RADIO
Data Book

Compiled by
B. BABANI

for the

Home Constructor
Radio Amateur
Service Engineer

★★★★

No. 95 BERNARDS RADIO MANUALS 1/6

1/51 1/6-

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DATA BOOK

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LONDON
BERNARDS (Publishers) LTD

BERNARDS RADIO MANUALS No. 95

General Editor: W. J. MAY

FIRST PUBLISHED 1950

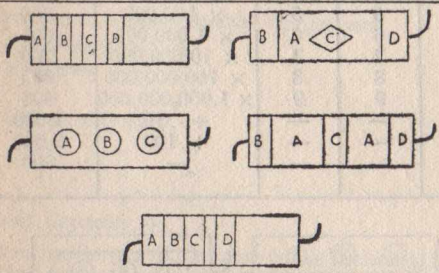
Printed for Bernards (Publishers) Ltd., The Grampians, Western Gate, London, W.6 by Eversholt Printing Works (T.U.) 241 Eversholt Street, London, N.W 1.

Contents

BRITISH AND U.S.A. RESISTANCE COLOUR CODE.

Colour code shall consist of four bands of colour which may be adjacent to each other or be slightly separated from each other as desired. They shall be placed on the resistor towards one end of it and the significance of the colour bands shall be read from the band nearest to one end and in the order of the bands as follows :—

Band	*Indicates*
1st	First significant figure of the resistance value.
2nd	Second significant figure of the resistance value.
3rd	Decimal multiplier applicable to the first two significant figures.
4th	% Tolerance.



The meaning assigned to the various colours are set out in the Table below :—

Colour	*Shade*	*Significant Figures*	*Decimal Multiplier*	*Tolerance*
Black	—	0	1	—
Brown	No. 13	1	10	—
Red	No. 38	2	100	—
Orange	No. 57	3	1,000	—
Yellow	No. 55	4	10,000	—
Green	No. 26	5	100,000	—
Blue	No. 5	6	1,000,000	—
Violet	*	7	10,000,000	—
Grey	No. 31	8	100,000,000	—
White	—	9	1,000,000,000	—
Gold (metallic) ...	*	—	0.1	5%
Silver (metallic) ...	*	—	0.01	10%
No additional colour	—	—	—	20%

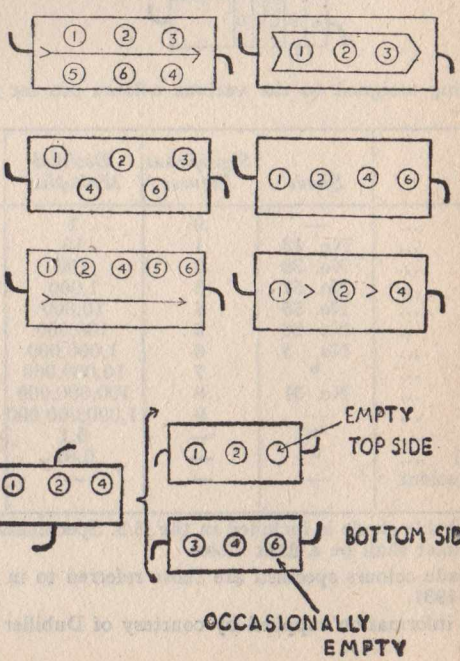
*No suitable shade is included in the B.S. Specification.
The violet shall be a **dark** violet.

NOTE.—The shade colours specified are those referred to in B.S.S. No. 381C—1931.

The above information supplied by courtesy of Dubilier Condenser Co. (1925) Ltd.

BRITISH AND U.S.A. COLOUR CODES FOR FIXED MICA CONDENSERS.

Colour Mark	1 *First Figure*	2 *Second Figure*	3 *Third Figure*	4 *Multiplier Value*	5 *Direct Current Voltage Test Rating*	6 *Percentage Tolerance Plus or Minus*
Black ...	0	0	0	Nil	—	—
Brown ...	1	1	1	× 10	100	1%
Red ...	2	2	2	× 100	200	2%
Orange ...	3	3	3	× 1,000	300	3%
Yellow ...	4	4	4	× 10,000	400	4%
Green ...	5	5	5	× 100,000	500	5%
Blue ...	6	6	6	× 1,000,000	600	6%
Violet ...	7	7	7	× 10,000,000	700	7%
Grey ...	8	8	8	× 100,000,000	800	8%
White ...	9	9	9	× 1,000,000,000	900	9%
Gold ...	—	—	—	÷ 10	1,000	5%
Silver ...	—	—	—	÷ 100	2,000	10%
No Colour	—	—	—	—	500	20%



BRITISH AND U.S.A. COLOUR CODES FOR RADIO COMPONENTS.

FUSES.

Colour:	*Value*:	*Colour*:	*Value*:
Black ...	.060 Amp.	Dark Blue ...	1 Amp.
Grey ...	.100 Amp.	Light Blue ...	1.5 Amp.
Red... ...	.150 Amp.	Purple	2 Amp.
Brown ...	.250 Amp.	White	3 Amp.
Yellow ...	.500 Amp.	Black and White	5 Amp.
Green ...	.750 Amp.		

FIXED CONDENSER LEADS.

Value:	*Colour*:
Centre lead of Voltage doubler Condensers	White
Principal Negative Lead	Black
2nd Negative „	Brown
3rd „ „	Grey
5th highest Capacity +	Violet
4th „ „ +	Blue
3rd „ „ +	Green
2nd „ „ +	Yellow
Highest Capacity +	Red

When 2 capacities are of the same value, the one of the higher voltage rating has the higher colour in the table.

Series connections are marked ±
Common Positive junctions are marked +
Unconnected sections are marked &
Common Negative junctions are marked —

Examples :—

6 ± 6 = A series voltage doubler connection.
2 + 2 = Two 2uF condensers with common positive lead.
4 & 4 = Two isolated 4uF condensers.
8 — 8 = Two 8uF condensers with common negative lead.

WANDER PLUGS.

Value:	*Colour*:
Highest + H.T.	Red
2nd highest + H.T.	Yellow
3rd highest + H.T.	Green
4th highest + H.T.	Blue
L.T. Positive	Pink
L.T. —	Black
H.T. —	Black
G.B. +	Black
Highest G.B. —	Brown
2nd highest G.B. —	Grey
3rd highest G.B. —	White

Any additional battery lead is Violet, and any centre tap is White.

BRITISH AND U.S.A. COLOUR CODES.

U.S.A. COLOUR CODES FOR LOUDSPEAKER LEADS AND PLUG CONNECTORS.

A = Blue lead. B = Brown lead. C = Red lead. D = Black and Red striped lead. E = Slate and Red striped lead. F = Yellow and Red striped lead. G = Black lead. H = Green lead. J = Black and Green striped lead. K = Yellow and Green striped lead. P = Primary. S = Secondary.

Sketch A.
Plugs shown with Pins facing the reader.

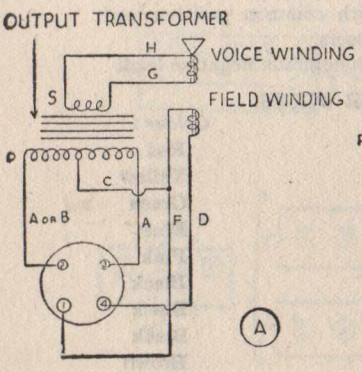
Sketch B.
Plugs shown with Pins facing the reader.

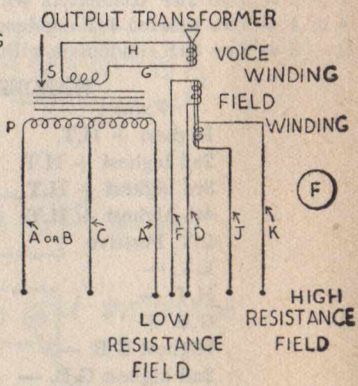
Sketch C.
Plugs shown with Pins facing the reader.

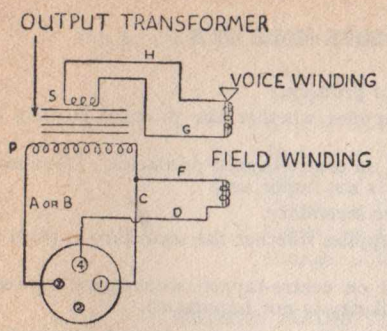
Sketch D.
Plugs shown with Pins facing the reader.

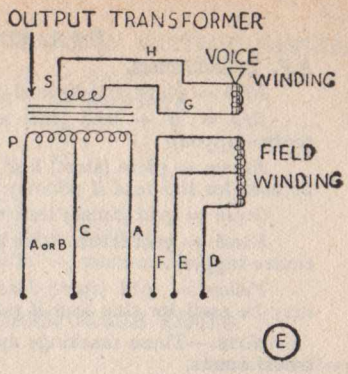
Sketch E.
Plugs shown with Pins facing the reader.

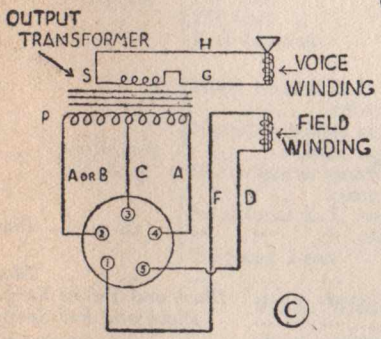
Sketch F.
Plugs shown with Pins facing the reader.

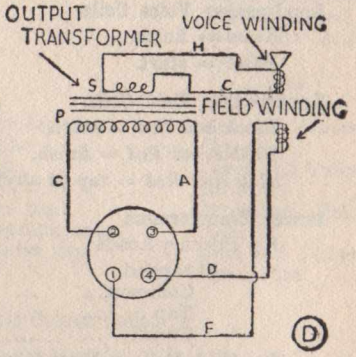












BRITISH AND U.S.A. COLOUR CODES.

BRITISH COLOUR CODE FOR BATTERY CORDS.

Colour.	*Purpose.*
Maroon	3rd Positive Voltage.
Maroon and Red	2nd Positive Voltage.
Red	Highest Positive Voltage.
Black and Green	2nd Negative Bias.
Black with Green Tracer	Maximum Negative Bias.
Green	Positive Bias Voltage.
Black with Yellow Tracer	Negative L.T. Voltage.
Yellow	Positive L.T. Voltage.
Black with Red Tracer	Negative H.T.
Black with Brown Tracer	Loud-speaker Connections.
High Potential, Brown	Loud-speaker Connections.

U.S.A. COLOUR CODE FOR

A.F. Transformers.

Blue = plate (finish) lead of primary.

Red = B + lead (this applies whether the primary is plain or centre-tapped).

Brown = plate (start) lead on centre-tapped primaries. (Blue may be used for this lead if polarity is not important).

Green = grid (finish) lead to secondary.

Black = grid return (this applies whether the secondary is plain or centre-tapped).

Yellow = grid (start) lead on centre-tapped secondaries. (Green may be used for this lead if polarity is not important).

NOTE.—These markings apply also to line-to-grid and tube-to-line transformers.

Loudspeaker Voice Coils.

Green = finish.

Black = start.

Loudspeaker Field Coils.

Black and Red = start.

Yellow and Red = finish.

Slate and Red = tap (if any).

Power Transformers.

1.	Primary Leads	*Black*
	If tapped :	
	Common	*Black*
	Tap	*Black and Yellow Striped*
	Finish	*Black and Red Striped*
2.	High-Voltage Plate Winding	*Red*
	Centre-Tap	*Red and Yellow Striped*
3.	Rectifier Fil. Winding	*Yellow*
	Centre-Tap	*Yellow and Blue Striped*
4.	Fil. Winding No. 1	*Green*
	Centre-Tap	*Green and Yellow Striped*
5.	Fil. Winding No. 2	*Brown*
	Centre-Tap	*Brown and Yellow Striped*
6.	Fil. Winding No. 3	*Slate*
	Centre-Tap	*Slate and Yellow Striped*

RADIO GRAMOPHONE ELECTRIC MOTORS. COLOUR CODE FOR FREQUENCY.

White dot = 25 cycles.
Green dot = 50 „
No mark = 60 „

U.S.A. COLOUR CODE FOR MULTIPLE BATTERY CABLES.

Blue	= H.T. +	highest.
White	= H.T. +	medium.
Yellow	= H.T. —	
Red	= L.T. +	
Black	= L.T. —	
Brown	= G.B. +	
Green	= G.B. —	highest.
Orange	= G.B. —	medium.

BRITISH MAINS TRANSFORMER LEADS.

		Colour.
Primary Winding	10 volt tapping	Black and Green.
	210 volt „	Black and Yellow.
	230 volt „	Black and Red.
	250 volt „	Black and Brown.
	Zero tapping	Black.

		Colour.
Secondary Winding	High tension ends	Red.
	„ „ centre tap	Red and Yellow.
	Rectifier heater ends	Green.
	„ centre tap	Green and Yellow.
	Valve heater ends	Brown.
	„ „ centre tap	Brown and Yellow.
	Additional L.T. winding ends	Blue
	„ „ centre tap	Blue and Yellow.
	Earthing Lead	Bare Wire

G.E.C. Wiring Colour Code.

White	... ...	High-potential connections to aerial and first section of band-pass circuits, also non-earth side of special coil.
Green	... ...	Other high potential signal circuits, including grid circuits.
Blue	... ...	Screening grid circuits.
Pink	... ...	Cathode connections.
Orange	... ...	Anode connections.
Black	... ...	Earth connections.
Slate	... ...	H.T. negative, when not earthed.
Red	... ...	Smoothed H.T. positive.
Red/White	...	Unsmoothed H.T. positive.
Green/White	...	A.V.C. and grid de-coupling.
Black/Red Black/White	... ...	Heaters.
Black/Red	...	L.T. positive (in battery sets).

BRITISH MOVING COIL SPEAKER—COLOUR CODE.

Colour.	*Purpose.*
Green (outer end)	Output Transformer—Primary ends of winding.
Brown (inner end)	„ „ Primary ends of winding.
Red	„ „ Primary centre tap.
Maroon	„ „ Secondary end—inside.
White	„ „ „ „ outside.
Yellow	Field Winding—Outside end.
Black	„ „ Inside end.

I.F. Transformers.

Blue = plate lead.
Red = B + lead.
Green = grid (or diode) lead.
Black = grid (or diode) return.

NOTE.—If the secondary of the i.f.t. is centre-tapped, the second diode plate lead is green-and-black striped, and black is used for the centre-tap lead.

REACTANCE FORMULAS.

Reactance is measured in ohms and is defined as the resistance against the flow of an A.C. in any component due to its capacity or inductance. Amongst other factors it is variable due to the frequency of the A.C.

Reactance in ohms of a condenser is equal to 1 divided by (6.283 × frequency of A.C. in cycles per second × capacity of condenser in farads).

Reactance of a coil is equal to (6.283 × frequency of A.C. in cycles per second × inductance of coil in henries).

Reactance of a condenser and a coil in series is equal to the reactance of the coil on its own minus the reactance of the condenser.

RESONANT FREQUENCY.

This is the condition when a condenser and coil in a tuning circuit are so adjusted as to produce resonance. The formula for this condition is as follows :—

Frequency of resonance = $1 \div [6.283$ (square root of the coil inductance in henries multiplied by the condenser capacity in farads)$]$

Capacity in farads of a condenser in a resonant circuit =

$1 \div [39.478 \times (\text{resonant frequency})^2 \times$ inductance of the coil in circuit in henries$]$

Inductance in henries of a coil in a resonant circuit =

$1 \div [39.478 \times (\text{resonant frequency})^2 \times$ capacity of the condenser in circuit in farads$]$.

OHMS LAW FOR D.C.

AMPERES = Volts ÷ Resistance.

" = Watts ÷ Volts.

" = $\sqrt{\text{Watts} \div \text{Resistance}}$.

VOLTS = Resistance x Amperes.

" = Watts ÷ Amperes.

" = $\sqrt{\text{Watts} \times \text{Resistance}}$.

WATTS = $[\text{Amperes}]^2 \times$ Resistance.

" = $[\text{Volts}]^2 \div$ Resistance.

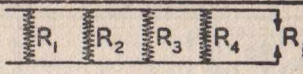
" = Amperes x Volts.

RESISTANCE = Volts ÷ Amperes.

" = $[\text{Volts}]^2 \div$ Watts.

" = Watts ÷ $[\text{Amperes}]^2$

RESISTANCES IN PARALLEL



$$R = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \frac{1}{R_4} + \text{etc.}}$$

2 PARALLEL RESISTANCES

$$R = [R_1 \times R_2] \div [R_1 + R_2]$$

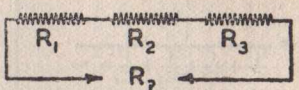
3 PARALLEL RESISTANCES

$$R = \frac{R_1 \times R_2 \times R_3}{[R_1 \times R_2] + [R_2 \times R_3] + [R_3 \times R_1]}$$

4 PARALLEL RESISTANCES

$$R = \frac{R_1 \times R_2 \times R_3 \times R_4}{[R_1 \times R_2 \times R_3] + [R_2 \times R_3 \times R_4] + [R_3 \times R_4 \times R_1] + [R_4 \times R_1 \times R_2]}$$

RESISTANCES IN SERIES



$$R = R_1 + R_2 + R_3 + \text{etc}$$

OHMS. LAW FOR A.C.

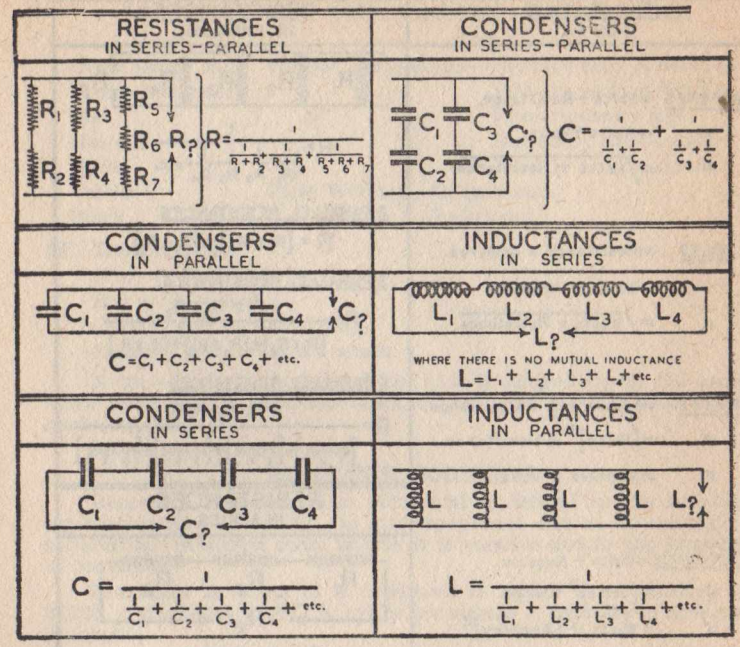
Where I = current in amperes.
Z = impedance in ohms.
E = voltage across Z.
P = wattage.
X = degrees of phase angle.

E = P ÷ (I cos X).
= $\sqrt{PZ \div \cos X}$.
= IZ.

Z = P ÷ (I^2 cos X).
= E ÷ I.
= (E^2 cos X) ÷ P.

P = IE cos X.
= (E^2 cos X) ÷ Z.
= I^2 Z cos X.

I = P ÷ (E cos X).
= E ÷ Z.
= $\sqrt{P \div (Z \cos X)}$.



WAVELENGTH AND FREQUENCY TABLE.

This table enables all calculations for wavelength and frequency to be arrived at. Although the table only covers a limited scale it is quite easy to cover any range required by the following method : If the figure in column A is multiplied by 10 the answer in column B must be divided by 10, or if the figure in column A is divided by 100 the answer in column B must be multiplied by 100. If column A is used to denote wavelength, then the answer in column B will be in Megacycles, or if column A is used for Frequency in Megacycles, the answer in column B will denote the equivalent wavelength in metres. This table is based on the fact that the frequency in kilocycles is equal to 299,820 ÷ by the wavelength in metres, whilst the wavelength in metres is equal to 299,820 ÷ by the frequency in kilocycles.

FREQUENCY AND WAVELENGTH TABLE

A	B	A	B	A	B	A	B	A	B
299·8	1000	315·6	950	333·1	900	352·7	850	374·8	800
300·1	999	315·9	949	333·5	899	353·1	849	375·2	799
300·4	998	316·2	948	3339	898	3536	848	375·7	798
300·7	997	316·6	947	3342	897	3540	847	376·2	797
301·0	996	316·9	946	3346	896	3544	846	376·7	796
301·3	995	317·3	945	3350	895	3548	845	377·1	795
301·6	994	317·6	944	3354	894	3552	844	377·6	794
301·9	993	317·9	943	3357	893	3556	843	378·2	793
302·2	992	318·3	942	336·1	892	356·1	842	378·6	792
302·5	991	318·6	941	3365	891	356·5	841	379·0	791
302·8	990	319·0	940	3369	890	3569	840	379·5	790
303·1	989	319·3	939	337·3	889	357·4	839	380·0	789
303·5	988	319·6	938	3376	888	3578	838	380·5	788
3038	987	319·9	937	3380	887	358·2	837	381·0	787
304·1	986	320·3	936	3384	886	3586	836	381·4	786
304·4	985	320·7	935	3388	885	3590	835	381·9	785
304·7	984	321·0	934	3392	884	3595	834	382·4	784
305·0	983	321·4	933	3395	883	3599	833	382·9	783
305·3	982	321·7	932	3398	882	360·4	832	383·4	782
305·6	981	322·0	931	3403	881	360·8	831	383·9	781
305·9	980	322·3	930	3407	880	361·2	830	384·4	780
306·3	979	322·7	929	341·1	879	361·6	829	384·9	779
306·6	978	323·1	928	3415	878	362·1	828	385·4	778
3069	977	323·4	927	3419	877	362·5	827	385·9	777
307·2	976	323·8	926	3423	876	363·0	826	386·4	776
307·5	975	324·1	925	3427	875	363·4	825	386·9	775
3078	974	3245	924	3430	874	363·9	824	387·4	774
3081	973	3248	923	3434	873	364·3	823	387·9	773
3084	972	325·2	922	3438	872	3647	822	388·4	772
3088	971	325·5	921	3442	871	365·2	821	388·9	771
309·1	970	325·9	920	3446	870	3657	820	389·4	770
309·4	969	326·2	919	3450	869	366·1	819	389·9	769
3098	968	326·6	918	3454	868	366·5	818	390·4	768
310·1	967	327·0	917	3458	867	3670	817	390·9	767
3104	966	327·3	916	3462	866	367·4	816	391·4	766
3108	965	327·7	915	3466	865	3679	815	391·9	765
311·0	964	3280	914	3470	864	3683	814	392·4	764
311·3	963	3284	913	3474	863	3688	813	392·9	763
311·7	962	3288	912	3478	862	3692	812	393·4	762
3120	961	329·1	911	3482	861	3696	811	394·0	761
312·3	960	3295	910	3486	860	370·1	810	394·5	760
312·7	959	3299	909	3490	859	3706	809	395·0	759
3130	958	3302	908	3494	858	371·1	808	395·5	758
313·3	957	3306	907	3498	857	371·5	807	396·0	757
3136	956	3309	906	3502	856	3720	806	3966	756
3140	955	3313	905	3507	855	3724	805	397·1	755
3143	954	3317	904	351·1	854	372·9	804	397·6	754
3146	953	332·1	903	351·5	853	3734	803	398·2	753
3149	952	3324	902	351·9	852	3738	802	398·7	752
315·3	951	3328	901	352·3	851	3743	801	399·2	751

FREQUENCY AND WAVELENGTH TABLE

A	B	A	B	A	B	A	B	A	B
399·8	750	428·3	700	461·3	650	499·7	600	545·1	550
400·3	749	428·9	699	462·0	649	500·5	599	546·1	549
400·8	748	429·5	698	462·7	648	501·4	598	547·1	548
401·4	747	430·1	697	463·4	647	502·2	597	548·1	547
401·9	746	430·8	696	464·1	646	503·1	596	549·1	546
402·4	745	431·4	695	464·8	645	503·9	595	550·1	545
402·9	744	432·1	694	465·6	644	504·7	594	551·1	544
403·5	743	432·6	693	466·4	643	505·6	593	552·2	543
404·1	742	433·3	692	467·0	642	506·5	592	553·2	542
404·6	741	433·9	691	467·7	641	507·3	591	554·2	541
405·2	740	434·5	690	468·5	640	508·2	590	555·2	540
405·7	739	435·1	689	469·2	639	509·0	589	556·3	539
406·3	738	435·8	688	469·9	638	509·9	588	557·3	538
406·8	737	436·4	687	470·7	637	510·8	587	558·3	537
407·4	736	437·1	686	471·4	636	511·6	586	559·4	536
407·9	735	437·7	685	472·1	635	512·5	585	560·4	535
408·5	734	438·3	684	472·9	634	513·4	584	561·5	534
409·0	733	439·0	683	473·6	633	514·3	583	562·5	533
409·6	732	439·6	682	474·4	632	515·2	582	563·6	532
410·2	731	440·3	681	475·2	631	516·0	581	564·6	531
410·7	730	440·9	680	475·9	630	516·8	580	565·7	530
411·3	729	441·6	679	476·7	629	517·7	579	566·8	529
411·8	728	442·3	678	477·4	628	518·7	578	567·8	528
412·4	727	442·9	677	478·2	627	519·6	577	568·9	527
413·0	726	443·5	676	478·9	626	520·5	576	570·1	526
413·6	725	444·2	675	479·7	625	521·4	575	571·1	525
414·1	724	444·8	674	480·5	624	522·3	574	572·2	524
414·7	723	445·5	673	481·3	623	523·2	573	573·3	523
415·3	722	446·2	672	482·0	622	524·2	572	574·4	522
415·8	721	446·8	671	482·8	621	525·1	571	575·5	521
416·4	720	447·6	670	483·6	620	526·0	570	576·6	520
417·0	719	448·2	669	484·4	619	526·9	569	577·7	519
417·6	718	448·8	668	485·1	618	527·9	568	578·8	518
418·2	717	449·5	667	485·9	617	528·8	567	579·9	517
418·8	716	450·2	666	486·7	616	529·7	566	581·1	516
419·3	715	450·9	665	487·5	615	530·7	565	582·2	515
419·9	714	451·5	664	488·3	614	531·6	564	583·3	514
420·5	713	452·2	663	489·1	613	532·5	563	584·4	513
421·1	712	452·9	662	489·9	612	533·5	562	585·5	512
421·7	711	453·6	661	490·7	611	534·5	561	586·6	511
422·3	710	454·3	660	491·5	610	535·4	560	587·8	510
422·9	709	455·1	659	492·4	609	536·4	559	588·9	509
423·5	708	455·7	658	493·1	608	537·3	558	590·2	508
424·1	707	456·3	657	493·9	607	538·3	557	591·3	507
424·7	706	457·0	656	494·8	606	539·2	556	592·5	506
425·3	705	457·7	655	495·7	605	540·2	555	593·7	505
425·9	704	458·4	654	496·5	604	541·2	554	594·9	504
426·5	703	459·1	653	497·3	603	542·2	553	596·1	503
427·1	702	459·8	652	498·0	602	543·2	552	597·3	502
427·7	701	460·5	651	498·9	601	544·1	551	598·4	501

FREQUENCY AND WAVELENGTH TABLE

A	B	A	B	A	B	A	B	A	B
599·6	500	666·3	450	749·4	400	856·5	350	999·4	300
600·8	499	667·8	449	751·3	399	859·1	349	1003·	299
602·1	498	669·2	448	753·2	398	861·6	348	1006·	298
603·3	497	670·7	447	755·1	397	864·1	347	1009·	297
604·5	496	672·2	446	757·1	396	866·5	346	1013·	296
605·7	495	673·8	445	759·1	395	869·1	345	1016·	295
606·9	494	675·3	444	761·0	394	871·6	344	1020·	294
608·2	493	676·9	443	762·8	393	874·2	343	1024·	293
609·4	492	678·3	442	764·8	392	876·7	342	1027·	292
610·6	491	679·9	441	766·7	391	879·2	341	1030·	291
611·9	490	681·4	440	768·7	390	881·8	340	1034·	290
613·1	489	683·0	439	770·7	389	884·4	339	1037·	289
614·4	488	684·6	438	772·7	388	887·1	338	1041·	288
615·6	487	686·1	437	774·7	387	889·7	337	1045·	287
616·9	486	687·7	436	776·8	386	892·3	336	1048·	286
618·2	485	689·2	435	778·8	385	895·1	335	1052·	285
619·5	484	690·8	434	780·8	384	897·7	334	1056·	284
620·7	483	692·4	433	782·8	383	900·3	333	1059·	283
622·1	482	694·0	432	784·8	382	903·1	332	1063·	282
623·3	481	695·6	431	786·9	381	905·8	331	1066·	281
624·6	480	697·3	430	789·0	380	908·6	330	1070·	280
625·9	479	698·9	429	791·1	379	911·3	329	1074·	279
627·3	478	700·6	428	793·2	378	914·1	328	1078·	278
628·6	477	702·2	427	795·3	377	916·9	327	1082·	277
629·9	476	703·8	426	797·4	376	919·7	326	1086·	276
631·2	475	705·5	425	799·5	375	922·5	325	1090·	275
632·5	474	707·1	424	801·7	374	925·4	324	1094·	274
633·9	473	708·8	423	803·8	373	928·2	323	1098·	273
635·2	472	710·5	422	805·9	372	931·1	322	1102·	272
636·6	471	712·2	421	808·1	371	934·1	321	1106·	271
637·9	470	713·9	420	810·3	370	936·9	320	1110·	270
639·3	469	715·6	419	812·5	369	939·8	319	1115·	269
640·6	468	717·3	418	814·7	368	942·8	318	1119·	268
642·1	467	719·1	417	817·1	367	945·8	317	1123·	267
643·4	466	720·7	416	819·2	366	948·8	316	1127·	266
644·8	465	722·5	415	821·4	365	951·8	315	1131·	265
646·2	464	724·2	414	823·8	364	954·8	314	1136·	264
647·6	463	725·9	413	826·1	363	957·9	313	1141·	263
649·1	462	727·7	412	828·3	362	961·1	312	1145·	262
650·4	461	729·5	411	830·4	361	964·1	311	1149·	261
651·8	460	731·3	410	832·8	360	967·2	310	1153·	260
653·2	459	733·1	409	835·2	359	970·3	309	1158·	259
654·6	458	734·9	408	837·5	358	973·4	308	1162·	258
656·1	457	736·7	407	839·8	357	976·7	307	1167·	257
657·5	456	738·5	406	842·2	356	979·8	306	1171·	256
658·9	455	740·3	405	844·6	355	983·1	305	1176·	255
660·4	454	742·1	404	847·1	354	986·2	304	1180·	254
661·9	453	744·1	403	849·4	353	989·4	303	1185·	253
663·3	452	745·8	402	851·8	352	992·8	302	1190·	252
664·8	451	747·7	401	854·2	351	996·2	301	1195·	251

FREQUENCY AND WAVELENGTH TABLE									
A	B	A	B	A	B	A	B	A	B
1199	250	1362	220	1578	190	1873	160	2306	130
1204	249	1369	219	1587	189	1885	159	2323	129
1209	248	1375	218	1595	188	1898	158	2342	128
1214	247	1381	217	1603	187	1910	157	2361	127
1219	246	1388	216	1612	186	1923	156	2380	126
1224	245	1395	215	1620	185	1934	155	2399	125
1229	244	1401	214	1629	184	1947	154	2417	124
1234	243	1407	213	1638	183	1960	153	2438	123
1239	242	1414	212	1647	182	1973	152	2458	122
1244	241	1421	211	1656	181	1986	151	2478	121
1249	240	1428	210	1665	180	2000	150	2498	120
1255	239	1435	209	1675	179	2012	149	2521	119
1260	238	1442	208	1684	178	2025	148	2541	118
1265	237	1448	207	1694	177	2040	147	2563	117
1270	236	1454	206	1703	176	2053	146	2585	116
1276	235	1463	205	1713	175	2067	145	2607	115
1281	234	1470	204	1723	174	2082	144	2630	114
1287	233	1477	203	1733	173	2097	143	2653	113
1293	232	1484	202	1743	172	2110	142	2677	112
1298	231	1492	201	1753	171	2127	141	2701	111
1303	230	1499	200	1763	170	2142	140	2726	110
1309	229	1507	199	1774	169	2157	139	2751	109
1315	228	1514	198	1784	168	2173	138	2776	108
1321	227	1523	197	1794	167	2188	137	2808	107
1327	226	1531	196	1806	166	2204	136	2828	106
1333	225	1538	195	1817	165	2221	135	2855	105
1338	224	1545	194	1828	164	2237	134	2883	104
1344	223	1553	193	1839	163	2254	133	2911	103
1351	222	1562	192	1851	162	2272	132	2939	102
1357	221	1570	191	1862	161	2289	131	2969	101
								2998	100

CALCULATION OF CORRECT RESISTOR FOR SELF BIAS.

From Ohms. law :—

$$R = \frac{\text{Grid Bias Voltage} \times 1{,}000.}{\text{Total Cathode Current in Ma} \times \text{number of Valves involved.}}$$

For Triodes total cathode current = plate current.

For Pentodes and Tetrodes, total cathode current = plate plus screen currents.

For Pentagrids, total cathode current = plate plus screen plus oscillator plate currents.

Example.—Find Bias Resistor for two 6K6 Valves operating in push pull with 315 volts on the plates.

The following data is obtained from valve characteristics for the 6K6 from Bernards " Radio Valve Manual, No. 30," price 3/6.

Grid Bias = 21 volts

Screen Current = 4 Ma.

Plate Current = 25.5 Ma. ∴ Total Cathode Current = 29.5 Ma.

Therefore, $R = \frac{21 \times 1{,}000}{29.5 \times 2} = \frac{21{,}000}{59} = 355$ ohms. approximately.

When over biased operation is used the advised bias resistor value will be shewn under Ratings and current applications for the type of Valve involved in Bernard's " Radio Valve Manual."

POWER RATINGS OF FIXED RESISTANCES

Wattage Rating ↓	OHMS →	50	100	250	500	750	1000	2000	3000	4000	5000
0·5 Watt	Amps	·1	·07	·045	·032	·025	·022	·016	·013	·011	·010
	Volts	5	7	11	16	20	22	32	39·5	45	50
1·0 Watt	Amps	·141	·10	·063	·045	·036	·032	·022	·018	·016	·014
	Volts	7	10	16	22	27	32	45	55	62·5	71
2·0 Watts	Amps	·2	·141	·089	·061	·051	·045	·032	·026	·022	·020
	Volts	10	14·1	23·1	32·5	39	45	62	77	89	100
3·0 Watts	Amps	·25	·173	·108	·076	·062	·055	·040	·032	·027	·025
	Volts	12·2	17·3	27·2	39	49	55	77	95	110	121
5·0 Watts	Amps	·32	·224	·141	·100	·083	·071	·050	·041	·035	·032
	Volts	15·8	22·4	35·5	50	60	71	100	124	141	159

Wattage Rating ↓	OHMS →	6000	7000	8000	9000	10000	15000	20000	25000	30000
0·5 Watt	Amps	·009	·008	·008	·0075	·007	·0058	·0055	·0045	·004
	Volts	55	59	63	67	71	86	100	110	124
1·0 Watt	Amps	·013	·012	·011	·0105	·010	·008	·007	·0063	·0058
	Volts	77	84	89	95	100	121	141	158	174
2·0 Watts	Amps	·018	·017	·016	·015	·014	·011	·010	·009	·0082
	Volts	110	118	125	135	141	172	200	225	244
3·0 Watts	Amps	·022	·021	·020	·018	·017	·014	·012	·011	·010
	Volts	135	145	154	164	172	213	245	272	300
5·0 Watts	Amps	·029	·027	·025	·023	·022	·018	·016	·014	·013
	Volts	173	188	200	212	225	265	315	355	389

Wattage Rating ↓	OHMS →	40000	50000	75000	100000	200000	250000	500000	750000	1000000
0·5 Watt	Amps	·0035	·003	·0025	·0021	·0015	·0014	·001	·0008	·0007
	Volts	140	159	194	220	321	350	500	612	709
1·0 Watt	Amps	·005	·0043	·0036	·003	·0023	·002	·0014	·0012	·001
	Volts	200	225	275	309	441	500	700	866	1000
2·0 Watts	Amps	·0071	·0063	·0052	·0044	·0032	·0028	·002	·0016	·0014
	Volts	282	317	387	440	631	700	1000	1224	1410
3·0 Watts	Amps	·0087	·0077	·0062	·0055	·004	·0035	·0025	·002	·0017
	Volts	344	386	475	550	770	861	1200	1500	1720
5·0 Watts	Amps	·011	·010	·008	·007	·005	·0045	·003	·0026	·0022
	Volts	448	500	613	707	1000	1120	1581	1937	2250

COPPER WIRE TABLES

S.W.G.	DIAMETER.	Weight in lbs. per 1000 yds	Resistance in ohms per lb	Resistance in ohms per 1000 yds	TURNS PER INCH CLOSE WOUND					Area of wire in circular Mils.	TURNS PER SQUARE INCH WITH WIRES WOUND SIDE BY SIDE AND EACH LAYER IMMEDIATELY ABOVE THE OTHER				
					Enamel.	Single Silk	Double Silk	Single Cotton	Double Cotton		Enamel	Single Silk	Double Silk	Single Cotton	Double Cotton
7/0	·5000	2271·0	·000053	·12227	—	—	—	—	—	250000	—	—	—	—	—
5/0	·4320	1695·1	·000096	·16379	—	—	—	—	—	186624	—	—	—	—	—
3/0	·3720	1256·9	·000175	·2209	—	—	—	—	—	138384	—	—	—	—	—
1/0	·3240	935·5	·000305	·2912	—	—	—	—	—	104976	—	—	—	—	—
2	·2760	691·9	·000580	·4013	—	—	—	—	—	76176	—	—	—	—	—
4	·2320	488·9	·001161	·5679	—	—	—	—	—	53824	—	—	—	—	—
6	·1920	334·8	·002476	·8292	—	—	—	—	—	36864	—	—	—	—	—
8	·1600	232·5	·005135	1·1941	—	—	—	—	—	25600	—	—	—	—	—
10	·1280	148·82	·012537	1·8657	7·5	—	—	—	—	16384	56	—	—	—	—
11	·1160	112·22	·018587	2·272	8·2	—	—	8·0	7·6	13456	67	—	—	64	58
12	·1040	98·24	·02877	2·826	9·1	—	—	8·8	8·4	10816	83	—	—	77	71
13	·0920	76·88	·04698	3·612	9·4	—	—	9·9	9·3	8464	88	—	—	98	86
14	·0800	58·13	·08216	4·776	10·8	—	—	11·2	10·5	6400	117	—	—	125	110
15	·0720	47·09	·12523	5·897	13·2	—	—	12·5	11·8	5184	174	—	—	157	139
16	·0640	37·20	·2006	6·611	14·8	14·7	14·5	13·9	13·0	4096	219	216	210	193	169
17	·0560	28·48	·3422	9·747	16·9	16·7	16·5	15·7	14·5	3136	285	279	272	246	210
18	·0480	20·93	·6340	13·267	19·7	19·8	19·4	18·0	16·8	2304	388	392	376	324	282
19	·0400	14·533	1·3146	19·105	23·5	23·5	23·0	21·0	19·4	1600	562	552	529	441	376
20	·0360	11·772	2·004	23·59	26·0	26·0	25·3	23·5	21·0	1296	676	676	640	552	441
21	·0320	9·301	3·209	29·85	29·2	29·1	28·3	26·1	23·0	1024	852	847	800	681	529
22	·0280	7·121	5·475	38·99	33·0	33·0	31·8	29·1	25·4	784	1089	1089	1017	846	645
23	·0240	5·232	10·144	53·07	38·3	39·6	37·8	34·2	28·4	576	1467	1568	1428	1169	796
24	·0220	4·396	14·366	63·16	41·6	42·1	36·9	36·7	31·0	484	1730	1772	1361	1346	961
25	·0200	3·633	21·030	76·42	45·5	46·0	43·1	39·6	33·1	400	2070	2116	1857	1568	1095

The above data supplied by courtesy of London Electric Wire Co. & Smiths Ltd. [LEWCOS]

COPPER WIRE TABLES [CONTINUED]

S.W.G.	DIAMETER	Weight in lbs. per 1000 yds.	Resistance in ohms per lb.	Resistance in ohms per 1000 yds	TURNS PER INCH CLOSE WOUND					Area of wire in circular Mils.	TURNS PER SQUARE INCH WITH WIRES WOUND SIDE BY SIDE AND EACH LAYER IMMEDIATELY ABOVE THE OTHER				
					Enamel.	Single Silk	Double Silk	Single Cotton	Double Cotton		Enamel.	Single Silk	Double Silk	Single Cotton	Double Cotton
26	·0180	2·943	32·06	94·35	50·2	51·2	48·3	43·0	36·4	324·00	2520	2621	2333	1849	1253
27	·0164	2·443	46·52	113·65	55·1	55·8	52·3	46·2	37·6	268·96	3036	3113	2735	2134	1413
28	·0148	1·9895	70·14	139·55	61·0	61·7	57·4	50·2	38·6	219·04	3721	3806	3294	2520	1489
29	·0136	1·6800	98·37	165·27	66·0	66·7	61·7	53·5	40·5	184·96	4356	4448	3808	2862	1640
30	·0124	1·3966	142·35	198·80	72·5	72·4	66·6	57·1	44·4	153·76	5256	5024	4435	3260	1971
31	·0116	1·2222	185·87	227·2	77·5	76·9	70·4	59·8	46·0	134·56	6006	5913	4956	3576	2116
32	·0108	1·0594	247·4	262·1	82·7	81·9	74·6	62·8	47·8	116·64	6839	6707	5565	3943	2284
33	·0100	·9083	336·5	305·7	89·3	88·7	79·3	66·2	49·7	100·00	7956	7867	6288	4382	2470
34	·0092	·7688	469·8	361·2	97·0	94·3	84·7	69·9	51·7	84·64	9409	8892	7174	4886	2672
35	·0084	·6409	676·0	433·2	105	102	90·9	80·0	57·1	70·56	11025	10404	8262	6400	3260
36	·0076	·5246	1008·7	529·2	116	111	97·9	85·4	59·9	57·76	13456	12321	9584	7293	3588
37	·0068	·4200	1574·0	661·1	128	122	104	91·7	63·7	46·24	16384	14884	10816	8408	4057
38	·0060	·3270	2597·0	849·1	145	135	113	99·0	67·7	36·00	21025	18225	12769	9801	4583
39	·0052	·2456	4603	1130·5	164	151	125	107	70·9	27·04	26896	22801	15625	11449	5026
40	·0048	·2093	6340	1326·7	178	161	131	112	75·1	23·04	31684	25921	17161	12544	5640
41	·0044	·17585	8979	1578·9	192	175	149	——	——	19·36	36864	30625	22201	——	——
42	·0040	·14533	13146	1910·5	208	188	158	——	——	16·00	43264	35344	24964	——	——
43	·0036	·11772	20040	2359	227	204	169	——	——	12·96	51529	41616	28561	——	——
44	·0032	·09301	32090	2985	256	222	181	——	——	10·24	65536	49284	32761	——	——
45	·0028	·07121	54750	3899	286	243	196	——	——	7·84	81796	59049	38416	——	——
46	·0024	·05232	101440	5307	333	270	212	——	——	5·76	110889	72900	44944	——	——
47	·0020	·03633	210300	7642	385	302	232	——	——	4·00	148225	91204	53824	——	——
48	·0016	·02325	513500	11941	——	——	——	——	——	2·56	——	——	——	——	——
49	·0012	·013079	1623000	21230	——	——	——	——	——	1·44	——	——	——	——	——
50	·0010	·009083	3365000	30570	——	——	——	——	——	1·00	——	——	——	——	——

The above data supplied by courtesy of London Electric Wire Co. & Smiths Ltd. [LEWCOS]

PROPERTIES AND CHARACTERISTICS OF RESISTANCE MATERIALS

MATERIAL	Resistance relative to COPPER	Resistance in ohms per circular Mil-Foot.	Temperature Coefficient of Resistivity per °C	Resistance in Microhms per cubic Centimetre	Resistance in ohms per square Mil-Foot	Resistance in Microhms per cubic Inch
Copper.	1·0	10·3	+·0039	1·724	8·0	0·68
Steel.	6·4	67·4	+·0043	11·2	53·0	4·41
Aluminium.	1·7	16·9	+·0038	2·82	13·0	1·11
Pure Iron.	5·8	60·2	+·005	10·0	47·0	3·94
Silver.	0·9	9·5	+·0037	1·59	7·5	0·63
Gold.	1·3	14·6	+·0035	2·43	11·0	0·94
Platinum.	5·8	60·2	+·0031	10·0	47·0	3·94
Tin.	6·6	67·5	+·0043	11·4	54·0	4·49
Zinc.	3·3	33·8	+·0036	5·7	27·0	2·25
Lead.	12·7	133·0	+·0039	21·9	104·0	8·63
Nickel.	6·0	61·4	+·0059	10·2	48·0	4·02
Advance.	28·4	295·0	+·000014	49·0	232·0	19·31
Eureka.	28·4	295·0	+·000014	49·0	232·0	19·31
Glowray.	59·0	602·0	+·00001	100·0	473·0	39·4
Climax.	50·4	524·0	+·00069	87·0	412·0	34·28
Constantan.	28·4	295·0	+·000014	49·0	232·0	19·31
Excello.	52·8	547·0	+·00017	91·0	430·0	35·86
Ideal.	28·0	295·0	+·000014	49·0	232·0	19·31
Manganin.	25·5	265·0	+·000014	44·0	208·0	17·33
Platinoid.	24·3	253·0	+·0003	42·0	199·0	16·55
Ia.–Ia.	29·6	307·0	−·000024	51·0	241·0	20·1
Tungsten.	3·3	33·8	+·0044	5·7	27·0	2·25
Monel.	24·3	253·0	+·0021	42·0	199·0	16·55
Alumel.	19·1	199·0	+·0011	33·0	156·0	13·10
Chromel.	44·0	458·0	+·00007	76·0	360·0	29·94
Copel.	28·4	295·0	+·000001	49·0	232·0	19·31
Carbon.	2030·0	21070·0	−·0005	3500·0	16555·0	1379·0
Brightray.	58·0	602·0	+·00019	100·0	473·0	39·4
Dullray.	50·4	525·0	+·0007	87·0	412·0	29·94
Cupro.	15·0	157·0	+·0003	26·0	123·0	10·24
No-Mag.	81·8	848·0	+·00091	141·0	667·0	55·55
Nicrome 5%	52·8	547·0	+·00105	91·0	430·0	35·86
Nicrome 15%	63·8	662·0	+·0002	110·0	520·0	43·34
" 80%20%	63·2	656·0	+·0001	109·0	515·0	42·95
Corronil.	29·0	301·0	+·00065	50·0	236·0	19·7
Redray.	53·9	559·0	+·00026	93·0	440·0	36·65
Mangonic.	8·6	90·2	+·0035	14·95	74·0	5·87
B.B.	23·2	241·0	+·00021	40·0	189·0	15·76
Ferry.	27·8	289·0	+·00002	48·0	227·0	18·91
Zodiac.	20·9	217·0	+·00023	36·0	170·0	14·19
Tarnac.	22·6	235·0	+·000017	39·0	184·0	15·36
Ferrozoid.	48·8	506·0	+·00076	84·0	398·0	33·09
Cromaloy 2	63·8	662·0	+·00013	110·0	520·0	43·34
" 3	53·9	559·0	+·00013	93·0	440·0	36·65
" 4	58·0	602·0	+·00008	100·0	473·0	39·4
Nickel-Silver. 1	18·0	187·0	+·00027	31·0	147·0	12·22
" " 4	12·2	127·0	+·00047	21·0	100·0	8·28
Platinum-Iridium.	18·0	187·0	+·00082	31·0	147·0	12·22
" Silver.	18·2	190·0	+·00028	31·4	148·0	12·38
Kromore.	52·2	542·0	+·0002	90·0	426·0	35·46

RESISTANCE WIRE DATA

S.W.G.	NICKEL SILVER WIRE				MANGANIN WIRE				PLATINOID WIRE				Dia. in INCHES
	RESISTANCE		Amperage required for temperature rise of		RESISTANCE		Amperage required for temperature rise of		RESISTANCE		Amperage required for temperature rise of		
	Ohms per 1000 ft. approx.	Ohms per Ounce approx.	200°C	100°C	Ohms per 1000 ft. approx.	Ohms per Ounce approx.	200°C	100°C	Ohms per 1000 ft. approx.	Ohms per Ounce approx.	200°C	100°C	
8	—	—	—	—	9·6	·008	61	39	9·5	·008	—	—	·160
10	—	—	—	—	15·0	·018	39	27	14·9	·018	—	—	·128
12	—	—	—	—	22·7	·042	28	21	22·7	·042	—	—	·104
14	—	—	—	—	38·3	·12	17·5	11·7	38·4	·12	—	—	·080
16	34	·17	14·2	8·1	59·6	·30	10·1	7·2	59·7	·31	—	—	·064
18	59	·53	9·4	6·1	107	·95	7·6	5·1	108	·95	—	—	·048
20	109	1·7	6·3	4·1	190	2·9	5·1	3·6	189	2·9	—	—	·036
21	—	—	—	—	241	4·9	—	—	—	—	—	—	·032
22	180	5·04	4·2	3·1	315	8·8	3·8	2·6	316	8·7	—	—	·028
23	—	—	—	—	428	15	—	—	—	—	—	—	·024
24	292	12·25	—	—	510	21	—	—	509	22	—	—	·022
25	—	—	—	—	617	32	—	—	—	—	—	—	·020
26	437	27·56	—	—	763	48	—	—	764	48	—	—	·018
27	—	—	—	—	918	70	—	—	—	—	—	—	·0164
28	669	64·37	—	—	1166	112	—	—	1165	112	—	—	·0148
30	917	121	—	—	1600	211	—	—	1601	212	—	—	·0124
32	—	—	—	—	2105	357	—	—	2104	367	—	—	·0108
34	—	—	—	—	2935	704	—	—	2933	705	—	—	·0092
36	—	—	—	—	4303	1520	—	—	4305	1520	—	—	·0076
38	—	—	—	—	6918	3900	—	—	6917	3901	—	—	·006
40	—	—	—	—	10762	9530	—	—	10764	9531	—	—	·0048
42	—	—	—	—	15413	19500	—	—	15416	19500	—	—	·004
44	—	—	—	—	24083	48000	—	—	24087	48000	—	—	·0032
46	—	—	—	—	42816	152000	—	—	48819	152000	—	—	·0024

The above data supplied by courtesy of London Electric Wire Co. & Smiths Ltd. (LEWCOS)

FUSE WIRE TABLES

Figures are approximate and for commercial use only

Fusing Current in Amperes	DIAMETER IN INCHES.				
	Copper.	Aluminium.	Tin.	Allo-Tin.	Lead.
1	·0020	·0028	·0076	·0084	·0084
2	·0036	·0040	·0116	·0136	·0124
3	·0044	·0052	·0148	·018	·0164
4	·0052	·0068	·018	·022	·020
5	·0060	·0076	·022	·024	·024
10	·0100	·0124	·036	·040	·036
15	·0124	·0164	·044	·048	·048
20	·0136	·0180	·052	·064	·060
25	·018	·0220	·064	·072	·072
30	·020	·024	·072	·080	·078
35	·023	·028	·076	·092	·084
40	·024	·030	·084	·096	·096
45	·026	·032	·092	·104	·104
50	·028	·036	·096	·116	·108
60	·032	·040	·110	·128	·124
70	·036	·044	·122	·144	·136
80	·040	·048	·134	·160	·150
90	·044	·052	·144	·168	·162
100	·048	·056	·152	·180	·174
120	·052	·064	·176	·202	·196

EUREKA RESISTANCE WIRE

(REGD.)

CURRENT NECESSARY TO MAINTAIN GIVEN TEMPERATURE RISE. WIRE HELD STRAIGHT AND HORIZONTAL IN AIR WITH FREE RADIATION.

Size S.W.G.	Diam. Inch	M/m.	Amperes for a Temperature rise of			Resistance per 1,000 yards at 15·5° C. Ohms.	Weight per 1,000 yards. lbs.
			100° C.	200° C.	300° C.		
8	·160	4·06	29·0	44·5	57·9	34·5	233·5
9	·144	3·65	24·0	37·2	48·7	42·6	189·0
10	·128	3·25	20·1	30·8	40·0	54·0	149·2
11	·116	2·94	18·5	28·1	36·4	65·7	122·8
12	·104	2·64	14·8	22·4	29·0	81·8	98·8
13	·092	2·33	12·6	18·8	24·5	104·4	77·1
14	·080	2·03	10·5	15·5	20·1	138·1	58·4
15	·072	1·82	9·3	13·4	17·4	170·6	47·3
16	·064	1·62	8·1	11·5	15·1	215·9	37·4
17	·056	1·42	7·0	9·8	13·0	281·9	28·6
18	·048	1·21	5·75	8·2	11·0	384	21·0
19	·040	1·01	4·6	6·7	9·2	552	14·6
20	·036	·91	4·1	6·0	8·3	682	11·8
21	·032	·81	3·6	5·4	7·4	864	9·35
22	·028	·71	3·1	4·6	6·5	1123	7·15
23	·024	·60	2·7	4·00	5·5	1535	5·24
24	·022	·55	2·4	3·55	5·0	1823	4·41
25	·020	·50	2·18	3·20	4·06	2211	3·64
26	·018	·45	2·00	2·90	3·60	2729	2·96
27	·0164	·41	1·82	2·68	3·21	3288	2·46
28	·0148	·37	1·66	2·42	2·85	4205	2·00
29	·0136	·34	1·54	2·22	2·58	4781	1·69
30	·0124	·31	1·40	2·00	2·30	5750	1·40
31	·0116	·29	1·30	1·81	2·13	6570	1·23
32	·0108	·27	1·20	1·64	1·94	7581	1·06
33	·0100	·25	1·08	1·46	1·77	8842	·912
34	·0092	·23	·98	1·30	1·60	10440	·771
35	·0084	·21	·85	1·13	1·42	12530	·644
36	·0076	·19	·75	·98	1·26	15310	·526
37	·0068	·17	·68	·83	1·09	19130	·421
38	·0060	·15	·58	·70	·93	24550	·328
39	·0052	·13	·50	·58	·78	32700	·246
40	·0048	·12	·46	·52	·70	38380	·210
41	·0044	·11				45670	·176
42	·0040	·10				55250	·146
43	·0036	·09				68070	·118
44	·0032	·08				86370	·093
45	·0028	·07				112800	·072
46	·0024	·06				153500	·053
47	·0020	·05				221000	·036
48	·0016	·040				345400	·023
49	·0012	·030				614000	·013
50	·0010	·025				884200	·009

The resistance values given above are standard and are subject to the tolerances given in B.S.I. Specification No. 115 of 1923

Approximate Characteristics

Temperature Co-efficient .. .. 0·000014.
Specific Resistance .. .. 49 microhms per cm cube
Comparative Resistance Copper—Unity 78
Specific Gravity .. .. .. 8·92

Thermo E.M.F against Copper
(20° to 300° C.) .. .. 0·5 millivolts per ° C
Melting Point .. .. .. 1,250° C.
Tensile Strength .. .. 36 tons per square inch

The above information supplied by courtesy of Lewcos Ltd.

ELECTRICAL CABLE SIZES

NOMINAL AREA Sq. inch.	OLD STANDARD No. S.W.G.	NEW STANDARD No/inch.	Dia. in inches	WEIGHT per 1000 yds. in lbs.	MAXIMUM RESISTANCE per 1000 yds. in OHMS.	LENGTH of CIRCUIT per Volt drop in feet.	CAPACITY of single cables in AMPS.
·001	1/20	1/·036	0·035	11·76	24·29	30	4·1
·0015	–	1/·044	0·044	17·58	16·26	30	6·1
·002	–	3/·029	0·062	23·37	12·61	30	7·8
·003	3/20	3/·036	0·078	36·02	8·180	29	12·0
·003	1/16	1/·064	0·064	37·20	7·688	29	12·9
·0045	–	7/·029	0·087	54·39	5·387	28	18·2
·007	7/20	7/·036	0·108	83·81	3·496	33	24·0
·01	–	7/·044	0·132	125·4	2·340	39	31·0
·0145	–	7/·052	0·155	174·9	1·675	45	37·0
·0225	7/16	7/·064	0·192	264·9	1·100	56	46·0
·03	–	19/·044	0·220	340·4	0·8637	61	53·0
·04	19/17	19/·052	0·260	475·5	0·6184	71	64·0
·06	19/16	19/·064	0·320	720·3	0·4085	83	83·0
·075	19/15	19/·072	—	911·6	0·3225	90	97·0
·10	–	19/·083	0·415	1212·0	0·2427	98	119·0
·12	37/16	37/·064	—	1403·0	0·2097	104	130·0
·15	37/15	37/·072	0·504	1776·0	0·1657	112	152·0
·20	–	37/·083	0·581	2360·0	0·1247	123	185·0
·25	–	37/·093	—	2963·0	0·09933	132	214·0
·30	–	37/·103	0·721	3635·0	0·08089	148	240·0
·40	–	61/·093	0·837	4886·0	0·06026	162	288·0
·50	–	61/·103	0·927	5994·0	0·04913	173	332·0
·60	–	91/·093	—	7290·0	0·04040	181	364·0
·75	–	91/·103	1·133	8942·0	0·03294	185	463·0
·85	–	127/·093	—	10175·0	0·02895	190	512·0
1·00	–	127/·103	1·339	12481·0	0·02360	200	595·0

FLEXIBLE CORDS

SIZE	AREA in Sq. Inches	CURRENT RATING in Amps.	RESISTANCE per 1000 yards single core..	MAXIMUM WEIGHT in lbs.	YARDS PER POUND WEIGHT for TWIN SILK (twisted)
14/·0076	·0006	2	39·7	3	17·5
23/·0076	·0010	3	24·2	5	13·3
40/·0076	·0017	5	13·8	10	9·75
70/·0076	·0030	10	7·94	10	6·55
110/·0076	·0048	15	5·05	10	4·65
162/·0076	·0070	20	3·43	10	3·33

MAXIMUM CURRENT RATING OF CABLES

SIZE	Rating in AMPERES A.C. & Voltage drop per 100 feet				SIZE	Rating in AMPERES A.C. & Voltage drop per 100 feet			
	Cores in one sheath					Cores in one sheath			
	UP TO 4		UP TO 8			UP TO 2		UP TO 4	
	AMPS.	VOLTS	AMPS.	VOLTS		AMPS.	VOLTS	AMPS.	VOLTS
1/·044	5	2·8	5	2·8	19/·052	78	1·75	62	1·4
3/·029	5	2·1	5	2·1	19/·064	102	1·55	82	1·19
3/·036	10	2·8	8	2·4	19/·083	147	1·35	119	1·04
7/·029	15	2·9	12	2·4	37/·072	190	1·28	151	0·98
					37/·083	229	1·26	183	0·98
	UP TO 2		UP TO 4		37/·103	298	1·28	238	0·98
7/·036	29	3·4	23	2·9	61/·093	358	1·38	286	1·04
7/·044	38	3·1	30	2·4	61/·103	413	1·50	330	1·15
7/·052	45	2·7	36	2·2	91/·103	530	1·80	—	—
7/·064	56	2·1	46	1·75	127/·103	648	2·10	—	—
19/·044	65	2·0	52	1·6					

CAPACITY OF FUSES IN AMPERES

FUSE RATING In Amps.	TINNED COPPER WIRE		STANDARD ALLOY WIRE		FUSE RATING in Amps.	TINNED COPPER WIRE		STANDARD ALLOY WIRE	
	Dia.	S.W.G.	Dia.	S.W.G.		Dia.	S.W.G.	Dia.	S.W.G.
1·8	—	—	·0164	27	30	·032	21	—	—
3	·006	38	·024	23	37	·04	19	—	—
5	·0084	35	·032	21	46	·048	18	—	—
8·5	·0124	30	—	—	53	·048	18	—	—
10	·0136	29	—	—	60	·056	17	—	—
15	·02	25	—	—	64	·056	17	—	—
17	·022	24	—	—	83	·072	15	—	—
20	·024	23	—	—	100	·08	14	—	—
24	·028	22	—	—					

COMPARISON BETWEEN
BRITISH & U.S.A. WIRE GAUGES
DIAMETERS IN INCHES

SIZE	4/0	3/0	2/0	0	1	2	3	4	5	6	7
S.W.G.	·400	·372	·348	·324	·300	·276	·252	·232	·212	·192	·176
B.W.G.	·454	·425	·380	·340	·300	·284	·259	·238	·220	·203	·180
B.&S.	·460	·4096	·3648	·3249	·2893	·2576	·2294	·2043	·1819	·1620	·1443

SIZE	8	9	10	11	12	13	14	15	16	17	18
S.W.G.	·160	·144	·128	·116	·104	·092	·080	·072	·064	·056	·048
B.W.G.	·165	·148	·134	·120	·109	·095	·083	·072	·065	·058	·049
B.&S.	·1285	·1144	·1019	·0907	·0808	·072	·0641	·0571	·0508	·0453	·0403

SIZE	19	20	21	22	23	24	25	26	27	28	29
S.W.G.	·040	·036	·032	·028	·024	·022	·020	·018	·0164	·0148	·0136
B.W.G.	·042	·035	·032	·028	·025	·022	·020	·018	·016	·014	·013
B.&S.	·0359	·032	·0285	·0253	·0226	·0201	·0179	·0159	·0142	·0126	·0113

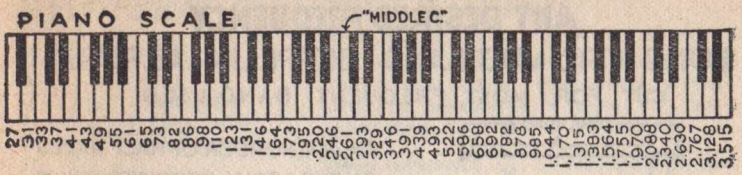
SIZE	30	31	32	33	34	35	36	37	38	39	40
S.W.G.	·0124	·0116	·0108	·010	·0092	·0084	·0076	·0068	·006	·0052	·0048
B.W.G.	·012	·010	·009	·008	·007	·005	·004	——	——	——	——
B.&S.	·0100	·0089	·0079	·0071	·0063	·0056	·005	·0045	·004	·0035	·0031

SIZE	41	42	43	44	45	46	47	48	49	50
S.W.G.	·0044	·0040	·0036	·0032	·0028	·0024	·002	·0016	·0012	·001
B.W.G.	——	——	——	——	——	——	——	——	——	——
B.&S.	·0028	·0025	·0022	·002	·0018	——	——	——	——	——

The above data supplied by courtesy of LEWCOS LTD.

RADIO SOLDER COMPOSITION AND MELTING POINTS

Composition	Percentage	Melting at °F	Composition	Percentage	Melting at °F
LEAD / TIN	100 / —	452	LEAD / TIN	40 / 60	462
LEAD / TIN	90 / 10	411	LEAD / TIN	30 / 70	494
LEAD / TIN	80 / 20	381	LEAD / TIN	20 / 80	551
LEAD / TIN	70 / 30	366	LEAD / TIN	10 / 90	568
LEAD / TIN	60 / 40	373	LEAD / TIN	— / 100	617
LEAD / TIN	50 / 50	411			



Piano scale showing the frequencies to which the keys are usually tuned, which is to a slightly different pitch from that used by physicists, based on Middle C = 256 c/s., and such scales are apt to be misleading. Frequencies of black keys can be obtained by multiplying the frequency of the white key below it by 1.05946. This scale is useful for the approximate calibration of oscillators and rough determination of resonant frequencies, etc.

VIBRATIONS AND THE MUSICAL SCALE.

Ratio of vibrations of 1 octave in any part of the Musical Scale :—

Note	C.	D.	E.	F.	G.	A.	B.	C.
Ratio	1	9/8	5/4	4/3	3/2	5/3	15/8	2
Decimal Ratio ...	1	1.125	1.25	1.33	1.5	1.66	1.875	2
Tonic Sol Fa Scale	Doh	Ray	Me	Fah	Soh	Lah	Te	Doh

* STROBOSCOPE TABLE.

FREQUENCY of Supply (c/s.)		15	25	33	40	50	60	80	90	100
RECORD SPEED	78 r.p.m.	23	38	51	62	77	92	123	139	154

To find the number of black spokes required for any speed and a.c. mains-frequency, the formula is :—

$$N \ \ldots \ = \frac{120.f}{r}$$

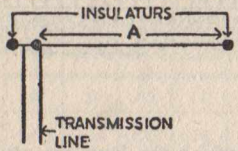
where N = number of black spokes.
f = mains supply frequency.
r = speed of record required.

N.B.—180 black spokes are required at 33⅓ r.p.m. for 50 c/s. mains.

FORMULAS FOR AERIALS CUT TO RESONATE AT ANY DESIRED FREQUENCY

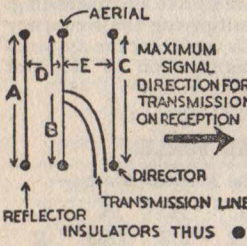
LONG WIRE MULTIBAND ZEPPELIN AERIAL

CUT FOR MOST FREQUENT BAND USED



$A = \left[\left\{164 (\text{NUMBER OF HALF WAVES ON THE AERIAL REQUIRED, MINUS } \cdot 05)\right\} \div \left\{\text{FREQUENCY IN MEGACYCLES OF MOST USED BRAND}\right\}\right]$ YDS.

DIRECTOR AND REFLECTOR HALF WAVE AERIAL



$A = \left\{164 \div (\text{FREQUENCY IN MEGACYCLES})\right\}$ YDS.

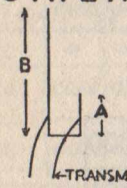
$B = \left\{156 \div (\text{FREQUENCY IN MEGACYCLES})\right\}$ YDS.

$C = \left\{150 \div (\text{FREQUENCY IN MEGACYCLES})\right\}$ YDS.

$D = \left\{(\text{WAVELENGTH IN METRES} \times \cdot 125) \times 1 \cdot 094\right\}$ YDS.

$E = \left\{(\text{WAVELENGTH IN METRES} \times \cdot 1) \times 1 \cdot 094\right\}$ YDS.

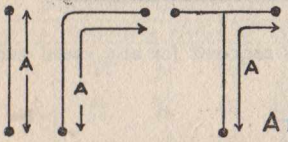
J TYPE AERIAL FOR VERY HIGH FREQUENCIES



$A = \left\{(\text{WAVELENGTH IN METRES} \div 4) \times 1 \cdot 094\right\}$ YDS.

$B = \left\{(\text{WAVELENGTH IN METRES} \times \cdot 75) \times 1 \cdot 094\right\}$ YDS.

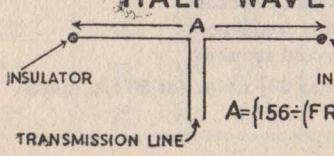
MARCONI TYPE ¼ WAVE AERIAL



$A = \left\{(\text{WAVELENGTH IN METRES} \div 4) \times 1 \cdot 094\right\}$ YARDS

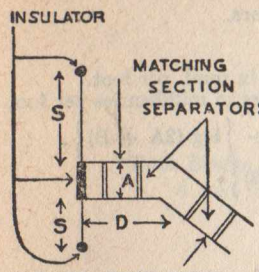
A HERE INCLUDES LENGTH OF LEADIN

HALF WAVE AERIAL



$A = \left\{156 \div (\text{FREQUENCY IN MEGACYCLES})\right\}$ YDS.

HALF WAVE Q MATCHED AERIAL



THE DIMENSION A DEPENDS UPON THE AERIAL IMPEDANCE AND THE IMPEDANCE OF THE TRANSMISSION LINE AND THE IMPEDANCE IN OHMS OF THE MATCHING SECTION IS EQUAL TO

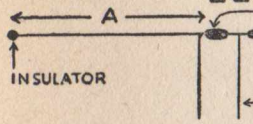
$$\sqrt{\text{AERIAL IMPEDANCE IN OHMS} \times \text{TRANSMISSION LINE IMPEDANCE IN OHMS}}$$

THEREFORE DIMENSION A IS OBTAINED BY REFERENCE TO THE SECTION DEALING WITH TRANSMISSION LINE FORMULAS ONCE THE IMPEDANCE OF THE MATCHING SECTION IS OBTAINED

D={78÷FREQUENCY IN MEGACYCLES)} YDS.

S={78÷FREQUENCY IN MEGACYCLES)} YDS.

ZEPPELIN AERIAL



A={156÷(FREQUENCY IN MEGACYCLES)} YDS

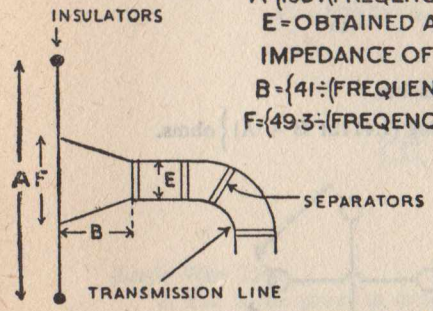
HALF WAVE DELTA MATCHED AERIAL

A={156÷(FREQENCY IN MEGACYCLES)} YDS.

E=OBTAINED ACCORDING TO THE IMPEDANCE OF THE TRANSMISSION LINE

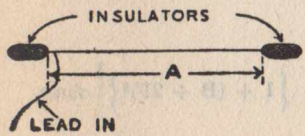
B={41÷(FREQUENCY IN MEGACYOLES)} YDS.

F={49·3÷(FREQENCY IN MEGACYCLES)} YDS.



LONG WAVE AERIAL

ANY NUMBER OF HALF WAVES IN LENGTH



A=[{164(NUMBER OF HALF WAVES ON THE AERIAL MINUS·05)} ÷{FREQUENCY IN MEGACYCLES}] YDS.

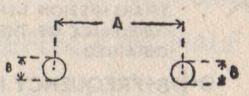
TRANSMISSION AND FEEDER LINE FORMULAS.

Two Wire Line.

Let A = Wire centre spacing in inches.
B = Wire diameters in inches.
C = Line impedance in ohms.
D = Capacity of twin line feeder in mmf. per foot.
E = Inductance of twin line feeder in millihenries per foot.

$$C = 276.36 \left\{\log (2A \div B)\right\}. \quad D = 3.679 \div \left\{\log (2A \div B)\right\}.$$

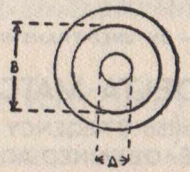
$$E = .2812 \left\{\log (2A \div B)\right\}.$$



Concentric Line.

A and B are given in inches.

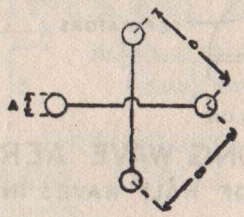
$$C = 138.18 \left\{\log (B \div A)\right\} \text{ ohms.}$$



Double Twin Line.

A and B are given in inches.

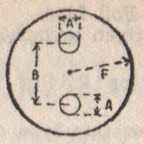
$$C = 138.18 \left\{\log (1.41421\ B \div A)\right\} \text{ ohms.}$$



Shielded Twin Line.

A, B and F are given in inches.

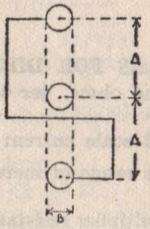
$$C = 276.36 \log \frac{2B}{A} \left\{\left\{1 - (B \div 2F)^2\right\} \div \left\{1 + (B \div 2F)^2\right\}\right\} \text{ ohms.}$$



Twin Single Line.

A and B are given in inches.

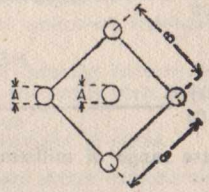
$$C = 207.3 \left\{ \log (1.587401A \div B) \right\} \text{ ohms.}$$



Square Concentric Line.

A and B are given in inches.

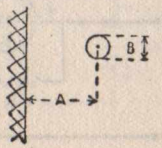
$$C = 171.71 \left\{ \log (1.148\ B \div A) \right\} \text{ ohms.}$$



Single Wire Line.

A and B are given in inches.

$$C = 138.18 \left\{ \log (4\ A \div B) \right\} \text{ ohms.}$$

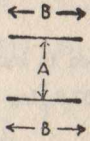


Parallel Thin Strip Foil Line.

A and B are given in inches.

$$C=1188\div\left[1+2.3\log\left\{2.3\log\left(\frac{(1+3.142B)}{A}\right)+\frac{3.142B}{A}+1\right\}+\frac{3.142B}{A}\right]$$

The formula for this type of line is only true when B is much greater than A.



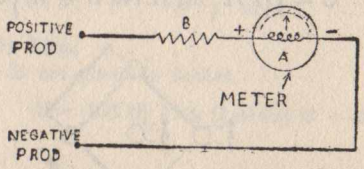
METER FORMULAS FOR DIRECT CURRENT MEASUREMENTS.

(*a*) To find the ohms. per volt resistance of a voltmeter. This value is equal to :—

1 ÷ full scale current in amperes.

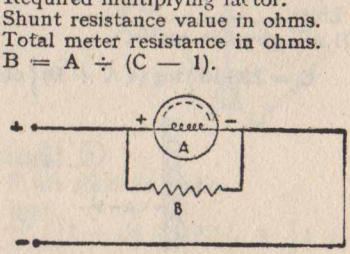
(*b*) To increase range of meter for voltage reading by any desired multiplier.

Let B = multiplier resistance value in ohms.
A = Total meter resistance in ohms.
Then B = (Required full scale reading in volts ÷ by the full scale meter current in amperes).



(*c*) To increase range of milliameter for current reading by any desired multiplier.

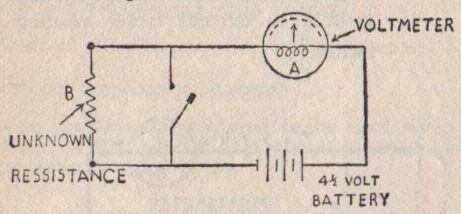
Let C = Required multiplying factor.
B = Shunt resistance value in ohms.
A = Total meter resistance in ohms.
Then B = A ÷ (C — 1).



(*d*) To find ohmage value of unknown resistance by using a voltmeter and battery.

Let B = value of unknown resistance.
A = resistance of voltmeter in ohms.

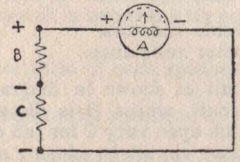
Then B = A {(Reading of voltmeter with closed switch ÷ Reading of voltmeter with open switch) — 1}



(*e*) To find value of universal current shunts.

Let D = required multiplier factor.
C + B = total resistance in ohms. for lowest shunted current range required.
A = meter resistance in ohms.

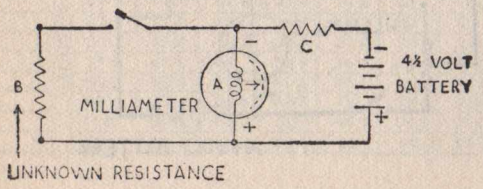
$$B = (A + B + C) \div D.$$



(*f*) To find ohmage value of unknown resistance by means of milliameter and battery.

Let C = series resistor for limiting battery current so as to give a reading on the meter scale when switch is open.
B = unknown resistance.
A = resistance of milliameter in ohms.

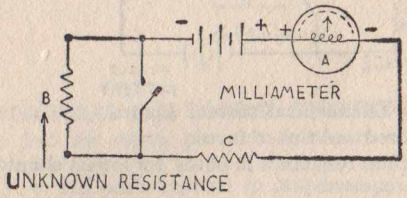
Then B = {Switch closed meter current reading ÷ (switch open meter current reading minus switch closed meter current reading)}.



(*g*) To find ohmage value of unknown resistance by means of milliameter, battery and any known resistor.

Let C = known resistance value in ohms.
B = unknown resistance value in ohms.
A = Meter resistance in ohms.

Then B = $\{C + A\}$ {(Meter current reading with closed switch minus meter current reading with open switch) ÷ current meter reading with open switch}.

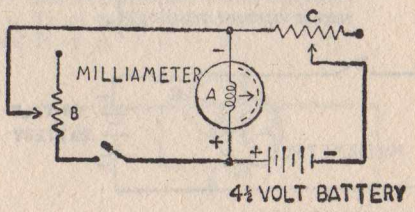


(*h*) To find the direct current resistance in ohms. of an unidentified voltmeter or milliameter.

Let C and B = Variable resistors.
A = unknown meter resistance.

Then connect circuit as shown in diagram with resistor C only being used in circuit, whilst B is disconnected by switch being open. With switch open vary C for full scale meter reading, then bring resister B into circuit by closing switch, and vary B until the meter reading returns to half scale. Then, if the value of resistance B at this setting is checked by an ohmmeter, the reading shown is equal to the resistance of A. It is vital that resistance C is of sufficiently high value to prevent an off the scale meter reading. If the full scale current of the meter is known, it is easy to calculate value of C by the following formula :—

C = (1,000 times testing battery voltage used) ÷ (meter full scale current in milliamperes).



SPEAKER OUTPUT TRANSFORMERS FORMULAS.

Ascertain output valve load resistance from "Bernards Valve Manual" No. 30, price 3/6, or from manufacturers data sheets and also speaker speech coil impedance in ohms. NOTE.—When two valves operate in Push-Pull, reckon the output load resistance to be twice that of a single valve, and when two valves are operating in parallel reckon output load resistance to be half that of a single valve.

The speaker output transformer ratio is equal to :—

Square root of { (Optimum valve load resistance) ÷ (speaker speech coil impedance in ohms) }.

When extension speakers are required to be used with the same speech coil impedance as that used in the normal internal speaker, the output transformer ratio is equal to :—

Square root of [Number of speakers × { (optimum valve load resistance) ÷ (single speaker speech coil impedance in ohms.) }]

Output transformer ratio for extra speakers with different speech coil impedances. In this case it is necessary for each speaker to have its own output transformer.

The output transformer ratio of each speaker is equal to :—

Square root of [Number of speakers × { (Optimum valve load resistance) ÷ (Impedance in ohms. of speech coil of speaker being used) }]

OUTPUT TRANSFORMERS
TABLE OF RATIOS

VALVE LOAD (PLATE TO PLATE FOR P.P. OPERATION)	RATIOS ↑	SPEECH COIL IMPEDANCES							
		2 Ω	3 Ω	5 Ω	8 Ω	10 Ω	15 Ω	20 Ω	25 Ω
4000		44·7	36·5	28·3	22·4	20	16·4	14·1	12·6
5000		50	40·8	31·6	25	22·4	18·3	15·8	14·1
6000		54·8	44·7	34·6	27·4	24·5	20	17·3	15·5
8000		63·3	51·6	40	31·6	28·3	23	20	17·9
10000		70·7	57·7	44·7	35·3	31·6	25·8	22·4	20
12000		77·5	63·3	49	38·7	34·6	28·3	24·5	22
14000		83·7	68·3	53	41·8	37·4	30·6	26·5	23·7
16000		89·4	73	56·6	44·7	40	32·8	28·3	25·3
20000		100	81·6	63·2	50	44·7	36·5	31·6	28·3
25000		111·8	91·3	70·7	55·9	50	40·8	35·3	31·6

WAVELENGTH FREQUENCY AND L.C. FACTOR TABLES.

To use these tables which give inductance capacity values for Radio Frequencies the following examples are shown :—

1. Given a tuned circuit total capacity .0005 mfd. and inductance 245 microhenries, what is the natural wavelength and frequency? Answer : the L.C. constant is .0005 × 245 = .1225 ; therefore, wavelength is 660 metres and frequency 454.3 Kilocycles.

2. What inductance is needed to tune a .0005 mfd. condenser to 1,900 metres. Answer : L.C. for 1,900 metres = 1.016 ; therefore, inductance is 1.016 divided by .0005 which equals 2.032 microhenries.

3. A circuit with a natural frequency of 1,250 Kc. is required, the tuning coil inductance being 81 microhenries. What capacity should be connected across the coil? Answer : L.C. for 1,250 Kc. = .01624 ; hence capacity is .01622 ÷ by 81 which equals .0002 microfarads.

MULTIPLYING FACTORS FOR OTHER RANGES OUTSIDE THIS TABLE.

(A) If column 1 is multiplied by 10 then read column 2 multiplied by 100, and column 3 divided by 10.

(B) If column 1 is divided by 10, then read column 2 divided by 100 and column 3 multiplied by 10.

(C) If column 2 is multiplied by 10 then column 1 is multiplied by $\sqrt{10}$ and column 3 is divided by $\sqrt{10}$.

(D) If column 2 is divided by 10 then column 1 is divided by $\sqrt{10}$ and column 3 is multiplied by $\sqrt{10}$.

(E) If column 3 is multiplied by 10 then column 1 is divided by 10 and column 2 is divided by 100.

(F) If column 3 is divided by 10 then column 1 is multiplied by 10, and column 2 is multiplied by 100.

W/length Metres.	L. × C. Factor m.f. and m.h.	Frequency Kilocycles.	W/length Metres.	L. × C. Factor m.f. and m.h.	Frequency Kilocycles
1	.00000028	299820.0	55	.0008521	5451.0
2	.00000112	149910.0	60	.001014	4997.0
3	.00000253	99940.0	65	.001188	4613.0
4	.00000451	74955.0	70	.001379	4283.0
5	.00000704	59964.0	75	.001583	3998.0
6	.00001014	49970.0	80	.001801	3748.0
7	.00001383	42831.4	85	.002034	3527.0
8	.00001801	37477.5	90	.002280	3331.0
9	.00002282	33313.3	95	.002541	3156.0
10	.00002816	29982.0	100	.002816	2998.0
15	.0000635	19990.0	105	.003101	2855.0
20	.0001129	14991.0	110	.003404	2726.0
25	.0001754	11990.0	115	.003721	2607.0
30	.0002531	9994.0	120	.004052	2498.0
35	.0003445	8566.0	125	.004402	2399.0
40	.0004503	7495.5	130	.004757	2306.0
45	.0005702	6663.0	135	.005132	2221.0
50	.0007039	5996.4	140	.005518	2142.0

W/length Metres.	L. × C. Factor m.f. and m.h.	Frequency Kilocycles	W/length Metres.	L. × C. Factor m.f. and m.h.	Frequency Kilocycles
145	.005923	2067.0	395	.04392	759.1
150	.006335	1999.0	400	.04503	749.4
155	.006764	1934.0	405	.04617	740.3
160	.007204	1873.0	410	.04733	731.3
165	.007661	1817.0	415	.04851	722.5
170	.008134	1763.0	420	.04968	713.9
175	.008622	1713.0	425	.05084	705.5
180	.009120	1665.0	430	.05198	697.3
185	.009631	1620.0	435	.05323	689.2
190	.01016	1578.0	440	.05446	681.4
195	.01070	1539.0	445	.05573	673.8
200	.01129	1499.0	450	.05700	666.3
205	.01182	1463.0	455	.05830	658.9
210	.01239	1428.0	460	.05960	651.8
215	.01301	1395.0	465	06092	644.8
220	.01362	1362.0	470	.06225	637.9
225	.01425	1333.0	475	.06356	631.2
230	.01490	1303.0	480	.06485	624.6
235	.01554	1276.0	485	.06624	618.2
240	.01624	1249.0	490	.06757	611.9
245	.01689	1224.0	495	.06898	605.7
250	.01755	1199.0	500	.07039	599.6
255	.01830	1176.0	505	07184	593.7
260	.01902	1153.0	510	07327	587.8
265	.01977	1131.0	515	.07468	582.2
270	.02052	1110.0	520	.07606	576.6
275	.02125	1090.0	525	.07757	571.1
280	.02209	1070.0	530	.07903	565.7
285	.02285	1052.0	535	.08055	560.4
290	.02372	1034.0	540	.08208	555.2
295	.02451	1016.0	545	.08363	550.1
300	.02530	999.4	550	.08518	545.1
305	.02621	983.1	555	.08677	540.2
310	.02704	967.2	560	.08836	535.4
315	.02795	951.8	565	.08986	530.7
320	.02884	936.9	570	.09141	526.0
325	.02975	922.5	575	.09304	521.4
330	.03069	908.6	580	.09467	516.8
335	.03161	895.1	585	.09630	512.5
340	.03250	881.8	590	.09803	508.2
345	.03351	869.1	595	.09973	503.9
350	.03446	856.5	600	.1014	499.7
355	.03552	844.6	605	.1031	495.7
360	.03648	832.8	610	.1047	491.5
365	.03753	821.4	615	.1064	487.5
370	.03856	810.3	620	.1082	483.6
375	.03962	799.5	625	.1099	479.7
380	.04070	789.0	630	.1117	475.9
385	.04173	778.8	635	.1136	472.1
390	.04277	768.7	640	.1154	468.5

W/length Metres.	L. × C. Factor m.f. and m.h.	Frequency Kilocycles.	W/length Metres.	L. × C. Factor m.f. and m.h.	Frequency Kilocycles
645	.1171	464.8	895	.2254	335.0
650	.1188	461.3	900	.2280	333.1
655	.1205	457.7	905	.2306	331.3
660	.1225	454.3	910	.2332	329.5
665	.1244	450.9	915	.2357	327.7
670	.1263	447.6	920	.2381	325.9
675	.1282	444.2	925	.2407	324.1
680	.1302	440.9	930	.2434	322.3
685	.1322	437.7	935	.2461	320.7
690	.1341	434.5	940	.2487	319.0
695	.1360	431.4	945	.2514	317.3
700	.1378	428.3	950	.2541	315.6
705	.1398	425.3	955	.2568	314.0
710	.1419	422.3	960	.2595	312.3
715	.1439	419.3	965	.2621	310.7
720	.1459	416.4	970	.2647	309.1
725	.1479	413.6	975	.2676	307.5
730	.1501	410.7	980	.2704	305.9
735	.1520	407.9	985	.2731	304.4
740	.1540	405.2	990	.2759	302.8
745	.1561	402.4	995	.2788	301.3
750	.1583	399.8	1,000	.2816	299.8
755	.1604	397.1	1,010	.2879	296.9
760	.1625	394.5	1,020	.2927	293.9
765	.1646	391.9	1,030	.2986	291.1
770	.1668	389.4	1,040	.3045	288.3
775	.1691	386.9	1,050	.3105	285.5
780	.1714	384.4	1,060	.3161	282.8
785	.1735	381.9	1,070	.3222	280.2
790	.1756	379.5	1,080	.3283	277.6
795	.1778	377.1	1,090	.3344	275.1
800	.1801	374.8	1,100	.3404	272.6
805	.1824	372.4	1,110	.3468	270.1
810	.1847	370.1	1,120	.3531	267.7
815	.1870	367.9	1,130	.3595	265.3
820	.1893	365.7	1,140	.3660	263.0
825	.1917	363.4	1,150	.3721	260.7
830	.1941	361.2	1,160	.3786	258.5
835	.1963	359.0	1,170	.3853	256.3
840	.1985	356.9	1,180	.3921	254.1
845	.2009	354.8	1,190	.3988	252.1
850	.2034	352.7	1,200	.4052	249.8
855	.2057	350.7	1,220	.4191	245.8
860	.2081	348.6	1,240	.4326	241.7
865	.2106	346.6	1,260	.4470	238.0
870	.2132	344.6	1,280	.4609	234.2
875	.2156	342.7	1,300	.4757	230.6
880	.2179	340.7	1,320	.4905	227.2
885	.2204	338.8	1,340	.5053	223.7
890	.2229	336.9	1,360	5208	220.4

W/length Metres.	L. × C. Factor m.f. and m.h.	Frequency Kilocycles.	W/length Metres.	L. × C. Factor m.f. and m.h.	Frequency Kilocycles
1,330	.5359	217.3	2,500	1.7597	119.9
1,400	.5517	214.2	2,600	1.9027	115.3
1,420	.5675	211.0	2,700	2.0521	111.0
1,440	.5837	208.2	2,800	2.2071	107.0
1,460	.5999	205.3	2,900	2.3662	103.4
1,480	.6165	202.5	3,000	2.5331	99.9
1,500	.6334	199.9	3,100	2.7052	96.7
1,520	.6502	197.3	3,200	2.8831	93.7
1,540	.6671	194.7	3,300	3.0849	90.9
1,560	.6849	192.3	3,400	3.2552	88.2
1,580	.7028	189.8	3,500	3.4479	85.6
1,600	.7206	187.3	3,600	3.6478	83.3
1,620	.7388	185.1	3,700	3.8539	81.0
1,640	.7573	182.8	3,800	4.0648	78.9
1,660	.7756	180.6	3,900	4.2811	76.9
1,680	.7946	178.4	4,000	4.5007	74.9
1,700	.8135	176.3	4,100	4.7322	73.1
1,720	.8329	174.3	4,200	4.9657	71.4
1,740	.8520	172.3	4,300	5.2061	69.7
1,760	.8720	170.3	4,400	5.4512	68.1
1,780	.8917	168.4	4,500	5,6999	66.6
1,800	.9121	166.5	4,600	5,9561	65.2
1,820	.9327	164.7	4,700	6.2188	63.8
1,840	.9531	162.9	4,800	6.4861	62.5
1,860	.9742	161.2	4,900	6.7592	61.2
1,880	.9949	159.5	5,000	7.038	59.9
1,900	1.0165	157.8	5,100	7.321	58.8
1,920	1.0375	156.2	5,200	7.609	57.7
1,940	1.0598	154.5	5,300	7.911	56.6
1,960	1.0811	153.1	5,400	8.212	55.5
1,980	1.1036	151.4	5,500	8.508	54.5
2,000	1.1257	149.9	5,600	8.829	53.5
2,100	1.2413	142.8	5,700	9.151	52.6
2,200	1.3624	136.2	5,800	9.472	51.7
2,300	1.4894	130.3	5,900	9.809	50.8
2,400	1.6218	124.9	6,000	10.11	49.9

THE CIRCULAR MIL.

The circular mil. is a modern and facile method of calculating area of wire cross sections and is equal to the square of the wire diameter given in mils., which are the one thousandth part of an inch. Example : 26 S.W.G. wire is equal to .018″ diameter ; the circular mil. area of this size wire is calculated thus, 18 × 18 = 324. Therefore, the circular mil. area is equal to 324 mils.

The circular mil. foot is a piece of wire one foot in length by one circular mil. in area.

"Q" SIGNALS.

The signals are intended as advice when no question mark follows them.

This code was originally used by wireless telegraphy operators at sea, but it has now become the standard code for use in all forms of Wireless Telegraphic Service.

It should be noted that, in a number of Aeronautical Services the words "True Bearing" and "True Course" are called "Geographical Bearing" and "Geographical Course."

QRA ... What is the name of your station?
QRB ... How far approximately are you from my station?
QRC ... What Company (or Government) settles the accounts for your station?
QRD ... Where are you bound for and where are you from?
QRG ... Will you tell me my exact frequency (wavelength) in kc/s. (or metres)?
QRH ... Does my frequency (wavelength) vary?
QRI ... Is my note good?
QRJ ... Do you receive me badly? Are my signals weak?
QRK ... What is the legibility of my signals (1 to 5)?
QRL ... Are you busy?
QRM ... Are you being interfered with?
QRN ... Are you troubled by atmospherics?
QRO ... Shall I increase power?
QRP ... Shall I decrease power?
QRQ .. Shall I send faster?
QRS .. Shall I send slower?
QRT ... Shall I stop sending?
QRU ... Have you anything for me?
QRV ... Are you ready?
QRW ... Shall I tell.....that you are calling him on..... kc/s. (or.....metres)?
QRX ... Shall I wait. When will you call me again?
QRY ... What is my turn?
QRZ ... Who is calling me?
QSA ... What is the strength of my signals (1 to 5).
QSB ... Does the strength of my signals vary?
QSD ... Is my keying correct? Are my signals distinct?
QSG ... Shall I send.....Telegrams (or one telegram) at a time?
QSJ ... What is the charge per word for.....including your internal telegraph charge?
QSK ... Shall I continue with the transmission of all my traffic? I can hear you through my signals.
QSL ... Can you give me acknowledgment of receipt?
QSM ... Shall I repeat the last telegram I sent you?
QSO ... Can you communicate with.....direct (or through the medium of.....)?
QSP ... Will you re-transmit to.....free of charge?
QSR ... Has the distress call received from.....been cleared?
QST ... General call preceding message addressed to all amateurs.
QSU ... Shall I send (or reply) on.....kc/s. (or metres) and/or on waves of Type A1, A2, A3 or B?
QSV ... Shall I send a series of VVV.....?
QSW ... Will you send on.....kc/s. (or.....metres), and/or on waves of Type A1, A2, A3. or B?

QSX ... Will you listen for.....(call sign) on.....kc/s. (or.....metres) ?

QSY ... Shall I change to transmission on .....kc/s. (or .....metres) without changing the type of wave, or shall I change to transmission on another wave ?

QSZ ... Shall I send each word or group twice ?

QTA ... Shall I cancel telegram No..... as if it had not been sent ?

QTB ... Do you agree with my number of words ?

QTC ... How many telegrams have you to send ?

QTE ... What is my true bearing in relation to you ? OR
What is my true bearing in relation to.....(call sign) ?
What is the true bearing of.....(call sign) in relation to .....(call sign) ?

QTF ... Will you give me the position of my station according to the bearings taken by the direction finding stations which you control ?

QTG ... Will you send your call sign for fifty seconds followed by a dash of ten seconds on .....kc/s. (or.....metres) in order that I may take your bearing ?

QTH ... What is your position in latitude and longitude (or by any other way of showing it) ?

QTI ... What is your true course ?

QTJ ... What is your speed ?

QTM ... Send Radio-electric signals and submarine sound signals to enable me to fix my bearing and my distance.

QTO ... Have you left dock (or port) ?

QTP ... Are you going to enter dock (or port) ?

QTQ ... Can you communicate with my station by means of the International code of Signals ?

QTR ... What is the exact time ?

QTU ... What are the hours during which your station is open ?

QUA ... Have you news of.....(call sign of the mobile station) ?

QUB ... Can you give me in this order information concerning visibility, height of clouds, ground wind for..... (place of observation) ?

QUC ... What is the last message received by you from..... (call sign of the mobile station) ?

QUD ... Have you received the urgency signal sent by..... (call sign of the mobile station) ?

QUF ... Have you received the distress signal sent by..... (call sign of the mobile station) ?

QUG ... Are you being forced to alight in the sea (or to land) ?

QUH ... Will you indicate the present barometric pressure at sea level ?

QUJ ... Will you indicate the true course for me to follow, with no wind, to make for you ?

QUK ... Can you tell me the condition of the sea observed at..... (place or co-ordinates) ?

QUL ... Can you tell me the swell observed at.....(place or co-ordinates) ?

QUM ... Is the distress traffic ended ?

SIGNAL STRENGTH REPORTS.

THE "QSA-R" SYSTEM.

"Q" Readability System.

QSA1—Barely perceptible; unreadable.
QSA2—Weak; readable only now and then.
QSA3—Fairly good; readable with difficulty.
QSA4—Good readable signals.
QSA5—Very good signals; perfectly readable.

"R" Audibility System.

R1—Very weak signals; hardly readable.
R2—Weak signals; barely readable.
R3—Weak signals; but can be read.
R4—Fair signals; easily readable.
R5—Fairly strong signals.
R6—Good signals.
R7—Good strong signals, that come through QRM and QRN.
R8—Very strong signals; heard several feet from the phones.
R9—Extremely strong signals.

"T" Tone System.

T1—("T3, R6") very rough 25 or 60 cycle A.C. tone.
T2—Rough 60 cycle A.C. tone.
T3—Poor A.C. tone. Sounds like no filter.
T4—Fair A.C., small filter.
T5—Nearly pure D.C. tone, good filter, but has key thumps, or back wave, etc.
T6—Nearly pure D.C. tone. Very good filter; keying perfect.
T7—Pure D.C. tone, but has key thumps, back wave, etc.
T8—Pure D.C.
T9—Pure crystal controlled D.C. tone.

THE "RST" SYSTEM.

Readability.

R1—Unreadable.
R2—Barely readable—very few words distinguishable.
R3—Readable with some difficulty.
R4—Readable with practically no difficulty.
R5—Perfectly readable.

Signal Strength.

S1—Faint—signals barely perceptible.
S2—Extremely weak signals.
S3—Weak signals.
S4—Fair signals.
S5—Fairly good signals.
S6—Good signals.
S7—Fairly strong signals.
S8—Strong signals.
S9—Extremely strong signals.

Tone.

T1—Extremely rough, hissing note.
T2—Very rough A.C. note—no trace of musicality.
T3—Rough, low-pitched A.C. note—slightly musical.
T4—Rather rough A.C. note—moderately musical.
T5—Musically modulated note.
T6—Modulated note—slight trace of whistle.
T7—New D.C. note—smooth ripple.
T8—Good D.C. note—minute trace of ripple.
T9—Purest D.C. note.

If the note appears to be crystal controlled, add **X** following the appropriate number.

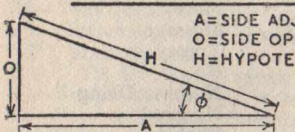
AMATEUR OF "HAM" ABBREVIATIONS USUALLY USED IN NON-COMMERCIAL WIRELESS TRAFFIC.

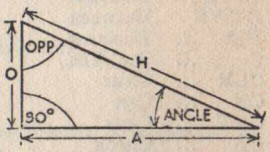
ABT	About	IC	I see
AGN	Again	ICW	Interrupted Continuous Wave
AHD	Ahead		
AHR	Another	K	Go ahead
ANI	Any	LID	Poor Operator
APRX	Approximate—Approximately	LIL	Little
		LFT	Left
BC	Broadcast	LST	Last—Listen
BD	Bad	LTR	Letter
B4	Before	MG	Motor Generator
BK	Break	MI	My
BN	Been	MK	Make
BND	Band	MO	More
BCUZ	Because	MSG	Message
BTWN	Between	MT	Empty
BIZ	Business	N	No
C	See, Yes.	ND	Nothing Doing
CLR	Clear	NG	No good
CN	Can	Nil	Nothing
CNT	Cant	NM	No more
CK	Check	NR	Number
CKT	Circuit	NW	Now
CMG	Coming	OB	Old Boy
CUD	Could	OL	Old Lady
CW	Continuous Wave	OM	Old Man
CUL	See you later	OP	Operator
CUAGN	See you again	OT	Old Top-Timer
DA	Day	OW	Old Woman
DE	From	PLS	Please
DH	Deadhead	PSE	Please
DINT	Did not	PX	Press
DNT	Don't	R	OK
DX	Long distance	RCD	Received
ES	And	RCVR	Receiver
EZ	Easy	RI	Radio Inspector
FB	Fine business	SA	Say
FM	From	SEZ	Says
FR	For	SM	Some
FRQ	Frequency	SW	Short Wave
GA	Go ahead	SIG	Signal
GB	Good Bye	SKED	Schedule
GM	Good Morning	TFC	Traffic
GN	Good Night	TMW	To-morrow
GG	Going	TR	There
GT	Got, Get	TT	That
GND	Ground	TK	Take
HA or HI	Laughter	TKS	Thanks
HM	Him	TNK	Think
HR	Here—Hear	TNX	Thanks
HV	Have	U	You
HW	How	UD	You would

AMATEUR ABBREVIATIONS—*continued.*

UL	...	You will	WT	...	What
UR	...	Your	WX	...	Weather
VT	...	Vacuum Tube (Valve)	X	...	Interference
VY	...	Very	XMTR		Transmitter
WA	...	Word after	XTAL	...	Crystal
WB	...	Word before	YF	...	Wife
WD	...	Would	YL	...	Young Lady
WF	...	Word following	YR	...	Your
WK	...	Work	30	...	Finish—end
WL	...	Will—would	73	...	Best regards
WN	...	When	88	...	Love and Kisses

SOLUTION OF RIGHT ANGLE TRIANGLES





SINE $\phi = \frac{O}{H}$ TANGENT $\phi = \frac{O}{A}$ SECANT $\phi = \frac{H}{A}$

COSINE $\phi = \frac{A}{H}$ COTANGENT $\phi = \frac{A}{O}$ COSECANT $\phi = \frac{H}{O}$

PARTS GIVEN	PARTS TO BE FOUND				
	HYP	ADJ SIDE	OPP SIDE	ANGLE	OPP ANGLE
HYPOTENUSE AND ADJACENT	——	——	$\sqrt{HYP^2-ADJ^2}$	COSINE $= \frac{ADJ}{HYP}$	SINE $= \frac{ADJ}{HYP}$
HYPOTENUSE AND OPPOSITE	——	$\sqrt{HYP^2-OPP^2}$	——	SINE $= \frac{OPP}{HYP}$	COSINE $= \frac{OPP}{HYP}$
HYPOTENUSE AND ANGLE	——	HYP X COSINE	HYP X SINE	——	90°—ANGLE
ADJACENT AND OPPOSITE	$\sqrt{ADJ^2+OPP^2}$	——	——	TAN $= \frac{OPP}{ADJ}$	COTAN $= \frac{OPP}{ADJ}$
ADJACENT AND ANGLE	$\frac{ADJ}{COSINE}$	——	ADJ X TANGENT	——	90°—ANGLE
OPPOSITE AND ANGLE	$\frac{OPP}{SINE}$	OPP X COTAN	——	——	90°—ANGLE

B.A. TAPPING DRILLS

B.A. No	DRILL SIZE	B.A. No	DRILL SIZE	B.A. No	DRILL SIZE	B.A. No	DRILL SIZE
0	No 12	5	No 40	10	No 56	15	No 72
1	No 19	6	No 44	11	No 58	16	No 74
2	No 26	7	No 48	12	No 63	17	No 76
3	No 30	8	No 51	13	No 65	18	No 77
4	No 34	9	No 53	14	No 70	19	No 79

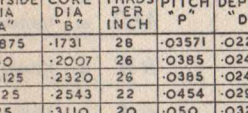
B.A. CLEARANCE DRILLS

B.A. No	DRILL SIZE	B.A. No	DRILL SIZE	B.A. No	DRILL SIZE
0	"C"	6	No 32	12	No 54
1	No 3	7	No 37	13	No 54
2	No 11	8	No 42	14	3/64"
3	No 19	9	No 46	15	No 60
4	No 26	10	No 49		
5	No 29	11	No 51		

BRITISH ASSOCIATION THREADS (B.A)

B.A. N°	THRDS PER INCH	OUTSIDE DIA "A"	CORE DIA "B"	PITCH "P"	DEPTH "D"	RADIUS "R"
0	25·38	·2362	·1890	·0394	·0236	·0072
1	28·25	·2087	·1663	·0354	·0212	·0064
2	31·35	·1850	·1468	·0319	·0191	·0058
3	34·84	·1614	·1272	·0287	·0172	·0052
4	38·46	·1417	·1105	·0260	·0156	·0047
5	43·10	·1260	·0980	·0232	·0139	·0042
6	47·85	·1102	·0852	·0209	·0125	·0038
7	52·91	·0984	·0758	·0189	·0113	·0034
8	59·17	·0866	·0664	·0169	·0101	·0031
9	64·94	·0748	·0564	·0154	·0092	·0028
10	72·46	·0669	·0503	·0138	·0083	·0025
11	81·97	·0591	·0445	·0122	·0073	·0022
12	90·91	·0511	·0375	·0110	·0066	·0020
13	102·0	·0472	·0354	·0098	·0059	·0018
14	109·9	·0394	·0284	·0091	·0055	·0016
15	120·5	·0354	·0254	·0083	·0050	·0015
16	133·3	·0311	·0221	·0075	·0045	·0014
17	149·3	·0276	·0196	·0067	·0040	·0012
18	169·5	·0244	·0174	·0059	·0035	·0011
19	181·8	·0213	·0147	·0055	·0033	·0010
20	212·8	·0189	·0133	·0047	·0028	·0009
21	232·6	·0165	·0113	·0043	·0026	·0008
22	256·4	·0146	·0100	·0039	·0023	·0007
23	285·7	·0130	·0088	·0035	·0021	·0006
24	323·6	·0114	·0076	·0031	·0019	·0006

BRITISH STANDARD FINE THREADS (B.S.F)



DIA	OUTSIDE DIA "A"	CORE DIA "B"	THRDS PER INCH	PITCH "P"	DEPTH "D"	RADIUS "R"
7/32	·21875	·1731	28	·03571	·0229	·0049
1/4	·250	·2007	26	·0385	·0246	·0053
9/32	·28125	·2320	26	·0385	·0246	·0053
5/16	·3125	·2543	22	·0454	·0291	·0062
3/8	·375	·3110	20	·050	·0320	·0069
7/16	·4375	·3664	18	·0556	·0356	·0076
1/2	·500	·420	16	·0625	·040	·0086
9/16	·5625	·4825	16	·0625	·040	·0086
5/8	·625	·5335	14	·0714	·0457	·0098
11/16	·6875	·596	14	·0714	·0457	·0098
3/4	·750	·6433	12	·0833	·0534	·0114
13/16	·8125	·7058	12	·0833	·0534	·0114
7/8	·875	·7586	11	·09091	·0582	·0125
1"	1·000	·8719	10	·1000	·064	·0137
1 1/8	1·125	·9827	9	·1111	·0711	·0153
1 1/4	1·250	1·1077	9	·1111	·0711	·0153
1 3/8	1·375	1·2149	8	·1250	·080	·0172
1 1/2	1·500	1·3399	8	·1250	·080	·0172
1 5/8	1·625	1·4649	8	·1250	·080	·0172
1 3/4	1·750	1·567	7	·1428	·0915	·0196
2	2·000	1·817	7	·1428	·0915	·0196
2 1/4	2·250	2·0386	6	·1667	·1067	·0229
2 1/2	2·500	2·2866	6	·1667	·1067	·0229
2 3/4	2·750	2·5366	6	·1667	·1067	·0229
3	3·000	2·7439	5	·2000	·1281	·0275

METRIC TO DECIMAL EQUIVALENTS

M/M	INCH	M/M	INCH	M/M	INCH
·01	·0004	·43	·0169	·85	·0335
·02	·0008	·44	·0173	·86	·0339
·03	·0012	·45	·0177	·87	·0343
·04	·0016	·46	·0181	·88	·0347
·05	·0020	·47	·0185	·89	·0350
·06	·0024	·48	·0189	·90	·0354
·07	·0028	·49	·0193	·91	·0358
·08	·0032	·50	·0197	·92	·0362
·09	·0036	·51	·0201	·93	·0366
·10	·004	·52	·0205	·94	·03701
·11	·0043	·53	·0209	·95	·0374
·12	·0047	·54	·0213	·96	·0378
·13	·0051	·55	·0217	·97	·0382
·14	·0055	·56	·0221	·98	·0386
·15	·0059	·57	·0225	·99	·03898
·16	·0063	·58	·0228	1	·0394
·17	·0067	·59	·0232	2	·0787
·18	·0071	·60	·0236	3	·1181
·19	·0075	·61	·0240	4	·1575
·20	·0079	·62	·0244	5	·1968
·21	·0083	·63	·0248	6	·2362
·22	·0087	·64	·0252	7	·2756
·23	·0091	·65	·0256	8	·315
·24	·0095	·66	·026	9	·3543
·25	·0099	·67	·0264	10	·3937
·26	·0103	·68	·0268	11	·4331
·27	·0106	·69	·0272	12	·4724
·28	·0110	·70	·0276	13	·5118
·29	·0114	·71	·0279	14	·5512
·30	·0118	·72	·0283	15	·5905
·31	·0122	·73	·0287	16	·6299
·32	·0126	·74	·0291	17	·6693
·33	·013	·75	·0295	18	·7082
·34	·0134	·76	·0299	19	·748
·35	·0138	·77	·0303	20	·7874
·36	·0142	·78	·0307	21	·8268
·37	·0146	·79	·0311	22	·8661
·38	·0150	·80	·0315	23	·9055
·39	·0154	·81	·0319	24	·9449
·40	·0158	·82	·0323	25	·9842
·41	·0162	·83	·0327		
·42	·0166	·84	·0331		

B.S.F. TAPPING DRILLS

DIA	DRILL SIZE	DIA	DRILL SIZE	DIA	DRILL SIZE	DIA	DRILL SIZE
1/4	13/64	7/16	"U"	11/16	39/64	1"	7/8
1/4	No 7	1/2	27/64	3/4	21/32	1 1/8	63/64
5/16	"F"	9/16	31/64	13/16	23/32	1 1/4	1 7/64
3/8	"O"	5/8	35/64	7/8	49/64		

B.S.F. CLEARANCE DRILLS

DIA	DRILL SIZE	DIA	DRILL SIZE	DIA	DRILL SIZE	DIA	DRILL SIZE
1/4	17/64	3/8	"V"	11/16	45/64	1 1/8	1 9/64
1/4	"F"	7/16	29/64	3/4	49/64	1 1/4	1 17/64
5/16	21/64	1/2	33/64	13/16	53/64	1 3/8	1 25/64
5/16	"O"	9/16	37/64	7/8	57/64	1 1/2	1 33/64
3/8	25/64	5/8	41/64	1"	1 1/64	1 5/8	1 41/64

MATHEMATICAL SYMBOLS

$\gg$	Is much greater than.	$\therefore$	Therefore.
$>$	Is greater than.	Δ	Increment or Decrement.
$\equiv$	Identity.	$\parallel$	Parallel to.
$\cong$	Is approximately equal to.	$-$	Negative. Minus. Subtract.
$\neq$	Does not equal.	$\times$ or $\cdot$	Multiplied by.
$\leqq$	Less than or equal to.	$+$	Positive. Plus. Add.
$\geqq$	Greater than or equal to.	$\mp$	Negative or positive. Minus or Plus.
$\ll$	Is much less than.		
$<$	Is less than.	$\pm$	Positive or Negative. Plus or Minus.
$\lvert n \rvert$	Absolute value of n.		
$\perp$	Perpendicular to.	$\div$ or $:$	Divided by.
$\angle$	Angle.	$=$ or $::$	Equals.

UNITS

A	Ampere	*V*	Volt
Ah	Ampere-hour	*W*	Watt
C	Coulomb	*Wh*	Watt-hour
F	Farad	Ω	Ohm
H	Henry	*C/S*	Cycles per Second
db	Decibel		

Examples:—

$M\Omega$	=	Megohm [meg.]
kW	=	Kilowatt.
mA	=	Milliamp
μV	=	Microvolt
$\mu\mu F$	=	Micro-Microfarad.
Mc/s	=	Megacycles per second.
kc/s	=	Kilocycles per second.
mH	=	Millihenry
μF	=	Microfarad.
pF	=	Pica-farad

MULTIPLES AND SUBMULTIPLES

M	Mega.	$= 10^6$	μ	Micro $= 10^{-6}$
k	Kilo.	$= 10^3$	$\mu\mu$	Micro-micro. $= 10^{-12}$
m	Milli.	$= 10^{-3}$	*p*	Pica. $= 10^{-12}$

SYMBOLS

NORMALLY IN COMMON USE
IN RADIO AND ELECTRICAL FORMULAE

B	Magnetic Flux Density	R	Resistance.
C	Capacity.	Ra	A.C. Anode Resistance of Valve.
E	Electromotive Force [E.M.F].	Rd	Dynamic Resistance of Tuned Circuit = L/CR.
i	Instantaneous E.M.F.	S	Magnetic Reluctance.
f	Frequency.	t	Time
G	Magneto-Motive-Force [M.M.F.].	V	Potential Difference
G	Conductance.	W	Energy.
g or gm	Mutual Conductance of Valve.	X	Reactance.
H	Magnetic Field Strength.	Z	Impedance.
I	Current.	λ	Wavelength.
i	Instantaneous Current.	μ	Valve Amplification Factor
K	Specific Inductive Capacity.	μ	Magnetic Permeability
L	Self Inductance.	π	Ratio of Circumference to Diameter of Circle = 3·14 [approx.]
M	Mutual Inductance.	ϱ	Specific Resistance
m or μ	Amplification Factor of Valve.	Φ	Magnetic Flux.
P	Power	φ	Phase Angle.
Q	Quantity of Electricity.	ω	Angular Velocity

CONVERSION TABLES.

To change	*Into*	*Multiply by*	*To obtain converse multiply by*
Cubic Centimetres	Cubic Inches	0.06102	16.39
Calories	Kilogrammetres	427.0	0.00234
Dynes	Grammes weight	0.001019	980.39
Cubic Yards	Cubic Metres	0.7646	1.308
Cubic Inches	Litres	0.0164	61.0
B.Th.U.	Watt-hours	0.2931	3.41
Atmospheres	Lb./sq. in.	14.70	0.068
B.Th.U.	Calories	0.252	3.97
B.Th.U.	Foot Pounds	777.4	0.001285
Centimetres	Inches	0.3937	2.54
Cubic Feet	Cubic Metres	0.0283	35.31
Dynes	Poundals	0.000072	13825.52
Feet	Metres	0.305	3.281
Ergs	Foot-lb.	7.373×10^{-8}	1.36×10^{7}
Foot-lb.	Kilogrammetres	0.1384	7.23
Feet/sec.	Miles/hr.	0.68182	1.467
Feet/min.	Miles/hr.	0.01137	88.0
Feet/sec.	Metres/min.	18.288	0.0547
Grains	Grammes	0.0648	15.432
Gallons	Litres	4.546	0.2205
Foot-lb./sec.	Horse-power	0.0018	55.0
Feet/min.	Metres/sec.	0.00508	196.8
Horse-power	B.Th.U./min.	42.41	0.0236
Grammes/c.c.	Lb./cu. in.	0.03613	27.68
Gallons	Cubic Feet	0.161	6.211
Grammes	Ounces	0.03527	28.35
Grammes/sq. m.	Ounces/sq. yd.	0.0295	33.9
Inches	Millimetres	25.4	0.03937
Horse-power	Kilogrammetres/sec.	76.04	0.01315
Horse-power	Watts	746.0	0.00134
Joules	Watt-seconds	1.0	1.0
Inches	Feet	0.0833	12.0
Imperial Gallons	U.S. Gallons	1.205	0.830
Kilocalories/Kilogramme	B.Th.U./lb.	1.80	0.55
Joules	Ergs	10^{7}	10^{-7}
Inches of Mercury	Lb./sq. in.	0.4902	2.04
Inches	Metres	0.0254	39.37
Inches	Yards	0.0277	36.0
Kilocalories	B.Th.U.	3968.0	0.000251
Kg./P.S.	Lb./h.p.	2.235	0.4475
K.Cal./cm.^{2}/cm./hr.C°	B.Th.U./in./hr./F°	5.598	0.180
Kilogrammes	Lb.	2.205	0.454
Metres	Yards	1.094	0.914
Kilowatt Hours	Joules	36×10^{5}	27×10^{-7}
Kilogrammes/sq. cm.	Lb./sq. in.	14.22	0.0703
Kilogrammes	Tons	0.000891	1016.2
Kilometres	Miles	0.621	1.609
Poundals	Lb. weight	0.03107	32.15
Knots	m.p.h.	1.151	0.868
Kilowatts	Horse-power	1.3406	0.746
Litres	Pints	1.76	0.568
Metres/sec.	m.p.h.	2.24	0.447
Square Metres	Square Yards	1.197	0.8361
Square Centimetres	Square Inches	0.155	6.4516
Tonnes	Tons	0.9842	1.016

BERNARDS RADIO BOOKS

30.	Radio Valve Manual	3/6
37.	Manual of Direct Disc Recording	2/–
42.	Shortwave Radio Handbook	2/–
43.	Modern Radio Test Gear	1/6
44.	Radio Service Manual	2/6
48.	Radio Coil & Transformer Manual	2/–
52.	Radio Tuner Unit Manual	2/6
53.	Radio Constructors' Manual	3/–
54.	Radio Resistor Chart	1/–
56.	Radio Aerial Handbook	2/6
57.	Ultra-Shortwave Handbook	2/6
58.	Radio Hints Manual	2/6
59.	Television Constructors' Manual	3/6
60.	Radio Repairs Manual	2/6
61.	Amateur Transmitters' Construction Manual	2/6
62.	Car & Portable Radio Constructors' Manual	2/6
63.	Radio Calculations Manual	3/6
64.	Sound Equipment Manual	2/6
65.	Radio Designs Manual	2/6
66.	Communications Receivers' Manual	2/6
67.	Radio Valve Equivalents Manual	2/6
68.	Frequency Modulation Receivers' Manual	2/6
69.	Radio Inductance Manual	2/6
70.	Loudspeaker Manual	2/6
71.	Modern Battery Receivers' Manual	2/6
72.	Experimental Circuits Manual	2/6
73.	Radio Test Equipment Manual	2/6
74.	Radio Valve Application Manual	5/–
75.	International Radio Tube Encyclopædia	42/–
76.	Radio Anti-Interference Manual	2/6
77.	Walkie-Talkie Construction Manual	2/6
78.	Radio & Television Laboratory Manual	2/6
79.	Radio Modernisation Manual	3/6
80.	Television Servicing Manual	4/6
81.	Using Ex-Service Radio Apparatus	2/6
82.	AC/DC Receiver Construction Manual	2/6
83.	Radio Instruments and their Construction	2/6
84.	International World Radio Station List	1/6
85.	Miniature Radio Equipment Construction Manual	3/6
86.	Midget Radio Construction	3/6
87.	The Oscilloscope: Design and Construction	4/6
88.	Wire Recorder Manual	2/6
89.	High Definition Television Construction Manual	3/6
90.	Wireless Amplifier Manual No. 2	3/–
91.	Handbook of Radio Circuits No. 3	2/6
	The Electronic Photographic Speedlamp: How to Make It & How to Use It	3/6

Forthcoming Publications:

Power Pack Manual
Photo-cell Applications
Television Aerial Construction
Television Circuits Manual
Introduction to Ham Radio
Service Man's Valve Manual
Practical Radio Receivers Manual
Hints and Tips No. 2
Beginners' Manual (Part 1)