The H.R.S.A. ASTOR BOOK, Vol.2

1935–1936

Compiled by Ray Kelly from original Astor factory files together with some extra information as available.

RADIO & ELECTRICAL MERCHANT
May 17th, 1935.

ASTOR MUSIC MODELS

Establishing a new standard of tonal excellence . . .

Astor MODEL 110

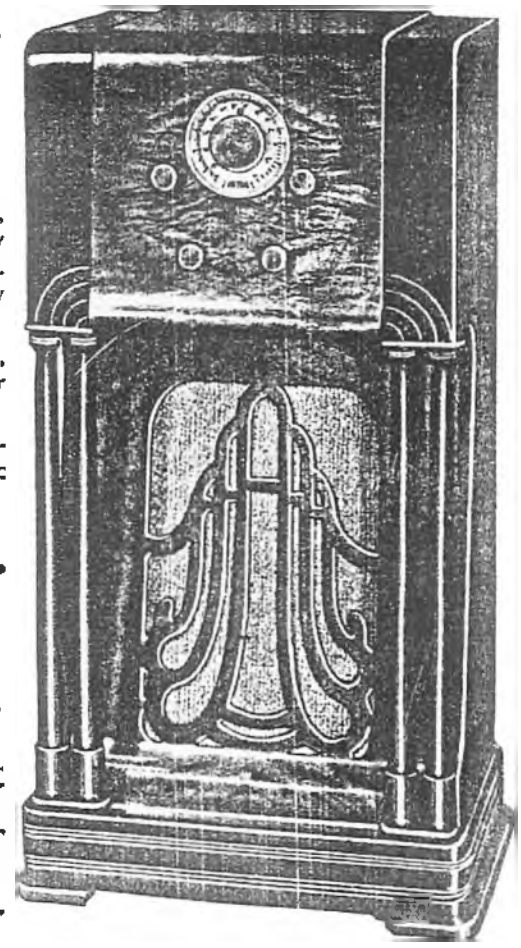
with the Magic Selectivity Control

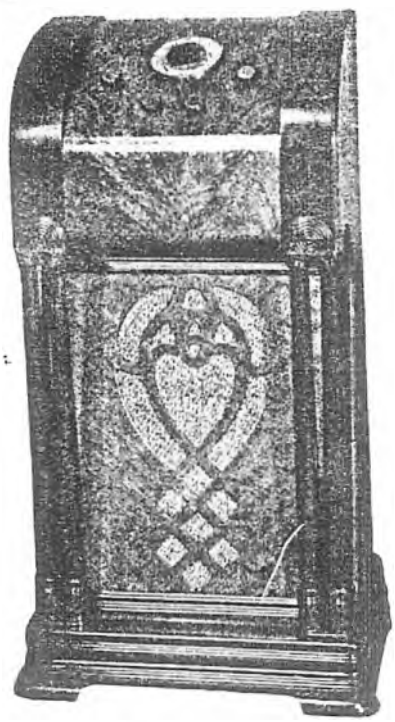
New de Luxe Superheterodyne employing multiple-function valves, gives actual seven valve performance . . . while the amazing selectivity control, exclusive to Astor Model 110, provides full side-band response. Used in conjunction with the new high fidelity cabinet, it renders every audible frequency in true perspective.

The Model 110 provides an actual baffle area of 3,000 square inches, with large inclined sounding board which directs overtones to ear level. Not a single note or harmonic is missed.

Features include automatic volume control, and tone control; air-plane dial with colour-light for accurate tuning, and 10 inch dynamic speaker by Jensen.

The cabinet is a masterpiece of the craftsman's art with butt maple panels and contrasting genuine Ebony side-pilasters. PRICE . . . . . **30 Gns.**





and now . . .

"London direct on an indoor aerial" with . . .

Astor MODEL 170

De-Luxe 7 valve Dual Wave Superheterodyne

World short-wave reception is lifted from the experimental sphere to that of everyday entertainment by Astor's dual wave masterpiece—the Model 170 . . . incorporating all the desirable features of a de luxe broadcast receiver with unbelievable ease in short-wave tuning by means of novel S-L-O-W 70-1 vernier (two speed) selector. Greater signal strength with less "background" noise. Exclusive seven valve circuit employs multiple-function valves, giving actual nine valve performance. Constant sensitivity over the full range of the tuning scale. No "missing" spots on the short-wave band. Fading eliminated on all wavelengths by improved automatic volume control . . . tone control and static suppressor.

Housed in acoustically perfect cabinet of striking beauty. The radically new design provides over 3,000 square inches of effective baffle area. Built of "musical woods" on curved classical lines, featuring rare burl maple, ebony pilasters and figured ribbon maple grille. . . . . PRICE **40 Gns.**

The H.R.S.A. ASTOR BOOK, Vol.2

1935-36

Compiled by Ray Kelly from original Astor factory files, supplemented by extra information as available.

This second volume contains more of the circuits in our files that have not been published in A.O.R.S.M's, etc, and it covers the period 1935-1936. It was my original intention to include 1937 circuits as well, but there was so much information in the files that it was becoming too cumbersome, and it seems that I will have to prepare a third volume to cover 1937 and some of the 1941-42 circuits that missed being included in A.O.R.S.M's. While some of these circuits may have been published elsewhere, for the sake of completeness I have included everything that I have for these years, including where possible, pictures of the sets taken from adverts of the period.

I have chosen to photocopy and use the original typewritten descriptions etc from the files rather than retyping them. While the presentation suffers you know that you are reading the original, from the hand of the designer's typist and presumably corrected by him. In fact you are getting close to reading from our original files, though in places I have had to touch up the print, especially the letter "a" which did not always reproduce well on the company's typewriter. If I had retyped them I would have had a very sore right index finger, my typing finger, and possibly have introduced errors, or at least put the doubt in your mind that I had perhaps done so.

Unfortunately the files are tightly bound and on many pages the extreme left is a little out of focus as the page could not be laid flat on the photocopier. I apologise for this.

Volume 1 has been very well received, the first 50 copies were soon sold, which encourages me to continue. My aim has been to fill the gap between the start of A.O.R.S.M's and the beginnings of production by the company.

I would like to thank Kevin Mann for his considerable help in producing the first copies of volume 1, which enabled me to offer enough copies to prove that I was not completely wasting my time! Without Rex Wales' assistance in getting further copies printed and mailing them it would all have been too much for me.

Ray Kelly, October 1995.

The H.R.S.A. ASTOR BOOK, Vol.2 , 1935-1936.

CONTENTS.

RADIO & ELECTRICAL MERCHANT
May 17th, 1935.

Radio Corporation has Romantic Story

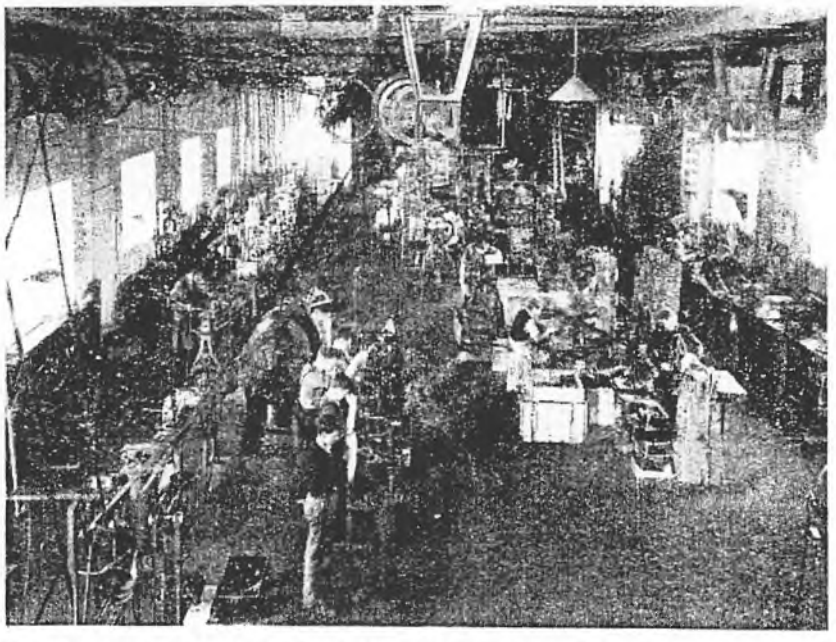
Twelve Years of Progress

MR. A. G. WARNER—Joint Managing Director Radio Corporation Pty. Ltd., Melbourne

TWELVE years of successful trading has been the achievement of Radio Corporation Pty. Ltd., Melbourne. As far back as 1923 Mr. Arthur Warner, now joint managing director of Radio Corporation, commenced in a wholesale radio business. Three months later Mr. Louis Abrahams started Louis Coen Wireless, shortly afterwards to combine with Mr. Warner. They foresaw that radio would be a major industry and by applying diligent and careful methods to their trading built up over the course of the next few years a business which was turning over £250,000 worth of parts. Louis Coen Wireless was known throughout the length and breadth of Australia.

It was in these days that the first radio sets in "knock-down" or kit form and the "Assemble your Own" slogan was introduced for the first time in Australia. With the imposition of duties on imported parts Messrs. Warner and Abrahams directed their attention to radio manufacturing and Louis Coen Wireless became the Radio Corporation of Australia.

Throughout this long period of successful trading it has been the policy of Radio Corporation to do things in a different way, and to be first on the scene with important developments. The Company claims to have introduced into Australia the first portable receiver and the first electric receiver on a big scale. They were first with a.v.c., they had the first real midget and were first to use cathode ray equipment in their testing laboratories. They were also first to introduce an entirely new and different range of cabinets and first manufactured and distributed auto-radio in a big way.



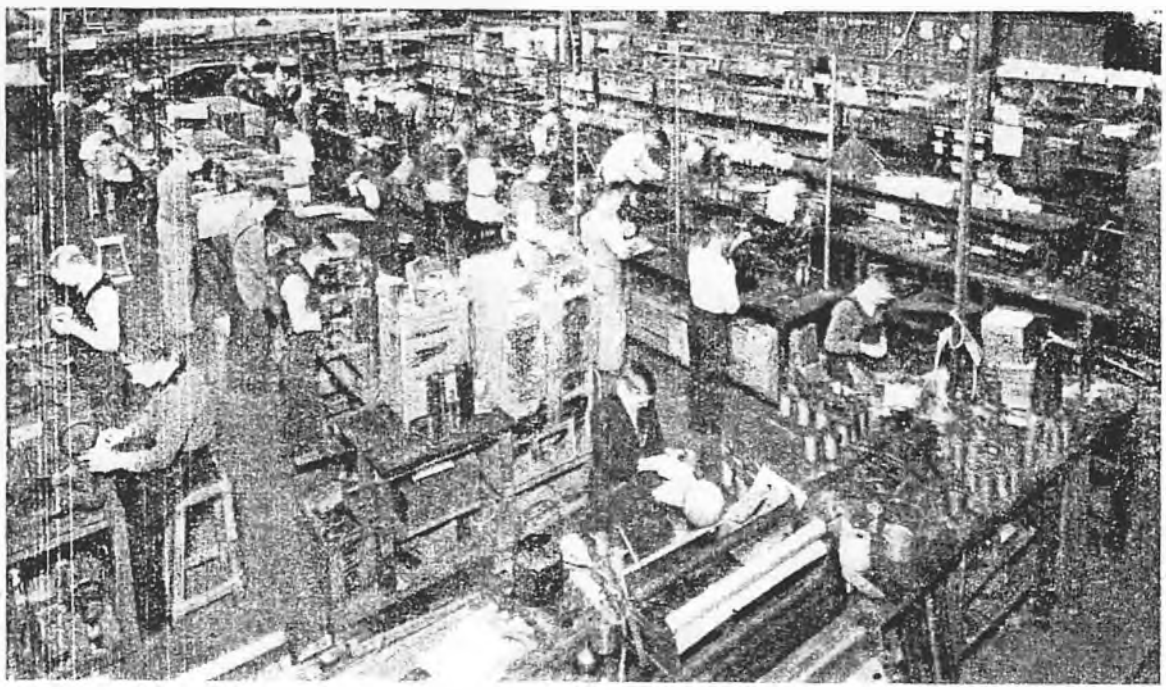
General View of the Machine Shop, where Astor Radio Receivers are made

Active in Advertising

Combined with novelty on the developmental side goes novelty in advertising. Recognising the value of advertising in business building Radio Corporation Pty. Ltd. have always been big investors in this direction. Novel ideas have been introduced into their advertising. Many will remember the Astor Aeroplane Competition in 1927-28 followed by a landing competition in conjunction with the Vacuum Oil Co. A little

RADIO & ELECTRICAL MERCHANT
May 17th, 1935.

Where Astor Radio is Produced



A section of the Main Assembly Factory of Radio Corporation Ltd., Melbourne.

later the public and trade were startled by a challenge issued by Radio Corporation whereby they offered to pay £3 to anyone who chose another set after having made a comparison between it and an Astor. Only last week the challenge was repeated in a novel advertisement whereby £5 was offered to anyone who selected another receiver having the same advantages as the Mickey Grand.

In Every State

The company is now very well organised. In every State of Australia is to be found an office of the company in charge of a staff man. In New South Wales a branch was recently opened and is doing well.

The ramifications of the company do not end in Australia, for as is well known there is a very strong Hazeltine tie-up and through this the very latest developments of the American laboratories are brought to Radio Corporation. In this connection it is interesting to note that they are continually sending engineers abroad and at the present time a resident engineer is being maintained in the States.

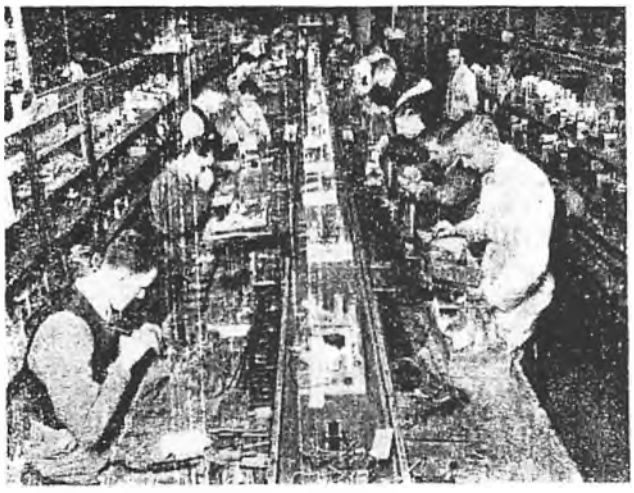
The Company is well capitalised and is representative of wide inter-

(Continued on page 26)

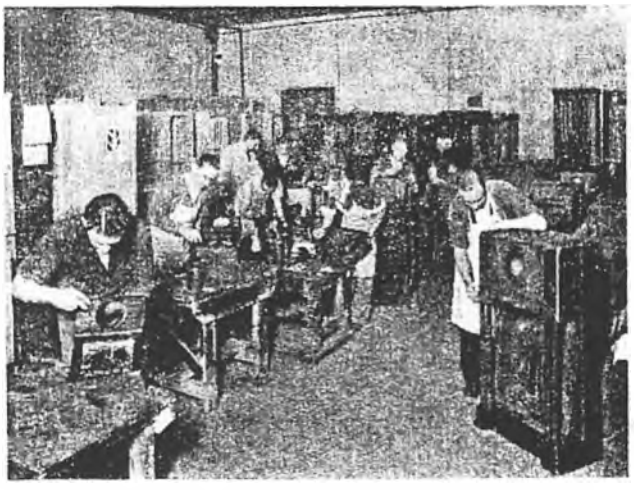
ASTOR EXECUTIVES CONFER

MR. LOUIS ABRAHAMS—Joint Managing Director, holds a conference with some of his factory executives. Radio Corporation, Melbourne

RADIO CORPORATION'S PROGRESS (*Continued from Page 7*)



The Famous Astor Wiring Line in Full Swing



Astor Cabinets are hand rubbed. A section of the cabinet finishing Department

ests. Two of the directors are resident in the United States to take care of its interests there.

A Modern Factory

The factory in Sturt Street, South Melbourne, which has been scientifically built for radio, is used for nothing else. It is equipped with plant to manufacture almost every requirement for radio receivers and in fact everything but resistors and condensers (which are imported from America) is manufacured within the walls of the factory. Surrounded on three sides by main thoroughfares the factory is designed so that the raw materials come in one end and radio sets go out at the other.

Special care is taken with the cabinets which in a half finished state are taken in on the third side and are thus kept quite distinct from the rest of the material coming in or

ASTOR SALES CONFERENCE

Reading from left to right:— H. W. Woodcock, J. R. Rogarty, F. M. Cooper, R. T. Cannot, J. C. Wentworth, H. M. McCubbin, G. C. Bryce, E. L. Budge, F. H. Slee. Sales Staff of Radio Corporation.

going out. By going straight to the finishing department where the cabinets are hand-rubbed and wax finished with satin sheen it is almost impossible for a cabinet to be scratched or damaged. A special cabinet designer is maintained by the company and it is his job to see that originality and finish characterise the company's cabinets.

An extensive research department is maintained. It is assisted by experts abroad and has at its command a wide range of laboratory instruments extending from cathode ray gear to a multitude of oscillators and measuring instruments. A continuous test is made of all parts used in the production of receivers as the company maintains that it is easier to locate a defective part before it goes into the radio set than afterwards.

Radio Corporation Pty. Ltd. merchandise a wide range of receivers, but do not sell parts, preferring to keep their products exclusive to Astor Radio. The new series featured this year is an exceedingly fine one. Included in it is the most unusually designed Mickey Grand and the high quality Model 110 with the variable selectivity control another exclusive Astor feature.

The control of the company is in very careful hands. The administrative side of the business is in the special care of Mr. A. G. Warner, while Mr. Louis Abrahams takes care of the factory. Both gentlemen are exceedingly hardworking and devote their entire energies to the furthering of their business. The sales are taken care of by Mr. Hugh McCubbin.

Radio Corporation Pty. Ltd. can look back over their achievements during the last 12 years with pride. Few concerns in radio or for that matter outside it can produce evidence of such rapid and substantial growth.

Astor Releases New High Quality Receiver

THE whole world still thrills to the story of the Master, Beethoven, writing his greatest compositions after he had become stone deaf and thus deprived of the satisfaction of even hearing them performed. The thought of his sad affliction gains an added poignancy when one speculates how the heart of this great genius would have been stirred had it been possible for him to hear his masterpieces rendered by a Modern Symphony Orchestra with all its adventitious helps in the form of improved instruments and perfected musical technique. And then to speculate on the modern miracle of radio. . . . ." so runs the introduction to a most attractive folder that Radio Corporation Pty. Ltd. is now distributing to its dealers to announce the new high quality model 110 receiver.

Publicity in connection with the new Astor is being tied up with the Beethoven motif. Attractive showcards with the great master in the background together with symbols of music are being prepared and will be distributed shortly. Four colour folders will also be available shortly.

The new receiver is being merchandised with a quality appeal. To quote the Astor pamphlet—"Of surpassing beauty, it captures all the elegance of a graceful period—the time of the great composers—and dramatises in a masterful manner the unsuspected loveliness of Australian timbers, incorporating butt maple top and instrument panel, contrasting with Macassar Ebony side pilasters, maple veneered-shaped grill and maple veneered solid coachwood sides."

This Astor 110 incorporates what is known as the New Magic Selectivity Control, a means of varying the coupling in the i.f. stages so as to give less selectivity, but less cutting on the side bands. By the operation of this control remarkable fidelity can be introduced into the reproduction. Maintained in its extreme position the set is needle sharp.

The pamphlet claims that every frequency in the audible range can be rendered in its true perspective so that not a single note, overtone or harmonic is missed from a movement by a great symphony orchestra.

The characteristics of the new 110 are as follows: De Luxe model superheterodyne for AC 200-250 volt operations, employing 42 Power Pentode output and new multiple function valves giving seven valve performance.

Features: Magic selectivity control, quiet a.v.c. operation, automatic tone control, automatic bass compensation, retaining depth of natural bass when volume is reduced below normal level; colour light tuning which permits station to be tuned to exact point where best tone and maximum volume is reached; inclined sounding board harmonics and overtones, vital to the faithful reproduction of sound, tend to travel in straight lines—the inclined sounding board directs them up to ear level; 3,000 square inches of baffle area—as in the grand piano the larger the baffle area the better the reproduction of low notes—Astor model 110 provides over 3,000 square inches of effective baffle area. Other features include 10 inch Jensen, electro-dynamic speaker, vernier tuning and airplane dial.

To facilitate service the chassis is mounted on a sliding shelf.

Attractive 110 Astor

MISSING SET

A Tasma Model 235 Serial No. 83 was stolen from the showrooms of Mr. H. D. Hawthorn, Ardlethan, N.S.W.

THE ASTOR model 80, series H

5 valve, a.c. operated console, broadcast only, clock dial

Valve types; 6A7 mixer, 6D6 IF amplifier, 6B7 diode detector & audio amplifier, 43 output, 25Y5 or 25Z5 rectifier.

I.F. frequency 456 Khz.

Instructions for Operating.

5 Tube A.C. Superheterodyne

MODEL H

With Automatic Volume Control.

AERIAL.

An indoor aerial of 20 to 30 ft. will be found to be satisfactory in districts close to a broadcasting station. When located at a considerable distance from broadcasting stations, an aerial of from 30 to 50 ft. may be used, and will prove an advantage.

GROUND.

A ground connection is not essential to this set. Try the A.C. main adapter both ways in the socket for quietest operation. A terminal marked E is provided on the chassis for this connection, if required.

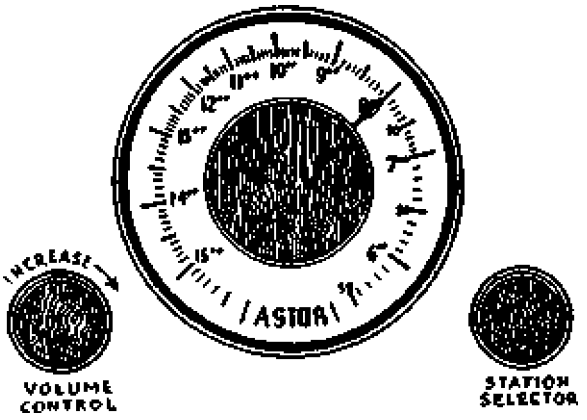
OPERATION.

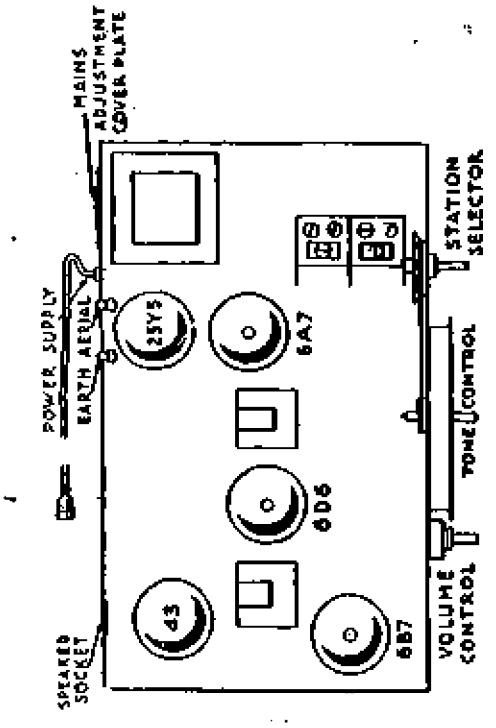
Make sure that all tubes are firmly seated in their sockets, and that all tube top connection clips are in their places. Tubes require about 30 seconds to reach full operating temperature.

Turn the volume control nearly fully clockwise, and rotate tuning control until a station is heard, and then re-adjust tuning finely. The tuning control should never be used to reduce the volume by de-tuning. If this is done, the tone will become very harsh, and the reproduction will be noisy. Always adjust the volume by means of the volume control.

INDICATOR LAMP.

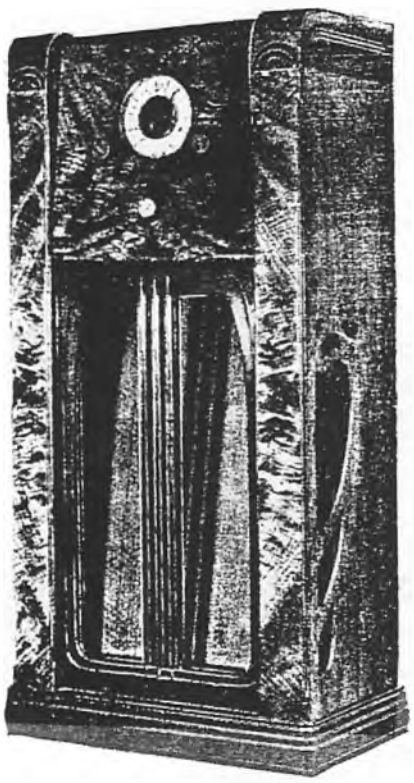
Spotlight filament lamps of 3.5 volts .3 amp. rating are used. These can be purchased at any electrical store.





Astor Model 80

This is one of the most attractive propositions on the Astor list, and is a five



ASTOR MODEL 80

valve Superheterodyne as illustrated, selling at the retail price of only £24/10/-. It will be seen to possess distinguishing sales features, particularly in appearance. The cabinet design is rather unusual and most attractive. The dial is truly a full vision one rendering good visibility with needle-point accuracy. The volume and tone controls are arranged on the front of the cabinet and the knobs and dial have a wood pattern inlaid.

The most unique feature of this new Astor job, is the large and sloping baffle which unquestionably promises a better reproduction in the average home.

To those who have never heard reproduction from a well-designed sloping baffle—you should stand in front of a radio set fitted with a straight baffle, and then bend your head down till you come in a direct line with the actual speaker, and you will find that you hear a lot more notes and get a much better reproduction than if you stood up straight.

Such bending action is unnecessary with the Astor Model 80, as the sound waves are reflected directly up into the room instead of along the floor, and therefore a truer appreciation of the reproduction is obtained.

A radical departure in cabinet design is noted in this new Astor Model 80, in that artistic openings have been provided in the sides of the Cabinet, which will add still further to the acoustical properties and eliminate directional effects. As a broadcast receiver, this Astor Model 80 will be very hard to beat.

—oo—

RADIO & ELECTRICAL MERCHANT
February 15th, 1935

RADIO & ELECTRICAL MERCHANT
February 22nd, 1935

FIRST ASTOR 1935 RELEASE

Model 80 with High Fidelity Cabinet

A DEPARTURE from the standard types of radio cabinets has been made by the Astor designers in their new 1935 Models, the first of which to be released, the Model 80, has been submitted to our Melbourne Office for test.

Incorporating a five valve superheterodyne chassis developed to the highest peak of electrical and mechanical efficiency, and utilising the latest dual purpose hexode and duplex diode valves, it is in the design of the cabinet that the Astor Model 80 is outstanding from most other high quality receivers at present on the market.

Designed on massive proportions and featuring choice Queensland maple veneer with walnut inlays, an extremely large baffle occupies two-thirds of the cabinet, and has an actual baffle area of 494 square inches. This baffle slopes back at an angle of about thirty degrees, and has sound vents cut in both side walls of the cabinet.

This novel application of the principles of acoustics in radio cabinet construction is classified by the trade as "high fidelity" design. The reason for this drastic departure from the recognised standard types on which radio cabinets have been planned for many years, is due to the tendency among prominent radio manufacturers to turn their attention to the acoustic properties of the cabinets in which their receivers are housed.

It has long been known that with the ordinary square or box baffle certain notes are almost totally lost in reproduction. This is due to what sound experts describe as air resonance phenomena, and occurs when the distance from the back to the front of the speaker equals the wave-length of the musical note being emitted. The two wave-lengths neutralise one another and, of course, the note is lost.

The new "high fidelity" cabinet is constructed on a scientifically calculated shape which prevents any note being lost through this phenomenon.

Further acoustical investigation also established that accuracy of reproduction depends to a large extent on the preservation of certain overtones and harmonics which are normally lost in radio reproduction of music. By the introduction of an angle mounted baffle, the sound waves are directed to ear level. Such waves have a tendency to travel in a straight line, thus these overtones are given due prominence.

Another departure from the accepted specifications of radio cabinets is the dust proof design introduced by Model 80, a full back is made of extremely fine silk, which is proof against dust infiltration, yet in no way interferes with air circulation, which is an acoustical necessity.

A full floor is also fitted, thus making the Model 80 entirely dust proof and ensures that the efficiency of chassis and speaker will not be effected by the introduction of foreign matter.

The chassis is a five valve superheterodyne employing the multi-purpose hexode 6A7 as first detector and oscillator with 6D6 intermediate frequency amplifier into 6B7 duplex diode pentode second detector and amplifier. The type 43 pentode is used as output valve with 25Y5 full wave rectifier. In this circuit the five valves thus perform the functions of seven valves and afford extremely satisfactory Interstate range combined with remarkable clarity in reception of all signals.

The full automatic volume control was found on test to be the most effective in preventing blast from high powered local stations and fading on the long range programmes.

The tone control is another most useful feature, really an essential if reproduction is to be entirely suited to one's individual acoustic taste. The new style of tapered volume control is also worthy of mention. Extremely smooth in operation it is effective from a whisper to full output.

PRODUCTS OF AUSTRALIA'S LARGEST RADIO MANUFACTURERS,

whose research laboratories are equipped with the most complete scientific apparatus in Australia, with Overseas technical staffs working in collaboration with the World's largest research organisation.

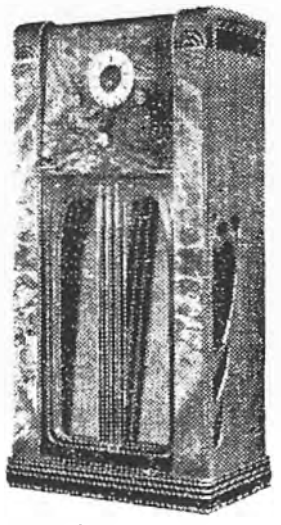
Astor Radio is entirely produced at the enormous works illustrated above. Homecrafts are wholesale Distributors of Astor Radio for Victoria and the Riverina.

NEW TYPE H 456 KC TRAP COILS.

METHOD FOR TESTING ABOVE COILS. 29.3.35.

Put type H aerial coil in standard stage as for normal test except that across secondary an extra .0002mfd. T.C.C. condenser is placed across secondary which is then tuned to 456 KC. Break lead from aerial terminal of stage to aerial lug of coil and insert trap coil between the two and push attenuator rod on signal generator in until a reading is again obtained. By turning signal generator dial and noting where dip in stage reading occurs this corresponds to the trap frequency. Turns are stripped off until this dip occurs on 456 KC.

W. COOK
RESEARCH



MODEL 80

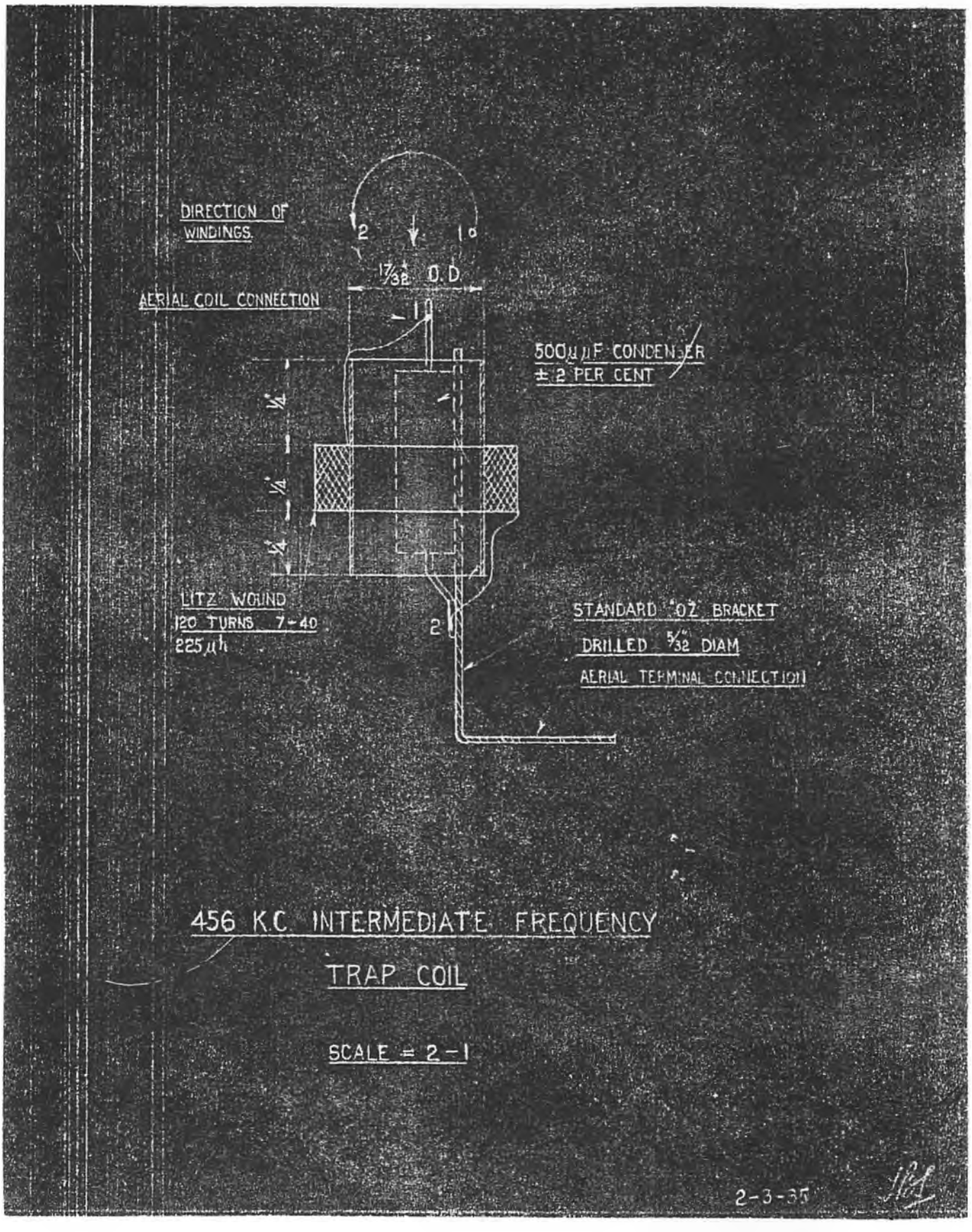
MODEL 80

Five-valve All-electric Superheterodyne employing the latest multi-purpose hexode for range, duplex diode for purity it gives actual seven-valve reception.

Classic features:—
- Full automatic volume control
- Tone Control, and
- Static Suppressor.
- Tapered Volume Control which gives new smoothness in varying sound intensity.
- Full Circle Dial graduated in kilocycles.

Price, £24/10/- s

EASY TERMS ARRANGED

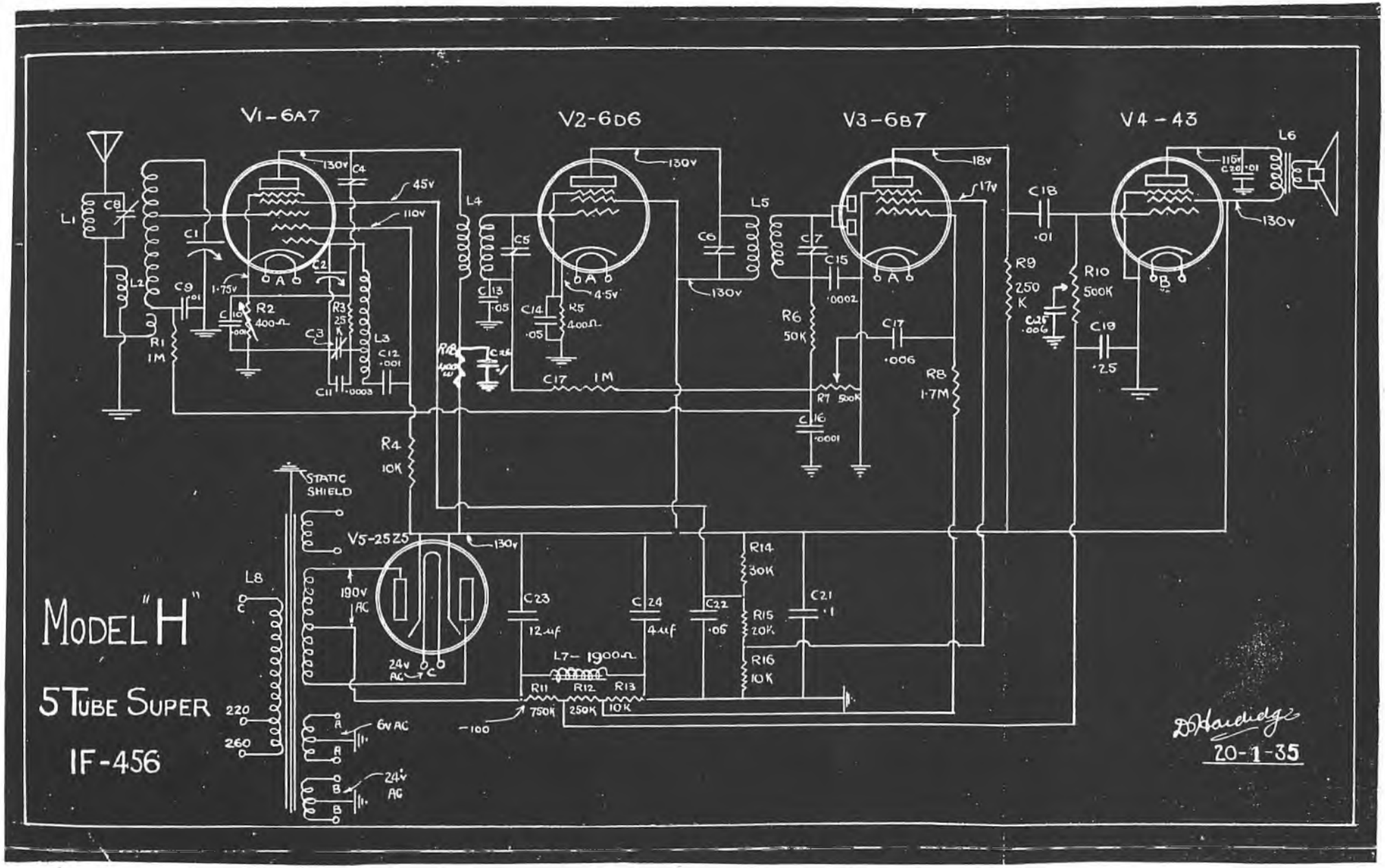


456 K.C. INTERMEDIATE FREQUENCY

TRAP COIL

SCALE = 2-1

2-3-35


V1-6A7
V2-6D6
V3-6B7
V4-43
V5-25Z5
MODEL "H"
5 TUBE SUPER
IF-456
STATIC SHIELD
L1
L2
L3
L4
L5
L6
L7- 1900Ω
L8
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10 .001K
C11 .0003
C12 .001
C13 .05
C14 .05
C15 .0002
C16 .0001
C17 .006
C17 1M
C18 .01
C19 .25
C20 .01
C21 .1
C22 .05
C23 12 mf
C24 4 mf
C25 .006
R1 1M
R2 400Ω
R3 25K
R4 10K
R5 400Ω
R6 50K
R7 500K
R8 1.7M
R9 250K
R10 500K
R11 750K
R12 250K
R13 10K
R14 30K
R15 20K
R16 10K
R18
130V
45V
110V
1.75V
4.5V
18V
17V
115V
190V AC
24V AC
6V AC
220
260
-100
D Hardidge
20-1-35

CIRCUIT CONSTANTS.

MODEL H.
" PH
" H-80.

29.I.35.

RESISTORS

.	1,000,000 ohm	1/3 watt.
,	400 ohm	variable
.	25,000 ohm	1/3 watt
,	10,000 ohm	" "
,	400 ohm	" "
.	50,000 ohm	" "
.	500,000 ohm	Volume control
.	1,700,000 ohm	" "
.	250,000 ohm	" "
).	500,000 ohm	Tone control
1.	750,000 ohm	1/3 watt.
2.	250,000 ohm	" "
3.	10,000 ohm	" "
4.	30,000 ohm	1/2 watt.
5.	20,000 ohm	" "
6.	10,000 ohm	1/3 watt.
7.	1,000,000 ohm	" "
8.	400 ohm	" "

CONDENSERS.

C1-2.	Gang	
C3.	Series Padder.	
C4-7	IF Padders.	
C8.	Image Rejector Padders.	
C9.	.01 Paper 200V.	
C10.	.006 " "	
C11.	.0003 Mica 5%	
C12.	.001 " 10%	
C13.	.05 Paper 200V.	
C14.	.05 " "	
C15.	.0002 Mica 10%	
C16.	.0001 " "	
C17.	.006 Paper 200V.	
C18.	.01 " "	
C19.	.25 " "	
C20.	.01 " "	
C21.	.1 " "	
C22.	.05 " "	
C23.	12mf. 300V.)	Block
C24.	4mf. 200V.)	Dry Elect.
C25.	.006 200V.	Paper
C26.	.1mfd.200V.	"

INDUCTORS.

.	Image trap	L4-5.	IF Trans.
.	Aerial coil	L6.	Speaker Input Trans.
.	Oscillator coil	L7.	Field
		L8.	Power Trans.

11 Model "H" Coil Data

18-8-34

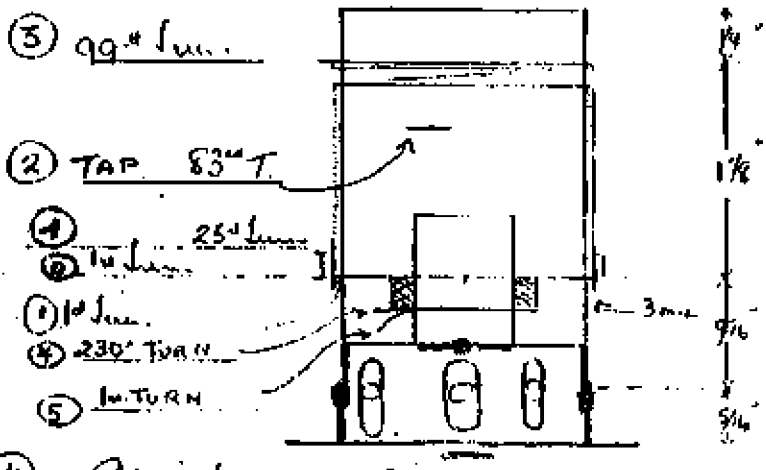
Aerial Coil

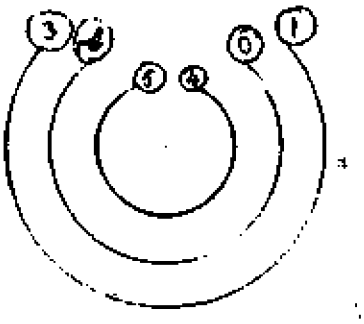
1-5 230 turns 38 B&S SSC

4-0 20 turns 40 SWG SSC

3 mil spacer

1-3 99 turns 31 B.S. En Clo

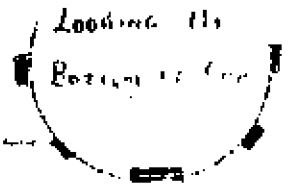




④ - Aerial

① - Grid Rotor

③ - Tuning Condenser

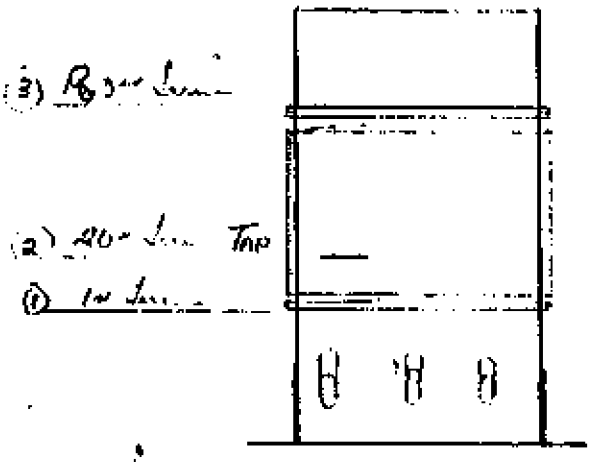


5) Earth

2) - Grid

Oscillator Coil

(1) Grid Rotor



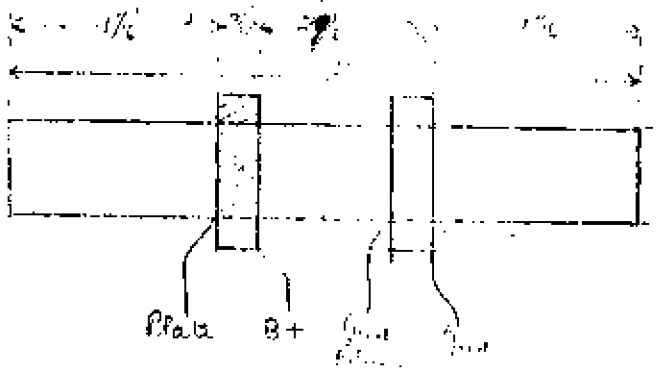
1-2 20 turns 30 B.S.

2-3 turns 63 turns

RBH
17/8/34

1st IF Trans.

29/3



Single Square Loop
3 1/2 x 1 1/2 x 1/2

Grid choke & Loop

Shunted by 30 – 70 uuf Mica

Primary Padder connected between Plate & earthed end of 6m7 coil.

2nd IF Trans

Screen grid

Shunted by 30 – 70 uuf Padder

Single Square Loop
1 1/2 x 1 1/2 x 1/2

Plate

Grid

Anode

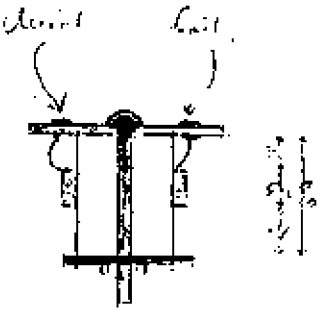
Changed to 4/15
March 35

Grid Leak and condenser returned to Cathode

Shunted by 30 – 70 uuf Padder

Pad padder parallel screen coil

Loop coil



Winding

75 turns 38 B.S. SSC Aluminium

Shunted by 1/2 a 01 Sum Padder

700 – 1300 uuf

THE ASTOR model 30

series AAB

5 valve, battery console, broadcast only

Valve types; 2A7 mixer, 34 1st IF amplifier, 34 2nd IF amplifier, 19 used as diode detector & audio amplifier, 33 output.

I.F. frequency 456 Khz.

Battery requirements; 2 volts A, 135 volts B, -22½ volts C.

Comments; AVC, static suppressor, image trap adjustment.

CIRCUIT CONSTANTS.

MODEL AA-B.

RESISTORS.

R1.	250,000	ohm	1/2 w.	resistor.
2.	100,000	ohm	1/3 w.	"
3.	400	"	" "	"
4.	250,000	"	" "	"
5.	250,000	"	" "	"
6.	100,000	"	" "	"
7.	500,000	"	" "	"
8.	250,000	"	" "	"
9.	500,000	"	Volume Control.	
10.	10,000	"	1/3 w.	resistor.
11.	250,000	"	" "	"
12.	500,000	"	Tone Control	
13.	2,000	"	1 w.	resistor
14.	300	"	1/3 w.	"
15.	1,000,000	"	" "	"
16.	1,000,000	"	" "	"
17.	1,000,000	"	" "	"
18.	25,000	"	" "	"

INDUCTORS.

1. IF trap coil assembly.
2. Aerial coil assembly.
3. Oscillator coil assembly.
4. 1st IF Transformer assembly
5. 2nd " " "
6. 3rd " " "
7. High Impedance choke.
8. Speaker input transformer.

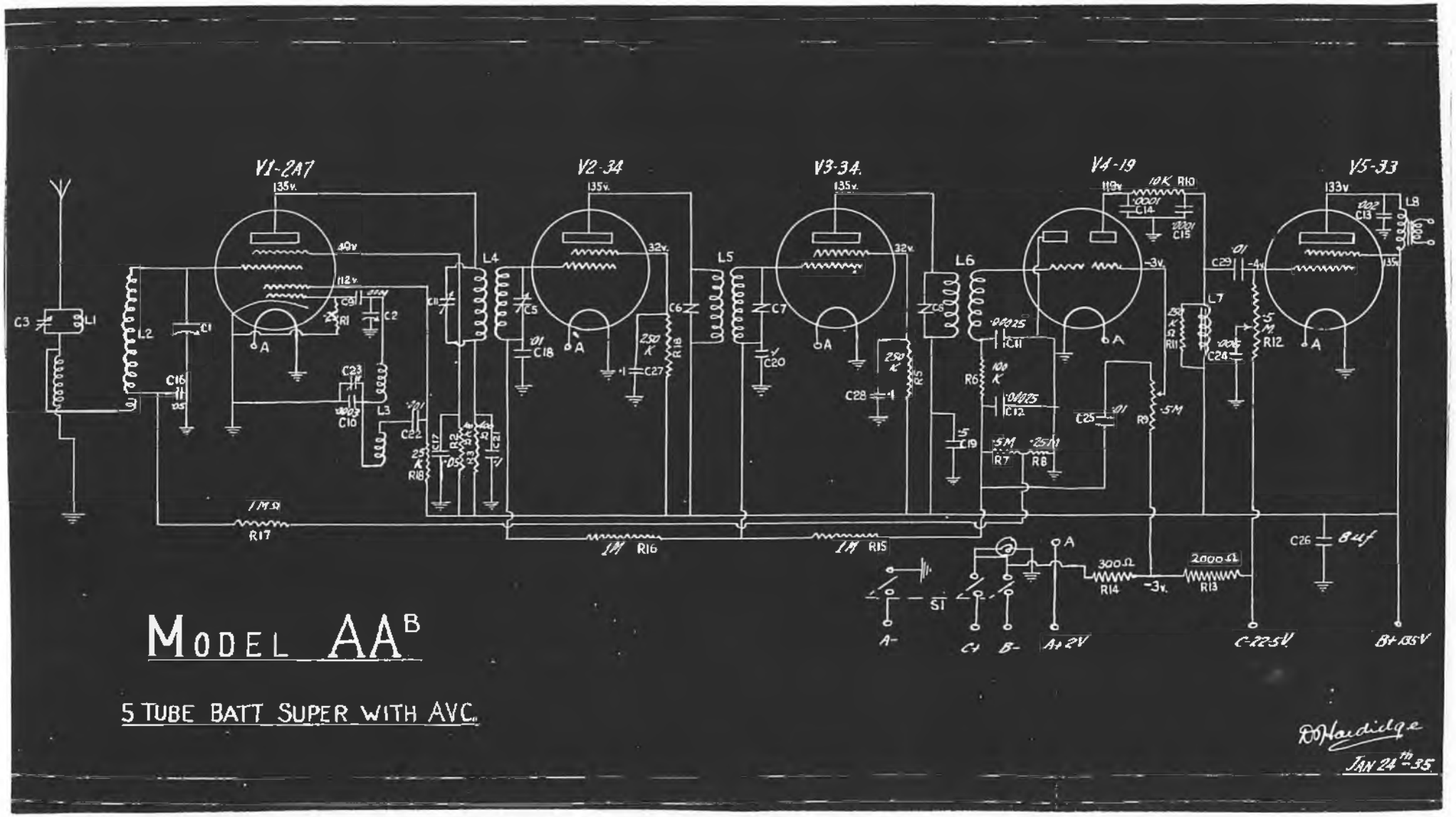
Condensers ctd.

8.	.1 Paper cond.	400V.	10% tol.
9.	.01 " "	200V.	"

CONDENSERS.

C1.	Aerial section of gang cond.		
2.	Oscillator section of gang cond.		
3.	IF trap coil padder.		
4)	Primary and secondary padder		
5)	1st IF Transformer.		
6)	Primary and secondary padder		
7)	2nd IF Transformer.		
8.	Primary padder of 3rd IF Transformer.		
9.	.0001 Mica cond.	1000V.	10% tol.
10.	.0003 " "	1000V. below	50% tol.
11.	.00025 " "	1000V.	10% tol.
12.	.00025 " "	1000V.	"
13.	.002 " "	"	"
14.	.0001 " "	"	"
15.	.0001 " "	"	"
16.	.05 Paper cond.	200V.	"
17.	.05 " "	"	"
18.	.01 " "	"	"
19.	.5 " "	"	"
20.	.1 " "	400V.	"
21.	.1 " "	400V.	"
22.	.001 Mica cond.	1000V.	10% tol.
23.	Series pad.		
24.	.006 Paper cond.	200V.	"
25.	.01 " "	"	"
26.	8mfd. Elect. cond. (wet)		
27.	.1 Paper cond.	400V.	10% tol.

----------ooo----------


V1-2A7
V2-34
V3-34
V4-19
V5-33
135v.
119v.
133v
40v
32v.
112v.
-3v.
-4v.
L1
L2
L3
L4
L5
L6
L7
L8
C1
C2
C3
C5
C6
C7
C8
C11
C12
C13
C14
C15
C16
C17
C18
C19
C20
C21
C22
C23
C24
C25
C26
C27
C28
C29
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
1M R16
1M R15
1M Ω
300Ω
2000Ω
S1
A-
G
B-
A+2V
C-22.5V
B+135V
MODEL AA^B
5 TUBE BATT SUPER WITH AVC.
D.D. Hardidge
JAN 24th -35

Instructions for Operating

FIVE TUBE BATTERY SUPERHET RECEIVER

MODEL 30

With Automatic Volume Control.

Operating Instructions

5 Tube Battery Superhet Receiver

AERIAL.—An outside aerial of from 40 to 100 feet length is suitable. In some localities an indoor aerial of about 40 feet length may be found suitable. Generally the longer outside aerial gives better daylight results over long distances.

GROUND.—The ground lead should be as short as possible. Solder or firmly clamp to a water pipe if available, otherwise drive a metal pipe about 4 feet long into moist ground, soldering the ground lead to the pipe. There should be no twisted joints in aerial or ground leads; if joints are necessary, they should be soldered. Gradual oxidation of twisted leads is sure to cause weak and noisy reception.

BATTERIES.—For the "A" battery supply a two volt accumulator is required. Air cells or dry cells should not be used unless some suitable device is used to limit the applied voltage to two volts. "B" AND "C" BATTERIES OF THE HEAVY DUTY TYPE SHOULD BE USED. The circuit is so designed that an even drain is placed on both these batteries, and, should a "C" battery of the light duty type be used, it will become exhausted long before the "B" battery, thus placing an undesirable strain on the tubes, and shortening their period of usefulness considerably. Connections for all batteries are shown on the accompanying diagram, each lead being fitted with a descriptive metal tag.

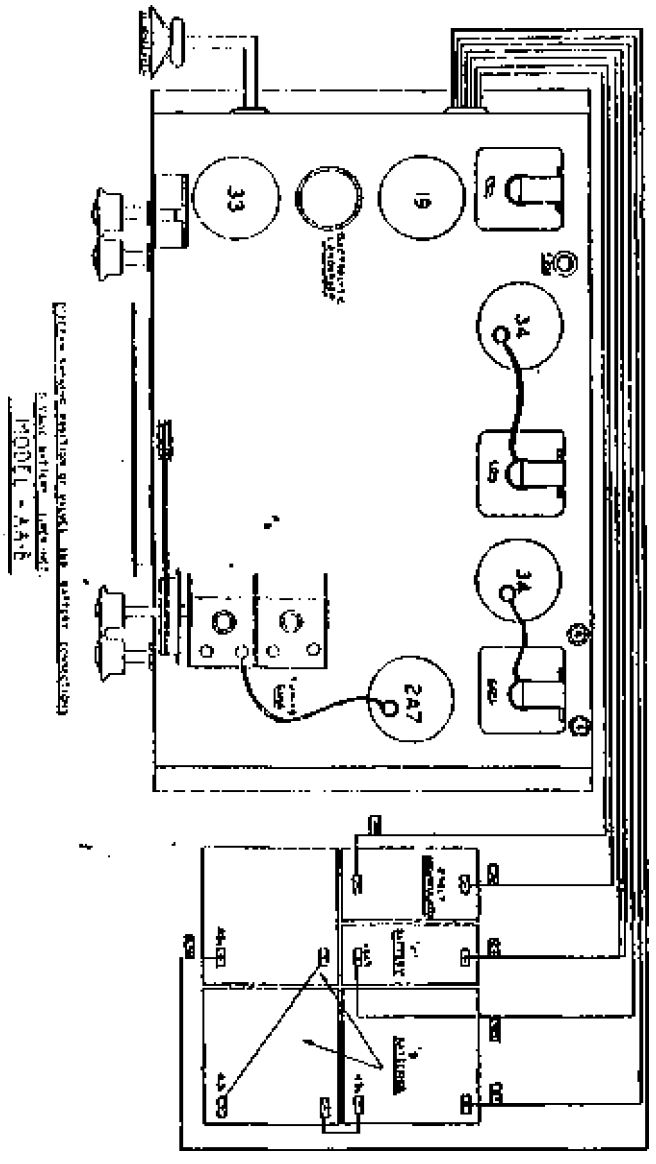
TUBES.—Before operating, see that all valves are properly seated in their sockets, as indicated on the diagram, and that leads which connect to the tip on some of the tubes are in place.

FUSES.—One ordinary torch lamp is fitted for the protection of tubes and batteries in the event of wrong connections being made, or accidental short circuits. Any torch lamp not consuming more than 3-10ths of an ampere can be used for replacement. If the receiver fails to work at any time, check these fuses by placing a spare lamp in the socket. A blow fuse is indicated by a bubbling in the socket. A blown fuse is indicated by a bubbling noise from loud speaker.

CARE OF BATTERIES.—The accumulator should be charged regularly, about every three weeks. A new accumulator requires charging more frequently until it has been charged about four times. Test every week with a hydrometer for best results. Test "B" and "C" batteries once a month with a small voltmeter. The "B" battery drain of this receiver is very low, and the circuiting is such as to allow maximum possible service from batteries. It will be found most satisfactory, however, to discard batteries after they have fallen below one half of their original voltage.

OPERATION.—Switch on batteries by turning the switch knob to the left. Approximately 30 seconds warming up time is necessary for tubes to reach operating conditions. Turn volume control clockwise, and rotate tuning control until a station is heard, then regulate to required volume by volume control. Readjust tuning control until best quality is obtained. Turning the volume control clockwise makes the receiver more sensitive for long-distance reception.

STATIC SUPPRESSOR.—This control may be used to suppress strong static interference, as well as for graduated tone control. When static noise is high, turn the control until the noise is reduced.



SERVICE DATA.

MODEL 50 (TYPE AA)
MODEL 30 (TYPE AA-B)

GENERAL:

The Astor Models 30 and 50 are both five tube, battery operated superheterodyne radios, so designed as to assure maximum satisfactory performance together with minimum battery consumption. The receivers are identical, with the exception that Model 50 covers an additional band of from 18.5 to 55 meters.

TUBE COMPLEMENT:

Type.	Function
2A7	Oscillator Modulator.
34	1st Intermediate Frequency Amplifier
34	2nd Intermediate Frequency Amplifier
19	Diode 2nd Detector, AVC, 1st audio amp.
33.	Power Output.

CIRCUIT DESCRIPTION:

The receiver requires the use of only five tubes as it has a highly efficient circuit, designed to take full advantage of the multi purpose tubes. It is of the conventional superheterodyne type and does not involve the use of regeneration or of highly peaked circuits which tend to effect the stability and overall gain taken over a period.

The antenna circuits on both shortwave and broadcast bands are of the high gain type with fairly wide band-widths to allow for possible mis-alignment with various types of aerials, the shortwave aerial has adjustable resonance by virtue of the shortwave vernier knob mounted in center-front of cabinet.

The plate voltage supplied to tubes should be approximately 135V. with 22V. C bias. Greater power output with lower percentage of distortion may be obtained by either increasing plate supply or decreasing C bias voltage, it should be borne in mind however that either of the above procedures will increase the B battery consumption.

Automatic volume control is used and is indispensable especially on shortwave reception as it evens up the volume of signal receiver from stations which fade.

Noise level is reduced considerably by use of high antenna circuits and by high gain converter stage using 2A7 tube.

CIRCUIT OPERATION:

Referring to circuit diagram:

The signal is fed through the IF trap L1 and C3 to the aerial coil L2 and 3 and thence to 2A7 grid. With switch in S.W. position the trap is eliminated and signal feeds direct to S.W. aerial coil L4 and 5, C31 is the Shortwave vernier.

The converted signal is fed via 1st IF transformer L10 to grid of 1st IF Amplifier V2 where further amplification takes place.

The output of V2 is fed through L11 (2nd IF trans.) to grid of V3 (2nd IF tube) and after further amplification is fed through L12 (Single tuned 3rd IF transformer) to Diode section of V4 (19). The first triode of this tube is converted for diode operation by earthing the plate. AVC voltage is built up by the rectified signal in resistors R7 and 8 the full value of this AVC voltage is fed through filters R15 and C20 to V3 and R16 and C18 to V2. Half value is supplied to V1 via filter R17 and C16. The audio output from the diode is fed to the second triode section of V4 via coupling condenser C25, volume control being carried out on this triode grid by virtue of R9. Filtering in plate circuit is carried out by R10 and C14 and 15, coupling is Impedance capacity type allowing for maximum audio gain.

Tone control is accomplished by a variable resistor R12 in the grid circuit of the output tube the variable arm of this resistor is taken through C24 (tone control condenser) to earth, output is through L14 (Speaker transformer) to voice coil.

C8 acts as filter for ageing battery noises which would otherwise become apparent.

R13 and 14 act as both bias divider and C battery bleeder and make sure that B and C battery voltages are always in correct proportion. Bleeder current is approx. 10 mils.

Switch 1 is part of the shortwave switch in Model 50, it being just a single section in Model 30 and is responsible for completely disconnecting all batteries. Voltages to be expected for a normal receiver on fully charged batteries are shown on circuit diagram and are taken with a 1000 ohm per volt meter.

ALIGNMENT:

A. Intermediate Frequency adjustment.

Intermediate Frequency = 456 Kc. Signal to be applied direct to grid of V1, adjust 3rd transformer (single padder) first, following in order with No. 2 and No. 1 transformers.

This procedure should be gone over twice using as small an input as possible.

B. Image Trap adjustment.

This adjustment is located on the right hand side of chassis, a signal of 456 Kc should be fed through a 200 mmf dummy antenna to aerial terminal of set and with wave band switch in Broadcast position, the adjustment pad should be turned until minimum reading is obtained, that is, tuned to a dip. Later models will have a fixed trap coil, making this adjustment unnecessary.

C. Broadcast Band adjustment Model AA.

Padders are located above coils, under base. Locations are taken looking at front of chassis (at dial) with tubes uppermost. Feed signal through 200mmf. dummy to aerial terminal, and with gang plates fully out of mesh adjust rear left hand padder (osc. circuit) to 1550 kcs, move generator to 1400 Kc and tune in signal using gang knob, resonate carefully and then adjust front left hand padder (ant. circuit). Move generator to 600 kc and adjust series padder which is located toward rear of chassis in line with V2.

Recheck (Antenna circuit only) at 1400 Kc. Check various other spots if necessary by using antenna section split plates, oscillator split plates should not be used as this tends to throw out dial logging.

D. Shortwave section.

Set gang at zero and adjust rear right hand padder (oscillator circuit) to 18.5 meters. This is the only short wave adjustment necessary as aerial circuit is resonated by use of shortwave vernier control and series padder has a fixed value.

E. Model AA-B Broadcast Adjustment.

This is precisely similar to Model AA with the exception of trimmer location. Trimmers are located on top of gang in the normal manner for this receiver, the front trimmer being the Aerial and the rear on the Oscillator.

NOTE: When adjusting shortwave section of Model AA it will be noticed that with a strong signal, there is a tendency for reception to take place in two fairly widely separated spots. This is perfectly normal, the correct spot being the one which, when gang is left stationary, is located on the lowest frequency reading as generator dial is rotated.

If generator dial is left stationary the correct frequency spot will be that which is found on the highest frequency reading (lowest wavelength) on set dial.

THE Pinnacle models AF & PF

5 valve, AC operated console, broadcast only

Valve types; 6A7 mixer, 6D6 IF amplifier, 75 diode detector & audio amplifier, 43 output, 25Y5 rectifier

I.F. frequency 456 Khz.

Comments; 5 KΩ wirewound pot as volume control in RF stages. Model AF has small clock dial.

Instructions for Operating.

FIVE TUBE A.C. SUPERHETERODYNE

MODEL AF

WITH CLOCK DIAL

Instructions for Operating

5 Tube A.C. Superheterodyne

MODEL AF

WITH CLOCK DIAL

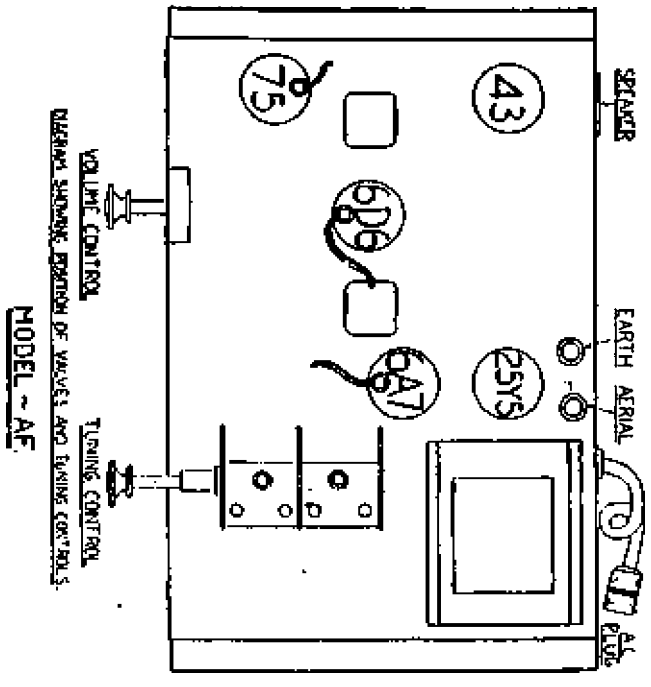
AERIAL.—40 to 60 feet of outside aerial will give best results. An inside aerial of 30 to 40 feet will give good results, but will not receive distant stations as well as the outside aerial.

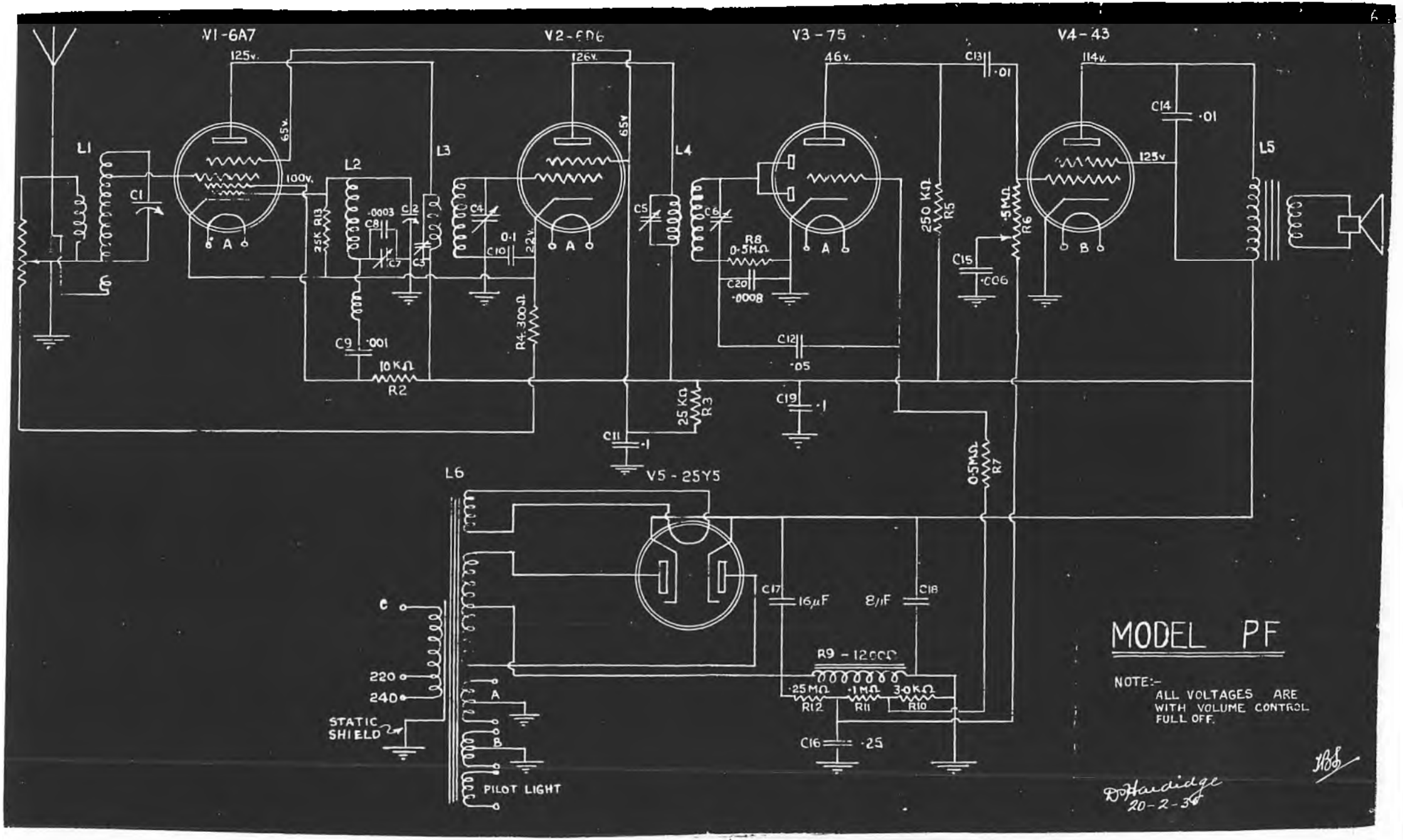
GROUND.—A good ground lead is essential for best results. Solder or clamp to a water pipe if available; otherwise drive about 4 feet of metal piping into moist ground and solder or clamp to it.

OPERATION.—Wait for about 30 seconds for tubes to heat up to a working condition. Turn volume control fully clockwise, and turn tuning control until a station is heard. Readjust volume control.

DIAL LAMP.—A 3½ volt Madza torch lamp is used if replacement should be necessary.

A.C. SUPPLY.—Adjustment is provided on underside of chassis for 200-240, 240-260.




V1-6A7
V2-6D6
V3-75
V4-43
125v.
126v.
46v.
114v.
65v.
65v.
100v.
125v
22v.
L1
L2
L3
L4
L5
L6
C1
C2
.0003
C3
C4
C5
C6
C7
C8
C9 .001
C10 0.1
C11 .1
C12 .05
C13 .01
C14 .01
C15 .006
C17 16μF
C18 8μF
C19 .1
C20 .0008
R1
R2 10KΩ
R3 25KΩ
R4 300Ω
R5 250KΩ
R6 .5MΩ
R7 0.5MΩ
R8 0.5MΩ
R9 - 1200Ω
R10 3.0KΩ
R11 .1MΩ
R12 .25MΩ
C16 .25
V5 - 25Y5
A
B
C
220
240
STATIC SHIELD
PILOT LIGHT
MODEL PF
NOTE:-
ALL VOLTAGES ARE WITH VOLUME CONTROL FULL OFF.
D. Hardidge
20-2-36

THE ASTOR model 170 series AB

7 valve, AC operated console, Dual-wave

Valve types; 6D6 RF amplifier, 6A7 mixer, 6D6 1st IF amplifier, 6D6 2nd IF amplifier, 75 diode detector, AVC & audio amplifier, 42 output, 280 rectifier

I.F. frequency 456 Khz.

Comments; Ratio drive.

Circuit diagram needs these components labelled, capacitor between R11 & R12 is 8 mfd electrolytic, cathode resistors R15 & R16 are 1000Ω.

Unfortunately page 3 was omitted from the service data when the file was bound, 50 years ago!

[redacted] DEPT.

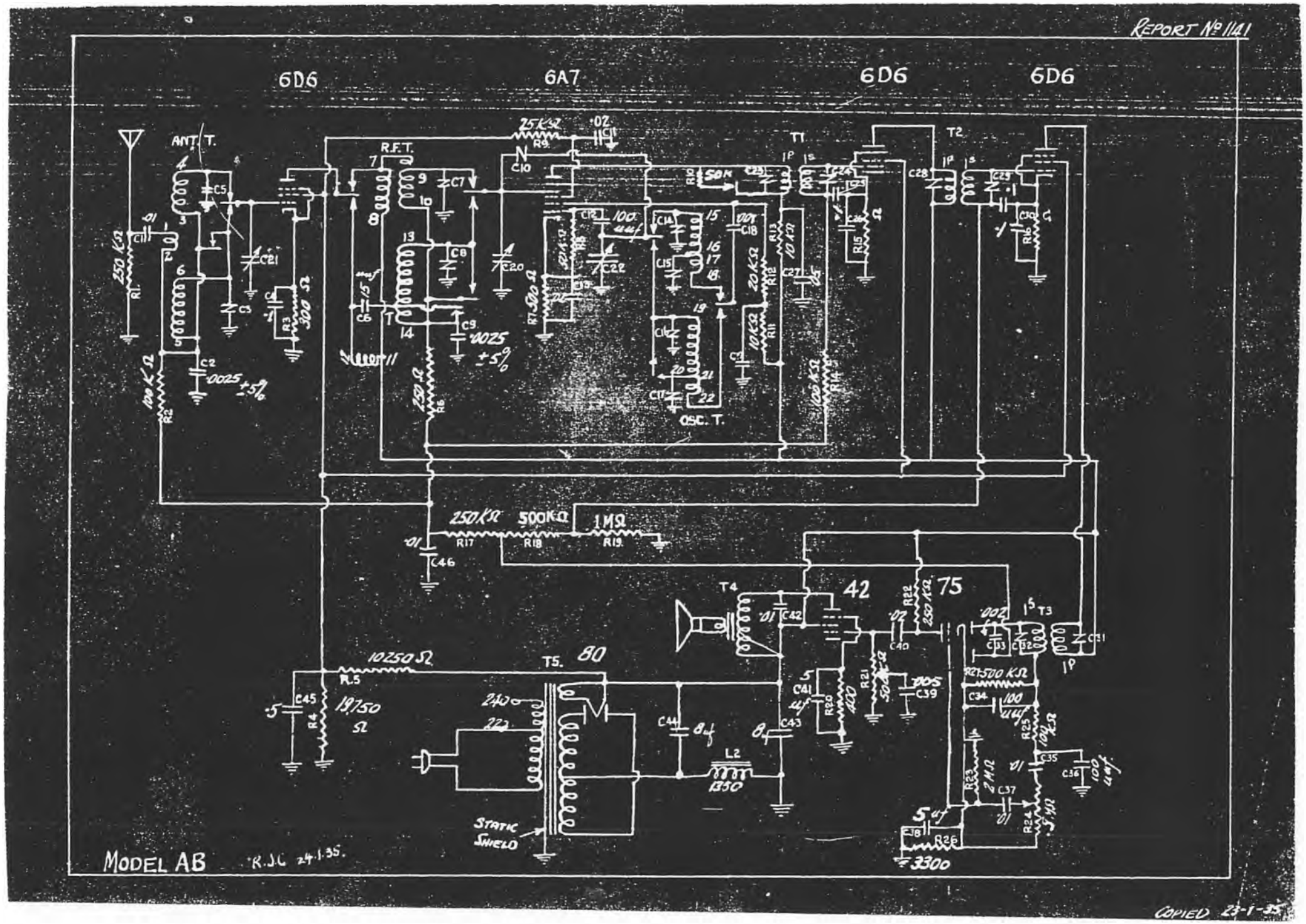
[redacted] 170 (AB). [redacted] 25.2.35.

The boom on short wave has been eliminated. The following mechanical precaution is still needed however:-

The rope drive from the vernier to the condenser may be left under tension on one side after an adjustment has been made.

This tension may be all applied to one side of the rope, leaving it like a violin string, free to vibrate at some audio frequency. On very high modulated inputs one particular note may start this string vibrating, which has the effect of tuning the condenser in and out sufficient to start a sustained vibration.

Precaution: Both sides of the rope should have the same tension or the tension should be such as the rope is quite slack.


REPORT No 1141
6D6
6A7
6D6
6D6
ANT. T.
R.F.T.
T1
T2
OSC. T.
T4
T5. 80
T3
42
75
MODEL AB
R.J.C 24.1.35.
STATIC SHIELD
COPIED 23-1-35

SERVICE DATA.

ASTOR MODEL 170 (TYPE AB)
SEVEN VALVE DUAL WAVE RECEIVER

COVERAGE:

This receiver is designed to cover the broadcast channel from 550 to 1500 Kc/s. and also a range of high frequency channels from 16 Mc/S to 6 Mc/s, thus covering the most widely used Shortwave channels.

RADIO FREQUENCY AMPLIFIER.

The radio frequency amplifier consists of one stage of amplification at signal frequency, followed by a frequency changer (6A7 valve) and by two stages of amplification at the new radio frequency, 456 kilocycles. The detector is one diode of a 75 valve, while the other diode of the 75 is used for the creation of AVC voltage. The triode section of the 75 serves as an audio amplifier and the 42 Pentode is the power output valve.

COUPLING.

An advanced system of coupling is used in the radio frequency circuits, and a brief description will be given.

DEALING WITH THE ANTENNA SYSTEM.

The antenna is connected to ground through a 250,000 ohm resistor as a guard against hum modulation. The coil 1-2 is a small inductance used to couple the antenna to the short-wave coil 3-4. The coil 1-2 offers negligible impedance to broadcast frequencies, and the antenna is coupled to the broadcast secondary 5-6 by means of the .0025 fixed condenser which is connected from 5 to ground. The .01 fixed condenser in the antenna lead is used to prevent possible loss of AVC voltage due to a badly insulated antenna.

When the wave change switch is on the shortwave position the broadcast secondary is shorted, and has no interaction on the shortwave secondary.

The signal frequency amplifying valve (6D6) is coupled to the frequency changing valve (6A7) by means of high inductance primaries and tuned secondaries. This means that the plate circuit has relatively high impedance, as well as the grid circuit, a desirable feature.

The Broadcast primary coil 11-12 is an inductively reactive circuit, which in combination with the small amounts of capacity associated with it, is resonant to a frequency lower than the lowest broadcast frequency that the receiver will tune.

The tuned broadcast secondary 13-14 is tapped close to the low RF potential end, and the tap is connected to the plate of the preceding valve by means of a small fixed condenser. The small ceupling condenser from plate to tap of 13-14 favors the amplification of the higher broadcast frequencies, while the series .0025 condenser tends to favor the lower broadcast frequencies, thus even amplification is attained over the whole broadcast band.

The .0025 condenser connected from 14 to ground, beside being used as a coupling condenser, serves, in conjunction with the section of secondary inductance from tap to 14, as a series tuned trap circuit, resonant to 456 Kc, the Intermediate Radio Frequency. This serves to reduce "tweets". The coil 11-12 is not inductively coupled to the broadcast secondary. When the wave-change switch is in shortwave position the secondary 13-14 is shorted, as is the section T14. This prevents

(Unfortunately p.3. is missing from the file!)

ially the same for both broadcast and shortwave frequencies.

The small neutralizing condenser shown between the 6A7 oscillator grid and control grid and control grid is not now used.

ALIGNMENT:

Three intermediate radio frequency transformers are used, and in alignment of these, factory procedure is as follows:

a. Switch receiver to shortwave position.

b. Connect output of 456 Kc generator (30%-400 cycle modulation) to grid of 6A7 in place of existing grid clip.

c. Tune each IF transformer, starting on the last and working back to the first, until all are aligned to 456 Kc. Attenuate the signal until about 50 MW is shown on the output meter, and check over the tuning of the transformers. The overall resonance curve of the receiver has a broad top, with steep slopes, helpful for tonal fidelity, and also useful on shortwaves in that it minimides frequency drift due to warming up of valves etc.

It must be remembered that there is nothing "hit and miss" about the design of this receiver. The misalignment of the shortwave circuits is very small, being about the same percentage as the broadcast circuit misalignment, which does not usually exceed 1/2%. Therefore it is important that circuit alignment be done accurately, if needed.

SHORTWAVE ALIGNMENT.

The shortwave alignment is done exactly the same as broadcast alignment, except that it is possible to align the

oscillator circuit incorrectly.

The shortwave trimmers are in the coil cans inside the chassis, nearest the switch. The coil nearest the front of the chassis is the oscillator assembly, next is the RF (signal frequency) assembly, and then the antenna transformer assembly.

The shortwave high frequency alignment position is 20 metres (15 Mc/S).

The output of the signal generator (shortwave) is connected to the chassis, and to the aerial terminal through a 400 ohm non inductive resistor, and the generator adjusted to 15 Mcs. The oscillator trimmer is then adjusted until an output is observed.

LOCATION OF OSCILLATOR ALIGNMENT POSITION.

Next the signal input is increased, and the dial of the generator turned to 15.912 Mcs. If the oscillator is aligned to the correct frequency the "2 times" IF frequency image will be heard.

It must be understood that at high frequencies it is possible, even when the circuits are correctly aligned, to hear a signal from the generator at three different frequencies, if sufficient voltage is applied to the antenna terminal of the receiver. These are:-

1. Correct signal frequency. The oscillator circuit is operating at a frequency 456 Kc/s higher than the resonant frequency of the antenna and RF circuits.
2. Correct signal frequency plus 1/2 IF frequency. Here the 2nd harmonic of a strong input is applied to the antenna

beats with the 2nd harmonic of the oscillator frequency to produce an IF frequency. Thus if the oscillator is trimmed to Align with a signal of 15 Mc/s it will operate at 15.456 Mc/S. If a strong signal of correct sig-

1. nal frequency plus 1/2 IF frequency, that is 15.228 Mc/S is applied, the 2nd harmonic of the oscillator, 30.912 Mc/s and the 2nd harmonic of the signal 30.456 Mc/s beat, and having a frequency difference of 456 Kc/S will pass through the intermediate radio frequency amplifier.

3. Correct signal frequency plus "2 times" IF frequency. Here the signal is 456 Kc/S higher than the oscillator instead of 456 Kc/s lower in frequency.

Thus if the oscillator is adjusted to align with a signal of 15 Mc/s, it oscillates at 15.456 Mc/s. If a signal of 15 Mc/s plus "2 times" IF frequency (15.912 Mc/S) is applied, there is a frequency difference of 456 Kc, which passes through the intermediate radio frequency amplifier.

It is apparent that there is a possibility of incorrectly aligning the oscillator circuit and the antenna and RF circuits. The paragraph headed "Location of Oscillator alignment position" shows one method of locating the correct position. Another method is to apply a signal of 15 Mc/s, adjust the condenser until the pointer on the dial shows 20 metres, turn the oscillator trimmer condenser out as far as it will go, then increase its capacity. The first signal heard is the correct aligning position.

After the oscillator is aligned to the correct frequency, the RF and antenna circuits are aligned for maximum output, then the receiver dial pointer is turned to about 50 metres (6 Mc/s). The generator is set to 6 Mc/s, and the series pad adjusted to give maximum output. The tuning condenser is turned back and forth a little while the series pad is being adjusted, until the correct combination of tuning condenser capacity and series pad capacity is obtained. It is not deemed sufficient to merely adjust the tuning condenser to 50 metres, and then adjust the series pad for maximum output. The shortwave series pad adjustment screw is on the top of the chassis, near the back of the centre gang of the tuning condenser.

WHERE NO GENERATOR IS AVAILABLE.

In cases where a shortwave signal generator is not available, shortwave alignment may be possible by using the tenth harmonic of a broadcast signal generator. This, of course, only holds if the generator is rich in harmonics.

For trimming the condensers across the coils, the generator would be set to 1500 Kilocycles (the 10th harmonic of which is 15 Mc/s. or 20 metres) and the pointer of the receiver dial to 20 metres. For adjusting the series pad on shortwaves, using a broadcast signal generator, adjust the generator to 600 Kilocycles, and use the 10th harmonic.

Alignment is also possible by using a station on about 20 metres, and another on about 50 meters, trimming for maximum loudness.

It is important to remember however that it is possible to adjust the oscillator to a wrong setting.

FINDING CORRECT OSCILLATOR TRIMMER ADJUSTMENT.

The correct oscillator trimmer position can be found by turning the adjustment screw right in, then applying a fairly high input voltage to the antenna terminal, through a 400 ohm non-inductive resistance. Next the trimmer screw is turned out, increasing the trimmer capacity. The signal will be tuned in three times as this is done. The first position of the trimmer (near minimum capacity) at which the signal is heard, is the correct position. This rule applies when a shortwave signal generator is used.

Broadcast circuit alignment is similar to that used on shortwaves, except that the oscillator trimmer condenser will only peak at one frequency, the correct one.

A dummy antenna of 200 mmf is used to connect the generator to the antenna terminal, and the receiver has the parallel trimmers (situated in the coil shield cans, and furthest from the switch) adjusted at 1400 Kc/s, and the series pad (situated on the top of the chassis near the front end of the tuning gang) is adjusted at 600 Kcs.

FINALLY:—

There is nothing complex about the Model 170, type AB. Good engineering practice has been used in the design, so that the same order of performance is to be expected from shortwaves as from broadcast waves. The AVC control is very good indeed. In fact a 30% modulated (400 cycle) carrier needs to be increased from 100 mv input to 1,000,000 mv input, a ratio of 10,000 to 1 in order to increase the output voltage of the receiver by a ratio of 5 to 1. A variation of from

50 microvolts to 500 microvolts inout voltage varies the output by only 3 decibels, an amount just distinguishable by the ear, therefore fading and variation of signal strength must be very bad indeed before they can be detected by the ear.

As many shortwave stations are subject to considerable fading, the excellent AVC almost completely eliminates this disadvantage.

The sensitivity on both wave ranges usually averages between 1 and 4 microvolts. It is felt that greater sensitivity in this receiver, while easily attainable, is undesirable.

R. J. COLLINS A.M.I.R.E

Engineer

RESEARCH DEPT.

MODEL AB TYPE 170. 2.6.35

Mr Ingram reports that many condenser gangs have plates out of central, and that such, apart from alignment trouble, have a tendency to make sets boom.

In a condenser, when the plates are central, a small movement either way of the rotor plates makes little difference to the capacity.

However, if the plates are off center a small vibration of the rotor plates will substantially vary the condenser capacity, and cause booming.

The rotor plates must be kept as central as possible.

All sets in production must have condensers replaced if their rotors are not central.

ASTOR MUSIC MODELS

Establishing a new standard of tonal excellence . . .

Astor MODEL 110

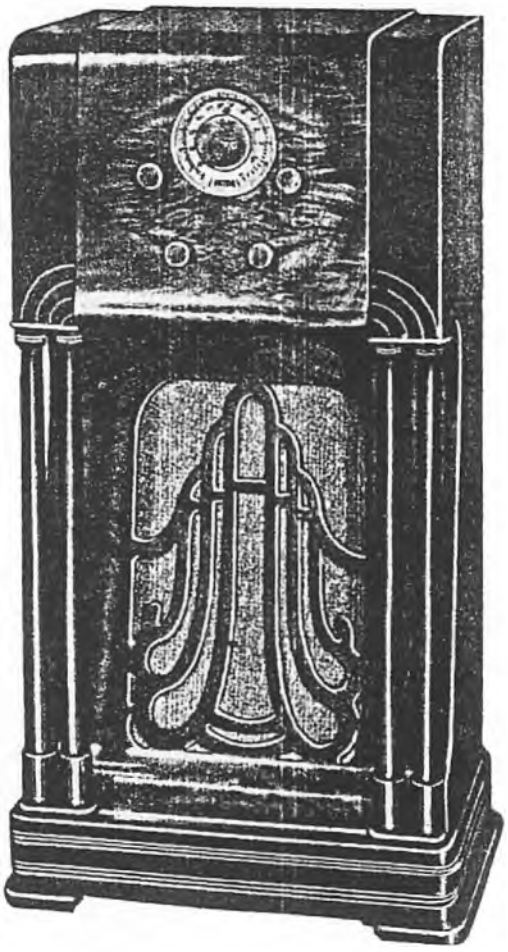
with the Magic Selectivity Control

New de Luxe Superheterodyne employing multiple-function valves, gives actual seven valve performance . . . while the amazing selectivity control, exclusive to Astor Model 110, provides full side-band response. Used in conjunction with the new high fidelity cabinet, it renders every audible frequency in true perspective.

The Model 110 provides an actual baffle area of 3,000 square inches, with large inclined sounding board which directs overtones to ear level. Not a single note or harmonic is missed.

Features include automatic volume control, and tone control; airplane dial with colour-light for accurate tuning, and 10 inch dynamic speaker by Jensen.

The cabinet is a masterpiece of the craftsman's art with butt maple panels and contrasting genuine Ebony side-pilasters. PRICE . . . . . **30 Gns.**



and now . . .

"London direct on an indoor aerial" with . . .

Astor MODEL 170

De-Luxe 7 valve Dual Wave Superheterodyne

World short-wave reception is lifted from the experimental sphere to that of everyday entertainment by Astor's dual wave masterpiece—the Model 170 . . . incorporating all the desirable features of a de luxe broadcast receiver with unbelievable ease in short-wave tuning by means of novel **S-L-O-W 70-1 vernier (two speed) selector.** Greater signal strength with less "background" noise. Exclusive seven valve circuit employs multiple-function valves, giving actual nine valve performance. Constant sensitivity over the full range of the tuning scale. No "missing" spots on the short-wave band. Fading eliminated on all wavelengths by improved automatic volume control . . . tone control and static suppressor.

Housed in acoustically perfect cabinet of striking beauty. The radically new design provides over 3,000 square inches of effective baffle area. Built of "musical woods" on curved classical lines, featuring rare burl maple, ebony pilasters and figured ribbon maple grille. . . . . PRICE **40 Gns.**

Get particulars of ASTOR'S attractive Sales Proposition . . . Terms Sales Financed

Entirely Produced by RADIO CORPORATION PTY. LTD. Sturt Street, South Melbourne

Vic. Wholesale Distributors:—Keep Bros. & Wood, 200 Latrobe Street, E. A. Machin & Co. Pty. Ltd., 535 Elizabeth Street and Homecrafts Pty. Ltd., 211 Swanston Street, Melbourne. *N.S.W. Distributors*: Smith, Sons & Rees Ltd., 30-32 Wentworth Avenue, Sydney. *South Aust.—Country Distributors*: Oliver J. Nilsen & Co. Pty. Ltd., 35 King William St., Adelaide. *West Aust.—Factory Representative*: H. E. Pead, 905 Hay Street, Perth. *Queensland — Factory Representative*: A. P. Taylor, Albert House, Albert Street, Brisbane. *Tas.—Factory Representative*: L. Lucke, 146 Collins Street, Hobart; F. W. Koochew, 25 The Quadrant, Launceston.

THE ASTOR model 110 series AC

5 valve, AC operated console, Dual-wave receiver

Valve types; 6A7 mixer, 6D6 IF amplifier, 6B7 diode detector, AVC & audio amplifier, 42 output, 280 rectifier

I.F. frequency 456 Khz.

Comments; Tuna-light, tone control, expanding selector, 12" Jensen D9 speaker.

Retyped from file due to poor photocopy from original pink paper.

There have been isolated cases in which complaints have been made concerning whistling and other noises when the expanding control has been used. This is caused by regeneration in the 6A7 valve.

A certain amount of regeneration is used in this valve to improve the sensitivity of the receiver. Under some circumstances having to do with climatic conditions it is possible that the regeneration may become too great.

The remedy is to substitute a 0.01 mfd capacitor across the cathode resistor of the 6A7 valve. This may slightly reduce the sensitivity, but such reduction will not be noticeable to the ear. The value is not critical as the capacitor can be from 0.01 to 0.05 mfd without any very noticeable drop in sensitivity.

MODEL 110

With the MAGIC Selectivity Control, Seven Five-valve Superheterodyne A.C. Set.

This introduces an entirely new feature not yet released in America.

Selectivity control, an innovation in circuit design which enables one to broaden the selectivity of the receiver, and thus obtain full side band reception of the broadcasting signal, which results in remarkable clarity, and perfect reproduction.

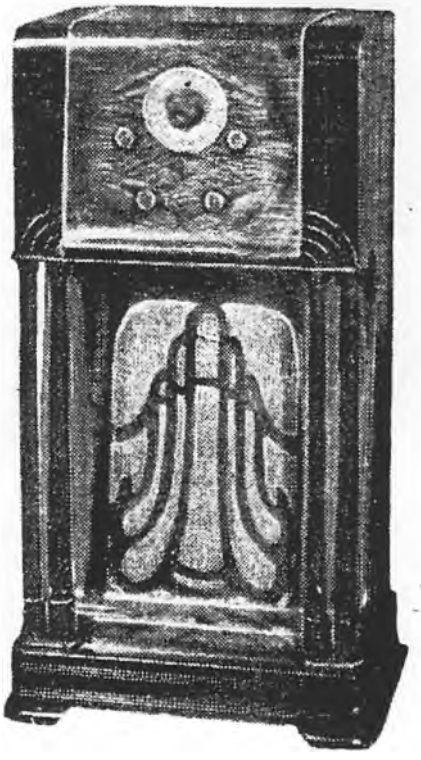
Reproduction of this quality has not previously been obtainable in any Australian receiver. Chassis equipped with all the latest devices—

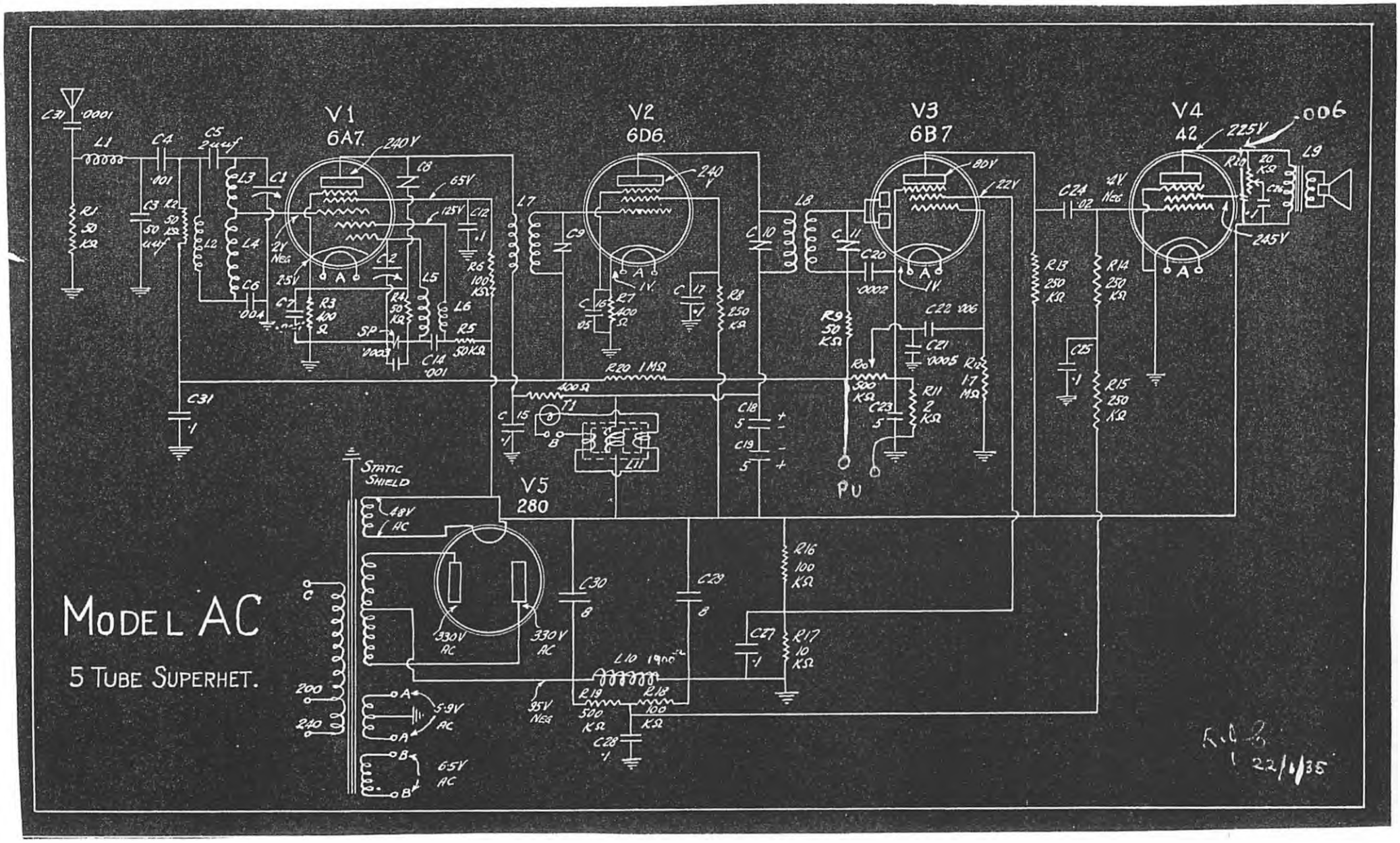
Full Automatic Volume Control,
Tone Control, and
Static Suppressor.
Tuned Volume Control, etc.

Housed in magnificent high Gloss cabinet, illustrated on right, reminiscent of a grand piano. The Astor Model 110 is, in truth, the grand piano of radio.

Price, £31/10/- s

EASY TERMS ARRANGED.




MODEL AC
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V3
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65V
125V
2V NEG
25V
1V.
80V
22V
4V NEG
225V
245V
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STATIC SHIELD
48V AC
330V AC
330V AC
5·9V AC
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95V NEG
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SERVICE DATA.

ASTOR MODEL 110 RECEIVER TYPE AC WITH EXPANDING SELECTOR. 23.4.35.

Definition of Broadcast Wave.

A modulated broadcast wave can be considered as a carrier frequency accompanied by side frequencies corresponding to the frequency of the carrier frequency plus and minus the frequencies of the low frequency waves impressed upon the carrier. Thus a carrier of 1000 kilocycles modulated with three frequencies, 1 Kc, 5 Kc and 10 Kc, could be considered as radiations of 1010 Kc, 1005 Kc, 1001 Kc, 1000 Kc, 999 Kc and 990 Kc/s.

Requirements for High Fidelity.

Thus a receiver, such as any modern receiver intended for double side band reception, should be able to receive the carrier frequency plus and minus the side frequencies representing the broadcast sounds. For High Fidelity reproduction it is desirable that the overall selectivity curve of a receiver should be such that the attenuation of the side frequencies remote from the carrier frequency should be negligible. It is generally accepted by those who have made a close study of high fidelity radio reception that the maximum range of frequencies which should be passed through the radio amplifier to the detector with a minimum of attenuation is about 14 Kc, which means that the detector would be able to supply a range of audio frequencies up to 7000 cycles to the audio amplifier.

If a receiver is purposely made to cover a wide range of side frequencies as well as the carrier, it is likely that in many cases it would be troubled by adjacent channel interference. Therefore it is desirable that the selectivity of a receiver

be continuously variable, in order that the user can attain the greatest flexibility.

Expanding Selector.

The Expanding Selector makes it possible for the selectivity of the Model 110 to be continuously varied, and it can be varied by the user to suit his own particular requirements.

Use of Expander.

With powerful local stations, where long distant adjacent channel stations are eliminated by the AVC action of the receiver, the receiver can be "Expanded" so that it supplies the widest range of audio frequencies of which it is capable, thus very materially improving the quality and naturalness of the reproduction.

Where it is desired that long distance stations closely adjacent to a pwerful local station or stations are to be heard, the reverse operation is performed, and the receiver can be "Contracted". This make possible the reception of weak long distance stations, and at the same time "Contracts" the reproduced audio frequency range, eliminating the higher frequencies in a manner proportional to the amount of "Contraction". This has the very beneficial effect of reducing the rustling and crackling noises due to atmospherics, and other relatively small electrical disturbances, which only reach large proportions when they are heard together with a very weak station

Description of Expander.

The Expanding Selector in this receiver takes the form of

mechanical variation, simultaneously, of the selectivity of the IF transformers. This is done by altering the coupling of the double tuned transformers from very loose coupling through optimum coupling, to a point where they are sufficiently overcoupled to produce a steep sided, broad topped overall resonance curve. The radio frequency amplifier, when in the expanded position, will supply the audio amplifier with a range of frequencies up to 7000 cycles without undue attenuation of the higher frequencies.

Tone Control.

As well as the Expander control, tuning control, and volume control, is the tone control. Usually a tone control consists of a variable capacitive impedance which is used to attenuate the higher audio frequencies. It is felt that the average user does not wish to eliminate the high notes so much as to accentuate the bass notes. For this reason the tone control in the Type AC accentuates the bass to some extent simultaneously with a reduction of the high frequencies. This is brought about by making the value of the tone control condenser such that in combination with the inductance of the speaker input transformer primary the load of the output valve is resonant to a frequency in the order of 80 cycles. When the maximum amount of tone control resistance is in series with the tone control condenser the high notes are least attenuated, and the resonance lift at low frequencies is removed by the increase of resistance in the tuned circuit.

Adjustment of Receiver prior to Testing.

For Servicemen there is nothing complicated in the Model 110

Type AC. The primaries of the IF Transformers can be adjusted as regards their separation from the secondaries by means of the Expanding Selector gear. If the inside of the IF former extension which is connected to the mechanical expanding gear is examined it will be seen that there are three pencil marks made. When the centre line is level with the edge of the mounting bracket the IF transformer is in the optimum coupled position, and when a receiver is being aligned or measured for sensitivity, it is necessary for the transformers to be adjusted to optimum coupling.

Alignment.

Adjust the IF transformers to optimum coupling by means of the Expander knob.

Tune the transformers to 456 kilocycles, applying the signal input to the grid of the 6A7 valve in place of its grid clip.

Signal Circuit Alignment.

For signal circuit alignment, replace the 6A7 grid clip, and connect the signal generator output direct to the antenna the ground terminals (do not use a dummy antenna, as it is incorporated in the receiver). Align the oscillator and antenna stage tuning condenser trimmers at 1400 kilocycles, then tune the set to approximately 600 kilocycles and the signal generator to 600 kilocycles. The series pad is adjusted while the tuning gang of the set is moved back and forth until greatest output is received. It is not usually deemed sufficient to set the pointer of the receiver on 600 kc and then adjust the series pad to give maximum output.

Sensitivity.

The sensitivity of this receiver is increased by a certain amount of regeneration introduced at the 6A7 valve. Should this increase for any reason the receiver may emit bubbling sounds if tuned to 550 kilocycles or thereabouts, when in a contracted position as regards the Expanding Selector. The remedy is to increase the cathode resistance of the 6A7 (it is variable) or increase the capacity of the cathode bypass condenser of the 6A7.

The Curves in Fig. 1 indicate measured resonance curves of an average receiver. Note that in the Expanded position the resonance peak covers 17 Kcs. with negligible attenuation. In the Contracted position side frequencies situated 7 Kcs. on either side of the carrier frequency are considerably attenuated, in the order of a 20 db voltage ratio. Obviously the receiver is in a very selective condition when Contracted, but this is arrived at by cutting the higher audio frequencies. Actually this is advantageous, as the receiver is Contracted only when the user is searching for long distant stations, and on such suppression of the higher audio frequencies tends to materially reduce "static" noises, and thus improve the general intelligibility of the reception.

Finally:

The Expanding Selector has been dealt with here in a manner which may be considered prolix; but it is felt that the Expanding Selector is such an important advance in the Radio Art that it is certain to become more widely used, and therefore Servicemen should be made acquainted with the basic idea at least.

R. J. COLLINS, A.M.I.R.E.
Engineer.

MODEL 110 Type AC.
(AC-106)

Characteristic Data.

Antenna Stage Gain

Kc	550	600	800	1000	1200	1400	1500
u	5.25	5	2.5	2	2.1	3.2	2.8

W2

Similar to Mickey Mouse.(report 1020)

Conversion Gain. Optimum Coupling.

Kc	550	1000	1400
u	63	63	73

I.F.Gain Optimum Coupling

Kc	456
u	70

Couplings of IF transformers.

3/8" ---Close
9/16"---Optimum
1-1/16"-Loose.

Sensitivity to IF Input to Antenna Post.

Coupling	Close	Optimum	Loose.
Uv input.			
550 Kc	56000	36000	100,000
1400 Kc.	80,000	80,000	over 1 volt.

Overall Performance.at 1000 Kc. of IFs.

W W1/	Fully Expanded	Optimum	Loose
W 2	-	5	3.5 Kc
W 2	25	9	5
W 10	37	10	13.5
W 100	61	37	28
W 1000	151	65	50

Model,110 Type AC
(AC 106)

Gain at 1000 Kc.

	Expanded	Optimum	Loose
Uv.	16	14	450
Retuned	11 (1005 Kc)	14 (Same)	225 (998 Kc)

(the above indicates that the tuning of the IFs is affected by altering their coupling)

Overall Gain and Bandwidth,Optimum coupling.-(Low 6A7)

Kc.	550	600	800	1000	1200	1400	1500
uv	9	12	31	28	28	28	20
W2		7.5		9		10	
W 10		17		21		22	
W 100		32		37		42	
W 1000		52		60		72	
W 10000		88		100		122	

Sensitivity with high 6A7.

uv.	3.5	6	16	18	18	12.5	

Voltages,220 Volt Tap.

	Cathode	Screen	Plate	Osc.Plate	Osc.Grid.	Grid
6A7	2.2v	55v	250v	115v	-	
6D6	1.2	45v	250			
6B7	1.2	20v	60			
42	0	250v	235			-18v

Taken with 1000 ohms per volt meter.

Bandwidths and Sensitivity,1000 Kc/s

	Expanded	Optimum	Loose.
uv	11	14	450
W2	10	9	6
W10	35	21	16
W100	55	37	33
W1000	95	60	69
W10000	140	100	---

These figufes can be interpreted as follow.For stations which apply signals of equal strength into the aerial such as nearby local stations, for no interference they will have to be separated as follow.

Expanded.	Optimum	Loose
27.5 Kc	18.5 Kc	16.5 Kc.

Where the ratio of input power is not unity the selectivity

THE Pinnacle models BC & BG

5 valve, AC operated console, model BC is a Dual-wave receiver
model BG is broadcast only.

Valve types; 6A7 mixer, 6D6 IF amplifier, 75 diode detector & audio amplifier, 43 output, 25Y5 rectifier

I.F. frequency 456 Khz.

Comments; Bias voltages marked in pencil on the circuit diagram, which will not copy clearly are, across the field coil -63 volts, junction of R11 & R12 -26.5 volts, junction of R11 & R10 -0.9 volts.

Due to tight binding of the file, the left hand edge of the circuit would not copy. Between points A,B, & C a 5000Ω wire-wound potentiometer is connected with the moving arm connected to point B.

Instructions for Operating

5 Valve A.C. Dual-Wave Superhet.

MODEL B.C.

For Shortwave and Broadcast reception.

AERIAL.—For best results on shortwave, an outside aerial is most satisfactory. A length of about 100 feet from set to far end of aerial is suitable. The aerial should be as high as convenient, and kept clear of nearby objects such as metal roofs, etc. It must be remembered that the aerial picks up power from the long distance station, and the better the aerial the greater the volume of long distance stations. For broadcast reception, when the set is situated close to a broadcast station, a small indoor aerial is usually most satisfactory. This can be obtained by having an outside aerial for short waves, and a few feet of wire indoors for broadcast reception. The sensitivity of the receiver is such that a big aerial is not needed for broadcast wavelengths.

GROUND.—A good ground lead is essential for best results. Solder or clamp to a water pipe if available; otherwise drive about 4 feet of metal piping into moist ground and solder or clamp to it.

OPERATION.—The valves take a few seconds to warm up to a working condition. For broadcast reception, the wave change switch (in the middle) is turned to the left. For short wave reception, the wave change switch is turned to the right; the volume control turned full on and the tuning control turned slowly. The important short wave channels are underlined in black on the inner dial scale. The broadcast scale is marked in kilocycles, and the short wave scale in metres.

SHORT WAVES.—Short waves reach Australia from other parts of the world because they are reflected from the Heaviside Layer which is 80 to 200 miles above the earth. This layer varies in height with the time of day and the seasons, and so reception varies. The British Empire transmissions from Daventry are sent at times when they will be heard best in Australia. Generally such transmissions specially directed at Australia are best. London, Berlin and Paris are very reliable. Australian Wireless Periodicals usually have a page devoted to short waves, in which best times to listen are frequently shown.

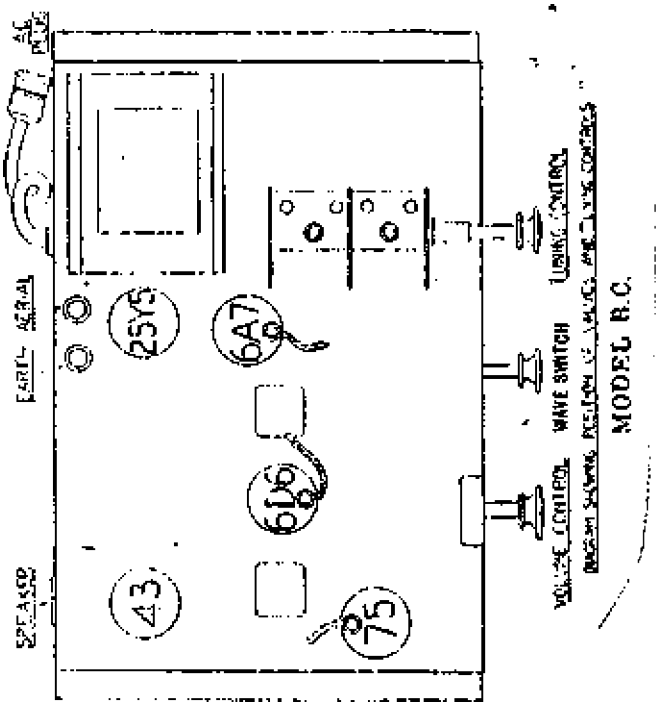
EMPIRE TRANSMISSIONS FROM DAVENTRY, ENGLAND.—

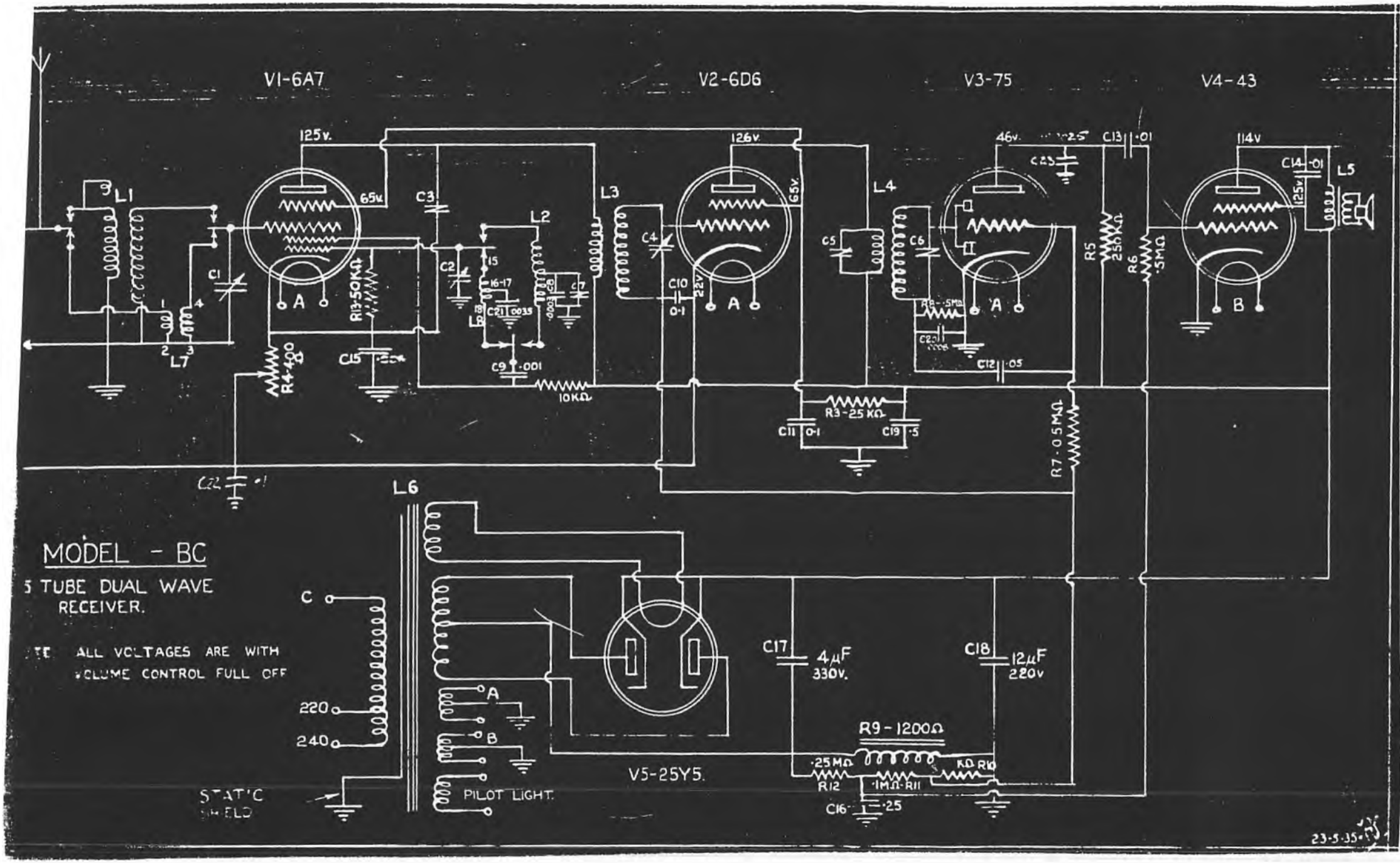
Stations GSB, 31.55 metres.
GSD, 25.53 metres.

GSB and GSD radiate transmission No. 1 directed at Australia. Melbourne times of operation are shown below:

GSD and GSB—
20th Jan. to 16th Feb., 6 to 8 p.m.
17th Feb. to 16th Mar., 5.15 to 7.15 p.m.
17th Mar. to 13th Apr., 4.15 to 6.15 p.m.
14th Apr. to 11th May, 3.15 to 5.15 p.m.
12th May to 27th July, 2.30 to 4.30 p.m.
28th July to 31st Aug., 3.15 to 5.15 p.m.
1st Sept. to 5th Oct., 4.15 to 6.15 p.m.
6th Oct. to 9th Nov., 5.15 to 7.15 p.m.
10th Nov. to 14th Dec., 6 to 8 p.m.
15th Dec. to — Jan., 6.30 to 8.30 p.m.

The above times are subject to change; programmes and times are shown in the Empire edition of "World Radio" (a weekly) obtainable at large newsagencies.




V1-6A7
V2-6D6
V3-75
V4-43
125v.
65v.
126v.
65v.
46v.
114v
L1
L2
L3
L4
L5
L6
L7
C1
C2
C3
C4
C5
C6
C9 .001
C10 0.1
C11 0.1
C12 .05
C13 .01
C14 .01
C15 .25
C17 4μF 330V.
C18 12μF 220v
C19 .5
C22 .1
R1 .5MΩ
R2 .5MΩ
R3 - 25 KΩ
R4 400Ω
R5 250KΩ
R6 .5MΩ
R7 - 0.5MΩ
R9 - 1200Ω
R12
R13 - 50KΩ
10KΩ
MODEL - BC
5 TUBE DUAL WAVE RECEIVER.
ALL VOLTAGES ARE WITH VOLUME CONTROL FULL OFF
220
240
PILOT LIGHT.
V5-25Y5.
23-5-35

MODEL "BC" MEASUREMENTS.

BC 150, 200 uuf Antenna, Sig. Gen. No. 8. 14.6.35.

KC	1400	1200	1000	800	600	550
db	104	102	100	98	96	95
uV	6.3	8.	10.	12.5	16.	18.

W2	9
W10	21
W100	41
W1000	72
W10,000	120

Image Ratio.	600 KC	550 KC.
plus 228 KC	78db, 7950	79db, 8900
plus 912 KC	40db, 100	38db, 79.5

Coverage: 547 KC - 1560 KC.

Rejection to I.F.	1400 KC	550 KC
compared to resistive	32db, 400	14db, 50

90 400uv in for 50 mw out

With 456 KC trap in antenna lead
32db or 400 Ratio at 550 KC.

Short Wave.

MC	15	12	10	8	6
db	74	80	83	85	82
uV	2000	1000	700	560	800

Coverage: 5.7 MC - 16.2 MC.

THE ASTOR model 220 series DA

6 valve, 2 unit car radio

Valve types; 78 RF amplifier, 6A7 mixer, 78 IF amplifier, 6B7S diode detector, AVC & audio amplifier, 41 output, 84 rectifier

I.F. frequency 166, 173 Khz.

Comments; non synchronous vibrator. PM 131 for 6 volts, PM 132 for 12 v.

SERVICE NOTE:

12.11.35.

Astor Model FA Automobile Receiver.
(GMH)

The following consists of a few hints in connection with receivers of the above model which may be returned for service.

It is desirable to change R4 on all receivers from 1000 to 500 ohms, this applies especially in cases of low gain.

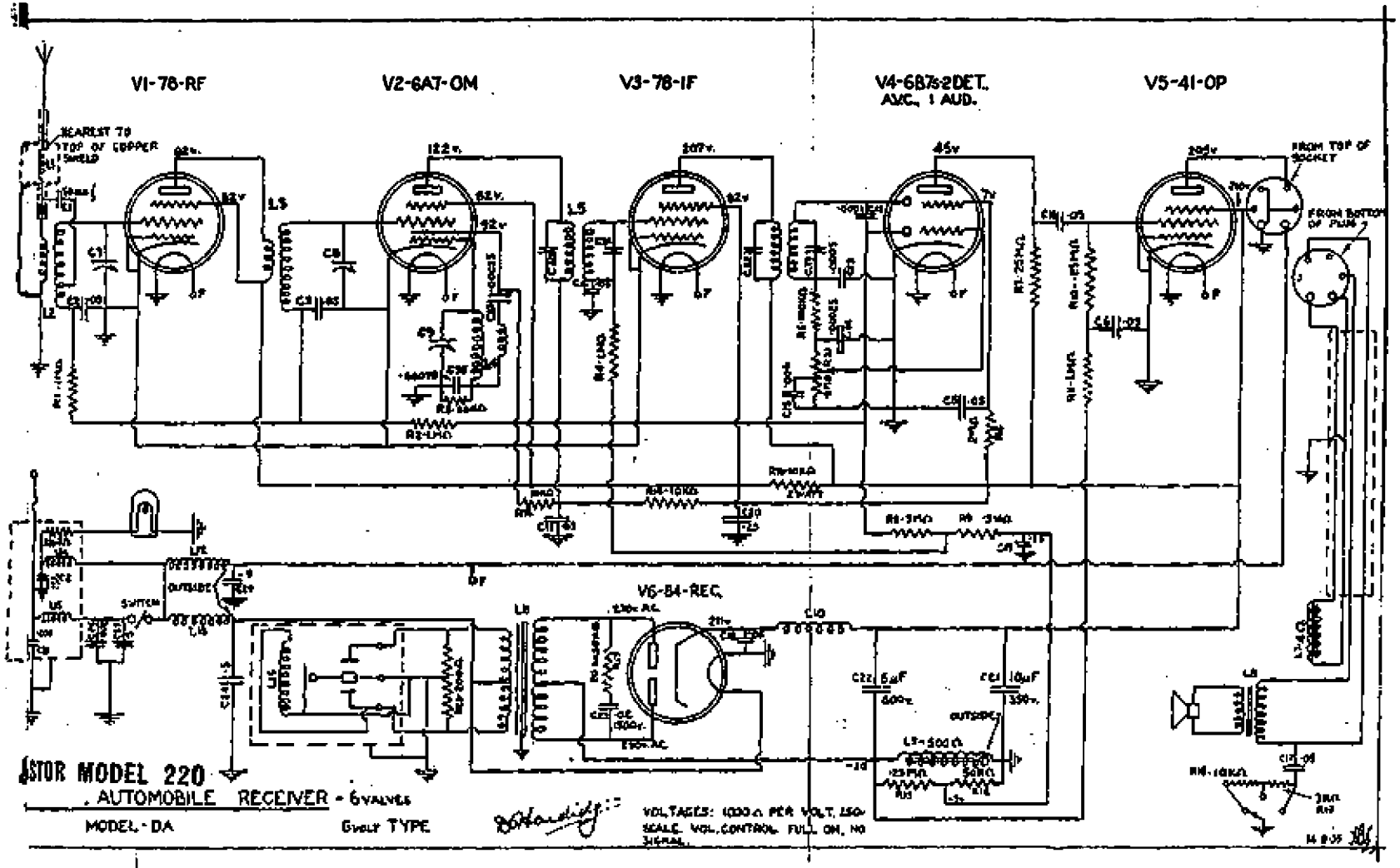
Regarding possible complaints of distortion on high volume. This may be caused by a faulty volume control R11 which may have increased its resistance considerably. This may be overcome by fitting a 1 Meg resistor from the center lug of control to chassis.

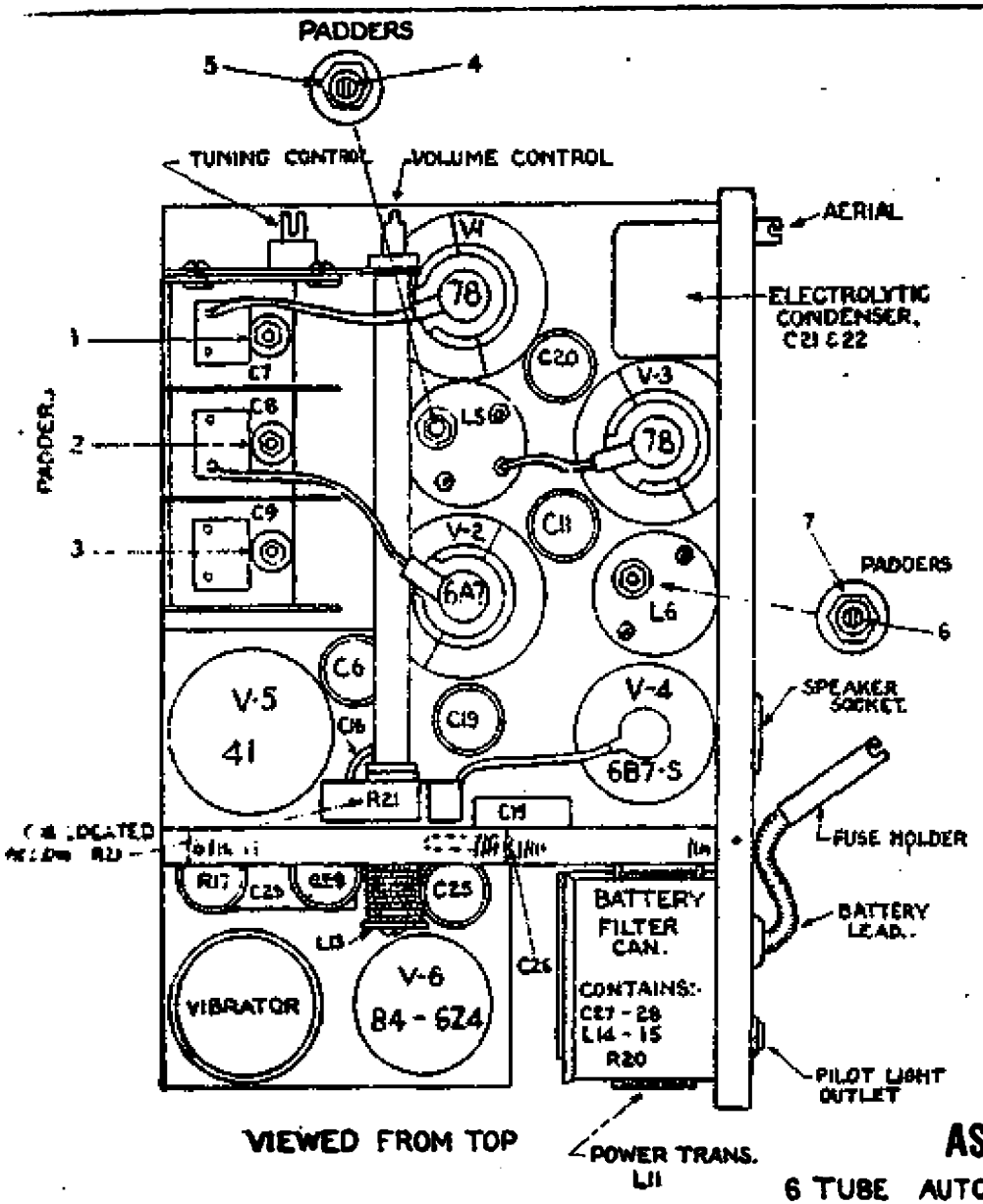
Other possible sources of troubles are:

C24 leaking or broken down, this in turn may cause damage to R16 due to overheating.

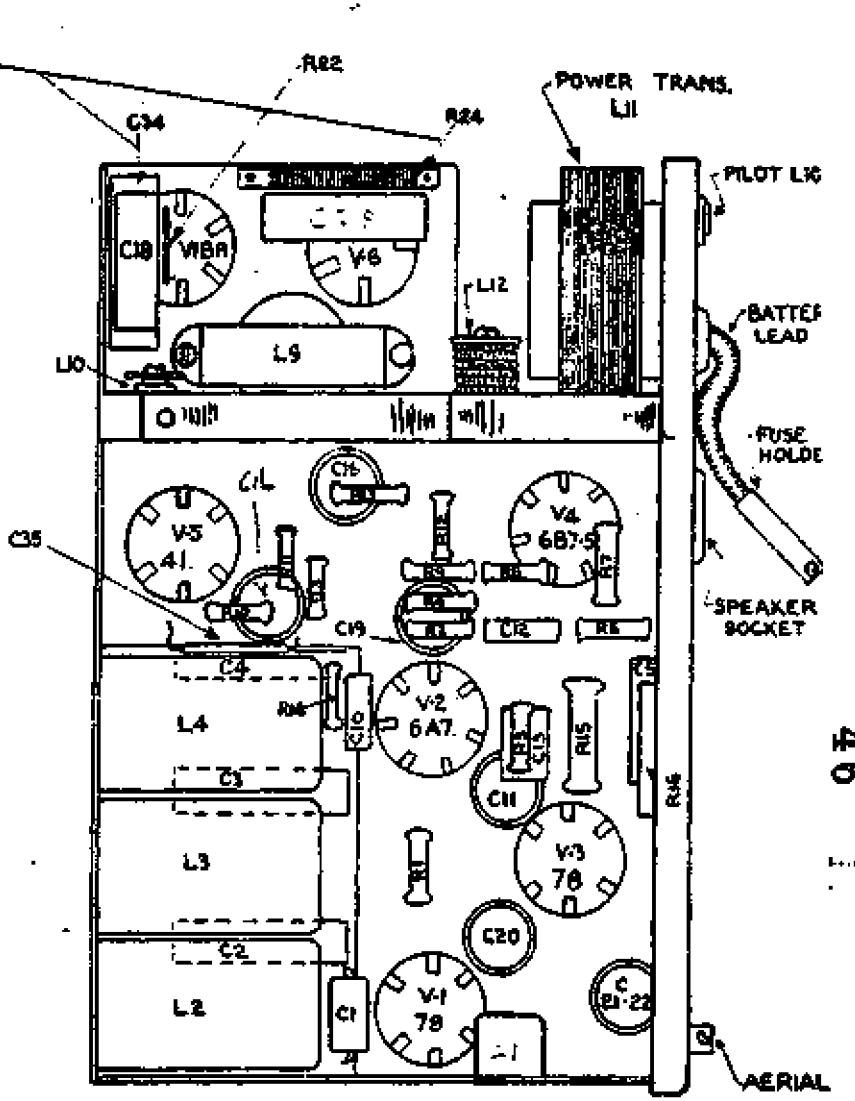
C23 leaking - check for low voltage.
C19 leaking - check for plus voltage on 41 grid.

Complaints of vibrator crackle on the 12v. series may be overcome by inserting a 5mfd. electrolytic (with a .00025 mica condenser in shunt) from the junction of V5 and V6 filaments (which are in series) to frame. Negative side of electrolytic to frame.


V1-78-RF
V2-6A7-OM
V3-78-IF
V4-6B7&2DET. AVC., 1 AUD.
V5-41-OP
V6-84-REC.
NEAREST TO TOP OF COPPER SHIELD
FROM TOP OF SOCKET
FROM BOTTOM OF PLUG
OUTSIDE
STOR MODEL 220
AUTOMOBILE RECEIVER - 6 VALVES
MODEL - DA
6 VOLT TYPE
VOLTAGES: 1000 Ω PER VOLT, 150-SCALE, VOL. CONTROL FULL ON, NO SIGNAL.



VIEWED FROM TOP



ASTOR MODEL 220

6 TUBE AUTOMOBILE RECEIVER. 6 VOT SERIES.

PARTS LOCATION DIAGRAM.

12-9-35

SERVICE DATA. 10.9.35.

ASTOR AUTOMOBILE RADIO MODEL 220, CHASSIS TYPE DA, 6V. SERIES.

GENERAL:

The Astor Model 220 is a two unit receiver especially designed for Automobile use, the two units are respectively, receiver and universal speaker.

The reason for the change over by Astor Engineers from single unit to two unit receivers is that with the latter, better placement of the speaker is made possible, thus enabling, by the use of header board mounting, the rear seat passengers to comfortably listen to reception without increasing volume to an annoying level for the front seat passengers.

Also the removal of the speaker from the receiver enables the receiver size to be considerably reduced and therefore mounting under the dash and even above the steering column under the dash is possible, the receiver is therefore completely out of sight. The receiver mounting is two hole, the chassis being held in its case by six drive screws, an extra four screws holding the drive centering device and it is advisable to also remove these when servicing the receiver.

The speaker mounting for under dash fitting is by three screws to the fire panel and for header bar mounting by three screws to the header bar.

The speaker case is adjustable to suit any angle between header bar and hood lining.

The frequency range covered by this receiver is from 530 to 1550 Kcs.

TUBE COMPLEMENT:-

Type	Function.
78	Radio frequency amplifier
6A7	Oscillator Modulator.
78	Intermediate frequency amplifier.
6B7 "S"	Diode Detector. Delayed AVC rectifier. Audio frequency amplifier.
41	Power output.
84	Rectifier (power supply)

CIRCUIT DESCRIPTION:

By the use of six tubes, one as dual purpose and another as triple purpose, and also a very efficient antenna stage, the gain of this receiver has been raised to an enormous degree.

At the same time the noise level has been kept remarkably low, the result is a receiver which has an exceedingly high degree of useful sensitivity. Actual figures show a sensitivity of /

better than one microvolt at the least sensitive point on the received band, the sensitivity gradually increases toward the high frequency end, thus enabling far greater distant daylight reception of B class stations. A very efficient Automatic Volume Control system is used which supplies AVC to all tubes with the exception of the power output and of course the rectifier. AVC is absolutely indispensable in an Automobile receiver owing to the enormously varying field strengths encountered, and with the Model 220 inputs bearing a ratio of 100,000 to 1 will not cause a noticeable change in volume level, also it will be found impossible to overload the receiver or speaker no matter how near the station or what the position of the volume control.

This feature cannot be over stressed as Astor Engineers have found that with most types of Automobile receivers the driver is continually making adjustments to the volume level according to the distance from transmitting stations, shielding properties of surrounding buildings, etc.

A further feature of the AVC system is its delayed characteristic which allows very weak signals to receive maximum amplification and which does not cause any AVC action to take place until a certain predetermined level is reached, the level is 4 volts at the AVC diode. All cathodes are at earth potential, this has the advantage of reducing hum in the audio section and also has beneficial effects on spark plug noise pickup in the radio frequency stages.

Bias is obtained from the voltage drop across L9 the full amount being fed to the power tube whilst a voltage divider takes care of the minimum bias supplied to all other tubes except the 6B7"S" which is diode biased.

CIRCUIT OPERATION:

Referring to circuit diagram.

Signal: The signal is fed through spark interference filter L1 to high gain antenna stage L2 and C7 where amplification in the order of 16 times takes place. V1 amplifies this signal which is fed via RF transformer L3 to grid of V2 which changes the signal at the output of this tube to 473 Kc whence it is fed through 1st IF transformer L5 to grid of intermediate frequency tube V3, further amplified and passed on through 2nd IF transformer to 2nd detector diode of V4.

The rectified signal appears on R21 (volume control) the arm of which feeds the signal to the grid of V4. The amplified output from this tube is fed to grid of power tube V5, output being via speaker transformer L8. Referring back to 2nd Detector diode of V4 the signal is also fed via C12 to AVC diode the AVC voltage being developed across voltage divider R8, 9 and 12.

The section R12 supplies minimum bias to V1, 2 and 3, section R9 and 12 supplies approx. half value AVC to V3. Full AVC is supplied to V1 and 2. Both AVC and Min. bias voltages are fed through the same filter system for V1 the filter is R2, C3, R1

and C2, for V2, R2 and C3 are used. V3 uses filter R4 and C4. This AVC action is delayed by virtue of positive bias and AVC diode caused by voltage drop on R12 section of R12-13.

POWER SUPPLY:

Power supply is drawn from the automobile battery and is approx. 36 watts for both 6 and 12 v. receivers.

This shows a very efficient operation as the average home type of six tube receiver operating on AC uses approx. 75 watts.

The receiver is fused for protection. Replacements should be of 10 to 15 amp rating.

The supply is fed through the fuse to filter can containing C28 and L15, also further filtering on live side of switch is accomplished by C25 and 26.

After passing through switch the supply is fed through filter L12, C29 to filaments and field, thence to filter can for further filtering before being fed to pilot light. From the switch the supply is also filtered by L13 and C24 before being fed to the vibrator and rectifier.

By this very complete filter system it is possible to completely eliminate vibrator hash and pickup from battery and pilot light of engine noise.

R22 across vibrator points reduces sparking and increases the life of the vibrator unit.

C18 and L10 are used as an RF filter for plate supply of tubes, the power filter consists of choke coil L9 and condensers C21 and 22.

TONE CONTROL:

This is accomplished by the voltage divider R18 and 19 and condenser C17 from plate of output tube to ground, the control being by switching. The three positions are Brilliant, Mellow and Deep.

HINTS FOR FAULT FINDING:

Every conceivable precaution has been taken in the design to prevent trouble occurring, but, at the same time it is realized that nothing is infallible, so the text below is an endeavor to forecast some possible points at which trouble may occur and to suggest a system of investigation.

When checking a receiver which has failed to operate it is suggested that firstly all tubes should be checked by substitution of O.K. ones, secondly that all voltages should be checked as against those listed on the circuit diagram.

This should in all cases, bring to light the trouble or at least provide some definite clue to cause of same.

If the fault be intermittent operation, it is a case of patient, systematic search, and much can be accomplished by pushing valves, connections etc. to and fro, until the fault is located.

LOW VOLTAGES (PLATE SUPPLY).

This may be traced to a faulty accumulator, faulty C21, C22 or C18,or faulty vibrator unit.

LOUD AND CONTINUOUS BUZZ may be caused by open C18 and C19 or on 12v. set by open C34. Also check filter condensers C21 and 22.

HUM may be caused by faulty C21, C22 or C6.

OSCILLATION may be due to faulty C20 or open C2, 3 or 4. R12 may be low resistance.

LOW SENSITIVITY:

When checking for this fault a signal generator should be used to endeavor to locate which stage is causing the trouble. Another idea is to try a capacitor of approx. .1mfd. across existing capacitors in an endeavor to locate an open circuit. Coils should be checked with a continuity meter. Voltages and tubes should of course be checked.

POOR TONE may be caused by faulty C16, faulty tubes most probably V4 or 5, also by low voltage.

BLOWN FUSES:

If fuse blows without set switched on, check filter can assembly, (located above power transformer) and also C25 and 26. If fuse blows when set is switched on, check filter can as well as components L12, 13 and 16, C29 and 24, also speaker extension assembly.

CAUTION:

When investigating complaints of lack of sensitivity, intermittent operation, or of no signals at all, the first procedure should be to check the Aerial installation for leakage, short or open circuit.

RE-ALIGNMENT:

Only in most extreme cases should adjustment to the receiver's alignment be necessary. If it is thought necessary to make any adjustments the following instructions should be carefully followed.

Necessary Test Gear:

Signal generator capable of supplying modulated signal of following frequencyes:-

166-173 and 180 Kilocycles for Intermediate Frequency alignment.
Full range of calibration for broadcast band alignment.

Output meter, preferably one having resistance of approx. 4000 ohm and having calibration at 10 volts giving reasonable deflection.

Starting position block (Supplied from factory)
Insulated screw driver and 1/8" box spanner.

Set up of gear:

Connect output meter across speaker output.
Connect earth side of generator to can of receiver.
I.F. adjustment may be made with output from signal generator fed through a large fixed condenser (approx. .1mfd) to grid of 6A7 oscillator-modulator tube. Grid lead from gang connected. Broadcast band adjustments must be made with signal generator output fed through a 200 mmf MICA fixed condenser to aerial connection of receiver.

Reading on the output meter, whilst making adjustments, should not exceed 15 volts with 4000 ohm meter, as with higher voltages than this the AVC action will cause inaccurate results to be obtained.

Standard output may be taken as 10 volts on the meter recommended.

For padder positions and numbers see drawing of receiver.

Preliminary Intermediate Frequency Adjustment.

Set generator dial to 173 Kc. Adjust IF padders, numbers 4, 5, 6 and 7 in order for maximum output. Padders 4 and 6 are adjusted by an insulated screw driver whilst for 5 and 7 adjustment is made by use of an insulated box spanner to fit the standard 1/8" nut. This adjustment should be checked over twice to make sure of accurate alignment.

Broadcast Band adjustment:

Set Generator dial at 1400 Kc.

6.

Insert alignment block (supplied from factory) between rotor and stator plates of aerial section of gang making sure that the block is bedding correctly.

Adjust oscillator trimmer No. 3 and follow up with padders No. 2 and 1 (RF and Ant.)

These adjustments should also be rechecked and once satisfactory should not be retouched, with the exception of the aerial trimmer No. 1.

The block should be then removed and the aerial adjustment re-checked (Padder No. 1).

This completes the adjustment for the broadcast band, as owing to a special coil arrangement, there is no adjustment necessary at 600 Kcs.

Final IF Adjustment:

Set generator dial at 166 Kc. and peak padder No. 4, move generator dial to 180 Kc. and adjust padder No. 5, re-check both of these at the above mentioned frequencies.

Set generator dial at 173 and peak No. 6 padder, move dial to 166 and adjust No. 7 padder. Recheck both these adjustments as above.

Set generator at 173 and adjust attenuator for approx. full scale reading (not above 15v.) setting dial off frequency and approaching from either side, note if peak appears within 1 Kc. plus or minus, of 173 Kc.

If adjustments are correctly carried out this should be the case and the IF adjustment is then finalized. Should the peak occur elsewhere than as specified, the above adjustments should be carefully rechecked.

Final Broadcast Band check.

A final check of sensitivity is all that is now necessary, no adjustment being required after final IF adjustment is made:

Standard checking spots are:

560 600 800 1000 1200 1400 1500 Kc.

COMPONENT PARTS MODEL DA 6 & 12V. SERIES.

RESISTORS:

R1.	100,000	ohm	1/3	watt	resistor	10% Tolerance.
2.	1,000,000	ohm	"	"	"	" "
3.	50,000	ohm	"	"	"	" "
4.	1,000,000	ohm	"	"	"	" "
5.	100,000	ohm	"	"	"	" "
6.	2,000,000	ohm	"	"	"	" "
7.	250,000	ohm	"	"	"	" "
8.	500,000	ohm	"	"	"	" "
9.	500,000	ohm	"	"	"	" "
10.	250,000	ohm	"	"	"	" "
11.	1,000,000	ohm	"	"	"	" "
12.	50,000	ohm	"	"	"	" "
13.	250,000	ohm	"	"	"	" "
14.	10,000	ohm	"	"	"	" "
15.	10,000	ohm	1/2	"	"	" "
16.	10,000	ohm	2	"	"	" "
17.	20,000 ohm) or 50,000 ohm)		3	"	"	" "
18.	10,000	ohm	1/3	"	"	" "
19.	5,000	ohm	"	"	"	" "
20.	7	ohm	wire wound		"	" "
21.	500,000	ohm	Volume control and switch. Volume control tapped at approx. 100,000 ohms.			
22.	200	ohm	centre-tapped resistor.			
23.	45	ohm	wire wound resistor.			
24.	10	ohm	"	"	"	

INDUCTORS:

L1.	Antenna choke.
2.	Antenna coil assembly
3.	R.F. Coil assembly
4.	Oscillator assembly
5.	1st IF Transformer.
6.	2nd IF Transformer.
7.	Field coil.
8.	Speaker Input Transformer.
9.	500 ohm choke.
10.	R.F. High Tension choke.
11.	Power Transformer
12.	Layer wound choke, set filaments and field filter.
13.	" " " rectifier filament and vibrator filter.
14.	Spiral wound choke (Pilot light)
15.	" " " (Hot A)
16.	Vibrator unit.

CONDENSERS:

1.	.00005 mfd.	Mica	Cond.	20%	Tolerance.	
2.	.05 mfd.	200V.	Paper	cond.	10%	Tolerance.
3.	" "	"	"	"	"	"
4.	" "	"	"	"	"	"
5.	" "	"	"	"	"	"
6.	" "	"	"	"	"	"
7.	Aerial section of Three gang condenser.					
8.	R.F. section of three gang condenser.					
9.	Oscillator section of three gang condenser.					
10.	.00025 mfd.	Mica	condenser	10%	Tolerance.	
11.	.05 mfd.	400V.	Paper	cond.	"	"
12.	.0001mfd.	Mica	condenser	"	"	
13.	.0005mfd.	"	"	"	"	
14.	.00025mfd.	"	"	"	"	
15.	.006mfd.	2oV.	Paper	"	"	
16.	.05mfd.	400V.	Paper	cond.	"	"
17.	.05mfd.	"	"	"	"	"
18.	.05mfd.	"	"	"	"	"
19.	.25mfd.	200V.	"	"	"	"
20.	.25mfd.	"	"	"	"	"
21.	10 mfd.	350V.	Elect.	"	)	
22.	6 mfd.	400V.	"	"	)	in one container.
23.	.02mfd.	1500V.	Paper	cond.	10%	Tolerance
24.	.5mfd.	200V.	"	"	"	"
25.	.5mfd.	"	"	"	"	"
26.	.002mfd.		Mica	cond.	"	"
27.	.002mfd.		"	"	"	"
28.	.004mfd.		"	"	"	"
29.	.5mfd.	"	Paper	cond.	"	"
30.) 31.)	Trimmers of 1st IF Transformer.					
32.) 33.)	Trimmers of 2nd IF Transformer.					
34.	.25mfd.	200V.	Paper	cond.	10%	Tolerance
35.	.00079mfd.		Mica	cond.	2%	"

The following data outlines the necessary design alterations for 12v. operation.

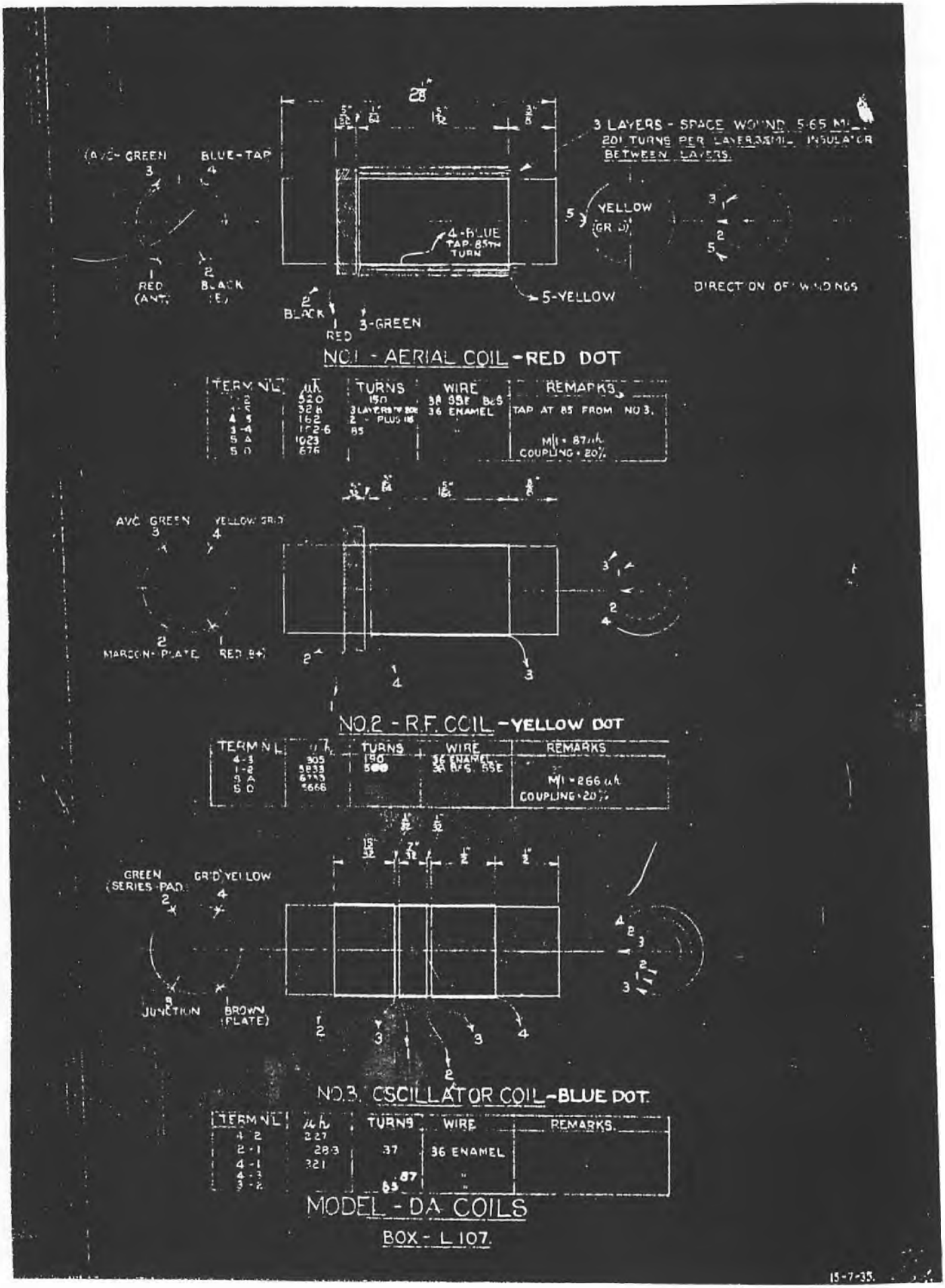
PARTS LIST ALTERATION - SEE PAGES 7 AND 8.

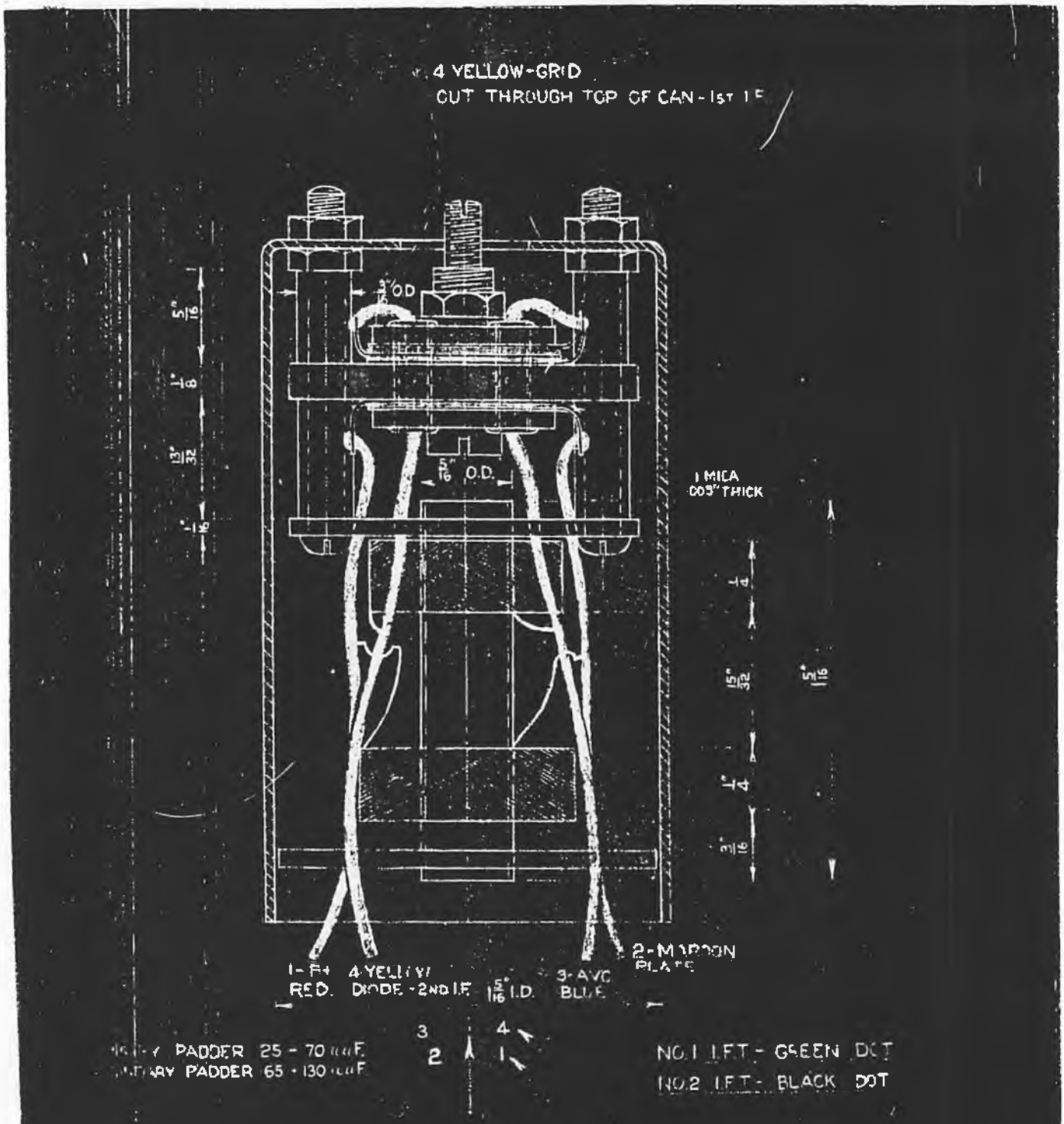
L16	Vibrator Special 12v. type.
L11	Power Transformer Special 12 v. type.
R24	10 ohm Wire wound resistance - extra from 6 v. series.
C34	.25 paper condenser 200V. 10% tolerance. extra from 6 v. series
R22	Center tap 200 ohm resistance - not used on 12 v. set.
R23	45 ohm pilot lamp resistance (7 ohm in 6v. set) (R20)

The filament and field supply constitutes the only other additional change, the alteration being shown on a separate circuit diagram.

Voltages will be similar to those shown on the circuit diagram for the 6 v. series.

Alignment instructions, fault finding and all other general data on the 6 v. receiver applies equally to the 12 v. series.


28"
3 LAYERS - SPACE WOUND 5·65 M/M
201 TURNS PER LAYER. M/M INSULATOR BETWEEN LAYERS.
(A.V.C.) GREEN 3
BLUE-TAP 4
YELLOW (GRID) 5
4-BLUE TAP 85TH TURN
1 RED (ANT.)
2 BLACK (E)
2 BLACK
1 RED
3-GREEN
5-YELLOW
DIRECTION OF WINDINGS
NO.1 - AERIAL COIL - RED DOT
TERMINAL | μH | TURNS | WIRE | REMARKS
1-2 | 520 | 150 | 38 SSE B&S | TAP AT 85 FROM NO 3.
1-5 | 328 | 3 LAYERS 70 BOB | 36 ENAMEL |
4-5 | 162 | 2 - PLUS 18 | " |
3-4 | 102·6 | 85 | |
5-A | 1023 | | | M/I = 87 μH.
5-D | 676 | | | COUPLING = 20%
AVC GREEN 3
YELLOW GRID 4
2 MAROON-PLATE
1 RED B+
NO.2 - R.F. COIL - YELLOW DOT
TERMINAL | μH | TURNS | WIRE | REMARKS
4-3 | 305 | 150 | 36 ENAMEL |
1-2 | 5833 | 500 | 38 B/S, SSE |
3-A | 6753 | | |
5-D | 5668 | | | M/I = 266 μH.
COUPLING = 20%
GREEN (SERIES PAD) 2
GRID YELLOW 4
3 JUNCTION
1 BROWN (PLATE)
NO.3. OSCILLATOR COIL - BLUE DOT.
TERMINAL | μH | TURNS | WIRE | REMARKS.
4-2 | 227 | | |
2-1 | 28·3 | 37 | 36 ENAMEL |
4-1 | 321 | | |
4-3 | | 65 67 | " |
3-2 | | | " |
MODEL - DA COILS
BOX - L 107.
15-7-35.



TERMN'L	M/H	TURNS	WIRE	REMARKS
1-2	11·8	1150	38 B&S, SSE.	
3-4	8·0	970	38 B&S SSE.	
1-3	20·7			2-4 SHORTED
2-4	19·05			1-3 " "
				M·H. ·425 M/H. COUPLING 2-16

I.F.T. COILS.

MODEL - DA

2 OFF PER ASSEMBLY

SCALE - 2-1

17-7-35

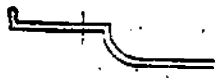
THE ASTOR model 220 series DA

SET LOCATION, DIALS ETC.

(1) Set to be located on R.H. side at rear of dash panel if practical.

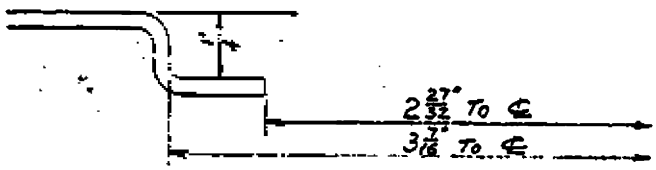
ANTENNA.
(1) New side clearance between wire and sheet metal - 3".
(2) Chicken or birdproof wire ½" mesh, dip galvanised.
(3) Delete roof battens, tape, hoop iron, Galts felt, antisqueak, nails etc.,
Replace by:-
Mesh as above with material scrap on outside, paper felt and centre rib fore and aft, four cross ribs.
(4) Down lead in centre, front unbraided 7/.0124 slip back wire, fit socket.
(5) Drill 1/8 hole near opening in header for earthing down lead shield.
(6) Wire to draw down leads in R.H. front pillar to be supplied with each body.
(7) Dome lamp wires on L.H. pillar lamp to be located at rear of roof as on rear light.
(8) (6) & (7) if set located on R.H. side; if L.H. side reverse (6) & (7).

SPEAKER ATTACHMENT.
Inner header panel cutout 1/8 larger diameter than inner flange of cone housing.



(2) Inner panel to be flanged thus;

(5) Input transformer on drivers side when speaker in position, washer 1/8 to be fitted under cone housing.
(7) Holdens to manufacture header with 1/4" rebate.



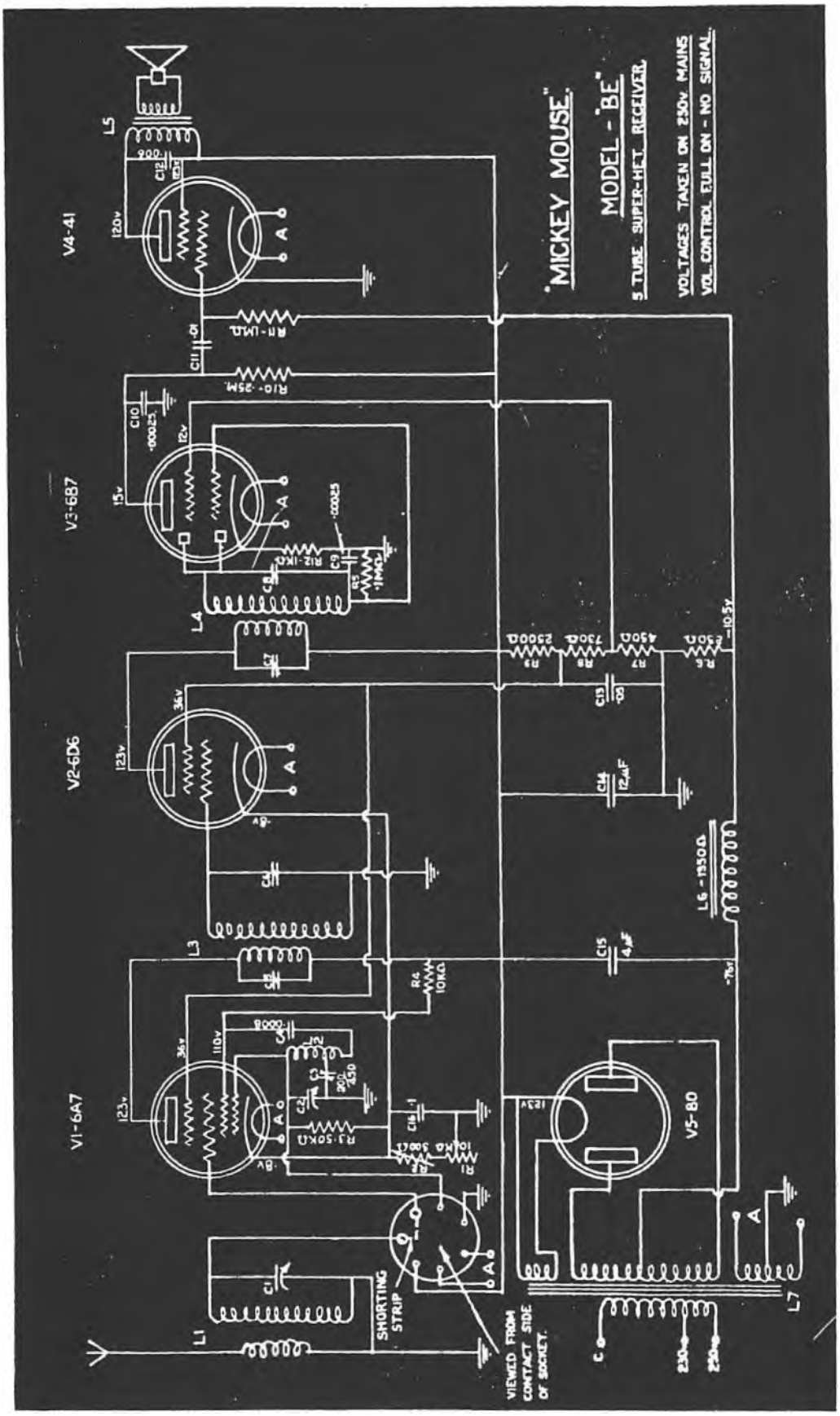
These were instructions to GMH regarding preparation of car for installation. Not all reproduced as having no bearing 60 years later.

THE ASTOR "Mickey Mouse" model BE, and short-wave converter model BD "Oversea-er"

Valve types model BE; 6A7 mixer, 6D6 IF amplifier, 6B7 diode detector & first audio, 41 output, 80 rectifier.
Model BD; 6A7 mixer.
When used with the short-wave converter, the 6A7 in the model BE becomes an IF amplifier.

IF frequency; 456 Khz.

"Astor" Mickey Mouse—Chassis type BE



Astor "Mickey Mouse," chassis type "BE," is a five-valve receiver designed for broadcast coverage and operation from 200-260 volts A.C. mains. This receiver is of the compact "midget" type and is fitted with two controls — volume (R1—10,000 ohms) and tuning. The loudspeaker fitted is a 6 inch unit with a field coil resistance of 1,350 ohms. A feature of this receiver is found in the provision of a 7-pin socket for connection of a short-wave converter unit—the "Oversea-er"—which enables the receiver to be operated on the 16-51 metres short-wave band. The connections to this socket are such that the valve (type 6A7) used in the "Oversea-er" receives all of its power supply from the "Mickey Mouse" pack. Inspection of the "Oversea-er" socket wiring will also reveal that the receiver 6A7 operates purely as an I.F. amplifier when the "Oversea-er" is connected; this means that the usual "short-wave adaptor" faults due to oscillator harmonics, etc., are eliminated.

Inspection of the general circuit arrangement of this receiver will show that the wiring is quite straightforward. No A.V.C. of the ordinary type is provided, but it will be found that the diode-biasing system employed for the type 6B7 second detector has quite an appreciable "levelling" effect on signals. Other points of interest in the circuit are the simplified oscillator circuit, and the low voltages which apply throughout the receiver. In connection with the latter, it should be noted that the total voltage developed between rectifier filament and H. T. secondary C.T. is almost exactly 200 volts. About 65 volts of this is dropped across the speaker field (in the negative return), another 10 volts or so is dropped across the bleed type power valve bias resistor, while the remaining 120 volts serves as high-tension.

Final points to note are that the two main filter condensers (C14 and C15) are both electrolytic units and are made up in one block; that R2 (300 ohms) is made adjustable so that the maximum sensitivity can be set by the installer; and that the I.F. used is exactly 456 KC.

RADIO CORPORATION PTY. LTD.
11-21 STURT STREET, SOUTH MELBOURNE.

Bulletin 29
9.10.35.

HOUSEHOLD RADIO SERVICE BULLETIN.

SUBJECT: ASTOR MICKEY MOUSE AND OVERSEA-ER MODELS.

GENERAL:

The Astor Mickey Mouse is a five tube superheterodyne employing two dual purpose tubes and giving excellent results from a very straight forward and simple design.

The design is such that very little service trouble should be experienced while at the same time there is plenty of sensitivity and selectivity for all general purposes.

The new Mickey Mouse receiver is so designed to enable another unit to be plugged in to allow overseas reception of short wave transmissions.

This unit - the Oversea-er - derives its name from this feature.

The Oversea-er is not another version of the usual adaptor but rather is a specially designed unit which converts the Mickey Mouse receiver to a six tube receiver using one Oscillator Modulator stage followed by two IF stages, thus giving excellent sensitivity.

It will be seen by perusal of the circuit diagram for these receivers, that, when the Oversea-er is plugged into the Mickey Mouse receiver, the 6A7 V1 in Mickey diagram is converted to an intermediate frequency amplifier, the aerial stage and oscillator section being automatically thrown out of operation.

This has distinct advantages inasmuch as with the usual adaptor feeding to the aerial terminal of the receiver, trouble is encountered with harmonics of the oscillator frequency of the receiver beating with the adaptor oscillator, and aerial and IF frequencies, but, with the Oversea-er the receiver oscillator section is out of commission and all this is overcome.

The Mickey Mouse coverage is from 1550 Kc. to 540 Kc., while the Oversea-er covers from 19 Mc. to 5.75 Mc. or from 15.8 to 51.5 meters.

HOUSEHOLD RADIO SERVICE BULLETIN.

TUBE COMPLEMENT.

MICKEY MOUSE.

TYPE	FUNCTION
6A7	Oscillator Modulator.
6D6	Intermediate frequency amplifier
6B7	2nd Detector. 1st Audio.
41	Output
80	Rectifier (Power supply)

MICKEY MOUSE & OVERSEA-ER.

6A7	Oscillator Modulator.
6A7	1st IF Amplifier
6D6	2nd IF "
6B7	2nd Detector. 1st Audio
41	Output
80	Rectifier (Power Supply)

CIRCUIT OPERATION:

L1, C1, Antenna stage, feeds signal through shorting strip to grid of V1 Oscillator Modulator, the IF signal appearing at plate of V1 is fed through IF transformer L3 to IF amplifier V2.

Diode detection is used the signal being fed directly to grid of Audio section of 6B7. The output tube is resistance-capacity coupled to the 6B7.

Plate screen supplies are derived from voltage divider R6-9 filtration being by C14, 15 and L6, the 1350 ohm speaker field coil.

Two primary tappings are provided for on the power transformer being 200/230 and 230/260 volts.

In the Oversea-er the usual aerial amplification L1, C1; and conversion by V1 takes place, and the signal of approx. 456 Kc. is obtained in L3 which has a value such as to be resonant - due to self capacity of plug, lead etc. - at this frequency.

CIRCUIT OPERATION CTD.

This signal is coupled to the grid of V1 Mickey Mouse via C8 and R5.

With this arrangement slight differences in various receivers and adaptors are not detrimental, and a maximum transference of energy from converter to set takes place.

HINTS FOR FAULT FINDING.

Loud hum on stations, due to shorting plug not being insulated, whilst operating on BC frequencies.
Bubbling on short wave signals due to volume control being turned on too far.
Other troubles should easily be located by study of voltages and checked with a volt meter also by use of a continuity meter and a new kit of tubes.
These voltages have been taken with a 1000 ohm per volt instrument using the 250V. range.

ALIGNMENT:

IF Section - Mickey Mouse.

Feed signal of 456 Kc. to grid of V1 6A7 and align IF padder starting at lower padder of IF transformer near to 6A7 tube, follow up with top padder thence to 2nd transformer.

Volume control should be full on and signal not above 10v. at output. Gang should be turned full in (540 Kc. end)

Broadcast Section.

Turn gang full out and adjust oscillator trimmer (nearest back of receiver) to 1550 Kcs. Move gang to approx. 1400 Kcs. and resonate by use of generator dial, align aerial trimmer (nearest front of cabinet)

Move to other end of band and peak series padder located at rear of base.

RADIO CORPORATION PTY. LTD.
11-21 STURT STREET, SOUTH MELBOURNE.
HOUSEHOLD RADIO SERVICE BULLETIN.

Bulletin 29
9.10.35.
Page 4.

ALIGNMENT:

Broadcast Section ctd.

The usual procedure should be followed here, that is, generator dial to remain stationary at approx. 600 Kc. Gang to be adjusted for maximum output, series padder adjustment to be altered slightly and gang rechecked. This should be continued until position of series padder screw showing greatest output on meter is found.

1400 Kc. should be rechecked after series padder adjustment is made.

Shortwave section.

Set generator dial at 19 Mc. and resonate oscillator padder (nearest front of cabinet). Move to 16 Mc. and resonate with generator dial, adjust aerial trimmer (nearest back of cabinet)

No adjustment is necessary at the low frequency end as this is accounted for in C4.

Gang alignment in both Mickey Mouse and Oversea-er receiver is accessible from the bottom of the cabinet by sliding out the safety bottom. Thus it is possible to completely align both receivers without removing them from their respective cabinets.

Mickey Mouse has an adjustable resistor R2 by which it is possible to either increase or decrease the receiver's sensitivity. This is definitely only for the dealers convenience and should not be adjusted unless deemed absolutely necessary.

HOUSEHOLD RADIO SERVICE BULLETIN.

RESISTORS:

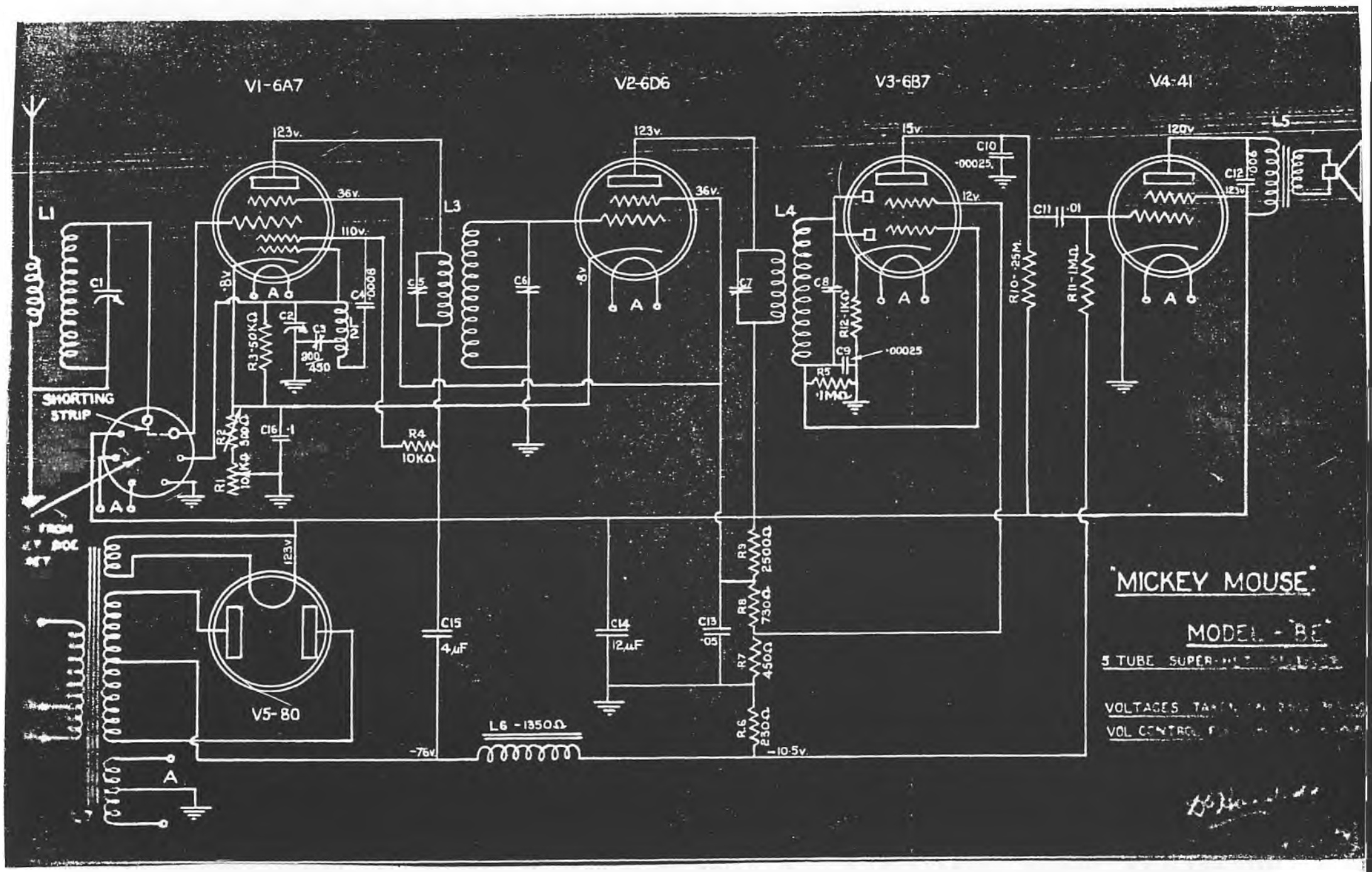
R1 10,000 ohm Volume control
2 300 ohm Adjustable sensitivity control
3 50,000 ohm 1/3 watt 10% tolerance
4 10,000 ohm " " " "
5 100,000 ohm " " " "
6 230 ohm section of voltage divider
7 450 ohm " " " "
8 730 ohm " " " "
9 2,500 ohm Wirewound resistor.
10 250,000 ohm 1/3 watt 10% tolerance.
11 1,000,000 ohm " " " "
12 1,000 ohm " " " "

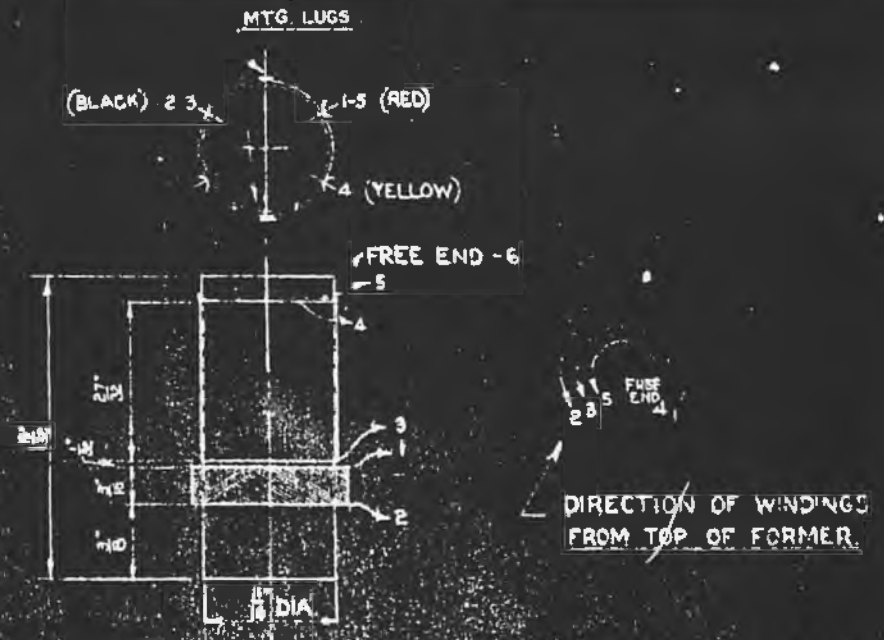
CONDENSERS.

C1 Antenna section of gang condenser.
2 Oscillator section of gang condenser.
3 Series padder 200-450 mmf.
4 .0008 Mica 1000V. 10% tolerance
5 Primary padder 1st IF
6 Secondary padder 1st IF
7 Primary padder 2nd IF
8 Secondary padder 2nd IF
9 .00025 MICA 1000V. 10% tolerance
10 .00025 " " " "
11 .01 Paper 200V. " "
12 .006 " " " "
13 .05 " " " "
14 12mfd. Section of Dry Elect. Block 200V.
15 4 mfd. " " " " " 300V.
16 .1mfd. Paper 200V. 10% tolerance.

INDUCTORS.

L1 Aerial coil assembly
2 Oscillator coil assembly
3 1st IF Transformer
4 2nd IF Transformer
5 Speaker Input transformer
6 Field coil 1350 ohm
7 Power transformer.

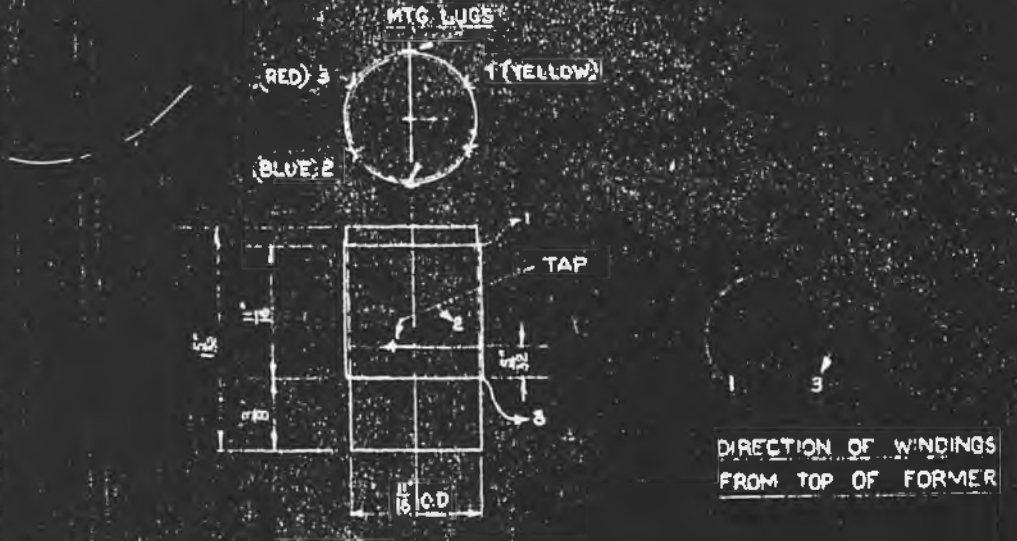

V1-6A7
V2-6D6
V3-6B7
V4-41
V5-80
L1
L3
L4
L5
L6 - 1350Ω
C1
C2
C3
300
450
C4 ·0008
C5
C6
C7
C8
C9 ·00025
C10 ·00025
C11 ·01
C12 ·008
C15 4μF
C14 12μF
C13 ·05
C16 ·1
R1 10KΩ
R2 300Ω
R3 50KΩ
R4 10KΩ
R5 1MΩ
R6 230Ω
R7 450Ω
R8 730Ω
R9 2500Ω
R10 ·25M.
R11 1MΩ
R12 1KΩ
SHORTING STRIP
123v.
36v.
110v.
·8v
15v.
12v.
120v
-76v.
-10·5v.
"MICKEY MOUSE"
MODEL - "BE"
5 TUBE SUPER-



NO.1 AERIAL COIL.

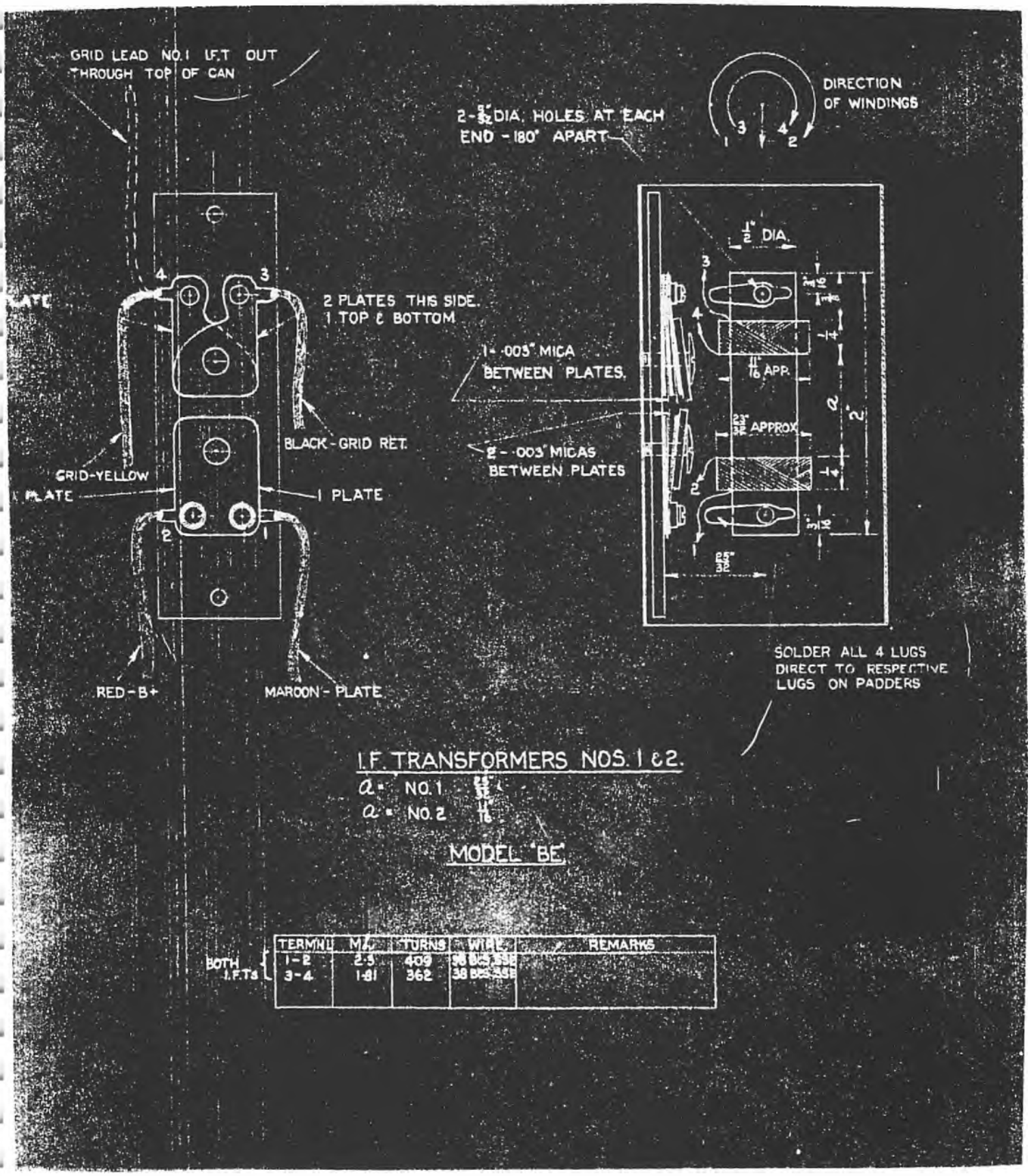
	TERMINAL	INDUCTANCE	TURNS	WIRE	REMARKS
AERIAL COIL	1-2	1033 μH	195	38 SSE	UNIVERSAL WINDING
	3-4	257 "	138	36 ENAM.	
	5-6			28 SSE	CAP. 1-4 = 10·8 μμF
	1-4	1510 "			2-3 JOINED
	2-3	1070 "			1-4 "
OSC. COIL	1-2	137 "	19·98	36 EN. B&S	
	2-3	825 "	86.30	" "	
	1-3	195 "	19·128	" "	

MODEL - BE - COILS



NO.2 OSCILLATOR COIL.

2-7-35



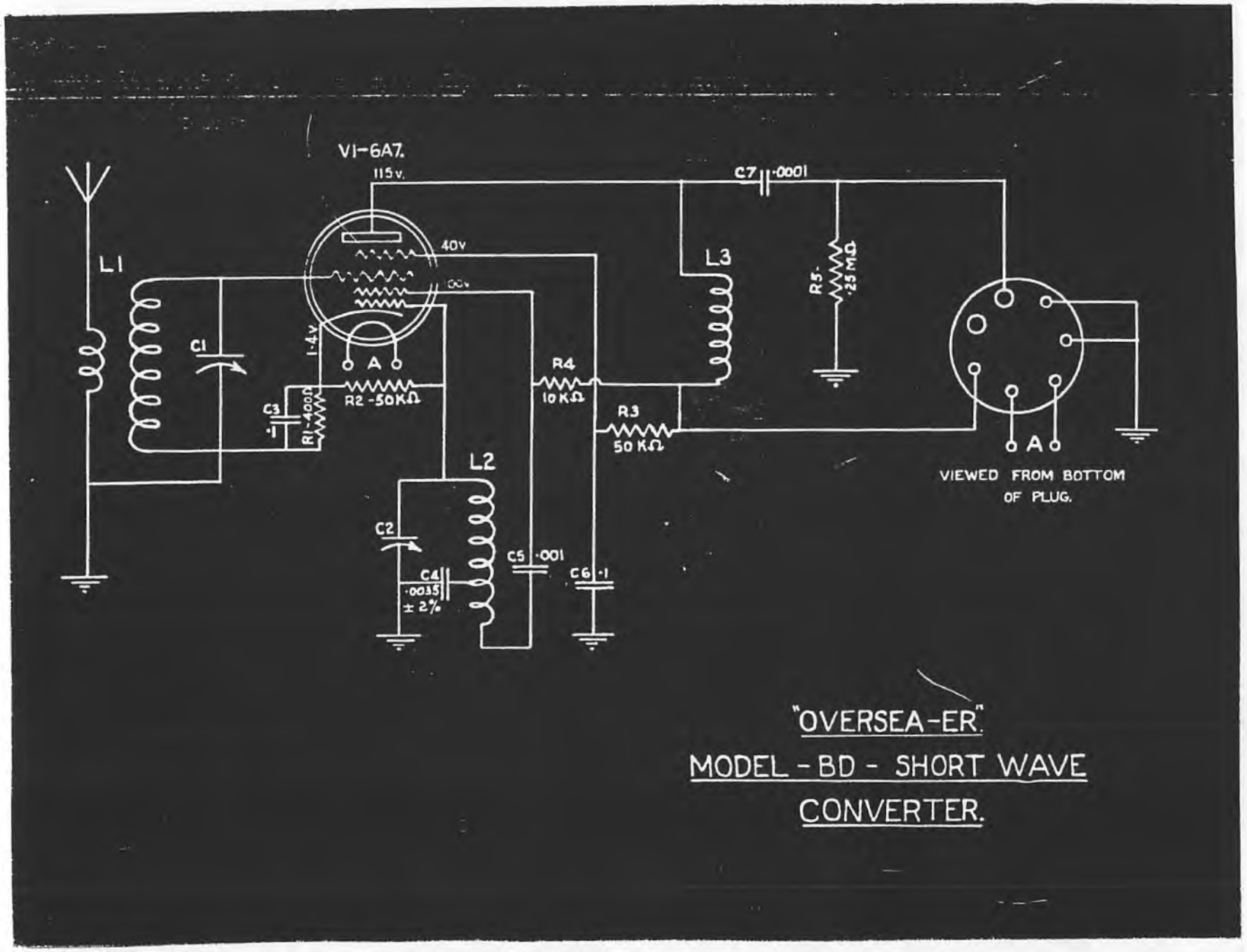
I.F. TRANSFORMERS NOS. 1 & 2.

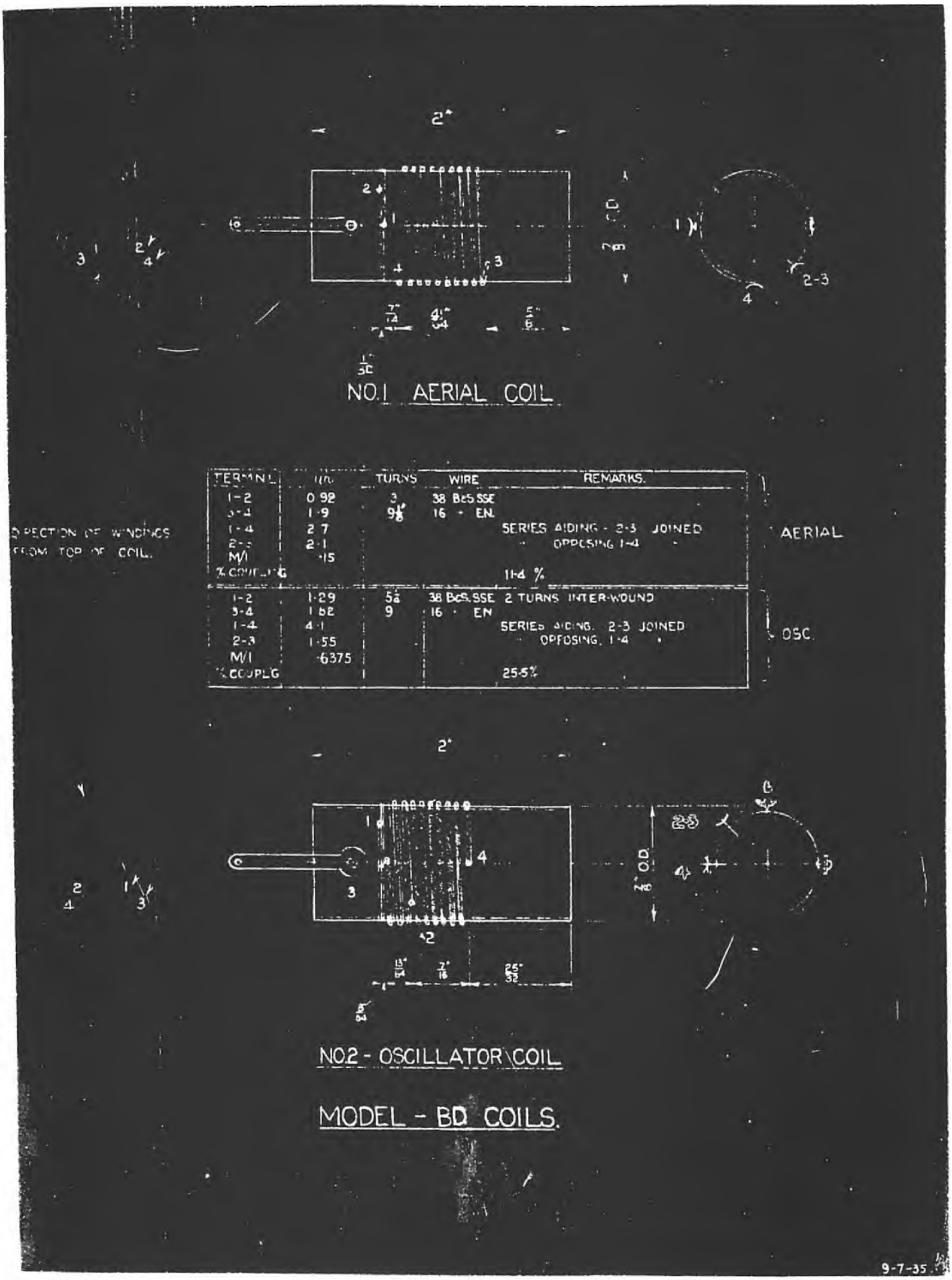
a = NO. 1 25/32"

a = NO. 2 11/16"

MODEL "BE"

	TERMNLS	M.A.	TURNS	WIRE	REMARKS
BOTH I.F.Ts	1-2	2.5	409	38 DCC	
	3-4	1.81	362	38 DCC	


V1-6A7.
115 v.
C7 .0001
40v
L1
L3
R5-
.25 MΩ
C1
1.4v
A
R4
10 KΩ
C3
.1
R1-400Ω
R2 -50KΩ
R3
50 KΩ
L2
C2
C5 .001
C4
.0035
± 2%
C6 .1
A
VIEWED FROM BOTTOM
OF PLUG.
"OVERSEA-ER"
MODEL - BD - SHORT WAVE
CONVERTER.


2"
2
1
3
4
3
2-3
4
7/64
4 1/64
5/8
1/32
NO.1 AERIAL COIL
TERMINL
M/I
TURNS
WIRE
REMARKS.
1-2
0 92
3
38 BcS SSE
3-4
1·9
9 1/8
16 · EN.
1-4
2 7
SERIES AIDING - 2-3 JOINED
2-3
2·1
OPPOSING 1-4
M/I
·15
% COUPLG
11·4 %
AERIAL
1-2
1·29
5 1/2
38 BcS SSE 2 TURNS INTER-WOUND
3-4
1 62
9
16 · EN
1-4
4·1
SERIES AIDING. 2-3 JOINED
2-3
1·55
OPPOSING. 1-4
M/I
·6375
% COUPLG
25·5%
OSC.
2"
1
4
2
3
2
2-3
4
1
2" O.D.
13/64
7/16
25/32
NO.2 - OSCILLATOR COIL
MODEL - BD COILS.
9-7-35

Hazeltine Laboratories, Notes on design of short-wave converters, was included in file for Astor "Oversea-er"

Recent development work on short wave converters has resulted in improved efficiency and in the elimination of one unit of the gang switch. The procedure to be followed in arriving at the proper circuit constants and in testing has been worked out and is here set forth. The circuit data given here is representative only, and may be departed from by the licensee in so far as it is necessary to utilize coil forms, shield cans, etc., which are readily available.

The feature of automatic switching (Report 781) is not redescribed here as it appears that few licensees are willing to go to such an expensive type of set. Other features are of course optional, for example:

(a) B -power supply may be included in the converter chassis asshown in Figure 1, or omitted and the leads M and N connected to a single lead wire to be connected to a point of B-potential of 200 v. to 250 volts on the broadcast receiver. In this case a small transformer for supplying the heaters of the converter tubes will necessarily be included on the converter chassis.

(b) The wave trap in the input and the shielded cable in the output may be omitted, in which event it will be necessary for the operator to set the frequency of the broadcast receiver at a silent point as near 1000 kilocycles as is possible to avoid broadcast reception. The advantage of the wave trap and shielded output lead is not always apparent when testing near a strong broadcast station of about 1000 kc., as the broadcast receiver may directly pick up such signals, but it is a fact that in most home locations this feature has real advantages.

(c) Frequency calibration of the dial is recommended. While it may appear easier to use a 0-100 division dial and furnish a booklet carrying an approximate calibration, it should be noted that the oscillator frequency is sufficiently constant and reproducable in production so that a printed dial calibrated in frequency is not a problem. For this connection the dial is calibrated to be 1000 kc. lower in frequency than the oscillator frequency, irrespective of antenna tuning.

(d) The use of separately switched lights for each frequency scale is urged as a feature of merit. This was fully described in Report 781 and involves the use of one more unit in the gang switch than is shown in Figure 1 of this report.

Referring now to Figure 1, it will be noted that the modulator tube, although a '24 type, is utilized as a three-element tube having a grid condenser and leak. The plate voltage is adjusted to be low and, as read by a high resistance voltmeter connected between ground and plate, it should be of the order of 20 to 30 volts. This is desirable to give good sensitivity for the very weak signals with which the converter has to deal.

The parallel padding of the oscillator circuit has been reduced to a single padding for all three ranges and thus switching of parallel padders is avoided. This padder may be the usual one built on the frame of the gang condenser. Also, the padding condenser of the 1500 μμf series alignment condenser, which is in circuit on the short wave position, has been omitted because this alignment condenser is so large that its value need be only approximate.

Where a shielded output lead is used it will be found that the capacity of the lead to ground is generally of the order of 50μμf and in the absence of inductance L, it acts to bypass the 1000 kc. output of the modulator. Inductance L is therefore connected as shown to tune the shielded lead to parallel resonance at 1000 kc. This inductance may be a small universal winding of approximately 500 μh. Its value should be determined experimentally to give maximum signal strength for the particular receiver with which it is to operate.

In Figure 2 winding data is given for coils to be incased in 2" diameter aluminium cans and to be tuned by variable condenser units having a capacity range, when padded, of from 35 μμf to 250μμf. When so utilized the following frequency bands are covered:

1500 - 4000 kc.
3700 - 10000 kc.
8000 - 22000 kc.

It will be understood, however, that the licensee may substitute other diameter cans and coil forms by following the design procedure to be described. However, it is recommended that coil forms of 1¼" diameter with spaced windings of 28 turns per inch be utilized, as the turns here given will be very nearly correct in starting the design.

It will be apparent that both for the antenna tuning and for the oscillator, the turns required on the high frequency sections of the coils must first be determined; next, those of the medium frequency range: and finally, those for the low frequency range, as the reverse order would be impossible on a single coil form.

For the determination of these inductances then, a signal generator, having modulated output and capable of reaching the highest oscillator frequency (23,000 kc) is necessary. The frequency determinations are best made, both for the antenna tuning and for the oscillator, by placing a pair of headphones in series with a condenser of 250 mmf between the modulator plate and ground. Thus, without any broadcast receiver connected to the converter output, the phones will indicate resonance of the antenna tuning when the modulating tone from the signal generator is at maximum, and will also indicate the oscillator frequency when by "zero" beating, the oscillator is synchronized with the carrier frequency of the signal generator. An improved arrangement would be to include a stage of audio amplification with the headphones. This same arrangement is recommended in production for setting the oscillator frequency ranges and checking alignment.

Considering now the antenna tuning, and the range to be covered on each band, it is clear that since only one parallel padder is included in this circuit, the input ranges of tuning for all three bands will be approximately the same as determined by the ratio of maximum to minimum capacity of the variable condenser and paralleling capacities. This tuning range is affected only by capacity introduced from the antenna and differences of distributed capacity for the three ranges. For example, if the total band to be covered is 1.5 to 22.0 megcycles, which is a ratio of 14.66, then each band will necessarily tune over a ratio of $\sqrt[3]{14.66}$ or 2.45. Since overlap is desired we may take the slightly larger ratio of 2.6 and hence arrive at the following bands:

1.5 - 3.9
3.7 - 9.6
8.5 -22.0

A suitable condenser for tuning over such a frequency band is one having a capacity range of $(2.6)^2$; for example, 37 μμf to 250 μμf (including minimum distributed and padding capacities). If the available condenser is a larger unit, plates should be removed until the maximum capacity is of the above order and the parallel padder utilized to set the ratio of capacity variation.

Irrespective of the actual frequency band covered for the short wave position of the antenna tuner, the ratio of maximum to minimum frequency should be first made correct and then the turns of the coil adjusted until the lowest frequency of the band is correct. Next, the converter is switched to the middle frequency band and (the tuning ratio remaining approximately correct) the turns of the middle section are now determined to set the lowest frequency of this band at its correct value. Finally the converter is switched to the long wave band and the turns of the lower coil section determined to set the lowest frequency of the long wave band at its correct value.

In adjusting the coil sections, it is useful to remember that the number of turns to add or subtract may be calculated with satisfactory accuracy from the relation: the number of turns desired is equal to the number already on the form, multiplied by the ratio of the lowest available frequency to the lowest desired frequency to which the coil is to tune.

In making the above determination it is desirable to omit the antenna primary coil and couple the signal generator through a small (10μμf) capacity to the grid of the modulator, the reason for this procedure being that the tuning is then sharp and unaffected by the broadcast antenna. While this pro-

cedure may sound fundamentally wrong, it appears to be the only feasible way at present, since the effect of the coupling through a dummy antenna is to broaden the tuning at the high frequency ends of the high frequency bands so that sharp tuning is impossible with the present input circuit.

Coming now to the oscillator circuit, the same procedure must be followed of determining first the high frequency range, second the middle frequency range, and finally the low frequency range.

For example, since the signal frequencies for this range are to be 8500 to 22000 kc., the oscillator must tune from 9500 to 23000 kc., or a ratio of 2.42. The series alignment condenser for this range is calculated to be about 1500 μμf and is not critical. Hence, a condenser of approximately this value is placed in circuit, and the parallel padder is adjusted until (by "zero-beat" determinations as previously explained) the oscillator tunes over a range of 2.42. The turns on the high frequency section of the oscillator coil are then adjusted to set the lowest frequency of this band at its correct value.

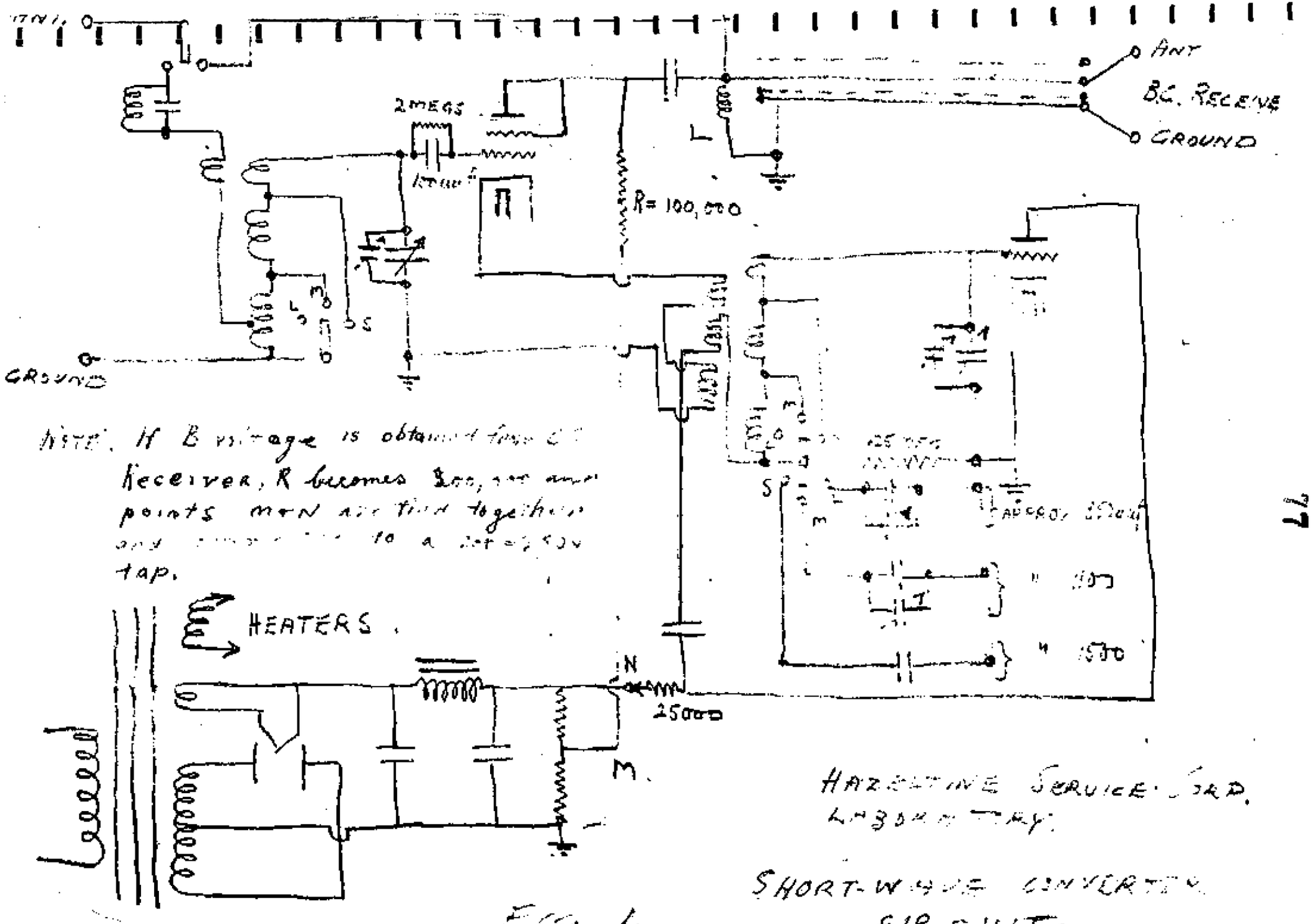
Next, the converter is switched to the middle frequency band. Here the tuning is to be from 3700 to 9600 kc. and hence the oscillator must tune from 4700 to 10600 kc., which is a ratio of 2.25. The calculated series alignment condenser is 1100 μμf and a padder is included. Without any change in the parallel padder, which was set for the high frequency band, the padder of the series alignment condenser is adjusted until the oscillator frequency ratio is 2.25 and then the turns on the middle section of the coil are adjusted until the lowest frequency for this band is cor-

rect. Next the converter is switched to the lowest frequency band. Here the tuning range is to be 1500 to 3900 kc. The oscillator frequency must then be 2500 to 4900 kc., a ratio of 1.9. The calculated series alignment condenser is 350 μμf and with a condenser of approximately this value in circuit, plus a padder, the padder is adjusted to set the frequency ratio for this band to be 1.9. The turns of the lowest section of the oscillator coil are then adjusted to set the lowest frequency of the oscillator at 2.5 kc.

When these adjustments have been completed the converter, may be connected up for operation and the alignment will be found to be practically correct. Since, however, alignment should be most difficult at the low frequency range, it is generally desirable to readjust the parallel padder of the antenna tuner for alignment near the high frequency end of the low frequency range.

Once the first model had been completed, it appears that in production only the following adjustments need be made. The oscillator frequencies are checked by adjusting the parallel padder at 23,000 kc. and by adjustment of the series alignment padder at 2500 kc and at 4700 kc (the lowest frequencies of the lower bands). With a modulated signal of 3700 kc, the parallel padder of the antenna tuner is adjusted for maximum signal, which brings it in alignment near the upper end of the low frequency range.

HAZELTINE SERVICE CORPORATION LABORATORY.



NOTE. If B voltage is obtained from the receiver, R becomes 250,000 ohms and points M & N are tied together and connected to a 250 volt tap.

FIG. 1.

HAZELTINE SERVICE-SRD. LABORATORY.

SHORT-WAVE CONVERTER CIRCUIT.

THE ASTOR model 55 Series DB.

4 Valve AC Superheterodyne, console

Valve types ; 6A8 mixer, 6B7 IF amplifier, diode detector & first audio, 6F6 output, 5Z4 rectifier.

IF frequency; 456 Khz.

PERFORMANCE FIGURES.

MODEL DB STANDARD RECEIVER.

Overall Sensitivity, Selectivity and Power Output.

Kc.	600	1000	1400
db	72	72	72
uv	250	250	250
W2		6	
W10		14	
W100		24	
W1000		38	

Max. output = 80 v. on 4000 ohm load = 1.6 watts.

IF to output Sensitivity and Selectivity

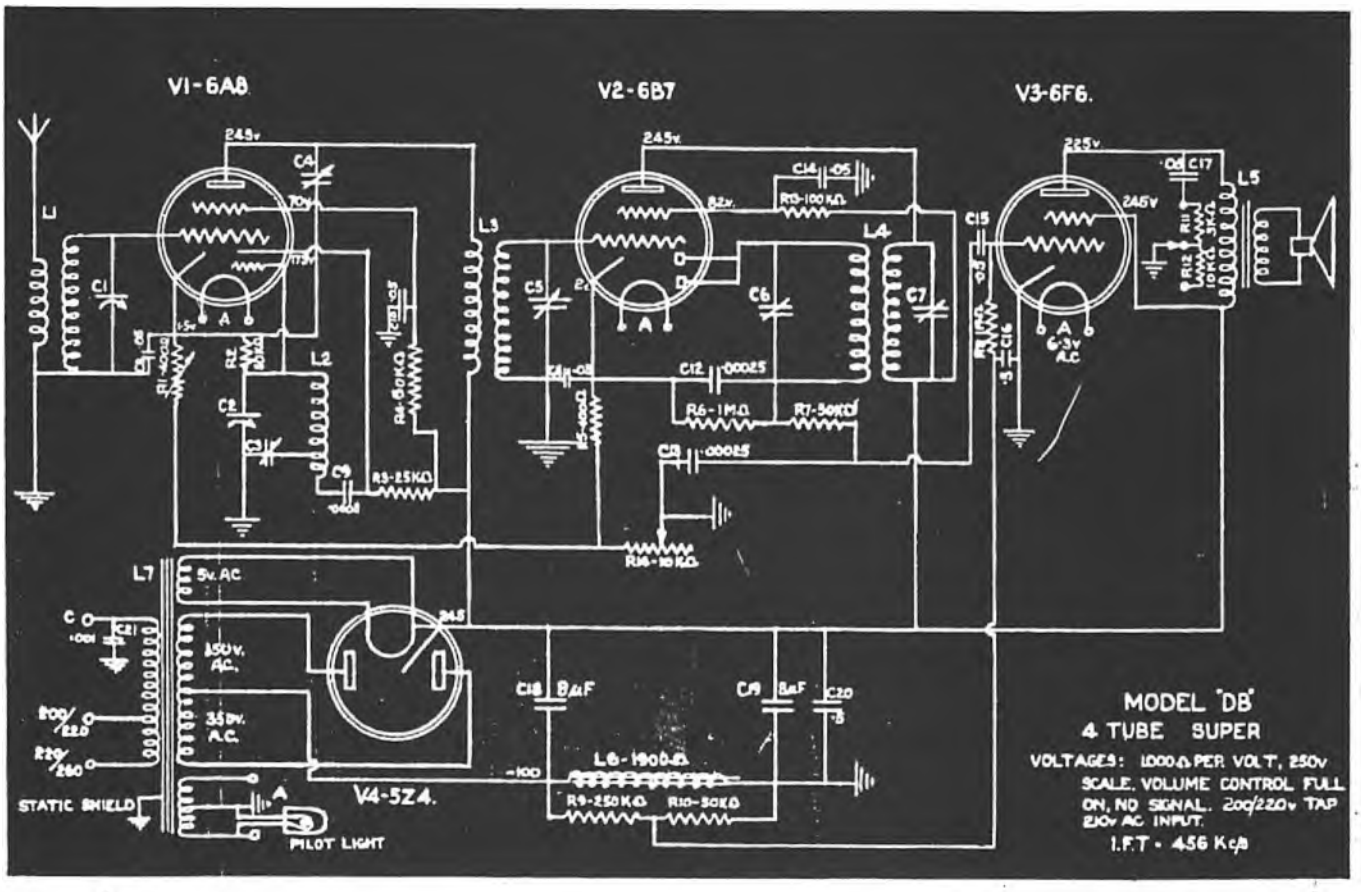
db = 20.5 = μV
$\sqrt{2}$ = 12
W2 = 15
W10 = 19

OM to output Sensitivity and Selectivity (Osc. kg.)

db = 86.5 db
W2 = 7
W10 = 14
W100 = 27

NOTE: Figures are for normal main receiver fitted with lowest tubes of a batch of 12 of each type.

"Astor" A.C. Model 55—Chassis type DB



Astor model "55," chassis type "DB," is a four-valve receiver designed for broadcast coverage and operation from 200-260 volts A.C. mains. This receiver is of the console type and is fitted with three controls—volume, tuning, tone (3 positions)—and an 8 inch, 1,900 ohms field, loudspeaker.

This receiver is an extremely simple arrangement and no trouble should be experienced in locating any faults which may occur. It should be noted, however, that the 6B7 is used as 456 KC., I.F. amplifier and diode detector only—no reflexing or A.V.C. being employed. Another point of interest is found in the provision of a "maximum sensitivity" adjustment in the form of adjustable resistor R1 (400 ohms total) as cathode bias resistor for the converter. This resistor is taken together with the I.F. valve cathode resistor, to one end of the volume control (R14—10,000 ohms), and the arrangement becomes an effective "radio" type volume control with an adjustable "maximum volume" setting. A final feature of interest is found in the use of a voltage divider system (R9—250,000 ohms, and R10—50,000 ohms) across the L.S. field in order to obtain bias for the output valve; the arrangement, in conjunction with C16 (0.5 mfd.), also serves as a very effective hum filter.

When checking up the I.F. system it will be noted that the first I.F.T. primary trimmer (C4) is returned direct to the 6A8 cathode instead of to the high-tension side of the coil; this is quite in order. Finally, the oscillator padder (C3) is a compression-type trimmer with a capacity range of 200/400 mmfd.

RADIO CORPORATION PTY. LTD.
11 - 21 STURT STREET, SOUTH MELBOURNE.

Bulletin 30,
18.11.35.
Page 1.

HOUSEHOLD RADIO SERVICE BULLETIN.

SUBJECT - ASTOR FOUR VALVE SUPERHETERODYNE IRON-CLAD SERIES MODEL 55.

GENERAL:

The Astor Model 55 is a 4 tube superheterodyne specially designed to operate with the new metal tubes, and uses three of these tubes out of a total of four.

The main design features apart from these metal tubes, are:

Vastly increased selectivity
Diode detection followed by only the power amplifier tube
Exceptional sensitivity for four tubes
Three point tone control
Approximately 2 watts output
Newly designed tuning dial.

These features need no explanation, with perhaps one exception, that of the diode detector feeding the output tube. With this arrangement, owing to the excellent detection properties of the diode and the low actual voltage amplification factor in the pentode output tube, the amount of distortion possible is extremely low, resulting in exceptional tonal qualities.

TUBE COMPLEMENT:

Oscillator modulator	- 6A8 Metal tube.
IF amplif. and diode det.	- 6B7 glass tube
Power output	- 6F6 Metal tube
Cathode type rectifier	- 5Z4 Metal tube

METAL TUBE FEATURES:

6A8 - Smaller inter-electrode capacities, in some cases as low as only 10% that of 6A7.
Greater plate resistance, allowing greater gain and especially selectivity, 16% higher than 6A7.
Lower plate current resulting in lower noise level, 7% lower than 6A7.
Greater conversion-conductance (the true measure of efficiency) resulting in greater gain, 11% higher than 6A7.

METAL TUBE FEATURES CONTD.

6F6 - This tube has a 4.5% high mutual conductance without alteration to plate current or load as compared with the 42.

5Z4 - The greatest advantage this tube has over the 280 is, that it is a cathode heating type, that is, it warms up to operating temperature at the same rate as the other tubes. With the 280 the full voltage is available across all units immediately the receiver is switched on and remain abnormally higher until the other tubes reach operating temperature.

It is easily seen that this places a considerable strain on all condensers etc. as this voltage reaches as high as 50% above the normal working voltage. With the 5Z4 all this is eliminated and the normal working voltage is never exceeded.

CIRCUIT OPERATION.

Aerial stage L1-C1 feeds signal to grid of oscillator modulator tube, V1 the gain of which is separately adjustable for service purposes only, by resistor R1.

The IF signal appears at primary of L3 and is transferred to grid of V2 IF amplifier section, the amplified signal appears in primary of L4 and is transferred to diode of V2 2nd detector section.

The rectified signal appears in load resistor R6, is filtered for IF by R7, C13 and fed to output tube V3 by C15. Tone control network consists of C17, R11 and 12. Bias for the output tube is obtained from a voltage divider shunted across the speaker field coil in the negative lead of the power supply.

Volume control is obtained by variation of resistor R14 which controls the bias on V1 and V2.

ALIGNMENT:

IF Channel. Feed 456 Kc. signal to grid of V1, preferably with grid clip connected and gang at full in position, and peak IF padders, starting with No. 1 and following up with No. 2. For purposes of identification in this respect, No. 1 has the grid lead protruding from the top of can. It is advisable to adjust the primary padder first in both cases,

ALIGNMENT:

IF Channel ctd.

this padder is controlled by a slotted topped screw whilst the secondary padder uses a hexagon nut.

Broadcast channel. Set pointer at 1550 Kc. and then move to 1300 Kc. and resonate rear gang padder, commencing with the oscillator (Front padder).

Move generator to approximately 600 Kc. and adjust series padder which is located on the right hand side of the gang near the front, in the usual manner.

Recheck at 1300 Kc. and check calibration, which should be very close to markings. NOTE: It is essential that 1300 Kc. on generator used should be accurate otherwise error in calibration will be noted.

Should the generator used be in error at this point it is better to start oscillator off in the following manner.

Set pointer at 1550 kc. Turn to known station in close vicinity of 1300 Kc. and tune to maximum volume by use of oscillator (front) padder. The aerial trimmer can then be resonated in the usual manner.

MAIN Features (cont). - 2 -

Tone control is fitted and is three point adjustable.

Fidelity:

The overal fidelity of the receiver is truly exceptional. This is due to the design as a whole, but more especially to the audio frequency side of the receiver.

The circuit here is a diode, which is renowned for its linear rectification properties and is equalled only by the crystal detector, followed by a single pentode power output stage.

This, helped by the especially designed IF transformers, allows approx. 2 watts output and limits the possible amount of distortion considerably resulting in an extremely low percentage of distortion in the output to the speaker.

Dial.

This has marked on it the main broadcast stations and also a complete calibration in Kilocycles. This dial is so designed as to allow replacement in the case of re-allocation of stationsat any future date.

RADIO CORPORATION PTY. LTD. Bulletin 30.
18.11.35.
11 - 21 STURT STREET, SOUTH MELBOURNE. Page 4.

HOUSEHOLD RADIO SERVICE BULLETIN.

SUBJECT - COMPONENT PARTS:

RESISTORS:

1. 400 ohm Wirewound adjustable
2. 50,000 ohm 1/3watt 10% tol.
3. 25,000 ohm " " "
4. 50,000 ohm 1/2watt " "
5. 400 ohm 1/3watt " "
6. 1,000,000 ohm " " "
7. 50,000 ohm " " "
8. 1,000,000 ohm " " "
9. 250,000 ohm " " "
10. 50,000 ohm " " "
11. 3,000 ohm " " "
12. 10,000 ohm " " "
13. 100,000 ohm " " "

INDUCTORS:

1. Aerial coil assembly.
2. Oscillator coil assembly
3. No.1 IF transformer
4. No.2 " "
5. Speaker input transformer.
6. 1900 ohm Speaker field coil
7. Power transformer.

CONDENSERS:

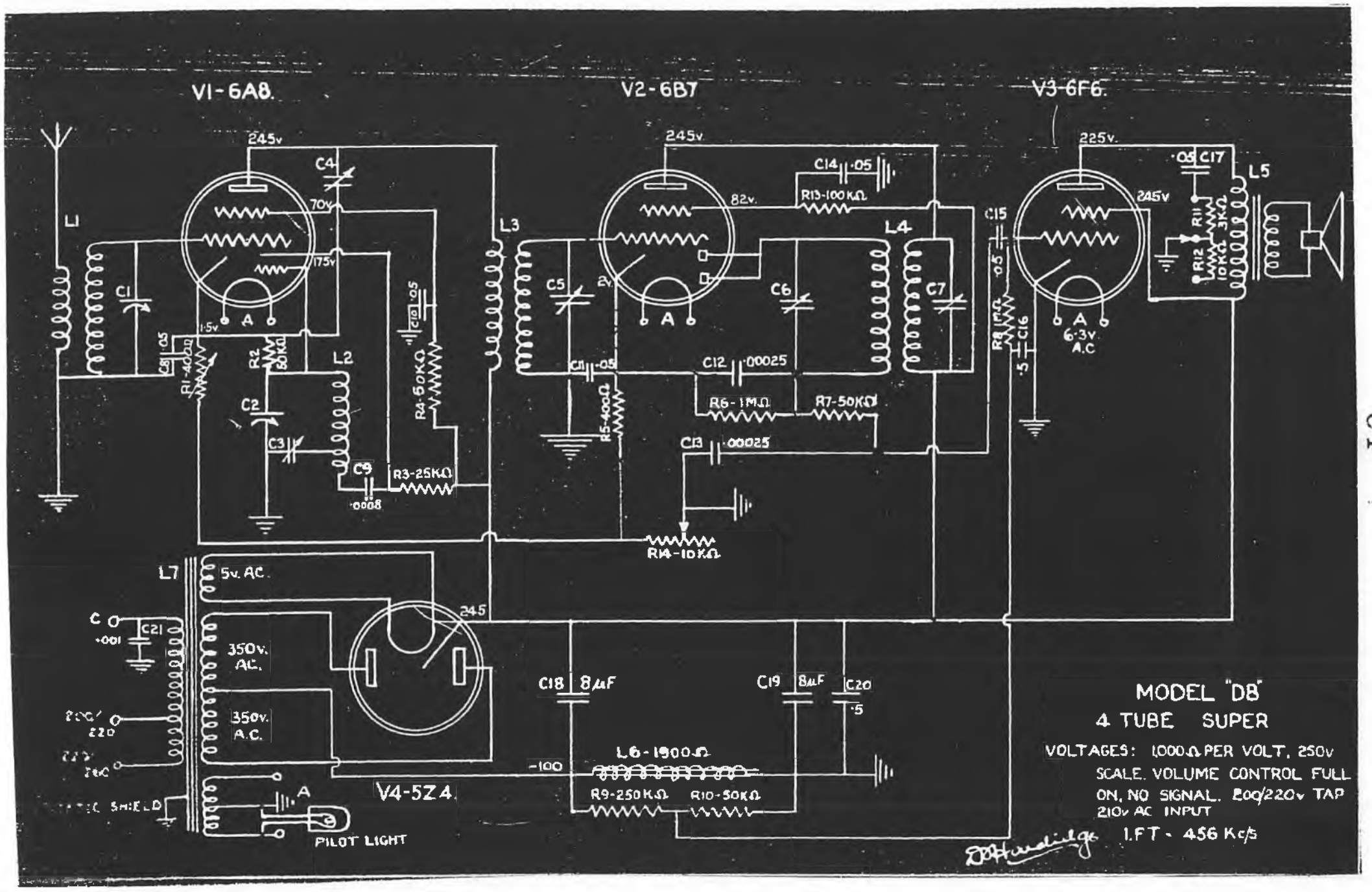
C1. Ant. section of gang
2. Osc. section of gang
3. Series padder 200/400mmf.
4. Primary padder 1st IF Trans.
5. Secondary padder 1st IF Trans.
6. Secondary padder 2nd IF Trans.
7. Primary padder 2nd IF Trans.
8. .05mf. Paper cond. 200V. 10% tol.
9. .0008 Mica cond. 1000V. " "
10. .05mf. Paper cond. 200V. " "
11. .05mf. " " " " "
12. .00025 Mica cond. 1000V. " "
13. .00025 " " " " "
14. .05mf. Paper cond. 200V. " "
15. .05mf. " " 400V. " "
16. .5mf. " " 200V. " "
17. .05mf. " " 600V. " "
18. 8mf. Elect. " 500V. " "
19. 8mf. " " 450V. " "
20. .5mf. Paper cond. 400V. " "

Pilot light - 4½V. .3 amp globe.

OPERATING INSTRUCTIONS (Cont.)

- 2 -

DIAL CALIBRATION: The dial is calibrated in Kilocycles and also has the main broadcasting stations clearlymarked. This will be found helpful in locating stations with a minimum amount of trouble. In the case of further re-allocation of station frequencies, the dial is detatchable and will be able to be replaced by a new one bearing corrected station markings. In order to carry out this operation it is necessary to remove the receiver from the cabinet.


V1-6A8.
V2-6B7
V3-6F6.
245v
70v
175v
1·5v
245v.
82v.
225v.
245v
6·3v
A.C
L1
L2
L3
L4
L5
L7
C1
C2
C3
C4
C5
C6
C7
C8 ·05
C9 ·0008
C10 ·05
C11 ·05
C12 ·00025
C13 ·00025
C14 ·05
C15 ·05
C16 ·5
C17 ·05
C18 8μF
C19 8μF
C20 ·5
C21 ·001
R1-400Ω
R2 80KΩ
R3-25KΩ
R4-50KΩ
R5-400Ω
R6-1MΩ
R7-50KΩ
R8 1MΩ
R9-250KΩ
R10-50KΩ
R11 3KΩ
R12 10KΩ
R13-100KΩ
R14-10KΩ
L6-1900Ω
5v. AC.
350v. AC.
350v. A.C.
245
-100
V4-5Z4
PILOT LIGHT
MODEL "D8"
4 TUBE SUPER
VOLTAGES: 1000Ω PER VOLT, 250v SCALE. VOLUME CONTROL FULL ON, NO SIGNAL. 200/220v TAP 210v AC INPUT
I.F.T - 456 Kc/s

7.11.38.

INSTRUCTIONS FOR OPERATING ASTOR MODEL 55

4 TUBE SUPERHETERODYNE.

AERIAL: A short aerial, indoor or outdoor, of about 35 feet or less total length will be sufficient for most localities. For extreme long-distance reception an outside aerial of 60 feet total length will be sufficient.

GROUND: A good ground tends to eliminate noise, and gives more steady reception. Ground leads should be as short as possible, and soldered or clamped to a water supply pipe where possible. Otherwise drive a piece of metal pipe about four feet long into moist ground, and solder ground lead to this.

A.C. SUPPLY VOLTAGE ADJUSTMENT: Connections are provided for 200,-220 and 220-260 volts. Ascertain voltage of your supply from supply company. DISCONNECT SET FROM SUPPLY. Remove danger cover plate. A single covered wire will be seen held down by a nut on a bolt. The voltage connections for the two bolts are indicated on cover plate. Bolt wire to desired voltage, and replace cover.

OPERATION: Make certain that all tubes are firmly seated in their sockets by pushing them downwards. See that top connection clips are properly secured to top terminal caps of tubes. Tubes require about 30 seconds to reach operating temperature. Turn volume control nearly full clockwise. Turn tuning control until desired station is heard. The volume control setting should not be unnecessarily advanced, as, in the case of local, or very strong stations, this will cause the receiver to overload or distort. When listening for distant stations it will be necessary to fully advance the volume control.

TONE CONTROL: A tone control is provided and enables the user to adjust the receiver's tonal response according to taste.

DIAL LIGHT LAMP: For replacements use 4.5 volt .3 amp globes.

TUBE REPLACEMENTS: Should it be found necessary at any time to replace a tube, or in cases where the tubes may have been removed from the receiver, care should be exercised in replacing, to make sure that each tube is fitted to correct socket.
This receiver uses three of the new metal tubes, these three being of different types, and, as the sockets for these tubes are identical, harm will result from fitting tubes in incorrect sockets.
Correct positions are indicated on the location diagram.

FITTING TUBE TO SOCKET. This is an extremely simple procedure with the metal tubes as all pins are equally spaced in a circle, correct location being taken care of by a key, or a large central pin on the tube which fits into a kew-way in the socket. The procedure is simply to fit large tube-base pin in center hole of socket and turn tube around until it falls into position, then push down until firmly bedded.

Continued page 4, Bulletin 30. this file. (83)

MAIN FEATURES OF THE MODEL "55" 4 TUBE SUPERHET.

6.11.38.

This receiver uses three of the new metal tubes.
These are: Type 6A8 Improved Pentragrid converter (Replaces 6A7)
6F6 " Power output tube (Replaces 42)
5Z4 Cathode type rectifier (Replaces 280)
The other tube is the glass 6B7 type.

The receiver gives, by virtue of the two dual purpose tubes (6A8 and 6B7) six tube performance.

The main features of the new metal tubes are as follows:

6A8: Smaller inter-electrode capacities, in some cases as low as only 10% that of 6A7.
Greater plate resistance, allowing greater gain and especially selectivity, 16% higher than 6A7.
Lower plate current resulting in lower noise level. 7% lower than 6A7.
Greater conversion-conductance (the true measure of efficiency) resulting in greater gain 11% higher than 6A7.

6F6: This tube has a 4.5% higher mutual conductance without alteration to plate current or load as compared with the 42.

5Z4: The greatest advantage this tube has over the 280 is, that it is a cathode heating type, that is, it warms up to operating temperature at the same rate as the other tubes. With the 280 the full voltage is available across all units immediately the receiver is switched on and remain abnormally higher until the other tubes reach operating temperature.

It is easily seen that this places a considerable strain on all condensers etc. as this voltage reaches as high as 25% above the normal working voltage. With the 5Z4 all this is eliminated and the normal working voltage is never exceeded.

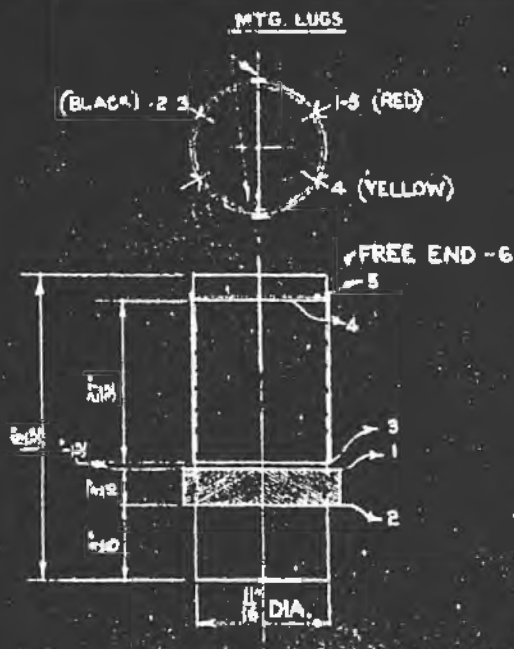
Another advantage is that the plates of this tube are exposed directly to the air. The outer element is the shield, and is perforated to allow a free air circulation, resulting in very low operating temperature compared with the 280.

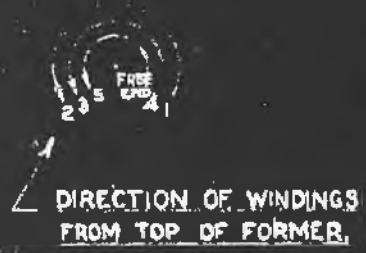
Sensitivity and Selectivity.

The sensitivity of the receiver is adequate for interstate reception on an indoor aerial, the noise level is extraordinary low.

High gain aerial stage is used in conjunction with special new type IF transformers which allow a degree of selectivity hither to unattainable, to be realized and at the same time actually allow an increase in gain.

CONTINUED. p. 3 Bulletin 30 this file. (p.82)

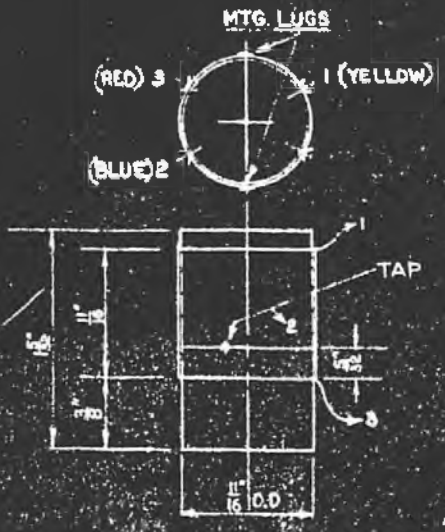




NO.1. AERIAL COIL.

	TERMINAL	INDUCTANCE	TURNS	WIRE	REMARKS
AERIAL COIL	1-2	1033 μH	195	38 SSE	UNIVERSAL WINDING
	3-4	257 "	158	36 ENAM.	
	5-6		11/16	28 SSE	CAP 1-4 = 10·8 μμF
	1-4	1510 "			2-3 JOINED
	2-3	1070 "			1-4 "
OSC. COIL	1-2	226 "	96	36 ENAM.	
	2-3	137 "	30 ①	" "	
	1-3	296 "	128	" "	

MODEL - BE - COILS



① TURNS WERE 90, 28, 118
NOW 98, 30, 124 25-11-36
M.E.B.B. ALTERED AT PREVIOUS
DATE, D.D. NOT NOTIFIED TILL
ABOVE DATE.

DIRECTION OF WINDINGS
FROM TOP OF FORMER

NOTE:- SAME FORMER IS USED ON MODELS: DB, DE, DG, FC, FE, FF, GB, EH, GA, FG, HB, BB.

NO.2. OSCILLATOR COIL.

W.NO. / FILE NO. 44

2-7-35

THE ASTOR model 66 Series DD.

5 Valve Dual-wave AC Superheterodyne, console

Valve types ; 6A8 mixer, 6K7 IF amplifier, 75 (later 6Q7 diode detector & first audio, (version made for Myers uses 6J7 anode bend detector instead) 6F6 output, 5Z4 rectifier.

IF frequency; 472.5 Khz.

Comments; fuses in plate circuit of 5Z4 rectifier. (Ye of little faith?) no AVC instead RF gain control.

Instructions for Operating

METAL VALVE

5 Valve A.C. Dual Wave Superhet.

TYPE DD

For Shortwave and Broadcast Reception

Using "Ferrocart" iron dust cores in RF and IF transformers.

AERIAL.—For best results on shortwave, an outside aerial is most satisfactory. A length of about 100 feet from set to far end of aerial is suitable. The aerial should be as high as convenient, and kept clear of nearby objects such as metal roofs, etc. It must be remembered that the aerial picks up power from the long distance station, and the better the aerial the greater the volume of long distance stations. For broadcast reception, when the set is situated close to a broadcast station a small indoor aerial is usually most satisfactory. This can be obtained by having an outside aerial for short waves, and a few feet of wire indoors for broadcast reception. The sensitivity of the receiver is such that a big aerial is not needed for broadcast wavelengths.

(See back for more data on aerials.)

GROUND.—A good ground lead is essential for best results. Solder or clamp to a water pipe if available; otherwise drive about 4 feet of metal piping into moist ground and solder or clamp to it.

OPERATION.—The valves take a few seconds to warm up to a working condition. For broadcast reception, the wave change switch (on the right) is turned to the left. For short wave reception the wave change switch is turned to the right; the volume control turned full on to the right, and the tuning control turned slowly. The important short wave channels are underlined in black on the inner dial scale. The broadcast scale is marked in kilocycles, and the short wave scale in metres. This receiver is suitable for all the main international short wave channels, namely 16, 19, 25, 31 and 49 metres.

SHORT WAVES.—Short waves reach Australia from other parts of the world because they are reflected from the Heaviside Layer, which is 80 to 200 miles above the earth. This layer varies in height with the time of day and the seasons, and so reception varies. The British Empire transmissions from Daventry are sent at times when they will be heard best in Australia. Generally such transmissions specially directed at Australia are best. London, Berlin, and Paris are very reliable. Australian Wireless periodicals usually have a page devoted to short waves, in which best times to listen are frequently shown.

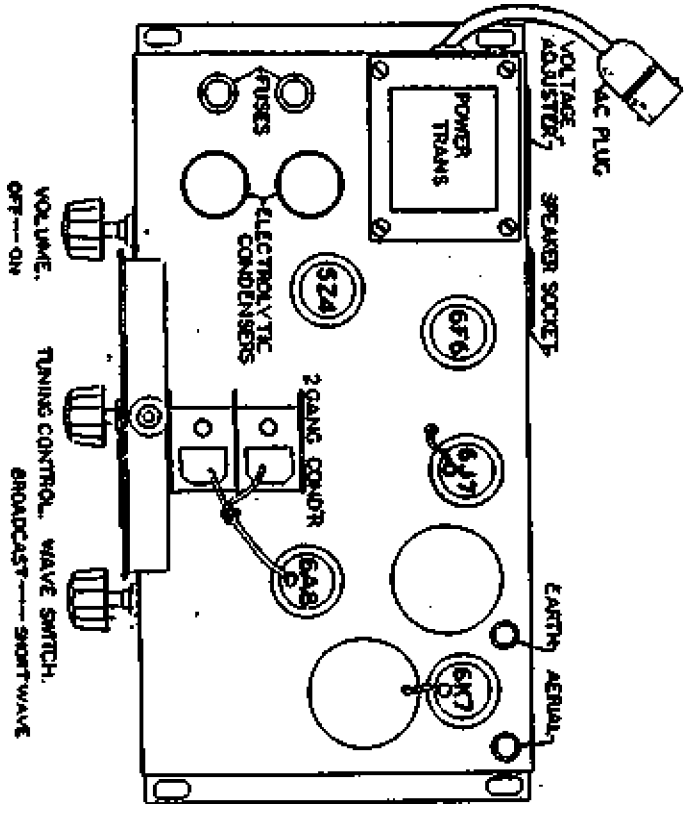
EMPIRE TRANSMISSIONS FROM DAVENTRY, ENGLAND—

Stations GSB, 31.55 metres.
GSD, 25.53 metres.

GSB and GSD radiate transmission No. 1 directed at Australia. Melbourne times of operation are shown below:—

GSD and GSB—
20th Jan. to 16th Feb., 6 to 8 p.m.
17th Feb. to 16th Mar., 5.15 to 7.15 p.m.
17th Mar. to 13th Apr., 4.15 to 6.15 p.m.
14th Apr. to 11th May, 3.15 to 5.15 p.m.
12th May to 27th July, 2.30 to 4.30 p.m.
28th July to 31st Aug., 3.15 to 5.15 p.m.
1st Sept. to 5th Oct., 4.15 to 6.15 p.m.
6th Oct. to 9th Nov., 5.15 to 7.15 p.m.
10th Nov. to 14th Dec., 6 to 8 p.m.
15th Dec. to — Jan., 6.30 to 8.30 p.m.

The above times are subject to change; programmes and times are shown in the Empire edition of "World Radio" (a weekly) obtainable at large newsagencies.



THE ASTOR model 66 Series DD.

REPRESENTATIVE VOLTAGE TABLE, Model DD

Valve	6A8		6K7		6Q7		6F6	
Volume control	off	on	off	on	off	on	off	on
Plate volts	250	250	250	250	70	70	225	225
Screen volts	90	70	175	40			250	250
cathode volts	35	3	35	3	0	0	0	0
Osc. plate	150	135						

Total B voltage = 250v
Voltage across field = -95v

Switch in broadcast position, taken with 1000Ω/volt meter.

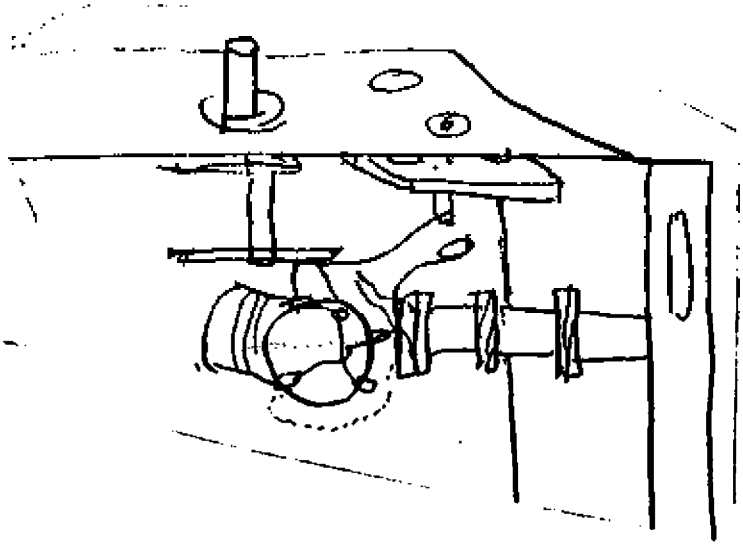
BROADCAST STANDARD COILS.

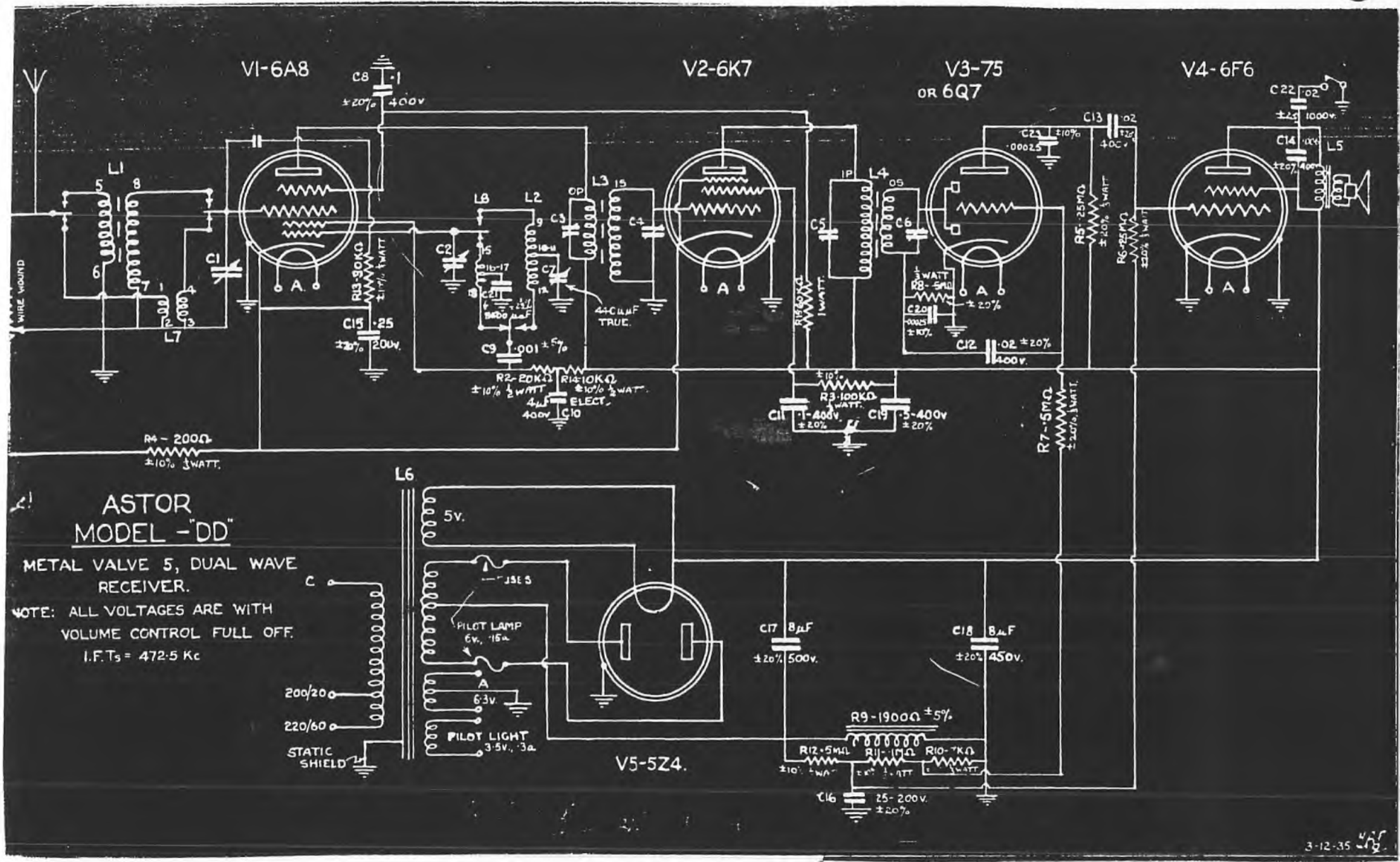
Antenna transformer secondary, 238μH, 92½ turns 15/44 B&S litz
primary 1500μH, 320 turns 38 SSE B&S
M 103.75 μH
K 17.3%

Oscillator transformer primary 11.75 μH 16.75 turns 38 SSE clockwise
secondary 124 μH 72.25 turns 0.005 E spaced
M 15.125μH
K 40%

ISOMETRIC SKETCH, Position of SW and Bc coils.

It is important that leads go straight to coils and not form loops near the coils, which affects the inductance. Dotted line indicates a loop which caused trouble by increasing antenna inductance on SW.





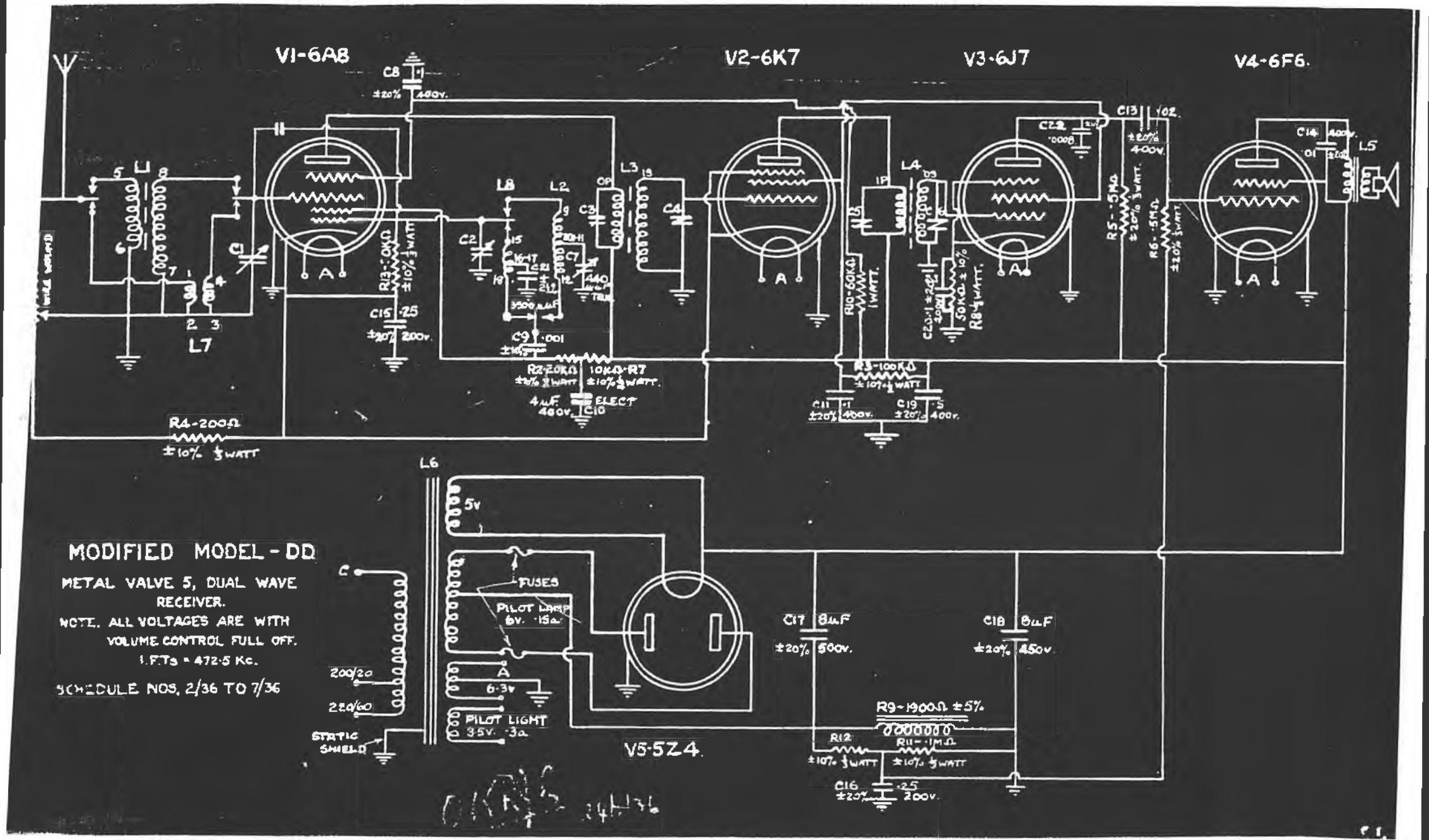
ASTOR
MODEL -"DD"

METAL VALVE 5, DUAL WAVE RECEIVER.

NOTE: ALL VOLTAGES ARE WITH VOLUME CONTROL FULL OFF.

I.F.Ts = 472·5 Kc

3-12-35


V1-6A8
V2-6K7
V3-6J7
V4-6F6.
V5-5Z4.
L1
L2
L3
L4
L5
L6
L7
L8
C1
C2
C3
C4
C5
C6
C7
C8 ·1 ±20% 400v.
C9 ·001 ±10%
C10 4μF 450v. ELECT
C11 ·1 ±20% 400v.
C12 ·0008
C13 ·02 ±20% 400v.
C14 ·01 ±20% 400v.
C15 ·25 ±20% 200v.
C16 ·25 ±20% 200v.
C17 8μF ±20% 500v.
C18 8μF ±20% 450v.
C19 ·5 ±20% 400v.
C21 ·0002 ±2%
C22 ·0008
R1 - 1MΩ ±10% ½ WATT
R2 - 20KΩ ±10% 1 WATT
R3 - 100KΩ ±10% ½ WATT
R4 - 200Ω ±10% ½ WATT
R5 - 1·5MΩ ±20% ½ WATT
R6 - 1·5MΩ ±10% ½ WATT
R7 - 10KΩ ±10% ½ WATT
R8 - ½ WATT
R9 - 1900Ω ±5%
R10 - 60KΩ 1 WATT
R11 - 1MΩ ±10% ½ WATT
R12 ±10% ½ WATT
2500 μμF
50KΩ ±10%
5v
6·3v
FUSES
PILOT LAMP 6V. ·15a.
PILOT LIGHT 3·5V. ·3a.
200/220
220/60
STATIC SHIELD
MODIFIED MODEL - DD
METAL VALVE 5, DUAL WAVE RECEIVER.
NOTE. ALL VOLTAGES ARE WITH VOLUME CONTROL FULL OFF.
I.F.Ts = 472·5 Kc.
SCHEDULE NOS. 2/36 TO 7/36

PARTS LIST, MYER DD 24/2/36

C1,2 gang 14-386 pfd.
C3-6 IF trimmers
C7 series padder,250-500 pfd.
C8,C11,C20 0.1 µfd, 400 volt
C9 0.001 µfd, +/- 10%
C10 4µfd 400 volt electrolytic
C13 0.02 µfd, 400 volt
C14 0.01 µfd, 400 volt
C15,16 0.25 µfd, 200 volt
C17,18 8µfd, 500 volt electrolytic
C19 0.5µfd, 400 volt
C21 3500 pfd, +/- 2.5 % mica
C22 0.0008 mica,+/- 10%

R1, 5KΩ wirewound pot
R2, 20KΩ ½ watt
R3,11 100KΩ ½ watt
R4, 200Ω ½ watt
R5,6,12 500KΩ ½ watt
R7 10KΩ ½watt
R8 50KΩ ½watt
R10 60KΩ 1 watt
R11 100KΩ ½watt
R13 30KΩ ½watt

Fuses, 6.3 volt 0.15Amps dial lamps
Dial lamps, 4.5 volt 0.3 amps

THE ASTOR model 66S Series DD-G.

This model is identical to the model DD, except for the return to the use of locally made glass valves, instead of the more costly metal valves. The valve types used are;

6A7 mixer, 6D6 IF amplifier, 75 diode detector, AVC & audio amplifier, 42 output and 80 rectifier.

I.F. Frequency 472.5 Khz.

THE ASTOR model 66S Series DDA.

6 Valve Dual-wave AC Superheterodyne, console

Valve types ; 6A8 mixer, 6K7 IF amplifier, 75 (later 6Q70diode detector & first audio, 6F6 output, 5Z4 rectifier, 6E5 magic eye..

IF frequency; 472.5 Khz.

Instructions for Operating

ASTOR

5 Valve A.C. Dual Wave Superhet.

MODEL 66S

For Shortwave and Broadcast Reception.

Using "Ferrocart" iron dust cores in RF and IF transformers.

AERIAL.—For best results on shortwave, an outside aerial is most satisfactory. A length of about 100 feet from set to far end of aerial is suitable. The aerial should be as high as convenient, and kept clear of nearby objects such as metal roofs, etc. It must be remembered that the aerial picks up power from the long distance station, and the better the aerial the greater the volume of long distance stations. For broadcast reception, when the set is situated close to a broadcast station a small indoor aerial is usually most satisfactory. This can be obtained by having an outside aerial for short waves, and a few feet of wire indoors for broadcast reception. The sensitivity of the receiver is such that a big aerial is not needed for broadcast wavelengths.

(See back for more data on aerials.)

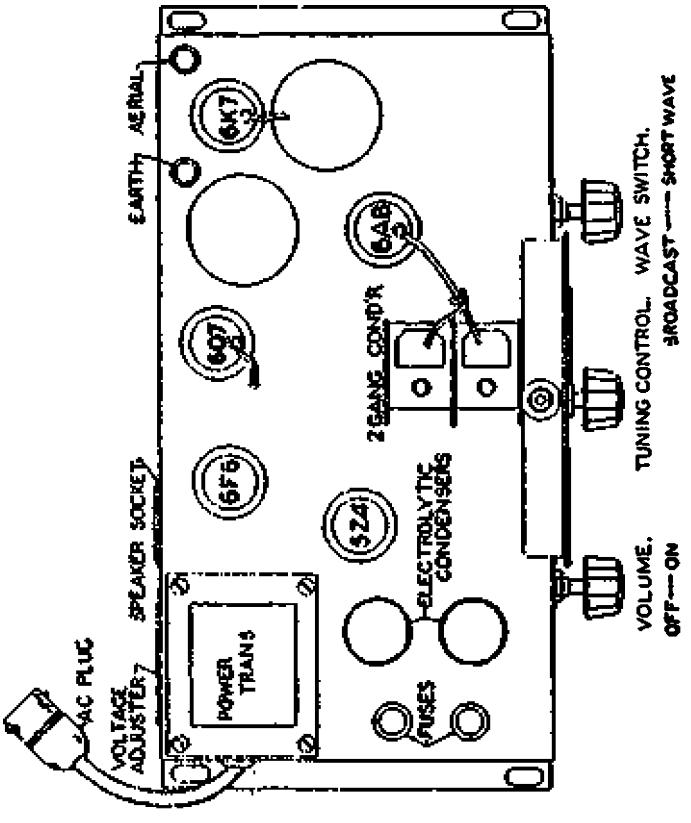
GROUND.—A good ground lead is essential for best results. Solder or clamp to a water pipe if available; otherwise drive about 4 feet of metal piping into moist ground and solder or clamp to it.

OPERATION.—The valves take a few seconds to warm up to a working condition. For broadcast reception, the wave change switch (on the right) is turned to the left. For short wave reception the wave change switch is turned to the right; the volume control turned full on to the right, and the tuning control turned slowly. The important short wave channels are underlined in black on the inner dial scale. The broadcast scale is marked in kilocycles, and the short wave scale in metres. This receiver is suitable for all the main international short wave channels, namely 16, 19, 25, 31 and 49 metres.

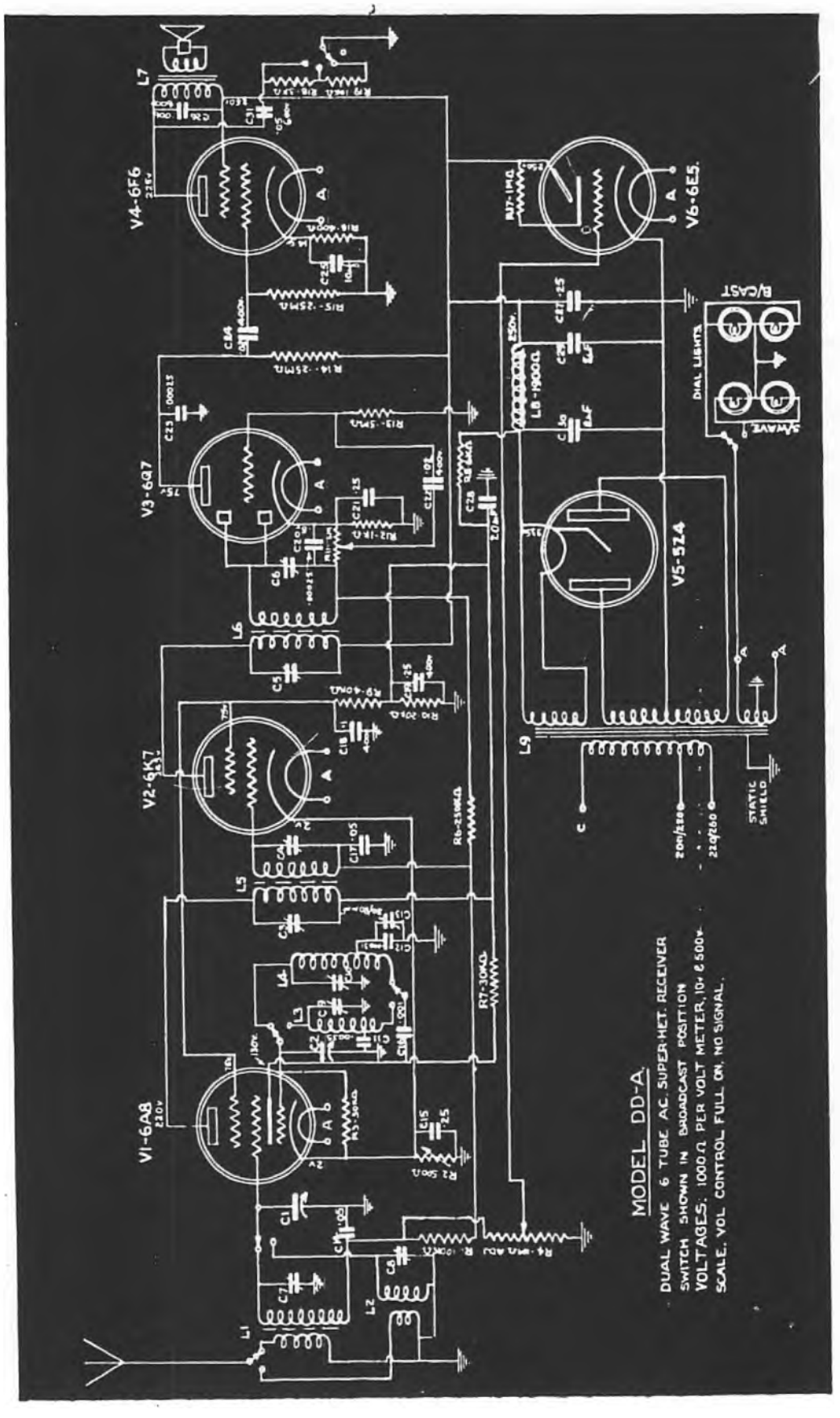
SHORT WAVES.—Short waves reach Australia from other parts of the world because they are reflected from the Heaviside Layer, which is 80 to 200 miles above the earth. This layer varies in height with the time of day and the seasons, and so reception varies. The British Empire transmissions from Daventry are sent at times when they will be heard best in Australia. Generally such transmissions specially directed at Australia are best. London, Berlin, and Paris are very reliable. Australian Wireless periodicals usually have a page devoted to short waves, in which best times to listen are frequently shown.

TONE CONTROL and Static Suppressor.—The tone control knob is beneath the tuning control knob. For emphasis of bass notes, the tone control knob is turned to the right. This also helps reduce static noises on long distance stations.

This control may also be used to suppress strong static interference, as well as for graduated tone control. When static noise is high, turn the control until the noise is reduced.



"Astor" A.C. Model 66 A.V.—Chassis type DD-A



Astor model 66AV, chassis type DD-A, is a five-valve receiver designed for dual-wave coverage and operation from 200-260 volts A.C. mains. This receiver is of the console type and is fitted with four panel controls—volume, tuning, wave-change, tone (4 positions)—and an 8 inch, 1,900 ohms field, loudspeaker. In addition to the panel controls, two "internal" controls are fitted in the form of R2. (500 ohms adjustable) for adjusting the bias of the converter and I.F. valves; and R4 (1 megohm potentiometer) for adjusting the amount of A.V.C. voltage applied to the 6E5 tuning indicator grid.

The design of this receiver follows standard "Astor" lines and requires no particular description. Attention should be paid, however, to the presence of the "anti-flutter" network R8 (6,000 ohms) and C28 (20 mfd.), which ensures a steady plate, screen, and oscillator high-tension supply for the converter valve. This network is fed from the rectifier side of the loudspeaker field in order to obtain maximum stability. It should be noted that resistor R8 must have a rating of at least 2 watts. To provide still greater stabilisation of the voltage supplied to the converter elements, a "bleeder" resistance (R10—20,000 ohms) is inserted; the voltage drop across this is about 220 volts and a unit with a rating of at least 3 watts must be employed.

The I.F. used in this receiver is exactly 472.5 KC., and adjustment to this frequency is effected by means of the trimmers C3, C4, C5, C6. Broadcast alignment is effected by means of the trimmers C7, C10, and the padder C13 (30/80 mfd.); note that the latter is shunted by a 300 mmfd. (0.0003 mfd.) fixed condenser (C12). S.W. alignment is by trimmers C8, C9; the padder (C11) is fixed.

Finaly, it should be noted that a small neutralising capacity is connected between the oscillator and mixer circuits of the 6A8. This takes the form of two or three turns of insulated wire twisted around the 6A8 grid lead and connected to the oscillator section of the gang condenser. Do not disturb this when servicing the receiver.

RADIO CORPORATION PTY. LTD. Bulletin 37.
25.5.36.
11 - 21 STURT STREET, SOUTH MELBOURNE. Page 1.

HOUSEHOLD RADIO SERVICE BULLETIN.

SUBJECT - ASTOR MODEL 66 AV 5 METAL VALVE DUAL WAVE SUPERHETERODYNE WITH A.V.C. AND TUNING EYE (TYPE DDA)

COVERAGE: This receiver is designed to cover the broadcast range of frequencies from 550 to 1500 Kcs. and also a range of high frequency channels from 16.6 Mcs. to 6 Mcs. All of the International shortwave channels of importance, namely 19 M, 21 M, 25 M, 31 M, 42 M and 49 Meters are tunable.

ANTENNA CIRCUIT - BROADCAST. The broadcast antenna circuit comprises a high inductance untuned primary and a tuned secondary of high Q, with iron dust core. Misalignment of secondary tuning is negligible with any antenna from 15 feet to 250 feet long. This is very important in any set, and is particularly so in this receiver, as it has a very selective secondary, due to the iron core.

ANTENNA CIRCUIT - SHORTWAVE. We have investigated theoretically and experimentally the action of the simplest antenna system for high frequency reception, in which the antenna and the leadin together consist of a single wire, and in which the only coupling system is a simple inductively coupled transformer between the leadin and the grid of the first valve.

In all Astor receivers capable of receiving shortwaves, the antenna transformers are adjusted for optimum coupling with a 400 ohm resistive dummy antenna and when the shortwave sections are being aligned, the dummy aerial should be a 400 ohm non-inductive resistance.

Correct design of these transformers means that the aerial length is not critical, and for any length of aerial best average results will be obtained. This is most important where the dealer has no control over the aerial installation. This aerial coupling system is eminently suited to any of the reliable makes of "noise reducing, all wave antenna systems".

CIRCUIT. The wave change switch is so arranged that when in either broadcast or shortwave position, the other coils are out of circuit, and being well separated do not couple to cause "suckouts" or "dead spots". The cathodes of the 6A8 and the 6K7 are joined, being bi-passed by a condenser. This introduces about 6 decibels of regeneration, thus doubling the sensitivity.

The use of iron dust cores in antenna and IF transformers give this receiver greater sensitivity and twice the selectivity of previous models.

Approximately 6 decibels of regeneration are introduced by connecting the cathodes of the 6A7 and 6D6 to a common cathode resistor and bipassing by a suitable condenser. The smaller the capacity of this condenser (C15) the greator the regeneration.

Automatic volume control is used and the control is very good for this type of receiver. An increase of input from 1000 to 1,000,000 microvolts, a ratio of 1000 to 1, increases the audio output voltage by a ratio of only 8 to 1.

The ratio of inherent noise to signal is very good also, noise being practically non existant with signals greater than 50 microvolts.

The maximum output of the receiver is 2 watts for a 30% modulated signal, and this output is closely approached for all signals down to 100 microvolts.

By suitable balancing of capacitive and inductive coupling in the oscillator circuits, the oscillator voltage amplitude is substantially constant and high on each wave band. This means a good signal to noise ratio. The signal-noise ratio is also improved in this set by increasing the antenna stage gain to the limits set by consideration of wave coverage, good alignment and coil size.

IF TRANSFORMERS. The IF transformers represent the greatest advance in design so far achieved. By careful attention to many minor details such as insulation, coil can size and material and wire size

and shape, together with the use of iron dust cores, not only has the stage gain been improved, but the selectivity of the receiver has been more than doubled.

Hitherto it has been customary to attain some measure of selectivity in the simpler sets by loose coupling the IF transformers; but this brings about a drop in the gain and even with very loose coupling the losses in the secondary circuits are still sufficient to make such a receiver relatively broad. The new transformers, however, are optimum coupled, thus passing more of the side frequencies and giving higher musical fidelity, and at the same time have over twice the skirt selectivity, resulting in an adjacent channel selectivity never before realized in a five valve superheterodyne.

On account of the greater IF selectivity an IF frequency of 472-1/2 Kcs. is used. This results in less image interference especially on shortwaves. In special cases the IF can be aligned at any frequency down to 456 Kcs.

TUNING INDICATOR. A type 6E5 tuning indicator is used. This is a type of cathode ray tube, and the fluorescent area is controlled by the AVC voltage. When the set is precisely tuned the eye closes to its narrowest.

GENERAL.

A three position tone control is used.

Care has been taken to attain the best possible reproduction. For example, a satisfactory ratio of AC and DC diode output loads has been arrived at, and this enables the diode to handle high percentages of modulation without distortion. The total harmonic distortion for a 100% modulated signal due to the diode circuit does not exceed 1%.

For maximum output the total harmonic distortion of the output valve does not exceed 5%

The receiver can be considered to have negligible harmonic distortion.

The biassing system is such that attenuation of bass notes is quite small.

It will be noted that a small neutralizing capacity is connected between the oscillator grid and control grid of the 6A8 valve. This is a Hazeltine invention (as is the 6A8 type of valve) and reduces a somewhat troublesome effect which otherwise takes place at high frequencies (in the order of 15 to 18 megacycles)

Such a capacity is not very critical, and in this receiver it consists of about 1-1/2 turns of rubber insulated wire twisted around the control grid lead, and connected to the oscillator grid. The capacity is about 1 uuf.

It is important that the signal circuit should always be resonant to a lower frequency than the oscillator circuit.

ALIGNMENT.

IF Transformers, 472.5 Kcs.

Put switch in broadcast position.
Connect signal generator to grid of 6A8 valve directly (do not use dummy antenna)
Adjust to 472-1/2 Kcs.
Tune IF coil condensers until standard output is obtained with volume control full on.
The IF gain taken this way (for 50 mw output) is between 80 and 86 db usually.

ALIGNMENT - BROADCAST RANGE.

Use a dummy antenna of 100 uuf 20 uh and 25 ohms.
Turn condenser fully out, and adjust oscillator trimmer to 1550 Kcs.
Turn dial to 1400 Kc, and apply 1400 Kc. signal from generator; adjust antenna trimmer for maximum output.
Adjust signal generator to 600 Kcs, turn dial of set toward 600 Kcs, and adjust series pad for maximum output, rocking the condenser rotor back and forth

the while, until maximum output is achieved. If the series pad is very much out, it is usually better to re-adjust the aerial trimmer again at 1400 Kcs.

ALIGNMENT - SHORTWAVE RANGE.

Use a dummy antenna consisting of a non-inductive non-capacitive 400 ohm resistance.

Turn switch to short wave position, turn condenser fully out, and adjust oscillator trimmer to 16.7 Mc (16,700 Kc.)

In this position the trimmer is well out, near its minimin capacity position.

Next adjust generator to 15 Mc. (15,000 Kc.) tune set to about 15 Mc. then adjust antenna trimmer, rocking the rotor of the variable condenser back and forth the while. It is possible to align the aerial circuit incorrectly. The correct position of the padder is near the maximum capacity position.

This procedure is necessary. If the antenna trimmer is merely adjusted without rocking the rotor, the gain of the set, while apparently aligned, may be 10 to 15 db less than obtainable by correct alignment.

The series pad is fixed, and needs no adjustment.

It is important to remember, in aligning the oscillator section that it is possible to get two spots, and in the case of very strong inputs, three spots. When the needle is turned to 20 metres (15 mc) and the oscillator trimmer adjusted until a note is heard (using a fairly weak signal), this note indicates the correct position provided that another and weaker note is heard near 16 Mc. according to the generator, when the generator dial is tuned, the set remaining untuned. This is the image 945 Kc. higher in frequency than the correct signal.

SERVICE REPAIR, ETC. Experience is the best guide. Systematic search of faults is quickest and most reliable.

1. Fifty percent of faults are due to valves. Try replacing them one by one with O.K. valves.

2. Check electrode voltages, etc. with 1000 ohms per volt voltmeter.

3. Check each stage separately. First the audio stage, then the detector and audio stages to see if they are operating. A small positive voltage, 4-1/2 volts or so, applied to the grids will cause a click in the speaker.

4. Next check the IF stage by applying an IF signal from the generator to the grid.

5. Next check the 6A8 stage by applying an IF signal to the grid.

6. Next apply a broadcast frequency signal to the grid of the 6A8. This will indicate if the oscillator is working or not.

7. Next apply a broadcast signal to the antenna. This will indicate if the antenna transformer is O.K.

Checking the set by stages localises a fault and saves time. Where a stage is found to be faulty the components can be tested by means of a continuity meter. This shows up open circuits and shorted condensers, etc.

If a set has been tampered with it is naturally more difficult to rewire it correctly. Here knowledge and experience are very valuable.

Where coils, transformers, etc. need renewing, care should be taken to carefully note the connections of the wires before the faulty parts are removed.

HOUSEHOLD RADIO SERVICE BULLETIN.

COMPONENT PARTS LIST.

RESISTORS.

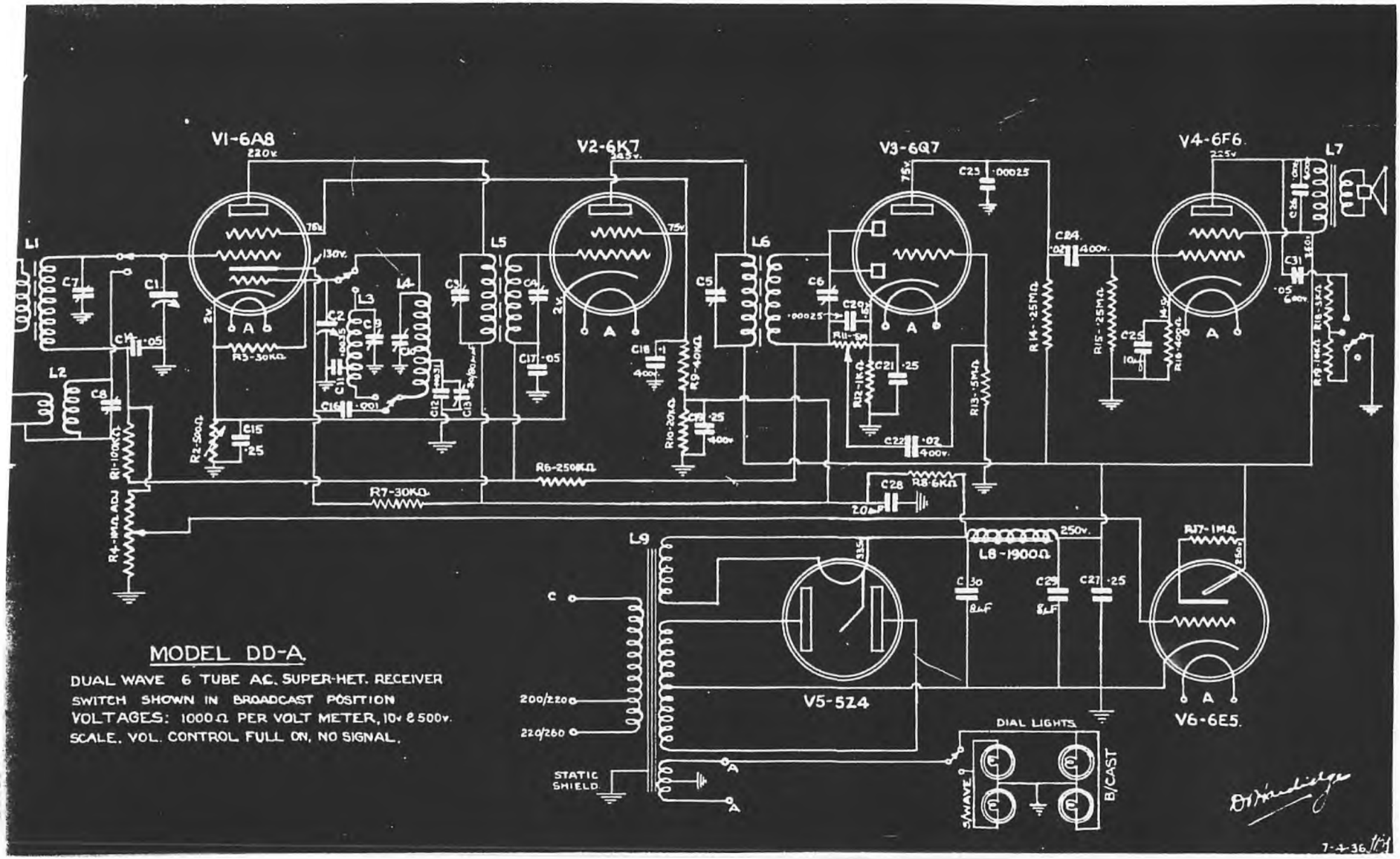
1. 100,000 ohm 1/4W. 20% (able
2. 500 ohm Wirewound adjust-
3. 30,000 ohm 1/4W. 20% (able
4. 1,000,000 ohm 1W. 20% adjust-
5.
6. 250,000 ohm 1/4W. 20%
7. 30,000 ohm 1/2W. 20%
8. 6,000 ohm 2W. 10%
9. 40,000 ohm 1/2W. 20%
10. 20,000 ohm 3W. 10%
11. 500,000 ohm Carbon type V.cont.
12. 1,000 ohm 1/4W. 20%
13. 500,000 ohm 1/4W. 20%
14. 250,000 ohm 1/4W. 20%
15. 250,000 ohm 1/4W. 20%
16. 400 ohm 1W. 20%
17. 1,000,000 ohm 1/4W. 20%
18. 3,000 ohm 1/4W. 20%
19. 10,000 ohm 1/4W. 20%

INDUCTANCES.

1. Broadcast aerial coil
2. Shortwave aerial coil.
3. " " Osc. coil.
4. Broadcast Osc. coil
5. Input IF Transformer
6. Output IF Transformer
7. Speaker input transformer
8. Field coil 1900 ohm 10% tol.
9. Power transformer.

CONDENSERS.

C1. Aerial section gang condenser.
2. Oscill. " "
3. Primary padder 1st IF trans.
4. Second. " " " "
5. Primary " 2nd " "
6. Second. " " " "
7. Broadcast aerial Secondary padder
8. Shortwave " " "
9. " Oscill. " "
10. Broadcast " " "
11. .0035 Mica 1000V. 2½% tol.
12. .00030 " " Plus 0 Minus 5%
13. Adjustable series padder 30/80uuf.
14. .05uf. Paper 200V. 20%
15. .25uf. " " "
16. .001 Mica 1000V. 10%
17. .05uf. Paper 200V. 20%
18. .1uf. " 400V. 20%
19. .25uf. " " 20%
20. .00025uf. Mica 1000V. 10%
21. .25uf. Paper 200V. 20%
22. .02uf. " 400V. 20%
23. .00025 Mica 1000V. 10%
24. .02uf Paper 400V. 20%
25. .10uf. Dry elect. 50V. 20%
26. .006uf. Paper 600V. 20%
27. .25uf. " 400V. 20%
28. 20uf. Wet Elect. 450V. peak
29. 8uf. " " 450V. "
30. 8uf. " " 500V. "
31. .05uf. Paper 600V. 20%


V1-6A8
V2-6K7
V3-6Q7
V4-6F6
V5-524
V6-6E5
L1
L2
L3
L4
L5
L6
L7
L8-1900Ω
L9
R1-100KΩ
R2-500Ω
R3-30KΩ
R4-1MΩ ADJ
R5-40KΩ
R6-250KΩ
R7-30KΩ
R8-6KΩ
R9-40KΩ
R10-20KΩ
R11-1KΩ
R12-1KΩ
R13-5MΩ
R14-.25MΩ
R15-.25MΩ
R16-400Ω
R17-1MΩ
R18-3KΩ
C1
C2
C3
C4
C5
C6
C7
C8
C11 .00035
C12 .00035
C13 .00035
C14 .05
C15 .25
C16 .001
C17 .05
C18 .1 400v.
C19 .25 400v.
C20 .05
C21 .25
C22 .02 400v.
C23 .00025
C24 .02 400v.
C25 .00025
C26 .25
C27 .25
C28 20μF
C29 8μF
C30 8μF
C31 .05 600v.
C
200/220
220/260
STATIC SHIELD
DIAL LIGHTS
S/WAVE
B/CAST
MODEL DD-A.
DUAL WAVE 6 TUBE AC. SUPER-HET. RECEIVER
SWITCH SHOWN IN BROADCAST POSITION
VOLTAGES: 1000Ω PER VOLT METER, 10v & 500v.
SCALE. VOL. CONTROL FULL ON, NO SIGNAL.
7-1-36

IRON CORED DUAL WAVE RECEIVER MEASUREMENTS.

TABLE 1.

Overall Measurements

50 mw output in 8000 ohms load
30% modulation at 400 cycles
230 volts line.

RANGE 1 545 to 1550 Kc.
RANGE 2 5.9 Mc to 18.1 Mc.

Dummy antenna for RANGE 1 200uuf, 20uh, 25 ohms
Dummy antenna for RANGE 2 400 ohms
x Indicates frequency of exact oscillator alignment.

Mc	uv	db	Noise uv	472-1/2Kc uv	+2 i.f. Image Ratio	W2 kc	W 10 kc	W 100 kc	W 1000 kc	W 10,000 kc
.550	28	91		440	110	8	12	20	32	48
.600x	28	91			100	7	11.5	18	27	40
.800	40	88								
1.000	40	88				8	12	22	35	55
1.200	50	86								
1.400x	56	85				10	15	28	44	69
1.500	56	85		800						
6x	80			17,000	16					
7	65				13.8					
8	50				13.8					
9	32				13.8					
10	25				14					
11	28				13.8					
12	28				10					
13	40				6.3					
14	50				5					
15	80				3.2					
16	90				2.8					
17	140				1.8					
18x	280			25,000	0					

IRON CORED DUAL WAVE RECEIVER MEASUREMENTS.

TABLE 2.

Single Stage Measurements

Mc	Antenna u	Antenna db	Antenna W2	Conversion u	Conversion db	Conversion W2	Conversion W10	E.Osc.x	Oscillator Misalign.	Gain i.f. u	Gain Ant. to grid db
.550	6.3	16	10kc	80	38	10	18				
.600	5.0	14	9	63	36	7.5	17.5	14			
.800											
1.000	4.0	12	23	63	36	9	18	16.5			
1.200											
1.400	4.5	13	53	60	35.5	9	19	13.5			
1.500											
6	1.25	2		56	35			7	0	63	36
7	1.6	4						8	+10		
8	1.6	4	190	56	35			8.75	+40	80	38
9	1.6	4						9.25	+20		
10	2.1?	6.5		50	34			9.5	+10	89	39
11	1.8	5						9.75	+20		
12	1.8	5	370	40	32			9.9	-40	100	40
13	1.8	5						9.9	-60		
14	2	6		38	31.5			9.9	-120	86	38.5
15	2.8?	9						9.5	-110		
16	2.8?	9	750	56	35			9	-200	100	40
17	3.2	?10						8.75	-70		
18	2.8?	9		40	32			9.5	0	36	31

x Indicates apparent voltage = E = IR of grid leak.

Miscellaneous Measurements

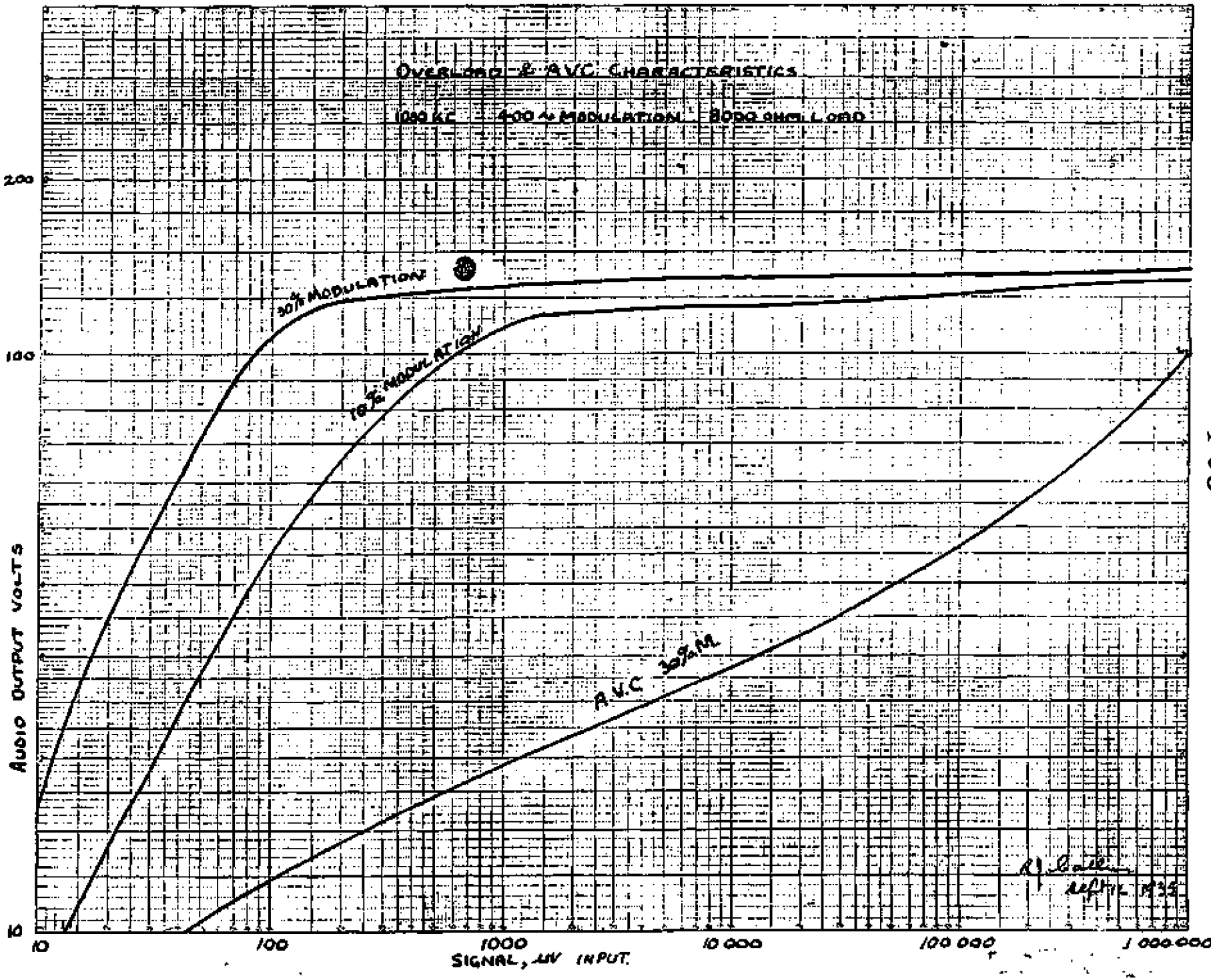
	Modulator Stage (Oscillator working)	I-F Stage (Diodes working)
Kc	472.5	472.5
u	(38 db)79	(39 db)89
W2	6Kc	8.5Kc
W10	15	20

Detector Sensitivity --- .63V. (4 db)

Input (uv)	1,000,000	100,000	10,000
Equiv. Tweet Mod. 955 Kc	30%	3%	1.9%

Antenna Alignment (Kc variation due to antenna)

Kc	550	600	1000	1400
Ant. Cap.				
60 uuf		+2	+1	+2
100 "		0	0	0
200 "		-1	-1	-1
300 "		-3	-1	-2
400 "		---	---	---


OVERLOAD & AVC CHARACTERISTICS
1090 KC 400 ~ MODULATION 8000 OHM LOAD
200
100
15
AUDIO OUTPUT VOLTS
30% MODULATION
15% MODULATION
A.V.C 30% M.
10
100
1000
10 000
100 000
1 000 000
SIGNAL, μV INPUT.

THE ASTOR series DF

5 valve, AC operated console

Valve types; 6A7 mixer, 6D6 IF amplifier, 75 diode detector & audio amplifier, 42 output, 80 rectifier

I.F. frequency 472.5 Khz.

TABLE OF VOLTAGES.

Normal AC mains input voltage, DC voltages measured with 1000 ohms per Volt voltmeter.

Ground to	Cathode		Screen		Plate		Osc. plate.	
	A	B	A	B	A	B	A	B
6A7	4.8	35V.	87½	110	250	250	160	160
6D6	4.8	35V.	87½	110	250	250		
75	Grounded		-		100	100		
42	Grounded		250	250	225	225		

A Volume full on, B volume full off

Voltage, B plus to ground 250V.

Voltage across speaker field, minus 100 to 110 volts.

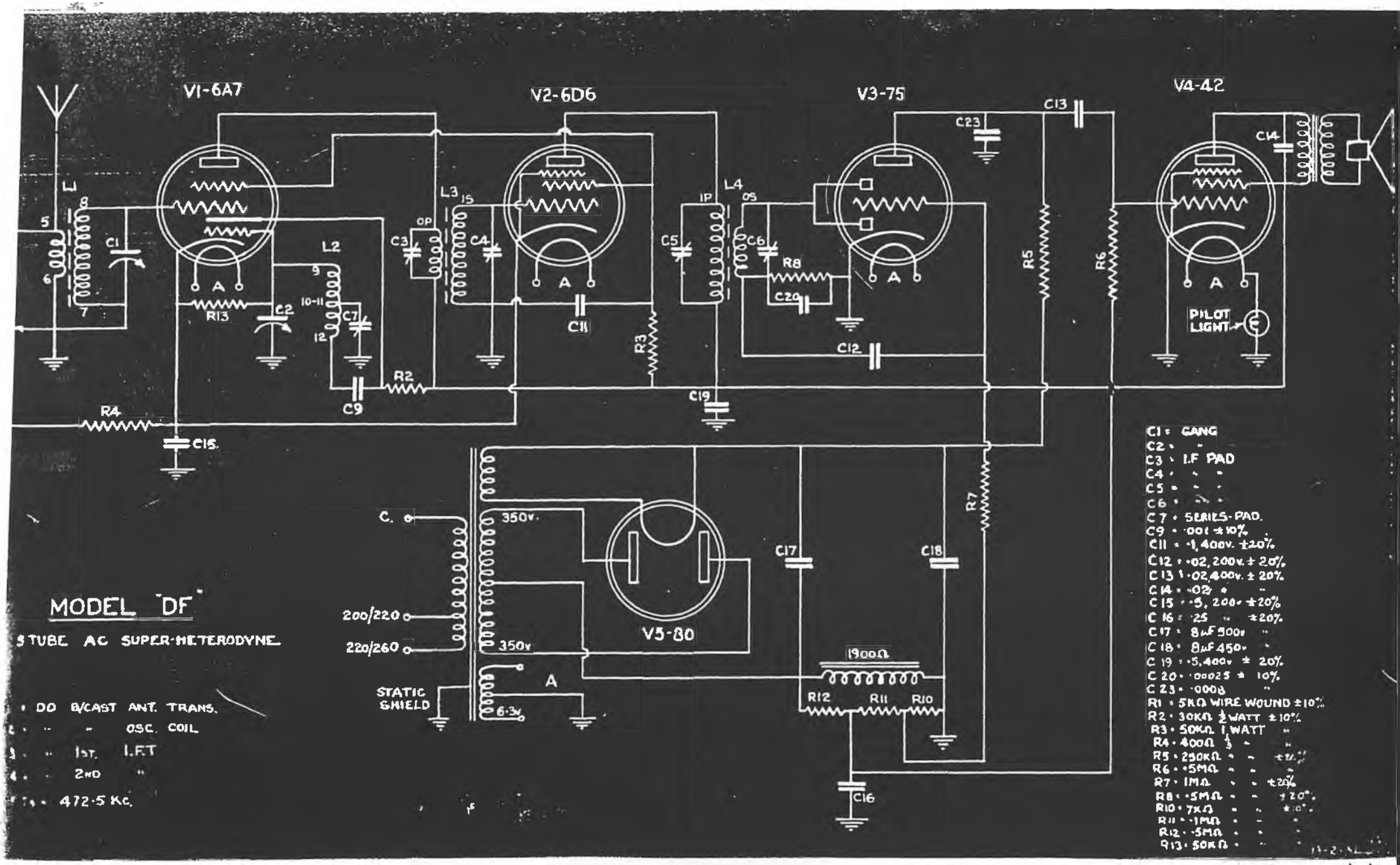
THE ASTOR series DF-G

5 valve, AC operated console, with tone control.

Valve types; 6A7 mixer, 6D6 IF amplifier, 75 diode detector & audio amplifier, 42 output, 80 rectifier

I.F. frequency 472.5 Khz.

The circuit and other comments are as for the model DF, with the addition of a tone control comprising an additional 0.02 µF, 1000 volt capacitor with switch in series from the 42 plate to ground.

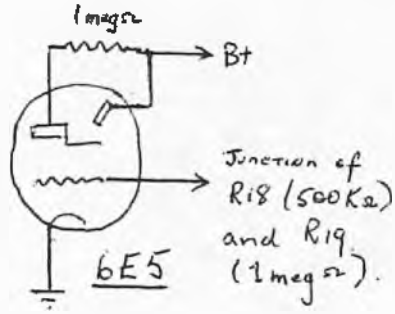

V1-6A7
V2-6D6
V3-75
V4-42
V5-80
L1
L2
L3
L4
C1
C2
C3
C4
C5
C6
C7
C9
C11
C12
C13
C14
C15
C16
C17
C18
C19
C20
C23
R1
R2
R3
R4
R5
R6
R7
R8
R10
R11
R12
R13
OP
IP
A
PILOT LIGHT
C.
350v.
200/220
220/260
350v
6·3v
STATIC SHIELD
1900Ω
MODEL "DF"
5 TUBE AC SUPER-HETERODYNE
1 = DO B/CAST ANT. TRANS.
2 = " OSC. COIL
3 = " 1ST. I.F.T
4 = " 2ND "
Fs = 472·5 Kc.
C1 = GANG
C2 = "
C3 = I.F PAD
C4 = " "
C5 = " "
C6 = " "
C7 = SERIES-PAD.
C9 = ·001 ±10%
C11 = ·1, 400v. ±20%
C12 = ·02, 200v. ± 20%
C13 = ·02, 400v. ± 20%
C14 = ·02 " "
C15 = ·5, 200v ±20%
C16 = ·25 " ±20%
C17 = 8μF 500v "
C18 = 8μF 450v "
C19 = ·5, 400v ± 20%
C20 = ·00025 ± 10%
C23 = ·0008 "
R1 = 5KΩ WIRE WOUND ±10%
R2 = 30KΩ ½ WATT ±10%
R3 = 50KΩ 1 WATT "
R4 = 400Ω ½ " "
R5 = 250KΩ " " ±10%
R6 = ·5MΩ " " "
R7 = 1MΩ " " ±20%
R8 = ·5MΩ " " ±20%
R10 = 7KΩ " " ±10%
R11 = ·1MΩ " " "
R12 = ·5MΩ " " "
R13 = 50KΩ " "

THE ASTOR model 170, series AB

7 valve, AC operated dual-wave console.
Valve types; 6D6 RF amplifier, 6A7 mixer, 6D6 1st IF amplifier, 6D6 2nd IF amplifier, 75 diode detector & audio amplifier, 42 output, 80 rectifier

An earlier circuit, dated 24-1-1935 is altered in red to show octal valves as an alternative, using 6K7's, 6A8 , 6Q7, 6F6 but retaining the 80 and using a 6E5 magic-eye . This circuit would not copy clearly, with red on a blue background. The magic eye circuit is included in this file and there are some changes to component values, notably R17,18 & 19 which are shown as 100K,100K & 250K.. R6 is shown as 100K (note that the circuit shows only 250Ω but the parts list shows 250KΩ), and R8 is shown as 30KΩ. R23 appears to be ½MΩ.

I.F. frequency 456 Khz.



SUBJECT - MODEL 190 7 VALVE DUAL WAVE AC SUPER-HETERODYNE (1936 AB)

Bulletin 39.
29.5.36.
Page 1.

The Model 190 is an improved version of the Model 170. Service data for the Model 170 is included in this bulletin, as the principle change is only the replacement of the last IF transformer with an iron cored transformer.

All other descriptions in the Model 170 bulletin covers the Model 190.

Operating Instructions to the buyer of the "Astor" model 170.

Unfortunately due to the tight binding of this file, it was not possible to obtain a complete copy.

Instructions for Operating

7 Tube Dual-Wave Superhet Receiver

RECEIVER SPECIFICATION.

The Model 170 is a 7-tube superheterodyne receiver, designed to cover both the broadcast band and the principal shortwave band, extending from 18.5 to 50 meters.. Changing from one band to the other is accomplished by means of a switch.

The shortwave band covers the stations most frequently received in Australia, as well as many experimental stations and other transmissions of interest, such as telephone conversations, the beam, etc.

The receiver is equipped with automatic volume control, which is absolutely necessary for best results, especially on shortwave reception. This feature keeps the fading, which is encountered in long distance transmission, under control automatically, and maintains steady, even volume.

The tuning dial is calibrated with frequency in kilocycles for the broadcast band, and wave-length markings are used for the shortwave section; the most-used shortwave channels being underlined and split into sections to assist in locating stations.

Tuning, especially on shortwaves, has been considerably simplified by the use of a special vernier drive, which has two gear ratios; the faster will be found sufficiently slow for all normal tuning, and the slower is especially designed for shortwave tuning. The gear ratios are such that, in order to cover the tuning range, 30 complete revolutions of the tuning knob are necessary when using slow gear, and 9 when fast gear is engaged. Gear change is accomplished by use of the rear portion of the tuning control knob, fast gear being engaged when control knob protrudes slightly from cabinet face; to engage slow gear, turn rear portion of tuning control knob as far as possible in a clockwise direction (to the right), push in, and release. To re-engage fast gear, once more turn rear portion of tuning knob as far as possible in a clockwise direction, pull out, and release.

AERIAL.—An outside aerial of from 40 to 100 feet length is suitable. In some localities an indoor aerial of about 40 feet length may be found suitable. Generally the longer outside aerial gives better daylight results over long distances.

GROUND.—The ground lead should be as short as possible. Solder or firmly clamp to a water pipe if available, otherwise drive a metal pipe about 4 feet long into the ground, soldering the ground lead to the pipe. There should be no twisted joints in aerial or ground lead. If joints are necessary, they should be soldered. Grass oxidation of twisted leads is sure to cause weak and poor reception.

VALVES.—Before operating, see that all valves properly seated in their sockets, as indicated on the gram, and that leads which connect to the tip on som the valves are in place.

OPERATION.

Connect the receiver to the ~~220-volt 50-cycle~~ 50 AC pow electric light supply, and switch on, after seeing that aerial and earth leads are connected to the correct minals.

A card is fitted to the front of the receiver to the use of the various controls.

BROADCAST OPERATION.

Turn the wavechange switch to "Broadcast" pos and turn the station selector knob until the desired st is received. The volume can be adjusted to suit b of the volume control, and the tone can be adjusted a wide range, from "deep" to "brilliant," by use of the control knob.

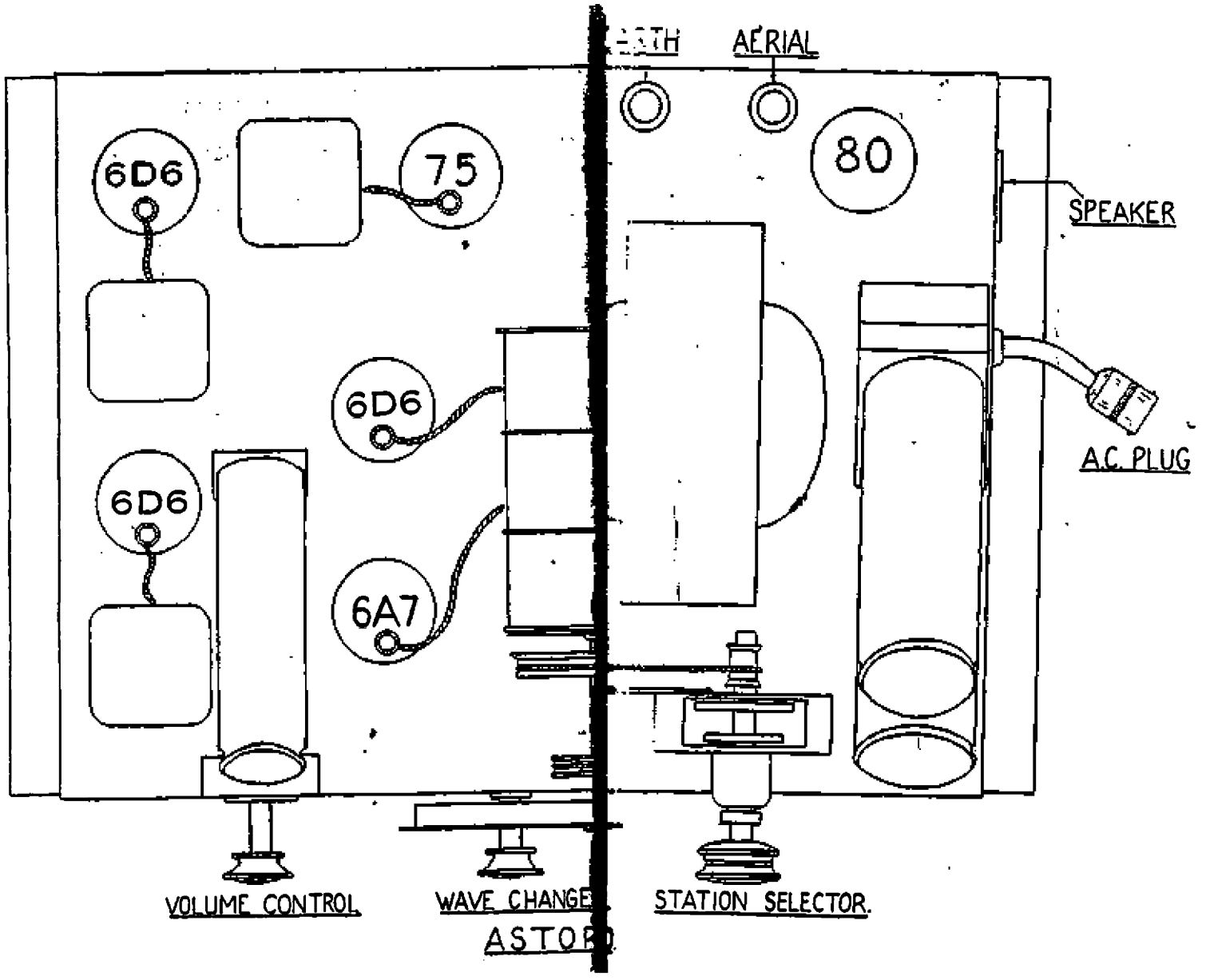
Static is reduced on long distance stations by tu the tone control to the "deep" position.

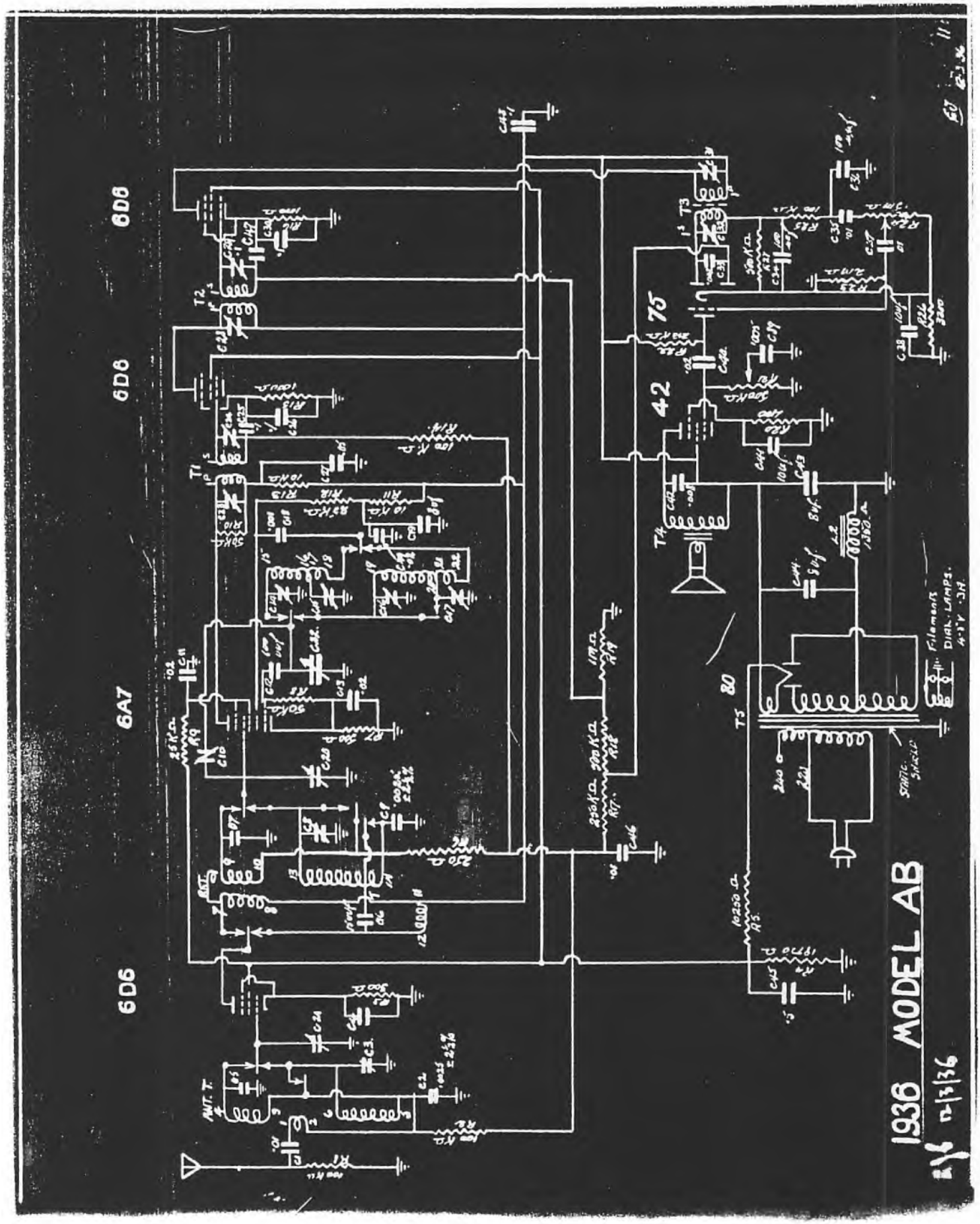
SHORTWAVE OPERATION.

Turn the wavechange switch to short-wave position, turn the station selector knob, adjusting the volume urt by means of the volume control when an interna- al station is received. It may be convenient to use slow vernier for short waves, and this can be put into as explained in the paragraph headed "Tuning." It be found that most shortwave stations will be heard n the pointer on the dial is situated in one of the heavily lined sections. These sections are graduated to make reater ease in logging stations.

The main shortwave broadcast bands are 19 metres, metres, and 31 metres. These are all clearly marked he dial, as well as other bands, which at present are used as much as the three main bands.

In various Australian Wireless publications will be found rtments in which full information is given from time me of best wavelengths and times to listen for inter- nal broadcasts. Usually the Empire Transmissions Daventry, England, can be heard in the early even- and also from about 10 p.m. Eastern standard time early morning. Berlin and Paris are also to be heard arly from about 10 p.m. on. The United States sta- an usually be heard early in the morning.


EARTH
AERIAL
6D6
75
80
SPEAKER
6D6
6D6
6A7
A.C. PLUG
VOLUME CONTROL
WAVE CHANGE
STATION SELECTOR.
ASTOR



NOTE R6, shown as 250 Ω should be 250 KΩ

COMPONENT PARTS LIST 1936 MODEL AB - GLASS VALVES.

RESISTORS.

		P/M
R1.	100,000 ohm	20% 1/3 W.
2.	100,000 ohm	" "
3.	300 ohm	10% "
4.	19,750)ohm	Wirewound
5.	10,250)ohm	voltage divider.
6.	250,000 ohm	20% 1/3W.
7.	500 ohm	10% "
8.	50,000 ohm	10% ".
9.	25,000 ohm	" 1 W..
10.	50,000 ohm	" 1/3W.
11.	10,000 ohm	" 1/2W.
12.	25,000 ohm	" 1/2W.
13.	10,000 ohm	" 1 W.
14.	100,000 ohm	20% 1/3W.
15.	1,000 ohm	10% "
16.	1,000 ohm	" "
17.	250,000 ohm	20% "
18.	500,000 ohm	" "
19.	1,000,000 ohm	" "
20.	400 ohm	10% 1W.
21.	500,000 ohm	" Volume control tapered used as continuous tone cont.
22.	250,000 ohm	20% 1/3W.
23.	2,000,000 ohm	" "
24.	500,000 ohm	10% Volume control, tapered.
25.	100,000 ohm	20% 1/3W.
26.	3,000 ohm	10% 1/3W.
27.	500,000 ohm	20% 1/3W.

VALVES.

V1.	6D6
2.	6A7
3.	6D6
4.	6D6
5.	75
6.	42
7.	80

CONDENSERS.

P/M

C1. .01 20% 200V.
2. .0025 2½% Mica preferably dead true if possible.
3. Coil trimmer - See Antenna coil data.

CONDENSERS.

P/M

C4. .1 20% 200V.
5. Coil trimmer See Antenna coil data
6. 15mmf.5 % Mica.
7. Coil trimmer See R.F.Coil data.
8. " " " " " "
9. .0025 Mica 2½% Preferably dead true if possible
10. Small neutralizing capacity, 1 turn rubber covered wire.
11. .02 10% 400V.
12. .0001 10%Mica.
13. .02 10% 200V.
14. Oscillator coil trimmer, see oscillator coil data.
15. Series pad, .001 5% Mica paralleled by DD series pad 250-500mmf.
16. Oscillator coil trimmer, see oscillator coil data.
17. Series pad .0003 5% Paralleled by series pad 50-125mmf.
18. .001 10% Mica
19. 8mfd. Wet condenser 20%, Round 1⅛" x 3¾" Dimension important.
20) 3 gang condenser
21) Min 16, Max. 386 mmf.
22)
23. Trimmer across 1st IF Prim. See coil data.
24. Trimmer across 1st IF Sec. See coil data.
25. .1 20% 200V.
26. .1 20% 200V.
27. .05 10%400V.
28. Trimmer across 2nd IF Prim. See coil data.
29. Trimmer across 2nd IF Sec. See coil data.
30. .1 20% 200V.
31. Trimmer across 3rd IF Prim. See coil data.
32. Trimmer across 3rd IF Sec. See coil data.
33. .002 10% Paper or mica.
34. .0001 10% Mica
35. .01 10% 200V.
36. .0001 10% Mica
37. .01 10% 200V.
38. 10mfd. 20% Elect. 50 working volts.
39. .005 10% 200V.

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CONDENSERS.

	P/M	
C0.	.02	20% 400V.
C1.	10mfd.	20% Elect. 50 working volts.
C2.	.006	20% 600V.
C3.	8mfd.	20% 500 working volts.
C4.	"	20% 500 working volts
C5.	.5	20% 400V.
C6.	.01	20% 200V.
C7.	.1	20% 200V.
C8.	.1	20% 400V.
C9.	.02	20% 400V.

Coil - See accompanying drawing.
Speaker D8R - see accompanying data.
Measurements- " " "

Pilot lamps 2, - 4.5volt .3 amp.
Ganging switch - 3 units each
4 sections single pole double throw - see drawing.

COILS.

Antenna transformer
See coil data.
R.F. Transformer
See coil data.
Oscillator transformer
See coil data.

T1. 1st IF Transformer
See coil data.

2. 2nd IF Transformer
See coil data.

3. 3rd IF Transformer(core trans.
See coil data for 2nd DD iron

4. Speaker transformer
See accompanying data.

5. Power Transformer
See accompanying data.

L2. Field coil - 1350 ohms
See data on speaker.

RESEARCH DEPT. 2.4.36.

MODEL AR 1936(MODEL 190)

The condenser C15 .001 plus/minus 5% is too high.
It is to be replaced by a .0008 plus 10%. That is a condenser between the values of .0008 and .00088.
As mentioned in a previous memo, C17 is to be replaced by a condenser in the bracket, .00025 to .000275, that is .00025 plus 10%.
Investigation has shown that C2 and C9 .0025 plus/minus 2-1/2% in many sets are 6% to 7% low.
These are to be either dead true, or on the high side up to 2-1/2%. These condensers when on the low side tend to create misalignment in sets.

N. J. COLLINS.

ASTOR MODEL 170 (TYPE AB)
SEVEN VALVE DUAL WAVE RECEIVER

COVERAGE:

This receiver is designed to cover the broadcast channel from 550 to 1500 Kc/s. and also a range of high frequency channels from 16 Mc/S to 6 Mc/s, thus covering the most widely used Shortwave channels.

RADIO FREQUENCY AMPLIFIER.

The radio frequency amplifier consists of one stage of amplification at signal frequency, followed by a frequency changer (6A7 valve) and by two stages of amplification at the new radio frequency, 456 kilocycles. The detector is one diode of a 75 valve, while the other diode of the 75 is used for the creation of AVC voltage. The triode section of the 75 serves as an audio amplifier and the 42 Pentode is the power output valve.

COUPLING.

An advanced system of coupling is used in the radio frequency circuits, and a brief description will be given.

DEALING WITH THE ANTENNA SYSTEM.

The antenna is connected to ground through a 250,000 ohm resistor as a guard against hum modulation. The coil 1-2 is a small inductance used to couple the antenna to the short-wave coil 3-4. The coil 1-2 offers negligible impedance to broadcast frequencies, and the antenna is coupled to the broadcast secondary 5-6 by means of the .0025 fixed condenser which is connected from 5 to ground. The .01 fixed condenser in the antenna lead is used to prevent possible loss of AVC voltage due to a badly insulated antenna.

When the wave change switch is on the shortwave position the broadcast secondary is shorted, and has no interaction on the shortwave secondary.

The signal frequency amplifying valve (6D6) is coupled to the frequency changing valve (6A7) by means of high inductance primaries and tuned secondaries. This means that the plate circuit has relatively high impedance, as well as the grid circuit, a desirable feature.

The Broadcast primary coil 11-12 is an inductively reactive circuit, which in combination with the small amounts of capacity associated with it, is rdsonant to a frequency lower than the lowest broadcast frequency that the receiver will tune.

The tuned broadcast secondary 13-14 is tapped close to the low RF potential end, and the tap is connected to the plate of the preceding valve by means of a small fixed condenser. The small coupling condenser from plate to tap of 13-14 favors the amplification of the higher broadcast frequencies, while the series .0025 condenser tends to favor the lower broadcast frequencies, thus even amplification is attained over the whole broadcast band.

The .0025 condenser connected from 14 to ground, beside being used as a coupling condenser, serves, in conjunction with the section of secondary inductance from tap to 14, as a series tuned trap circuit, resonant to 456 Kc, the Intermediate Radio Frequency. This serves to reduce "tweets". The coil 11-12 is not inductively coupled to the broadcast secondary. When the wave-change switch is in shortwave position the secondary 13-14 is shorted, as is the section T14. This prevents

"suck-outs" (drop in sensitivity due to absorption) and mis-alignment due to resonance effects.

The shortwave primary in the plate circuit of the signal frequency amplifying valve is inductively reactive, and is resonant to a frequency lower than the lowest shortwave frequency to which the receiver will tune. It is inductively coupled to the shortwave secondary. A small capacity coupling is connected from the high potential end of coil 7-8 to a midpoint on the secondary coil 9-10 (a few turns of fine wire is used for this purpose).

The combination of capacitive and inductive coupling aids the signal frequency amplifier in maintaining substantially constant amplification over the whole shortwave tuning range, the inductive coupling favoring the lower shortwave frequencies, and the capacity coupling favoring the higher shortwave frequencies.

The oscillator tuned circuits are on the same principle as the previously described circuits. The broadcast section is shorted out when the wave-change switch is on shortwave position.

Two separate series pads are used, one for broadcast range, the other for shortwave range.

It will be seen that when the wave change switch is on broadcast position, a 50,000 ohm resistor is connected across the primary of the first intermediate radio frequency amplifier transformer. This reduced the ratio $\frac{L}{R}$ of the coil, and thus the amplification of the transformer.

The idea of the reduction of IF gain on broadcast frequencies is to maintain the sensitivity of the receiver substant-

ially the same for both broadcast and shortwave frequencies.

The small neutralizing condenser shown between the 6A7 oscillator grid and control grid and control grid is not now used.

ALIGNMENT:

Three intermediate radio frequency transformers are used, and in alignment of these, factory procedure is as follows;

a. Switch receiver to shortwave position.

b. Connect output of 456 Kc generator (30%-400 cycle modulation) to grid of 6A7 in place of existing grid clip.

c. Tune each IF transformer, starting on the last and working back to the first, until all are aligned to 456 Kc. Attenuate the signal until about 50 MW is shown on the output meter, and check over the tuning of the transformers. The overall resonance curve of the receiver has a broad top, with steep slopes, helpful for tonal fidelity, and also useful on shortwaves in that it minimises frequency drift due to warming up of valves etc.

It must be remembered that there is nothing "hit and miss" about the design of this receiver. The misalignment of the shortwave circuits is very small, being about the same percentage as the broadcast circuit misalignment, which does not usually exceed 1/2%. Therefore it is important that circuit alignment be done accurately, if needed.

SHORTWAVE ALIGNMENT.

The shortwave alignment is done exactly the same as broadcast alignment, except that it is possible to align the

oscillator circuit incorrectly.

The shortwave trimmers are in the coil cans inside the chassis, nearest the switch. The coil nearest the front of the chassis is the oscillator assembly, next is the RF (signal frequency) assembly, and then the antenna transformer assembly.

The shortwave high frequency alignment position is 20 metres (15 Mc/S).

The output of the signal generator (shortwave) is connected to the chassis, and to the aerial terminal through a 400 ohm non inductive resistor, and the generator adjusted to 15 Mcs. The oscillator trimmer is then adjusted until an output is observed.

LOCATION OF OSCILLATOR ALIGNMENT POSITION.

Next the signal input is increased, and the dial of the generator turned to 15.912 Mcs. If the oscillator is aligned to the correct frequency the "2 times" IF frequency image will be heard.

It must be understood that at high frequencies it is possible, even when the circuits are correctly aligned, to hear a signal from the generator at three different frequencies, if sufficient voltage is applied to the antenna terminal of the receiver. These are:-

1. Correct signal frequency. The oscillator circuit is operating at a frequency 456 Kc/s higher than the resonant frequency of the antenna and RF circuits.
2. Correct signal frequency plus 1/2 IF frequency. Here the 2nd harmonic of a strong input is applied to the antenna

beats with the 2nd harmonic of the oscillator frequency to produce an IF frequency. Thus if the oscillator is trimmed to align with a signal of 15 Mc/s it will operate at 15.456 Mc/S. If a strong signal of correct signal frequency plus 1/2 IF frequency, that is 15.228 Mc/S is applied, the 2nd harmonic of the oscillator, 30.912 Mc/s and the 2nd harmonic of the signal 30.456 Mc/s beat, and having a frequency difference of 456 Kc/S will pass through the intermediate radio frequency amplifier.

3. Correct signal frequency plus "2 times" IF frequency. Here the signal is 456 Kc/S higher than the oscillator instead of 456 Kc/s lower in frequency.

Thus if the oscillator is adjusted to align with a signal of 15 Mc/s, it oscillates at 15.456 Mc/s. If a signal of 15 Mc/s plus "2 times" IF frequency (15.912 Mc/S) is applied, there is a frequency difference of 456 Kc, which passes through the intermediate radio frequency amplifier.

It is apparent that there is a possibility of incorrectly aligning the oscillator circuit and the antenna and RF circuits. The paragraph headed "Location of Oscillator alignment position" shows one method of locating the correct position. Another method is to apply a signal of 15 Mc/s, adjust the condenser until the pointer on the dial shows 20 metres, turn the oscillator trimmer condenser out as far as it will go, then increase its capacity. The first signal heard is the correct aligning position.

After the oscillator is aligned to the correct frequency, the RF and antenna circuits are aligned for maximum output, then the receiver dial pointer is turned to about 50 metres (6 Mc/s). The generator is set to 6 Mc/s, and the series pad adjusted to give maximum output. The tuning condenser is turned back and forth a little while the series pad is being adjusted, until the correct combination of tuning condenser capacity and series pad capacity is obtained. It is not deemed sufficient to merely adjust the tuning condenser to 50 metres, and then adjust the series pad for maximum output. The shortwave series pad adjustment screw is on the top of the chassis, near the back of the centre gang of the tuning condenser.

WHEN NO GENERATOR IS AVAILABLE.

In cases where a shortwave signal generator is not available, shortwave alignment may be possible by using the tenth harmonic of a broadcast signal generator. This, of course, only holds if the generator is rich in harmonics.

For trimming the condensers across the coils, the generator would be set to 1500 Kilocycles (the 10th harmonic of which is 15 Mc/s. or 20 metres) and the pointer of the receiver dial to 20 metres. For adjusting the series pad on shortwaves, using a broadcast signal generator, adjust the generator to 600 Kilocycles, and use the 10th harmonic.

Alignment is also possible by using a station on about 20 metres, and another on about 50 meters, trimming for maximum loudness.

It is important to remember however that it is possible to adjust the oscillator to a wrong setting.

FINDING CORRECT OSCILLATOR TRIMMER ADJUSTMENT.

The correct oscillator trimmer position can be found by turning the adjustment screw right in, then applying a fairly high input voltage to the antenna terminal, through a 400 ohm non-inductive resistance. Next the trimmer screw is turned out, increasing the trimmer capacity. The signal will be tuned in three times as this is done. The first position of the trimmer (near minimum capacity) at which the signal is heard, is the correct position. This rule applies when a shortwave signal generator is used.

Broadcast circuit alignment is similar to that used on shortwaves, except that the oscillator trimmer condenser will only peak at one frequency, the correct one.

A dummy antenna of 200 mmf is used to connect the generator to the antenna terminal, and the receiver has the parallel trimmers (situated in the coil shield cans, and furthest from the switch) adjusted at 1400 Kc/s, and the series pad (situated on the top of the chassis near the front end of the tuning gang) is adjusted at 600 Kcs.

FINALLY:

There is nothing complex about the Model 170, type AR. Good engineering practice has been used in the design, so that the same order of performance is to be expected from shortwaves as from broadcast waves. The AVC control is very good indeed. In fact a 30% modulated (400 cycle) carrier needs to be increased from 100 μv input to 1,000,000 μv input, a ratio of 10,000 to 1 in order to increase the output voltage of the receiver by a ratio of 5 to 1. A variation of from

50 microvolts to 500 microvolts input voltage varies the output by only 3 decibels, an amount just distinguishable by the ear, therefore fading and variation of signal strength must be very bad indeed before they can be detected by the ear.

As many short wave stations are subject to considerable fading, the excellent AVC almost completely eliminates this disadvantage.

The sensitivity on both wave ranges usually averages between 1 and 4 microvolts. It is felt that greater sensitivity in this receiver, while easily attainable, is undesirable.

R. J. COLLINS A.M.I.R.E.

Engineer

THE ASTOR models 77 & 77DW Series DG & DE.

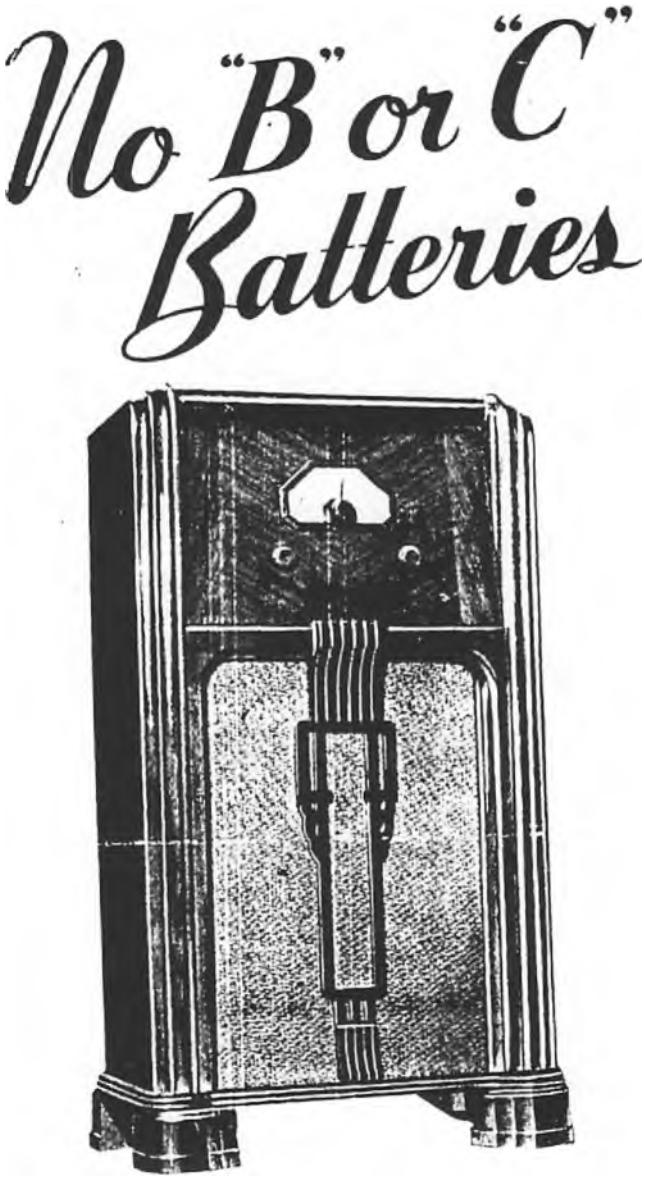
5 Valve Vibrator powered console.

Model DG is dual-wave, model DE is broadcast only.

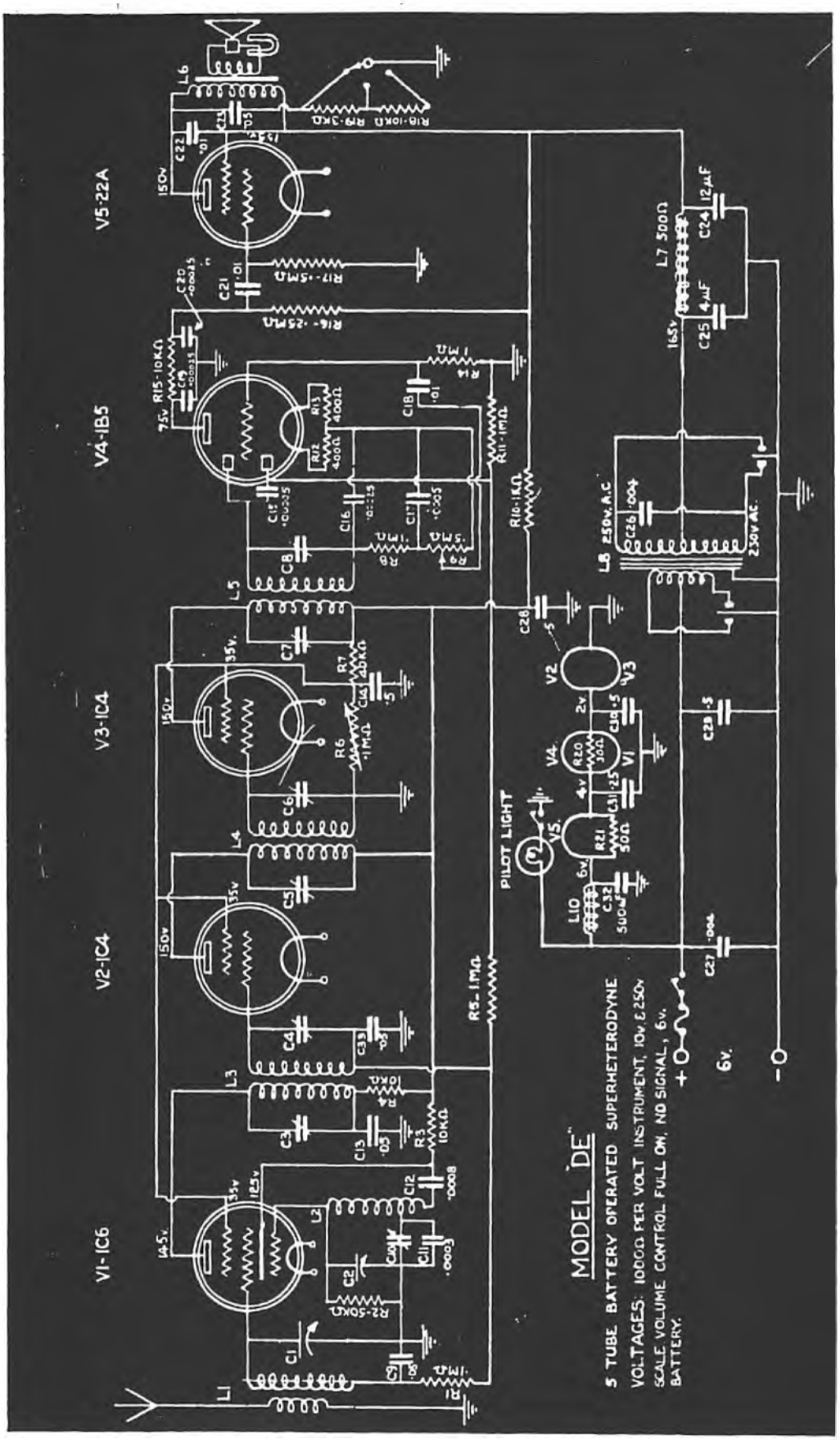
Valves used; 1C6 mixer, 1C4 1st IF, 1C4 2nd IF, 1B5 diode detector, AVC & 1st audio, PM22A output.

IF frequency 456 Khz.

Power source, 6 volt battery.



"Astor" Battery Model 77—Chassis type DE



Astor model "77," chassis type "DE," is a five-valve receiver designed for broadcast coverage and operation from a 6 volt accumulator — conversion of the low-tension supply to high-tension being effected by means of a synchronous vibrator system. This receiver is of the console type and has three controls—volume (with battery switch), tuning (with combined dial-lamp switch) and tone (3 positions). The loudspeaker is an 8-inch permanent magnet type. The I.F. used in this receiver is exactly 456 K.C.

The circuit arrangement of this receiver follows standard "Astor" practice, and is self-explanatory as far as component values and operating voltages are concerned. However, the component values shown are those originally employed and as several changes were made from time to time, it will be of interest to list these in the order of their appearance.

COMPONENT CHANGES.

The first change made was in the resistance of the volume control (R9). This was changed to a 1 megohm tapped unit which has a 250,000 resistor connected between the tap and the low-volume end. Next R7 (40,000 ohms, 0.5 W. fixed) was changed to 100,000 ohms, 1 W., adjustable, in order to provide greater control over the screen voltage. At the same time, the primary of the vibrator transformer (L8) was shunted by an 0.05 mfd., 200 v., paper condenser (now known as "C33"); the secondary buffer system was changed to two 0.004 mfd., 1,000 v., mica condensers (one across each half of the winding) instead of the one (C26) originally used; and C29 (the second primary filter condenser) was changed to 1 mfd., instead of 0.5 mfd.

Finally, in a later batch, the two 0.004 mfd. mica buffers were replaced by two 0.008 mfd., 1,000 v., units and, at the same time, the 0.05 mfd. vibrator primary shunt (referred to above as C33) was deleted and replaced by a 10 mfd., 75 v., W., electrolytic condenser connected from the outside turn of the L8 primary to earth.

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SUBJECT - ASTOR FIVE TUBE BATTERY-OPERATED SUPERHETERODYNE MODEL 77.

GENERAL:

The Astor Model 77 is a 5 tube superheterodyne designed to operate from a 6 v. accumulator, without the use of B or C batteries.

This is accomplished in a very economical manner by the use of a synchronous vibrator and a special filament circuit using normal 2 v. battery tubes.

The total drain from the accumulator is approx. one ampere and is never above 1.25 amperes.

TUBE COMPLEMENT.

Function	Type
Oscillator Modulator	1C6
1st IF amplifier	1C4
2nd IF amplifier	1C4
Diode Detector AVC 1st Audio amplifier	1B5
Power output Pentode	22A

CIRCUIT DESCRIPTION.

Careful design, together with latest tubes, including two dual purpose type - improved IF Transformer and iron cored aerial coil is responsible for very high sensitivity which is in the order of 2 microvolts. At the same time the inherent noise level of the receiver has been kept down to a really low value.

This is mainly due to the high gain aerial coil and also to the fact that the tubes are not being worked at the maximum value, while the actual coil step up is high.

Automatic volume control is used and has the advantage of a delayed characteristic which allows maximum amplification of weak signals without any sacrifice to control of stronger inputs.

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CIRCUIT OPERATION.

L1, C1 comprises the aerial stage which feeds the signal to grid of oscillator modulator tube V1. C2, L2 together with C10, 11 and 12 and R2 comprise the oscillator circuit.

The 456 Kc. IF signal appears in the primary circuit of L3 being transferred to V2 via the secondary of this transformer. There now follows two stages of intermediate frequency amplification V2 and V3.

Rectification takes place in circuits comprising secondary of L5, R8 and 9, the volume control being accomplished in R9 (Diode load resistor). Rectification also takes place in the other diode circuit comprising C15, R11 and this is used for automatic volume control. This AVC voltage has a delay value due to the voltage drop between earth and the filament leg to which this diode is connected.

The AVC voltage is fed to V1 and V2 via filter network comprising R5 - 1, C9 - 33.

The audio signal picked off R9 is fed to the grid of V4, R15, C19 and 20 acting as filter for any IF frequency which is not mopped up in R8, C16 and 17.

Coupling between 1st audio and power pentode is resistance capacity type.

Tone control is accomplished by R18 and 19 together with C23.

Minimum bias is obtained by the voltage drop in the series parallel filament circuit. V1 and V4 obtain 2 v. each. V5 has 4 v. and V2 and 3 are especially designed to work on zero grid bias and so do not have any bias other than the AVC bias obtained from the signal.

Referring to the power supply C27 and 29 comprise the vibrator filter and are mainly responsible for stopping vibrator noise from getting back to the

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HOUSEHOLD RADIO SERVICE BULLETIN.

battery and being picked up by the receiver via the aerial. L10 and C32 take care of filtration in the filament circuit.

Resistors R21 and 20 are necessary to equalize the filament circuit in all tubes.

The high tension AC is rectified by the vibrator the positive potential appearing at the centre tap of L8 (Power transformer) Filtration is provided for by L7 C25 and 24.

HINTS FOR FAULT FINDING.

Before endeavoring to locate trouble in a faulty receiver the following points should be noted.

Never, under any circumstances, replace either the vibrator and any of the tubes whilst the receiver is switched on, as, owing to the arrangement of the filament circuit it is possible by not following these instructions to damage tubes or, in the case of the vibrator, to receive an unpleasant shock. Make sure the battery is connected correctly as reversal will place a negative voltage on the receiver where a positive one is intended.

Make sure battery clips are making good contact to battery lugs and if corroded they should be cleaned and smeared with vaseline before replacing.

Make sure that an adequate earthing system is being used.

Never under any circumstances, run the receiver on any but the specified battery voltage - viz 6 volts.

In order to remove the chassis from the cabinet it is necessary that dial light lead be removed from the socket located toward the front of the cabinet on the left hand side.

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HINTS FOR FAULT FINDING CTD.

Blown fuse. Check over filament wiring, power transformer primary, C29, C27, etc. for short circuit before replacing fuse.

Fuse O.K. Valves not alight. Check accumulator. Check switch and L10 for open, C32 for short or high leakage. Check valves for open filament, switching off the receiver before removing any tubes.

By means of a volt meter check voltage spots as marked on diagram, this will indicate just where voltage ceases.

Valves alight, no signals. Vibrator working.

Check voltages as marked on circuit diagram.
No voltage (HT) could be caused by faulty power transformer.
Check AC voltage as per diagram.
Shorted or open L7, shorted C4 or C12 electrolytic.
Shorted C26, faulty vibrator.
Low voltage (HT) may be due to shorted C28, 14, 13 or 23, shorted primary of either L3, 4, or 5.
Leaky or shorted C26, faulty vibrator.

Loud whistle or howl on all strong stations as tuned, due to faulty C30, 31 or 32, most probably C32.

Set alive but no stations received. Oscillator is not working, check components in oscillator circuit (see text) especially R2 or C8.

Free Oscillation. Check position of movable arm on R6, may be too near earth end or have become loose, tighten. Also could be open C14, 22, 13 or C28.

Other sources of free oscillation are faulty condenser in AVC filter line, namely C9 and 33 or in some cases through working without adequate earthing system.

HOUSEHOLD RADIO SERVICE BULLETIN.

NOTE: Open condenser may be readily checked without dis-connection by placing a similar or larger capacity across suspect.

Vibrator crackle may be caused by vibrator working loose in socket owing to transport, C26 open circuit.

In order to check this condenser (C26), it will be necessary to solder a substitute condenser in place, as holding one in position will only increase trouble.

Another source is open circuit C29 or C27.

Hum. Volume control turned down may be caused by open or leaking C24, 25, open R12 and 13, shorted C18.

Volume control full on. Faulty C24, 25.

On strong signal only. Faulty C32.
(Do not confuse with normal modulation hum present in some stations.

ALIGNMENT:

The following procedure should be followed in cases where re-alignment has been found necessary.

IF Channel.

Connect one side of generator output to junction of aerial grid lead and condenser lug. Do not disconnect grid lead. Connect earth side of generator to receiver earth terminal. Turn gang to approx. 550 Kc. and adjust IF padder in the following sequence.

1st Primary No.1 transformer - Screw slot.
2nd Secondary Box nut
3rd Primary No.2 transformer - Screw slot.
4th Secondary Box nut
5th Primary No.3 transformer - Screw slot
6th Secondary Box nut

See diagram for positions of transformers.
Recheck when finished.

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Broadcast Band. Turn gang full out, connect live lead from generator through 200 mmf. Mica condenser to aerial terminal. Earth connection as before. Resonate oscillator padder (nearest dial) to 1550 Kcs.

Move generator to 1300 Kcs. and resonate by use of tuning knob. When correct, resonate aerial trimmer (Rear trimmer)

Move generator to 600 Kcs. and adjust series padder, located near front of chassis on R.F. side of gang (nearest edge of base)

This is accomplished by making a small variation of padder and resonating by use of tuning knob for each variation.

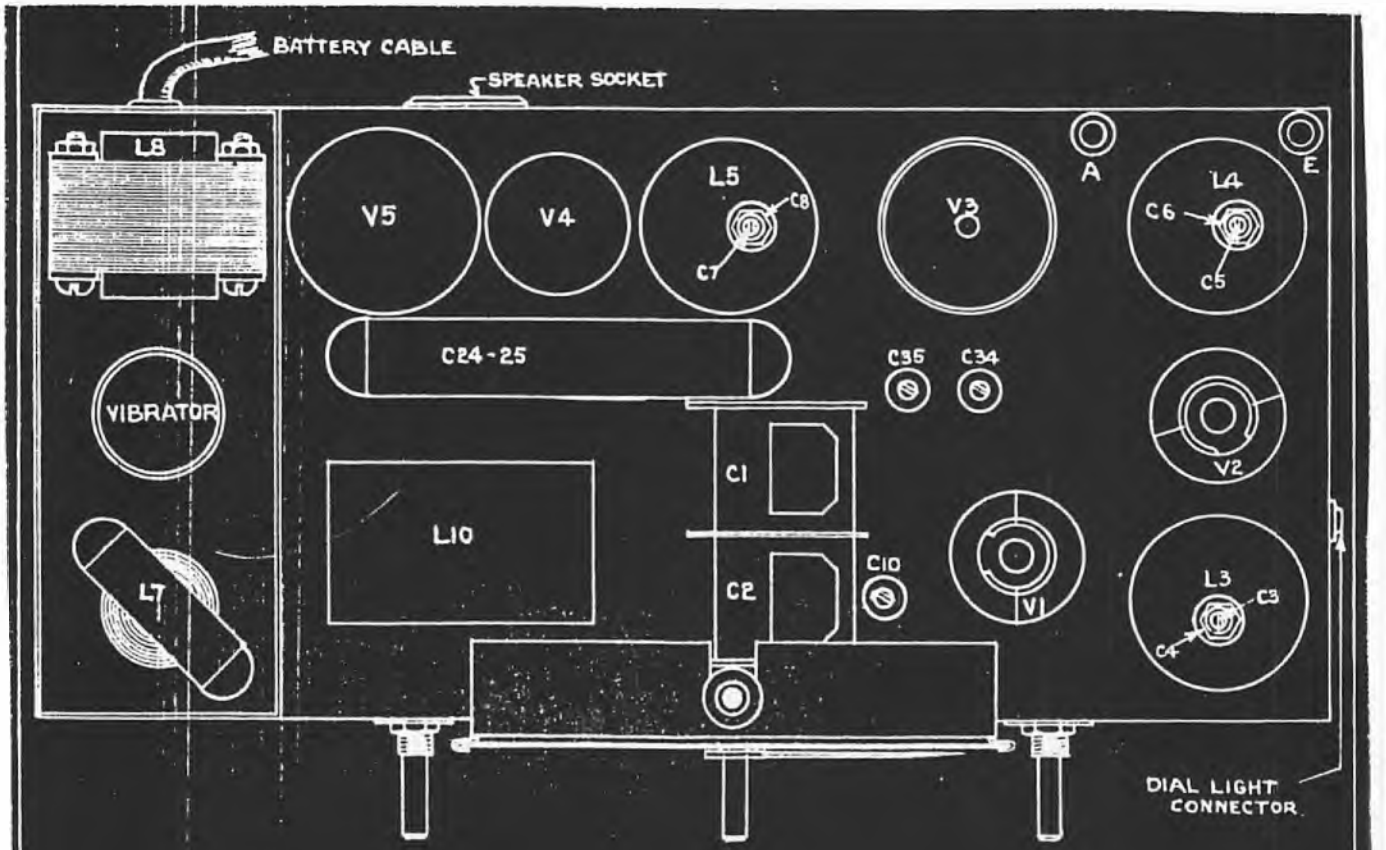
Position of padder giving greatest output is correct.

Dial calibration. If following instructions have been followed the calibration should be O.K.

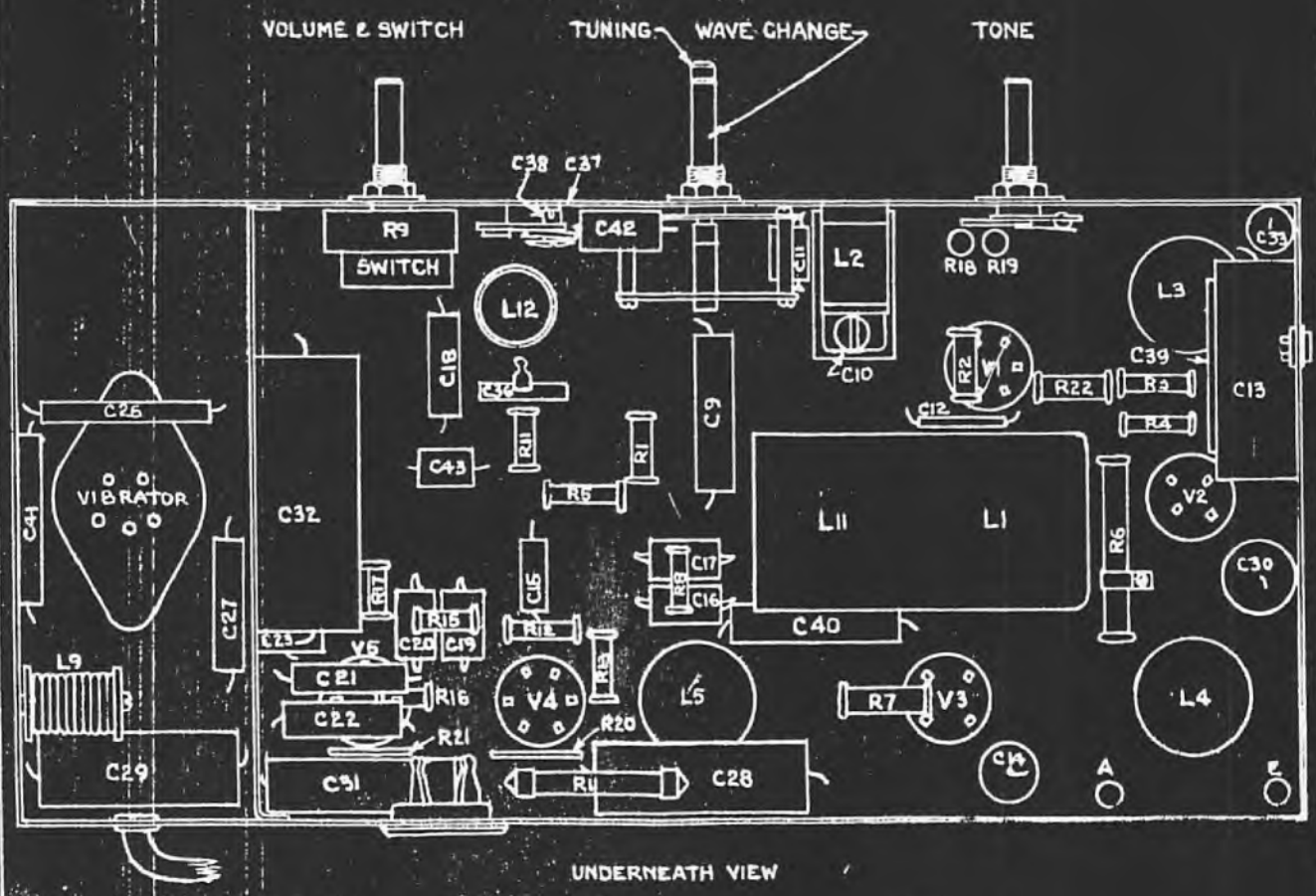
In cases where calibration needs re-checking and IF channel is deemed O.K. it is possible to make a fairly accurate job without the use of a signal generator.

First tune in a weak station, approx. 1300 Kc. and adjust oscillator trimmer until max. output is obtained at station frequency marking on dial using normal aerial. Next adjust antenna trimmer for maximum output at this position.

Next tune in a weak station at approx. 600 Kc. and follow same direction as specified for series pad alignment.



PLAN



PARTS LOCATION DIAGRAM.

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HOUSEHOLD RADIO SERVICE BULLETIN.

SUBJECT - ASTOR FIVE TUBE BATTERY OPERATED SUPER-HETERODYNE DUAL WAVE MODEL 77 - CHASSIS TYPE DG.

GENERAL:

The Dual wave Model 77 is very similar to the Broadcast Model 77, the only alteration being in the addition of shortwave operation.

The purpose of this bulletin is to cover the necessary additions to the original Model 77; Bulletin No. 32 should be consulted in conjunction with this bulletin.

Investigation of the Component Parts List will disclose the fact that the parts used in the Model 77 are identical with those used in the Dual-wave 77 there being, however, additional parts for the dual wave receiver. In order to save time and to facilitate checking this bulletin will contain a complete parts list for the Dual wave 77.

For tube complement, circuit description, circuit operation, and hints for fault finding, consult Bulletin 32.

Additfonal hints for fault finding Dual wave Model 77.

O.K. Broadcast - no signals short wave.

Check switch for faulty contacts.
Check coils for continuity and see that padders C35 and 37 are not shorting.
Check V1 which may not be oscillating on short-waves.
Check C12 and C42 for open or short.

Dead spots in short wave band.

Check C42 for open circuit.
Check value of R2.
Check C12 and 42.
Check V1.
Check L12.
Check C39 for leak.

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Excess Vibrator crackle on Shortwave band.

Check C41, 26, 27 and 29 for open circuits.

ALIGNMENT.

See Bulletin 32 for IF alignment.

Broadcast alignment.

Instructions for Model 77 apply, the only difference being in the location of the padders.

Broadcast secondary padder is C34.
Oscillator secondary padder is C38.
Broadcast series padder is C10.
(See parts location diagram, in this Bulletin)

Shortwave alignment.

Set generator at 18.3 Mc using 400 ohm non-inductive resistor in live lead to aerial. Peak oscillator padder C37. Move generator dial to 15 Mc and resonate aerial padder C37, this procedure being carried out in a similar manner to that employed when adjusting the broadcast band series padder. Adjustment at other frequencies is not necessary as a fixed series pad capacity is used on short waves.

Dial calibration.

This should be adjusted as explained in Bulletin 32 on the broadcast band and then if shortwave alignment has been carried out to instructions the calibration here should be satisfactory.

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COMPONENT PARTS.

RESISTORS

.	100,000 ohm	1/3 W.	20%	Tol.
.	50,000 ohm	"	"	"
.	10,000 ohm	"	"	"
.	10,000 ohm	"	"	"
.	1 megohm	"	"	"
.	100,000 ohm	1 W.		"
.	40,000 ohm	1/2 W.	10%	"
.	100,000 ohm	1/3 "	20%	"
.	500,000 ohm	Carbon vol.control	20%	Tol.
.	1,000 ohm	1/3 W.	10%	"
.	1 megohm	"	20%	"
.	400 ohm	"	"	"
.	400 ohm	"	"	"
.	1 megohm	"	"	"
.	10,000 ohm	"	"	"
.	250,000 ohm	"	"	"
.	500,000 ohm	"	"	"
.	10,000 ohm	"	"	"
.	3,000 ohm	"	"	"
.	30 ohm	Wirewound	5%	"
.	50 ohms	"	"	"
.	20,000 ohm	1/3W.	20%	"

INDUCTORS.

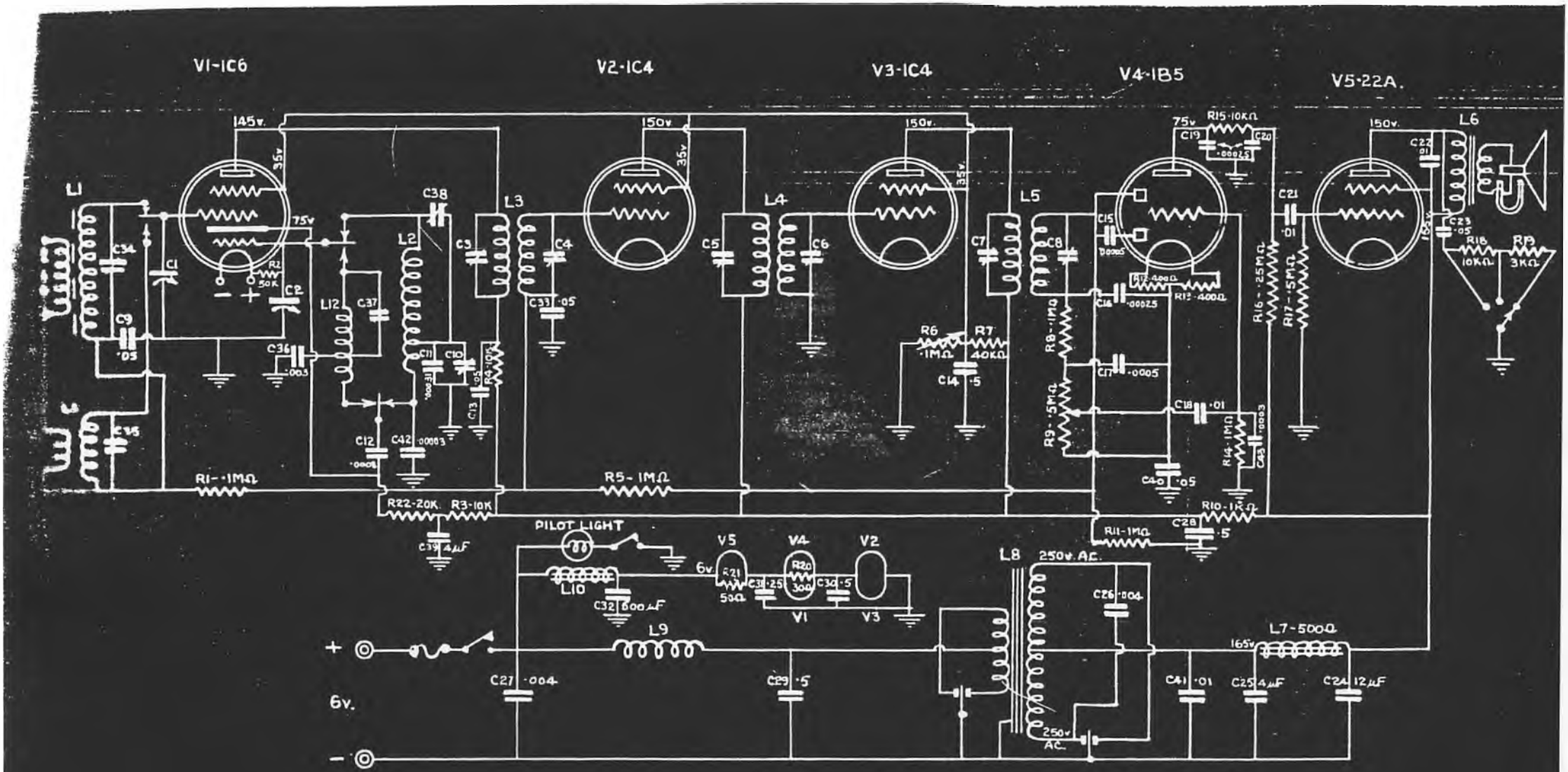
1. Aerial coil Broadcast
2. Oscill. coil Broadcast
3. 1st IF Transformer
4. 2nd IF Transformer
5. 3rd IF Transformer
6. Speaker Input Trans. 15,000Ω
7. 500 ohm filter choke
8. Power transformer
9. Battery filter choke
10. Filter supply choke
11. Aerial coil Shortwave
12. Oscill.coil Shortwave

VALVES.

1. 1C6
2. 1C4
3. 1C4
4. 1B5
5. 22A

CONDENSERS.

C1.	Antenna section gang				
2.	Oscill.	"	"		
3.	Prim.	padder	1st	IF	
4.	Sec.	"	"	"	
5.	Prim.	"	2nd	IF	
6.	Sec.	"	"	"	
7.	Prim.	"	3rd	IF	
8.	Sec.	"	"	"	
9.	.05mfd.	200V.	Paper		10%Tol.
10.	Series padder Broadcast (30/80)				
11.	.00031mfd.	Mica	1000V.		2½%Tol.
12.	.0008 "	"	"		10 % "
13.	.05 "	Paper	400V.		" "
14.	.5 "	"	200V.		" "
15.	.00005 "	Mica	1000V.		" "
16.	.00025 "	"	"		" "
17.	.0005 "	"	"		" "
18.	.01 "	Paper	400V.		" "
19.	.00025 "	Mica	1000V.		" "
20.	.00025 "	"	"		" "
21.	.01 "	Paper	400V.		" "
22.	.01 "	"	"		" "
23.	.05 "	"	600V.		" "
24.	12 "	Working	200V.		" "
25.	4 "	"	300V.		" "
26.	.004 "	Mica	1000V.		" "
27.	.004 "	"	"		" "
28.	.5 "	Paper	400V.		" "
29.	.5 "	"	200V.		" "
30.	.5 "	"	"		" "
31.	.25 "	"	"		" "
32.	500 "	6v.Wkg.	Dry Elect.		" "
33.	.05 "	Paper	200V.		" "
34.	Aerial trimmer cond. Broadcast				
35.	"	"	"	Shortwave	
36.	Series padder (S'wave) .003 Mica				2½% "
37.	Osc. trimmer shortwave.				
38.	Osc. trimmer broadcast				
39.	4 mfd.Dry Elect.Wkg.300Peak 350V.				10% Tol.
40.	.05 "	Paper	200V.		" "
41.	.01 "	Mica	1000V.		" "
42.	.00003 "	"	"		5% "
43.	.0003 "	"	"		10% "



MODEL "DG"

5 TUBE BATTERY OPERATED SUPERHETERODYNE.
FOR SHORTWAVE AND BROADCAST RECEPTION.
VOLTAGES: 1000Ω PER VOLT INSTRUMENT, 10v. & 250v.
SCALE. VOLUME CONTROL FULL ON, NO SIGNAL, 6v. BATTERY.

2-3-36

RADIO CORPORATION PTY. LTD.
11 - 21 STURT STREET, SOUTH MELBOURNE.

Service Note
24.8.36.

HOUSEHOLD RADIO SERVICE BULLETIN.

RE SERVICE BULLETINS 32, 33 and 40 (MODELS LE, DG AND EH).

These models will in future be using 1 megohm volume controls instead of the 0.5 megohm as previously used. These 1 megohm controls will be marked with a purple spot on the back and must be shunted from the centre tap to the low volume end of the control, by a 0.5 megohm .25 watt resistor.

As shown in factory memo dated 21.8.36. these resistors should be fitted before leaving the factory for replacement purposes.

W.Cook
Design Dept.

SERVICE NOTE:

MODEL 77 & 77 DUAL WAVE. 17.9.36.

Commencing from Run 38/36, of both the above models, C22 will be changed from .01mfd. 400v. test to .002 of similar voltage.

This change has the effect of increasing the high frequency response of the receiver. There will be very little effect to the overall response with the tone control switch fully in circuit.

In cases where complaints from customers are encountered on this question it is advisable to make this change.

D. HARDIDGE.
DESIGN DEPT.

RADIO CORPORATION PTY. LTD.

11 - 21 STURT STREET, SOUTH MELBOURNE.

Service Note. 2.2.37.

HOUSEHOLD RADIO SERVICE BULLETIN.

RE BULLETINS 32, 33 and 40 (MODELS DE, DG & EH).

Commencing run 46/36 the following changes will take place:-

1. Secondary of L8 will have two .008mfd. special mica condensers connected in series across its windings, the centre connection of these condensers will be earthed. This is to replace .004mfd. condensers.

2. C34 (.05 400v. condenser across primary of L8) is deleted and a 10mfd. 75 V. working electrolytic condenser connected from the outside turn of the primary of L8 to earth. This condenser will now be known as C34.

J. SALVADO.
DESIGN DEPT.

IMPORTANT NOTICE.

BATTERY CONNECTIONS Connect the red clip to the battery lug marked with a red dot. In some cases this lug may be marked with the abbreciation "pos" or with a plug sign. Reversed connections will prevent the receiver from operating.

Use only a 6 v. battery.

EARTH CONNECTION. The receiver is designed to work with an earth connection and for efficient operation this should be installed (See instructions). As a temporary measure a length of insulated wire 25 feet or longer with one end connected to the earth terminal may be used.
This wire should be stretched out and could be run around the flooring board, keeping well into the corners so as to be out of sight.

D. HARDIDGE

Dat[illegible] SPECIFICATION. Number [illegible]
RECD.5.6.37.

Exp. Book No.....

Part Name[illegible]

Part Number[illegible] Blue Print Number..... File Number.....

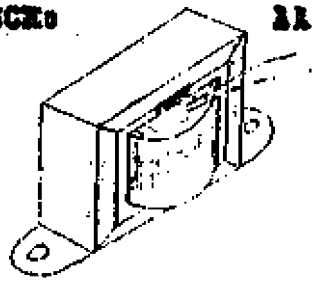
Used in Models[illegible] Test Procedure Number 20

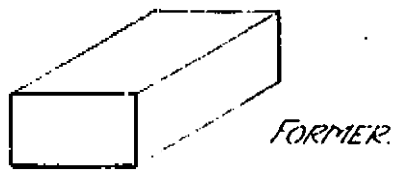
CHANGE INDEX.

Date	Change Notice No.	Nature of Change (In Brief)	Authorised by

DESCRIPTION:

[illegible]:	No. 0
THICKNESS OF STACK:	5/8" ~~Lay stack 4 x 6.~~ Butt Stack. @.
CROSS SECTION AREA:	.39 sq. in.
FORMER:	Bakelite type 5/8"x5/8"x15/16"in.length.
DESCRIPTION:	The winding is layer wound and is 3300 turns of 37 S W G Enamel wire with 1 layer of 1 Mil Excelsior paper per layer of wire and finished off with 2 layers of 3 Mil red rope fibre.
TREATMENT:	Standard Practice No.5.
TEST GEAR:	As.
TEST VOLTAGE:	500 volts maximum of 4 m/A.
LEADS:	Are wiring flex brought out from the laminated and 7-1/2" long.
INDUCTANCE:	At Henries +/- 10% with no DC flowing.





DC RESISTANCE: 480 to 5[illegible] ohms.

TYPE NO: mounted on bakelite base and inside lead connected to core by means of .004" copper foil clamped under long side of sleeve opposite leads.

COPIES: [illegible] TRANSFORMERS FILE.

Signature W. E. Gent

Date 3.8.37. SPECIFICATION. Number 656
RECD.6.8.37.
Exp. Book No.

Part Name "A" BATTERY CHOKE (FILAMENT SUPPLY)

Part Number 112 Blue Print Number File Number

Used in Models DE DG EH BB FG FF. Test Procedure Number 20

CHANGE INDEX.

Date	Change Notice No.	Nature of Change (In Brief)	Authorised by

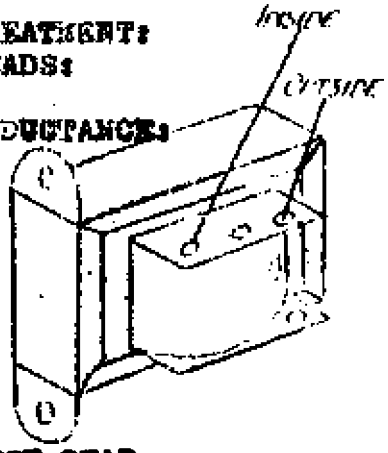
DESCRIPTION:

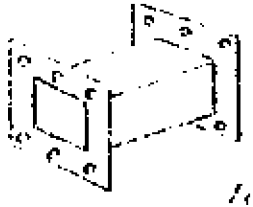
LAMINATION TYPE: No. 1.
THICKNESS OF STACK 3/4" Lap stack 4 x 4
CROSS SECTION AREA: .54 sq. in.
FORMER: Bakelite 23/32"x3/4"x1-3/16" in length, with red fibre end cheeks.

DESCRIPTION: The winding is layer wound with no insulation between layers and consists of 180 turns of 19 S & S enamel covered wire finished off with two layers of 5 mil Red rope fibre.

TREATMENT: Standard Practice No. 4.
LEADS: Inside 4-1/2" long Red spaghetti covered.
Outside 8-1/2" " Yellow " "

INDUCTANCE: to be 60 Milli-henries plus 10% minus and resistance not more than .5 ohms.
Mounted in sleeve bracket with bottom plate.





TEST GEAR 5A.

COPIES: Research & Transformers File

Signature M. L. Brooks

THE ASTOR model ? Series EA.

5 Valve broadcast console, with magic-eye.

Valves used; 6A7 mixer, 6D6 IF, 75 diode detector, AVC & 1st audio, 42 output, 80 rectifier, 6E5 tuning indicator.

IF frequency 472 Khz.

This model is listed as model 500 in the files, which were put together by Radio Corporation seemingly during the war years. However the model 500 is advertised in "Wireless Weekly" March 3, 1939 as a 5 valve battery mantel using 1.4 volt valves, while Mingay's IF index agrres with this and lists the chassis series EA as model 58.

RADIO CORPORATION PTY. LTD.

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HOUSEHOLD RADIO SERVICE BULLETIN.

Supplement to Bull.36 23.5.36. Page 1.

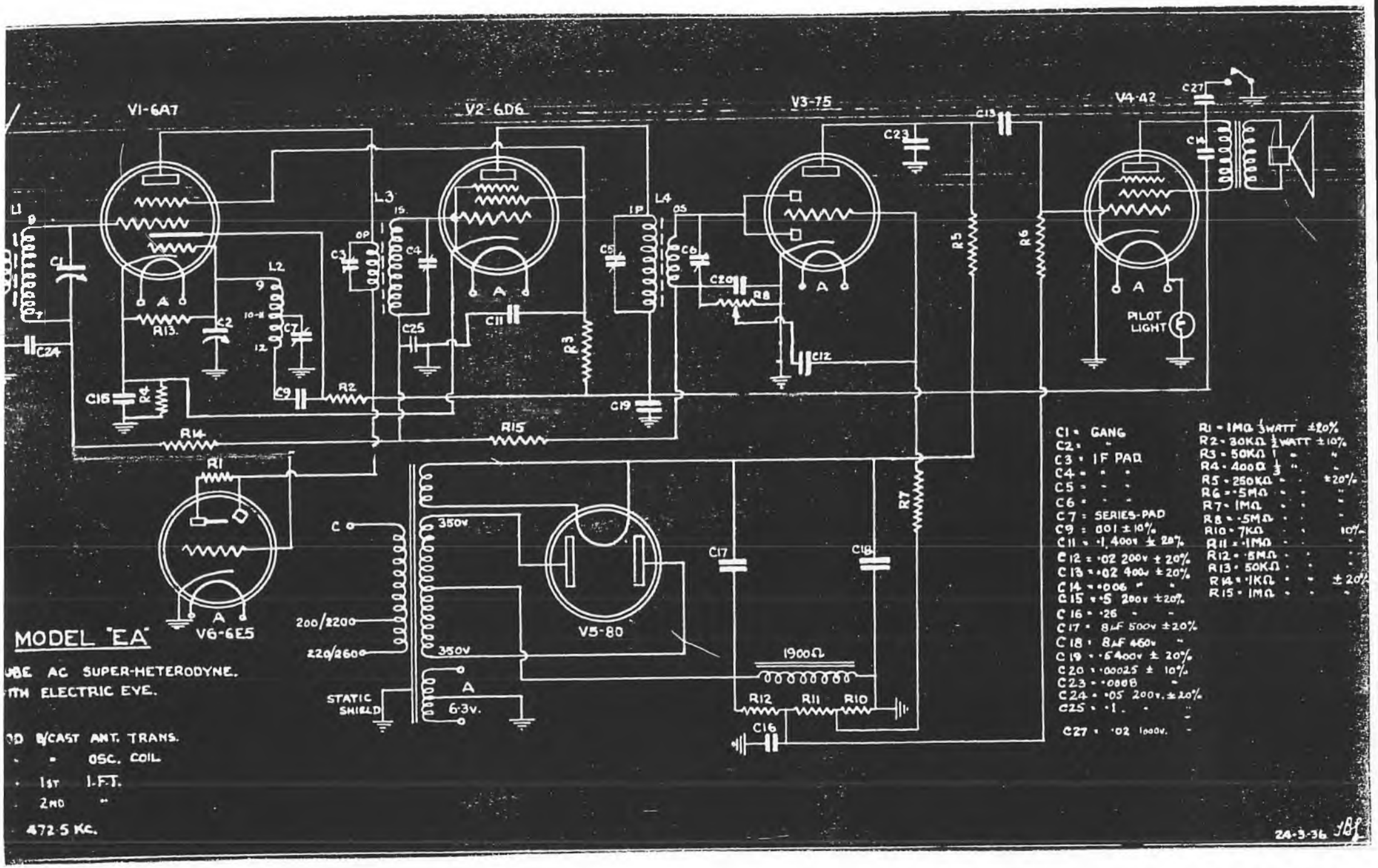
SUBJECT - 5 VALVE A.V.C. RECEIVER WITH MAGIC EYE.

From today R17 is deleted.

Removal of this resistor gives greater action of the Magic Eye on weak stations or where a small aerial is used.

Service Men please note that receivers marked with Schedule Numbers smaller than 20/36 contain R17, and by removing this, greater eye action is obtainable.

R. J. COLLINS
RESEARCH ENGINEER.


V1-6A7
V2-6D6
V3-75
V4-42
V5-80
V6-6E5
L1
L2
L3
L4
C1
C2
C3
C4
C5
C6
C7
C9
C11
C12
C13
C14
C15
C16
C17
C18
C19
C20
C23
C24
C25
C27
R1
R2
R3
R4
R5
R6
R7
R8
R10
R11
R12
R13
R14
R15
PILOT LIGHT
350v
350v
200/2200
220/2600
6·3v.
STATIC SHIELD
1900Ω
C1 = GANG
C2 = "
C3 = I.F. PAD
C4 = " "
C5 = " "
C6 = " "
C7 = SERIES-PAD
C9 = ·001 ± 10%
C11 = ·1, 400v ± 20%
C12 = ·02 200v ± 20%
C13 = ·02 400v ± 20%
C14 = ·006 " "
C15 = ·5 200v ± 20%
C16 = ·25 " "
C17 = 8μF 500v ± 20%
C18 = 8μF 450v "
C19 = ·5 400v ± 20%
C20 = ·00025 ± 10%
C23 = ·0008 "
C24 = ·05 200v. ± 20%
C25 = ·1 " "
C27 = ·02 1000v. "
R1 = 1MΩ ⅓WATT ±20%
R2 = 30KΩ ½WATT ± 10%
R3 = 50KΩ 1 " "
R4 = 400Ω ⅓ " "
R5 = 250KΩ " ±20%
R6 = ·5MΩ " " "
R7 = 1MΩ " " "
R8 = ·5MΩ " " "
R10 = 7KΩ " " 10%
R11 = ·1MΩ " " "
R12 = ·5MΩ " " "
R13 = 50KΩ " " "
R14 = ·1KΩ " " ±20%
R15 = 1MΩ " " "
MODEL "EA"
UBE AC SUPER-HETERODYNE.
ITH ELECTRIC EYE.
OD B/CAST ANT. TRANS.
" " OSC. COIL
" 1ST I.F.T.
" 2ND "
472·5 KC.
24-3-36

RADIO CORPORATION PTY. LTD. Bulletin 36.
5.5.36.
11 - 21 STURT STREET, SOUTH MELBOURNE. Page 1.

HOUSEHOLD RADIO SERVICE BULLETIN.

SUBJECT - ASTOR 5 VALVE SUPERHETERODYNE WITH A.V.C. AND TUNING EYE, TYPE EA.

COVERAGE:

This receiver is designed to cover the Broadcast range of frequencies from 550 to 1500 Kcs.

ANTENNA CIRCUIT, BROADCAST.

The broadcast antenna circuit comprises a high inductance untuned primary and a tuned secondary of high Q, with iron dust core. Misalignment of secondary tuning is negligible with any antenna from 15 feet to 250 feet long. This is very important in any set, and is particularly so in this receiver, as it has a very selective secondary, due to the iron core. The antenna system is a Hazeltine invention, and the gain and misalignment of the aerial is substantially unaffected by any size of aerial ordinarilly used.

CIRCUIT.

The use of iron dust cores in antenna and IF transformers give this receiver greater sensitivity and twice the selectivity of previous models.

Approximately 6 decibels of regeneration are introduced by connecting the cathodes of the 6A7 and 6D6 to a common cathode resistor and bipassing by a suitable condenser. The smaller the capacity of this condenser (C35) the greater the regeneration.

The structure of the oscillator circuit is such that the conversion gain is substantially constant over the whole tuning range.

Automatic volume control is used and the control is very good for this type of receiver. An increase of input from 1000 to 1,000,000 microvolts, a ratio of 1000 to 1, increases the audio output voltage by a ratio of only 8 to 1.

The radio of inherent noise to signal is very good also, noise being practically non existant with signals greater than 50 microvolts.

The maximum output of the receiver is 2 watts for a 30% modulated signal, and this output is closely approached for all signals down to 100 microvolts.

TUNING INDICATOR. A type 6E5 tuning indicator is used. This is a type of cathode ray tube, and the fluorescent area is controlled by the AVC voltage. When the set is precisely tuned the eye closes to its narrowest.

GENERAL:

A two position tone control is used.

Care has been taken to attain the best possible reproduction. For example, a satisfactory ratio of AC and DC diode output loads has been arrived at, and this enables the diode to handle high percentages of modulation without distortion. The total harmonic distortion for a 100% modulated signal due to the diode circuit does not exceed 1%.

For maximum output the total harmonic distortion of the output valve does not exceed 5%.

The receiver can be considered to have negligible harmonic distortion.

The biassing system is such that attenuation of bass notes is quite small.

SERVICE REPAIR, ETC.

Experience is the best guide.

Systematic search of faults is quickest and most reliable.

1. 50% of faults are due to valves. Try replacing them one by one with O.K. valves.

2. Check electrode voltages, etc. with 1000 ohms per volt voltmeter.

3. Check each stage separately. First the audio stage, then the detector and audio stages to see if they are operating. A small positive voltage, 4-1/2 volts or so, applied to the grids will cause a click in the speaker.

4. Next check the IF stage by applying an IF signal from the generator to the grid.

5. Next check the 6A7 stage by applying an IF signal to the grid.

6. Next apply a broadcast frequency signal to the grid of the 6A7. This will indicate if the oscillator is working or not.

7. Next apply a broadcast signal to the antenna. This will indicate if the antenna transformer is O.K.

Checking the set by stages localises a fault and saves time.

Where a stage is found to be faulty the components can be tested by means of a continuity meter. This shows up open circuits and shorted condensers, etc.

If a set has been tampered with it is naturally more difficult to rewire it correctly. Here knowledge and experience are very valuable.

Where coils, transformers, etc. need renewing, care should be taken to carefully note the connections of the wires before the faulty parts are removed.

Oscillation may be caused by open or faulty fixed condensers.

If condenser C15, C19,C20 and C23 are open or faulty, there is a possibility of oscillation.

R.J.COLLINS A.M.I.R.E.
Engineer.

REPRESENTATIVE TABLE OF VOLTAGES.

Taken with 1000 ohms per volt voltmeter.

VALVE:	6A7	6D6	75	42.
Plate	230	230	85	200
Screen	80	80	-	230
Cathode	3.2	3.2	0	0
Oscl plate.	115			

B voltage 230
Voltage across field coil minus 90 volts.

The above voltages may be slightly more or less according to the main voltage supply.

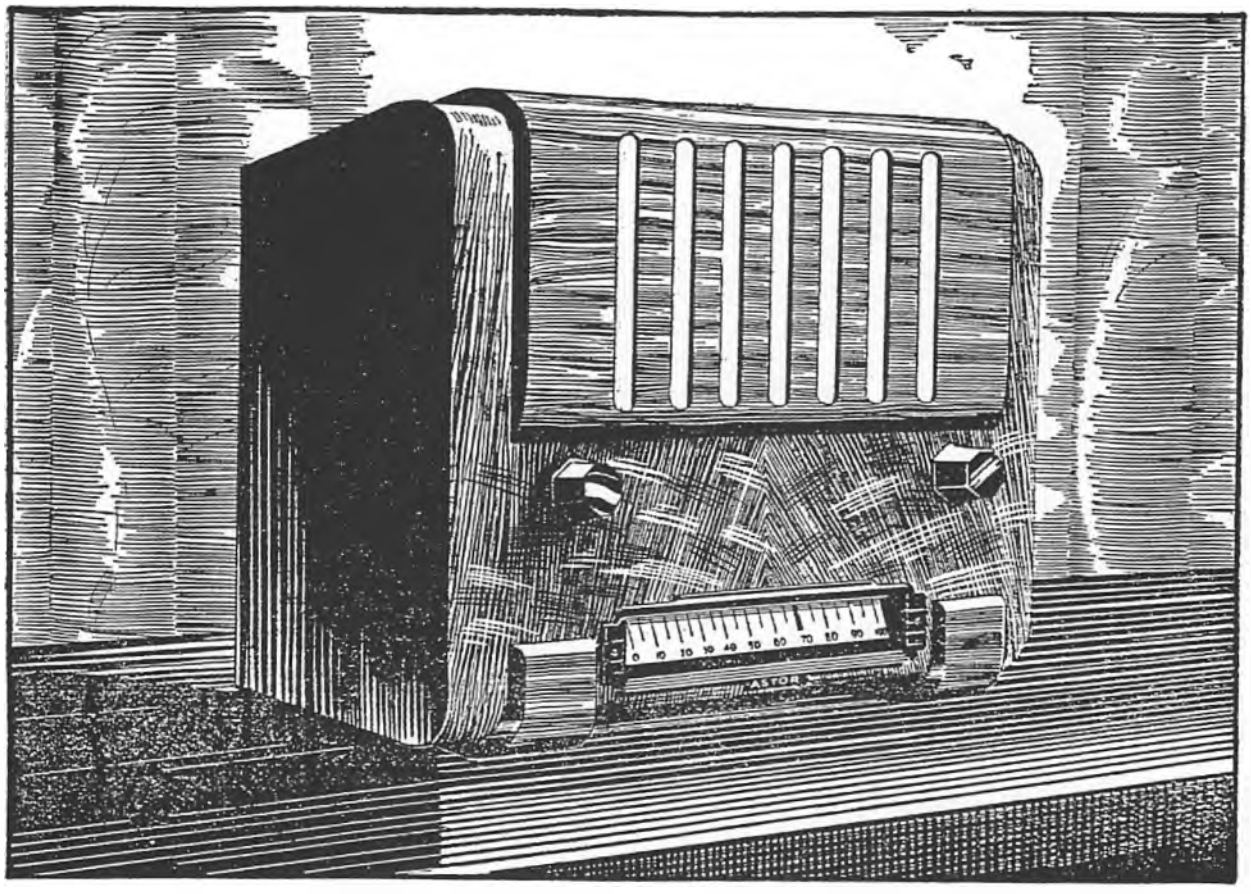
THE ASTOR "Mickey Mouse" & "Mickey Grand" Series DH.

5 Valve broadcast mantel models

Valves used; 6A7 mixer, 6D6 IF, 75 diode detector, AVC & 1st audio, 43 output, 80 rectifier.

IF frequency 456 Khz.

Socket on back of chassis for short-wave converter model DB.



ASTOR *Mickey* GRAND

The miracle of modern radio science!
Melodious-Realistic-Satisfying

From the crashing crescendo of a glorious band to the soft, delicately woven harmonies of the old masters, the Astor Mickey Grand gives extraordinary tonal reproduction. This receiver sets a standard of performance that challenges all comparison in the mantel range.

Astor Mickey Grand is a 5-valve full-powered superheterodyne mantel model receiver for A.C. 200-250 volt operation, employing power pentode output, and new multiple-function valves, giving 7-valve performance. Equipped with Automatic Volume Control that ensures constant volume on all stations, with elimination of fading and blasting by nearby stations. Interstate Reception is guaranteed on a Self-Contained Aerial. Illuminated Tuning Dial. 6½ inch Electro-Dynamic Speaker. Adaptable for world reception.

Price with Automatic Volume Control. Easy Terms Arranged. **£14/19/6**

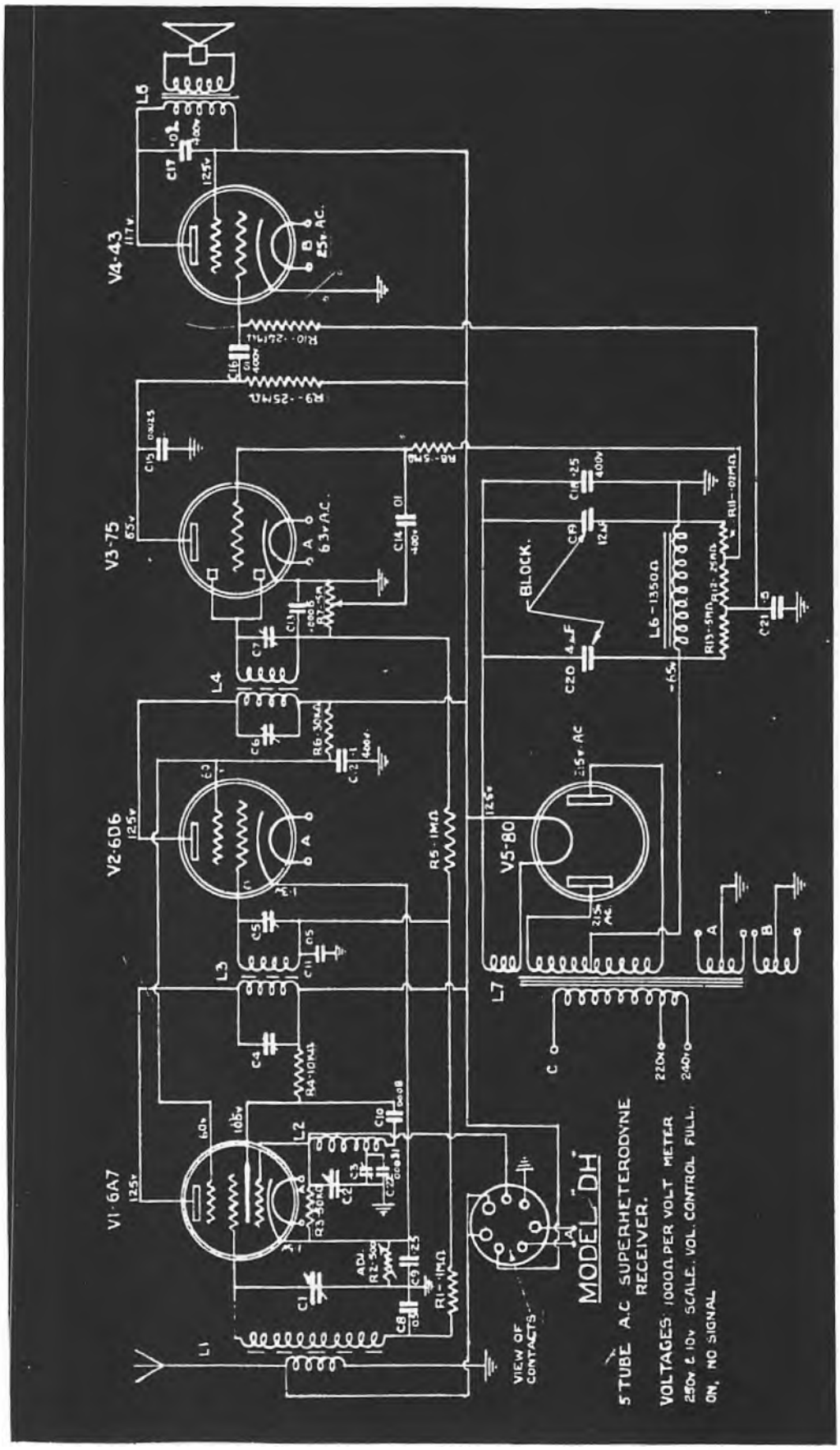
Ask your local Astor Dealer for 7 days free trial, or write and arrangements will be made by—

HOMECRAFTS PTY. LTD., 211 Swanston St., Melbourne, C.1.

KEEP BROS & WOOD PTY. LTD., 200 Latrobe Street, Melbourne, C.1.

AV76

"Astor" Mickey Grand–Chassis type DH



Astor "Mickey Grand," chassis type "DH," is a five-valve receiver designed for broadcast coverage and operation from 200-250 volts A.C. mains. This receiver is of the "table" type and is fitted with two panel controls —volume and tuning. In addition, an internal "sensitivity" control is provided in the form of R2 (500 ohms adjustable) which regulates the minimum bias applied to the converter and I.F. valves. The loudspeaker used is a 6 inch, 1,350 ohms field, unit. This receiver, in common with others in the "Mickey Mouse" series, is fitted with a 7-pin socket for connection of an Astor "Oversea-er."

CIRCUIT NOTES

Although the circuit arrangement of this receiver is fairly straightforward, the use of a type 43 output pentode will be a surprise to those unaccustomed to "Astor" practice. This valve is, of course, a 25 v. heater type, and is normally used only in A.C./D.C. receivers. In this model, however, the designers have endeavoured to keep the high-tension supply voltage as low as possible, in order to increase the safety factor and reduce the heat dissipation—both important points in a compact chassis. Consequently, the use of a type 43 was indicated as it was, at the time, the only valve type available which was capable of delivering a reasonable power output at a low plate voltage. As a result of the design policy adopted, the highest D.C. voltage present in this receiver is approx. 180 v.—between rectifier filament and H.T. secondary C.T. 65 volts of this is dropped across the L.S. field, thus leaving a total H.T. supply of only 125 volts.

Final points of interest are the "bleed" biasing of both the 75 triode section and the 43. Grid bias for these valves is obtained from the voltage divider network across the L.S. field. Resistor R13 of this and condenser C25 also form an effective hum filter system.

The I.F. used in this receiver is exactly 456 KC.

RADIO CORPORATION PTY. LTD.
11 - 21 STUART STREET, SOUTH MELBOURNE.

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26.5.33.
Page 1.

HOUSEHOLD RADIO SERVICE BULLETIN.

SUBJECT - ASTOR MICKEY GRAND 5 TUBE SUPERHETERODYNE (TYPE DH).

GENERAL: The new Astor Mickey Grand receiver is a 5 tube superheterodyne of considerably improved design and performance.

Some of the features are - Iron cored aerial and IF coils, Automatic volume control and easy conversion to short wave reception by use of the Astor Oversea-er.

The introduction of iron core coils make possible results never before obtained with a receiver of the midget type.

TUBE COMPLEMENT.	TYPE.	FUNCTION.
	6A7	Oscillator modulator
	6D6	Intermediate frequency amplifier
	75	2nd Det. A.V.C. 1st Audio
	43	Power output
	80	Rectifier.

ALIGNMENT: IF section - Mickey Mouse.

Feed signal of 456 Kc. to grid of V1 6A7 and align IF padder starting at lower padder of IF transformer near to 6A7 tube, follow up with top padder thence to 2nd transformer.

Volume control should be full on and signal not above 10v. at output. Gang should be turned full in (540 Kc. end)

Broadcast Section.

Turn gang full out and adjust oscillator trimmer (nearest back of receiver) to 1550 Kcs. Move gang to approx. 1400 Kcs. and resonate by use of generator dial, align aerial trimmer (nearest front of cabinet)

Move to other end of band and peak series padder located at rear of base.

The usual procedure should be followed here, that is, generator dial to remain stationary at approx. 600 Kc.

Gang should be adjusted for maximum output, series padder adjustment to be altered slightly and gang rechecked. This should be continued until position of series padder screw showing greatest output on meter is found.

1400 Kc. should be rechecked after series padder adjustment is made.

Shortwave section (Oversea-er)

Set generator dial at 19 Mc. and resonate oscillator padder (nearest front of cabinet). Move to 16 Mc. and resonate with generator dial, adjust aerial trimmer (nearest back of cabinet)

No adjustment is necessary at the low frequency end as this is accounted for in C4.

Gang alignment i both Mickey Mouse and Oversea-er receiver is accessible from the bottom of the cabinet by sliding out the safety bottom. Thus it is possible to completely align both receivers without removing them from their respective cabinets.

Mickey Mouse has an adjustable resistor R2 by which it is possible to either increase or decrease the receiver's sensitivity. This is definitely only for the dealers convenience and should not be adjusted unless deemed absolutely necessary.

FAULT FINDING ETC.

A thorough check of voltages, together with substitution of tubes for known O.K. ones will in most cases locate the source of trouble.

Other possible sources of trouble may be:

Hum, due to faulty C21 or Filter block C19/20.

Oscillation, due to faulty C18, C9, C8, C11 or C12.

Oscillator not functioning - set sounds alive, but no signals - due to faulty C10, open R3, defective L2 or short circuited C2.

Sensitivity control (R2) is available in order that standard output may be obtained by the dealer or service man in cases where, through no apparent fault in the receiver, the gain is either too low or too high. This control adjusts the minimum bias on V1 and 2 and therefore should not be set too near the earth end as this would result in under biasing.

COMPONENT PARTS LIST.

RESISTORS.

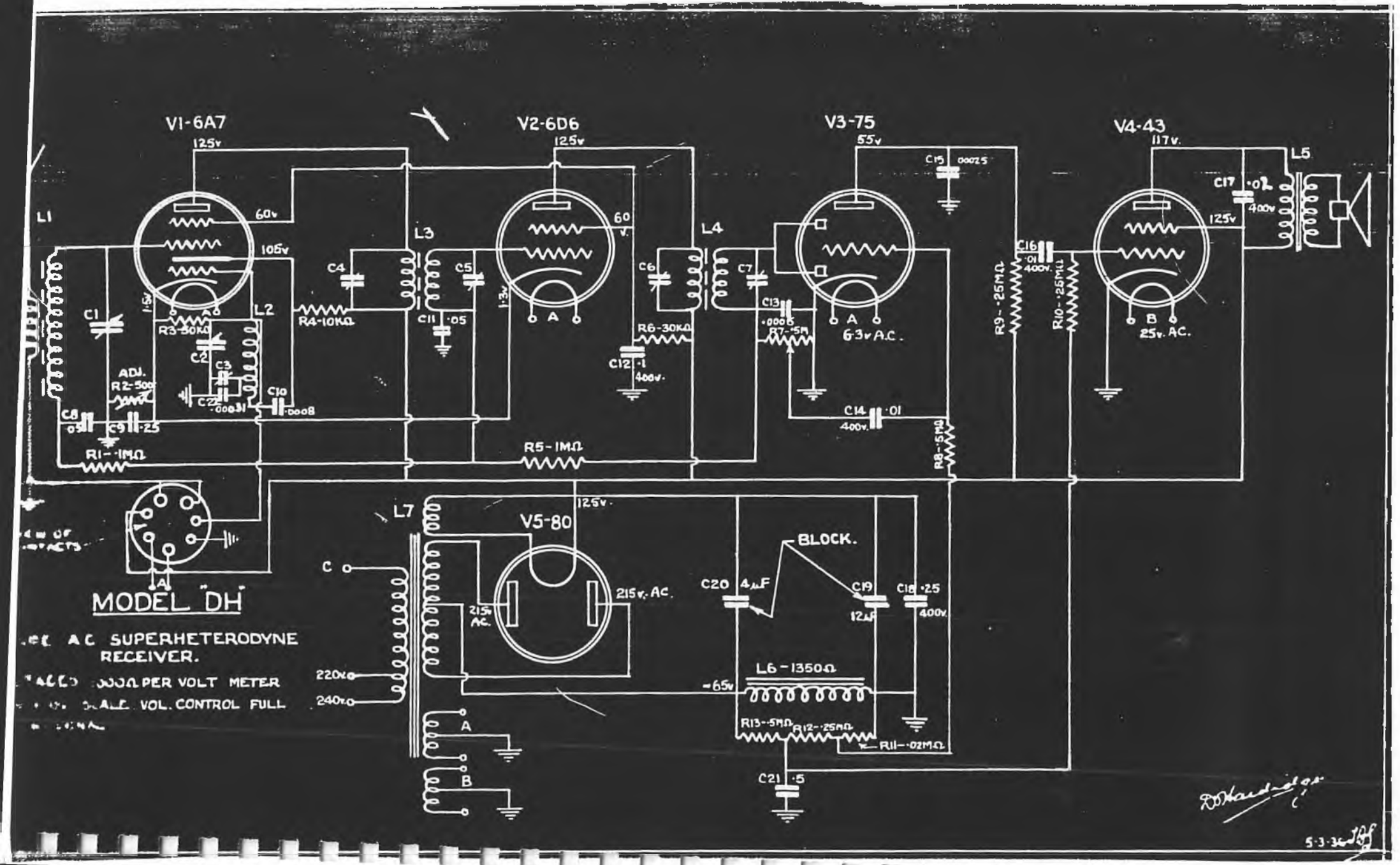
R1.	100,000 ohm	1/4 watt 20%
2.	500 ohm	Wirewound sensitivity control
3.	50,000 ohm	1/4 watt 20%
4.	10,000 ohm	" " "
5.	1,000,000 ohm	" " "
6.	30,000 ohm	" " 10%
7.	500,000 ohm	Carbon V/control
8.	500,000 ohm	1/4 watt 20%
9.	250,000 ohm	" " "
10.	250,000 ohm	" " "
11.	20,000 ohm	" " 10%
12.	250,000 ohm	" " "
13.	500,000 ohm	" " "

INDUCTORS.

1. Aerial coil assembly.
2. Oscillator coil assembly
3. 1st IF Transformer
4. 2nd " "
5. Speaker Input transformer
6. 1350 ohm field coil.
7. Power Transformer

CONDENSERS.

C1.	Aerial section gang condenser.
2.	Oscill. " " "
3.	Series pad trimmer 30/80mmf.
4.	Primary padder 1st IF Trans.
5.	Second. " " " "
6.	Primary " 2nd " "
7.	Second. " " " "
8.	.05mfd. Paper 200V. 20%
9.	.25 " " " "
10.	.0008mfd. Mica 1000V. 10%
11.	.05mfd. Paper 200V. 20%
12.	.1mfd. " 400V. "
13.	.0005mf. Mica 1000V. 10%
14.	.01mfd. Paper 400V. 20%
15.	.00025mfd. Mica 1000V. 10%
16.	.01mfd. Paper 400V. 20%
17.	.02mfd. " 400V. 20%
18.	.25mfd. " 400V. 20%
19.	12mfd. Section Dry Elect. Block
20.	4mfd. " " " "
21.	.5mfd. Paper 200V. 20%


V1-6A7
V2-6D6
V3-75
V4-43
V5-80
125v
55v
117v.
60v
105v
60
L1
L2
L3
L4
L5
L6-1350Ω
L7
C1
C2
C3
C4
C5
C6
C7
C8 .05
C9 .25
C10 .0008
C11 .05
C12 .1 400v.
C13 .0005
C14 .01 400v.
C15 .00025
C16 .01 400v.
C17 .02 400v
C18 .25 400v.
C19 12μF
C20 4μF
C21 .5
C22 .00031
R1-1MΩ
R2-500Ω
ADJ.
R3-50KΩ
R4-10KΩ
R5-1MΩ
R6-30KΩ
R7-5Ω
R8-5MΩ
R9-.25MΩ
R10-.25MΩ
R11-.02MΩ
R12-.25MΩ
R13-5MΩ
6.3v A.C.
25v. AC.
215v. AC.
215v. AC.
BLOCK.
-65v
220v.
240v.
A
B
C
MODEL DH
AC SUPERHETERODYNE
RECEIVER.

The Astor Series DC

6 Valve AC-DC broadcast console

Valves used; CK1 or FC13 mixer, CF2 or VF13A I.F. amplifier, CBC1 or TD13 diode detector, A.V.C. and first audio, CL2 or Pen26 Output, CY2 or UR2 rectifier, C1 or B13 ballast. Dial lamp 4.5 V. 0.3A.

I.F. frequency 472.5 kHz, broadcast coverage 1500-535 kHz.

Instructions for Operating

5 Tube Universal A.C. or D.C. Superheterodyne Receiver.

With Automatic Volume Control.

This Receiver uses "Ferrocart" iron dust cores in Radio and IF coils. This results in greater sensitivity and twice the selectivity of previous models.

AERIAL.—Install an outside aerial of from 40 to 60 feet total length for best results. Where this is not practicable, an inside aerial of from 30 to 40 feet will give good results. Short indoor aerials have a tendency to create a certain amount of background noise in reception of weak stations.

GROUND.—Keep the ground lead as short as possible and solder or firmly clamp to a water pipe if available. Where there is no water pipe available, a good ground can be made by driving a metal pipe about 4 feet long into moist ground and soldering the ground wire to the pipe. There should be no twisted joints in either aerial or ground leads. If joints are necessary, they should be soldered. Gradual oxidation of twisted leads is sure to cause weak and noisy reception.

A.C. OR D.C. SUPPLY ADJUSTMENT.—The barretter tube automatically keeps the filaments at the correct temperature over a range from 190 volts to 260 volts. No adjustments are needed. In D.C. areas it may be necessary to reverse the plug in the mains socket before the Receiver will operate.

OPERATION.—Tubes require 90 seconds to heat up to full operating condition. Turn volume control fully clockwise, and rotate tuning control until a station is heard.

TONE.—To obtain the best tone, the station must be tuned in accurately, and until it comes in loudest. Adjust strength by means of volume control, and not by detuning.

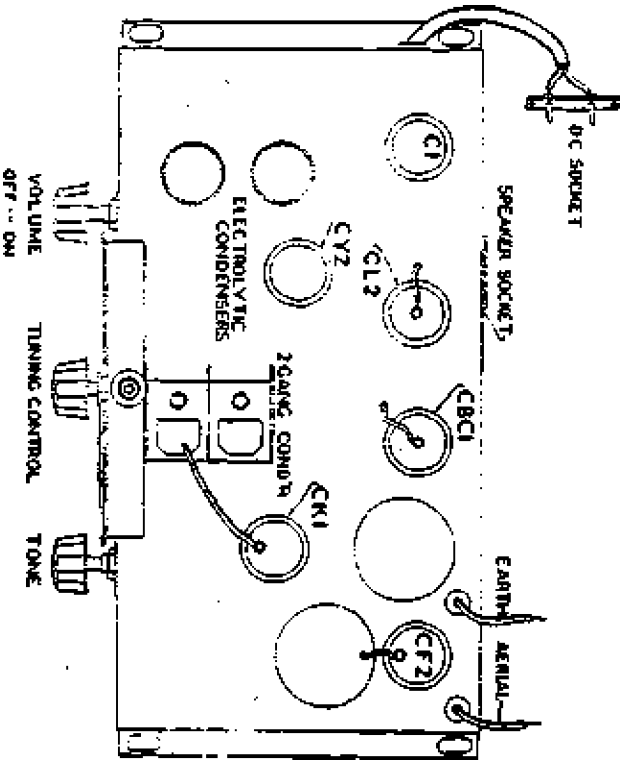
TONE CONTROL.—Turn to required quality of tone. Static effects may be reduced by use of this control.

AUTOMATIC VOLUME CONTROL.—This feature brings the volume of all except distant stations to almost the same level. The effect is to amplify weak, distant stations more, and powerful local stations less.

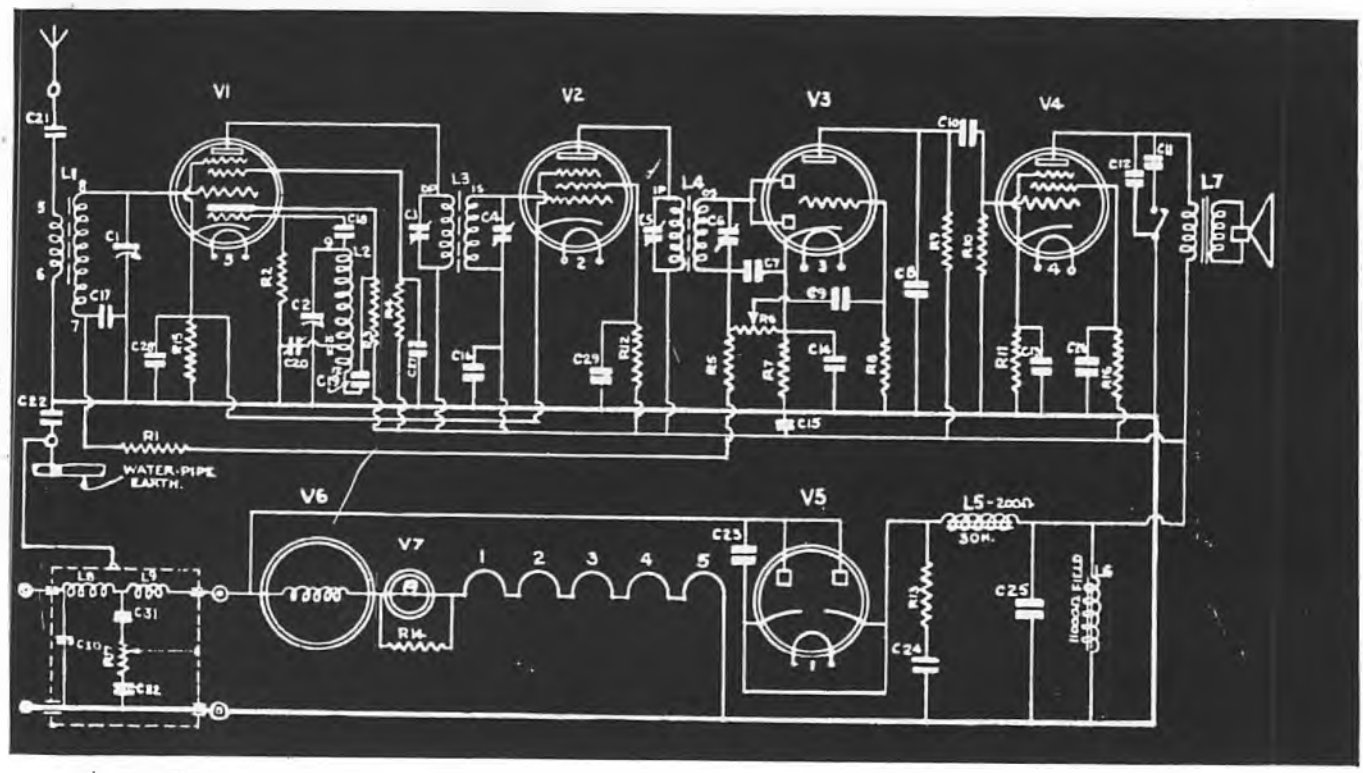
DIAL LIGHT.—This is a .3 amp. 4.5 volt torch globe.

SAFETY MEASURES.—As there is no transformer in this Set to isolate the Set from the power supply, provision has been made so that the power is automatically removed when the door is opened.

MAINS FILTER.—A mains filter is provided, to minimise mains-borne noises. This filter suppresses the majority of noises, but provision is made on it for finely balancing out the more persistent noises. The knob on the left side of the cabinet should be adjusted until mains-borne noise is reduced to a minimum. This device does not minimise static and noise conveyed to the Set by the aerial. Mains-borne noise is the noise left in the Receiver when the aerial and earth leads from the Set are shorted together.



"Astor" A.C./D.C. Models 88, 99—Chassis type DC



Astor model 88 or 99, chassis type "DC," is a five-valve receiver designed for broadcast coverage and operation from A.C. or D.C. mains with any voltage between 190 and 260 volts; regulation for the latter is provided by a Philips type C1 barretter ("V6" on circuit diagram). This receiver is of the console type and is provided with a back in order to protect the user from accidental shock. Three controls — volume, tuning, tone — are fitted to the front panel of this receiver and a fourth is fitted to the side of the cabinet for line filter "tuning." This control (R17) acts as a noise balancer and proves very effective on noisy D.C. mains. As originally released, this receiver was known as model "99," but the model number was later changed to "88"; the circuit arrangement is the same in each case. The loudspeaker used is an 8-inch, 11,000 ohms field, unit in each case.

The design of this receiver is fairly straightforward, but particular attention should be paid to the aerial and earth isolating condensers (C21 and C22) as a short in either of these is likely to result in either a shock to the user or a mains short-circuit, particularly on A.C. supply or D.C. mains of the "positive earth" type. Other points of interest are the use of a "hum filter" condenser (C23) between plate and cathode of the rectifier, and the provision of a "surge protection" resistor (R13) in series with the first filter condenser (C24).

The valves used in this receiver are all of the Philips 200 mA. series, with type numbers and functions as follow: V1 — CK1, octode frequency converter; V2 — CF2, 472.5 KC. I.F. amplifier; V3 — CBC1, detector, A.V.C. rectifier, and A.F. amplifier; V4 — CL2, output pentode; and V5 — CY2, rectifier. V6 and V7 are the type C1 barretter and a 4.5 v., 0.3 A., dial lamp, respectively. In some of these receivers it may be found that Mullard equivalents of the above Philips' valve types are employed, in which case the valve complement, in the order given previously, is as follows: FC13, VP13A, TD13, Pen. 26, UR2, and B13 barretter. The dial-lamp is the same in each case. The operating voltages for this receiver are in accordance with manufacturers' ratings.

Component Values

COILS.

L1 — DD aerial coil; L2 — DD osc. coil; L3 — 1st I.F.T.; L4 — 2nd I.F.T.; L5 — 30 H., 200 ohms, filter choke; L6 — 11,000 ohms L.S. field; L7 — 2A5 type L.S. matching transformer; L8 — 1.3 microhenry R.F. choke; L9 — 180 microhenry R.F. choke.

CONDENSERS.

C1, C2 — sections of 2 gang variable cond.; C3, C4, C5, C6 — I.F.T. trimmers; C7 — 0.00025 mfd. mica; C8 — 0.0005 mfd. mica; C9 — 0.02 mfd., 200 v., paper; C10 — 0.02 mfd., 400 v., paper; C11 — 0.02 mfd., 1,000 v., paper; C12 — 0.006 mfd., 400 v., paper; C13 — 10 mfd., 50 v. W., electro.; C14 — 0.25 mfd., 200 v., paper; C15 — 0.5 mfd., 400 v., paper; C16 — 0.1 mfd., 200 v., paper; C17 — 0.05 mfd., 200 v., paper; C18 — 0.0001 mfd. mica; C19 — 0.001 mfd. mica; C20 — 250/500 mmfd. padder; C21 — 0.001 mfd., 1,000 v., mica; C22, C23 — 0.01 mfd., 1,000 v., mica; C24 — 16-20 mfd., 500 v., electro.; C25 — 18-22 mfd., 500 v., electro.; C26 — 0.25 mfd., 400 v., paper; C27 — 0.1 mfd., 400 v., paper; C28 — 0.5 mfd., 200 v., paper; C29 — 0.25 mfd., 400 v., paper; C30, C31, C32 — 0.05 mfd., 1,000 v., paper.

RESISTORS.

R1 — 10,000 ohms, 1/3 W.; R2 — 50,000 ohms, 1/3 W.; R3 — 100,000 ohms, 1 W.; R4 — 60,000 ohms, 1 W.; R5 — 1 megohm, 1/3 W.; R6 — 500,000 ohms vol. cont.; R7 — 1,000 ohms, 1/3 W.; R8 — 1 megohm, 1/3 W.; R9 — 50,000 ohms, 1/3 W.; R10 — 500,000 ohms, 1/3 W.; R11 — 400 ohms, 1 W.; R12 — 100,000 ohms, 1 W.; R13 — 100 ohms, 3 W., wire-wound; R14 — 50 ohms, 3 W., wire-wound; R15 — 500 ohms, 1/3 W.; R16 — 25,000 ohms, 1 W.; R17 — 6 ohms potentiometer (in line filter).

I.F. ALIGNMENT—ASTOR MODELS

The majority of "Astor" receivers produced during, and since, 1936 are fitted with a special dual trimmer assembly for I.F. transformer alignment. This is accessible from the top of the shielding can and adjustment is effected by means of a slotted screw and a hexagonal nut. At first glance, these two controls give the appearance of an adjusting screw fitted with a locking nut, but closer inspection of the assembly will show that each can be rotated independently. The slotted screw controls the primary trimmer, while the secondary trimmer is controlled by the hexagonal nut.

RADIO CORPORATION PTY. LTD. Bulletin 35,
4.5.36.
11 - 21 STURT STREET, SOUTH MELBOURNE. Page 1.

HOUSEHOLD RADIO SERVICE BULLETIN.

SUBJECT - 5 VALVE AC-DC UNIVERSAL MODEL 99
(TYPE DC)

The circuit of this receiver has been designed by the Research Laboratory of the Radio Corporation Pty. Ltd. in conjunction with the Laboratories of the Haseltine Corporation New York, and is covered by numerous patents.

An efficient superheterodyne circuit is used, employing the Philips 200 ma series of AC-DC valves.

The receiver operates equally well from AC or DC supply of any ordinary frequency, and is self regulating for any voltage supply from 190 to 260 volts.

This receiver complies with the State Electricity Commission's safety standards for electrical apparatus.

We strongly recommend that service men use great care in handling the chassis when the power is on, for, as will be seen from the circuit diagram, the chassis is directly connected to one of the mains wires. Obviously the chassis can be alive compared to ground if the mains plug is suitably polarised.

In factory procedure rubber gloves are used by operatives working on these receivers, when they are connected to the mains. Where adjustments are to be made to a chassis on AC mains, the chassis should be connected to the "dead" wire of the mains. A 220 volt test lamp should be connected from chassis to ground. This lights when the chassis is connected to the "live" mains wire; in such cases the mains plug should be reversed, and the chassis is then at or near ground potential.

In some DC areas the positive mains wire is earthed, and in others the negative wire is earthed. Obviously, where the positive mains wire is earthed, the chassis will be at a high potential against ground when the receiver is switched on.

The set will only work in DC areas when the mains plug is connected the right way round, on account of the polarity of the mains. On AC mains the receiver will sometimes show improved tone and freedom from noise if the mains plug is reversed.

A line filter is incorporated in this receiver. Previous models did not have a built in line filter. The line filter reduces mains borne noises, and a knob is fitted to the filter for accurate balancing out of more persistent noises.

The line filter is a network designed to reduce all radio frequency interference from a few meters to several hundreds of meters wavelength. "Man made static" can also come in through the aerial and in this case nothing can be done but to stop the noise at its source. Man made static is caused by electric sparks, and in DC areas such noises are much greeter than in AC areas, because most DC apparatus, generators, motors, etc. have sparking commutators.

A booklet "Suppression of Radio Inductive interference" can be obtained gratis from the Wireless Branch, Treasury Buildings, Melbourne C1, on application. This booklet describes sources of, and remedies for interference.

SERVICING.

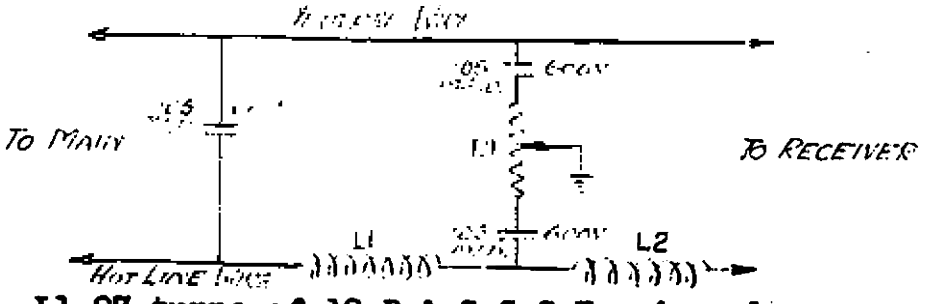
The same general method can be adopted in servicing any receiver which has not been tampered with.

Faults can be put down to three main headings.

1. One or more parts have become defective.
2. Connections have come adrift or parts have short circuited.
3. The receiver has gone out of alignment.

Usually it is a good plan to check the valves by replacing them with a spare set known to be good.

DESCRIPTION:



L1 27 turns of 19 B & S S.C.E. wire close wound solenoid on 1/4" diameter mandril

L2 43 turns of 19 B & S S.C.E. wire bunch wound on 2-1/2" diameter mandril.

R1 7 ohm potentiometer wound with 1/16"x .005 Nichrome ribbon plus and minus 20%.

Next the voltages on all the valve electrodes can be checked with a 1000 ohm per volt voltmeter, against the accompanying representative table. This indicates short circuits on broken connections. Short circuits can be valve elements touching internally, wires touching, broken down fixed condensers, etc. Open circuits can be broken leads, burned out transformers, resistors, etc.

With sets in which diagnosis is difficult it is usually best to proceed in stages. Test the audio section by touching the grid cap of the CBC1 with one's finger. Fairly loud clicks from the speaker indicate that the CBC1 and C12 are operating. No sound means a search of that section of the circuit for broken down fixed condensers, etc. A continuity meter is most useful in this work.

Next the IF stage can be checked. It is best to connect the output of a signal generator to the grid cap, and gauge if the sensitivity of this section of the circuit is normal.

Next a broadcast signal generator can be connected to the grid of the CK1, and one notes if the output is normal at say 1000 Kc.

Lack of signals in either of these stages can be caused by:-

a. Serious IF misalignment.
b. Defective valves.
c. Open, or short circuits.

Next the signal generator can be connected to the antenna of the receiver through a dummy antenna of 100 uuf 25 ohms and 20 microhenries. Usually a fixed condenser of 100 uuf is quite satisfactory on its own. The signals should be louder because the antenna transformer alone gives a lift, and the set should have nearly the same sensitivity at the three test points, 1400, 1000 and 600 Kc.

Representative values for the stage gains, taken at 1000 Kc. are as follows:

Antenna stage	14 db.
Conversion stage	31 db.
IF stage	41 db.
Audio stage	12 db.

This means that for standard output (50 mw) a signal applied to the IF valve grid would have to be attenuated 53 db, to the CK1 grid 84 db, and to the antenna terminal 98 db.

RADIO CORPORATION PTY. LTD. Bulletin 35.
4.5.36.
11 - 21 STURT STREET, SOUTH MELBOURNE. Page 4.

HOUSEHOLD RADIO SERVICE BULLETIN.

Lack of sensitivity. This can be caused by weak valves, or by the set being out of alignment.

Misalignment can be caused by rough handling, excessive vibration, high heat or high humidity.

Realignment of IF transformers should only be attempted by means of a calibrated signal generator and preferably an output meter. It cannot be done by guesswork.

Coils. Antenna transformer, oscillator transformer and IF transformers are standard as used in Type DD.

ALIGNMENT.

The IF transformers are aligned at 472-1/2 Kc. In cases where a morse station is close to 472-1/2 Kc. they can be aligned at any other frequency down to 456 Kc.

Antenna and oscillator. The condenser is turned right out, and the pointer should come to zero. The oscillator pad is adjusted to 1550 Kc. The pointer is then turned to 1400 Kc, the signal generator adjusted to 1400 Kc, and the aerial trimmer adjusted for maximum output. Next the generator is adjusted to 600 Kc, the pointer turned toward 600 Kc, and the series pad adjusted for maximum output. The condenser should be rocked back and forth while this is done.

The adjustment of the series pad may effect the minimum capacity setting of the oscillator condenser. The gang should be turned out again, to 1400 Kc. the generator set to 1400 Kc, and the antenna trimmer slightly adjusted once more for maximum gain.

Manufacturing tolerances are held so close, and parts and receivers are tested so frequently during production that faults due to manufacturing errors will be found to be practically non-existant in this, as in other Astor receivers.

R. J. COLLINS, A.M.I.R.E.
Engineer.

RADIO CORPORATION PTY. LTD.

11 - 21 STURT STREET, SOUTH MELBOURNE.

Supplement
28.6.37.

HOUSEHOLD RADIO SERVICE BULLETIN.

SUPPLEMENT TO BULLETINS 35 AND 44.
CHASSIS TYPES: DC AND FE.

Supplement No. 3 to Bulletin 35.
" " 5 " " 44.

SUBJECT - IF ALIGNMENT.

It has been noted by the Service Repair Dept. that hum modulation is sometimes present when aligning IF transformers.

It is recommended that the earth lead from the set be connected to the chassis and earthed. The usual generator connections for IF alignment can then be made. That is, an earth connection and a straight through lead to the grid of the oscillator modulation or IF amplifier tube from which the grid cap has been removed.

IMPORTANT: When set is switched on, it is imperative that the chassis be at earth potential. A 230 volt lamp connected from chassis to ground, should not light. If it does, the mains plug should be reversed.

DESIGN DEPT.

Issued by Engineer .
G.L.M.

SUPPLEMENT TO BULLETIN 35 CHASSIS TYPE DC, MODEL 88.

When trouble in the form of uncontrollable oscillations, howls, crackles, etc. develops in this model, experience has shown that it is often caused by the metal spray on the valves not making proper contact with the ground connection. This is a wire twisted around the bottom of the glass envelope.

The remedy for this fault is to fit a "Goat" shield onto the tube in question and either solder the existing earth wire to the shield, or run a lead directly from the shield to frame.

DESIGN DEPT.

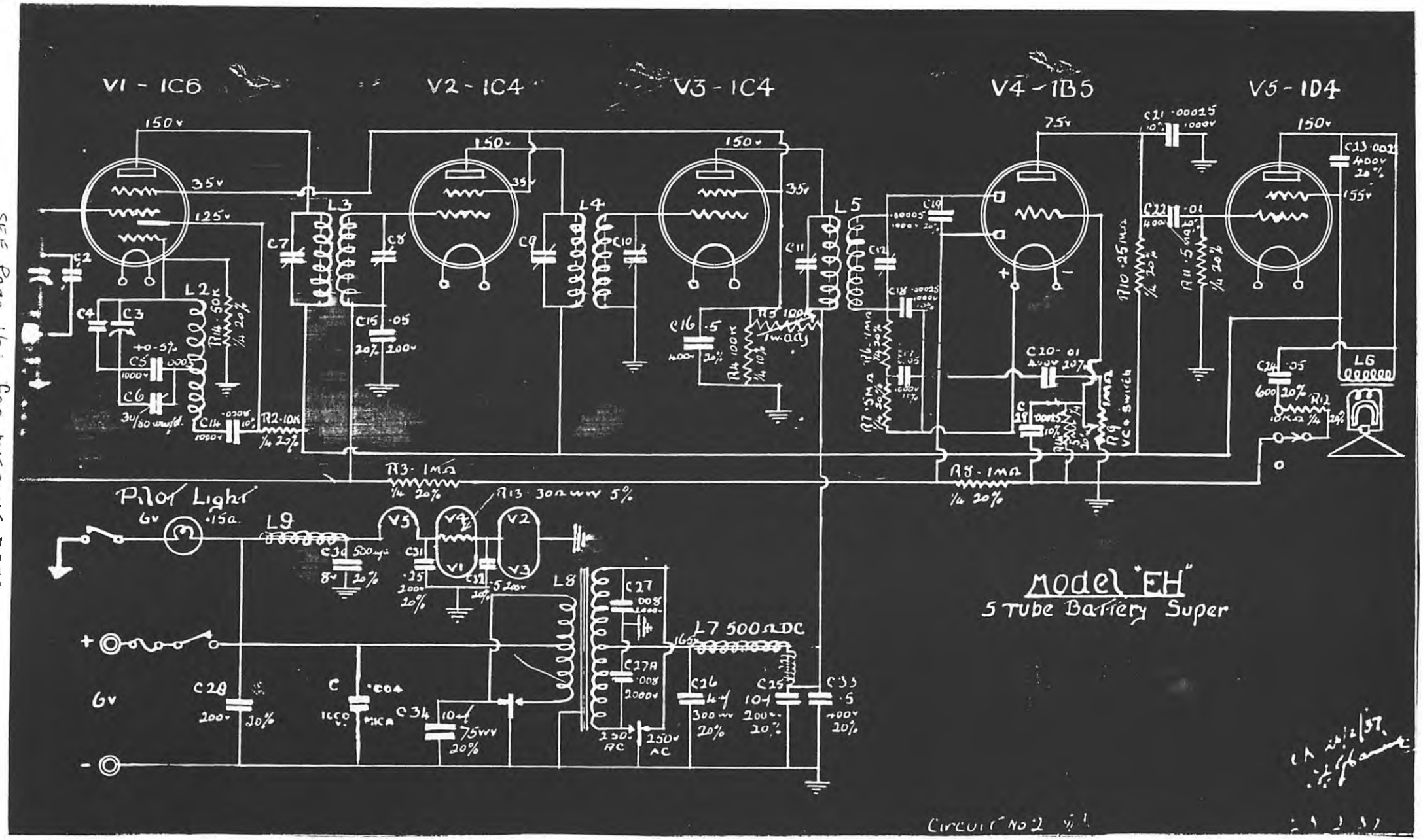
Issued by Engineer
G.L.M.

The Astor Mantel 77, Series EH

5 Valve Vibrator broadcast mantel

Valves used; 1C6 mixer, 2 of 1C4, 1st & 2nd I.F. amplifiers, 1B5 diode detector, A.V.C. and first audio, 1D4 Output. PM104 Vibrator.

I.F. frequency 456 kHz, broadcast coverage 1550-540 kHz.



SEE Page 14 for MISSING DETAIL

RADIO CORPORATION PTY. LTD.

11 - 21 STURT STREET, SOUTH MELBOURNE.

Bulletin ...
15.8.36.

HOUSEHOLD RADIO SERVICE BULLETIN.

SUBJECT - ASTOR 5 TUBE BATTERY TABLE MODEL RECEIVER

CHASSIS TYPE EH.

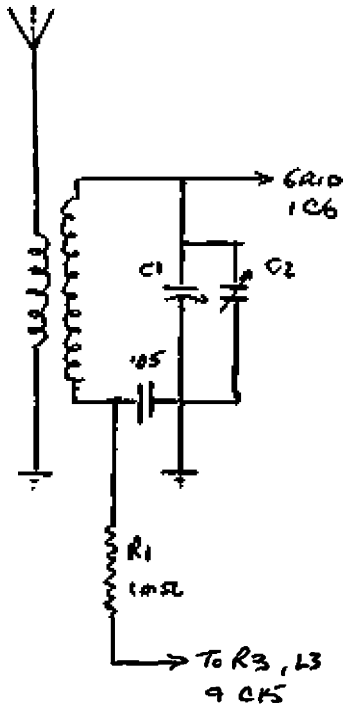
GENERAL:

The Astor Model EH is a 5 tube superheterodyne designed to operate directly from a 6 v. accumulator without the use of B or C batteries. This is accomplished in a very economical manner by the use of a synchronous vibrator and a special filament circuit using standard 2 v. battery type tubes.

The total drain from the receiver is approximately 1 ampere, never above 1.25 amperes even with dial light working.

TUBE COMPLEMENT:

Type.	Function.
1C6	Oscillator Modulator
1C4	1st IF amplifier
1C4	2nd IF "
1B5	2nd Det. Del yed A.V.C. and 1st Audio Amplifier.
1D4	Power output pentode.



The binding would not allow the full circuit to be copied. RK.

CIRCUIT DESCRIPTION.

Careful design, together with latest tubes, including two dual purpose type - improved IF Transformer and iron cored aerial coil is responsible for very high sensitivity which is in the order of 2 microvolts. At the same time the inherent noise level of the receiver has been kept down to a really low value.

This is mainly due to the high gain aerial coil and also to the fact that the tubes are not being worked at the maximum value, while the actual coil step up is high.

Automatic volume control is used and has the advantage of a delayed characteristic which allows maximum amplification of weak signals without any sacrifice to control of stronger inputs.

CIRCUIT OPERATION.

L1, C1 comprises the aerial stage which feeds the signal to grid of oscillator modulator tube V1. C3, L2 together with C5, 6, 14 and R14 comprise the oscillator circuit.

The 456 Kc. IF signal appears in the primary circuit of L3 being transferred to V2 via the secondary of this transformer. There now follows two stages of intermediate frequency amplification V2 and V3.

Rectification takes place in circuits comprising secondary of L5, R6 and 7, the volume control being accomplished in R7 (Diode load resistor). Rectification also takes place in the other diode circuit comprising C19, R8 and this is used for automatic volume control. This AVC voltage has a delay value due to the voltage drop between earth and the filament leg to which this diode is connected.

The AVC voltage is fed to V1 and V2 via filter network comprising R3 - 1, C15 - 13.

The audio signal picked off R7 is fed to the grid of V4, C21 acts as filter for any IF frequency which is not mopped up in R6, C18 and 17.

Coupling between 1st audio and power pentode is resistance capacity type.

Tone control is accomplished by R12 together with C21.

Minimum bias is obtained by the voltage drop in the series parallel filament circuit. V1 and 74 obtain 2 v. each. V5 has 4 v. and V2 and 3 are especially designed to work on zero grid bias and do not have any bias other than the AVC bias obtained from the signal.

Referring to the power supply C28 and 29 comprise the vibrator filter and are mainly responsible for stopping vibrator noise from getting back to the battery and being picked up by the receiver via the aerial. C29 and C30 take care of filtration in the filament circuit.

HOUSEHOLD RADIO SERVICE BULLETIN.

CIRCUIT OPERATION CTD.

Resistor R13 is necessary to equalize the filament circuit in all tubes.

The high tension AC is rectified by the vibrator, the positive potential appearing at the centre tap of L8 (Power transformer) Filtration is provided for by L7, C25 and 26.

HINTS FOR FAULT FINDING.

Before endeavoring to locate trouble in a faulty receiver the following points should be noted.

Never, under any circumstances, replace either the vibrator or any of the tubes whilst the receiver is switched on, as, owing to the arrangement of the filament circuit it is possible by not following these instructions to damage tubes or, in the case of the vibrator, to receive an unpleasant shock. Make sure the battery is connected correctly as reversal will place a negative voltage on the receiver where a positive one is intended.

Make sure battery clips are making good contact to battery lugs and if corroded they should be cleaned and smeared with vaseline before replacing.

Make sure that an adequate earthing system is being used.

Never under any circumstances, run the receiver on any but the specified battery voltage - viz 6 volts or with any but the specified tube types.

In order to remove the chassis from the cabinet it is necessary that dial light lead be removed from the socket located toward the rear of the cabinet on the left hand side, near speaker connection.

Blown fuse. Check over filament wiring, power transformer primary, C29, C28, etc. for short circuit before replacing fuse.

Fuse O.K. Valves not alight. Check accumulator. Check switch and L9 for open, C30 for short or high leakage. Check valves for open filament, switching off the receiver before removing any tubes.

HOUSEHOLD RADIO CORPORATION PTY. LTD.
11 - 21 SHORT STREET, SOUTH MELBOURNE.

Bulletin 40,
15.8.36.
Page 4.

HOUSEHOLD RADIO SERVICE BULLETIN.

HINTS FOR FAULT FINDING, CTD.

By means of a volt meter check voltage spots as marked on diagram, this will indicate just where voltage ceases.

Valves alight, no signals. Vibrator working.

Check voltages as marked on circuit diagram.
No voltage (HT) could be caused by faulty power transformer.
Check AC voltage as per diagram.
Shorted or open L7, shorted C25 or C26 electrolytic.
Shorted C27, faulty vibrator.
Low voltage (HT) may be due to shorted C33, 16 or 24, shorted primary of either L3, 4 or 5.
Leaky or shorted C27, faulty vibrator.

Loud whistle or howl on all strong stations as tuned, due to faulty C30, 31 or 32, most probably C30.

Set alive but no stations received. Oscillator is not working, check components in oscillator circuit (see text) especially R14 or C14.

Free oscillation. Check position of movable arm on R4, may be too near earth end or have become loose, tighten. Also could be open C16, 23 or 33.

Other sources of free oscillation are faulty condenser in AVC filter line, namely C13 and 15 or in some cases, through working without adequate earthing system.

NOTE: Open condenser may be readily checked without disconnection by placing a similar or larger capacity across suspect.

Vibrator crackle may be caused by vibrator working loose in socket owing to transport, C27 open circuit.

In order to check this condenser (C27), it will be necessary to solder a substitute condenser in place, as holding one in position will only increase trouble.

Another source is open circuit C29 or C28.

HUM. **Volume control turned down** may be caused by open or leaking C26, 25, shorted C20.

Volume control full on. Faulty C26, 25.

On strong signal only. Faulty 30.
(Do not confuse with normal modulation hum present in some stations.)

ALIGNMENT.

The following procedure should be followed in cases where re-alignment has been found necessary.

I.F. CHANNEL.

Connect live side of generator output to junction of aerial grid lead and condenser lug. Do not disconnect grid lead. Connect earth side of generator to receiver earth terminal. Turn gang to approx. 520 Kc. and adjust IF padder in the following sequence.

1st	Primary No. 1 transformer -	Screw slot.
2nd	Secondary	Box nut.
3rd	Primary No. 2 transformer -	Screw slot.
4th	Secondary	Box nut.
5th	Primary No. 3 transformer -	Screw slot.
6th	Secondary	Box nut

See diagram in instruction booklet for positions of transformers. Recheck when finished.

Broadcast Band. Turn gang full out, connect live lead from generator through 200mmf. Mica condenser to aerial terminal. Earth connection as before. Resonate oscillator padder (nearest dial) to 1550 Kcs.

Move generator to 1300 Kcs. and resonate by use of tuning knob. When correct, resonate aerial trimmer (Rear trimmer)

Move generator to 600 Kcs. and adjust series padder, located near front of chassis directly under gang plates when at zero.

This is accomplished by making a small variation of padder and remounting by use of tuning knob for each variation.

Position of padder giving greatest output is correct.

Dial calibration. If following instructions have been followed the calibration should be O.K.

In cases where calibration needs re-checking and I.F. channel is deemed O.K., it is possible to make a fairly accurate job without the use of a signal generator.

First tune in a weak station approx. 1500 Kc. and adjust oscillator trimmer until max. output is obtained at station frequency marking on dial using normal aerial. Next adjust antenna trimmer for maximum output at this position.

Next tune in a weak station at approx. 600 Kc. and follow same direction as specified for series pad alignment.

RADIO CORPORATION PTY. LTD.

11 - 21 STUART STREET, SOUTH MELBOURNE.

Supplement
Bulletin 40.
2.9.37.

HOUSEHOLD RADIO SERVICE BULLETIN.

REVISED PARTS LIST FOR CIRCUIT NO. 2 MODEL EH.

RESISTORS.

10[illegible],000 ohm 1/4 W. 20% Tol.
10[illegible],000 ohm " " " "
1[illegible] " " " "
1[illegible],000 ohm " " 10% "
10[illegible],000 ohm 1 " adjustable.
10[illegible],000 ohm 1/4 " 20% Tol.
50[illegible],000 ohm " " " "
1[illegible] " " " "
.1[illegible] Vol.control switch
25[illegible],000 ohm 1/4 watt 20% Tol.
50[illegible],000 ohm " " " "
1[illegible],000 ohm " " " "
30 ohm W.wound 5% "
50[illegible],000 ohm 1/4 W. 20% "

INDUCTORS.

Aerial coil.
Oscillator coil
1st IF transformer.
2nd IF "
3rd IF "
Speaker input transformer.
Filter choke
Power transformer
Battery filter choke
R.F.Choke

Pilot light 6 v. .15 amp.

CONDENSERS.

C1. Antenna section gang.
2. " " padder.
3. Oscillator section gang.
4. " " padder.
5. .0003 Mica Plus 0% Minus 5% 1000V.
6. 30/80 Adjust padder.
7. Primary padder 1st IF
8. Secondary padder 1st IF
9. Primary padder 2nd IF
10. Secondary padder 2nd IF
11. Primary padder 3rd IF
12. Secondary padder 3rd IF
13. [illegible] Stedipower 200V. 20% Tol.
14. .05mfd. Mica [illegible]V. 10% "
15. .05mfd. Stedipower [illegible]0V. 20% "
16. .5mfd. Paper [illegible]V. " "
17. .0005mfd. Mica 1000V. 10% "
18. .00025mfd. " " " "
19. .00005mfd. " " " "
20. .01mfd. Stedipower 400V. 20% "
21. .00025mfd. Mica 1000V. 10% "
22. .01mfd. Stedipower 400V. 20% "
23. .002mfd. Paper 400V. " "
24. .05mfd. Stedipower 600V. " "
25. .1mfd. Dry Elect. 200V. " "
26. .4mfd. " " 300V. " "
27. .008mfd. Mica 2000V. 10% "
27a. .008mfd. " 2000V. " "
28. .1mfd. Paper 200V. 20% "
29. .00025mfd. Mica 1000V. 10% "
30. 500mfd. Elect. 8WV 20% "
31. .25mfd. Paper 200V. " "
32. .5mfd. " " " "
33. .5mfd. " " " "
34. 10mfd. Dry elect. 75WV " "
35. .004mfd. Mica 1000V. 10% "

Date 3.8.37. **SPECIFICATION.** Number 656
RECD. 5.8.37.
Exp. Book No.

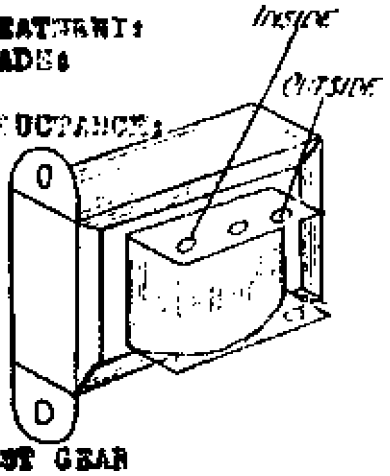
Part Name "A" BATTERY CHOKE (FILAMENT SUPPLY)

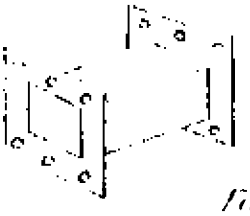
Part Number 112 Blue Print Number File Number

Used in Models DR DG FT HB FG DF. Test Procedure Number 50

DESCRIPTION:

LAMINATION TYPE: No. 1.
THICKNESS OF STACK 3/4" Lap stack 4 x 4
CROSS SECTION AREA: .54 sq. in.
FORMER: Bakelite 23/32"x5/4"x1-3/16" in length, with red fibre end cheeks.
DESCRIPTION: The winding is layer wound with no insulation between layers and consists of 180 turns of 18 S & S enamel covered wire finished off with two layers of 5 mil Red rope fibre.
TREATMENT: Standard practice No. 4.
LEADS: Inside 4-1/2" long red spaghetti covered.
Outside 4-1/2" " Yellow " "
INDUCTANCE: to be 0.1111-henries plus 10% and resistance not more than .6 ohms.
Mounted in sleeve bracket with bottom plate.





TEST GEAR 5A. Inductance

COPIES: Research & Transformers File

Signature H. L. Leete

Date 3.8.37. **SPECIFICATION.** Number 657
RECD. 5.8.37.
Exp. Book No.

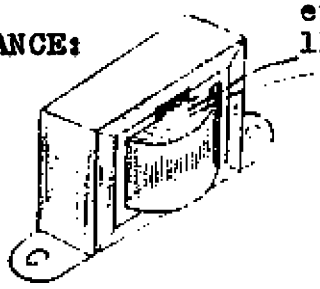
Part Name HIGH TENSION FILTER CHOKE.

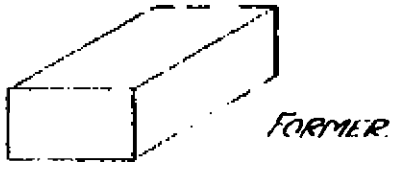
Part Number PT108 Blue Print Number File Number

Used in Models DE.DA.EH.FG. FF.BB. Test Procedure Number 30

DESCRIPTION:

LAMINATION TYPE:	No. O
THICKNESS OF STACK:	5/8" Lap-stack 4 x 4.
CROSS SECTION AREA:	.39 sq. in.
FORMER:	Bakelite type 5/8"x5/8"x15/16"in.length.
DESCRIPTION:	The winding is layer wound and is 3300 turns of 37 B & S Enamel wire with 1 layer of 1 Mil Excelsior paper per layer of wire and finished off with 2 layers of 5 Mil red rope fibre.
TREATMENT:	Standard Practice No.5.
TEST GEAR:	5A.
TEST VOLTAGES:	200 volts maximum of 40 M/A.
LEADS:	Are wiring flex brought out from the laminated end 7-1/2" long.
INDUCTANCE:	11 Henries P/M 10% with no DC flowing.





DC RESISTANCE: 480 to 500 ohms.

TYPE BB: mounted on bakelite base and inside lead connected to core by means of .004" copper foil clamped under long side of sleeve opposite leads.

RESEARCH 6. TRANSFORMERS FILE.

Signature

The Astor "Selftuna", Series EP

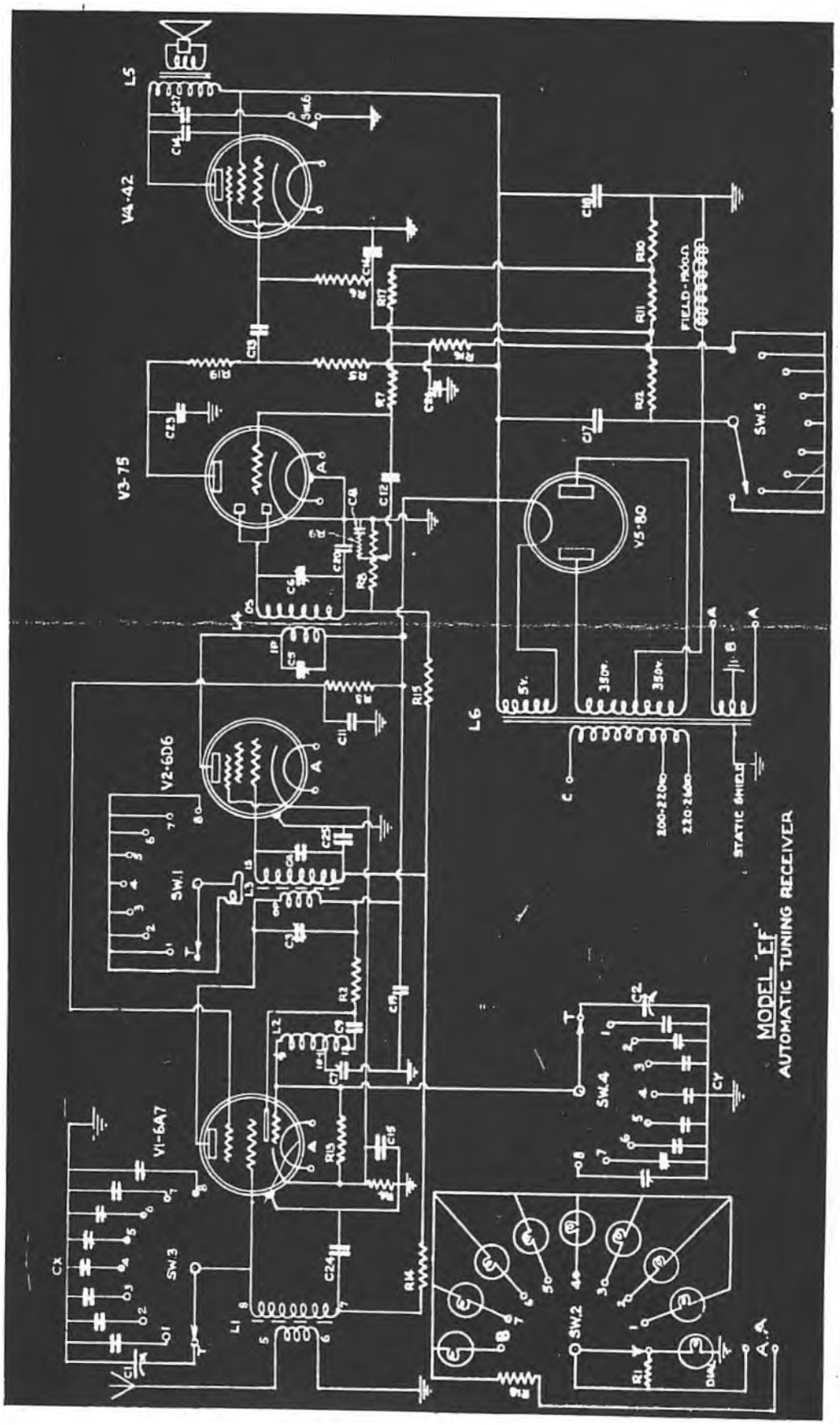
5 Valve broadcast mantel

Valves used; 6A7 mixer, 6D6 I.F. amplifier, 75 diode detector, A.V.C. and first audio, 42 Output, 80 Rectifier.

I.F. frequency 472 kHz, broadcast coverage 1550-540 kHz.

Features; Automatic station selection with choice of 8 stations, automatic bass compensation, A.V.C., tone control.

"Astor" Selftuna—Chassis type EF



Astor "Selftuna," chassis type "EF," is a five-valve receiver designed for broadcast coverage and operation from 200-260 volts A.C. mains. A particular feature of this receiver is found in the provision of a 9-position selector switch which enables the receiver to be instantly adjusted to the frequency of any of 8 local stations or operated by means of the normal tuning dial. The receiver is housed in a console cabinet and employs an 8 inch, 1,900 ohms field, loudspeaker. Four controls are fitted, these being for switch-tuning (9 positions), manual tuning, tone control (SW.6, 2 positions), and volume (tapped, bass compensation type).

Although the basic circuit arrangement of this receiver is quite straightforward, a number of factors are introduced by the switch-tuning system which are not found in normal practice. The first point of interest is provided by the "band-expander" switch (SW.1). This is ganged to the switch-tuning control and, in all positions except that for normal "dial" tuning ("T"), closes a link circuit in the first I.F. transformer. The effect of this link circuit is to overcouple the primary and secondary windings and so broaden the response of the receiver.

The "switch-tuning" sections of the selector switch (SW.2, SW.3, and SW.4) are quite normal in function—that of SW.2 being to bring separate indicator lamps into circuit and also to bring the normal dial-lamp up to full illumination by shorting out R1 when the selector is in the "dial-tune" position, and those of SW.3 and SW.4 being to control the tuning of the aerial and oscillator circuits, respectively. The trimmers used in positions 1 to 8 of these switch-sections are of the mica compression type and all are accessible by merely removing a plate from the back of the chassis.

The final section of the station-selector bank (SW.5) introduces a most unusual feature in the form of a time-delay circuit for "muting" the receiver whilst rotating the selector switch. A glance at the circuit diagram will reveal that the contact arm for this switch is shown between studs, instead of being on a stud, as in the other sections.

(Continued on page 241)

11 - 21 STURT STREET, SOUTH MELBOURNE.

HOUSEHOLD RADIO SERVICE BULLETIN.

SUBJECT - 5 VALVE A.C/D.C FOR "SELFTUNA" TYPE OF AUTOMATIC STATION SELECTOR SUPERHETERODYNE RECEIVER.

DESCRIPTION.

This is a new type of radio receiver incorporating several important new developments in circuit design.

AUTOMATIC STATION SELECTOR.

By means of a rotary switch it is possible to tune instantly any one of eight different stations. A time delay of half a second makes possible the selection of any one particular station without the others being heard as the selector is rotated.

The time delay is brought about by momentarily biassing the 75 valve beyond cutoff as the switch rotates. The bias charge is held in a 2mfd. condenser (C26) and leaks away through a resistor (R17) in about half a second. Thus the selector can be turned through its complete range without any other than the desired station being heard.

The name of the station selected is shown in a porthole in the rectangular escutcheon. If desired, the ordinary tuning unit can be selected. When the selector is turned completely to the left and the main dial lights up, the receiver can be tuned just as any other receiver, and stations not provided for in the selector positions can be tuned in. It will be noted that all important local stations can be selected, while long distance and other stations can be tuned by the variable control.

AUTOMATIC BASS COMPENSATION.

The human ear has not the same response to all sounds. The accompanying chart shows in heavy black line the sound power needed to be just audible to the ear. (The dashed line shows the sound power which causes a sensation of pain in the ears). It is apparent from this that if the sound level of a receiver is lowered only the middle frequencies will be audible.

Automatic bass compensation causes the low frequency notes to be magnified compared to the middle frequency notes, by a constantly increasing ratio, which reaches several hundred percent, as the volume is turned down.

Thus the full naturalness of reproduction is maintained at any volume level, and it is not necessary to have loud volume to get good reproduction as heretofore.

In order to increase the frequency response the receiver is automatically made "Wide range" in the Selector positions. This increases the high audio frequency response on local stations. The frequency range in Selector positions is 32% greater than in the variable Tune position.

In the variable tune position the receiver has maximum selectivity in order that stations can be effectively separated.

DISTORTION.

By careful attention to circuit parameters, the percentage of harmonic distortion of this receiver has been made negligible up to 3 watts output. The maximum output is in the order of 4 watts for normally modulated signals.

HIGH FIDELITY.

When the selector is turned to a station the receiver is automatically made "High Fidelity". By means of a link coupling, the first IF transformer becomes overcoupled, and due to the broad topped resonant response passes more high frequency notes than it does when the receiver is in the highly selective "tune" position.

Thus maximum selectivity for long distance stations and high fidelity reception of local stations is achieved. Local stations are so widely separated in frequency that extreme peak selectivity is not needed.

INSTRUCTIONS FOR SERVICEMEN.

Alignment of Selector tuner.

Remove cover plate from rear of receiver. The adjusting screws for each station are marked. Turn the selector knob until the desired station light shows, then adjust the screws at the back of the receiver corresponding to the station. Most permanent alignment is got by loosening the screws off to the right slightly then gently screw them up to the left for maximum signal. Do not lossen off again in an attempt to peak.

Receiver alignment.

The IF frequency is 472½ Kc. Turn selector switch until the receiver is in the Manual Tune position, turn the condenser fully out.

Apply a modulated signal to the grid of the 6A7, and adjust the screws and nuts in the top of the IF transformer shields for maximum output.

Variable condenser alignment.

Turn the pointer to 1400 kc. Apply a modulated signal of 1400 Kc. to the aerial terminal, using 100mmf. condenser as dummy aerial. Adjust the variable condenser trimmers for maximum output from set.

Next put signal generator on 600 Kc. turn set to about 600 Kc. and adjust series pad (just to rear of variable condenser) meanwhile turning condenser knob back and forth, until best combination of condenser and series pad adjustment is reached. Go back to 1400Kc. and make a further slight adjustment.

Defective parts.

Defective parts can usually be found by continuity and other tests well known to Servicemen. The parts list gives the values and tolerances. Parts not obtainable locally can always be got from Radio Corporation Pty. Ltd. South Melbourne.

TABLE OF VOLTAGES.

Taken with 1000 ohms per volt voltmeter.
0 - 10 volt and 0 - 250 volt ranges.

	Cathode	Screen	Plate.	Oscillator Plate.
6A7	3.8 volts	70 volts	250 volts	125V.
6D6	3.8 "	70 "	250 "	
75	0	---	65 "	
42	0	250 "	235 "	

Voltage across field coil - 80 volts.

SUBJECT - MODEL EF TUNING PADDERS.

When in close proximity to a broadcast station which has a frequency which is a multiple of the IF frequency, or close to a multiple of the IF frequency, such as 955 and 1417½ Kcs. it is possible to so mistune the oscillator tuning padder that a constant whistle may be heard. The remedy of this is - retune until the whistle disappears.

Under some circumstances, when in close proximity to powerful stations it may happen that a microphonic booming sets up in the switch tune position on maximum volume. This is due to mechanical vibration of the padder plates. The remedy is to mount the padder plate on live rubber,

NOTE: Only a very few of the first sets have solidly mounted padder plates.

11 - 21 STUDD STREET, SOUTH MELBOURNE.

HOUSEHOLD RADIO SERVICE BULLETIN.

SUBJECT - ASTOR "SELFTUNA" TYPE EF PARTS LIST.

CONDENSERS.

Gang 17-445 with trimmers
Part No. Cond. 11
Gang 17-445 with trimmers
Part No. Cond. 11

I.F. padders

Series pad 250-500mmf.
Part No. Series Pad 2.
.003mfd. Mica P/M 10%
.001mfd. " " "

.1 mfd. " 20% 400V.
.02 " " " 200V.
" " " " 400V.
.006 " " " 400V.
.5 " " " 200V.
.25 " " " 200V.
" " Wet " " 500V.
" " " " " 450V.
.5 " " " 400V.
.00025mfd. " 10% Mica

.0008mfd. " " Mica
.1 mfd. " 20% 200V.
.1 " " " 200V.
.5 " " " 200V.
.02 " " " 1000V.

Tuning Pads
Part No. EF Tuning Pad

RESISTORS.

R1.	7	ohms	P/M 10%	2W. W/W
2.	30,000	ohms	"	" 1/2W.
3.	50,000	ohms	"	" 1W.
4.	400	ohms	"	" 1/3W.
5.	250,000	ohms	"	20% "
6.	.5	meg	"	20% "
7.	.5	"	"	" "
8.	1	meg	C.T. V. control	
9.	10,000	ohms	P/M	20% 1/3W.
10.	7,000	ohms	"	10% "
11.	.1	meg	"	" "
12.	.5	meg	"	" "
13.	30,000	ohms	"	" 1/2W.
14.	.1	meg	"	20% 1/3W.
15.	.1	meg	"	" "
16.	.5	meg	"	" "
17.	.5	meg	"	" "
18.	7	ohms	"	10% 2W. W/W
19.	.1	meg	"	20% 1/3W.

VALVES.

V1.	6A7	valve	Pentagrid converter
2.	6D6	"	Variable Mu R.F. Amplifier
3.	75	"	Duo Diode Triode
4.	42	"	Power Pentode
5.	80	"	Rectifier

Dial light 4.5 V. .3 amp Minature screw base
Station lights 6.3 V. .15amp " "

INDUCTORS.

Gang Switch Part No. EF-S1

On-Off Tone control switch(oak)
Antenna Transformer " " EF-T1
Oscillator Transformer " " EF-T2
1st IF Transformer " " EF-T3
2nd IF Transformer " " EF-T4
Loud Speaker 1900 ohm Field
42 type Input transformer
Power Transformer " " EF-T6

"Astor" Selftuna, chassis type EF

(Circuit diagram and commencement of descriptive matter are on page 17)

This is as it should be, and is a point which should be carefully watched as the operation of the "muting" system (and the receiver itself) depends on whether this switch "breaks" as the others "make." The principle behind this system is quite simple. As can be seen, the triode section of the 75 is normally biased by the voltage obtained at the junction of R10 and R11. Under these conditions R17 and C26 act as a hum filter circuit in series with the grid resistor (R7). As the selector switch is rotated, SW.5 completes a circuit between R16 and the most negative end of the bias system, with the result that C26 is charged to a much higher potential than usual and the 75 is biased to cut-off. This effectively "mutes" the receiver and prevents any signal being heard until switch-sections 1 to 4 are brought to rest on a stud. This means that the circuit through SW.5 is opened and the extra charging potential for C26 is removed. However, the capacity of C26 is such that it takes about 30 seconds for the charge to leak away through R17 and the bias to come back to normal. This time-delay prevents signals being heard as the switch is rotated over any stud, but allows the selected station to come in normally a few seconds after the switch is brought to rest.

The remainder of the receiver follows standard practice and, although it is not possible to give any component values, no difficulty should be experienced because of this. However, the following tabulation of operating voltages will provide a useful guide as to the conditions applying. The measurements were made with a "1,000 ohms per volt" meter between chassis and the socket contact indicated.

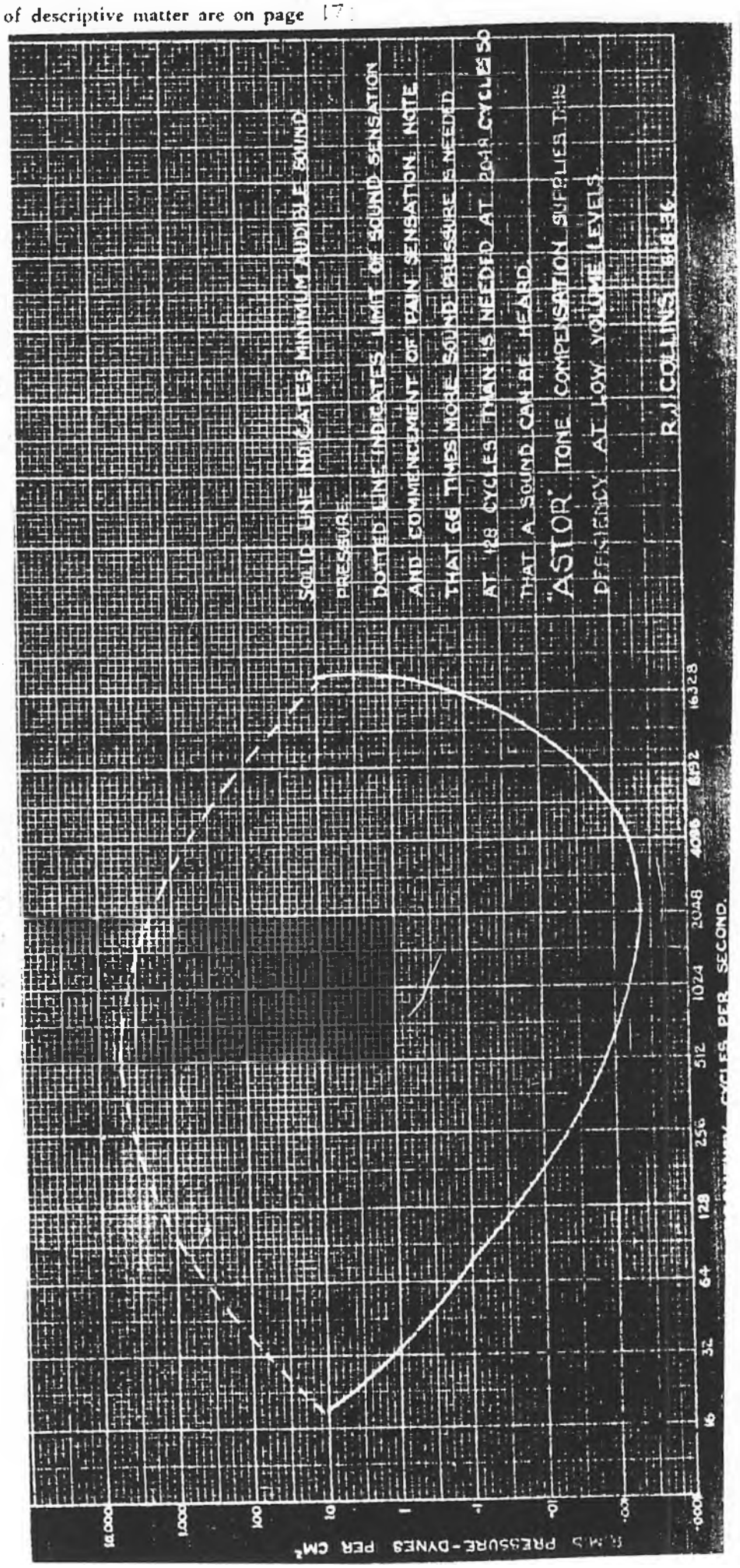
6A7, Frequency Converter. Plate, 250 v.; screen, 70 v.; cathode, 4 v.; osc. anode grid, 125 v.

6D6, 472.5 KC. I.F. Amplifier. Plate, 250 v.; screen, 70 v.; cathode, 4 v.

75, Detector, A.V.C. Rectifier and Audio Amplifier. Plate, 65 v.; cathode, earthed. Bias is obtained from a tapping slightly over 1 volt negative on a voltage divider system across the L.S. field.

42, Output Pentode. Plate, 235 v.; screen, 250 v.; cathode, earthed. Bias is obtained from a tapping about 17 volts negative on a voltage divider system across the L.S. field.

Voltage Drop across L.S. Field is approx. 80 volts.



PROCEEDURE ADOPTED FOR ASSEMBLY OF MODEL EF MULTI PADS.

Component Parts Required: -

1	20 G.	Steel base
31	No. 36	Rotor plates
21	No. 24	Stator "
4	No. 18	Rotor "
4	No. 35	Stator "
16	20 G.	Steel Packers
16	1/16"	Bakelite Packers
116	pieces	3 mil. Mica (3/16" hole)
32	¼" x ⅛"	Steel R.H. Screws
16	3	B.A. Screws
16	9/16"	Steel washers

Op. 1. Take the above number of plates and crimp bakelite washers in same.

Op. 2. Insert 3/16" brass spindle in 3 B.A. tapped hole in top left hand corner of base.

Op. 3. Interleave one film of mica and one full plate until four plates have been attached, two with lugs protruding on opposite side to others.(Keep top plate lug nearest to bottom edge of base.)

Op. 4. Place one steel and one bakelite packer on two ¼" R.H. screws and screw to base through rear end of plates.

Op. 5. Screw down one 3 B.A. screw with 9/16" steel washer, through center hole of plates.

Op. 6. Repeat operations 2 and 5 for each separate pad but vary quantity of mica and plates as follows. -
Note: The mica films given are for between base and bottom plate. One film only should be between plates.)

Top Row (Left to Right)

4 full plates	1 mica film
4 cut away plates	5 " "
4 full plates	1 " "
2 cut away plates	5 " "

2nd Row

4 cut away plates	5 " "
2 cut away plates	5 mica film
4 " " "	5 " "
2 " " "	5 " "

3rd Row Same as second

Bottom Row

4 Cut away plates	5 mica films
4 " " "	5 " "
4 " " "	5 " "
2 " " "	5 " "

Op. 7. Tighten all anchoring screws and bake in oven at 195°f. for four hours.

Op. 8. Retighten all anchoring screws while hot and test for minimum and maximum capacity, which will be: -

2 pl. cut away pads	15-105 mmfd.
4 pl. " " "	30-290 "
4 pl. full "	150-500 "

Op. 9. Repeat operation 7.

Op. 10. Tighten anchoring screws and again test for minimum and maximum capacity at correct readings, which are -

2 pl. cut away pads	19-100 mmfd.
4 pl. " " "	40-250 "
4 pl. full "	200-450 "

Op. 11. Loosen adjusting screws leaving just enough tension to obviate them from working out.

Op.12. Wrap in tissue paper and deliver to store.

Note: - Should the plates not be bent correctly, it is advisable to space same with flat instrument so that they are relatively the same distance apart at minimum capacity.

Leave screws with just sufficient tension on to keep them from falling out, and wrap completed units in tissue paper for storage.

Some units from store should be spot checked after one week, to check tightness of anchoring screws and capacity range. If screws are again loose, the complete batch should be withdrawn and retightened.

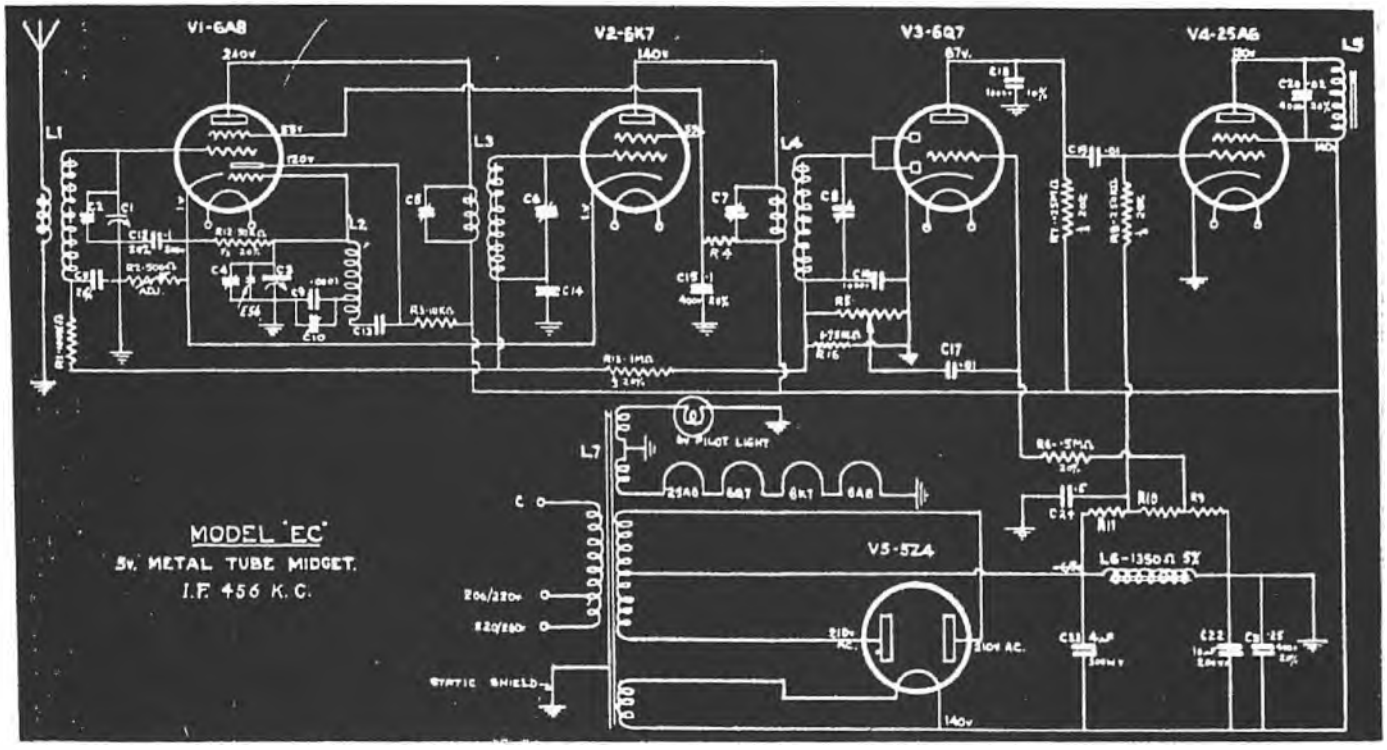
THE ASTOR "Mickey Mouse" Series EC.

5 Valve broadcast mantel model

Valves used; 6A8 mixer, 6K7 IF, 6Q7 diode detector, AVC & 1st audio, 25A6 output, 5Z4 rectifier.

IF frequency 456 Khz.

Astor Type "EC" Mickey Mouse A.C. Broadcast Midget



Astor "Mickey Mouse"

Chassis type "EC," uses metal envelope valves and 5-inch, 1,350 ohms field, loudspeaker. Circuit appears on facing page.

COMPONENT VALUES.

RESISTORS.

R1—100,000 ohms, ½ W.; R2—500 ohms, w.w.; A.F. volume control; R3—10,000 ohms, ½ W.; R4—30,000 ohms, ½ W.; R5—1 megohm, A.F. volume control; R6, R11—500,000 ohms, ½ W.; R7, R8, R10—250,000 ohms, ½ W.; R9—20,000 ohms, ½ W.; R12—50,000 ohms, ½ W.; R13—1 Megohm, ½ W.; R14—750,000 ohms, ½ W.; R15—40,000 ohms, ½ W.; R16—1.75 megohms, ½ W.

COILS, ETC.

L1—Iron plug aerial coil; L2—Osc. coil; L3, L4—1st and 2nd iron cored I.F. trans. resp. 456 kC.; L5—loudspeaker trans.; L6—loudspeaker field coil, 1,350 ohms, 5%, L7—power trans.

CONDENSERS.

C1, C3—sections of 2-gang variable; C2—aer. trimmer; C4—osc. trimmer; C5, C6, C7, C8—I.F.T. trimmers; C9—380 mmfd., 1,000 v., mica, plus 0%, minus 5%; C10—30/80 mmfd., padder; C11, C14—0.05 mfd., 200 v., paper; C12, C15—0.1 mfd., 200 v., paper; C13, C16—500 mmfd., 1,000 v., mica; C17, C19—0.01 mfd., 400 v., paper; C18—250 mmfd., 1,000 v., mica; C20—0.02 mfd. 400 v., paper; C21—0.25 mfd., 400 v., paper, plus 0%, minus 10%; C22—10 mfd., 200 v., W., paper; C23—4 mfd., 300 v., W., paper; C24—0.5 mfd., 200 v., paper; C25—0.003 mfd., 1,000 v., mica.

ALTERATIONS.

In earlier models of this series it will be found that R16 (1.75 megohms) was omitted. This was added on 21/6/'37, and has the effect of minimising the effect of any change in the resistance of the vol. cont. E58—small added capacity not found in earlier models.

RADIO CORPORATION PTY. LTD. Bulletin 39, 10.8.36.
11 - 21 STURT STREET, SOUTH MELBOURNE. Page 1.

HOUSEHOLD RADIO SERVICE BULLETIN.

SUBJECT - ASTOR FIVE TUBE MICKEY MOUSE RECEIVER

CHASSIS TYPE EC.

GENERAL:

The type EC Astor Mickey Mouse receiver is the smallest and most efficient midget receiver yet produced by the Company. Quite a few new features are incorporated namely, all iron cored coils (excepting oscillator) Automatic volume control, New type audio frequency circuit resulting in much improved bass response at low volume level without attenuation of higher frequencies, Diecast speaker and dial mounting ring, Calibrated illuminated dial, with main stations marked.

TUBE COMPLEMENT.

Type.	Function.
6A8	Oscillator-Modulator.
6K7	IF amplifier.
6Q7	2nd Det. A.V.C. 1st Audio Amplifier
25A6	Power output.
5Z4	Rectifier.

CIRCUIT DESCRIPTION AND OPERATION.

The circuit used is the conventional superheterodyne type which has very high gain and low noise level by the use of Iron cored, high gain, IF transformers, and, more especially, the aerial coil.

A.V.C. is developed across the manual volume control which is located in the diode loading circuit. High and low note balance is also effected in this circuit. Minimum bias for the audio section is obtained by use of a voltage divider across the 1350 ohm loud speaker field coil.

Minimum bias for R.F. end of receiver is obtained by the use of an adjustable resistor R2 located in the common cathode lead of V1 and V2. By the use of this resistor it is possible to vary the gain of any particular receiver in order that slight differences in tube gain may be overcome.

ALIGNMENT:

IF frequency is 456 Kc.
A signal of this nature should be fed from a reliable signal generator to the grid of V1 -Gang set with plates closed, Padders C5, C6, C7 and C8 should be adjusted in this order until maximum reading is indicated on output meter. This reading should not exceed 10v. at 4000 ohm load or correct alignment will be impossible owing to the AVC effect. The output meter should be circuited between Plate and Screen of V4.

Broadcast Frequencies.

Adjust the dial pointer to 1550 and tune in (with aerial supplied) and using tuning knob, to the highest frequency station obtainable. Adjust oscillator gang trimmer (One without lead to grid of 6A8) until the station reads correct frequency. It will be necessary to "chase" the station with the tuning control every time the oscillator padder is shifted until the station reads correct frequency on dial.

No further adjustment of the oscillator padder should be attempted.

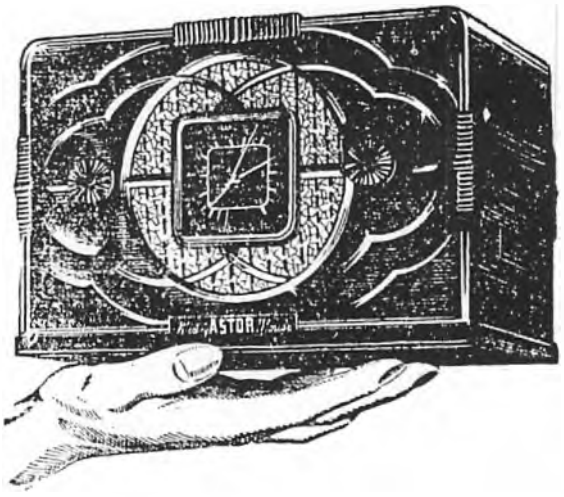
Feed 1400 Kc (approx.) signal from generator through a 100 mmf. mica fixed condenser to end of attached aerial after same has been rolled into a small ball approx. 2" dia. Tune in signal with tuning knob and peak aerial trimmer.

Move generator to 600 Kc (approx) and adjust series padder condenser located in back of chassis.

The usual method of rocking the tuning knob over the frequency whilst making adjustments to series pad screws should be followed, the padder screw being left at position giving greatest output.

In cases where a large amount of adjustment is necessary topeak series padder the whole procedure of adjusting oscillator and aerial padder should be rechecked.

The alignment should be checked at 1000 Kc. when all other adjustments are completed and should be found to be practically exact.



The method used for 1000 Kc. check is to tune in generator to 1000 Kc. as specified for 1400 Kc. only instead of adjusting aerial padder, the aerial section split plate which has just come into mesh at this frequency should be gently pushed in or out.

If any improvement is noticed, the alignment at this spot is not exact and should the amount be only small it may be corrected by adjustment of the aerial split plate.

Calibration should be then checked and if directions are carefully followed very accurate results should be obtained.

FAULT FINDING

Check all tubes by substitution with known good ones; as the filaments are series wired, it is necessary to check all filaments with a continuity meter. Check voltages against those shown on blueprint diagram.

Check bypass condensers for short and for open by substitution, the O.K. condenser may be just held across suspected position.

Following are a few possible faults with probable remedies.

Excess hum at low volume	- Open C24.
Continual Hum	- Leaky or open C23, 22.
Oscillation	- Faulty tubes, incorrect adjustment R2. Open C21, 15, 12, 11 or 14.
Distortion	- Open C16, leaky C17 or 19. Faulty tubes.
Lack of bass response	- Shorted C25.
Receiver alive, no signal.	- Open R12, open or shorted C13, faulty tubes, faulty L2, shorted C3, 4, 9 or 10.

CHANGE NOTICE

11/7/39 ~~Before~~ After Production Number of Change Notice E228

EC Part Name .1 mfd 200V Paper Condenser

Nature of Change A .1 mfd Paper 400V Condenser will be added to the circuit across the field coil. Wiring as per samples.

Reason for Change Hum reduction

e or Run Effective Immediately

Authorised by Committee of Management D. R. McGREGOR CHAIRMAN: Suggested by G. OGLE ~~J. SALVADY~~

Date. 29-5-1939 Change Notice E220
Model EC

Nature of change. The 6 mfd Electrolytic (C23) will be changed to a 10 mfd electrolytic capacitor 300 volt rating, immediately to reduce hum level. (Retyped as original was not clear enough for further copying)R.K.

MODEL EC. 30/5/39

COMPLAINTS ON BOOM TROUBLE.

POINTERS SLIPPING.

Refer memo 3/4/39 on same subject.

Mr. Parker has found two cases to-day of EC booming because of the sneaker touching the gang.

Whatever measures were taken on 3/4/39 have proved unsatisfactory and some fresh effort is needed to overcome this problem.

Mr. Parker also states numbers of sets rejected from final OK for indicators slipping. This is due off centre holes in the dials, the edge of the celluloid acting as a break on the pointer.

Date 22.8.37. SPECIFICATION.

Exp. Book No. B61 P17

Part Name EC ANTENNA TRANSFORMER

Part Number EC365 Blue Print Number 32 File Number 55

Used in Models EC Test Procedure Number 4

DESCRIPTION:
TYPE: Iron cored secondary, plug type.
FORMER: Bakelized paper tube 13/32" O.D. 9.5 mm. I.D. 1-1/4" long.
PRIMARY: 400 turns 38 B & S SSE Inductance 2450 uh. 39/40 gears 0.125 cam.
SECONDARY: 92 turns 7/41 B & S litz. Inductance 225 uh 38/40 gears 0.125 cam.
COUPLING: 15.2%
CAPACITY COUPLING: 3 turns 32 B & S DSC over secondary 8 uuf P/M 1 uuf.
CONNECTIONS: All windings same direction. outside secondary grid, inside primary antenna. Finish capacity winding to antenna lug.
TREATMENT: Standard Practise No. 1.
REMARKS: Suitable for use with tuning condenser 13.5 min. 387 uuf. max. Tuning range with 50 uuf. antenna 547-1550 kc. This coil will match coil PT104 and all FF, FE, FC, GB, GD, GH, dials. Can be used in any of these sets where they are to work on an indoor aerial 16'6" long. (50 uuf.)

Date 16.5.37. SPECIFICATION.

Exp. Book No.

Part Name BROADCAST OSCILLATOR COIL MODEL FC.

Part Number PT104 Blue Print Number 13 File Number 55

Used in Models FC.FF.FE.FC.GA.GB.GD.GH (No.2 dial) GH Test Procedure Number 4

DESCRIPTION:
TYPE: Air core, single layer.
FORMER: Bakelite tube, 11/16"O.D.x1-5/32"long.
PRIMARY: 24-5/6 turns 36 B & S enamel, close wound. Inductance 15.6 uh.
SECONDARY: 91.5 turns 36 B & S enamel, close wound. Inductance 122 uh.
COUPLING: 28.75%.
CONNECTIONS: Both windings same direction, and wound without space between. Finish of primary and start of secondary connected together to form tap.
TREATMENT: Bake untreated coil for half hour at 320°F. Brush with Copal varnish and bake 1 hour at 160°F, followed by 4 hours at 320°F max.

AFTER PRODUCTION CHANGE.

MODEL EC. 2.3.37.

The volume controls used in this model have given trouble in service owing to change in resistance amounting in some cases to 700 to 800% from original values. This is shown up as an intermittent fading effect in the set when tuned to a strong signal owing to the blocking effect which the high resistance has on the automatic volume control circuit. To obviate this it will be necessary to connect a 1.75 megohm 1/4 watt 20% tol. resistor in parallel across the outside lugs of the volume controls.

RADIO CORPORATION PTY. LTD. Supplement 1.
Bulletin 39.
11 - 21 STURT STREET, SOUTH MELBOURNE. 31.5.37.

HOUSEHOLD RADIO SERVICE BULLETIN.

SUPPLEMENT TO BULLETIN 39, CHASSIS TYPE EC.

Beginning from 25.5.37. Schedule 21/37, Antenna transformer PT102 and Condenser PC138 have been deleted and replaced by a new antenna Transformer EC365. This transformer gives higher gain with the small aerial used.

PT102 and EC365 are interchangeable in the EC (provided oscillator PT104 and Dial EC2 are used, and PC138 is not used with EC365.)

Nature of Change. **Dial.** A new dial has been printed for present production EC receivers. This is to be used from today. The dial is EC3. This dial will be used in production sets up to schedule 13/37, approximately.

Transformers. Production of EC aerial and oscillator will cease from todays date. Stocks, and the Coil Dept. bank of EC transformers (aerial and oscillator) which together number 230 sets, should be used up by the finish of schedule 13/37.
From schedule 14/37 a new dial (No.EC2) and different aerial and oscillator transformers will be used. See change notice E6 for details.

Reason for Change. 1. To correct dial scale for new alignment procedure and recent station changes.

2. To make provision for a change over to standard coils on schedule 14/37.

The

MONARCH

Model E. C.

4-VALVE SUPERHETERODYNE 200-260 VOLT A.C. RECEIVER.

For Operation from 200-260 A.C. Electric Supply Mains

GENERAL INFORMATION.

AERIAL.

An aerial is provided with receiver, being approximately 16 feet in length. This will be found sufficient for normal purposes, but in cases where reception is poor, or where more distant reception is desired, an outdoor aerial of from 35 to 100 feet may be used. The permanent aerial may be joined to the end of the aerial provided.

A HAZELTINE PATENT AERIAL TRANSFORMER is incorporated in this set, and makes the actual size of the aerial non-critical. It has been found that a very small aerial picks up little energy from the broadcast station, and tends to make static noises relatively louder. Where the receiver is situated very close to a powerful local station a smaller aerial may give more satisfactory results.

EARTH WIRE.

An earth terminal is provided, and is marked "E" on the chassis. In some localities an earth wire helps to reduce noise. The earth lead should be as short as possible, and may be clamped or soldered to a water pipe or to a pipe driven into the earth for from two to three feet.

OPERATION.

Tubes require 30 seconds to warm up to operating temperature. Turn volume control clockwise, and rotate tuning control until a station is heard. Readjust volume control to required volume level, and readjust tuning control.

VALVES.

Valve types and positions are shown on diagram, and include two dual-purpose valves, viz.: 6A8 and 6Q7.

LINE VOLTAGE ADJUSTMENT.

It is important that the receiver should operate on the correct line voltage. In order to check this point, it is at first necessary to ascertain the line voltage for the area concerned. Then, before any attempt is made to adjust voltage, the receiver plug should be disconnected from the power socket. An inspection of the back of the receiver chassis will disclose a screw holding in position one end of a cover plate. On removal of this screw, by turning the cover plate, there will be visible two screw ends, opposite which on the chassis will be noted the corresponding voltage ratings. Should it so happen that the receiver is connected to the incorrect voltage, the retaining nut should be removed, the eyelet lug moved on to the correct screw, and the nut tightened down once more.

The

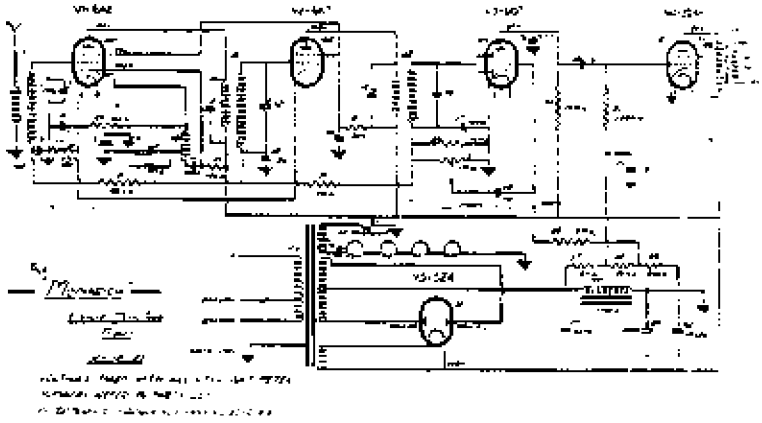
MONARCH

5-VALVE METAL TUBE MIDGET

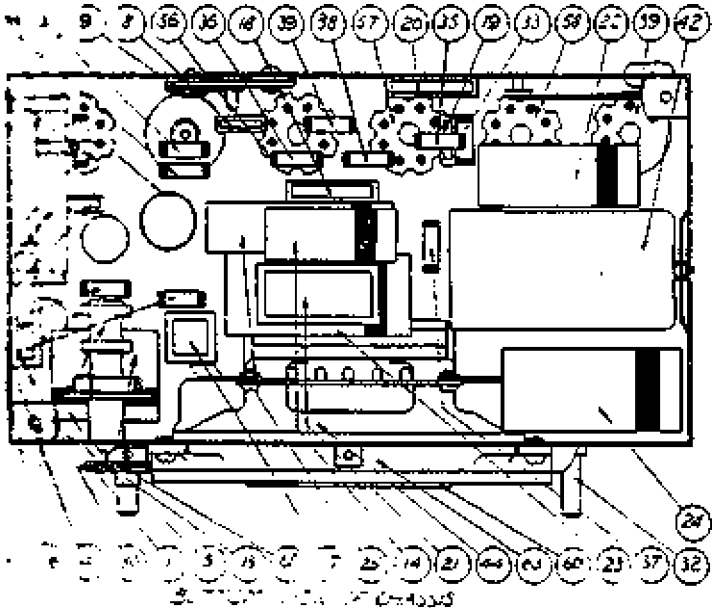
A.C. Model

DIAL LIGHT.

The dial is lit by a 6 v. 0.15 amp. bayonet socket globe, replacement of which, should same become necessary, may be accomplished in the following manner:—Remove knobs from shafts, remove chassis from cabinet by unscrewing the two screws located under cabinet. Turn condenser shaft until pointer is located at the extreme end of travel. Note position of pointer. Unscrew pointer set-screw and remove. Unscrew four screws holding dial in position, and remove. The lamp will then be accessible and may be changed.



Description (Numbers refer to Circuit)	Rating	Tol. P.M.	Spec.	Part Number
Mains Transformer	—	—	633	PT167
Gang Var. Condenser	—	—	711	PC157
Aerial Coil Trimmer				
Solid Paper Condenser	400v.	20%	—	PC103
Solid Paper Condenser	200v.	20%	—	PC102



6.	2-gang Var. Condenser	—	—
7.	Oscillator Coil Trimmer		
8.	.0003 ufd Mica Condenser	1000v.	5%
9.	Adjustable Series Padder	—	—
10.	.0005 ufd Mica Condenser	1000v.	10%
11.	Ceramic Base IF Padder	—	—
12.	Ceramic Base IF Padder	—	—
13.	.05 ufd Paper Condenser	200v.	20%
14.	.1 ufd Paper Condenser	400v.	20%
15.	Ceramic Base IF Padder	—	—
16.	Ceramic Base IF Padder	—	—
17.	.0005 ufd Mica Condenser	1000v.	10%
18.	.01 ufd Paper Condenser	400v.	20%
19.	.00025 ufd Mica Condenser	1000v.	10%
20.	.01 ufd Paper Condenser	400v.	20%
21.	.02 ufd Paper Condenser	400v.	20%
22.	.5 ufd Paper Condenser	200v.	20%
23.	4 ufd Electrolytic Condenser	300v.	20%
24.	10 ufd Electrolytic Condenser	300v.	20%
25.	.25 ufd Paper Condenser	400v.	20%
26.	100,000 ohm Resistor	½ watt	10%
27.	500 ohm Adj. W.W. Resistor	—	—
28.	50,000 ohm Carbon Resistor	½ watt	10%
29.	10,000 ohm Carbon Resistor	½ watt	10%
30.	1 megohm Carbon Resistor	½ watt	20%

31. 30,000Ω carbon resistor, 1/4 watt, 10%
32. 1 megohm volume control
33. 250,000Ω carbon resistor, 1/4 watt 10%
34. 1.75 megohm carbon resistor, 1/4 watt
35. 250,000Ω carbon resistor, 1/4 watt 10%
36 & 37. 500KΩ carbon resistor, 1/4 watt 10%
38. 250,000Ω carbon resistor, 1/4 watt 10%
39. 20,000Ω carbon resistor, 1/4 watt 10%
44. Rola speaker, 4000Ω input, 1350Ω field

Retyped as original too tightly bound (R.K).