

TECHNICAL INFORMATION

BULLETIN NO. 139

(TYPE)

Cromwell +

GULBRANSEN MODEL 720 7-VALVE

DUAL WAVE RECEIVER.

same Bulletin does for the
720 + 722. very slight
difference regards tubes.

17 July 1940

RECEIVER

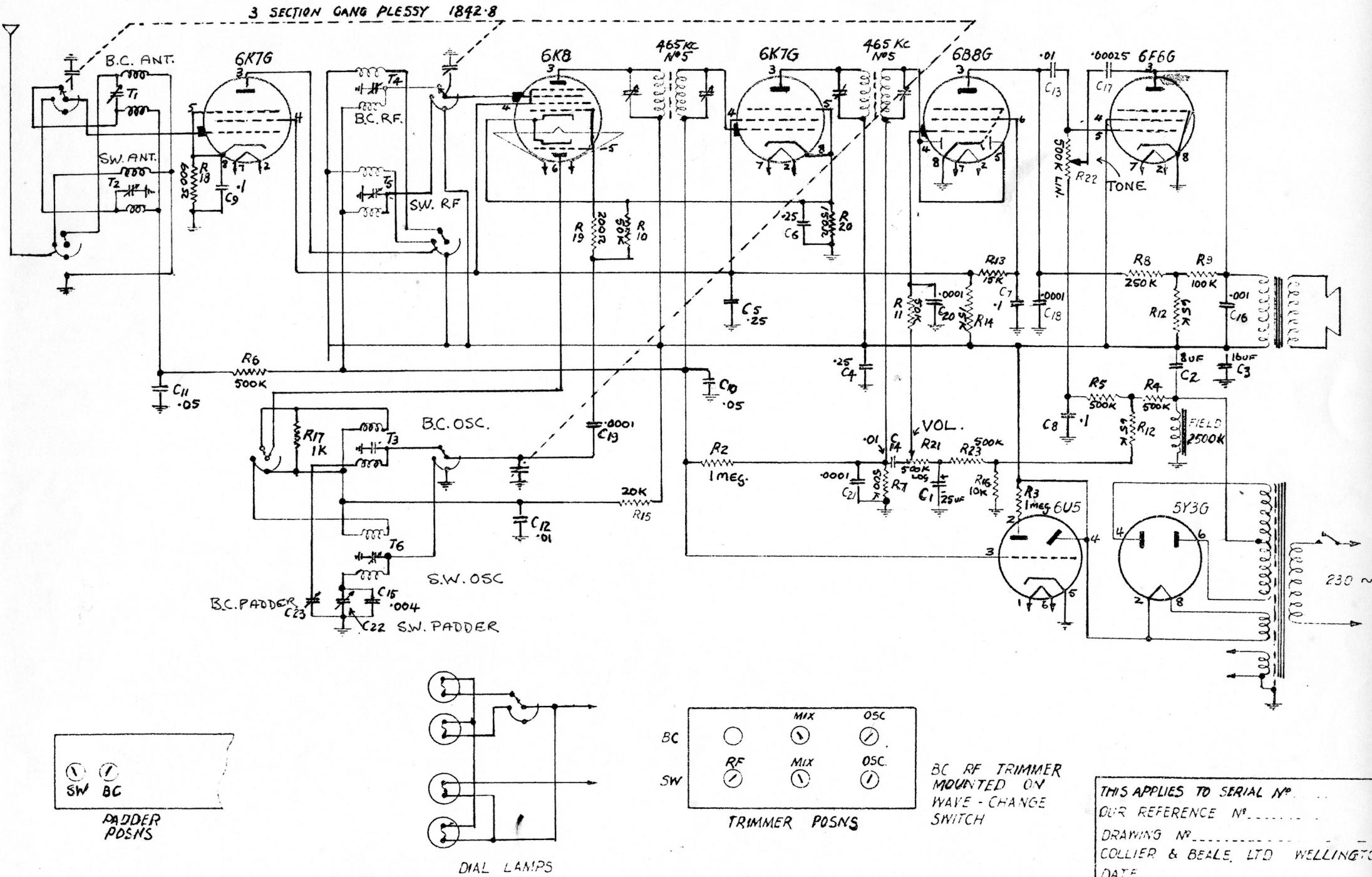
COLLIER & BEALE LTD.

WELLINGTON

cl.

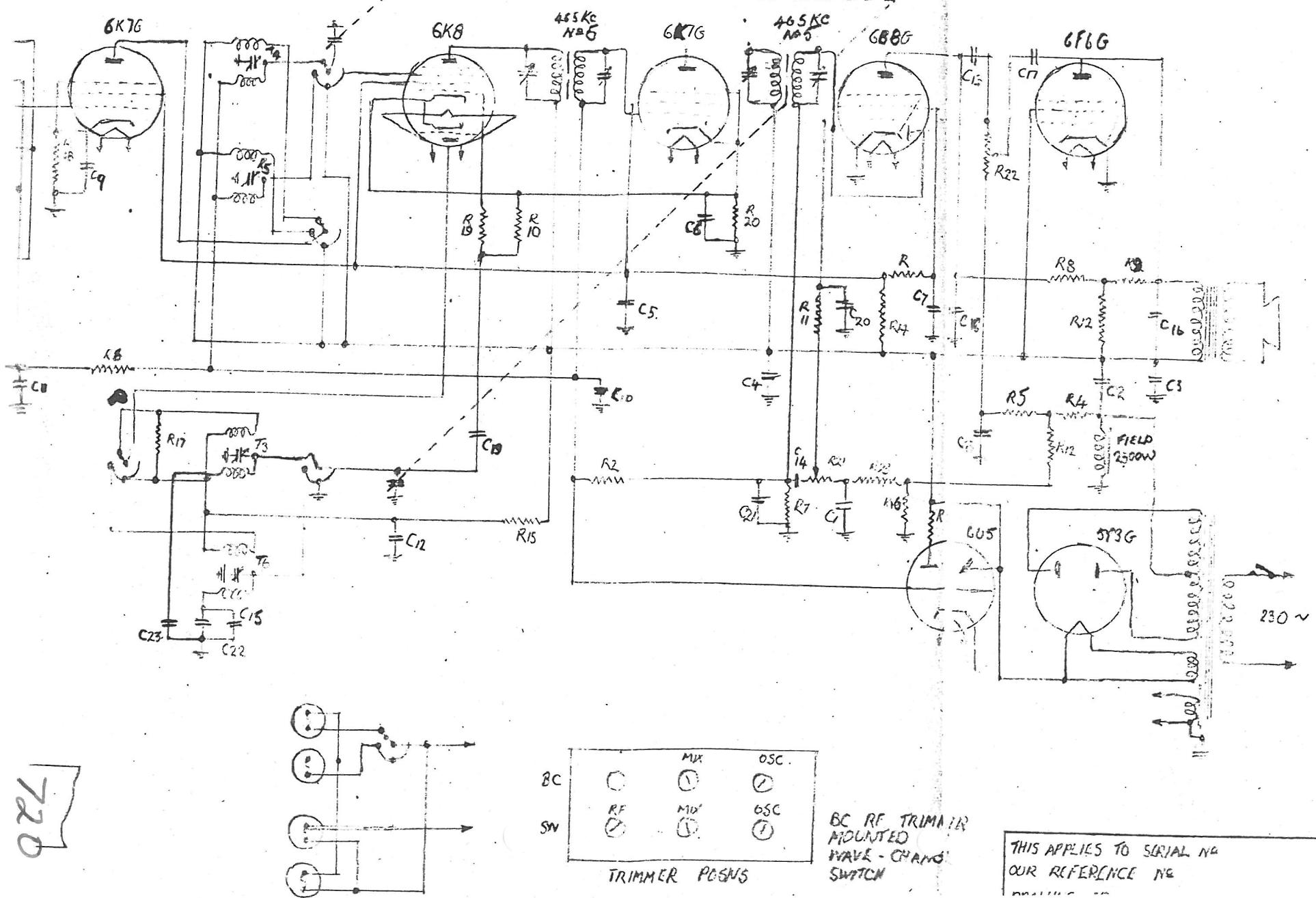
720

SCHEMATIC DIAGRAM ~ GULBRANSEN TYPE 720



SCHEMATIC DIAGRAM ~ GULFRANSSEN TYPE 720

3 SECTION GANG PLESSY 1842/8



CONDENSERS:

C-1	25-mfd.	Cathode by-pass condenser (1st A.F. stage)
2	8 "	Power supply filter condensers
3	16 "	H.T. R.F. by-pass
4	.25 "	Screen R.F. by-pass
5	.25 "	Cathode R.F. by-pass
6	.25 "	Screen by-pass (1st A.F. stage)
7	.1 "	A.F. bias filter
8	.1 "	Cathode R.F. by-pass
9	.1 "	A.V.C. filter
10	.05 "	" "
11	.05 "	Oscillator R.F. by-pass
12	.01 "	Audio coupling condenser
13	.01 "	" " "
14	.01 "	Fixed padding condenser, (S.W. band)
15	.004 "	Audio filter
16	.001 "	Tone control condenser
17	.00025 "	R.F. plate filter
18	.0001 "	Oscillator grid condenser
19	.0001 "	R.F. grid suppressor
20	.0001 "	Diode load by-pass
21	.0001 "	Padding condenser, (S.W. band)
22	2,000-mmfld.	Padding condenser, (broadcast band)
23	550 "	
T-1)	
2)	H.F. alignment trimming capacitors
3)	
4)	
5)	
6)	

RESISTORS:

R-1	.5-meg.	Screen feed (1st A.F. stage)
2	1 "	A.V.C. filter
3	1 "	Plate load (tuning indicator)
4	.5 "	Audio bias potentiometer
5	.5 "	" " filter
6	.5 "	A.V.C. filter
7	.5 "	Diode load
8	.25 "	Plate load (1st A.F. stage)
9	.1 "	Negative feed-back potentiometer
10	50-K-ohm.	Oscillator grid leak
11	50 "	R.F. grid suppressor
12	65 "	A.F. bias potentiometer
13	15 "	Negative feed-back potentiometer
R-14	15-K-ohm.	Screen feed resistor
15	20 "	Oscillator feed resistor
16	10 "	A.F. bias potentiometer
17	1 "	Feed-back equaliser (B.C. band)
18	600 "	Cathode bias resistor
19	200 "	Oscillator grid suppressor
20	150 "	Cathode bias resistor
21	.5-meg.	Volume control
22	.5 "	Tone control
23	.5 "	Audio bias filter

COLLIER & BEALE LIMITED,
66 GHUZNEE STREET,
WELLINGTON, C.2.
17th July, 1940.

TECHNICAL DESCRIPTION AND ADJUSTMENT PROCEDURE

OF 7-VALVE DUAL-WAVE RECEIVER

GULBRANSEN MODEL 720.

Model 720 receiver is of the Superheterodyne type and employs a total of 7 valves used in the following arrangement:-

- 1 - type 6U7-G Signal frequency amplifier (both bands)
- 1 - " 6K8 Mixer oscillator
- 1 - " 6K7-G Intermediate frequency amplifier (465-Kc/s.)
- 1 - " 6B8-G Diode rectifier and 1st audio amplifier
- 1 - " 6F6-G Power amplifier
- 1 - " 6U5 Visual tuning indicator
- 1 - " 5Y3-G Power supply rectifier

The circuit embodied in this receiver is conventional, other than the use of series negative feed-back in the output stage.

Two frequency ranges are covered by a unit coil assembly, the range desired being brought into action by a panel operated switch of the type that short-circuits the unused coils in all sections, thus avoiding "trapping" of the band in use, and production of dead spots in the tuning range of the short-wave band.

As previously stated, the basic circuit is entirely conventional, and, other than the provision of high "Q" intermediate frequency transformers, with consequent limited band width and reduction of receiver back-ground noise, the only modification is in the audio frequency portion of the circuit. This modification, although a very simple one, materially reduces so-called pentode distortion by the application of negative feed-back in the output stage by the use of a series circuit. This is accomplished in Model 720 by feeding the anode of the first voltage amplifier (type 6B8) from a voltage dividing network across the output of the power amplifier stage. The resistors involved in performing this function are designated R-9 and R-13 in schematic diagram attached. In all other respects the receiver circuit is entirely conventional and adjustment, if ever required, should follow along orthodox lines.

As an aid in ensuring the correct adjustment procedure being applied, the following notes, which should be used in conjunction with the location plan of trimmer positions in Drawings Nos. 291 and 292, are included.

Intermediate Frequency Amplifier Alignment. The intermediate frequency used in Model 720 is 465-Kc/s., both transformers being adjusted for maximum output, and under no circumstances should a "staggered" adjustment be used as the "gain" of the whole receiver will be materially affected. Adjustment of these two transformers should be undertaken by first aligning the diode transformer alone, this being accomplished by clipping the signal generator lead on to the grid of the intermediate frequency amplifier tube (6K7-G) and adjusting for maximum output. The generator unit should then be transferred to the grid of the mixer tube (6K8) and the first transformer treated in a similar manner. In this latter adjustment it is desirable to make certain that the wave-band switch is in the "broadcast" position, otherwise the comparatively low impedance of the short-wave tuned circuits at this test frequency will place the equivalent of a short-circuit across the generator terminals and so make the obtaining of an adequate test

voltage difficult. An alternative arrangement - to avoid any possibility of loss in the detector input circuits - is to entirely remove the grid lead from this valve, and to complete the grid circuit temporarily with a fixed resistor of approximately 50,000-ohms. resistance.

Signal Frequency Circuits Alignment. Adjustment of the signal frequency circuits, although not difficult, should be undertaken with a fair amount of care, particularly in the setting of the oscillator trimmer condensers, and, in no case, unless the performance of the receiver is in question, should any attempt be made to disturb the factory adjustments, regardless of minor errors in dial readings. In all cases, the broadcast band should be treated first; the order of adjustment is as follows:-

With an accurate signal generator set at some convenient high frequency, say 1,500-Kc/s. or 1,600-Kc/s., and with the gang condenser set at the correct position as indicated by the dial scale, the oscillator trimmer should be adjusted for maximum output. With this adjustment made, both the mixer and R.F. trimmers may then be adjusted, it being noted that the R.F. trimmer of the broadcast band is located under the chassis and mounted on the wave-change switch. Neither of these two latter adjustments is critical or difficult to perform and very rarely, unless the receiver has been tampered with, will any major variation be required to be made.

With these adjustments satisfactorily made, the receiver should be aligned or "padded" at the low frequency end of the band, this adjustment taking place at approximately 600-Kc/s. The most satisfactory way of adjusting the padding condenser is to use a highly damped signal source, rather than the signal generator, to avoid the necessity of constantly "rocking" the tuning mechanism, to ensure the optimum adjustment that provides maximum output. The most suitable highly damped source is generally available in the variety of electrical disturbances that constitute the usual background of a radio receiver when connected to an antenna. The receiver, therefore, should preferably be tuned to a frequency of 600-Kc/s., making sure that no station carrier wave is present, and the padding condenser adjusted for maximum noise output. After satisfactory adjustment of the padding condenser, it is wise again to recheck the high frequency oscillator trimmer condenser, this latter adjustment only being necessitated if a considerable movement of the padding condenser has taken place.

The adjustment of the short-wave band should be undertaken in an identical manner to that described above, the only requirement being the exercise of greater care in the adjustment of the oscillator trimmer condenser, which, in this case, will be found to be quite critical. The same remarks in regard to the avoidance of altering trimmer adjustments, if the performance of the receiver is satisfactory, apply in this band as well, and in the event of dial readings being appreciably out, movement of the pointer should be suspected and adjustment made accordingly. In certain cases unequal stretching of the dial operating cord can produce fair discrepancies in dial reading, and in such cases, the remedy is quite simple and necessitates only the repositioning of the cursor on the dial operating cord.

As an aid in servicing the receiver in the event of failure in any of the

components fitted, a component schedule is appended which is to be used in conjunction with the schematic diagram attached.

1	25-mfd.	Cathode by-pass condenser (1st a.f. stage)
2	.8 "	Power supply filter condensers
3	16 "	
4	.25 "	R.F. b.f. by-pass
5	.25 "	Screen b.f. by-pass
6	.25 "	Cathode b.f. by-pass
7	.1 "	Screen by-pass (1st a.f. stage)
8	.1 "	A.F. bias filter
9	.1 "	Cathode R.F. by-pass
10	.05 "	A.V.C. filter
11	.05 "	" "
12	.01 "	Oscillator R.F. by-pass
13	.01 "	Audio coupling condenser
14	.01 "	" "
15	.004 "	Fixed padding condenser, (S.W. band)
16	.001 "	Audio filter
17	.0005 "	Time control condenser
18	.0001 "	A.F. plate filter
19	.0002 "	Oscillator grid condenser
20	.0001 "	R.F. grid suppressor
21	.0001 "	Diode load by-pass
22	2,000-mfd.	Padding condenser, (S.W. band)
23	.50 "	Padding condenser, (broadcast band)
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		
46		
47		
48		
49		
50		
51		
52		
53		
54		
55		
56		
57		
58		
59		
60		
61		
62		
63		
64		
65		
66		
67		
68		
69		
70		
71		
72		
73		
74		
75		
76		
77		
78		
79		
80		
81		
82		
83		
84		
85		
86		
87		
88		
89		
90		
91		
92		
93		
94		
95		
96		
97		
98		
99		
100		
101		
102		
103		
104		
105		
106		
107		
108		
109		
110		
111		
112		
113		
114		
115		
116		
117		
118		
119		
120		
121		
122		
123		
124		
125		
126		
127		
128		
129		
130		
131		
132		
133		
134		
135		
136		
137		
138		
139		
140		
141		
142		
143		
144		
145		
146		
147		
148		
149		
150		
151		
152		
153		
154		
155		
156		
157		
158		
159		
160		
161		
162		
163		
164		
165		
166		
167		
168		
169		
170		
171		
172		
173		
174		
175		
176		
177		
178		
179		
180		
181		
182		
183		
184		
185		
186		
187		
188		
189		
190		
191		
192		
193		
194		
195		
196		
197		
198		
199		
200		
201		
202		
203		
204		
205		
206		
207		
208		
209		
210		
211		
212		
213		
214		
215		
216		
217		
218		
219		
220		
221		
222		
223		
224		
225		
226		
227		
228		
229		
230		
231		
232		
233		
234		
235		
236		
237		
238		
239		
240		
241		
242		
243		
244		
245		
246		
247		
248		
249		
250		
251		
252		
253		
254		
255		
256		
257		
258		
259		
260		
261		
262		
263		
264		
265		
266		
267		
268		
269		
270		
271		
272		
273		
274		
275		
276		
277		
278		
279		
280		
281		
282		
283		
284		
285		
286		
287		
288		
289		
290		
291		
292		
293		
294		
295		
296		
297		
298		
299		
300		
301		
302		
303		
304		
305		
306		
307		
308		
309		
310		
311		
312		
313		
314		
315		
316		
317		
318		
319		
320		
321		
322		
323		
324		
325		
326		
327		
328		
329		
330		
331		
332		
333		
334		
335		
336		
337		
338		
339		
340		
341		
342		
343		
344		
345		
346		
347		
348		
349		
350		
351		
352		
353		
354		
355		
356		
357		
358		
359		
360		
361		
362		
363		
364		
365		
366		
367		
368		
369		
370		
371		
372		
373		
374		
375		
376		
377		
378		
379		
380		
381		
382		
383		
384		
385		
386		
387		
388		
389		
390		
391		
392		
393		
394		
395		
396		
397		
398		
399		
400		
401		
402		
403		
404		
405		
406		
407		
408		
409		
410		
411		
412		
413		
414		
415		
416		
417		
418		
419		
420		
421		
422		
423		
424		
425		
426		
427		
428		
429		
430		
431		
432		
433		
434		
435		
436		
437		
438		
439		
440		
441		
442		
443		
444		
445		
446		
447		
448		
449		
450		
451		
452		
453		
454		
455		
456		
457		
458		
459		
460		
461		
462		
463		
464		
465		
466		
467		
468		
469		
470		
471		
472		
473		
474		
475		
476		
477		
478		
479		
480		
481		
482		
483		
484		
485		
486		
487		
488		
489		
490		
491		
492		
493		
494		
495		
496		
497		
498		
499		
500		
501		
502		
503		
504		
505		
506		
507		
508		
509		
510		
511		
512		
513		
514		
515		
516		
517		
518		
519		
520		
521		
522		
523		
524		
525		
526		
527		
528		
529		
530		
531		
532		
533		
534		
535		
536		

TUBE POSITIONS FOR TYPE 720

