

ASTOR

RADIO CORPORATION PTY. LTD.

DIVISION OF ELECTRONIC INDUSTRIES LTD.

126-130 GRANT STREET, SOUTH MELBOURNE, S.C.4.

TECHNICAL BULLETIN

**File: Receivers
Portable**

BULLETIN: FRW - 1

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ASTOR MODEL "FRW"

6 TRANSISTOR MIDGET PORTABLE RECEIVER

IN A PLASTIC CARRYING CASE



THIS BULLETIN CONTAINS:

1. Service Instructions - Electrical.
2. Service Instructions - Mechanical.
3. Component Parts List.
4. Chassis Serial Number.
5. Battery Replacement Instructions
6. Circuit Diagram.

MODEL "FRW"

FOR OPERATION FROM:

6 Volts DC. (four 1.5 volt batteries
in series)

CURRENT CONSUMPTION:

10 mA. (no signal)
18.5 mA. (6 mW signal)

POWER OUTPUT:

100 Milliwatts.

INTERMEDIATE FREQUENCY:

455 Kc/s.

TUNING RANGE:

535 - 1610 Kc/s.
560.7 - 186.3 Metres.

SERVICE INSTRUCTIONS — electrical

ALIGNMENT PROCEDUREEQUIPMENTALIGNMENT CONDITIONS

Signal Generator:	Modulated 400 cps.	Output Meter	Connect output meter
Output Meter		Connection :	leads to plug part
Plug	: Part No. M502 for fitting to output meter leads.		No. M502 then insert plug into earphone socket on receiver.
Mica Capacitor	: .01MF Part No. PC145 for I.F.T. align- ment.		Insertion of the plug disconnects the speaker voice coil.
Alignment Tool	: Part No. PM581 for adjustment of RF. trimmers.		No audible note will be present, the out- put signal is only by indication on the meter.
Alignment Tool	: Part No. M501 for I.F.T. core and oscl. coil core adjustment.		
		Output Meter	
		Load Impedance:	15 ohms.
		Output Level:	6 Milliwatts. (voice coil open)
		Vol. Control:	Max. vol. (full on)
		IF Frequency:	455 Kc/s.
		Battery :	6 Volts (four 1.5 volt batteries in series).

IF. TRANSFORMER ALIGNMENT

- NOTE: 1. Two peaks may be obtained when adjusting the iron core in the IF. transformers. The correct peak is when the core is screwed furthest toward top of transformer.
2. The receiver does not have to be removed from the moulded case for alignment purposes.

It is only necessary to remove the rear section of the moulded case from the front section.

Unscrew the two screws at the rear of the case then gently prise off the rear section.

3. The connection point on the receiver for the generator IF. signal is the converter transistor 2N486 socket base lug and is accessible as detailed below.

Alongside the oscillator transformer (colour coded green) are two resistors mounted vertically.

Connect IF. generator attenuator active lead to the top end (pig-tail lead) of the resistor (12,000 Ohms) which is the resistor nearest to the oscillator transformer.

Connect other lead of IF. generator attenuator to cond. gang frame.

Oper. No.	Generator Connection	Generator Frequency	Dummy Antenna	Instructions
1.	Refer para.3.	455 Kc/s	0.01 MF Mica. cond. in series with generator.	Turn tuning cond. gang plates fully out of mesh. Peak 3rd IF. trans. iron core for max. output. (refer note 1.)
2.	"	"	"	Peak 2nd IF. trans. iron core for max. output.
3.	"	"	"	Peak 1st IF. trans. iron core for max. output.
4.	"	"	"	Repeat operations 1 and 2 and 3.

NOTE: 1st I.F.T. colour coded - black
 2nd I.F.T. " " - white
 3rd I.F.T. " " - brown
 Oscil. trans." " - green

2N632



10 MA. (NO SIGNAL) _____
18.5 MA (6MW. SIGNAL) _____

PRECAUTIONS WHEN TESTING TRANSISTOR RECEIVERS

1. A transistor is extremely sensitive to heat. When a defective component is being replaced use a soldering iron which supplies just the required heat for unsoldering the connections. If the soldering iron is to be used close to a transistor, remove the transistor from its socket before applying the iron. The short wires protruding from the transistors must not be heated to make direct connections.
2. A continuity meter must not be applied to the receiver wiring with the transistor in circuit. A transistor must not be checked for continuity with an ohmmeter as the applied voltage and resultant excess current flow may result in permanent damage to the transistor. A voltmeter of at least 20,000 ohms / volt or a high impedance vacuum tube type voltmeter is a safe means of measuring circuit voltages.
3. A screwdriver or similar instrument must not be used to short components together or to the common positive. The use of this method of checking for the existence of voltage or signal clicks will result in permanent damage to the transistors and components.

SERVICE INSTRUCTIONS—mechanical

TO REMOVE RECEIVER CHASSIS FROM MOULDED PLASTIC CASE

1. Unscrew and remove two screws located about the centre of the back.
2. Prise back section off body section by inserting a knife blade between the two sections.
3. Place receiver front face downward then remove batteries by pulling ends of tape protruding from beneath batteries.
4. Unscrew and remove a screw from each of the lower cavities in the battery holder.
5. Hold the tuning dial disc securely, turn the gold coloured locking screw located in the centre of the dial anticlockwise then remove screw, tuning dial disc, rubber washers and plastic bush from the tuning condenser shaft.
6. Unscrew and remove hexagonal bush located between volume control and tuning condenser gang.
7. Remove the chassis from the plastic case by lifting firstly the end near tuning condenser then the battery end.

TO REFIT CHASSIS TO MOULDED PLASTIC CASE

1. Place chassis into plastic case by entering first the battery end then tuning condenser end.
2. Refit hexagonal spacer (finger tight) on to screw protruding through chassis between volume control and tuning condenser.
3. Place plastic bush on to tuning condenser shaft. Turn bush until flats inside bush fit flats on shaft then press bush firmly on to shaft.
4. Refit rubber washers tuning dial disc and gold coloured locking screw to tuning cond. shaft. Turn locking screw clockwise to tighten.
5. Tighten hexagonal spacer between volume control and tuning condenser then refit two screws which fasten battery box to plastic case.
6. Place tapes across battery box cavities then refit batteries, refer battery replacement diagram for correct polarity.
7. Switch receiver 'ON' and check station logging. Should adjustment be required loosen locking screw by turning it anti-clockwise. The dial disc is to be adjusted for optimum logging.

8. Two screws and locknuts are provided in the tuning cond. mount bracket for clearance adjustment between the tuning dial disc and dial background.
9. Refit rear section of plastic case and fasten in position with two screws previously removed.

TO REMOVE TUNING DIAL DISC AND FIT NEW TUNING DIAL DISC

The chassis does not have to be removed from plastic case to perform this operation.

1. Remove the gold coloured locking screw from the centre of the tuning dial disc by turning the screw anticlockwise.
2. Lift off the tuning dial disc, note the position of the rubber washers.
3. Reposition the rubber washers then fit new tuning dial disc.
4. Refit gold coloured locking screw centre of dial disc. Turn clockwise to tighten.
5. Switch receiver 'ON' and check station logging. Should adjustment be required loosen locking screw by turning it anti-clockwise. Adjust disc the required distance then retighten the locking screw. The dial disc is to be adjusted for optimum logging.

BATTERY REPLACEMENT

About the centre of the back of the moulded case are two screws. Unscrew and remove these two screws then prise off rear section of case. Replacement type batteries are detailed in the parts list.

NOTE: It is most important that the batteries be installed with their polarity as shown in the placement diagram attached to the circuit.

BATTERY CONNECTIONS OF INCORRECT POLARITY WILL DAMAGE THE RECEIVER

Two tapes are provided for ease of battery removal. Before fitting new batteries lay the tapes into the cavities of the battery holder.

RECEIVER SERIAL NUMBER

The receiver serial number is stamped into the metal bracket to which the tuning condenser is mounted.

To view the serial number fully mesh condenser gang plates then unscrew the two screws fastening the centre of the moulded back to the front section. Prise the sections apart.

CLEANING AGENT FOR PLASTIC BAG AND MOULDED PLASTIC CASE

Do not polish the plastic bag or the moulded plastic case with an abrasive material, motor car polish, boot polish or similar household cleaning fluids as permanent damage may result to the finish of the plastic bag or the moulded case.

To restore the lustre of the plastic bag and the moulded case wipe with a soft cloth dampened with water and lightly polish with a neutral wax.

STORAGE WHEN OUT OF USE

It is not advisable to leave an exhausted battery in the receiver. If the receiver is stored away or not required for long periods even partially used batteries should be removed and stored in a dry cool place. This is a precautionary measure against the swelling and corroding action of worn-out batteries, which applies to all battery operated devices such as torches etc.

Circuit No.	Description	± Tol.	Rating	Part No.
1	Two gang variable condenser - includes trimmers			C295
2	.01 MF Ceramic condenser	GMV	33V DCW	C391
3	.0047 MF Ceramic condenser	GMV	33V DCW	C327
4	220 MMF Silvered mica condenser	2 $\frac{1}{2}$ %	500V DCW	C324
5	.01 MF Ceramic condenser	GMV	33V DCW	C391
6	.01 MF Ceramic condenser	GMV	33V DCW	C391
7	10 MF Electrolytic condenser	+250% -10%	6V DCW	C322
8	22 MMF Disc ceramicon condenser NPO	5%	500V DCW	C352
9	.01 MF Ceramic condenser	GMV	33V DCW	C391
10				
11	220 MMF Silvered mica condenser	20%	500V DCW	C324
12	.01 MF Ceramic condenser	GMV	33V DCW	C391
13	18 MMF Disc ceramicon condenser	5%	500V DCW	C361
14	.01 MF Ceramic condenser	GMV	33V DCW	C391
15	220 MMF Silvered mica condenser	2 $\frac{1}{2}$ %	500V DCW	C324
16	.1 MF Ceramic condenser	+80% -25%	33V DCW	C387
17	2 MF Electrolytic condenser	+250% -10%	6V DCW	C323
18	2 MF Electrolytic condenser	+250% -10%	6V DCW	C323
19	.01 MF Ceramic condenser	GMV	33V DCW	C391
20				
21	50 MF Electrolytic condenser	+250% -10%	3V DCW	C307
22				
23				
24	.1 MF Ceramic condenser	GMV	33V DCW	C387
25	100 MF Electrolytic condenser	+250% -10%	6V DCW	C321
26				
27				
28				
29				
30	56,000 Ohm carbon resistor	10%	$\frac{1}{8}$ W	R5632
31	12,000 Ohm carbon resistor	10%	$\frac{1}{8}$ W	R1232
32	2,200 Ohm carbon resistor	10%	$\frac{1}{8}$ W	R2222
33	47,000 Ohm carbon resistor	10%	$\frac{1}{8}$ W	R4732
34	2,200 Ohm carbon resistor	10%	$\frac{1}{8}$ W	R2222
35	330 Ohm carbon resistor	10%	$\frac{1}{8}$ W	R3312

Circuit No.	Description	+ - Tol	Rating	Part No.
36	2,200 Ohm carbon resistor	10%	$\frac{1}{2}$ W	R2222
37	4,700 Ohm carbon resistor	10%	$\frac{1}{2}$ W	R4722
38	22,000 Ohm carbon resistor	10%	$\frac{1}{2}$ W	R2232
39	560 Ohm carbon resistor	10%	$\frac{1}{2}$ W	R5612
40	560 Ohm carbon resistor	10%	$\frac{1}{2}$ W	R5612
41	3,300 Ohm carbon resistor	10%	$\frac{1}{2}$ W	R3322
42	82,000 Ohm carbon resistor	10%	$\frac{1}{2}$ W	R8232
43	5,000 Ohm potentiometer SP.ST. switch attached			R262
44				
45				
46				
47				
48				
49	3,900 Ohm carbon resistor	10%	$\frac{1}{2}$ W	R3922
50	22,000 Ohm carbon resistor	10%	$\frac{1}{2}$ W	R2232
51	1,000 Ohm carbon resistor	10%	$\frac{1}{2}$ W	R1022
52				
53	1,500 Ohm carbon resistor	10%	$\frac{1}{2}$ W	R1522
54	10 Ohm carbon resistor	10%	$\frac{1}{2}$ W	R1002
55	130 Ohm disc type NEG. TEMP. COEFFICIENT resistor	10%	1W	R167
56	82 Ohm carbon resistor	10%	$\frac{1}{2}$ W	R8202
57				
58				
59				
60				
61	Ferrite slab aerial - slab width $\frac{5}{8}$ "			L380
62	Oscillator coil - green spot			L425
63	1st IF transformer - black spot			L426
64	2nd IF transformer - white spot			L361
65	3rd IF transformer - brown spot			L427
66	Driver transformer - 4500 : 1100 Ohms impd. centre tapped sec. type DR22.			T199
67	Speaker transformer - 320 Ohms CT : 15 Ohms impd. type TR22			T200
68	Earpiece jack socket			A127/250
69	Speaker $2\frac{3}{4}$ " dia. permag. type "C" 15 Ohms V.C. impedance			K218
70	Switch - SP.ST. part of circuit No. 43.			
71	1.5 Volt battery (4) Eveready type 915 size AA.			M491
	Earpiece, lead and plug assy.			M485
	Transistor socket (6)			A124/849
	Battery holder assy. includes lugs, eyelets and springs			A131/849
	Dial tuning disc - N.S.W.			693/81-32
	Dial tuning disc - VIC./TAS.			693/81-33
	Dial tuning disc - QLD.			693/81-34
	Dial tuning disc - SA./WA.			693/81-35
	Locking screw - gold colour, dial tuning disc			69/849
	Moulded bush - tuning cond. shaft extension			686/81
	Washer (2) rubber, moulded bush			68/849
	Volume control knob - CHARCOAL			765/81-4
	Hexagonal spacer - fasten receiver into cabinet			32/849

Screw (2) $\frac{3}{8}$ " x No.4 CSK. HD. self-tapping, fastens battery box to cabinet	36/560-20
Tuning condenser mount bracket	22/849
Spacer (3) tuning condenser mt.	53/849
Speaker clip ring	21/849
Aerial support (2) fastens ferrite slab aerial to receiver assy.	691/81
Gasket - neoprene, grille	74/849
Screw (2) fastens back sec. to front sec. of plastic case	236/415-3
Screw (2) $\frac{3}{8}$ " x $\frac{1}{8}$ " Whit. rd.hd. - tuning disc spacing adjust.	10/560-8
Nut (2) $\frac{1}{8}$ " Whit.	3/478-2
Linen tape - $9\frac{1}{2}$ " long, battery removal.	OC082
Organdie - black, cover grille opening in cabinet back.	G0151
Plastic carrying bag - complete, includes plastic shoulder strap and ear-piece pouch, which are not available as separate items	2205/250

MOULDED PLASTIC CASE STYLING

PLASTIC CASE FRONT ASSY - includes moulded escutcheon, Metcal insert, grille, tuning indicator insert and mount screw.

TAN	- A143/849-1	CHERRY RED	- A143/849-3
CHARCOAL	- A143/849-4	CHARTREUSE	- A143/849-5
LIME	- A143/849-8	DARK GREEN	- A143/849-9

Components of the Plastic case front assy. which are available as separate items.

Screw - $\frac{3}{8}$ " x $\frac{1}{8}$ " Whit. hex. hd.	16/609-2
Metcal insert - silver colour	711/250
Tuning indicator insert - gold colour	689/81
Grille - gold colour	710/250
PLASTIC CASE BACK ASSY - WHITE	A133/849

TRANSISTOR ELECTRICAL ALTERNATIVES

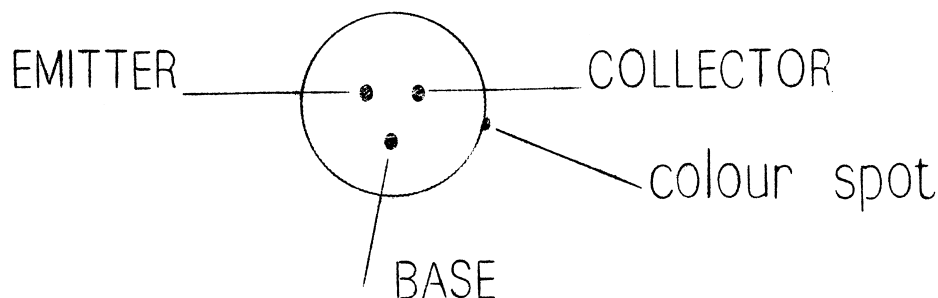
Owing to the shortage of various types of transistors used in this receiver, the electrical alternatives listed below will be used.

The electrical alternatives must be used in the following combinations.

A.	Converter	2N486	Raytheon
	1st IF.	2N484	"
	2nd IF.	2N484	"
	1st Audio	TS2	S. T. C.
	Output	2N632	Raytheon
	Output	2N632	"
B.	Converter	2N486	Raytheon
	1st IF.	2N484	"
	2nd IF.	2N484	"
	1st Audio	TS3	S. T. C.
	Output	2N632	Raytheon
	Output	2N632	"
C.	Converter	2N486	Raytheon
	1st IF.	2N484	"
	2nd IF.	2N484	"
	1st Audio	TS3-Z	S. T. C.
	Output	2N632	Raytheon
	Output	2N632	"

No modifications are required to the circuit when using the alternative transistors detailed in Groups A, B and C above.

TS2 , TS3 & TS3-Z pin view



Additional groups of alternative transistors are detailed on page 13.

When the transistor complements detailed in Groups D, E, F and G are used two component modifications are required.

1. Circuit No. 8 22 MMF disc ceramicon condenser is to be changed to 15 MMF disc ceramicon condenser $\pm 5\%$ 500V DCW part No. C343.

2. Circuit No. 13 18 MMF disc ceramicon condenser is to be changed to 12 MMF disc ceramicon condenser $\pm 5\%$ 500V DCW part No. C385.

D.	Converter	2N412	A. W. V.	
	1st IF.	2N410	"	
	2nd IF.	2N410	"	
	1st Audio	2N406	"	
	Output	2N408	"	} Matched pair
	Output	2N408	"	

E.	Converter	2N412	A. W. V.	
	1st IF.	2N410	"	
	2nd IF.	2N410	"	
	1st Audio	TS2	S. T. C.	
	Output	2N408	A. W. V.	} Matched pair
	Output	2N408	"	

F.	Converter	2N412	A. W. V.	
	1st IF.	2N410	"	
	2nd IF.	2N410	"	
	1st Audio	TS3	S. T. C.	
	Output	2N408	A. W. V.	} Matched pair
	Output	2N408	"	

G.	Converter	2N412	A. W. V.	
	1st IF.	2N410	"	
	2nd IF.	2N410	"	
	1st Audio	TS3-Z	S. T. C.	
	Output	2N408	A. W. V.	} Matched pair
	Output	2N408	"	

2N406, 2N408, 2N410, 2N412 — PIN VIEW

