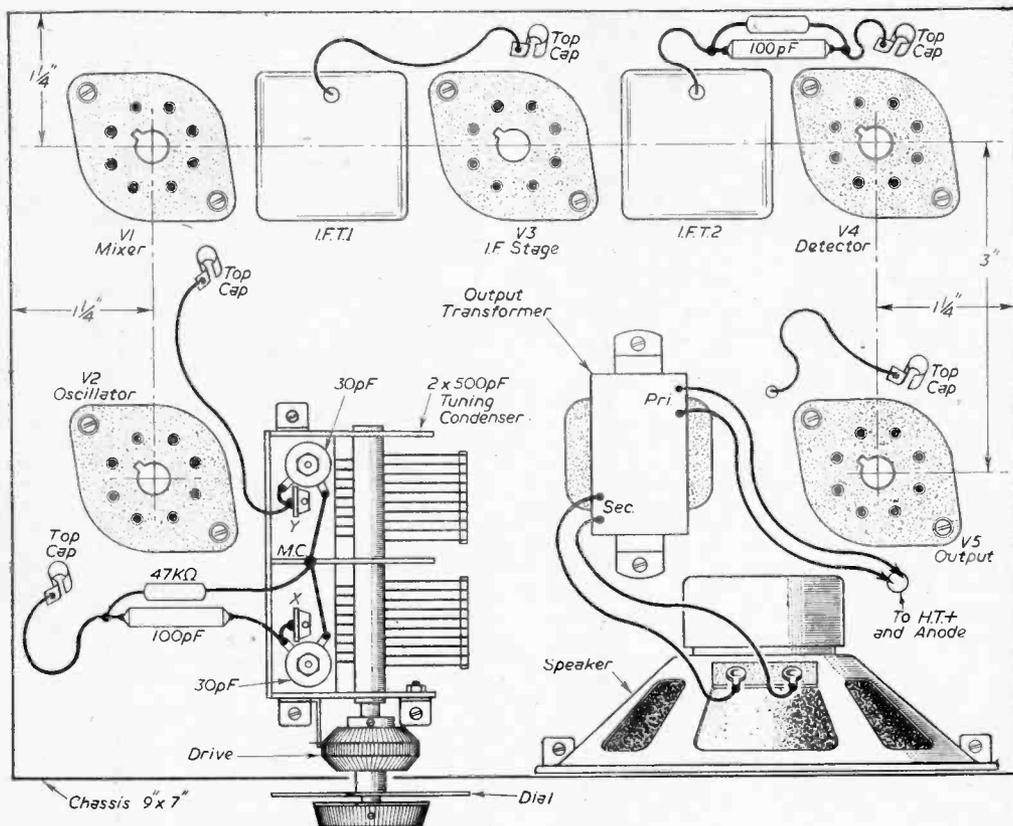


Fig. 2.—Chassis layout.

These pin connections are, of course, common to all the stages throughout the receiver. It is thus easy to make a final check of valveholder wiring, before trying the set.

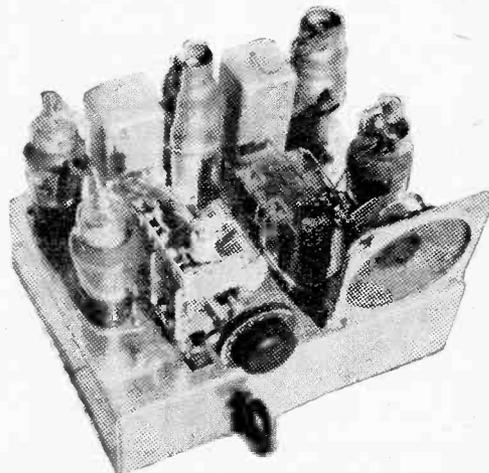
Chassis Layout

A chassis 9in. \times 7in. \times 2½in. deep will easily accommodate the parts, including a 4in. or similar speaker, and the layout is shown in Fig. 2. A sensitive speaker of the type used in battery portables will be satisfactory, and its output transformer may generally be retained because the primary current is only some 12mA or so. A transformer for mains output valves, of larger type and greater current rating, is equally satisfactory.

Separate trimmers of 30pF or 50pF maximum capacity must be wired in parallel with each section of the gang condenser, as shown in Fig. 2, if this item does not have trimmers already fitted. Any type of reduction drive is satisfactory. The small drives made to fit directly on the condenser spindle have a projecting lug which must be held by a bracket or long bolt and lock nuts, or the drive cannot function.

The first I.F. transformer will normally have a lead issuing from the top, unless it is a midge component. This lead is for I.F. stage grid

connection. With the second transformer, all leads normally issue from the bottom, and the wire which would normally go to the diode can



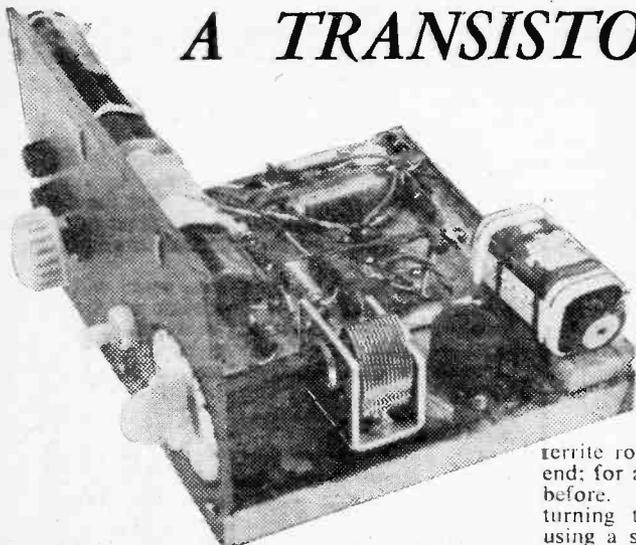
The parts shown in the chassis layout diagram can be identified in this view of the receiver.

A TRANSISTOR REFLEX RECEIVER

COMPLETING AND TESTING THE SET

(Continued from page 744 of the January issue)

By D. B. Pitt



THE circuit diagram of this receiver was given in the previous article (January issue) and its operation was discussed. The construction of the receiver was begun and the two brass busbars used can be seen clearly in the illustration on the opposite page. When the ferrite rod has been mounted, as described last month, the stand and core of the pot should be fixed in the set with woodscrews or the bolts provided with it, making sure that it is not too near the ferrite rod. Failure to separate L1 and L2 by a gap of several inches may result in unpleasant howls and distortion.

We will now assume that all the components have been wired up and firmly fixed, with the exception of the battery, L1 and L2. Turn R5 to its fully negative position (i.e., rotor-arm shorted to emitter of T1). Now take 5ft. of thin coil wire (the gauge is not important, but you should be able to handle it without breaking it) and wind 33 turns tightly on the middle groove of the bobbin. Secure the coil with thread or a very small rubber band that does not protrude beyond the rim of the groove, and reassemble the pot in its proper position, making sure that the wires emerge from the holes without being trapped between the cups, and that the plastic screw is turned up firmly but gently.

Testing

Next, connect up the two ends of the coil temporarily to the correct circuit points (across C1) and also connect a temporary aerial to T1 collector terminal via a 47pF capacitor. Do not shorten the coil leads yet; you may need the extra for adjustments.

Now take another 5ft. length of coil wire and connect its ends (temporarily) to the proper points for L2 (i.e., base of T1 and junction of R1 and R2).

Next, take the ferrite rod (or the second pot-core, if a fixed receiver with aerial is planned) and wind on about 20 turns of the wire. For a

ferrite rod this means bunch-wound towards one end; for a pot core it means the middle groove as before. You should now be able to hear, on turning the tuner, a local station or two. If using a second pot you must remember to close it when listening.

Sensitivity

Carry on in this way, adding turns one by one, until heterodyne squawks straddle each station. You must now judge the right moment to stop. An excessive number of turns will make the receiver over-sensitive and exasperatingly difficult

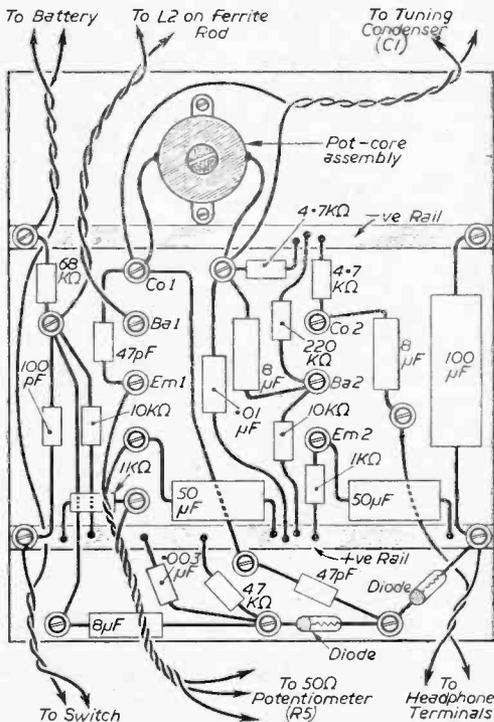


Fig. 2.—The wiring diagram.

to control without geared tuning. A slow, rhythmical chirping or "motor-boating" indicates a serious fault caused by insufficient separation of L1 and L2, cramping of wires and components, or failure of C11 or C12, and should be remedied before proceeding further.

When satisfied that the best degree of sensitivity has been reached, try the effect of using C1 and R5 controls together. Notice that although R5 has little effect on tuning-scale positions, the loudest reception of a given station is by no means always achieved with the highest level of regeneration.

If you do not intend to use an aerial, you should now disconnect the temporary one and readjust the turns of L2 for ferrite rod alone. This will mean a few extra turns for best results.

Finally, shorten the leads of L1 and L2 and fasten the ends properly, making sure that the two coils keep their proper distance apart.

Notes

For really long-range reception, obtain two shaft-extension bushes and shorten the shafts of L1 and C5 and use the coupling bushes to attach lengths of $\frac{1}{2}$ in. plastic rod or dowelling to these two components. If you can obtain a geared drive for C1, so much the better. Fix the two components at the back of the receiver and allow the ends of the plastic rods to project through the front of it sufficiently to attach the knobs. A last refinement which may be tried is to connect a small capacitor (maximum value 47pF) between the collector and emitter terminals of T1. By the use of these three stratagems the turns on L2 may be considerably increased whilst control is maintained.

Superhet sensitivity is thus achieved without instability. The receiver will not break into self-sustained oscillation, anyway, the above measures being remedies for hand-capacitance, etc. To constructors familiar with the temperament of orthodox regenerators, this automatic suppression of oscillation at the central tuning point of each station may come as a pleasant change.

Screening

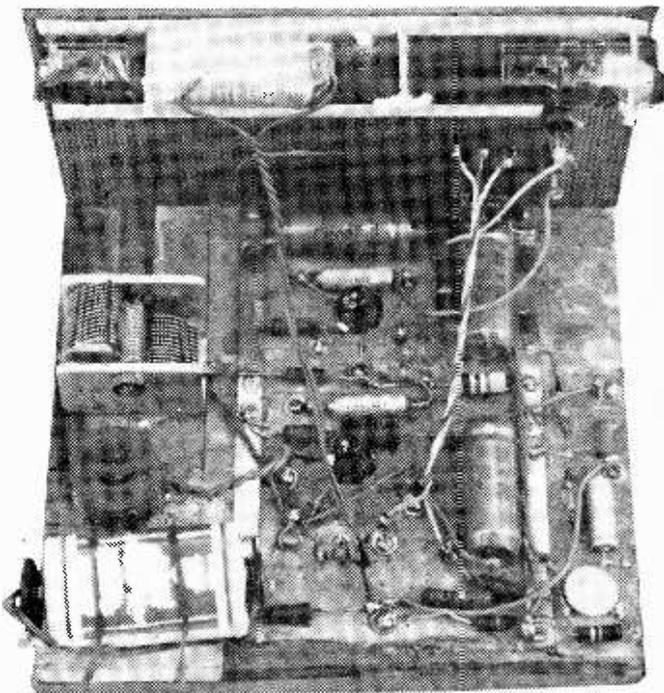
Screening has not been mentioned in the above note because no part of R5 or C1 is at the same potential and so it is difficult to apply. If you would like to try the effect, then place a large sheet of aluminium at the front of the receiver, electrically isolated from the circuit, drilling two holes for the plastic control shafts. If this is unsatisfactory, connect a high resistance potentiometer across the battery and take a wire from its middle terminal to the screen. Adjust the potentiometer setting for best results.

The use of Litz (stranded) wire for L1 and

L2 will improve performance. If you use this wire, clean the insulation from the ends of all the strands. Join all the strands together with solder and treat as one wire for fixing. Failure to observe these precautions will mean losing the advantages that this wire offers.

Earth

The use of an earth wire is not recommended, but if you intend to try one, connect it to various points on the circuit until best results are achieved. If you are using a screen, then con-



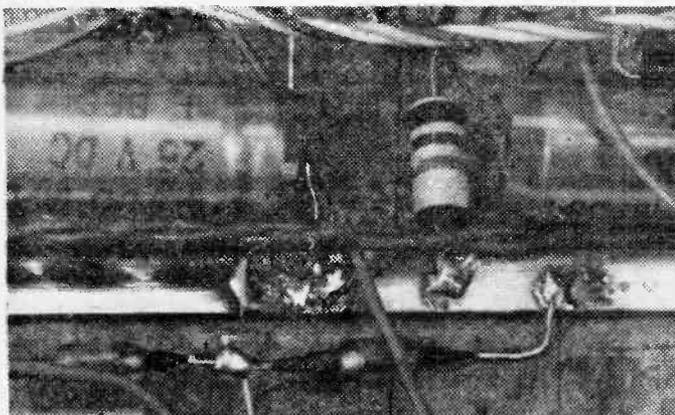
Rear view of the receiver.

nect the earth wire to the screen and nowhere else.

H.F. Reception

Reception on the lower (high frequency) end of the medium waveband, for which L1 is designed, will not be very loud. This is not the fault of the set but of the transistor specified when used in the common emitter (high gain) mode. Better results will be obtained with an OC45 for T1 and perfect results with an OC44, but at some extra expense. Alternatively, the waveband may be altered by adding half a dozen extra turns to L1 thus bringing in low-frequency medium-wave stations at high volume. If this is done, the number of turns on L2 may have to be adjusted slightly.

If you use a second pot core for L2 (for a fixed set with an aerial) you may care to use the internal slug for small adjustment of inductance. For this you will have to drill a $\frac{1}{4}$ in. hole in the baseboard or chassis on which L2 is mounted,



Close-up of part of the wiring.

directly under the centre of the core, so that a screwdriver can be inserted from the far side.

Do not forget that receivers that produce heterodyne whistles can spoil other people's reception if too long an aerial is used.

the sleeve, and position of the sleeve on the rod, will be again repaid in terms of results.

impedance headphones. The addition of one more transistor audio stage gave good loud-speaker loading with sufficient volume for an average domestic room. Tone, using a good 12in. speaker, was apparently undistorted, and background noise (with this speaker) was negligible. This performance refers to Nottingham, which is not an especially good location for the reception of Continental transmissions on the medium wave-band.

Readers constructing this receiver should note that its performance depends, more than anything else, on the winding of L2. A little extra time spent in adjusting the number of turns, spacing of turns along

Books Received

R.S.G.B. AMATEUR RADIO CALL BOOK. 1960 edition. 72 pp. 10in. X 7in. Published by The Radio Society of Great Britain, New Ruskin House, Little Russell Street, London, W.C.1. Price 3s. 6d. 4s. by post.

The previous edition of the R.S.G.B. Amateur Radio Call Book appeared in November, 1958, and since then more than 350 new calls have been issued. More than 300 calls cancelled, 100 old calls re-issued and more than 900 changes of address recorded. The popularity of the book can be judged from the fact that practically all copies of the 1959 issue were sold within a few months of publication.

AUTO RADIOS, by Jack Darr. 154 pp. 8½in. X 5½in. Published by John F. Rider Publisher Inc., 116 West 14th Street, New York, 11, N.Y., U.S.A., and obtainable from Chapman and Hall, 37, Essex Street, London, W.C.2. Price 26s.

This American book deals with the installation and servicing of car radio receivers and although many American expressions and technical terms are used, much of the information would prove of value to the serviceman in this country. Chapters deal with installation, servicing, 6-12V conversions, hybrid radios and the workshop.

BASIC AUDIO (three volumes), by Norman H. Crowhurst. 448 pages in all. 9in. X 6in. Published by John F. Rider Publisher Inc., 116 West 14th Street, New York 11, N.Y. Obtainable from Chapman and Hall, 37, Essex Street, London, W.C.2. Price 23s. per set.

These three volumes deal with almost every aspect of A.F. theory and are illustrated throughout with line drawings. The treatment may seem rather elementary to some British readers, but no knowledge is assumed and the books should prove valuable to the practical man. The illustrations follow the typical American style.

COMPONENTS LIST

Resistors :

- R1—68K, ½W
- R2—10k, ½W.
- R3—4.7k, ½W.
- R4—1k, ½W.
- R5—50ohm, wirewound pot.
- R6—47k, ½W.
- R7—220k, ½W.
- R8—10k, ½W.
- R9—4.7k, ½W.
- R10—10k, ½W.

All resistors are of 10 per cent. tolerance.

Capacitors :

- C1—50pF variable (miniature or standard).
- C2—50µF, 12VW electrolytic.
- C3—100pF ceramic.
- C4—47pF ceramic.
- C5—0.093µF mica.
- C6—8µF 12VW electrolytic.
- C7—3µF 12VW electrolytic.
- C8—50µF 12VW electrolytic.
- C9—8µF 12VW electrolytic.
- C10—47pF ceramic.
- C11—0.01µF paper.
- C12—100µF 12VW electrolytic.
- C13 (if needed)—47pF ceramic.

Transistors :

- T1—XA104.
- T2—XB104.

Coils :

- L1—Pot-core assembly, Neosid D10 (Denco).
- L2—See text.

Diodes :

- X1 and X2—GEX34

Performance

No aerial or earth connection has been shown in the diagrams. Reception of local stations on the ferrite rod alone was adequate during daylight, and after nightfall all the strongest medium-wave stations above about 230 metres were received at good volume, using standard high-

C.R.T. ISOLATION TRANSFORMERS
 1 1/2 P.P. A. OPTIONAL 25% and 50% BOOST.
 2 V. OR 4 V. OR 6 V. OR 10 V. OR 15 V. OR
 18.3 v. 12/6. MAINS INPUT.
 OUR LATEST SUPERIOR PRODUCT
 TYPE: A2. HIGH QUALITY. LOW CAPACIT-
 IY. 10/15 P.P. OPTIONAL BOOST 25%, 50%,
 75%, 10/6 EACH. MAINS INPUT.
 TYPE H. MAINS INPUT. MULTI OUTPUT 2,
 4, 6, 8, 7.8, 10 AND 13 VOLTS. BOOST 25%
 AND 50%. LOW CAPACITY. 21/-.

TRIMMERS, Ceramic. 30, 50, 70 pf., 9d.; 100 pf.,
 50 pf., 1/3; 250 pf., 1/3; 500 pf., 7/0 pf., 1/9.
 RESISTORS, Preferred values, 10 ohms to 10 meg.,
 1/2 w., 4d.; 1/4 w., 4d.; 1 w., 6d.; 1 1/2 w., 8d.; 2 w., 1/
 HIGH STABILITY. 1/2 w., 1/2; 1 w., 2/6. Preferred values,
 100 ohm to 10 meg. Ditto, 5 w., 100 ohm to 5 meg. 0. 9d.
 5 watt WIRE-WOUND RESISTORS 1/3
 10 watt 25 ohms-10,000 ohms 1/9
 15 watt 25 ohms-10,000 ohms 2/-
 15,000 ohms-50,000 ohms, 5 w., 1/9; 10 w., 2/3.

PLASTIC RECORDING TAPE

Long Play 7 in. reel, 1,700 ft. ... 38/-
 5 in. reel, 1,200 ft. ... 28/-
 5 in. reel, 850 ft. ... 21/-
 3 in. reel, 2,250 ft. ... 7/6
 Standard 7 in. Reel, 1,200 ft. ... 14/-
 5 in. reel about. ... 25/-

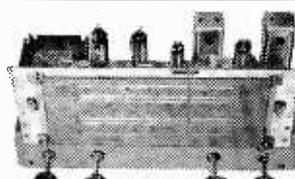
"Instant" Bulk Tape Eraser and Head De-
 fluxer, 200/250 v. A.C. 2/76. Leaflet, S.A.E.

O.P. TRANSFORMERS, Heavy Duty 50 mA., 4/6.
 Multi-tap, push-pull, 7/6. Miniature, 3/4, etc., 4/4.
 L.F. CHOKES 1 1/2 H. 60/65 mA. 5/-; 10 H.
 85 mA., 10/6; 10 H. 150 mA., 14/-.

MAINS TRANSFORMERS 200/250 v. A.C.
 STANDARD, 250-0-250, 80 mA., 6.3 v. 3.5 a.
 tapped 4 v. 4 a. Rectifier 6.3 v. 1 a. 5 v.
 2 a. or 4 v. 2 a. Ditto, 250-0-250 ... 22/6
 MINIATURE, 200 v. 20 mA. 6.3 v. 1 a., 10/6
 MIDGET, 220 v. 45 mA., 6.3 v. 2 a. ... 15/6
 SMALL, 250-0-250, 100 mA., 6.3 v. 3.5 a. 19/6
 STD. 250-0-250, 85 mA., 6.3 v. 2.5 a. 17/6
 HEATER TRANS. 6.3 v. 1 1/2 amp. ... 7/6
 Ditto, tapped sec. 2, 4, 6.5 v., 1 1/2 amp. ... 8/6
 Ditto, sec. 6.3 v. 3 amp. ... 10/6

ALADDIN FORMERS and cores. 4in., 8d.; 4in., 10d.
 4.5in. FORMES 5937/8 and Core TV12. 7in. sq. x
 2 1/2in. and 2in. sq. x 1 1/2in. 2/- ea., with cores.
 TYANA.—Midget Soldering Iron, 250/0 v. 10 w., 18/9.
 REMLOY Instrument Iron, 230 v. 25 w., 17/6.
 MAINS DEOPERS, 3in. x 1 1/2in. Adj. Sliders,
 6.3 amp., 750 ohms, 4/3. 0.2 amp., 1,000 ohms, 4/3.
 LINE CORE, 3 amp., 60 ohms per foot, 2 amp., 100
 ohm per foot, 2-way, 6d. per foot, 2-way, 7d. per ft.
 LOUSPEAKER P.M. 3 OHM. 6in. Rola, 17/6.
 No. Heavy 19in., 6in. x 4in. Rola, 15/6. 6in. Rola, 30/-,
 18" x 8 in. 21/-, 10 x 6 in., 27/6. 10in. Rola, 30/-,
 Hi-Fi Tweeter, 25/-, 12in. R.A., 30/-.
 STENTORIAN HF1012 10in. 3 to 15000 10 w., 95/-,
 12in. Baker 13 watt 3 ohms, or 15 ohms, 105/-,
 12in. BAKER FOAM SUSPENSION 15 ohm, 12/-.
 CRYSTAL DIODE G.E.C., 2/-, GEX34, 4/-.
 HIGH RESISTANCE PHONES, 4,000 ohms, 18/6 per
 pair. MIKE STRIP, 30:1, 3/9 ea.; 100:1, Potted, 10/6.
 SWITCH CLEANER, Fluid squirt sprout, 4/3. Tin.
 TWIN GANG TUNING CONDENSERS, 305 pf.,
 miniature 1in. x 1 1/2in. x 1 1/2in., 10/-, 4005 Standard
 with trimmers, 9/-; less trimmers, 8/-; midget, 7/6.
 SINGLE, 50 pF., 2/6; 80 pF., 100 pF., 160 pF., 7/-,
 Dual dielectric 100, 300, 500 pF., 3/6.
 SPEAKER FRET, GOLD CLOTH, 17in. x 25in., 5/-,
 25in. x 35in., 10/- Tyran 6 in. wide, 10/-; 12/-; 2ft.
 5in. wide, 5/-; Samples, S.A.E.
 New and Boxed VALVES 90-day Guarantee.

CHRIS	8/6/8K80	8/6/8A8C50	HABCS0
185	8/6/6L6G	10/6	10/6
1T1	8/6/8N7M	7/6/8B1	8/6/HYR2A
2X2	3/6/847G	10/6/8EC33	8/6/MU14
3S1	8/6/88A7	7/6/8EC34	10/6/P61
8Y4	8/6/847M	10/6/8EP80	10/6/PC84
5U4	8/6/88N7	8/6/8EC84	12/6/PCF80
5Y3	8/6/8V6G	7/6/8ECF80	11/6/PC182
5Z1	10/6/6X4	7/6/8EC142	10/6/PEN25
6AM6	8/6/6X3S	7/6/8EC182	12/6/PL82
6B6	5/6/12A7	8/6/8EF2	7/6/PV80
6BE6	7/6/12A7	8/6/8EF41	10/6/PV81
6BH6	10/6/12AX7	9/6/8EF50	5/6/PV82
6BW6	10/6/12BE6	10/6/8EF80	10/6/8P61
6D6	7/6/12K7	8/6/8EF91	8/6/UF12
6E6	7/6/12AT7	8/6/8EF92	8/6/UF10
6G6	3/6/35L7	8/6/8EL2	5/6/UF41
6J5	6/6/35Z4	8/6/8EL4	10/6/UF41
6J6	7/6/8I80	10/6/8M81	12/6/VA 41
6J7C	8/6/507	8/6/8V2	8/6/UF10
6K6GT	8/6/83	8/6/8V290	8/6/VR105
6K7G	5/6/8A50	1/6/8V1448	1/6/VR150



1960 RADIOGRAM CHASSIS
 THREE WAVEBANDS. FIVE VALVES
 S.W. 16 m.—50 m. LATEST MULLARD
 M.W. 200 m.—500 m. ECH81, EP80, EBC81,
 L.W. 800 m.—2,000 m. ELS4, EZ80,
 12-month guarantee.
 A.C. 200/250 v. 4-way Switch; Short-Medium-Long-
 Gram. A.V.C. and Negative feedback
 4.2 watts. Chassis 12 1/2 x 5 1/2 x 2 1/2 in. Glass dial
 horizontal or vertical size 10in. x 4 1/2 in.
 Aligned and calibrated. Isolated Chassis.
£9.10.0 Carr. & Ins. 4/6

TERMS: Dep. £5.5.0 and five monthly of £1.
 MATCHED SPEAKERS FOR ABOVE CHASSIS.
 5in., 17/6; 10in., 25/-; 12in., 30/-.

NEW AM-FM MODEL

6 Valves **£18.19.6** Leaflet, S.A.E.



The Brilliant Successful
£6.19.6 Maranch 1000
 World's Best Export Radiogram

TERMS: Dep. £9.10.0 and four monthly of £1.
 Stereo Model UAS £7.19.6; UA12 £10.10.0.

BUILD THESE REPRODUCER BARGAINS SINGLE PLAYER KIT

Ready for immediate assembly.
 Equipped Collaro "Junior" Unit £12 12 6
 Handsome case, 17 1/2 x 12 1/2 x 7 1/2 in.,
 with room to play 12in. records £2 5 0
 Ready-built 2-watt amplifier with
 two valves and loud-speaker £12 12 6
 or **£9.15.0** complete kit post free.

COLLARO AUTO-PLAYER KIT HIGH-FIDELITY AUTOCHANGER 4-SPEED-10 RECORDS Studio "O" pick-up

OUR PRICE **£7.19.6** post free.
 Or with cabinet, speaker, and amplifier
£11.19.6 Carr. 5/6.

STEREO E.M.I. 4-SPEED SINGLE RECORD
 PLAYER. Acco 73 hi-fi stereo and normal xtal
 pick-up. Silent motor heavy turntable.
 Special Offer £9.19.6. Post 5/6.

ALUMINIUM CHASSIS. 18 s.w.g. un-dilled.
 With 4 sides, riveted corners, and hiffie fixing
 holes, 2 1/2in. sides, 7 x 4in. 4/6; 8 x 7in. 5/9;
 11 x 7in. 6/9; 12 x 6in. 5/6; 14 x 1 1/2in. 10/6;
 15 x 1 1/2in. 12/6; 18 x 1 1/2 x 1 1/2in. 16/6.

TRANSISTORS, GENUINE EDISWAN
 H.P. 4 Mc/s, 18/-; 5 Mc/s, 15/- Audio, 10/-.
 Complete data sheets supplied.

CRYSTAL MIKE INSERT by Acco, precision
 engineered. Size only 1in. x 3/16in., 6/6.

HI-GAIN BAND 3 I.T.A. PRE-AMP KIT.
 Cascade circuit with valve ECH81, Price 29/6.
 With Power Pack 49/6. Pins only 6d.
 Band 1 B.I.F. version same prices.

BBC TRANSISTOR RADIO, M. & L. wave.
 Complete kit 32/6, special 7/6 extra. Deaf Aid
 Earpiece 12/6. Phones Lead 2/6. Details 6d.

GARRARD 48P. SINGLE PLAYER AUDIO PERFECTION

Designed to play 16, 33, 45, 78 r.p.m. Records
 7in., 10in., 12in. Lightweight Xtal pick-up.
 GCZ turnover head, two separate appahre styl.
 OUR PRICE **£7.10.0** each. Post Free
 Model TA Mk. II 28-10-0. Model 4HF £18-0-0.
 With Plug-in Normal Heads.
 (Stereo heads £2 extra). Leaflets, S.A.E.

Volume Controls 80 ohm CABLE COAX

Long spindles. Guaranteed 1 year. Midget 5K ohms to 2 Meg. No Sw. D.P.S.W. 3/- 4/9 Linear or Log Tracks. Fringe Quality 1/- yd. Air Spaced.

COAX PLUGS ... 1/- LEAD SOCKET ... 2/-
 PANEL SOCKETS 1/- OUTLET BOXES ... 4/6
 BALANCED TWIN FEEDER Yd. Ed. 60 or 300 ohms.
 DITTO SCREENED per yd. 1/6. 80 ohms only
 WIRE-WOUND POTS, 3 WATT. Pre-set. Mini-
 T.V. Type. All values 25 ohms to 25 K., 3/- ea.
 30 K., 50 K., 4/- (Carbon 30 K. to 2 meg., 3/-).
 WIRE-WOUND 4 WATT Pots. Long Spindles.
 Value, 100 ohms to 50 K., 6/6; 100 K., 7/6.
 CONDENSERS, Ne. 80 ohms, 100 v. 5 pf. to 7 1/2 v.
 T.C.C. 5/6; Ditto, 20 v. 4/6; 100 v. 1/2 v. 8/6;
 Tubular 500 v. .001 to .05 mfd., 9d. 1. 1/-; .25: 1/0;
 .5: 2/50 v., 1/9; 1.350 v., 9d.; 1/1000 v., 1/9
 .01: 2/50 v., 1/9; 1 mfd., 2,000 volts, 3/6.
 CERAMIC COND. 500 v. 5 pf. to .01 mfd., 5d.
 SILVER MICA CONDENSERS, 100 v. 5 pf. to 7 1/2 v.
 1/-; 600 pf. to 3,600 pf., 1/3. Loss tolerance
 (+/- 1 P.F.) 1.5 pF. to 47 pF., 1/8. Ditto 10 v. 50
 to 815 pF., 1/9; 1,000 pF. to 5,000 pF., 2/-.

R.F. TRANSFORMERS 7/6 pair.

465 Kcs Slug Tuning Miniature Can, 2 1/2in. x
 1in. x 1in. High Q and good landw. chn.
 By Bye Radio. Data sheet supplied.

Wearite M800 I.F. 465 Kcs. 12/6 per pair.
 Wearite 550 I.F. 465 Kcs. 12/6 per pair.

NEW ELECTROLYTICS. FAMOUS MAKES

TUBULAR	TUBULAR	CAN TYPES
1/350v. 2/-	64/350v. 5/8	8/500v. 2/-
2/450v. 2/6	100/25v. 2/6	16/500v. 4/-
4/450v. 2/8	250/25v. 2/8	32/350v. 4/-
8/450v. 2/8	500/12v. 3/-	100/270v. 6/6
16/450v. 3/6	84/840v. 4/6	200/50v. 4/-
16/450v. 4/6	84/840v. 5/-	324/350v. 4/6
16/450v. 4/6	84/1640v. 5/-	524/350v. 4/6
32/450v. 5/6	84/1640v. 5/6	50+50/350v. 7/-
50/450v. 5/6	164/1640v. 5/6	64+160/270v. 7/6
50/450v. 5/6	164+1640v. 5/6	120+500v. 10/6
50/450v. 5/6	122+225/25v. 4/6	100+200/275v. 12/6

SELENIUM RECTIFIER. 300 v. 85 mA., 7/6.

CONTACT COOLED 250 v. 50 mA., 7/6; 60 mA., 8/6.
 55 mA., 9/6; 200 mA., 21/-; 300 mA., 27/6.

OILS Wearite "P" type, 3/- each. Osmor Midget "Q" type add dust core from 4/-. All ranges.
 TELETRON L & Med. T.F. with reaction, 7/6.
 FERRITE ROD AERIALS, M.M., 8/9; M.A., 12/6.
 T.R.F. COILS A.H.F., 7/- pair. H.F. CHOKES 2, 2/8.
 FERRITE ROD. 7in. x 3/8in. dia., 2/6.

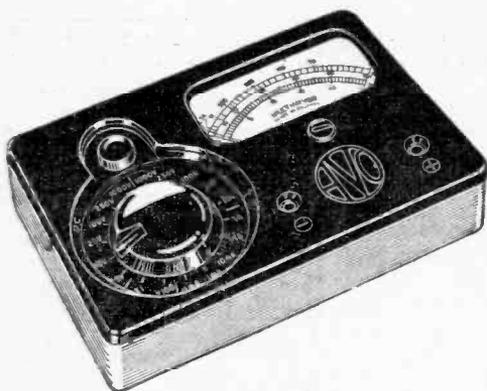
JASON F.M. TUNER COIL SET. 26/-.

H.F. coil, aerial coil, Oscillator coil, two I.F. trans.
 10/7 Mc/s. Ratio Detector and heater choke.
 Circuit book using four 6AM6, 2/6.
 COMPLETE JASON F.M. KIT WITH VALVES.
 £26.15.0. Fringe area kit, 22/6 extra.

FULL WAVE BRIDGE SELENIUM RECTIFIERS:

2 p. 2-way, or 3 p. 2-way short spindle ... 2/6
 2 p. 6-way, 4 p. 2-way, 4 p. 3-way long spindle ... 3/6
 3 p. 4-way, or 1 p. 12-way long spindle ... 2/6
 CHARGER TRANSFORMERS. Tapped input 200/
 250 v. for charging at 2.6 or 12 v., 11 amps. 15/6.
 2 amp., 17/6; 4 amps., 22/6. Circuit included.
 WAVE AND TUBE EQUIPMENT
 TOGGLE SWITCHES, S.P., D.P. 3/6, D.P.D.T. 4/6.
 WAVECHANCE SWITCHES
 5 p. 4-way 2 water long spindle ... 6/6
 2 p. 2-way, or 3 p. 2-way short spindle ... 2/6
 2 p. 6-way, 4 p. 2-way, 4 p. 3-way long spindle ... 3/6
 3 p. 4-way, or 1 p. 12-way long spindle ... 2/6
 VALVE HOLDERS, Pax. Int. Oct., 4d., EP50, RA50,
 6d., B12A, CRT. 1/3. Eng. and Amer. 4, 5, 6, and
 7 pin. 1/1. MOULDED MAZDA and Int. Oct. 6d.
 B7C, B8A, B8G, B9A, 9d., B7C with can, 1/6.
 B9A with can, 1/9. CERAMIC B7G, B7C, B9A,
 Int. Oct. 1/8. S/Cans. B7G, B9A, 1/1.
 HOTTOR MAINS-BATTERY POWER PACK 90 v.
 C.T. 14 v. L.T. Same size as BATTERY B12B
 and RD 35. List 63/-, our price 39/6.

GRAND COMPONENT SPECIALISTS
 OUR ONLY ADDRESS
 337 WHITEHORSE RD.,
 WEST CROYDON
 48 Hour Postal service. 1/-, over £2 free. (Export Extra.) C.O.D. 1/6. (Wed. 1 p.m.) THO 1665. Buses 133 or 13



Indispensable

THE MULTIMINOR

Whether you're building your own amplifier or servicing a complete installation—for fault finding on anything from pre-amplifier to speaker—you'll find the MULTIMINOR to be "just right."

You'll enjoy using this neat pocket instrument giving readings over nineteen ranges on a clear open scale. A.C. and D.C. voltage, D.C. and Resistance measurements are made by means of only two sockets. The robust, easy-to-read range selector has a smooth, clean, positive action.

"Can you afford it?" Let's say rather—"Can you really afford to be without it?"

Designed and Manufactured by

AVO LTD AVOGET HOUSE · 92-96 VAUXHALL BRIDGE RD. · LONDON · S.W.1

A MEMBER OF THE METAL INDUSTRIES GROUP OF COMPANIES.

MM.10

19 Ranges

D.C. Voltage : 0-1,000V in 7 ranges

A.C. Voltage : 0-1,000V in 5 ranges

D.C. Current : 0-1A in 5 ranges

Resistance : 0-20,000 Ω 0-2M Ω

Pocket Size : 5½ x 3½ x 1½ inches.

Weight : 1 lb. approx.

List Price **£9 : 10s.**

Complete with Test Leads and Clips.

Leather Case if required 39/-.

Sensitivity :

10,000 ohms per volt on D.C. voltage ranges.
1,000 ohms per volt on A.C. voltage ranges.

Accuracy :

On D.C. 3% of full scale value.

On A.C. 4% of full scale value.

To meet special requirements, instruments can be supplied to a higher degree of accuracy for a small additional charge.

Telephone : VICTORIA 3404 (12 lines)

Build your own HI-FI!

At last! A specially selected and designed HI-FI Sound Installation for your home at really reasonable cost!

You save because you assemble everything yourself following our step by step instructions. You gain because you learn about the equipment as you build and are able to service and maintain it afterwards. Best of all—you'll have fun building it and be thrilled with the finished instrument which will bring you an entirely new experience in the enjoyment of sound. No previous skill or experience is needed. Post coupon now for full details, without any obligation. Easy terms available.

Equipment Includes: Luxury Cabinets · Top Quality Amplifier suitable for stereo or non-stereo reproduction · VHF/FM Radio Units · Record Player · Tape Recorder · HI-FI Speaker system.



FREE BROCHURE - POST TODAY

Radiostructor (Dept. H34), 46 Market Place, Reading, Berks.
Please send Brochure without obligation to:

Name BLOCK
Address CAPS
 PLEASE

309

We do not employ representatives

RADIOSTRUCTOR
BRITAIN'S LEADING RADIO TRAINING ORGANISATION

AMPLIFIER IN CABINET



82/6
(3/- P. & P.)

Beautifully finished wood cabinet with "gold" and brown dividing strip and "gold" finished fabric front. Size 13" x 7½" front to back 4½". 5" P.M. speaker. ECL82 valve with metal rectifier. Vol. to e, on-off. 82/6 (3/- p. & p.). Cabinet only 20/-, plus 2/- post.

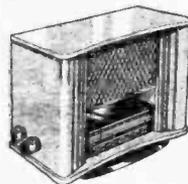
COILPACK

I.F. 465 470 kc/s.; complete with two-gang tuner; fully aligned and tested.

Type 1. For 41M-120M, and 16-49 M. Price 20/-.

Type 2. For 25-75 M. and 200-550 M. (22/6.) BOTH POST PAID

COMPLETE V.H.F./A.M. RADIO FOR £12.12.



Brand new set, in superb walnut cabinet (size 19" x 8½" x 14½" high). Covering 80-100 Mc/s. 16-49 M., 200-500 M. and 1,200-2,000 M. Mains trans. 200-250 v. with 3 tapings. Ferrite rod aerial for A.M. Controls: volume on/off, tone, tuning, w/change. Gram and ext. speaker position provided. Fully

guaranteed. Post and packing 10/- extra. Terms: £3.12.0 down (inc. carr.) and 5 monthly payments of £2. Indoor V.H.F. aerial 10/- extra, cash.

UNIC SHAVERS LTD.
25, Wordsworth Road, Worthing, Sussex.

Versatile V.F.O.

FREQUENCY STABILITY IS
A VALUABLE FEATURE

By R. H. Wright

ALTHOUGH use of a quartz crystal is the ideally safe method of controlling the frequency of a transmitter (and incidentally crystal control frequently leads to a reduction of TVI.) there are practical advantages to be gained from V.F.O.

Advantages

With a V.F.O. it is usually possible to find a spot in the band which is free from interference and thus a call may be made without causing QRM to stations already working. Also, if two—or more—stations in contact use the same frequency, less crowding of the band will result than if each operated on a different crystal frequency.

In developing the V.F.O. described below, and shown in circuit form in Fig. 1, the writer had a number of factors in mind. It should, first of all, have excellent frequency stability particularly in the event of supply voltage variations, and also when the output circuit is tuned. The effects of supply voltage variations are reduced by the use of the voltage stabilisers (Type VR150/30) shown in the power supply circuit, Fig. 2. The effects of tuning the output circuit are minimised by

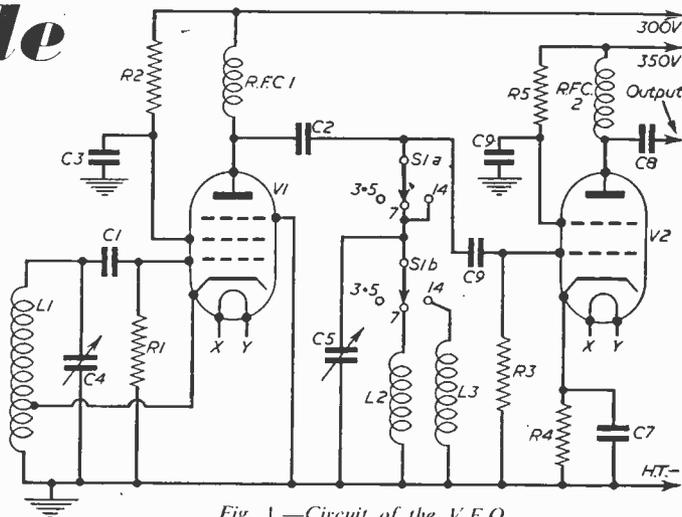


Fig. 1.—Circuit of the V.F.O.

electron-coupled Hartley type oscillator operating on 3.5Mc/s. Output on the second and fourth harmonics (7.0 and 14.0Mc/s) will be sufficient to drive an amplifier if the output circuit (C5 and L2 or L3) is tuned to either frequency. Thus, output can be obtained from the unit on three bands without the need of further doubling. A 6CH6 valve was used in the prototype, but the larger 6AG7 can also be used successfully. V2 is an untuned buffer, isolating the V.F.O. from any effects that the following amplifier may have. The oscillatory circuit is tuned by a 500pF variable capacitor and with this capacitor a good slow motion dial is an absolute necessity. Alternatively, a 500pF capacitor may be used to "set" the band and the actual tuning then carried out by means of a 50pF variable connected in parallel.

COMPONENT FOR V.H.F.

- R1, R3—100,000ohms, ½W.
- R2—22,000ohms, 1W.
- R4—220ohms, 2W.
- R5—4,700ohms, 1W.
- C1, C9—100pF.
- C2, C3, C7, C8, C9—0.01µF (mica).
- C4—500pF variable, see text.
- C5—100pF variable.
- RFC1, 2—R.F. choke. 2.4mH. Denco type RFC.5.
- L1—36 turns, 26 D.C.C. wire on ½in. diameter former, close wound and tapped 12 turns from earth.
- L2—7Mc's coil. 40 turns 26 D.C.C. wire on ½in. diameter former.
- L3—14Mc's coil. 25 turns 18 D.C.C. evenly spread over 1½in. on ½in. diameter former.
- V1—6CH6, or octal-based 6AG7.
- V2—6V6.

running "straight through" when transmitting the fundamental V.F.O. frequency and only tuning the output when harmonic operation is required.

Hartley Circuit

The oscillator section of the circuit is an

Harmonic Operation

When output is required on 3.5Mc/s band, the oscillator is tuned to the required frequency and switch S1 (a) and (b) turned to the blank position. The oscillatory voltage developed across RFC1 is then applied directly across grid and cathode of the buffer valve. If output is required on 7Mc/s the oscillator is tuned still on 3.5Mc/s and the output circuit of C5/L2 switched into use through switch S1 (a) and (b). this circuit is then tuned to the second harmonic of 3.5Mc/s. For 14Mc/s output the oscillator is still left on 3.5Mc/s but L2 is now replaced by L3 by means of the switch S1, and the circuit C5/L3 is tuned to the 14Mc/s harmonic. Output on this frequency—the fourth harmonic—will, of course, be less than on the fundamental frequency of 3.5Mc/s or on the second harmonic of 7.0Mc/s but nevertheless will be sufficient to drive an amplifier.

If the V.F.O. unit is followed by an amplifier, the whole arrangement forms a useful low-power transmitter, with an input to the final stage of about 15W. Fig. 3 shows the circuit of such an amplifier which may be operated from the power

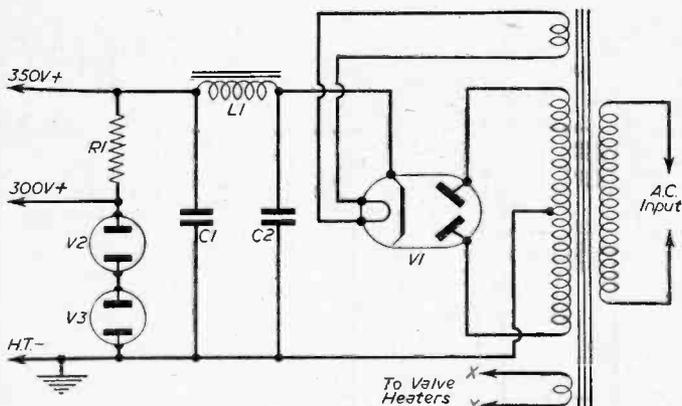


Fig. 2.—Circuit of a suitable power supply.

COMPONENTS FOR POWER UNIT

- T1—350-0-350, 150mA sec. 5V, 3A, 6.3V, 5A.
- L—L.F. choke. 20H, 150mA.
- C1 C2—16—16 μ F electrolytic capacitors. 500VW.
- V1—5Y3 or 5Z4.
- V2 V3—Stabiliser type VR150/30.
- R—2,000ohms, 10W fixed resistor.

unit normally supplying the V.F.O. This amplifier, if used as a doubler as well as an output stage, will enable the transmitter to operate on 28Mc/s. if C5/L3 is tuned to 14Mc/s, thus increasing the versatility of the unit. If this procedure is followed, no alteration to the power amplifier stage is required beyond tuning the aerial circuit to 28Mc/s.

Power Amplifier

Only a little comment is required here since the amplifier is quite a normal circuit. The meter in the grid circuit (M1) is more of a necessity than a luxury since it permits accurate tuning of the circuit C5/L2 or L3 when using the oscillator on 7 and 14Mc/s. The tuned circuit

COMPONENTS FOR AMPLIFIER UNIT

- C1, C2, C3—0.01 μ F (mica).
 - C4—500 μ F variable.
 - C5—0.001 μ F variable (2 x 0.0005 μ F units in parallel).
 - R1, R2—22,000ohms, 1W.
 - R3, R4, R5—68,000ohms 1W.
 - RFC1, RFC2—R.F. choke 2.5mH. Denco type RFC5.
 - M1—0.5mA moving-coil meter.
 - M2—0.50mA moving-coil meter.
 - L1—1.8Mc/s : 48 turns, close wound.
3.5Mc/s : 32 turns, close wound.
7.0Mc/s : 20 turns, 1 $\frac{1}{2}$ in. long.
14Mc/s : 10 turns, 1 $\frac{1}{2}$ in. long.
- All coils wound with 22s.w.g. enamelled wire in Eddystone 1 $\frac{1}{2}$ in. diameter coil formers, type 538. If these plug-in coils are used, then a chassis-mounting base, type No. 964, will also be required.
- L2/C6—See text.

should be adjusted to give maximum power amplifier grid current reading. The inductive part of the π -output coupling into the aerial (L1) may be one inductance tapped for use on the various bands and the tapping points then connected to a switch. However, plug-in coils are generally used by the writer since their use eliminates the losses normally associated with a switched inductance. Details of coils suitable for use on the popular 80, 40 and 20m bands are given below.

L2 and C6 are included as a series filter to reduce interference with the local Band I television (BBC) reception. L2 should be formed from nine turns of 18 gauge enamelled wire close-

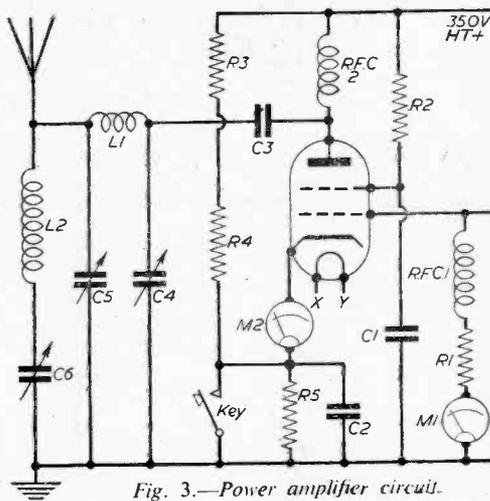
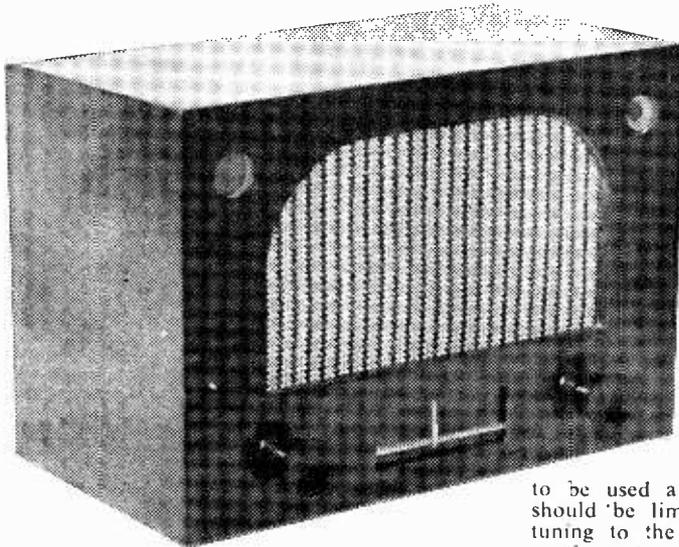


Fig. 3.—Power amplifier circuit.

wound on a half-inch diameter former and C6 is a 25pF variable capacitor. When the transmitter has been tuned up, as described below, the capacitor C6 should be adjusted so as to give minimum interference to a nearby television receiver tuned to the local BBC station.

With the addition of six turns to the grid end of the oscillatory circuit inductance, L1 (Fig. 1), C4 will tune over both the 1.8 to 2.0Mc/s and 3.5Mc/s bands. With the oscillator circuit tuned to 2.6 to 2.7Mc/s, a suitable inductance wired to switch S1 (b), can be resonated at the fourth harmonic of 10.5Mc/s and then, by doubling in the aerial circuit output can be obtained on the 21Mc/s band.

Finally, a word of warning. Although the V.F.O. has obvious advantages, it has two particular disadvantages: (i) It is very easy to slip outside the allocated frequency band, (ii) When harmonic operation is being used, it is also very easy to tune the amplifier to the wrong harmonic.



A Quality V.H.F./F.M. Receiver

No. 2.—ALIGNMENT WITHOUT
INSTRUMENTS AND THE
A.F. AMPLIFIER

(Continued from page 785 of
the January issue)

By V. E. Holley

AFTER the I.F. circuits of the receiver have been aligned with the signal generator as described in last month's article an aerial should be connected and probably transmissions will be heard somewhere in the first 90deg. of rotation of the tuning condenser. Stations will probably be heard at near minimum capacity also, but the lower oscillator frequency is the one

to be used and the rotation of the condenser should be limited by suitable stops to restrict tuning to the desired range. Then, tune the receiver to the centre one of the three transmissions it is desired to receive and adjust the core of L1 for maximum response. The inductance of L3 may also be checked now by parting or closing the turns and observing the result on the meter connected between earth and the junction of R11 and C15 by way of a 100k isolating resistor. Adjust for maximum volts negative. If the coil is of the correct length and diameter, not much improvement is to be expected.

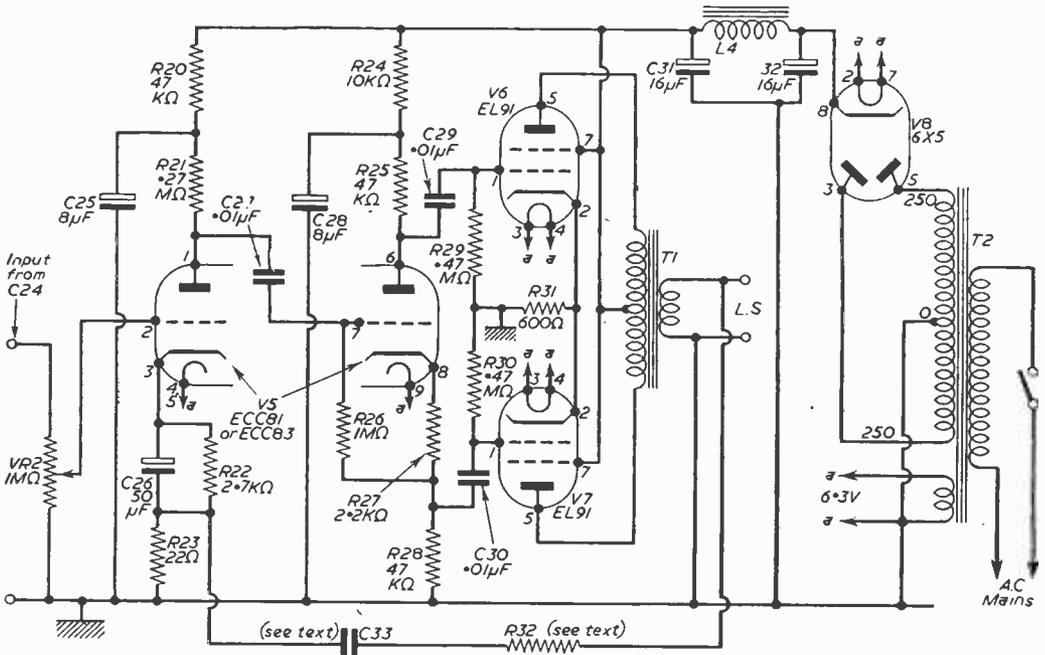


Fig. 4.—The circuit diagram of the A.F. amplifier and power pack.

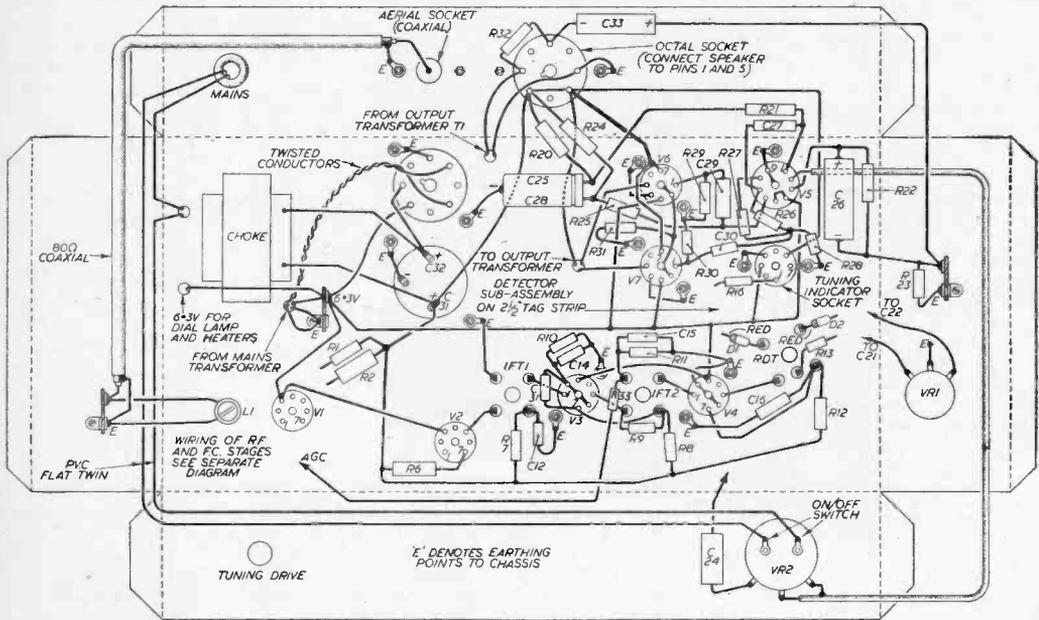


Fig. 5.—Wiring diagram of the receiver omitting the detector sub-assembly and the R.F. and F.C. wiring.

Alignment Without Instruments

The prototype receiver was first aligned by this method to establish its feasibility. Pre-tuned I.F. transformers were not used. A subsequent check with instruments showed satisfactory alignment except that the I.F. was 11Mc/s, a discrepancy of no importance.

First detach the control grid cable of the EM34 tuning indicator from its connection to R16, fit a small crocodile clip to the end and re-connect. In the cathode lead of the indicator, insert a wire-wound potentiometer of from 25k to 50k with its slider connected to earth. Clip the control grid to earth and adjust the potentiometer from maximum shadow angle; re-connect to R16. Connect the tuner to an audio amplifier and advance the volume control. A subdued "rushing" noise should be heard in the speaker. If it is not, there is probably a fault somewhere, which must be rectified before proceeding further. Check in particular that V2 is oscillating, by noting the voltage drop across R7; it should not be more than about 20. Assuming all is well, adjust the core of L1 so that it is about 1/4 in. below the open end of the former. Connect the best available aerial, advance the volume control fully and search for transmissions.

Reception will probably be weak and distorted. Select what appears to be the most powerful and check by reference to the published programmes that it is in fact a BBC F.M. transmission. If the signal is not of sufficient strength to register on the tuning indicator, tune it for maximum volume by moving the cores of the I.F. transformers each a little at a time. Do not make any large adjustments nor any that do not increase the signal. As soon as a clear visual indication

is obtained, turn down the volume control and use the indicator for all subsequent adjustments.

The procedure is now the same as when using instruments, the transmission taking the place of the signal generator and the tuning indicator that of the meter. To adjust the bottom core of the detector transformer, first clip the control grid of the indicator to chassis and adjust the

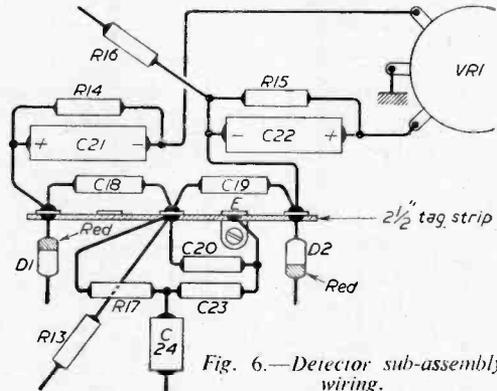


Fig. 6.—Detector sub-assembly wiring.

cathode potentiometer for zero shadow angle on the more sensitive side of the display. The valve will now perform as a sensitive zero indicator, i.e., a positive voltage on the grid will increase the shadow angle on one side of the display while a negative voltage will reduce the angle on the other. Clip the control grid to point Z and adjust the core for zero. An approximate acceptance bandwidth test can now be carried out by

the output stage. If matching facilities are not available, 5 per cent. resistors should be used. Decoupling and additional smoothing are provided by R24 and C28, and the stage is completed with a 2.2k bias resistor and a 1M grid resistor. The gain is 0.9 on each side, or 1.8 overall. The required input is therefore 30/1.8 or 17V peak.

The other half of V5 is arranged as a resistance coupled amplifier and with a load resistance of 0.25M affords a stage gain of 60 times. The input to its grid must therefore be 17/60 or slightly less than 0.3V peak, which the ratio detector is well able to produce with something in hand for negative feedback. Decoupling is provided by R20 and C25. In the grid circuit is the volume control with which is incorporated the mains on-off switch. As there are no heterodyne whistles, sideband chatter, etc., to contend with, a conventional tone control is unnecessary and is not included. A wide range of control over the balance of reproduction is, however, available by negative feedback as will be described.

Construction

The construction of this part of the receiver follows standard practice. The layout is not at all critical and more or less follows the circuit diagram. An octal socket was used for connecting the speaker as this is standard in other equipment in use by the author and the spare tags form useful anchorages for small components.

Power Supply

The mains transformer need have only two secondaries, 250-0-250V, 60 mA and 6.3V, 0.3A. If a transformer including a 5V secondary is used, a 5Z4 rectifier would be suitable. It has been noticed that some rectifiers are liable to introduce modulation hum in compact assemblies; the 6X5 and 5Z4 do not offend. A choke is used for smoothing in preference to a resistor to reduce heat generation and avoid voltage drop. The choke should have an inductance of not less than 10H at 50mA.

Negative Feedback

When feedback is carried over three stages as it is in this receiver, it is desirable in the interests of stability that one stage should introduce some attenuation of extreme frequencies, particularly the lower frequencies. The limitations of the output transformer are thus turned to good account and quite a large amount of feedback, either "straight" or frequency selective, may be applied with no untoward consequences. It is suggested that the receiver be completed with a 200 ohm resistor for R32 and temporarily omitting C33 and that the values of these components be

decided after listening to the set installed with its speaker in the cabinet. When the prototype was tried with a 6in. speaker in a bass reflex cabinet, crisp, clean and well balanced reproduction was obtained with R32=100 ohms and C33 omitted. When tried in a cabinet with internal speaker, there was some noticeable attenuation of lower frequencies which was remedied by including C33 at 8 μ F. The values required will vary with the output transformer and speaker used and may be varied between 100 and 300 ohms and 2 to 8 μ F. The feedback network renders unnecessary the tone correction resistor and condenser customarily employed with pentodes across the primary of the output transformer.

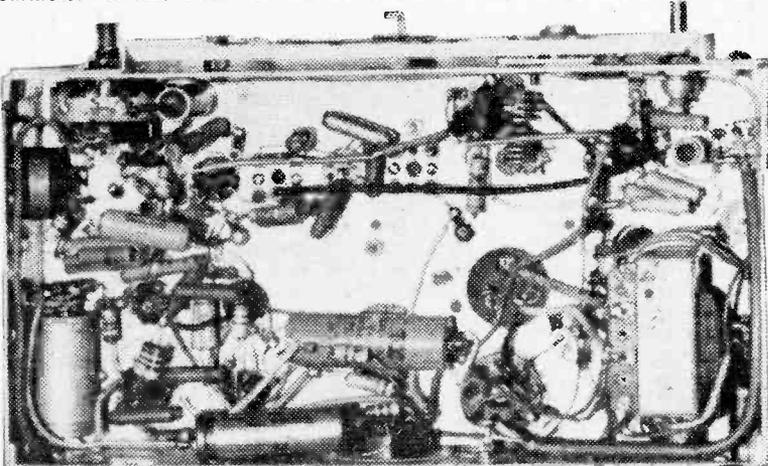
Gain

No misgivings need be felt about the loss of gain resulting from feedback. Unlike the conventional A.M. receiver, the set is not required to deal with weak and distant transmissions and no large reserve of gain is required. Sufficient is provided to load the output stage fully.

The combination of modest A.F. gain, good smoothing and negative feedback combine to form a silent background and it should be necessary in the absence of a programme, to listen carefully within 6in. of the speaker to discover by ear whether the set is switched on.

The Cabinet

A suitable cabinet for the receiver may be made from 5-ply wood, $\frac{1}{2}$ in. thick and having an oak, walnut or similar facing. The best source of supply is an old cabinet or piece of furniture made of this material because, although the polish will have to be removed, the wood will



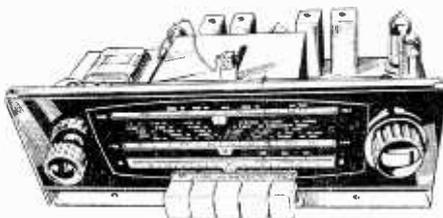
Under chassis view of the receiver.

need much less subsequent treatment than if it were new.

The constructor will require a sharp tenon saw, a chisel, a carpenter's brace and centre bits, a hacksaw blade, some glue, glass paper and panel pins.

(To be continued)

BRAND NEW AM/FM (V.H.F.) RADIOGRAM CHASSIS AT £13.6.8. (P. & P. 10/-)



Why buy a F.M. Tuner at the same price?
 Tapped input 220-225 v. and 226-250 v. A.C. ONLY.
 Chassis size 15" x 6 1/2" x 5 1/2" high. New manufacture.
 Dial 14 1/2" x 4" in gold and black.
 Pick-up. Extension Speaker, Ae., E., and Dipole sockets. Five " piano " push buttons—OFF, L.W., M.W., F.M. and Gram. Aligned and tested. With all valves & O.P. Transformer. Tone Control Fitted.
 Covers 1,000-1,900 M.; 200-500 M.; 88-99 Mc/s.
 Valves E280 rect., ECH81, EF89, EABC80, EL84, ECC85. Speaker & Cabinet to fit chassis, 47/6.
 10" x 6" ELLIPTICAL SPEAKER, 20/-.
TERMS:—(Chassis) £4.16.8 down + 10/- carr. and 6 Monthly Payments of 30/-, or with Cabinet & Speaker £5.9.2 down and 7 Monthly Payments of 32/-.

"READY TO USE" I.T.A. CONVERTER

I.T.A. high gain converter. ALL CHANNELS—ALL AREAS—ALL SETS. Direct switching (I.T.A. to B.B.C.); internal power pack; valves PCF80 and PCC84; moulded cabinet 8 1/2" x 4" x 3". No alteration to your set; fitted in 10 mins. 12 months' guarantee.

£5.5.0 D. & P. 3/-



AUTOMATIC RECORD CHANGERS COLLARO CONQUEST with manual play also. Turnover crystal pick-up, 4-speed, A.C. mains 200-250 v., see illus.

£7.10.0 (5/- D. & P.)

B.S.R. 4-SPEED AUTO-CHANGER UA8 only £6.12.6 (5/- carr.)



COMPLETE RADIO FOR ONLY £10.10.0 carr. pd.

Size 19" x 13" x 7 1/2" or Chassis and dial for £8 (carr. pd.). Chassis Size 15" x 6 1/2" x 5 1/2"; 1,000-2,000 M.; 200-550 and 16-54 M. Mains (200-250 v. A.C.) and O.P. Trans (3 ohm); Gram., Aer., E., Ext. L.S. Sockets; New Mullard Valves ECH42, EF41, EBC81, EL84, EZ80 and Magic Eye EM81. Dial 15" x 3". Fully aligned. Fantastic value for money.

61 or 6" x 4" speaker fitted to cabinet.



GRAMOPHONE AMPLIFIER with 5 in. SPEAKER. On Fabric-covered Baffle 12" x 5". Mains and Output Transformers, Meta. Rectifier, ECL82 Valve. Tone and Volume Controls. On/Off switch. Plenty of Volume. Fully Guaranteed. Two Knobs supplied. Ready to play. Useful for Stereo.

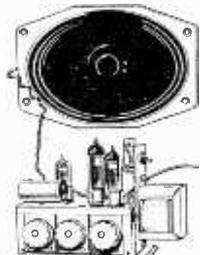
ONLY 57/-, post 3/-

BATTERY ELIMINATOR. Converts your Battery Set to Mains. For 4 Low Consumption Valves (DK range). 90 v. 15 ma. and 1.4 v. 125 ma., 42/6 (2/6 post). 200-250 v. A.C. Size 5 1/2" x 5 1/2" x 2". Also for 250 ma. 1.4 v. and 90 v. 15 ma. at same price. Specify which.

TELELECTION. "Twenty-20" adjustable set top or table for Bands 1, 2 and 3. "Gold" finished rods and mounting. List Price 42/- Our price 30/- (carr. paid).

AERIALS F.M. Aerials single dipole room mtg., 17/6; ditto 10ft mtg., 20/-; "H" with chimney lashings, 65/-. Co-axial low loss cable 8d. yard or 20 yds. 12/6, all these items carriage paid.

50 SILVERED MICA AND CERAMIC CONDENSERS, 10/-, 5C RESISTORS, 5/-, ALL DIFFERENT VALUES.



3-VALVE AMPLIFIER (INCL. RECT.). Capable of giving 6 watts. Mains and output transformers. Valves ECC81, EL84 and Rect. 3 Controls, volume, bass and treble. On/Off switch. Fully guaranteed. Chassis size 6 1/2" x 3" x 2 1/2". 6 1/2" round or 6" x 4" elliptical speaker, state which.

67/- (3/- p. & p.).

BERIC "PIONEER" RADIO IN MAKER'S CARTON. Valves DK96, DF96, DAF96, DL96. Beric Ever-Ready Battery

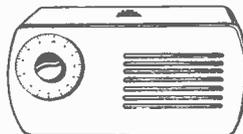
B103, 18/6 extra. Two Short Wavebands 2.5 to 7 Mc/s and 6.5 to 17 Mc/s. Cabinet, 12" x 7 1/2" x 6". **ONLY £4.10.0** (2/6 p. & p) (MW and SW £4.15.0 plus 2/6 p. & p.). In kit form with instructions and fully wired coil pack. Two Short Wavebands £4. One M.W. and S.W. £4.5.0. Plus 2/6 p. & p. Separate items supplied.

YOU CAN HAVE the sprayed case (grey and blue), back chassis, (without components or coil pack), bracketry, dial cover for dial, and speaker baffle for only 15/- carr. pd. illus. as above.

TAKE A CHANCE. We have surplus to present manufacturing requirements tens of thousands of resistors, silvered mica, tubulars, volume controls, electrolytics, valve holders, etc. **SEND US 20/-** for a bargain parcel of new goods. Our good name is your guarantee. Money back if not satisfied. State preference of types of goods.

SIX TRANSISTOR SUPERHET KIT £8.19.6

Med. and L.W.; Printed Circuit; Instruction Book. Internal aerial. All items supplied separately. Write for price list. Battery, 9 v., FP4, 2/6.

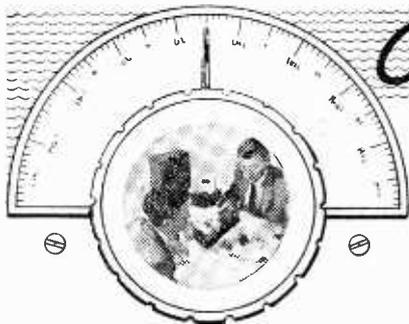


Send 6d. (stamps will do) for our illustrated catalogue of the above items and others. All New Goods. Delivery by return. Terms:—One-third down and balance plus 7/6 in four equal monthly payments. Postage with down payment. (C.O.D. 2/- extra.)

SEE SPECIAL TERMS FOR A.M./F.M. CHASSIS.

Large selection of complete Radiograms, ready built in cabinets, with 4-speed Autochanger. Write for details, giving approximate size required. Price from £25 for A.M. only, or £36 for A.M./F.M.

GLADSTONE RADIO—58A, HIGH STREET, CAMBERLEY, SURREY. Tel. 22791



On Your Wavelength

BY THERMION

P.D. and E.M.F.

IN the September/October issue, I tried to make clear the distinction between potential difference (P.D.) and electro-motive force (E.M.F.), but it seems from the letters I have received on the subject that there is still some confusion. For instance, in the letter from Mr. W. F. A. Chambers, who is in Cyprus, is the statement that he thinks the term electro-motive force is superfluous and could be suppressed! Mr. Chambers adds to his confusion by discussing at length several circuits in which the valve is included. As is generally appreciated, valves cannot be treated as resistors, except when certain circuit conditions obtain. When trying to learn and understand the theoretical background to technical terms, it is always best to consider for analysis simple circuits.

There should be no confusion between P.D. and E.M.F. As I stated before, first comes the E.M.F.: you cannot have a current unless you push it around. Then comes the current and, finally, because of the current, the P.D. Just as, in order to produce a pressure difference across a horizontal tube containing water, the water must be flowing. If you go to the source of Ohm's Law, you will find it stated that the P.D. appearing across a conductor is proportional to the corresponding current flowing.

Reminiscences

REGULAR readers of this page may remember that on page 215 of the May, 1959, issue I published a photograph of Mr. L. H. Brown, of Abingdon, operating one of his first receivers. Since then, Mr. Brown has sent me another letter enclosing a very interesting selection of photographs of an early den of his fitted up around 1930. The illustration on the right shows part of the den and the scope of Mr. Brown's activities can be judged by the amount of apparatus visible. The room was a portion "abstracted from the coal cellar," and the living room was behind the wall on the left of the photo. As my friends know, I have often advocated placing amplifiers and radio tuners, etc., away from the listening position: in other words, for most listeners, all that is required for radio reception is a loudspeaker and tuning controls, the amplifiers, which are probably home-constructed and without cabinets, being housed in a remote room. Mr. Brown appears to have planned his den with a similar idea in mind. To provide a baffle (so-

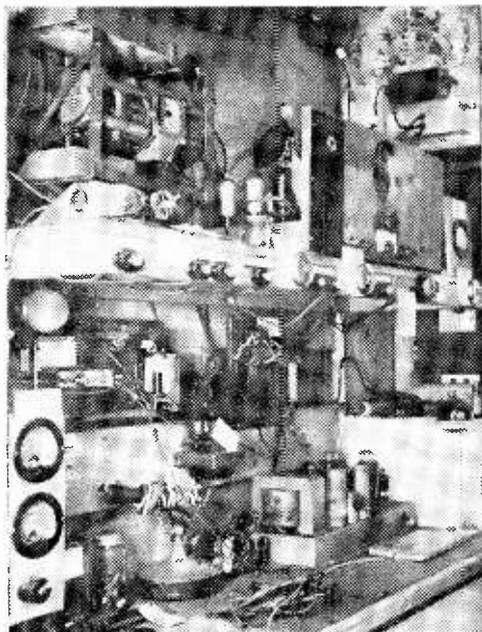
called "infinite") for the speaker, he made a hole in the wall between his den and the living room and mounted the speaker in it. This method is often said to give especially good results although, of course, it means that the radio programme will be heard in two rooms simultaneously.

In my opinion, a similar plan could be adopted for television receivers, the tube, loudspeaker, and controls being separate from the receiver chassis. This procedure is not as easy as it sounds. Mr. Brown, however, overcame the difficulties by enlarging the hole in the wall, made originally for his loudspeaker, to accommodate a 12in. cathode ray tube so that all that was visible in the living room was a speaker fret and an apparently flat screen. As Mr. Brown states, it was "A case of what the eye didn't see!"

Mr. Brown overcame the problem of tuning the radio from remote positions by the use of relays which were used to operate the motor-driven unit attached to the tuning condenser.

Our Film Show

PRACTICAL WIRELESS and *Practical Television* are again holding a film show at Caxton Hall which will take place on Friday, January 22nd. There are still a few tickets left (which are free) and I advise you to take advantage of this last chance: it is always a most enjoyable evening.



Mr. L. H. Brown's early den.

Valve Coding Systems

VARIOUS SCHEMES EXPLAINED

By J. Alexander

EACH type of valve is distinguished by a number or by a group of letters and a number. In most coding systems these letters and numbers have a meaning so that anyone who is familiar with the coding system will be able to deduce a number of facts about a valve of which only the coding is known. Most manufacturers have their own codes and in addition the Services have a separate coding system.

CV System

The CV system of valve coding is used by the armed forces and by research stations under Government control. Most readers will meet valves with CV coding when they buy surplus equipment. This system of coding is one of the few in which there is no connection between the type of valve and the code number. Who would imagine, for instance, that the CV448 is a crystal diode, the CV449 a voltage stabiliser and the CV450 a power output valve? The valve type, usually known as the 807, has at least three CV equivalent numbers: CV124, CV1060 and CV1572. In such cases where a single type of valve has more than one CV number, the exact specifications of the various CV types are usually slightly different and they probably come from different manufacturers. A letter X placed between the CV letters and the following number signifies that the valve is still in the experimental stages. Valve types in CV coding are much more difficult to remember than the combinations of letters and numbers used in almost all other systems.

Valves coded under a previous system are sometimes found in surplus equipment. Examples are ATP4 (Army transmitting pentode No. 4) and ARP12 (Army receiving pentode No. 12). Yet another type of coding is the VR system, e.g., VR65 (valve, radio No. 65).

Valves with the above markings are made especially for the services by valve manufacturers who may also make exactly the same valve with their normal coding.

American System

American valves used to have a coding which was merely a number (e.g., 80, 807, etc.), but now they are virtually all coded on a system set out by The Radio Manufacturers' Association (Standard ET-110). Many American-coded valves are found in surplus equipment and some British manufacturers make valves marked with the American coding. The first figure gives the approximate heater voltage as shown below:—

- 0 Cold cathode.
- 1 Up to and including 1.6V.
- 5 4.6 to 5.6V.
- 6 5.6 to 6.6V.
- 7 6.3V loctal types.
- 12 12.6V approx.

14 12.6V loctal types.

25 25V approx.

35 35V approx.

If the heater has a tapped filament, the first coding figure shows the voltage across the whole of the heater. The usual operating voltages of the American 7 and 14 loctal series are 6.3V and 12.6V respectively, but their maximum ratings are 7 and 14V. They are mainly intended for car radio receivers where the high maximum ratings are necessary because the battery voltage is high when it is being charged by the car dynamo.

Second Symbol

The second symbol is a serial letter allocated in sequence and normally commencing with A. Letters I and O are not used. Rectifiers follow the sequence backwards starting from Z. When the single letters have all been used for a particular group of valves, the system then uses two letters commencing with AB. Two identical letters are not normally used. The single-ended range of valves may have a letter S following the number which indicates the heater voltage. For example, the 6SK7 is the nearest single-ended equivalent to the 6K7 which has the same type of base. Although the 6SL7 is a single-ended valve, it is not related to the 6L7.

The final number in the American coding is intended to indicate the number of electrodes or other useful elements (such as screening) which are brought out to a separate external connection. The heater counts as one electrode for coding purposes, but if it should happen that the heater is tapped, it will count as two electrodes only if the tappings are of unequal voltage or current ratings. In the case of international octal valves with an all-metal envelope, the envelope counts as a useful element. Octal valves with a glass envelope have a similar coding to that of the corresponding valve with a metal envelope, i.e., one electrode is added for coding purposes even if no screening is brought out to a separate connection. An octal-based valve with n useful elements, therefore, has a final figure of $(n + 1)$ in its coding. This does not apply to the few valves in which pin 1 is used for a connection other than screening (e.g., types 6SN7 and 6SL7). If more than one electrode is connected to the same pin, these count as only one useful element.

Suffix

A further letter (a suffix) may be placed after the main coding to show the external construction. Miniature, loctal and metal valves normally have no suffix, but sometimes a letter M is used to show the valve has a metal envelope. The letter M should really only be used for valves which have a metallised glass envelope. Octal-based valves with a comparatively large glass

envelope are given the suffix G and those with the smaller glass envelope with straight sides (the "T9" bulb) are given the suffix GT (glass tubular). Modified versions of valves are given suffixes starting with A. Suffixes X and Y indicate that the valve has a low loss base, those having the suffix X being the best in this respect. The letter W is used to distinguish military types. Voltage regulators are coded VR followed by a number showing the normal burning voltage. The final number shows the approximate amount by which the striking voltage is higher than the normal burning voltage.

Examples

6C4 (B7G):—6.3V triode.

6C5-GT (octal):—6.3V triode with small glass envelope. (One electrode is added because the base is octal.)

12SK7 (octal):—12.6V pentode with a separate suppressor grid connection.

6F6 (octal):—6.3V pentode with suppressor grid connected to the cathode.

6K8 (octal):—6.3V triode hexode. Hexode grids g_2 and g_3 are connected together and g_1 of the hexode is connected to the triode grid. The cathode is common to each section. One useful element is added because of the octal base, giving a total of eight useful elements.

12AX7 (B9A):—12.6V centre-tapped heater. Double triode with separate cathodes.

VR 150/30:—Voltage stabiliser running at about 150V and striking at about 180V.

Mullard System

In the Mullard system most valves are represented by two or three letters followed by a number. The first letter signifies the heater voltage or, if the valve is intended for series heater connection in A.C./D.C. receivers, the heater current. The heater voltage is one of the most important factors which determines whether it is convenient to use a particular valve in a certain apparatus. The Mullard code for the heater voltage is shown in the table. If the heater is tapped (e.g., ECC81) the voltage indicated by the code is for parallel connection.

The second (and any subsequent) letter indicates the general class to which the valve belongs; the code is shown in the third column of the table. More than one letter may follow the heater voltage if the valve contains two separate sections within the same envelope.

The type of base is indicated by the first figure following the letters as shown below.

- 1-19 Various.
- 20-29 B8G loctal.
- 30-39 International octal.
- 40-49 B8A rimlock.
- 50-59 Mainly B9G.
- 60-79 Sub-miniature.
- 80-89 B9A noval.
- 90-99 B7G.

The second or subsequent figure is only a serial number to distinguish valves of the same class which have the same heater voltage or current and the same type of base.

Mullard television tubes are coded MW or AW

MULLARD VALVE NOMENCLATURE

	First letter (Heater)	Second or subsequent letter (Class of valve)
A	4V	Single diode
B	—	Double diode
C	200mA	Triode (or Transistor)
D	0.5V to 1.5V (battery)	Power triode
E	6.3V	Tetrode voltage amplifier
F	—	Pentode voltage amplifier
G	5V	—
H	150 mA	Hexode
K	2V (battery)	Heptode or octode
L	—	Output tetrode or pentode
M	—	Tuning indicator
N	—	Thyatron
O	Semi-conductor device	—
P	300mA	—
Q	—	Nonode
U	100mA	—
X	—	Gas-filled full-wave rectifier
Y	—	Half-wave rectifier
Z	—	Full-wave rectifier (Zener diode if third letter)

followed by a number (e.g., MW43-80). The MW tubes are magnetically focused and the AW tubes electrostatically focused. Semi-conductor devices have codes commencing with the letter O. The second letter is an A in the case of germanium diodes (e.g., OA70) or a C in the case of transistors. Zener diodes for voltage stabilisation are coded OAZ followed by a number. Voltage stabiliser tubes sometimes have codes commencing with the average normal burning voltage (e.g., 85A1 or 150B2), but this does not apply to older types (e.g., 7475). Incidentally, Mullard photographic flash tubes have the lettering LSD followed by a serial number!

Examples

- EB91. Double diode with a 6.3V heater and a B7G base.
- EBC33. Double diode triode with octal base and a 6.3V heater.
- DK91. Heptode frequency changer with a 1.4V heater and a B7G base.
- UCH42. Triode-hexode frequency changer with a B8A base and a 0.1A heater.
- EABC80. Triple diode triode with a B9A (noval) base and a 6.3V heater.

Ediswan-Mazda Code

The Ediswan-Mazda code for current types of valve commences with a number indicating the heater voltage or current as follows:—

- 1 1.4V.
- 6 6.3V.
- 10 0.1A.
- 20 0.2A.
- 30 0.3A.

This number is followed by a letter which indicates

(Continued on page 862)

Using High-Cycle Transformers

THESE COMPONENTS CAN BE EMPLOYED
ON 50c/s MAINS

By J. B. Willmott

AN extremely useful and informative article on the subject of utilising the high-cycle mains transformer contained in Government Surplus AM.1355 receivers, appeared in June, 1957, issue of PRACTICAL WIRELESS (which is now out of print) and, inspired by the contents, the present author has made further investigation into the uses to which this class of component can be put. Also, as there may now be many new readers who have not access to the above issue, the following general information relating to high-cycle transformers is given for the guidance of those wishing to experiment further.

Specification

Firstly, then, a word about the type of mains transformer found in most Government surplus equipment. As in the normal domestic receiver, the purpose of the mains transformer is to supply the necessary L.T. voltages for feeding valve heaters, normally 6.3V for all except the rectifier, which is fed from a separate winding rated at 4.0V (or, in some cases, 5.0V); and a centre-tapped H.T. secondary winding is provided to feed the anodes of the rectifier, frequently having a rated output in the region of 250 to 500V.

The primary winding is designed to be fed from an 80V supply at a frequency of 2,000c/s instead of the 200 to 250V at 50c/s which constitutes the normal range of domestic supplies. This means that the existing primary winding is quite unsuitable for connection to normal A.C. house supply, and on no account must this be done. Usually it is quite safe to connect the former H.T. secondary winding across the mains supply, but when making initial tests of this sort, it is essential that a fuse rated at not more than 2A be placed in series with one, or preferably both connections to the mains supply, it is not safe to rely on the house fuses as these will be more highly rated, and give insufficient instantaneous protection in case of accidental short circuit or erroneous connection to a low resistance winding on the transformer under test. Also, never forget to switch off and withdraw the mains plug before making or altering any connections.

Identification

If an ohmmeter is available, it is a simple matter to identify the former H.T. secondary windings, as these will usually have a resistance in the range of 50 to 200 ohms between either end and the centre tap, all other windings being of virtually negligible resistance. Failing the availability of such an instrument, use a torch battery and bulb in series with each group of windings in

turn. Disregard all those where the bulb lights up (these will be the low resistance heater and original 80V primary winding). Only those tags connected to the original H.T. secondary will have sufficient resistance to prevent the bulb from lighting. This method does not, of course, immediately indicate which are the "ends" and "centre tap" of the H.T. winding, but the following additional test will quickly establish this point.

Having now identified the former H.T. secondary connections, attach the mains leads (suitably fused as described above) to any two of them, and switch on. If there is no sign of overheating, or other form of distress (such as a loud "buzz" from the transformer core laminations) proceed to measure the A.C. output voltage developed across the various former heater secondaries and the 80V primary winding; in most cases this will be well below the original voltage rating. Now change over one of the mains leads to the formerly unused one of the three H.T. secondary tags, and again take voltage readings at the other windings. If the voltages obtained are the same as in previous case, it is proof that the mains lead which has remained undisturbed is, in fact, connected to the centre tap of the former H.T. winding, but if lower voltages (approximately half the first set of readings) are obtained, one may assume that the mains lead which has been changed, has, in fact, been

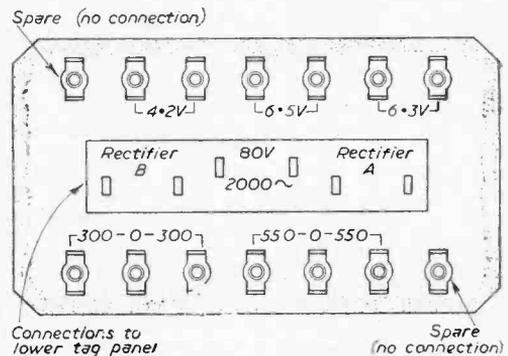


Fig. 1.—Top panel showing tag connections (as printed) including "key" to connections to lower tag panel.

moved from the "centre tap" to the "outer end" of the winding, likewise, if the second set of readings is roughly double the first, one may assume that the mains lead which has been changed over, has, in fact, changed from one of the "outers" to the centre tap. It is a good plan now to clearly label these tags as "Primary Outer (A)," "Primary Outer (B)" and "Primary Centre" respectively, for future reference.

Output Voltages

An examination should now be made of the A.C. output voltages obtained from the various windings, using whole or half of the newly designated primary winding, and quite a useful range of low tension A.C. voltages will be available, especially if various combinations of windings in series (correctly phased) are utilised, and

these may be used as heater supplies for valves in radio circuits, or, in conjunction with suitable metal rectifier, as source of D.C. for battery charging or running electric model railways.

There are several types of high-cycle transformer readily obtainable on the surplus market at extremely low prices (mainly, no doubt, because they have hitherto been regarded as of very little use by constructors). The author has made considerable use of the component found in Radar Receiver Type 3F, which it is understood is also

when on 240V mains the following voltages appear:—

The 550-0-550V winding gives 230-0-230V.

The 6.5V and 6.3V windings in series give 6.1V.

The 4.2V, and the two "Rectifier (A and B)" windings in series give a total of 4.2V.

H.T. Supply

The 230-0-230V output is ample for feeding to the anodes of a rectifier, giving a D.C. output after rectification of approximately 235volts "on load." the 6.1V supply appears to be adequate for feeding valve heaters rated at 6.3V, no noticeable reduction in efficiency being observed by the author, and the 4.2V supply can be used to supply the current needed to operate a 5-valve superhet receiver, or single-ended amplifier. It will be noticed that the output from the former 80V primary (which was found to be 30V) is not used in the above arrangement, but there are a number of uses to which it could be put. Firstly, it could be used to supply the heater of a rectifier valve rated in the region of 30V, type UR3C being an obvious choice. A UY41, readily obtainable at cheap prices from advertisers in this magazine, could also be used, but as this is a half-wave rectifier, the output from one half of the H.T. secondary only could be utilised, with a consequent drop in rectified H.T. voltage.

Output Transformers

Quite apart from their employment as mains transformers as outlined above, these high-cycle transformers have a further useful range of applications as output transformers. Although their method of design is not strictly in accordance with audio output transformer requirements, their performance in this respect will usually be found equal, if not superior to that of the cheaper range of output transformers. By using the former high voltage secondary winding as a primary, and one or more of the former heater windings in series as the secondary, a suitable ratio to match the standard 3 or 15ohm loud-speaker can usually be found. The turns ratio which gives greatest output with minimum distortion can usually be accepted as the correct working conditions, and in the case of the Radar Receiver Type 3F transformer referred to above, it has been found that using the whole of the 300-0-300V winding as a primary, and the 6.5V plus 6.3V secondaries in series to feed a 3ohm speaker, gives good results.

Earthing

Finally, it was found that in the original Radar Receiver 3F, one side of each of the 4.2, 6.5 and 6.3V windings was bonded to earth (the frame of the transformer); these connections must be removed by clipping off the interconnecting wires just below the surface of the top tag panel, otherwise windings will be short circuited when any attempt is made to connect them in series. There was also a "flying lead" from one side of the 300-0-300 winding, formerly connected to a high voltage pencil rectifier mounted on brackets at the side of the transformer; this lead (and the pencil rectifier if present) should also be removed.

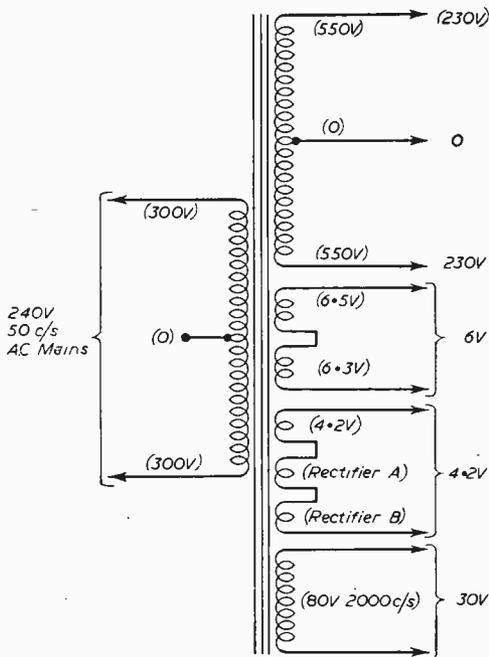


Fig. 2.—Theoretical diagram of connections when used as a mains transformer on domestic 50 c.s A.C. mains. The original designations are given in brackets.

utilised in a number of other radar receivers. This particular component, which is a fairly massive job weighing approximately 14lb., has all its connections brought out to clearly marked solder tags on panels mounted on top and at the base of the component.

The windings, in their original form, comprise an 80V high-cycle primary (two centre tags at the base of the component), two pairs of "rectifier heater windings" (right-hand and left-hand pairs of tags at the base); whilst on the top panel there are heater windings rated at 4.2V, 6.5V and 6.3V together with two entirely separate centre-tapped secondaries rated at 300-0-300V and 550-0-550V respectively. Fig. 1 clearly shows the layout of these connections. By virtue of the existence of two isolated H.T. windings, either of which, in whole or in part, can be used as a primary on 50c/s mains, a very wide range of voltages is available from the various other windings. The most useful method of connection seems to be as follows:—

Use the entire 300-0-300 winding as primary.

An Experiment

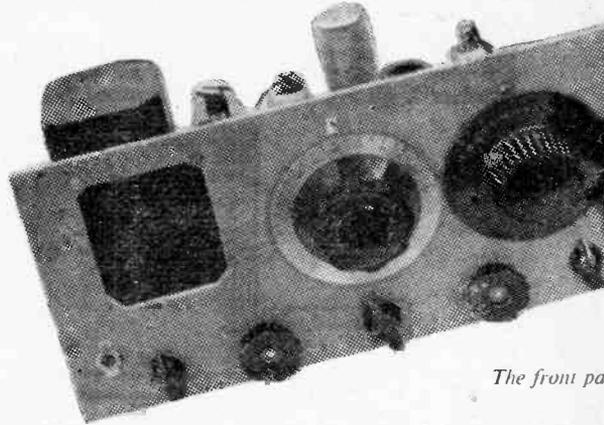
A HIGHLY SENSITIVE CIRCUIT FOR THE SWL

By F. G. Rayer

This is a mains operated circuit employing three valves (plus rectifier) and intended particularly for use on wavelengths between 10 and 100m. Bandsread tuning is used to simplify the accurate logging of stations, and Amateur Band reception. The very high sensitivity of the detector stage, in particular, makes long distance reception possible with even a poor aerial.

Circuit

The circuit is shown in Fig. 1, and can be modified to some extent to suit valves or other components which may be to hand. The first valve acts as R.F. amplifier, and a switch enables the aerial circuit to be tuned or untuned at will. This means that it can usually be left untuned, tuning being confined to the detector alone. This simplifies operation, and one of the aerial coils can be switched in if conditions make this necessary. Good results will be achieved with the R.F. stage untuned, and this means that these coils can be omitted, together with their associated variable condenser, if a simpler receiver is wanted. Tuning this circuit does, however, improve reception of very weak signals. Connections are for VR65 (SP61) but other R.F. pentodes may be used. The 150k potentiometer controls R.F. gain. With vari- μ valves the usual cathode circuit bias control can be used instead. Plug-in coils are used in the detector stage,



The front pa

with a cheap surplus acorn valve which permits very short wiring. For single band working, a fixed coil can be used and only one aerial coil is then needed. A screen grid potentiometer controls regeneration. A 15pF bandspreading condenser gives good coverage and very easy tuning, but values of 10pF to 20pF or so are practicable. In the same way 100pF is not essential for bandsetting purposes, though a value of about 100pF to 160pF is most suitable.

Output Stage

Another VR65 is used for output, but any 6.3V L.F. or output valve will be satisfactory.

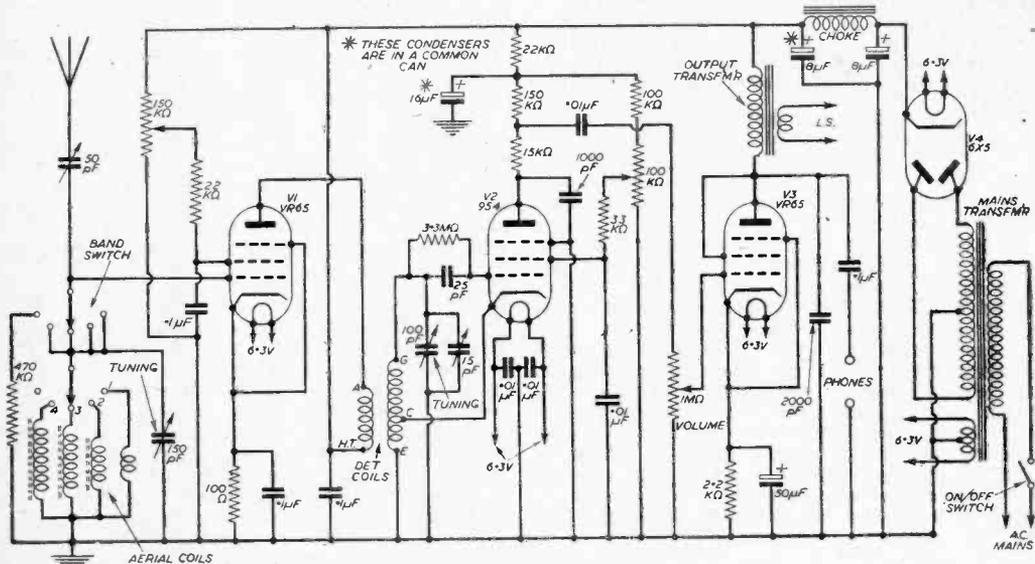
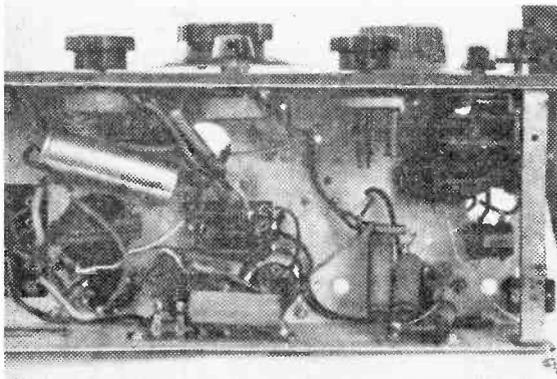


Fig. 1.—The circuit diagram.

al S.W. Three

with appropriate holder and bias resistor. Loud-speaker reception is generally possible, even with distant stations, but phones can be used when preferred, and the IM potentiometer allows volume to be kept down to a comfortable level. High impedance phones are necessary and of the usual type, fed through a condenser to keep direct current and H.T. voltages out of them. The speaker transformer primary acts as a choke when using phones, but the speaker can be silenced by wiring a switch in one lead from transformer secondary to speech coil.

In a set of this kind, complete isolation from the mains is wise, so the receiver draws current from a transformer, and the chassis can be earthed. Modification of this part of the circuit,



Underchassis view of the receiver.

to draw H.T. directly from the mains, is not recommended.

Screened Panel

A chassis about 12in. \times 5½in. \times 2in. deep, and a panel about 12in. \times 7in., will be satisfactory. This allows a 3½in. speaker to be accommodated, but a larger panel will be needed for a bigger speaker. Alternatively, the speaker can be in a separate cabinet, and much larger speakers will be satisfactory. A sheet of aluminium of similar dimensions to the panel should be placed behind the panel itself, if this is of three-ply. If a metal panel is used, this should be of stout gauge, or adequately supported with panel brackets.

Fig. 2 shows the chassis layout, the detector stage being most important. Valve connections

in Fig. 2 are correct when viewing the 954 from its short end, which carries the grid pin. The long end carries the anode pin. Care is necessary to solder to the extreme end of the pins, and to remove the iron instantly, as excessive heating may crack the glass. The valve is supported by the connections to it, which should be short and direct.

Condensers

The 100pF band setting condenser should have a knob or dial of such a kind that it can be returned accurately to any required reading. The large type of dial knob marked from 0 to 100 or 0 to 180, with a small bracket screwed to the panel and acting as a mark against which to take readings, will permit accurate resetting. It is then possible to tune in logged stations with the 15pF band spreading condenser, which has a similar dial and panel index. The separate logging of stations, by dial reading, will be possible even when they are so near in wavelength that logging would be impossible with an ordinary tuning scale.

Any 8 μ F or 16 μ F 350V or similar smoothing condensers are satisfactory. The large type can be mounted on the chassis as in Fig. 2. The output transformer is of the usual type for use with a mains output valve. The lead from the volume control slider to output valve cap should be screened, the braiding being wired to chassis. The cap lead of the other valve is not screened.

Underneath Components

Wiring is shown in Fig. 3. The heater circuit is completed first, leads being run against the chassis. If the mains transformer has a separate winding for rectifier heater, this is best used, but some rectifiers can have the heater wired in parallel with the other valves. Many 5V rectifiers, such as the 5Z4, are suitable, but need a transformer with separate 5V rectifier heater winding. If the transformer has a centre-tap on the 6.3V winding used for the other valves, this tap should be wired to chassis. If no tap is available, take one side of the heater circuit to chassis instead.

Referring to Fig. 3, the 50pF aerial condenser is an insulated surplus type, but may be replaced by a pre-set condenser, or small short wave type condenser on an insulated bracket, operated by an insulated extension rod. The switch is a two-wafer, five-way component, wiring being as shown in Fig. 1. The 150pF aerial tuning condenser requires a fairly large knob, but a dial is not needed because it is easily adjusted for best volume. The maximum capacity is a little larger than that of the detector tuning circuit to provide some overlap in aerial tuning.

The centre 150k potentiometer, acting as R.F. gain control, may be of 100k to 200k or so. The 100k regeneration control can be replaced by 50k, if to hand, provided that the 100k fixed resistor wired to it is reduced to 47k. The IM volume control can have a switch, for mains switching, or may be of 0.5M value, if to hand.

The values of the various by-pass condensers are not very important. The 0.01 μ F coupling condenser joined to the IM volume control should

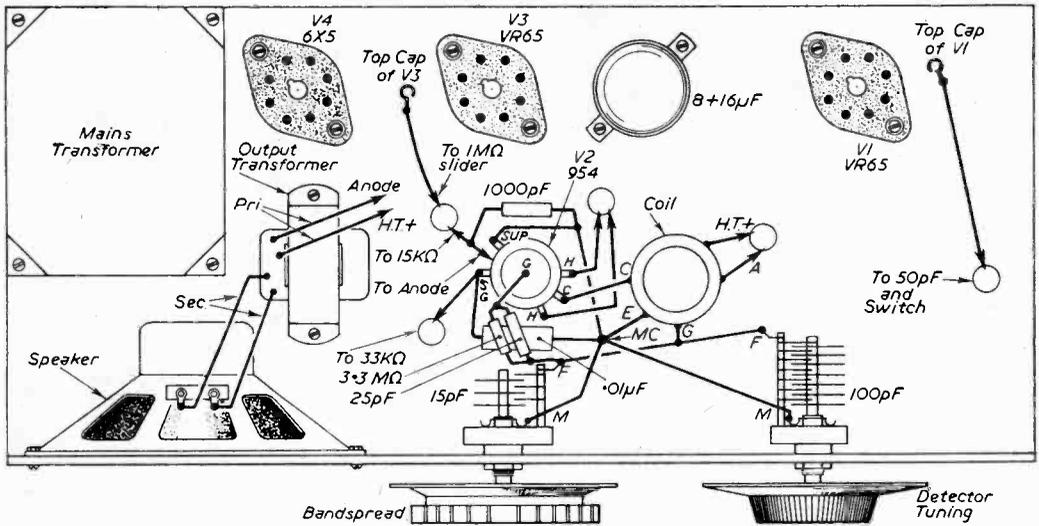


Fig. 2.—Above chassis wiring diagram.

preferably be of mica type as slight leakage will result in H.T. reaching the output valve grid.

The coil formers may be smooth or ribbed, and the diameter and gauge of wire and spacing between turns are not critical. Plug-in formers may be purchased, or made by fixing insulated formers to old valve bases. For one band only, a single coil may be wired directly in circuit.

For approximately 10 to 20m, five turns of 18s.w.g. wire, spaced to occupy 1in., on a 1½in. dia. former, with the cathode tap half turn from the earthed end, can be used. The primary is three and a half turns.

For about 18 to 30m, 11 turns of 22s.w.g. wire

occupying 1½in. on a 1½in. dia. former, with cathode tap half turn from the earthed end, and six turns for primary, may be used.

The 30 to 60m coil can be wound with 20 turns of 22s.w.g. wire occupying 1½in. on a 1½in. diameter former, with the cathode tap three-quarter turn from the earthed end and 16 turns for primary.

The largest coil, for approximately 60 to 100m, can have 35 turns of 24s.w.g. wire on a 1½in. diameter former, with the tapping one and a-half turns from the earthed end and 20 turns for primary.

(To be continued)

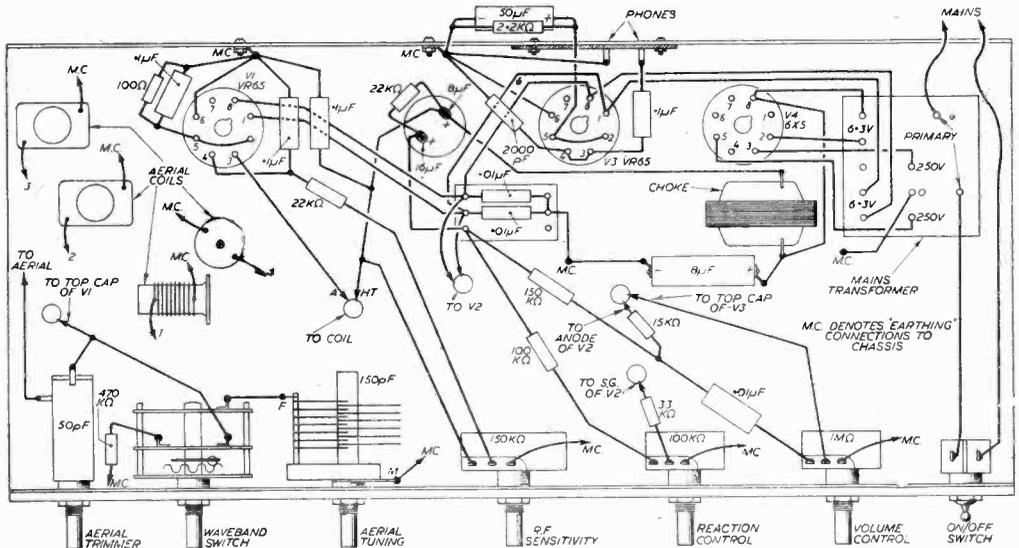


Fig. 3.—Under chassis wiring diagram.

Test Panel for Transistors

A SIMPLE UNIT FOR DETERMINING α'

By R. Leyland

STANDARD methods of testing transistors include comprehensive series of measurements on input and output currents and voltages, enabling graphs of the D.C. characteristics to be drawn. From these, A.C. characteristics can be derived, but are determined more directly by A.C. methods employing small A.C. inputs to measure the current gain and slope resistances.

Checks on transistors can, however, be made by less elaborate methods, and a circuit compris-

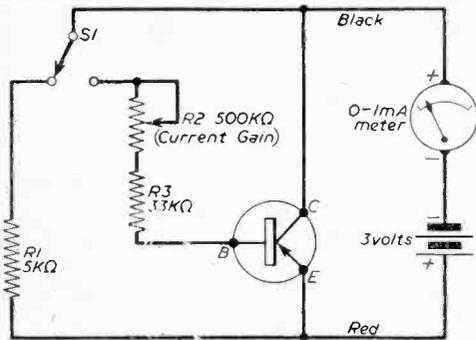


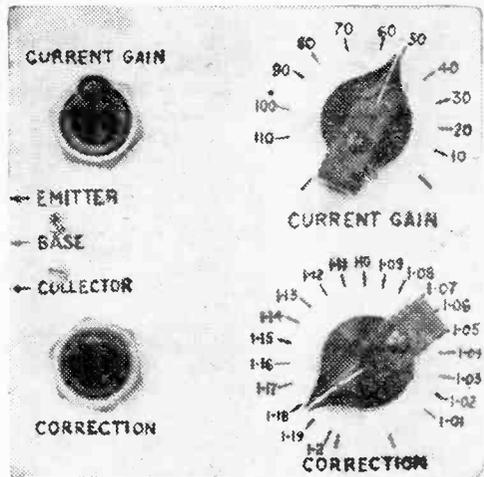
Fig. 1.—Circuit of the test panel in its simpler form.

ing the minimum of components will measure the current gain, α' , accurately enough for ordinary purposes. The current gain (unlike the leakage current) varies only slightly with temperature changes, and its variation over the maximum range of base currents may be 25 per cent. or less, while a fourfold increase of collector voltage may be expected to increase α' by only a third. Thus a test for the average value of α' over a certain range of currents, and at a certain battery voltage, will serve as a reliable basis for comparing transistors.

Basic Circuit

The measurement can be carried out with the circuit of Fig. 1. In one position of the switch a small current is applied to the base of the transistor through R2 and R3 and, is amplified by the transistor to give a considerable increase of collector current. In the other position of the switch, the base current becomes zero, but a resistance R1 is switched in across the transistor to make up the resulting drop in collector current. By adjusting R2, the amplified base current can be made equal to the current in R1, i.e., the milliammeter then reads the same at both positions of the switch.

$$\text{Since } \alpha' = \frac{\text{collector current increase}}{\text{base current increase}} = \frac{R2 + R3}{R1}$$



The panel of the tester.

approximately, the variable resistance R1 can be provided with a scale reading α' directly. The resistance R3 is, of course, required to limit the base current, so avoiding the risk of damaging the transistor.

Corrections

There are two errors in this measurement of α' . One is due to the assumption that the voltage across (R2+R3) is the same as the voltage across R3. Actually it is less by the small potential drop between the base and emitter of the transistor. With 3V on the collector, this P.D. across the input of the transistor is only about 170mV, and means that the value of α' given by the simple formula above should be increased by about 6 per cent. With higher collector voltages, the correction is smaller, and is only

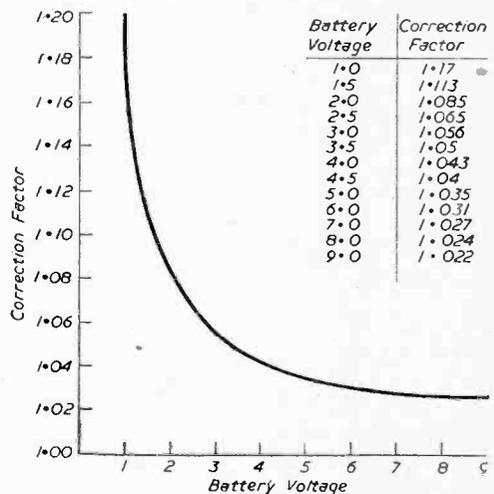


Fig. 2.—Correction factor to allow for P.D. across transistor inputs.

2 per cent. at 9V. Below 3V, however, the correction increases rapidly. These figures refer specifically to the circuit given, where the ratio of collector volts to the increase of collector

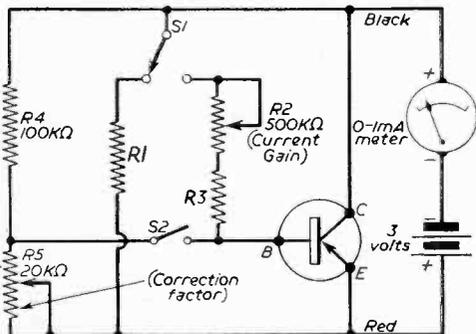


Fig. 3.—Modified circuit enabling the correction factor to be measured.

current is in each case made equal to a resistance of 5kΩ.

Graph

A graph of the correction against collector voltage is given in Fig. 2, and only in exceptional cases will a transistor show a noteworthy deviation from this graph. With a 3V battery, the correction factors for most transistors will be between 1.045 and 1.075. Thus, the assumption that the correction factor is 1.06 is not likely to produce errors greater than 1½ per cent. at the most.

The test is at comparatively low levels of base and collector currents, and in output stages, α' would attain a somewhat higher value. If it is desired to measure α' with battery voltages higher than 3, it will be necessary to replace the 1mA meter with a 5mA meter.

The remaining error is due to ignoring the

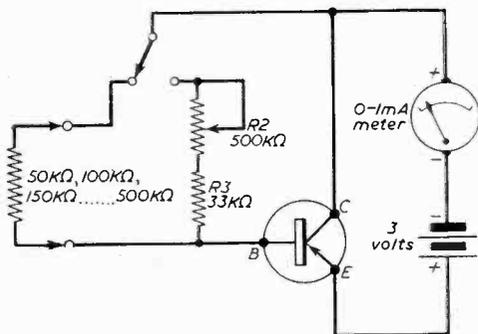


Fig. 4.—Temporary circuit arrangement for calibrating R2.

base current flowing through the meter. This means that (1) has to be subtracted from the result to obtain the actual value of α'.

Scales

It is possible to fix R2 and to vary R1 instead, and this has the advantage that a wire-wound

potentiometer can be used for R1, while if R2 is made variable, a carbon-track potentiometer has to be used. There are, however, a number of disadvantages in making R1 variable. The milliammeter current would vary to a much larger extent with different transistors, and the scale of α' would follow a reciprocal law, with the lower end of the scale expanded, and the higher reading cramped. It would also be more difficult to determine the position of the scale markings.

In theory, when R2 is made variable, a linear scale should be obtained, but imperfections in the carbon track tend to make the scale divisions rather erratic in spacing, although something resembling a linear scale will be obtained.

Modified Circuit

The correction factor can be ascertained directly, without knowing the battery voltage accurately, if a simple addition is made to the basic circuit. The modification is shown in Fig. 3, and consists of a potential divider containing a 100kΩ fixed resistance and a variable 20kΩ resistance, R5. By adjusting R5, the closing of switch S2 can be made to have no effect on the meter current. At this setting of R5, the correction factor can be read off directly, the scale

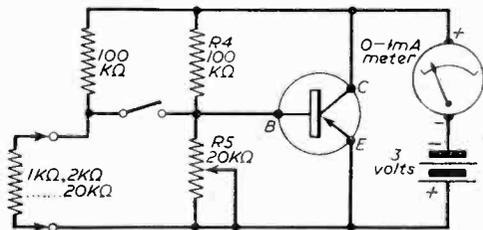


Fig. 5.—Temporary circuit arrangement for calibrating R5.

being marked in accordance with the formula:

$$\text{Correction factor} = \frac{R4 + R5}{R4}$$

its reading is multiplied by the correction factor ranging from 1.01 to 1.2. With a 3V battery, as previously stated, the pointer knob will give an indication in the neighbourhood of 1.06.

The larger test panel has two dials and two switches. One dial gives α' approximately and its reading is multiplied by the correction factor given by the other dial. Then 1 is subtracted to give the final value of α'.

Components

A panel of hardboard measuring 4in. square will serve to mount the two potentiometers and the two toggle switches. The fixed resistors should be high stability types of 1 per cent. tolerance. Two 10kΩ resistors in parallel can be used for the 5kΩ resistance, R1, or a 5.1kΩ resistor can be used, although this means that (R2 + R3) now has to be calibrated in multiples of 51kΩ which is more difficult than in multiples of 50kΩ.

The scale of correction factors is also linear, and can be marked either by setting up a Wheatstone bridge circuit, or as in Fig. 5, by comparison with accurate fixed resistances. When R5 is set

at 1k Ω , this corresponds to a correction factor of 1.01; 2k Ω corresponds to 1.02, and so on up to 20k Ω which corresponds to 1.2.

To calibrate R2, bridge methods will be less suitable, and accurate resistances of 50k Ω , 100k Ω , and so on (or 51k Ω , etc., if necessary) can be substituted for (R1 + R2) in circuit (Fig. 4), the

been calibrated. The steps involved in making a measurement are as follows:

- (1) Set R2 at the highest value of current gain, and R5 to the lowest value of correction factor.
- (2) Connect the battery and milliammeter, observing the correct polarities and voltage.
- (3) Connect the first transistor to be tested, making sure that it is the right way round.
- (4) With S1 and S2 at the unmarked positions, note the milliammeter reading carefully.
- (5) Switch to "current gain" and adjust the "gain" dial to give the same milliammeter reading.
- (6) Leaving S1 switched to "current gain," switch S2 to "correction factor" and adjust the "correction factor" dial to give the same milliammeter reading.
- (7) Multiply the readings of the two dials together (a slide rule will do this quickly) and then subtract 1.

It may be found that the milliammeter reading goes on increasing slightly, owing to the gradual rise in junction temperature inside the transistor, and some readjustment of the dials may be required, but it will be found that this makes only a small difference to the value of α' . The difficulty is that if a large current flows through the transistor it will raise the junction temperature and increase the leakage current. If most of the current is now diverted to an external resistance (R1), the junction temperature will begin to fall and the leakage current will decrease slightly, making its value different in the two switch positions.

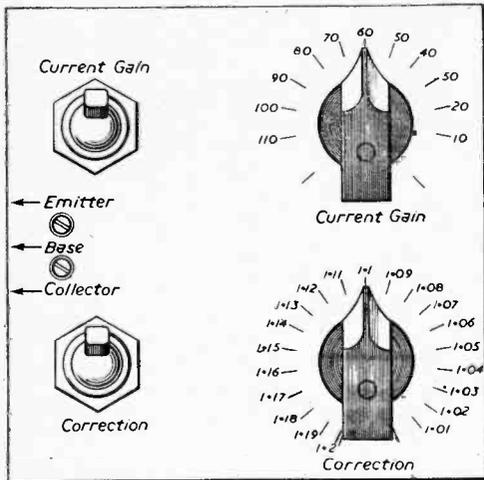


Fig. 6.—The panel layout.

variable R2 being adjusted to give the same readings of collector current.

Panel

The end positions of the pointer knobs should be marked carefully to make it easy to replace them correctly. Paper can be glued to the panel to take the markings made with Indian ink, and this can be covered with cellophane, or transparent plastic.

The toggle switches employed have four tags. When the toggle is to one side, connection is made between the two tags on the opposite side. One switch, S2, is used simply as an on/off switch, but the other, S1, is connected as a single pole, change-over switch.

A three-way connecting block, secured to the underside of the panel, connects the transistor to be tested. Although relatively clumsy for the purpose, it serves reasonably well, enabling all types of transistor to be connected temporarily for checking. The positions of emitter, base, and collector are marked on the top of the panel, and should be carefully observed.

Two insulated wires, each about 2ft. long, lead from the test panel to the milliammeter in series with a battery, and should be coloured red and black to avoid the risk of connecting the battery the wrong way round. With a grid-bias battery, red and black wanderer plugs should be used. Reversed connections, even if they do not result in damage to the transistor, will give rather puzzling readings.

Measurement

The accuracy of the measurements will depend in part upon the care with which the scales have

H.F. Operation

The value of α' measured by the test panel applies at low frequencies, and at a particular value of collector voltage and current. When the transistor is working at higher frequencies this value will be reduced, and an associated phase shift occurs. An R.F. transistor of a particular

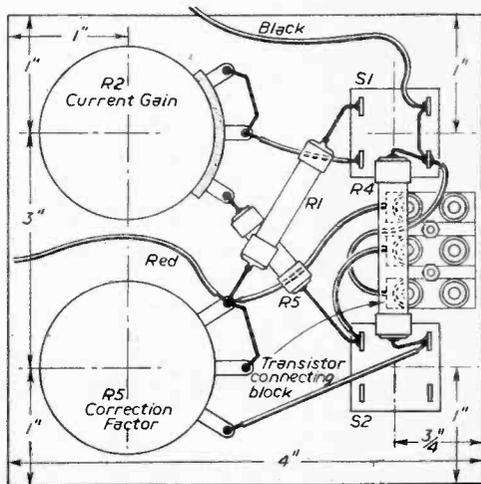


Fig. 7.—The wiring of the test panel.

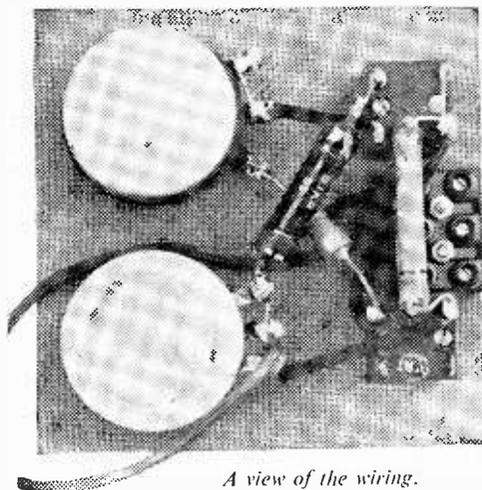
type is stated to have a certain typical "cut-off" frequency f_c of, say, 8Mc/s. This is for the grounded-base arrangement, and is divided by α' to obtain the "cut-off frequency", f'_{α} for the grounded emitter arrangement.

For example, if α' is 40, the grounded-emitter cut-off frequency will be
 $f'_{\alpha} = 8/40 \text{ Mc/s} = 200 \text{ kc/s}$

It does not follow that a high α' is a disadvantage, because the transistor with the higher α' usually has the higher f'_{α} also.

At the frequency f_c , the current gain is reduced to 71 per cent. of its low-frequency value, e.g., from 40 to 28, and a phase shift of 45deg. occurs. At ten times this frequency (2Mc/s) the current gain has fallen to 4 and the phase shift approaches 90 deg.

An R.F. transistor of these characteristics will nevertheless serve as a local oscillator over the long and medium waves. Used in the grounded base arrangement, a more level frequency response is obtained, owing to the negative feedback.



A view of the wiring.

VALVE CODING SYSTEMS

(Continued from page 853)

the general class to which the valve belongs. The code is as follows:—

C Frequency changer.

CRM Television tube.

D Diode or double diode.

F Voltage amplifier, triode or pentode.

K Small gas-filled triode or tetrode.

L Voltage amplifier, triode, tetrode or pentode.

M Tuning indicator.

P Power amplifier.

U Half-wave rectifier.

UU Full-wave rectifier.

The heater voltage of a rectifier is not placed in the coding. The letters are followed by a serial number.

Examples

1C2. Frequency changer with a 1.4V heater. (B7G base).

6C12. Frequency changer with a 6.3V heater. (B9A base).

6F33. 6.3V pentode with the suppressor grid connected to a diode. (B7G base).

30PE1. Triode-beam power tetrode with 0.3A heater. (B9A base).

UU9. Full-wave rectifier. (6.3V heater, B8A base.)

Marconi, Osram, G.E.C., M.O.V. Coding

This system of coding normally employs a letter or group of letters followed by a number. The letters indicate the class of valve and have the following meaning:—

A Valve with special industrial applications.

D Diode or double diode.

GU Gas-filled rectifier.

GT Thyatron.

H High impedance triode.

KT Kinkless tetrode or pentode.

L Low impedance triode.

M Metallised valve (usually placed at the end of the code).

N Output pentode.

U Rectifier.

W Variable- μ pentode.

X Frequency changer.

Y Tuning indicator.

Z Sharp cut-off pentode.

The first number following the letters often indicates the approximate heater voltage or current, but this is not always the case.

Examples

KT66. Beam tetrode with 6.3V heater.

KTW63. Variable- μ pentode with a 6.3V heater.

DL63. Double diode triode with a 6.3V heater. The triode is of the low impedance type.

X17. Frequency changer with a 1.4V heater.

Z77. Sharp cut off pentode with a 6.3V heater.

HN309. High impedance triode-output pentode with a 0.3A heater.

U52. Full-wave rectifier.

G.E.C. germanium diodes are coded GEX followed by a serial number. Current G.E.C. transistors are coded GET plus a serial number.

The Entirely New 13th Edition of The Famous Standard Work

THE PRACTICAL WIRELESS ENCYCLOPEDIA

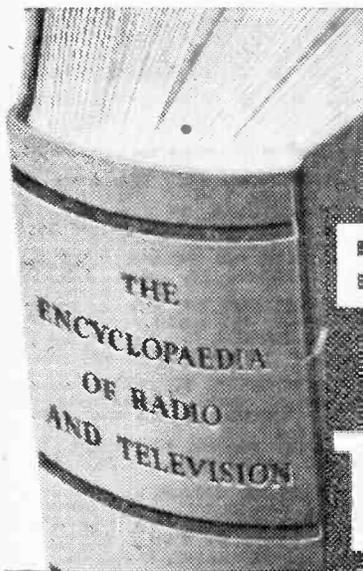
By F. J. CAMM

Considerably enlarged, amplified and entirely re-written and re-illustrated. Complete Television Section, with theoretical and constructional data.

All the facts, figures, and constructional data of Radio and Television—Definition, Terms—Units—Principles, Circuits, etc.

Over 300,000 copies sold. Price 21/- or 22/6 by post from:

GEORGE NEWNES, LTD., Tower House, Southampton Street, Strand, W.C.2.



YOURS on 7 DAYS' FREE APPROVAL!

ENCYCLOPAEDIA of RADIO and TELEVISION

**Up to the Minute!
Comprehensive! Authoritative!**

736 PAGES
Nearly 800
SPECIALLY PREPARED ILLUSTRATIONS

OVER 3,000 A-Z ENTRIES

Aerials; Amplification; Attenuation; Audio-Frequency Transmission; Automatic Gain Control; Broadcasting; Communication Systems; Colour Television; Detection; Direction-finding; Distortion; Electrical Machinery; Electrical Recording; Feedback; Feeders; Interference; Loudspeakers; Measuring Instruments; Modulation; Oscillators; Power Distribution; Power Supply; Public-address equipment; Pulse Code Modulation; Radar; Ratcheting; Receivers; Rectification; Relay systems; Senders; Stereophonic Reproduction; Symbols, Abbreviations; Testing and Fault Tracing; Tilt and Bend; Tuning; Transmission (general); Valves; Vision Frequency Transmission; VHF; Wave Propagation; etc.

THE ESSENTIAL REFERENCE for AMATEUR or ENGINEER

Here's the complete A-Z guide, packed with clear explanations, latest information and valuable reference data, that meets the practical man's every need! **Essential to the enthusiastic amateur, practising radio engineer, apprentice or student.** Over 3,000 easy-to-follow entries deal thoroughly with every aspect of the theory and practice of television, radio, radar, etc. *New edition, brought up to date by the inclusion of an appendix covering recent developments.* Special reference section gives useful formulae, abacs, etc. **The most remarkable value in any work of this type ever published!** 736 pages. Over 300,000 words. Nearly 800 illus. **De Luxe Edition, handsomely and strongly bound, yours (if kept) for only 30/- (cash price), or 11/6 down and 2 monthly payments of 10/- (31/6).**



DO THIS NOW! To accept this great offer, simply fill in form and post in 2d. stamped, unsealed envelope to Dept. E.B.26, People's Home Library, Odhams Press Ltd., Basted, Sevenoaks, Kent. Book comes to you **ON APPROVAL**—if satisfied you send remittance (full cash or down payment)—otherwise you return book within 8 days. Offer applies in U.K. and Eire only, closes Feb. 29.

SEND NO MONEY NOW!
POST FORM TODAY!

To: Dept. E.B.26, People's Home Library, Odhams Press Ltd., Basted, Sevenoaks, Kent. Please send me, **WITHOUT OBLIGATION TO PURCHASE**, "Encyclopaedia of Radio & Television." I will **EITHER** return the book in good condition, postage paid, within 8 days. **OR** send down payment of 11/6 eight days after delivery, followed by 2 monthly instalments of 10/- (31/6). **ALTERNATIVELY**, I will send the cash price of 30/- eight days after delivery.

Signature..... Occupation.....
 (Persons under 21 will be sent a Guarantor Form.) Age, if under 21.....
 Put tick where applicable: Cash Terms Householder Lodgings
 Furnished Premis. Unfurnished Premis. Hotel Live with Parents
BLOCK LETTERS BELOW
 NAME.....
 Full Postal ADDRESS.....

E.B.26/Feb.'60 *Firmly affix 2d. stamp in margin.*

A CHASSIS FOR SPARES | ALL THIS FOR ONLY 9/6

56 RESISTORS, 7 VARIABLE; CONDENSERS, INCLUDING ELECTROLYTICS; COILS: 7 I.F. AND R.F. TRANSFORMERS; 14 VALVEHOLDERS; 4 TRANSFORMERS, MAINS, O.P., LINE, FRAME; CHOKES; METAL REC., 300 VOLT, 250 M.A.; FUSE PANEL; SCANNING COIL; FOCUS MAGNET; PLUGS; SOCKETS; SWITCH; CHASSIS SCREWS; TAG STRIPS, ETC. I.F. STRIP IN SEPARATE POWER PACK CAN BE USED WITHOUT DISMANTLING. CHASSIS HAVE BEEN USED, BUT WERE WORKING WHEN STORED. 7 PAGES OF CIRCUITS AND INSTRUCTIONS SHOWING POSITION OF EACH COMPONENT. CARRIAGE 10/6.



'PERTH' STEREO RECORD PLAYER CABINET WITH EXTENSION SPEAKER CABINET

AT THE AMAZING OFFER OF **99/6**

Portable 1960 "Perth" show model in two-tone colours. Extension speaker cabinet secured in lid. (Arrow indicates position when fixed.)

Size 18 x 14 x 8 1/2 in. high. This Stereophonic player complete retails at 35 gns. in the shops today. A must for all teenagers, and an essential for the enthusiast. Carr. & Ins. 5/6 with order.

OR 6/1 INITIAL PAYMENT AND BALANCE OF 4/11 FOR 19 WEEKS.



EXTENSION SPEAKER 19/6

Ideal for Stereophonic sound. Attractive polished cabinet fitted with Bin. P.M. speaker. Std. matching to any receiver, 2-5 ohms. Switch and flex. P. & P. 3/6.

8in. P.M. SPEAKER 5/9

Had a slight cone repair, not affecting the quality. Tested and guaranteed. Limited quantity. P. & P. 2/9.

ELLIPTICAL SPEAKER, 19/6

9 1/2 in. x 4 1/2 in. Ideal for record players. P. & P. 2/6.

FOCUS MAGNETS, 9/9. Brand new, 38 mm. Incorporating picture shift control. P. & P. 1/3.
ELAC FOCUS MAGNET, 12/6. 38 mm. Incorporating Picture shift control. P. & P. 1/3.
SCANNING COILS, 10/6. Low impedance, 38 mm. New. P. & P. 1/3.

CO-AXIAL CABLE, 6d. yard. Cut to any length. Good quality. Post 1/6 on 20 yds.

RECTIFIERS, 2/9. 250 volt, 100 m.a. Full or half-wave. (State preference.) Salvage, guaranteed. P. & P. 1/3.

INSULATING TAPE, 1/6. 75ft. x 1/2 in. in sealed tins. Post 9d.

VOLUME CONTROLS, 2/6 doz. Assorted parcel of volume and tone controls stripped from working chassis. P. & P. 2/-.

TAG-BOARDS, 2/6 doz. 3-12 way. P. & P. 1/-.

CRYSTAL DIODES, 1/9. New. .070-.080. Post 6d.

NO-DARK CUT-OUT, 8/9. Overload cut-out switch, 200-250 volt. Max. load 2.5 amps. P. & P. 1/6

GANG CONDENSERS, 1/9. Std. size, 2-gang. All tested and guaranteed, .0003 and .0005. P. & P. 1/3.

O.P. TRANSFORMERS, 1/3. Std. 2-5 ohms. Guaranteed salvage. Post 1/-, 20 for £1. Carr. 5/6.

FRAME O.P. TRANS., 1/9. 500 ohms Prim., 18 ohms Sec. P. & P. 1/6.

MAINS AUTO TRANS., 8/9. 0-205-225-245 volt at 300 m.a. Isolated windings. 6.3 v.-6.3v.-2v. P. & P. 2/9.

MAINS TRANS., 7/9. 300-0-300 volt at 80 m.a., 6.3 v. at 3 amp. Prim. 200-250 v. P. & P. 2/9.

HEATER TRANSFORMER, 3/9. 2-1 ratio. Ideal auto trans., 2 v. to 4 v., 3 watts. P. & P. 1/9.

EYSI ISOLATION TRANS., 5/9. 7 kV., 1-1 ratio. P. & P. 1/9.

(Dept. 2), Stamp for FREE Catalogue.



COMPONENTS LTD.

219, Ilford Lane, Ilford, Essex. ILF 0295.

be TRANSISTOR-WISE! be POCKET-WISE!

"RECO" MIDDY ONE TRANSISTOR KIT



(Medium and Long Waves or Medium and Short Waves). Size 4 1/2 x 3 1/2 x 1 1/2 in. Variable sensitivity control. High gain Vari Q Ferrite Rod Aerial. "Sonotone" Dynamic Earpiece. Months of listening pleasure from 1 1/2 volt pencil. Complete Kit with EDISWAN TRANSISTOR and easy build plans, 39/6 post free.

AMAZON THREE TRANSISTOR POCKET RADIO

Covers 100 to 500 metres and Short Waves. New improved, super sensitive 5-stage reflexed circuit. EDISWAN transistors. Pocket sized case. Ferrite rod aerial. Case body in polystyrene with contrasting grille in red. Complete kit with easy build diagrams and "Sonotone" dynamic miniature earpiece with moulded insert. 72/6. p.p. 2/6.

"RECO" PUSH - PULL FOUR TRANSISTOR KIT

(Medium and Long Waves with two Short Wave Coils FREE.) Case size as PPS. New improved circuit. 3in. High Grade Moving Coil Speaker. Bias sensitivity volume control. Ferrite Rod Aerial. Gleaming Pale Blue Polystyrene Case with Contrasting Speaker Grille in Red. Complete Kit with 4 1st grade EDISWAN TRANSISTORS and 3 volt battery, £53.6; p.p. 2/6.



"RECO" PUSH-PULL FIVE TRANSISTOR KIT

(Size 6 1/2 x 4 1/2 x 1 1/2 in.) Medium, Long Waves and Trawler Band. Indoors or outdoors this brilliant radio brings Home and Continental Stations to your finger tips. High Grade 3in. Moving Coil Speaker. Regenerative receiver with EDISWAN TRANSISTORS. Push-Pull Output Stage. High Gain Ferrite Rod Aerial. Gleaming Pale Blue Polystyrene Case with Contrasting Speaker Grille in Red. Complete Kit with Pencil battery and easy build diagrams, etc., £69.6; p.p. 2/6.

A customer in Dorset writes—"Makes fine car radio."

"RECO" TRANSIGEN THREE TRANSISTOR KIT

(Case as PPS.) (Medium, Long Waves and Trawler Band.) Entirely self-contained no external aerial required. Fitted Super High Gain Ferrite Rod Aerial. R.F. Stage, EDISWAN TRANSISTORS. On test: tuned in Home, Light, Third, Radio Luxembourg, A.F.N. and many others at good listening level. The Prototype was tested at approximately 50 miles from nearest transmitter. Complete Kit with Super B.A. Reproducer and battery, 75/-, p.p. 2/6. Or with "Sonotone" super dynamic miniature earpiece, 79/6.



"RECO" AMAZON TWO TRANSISTOR KIT

(Medium and Short Waves.) Regenerative circuit with Ferrite Rod Aerial. Complete Kit with Personal Phone, EDISWAN Transistors and 3 volt battery, 59/6. p.p. 2/6.

AFTER SALES SERVICE.

Circuits and price list for above kits, 2/6.

RADIO EXCHANGE CO. 27 HARPUR ST., BEDFORD. Telephone 2367.

Closed 1 o/c Saturdays.

Becoming an Amateur

No. 6.—TWO ONE-VALVE RECEIVER CIRCUITS

By J. D. Pearson, G3KOC

THE reader may already be an experienced constructor, but if this is not the case then he is strongly advised to tackle a simple T.R.F. circuit; many such circuits have been published in past issues of this magazine, complete with detailed component lists and sound constructional advice.

It is a fact that there are still to-day many amateur stations using T.R.F. receivers for reception, particularly in certain European countries where there is no such thing as a "surplus" market. This point is made to illustrate the performance which can be achieved by a well designed T.R.F. set, having a sensitivity figure



Mr. J. W. Wroth of Ramsgate in his den.

gain experience with this type of gear before attempting mains-driven circuits.

Although a type HL2 valve is shown almost any 2V battery triode will function satisfactorily in this circuit; and for those who wish to use the 1.4V type of valve, a DF33 or DL35 in the octal-based range, and a 1T4 in the B7G range may be substituted, not forgetting of course to "strap" the screen-grid to the anode.

The circuit may be built using the "bread-board" method or alternatively, the more orthodox aluminium chassis. The HL2 will operate with an anode voltage anywhere between 60-120V and the 1.4V type with an anode voltage between 45-90V. The potential applied to the anode will determine the "smoothness" with which "reaction" can be applied.

Positive Feedback

If a controlled amount of the output signal at the anode of the detector valve is fed back in the correct phase into the grid circuit of this valve, the result is a high increase in the sensitivity of the stage. This process, if carried too far, causes the valve to provide its own grid-excitation and consequent self-maintained oscillation. The application of positive feedback in

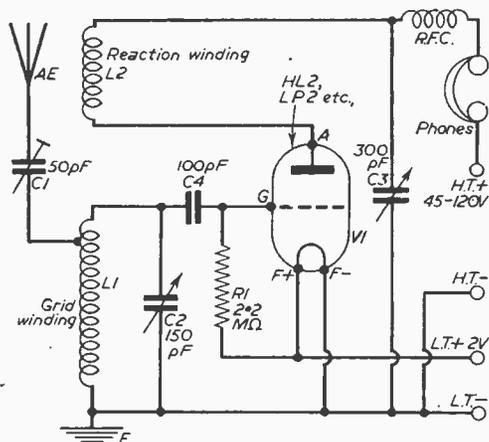


Fig. 1.—Simple one-valve circuit using a triode.

often well above that of the older-type superhet. Unfortunately the "straight" set cannot compare with the superhet as far as selectivity is concerned. And conditions being as they are on the amateur bands to-day, selectivity is of prime importance.

Beginner's Circuit

The circuit in Fig. 1 is intended for the newcomer who has no constructional experience whatever. The coil dimensions given will ensure coverage of the 160-metre amateur band. No apology is offered to the more sophisticated constructor who may be following this series. It must suffice to state that the series is designed to enable the merest tyro to attain the standard required to take the R.A.E.

It will be seen that the circuit is battery-operated: the beginner is strongly advised to

COMPONENTS LIST FOR FIG 1.

- C1 —50pF (0.0005 μ F.) semi-variable trimmer.
 - C2 —150pF (0.00015 μ F) tuning, air-spaced.
 - C3 —300 pF (0.003 μ F) reaction, air or mica dielectric.
 - C4 —100pF (0.0001 μ F) grid condenser, mica or silver mica.
 - R1 —2.2M Ω (Megohms) grid leak.
 - RFC —Radio Frequency Choke.
 - L1 —Grid coil, 45 turns 22 s.w.g. enamelled copper wire close-wound on 1 $\frac{1}{2}$ in. diameter former.
 - L2 —Reaction coil, 15 turns as above, on same former, spaced $\frac{1}{8}$ in. from L1. (See Fig. 3.)
 - Miscellaneous—High resistance headphones, valve-holder to suit V1, connecting wire, terminals, chassis and panel, coil-former and holder.
 - V1 —HL2, LP2, 1T4, DL35, DF33, etc.
- The grid leak R1 may be increased in value experimentally to 3.3 or 4.7M Ω , but should not be decreased.

this manner is known as "reaction" or "regeneration."

In order to obtain maximum performance from a T.R.F. receiver it is essential that the application of reaction should not be too fierce, or "ploppy," thus losing the increase in sensitivity which results when the valve is operated on the threshold of oscillation. Factors which determine the smoothness with which the receiver slides into oscillation are (a) H.T. voltage; (b)

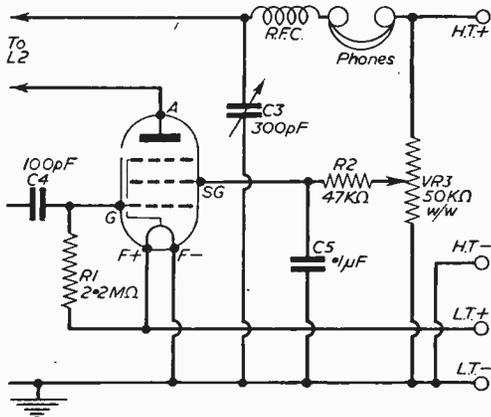


Fig. 2.—A one-valve circuit using a pentode.

amount of coupling between grid and anode coils; (c) proportion of anode turns to grid turns on these coils; (d) the value of the grid leak and condenser, and (e) the fitting of a well-earthed metal panel to the chassis, eliminating hand-capacity effects.

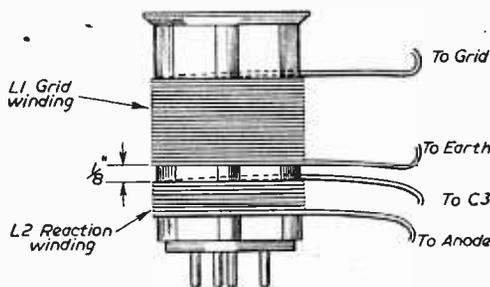


Fig. 3.—Details of the coils.

The beginner should, after building and operating the circuit of Fig. 1, experiment for himself by variation of the factors enumerated. If he has a milliammeter and inserts this *in series* with the H.T. supply to the valve, further lines of investigation will be revealed.

The next step is to supply the screen-grid of the valve with its own separate H.T. voltage through a variable resistor, as shown in Fig. 2. This allows a much finer control of reaction, in addition to that provided by C3. The strap between anode and grid should, of course, be removed. A screen-grid valve of the 2V type can, of course, be used in the circuit of Fig. 1 either with the anode and screen grid strapped, or as shown in Fig. 2.

Beginners should bear in mind that the pin connections to internal electrodes will differ with whichever type of valve is used. A commercial coil may be used in place of L1, L2 if the value of C2 is altered according to coil-manufacturers' directions.

Satellites

BALLOONS with aluminised surfaces will be orbited about 1,000 miles up as relay stations for microwave communications and intercontinental TV transmission in tests by Bell Labs., U.S.A.

Transmitters using 85ft. parabolic dishes will beam 10kW signals at the satellites at about 1,000Mc/s. It is hoped reflection from a satellite will give a usable signal receivable with a parabola 2,300 miles away. The signal will be funnelled into a maser amplifier, in this case a ruby crystal bathed in liquid helium. Bell engineers expect extremely low noise figures with this maser and a special horn collector used with the receiving dish—signal-to-noise ratios up to a hundred times better than presently obtainable.

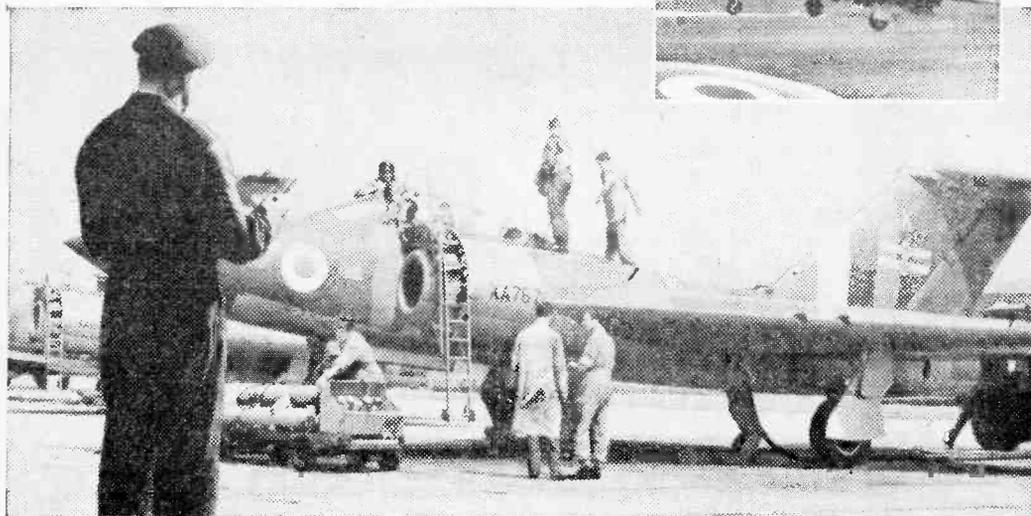
Where the new transoceanic cables carry up to 160 phone conversations at a time, a single microwave channel of this kind would carry 900 phone circuits, or a full-width TV channel. About 20 satellites would provide communication across the U.S.A. 95 per cent. of the time. This number would be required because such light, large, passive satellites would drift, failing to stay in the regular orbits of heavy, small, active satellites at present in orbit, or the doughnut-shaped satellite proposed by others.

New Technique

A RATHER simple soldering technique recently developed now makes it possible to solder a wide range of materials previously joined only by ultrasonic processes.

The technique requires, in addition to the usual soldering materials, only a hand grinder with an abrasive grinding wheel of medium grit. To solder such "unsolderable" materials as stainless steel, aluminium, ceramics and glass, the grinder is turned on and the abrasive wheel (preferably preheated by grinding metal or by applying heat with a torch) is brought to bear on a soft solder such as Wood's metal or 40-60 lead-tin. The soft solder melts and flows on to the surface of the wheel: the solder-loaded wheel is then applied to the surface to be soldered until a slight amount of abrasion has taken place, using the pressure one would ordinarily use in grinding. The heat generated by the friction again melts the solder, which flows on to the freshly abraded surface and forms a positive bond. The surface of the other material is also given this treatment if it is not ordinarily tinned with solder alone. After this tinning operation, the soldering process is performed in the usual manner with standard 50-50 lead-tin solder. Soldering flux or surface cleaning is unnecessary.

Touch-down!



7 minutes to go!

Their sortie completed—two Javelins return—only two aircraft—only four men—but it takes a large team of technicians to get them back into the air without delay.

A Javelin's ground crew works at top speed. They can rearm and refuel the aircraft and have it back on the runway fully serviced in seven minutes. Here, the Master Radar Station takes over. Once again a technical team . . . air operations staff, teleprinter operators, radar specialists. In the R.A.F., every man counts.

You'll get more out of life in the

R.A.F.

The R.A.F. will train you for a key post and a planned career in electronics, radio, radar or one of many other trades. For full details, post this coupon today.

To: Royal Air Force Central Recruiting Office (PW18a),
Victory House, Kingsway, London WC2

NAME DATE OF BIRTH

STATE TRADE PREFERENCE

ADDRESS



AS PART OF THEIR SERVICING. re-charged batteries are hoisted into the Javelin's fuselage. These provide a reserve source of electric power.



IN SEVEN MINUTES. two more Javelins are ready on the runway. From the Control Tower, it's . . . 'All clear for take-off'.

WEYRAD

COILS AND TRANSFORMERS FOR A 2-WAVE TRANSISTOR SUPERHET WITH PRINTED CIRCUIT AND FERRITE ROD AERIAL

LONG AND MEDIUM WAVE AERIAL—RA2W

On 6in. rod, 7/16in. diameter, flying lead connections, 208 pF tuning

OSCILLATOR COIL—P50/1AC 12/6

Medium wave in screening can. For 176 pF tuning condenser 5/4

1st AND 2nd I.F. TRANSFORMERS—P50/2CC

470 Kc/s operation with 250 pF tuning in cans. 11/16in. diameter by 3/4in. high 5/7

3rd I.F. TRANSFORMER—P50/3CC 6/-

Last stage transformer to feed diode detector. Size as P50/2 9/6

DRIVER TRANSFORMER—LFDT2

Upright mounting with six connecting tags—1 1/4in. x 1 1/4in. 9/6

PRINTED CIRCUIT—PCAI

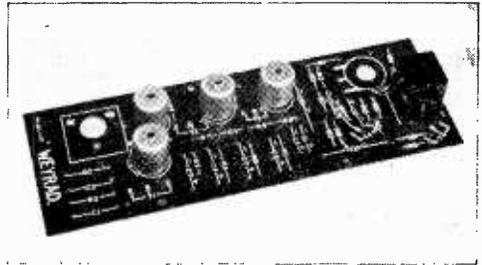
Size 2 1/4in. x 8 1/4in. Ready drilled and printed with component positions 9/6

THESE COMPONENTS ARE APPROVED BY TRANSISTOR MAKERS AND PERFORMANCE IS GUARANTEED.

Constructor's Booklet with full details, 2/-.

WEYMOUTH RADIO MANUFACTURING CO., LTD.

CRESCENT STREET, WEYMOUTH, DORSET



ERSIN MULTICORE SOLDERS

for a first class joint every time

Ersin Multicore contains 5 cores of extra-active, non-corrosive Ersin Flux. Prevents oxidation and cleans surface oxides.

SIZE 1 CARTON 5/-

HANDYMAN'S CARTON

Suitable for 200 average joints. 6d.



Wherever precision soldering is essential, manufacturers, engineers and handymen rely on MULTICORE. There's a MULTICORE SOLDER just made for the job you have in hand. Here are some of them.

SAVBIT TYPE 1 ALLOY

A specially formulated alloy to reduce the wear of soldering iron bits. Contains 5 cores of non-corrosive Ersin Flux and is ideal for all soldering purposes.

SIZE 1 CARTON 5/- Available in three specifications.



HOME CONSTRUCTORS 2/6 PACK

In addition to the well-known Home Constructors Pack (containing 19ft. of 18 s.w.g. 60/40 alloys) a similar pack is now available containing 40ft. of 22 s.w.g. 60/40 alloy especially suitable for printed circuits.



BIB WIRE STRIPPER AND CUTTER

Strips insulation without nicking wire, cuts wire cleanly, splits extruding flex. 3/6 each



MULTICORE SOLDERS LTD.,

MULTICORE WORKS, HEMEL HEMPSTEAD, HERTS. (BOXMOOR 3836)

SOUTHERN RADIO'S WIRELESS BARGAINS

ATTACHMENTS for "18" Transreceivers. ALL BRAND NEW. HEADPHONES, 15/6; HAND MICROPHONE, 12/6; AERIALS, 5/- SET OF 6 VALVES, 30/-.

CONDENSERS. 100 Assorted. Mica, Tubular, etc. NEW 15/- CONTACTOR TIME SWITCHES. 2 impulses per sec., in case 7/-

REMOTE CONTACTOR. For use with above 11/6

LUBBRA HOLE CUTTERS. Adjustable 1/2" to 3 1/2". For Metal, Plastic, etc. 7/6

MAGNETS. Strong Bar Type, 2" x 1 1/2". 1/6 each 7/-

MORSE PRACTICE SET. TAPPER with BUZZER on Base. Complete with Battery. BRAND NEW 12/6

MORSE TAPPERS. Midget Type, 2/9. Standard, 3/6. Heavy Type on Base, 5/6. ALL BRAND NEW.

PACKARD-BELL AMPLIFIERS. Complete BRAND NEW with Valves; Relay, etc., etc. 17/6 each.

QUARTZ CRYSTALS. Types F.T.241 and F.T.243, 2-pin, 1/2 Spacing. Frequencies between 5,675 Kc/s and 8,650 Kc/s. (F.T. 243) 20 Mc/s. and 38.8 Mc/s. (F.T.241), 54th Harmonic, 4/- each. ALL BRAND NEW. TWELVE ASSORTED CRYSTALS, 45/-. Holders for both types, 1/- each. Customers ordering 12 crystals can be supplied with lists of frequencies available for their choice.

RECORDING BLANKS. New "Emidisc," ready for use. 13" 6/- each. Quantity of 15 in metal case 4/-.

RESISTANCES. 100 Assorted useful values. New wire end, 12/6.

SPECIAL OFFER. 12 ASSORTED METERS. Slightly damaged. Mainly broken cases (perfect movements). Including 3 Brand New Aircraft Instruments. 12 for 45/-.

STAR IDENTIFIERS. Type I A-N Covers both Hemispheres. 5/6. TI154 TRANSMITTERS. Complete, NEW condition, in Transit case £2.5.0

TRANSPARENT MAP CASES, Plastic. 14" x 10 1/2". Ideal for Maps, Display, etc. 5/6

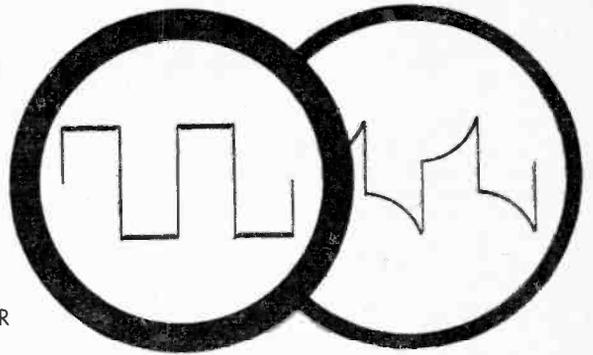
TRANSRECEIVERS. Type "38" complete with 5 valves, etc. New condition, untested by us, but serviceable, no guarantee. 22/6 each.

ATTACHMENTS for Type "38" Transreceivers. ALL BRAND NEW. PHONES, 15/6; THROAT MICROPHONES, 4/6; JUNCTION BOXES, 2/6; AERIALS, No. 1, 2/6; No. 2, 5/-; WEBBING, 4/-; HAVERSACKS, 5/-; VALVES, A.R.P.12, 4/6; A.T.P.4, 3/6. Set of FIVE VALVES, 19/- the set. POST OR CARRIAGE EXTRA. FULL LIST OF RADIO BOOKS, ETC., 3d.

SOUTHERN RADIO SUPPLY LTD.

11, LITTLE NEWPORT ST., LONDON, W.C.2. GER. 6653

Improving Amplifier Quality



USING PUSH-PULL CIRCUITS FOR BETTER RESULTS

(Continued from page 770 of the January issue)

By C. Stone

SOME old amplifiers of robust type and quite sound design employ a centre-tapped transformer to drive two valves in push-pull in the output stage. Feedback will help correct distortion arising in the transformer, but it is

constructed equipment the extra current can often be provided, when changing from a single output valve to push-pull. As example, two 6V6 valves, with a 285v supply, will require about 105mA. The existing rectifier, mains transformer, and smoothing choke may thus well be of insufficient rating, and need changing. Alternatively, it is sometimes possible to use output valves of smaller type, so that the total H.T. current does not exceed that taken by a single output valve of larger type.

In Fig. 5, the valves are triode connected. For pentode working (screen grids to H.T. positive line) the optimum load is 8,000 ohms. When maximum

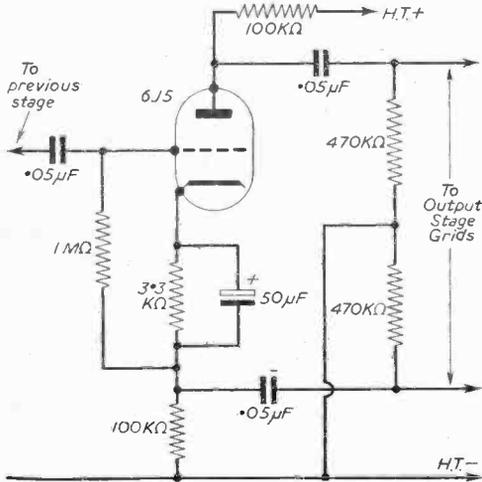


Fig. 4.—A single triode phase inverter.

nevertheless worthwhile considering the use of a phase inverter valve instead of the transformer. A circuit for a single triode is shown in Fig. 4. When there is no space for an extra triode, it may be possible to fit a twin triode in the existing position. The 6SN7, for example, would replace an existing 6J5 and at the same time make available a further triode with similar characteristics for use as phase inverter.

Component values may be varied somewhat, according to the valve type chosen, and H.T. voltage. The anode and cathode load resistors (100k in Fig. 4) should be of fairly close tolerance—say 5 per cent. of specified value. Similarly, the 470k grid resistors of the output valves should be of 5 per cent. tolerance, otherwise a rather large discrepancy may arise in the working of the two valves. For best results, a "matched" pair of valves should be selected.

A typical output stage is shown in Fig. 5, and may be used with the phase inverter in Fig. 4. With home

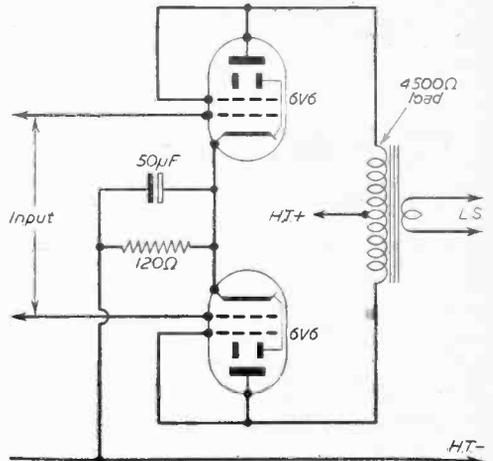


Fig. 5.—Output stage for circuit in Fig. 4.

output is required, with economical current demands, triode working is not recommended. It is also important to note that using valves in push-pull, as in Fig. 5, does not increase the *amplification* of this stage, compared with the use of a single valve.

Complete Amplifier

A complete amplifier circuit, with feedback, and push-pull, is shown in Fig. 6. Feedback can be modified by changing the value of the 220 ohm resistor. A higher value will be needed here if a speaker having a speech coil impedance higher than 3 ohms is used. The amplifier will require a fairly good input such as may be obtained from a radio tuner. A 6SN7 may replace the two 6J5 valves. Other

valves may be fitted, with values modified to suit if necessary.

For small inputs, such as obtained from some types of pick-up, or from a microphone, a triode or pentode pre-amplifier will be needed, and any tone correction circuits should be incorporated in this stage, not in the main amplifier.

Layout

A circuit such as that shown in Fig. 6 can have a layout similar to that of the circuit diagram: construction is simplified as the circuit has a certain degree of symmetry. A small aluminium chassis can be used and the unit could be built on the same chassis as the radio tuner. The 6V6 valves will develop considerable heat and provision should be made to ensure adequate ventilation. If the amplifier is assembled in a wooden box for instance, expanded metal grilles.

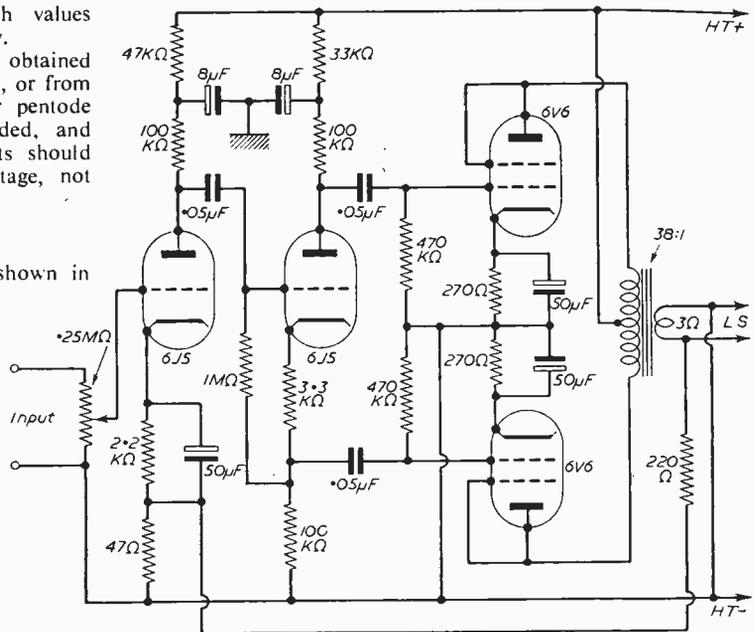


Fig. 6.—A push-pull amplifier for a radio tuner, etc.

GLOWS IN VALVES

By J. B. Dance, M.Sc.

SOMETIMES a blue, violet or pink glow is seen inside a valve whenever it is in use in dim light. This is, of course, nothing to do with the normal, red, glow from the valve heaters. In certain circumstances a perfectly good valve may glow under normal operating conditions but in other cases a glow indicates that the valve is faulty and it may then cause damage to other components in the circuit.

Occurrence

Valves which have an anode voltage of a few hundred volts or more and a fairly high anode current often emit a blue glow when they are operating normally. This glow is due to parts of the electron stream missing the anode and striking the glass envelope or some other solid object within the valve (such as the mica which supports the electrodes). It is almost always possible to distinguish such a glow from the other type of valve glow (which will be discussed below) by merely noting the place from which the glow is emitted. If the glow emanates from the glass envelope of the valve or from any mica supports in the envelope, this does not indicate that the valve is in any way faulty. For example, the glass envelope of 807 valves almost always glows to some extent in normal operation.

If a blue, violet or pink glow is seen coming from the space between two electrodes, there is certainly some gas in the valve. This glow is due to the formation of charged particles or ions in the gas (known as ionisation). The process is

very similar to the formation of light in gas discharge lamps such as the yellow (sodium) and blue (mercury) street lamps.

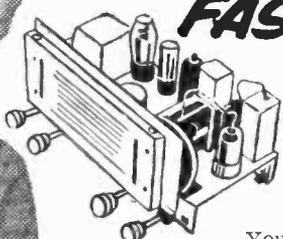
Vacuum

All ordinary radio valves are of the high vacuum type. If a glow is emitted from the space between the electrodes, gas has entered the valve and it is said to be "soft." A valve which has been "on the shelf" for a long time will probably have a very small amount of gas in it and may give a very slight blue glow when used. This disappears, however, when the valve is operated for a short time with a low resistance connected between its grid and cathode. A valve which emits a constant glow from the space between its electrodes should be regarded as a very doubtful component and should be replaced as soon as possible. A soft valve will have a high reverse grid current; that is, electrons pass on to the grid of the valve where they are neutralised by the positive ions in the gas. It is highly probable that the cathode will be damaged by positive ion bombardment.

In extreme cases the glow may extend outside the limits of the electrodes and sparking may occur inside the valve; it should then be discarded immediately. Sometimes a very small crack may be seen in the glass of a valve which is soft; in this case the getter—which should be of a bright metal deposit on the inside surface of the glass—becomes a dull white. Such a valve is invariably useless.

LEARN Train at home in your spare time
RADIO & T.V. SERVICING
 this new, easy, practical way!

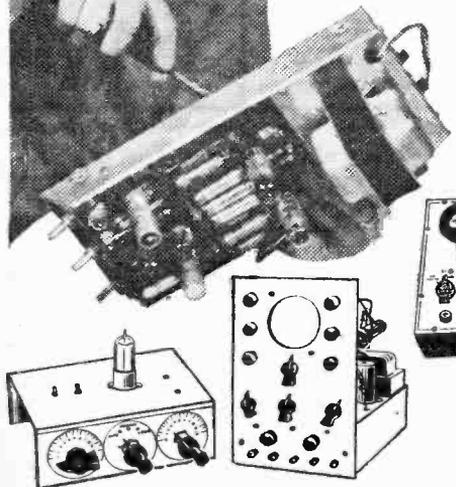
**YOUR OWN... BUSINESS...
 CAREER... OR
 FASCINATING HOBBY**



Electronics is rapidly becoming a great new industry with far reaching applications into every field of modern activity.
 You can learn all the essentials of this new science at home in your spare time and turn your knowledge to good purpose!
 Now is your chance to set up your own business and be your own boss!

**RADIOSTRUCTOR EQUIPMENT COURSES
 MAKE LEARNING SO SIMPLE**

You learn by building actual equipment with the big kits of components and parts which we send you. You advance by simple steps using high quality equipment and performing a whole series of interesting and instructive experiments—there are no complicated mathematics! Instruction manuals and our teaching staff employ the latest techniques for showing clearly how radio works in a practical and interesting manner; in fact, you really have fun whilst learning! And you end by possessing a first-rate piece of home equipment with the full knowledge of how it operates, and how to maintain it afterwards. In fact, for those wanting help with their radio career training, to set up their own full or part-time servicing business, or the hobbyist, this new and instructional system is exactly what is needed, and it can be provided at very moderate cost with payments available. Post the coupon now, for full details. There is no obligation of any kind.



- NO MATHEMATICS
- EASY TERMS AVAILABLE
- ALL TEST EQUIPMENT SUPPLIED
- PERSONAL TUITION
- FINEST EQUIPMENT

POST TODAY for FREE brochure

To **RADIOSTRUCTOR (Dept. G82)**
 46 MARKET PLACE, READING, BERKS.
 Please send Brochure without obligation to:

Name _____

Address _____

} **BLOCK
 CAPS
 PLEASE**

(827) We do not employ representatives 2-60



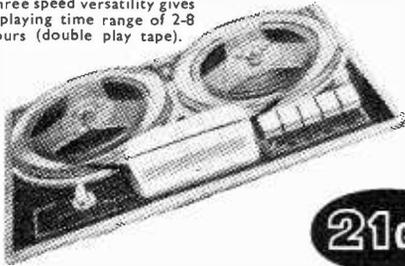
RADIOSTRUCTOR

BRITAIN'S LEADING RADIO TRAINING ORGANISATION

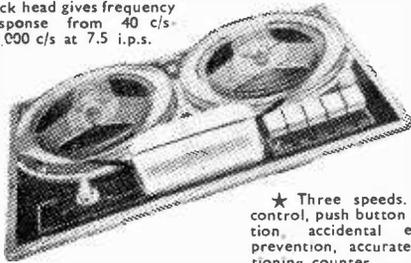
the NEW MOTEK 3 SPEED TAPE DECK

K10

- ★ Three speed versatility gives a playing time range of 2-8 hours (double play tape).

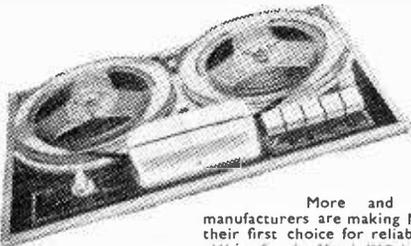

21 GNS

- ★ Improved record/play-back head gives frequency response from 40 c/s to 12,000 c/s at 7.5 i.p.s.



- ★ Three speeds, pause control, push button operation, accidental erasure prevention, accurate positioning counter.

the NEW MOTEK 3 SPEED TAPE DECK

K10


- More and more manufacturers are making Motek their first choice for reliability. Write for the Motek K10 leaflet.

**MODERN
TECHNIQUES**
Wedmore St., London, N.19. Tel: ARChway 3114.

REPANCO

HIGH GAIN TRANSISTOR COMPONENT

Ferrite Slab Aerial Type FS3. Medium Wave only. With fixing grommets. Size 3in. x 3/8in. x 5/32in., 7/16.

Long Wave Loading Coil for the FS3 Type XLI1. 3/6.

Oscillator Coil Type X08 for 176 pF gang. Ferrite core. Size 1/2in. sq. x 11/16in., 5/-.

Oscillator Coil Type X015 for 365 pF gang. Ferrite core. Size 1/2in. sq. x 11/16in., 5/-.

I.F. Transformer Type XT6. Suitable for 1st and 2nd I.F. 455 Kc/s. Size 1/2in. sq. x 11/16in. 10/-.

I.F. Transformer Type XT7. Designed for 3rd I.F.T. or detector I.F.T. 455 Kc/s. Size as XT6, 10/-.

Push Pull Interstage Transformer Type TT9. Ratio 1 : 1 C.T. Radiometal Core. Size 7/8in. x 7/8in. x 13/32in., 12/6.

Push Pull Output Transformer Type TT10. Ratio 8 : 1 C.T. Matched to 3 ohm speaker. Size as TT9, 12/6.

Practical and Theoretical circuits enclosed with each Repanco Transistor Component.

REPANCO EASY-TO-BUILD RECEIVERS

Mini-7. 7 Transistor pocket receiver. Size 5 1/2in. x 3 1/2in. x 1 1/16in. Long and medium wave Envelope. 1/6.

Major-7. New Portable 7 transistor receiver 9in. x 7in. x 4in. Long and medium wave. Envelope, 1/6.

Car Radio Receiver. 7 transistors. Long and medium wave. 2 watt output. R.F. stage, A.G.C. and auxiliary A.G.C. circuits. 12 volt or 6 volt. Envelope, 2/-.

Mail Order and Trade :
**RADIO EXPERIMENTAL
PRODUCTS, LTD.**
33 Much Park St.
COVENTRY
Tel. : 62572

Wholesale Enquiries and Export :
REPANCO, LTD.
O'Brien's Buildings,
203-269 Foleshill Rd.,
COVENTRY
Tel. : 40594

Special Bargain Offers

G.E.C. SELECTEST. 34 range testmeter. D.C. volts to 1,500 v. (10 ranges). A.C. volts to 1,500 v. (8 ranges). D.C. current to 30A (8 ranges). A.C. current to 15A (8 ranges). Ohms 0-1K Ω. 0-10K Ω. A robust instrument with 5in. mirror scale and cut out. Complete with battery and leads. Fully tested. £7.10.0. Post 3/6.

FERRANTI TESTMETER TYPE Q. An extremely compact self-contained multimeter. Volts 0 to 30, 150, 600 AC/DC, with additional 0.3 v. DC, and 0-15 v. AC ranges; milliamps 0 to 7.5, 30, 150 and 750 DC; ohms 0-25 K Ω. Accuracy BSS first grade. Knife-edge pointer and clearly calibrated 2 1/2in. scale. 500 μg/volt. With leads, probe, battery and instructions. In fitted velvet-lined 4 x 7 x 3in. case. Brand new condition, perfect working order. 52/6. Post 2/6.

GRAMOPHONE MOTORS. A.C. mains. Garrard AC-6. 78 r.p.m. For replacements. BRAND NEW. Boxed. 35/-. Post 2/6.

VITAVOX PRESSTRE UNITS, TYPE N. 20 watts. P.M. Heavy duty. BRAND NEW. Boxed. 89/6. carr. 5/6.

Q5'er. (BC-453 Command Receiver). Covers 100-550 Kc/s (IF 85 Kc/s.). Ideal for double superhet conversion, etc. Supplied BRAND NEW in original cartons, with all 6 valves and CIRCUIT. 89/6. Post 3/6.

R-1155-B. with latest drive first-class condition. £7.19.6.

R-1155-L. £12.19.6. Power Packs. 25-10.0. S.A.E. details.

CR100 COMMUNICATION RECEIVERS. Covers 60 kc s—30 Mc s in 6 bands 11 valves, 2 R.F. and 3 I.F. stages. Crystal gate. BFO, etc. Ready for 200-250 v. A.C. mains 2! watts output for 3 ohms speaker. SUPERB CONDITION AND OUTSTANDING PERFORMANCE for ONLY £21. S.A.E. for illustrated details.

URO COMMUNICATION RECEIVERS. complete with 9 coils. From 18 gns. S.A.E. for full particulars.

RCA VR-88 SPEAKERS. 3 or 8in. P.M. speaker in heavy gauge black crackled steel cabinet 11 x 10 x 6in. with rubber feet. A SUPER QUALITY unit. BRAND NEW. for ONLY 45/-. Post 3/6.

MINIATURE 373 I.F. STRIPS.—For F.M. tuner described in P.W. With 3 of EF91, 2 of EF92 and EB91. A fresh release enables us to offer these once again. BRAND NEW with circuit and full P.W. Reprint. 35/-. OR less valves. 12/6. Post either, 2/6.

MOVING COIL PHONES.—Finest quality Canadian, with Chamois ear-muffs and leather-covered headband. With lead and jack plug. Noise excluding, supremely comfortable. 19/6. post 1/6.

R.F. UNITS. R.F.25, 17/6; R.F.27, 22/6. Good condition. Post each, 3/6.

PLEASE ADD POSTAGE OR CARRIAGE ON ALL ITEMS
CHARLES BRITAIN (RADIO) LTD.
11 Upper Saint Martin's Lane, London, W.C.2
TEMPle Bar 0545
Shop Hours 9-6 p.m. (9-1 p.m. Thursday). Open All Day Saturday

Learning Morse

By H. J. Long (G5LO)

BEFORE an Amateur Sound Transmitting Licence is granted, the would-be amateur has to satisfy the authorities—in this case the Postmaster-General—that he has passed the City and Guilds Radio Amateurs' Examination and, also, that he is proficient in sending and receiving Morse code at a speed of not less than twelve words per minute.

Interference

The reason why the P.M.G. insists on a proficiency in Morse code is quite simple. If for some reason an amateur were operating his station and causing interference with a government or service station, he could be asked to close down, or even move frequency. How is he to comply with these instructions if he is unable to read Morse?

This being so, the enthusiast, if he wants to obtain his "ticket," should make a determined effort to learn the Morse code. It is not so very difficult, so the following simple instructions are intended as a guide in taking the first steps in learning the Morse code.

Various methods can be used in teaching Morse, some good, others perhaps not so good. Quite often the learner asks a friend to send slow Morse on a buzzer or audio oscillator. This method can be used, provided the friend is a good operator and has what is termed a good "fist." But this can be very boring, even to your best friend! So, if in doubt, my advice is to follow carefully the following simple instructions.

Sound and Rhythm

The Morse code as used in radio is one that has been adopted internationally; most countries of the world use it. It consists of dots and dashes arranged in a given sequence which represent a letter of the alphabet, a figure, or an abbreviation.

Look at the list of the Morse code alphabet and note how each letter has its own character or symbol. For the purpose of timing, which is very important in making up the sound and rhythm from which the Morse symbol can be identified, a dash is equal to three dots in time, while the interval between the dots and dashes in a sequence, i.e., in the same letter, equals a dot in time. Between two letters in a word the interval is equal to three dots and between two words five dots.

Having studied the Morse code alphabet, it is at once apparent, even to a novice, that it is quite impossible to count the dots and dashes as they are being sent. This brings us now to the most important point to understand, in that to read

Morse you have to *memorise the sound or rhythm as applied to each letter being sent*. In other words, you associate an individual sound being heard and write it down as the letter it represents, or retain it in your memory until you have a complete word—the latter coming only after some considerable practice. A clear understanding of what the beginner is trying to do in learning Morse is perhaps the most important point of all.

Memorising the Alphabet

The first step is to memorise each letter of the alphabet with its relation to the Morse symbol. Take a slip of paper and write down about four letters of the alphabet and alongside each letter put the Morse symbol. It is perhaps better to choose the letters at random, not in alphabetical order.

So we might now have N — —, W — —, E, G — —, on our slip of paper. At any odd moment look at one letter and its associated Morse symbol and in *dit dah* language repeat the Morse symbol mentally. For instance, if you look at letter N you would instantly say mentally *dah dit*, repeating it over and over again. Letter W *dit dah dah*, E *dit*, and G *dah dah dit*.

The reason why *dit dah* is used instead of dot dash is that the resulting sound you will eventually hear when reading Morse is much nearer the sound *dit*, which can be said in rather clipped terms, whereas *dah* is said in more drawn out terms, which lends itself to the dash which is equal to three dots in terms of time.

With sufficient practice, a few minutes at a time, you should in a short time be able to *dit dah* any of your four letters you have written down. When you know these letters perfectly, you may take another four and repeat the process until you have been right through the alphabet. Numerals and punctuation marks can be memorised in the same way.

Take your time in memorising these symbols, and if there are one or two letters of which you are not sure, go back over them. Time and patience spent on this first stage will be well repaid later on.

Copying Morse

Having now reached this stage, we have to consider in what form the Morse is to be copied down.

To be able to copy down Morse legibly calls for rather more care than, say, just writing one's signature, so clear, legible copying must be aimed at. Block capitals or script writing should be preferred to long-hand, for with the latter one is apt to scribble. Having decided on what form the copying down is to be, be sure to stick to

Morse code has a reputation of being difficult to learn; naturally, some effort is involved, but provided a suitable system is adopted from the outset, the task is by no means tedious.

that method, as to change one's style half-way through takes some doing.

We are now ready to have some copying practice—no, not from the receiver yet, but from our own *dit dah* language. So copy down on paper any letter you mentally think of in the Morse symbol. In effect we are reversing the process we previously did, instead of memorising a letter we

de as *dah dit dit, dit*, the de by the way means from, indicating that it is from the station the signal is being sent, and the actual call sign which is *dit dah, dah dit dit dit, dah dit dah dit*, or ABC.

If station ABC was putting out a general call, it would be CQ de ABC, the CQ indicating that it was a general call. Or if as ZYX de ABC, this would indicate that station ZYX was being called by station ABC.

Copy down any letter you may identify, but if you miss one let it go and try again the next time round. With a little practice you will soon reach the stage where you can copy a call sign first go. From now on it is a matter for the individual, practice and still more practice, but do not overdo it, ten minutes at a time is ample.

By trying to copy signals from commercial stations, which send signals automatically, but at hand speed between traffic, you should gain a good knowledge of the correct formation of the Morse symbol, which should serve you in good stead when you start to send Morse on the key, but, as we pointed out earlier, this article was intended as a guide in taking the first steps in learning the Morse code.

THE INTERNATIONAL MORSE CODE

A—dit-dah.	N—dah-dit.
B—dah-dit-dit-dit.	O—dah-dah-dah.
C—dah-dit-dah-dit.	P—dit-dah-dah-dit.
D—dah-dit-dit.	Q—dah-dah-dit-dah.
E—dit.	R—dit-dah-dit.
F—dit-dit-dah-dit.	S—dit-dit-dit.
G—dah-dah-dit.	T—dah.
H—dit-dit-dit-dit.	U—dit-dit-dah.
I—dit-dit.	V—dit-dit-dit-dah.
J—dit-dah-dah-dah.	W—dit-dah-dah.
K—dah-dit-dah.	X—dah-dit-dit-dah.
L—dit-dah-dit-dit.	Y—dah-dit-dah-dah.
M—dah-dah.	Z—dah-dah-dit-dit.

NUMERALS

1—dit-dah-dah-dah-dah.	6—dah-dit-dit-dit-dit-dit.
2—dit-dit-dah-dah-dah.	7—dah-dah-dit-dit-dit.
3—dit-dit-dit-dah-dah.	8—dah-dah-dah-dit-dit.
4—dit-dit-dit-dit-dah.	9—dah-dah-dah-dah-dit.
5—dit-dit-dit-dit-dit.	0—dah-dah-dah-dah-dah.

see printed as a Morse symbol, we think of a Morse symbol and write it down as a letter.

Say *dit dah* and write down letter A, say *dah dit dah dit* and write down letter Q, and so on. What to say can be taken from a book or newspaper, but sometimes read from right to left, picking out the letters one by one, as this helps to break the habit of "over reading," which is anticipating a letter before it is sent, a habit that is quite hard to break when reading faster copy at a later stage. Twenty minutes at a time in any one session is ample for this copying practice, but persevere with this until you can legibly transcribe any symbol of the Morse code from the *dit dah* to the written letter.

Listening out for Signals

We are now in a position to commence stage three in our operations. This will require a short-wave receiver with headphones. If your receiver is of the communications type you will have to switch in the B.F.O. to receive C.W. If it is of the simpler, straight, type you will have to use your reaction control so that the set is just oscillating.

Look round the short-wave spectrum and tune in a C.W. signal that is being sent fairly slowly; there are usually plenty of signals to choose from. Having found such a signal, try to recognise, in *dit dah* fashion, the distinct sound or rhythm which you already associate with the letters of the alphabet. As an example, say we have tuned in a station that is sending its call sign, such as VVV de ABC VVV de ABC VVV de ABC, repeated over and over again. It should not be too difficult to identify it in *dit dah* fashion as, *dit dit dit dah, dit dit dit dah, dit dit dit dah*, the

IMPORTED ELECTRICAL APPARATUS

Dangers of mis-connection

THE following Press notice has been received from the Institution of Electrical Engineers and it is of particular importance at this time of year.

"The attention of vendors and users of imported domestic electrical apparatus, photographic and projection equipment, tape recorders, etc., is urgently directed to the risks which may ensue if the colour coding of the cores of the flexible cord with which such apparatus is furnished differs from the established British coding set out in The Institution's Regulations for the Electrical Equipment of Buildings, that is to say:

Green—earth connection.

Red—phase (live) connection.

Black—neutral connection.

"The risk is most acute if the flexible cord provided with the apparatus has a core coloured red which serves as its earth connection; because if the user, following established British practice, connects this core to the terminal of a British connecting plug which may itself be marked red, and then inserts the plug into a normal British socket, the result will be that any exposed metal parts of the imported apparatus connected to the red core will be charged at mains voltage, and represent a serious hazard.

"The attention of importers and wholesalers known to be handling foreign apparatus fitted with flexible cords which do not conform with British practice in respect of colour coding has already been drawn by the Home Office Central Advisory Committee on Safety in the Home to this situation: the purpose of this notice is to warn vendors and users of the risk, so that they can enquire as to the nature of the flexible cord provided with apparatus in which they are interested."

...and NOW

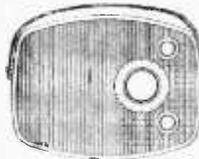
THE TOURIST PORTABLE

4 valve, 2 waveband Lightweight Battery Radio. Size only 8in. x 5½in. x 4in. Wt. 3½ lbs., incl. Battery.

- Complete Receiver Component Kit ... 56/6 P. & P. 1/6
- Set 4 miniature valves (96 series) ... 35/- P. & P. 9d.
- 5in. Speaker & O/put. Trans. ... 21/- P. & P. 1/6
- Cabinet, Dial & Knobs, etc. ... 19/6 P. & P. 2/-
- Complete Kit. **BARGAIN** Only **£6. 8. 6** post free

Latest circuitry, delayed AVC & A.F. Neg. feedback.
Instruction Booklet, 1/6. (Free with Kit.)

Terrific performance—Remarkable size—Staggering value



Record Player Bargains

Latest 4-speed Models

NEW RELEASE by E.M.I.—4-speed Single Player Unit fitted with latest stereo and monaural Xlat cartridge and that sapphire styl. Auto stop and start. A fidelity unit and bargain buy at only **£6.19.6**.

SINGLE PLAYERS BSR (TU9), 90/-; COLLARO (4/564) 8 gms.; GARRARD (48P), £7.10.6; GARRARD (TA Mk. II) de Luxe Model. £8.10.6. Carr. and Ins. 3/6.

AUTOCHANGERS. BSR (UAB), **£6.19.6**. COLLARO, £7.19.6; GARRARD (BCJ21 4) Mk. II) plug-in head, stereo adapted, 10 gms. Stereo head £2 extra.

RECORDED PLAYER CABINETS. Contemporary styled 15in. x 13in. x 8in., 3 gms. Carr. and Ins. 3/6.

RECORD PLAYER CABINETS

Contemporary style, rexine covered cabinet in fawn and brown with cream interior. Size 15" x 13" x 8". Carr. and Ins. 3/6.



£3.3.0. 8½in., fitted with all accessories, including baffle board and anodised metal feet. Stage available for all modern amplifiers and autochangers, etc. Uncut record player mounting board 14 x 13in. supplied

NEW VALVES

NEW BOXED	ALL GUARANTEED
1R5, 1T4, 7/6, DF96	9/- EF96 13/6 PCF40 10/6
1R5	7/6 DK96 9/- EF91 8/6 PCL83 12/6
834, 3V4 8/- DL96	9/- EL41 10/6 PL81 15/6
574	9/6 EABC80 9/6 EL54 9/6 PL82 9/6
6K7	5/6 BCC84 10/6 EY51 10/- PL83 11/6
6K8	8/6 ECF80 11/6 EY86 10/- PY80 7/6
6Q7	8/6 ECH42 10/6 EZ81 7/6 PY81 9/6
6V6	7/6 ECL80 10/6 MT14 9/6 PY82 12/6
12X7	9/6 EF89 9/6 PC84 10/6 1/25 12/6

SPECIAL PRICE PER SET
1R5, 1T4, 1R5, or 3S4 or 3V4, £7/6. DK96, DF96, DAF96, DL96, 35/- 6K8, 6K7, 6Q7, 6V6, 5Z4 or 6X5, 35/-.

COAX 80 OHM CABLE

Stand ½in. dia. Low Loss Semi-Air Spaced Aerial. Special Reduced Prices.
20 yds., 12/6, p. & p. 1/6; 60 yds., 32/6, p. & p. 3/-; 120 yds., £2/6, p. & p. 2/6; All other lengths 8d. per yard.
Coax Plugs 1/-, Sockets 1/-, Couplers 1/3. Cable End Sockets 1/6, Outlet Boxes 4/6.

Electrolytic AH Types New Stock TUBULAR CAN TYPES

25/25 v. 50.12 v. 1.9	8+8/450 v.	4 6
50/50 v. 100.25 v. 2.-	32+32/275 v.	4 6
	50+50/350 v.	6 6
16+16/450 v.	50+250/275 v.	12 6
	100+200/375 v.	12 6

Comprehensive range in stock.

RE-GUNNED TV TUBES

New Reduced Budget Prices

New Heater, Cathode and Gun Assembly fitted to all tubes. Reconditioned virtually as new. Now 12 months' guarantee to highest standards—as used by our own Service Dept.

12in. £6. 14in. £7. 17in. £8.10.0.

Most Mullard & Mazda types ex-stock Carr. & Ins. 10/-.

10/- Part Exchange allowance on your old tube.

2 WAVEBAND CAR RADIO KIT

12 v. operation Med. & Long Waves Development of the famous Brimar Hybrid vibratory Car Radio Circuit. 5 latest type low voltage valves and Power Transistor. R.F. stage and permeability pre-aligned Cydon Tuner Unit provides extremely good sensitivity and Signal/Noise ratio. Printed circuit and 7in. x 4in. Speaker. Self-contained in neat Metal Cabinet 8in. x 7in. x 2½in. with attractive dial. Speaker and Power Transistor stage mounted separately, approx. 8in. x 5in. x 3in.

RECOMMENDED BUY Complete Kit

£12. 19. 6 P. & P. 3/6. Instruction Booklet and Parts List available shortly 2/3 post free.

LOUDSPEAKERS. P.M. 3 ohms, 2½in. Elec., 17 6. 3½in. Goodman's, 18 6; 5in. Rola, 17 6; 6in. Elec., 18 6; 7-7 x 4in. Goodman's Elliptical, 18 6; 8in. Rola, 20/-; 10in. R. and A., 25/-; 10in. W.H. PH1012, 20 9; 12in. Plessey 15 ohms with 6 W. Tweeter and Cross Over Filter, 27 6.

2-VALVE 12-WATT AMPLIFIER

Twin stage ECL82 with vol. and neg. feedback. Tone controls AC. 200/250 volt with double-wound Mains trans. Complete with knobs, etc., regly wired to fit above cabinet.

£27.1.6 P. & P. 1/-.

6-in. Speaker and matching trans., 22/- P. & P. 1/6.

COSSOR VHF/FM CONSTRUCTORS KIT (MODEL 701K).

This is a 6-valve (UCX5, 2UF89, UAEC80, UL84, UY85) FM Radio Kit of high quality, design and superb reproduction, with pre-aligned coils and printed circuit complete with Power Pack for AC/DC 200/250 v. operation. Kit includes High Performance 10in. x 6in. Goodman's Speaker for quality response. Complete in every detail, including calibrated Tuning Dial, Slow Motion Drive and Pilot Lamp and comprehensive instruction details and circuit diagram this Kit is a genuine recommended buy.

BARGAIN OFFER

Only £8.19.6 Carr. and Ins. 4/6.

JASON FM TUNER UNITS (87-105 Mc/s)

Designer-approved kits of parts for these quality and highly popular tuners available as follows.

STANDARD MODEL (FMT)—as previously extensively advertised. COMPLETE KIT, 5 gms., post free. Set of 4 spec. valves, 30/-, post free.

LATEST MODEL (FMT2)—attractively presented shelf mounting unit to enclosed Metal Cabinet with Built-in Power Supply. COMPLETE KIT, £7, p. & p. 3/6. Set of 5 spec. valves, 39/6.

NEW JASON COMPREHENSIVE P.M. HAND-BOOK, 2/6 post free. 48 hr. Alignment Service, 7/6, p. & p. 2/6.

CONDENSERS.—Silver Mica. All pref. values. 2 p.f. to 1,000 p.f., 6d. each. Ditto, ceramics 4d. each. Tubulars 450 v. T.C.C., etc., .001 mid-.01 and 1/350 v., .04 each., .02-1,500 v., 1/- each., 25 Hants, 1/6. 5 T.C.C., 1/8, .001 6 kv., 5/6, .001 20 kv., 9/6.

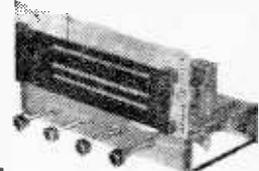
RESISTORS.—FULL RANGE 10 ohms-10 mega-ohms 20% ½ w. and 1 w., 3d., 1 w., 5d., (Midiget type modern rating), 1 w., 6d., 2 w., 8d., 10% HI-Stab., 1 w., 5d., 1 w., 7d., 5% 1 w., .04, 1% HI-STAB. ½ w., 1/6 (10-100 ohms 2/-).

Manufacturer's Surplus Bargain

7 VALVE AM/FM RADIOGRAM CHASSIS

Valve Line-up: ECC85, ECH81, EF89, EABC80, EL84, EMB1, EX80.

Three Waveband and Switched Gram positions. Med. 200-500 m.c., Long 1,000-2,000 m.c., VHF/FM 88-85 Mc/s. Philip's Continental Tuning insert with permeability tuning on FM and combined AM/FM IF transformers, 460 Kc/s and 10.7 Mc/s. Dust core tuning all coils. Latest circuitry including AVC and Neg. Feedback. Three watt output. Sensitivity and reproduction of a very high standard. Chassis size 13½ x 6½in. Height 7½in. Edge illuminated glass dial 11½ x 3½in. Vertical position. Horizontal station names. Gold on brown background. A.C. 200/250 v. operation.



Aligned and tested ready for use **£13. 10. 0** Carr. & Ins. 5/-
Complete with 4 Knobs—walnut or Ivory to choice.
Three 5in. P.M. speaker only required. Recommended quality speakers.
8in. Goodman's special cone.....21 6 10in. Rola (Heavy Duty).....30/- Post & Pkg. 1/6
ONLY A FEW ITEMS ARE LISTED FROM OUR COMPREHENSIVE STOCK. WRITE NOW FOR FULL BARGAIN LISTS, 3d.

RADIO COMPONENT SPECIALISTS

70 Brigstock Road, Thornton Heath, Surrey

Terms: C.W.O. or C.O.D. post and packing up to ½lb. 7d.: 1lb. 1/1: 3lb. 1 6: 5lb. 2/-: 10lb. 2/9.



Phone: THO 2188. Hours 9 a.m.—6 p.m. 1 p.m. Wed. Open all day Saturday. By Thornton Heath Station.

LASKY'S RADIO

A TRANSISTORISED RADIO CAN BE BUILT FOR ONLY 25/10

The "DIODEON"—a high efficiency 2-stage receiver using crystal diode detector and transistor in cascade. Covers 200-500 metres (medium wave). High gain tuning coil gives great sensitivity. Novel chassis shows pictorially all components and connections. Complete parcel, including two U16 batteries, 25/10, post free.

EARPHONES. High Imp., 14/-, Low imp., 7/6. Post 1/6.

Now Ready! The Finest Components Catalogue

for the home constructor.
100 pages, 8 1/2 x 5 1/2 in.,
copiously illustrated.
PRICE 2/- Post 6d

With free Bargain Bulletin

TAPE DECK OFFERS

Latest **MOTEK K.10**, press-button controls, 3 motors, 3 speeds, rev. counter, frequency response better than 40 to 12,000 c/s at 7 1/2 i.p.s. 2-tone grey finish. Limited number only. Listed at £22. LASKY'S PRICE £13.19.6.

Latest **COLLARO Studio Tape Transcriber**, 3 motors, 3-spd., 1 1/2, 3 1/2, 7 1/2 i.p.s. Fitted digital counter. Takes 7in. spools. Push-button controls. £15.15.0.

COLLARO MK. 4 Tape Transcriber, fitted digital counter. Few only. £17.19.6.

Carriage and Insurance all Tape Decks, 12/6.

Latest **B.S.R. "MONARDECK"**. Single speed. 3 1/2 i.p.s. Takes 5 1/2 in. spools. Simple controls. LASKY'S PRICE £9.19.6.

SPECIAL OFFER OF RECORDING TAPE Famous make. P.V.C. base on latest type plastic spools. Brand new, perfect and guaranteed. 1,200ft. on 7in. spool, 21/-, 1,200 ft. on 5 1/2 in. spool, 22/6.

GEVAERT L.P. PLASTIC TAPE. 1,700 ft. (7in. spool), 35/-; 850 ft. (5in.), 18/6; 210 ft. (3in.), 6/6.

SCOTCH plastic base, 1,700 ft. (7in. spool), 25/-. All orders for Tape post free.

SINGLE PLAYER BARGAINS

E.M.I. 4-speed, wired for STEREO and fitted Acos stereo t.o. cartridge. £6.19.6. Post 5/-.

COLLARO 4/564 or **GARRARD 4SP**, 4-spd., auto stop, t.o. crystal pick-up. £6.9.6. Post 5/-.

COLLARO Junior 4-speed Motor and separate crystal pick-up. 75/-. Post free.

4-SPEED MIXER AUTO-CHANGERS

Brand New in makers' cartons



B.S.R. type **UA8**, complete with latest "ful-fi" pick-up. £6.19.6. Post 5/-.

Ditto, wired for STEREO and complete with stereo cartridge, £7.19.6.

B.S.R. latest type **UA12**, wired for STEREO and complete with stereo cartridge. £8.19.6. Post 5/-.

Ditto, monaural cartridge, £7.19.6.

COLLARO, complete with Studio crystal pick-up and sapphire stylus. £7.19.6. Post 3/6.

GARRARD 4-spd. Auto-changers, monaural, from £9.19.6.

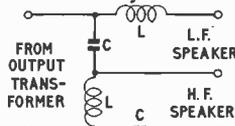
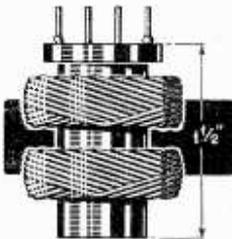
Wired for STEREO and complete with stereo cartridge, from £11.19.6.

LASKY'S (HARROW ROAD) LTD.

Open all day Saturday. Early Closing Thurs. Mail Orders to Edgware Road, please.
42, TOTTENHAM COURT ROAD, W.1. 207, EDGWARE ROAD, LONDON, W.2.
Telephone: MUSeum 2605. PAddington 3211/2.

THE WORD **MAXI-Q** IS THE REGISTERED TRADE MARK
OF **DENCO (CLACTON) LIMITED**
IT IS ALSO A GUARANTEE OF
WORKMANSHIP & TECHNICAL PERFORMANCE

OUR RANGE OF PRODUCTS IS SO GREAT THAT WE NOW HAVE TO REQUEST THE AMOUNT OF 1/4d. FOR OUR GENERAL CATALOGUE AND TO SAVE YOU POSTAL ORDER POUNDAGE CHARGE WE REQUEST SEND 1/4d. IN STAMPS.



FOR 3 OHM SPEAKERS LDN.1
L = 0.135mH. C = 30µF.
FOR 15 OHM SPEAKERS LDN.2
L = 0.675mH. C = 6µF.

LOUDSPEAKER DIVIDER NETWORK COILS

LDN.1 for 3 ohm speakers. Price 7/6 ea. (15/- per pr.)
LDN.2 for 15 ohm speakers. Price 10/- ea. (20/- per pr.)
Note: Two coils are required to complete the network shown in the circuit diagram, i.e., for 3 ohm speakers two type LDN.1 are required. (Please add 1/- to cover postage on each pair of coils.)

In both cases the cross-over frequency is 2.5 kc/s and with the constant resistance circuit recommended, the attenuation beyond the cross-over frequency will be 12 dbs per octave.

LOUDSPEAKER DIVIDER NETWORKS

Loudspeakers designed to reproduce the whole audio range are usually very expensive and results comparable with much more expensive units can be achieved by the use of two normal loudspeakers. One is used to reproduce the lower frequencies, the other caters for the higher frequencies where the response of the larger unit will have fallen off. It is clearly necessary to include a frequency dividing network between the speakers and output transformer in order to distribute the low and high frequencies to the appropriate speaker.

The frequency at which the cross-over takes place may lie between 800 c.p.s. and 5 kc/s depending upon the relative performance of the two loudspeakers used. A reasonable compromise which will suit most pairs consisting of an 8in. to 12in. unit and a 2 1/2in. to 6in. unit, is 2.5 kc/s.

PLEASE SEND S.A.E. WITH ALL ENQUIRIES.

DENCO (CLACTON) LTD. (DEPT. P.W.), 357/9, OLD ROAD, CLACTON-ON-SEA, ESSEX

Club News

REPORTS OF CURRENT ACTIVITIES

BRITISH INSTITUTION OF RADIO ENGINEERS

9, Bedford Square, London, W.C.1.

M London.—Meetings are held at the London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, W.C.1.

January 15th at 6.30 p.m.—“A Proposed Space-charge-limited Dielectric Triode”—G. T. Wright, Ph.D.
January 27th at 6.30 p.m.—“Training for Operating and Maintaining Television Broadcasting Equipment”—K. R. Sturley, Ph.D., and A. E. Robertson.

Bristol, South Western Section.—Meetings held at the School of Management Studies, Unity Street.

January 27th at 7 p.m.—“An Equipment for Automatically Processing Time Multiplexed Telemetry Data (Timetape).”—J. H. Russell, N. Purnell and T. T. Walters.

Cardiff, South Wales Section.—Meetings held at the Welsh College of Advanced Technology.

January 13th at 6.30 p.m.—“Television Broadcasting Methods”—H. J. M. Hockley and N. Hughes, B.Sc.

Liverpool, Merseyside Section.—Meetings held at the University Club, 2, Mount Pleasant.

January 11th at 7 p.m.—“High Frequency Propagation—its Present and Future Use for Communication Purposes”—A. F. Wilkins, O.B.E., B.Sc.

Newcastle-upon-Tyne, North Eastern Section.—Meetings are held at the Institution of Mining and Mechanical Engineers, Neville Hall, Westgate Road.

January 11th at 6 p.m.—“Data Processing Machines”—J. Allen and J. Keating.

Wolverhampton, West Midlands Section.—Meetings held at the Wolverhampton and Staffordshire College of Technology, Wulfruna Street.

January 13th at 7.15 p.m.—“Electronics in Medicine”—P. Styles.

DERBY AND DISTRICT AMATEUR RADIO SOCIETY

Hon. Sec.: F. C. Ward (G2CVV), 5, Uplands Avenue, Littleover, Derby.

FUTURE events:

January 13th at 7.30 p.m.—Members' exhibition—three sections; juniors; home constructed; kit assembled.

January 20th at 7.30 p.m.—Open evening in sub-basement rooms.

January 27th at 7.30 p.m.—Quiz night.

February 3rd at 7.30 p.m.—Annual General Meeting.

February 7th at 7.30 p.m.—Proposed date for contest for G5YY.

BRADFORD AMATEUR RADIO SOCIETY

Cambridge House, 68, Little Horton Lane, Bradford, 3.

Hon. Sec.: D. M. Pratt (G3KEP), “Glentree,” Lyndale Road, Eldwick, Bingley, Yorkshire.

ON November 10th three junior members gave lectures on “How We Began.” On November 18th the Society visited Messrs. Mains Radio Gramophones Ltd., the manufacturing company of the Radio Rentals Group. D. G. Enoch (G3KLZ), President of the Society, gave an interesting lecture on December 1st on “Tape and Disc Recording.”

Future events:

January 12th.—“Colour Photography”—Arthur Bailey.

January 26th.—Annual display of members' gear.

February 9th.—“Inexpensive Sound Fidelity”—D. Pratt (G3KEP), Hon. Sec.

February 23rd.—Junk sale.

Meetings are held at 7.30 p.m. Morse classes are held by arrangement before meetings.

SOUTH YORKSHIRE AMATEUR RADIO SOCIETY

THIS club is just being formed and meetings were held at the home of Mr. Albert Field, 3, Coppice Avenue, Hatfield, Doncaster, to collect names of members. All enquiries from those interested in joining the Society should be addressed to Mr. Field at the address given above.

CALCOT RADIO SOCIETY

Hon. Sec.: C. Aldous, 3, Oliver Drive, Calcot, Reading, Berkshire.

ON December 10th Mr. S. Woodward, of the Calcot Radio Society, gave a lecture and practical demonstration on stereophonic sound.

Future event:

January 21st.—A representative of Dynatron Radio will give a lecture and demonstration.

AMATEUR RADIO SOCIETY OF CHESHAM AND DISTRICT

Hon. Sec.: K. R. Spratt, 207, Bois Moor Road, Chesham, Bucks.

THIS recently formed society has not yet obtained premises and classes in Morse and theory for R.A.E. are being given by licensed members at their own homes, likewise all meetings are held on a rota basis at members' homes. It is hoped, when premises are available as a Society H.Q., not only to get more local amateurs together, but to take in many of the radio-minded youths of the district and enable them by lectures and Morse training to become licensed members.

AMATEUR RADIO MOBILE SOCIETY

Hon. Sec.: G. E. Storey (G3HTC), 10, Ayon Road, Sunbury-on-Thames, Middx.

FUTURE events:

January 30th at 3 p.m.—At the Small Hall of the St. Bride Foundation Institute, Bride Lane, Fleet Street, E.C.4.

The programme will include at least one lecture on a radio subject of general interest and the showing of several films.

The Society is planning a rally of an unusual kind to take place possibly in April or May of this year. The site will be somewhere between London and Birmingham. Those interested in attending either of the above meetings should write to the Secretary for further details.

THE READING AMATEUR RADIO CLUB

Hon. Sec.: R. J. Nash (G3EJA), 9, Holybrook Road, Reading.

THE November meeting was well attended and G4HZ and G5TP gave a short talk on aerials which proved most interesting to all concerned. The December meeting was held on the 19th and was also well attended. G3LLK gave an unusual and interesting talk on home-built receivers.

Future events:

January 30th.—Junk sale and discussion on future programme for 1960.

WELLINGBOROUGH AND DISTRICT RADIO AND TELEVISION SOCIETY

Hon. Sec.: D. J. Trusler, 87, Irchester Road, Rushden, Northants.

MEETINGS are held at the club room above the W.I.C.S. Fruit Shop in Silver Street, except where otherwise stated. (Every Thursday.)

Future events:

January 7th.—Annual general meeting.

January 21st.—“Transistors,” a talk by F. Manning.

February 4th.—A stereophonic sound demonstration by D. Clarke and P. Butler in the Lecture Theatre of the Wellingborough Technical College.

February 11th.—Some aspects of photography. A talk by T. Judge, President of the Local Camera Club.

February 18th.—Film night in the club room.

March 3rd.—“Electronics and Radiation,” talk by R. Mitchell, B.Sc.

THE ELECTRONICS CLUB, TRIVANDRUM, S. INDIA

THIS is a newly formed club, being only four months old and having 23 members in all. As in other radio clubs the membership consists of hams, SWL's, Hi-Fi enthusiasts and experimenters. Lectures and discussions are arranged and the Club maintains a technical library. Films on scientific subjects are screened occasionally and it is hoped to bring out a quarterly club journal.

On September 13th an inaugural lecture was held and Dr. Hariharan, of the University College, Trivandrum, spoke on “Some Aspects of Microwave.” The Club would like to receive copies of PRACTICAL WIRELESS and other magazines.

Indoor Aerials

FACTORS INVOLVED IN USING SMALL AERIALS

By W. Cleland

THE average domestic receiver usually gives sufficient loudness on a short length of aerial wire, and very often the "E" socket, which is either a direct connection to the chassis, or connected to it by a capacitor, is left unused.

Metal Plate

The return capacitance from this short length of wire to the "E" terminal and chassis of the set is very small, even when an earth is used, and a considerable increase in volume can be obtained by adding a metal plate to the end of the aerial wire. A sheet of aluminium placed out

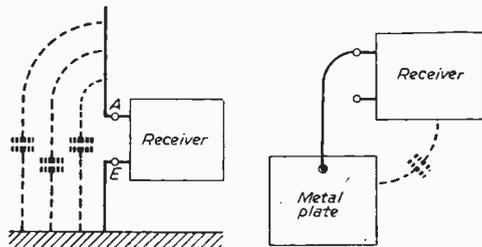


Fig. 1 (Left).—Aerial earth system, showing stray capacitance to earth. Fig. 2 (Right).—Increasing the end capacitance of a very short aerial by adding a metal plate.

of sight against a wall, behind some item of furniture, could be used for the purpose. The effect is similar to that of the horizontal section of an inverted "L" aerial, which adds top-capacitance.

With a mains radio, the addition of this metal plate will also assist in using the radio signals present in the mains. These reach the chassis of the set either directly, in the case of a live chassis, or through the interwinding capacitance of a mains transformer. Earthing the set, for example, to the third pin of a three-pin plug, is, therefore, unlikely to increase the volume, and a long wire to a clip on a water-pipe may cancel out some of the signal from the aerial, if the two run in the same direction.

The impedance of the mains to earth will be low, particularly if the cable has a metal covering, or a third wire connected to a water-pipe. Neither side of the mains is earthed on the premises, but one conductor is earthed at the power station.

Battery Sets

Earthing is, therefore, more important with a battery receiver, and will increase the volume. The signal input from the aerial can be increased by adding a metal plate, but the chassis of the

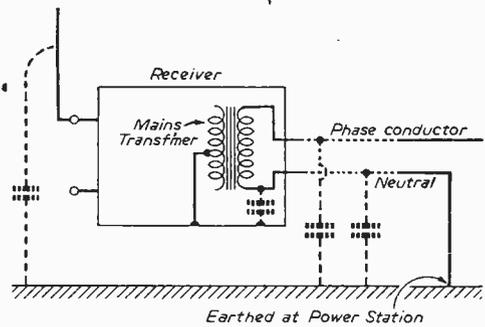


Fig. 3.—Earthing effect of mains connection.

receiver can be made to serve the same purpose by leaving the "E" socket unused and earthing the end of the aerial wire instead.

To do this with a mains receiver takes advantage of the mains as an aerial, but also increases the intake of mains-borne interference. An isolating capacitor included in the connection from the aerial socket to a water-pipe is sometimes misleadingly called a "capacity" aerial, suggesting that the effect depends in some way on the capacitor.

When the receiver is of a miniature type, a short wire aerial will be found to produce enormous changes in volume according to the position of the set in relation to surrounding objects. If the aerial wire is swung backwards and forwards near any large metal object, a corresponding fluctuation in the sound output will be noticed. In some parts of a room, reception may be almost unobtainable, although a ferrite aerial will still be able to receive the signal.

Internal Aerials

Unless the receiver is to be used in a fixed situation where a satisfactory aerial system can be provided, it is better to use a small frame aerial, or a more compact ferrite aerial. Although directional, these are the best types for portable radios as they are self-contained and little affected by capacitance to external objects. The listener himself has an appreciable capacitance, and can usually increase the volume by gripping the aerial; so his proximity to a midget receiver with an open aerial arrangement is likely to affect reception.

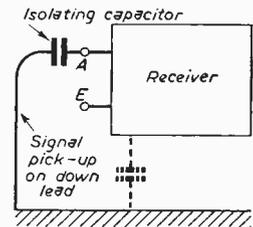


Fig. 4.—Reversed arrangement, sometimes called a "capacity" aerial when an isolating capacitor is included.

Much greater volume can, nevertheless, be obtained with an open aerial system under suitable conditions, and although a ferrite aerial can be recommended for a portable set, it is worthwhile providing a socket for an external aerial as an optional extra, where this is possible without upsetting the tuning.

HOME RADIO OF MITCHAM

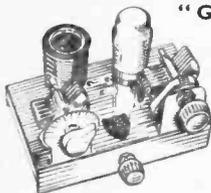
(Dept. P), 187 LONDON ROAD, MITCHAM, SURREY. MIT 3282

Shop Hours: 9 a.m.—6.30 p.m. Wednesday 9 a.m.—1 p.m.

DON'T MISS THIS BARGAIN OFFER

Of special interest to all constructors—12 new assorted volume-controls (some with switch) for **ONLY 6/-**. Send NOW while they last. **Post Paid.**

"GLOBE-KING"



(The one-valve kit costs **79/6** plus 1/- post).

Designed and marketed especially for the beginner the Globe-King short wave kit enjoys world wide popularity. Wonderful performance from this high efficiency miniature equipment. Includes three matched coils covering 10 to 100 metres. All high grade parts, do not confuse with other cheap kits. Real long distance reception. Send s.a.e. for leaflet.

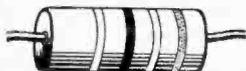
THE BEST COMPONENTS CATALOGUE EVER

Size 9 3/4 in. x 7 1/4 in. comprising 128 pages printed on high grade paper and listing over 4,000 different items with more than 400 illustrations. This catalogue has been compiled from our actual stock so you are sure that all items listed are normally available off the shelf. Included, are full details of Eddystone Short Wave components and receivers, and also W.B. Stentorian cabinets and speakers. This catalogue is exclusive to Home Radio Ltd. and is AVAILABLE NOW.

PRICE 2/- plus 9d. post. Please mark your envelope "Catalogue" in top left-hand corner.



RESISTORS



New range of miniature high grade insulated resistors, all 10% tolerance and available in all preferred values from 10 ohms to 10 megohms.

Type R5. Normal 1/2 watt (Max. 1/2 watt), 4d. ea.

Type R6. Normal 1/2 watt (Max. 1 watt), 6d. ea.

Type R7. Normal 1 watt (Max. 2 watt), 9d. ea.

Also 1/2 watt High Stability, 5%, 10 ohms to 1 meg., 9d. ea.

Latest Mullard Book

"DESIGNS FOR AUDIO AMPLIFIERS"

Every keen constructor should have a copy of this exciting new book on audio amplifiers. Technical data and constructional notes for over 12 different designs including amplifiers, pre-amplifiers, tape amplifiers, electronic mixers, stereo amplifiers and pre-amplifiers, AC/DC amplifiers, etc. Keep up to date with Audio design.

PRICE 8/6 plus 1/- post.

We can also supply all the parts to build these designs including punched chassis, ganged controls, Bulgin parts, special switches, and Elcom and Painton plugs, etc. Detailed **PRICE LISTS 6d.** for post.

SILVER MICA CONDENSERS



We can now offer a comprehensive range of high grade "Stability" Silver Mica Condensers. All 1% tolerance and 350v. working. Cat. No. 81.

Below 1,000 pF (.001 mfd.), 9d. ea.
Below 2,000 pF (.002 mfd.), 1/- ea.
Below 3,000 pF (.003 mfd.), 1/3 ea.
Below 5,000 pF (.005 mfd.), 1/6 ea.
Below 7,500 pF (.0075 mfd.), 2/- ea.
All values above this, 2/6 ea.

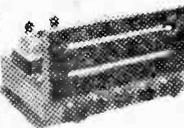
SIMON CADENZA CRYSTAL MICROPHONE



The most elegant and up-to-date microphone available today. A high quality crystal version is now introduced in the same styling, and with table stand. Delivery from stock at the remarkably competitive price of only, **£3.13.6 plus 1/- post.**

T.S.L. Three channel mixer. An essential accessory for all tape recorder and amplifier users. S.A.E. for leaflet. **PRICE £2.2.0 plus 1/- post.**

NEW ARMSTRONG RADIOGRAM CHASSIS MODEL 208



A new inexpensive chassis introduced by Armstrong's, the AF208 has full FM/VHF plus the normal Medium waveband, 5 watts output, with 7 valves and separate bass and treble controls. Hand built construction and traditional Armstrong quality makes this an exciting new addition to the range. There is no similar chassis on the market today which equals the AF208 for value. **PRICE 22 Gns.** plus 2/6 part carriage. Send for leaflet today. All other Armstrong and Dulci radiogram chassis in stock.

BARGAIN OFFER RECORDING TAPES

The following high grade re-ordering tapes at below wholesale prices while stocks last

LONG PLAY TAPES Sin. 80ft., 19/6; 5 1/2 in. 1150ft., 2/-; 7 in. 1,650ft., 32/6.

STANDARD TAPES Sin. 560ft., 15/6; 5 1/2 in. 800ft., 19/6; 7 in. 1,150ft., 25/-

PLEASE ADD 1/- POST TO ORDER.

"SHORT WAVE RECEIVERS FOR THE BEGINNER"

This new book contains constructional data for six different simple short wave receivers both battery and mains operation. Send for your copy today, and start this best hobby of all now. **PRICE 6/- Post 9d.**

VALVES! VALVES! VALVES!

We are pleased to announce a new range of brand new boxed valves, cheaper than standard and better than "surplus"—and every one guaranteed for 12 months.

5V4G	12/6	DM70	7/6	EF80	10/6
5Y3GT	12/6	EB41	9/-	EF86	13/-
5Z4G	12/6	EABC80	10/6	EL84	9/6
6AT6	9/6	EAF42	11/6	EM80	11/6
6BW6	11/6	EBF80	10/6	EM81	11/6
6X4	7/6	ECC81	11/-	EY51	10/-
6X5G	12/6	ECC82	11/-	EY86	10/-
12AT6	9/6	ECC83	11/-	EZ80	7/6
12AT7	11/-	ECC84	11/-	EZ81	7/6
12AX7	11/-	ECF80	12/6	PCC84	12/6
35Z4GT	12/6	ECF82	14/-	PCF80	12/6
50L6GT	14/6	ECH81	10/6	PL81	12/6
DF96	10/6	ECL80	10/6	PY80	7/6
DK96	11/6	ECL82	12/6	PY81	10/-
DL96	10/-	EF41	10/-	PY82	7/6

Other types are being added to this list every week, please send us your enquiries.

HI-FI EQUIPMENT

We stock a comprehensive range of Hi-Fi equipment including Pye, Leak, Dulci, Armstrong, Tripletone, etc. Demonstration room now open and a range of SENSIBLE high quality systems both ready made and in kit form are available to hear. Send stamped, addressed envelope for Hi-Fi equipment list.

WIRES, CABLES AND FEEDERS

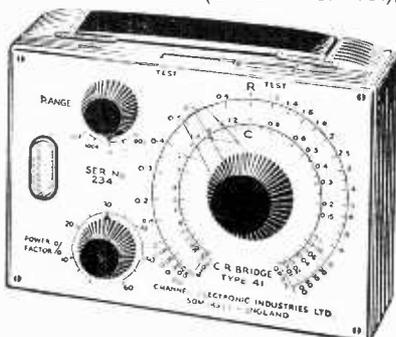
Pick-up cable. Miniature single, 10d. yd.
Pick-up cable. Miniature twin, 1/3 yd.
Microphone cable lightweight single, 6d. yd.
Microphone cable lightweight twin, 1/3 yd.
Microphone cable standard single, 1/1 yd.
Microphone cable standard twin, 1/10 yd.
Television coaxial 75 ohm low loss, 9d. yd.
Balanced twin 75 ohms, 6d. yd.
Balanced twin 300 ohms, 9d. yd.
Please add 1/- post to order.

NEW ! UNIQUE !

MINIATURE TRANSISTORIZED SIGNAL GENERATOR TYPE 40

- ★ Up to 20 Mc/s on fundamentals.
- ★ R.F. and Audio Output, Attenuated.
- ★ Accuracy better than 2%.
- ★ Miniature size only 4½ in. x 3½ in.

PRICE NET **£5.15.0.** Battery
2/6 extra.
Post (C.O.D. or C.W.O.), 2/6.



MINIATURE TRANSISTORIZED R.C. BRIDGE TYPE 41

- ★ Capacitance 5 µF to 20 µF.
- ★ Resistance 5 Ω to 20 MΩ.
- ★ Magic Eye Balance Indicator.
- ★ Calibrated Power Factor Check.
- ★ Miniature Size—Light Weight.

PRICE NET **£5.10.0.** Battery
3/3 extra.
Post (C.O.D. or C.W.O.), 2/6.

SEND S.A.E. FOR LEAFLETS, OR ORDER TODAY, FROM—

CHANNEL ELECTRONIC INDUSTRIES LTD. DEPT. P. DUNSTAN RD.
BURNHAM-ON-SEA, SOM.

Premier RADIO

23, TOTTENHAM COURT ROAD, LONDON, W.1.

TEL.: MUSEUM 3451/2



The "Ariel" PORTABLE

MAY BE BUILT FOR

£7.7.0

Plus p. & p. 3/-.

BATTERIES EXTRA.
H.T. 10/- (Type B126) or
equivalent L.T. 1/6 (Type
AD35) or equivalent.

★ Size only 8in. x 8in. x
4½ in.

★ Instruction book 1/6.

BATTERY ELIMINATOR, housed in two containers which
are approx. the same size as AD35 and B126 batteries.
37/6, plus 2/- p. & p. MAY BE CONSTRUCTED.

Convert your Battery Portable to A.C. mains operation with
the Cossor MU2 Battery Eliminator.

This unit is assembled and supplied with 4ft. of Mains Lead and unit
Torpedo type of On/Off Switch. Housed in 2 metal containers
approximately the same size as the AD.35 and B.126 batteries
and suitable for Receivers using 1.4 volt L.T. and 90 volt H.T.
ORIGINAL PRICE 3 gns.

OUR PRICE for a limited period, 37/6, plus 2/- p. & p.

VISIT OUR NEW BRANCH AT 309 EDGWARE ROAD, W.2.



The Famous Cossor 3 watt
AUDIO AMPLIFIER KIT 562K
Original Price £9.15.0.

OUR
PRICE **£5.19.6.** p. & p. 2/6

This Kit assembled will provide a
compact versatile Amplifier which
incorporates the most up-to-date
pre-assembled printed circuit and
is suitable for operation from
Radio, Microphone or Gramo-
phone. The circuit design includes negative feedback, valve
line-up 6V4, 6BQ5, EF86. Two Loudspeakers are used, i.e., 10in.
x 6in. Elliptical and 4in. Treble, ensuring high quality output,
suitable for use on 200/250 v. A.C. mains. All items are
supplied, including Loudspeakers, Knobs and Escutcheon, with
full assembly instructions and in maker's original cartons.

THE BEREC

The 'Berec' Battery Receiver for only
£4.19.6, plus 5/- p. & p., or £1.0.0
dep. and 5 mthly pymts of 19/-. Suitable
for use in the home or where normal
electricity supply is not available, re-
markable reception on med. and short
wavebands, using DK92, DF92, DAF96,
DL96, latest type min. Battery Valves : operates on an external
B.103 Battery or equiv. Housed in an attractive, two-tone meta-
case. Size 11½ x 7½ x 5½ in. BATTERY EXTRA 18/6



Increasing Signal-to-Noise Ratio

LIMITERS CAN IMPROVE RESULTS

By J. Ball

IF a constructor is troubled by noise in the output of a receiver, his immediate reaction may be to add a noise limiter. Whilst this sounds perfectly logical, he will almost certainly be disappointed because a noise limiter will reduce only one particular type of noise and this is not necessarily the type which usually causes most trouble.

Broadly speaking, noise can be considered to be any unwanted sounds emitted from a speaker. The important thing is not the actual noise voltage at any point in the receiver, but the signal-to-noise ratio. Extra amplification alone will not improve the signal-to-noise ratio or the intelli-

gibility because both the signal and noise are amplified by the same amount. A given amount of noise will, of course, cause most trouble when the signal voltage is very low, i.e., when receiving weak signals or using a high gain audio amplifier.

frequencies will, of course, also be reduced by increasing the selectivity. One of the simplest methods of obtaining excellent selectivity and, therefore, comparatively little sharsh is the use of a double superheterodyne receiver. A circuit which can be added on to a receiver to convert it into a double superhet was described on page 388 of the July, 1959, issue of PRACTICAL WIRELESS.

The high frequency components of sharsh cause most of the trouble. A low pass filter ("top cut" or tone control) may therefore help considerably, but there is little point in using such a filter in a high selectivity receiver. A steep cut low pass filter is useful for reducing sharsh on recordings. Sharsh noise from F.M. receivers is reduced by amplifying the high frequencies more than the low frequencies at the transmitter (pre-emphasis) and amplifying the low frequencies more than the high frequencies at the receiver (de-emphasis).

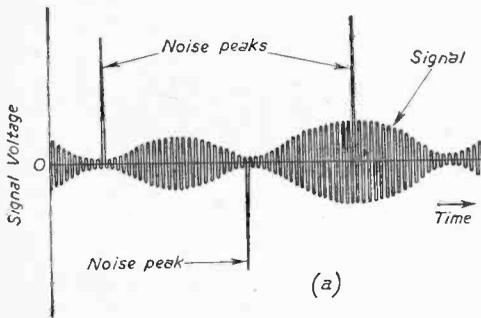


Fig. 1(a).—Typical impulse noise.

gibility because both the signal and noise are amplified by the same amount. A given amount of noise will, of course, cause most trouble when the signal voltage is very low, i.e., when receiving weak signals or using a high gain audio amplifier.

"Sharsh"

One type of noise is variously known as "hiss", "hash", "mush" or "sharsh" because, when one speaks these words, the sound resembles that of the noise. Sharsh noise is a mixture of all frequencies and is, therefore, by analogy, sometimes called "white noise" because white light is a mixture of light of all frequencies.

Some sharsh is present at the aerial. The receiver noise (also sharsh) is added to this during the passage of the signal through the receiver. No matter how the sharsh originates, the signal-to-noise ratio of a receiver can be improved by increasing the selectivity. Excessive selectivity should not be used, however, or side band cutting will take place with consequent loss of high frequencies and of intelligibility. The signal covers a narrow band of frequencies but sharsh is present on all frequencies. An increase of selectivity may therefore remove much of the sharsh which is not actually in the signal frequency band. Noise owing to signals on near-by

Aerial

It is essential to use a good, well designed outdoor aerial if low noise is to be obtained when weak signals are being received. The noise picked up by a good aerial may not be any less than that from a poor aerial but the signal voltage—and hence the signal to noise ratio—is greater.

Some sharsh is always generated in the receiver but at signal frequencies below about 20Mc/s it should be much less than the sharsh noise from the aerial in any well designed receiver. The only noise which is important is that generated in the R.F. stages or mixer because noise generated

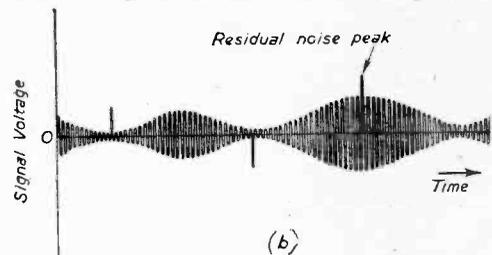


Fig. 1(b).—After passing through a limiting circuit the noise peaks are reduced.

later in the receiver is completely masked by the amplifier noise from the early stages. Mixer valves are always very noisy and it is important to keep this noise as low as possible if it is desired to receive weak signals on high frequencies. A good R.F. stage should be used so that the signal is amplified as much as possible before passing through the noisy mixer stage. Special R.F. stages which generate very low noise have been designed, but these lie outside the scope of

this article. It is also important to use the optimum aerial coupling and to ensure that the receiver is correctly aligned. Any noise which remains when the receiver aerial terminal is earthed is receiver sharsh noise.

Impulse Noise

Impulse noise—also known as pistol shot or machine gun noise—consists of short isolated signals of duration about one thousandth of a second (much less than this at the aerial). It can originate in a number of ways including internal

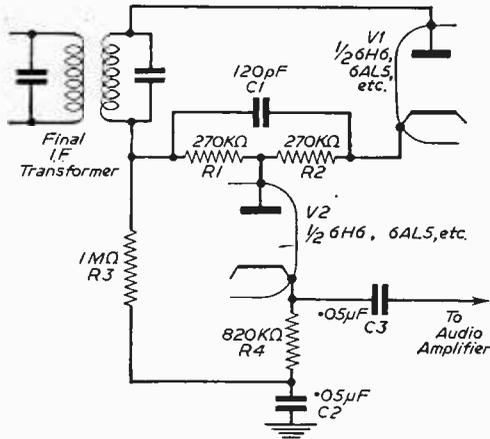


Fig. 2.—A series audio noise limiter and detector. (The cathode of V1 should be earthed.)

combustion ignition systems, clicks from electric switches, flashing signs, factory equipment and natural "static" lightning discharges. The noise from electric motors is a combination of sharsh and impulse noise.

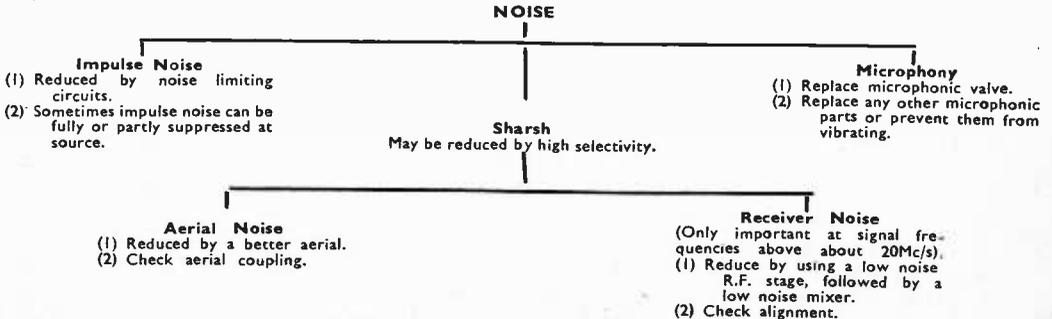
Fig. 1(a) shows a typical example of impulse noise together with the wanted signal. Owing to the extremely short duration of impulse noise, the amplitude must be very much greater than that of the signal if it is to cause appreciable interference. Much of the noise can be eliminated by means of a simple audio noise limiter; the signal and the remaining noise then appear as shown in Fig. 1(b). The noise limiter merely "chops off the tops" of the noise peaks leaving

the remainder of the noise just above the maximum signal level. A noise limiter will only reduce impulse noise and cannot affect sharsh.

A simple series noise limiter is shown in Fig. 2. V1 is the audio detector and V2 is the additional noise diode. The circuit requires only three more resistors and one more condenser than a conventional diode detector circuit. A negative voltage, which is proportional to the carrier level is developed across C2, but this voltage cannot change rapidly because C2 and R3 are both large. Noise peaks which exceed a certain level will drive the anode of V2 negative with respect to its cathode. During this instant of time the diode will not conduct and the audio signal will therefore be cut off or limited. The noise level at which this occurs is controlled by the bias on V2 which in turn depends on the carrier level at the time. The biasing, therefore, automatically adjusts itself whatever the input voltage from the last I.F. transformer in the receiver. If at any time it is desired to stop the limiter from working, it is only necessary to connect a wire from the anode of V2 to the cathode of the same valve. This could be done with a switch if desired so that the limiting circuit could be switched in and out. This particular noise limiter is of no use for Morse reception because the bias automatically adjusts itself to the carrier level. A noise limiting circuit of this type can be added to an existing receiver without any further drilling of the chassis if a suitable germanium diode (e.g., type 1N34) is used for V2. Alternatively, a small diode of the normal type such as the VR92 or the EA76 may be mounted under the chassis to avoid the need for drilling it. Many variations of the circuit are possible.

Microphony

Microphony is very different from the forms of noise mentioned previously. The component which is microphonic must first be found by careful tapping of components in the low level stages whilst the unit is working. If a valve is found to be microphonic it should be replaced, but it should not be discarded, as it will probably work quite well in a stage operating at a higher voltage level. Very occasionally, tuning condensers are found to be microphonic, and steps must then be taken to prevent the plates of the condenser from vibrating.



Summary of methods by which signal-to-noise ratio may be increased when various types of noise are causing trouble.

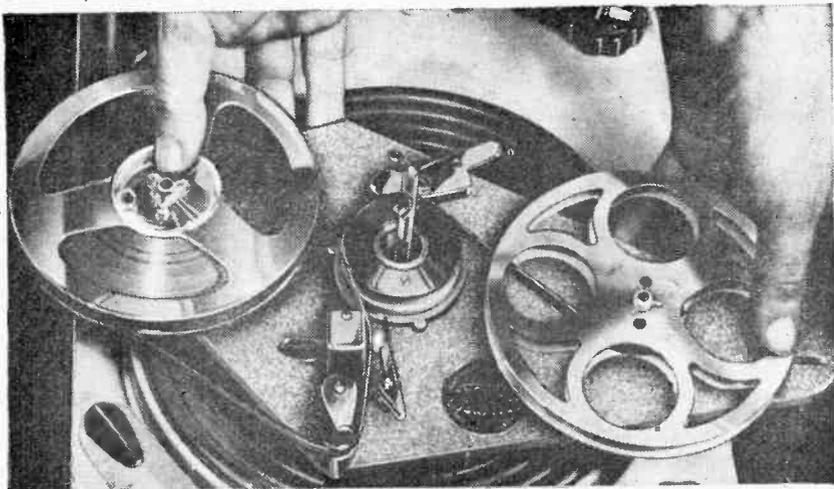
A REVOLUTIONARY NEW BRITISH INVENTION!

- ★ Uses standard tapes
- ★ Plays at 7½" per. sec. or 3 other speeds
- ★ Records direct from radio or microphone
- ★ Erase and fast rewind

£13.12s

Special moving-coil microphone and tape extra.

EASY TERMS



Instantly turns any gramophone into a first-class Tape-Recorder and back into a record-player in a moment!

Gramdeck is completely new . . . a revolutionary and ingenious invention that instantly turns your gramophone into a tape-recorder and back into a gramophone at will! Slip the Gramdeck on to your turntable and you have the finest tape-recorder you've ever heard! Lift it off . . . your gramophone is ready to play records again. There are no motors or valves to go wrong—and you get a quality that has to be heard to be believed! Everyone is praising the Gramdeck.

"The quality is at least equal to that obtained from a good microgroove disc," says a leading professional journal.

"Ingenious—simple . . . why on earth did no one think of it before!"—THE TAPE RECORDER.
 "Ingenious and robust."—BRITISH SOUND RECORDING ASSOCIATION JOURNAL.

"Quality of reproduction excellent . . . real hi-fi results . . . potential is tremendous . . . both designer and manufacturer should be congratulated."—BRITISH RADIO & T/V RETAILERS REVIEW.

"Better than many so-called hi-fi recorders . . . robust . . . carefully designed . . . excellent value."—AMATEUR CINE WORLD.

WORKS FROM ANY RECORD-PLAYER OR RADIOGRAM

Gramdeck records and reproduces with a wonderful depth and breadth of tone. Because it uses equipment that is already in your gramophone it only costs a fraction of the high-quality tape-recorder you would normally require. Full details, specifications, photographs, easy terms, etc., are given in the Gramdeck Book. Send for your FREE copy, today.

MADE BY THE FIRM THAT MAKES RADAR EQUIPMENT FOR VISCOUNTS & BRITANNIAS

FREE BOOK—POST NOW!

I would like to know how to turn my gramophone into a first-class tape-recorder . . . please send me the Gramdeck Book—FREE and without obligation.

(Write if you prefer not to cut page)

NAME

ADDRESS

Gramdeck (Dept. PA/805) 29 Wright's Lane
 Kensington, London, W.8

Gramdeck
 GRAMPHONE TAPE RECORDER
 HIGH QUALITY TAPE-RECORDING FOR EVERY HOME

GRAMDECK TURNS A TURNTABLE INTO A TAPE-RECORDER

Free!



CIRCUITS FOR AUDIO AMPLIFIERS

-a book every enthusiast will want!

This new Mullard publication is a practical manual for every audio enthusiast. In addition to describing twelve of the most popular Mullard circuits, it has introductory chapters on many of the theoretical and practical aspects of high quality sound reproduction.

Whether you are interested in disc or tape, monaural or stereo, you will find that "Circuits for Audio Amplifiers" gives just the sort of information you need.

This informative book costs only 8/6. The demand for it is high, so get your copy now from your local radio dealer.

Mullard

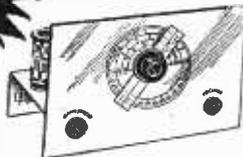
MULLARD LIMITED • MULLARD HOUSE • TORRINGTON PLACE

LONDON W.C.1
MVM423A



CONSTRUCTORS CORNER

Construction price includes valve and one coil covering 40-100 m.
● Can be converted to 2v. or 3v.
● Receives speech and music clearly from all over the world.
Send 2/- for diagram and price list.



The ideal low-cost transistor pocket radio for the beginner.
Send 2/- for data and list of components.

TRANSISTOR POCKET RADIO

Two-stage circuit using variloopstick coil.

- Ideal for the beginner.
- Can be built in 30 minutes.
- Works for months off 7d. battery.
- Fits into palm of your hand.

ONLY **30/-**

CRYSTAL RECEIVER

Covers M/W Band
All components including case for **10/6**
Ideal for the beginner.

Post and packing: Under 10/- add 9d.; under 40/- add 1/6; over POST FREE

ENSURE SUCCESS WITH R.C.S.

Explore the world on short-wave radio (10-100 m)

FOR ONLY **35/-**

SENSATIONAL RESULTS WITH 2 TRANSISTORS

- ★ No aerial or earth.
- ★ Dial tuning with mini .0005.
- ★ Drilled chassis, colour coded components, simple layout for beginners.
- ★ Special small case fits shirt pocket.
- ★ Soldering iron and pliers are only tools needed.



Finest results ever obtained with 2 transistors and diode layout. The ideal radio to carry with you everywhere. PARTS PRICE LIST & EASY LAYOUT PLANS, 2/-. Total building cost, including transistors, wire, etc., **62/6**

BUILD THIS AMAZING RADIO

POWERFUL! PERSONAL! PORTABLE!

- ★ Sturdy metal case.
- ★ No holes to drill.
- ★ Detachable rod aerial.
- ★ All batteries self contained.
- ★ Can be built in 1 hour.
- ★ Covers medium waves.
- ★ Loud clear tone.
- ★ Selective tuning.

All parts are sold separately. This delightful set is designed to give you a completely personal portable radio. Bronze-finished case. Ideal for the beach, the bedroom, the office—in fact, anywhere.
Send 2/- for wiring diagram and component price list.

FOR ONLY **35/-**



Trade Enquiries We'comed

R.C.S. PRODUCTS (RADIO) LTD. 11, OLIVER RD., LONDON, E.17.

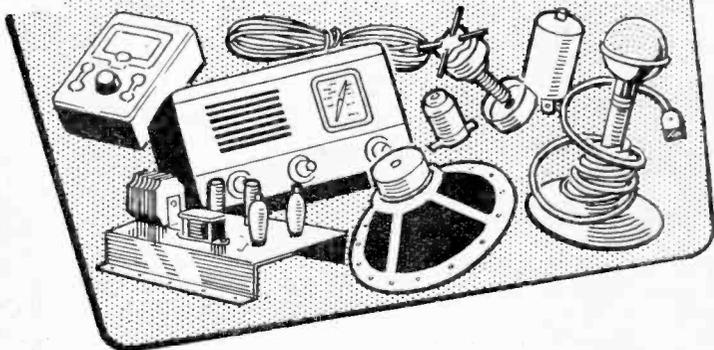
Mail Order Only

NEWS FROM THE TRADE

LATEST DEVELOPMENTS IN RECEIVERS AND COMPONENTS

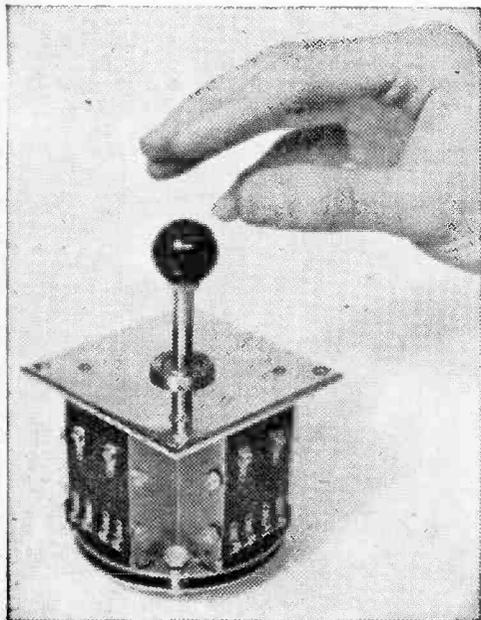
TAPE RECORDERS

It is announced by Philips Electrical Ltd. that they have added two new models to their range of portable tape recorders. They are the EL.3515 and the EL.3538, selling at 32 guineas and 57 guineas respectively. The EL.3515 is described as the "family" tape recorder and weighs only 18lb. Suitable for twin-track recording at $3\frac{1}{2}$ in./s. it gives a total of four hours' playing time when double-play tape is used. It will take all sizes of reel up to 7in., and has easy push-button controls and a 4in. speaker. A recording level indicator is incorporated and separate inputs with mixing facilities are provided. The amplifier can be used separately with microphone or gram and recordings can be monitored by headphones. There is generous storage space for cables and microphone. The carrying case of impact-proof "Polystyrene" is finished in two shades of grey. The EL.3515 is supplied complete with crystal microphone, 5in. reel of standard tape and spare take-up spool.



The EL.3538 is a three-speed ($1\frac{1}{2}$, $3\frac{1}{2}$ and $7\frac{1}{2}$ in./s.) tape recorder housed in a carrying case finished in blue-grey. Push-button controls, grouped at the front of the machine, ensure fully automatic operation. Using double-play tape, the machine will provide up to eight hours' recording and easy maintenance is facilitated by a plastic hood which can be detached for cleaning of the mechanism. The EL.3538 weighs 30lb. and is equipped with a compact-type moving coil microphone, a 7in. reel of long-playing tape, a spare take-up spool and a 5in. loudspeaker.

Further information may be obtained from Philips Electrical Ltd., Century House, Shaftesbury Avenue, London, W.C.2.



One of the Pye "joystick" switches.

"JOYSTICK" SWITCHES

A RANGE of new joystick control switches which are safer and more easily operated than conventional push-button systems has been developed by the Switch Division of Pye Ltd. With manual or automatic return from two to eight positions, this new controller has many basic variations. The joystick has all the advantages of visual directional movement, plus the inclusion of an isolator for additional safety. This advance in sequence control technique allows a wide range of applications—all of which require considerably less space and are less expensive than an equivalent number of push-button units. Basically, the controller consists of a varied number of robust switches mounted under a $3\frac{1}{2}$ in. square chromium top plate. The switches are grouped evenly each side of the square and are operated by a control lever which passes through an oil-filled spherical bearing. The operator moves the lever almost unconsciously in the direction in which a traverse or operation should take place—a movement similar to changing gear in a car. Directions in which the lever can be moved are controlled by a gate plate mounted below the switches. Controllers can be supplied with stepped switching for multi-speed control and latest types include built-in potentiometers for infinitely variable control. (Pye Ltd., Cambridge).

PLAYING TIME CALCULATOR

REQUESTS for the "Scotch" Brand Playing Time Calculator, which has been offered free of charge to recording enthusiasts, have been so overwhelming that two printings have now



The "Scotch" magnetic tape playing time calculator.

been completely exhausted. Further supplies are being prepared and efforts are being made to obtain further supplies to enable all requests to be fulfilled without delay. The calculator is obtainable from the *Minnesota Mining & Manufacturing Co., of 3M House, Wigmore Street, London, W.1.*

NEW BRANCH

IN addition to their branch at 42, Tottenham Court Road, Lasky's Radio Ltd. have now opened new and larger premises in Edgware Road, London, W.2, and have a complete stock of all high fidelity equipment, tape recorders and accessories, together with a full range of components.

NEW MINIATURE MICROPHONES

EXTREMELY small coil formers injection moulded in Styron Polystyrene are an essential feature of miniature microphones now being manufactured by *A. P. Besson and Partner Ltd. St. Joseph's Close, Hove 4, Sussex.*

These microphones are of the

self-energising balanced armature type, designed to operate with transistor amplifier, and function within a temperature range of 20-115 deg. F. They can, however, be specially processed to enable them to function satisfactorily at much higher temperatures if required.

They are ideal for use in hearing aids, dictating machines, tape recorders, lapel microphones, walkie-talkie sets, pocket transmitters and other miniature equipment in which their light weight and compactness can be used to advantage.

Styron Polystyrene, which can be moulded to close tolerance and possesses the requisite electrical properties, is marketed by *British Resin Products Ltd., Devonshire House, Piccadilly, London, W.1.*

OSCILLOSCOPE DISPLAYS OF HYSTERESIS LOOPS

THE production of hysteresis loops is a very lengthy procedure when using ballistic or magnetometer instruments, involving the plotting of many coordinates. For this reason many schools have, in the past, found it impossible to include the experiment in their programmes, although the subject of hysteresis appears in the G.C.E. physics syllabus at "S" level.

However, with an oscilloscope a direct display of a hysteresis loop may be obtained simply and with a minimum of preparation time, and since many school laboratories are equipped with such an instrument the Mullard Educational Service has produced a leaflet describing the experiment and giving full theoretical and constructional details of the circuitry required. It is the latest in the series, "Demonstrations & Experiments in Electronics" published by the Mullard Educational Service and may be obtained from *Mullard Ltd., Mullard House, Torrington Place, London, W.C.1.*



A miniature microphone and two polystyrene coil formers.

guaranteed Tubes

Carriage and Insurance 12/6	GUARANTEED 6 MONTHS REVAUCUMED	GUARANTEED 12 MONTHS REGUNNED NEW
CRM92, MW22-7, MW22-14, MW22-14C, MW22-17, MW22-18	£2/15/-	—
CRM121, CRM121A, CRM122, MW31-14C, MW31-17, MW31-19	£3/-/-	£5/10/-
121K, 141K, AW36-E1, C14FM, CRM123, CRM141, CRM142, MW31-18, MW31-74, MW36-24, MW36-44	£3/10/-	£5/15/- £7/19/-
171K, C17FM, CRM171, CRM172, MW43-64, MW43-69	£4/5/-	£6/15/- £8/19/-
AW43/80, C14BM, C17BM, CRM151, CRM152A, CRM152B, CRM153, MW43-80, MW41-1	£5/5/-	£6/15/-
CRM212, MW53-20, MW53-80	£6/15/-	£9/10/-

NEW 108K TV TUBES SPECIAL OFFER: £2/19/-
 Many other types not listed available. S.A.E. enquiries.

THAT SECOND SET? 13 CHANNEL T.V.'s

COMPLETE, UNTESTED
12" — £3.19.
14" — £7.10.
 CARRIAGE FREE BUT AT CUSTOMER'S RISK
 ALSO 12" 5 CHANNEL T.V.'s UNTESTED 55/ CARRIAGE

100 CONDENSERS 10/-
 A must for your spare box. A well-balanced assortment of miniature silver mica and ceramic condensers. 3-10,000 PF. List value over £5.

PM SPEAKERS
 Standard 3 ohms, ex-equipment, top makes, performance guaranteed.

6in. 8/- 5in. 7X4 11/- 10in. 10X6 13/-
100 RESISTORS 7/6
 A magnificent assortment. 1-2 watt.

SCR522: Transmitter receivers. U.S.A. standard aircraft type. 100-140 Mc/s. less 25/- Carr. 5/- valves.

COLLARO "CONQUEST"
 Hi-Fi 4 spd. 10 record Auto. £6/19/- Limited Quantity.

G73: SIGNAL GENERATOR and wave meter. 100 kc/s. 20 Mc/s. crystal calibrator, precision attenuator. 79/-

6 v. VIBRATOR PACKS
 Output 220 v. 60 m.a., 12/6 p. & p. 3/- complete

TRANSISTORS: RED SPOT. Transistors for I.F. L.F. and Output up to 800 kc/s. 4/9 ea. (4/3 each in dozens). WHITE SPOT. I.F. and L.F. 12.5 Mc/s. 7/- (6/6 each in dozens). XA103, 15/-; XA104 17/6; XB104 10/-; GET15 25/-.

DIODES
 General purpose famous make. 9d. 8/- doz.

RECTIFIERS: Iron selenium, full wave bridge, 12 volt 3-4 amps. 9/8 (Carr. 1/-). £5 per doz. 250 v. 80 ma. 5/-; 250 v. 250 a. 9/6; 500 v. 50 ma. 6/6; 500 v. 150 ma. 9/8; 1,000 v. 40 ma. 8/8; contact cooled 250 v. 50 ma., 7/-; 250 v. 250 ma. 19/6; 250 v. 300 ma. 23/6.

VALVES ALL GUARANTEED 3 MONTHS PL81 SOILED AMAZING 7/-
 VALUE AT ONLY

EY51 SHORT 5/- U25 SHORT 8/-
4-SPEED RECORD PLAYERS

Latest Turntable, together with lightweight Sisk Galaxy dual sapphire crystal turnover pick-up head. Truly amazing value. £3/10/- Carr. 3/- Pick-up only 19/-.

FREE TRANSFORMERS
 With each manufacturer matched pair of GT10 POWER 1 watt output. Transistors, price 50/- we give free the correct Push Pull INPUT AND OUTPUT TRANSFORMERS of High Grade construction and 4 Transistor Amplifier circuit. Will transform your existing receiver or amplifier into a truly "Mains Volume" outfit.

INFRA RED HEATERS
 At half price. Unrepeatable. 800w., 2ft. 0in. £3; 1,200 w., 2ft. 9in. £3/5/-; 2,000 w. 3 ft. 9 in. £3/10/- Carr. 3/-.

PICK-UP CARTRIDGES
 ACOS 22/6. POWER POINT 18/6. STEIG AND REUTER 15/-, SONOTONE 17/6.

B.S.R. TAPE DECKS £9/10/-

PORTABLE RECORD PLAYERS
 Collaro 4 speed auto-changer, 21 watt high gain amplifier. Super two- 2 1/2 Gns.

VALVES BY RETURN OF POST

10% DISCOUNT SPECIAL OFFER TO PURCHASERS
 of any SIX VALVES marked in black type (15% in dozens). Post: 1 valve, 6d.; 2-11, 1/-.

TRADE ENQUIRIES INVITED
 GUARANTEED 3 MONTHS

FREE TRANSIT INSURANCE. All valves are new or fully guaranteed ex-Government or ex-export origin. Satisfaction or Money Back Guarantee on goods if returned unused within 14 days.

024	5/6	8BBG	8/6	6J7GT	7/6	7B6	8/-	12SN7GT	8/6	80	6/8	DL82	17/6	EF38	2/6	EZ35	6/6	PCL82	10/-	U24	7/6	UF89	8/6
1A5GT	6/-	6BA6	6/6	6KGGT	6/9	7B7	7/8	18ST	13/6	80	6/8	DL92	7/6	EF37	2/6	EZ40	7/6	PCL83	11/6	U25	12/-	UL41	7/6
1A7GT	12/6	6G6	6/6	6K7	2/3	7B8	12/6	19A45	7/6	90A4	4/6	DL94	7/6	EF39	4/6	EZ41	8/6	PCL84	12/6	U26	12/-	UL44	12/6
1C5GT	10/6	6G6GG	12/6	6K7GT	5/3	7C5	7/6	19BGG16	16/-	DL96	8/3	EP40	13/6	EF40	13/6	EF280	6/9	PEN25	5/-	U33	11/-	UL48	9/6
1D5	9/6	6B16	7/6	6K8G	6/-	7C6	7/6	20D1	9/6	323A	5/-	EA50	9d.	EP41	8/6	EP281	7/6	PEN45	7/6	U35	8/6	UL84	9/6
1H5GT	9/6	6J78	6/6	6K9GT	9/8	7H7	7/6	20P2	9/6	723A	35/-	EABC80	7/6	EP42	7/6	GTIC	7/6	PEN46	5/-	U37	26/6	UL84	8/3
1L4	3/6	6BW6	7/6	9K25	7/6	7K7	8/-	20L1	12/6	8YTUSA	6/-	EAC91	5/6	EP50	8/6	RED	6/6	FX8383	9/-	U43	9/6	UM80	9/6
1N5GT	9/6	6BW7	8/6	9L1	13/6	787	9/6	20P1	11/6	808	15/-	EAF42	8/6	EP50	8/6	RED	6/6	FX8383	9/-	U50	6/6	UL06	9/6
1R5	7/-	6BX6	5/6	9K26	9/8	Y4	7/6	20P3	12/6	813	55/-	EB34	1/6	2/-	GZ37	10/6	FL36	13/6	U52	6/3	U07	9/6	
184	9/-	6C4	3/6	6L6G	7/6	7Z4	7/6	20P5	16/-	2050	3/6	EB41	7/-	EF50	USA	HABC80	9/6	PL38	14/6	U76	6/6	U08	16/6
185	6/6	6C5	5/6	6L7M	6/-	10C1	9/-	25A60	8/-	5763	10/-	EB81	4/-	2/-	HL41D	8/6	PL81	10/6	U78	6/6	U09	7/6	
174	5/-	6C6	4/3	6L8	9/6	10C2	12/6	25L66	8/-	7193	2/-	EB85	9/-	EF54	3/6	HLV12	6/6	PL82	7/9	U91	9/6	U41	6/6
2121	4/6	6C8	9/6	6L19	11/6	10C14	9/3	25L67	8/-	AZ31	9/6	EB33	5/-	EF30	8/6	KT32	8/6	PL63	8/6	U281	8/6	U48	7/3
374	6/-	6C10	8/9	6L13	8/9	10C1	10/6	25Y6	9/-	B38	6/6	EB41	8/9	EP85	7/-	KT33C	6/-	PX95	9/6	U282	22/7	VB11	30
3A5	9/6	6C16G	16/6	6L12D	7/9	10P9	10/6	25Z40	7/6	B65	4/9	EB81	11/-	EP86	11/-	KT38	9/-	PY31	8/6	U301	9/6	7/-	3/6
3Q5GT	8/9	6C16	9/3	6L20	8/6	10C11	14	27A19	16/-	CB131	24/6	EBF30	8/6	EP89	8/6	KT44	8/6	PY32	12/6	U329	12/6	W17	5/6
384	7/-	6D1	9d.	6P15	8/3	10D13	8/3	30C1	7/6	CC135	7/-	EBF69	8/6	EP91	3/9	KT45	8/6	PY80	7/-	U403	9/6	W61	9/6
474	7/6	6D2	4/-	6P25	5/-	12A7	6/-	30P1	13/6	D100	25/-	EBL31	16/-	EP92	4/9	KT46	8/6	PY80	7/-	U404	9/6	W76	6/6
5U4G	5/6	6D6	4/6	6Q7G	7/6	10P14	7/6	30L1	7/6	D93	1/6	ED90	3/6	FL32	4/-	KTW61	5/6	PY82	7/6	U405	9/6	W77	4/6
5V4G	10/6	6F1	5/9	6Q7GT	9/3	10P18	8/3	30P4	12/6	D77	4/-	EC91	4/6	EL33	9/6	KTW63	5/6	PY83	8/6	UAF42	9/-	W81	5/6
5Y3G	6/-	6F6G	6/6	6S47	8/-	12A6	5/6	30P12	11/6	D152	6/6	EC31	6/6	EL38	12/6	KTW63	5/6	PZ30	8/6	UB41	8/-	X61	12/6
5Y3GT	7/-	6F6M	7/-	6S17	9/-	12A7G	6/-	30P16	7/6	DAB9	12/6	EC32	3/9	E141	9/3	LL21	2/6	PC84	7/6	UC41	8/6	X63	8/6
6Z4G	9/-	6E12	4/-	6S27	5/-	12A7T	6/-	30P1	13/6	D100	25/-	EC33	7/6	EL42	9/6	LL152	8/6	PC84	7/6	UC61	12/6	X65	11/-
524GT	11/-	6F13	5/9	6S27	4/6	12A7U	6/6	35L6T	9/6	DAC32	9/6	EC34	9/-	EL84	8/3	LL219	7/9	PC84	7/6	UBF80	8/6	X65	11/-
6A7	9/6	6F14	9/6	6S27	5/6	12A7X	7/6	35W4	6/6	DAP91	6/6	EC35	6/9	EL85	11/-	MU14	8/-	R52	11/-	UBF89	9/6	X66	11/-
6A8G	8/6	6F15	8/6	6S27	5/-	12B40	6/-	38Z40	6/6	DAP96	8/3	EC38	8/6	EL91	4/9	N37	11/-	SP6	4/-	UCR85	8/9	X76M	9/6
6A8GT	9/-	6F16	8/6	6S17GT	6/9	12B15	9/-	35ZGT	8/6	DFP33	6/6	EC32	6/6	EL95	9/6	N78	15/-	SP41	2/6	UCR89	8/6	X78	14/6
6A8G	8/6	6F19	7/6	6S17GT	4/3	12B17	9/6	42	7/6	DF91	5/3	EC34	7/6	EL84	8/3	LL219	7/9	SP61	2/6	UCR81	12/6	X79	14/6
6AC7	4/6	6F23	5/-	6S27	6/6	12C8	6/6	50C5	10/6	DF96	8/3	EC35	8/3	EM81	9/3	P41	4/6	U25	12/6	UCR81	9/6	Y63	6/6
6AG5	4/6	6E8	2/-	6UAGT	10/6	12E1	12/6	50C16G	16/-	DF96	8/3	EC35	8/3	EM81	9/3	P41	4/6	U25	12/6	UCR81	9/6	Y63	6/6
6AK5	6/-	6J3	4/3	6V6G	5/9	12J5GT	3/6	50L6GT	9/6	DH63	7/6	EC91	3/6	EM84	10/6	P61	2/3	SU2150A	4/6	UL82	12/-	Z14	9/6
6AL5	4/-	6J35G	2/6	6V6GT	8/6	12K74	6/-	55KU	10/6	DH77	7/6	EC90	10/6	EM85	10/6	PABC90	9/6	T41	7/6	ULC13	13/6	Z63	5/6
6AM5	3/6	6J35GT	2/6	6X4	6/-	12K8GT	4/3	12B17	9/6	42	7/6	EC91	10/6	EM85	10/6	PABC90	9/6	T41	7/6	ULC13	13/6	Z63	5/6
6AM5G	3/6	6J35GT	2/6	6X4	6/-	12K8GT	4/3	12B17	9/6	42	7/6	EC91	10/6	EM85	10/6	PABC90	9/6	T41	7/6	ULC13	13/6	Z63	5/6
6AT6	7/6	6G6	5/-	6X9GT	6/6	12M7	6/-	61BPT	11/-	DK92	8/6	EC81	8/3	EY51	6/6	PC89	14/6	U14	8/-	UF80	9/6	Z77	4/6
6AU6	9/6	6J7	7/6	7A7	11/6	12M7	5/6	7/6	4/6	PK96	6/6	EC80	8/6	SMALL	9/6	PC89	7/6	U15	9/-	UF85	6/6	Z152	5/6
6B7	5/9	6J7G	5/-	7B5	12/6	12K8T	6/-	7/6	4/6	DL35	10/6	EC182	11/-	EY86	8/6	PCF82	8/9	U22	6/6	UF86	16/-	Z719	5/6

Post: 2 lbs. 1/6, 4 lbs. 2/-, 7 lbs. 2/9, 15 lbs. 3/6. No C.O.D. ALL ITEMS LESS 5% & POST FREE IN DOZENS. (Callers always welcome.) LIST OF 1,000 SNIPPS, 6d.

TECHNICAL TRADING CO. 350-352, FRATTON ROAD, PORTSMOUTH. P.O. BOX 21 (W)

UNIVERSAL AVOMETER MODEL D

Just released by the Air Ministry, these famous AC/DC Test Meters are a "snip" for anyone requiring a First Grade General Purpose Instrument. Normal Avometer size, 7 1/2 in. x 6 in. x 3 1/2 in., with carrying strap, indication being given on a 5 in. Mirror Scale. Thoroughly overhauled and complete with batteries and instructions. Provides 34 ranges of current, voltage and resistance, as follows:

D.C. Voltage	A.C. Voltage	D.C. Current	A.C. Current
150 mv.	7.5 v.	15 ma.	75 ma.
300 mv.	15 v.	30 ma.	150 ma.
1.5 v.	75 v.	150 ma.	750 ma.
3 v.	150 v.	300 ma.	1.5 amp.
15 v.	300 v.	1.5 amp.	7.5 amps.
30 v.	600 v.	3 amps.	15 amps.
150 v.	750 v.	15 amps.	
300 v.	1,500 v.	30 amps.	Resistance
750 v.			1,000 ohms
1,500 v.			10,000 ohms.

ONLY £8.19.6 (Carriage 3/6d).

COMMUNICATIONS RECEIVER R1155

The famous Bomber Command receiver known the world over to be supreme in its class. Covers 5 wave ranges 18.5 to 7.5 Mc/s. 7.5 to 3 Mc/s. 1,500 to 600 kc/s. 500 to 200 kc/s. and 200 to 75 kc/s. and is easily and simply adapted for normal mains use. Full details being supplied. All sets thoroughly tested and in perfect working order before despatch, and on demonstration to callers. Fitted latest type super slow-motion tuning assembly. Have had some use but in excellent condition. ONLY £7.19.6.

A.C. MAINS POWER PACK OUTPUT STAGE, in black crackle case to match, enabling it to be operated immediately, by just plugging in, without any modification. With built-in 8 in. speaker. £6.10.0 DEDUCT 10/- IF PURCHASING RECEIVER AND POWER PACK TOGETHER.

Send S.A.E. for illustrated leaflet, or 1/3 for 14-page booklet which gives technical information, circuits, etc., and is supplied free with each receiver. Add carriage 10/6 for Receiver, 5/- for Power Unit.

25,000 OHMS PER VOLT TEST METER. Made by TRIP-LETT, the famous American meter manufacturers. Full bench size 7 1/2 in. x 6 1/2 in. x 6 1/2 in., and incorporates a unique tilting bakelite container size 5 1/2 in. x 3 1/2 in., which has 2 meters, a 25,000 ohms per volt moving coil for D.C. Measurements, and a First Grade moving iron for A.C. Reads Resistances up to 40 Meg ohms. A.C. and D.C. volts to 1,000 D.C. Current to 250 mA., and also has 0-50 Microamps range. Facilities for measuring Condenser Capacity and Audio Output. Completely portable, with protective face cover. Complete with Test Leads, Instruction Book, and Batteries. Ex-Ministry of Supply. New Condition and thoroughly checked and overhauled. ONLY £10.10.0. (Post, etc., 3/6).

RECEIVER R107. A further purchase since our "sell out" last year. 9 valves, 3 wavebands, covering 1.2-17.0 Mc/s (18-250 metres), incorporating built-in speaker and power packs for 100-250 volts A.C. and 12 volts D.C. Size 2 1/2 in. x 1 3/4 in. x 1 1/2 in. Complete, ready to switch on, thoroughly tested and checked before despatch. IN NEW CONDITION. ONLY £13.10 (carr. 20/-).

RCA 8 in. P.M. SPEAKER, in heavy black crackled metal case. Can be used as normal 3 ohms extension. Size 1 1/2 in. x 10 1/2 in. x 6 in. NEW IN MAKER'S CARTONS. ONLY 45/- (post 3/6).

"Q FIVER" COMMAND RECEIVER. The famous American BC453, covering 190-550 kc/s. I.F.s being 85 kc/s. Complete with all 6 valves and circuit. NEW IN MAKER'S CARTONS. ONLY 89/6 (post 3/6).

R1155 SUPER SLOW-MOTION TUNING ASSEMBLY. As used on all late model 1155s. Easily fitted to "A" sets, etc. BRAND NEW. ONLY 12/6.

EHT TRANSFORMERS. 5.5 kV (Rect.) with 2 v. 1 a. 79/6. 7 kV. (Rect.) with 2 v. 1 a., 89/6. 2.5 kV. (Rect.) with 2-0-2 v. 1.1 a., 2-0-2 v. 2 a. (for VCR37 tube, etc.). 47/6 (postage 2/- per trans.).

POCKET VOLTMETERS. Read 0-15 volts and 0-300 volts A.C. or D.C. BRAND NEW and UNUSED. ONLY 18/6.

CRYSTALS. British Standards 2-pin 500 kc/s. 15/-. Miniature 200 kc/s. 10/-.

MAINS ISOLATING TRANSFORMER. Manufactured by Vortexion. Fully shrouded. Will provide true 1:1 ratio from nominal 230 v. Primary. Rated at 100 watts. BRAND NEW. ONLY 22/6. (Post 2/6).

SPRAGUE CONDENSERS. Metal cased, wire ends. New .01 mfd. 1,000 volt, and .1 mfd. 500 volt, 7/6 per dozen. Special quotes for quantities.

HARRIS ELECTRONICS

(LONDON) LTD.

138 Gray's Inn Road, London, W.C.1.

(Phone TERminus 7937)

Please include carriage costs on All items. (Open until 1 1/2 p.m. Saturdays. We are 2 mins. from High Holborn (Chancery Lane Station) and 5 mins. by bus from King's Cross.)

Let **I.C.S.**

train YOU!



COURSES ON:—

- **RADIO and TELEVISION**
- **SERVICING · ELECTRONICS**

EXAMINATION COURSES FOR:—

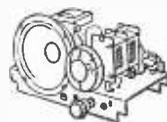
- **C. & G. Radio Servicing Certificate** (R.T.E.B.)
 - **C. & G. Radio Amateurs' Exam.** (Amateurs' Transmitting Licence)
 - **British Institution of Radio Engrs., etc. C. & G. Telecom Technicians.**
- Whether you plan to have your own business, to become an electronics engineer or to take up a career in industry, an I.C.S. Course will help you to succeed. You learn at home in your own time, under expert tuition. Moderate fees include all books.

LEARN - AS - YOU - BUILD

Practical Radio Course

A basic course in radio, electronic and electrical theory backed by thorough practical training. You build a 4-valve T.R.F. and a 5-valve superhet radio receiver, signal generator and multi-tester.

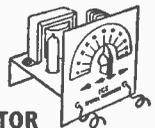
Other Learn-as-you-Build radio courses are available



MULTI-TESTER

(Sensitivity 1,000 ohms per volt)

5-VALVE SUPERHET RECEIVER



RF/AF SIGNAL GENERATOR

Post this Coupon TODAY! for FREE book on careers in Radio, etc., and full details of I.C.S. Courses.

INTERNATIONAL CORRESPONDENCE SCHOOLS

(Dept. 171J), Intertext House, Parkgate Road, London, S.W.11.

Name..... Age.....
(Block Letters please)

Address.....

Occupation..... 2-60

INTERNATIONAL CORRESPONDENCE SCHOOLS

Open to Discussion



The Editor does not necessarily agree with opinions expressed by his correspondents.

Whilst we are always pleased to assist readers with their technical difficulties, we regret that we are unable to supply diagrams or provide instructions for modifying commercial or surplus equipment. We cannot supply alternative details for receivers described in these pages. **WE CANNOT UNDERTAKE TO ANSWER QUERIES OVER THE TELEPHONE.** If a postal reply is required a stamped and addressed envelope must be enclosed with the coupon from page iii of cover.

Admiralty W/T Station

SIR,—My attention has been drawn to a report in PRACTICAL WIRELESS for November, 1959, on the recently inaugurated Admiralty Wireless station at Inskip, near Preston.

The report in your section "Round the World of Wireless" on page 345 is not quite factual. The paragraph states that "the supply and installation of the transmitting equipment for the new Admiralty W/T station at Inskip, near Preston, Lancs, has recently been completed by Marconi's Wireless Telegraph Co. Ltd." Whilst it is true that Marconi was the major contractor and co-ordinated the efforts of the various sub-contractors, it is of interest to note that Standard Telephones and Cables Limited supplied and installed eight short-wave transmitters rated at 40kW peak envelope power and two long wave transmitters rated at 10kW and 5kW respectively. In addition, we supplied several drive units.—J. READ (Publicity Manager, Standard Telephones and Cables Limited).

Variometers

SIR,—Mr. Barringer's letter from Glasgow re variometers is interesting and no doubt he wonders at the small parts now used in radio. I started in 1910 and still potter with radio, though with wavelengths of a few centimetres. The variometer was very efficient and required no tuning condenser across it.

The reason for miniature parts today is the cost of materials and the great drive to make things small and not so bulky. Before the First World War, our tuning coils were wound on cardboard tubes, four and five inches in diameter, dipped in hot candle wax for insulation. One of mine was six feet long.

Wavelengths in those days were two thousand meters, and the stations were Cleethorpes, Nauen in Germany, and the Eiffel Tower, if I remember rightly.

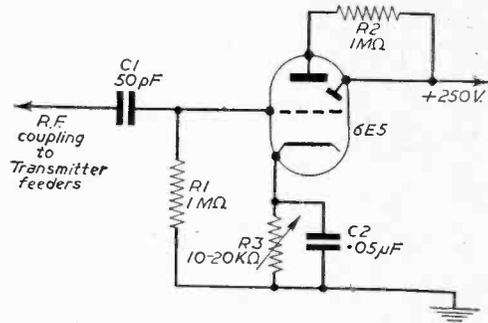
Only spark transmissions were on the air. We made condensers from 2lb. jam jars, lined with tinfoil, inside and out, and we used a moving iron band, like the wire recorder for rectifying signals. Old ignition coils made fine sparks for sending and could be heard all over the world. Crystals with cat's whiskers came in later. Mostly silicon

set in Wood's metal. When valves came in, about 1924, we used to buy variable condensers in parts and build them up to the capacity we wanted. They were large affairs with big dials and even light bulbs to show the readings at night. The only valves at first were Dutch, just a filament, grid and plate, four pin. They cost 5s. each and you had to try out several to find the one best suited to your circuit. Some valves were "soft" and some "hard."

Strict attention was paid to wiring-up sets. Leads were of stiff tinned copper wire. No attention was paid to their length as wavelengths in 1924 were long. Mr. Barringer should try his hand at making a variometer, they are good, cheap to make, require no condenser for tuning.—R. K. LLOYD (Karubue, Central Africa).

Modulation Indicator

SIR,—Below is a circuit for a simple modulation indicator which I have used at my station for several years, and which may be of interest to readers. I have no idea of the origin of this circuit; it was suggested by a friend of mine



Circuit of the indicator.

some years ago, when I contemplated building such a unit. It could be built into the existing rig, or as a separate unit.

The circuit incorporates a 6E5 magic eye, or any other similar tube as the indicator. High tension and heater supplies are obtained from any convenient source.

R.F. coupling is effected by wrapping a length of "hook up" wire several times around the feeders from the transmitter, and connecting to the grid of the 6E5 indicator tube through a 50pF mica condenser. It may be found that enough coupling is obtained by placing this wire near the final tank coil.

The method of adjustment is as follows: apply heater and H.T. voltage to the tube. Adjust R3 until the eye just closes. Now, line up transmitter without modulation applied, and adjust R.F. coupling from transmitter, until eye opens to 45 deg.

If the transmitter is now modulated, the "eye" will close at 80 per cent. modulation. It should be noted that readjustment of the R.F. coupling to the unit will be necessary when changing bands.—D. W. SMITH (Greenock).

Radio Club

SIR,—I am almost seventeen and have just started a Radio Club in the school which I attend. We have a small room at our disposal and £10 in the "kitty." I should like to know how to spend the money and what equipment to buy. I should like also to hear how other small clubs are run.

We have two experienced radio operators running the club and the members' knowledge of radio is not very great. Can anyone tender any advice?—J. M. REES (New House, The School, (Monmouth).

Electronic Organ Data Wanted

SIR,—There are one or two electronic organs on the market with 2ft stops, but which, in fact, do not generate higher than 4ft. I believe this effect is obtained by some form of filter or network, included between the generators and the amplifier. I have been unable to find any circuit or other data on this point, either in any of the many books on the subject, or at the Patent Office, and I wonder whether any readers who are interested in this subject may be able to offer any assistance in obtaining this 2ft effect. I believe in America that there is one instrument which has a 1ft. stop, obtained from a generated 8ft.—R. PENNANT (N.W.).

Transistors v. Valves

SIR,—To those who have experimented with both there can be no doubt as to the advantages of transistors. The real reason why transistors are not becoming popular is because the components required to go with them are not available.

Over 80 per cent. of transistor components available are made to go on the printed circuit board, thus dictating to the constructor what he shall build. Let us have some components with decent terminations and not short spills and then transistors will come into their own.—P. E. ADDIS (Minehead).

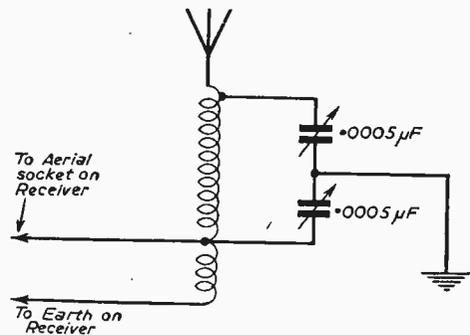
SIR,—I agree most heartily with Mr. B. Wallace. My interest in transistors has nothing whatever to do with matchbox, or portable, radios and lies in quality of reception with the absence of background noise. I disagree entirely with your November editorial. I have no knowledge of radio other than that picked up in relation to transistors during the last four years. I've put together almost as many circuits as those you have published and have damaged possibly six transistors in that time. I have never

yet damaged an OC70 or an OC71 though on one occasion I damaged a pair of OC72's in "push-pull," cost to buy OC70—8s. 6d.; OC72—12s. 6d.—hardly expensive.—B. A. (Birmingham, 13).

[We think that B. A. has been lucky in not damaging more transistors and would remind him that the sum of 8s. 6d. is much more than a great many constructors can afford to pay for a careless mistake.—ED.]

Selectivity

SIR,—In the past issues of PRACTICAL WIRELESS there has been a circuit of a M.W. Signal Booster, notes on medium wave aerials, and notes on improving selectivity by coupling the aerial to the receiver. The best improvement I have found is an aerial tuning unit (see diagram). The main coil is about 25 turns of 26 s.w.g. on 2in.



Circuit of the aerial tuning unit.

former with a link winding of five turns. The condensers are 0.0005 μ F as used in crystal sets, etc. The coil will cover 180-300m but by adding turns in the link winding and the main coil, by switching; there is no reason why stations up to 2,000m could not be covered and by changing condensers and coil again short waves could be covered.—M. REYNOLDS (Nailsea).

Information Required

SIR,—Can any reader supply information on the Bendix receiver BC624 (SCR522). There are a large number of the units available for sale and I should like some help as V.H.F. is rather tricky for a novice.—J. R. HARVEY (108, Fern Lane, Illeston, Middlesex).

Correspondents Wanted

SIR,—I am 14 years old and I am interested in radio construction. I would like to correspond with others of around my age. I have been reading PRACTICAL WIRELESS for over a year now.—J. WILKINSON (12 Church Road, Walkden, Near Manchester, Lancashire).

SIR,—I am 14 years old, and very interested in radio. I would like correspondents of my own age.—J. C. PLUNKETT-COLE (Kennicott House, Ashburton Road, Totnes, S. Devon).

Brand new, individually checked and guaranteed VALVES

AC/DD 2/6	DH76 4/9	EM4 4/-
AC/P 4/6	E1323 25/-	EY91 3/6
AC/PI 2/6	EA50 1/6	EZ40 7/-
AC5FEND 4/-	EAC91 4/6	EZ80 7/6
	EB34 1/6	FW4/500 6/6
AC6/PEND5 4/-	EBC33 6/-	H30 5/-
AC/SP3 4/6	EC52 3/-	H63 3/6
AL60 2/6	EC54 3/6	HP4101 6/-
AR6 2/6	ECC32 4/-	KBC32 5/-
AR8 5/-	ECC81 6/6	KF35 5/-
ARDD5 2/-	ECC82 6/9	KT2 4/-
ARP3 3/-	ECC83 7/-	KT31 8/-
ARP4 3/6	ECC84 7/9	KT33C 7/-
ARP12 2/9	ECC91 4/-	KT44 9/-
ARP24 3/6	ECL80 9/6	KT241 9/-
ARP31 5/6	EF22 7/3	KTW63 6/6
AV4 5/-	EF32 5/-	L30 4/-
SRP34 4/6	EF36 3/6	MH4 3/6
STP4 2/9	EF39 4/6	ML4 4/-
ATP7 5/6	EF50 2/6	ML6 6/-
AUI 5/-	EF52 5/-	MC/PEN 6/-
AVW3 4/6	EF54 3/6	MC/PENB6/-
BL63 6/-	EF55 6/-	MS/PEN/T 6/-
BT45 40/-	EF70 4/-	
BT9D 40/-	EF80 6/9	N34 8/-
D41 3/3	EF85 6/10	NR15A 3/-
D42 4/-	EF89 8/9	MT37 3/-
D77 4/3	EF91 4/10	(4033A) 10/-
DD30 12/6	EF92 5/-	OD3 5/-
DA10 4/6	EL32 3/9	OZ4 5/-
DETS 15/-	EL35 9/-	OZ4A 5/-
DET18 30/-	EL41 8/3	P61 4/6
DET19 2/6	EL84 8/3	PCC84 8/-
DET20 2/6	EL91 7/6	PCC85 8/-

PEN25 4/6	U18 6/-	3E29 (829B) 60/-
PEN46 5/6	U19 7/-	3Q5GT 9/-
PEN65 6/6	U27 8/-	4A1 4/6
PEN141 4/-	UL84 8/6	4D1 2/6
PEN220A 3/-	UU4 4/6	4U4G 5/-
PEN1340 6/-	UY85 7/-	5V4 7/-
PENDD/1360 9/6	V2D33B 8/-	5Y3GT 6/9
PL81 11/-	VR78 4/-	5Z3 8/6
PL82 8/-	VR99 8/-	5Z4G 8/-
PL83 9/-	VR105/30 7/6	6A6 5/-
PLM4DX 3/-	VR150/30 6/6	6AB7 5/-
PT25H 7/6	VR150/30 6/6	6AC7 4/3
PY82 8/-	VS110 4/-	6AG5 4/6
QP21 6/-	VS150/30 6/6	6AG7 8/-
QP25 5/3	VS110 4/-	6AK6 7/6
QS75/20 6/9	VT25 8/6	6AK7 8/-
QS95/10 6/9	VU111 3/-	6AMS 5/-
QS108/45 4/-	VU120 3/3	6AM6 6/3
	VU133A 3/-	6BG4 4/6
	W31 7/-	6B8 5/6
	W42 7/-	6B8B 2/6
	Y63 5/6	6C4 4/-
	Y66 8/-	6C5 6/-
	Z31 6/-	6C6G 4/6
	IA3 3/6	6C8G 5/-
RG3-250 17/6	IA5GT 5/-	6F6 7/-
	IC5GT 7/6	6F8H 6/6
RG4-1250 9/-	IDBGT 6/-	6F12 4/6
	IE7GT 7/6	6G6G 3/-
RK34 2/6	IL4 3/9	6H6M 2/3
RL37 3/6	ILD5 3/6	6H6GT 1/9
SP2 4/-	IR5 6/9	6HA7 4/3
SP4B 7/6	IS5 6/-	6J15 3/6
SP13C 4/6	IT4 4/-	6J6 4/6
SP21 4/-	2A3 8/-	6K6GT 6/6
SP41 2/6	2A6 7/-	6K7G 2/3
SP61 2/6	2C34 2/6	6K7GT 5/3
SU2150A 4/9	2DA4 4/-	6K8G 6/6
	T41 1/9	2X2 4/-
	TP25 15/-	3A4 6/-
	TT11 3/-	3B34 3/-

6L6GA 6/6	15E 8/-	956 2/-
6L34 4/6	15R 7/6	1619 5/-
6N7GT 7/-	30 5/-	954 2/-
6Q7G 6/3	35T 30/-	1625 6/-
6R7G 1/6	35Z3GT 7/-	1626 3/6
6SC7G 5/6	39/44 6/-	1629 4/6
6S3A 3/-	4242A 6/-	7193 1/9
6SG7 5/-	58 6/-	7475 5/-
6SH7 5/-	59 6/-	8010AR 22/6
6S17 6/9	71A 4/6	8013A 10/-
6S7G 6/6	77 6/-	8020 6/-
6SK7 5/6	80 6/3	9001 5/-
6SN7GT 4/6	82 8/6	9003 5/6
6SQ7 6/6	83V 12/-	9004 4/-
6SR7 6/6	84 12/6	9006 4/-
6SS7 5/-	89 6/-	
6V6G 5/6	210LF 3/-	Cathode Ray Tubes
6V6GT 6/-	210VPT 3BP1 25/-	5CPI 42/6
6X5G 6/6	217C 17/6	5F7 45/-
6X5GT 6/6	220VSG 3/-	PG75 15/-
6Y2 2/6	446A 14/-	VCR517 19/-
6B08 5/-	446B 14/-	YCRX258 (with scanning coil) 45/-
6D2 3/-	705A 17/6	5BPI 35/-
6I2A 2/6	715B 97/6	
6I2A7 7/-	717A 8/6	Special Valves
6I2A7T 6/6	801 6/-	2131 45/-
6I2AU7 6/9	803 22/6	3A/1481 45/-
6I2AX7 7/-	805 30/-	31/170/E £35
6I2CB 7/6	807AMER 5/3	31/192/E
6I2E1 22/6	807BR 3/9	£37.10
6I2H6 2/6	813 70/-	723AB 52/6
6I2JSGT 3/6	813 70/-	726N 27/6
6I2SCT 4/6	815 80/-	ACT25 40/-
6I2SG7 6/6	816 30/-	CV691 60/-
6I2SH7 4/9	829A 30/-	WL711C 15/-
6I2S17 6/-	833A £14	WL417A15/-
6I2SK7 5/-	843 7/6	
6I2SL7 7/-	866A 10/-	
6I2SR7 6/-	827A 35/-	
6I2SD7 6/-	930 8/-	

AND MANY OTHERS IN STOCK, INCLUDING CATHODE RAY TUBES AND SPECIAL VALVES. All U.K. Orders extra. Overseas Postage extra at cost.

Brand new original spare parts for AR88 Receivers. Tuning Mechanism (gear), £2/10/-, post free. Please write your other requirements. **Low Resistance Headphones**, brand new, type CLR, 5/-. Balanced Armature, 7/6. P. & P. 1/-. **Microphone Transformers**. Balanced input 30 or 250 ohms. U.S.A. manufacture 7/6. P. & P. 1/6. 813 Ceramic Valveholders, 3/- each. P. & P. 1/6. **Vacuum Condenser** 32,000 V. 50 pF 15/-. Post free. **Modulation Transformers** (U.S.A. Collins), primary imp. 6,000 ohms. C.T., secondary 6,000 ohms, 20 W., 9/6 each. Post free. **Carbon Inset Microphone**, G.P.O. Type 2/6. P. & P. 1/-. **Telescopic Aerial Masts**. 7 sections, total 11 yards. Immediate erection. £4/10/- each or £8 per pair. Post free. **Light Headgear Assembly**. Ideal for mobile use. Headphones 600 ohms carbon microphone, 18/- P. & P. 3/-. **Signal Generator Type TS. 14/AP**. 3,200-3,370 mc/s. Fully guaranteed, £85. **Rotary Transformer**. 171 W 12V input, 1,600 v 100 mA output, 30/- P. & P. 7/6. **R109 Receiver**. Covering 2-8 mc/s v. D.C. New and Tested, £4/5/-. Carriage paid. **R109A Receiver**. Covering 2-12 mc/s v. D.C. New and Tested, £5/5/-. Carriage paid. **Variometers** for W/S No. 19. Fully tested and working, 12/6. P. & P. 2/6. **Block Condensers**. 0.1 mfd. 12,000 v., D.C. test, 12/-; 0.0044 mfd., 20,000 v., D.C. test, 8/-; 0.5 mfd., 8,000 v., D.C. test, 8/-; 7.5 mfd., 400 v., D.C. test, 3/-.

Electrolytic Can Type. 250 mfd., 12 v. D.C. VKG, 2/6; 150 mfd. 25 v. D.C. VKG, 2/6; 8+8 mfd. (block) 450 v. D.C. VKG, 3/6.

**URGENTLY WANTED
SPEECH AMPLIFIERS
BC 614 E or H £17-10-0
or JUNCTION BOXES
J.B.70 £10-0-0**

Filament Transformers. Primary 0.90-210-230-250 v., 50 C. Sec. 1 2.5 v. C.T. at 10 amps.; 2.2.5 v. C.T. at 10 amps.; 3 10.5 v. C.T. at 11 amps., 4,000 v. insulation. Price £2.19.0. P. & P. 5/-. Primary 0.90-210-230-250 v., 50 C. Sec. 1 10 v. C.T. at 4.5 amps.; 2 10 v. C.T. at 4.5 amps., 4,000 v. insulation. £1.16.0. P. & P. 5/-. Primary 230 v. 50/60 c 6.7 v. amps. Sec. 1 6.3 v. 1-6 amps.; 2 6.3 v. C.T. 3 amps.; 3 6.3 v. C.T. 3 amps.; 3 6.3 v. C.T. 3 amps.; 4 6.3 v. C.T. 3 amps. £1.12.0. P. & P. 5/-. **Driver Transformers**. Primary 500 ohms imp. Sec. to match two 805 in push pull. £1.7.6. P. & P. 5/-. **Transformers**. Relay supply. Primary 230 v. Sec. 0.27-28-31 v. at 0.5 amps. 15/- P. & P. 5/-.

**P. C. RADIO LTD.
170 GOLDHAWK RD., W.12
SH Epherds Bush 4946**

I.F. TRANSFORMERS 4-5 mc/s, American Made in black crackle finish housing, 6/-. P. & P. 1/-. **SCR.522. Receivers** (BC624), 100-156 mc/s, including all valves, 25/- P. & P. 5/-. **SCR.522. Transmitter** (BC624) including all valves 22/6. P. & P. 5/-. **Vibrator Unit**. 12 v./160 v. 35 mA/ Exceedingly well filtered and smoothed, excellent for car radios. New including one 6X5G valve and vibrator, 17/6. P. & P. 5/-. **Famous U.S.A. Field Telephones** in canvas or leather case, type EEB, £9 per pair. Post free. **Marconi Signal Generator. TF144G**; 85 kc/s, 25 Mc/s. Made up to new standard, £70, delivered free. **Complete Set of Strong Aerial Rods** (American). Screw-in type MP49, 50. 41, 52, 53, total length 15ft. 10in., top diameter 0.615in., bottom diameter 0.185in., together with matched aerial base. MP37 with ceramic insulator, ideal for car or roof insulation, £2/10/-, post free **AR88D and L.F. Receivers**, completely overhauled and tuned, £60 and £57/10/- respectively. Completely rebuilt with P.V.C. wiring, £85. **HRO Mains power pack**, input 115/250 v. A.C.; output 250 v. .75 mA. and 6.3 v. 3.5 amps. £3, inc. carr. **Non Inductive Carbon Resistance**: 800Ω about 30 watt 1 in. dia. 10in. long, 7/6. P. & P. 1/6. **Avominors**. Leather case. With leads, fully tested and guaranteed. With batteries. A.C./D.C. volt range to 500 v. £4.19.6. As above but to 1,000 volt, D.C. only £3.9..6 P. & P. 2/6 on either.

PERSONAL CALLERS WELCOME

RECEIVERS & COMPONENTS

VALVES, new and used, from 1/6 each, all guaranteed. All types Radio, Television Components. Lists free. **HAMILTON RADIO** 237, Sedlescombe Rd. N., Hastings.

CALLING 9IN. TELEVISION OWNERS.—Brand new factory fresh 9in. Ferranti Tubes originally £14/10/-, will replace Mazda Brimar, G.E.C., etc., £4/10/- each; 6 months' guarantee. **TOMLINS** 127, Brockley Rise, Forest Hill, S.E.23.

SPEAKER REPAIRS, Cones/Fields fitted. Clock Coils Wound. **L.S. REPAIRS**, Pluckley, Ashford, Kent.

RADIO & TELEVISION VALVES, Etc.

2/6 and 10/- each.

Send Stamped Addressed Envelope for Latest Mazel Letter List of Goods for Disposal to

MAZEL RADIO

(Dept. P.W.), 124/136, London Road, Manchester, 1, Lancs.

FIT AND FORGET.—The Ajax T/V Signal Balancer will instantly give you both programmes with identical brilliance. Specially designed for receivers with one aerial socket; fitted in seconds; 10/-, post free. **AJAX ELECTRONIC PRODUCTS**, 85, Felsham Rd., Putney, S.W.15.

TRANSISTORS: OC71/72, 12/6 each; OC44, 15/- each; OC72, matched pairs, 24/-, return of post service. **A. W. WARD**, 142, Raiton Rd., London, S.E.24.

RESISTORS.—100 new wire ended, assorted, all types, 7/6 box, post free. **COOK'S OF BEDFORD**, 29, St. Mary's St., Bedford.

RECLAIMED VALVES, tested and perfect; huge stocks; all one price, 5/-, plus 6d. postage each. Delivery by return. **LEWIS**, 57, Chalford Walk, Woodford Green, Essex.

ANNAKIN

Phonetic Hi-Fi Amplifiers, 10 watts. Selector switch, Bass, Treble, Volume and Contour controls. Inputs, Tape, Radio, Mike. Gram (3 equalisation positions), 3 $\frac{1}{2}$ and 15 ohm outputs. Type 1004. List price 25 gns. Our price 15 gns., post free. A first-class job we can really recommend. **Fane and Wharfedale speakers**. At the usual list prices.

Exide 1 Unspillable Accumulators. 2 v. 11 AH. Lead-acid. New. Ex-Govt. 5/6 ea., post 1/9.

Periscope Prisms (not triangular). As used in Tanks, Viewing space 4in. x 14in. 2 prisms needed for periscope. Only 3/- per pair of prisms, post 1/9.

A.F. Oscillator Transformers. For valve or transistor, 1/- ea., post 9d.

Frost Warning Thermostats. Low voltage type. Contact closes at freezing. 1/6 ea., post 7d.

Thermal Delay Relays. New, 6 v., 2/- ea., post 9d.

Gramophone Amplifiers, 14 watts. Small. Vol. and Tone controls. 230 v. A.C. mains only. Printed circuit. New, 57/- ea., post 2/3.

Motors, Small, 4.6 v. D.C. 1 $\frac{1}{2}$ oz. New, 6/-, post 7d.

Electric Solder Irons, 6 v. 1 oz. New, 10/9 post free.

I.F. Strips No. 476, with 6 valves, 32/6, post 1/9.
Rec. Strips No. 114, with 5 valves, 25/-, post 1/9.
Mainland only. No Export. C.W.O. only. Send stamped addressed envelope for lists. **25, ASHFIELD PLACE, OTLEY, YORKS.**

RATES: 5/6 per line or part thereof, average five words to line, minimum 2 lines. Box No. 1/- extra. Advertisements must be prepaid and addressed to Advertisement Manager, "Practical Wireless", Tower House, Southampton St., Strand, London, W.C.2.

RECEIVERS & COMPONENTS

(Continued)

The Famous Telephone type F in excellent condition. Works up to 3 miles with any twin wire. 60/- each, carr., etc., 10/-.

10 Line UC exchanges for use with any buzzer or magneto calling phones, 25, carr. 4/-.

Sets of 120 new American crystals from 5675 K/c to 8650 K/c in steps of 25 K/c except for 5725 and 5850. Must have cost £300. Offered at 25, plus p. & p. 5/-.

30 watt pressure type loudspeaker units. Unused. £3, plus carr., etc., 5/-.

4 of any of the following valves for 10/-: EB91, EF91, EF92, 6K7, KT6W1, 2105PT, 210VPT, 210DDT, Post 1/-.

PO relays 2,000 ohm coil, 2 make, 1 break. New, 5/-, p. & p. 1/-.

Vibrator Power packs. New, fully smoothed in black crackle case with croc. clips, etc. 6 v. input, output 180 v., 40 m.a. 25/-, p. & p. 3/6.

Brand New Creed Reproforators with tools and instruction book, etc. £9, inc. carr. U.K. Brand New Teleprinter. Page printers in sealed cases £25.

ELECTROSURE

118, FORE STREET, EXETER

Phone: Exeter 56687

TURRET TUNERS, brand new, famous make, 12 channel, coils 1 to 5 and 3/9 fitted, 34/38 mc/s, complete with P.C.F. 90 and P.C.C. 84, circuit diagram included, £1/17/6, p. and p., 3/6; discounts for quantities; cash with order. **SOUTH SUPPLIES (ELECTRICAL) LTD.**, 95, Old Kent Rd., London, S.E.1.

MOTOROLA POLICE CAR TRANSmitters, 30/40 mc/s. F.M. 6v. input, 10 valves, 30 watts. £12/10/- (12/6). **BC-659J TRANSMITTER RECEIVERS**, 6, 12, or 24v. input with separate Power Unit, £13/10/- (15/-). **PLESSEY 6-FT. TRANSMITTER CABINETS**, open front for standard 19" panels, full length rear door with latch, ventilated top and sides, £4/10/- (20/-). **200 BRIDGE TUNERS**, give D.C. output from Radio Receiver for teleprinters, undulators, etc., 230v. input, £12/10/- (15/-). **DA-30 OUTPUT VALVES**, 20/- (1/-). **40 INCH MOBILE WHIP AERIALS**, one piece with loading coil in base effectively increasing length to 12-ft. American super finish, 35/- (5/-). **AMPLIFIERS, AMERICAN**, 40/250 ohms input, 300 v., 2,000 ohms output with 2=12J5, and 2=12A6; 28 v. input with dynamotor, 9" x 5" x 5" 20/- (5/-). **300-FT. BRAIDED COPPER**

Send for 40-page list of over 1,000 different items.

WIRE AERIALS, U.S.A., 4/6 (2/-). **15 IN. HIGH VOLTAGE AERIAL KNIFE SWITCHES**, on 4" stand off insulators on 5" x 2" base SPST, 7/6 (2/6). **NEW AMERICAN TRYLON LATTICE LADDER TOWERS**, 50-ft. high with everything ready to erect. 260 carriage pad, England and Wales. Amounts in brackets are carriage England and Wales.

We have large quantities of "bits and pieces" and can probably help your needs. Please enquire—everyone answered.

P. HARRIS**ORGANFORD DORSET****RECEIVERS & COMPONENTS**

(Continued)

POWER IN PACKETS.—162 x 12 x 3v. HTS (18-set), 10/9; 90 x 14v. HD., 10/9; 90 x 7 $\frac{1}{2}$ v., 5/-; 145v., Kallium type, 7/6; 14v. HD., 1/6 ea., 3 for 4/-, Files, 16/6 doz., assorted from 10in. to 4in. Grindstones cheap; s.a.e. for list. Huge buy of CV1397 (same as VCR97 but slightly longer persistence), now 10/- ea., crated. All prices inc. p. and p. **DIGGINS**, 129-133, Radnor St., Hulme, Manchester, 15.

TRANSISTORS, brand new OC71 9/6 each, V15/10P power type 14/6 each, 7in.—1,800ft. L.P. Tape 29/6, 5 $\frac{1}{2}$ L.P. 23/6. List available. **D. B. CARTER**, Radio, TV and Electrical Supplies and Service, 347, Ladypool Rd., Birmingham, 11. (Phone: SOU 3007.)

"WEYRAD" TRANSISTOR RECEIVER

COMPLETE KIT—LONG & MEDIUM-WAVE PUSH-BUTTON, £9/12/6
CONSTRUCTORS BOOKLET, 2/6
Send S.A.E. for Shopping List.

WESTHAM RADIO SUPPLIES

Rear of 176, Abbotbury Road

WEYMOUTH, DORSET

SAVE ON REPAIRS.—100,000 Salvaged Radio and TV spares, Valves, Tubes for practically any set made since 1936. Prices from: Col. 7/6; F.O.T. 7/6; Osc. Tr. 8/-; Sound, 2/6; Mains, 10/-; E.H.T. Mains, 50/-; Def. Coils, 12/6; Speakers, 5/-; Tubes, Mullard, Mazda, etc., 9-10in., 30/-; 12-14in., £2/19/6; 17in., £3/19/6; all picture tested, fitted free or sent subject to 14 days money-back guarantee; Mullard 6 months' guarantee. Valves: 1,000 types from 1/6; EP91, EB91, 6J5 2/6; EF80, UF42, 10P1, 6P1, 6SN7, 3/6. We can save you pounds! s.a.e. with enquiry or for complete list. **ST. JOHN'S RADIO**, 156, St. John's Hill, S.W.11. (Bat. 9838.)

• KINGSLAND**ELECTRONIC COMPONENTS**

Stupendous Offers

HURRY—A Must—while stocks last: Set of 4 Files with Handles, Set of 13 Drills from 1/16-1/4. Set of 4-piece, 2-way Screwdrivers in Plastic Cases, one Neon Main-taster, 6-piece Saw Set consisting of Hand, Tenon, Keyhole etc., one Junior Hacksaw, Bargain Price 21/-, P.P. 2/6.

FREE! Small Bench Vise OR Ratchet Screwdriver, with bargain pack consisting of: pair throat microphones, 50 assorted resistors, approx. 150 assorted screws, dial pointer, 2ft. 2in. screened lead with sockets, one 5 Henry 200 m.a. choke, two electrolytic condensers, knobs, toggle switches, Octal valve bases, vibrators, M.C. earphones, waveband switch, four Co-Ax. plugs, assorted coils, cartridge tubes, three potentiometers, WW multiplier, 24 assorted condensers, Festoon lamp and holder, coil PVC wiring-up wire.

All this for 35/-, p.p. 4/6.
100 ASSORTED RESISTANCES, including W.W., 10/-, p.p. 1/9.
50 ASSORTED CONDENSERS, 10/-, p.p. 1/9.

15 ASSORTED POTENTIOMETERS, 5/-, p.p. 1/6
Open Saturday until one o'clock. Personal callers welcome.

182, KINGSLAND RD., SHOREDITCH, E.2. Tel.: SHO 6572. Sorry, U.K. only.

RECEIVERS & COMPONENTS
(Continued)

BARGAIN PARCELS. unwanted Components. At least 2 useful valves, pots, res. con., etc. 6/6, or 3 for 15/-; money back guarantee. SMITH, 29, Pickford Rd., Bexleyheath, Kent.

COMPONENTS. Valves, Tubes etc. Write or phone for free list. ARION TELEVISION, 4, Maxted Rd., Peckham, S.E.15. (New X 7152.)

VALVES FOR SALE, all tested on Mullard Valve Tester: 6F12, 6D2, 6F80, 10F1, 6F1, PY82, 20L1, 6V6, 6P25, 6F13, 6F14, 6F15, 20D1, ECC81, ECC82, 5/- each, plus 1/- p. and p. on orders of less than 6. J. R. CALVERLEY & CO., LTD., 130, Water St., Radcliffe, Lancs.

FM-AM STEREO**Radiogram chassis-CB8**

Paired output 6 watts Plain or Stereo Records. A hand-built quality unit with two speakers

ONLY £20.

BEL SOUND PRODUCTS CO.,
Marlborough Yard, London, N.19.
ARC. 5078.

H.M.V. 151N. English Electric 15in. Ultra. etc. Televisions, not working, originally £175 each. £5/10/- TOMLINS, 127, Brockley Rise, Forest Hill, S.E.23.

NEW MINIATURE Printed Resistors, 6d. RAY, 4, Dalton Ave., Whitefield, Manchester.

FOR SALE

SATISFACTION ASSURED.—12in. Televisions £9/10/-, 14in. £16, 17in. £19/10/-. Write for quotation, stating requirements. We guarantee satisfaction. TOMLINS, 127, Brockley Rise, Forest Hill, S.E.23.

12 NEW ELECTROLYTICS. 5/-; 50 Resistors, 5/-; 25 Condensers, 5/-; Metal Rectifiers, 250v. 60mA. 4/6; P.M. Loudspeakers (used). 7/6; Valves from 1/6; Complete Kits. Crystal Set, 7/9; Pocket Transistor Radio, 27/9; Valve Radio, 36/-. All guaranteed. Postage extra. Lists free. HAMILTON RADIO (W), 237, Sedlescombe Rd. N. Hastings.

AMAZING VALUE. Philco Shortwave Car Radio Converters, originally £10; fit to any existing car radio and add six extra wavebands. 16-19-25-31-49 metre bands, also standard broadcast, 6/12 volts; compact under dash counting; chromium control panel with six press-buttons. Complete all fittings and instructions, easily fitted, 45/- post free. Each instrument brand new with Mullard valves. TOMLINS, 127, Brockley Rise, Forest Hill, S.E.23.

CABINETS, EQUIPMENT & SPEAKERS

Write for CATALOGUE.

A. L. STAMFORD
LTD., Dept. L.29,
84 Weymouth Terrace,
London, E.2.



GF57 16 Gnr.

FOR SALE (Continued)

ASTOUNDING VALUE.—9in. Televisions 45/-, 12in. Televisions 70/-, 14in. £9/10/-, 15in. £5/10/-, 17in. £14. Complete but not guaranteed working as received in part exchange. TOMLINS, 127, Brockley Rise, Forest Hill, London, S.E.23. All famous makes available, carriage 7/6.

100 BAYS of brand new adjustable steel Shelving, 72in. high x 34in. wide x 12in. deep; stove enamelled, dark green; sent unassembled; 6-shelf Bay, £3/15/-; sample delivered free; quantity discounts. N. C. BROWN, LTD., Eagle Steelworks, Heywood, Lancs. (Tel.: 69018.)

TELEVISION SETS, 12 inch G.E.C. 5145, Channel 4, £3/5/-; Invicta T112 5 channel, £3/10/-. Not guaranteed, but all complete as received in P.X. Carriage free. WIRELESS RENTALS LTD., 26, Horsemarket, Northampton.

SPECIAL PURCHASE! 1,800ft. Agfa-Wolfen L.P. Tape on 7in. spools, only 32/6; 1,200ft. 7in. Ferrotape, 26/6; p. and p. 1/6. Send for complete list of tape (including American Audio Tape, BASF, etc.) and Tape Recorder bargains. E. C. F. KINGSLEY & CO., 132, Tottenham Court Rd., London, W.1. (EUS 6500.)

WANTED

ALL TYPES of Valves wanted, PL81, ECL80, EY51, U25, PCF80, PZ30, U801 etc., etc., best cash price by return. STAN WILLETTS, 43, Spon Lane, West Bronwich, Staffs. (Tel.: WEST 2392.)

A PROMPT CASH OFFER for your surplus Brand New Valves, Speakers, Components, Test Instruments, etc. R.H.S., 155, Swan Arcade, Bradford, 1.

URGENTLY REQUIRED, new Radio, Television or Industrial Valves. Also old and obsolete types. Cash prices offered for any quantity. Write call or phone: MIT 6202, 201, Streatham Rd., Mitcham, Surrey.

WANTED VALVES

All types for prompt cash. Must be new. State quantity.

WILLIAM CARVIS LTD.
103, North Street, Leeds, 7.

SERVICE SHEETS

FAULTFINDER FILES (TV), showing common faults that each receiver is prone to, and other useful servicing information, 2/- ea. List 9d. plus postage. S. P. DISTRIBUTORS, 11, Old Bond St., London, W.1.

SERVICE SHEETS, Radio, T.V., 5,000 models. Lists 1/- S.A.E. enquiries. TELRAY, 11, Mandland Bk., Preston.

SERVICE SHEETS for sale, all types, from 1/- each. Also Radio, Television Books. Lists free. 100 Television Service Sheets, covering 330 popular models, 18/6. HAMILTON RADIO, 237, Sedlescombe Rd. N. Hastings.

SERVICE SHEETS (Continued)**SERVICE SHEETS****RADIO and Television**

Over 100,000, S.A.E. for List.
Large stock of obsolete Radio and Television Valves.

JOHN GILBERT RADIO,

20, Extension
Shepherd's Bush Market, London, W.12
SHE 3052

SERVICE SHEETS.—Huge stock at 4/- ea. List 1/-. Immediate delivery. GLOBE SUPPLIES, 33, Fairfield Close, Sidcup, Kent.

SERVICE SHEETS.—We have the largest stock of Radio and TV Service Sheets in the country for sale at 4/- ea. Why tolerate delay in obtaining your supplies when we will dispatch by return? Also Manuals for sale and hire. Service sheet list 1/-. Manuals list 9d. S.A.E. please. S.P. DISTRIBUTORS, 11, Old Bond Street, London, W.1.

SERVICE SHEETS (trade type)—TV 4/-, Radio 3/-. List 1/-. All orders dispatched on day received. C.O.D. if desired. Also Manuals for sale and hire. S.A.E. SULTAN RADIO, 6, Mount Ephraim Road, Tunbridge Wells, Kent. (Phone 22710.)

BOOKS & PUBLICATIONS

BOOKS for C. and G. exams: Teles. Principles, A and B, 9/6; Teles. (Principles), 1 and 2, 10/6; Maths for Teles., 1, 7/-; Maths for Teles., 2, 5/-, all post free. RIDDIFFORD, 384, Tilehurst Rd., Reading.

SOUND RECORDING

TAPE/DISC/TAPE transfer. 1,800ft. new L.P. Tape, 32/6. Unimixer Mixing Units for quality. SOUND NEWS, 10, Clifford St., London, W.1.

RADIO

AT LAST VHF/FM/AM for the family man. Astonishing De Luxe VHF/FM Radio offer. Merging of world famous Co., enables us to offer £24 DE LUXE VHF/FM/AM Radios for £15.10.0. Factory Fresh. Maker's Guarantee, extra thrilling quality. All features including Ferrite aerials. Our satisfaction guarantee or purchase price refunded. AC/DC 200/250v. Smaller radio with VHF/FM/AM, £13.10.0 originally £21.

TOMLIN ELECTRICAL,

127, Brockley Rise, London, S.E.23.

BENDIX RECEIVERS.—RA-10, 4-band superhet, 150kc/6-10Mc/s. Valves: 6SK7-RF; 6K8-Mixer, 2-6SK7-IF; 6R7-2nd det.; 6CS-BFO; 6K6-OP; 6K6-diode. Built-in PU 24v. Clean. Size 6in. x 15in. Easily converted to mains as described on p. 453 of Sept., 1957. P.W., £4, p.p. 10/-. American Beacon Tx-Rx RT-37/PPN-2, brand new, composed of Tx-Rx with 9 valves (5-3A5; 3-1S5; 1-R5); built-in 2v. vibrator pack, spare vibrator, headset, connector leads and 10ft. collapsible aerial, instr. book. 214-238Mc/s, £3/15/-, p.p. 7/6. National HEO Crystal Filter Units, 455kc/s with crystal set and phasing controls, new boxed, £4, p.p. 2/-. E.W.S. CO. 69, Church Rd., Moseley, Birmingham, 13.

EDUCATIONAL

★ LEARN ★

RADIO & T/V

SERVICING

for your OWN
BUSINESS/HOBBY

● by a new exciting no-maths system, using practical equipment, recently introduced to this country.

FREE Brochure from :—

RADIOSTRUCTOR

DEPT. G77, 46, MARKET PLACE,
READING, BERKS. 2/60

WIRELESS. See the world as a Radio Officer in the Merchant Navy; short training period; low fees; scholarships, etc., available. Boarding and Day students. Stamp for prospectus. **WIRELESS COLLEGE,** Colwyn Bay.

INCORPORATED Practical Radio Engineers home study courses of radio and TV engineering are recognised by the trade as outstanding and authoritative. Moderate fees to a limited number of students only. Syllabus of Instructional Text is free. The "Practical Radio Engineer" journal, sample copy 2/-. 6,000 Alignment Peaks for Superhets. 5/9. Membership and Entry Conditions booklet. 1/-. all post free from the **SECRETARY, I.P.R.E.,** 20, Fairfield Road, London. N.8.

AT LAST—at a reasonable cost—quality Hi-Fi in your home by building it yourself under our new system. Free brochure from: Dept. 21 P.W., **RADIOSTRUCTOR,** 40, Russell St., Reading, Berks.

LEARN-AS-YOU-BUILD Course in basic radio, electronic and electrical theory with practical training building a 4-valve TRF and 5-valve superhet radio receiver; Signal Generator and High-quality Multi-tester. Write for free book: **INTERNATIONAL CORRESPONDENCE SCHOOLS,** Intertext House, Parkgate Road (Dept. 541), London, S.W.11.

LEARN RADIO AND ELECTRONICS the new practical way! Hosts of absorbing experiments carried out at home under expert guidance to teach you Radio in a new, enjoyable and interesting way. Construction, servicing and fault finding on equipment made easy for the first time! No previous experience needed. No mathematics house. Free brochure from: Dept. 11 P.W., **RADIOSTRUCTOR,** 40, Russell St., Reading, Berks.

SITUATIONS VACANT

SEVERAL YOUNG MEN REQUIRED for Radio Test Dept. A little knowledge of radio essential, but previous laboratory experience unnecessary. 4/6 per hour to start. Would suit enthusiastic amateurs. **OSMOR,** Box No. 23, c/o PRACTICAL WIRELESS.

SITUATIONS VACANT (Continued)

STUDY RADIO, TELEVISION AND ELECTRONICS with the world's largest home study organisation—ICS Courses for the enthusiast and for those seeking examination qualification. **Brit.I.R.E.,** City and Guilds, R.T.E.B., etc. Build your own equipment with Practical Radio Course. Write today for Free book: **INTERNATIONAL CORRESPONDENCE SCHOOLS,** Intertext House, Parkgate Rd. (Dept. 541A), London, S.W.11.

T/V AND RADIO, A.M.Brit.I.R.E., City and Guilds, R.T.E.B. Cert. etc.. on "No pass—no fee" terms. Over 95% successes. For details of Exams and Courses (including practical apparatus) in all branches of Radio, T/V and Electronics, write for 148-page handbook, free. **B.I.E.T.** (Dept. 242G), 29, Wright's Lane, London, W.8.

DENCO (GLACTON) LIMITED require Chargehand skilled in Douglas wavewinding and small component production. Also Young Engineer to assist in design and putting into production coils, components and equipment. Both these appointments present an opportunity of permanent employment in a seaside town.

A.M.I.Mech.E., A.M.Brit.I.R.E., City and Guilds, G.C.E., etc., bring high pay and security. "No pass—no fee" terms. Over 95% successes. For details of exams and courses in all branches of Engineering, Building Electronics, etc., write for 148-page handbook, free. **B.I.E.T.** (Dept. 242B), London, W.8.

TELEVISION ENGINEERS

required for
production fault-finding
testing and repair.

Work is varied and interesting with opportunities for employment on experimental work.

All appointments are to the permanent staff, with Pension Fund and Sports and Social Club.

Exceptional prospects in a large and rapidly expanding organisation.

Apply to :—

BRITISH RELAY WIRELESS LTD.

(Staff Appointments),

1-7, CROFT STREET,
SOUTH BERMONDSEY,
S.E.8.

CITY AND GUILDS (Electrical, etc.) on "No pass—no fee" terms. Over 95% successes. For details of Electrical Engineering, Applied Electronics, Automation, etc., send for our 148-page handbook, free and post free. **B.I.E.T.** (Dept. 242a), 29, Wright's Lane, London, W.8.



The Royal Air Force

PILOTS, NAVIGATORS AND AIR ELECTRONICS OFFICERS COMMISSIONS IN THE GENERAL DUTIES BRANCH

Vacancies now exist for fit young men of character and good education and who are capable of taking responsibility, to train as pilots, navigators or air electronics officers in the general duties branch of the Royal Air Force.

Methods of Entry

University Entry — University graduates may enter on permanent or four-year short-service commissions. Permanent commissions carry an ante-date. University students may be accepted subject to graduation. Upper age limit 26th birthday.

Direct Commissions — The direct commission scheme offers the choice of a permanent career leading to a pension, or a twelve-year commission with the option of leaving after eight years. Age limits : 17½ to 26th birthday.

Short-Service Commissions — The short-service commission is for

five years and there are opportunities for transfer to either form of direct commission. Age limits : 17½ to 21.

Pay and Gratuities — Pay is high and terminal gratuities are generous. For example, a Flight Lieutenant of 25 can earn, with full allowances, nearly £1,700 a year. The tax-free gratuity paid at the end of a twelve-year commission is £4,000.

Write for further details, stating age and education, and the method of entry in which you are interested to the Air Ministry, M.9 (PW562b), *Adastral House, London, W.C.1.*

MISCELLANEOUS

**PROTECT YOUR CAR AT NIGHT
LITON
PHOTOELECTRIC
PARKING LIGHT
SWITCH**

will switch your lights on at dusk—off at dawn, automatically, while you are at work, in bed, or away from home. Controlled by light. Transistorised. Avoid accidents, fines. Save your battery.

**KIT OF PARTS, 5/6
BUILT AND TESTED, 5/6**

Pat. Pending. Send 6d. stamp for pamphlet. "St. John's Radio," 156, St. John's Hill, S.W.11. BATtersea 9838

MAKING YOUR OWN TELESCOPES. Enlargers, Projectors, Viewers, Microscopes, Episcopes, etc., then our booklets "How to Use ExGov. Lenses and Prisms," Nos. 1 and 2 at 2/6 ea. will show you easily and quickly how to achieve the finest possible results at lowest possible cost. The most comprehensive lists of optical and scientific equipment in the British Isles is free for s.a.e. H. W. ENGLISH, Rayleigh Rd., Hutton. Brentwood, Essex.

**A money saving guide—
THE HOME ELECTRICIAN**

by F.J. Camm Covers installation, upkeep, overhaul and repair of all electrical apparatus used in the home, with additional chapters on house-wiring, and is essentially a book for the handyman. 176 pages. 2nd Edition.

12s. 6d. FROM ALL BOOKSELLERS or 13s. 6d. from C. Arthur Pearson Ltd., Southampton Street, W.C.2.

12 v. D.C. MAGNETIC SWITCH. Cuts out on 2 a. overload or dead short. 13/6.

NEW BASS REFLEX 12in. SPEAKER and separate 4" tweeter in floor stand walnut cabinet 22 1/2 x 8 x 13 1/2 in. By prominent manufacturer at less than half price. £6.15/-.

COSSOR 3 watt audio amplifier kit with two speakers. £5.19/6. P. & P. 3/6. List Price £9.15/-.

NEW BOXED COLLARO CONQUEST 4-SPEED AUTOCHANGERS. 200/250 v. A.C. £7.19/6. Carriage 3/6 or B.S.R. ditto £6.19/6. P. & P. 3/6.

OUR FAMOUS TRANSFORMERS. Input 200/250. Output tapped 3 to 30 v. 2 a. or 5. 11. 17 v. 5 a. Each 24/6.

F.W. METAL RECTIFIERS. 12/6 volt. 1 a., 7/6; 3 a., 13/-; 4 a., 17/6; 6 a., 27/6.

TOGGLE SWITCHES DPDT. 3/-.

MICRO SWITCHES. Make & Break. 5/6

MAINS TRANSFORM. & RECTIFIER. Output 12 v. 1 a. D.C. 19/6.

NICKEL NIFE BATTERIES. 1.2 v. 2.5 a. Size 3 x 2 1/2 x 1 1/2 in. 6/- or 3 for 16/-, 4 for 21/-

ARMY MORSE KEYS. 3/-.

LIGHTWEIGHT H.R. PHONES. 17/6.

RELAYS. We hold large stocks. Any contact combination and operating coil voltage supplied from 3/-.

SPECIAL OFFER. 6 v. Relays with 4 make contacts 6/-, 2 for 11/6 or 3 for 16/-.

KEY SWITCHES from 3/-.

H.S. TWIST DRILLS. Set 7. 1/16-1". 4/-.

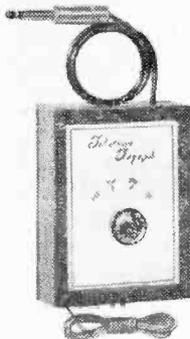
All items new, guaranteed & post free except where stated.

Lists sent on request. Post orders only to

RADIO & ELECTRICAL MART

29 STATION APPROACH, SUDBURY TOWN, WEMBLEY, MIDD.X.

**TELETRON
TAPEJAK**



The first Transistorized Radio Tuner, specially designed for use with Tape Recorders. Converts your Recorder to a high quality Radio receiver. Direct Recording on Tape.

5" x 3 1/2" x 1 1/2".

- ★ High sensitivity.
- ★ Twin Tuned Circuits.
- ★ Pre-setting for M.W. Programmes.
- ★ Fixed Tuned for 1,500 M.
- ★ Switched programme selector.
- ★ Self powered.

Tested and ready for use.
£5.9.0. BATTERY EXTRA.

**THE
TELETRON CO. LTD.,
112B, Station Rd., London, E.4**

'Phone: SIL. 0836.

**FIRST-CLASS
RADIO COURSES ...
GET A CERTIFICATE!**

QUALIFY AT HOME—IN SPARE TIME

After brief, intensely interesting study—undertaken at home in your spare time—YOU can secure your professional qualification. Prepare for YOUR share in the post-war boom in Radio. Let us show you how!

—FREE GUIDE—

The New Free Guide contains 132 pages of information of the greatest importance to those seeking such success-compelling qualifications as A.M.Brit.I.R.E.E., City and Guilds Final Radio, P.M.G. Radio Amateurs, Exams., Gen. Cert. of Educ., London B.Sc. (Eng.), A. M. I. P. E., A.M.I.Mech.E., Draughtsmanship (all branches) etc., together with particulars of our remarkable Guarantee of

SUCCESS OR NO FEE

Write now for your copy of this invaluable publication. It may well prove to be the turning point in your career.

**FOUNDED 1885—OVER
150,000 SUCCESSSES.**
**NATIONAL INSTITUTE OF
ENGINEERING**

(Dept. 461), 148, HOLBORN,
LONDON, E.C.1.

S. Africa: P.O. Box 8417, Jo'burg.
Australia: P.O. Box 4570, Melbourne

EDDY'S (Nottm.) LTD.

172 ALFRETON ROAD, NOTTINGHAM

Surplus New and Guaranteed Valves

1D5	9/6	6V6G	5/9	ECC84	9/-
1L4	3/9	6V6GT	6/6	ECC85	8/6
1S5	6/6	6X4	6/-	ECF80	10/6
1T4	4/9	6X5GT	6/6	ECL82	11/-
354	7/-	7C5	7/6	EF36	2/6
3V4	7/9	7C6	7/6	EF37	4/-
5U4G	5/9	7H7	7/6	EF42	8/6
5Z4G	9/-	7S7	9/6	EF50	1/9
6B8G	2/11	7Y4	7/6	EF80	6/6
6BA6	6/6	10F1	10/-	EF86	11/-
6B16	6/6	12A6	6/6	EF91	4/-
6C4	3/6	25A6G	8/-	EL84	8/3
6J5G	2/6	25Z4G	7/9	EY51	9/6
6J5GT	3/6	35W4	6/9	EY86	9/6
6J5M	4/3	807(B)	3/9	EZ80	6/9
6K7G	2/6	AZ1	12/6	PEN36C	6/6
6K8G	6/6	DAF96	8/3	PL33	9/-
6P28	9/6	DF96	8/3	PL83	8/9
6Q7G	7/6	DK96	8/6	PY31	8/6
6SA7M	6/-	DL96	8/3	PY80	7/-
6S67M	5/-	EB41	7/-	PY82	7/6
6SK7GT	5/-	EB91	4/-	U31	7/9
6SN7GT	4/9	ECC81	6/-	U35	8/6

NIFE ACCUMULATORS. Single Unit Size 3 x 2 1/2 x 1/2 amp. hrs., 1/11. P. 1/6.
ACOS CRYSTAL PICK-UPS. Turnover head (2 sapphire styli), 29/11. Post 2/6.
HEADPHONE CORDS. High Quality, 6ft. length, 1/11 Pair. Post 6d.
SPEAKER GOLD GRILLE. 6 1/2 in. x 4 in., 1/- each. Post 6d.

VIBRATORS. 12 v. 4 pin, 4/11. Post 1/-.
DIMMER SWITCHES. Ideal for train speed regulators, 1/11. Post 9d.

NEON MAINSTESTER/SCREW-DRIVERS; 3/11. Post 9d.

GERMANIUM DIODES; 1/- each, 9/6 Dozen. Post 4d.

RECTIFIERS. RM1, 4/9. RM2, 6/6. RM3, 7/6. RM4, 4/9. RM5, 19/6. Contact cooled 200-60 mA., 7/6. Post 1/-.

INSULATION TAPE. 10 yds. 3/4 in. width, 9d. Post 4d.
JACK PLUGS. Standard Type, 1/11. Post 6d.

CO-AXIAL CABLE. Air spaced, Suitable for T.V. Fringe area V.H.F., etc. 7 1/2 yd. Cut to any length.

CAR RAD'O KITS. 7 transistors Long and Medium. 2 watt output. R.F. stage and automatic gain control. 6 or 12 volts. Complete kit with cabinet. 10 gns. Post 5/-.

LUXEMBOURG EXPANDING AERIALS. Compact and easy to fit. No Technical Knowledge required. Greatly improves reception, 3/11. Post 6d.

CONDENSERS. Tubular wire end (not ex-Govt.). 8 mfd., 450 v., 1/9; 8-8, 450 v., 2/6; 16 mfd., 450 v., 2/9; 16-16, 450 v., 3/9; 16-8 450 v., 4/-; 32 mfd., 450 v., 3/9; 32-32, 350 v., 4/-; P. 1/-.

MORSE TAPPERS. Plated contacts adjustable gaps. Heavy Duty. 3/6. Post 9d.

MINIMOTORS. For model makers. High Speed. 1 1/2 v. to 6 v., 8/6. Post 1/-.

THROAT MIKES; 1/-; Post 6d. Could be used for electrifying musical instruments.

DYNAMOTORS. 200 v. D.C. to 12 v. D.C. Ideal for train sets, etc., 19/11. Post 2/6.

TRANSISTOR SUB-MINIATURE CONDENSERS. 1.6 mfd., 5 mfd., 8 mfd., 10 mfd., 16 mfd., 25 mfd., 32 mfd., 2/3 each. Post 6d.

GRAM AMPLIFIERS. High Sensitivity 3 watts output. Separate volume and tone controls. Printed circuit, 59/11. Post 4/-.

Fully Guaranteed. Size 8 x 2 1/2. Max. height, 5in.

Any parcel insured against damage in transit for only 6d. extra per order.

All uninsured parcels at customers' risk Postage and Packing 6d. per value extra Over £3 free. C.O.D. or C.W.O. only C.O.D. charge 3/- extra. S.A.E. with enquiries.

R.S.C. MANCHESTER BRADFORD & LEEDS

(Leeds) LTD.

Terms C.W.O. or C.O.D. No C.O.D. under £1. Post 1/9 under £2. 2/9 under £5.

EX. GOVT. MAINS TRANSFORMERS
 Primaries 200-250 v. 50 c.p.s. A.C.
 250 v. 60 m.a. 6.3 v. 2 a. 10/11
 275-0-275 v. 190 m.a. 6.3 v. 7 a. 5 v. 3 a. 21/9
 300-0-300 v. 60 m.a. 6.3 v. 2 a. 11/9
 300-0-300 v. 100 m.a. 6.3 v. 2 a. 5 v. 2 a. 18/9
 350-0-350 v. 160 m.a. 6.3 v. 5 a., 5 v. 3 a. 27/9
 450-0-450 v. 250 m.a. 6.3 v. 3 a., 6.3 v. 1 a. 49/9
 5 v. 6 a. 49/9

SELENIUM M F. W. BRIDGE	
6/12 v. 1 a.....	3/11
6/12 v. 2 a.....	6/11
6/12 v. 3 a.....	9/9
6/12 v. 4 a.....	12/3
6/12 v. 6 a.....	15/3
6/12 v. 10 a.....	25/9
6/12 v. 15 a.....	35/9
2 v. 2 a.....	14/9

Mail Orders to 29-31 Moorfield Rd., Leeds, 12.
 Callers to 5 and 7 County (Mecca) Arcade, Briggate, Leeds 1,
 8-10 Brown St. (Market St.), Manchester 2, or 56, Morley
 Street (Next Majestic Ballroom), Bradford.

RECTIFIERS
 H.T. Types H.W.
 150 v. 40 m.a. 3/9
 250 v. 50 m.a. 3/11
 250 v. 80 m.a. 4/11
 250 v. 80 m.a. 5/11
 250 v. 250 m.a. 12/9
CONTACT COOLED
 250 v. 80 m.a. H.W.
 6/11. 250 v. 75 m.a.
 F.W. (Bridge) 8/11.

TELEVISION RECTIFIERS. 250 v.
 200 m.a. small size. Only 6/9 ea.

RE-ENTRANT SPEAKERS. Tannoy.
 8 watt. 7.5 ohms. Only 19/6 each. Or
 35/- per pair.

**ARDENTE DEAF AID EAR-
 PIECES.** Brand new, complete with
 ear insert and lead. Only 15/6 each.

R.S.C. BATTERY CHARGING EQUIPMENT

ASSEMBLED CHARGERS
 6 v. 1 amp. 19/9
 6 v. or 12 v. 1 amp. 29/9
 6 v. 2 amps. 29/9
 6 v. or 12 v. 2 amps. 38/9
 6 v. or 12 v. 3 amps. with am-
 meter 59/9
 Above ready for use. With mains and
 output leads. Carr. 3/6.



**Assembled 6 v.
 or 12 v. 4 amps.**
 Fitted Ammeter and
 variable charge rate
 selector. Also selec-
 tor for plug for 6 v. or
 12 v. charging. Lou-
 vred steel case with
 stoved blue hammer
 finish. Fused 6/9
 and ready for 6/9
 use with Carr. 5/-
 mains and output
 leads. Terms :
 Deposit 13/3 and 5
 monthly payments
 13/3.

**ASSEMBLED
 CHARGER**
 6 v. or 12 v.
 2 amps.
 Fitted Ammeter
 and selector
 plug for 6 v. or
 12 v. Louvred
 metal case, fin-
 ished attractive
 hammer blue.
 Ready for use.
 With mains
 and output
 leads. Double
 Fused.
 Only
 Carr. 3/9. **49/9**

All for A.C. Mains 200-250 v. 50 ccs.
 Guaranteed 12 months.
BATTERY CHARGER KITS
 Consisting of Mains Trans-
 former, F.W. Bridge, Metal
 Rectifier, well ventilated steel
 case, Fuses, Fuse-holders,
 Grommets, panels and circuit.
 Carr. 3/6 extra.
 6 v. or 12 v. 1 amp. 24/9
 As above, with Ammeter... 32/9
 5 v. 2 amps. 35/9
 6 v. or 12 v. 2 amps. 31/6
 6 v. or 12 v. 2 amps. inclu-
 sive of Ammeter. 42/9
 6 v. or 12 v. 4 amps. 53/9
 6 v. or 12 v. 4 amps. with
 Ammeter and variable charge
 rate selector. 59/9
CHARGER AMMETERS.
 0-15 a., 0-3 a., 0-4 a., 0-7 a.,
 0-25 a., 0-80 a., 8/9.

HEAVY DUTY CHARGER KIT.
 6/12 v. 6 amps. variable output.
 Consisting of Mains Transformer
 J-200-230-250 v.; F.W. (Bridge)
 Selenium Rectifier; Ammeter, Multi
 Position Switch with Knob; Panels,
 Plugs, Fuses, Fuseholder, and circuit.
 59/9. Carr. 4/6.

EX-GOVT. CASES. Size 14-10-8 1/2 in. high. Well ventilated,
 black crackle finished, undrilled cover. **IDEAL FOR BAT-
 TERY CHARGER OR INSTRUMENT CASE, OR COVER
 COULD BE USED FOR AMPLIFIER.** Only 9/9, plus 2/9 postage.

2 v. 16 a.h. **EX-GOVT. ACCUMULATORS.** New, boxed.
 Only 5/6 each. 3 for 15/-, post 2/6. 6 for 27/6. carr. 3/6.

D.C. SUPPLY KIT. 12 v. 1 a. consisting of partially drilled
 metal case, mains trans., F.W. Bridge Rectifier, 2 fuseholders
 and fuses. Change Direction switch. Variable Speed regulator and
 circuit. For 200-250 v. A.C. mains. Suitable for Electric Trains,
 etc. Limited number available at 33/9.

STANDARD JACK PLUGS. With 4ft. screened lead, 1/11 ea
 5 CORED CLEF. Rubber insulated. 14/36, 1/3 yd., 50/- 50/yds
TRANSISTORS. Audio Type, 8/6; P.C., 12/6; Power type
 2 watts, V15/10P, 17/9. Mullard CG71, 16/9; CG72, 16/9; XB102,
 XB104, 10/-. Most types at bargain prices. Diodes OAR1, GD3, 3/9.
REPAKO CONSTRUCTIONAL ENVELOPES AND PARTS
 IN STOCK. Parts for 3 Dee 3 Transistor Radio. £3-6-6.
 Mini-Seven 7 Transistor Pocket Portable, 10 Gns.
TURNOVER STEREO MONAURAL PICK-UP HEADS,
 by Acos. Suitable for normal 78, 45, or 33 1/3 r.p.m. records or for stereo
 type. Sapphire Stylus. Will fit Garrard B.S.M., Collaro and Staar
 Galaxy Record Changers. Only 49/9.

**A television course
 for you to study at home**
Entirely new! Practical!
Bang up to date!

THE FAMOUS BENNETT COLLEGE OFFERS YOU THIS

An entirely new course of study based upon up-to-date techniques has now been prepared by The Bennett College. The course is non-mathematical, and contains clear diagrams, starting from the very beginning (even including the basic principles of sound radio receivers, if desired) and covering all that you need to know! This is what you've been looking for! A home-study course includes: production of the signal, scanning and reproduction of picture from signal. Aerials, types and purpose. The cathode-ray tube. Time-base oscillators, and output circuits. Synchronisation. Video frequency amplifiers. The TV tuner, turret, incremental, etc. Television test gear. Television faults. For more details, fill in the coupon below. Your studies cost little, the book you need is included in the cost.

-To THE BENNETT COLLEGE (Dept. 104TV Sheffield)
 Please send me details of the new
 TELEVISION SERVICING COURSE

NAME _____
 ADDRESS _____
 AGE _____

G2AK: This Month's Bargains

VARIABLE CONDENSERS
 All Brass with Ceramic End Plates and Ball Race Bearings.
 50 pf., 5/9; 100 pf., 6/6; 160 pf., 7/6; 250 pf., 8/6 and
 300 pf., 9/6. P. & P. 1/6. Designed for the S.W. constructor.

REPANCO MINIATURE COMPONENTS
 Full Range in Stock.

TRANSMITTER/RECEIVER AN/PPN-2. Frequency
 214/234 Mc/s. Complete in carrying pack, with 9 valves
 (5-3A5, 3-155, 1-1R5).

DUAL VIBRATOR PACKS (2 v.), HS 30 'PHONES and
 ANTENNA, full instruction book, £3.19.6, carr. 7/6.

HEADPHONES H.R. TYPE, 4,000 ohms, very sensitive.
 ONLY 12/6 pr. P. & P. 1/6. C.L.R. Type (low res.), 8/6.
 P. & P. 1/6.

ABSORPTION WAVEMETERS. 3,000 to 35,000 Mc/s in 3
 switched bands, marked on scale. Complete with indicator
 bulb. **A MUST** for any Ham shack. ONLY 17/6, post free.

2 METER 5 ELEMENT BEAM, W.S. Yagi, complete in
 box with 1" 2 1/2" masthead bracket. PRICE 49/-, P. & P. 3/6.

SUPER LOW LOSS AERIAL CABLE, 1/8 yd.
 P. & P. 1/6.

ROTARY CONVERTERS. 6 v. input, 250 v., 125 mA.
 output. ONLY 17/6. P. & P. 3/-.

CHAS. H. YOUNG LTD.
 THE COMPONENT SPECIALISTS
 Dept. "P," 110, Dale End, Birmingham, 4. (CEN 1635)
 (No C.O.D. under £1 please.) (By return Service.)

GENUINE GUARANTEED BRITISH TRANSISTORS

FAMOUS MAKES... LOWEST PRICES EVER
 TRI-L.F. General Purpose 800 kc/c. 4/8.
RED SPOT—L.F./I.F. General Purpose 900 kc/c. 5/-.
WHITE SPOT—R.F. Osc./I.F. 3.4 m/c.s. 6/6.
 Green/Yellow.—Audio/Output 125 mW. 7/6.
 T83.—Special Offer, a few only. 12/6.
EDISWAN—XA104, 18/-; XB102, 10/-; XB104, 10/-; XA103, 15/-
EDISWAN—Set of Seven Transistors. XA102, two XA101, XB102, XB103, two XC101. ONLY 60/6 per set.
MULLARD—OC16, 54/-; OC44, 26/-; OC45, 23/-; OC65, 22/6; OC86, 25/-; OC70, 14/-; OCT1, 14/-; OCT2, 17/-; 2 OC72 (Matched Pair), 34/-; OC170 (70 m/c.s.), 50/-; OC171, 50/-
ANY TYPE OF TRANSISTOR CAN BE SUPPLIED.

TRANSISTOR HOLDERS, 1/3. ARDENTE sub-miniature, 1/9. CRYSTAL DIODES, 1/-. GEX34, 4/-; Mullard OAB1, 4/-; OAT0, 4/-; FERITE ROD, 1/6. 2/6; 8" x 1/4" 2/8; 3" x 5/16" 1/6. **COILS**—Repanco DRR2, 4/-; DRX1, 2/6; Teletron HAX, 3/- . All complete with circuits.
TUNING CONDENSERS—Solid, dielectric, 500 pF (0005 mfd.), 4/-; 300 pF, 3/9; 100 pF, 3/- . **MINIATURE** 500 pF, 5/- .
TRANSISTOR CIRCUITS—MINI 1/3; Mini 7, 1/6; Major 7, 1/6; MAXI "Q" 8/-; Teletron Transdyne, 11d. (Full Kit, £11/7/6); Three Dee, 11d. (Full Kit, 67/6).
BEGINNERS 1 VALVE—Circuit and plans. 11d. Kit, 37/6.
RESISTORS—All values 10% ± w. 6d.; 1 watt, 9d.
HI-STAB RESISTORS—Special offer 100K 5% ± w, 9d.
CONDENSERS—Miniature, .001 mfd., .002 mfd./100 v. 8d.; .01/100 v. 10d.; 1 mfd./100 v. 1/2; .005/200 v. 10d.; Standard size, .01/100 v. 9d.; 1/350 v. 9d.; 1/500 v. 10d.; 5/350 v. 1/10.
ELECTROLYTICS—Can Type 32-32/450 v. 6/6; 100-200/275 v. 8/9; 60-250/275 v. 8/9; 64-120/350 v. 9/6; 60-100/275 v. 7/-; 24-24/350 v. 4/6; 100-100/200/275 v. 13/-; 60-50-50/350 v. 9/10; Wire ended, 16 mfd./450 v. 2/4; 16-16/450 v. 4/-; 8-8/450 v. 2/9; 8-16/450 v. 2/9; 50 mfd./50 v. 1/6; 25 mfd./25 v. 1/9; 100 mfd/6 v. 2/3.
Miniature, 25 mfd., 2/6; 50 mfd., 2/8; 8 mfd., 2/9; 2 mfd., 2/6
SUB-MINIATURE, 32 mfd., 2 mfd., 16 mfd., 8 mfd., 4 mfd., 2 mfd. All 3/6; 100 mfd., 2/9; 1 mfd., TCC, 4/-.

TERMS: Cash with Order (or C.O.D. on orders over £2). **ALL OUR PRICES ARE POST PAID.**

OAKFIELD RADIO
 THE TRANSISTOR PEOPLE
 Mail Order Only
 44 Oakfield Road,
 Stockport, Cheshire.

YOU CAN SAVE 1/- in every £1 Send 1/6 for our 56-page Catalogue and receive your order number for the Amazing Credit Coupon Scheme. Free Lists. Bargain Offers. Latest News, etc., etc. **ORDER NOW. Don't Delay.**

EXPRESS ELECTRONICS

ROSEDALE LABORATORIES
 KINGSWOOD WAY, SELSDON, SURREY
VALVES NEW, TESTED AND GUARANTEED
 REDUCED PRICES

1C1	7/6	6BR7	10/6	12Q7GT	7/6	EB91	5/6	N17	7/6
1C3	8/-	6BW6	7/6	16A5	9/-	EB41	10/6	N18	8/-
1F1	8/-	6BW7	7/-	25A60	10/6	EBF80	8/6	N19	7/6
1F3	7/6	6C10	9/-	35L6GT	9/-	EC81	7/6	PC84	9/-
1FD1	8/-	6D9	5/6	25Z4	9/-	ECC82	7/6	PCF80	9/-
1PD9	7/6	6F12	4/6	30C4	8/-	ECC83	7/6	PCL82	10/6
1L4	6/9	6J7GT	8/6	30L1	8/-	ECC84	9/6	PL38	22/6
1L1	8/-	6K7G	5/6	35L6GT	9/-	ECF80	10/6	PL81	12/-
1P10	7/6	6K8Q	7/6	35V4	8/6	ECP82	10/6	PL82	9/-
1P11	7/6	6L3	10/6	35Z4GT	9/-	ECH42	9/-	PY81	8/6
1R3	7/6	6Q7G	7/6	58KU	11/6	ECH81	10/-	PY82	7/6
1R5	7/6	68L7GT	7/6	5783	10/6	ECL80	10/6	U82	7/6
1T4	7/6	68N7GT	5/6	DAF91	7/6	EF31	9/-	U76	7/6
1U5	8/-	6V6G	7/6	DAP96	8/-	EF80	8/6	U78	7/6
3A5	10/6	6X4	7/6	DR91	7/6	EF86	11/-	U78	7/6
3Q4	8/-	6X8GT	6/-	DP96	8/-	EF91	4/6	UBC41	8/6
384	7/6	8D3	4/6	D176	7/6	EF92	5/6	UCH42	9/6
3V4	7/6	12AB8	10/6	DI77	7/-	EL38	22/6	UF41	8/6
504G	7/6	12AX7	8/6	DH142	8/6	EL41	9/6	UL41	8/6
5Y9GT	7/6	12AT7	7/6	DH150	10/-	EI84	8/6	UY41	7/6
5Z4G	9/6	12AU7	7/6	DK91	7/6	EY41	10/6	W76	6/6
6AK6	6/6	12AX7	7/6	DK92	9/-	EZ40	7/6	W142	8/6
6AL5	5/6	12BH7	14/6	DR96	8/-	EZ80	7/-	X17	7/6
6AM6	4/6	12J7GT	10/-	DL92	7/6	EZ81	8/-	X142	9/6
6AT6	7/6	12K7GT	8/9	DL94	7/6	EZ82	8/-	X180	9/6
6BA8	7/-	12K8GT	9/6	DL96	8/-	KT33C	9/6	Z77	4/6
6BE6	7/-		12/6	EABC80	8/6	KT66	11/6	ZD17	7/6

VOLUME CONTROLS MIDGET SIZE LONG SPINDLES D.P. switch, 3/9; S.P., 3/3; Less switch, 2/6. Values 10K to 2M. Pre set 2/6.

MATCHED PAIRS

EL84 21/-, 6V6G 17/-, KT66 27/6, 6BW6 18/- per pair. Push Pull O.P. Transformers for above 3-15Ω 14/6, 12" P.M. Speakers 3/11 24/6.

SETS OF VALVES

DK91, 1F91, DAF91, DL92 or DL94	23/6
DK96, 1F96, DAF96, DL96	22/-
1C3, 1F1, 1FD, 1P1	32/-
1R3, 1T4, 1S5, 384, or 3V4	23/6
6K8, 6K7, 6Q7, 6V6, 5Z4G or 6X5G	27/6

Postage and packing 6d. Over £1 post free. C.O.D. 2/6.

Visit the City's popular acoustically designed

HI-FI Centre

COME AND HEAR THE LEADING MAKES IN AMPLIFIERS AND TUNERS

AMPLIFIERS BY	V.H.F. TUNERS	HI-FI SPEAKERS
VERDIK	BY	BY
ARMSTRONG	ARMSTRONG	GOODMANS
ROGERS	LEAK	PLESSEY
DULCI	QUAD	WHARFDALE
GOODSELL	T.S.L.	W.B.
QUAD	DULCI	T.S.L.
LEAK	GOODSELL	G.E.C.
W.B., etc.	ROGERS, etc.	LORENZ, etc.

Another amazing scoop for the Hi-Fi enthusiast

Huge purchase of RCA equipment at enormous reductions

(1) The New RCA Orthophonic Amplifier

12-20 watt output; frequency response — within 0.2 DB
 20/25,000 CPS, within 0.5 DB
 10/60,000 CPS; noise level — 85 DB below rated output; distortion — total harmonic less than .01% at 10 watts; valve line up — two EF86, two KT66, GZ32; dimensions — 16½" x 8" x 7½"; weight 32 lb.
Pre-Amp. Input Mic., radio/tape high and low level, crystal p/up and magnetic p/up.
Output Tape and record, bass and treble, mixing facilities low and high pass filter, valve line up — one EF86, two ECC81. Dimensions: — 12½" x 6½" x 3½".
THE COMPLETE EQUIPMENT AT 29 gns. Carriage extra 15/-.



(2) RCA F.M. Tuner

Will match with the above amplifier or any other amplifier with radio input. Tuning range 87.5—108 m/c.s. The new RCA electronic ray tuning indicator is used. A.F.C., delayed AGC, power required 230-390 v. D.C. at 40 mA. H.T. 6.3 v at 2.25 amps. Valve line-up: EF95, EF91, ECC81, three 6AU6, EB91, 6AL7. Attractive finish. Dimensions: — 12½" x 6½" x 3½". **OUR PRICE £18.19.6** Post and pkg. 5/-.

(3) RCA Panoramic Multiple Speaker System

Beautifully made in walnut finish, using one 15" Hi-Fi speaker. Response down to 25 c/s, 2-2½" m/c oil tweeters. Response up to 20,000 c/s., crossover at 2,000 c/s. Cabinet ported bass reflex and acoustically damped. 25 watt rating. FEW ONLY — £35. The Famous RCA Moving Coil Pick-up with turnover cartridge for L.P.'s and standard records, weight adjustment. **ONLY £7.10.0** post & pkg. 2/6.

In addition to the above snips we can also offer a limited number of RCA 10 watt p./pull amplifiers, ideal for good quality reproducer. Bass, treble and balanced loudness feature.

AT THE VERY LOW PRICE OF £7.19.6. Post & pkg. 4/6. Also the Junior RCA 8 w. p./pull amplifier with frequency range 40-20,000 c/c. at £6.19.6. Post & pkg. 4/6.

Electronics (FLEET ST.) Ltd

Dept. B.

152/3 Fleet St., London, E.C.4. Tel. FLE 2833
 Business Hours: Weekdays, 9-6. Saturdays, 9-1.

GOVERNMENT SURPLUS AND MANUFACTURERS CLEARANCE

METERS. 500-0-500 Microamp. 3 1/2 in. dia. 37/6 ea. Dual Range 0-5 v. 0-100 v. FSD 1 m.a. 20/- ea.; 50-0-50 Microamp., 2 1/2 in., 30/-
I.T.A. AERIALS. New 3 element 22/6, 5 element 27/6.
CO-AX CABLE. 6d. per Air Sp. Aerial 9d. **DIPLEXERS 12/-**
GERMANIUM DIODES 1/-. 10-doz. **TRANSISTORS** from 5/-
VOLUME CONTROLS. Long Spindle Midget. 10,000 ohms-2 meg. Less Switch. 3/- D.P. switch 4/6
CONDENSERS. Twin Gang .0005 Standard 5/6. Midget 6/6
VENNER-SYN. METERS. 200/250 v. with gear train driving. 5 dials. 1/10-1,000 hrs. 25/- ea.
SEL. RECS. 12 v. 1 amp. 5/- 2 amp. 11/6. 4 amp. 15/- 500 v. 1 amp. containing 30/35 mm. discs. 10/- ea.
12 WAY P.V.C. CABLE. Screened & P.V.C. covered. 2/6 yd.
ELECTROLYTICS. Canned. 20+20 mid. 450 v., 2/6 ea. 25/- doz.
VAR. SLIDERS. 10 ohm 30 w. for chargers. 3 dials. 3/- ea.
FERRITE Rod Aerials. Med. & Long Wave. 10/- ea.
CONNECTING WIRE. P.V.C. 100 ft. 2/6. various colours.
RELAYS. Large stocks, assorted sizes, from 2/6 ea.
VENNER SILVER-ZINC ACCUMULATORS. H.105. New. 15/-
SALVAGING. 2 1/2 in. 3d. 3d. 2/6 doz.
P.P. OUTPUT TRANSFORMERS. For EL84, 3 ohm. 8/6.

VALVES TESTED ON MULLARDS ELECTRONIC TESTER

1L4	5/-	6D2	6/-	6X4	7/-	EAG5	1/6	EY51	5/-
1T4	6/6	6F1	7/6	6X5	7/-	EABCO	0	EY31	4/-
1U4	6/-	6F6	7/6	8D2	4/6			P61	4/-
3A1	6/-	6F13	7/6	9D2	5/-	EB41	7/6	PEN45	7/6
5Z1	9/-	6J5	6/-	10F1	7/6	EB91	5/6	PEN46	7/-
4I1	4/-	6J6	6/-	12A6	7/6	ECH42	8/-	SP41	4/-
6AG5	5/-	6J7	6/-	12AH8	9/-	EC140	9/-	SP61	4/-
6AL5	5/-	6K7	4/6	12A17	6/-	EF36	5/-	VR150/30	3/-
6AM5	5/-	6L6	6/6	12A17	7/-	EF37	9/-	ULR4	9/-
6AM6	6/-	6S A7	6/-	12AX7	7/-	EF39	5/6	VCR97	15/-
6AQ5	6/-	6S C7	4/6	12BH7	10/-	EF50	3/6	VCR138A	25/-
6AU6	7/-	6S J7	5/-	12SH7	6/-	EF59	5/-	VCR139A	25/-
6HA6	8/-	6SK7	5/-	12SJ7	10/-	EF80	8/-		
6BE6	5/6	6SL7	6/-	12SK7	5/-	EF91	6/-		
6BH6	5/-	6SN7	7/-	15D2	6/-	EF92	7/-		
6HW6	6/6	6U5	8/6	90C5	10/-	EL32	5/-		
6C4	5/-	6V6	6/6	90T	6/-	EL31	5/6		

SECONDHAND VALVES. YOUR CHOICE. £1.0.0 for EIGHT.
 ECL80, 6C4, 6AM6, 6AG6, 6J6, EF50, 6BE6, 3A1, EF90, SP61, P61, 6J5, PY80, PY82, 277, 6AL5, 6K7, 6S J7, EL32, EF42, 6D2, 20P1, 6F13, SP41, EY51, EB91, EF91, EF39, EF36, PEN45, PEN46.

HUGGETT'S LIMITED
 2-4 PAWSONS ROAD, WEST CROYDON

REPANCO HIGH GAIN COILS

Dual Range Crystal Set Coil, Type DRX1	2/6
Dual Range Coil with Reaction, Type DRR2	4/-
Matched Pair Dual Range T.R.F. Coils, Type DRM3, pair	8/-
Pair Dual Range Superhet Coils, Type SH4, pair	8/-

Miniature Iron Dust Cored Coils, Type "R" —

Range	Aerial	H.F.	Osc.	
800-2,000m.	RA1	RHF1	RO1	
190-550m.	RA2	RHF2	RO2	each..... 3/3
70-230m.	RA3	RHF3	RO3	
15-50m.	RA4	RHF4	RO4	

Ferrite Rod Aerial, Dual Range Type FR1..... 12/6
 Miniature I.F. Transformers, Type MSE (465 Kc/8), pair..... 12/6
 Standard I.F. Transformers, Type TCG (465 Kc/8), pair..... 13/6

Send S.A.E. for latest Repanco Component Catalogue.

RADIO EXPERIMENTAL PRODUCTS LTD.

33 Much Park St., COVENTRY. Tel.: 62572

The book for the serious model-maker RADIO-CONTROLLED MODELS

by F. J. Camm The remote control by radio of models—whether aeroplanes, boats, locomotives, tanks or steam rollers—as well as stationary models—is an important post-war development with a keen, wide-world following of hundreds of thousands of enthusiasts. This practical book is the result of the author's numerous experiments and long research on the subject and includes information already published in the nationally read "Practical Mechanics" plus additional material. Contents include steering control gear; receivers; transmitters; control box; tuned reeds; model actuators; tuning transmitting aerials; details for model battleship and aircraft, etc. Fully illustrated with circuit details, diagrams and photographs, etc.

12s. 6d. FROM ALL BOOKSELLERS... or in case of difficulty 13s. 6d. by post from C. ARTHUR PEARSON LTD. Tower House, Southampton Street, London, W.C.2.

LYONS RADIO LTD.

Dept. M.P., 3, GOLDHAWK ROAD, SHEPHERD'S BUSH, LONDON, W.12

Telephone: SHEpherd's Bush 1729

TRANSFORMER BARGAINS. Type ZA. Pri. 230 v. 50 cps. Sec. 350-0-350 v. at 225 mA. 250-0-250 v. at 75 mA. 6.3 v. at 5 A. 2 x 5 v. at 3 A. Ex. Govt. as new. PRICE ONLY 32/6, post 4/-
 Type 181. Pri. 180-230 v. 50 cps. Sec. 4.2 v. twice at 10 A. Ex-Govt. as new. PRICE ONLY 17/6, post 3/6
 Type MT3. Pri. 200/250 v. 50 cps. Sec. 30 v. at 2 A. tapped 3, 4, 5, 6, 8, 9, 10, 12, 15, 18, 20 and 24 v. All connections clearly marked. Brand new. PRICE ONLY 22/6, post 2/-

ACCUMULATORS. 6 v. 85 A. H. in metal cases 11 1/2 x 9 1/2 x 7 in. Ex-Govt. as new and unused. PRICE ONLY 45/-, carriage 7/6.

METAL RECTIFIERS. Selenium full-wave bridge type, 12 v. 1 A. PRICE ONLY 4/3, post 1/-

TRANSFORMERS. Pri. 200/250 v. Sec. tapped 3.5 v., 9 v. and 17 v. for providing when used with rectifier 2, 6 or 12 v. D.C. respectively. PRICE ONLY 10/6, post 1/6. BOTH ITEMS together 15/6 post paid. Wiring diagrams included.

RECEIVERS TYPE R1155A. Complete with valves, in good condition but untested. PRICE ONLY £4.15.6. Also a few available in good condition less outer case, valves and possibly a few parts, would provide a good source for Spares. PRICE ONLY 30/-, carriage either 8/6.

5 WAY CABLE. Each conductor 9/012 tinned copper, rubber insulated and colour coded with synthetic outer insulation. Outside dia. 1/4 in. Ex-Govt. origin. PRICE ONLY 35/- for 100 yards. 20/- for 50 yards. 12/6 for 25 yds.

PADGETTS RADIO STORE

40, MEADOW LANE, LEEDS, 11

Indicator Units.—Type 168A or Type 116. Complete with tube and all Valves. EF36s, etc. Good condition, 25/- Carr. 7/6.

1154 Transmitters.—Model M. Four wave band. Good condition, complete with Valves, Meters, etc. 16/- Carr. 12/6.

Tube Unit BC929H.—Complete with 3BP1 tube (guaranteed tube), less Valves, switch Motor and Transformer. 18/- Carr. 8/-. Condition of case. Store sold. Spare tube, 10/-

U.S.A. Receiver Type 1585.—11 Valves. 6 9001, 1 12A6, 3 GAK5, 6 Superhet Pre-set Positions on Medium Wave. 1 T.R.F. Band 234-258 Megs. A Car Radio all but made. Complete all for 18/- Post 3/6.

Special Offer of Reconditioned Ultra T.V. Sets, Model 815.—14in. T.V. for all B.B.C. and I.T.V. Stations. Perfect results and sold with a Money Back Guarantee. For £12 only. Tube sent in separate carton. Carriage per B.R.S., 17/-

Receiver Type 3645.—The cleaned-up 3645, complete with 7 VR65, 1 VR91 Valves, with valves, 12/- Less Valves, 6/- Carriage per B.R.S. 7/6.

Rush T.V. 24C. 12in. T.V. B.B.C. and I.T.V. Perfect Pictures. £9. Carriage 17/-

Bush, Pye, Ultra. 12in. B.B.C. only. Perfect Pictures. £6. Carriage 17/-

Twelve Inch T.V. Chassis. Complete with L.O.T., Focus Coils, etc. Less valves. 15/-
 Pye, Ultra, Plessey, Banner, Ekco, Marconi, etc. Carriage per B.R.S. 5/- Chassis less L.O.T. and Focus Coils for 5/- Carriage 4/-

Sneakers from T.V. Sets. All Perfect. 7 x 4. 10/-; 8in. 6/6; 6in. 6/6. Post 2/6. Send 3d. Stamp for Bargain List of Valves and Small Components.

HIGH GAIN TRANSISTORS

BRAND NEW AND GUARANTEED
 Red/Yell. (6 mc/s), 8/6. White Spt. (4 mc/s), 7/6. Yell./Grn., 6/6 (Matched pr. 250 mW), 13/6. Red Spt., 6/6.

MINIATURE AMPLIFIER

3-stage 4 TRANSISTORS, p.p. output, 250 mW, for 2-3 ohm speaker. Ideal for Gram., Radio, etc. High gain. Excellent quality, uses small 6 v. batt. Easy assembly. Full kit, matched Ediswan Transistors, complete instructions. Brand New Components, 59/6, p. & p. 1/6. Circuit diagram assembly details, 2/6.

SUB-MIN. ELECTROLYTICS. 2, 4, 8, 25, 50, 100 mid., 15 v.w., 2/9.

MIDGET RESISTORS. 1 1/2 wt. Approved valves, 3d.

MIDGET VOL. CONTROLS. Standard valves, 2/10 or with S.P. switch, 4/-

MIDGET ACCUMULATORS. About 1 1/2 in. x 1 in. x 1/2 in., 2 v., 27 amp./hrs. Ideal for radio, models, etc. 3/-

PLASTIC BOXES with hinged lids: 4 1/2 in. x 3 in. x 1 1/2 in., 2/6, p.p. 1/-; 5 1/2 in. x 3 1/2 in. x 1 1/2 in., 3/3, p.p. 1/-; 7 1/2 in. x 3 1/2 in. x 1 1/2 in., 4/9, p.p. 1/3.

PERSPEX. 6in. x 3in. x 1/2 in. Ivory. 1/-, p.p. 6d.

HEADPHONES. H/R, 17/6 pair.

Please include sufficient postage when ordering. Send 3d. stamp for list of New Components.

BURLAND RADIO ACCESSORIES
 G31RE Est. 1947 G31Z
 ANN'S PLACE, SOUTHWICK, SUSSEX

THE LINEAR LI/10

A 10-WATT HIGH FIDELITY ULTRA LINEAR AMPLIFIER WITH INTEGRAL PRE-AMP

Full advantage has been taken of latest component miniaturisation developments to produce a 10-watt Hi-Fi push-pull amplifier incorporating tone control pre-amplifier stages within the measurements of 9 x 7 x 5 ins.

In addition two high impedance input sockets are provided for microphone and gram., etc. With selector switch and vol. control, five B.V.A. valves are employed ECC83, ECC83, EL84, EL84, EZ81. H.T. and L.T. power supply point is included for a radio tuner.

FREQUENCY RESPONSE
± 1 d.b., 30-20,000 c.p.s.

MAXIMUM POWER OUTPUT
In excess of 14 watts.

SENSITIVITY
L.P. 220 m.v. for 10 watts. 78 r.p.m. 220 m.v. for 10 watts. Radio/Microphone 40 m.v. for 10 watts.

TREBLE LIFT CONTROL
+ 10 d.b. to -22 d.b. at 12,000 c.p.s.

BASS CONTROL
+ 14 d.b. to -10 d.b. at 50 c.p.s.

HUM LEVEL
Referred to maximum output and including integral pre-amp. -70 d.b.

NEGATIVE FEEDBACK
21 d.b. in main loop



HARMONIC DISTORTION Less than 0.1% measured at 8 watts at 1000 c.p.s. Weight 10 lbs. Power consumption 90 Watts. For 200-230-250 v. 50 c.p.s. A.C. mains. Outputs for 3- and 15-ohm speakers. Chassis finish stoved Gold hammer.

HIGHEST QUALITY! Retail price

MAXIMUM RELIABILITY!
AT A PRICE YOU CAN AFFORD. 13 GNS.

Send S.A.E. for descriptive literature.

TRADE ENQUIRIES to

Also Available—THE L45. A compact High Quality 4-5 watt amplifier. Size approx. 7.5-5 1/2 in. high. Sensitivity is 28 millivolts so that the input socket can be used for either microphone or gram., tape, radio tuner, etc. B.V.A. valves used are ECC83, EL84, EZ80. Controls are: Vol. Treble and Bass with mains switch. The Tone controls provide full compensation for long playing records. Output matching for 3 ohm loudspeaker. Retail price £5/19/6.

THE LT45 TAPE DECK AMPLIFIER. A complete unit (power pack and oscillator incorporated) ready for connection to A.C. mains. 3 ohm loudspeaker and practically any make of deck. Negative feedback equalization adjustment by multi-position switch for 3 1/2, 7 1/2 and 15in. per set. Retail price 12 gns.

DIATONIC 10-14 WATT. High Fidelity amplifier with integral pre-amplifier. Retail 12 gns.

CONCHORD 30 WATT. Hi-Fi amplifier with two separately controlled inputs. Retail 15 gns.

L3/3 STEREPHONIC AMPLIFIER. Sensitivity 150 m.v. Output 3 watts on each channel. Retail 7 gns.

L5/5 STEREO AMPLIFIER. 5 + 5 watt. 11 gns.

LINEAR PRODUCTS LTD. ELECTRON WORKS, ARMLEY, LEEDS.

BENSON'S BETTER BARGAINS

MONITOR 58, with Indicator 248 and Power Unit 675. Values: VCR138a, 3/EF50, 2/EC433, 3/EP55, 4/FA7A, 6/V6, 3/EA50 and 3/BU4G, VU120A. 200v. A.C. input. Each unit 12x9x18in., black finish. Panel controls: Brill, Focus, TB expansion. "Y" shift, "X" shift (2); TB 10-20,000 sees. A.C./D.C. switch, "Y" amp. multiplier/divider; sig. input, frigg, and "Y" input. Voltmeter C.Z. 5/20/100 v. "X", "Y" and "G" on "jumpers" at rear. Mains and 18-way cable inc. cathode probe unit, 17/8 extra. £8.10.0 (Retail 20/-).

RELAYS, two heavy makes: 13 v. or 24 v. either 3/8; 6 v. 2 breaks, 1/8; 2 makes, 2/8; TX 1154 multi c/o, heavy contacts, 5/8; DYNAMOTORS: D.G. 6 v. to 250 v., 60 mA., 11/8; 12 v. to 250 v., 65 mA. and 6.3 v. 2.5 A., 11/6 (post 3/6); miniature 11 v. to 310/360 v., 60/30 mA. 10/8. INDICATORS, type 277, with Lin. C.R.T., 4/VR91, 2/VR92, 37/6 (p.p. 3/6). Type 101, with VCR330 (6 pin. Blue, magnetic, Octal base), and 2/EB91, 2/EF91, 2/R10 (new cond., 30/- (post 3/6)). Type 1, with VCR243, 2/EP52, 5/430, 10/V6, 1/EY81, 2/EB91, 3/EP52; with RF EHT Generator and 25 kV. xtal, 45/- (Retail 7/6). CR100 Noise limiter assemblies, with valve, 3/6. VIBRATORS, Maltroy G634C 12 v. 4-pin, 7/6. 6 v. 5 pin (534C), reversible, 7/6. R1155B, good condition, tested, with handbook, £7.10.0 (Retail 10/-). DRIVES: slow-motion Admiralty 200; 1 radio, scaled 0-100, 5/6. R1155 S.M. "N" type, new, 10/6. Potentiometers, miniature wirewound, 6Ω, 100 Ω, 600 Ω, 1k or 2k, ea. 1/-.

CHOKES LF 10H 200 mA., 8/8; Potted 10H 100 mA., 7/8; "C" 5H 400 mA., 10/6. Mic. Inserts, 4-1-0, carbon, 2/6. Bat. armature type, 2/8. TX. VAR. CONDENSERS, 2kV, test; 50 or 100 pf., each, 7/6. Power Unit: Input 115/250. Outputs 330 v. 100 mA., D.C., smoothed and 6.3 v. A.C. twice. 3Z40 rectifier; potted LFC and trans. New, 30/- (Post 3/6). Input 230 v. Outputs 350 v. 80 mA. D.C. and 6.3 v. A.C. Values: 807, EF50, 5Z4 and EA50; each, 25/- (Post 3/6).

LIST AND ENQUIRIES: S.A.E. please. Terms, C.W.O. Postage extra. Immediate despatch.

Callers and Post: W. A. BENSON (PW), 138 Rathbone Road, Liverpool, 15. SEP 6853
Callers: SUPERADIO (Whitechapel), LTD., 116, Whitechapel, Liverpool, 2. RO 1 1750

WIRING ACCESSORIES

Return of Post Service. Lowest Possible prices consistent with high quality. Money back guarantee.

PVC Cable Flat Twin with E. 3 Core

1.044	£2. 1. 8	£2.15. 1	£2.19. 4
3.029	£2.14. 2	£3. 8.11	£3.19. 0
3.036	£3.16. 5	£4.10. 9	£5.10.10
7.029	£4.19.11	£6. 1.11	£6.18. 3

TRS CABLE

1.044	£2. 3. 5	£2.13.11	£3. 0.10
3.029	£2.15. 9	£3. 6.10	£4. 5. 4
3.036	£3.15. 2	£4. 6. 5	£5. 8. 7
7.029	£4.13.10	£5.16. 2	£6.16. 7

Prices per 100 yds. All sizes stocked supplied in 25, 50, 75 or 100 yd. lengths. 7.029 and above cut to length—no cutting charge. Carriage paid on all orders over £2. Full range of accessories available. Send for complete lists.

ELECTROSURE

118, FORE STREET, EXETER
Phone: Exeter 56687.

TRANSFORMERS

Suppliers to B.B.C., I.T.A., and leading radio manufacturers. Single or long runs. Prompt delivery. Home and export. Rewinds to all makes.

FORREST (Transformers) LTD.,
SHIRLEY, SOLIHULL, WARWICKS,
and SHI 2438

SHORT-WAVE RECEIVERS FOR THE BEGINNER

Step-by-step Building Instructions for a number of simple S.W. receivers, battery or mains, with point-to-point wiring diagrams, photographs, etc., and including an introductory chapter on S.W. techniques.

Data Pub. No. 14.
Postage 6d.

SERVICING TRANSISTOR RECEIVERS, by F. R. Pettit, 6/-.
Postage 6d.

R.S.C.B. AMATEUR RADIO CALL BOOK, 1960 ed. 3/6. Postage 6d.

PRINCIPLES OF ELECTRONICS, by H. Buckingham and E. M. Price, 18/6. Postage 9d.

HOW TO INSTALL & SERVICE AUTO RADIOS, by J. Darr, 26/-.
Postage 9d.

EVERYMAN'S WIRELESS BOOK, by F. J. Camm, 17/6. Postage 9d.

RADIO VALVE DATA, 6th ed. Compiled by "W.W.", 5/-.
Postage 9d.

SINGLE SIDEBAND. For the Radio Amateur, by A. R. R. L., 14/-.
Postage 1/3.

NEW 1960 CATALOGUE, 1/-.

THE MODERN BOOK CO.

BRITAIN'S LARGEST STOCKISTS of British and American Technical Books
19-23 PRAED STREET, LONDON, W.2.

Phone: PADdington 4185.
Open 6 days 9-6 p.m.

FREE TO AMBITIOUS ENGINEERS!

The Latest Edition of "Engineering Opportunities"



Have you sent for your copy?

'ENGINEERING OPPORTUNITIES' is a highly informative guide to the best-paid Engineering posts. It tells you how you can quickly prepare at home on "NO PASS—NO FEE" terms for a recognised engineering qualification, outlines the widest range of modern Home-Study Courses in all branches of Engineering and explains the benefits of our Employment Dept. If you're earning less than £20 a week you cannot afford to miss reading this unique book. Send for your copy to-day—FREE.

FREE COUPON

Please send me your FREE 148-page "ENGINEERING OPPORTUNITIES"

NAME
ADDRESS

Subject or Exam that interests me.....

British Institute of Engineering Technology
409 B, College House, 29-31, Wright's Lane,
Kensington, W.8.

WHICH IS YOUR PET SUBJECT?

Mechanical Eng.
Electrical Eng.
Civil Engineering
Radio Engineering
Automobile Eng.
Aeronautical Eng.
Production Eng.
Building, Plastics, Draughtsmanship, Television, etc.

GET SOME LETTERS AFTER YOUR NAME!

A.M.I.Mech.E.
A.M.I.C.E.
A.M.I.P.E.
A.M.I.M.I.
L.I.O.B.
A.F.R.Ae.S.
B.Sc.
A.M.Brit.I.R.E.
CITY & GUILDS
GEN. CERT.
OF EDUCATION
etc., etc.

BIET

Build your own TAPE RECORDER "ASPDEN"

Tape Deck and Amplifier Kits



TAPE DECKS. 2-speed, twin track, easy to assemble kits with finest motor. Ferroxcube heads and full instructions.

Reduced Prices:—

Model 582 for 5in. spools, kit £7.10.0.
Model 782 for 7in. spools, kit £8.10.0.
Either model assembled and tested, 30/- extra.

AMPLIFIER kit, 2½ watt, record/replay, 2 recording positions, neon indicator, etc., £5.18.0. Power Pack kit for above, £2.18.6 (both without valves). Carr. and packing extra.

Mr. R. White of Omagh, N. Ireland, writes: "The performance of the recorder is very good, and I recommend it to all those who wish to get first class performance at approx. half the cost."

Send STAMP for full particulars to:—

W. S. ASPDEN Stanley Works, Clevedon Road, Blackpool, Lancs.

New HI-FI Publications

JASON FM TUNERS 2s. 6d.
MULLARD AMPLIFIER MANUAL 8s. 6d.
MULLARD TAPE PRE-AMP. C 2s. 6d.
QUALITY AMPLIFIERS 7 designs 4s. 6d.

52-page Catalogue available on request.

J. T. FILMER 82, DARTFORD ROAD, DARTFORD, KENT.
Tel. Dartford 4057

Morse Code operating as a PROFESSION

45 years of teaching Morse Code is proof of the efficiency of the Candler system.

Send 3d. stamp for Payment Plans and full details of all Courses.

CANDLER SYSTEM CO., Dept. 5LO
52b, Abingdon Road, London, W.3.
Candler System Co., Denver, Colorado, U.S.A.

IS YOUR T.V. TUBE DIMMING? YOU CAN EXTEND THE LIFE OF THAT TUBE AND IMPROVE THE PICTURE



PRICE 30/-

Post, packing, & ins. 2/6.
C.W.O. C.O.D.

NO WIRING ● NO SOLDERING ● JUST PLUG IN ● IT'S AUTOMATIC ● IT'S GUARANTEED!
We can offer these units for any make of set. IMPORTANT. State name, address, & make and model no. of set, & tube in block caps.
SINCLAIR ELECTRONICS,
Disct. P.W., 33, BERWICK ST., W.1.
Callers Welcome—Trade Enquiries Invited.

SPECIAL OFFER

Set of 18 Wirewound 1% Resistors to measure Wheatstone Bridge to measure 0.1 ohms to 1.11 Meg. 19/6 p. & p. 1/-
15 Range A.C./D.C. Multimeter Kit 1,800 o.p.v. A.C. and D.C. Ranges 15, 60, 150, 300, 600 v. A.C. & D.C.; 3 v. D.C.; 6, 60, 600 mA. D.C.; Ohms to 2M. Kit Composes: 600 Ω A. meter scaled 0-15 and 0-600, Salford Inst. Rec., ready adjusted 1% Shunts, seven 1% multipliers, other resistors, switches, pot., circuit and instructions. 45/- post free.

Precision Wirewound Resistors
1 Watt. 1 to 1,000 ohms 1%, 2/9; 0.2%, 4/3; to 5 K. 1%, 3/3; 0.2%, 4/9; to 20 K. 1%, 4/-; 0.2%, 6/-; to 50 K. 1%, 4/8. Your value wound to order.
Transistors. Red Spot, 4/9; White, 4/9; Green/Yell., 7/6; Red/Yell., 15/-; STC TSL, 4/3. Post free.
Sprague 0.1 uF/600 v. Metal Cased, 4/- doz. P. & p., 1/-.

PLANET INSTRUMENT CO.,
25, Dominion Ave., Leeds, 7.

PETHERICK'S RADIO SUPPLIES

22, High St., Bideford, N. Devon.

5/- TRANSISTORS 5/-

Red Spots 5/- each. Yellow/Green 5/6. White Spots 6/6. Red/Yellow 12/6. Crystal Diodes 1-. GEX 34 4/-. OA70 4/-. CRYSTAL SET COILS. M.L. With circuit 2/6. DRR2 Coils with Circuits 4/-. Vari-Loopstick M.W. Coil with Transistor Circuit 4/6. Reaction Condensers .0001 3/-. .0003 3/9. .0005 4/-. Miniature .0005 4/-. 2 Mid. 150 volt Electrolytics 1/6. Headphones for Crystal Sets 14/-. British-made Volume Controls Miniature Less Switch 3/3, D.P. Switch 5/9. Deaf Aid Earpieces with ear insert and lead 13/6 each. All Post FREE in U.K.

1-Finger Pianist

Build your own electronic keyboard and play everything! Send for free leaflet. Guitar, cello, flute and trumpet are all easy. Write now.

C & S, 20 Maude Street, Darlington, Co. Durham.

RES/CAP. BRIDGE 37/-

p. & p. 2/-
Checks all types of resistors, condensers 6 RANGES

Built in 1 hour. Direct reading READY CALIBRATED

Stamp for details of this and other kits. RADIO MAIL (Dept. PV)
Raleigh Mews, Raleigh Street, Nottingham

A 3d. stamp will bring you a copy of our latest

RADIO & TELEVISION COMPONENT Catalogue

JAMES H. MARTIN & CO.
FINSTHWAITE, NEWBY BRIDGE,
ULVERSTON, LANCs.

"GLOBE-KING"

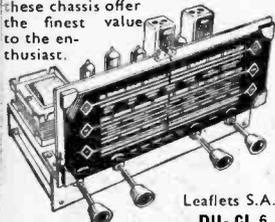
WORLD-FAMOUS KITS AND RECEIVERS for the Radio Amateur and S.W. Listener. Catalogue Free, enclose stamp for Postage. Kits from 79/6 at your dealers, or direct from

JOHNSONS (RADIO)
ST. MARTINS GATE, WORCESTER

KINGSMERE SUPPLIES LIMITED

Insured Post 1/-, over £2 Free. (Export extra.) MAIL ORDER HOUSE TERMS: Remit with Order or C.O.D.

Built to the highest specifications, these chassis offer the finest value to the enthusiast.



Leaflets S.A.E.

ALL BRITISH RADIOGRAM CHASSIS. 3 WAVEBANDS
5 MULLARD VALVES
 ECH81, EF89 EBC81, EL84, EZ80
 Brand new and guar. A.C. 200/250 v. Short-Medium-Long-Gram, P.U. High Q dust core coils. Latest circuit technique. AVC and neg. feedback. 4 watts. Chassis size 13½ x 6 x 7in. high. Aligned and calibrated ready for use. **Quality at Low Cost.** Chassis isolated. H.P. Dep. £5 and five monthly of £1.

OUR PRICE £9-9-0

DUCCI 6 VALVE AM-FM MODEL £18-18-0

Matched Speakers, 5in., 6in., 8in. 17/6 ea. 10in. 25/-.



The Brilliantly Successful

Monarch

U.A.S. WORLD'S FINEST 4-SPEED AUTOCHANGER

IDEAL FOR USE WITH OUR CHASSIS

H.P. Dep. £3.10.0 and four monthly of £1.

Stereo-monaural model £1 extra

BRAND NEW AND BOXED

OUR PRICE

£6-19-6

90-DAY GUARANTEE	VALVES	ALL BRAND NEW
6/5	7/6	1/6 5/6
5U4	6Q7G	954 1S5
6K8G	12AX7	EA50 1T4
6N7M	EF41	EL148 6K6GT
6V6G	EL41	6H6GT 807
6XS6	EL84	2/6 5P61
6AM6	EZ43	6K7G 6AC7M

SPECIAL PRICE PER SET

6K8G, 6K7G, 6Q7G, 6V6G, 6XS6 ... 27/6

1R5, 1T4, 1S5, 3V4 or 354 ... 27/6

Matched Pairs 6V6G, 15/-; EL84, 17/6

Valve Boxes, All Sizes 2/- doz.

Carbon Pots, 5K to 2M, 2/6; DP, 4/-.

BSR 4-SPEED SINGLE PLAYER

Model TU9. Our bargain price, 90/-.

Cut out board, 12½in. x 16½in., 5/-.

ALFA MULTIMETER

Pocket size 5½ x 3½ x 1½in.

300 microamp F.S.D. 3in. Scale.

17 Ranges. 3,330 ohms per volt.

A.C. Volts. 0 to 1,200 v. in 5 ranges.

D.C. Volts. 0 to 1,200 v. in 5 ranges.

D.C. Current. 0 to 300 m.a. in 3 ranges.

Resistance. 0 to 20 K and 0 to 2 meg.

Decibels. —20 to +23 db. and +20 to +37 db.

Complete with leads and prods. Uses

No. 8 battery. Fully Guaranteed.

REDUCED PRICE £5-19-6

FAMOUS MAKE

LONG PLAY PLASTIC RECORDING TAPE

On universal fitting plastic spools, for all recorders single and double track. 50% extra play at standard prices. 50¢ 7in. spool 1,700ft. tape, our price 35/-; 5½ in. spool 1,200ft. tape, our price 28/-; 5in. spool 850ft. tape, our price 21/-; MSS 3in. spool 225ft., price 7/6

STANDARD PLASTIC TAPE

7in. spool 1,200ft. tape, 21/-; 5in. spool 600ft. tape, 15/-; Spare Plastic Reels. All sizes 3/- each.

FOAMCOURT WAYE, FERRING, WORTHING, SUSSEX

TRANSISTOR SUPPLIES

Teletron Transidyne Pocket Transistor Set. All parts £11/- (Post 2/6.) Mini 7 Transistor Pocket Receiver. Complete kit, £9/10/- (Post 2/6.)

Red Spots, 4/-; White Spots, 5/-; Green/Yell., 5/9; Edison XB104, 8/6; XA104, 16/-; OC70, 14/-; OC71, 14/-; OC72, 17/-; OC44, 26/-.

Moving Coil Earpiece (use as miniature speaker), 5/-; Transformer for same, 5/-

Super Coax, 6d. yard. Var. Air Condenser, 365 pf., 3/-; Subminiature Electrolytics (15 volt), 2, 5, 8, 25, 50 µf., 3/-; Submin. Transformer Interstage, 5-1, 8-1, 7/6

Power Packs: 200/250 v. in.; 300 v. 200 mA. and 12 v. A.C. out., 50/- (carr. 7/6). 6 v. D.C. in., 120 v. 60 mA. (vibrator) out., 17/6 (carr. 5/-); Receiver 78, 35/- (carr. 5/-).

TERMS.—Cash with order. Post extra. Morco Reflex Circuit.—Best 2 Transistor. Send 8d. stamps for our Notes.

MORCO EXPERIMENTAL SUPPLIES

8 & 10, Granville Street, Sheffield, 2
 Tel.: 27461

ASTRAL RADIO PRODUCTS

'HOME RADIO,' 32-page illustrated booklet. Simple wiring instructions for Crystal Set, 1, 2, 3 Valves, 2/-, post 3d. **TRE COILS,** 7/-, post 6d. **DUAL WAVE HIF** Coil with REACTION. Specified for 'Summer All Dry Portable'. 'A.C. Double Triode 1', etc., 4/6, post 3d. **HIT** Miniature, 1" x 1½" x 2½" in cans. Extra high 'Q'. Special offer, 9/-, post 6d. Crystal Set Coils, L & M.W. 2/8, post 3d.
 82 Centurion Road, Brighton

B.B.C. - I.T.V. - F.M. AERIALS



B.B.C. (BAND 1), Telescopic loft, 19/6. External, S/D, 26/8.

I.T.V. (BAND 3), 3 Element loft array, 24/-; 5 Element, 32/6. Wall mounting, 3 Element, 33/9. 5 Element, 41/8.

COMBINED B.B.C. + I.T.V. Loft 1+3 Element, 41/8. 1+5 Element, 49/9. Wall mounting, 1+3 Element, 56/8. 1+5 Element 63/9. Chimney and mast mounting units also available.

F.M. (BAND 2), Loft "H", 28/4. 3 Element loft, 52/6. S/D loft, 12/6. External S/D 26/8. State channel when ordering. C.W.O. or C.O.D. P.P. 2/6. Coaxial cable, 8ft. yd. Coaxial plugs 1/3. Send 6d. stamps for illustrated lists.

K.V.A. ELECTRONICS (Dept. P.W.)
 38, Godstone Road, Kenley, Surrey

UNIVERSAL BOOK CO.

Short Wave Receivers for the Beginner, by DATA. 6/- Postage 6d.

Servicing Transistor Receivers, by Pettit. 6/- Postage 6d.

Building the Amateur Radio Station, by Berens. 24/- Postage 1/-.

Modern Car Radio Receivers. 3/6 Postage 6d.

T.V. Fault Finding, by Radio Constructor. 5/- Postage 6d.

T.V. Servicing, by Patchett, Vol. 4. 7/6 Postage 6d.

The A.R.R.L. Antenna Book. 18/- Postage 1/-.

12 Little Newport Street, London, W.C.2.

(adjoining Lisle Street)

CABINETS & HI-FI EQUIPMENT

We can supply any Cabinet to your own specification.



"Bureau" £16.16.0

This is only one example taken from our extensive range of stock cabinets. Write for our NEW 24 page fully illustrated catalogue on THE LARGEST RANGE OF CABINETS IN THE COUNTRY.

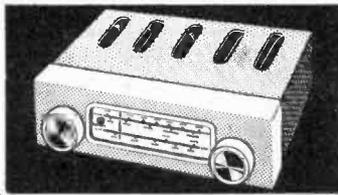
Equipment is also our speciality and we now offer, in a novel book form: A NEW EQUIPMENT COMPARATIVE illustrating our range of radio chassis, speakers, tape decks, single players and autochangers.

SEND TODAY for a copy of these two books, which are absolutely FREE.

LEWIS radio

120 (PW260) Green Lanes, Palmers Green London, N.13. BOWes Park 1155.6 (Nr. The Cock Tavern)

**BUILD
YOUR
OWN**



MAYKIT TRANSISTORISED CAR RADIO

- EASY TO BUILD ON PRINTED CIRCUIT.
- 5-VALVE SUPERHET WITH TRANSISTOR.
- STANDARD 7" x 2" for 12 VOLT BATTERY.

First tested Do-it-Yourself Car Radio, acclaimed by the Press. Uses low voltage valves and printed circuit. Negligible "fade," no buzz, only 1.5 amp. consumption. Complete with full instructions, diagrams, etc. Servicing and free advice on request. Also Jason Car Radios. Send 3/6 for Car Radio booklet.

Can be built for **£13.10.0** plus 5/- post./ins. and pack. Cash with order or BUY-AS-YOU-BUILD details and leaflet.

Dept. N., **MAYRA ELECTRONICS LTD.**
118 Brighton Rd., Purley, Surrey. Tel. : BYW 1263.



**Solve
that
Circuit
trouble!**

PIFCO
Radiometer

Not only circuit tests but everything electrical can be tested with this handy compact meter. Tests H.T. & L.T., Valves, components, electrical appliances and car lighting systems, etc. May be used on A.C. & D.C. mains.

See the Radiometer at your dealer or write for illustrated leaflet to :—

only
32/6
complete

PIFCO LTD.
WATLING STREET · MANCHESTER · 4.

Now . . . in your own home , LEARN

RADIO - TELEVISION - ELECTRONICS

NO PREVIOUS TECHNICAL EXPERIENCE NEEDED!

PRACTICAL EQUIPMENT
(INCLUDING TOOLS)
GIVES YOU A REAL LABORATORY TRAINING

"The trained electronics engineer has a great career ahead of him."

Valuable FREE Book shows how E.M.I. Institutes School of Electronics can train you for today's wonderful opportunities.

Radio, Television and Electronics provide an exciting field for the trained man—high pay, a prosperous future—or if you prefer it—independence in your own business. If you are trained at home by E.M.I. Institutes you will be in the hands of specialists who know the quickest way to prepare you for one of the fine jobs open to trained electronics-men. Whether you are a beginner or an advanced student with an examination in mind, E.M.I. Institutes School of Electronics has a Course exactly suited to your needs—with or without practical equipment—from electricity and magnetism to automation techniques.

Practical Radio
Radio & Television
Servicing
Practical Electronics
Electronics Engineering
Automation
Basic Practical and
Theoretic Courses for
beginners in Radio,
T.V., Electronics, Etc.
A.M. Brit. I.R.E.,
City & Guilds Radio
Amateurs' Exam,
R.T.E.B. Certificate
P.M.G. Certificate
"NO PASS—NO FEE"

**We Definitely Guarantee
"NO PASS—NO FEE"**
Full details of the Courses, Practical Equipment, convenient monthly payments, our Employment and Advisory Depts., and much other helpful information is given in our Guide to Careers in Electronics. Write for your copy today. There is no obligation and the book will be sent to you quite free of charge.

FREE BOOK - POST NOW !

Please send me a free copy of your Guide to Careers in Electronics.

NAME

ADDRESS

Subject or Exam

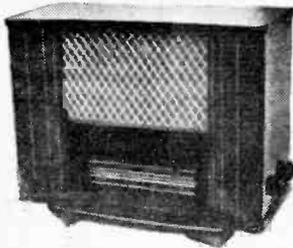


E.M.I. INSTITUTES SCHOOL OF ELECTRONICS

The Specialist Electronics Division of the British Institute of Engineering Technology.
(DEPT. SE/21), COLLEGE HOUSE, 29-31, WRIGHT'S LANE, KENSINGTON, LONDON, W.8.

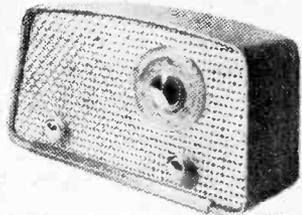
A.M./F.M. RECEIVER

In beautiful Walnut Cabinet, 5 valves, internal Ferrite Aerial, Long, Medium and Short Wave, and F.M. Wave Bands. Price **£12.12.0.** p. & p. 5/-.



COSSOR MELODY MINOR MODEL 565

A transportable Model of Ultra Lightweight design for use on 200/250 v. Mains D.C. or A.C., 40/100 c/s. Using 4 valves UCH81, UBF89, UY85 UCL82 and Internal Ferrite Aerial. LIST PRICE 14½ gns. OUR PRICE **£8.17.6** p. & p. 2/6



BASS REFLEX CABINET

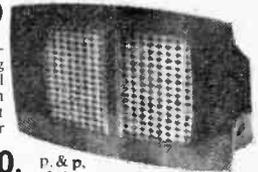
for your Hi-Fi or Stereo Equipment. Size 13½" x 8" x 23". A beautiful walnut finish cabinet strongly built, using a 12in. P.M. Speaker and 4in. Tweeter. LIST PRICE 9 gns. OUR PRICE **£5.19.6** p. & p. 2/6



Convert your Battery Set to Mains with a **COSSOR BATTERY ELIMINATOR MU2**. For operation on 200/250 v. 50 c/s A.C. mains. Output: L.T., 1.5 v. 125 mA.; H.T., 90 v. 10 mA. LIST PRICE 3 gns. OUR PRICE **37/6** p. & p. 2/6

AMPLIFIER AND CABINET

3-watt Amplifier, using an ECL82 Valve and Metal Rectifier, housed in a modern attractive styled walnut cabinet with 5" P/M Speaker and on/off and tone controls. Can be sold for **£45.0.** p. & p. 3/6.



RECORD CHANGERS

Collaro Conquest: 4-speed Auto Changers, turn over still, £7.19.6. Collaro AC4/564: Rim drive 4-speed player, turn over still, £6.9.6. Collaro Junior: 4-speed Single Player, Separate Pick-up, £3.15.0. B.S.R.: UAR 4-speed Auto Changer, Manual and Auto Control Dual turnover still, £6.19.6. Garrard RC120/D Mark 2, 4-speed Auto and Manual Controls, using GC2 Cartridge, price £9.9.0. Post and Packing 3/6.

WIRECOMP ELECTRONICS

A Six Transistor Pocket Radio for £9.19.6 plus 3/6 post.
378 HARROW ROAD, LONDON, W.9. Tel.: CUNNINGHAM 9530
 Hours of business: 9 a.m.-6 p.m. Open all day Saturday.

SOLDERING EQUIPMENT



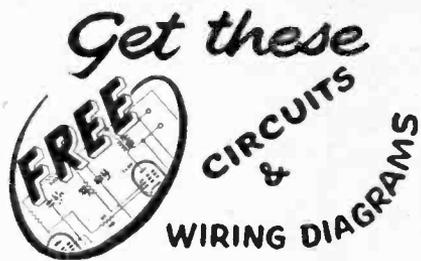
PRECISION SOLDERING INSTRUMENTS for the ELECTRONICS INDUSTRY

- Comprehensive range
- Robust & Reliable
- Light weight
- Rapid heating
- Bit sizes 3/32in. to 3/8in.
- 'Permabit' or Copper bits
- All voltage ranges 6.7v. to 230/250v.
- Prices from 19/6

Illustrated is the 25w. 3/16in. replaceable bit model with safety shield. British and Foreign Patents. Registered designs. Suppliers to H.M. and Foreign Governments. Agents throughout the world.

Brochure No. S.10 sent free on request. Sole proprietors and manufacturers:

LIGHT SOLDERING DEVELOPMENTS LIMITED
 28, Sydenham Road, Croydon, Surrey.
 Phone: CROYdon 8589 Grams: Litesold Croydon



- T.R.F. Circuits
 - Battery Circuits
 - Portable Circuits
 - Sheet Circuits
 - Mains Circuits
 - Filter Circuits
 - F.M. Tuner
 - T.V. Converter Circuits, etc.
- Send Postage 1/- (stamps)

OSMOR COILS are regularly used and recommended by designers writing in "Practical Wireless," "Wireless World" and "Radio Constructor." Why not follow the experts?

- "Q Coils" All ranges
- Potted Coils
- F.M. COILS
- TAPE COILS
- ROD AERIALS
- Coils and I.F.s for Transistor Circuits
- SUB-MINIATURE COILS
- Speaker Cross-over Coils
- Midget I.F. Trans. With ferrite cores



418 Brighton Road, South Croydon.
 Telephone: CRO 5148/9

FREE LISTS

BY RETURN

LARGE RANGE OF VALVES, TUBES, QUARTZ CRYSTALS, METERS TRANSISTORS, MINIATURE COMPONENTS AND EQUIPMENT.

Trade Enquiries Invited.

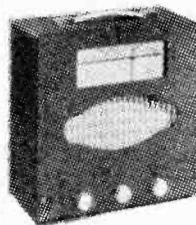
UNBEATABLE VALVE PRICES!

ALL ARE GUARANTEED; SEND FOR FREE COMPLETE LIST OF OVER 600 TYPES. INCLUDES TX, TUBES AND INDUSTRIAL UNITS.

0A2	10/-	6SG7	6/6	CL33	12/6
0B2	10/-	6SH7	5/-	CYIC	10/-
0Z4	5/-	6SJ7	6/-	DAC32	10/-
1A5	5/-	6SK7	6/-	DAF91	7/-
1A7	12/6	6SL7	6/-	DCC90	9/-
1C5	10/-	6SQ7	6/-	DF91	7/-
1H5	10/-	6SR7	6/-	DH63	7/6
1L4	5/-	6SS7	6/-	DK32	12/6
1LD5	5/-	6U4	12/6	DK40	10/-
1LN5	5/-	6U7	5/-	DK91	7/-
1N5	10/-	6V6G	6/6	DL91	7/-
1R5	7/-	6V6GT	7/6	DK92	7/6
1S4	7/-	6V6M	10/-	DL94	7/6
1S5	6/6	6X4	6/-	DM70	8/6
1T4	6/-	6X5GT	5/-	EB91	5/-
3A4	7/-	7A7	9/-	EBF33	6/6
3A5	9/-	7D5	10/-	EF50	4/-
3D6	4/6	7D6	10/-	EL32	5/-
3Q4	7/6	7S7	9/-	EL33	12/6
3Q5	9/-	7Y4	7/-	EM34	7/6
3S4	7/-	9D6	5/-	EM80	10/-
3V4	7/6	12AH7	6/-	EM81	10/-
5R4G	8/6	12AU6	9/-	EM85	11/-
5V4	10/-	12BE6	6/-	FC4	10/-
5X4G	10/-	12J7	10/-	FW4/800	
5Y3GT	6/-	12K8	10/-		
5Y4G	10/-	12SC7	6/-	GZ32	11/-
5Z3	10/-	12SG7	6/-	GZ34	11/-
5Z4G	8/6	12SH7	6/-	HL23/DD	
5Z4M	10/-	12SJ7	6/-		
6A7	9/-	12SK7	6/-	KT33C	8/6
6A8	9/-	12SQ7	8/6	KT66	12/6
6AB8	10/-	1A57	14/-	KTW61	6/6
6AC7	5/-	25A6	10/-	KTW63	5/-
6AG5	5/-	25L6	10/-	MVS PEN	
6AK5	6/-	25Z4	9/-	MS PEN	10/-
6AL5	5/-	25Z5	9/-	MU14	7/6
6AM5	5/-	25Z6GT	10/-	MX40	10/-
6AM6	5/-	28D7	4/-	NI4	10/-
6BBG	4/6	35Z5	8/6	PEN4VA	
6BR7	12/6	42	7/6		
6BW6	8/6	43	10/-	PEN25	5/-
6C4	5/-	50B5	10/-	PEN46	5/-
6C5	5/-	50C5	10/-	PP36	10/-
6F6	7/6	75	10/-	PX25	12/6
6F8	7/6	80	8/6	QP21	5/-
6F12	5/-	83V	10/-	QP25	6/6
6F32	7/6	83	10/-	SP4	10/-
6F33	5/-	807	5/-	TD4	10/-
6J5M	5/-	807USA	7/6	U50	6/-
6J7M	7/6	AC/SG	10/-	U52	6/-
6K7G	5/-	AC2PENDD	10/-	URIC	10/-
6K7M	7/6		12/6	VM54	10/-
6K8M	10/-	AC/PEN	10/-	VP23	5/-
6L6M	10/-	AC/VP1	10/-	V570	6/-
6Q7G	7/6	AC/VP2	10/-	XH	4/-
6R7	6/-	AR8	5/-	Y63	7/6
6SA7	6/-	AZ31	10/-		
6SC7GT	7/6				

REDUCTIONS FOR SETS OF VALVES:

X66, KTW61, DH63, KT63, U50, 30/-
 1R5, 1S5, 1T4, 1S4 (or 3S4 or 3V4), 25/-
 1C5, 1A7, 1N5, 1Q5 (or 3Q5), 35/-
 DL96, DF96, DAF96, 35/-
 TP25, VP23, 25/-
 HL23/DD, PEN25 (or QP25), 25/-
 12K8, 12K7, 12Q7, 35Z4, 35L6 (or 50L6), 40/-
 p.p. 6d. per valve. Orders above £3 post free.



Chassis Size 10 x 10 x 4 in.

SHORT-WAVE RADIO

- ★ 3 Wavebands (10 to 550 metres)—650 kc/s to 2 Mc/s, 2 to 11 Mc/s, 11 to 30 Mc/s.
- ★ 5-valve Marconi Superhet.
- ★ A.C./D.C. 200 to 250 v. mains.
- ★ 7 x 4 in. Speaker; Gram. input.
- ★ Slow-motion Drive.

NOW £6.15.6 P.P. 3/6.

OR COMPLETE IN PORTABLE CABINET, £7.12.6, P.P. 4/-.

★ ALTERNATIVE MODEL MEDIUM, LONG AND SHORT

— THE WORLD IN YOUR HOME —

A.C., D.C., R.F. METERS

0-15 v.	2 1/2"	M.I. (AC)	F.R.	8/6
0-20 v.	2"	M.C. (DC)	F.S.	7/6
0-40 v.	2"	M.C. (DC)	F.S.	7/6
0-150 v.	2 1/2"	M.C. (DC)	F.R.	12/6
0-200 v.	2 1/2"	M.C. (DC)	F.R.	12/6
0-11 kv.	2 1/2"	M.C. (DC)	P.	15/-
0-2 1/2 kv.	2 1/2"	M.C. (DC)	P.	15/-
0-500 U.A.	2 1/2"	M.C. (DC)	F.R.	15/-
0-500 U.A.	3"	C. (DC)	F.R.	59/6
0-400 U.A.	3"	M.C. (DC)	F.R.	59/6
0-1 mA	2 1/2"	M.C. (DC)	F.R.	22/6
2 1/2-2 1/2 mA	2 1/2"	M.C. (DC)	F.R.	12/6
0-30 mA	2 1/2"	M.C. (DC)	P.	7/6
0-50 mA	2"	M.C. (DC)	F.S.	7/6
0-10 mA	2 1/2"	M.C. (DC)	F.S.	10/-
0-100 mA	2"	M.C. (DC)	F.S.	10/-
0-150 mA	2"	M.C. (DC)	F.S.	7/6
0-500 mA	2 1/2"	M.C. (DC)	F.R.	12/6
0-750 mA	2 1/2"	T.C. (RF)	P.	6/-
0-500 mA	2"	T.C. (RF)	P.	6/-
0-1 amp.	2"	T.C. (RF)	P.	6/-
0-3 amp.	2"	T.C. (RF)	F.S.	6/-
0-12 amp.	2 1/2"	T.C. (RF)	P.	10/-
0-30 amp.	2"	M.C. (DC)	F.S.	7/6
5-0-5 amp.	2 1/2"	M.C. (DC)	P.	10/-
20-0-20 amp.	2"	M.C. (DC)	F.S.	12/6

FREE COMPLETE LIST ON REQUEST. (INCLUDES MULTIMETERS, AVO & CABY, TRIPLET, ETC. AT EASY PRICES.)

TRANSISTORS

FROM 5/- EACH

SHORT-WAVE, R.F., AUDIO AND POWER

SB078	20 Mc/s	6mW	H.F.	10/-
SB305	25 Mc/s	10mW	H.F.	15/-
SB231	30 Mc/s	10mW	H.F.	22/6
SB231R	50 Mc/s	10mW	H.F.	30/-
XB104	1 Mc/s	120mW	Audio	10/-
XA104	6 Mc/s	90mW	Osc/Mixer	18/-
XA103	4 Mc/s	90mW	RF, IF	15/-
XC121	—	200mW	Power	17/-
XC131	Matched pairs only	500mW	pr.	34/-
OC44	15 Mc/s	60mW	Osc/Mixer	26/-
OC45	6 Mc/s	60mW	RF, IF	23/-
OC71	600 kc/s	100mW	Audio	14/-
Red Spot	800 kc/s	125mW	Audio	5/-
White Spot	5 Mc/s	125mW	RF, IF	7/6
Photo Transistor	100mW			10/-
V15/10P	10-watt	Power		17/6

FREE DATA AND COMPLETE LIST ON REQUEST. ALL TYPES ARE FULLY GUARANTEED.

CRYSTAL MICROPHONES AND INSERTS

Acos 23-4	1in. Square	...	7/6
"	19-4 1/2in. Round	...	14/-
"	14 1/2in. Round	...	7/6
"	6-9 2in. Round	...	12/6
		P.P. 6d. any type.	

ACOS 39-1

Stick Mic. with Stand 39/6, P.P. 1/6
 ACOS 40 Desk Mic. ... 25/-, P.P. 1/6

TRANSMITTER/RECEIVER

Army Type 17 Mk. II. Complete with Valves, High Resistance Headphones, Hand Mike, Instruction Book and Circuit. Frequency Range 44.0 to 61 Mc/s. Range approximately 3 to 8 miles. Power requirements: Standard 120 v. H.T. and 2 v. L.T. Ideal for Civil Defence and communications.

BRAND NEW 45/- P.P. 5/-.

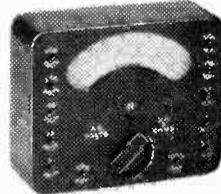
44-61 Mc/s calibrated wavemeter for same, 10/- extra.

TYPE 38 TRANSMITTER/RECEIVER

Complete with 5 valves. In new condition. These sets are sold without guarantee, but are serviceable.

7 to 9 Mc/s 22/6 P.P. 2/6.

Headphones 7/6 pair. Junction Box 2/6. Throat Mike 4/6. Canvas Bag 4/- Aerial Rod 2/6.



AVO-MINOR

- 1,000 ohms/volt.
- 0-500 mA.
- 0-500 volts (A.C./D.C.).
- 0-20 K. Resistance.
- Complete with leads, instructions and leather case.
- Full Guarantee, 79/6, p.p. 2/-.

HENRY'S (RADIO) LTD.

Opposite Edgware Road Tube Station. PADDINGTON 1008/9.

5, HARROW ROAD, EDGWARE ROAD, PADDINGTON, LONDON, W.2.

OPEN MONDAY to SAT. 9-6. THURS. 1 o'clock

SEE BACK PAGE

NEW! The "CONTINENTAL-6" (SUPERSEDING THE TRANSISTOR-8) COMBINED SIX TRANSISTOR PORTABLE/CAR RADIO

- ★ 400 mW Push-Pull Output.
- ★ Full Medium and Long Wave Tuning.
- ★ Slow-motion Drive.
- ★ XAI02, 2-XAI01, XB103, 2-Diodes, 2-XC101 Transistors.
- ★ Full A.V.C. and Car Radio.
- ★ Printed Circuit with all components marked.
- ★ Attractive Portable Cabinet.

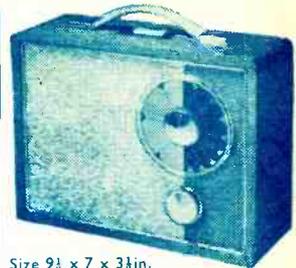
TOTAL COST OF ALL COMPONENTS INCLUDING CABINET, CAR RADIO, A.V.C., BATTERY, ETC.

£11.10.0 P.P. 3/6

ALL PARTS SOLD SEPARATELY. SEND FOR FREE DESCRIPTIVE LEAFLET AND PRICES.

(ALL COMPONENTS FOR THE TRANSISTOR-8 ARE STILL AVAILABLE.)

A SIX TRANSISTOR PORTABLE/CAR RADIO OF THE LATEST DESIGN HAVING FANTASTIC SELECTIVITY AND SENSITIVITY ON MEDIUM AND LONG WAVEBANDS. HI-FI TYPE SPEAKER GIVING 400 mW OUTPUT. THE SET OPERATES EQUALLY WELL AS A CAR RADIO—IS EASY TO BUILD—HAS GOOD LOOKS—LOW RUNNING COSTS—EQUALS ANY COMMERCIAL RECEIVER IN THE 20-GN. CLASS.



Size 9½ x 7 x 3½ in.
Weight 4 lbs.

MAJOR-2

(Two-transistor Pocket Radio)



69/6 TOTAL COST
P.P. 1/6.

NEW EASY BOOKLET FREE: All components sold separately.

GOOD RECEPTION ANYWHERE!

- ★ 4-stage reflex!
- ★ Medium wave: tunable!
- ★ Very sensitive!
- ★ No aerial or earth!
- ★ Complete layout!
- ★ Over 6 months on one battery.
- ★ 4½ x 3 x 1½ in.
- ★ Weight only 4 ozs.
- ★ Personal 'phone.

RED-SPOT TRANSISTORS

5/- EACH

WHITE-SPOT

7/6

NEW FREE LIST ON REQUEST

MAJOR-3

(THREE TRANSISTOR POCKET RADIO)



(As Described in "R.C." Sept. '59)

TOTAL 87/6 P.P. 1/6 NEW EASY BOOKLET FREE

FANTASTIC OUTPUT, TERRIFIC RECEPTION. GUARANTEED ANYWHERE

- ★ 5-stage Reflex Circuit.
- ★ No Aerial or Earth.
- ★ Min. Volume Control.
- ★ 3 Ediswan Transistors.
- ★ Medium Wave Tuning.
- ★ Size 4½ x 3 x 1½ in.
- ★ Personal 'phone.

SUPER 6

SIX TRANSISTOR MEDIUM AND LONG WAVES



LIMITED QUANTITY ONLY. FREE LIST ON REQUEST

- ★ Plessey Printed Circuit.
- ★ Mullard Transistors.
- ★ 3-inch Sensitive Speaker.
- ★ Full Medium & Long Waves.
- ★ Size 7 x 4½ x 2 in.

Recommended by us as being one of the easiest to build 6-Transistor printed circuit superhet receivers ever offered.

TOTAL COST OF ALL COMPONENTS, INCLUDING CABINET AND BATTERY.

£9.10.0 P.P. 2/6

All parts sold separately.

THE MINOR



★ 3 x 2 x ½ in. ★ Medium wave. ★ 3-stage reflex. ★ Internal aerial. ★ Smallest yet. **TOTAL COST WITH CASE AND MINIATURE EAR-PIECE** All parts sold separately. **49/6** Diagram and List Free. P.P. 1/6

" PRACTICAL TRANSISTOR CIRCUITS "

	ALL TRANSISTOR UNITS DESCRIBED	Total Cost	P.P.
1	RADIO CONTROL RECEIVER	50/-	1/-
2	R.F., I.F. GENERATOR	25/-	1/-
3	LIGHT OPERATED SWITCH	25/-	1/-
4	SQUARE WAVE GENERATOR	20/-	1/-
5	SIGNAL TRACER	37/6	1/6
6	HEARING AID AMPLIFIER	90/-	1/-
7	3-CHANNEL AUDIO MIXER	42/6	1/-
8	AUDIO GENERATOR	25/-	1/-
9	ADDON AMPLIFIER	59/6	1/6
10	2 WATT POWER STAGE	52/6	2/-
11	BABY ALARM—100% SAFE	72/6	2/-
12	TOP BAND TRANSMITTER	57/6	1/6
13	3 TO 12 MC/S XTAL OSC.	22/6	1/-
14	35 METRE C.W. TRANSMITTER ETC., ETC.	27/6	1/-

A BOOKLET PRODUCED FOR THE HOME CONSTRUCTOR CONTAINING TRANSISTOR CIRCUIT DIAGRAMS, PRACTICAL LAYOUTS, DATA AND INFORMATION. ALL COMPONENTS USED ARE READILY OBTAINABLE.

2/- POST FREE.

TO HENRY'S RADIO LTD.

Enclosed please find remittance value 2/- for "Practical Transistor Circuits," Radio Receiver Leaflets and Components Lists.

NAME
(BLOCK CAPITALS, PLEASE)

ADDRESS

P.W.F.

SEE OTHER ADVT. INSIDE

HENRY'S (RADIO) LTD.

Opposite Edgware Road Tube Station, PADddington 1008/9

5, HARROW ROAD, EDGWARE ROAD, PADDINGTON, LONDON, W.2.
OPEN MONDAY to SAT. 9-6. THURS. 1 o'clock.