

ASTOR

RADIO CORPORATION PTY. LTD.

DIVISION OF ELECTRONIC INDUSTRIES LTD.

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

TECHNICAL BULLETIN

**File: Receivers
Portable**

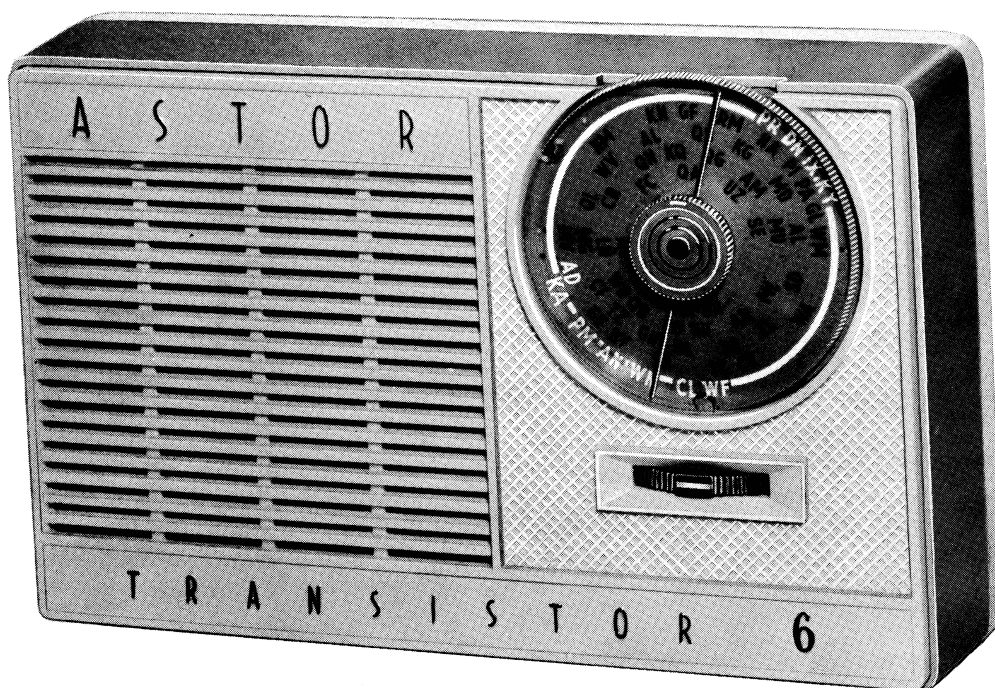
BULLETIN: FRX-1

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Page: 1

ASTOR MODEL "FRX"

**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 — FRX

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 PROCEDURE

<u>EQUIPMENT</u>	<u>ALIGNMENT CONDITIONS</u>
Signal Generator: Modulated 400 cps.	Output Meter
Output Meter	Connection :
Plug : Part No. M502 for fitting to output meter leads.	Connect output meter leads to plug part No. M502 then insert plug into earphone socket on receiver.
Mica Capacitor : .01MF Part No. PC145 for I.F.T. alignment.	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 output signal is only by indication on the meter.
Alignment Tool : Part No. M501 for I.F.T. core and osc. 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

BROADCAST ALIGNMENT

- A. To inject a signal into the receiver ferrite strip aerial, connect to the active terminal of the signal generator attenuator approximately 2 ft. of aerial wire, then fashion the wire to a vertical position.
- B. Place receiver so that ferrite strip aerial is uppermost and horizontal and so that volume control end of moulded case is nearest to the 2 ft. of vertical aerial wire.

A distance of not less than one foot is to be between the two feet of vertical aerial wire and the end of the receiver.

Oper. No.	Generator Connection	Generator Frequency	Dummy Antenna	Instructions
1.	Refer para. A and B.	525 Kc/s	Refer para. A and B.	Fully mesh cond. gang plates then peak oscl. coil (colour coded green) iron core.
2.	" "	1615 Kc/s	" "	Cond. gang plates fully out of mesh, peak oscl. trimmer condenser. (trim nearest 1st I.F.T.)
3.	" "	1470 Kc/s	" "	Tune receiver accurately to 1470 Kc/s. generator signal and adjust aerial and oscl. trimmer conds. for max. output. Do not rock cond. gang to and fro through the signal while adjusting the trimmers.
4.	" "	600 Kc/s.	" "	Repeak oscl. coil iron core for max. output. Rock cond. gang to and fro through the signal while adjusting the iron core.
5.	" "	1470 Kc/s.	" "	Repeat operations No. 3 and 4.
6.	Tuning range after alignment 535 - 1610 Kc/s. (minimum).			

TUNING INDICATOR DISC SETTING

Loosen the locking screw in the centre of the tuning indicator disc. Rotate the disc for optimum logging of the local stations, then retighten the locking screw. To loosen the locking screw, hold the tuning indicator securely then turn the locking screw anti-clockwise.

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. Refer paragraph 4.
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.
4. Transistor types 2N406, 2N408, 2N412, TS2, TS3 and TS3-Z are being wired directly into the circuit board without sockets.

The connecting leads of the replacement transistor are to be cut to the same length as the leads of the original transistor.

Before applying heat to the connections of the transistor, hold the leads of the transistor close to the point of heating with long nose pliers. This will ensure that the excess heat is dissipated into the pliers and prevented from heating the interior of the transistor.

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. Hold the tuning indicator disc securely, turn the locking screw located in the centre of the dial anticlockwise then remove screw, tuning indicator disc, rubber washers and plastic bush from the tuning condenser shaft.
4. Place receiver front face downward then remove batteries by pulling ends of tape protruding from beneath batteries.
5. Unscrew and remove hexagonal bush located between volume control and tuning condenser gang.
6. Unscrew and remove a screw from each of the lower cavities in the battery holder.
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 indicator disc and 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 tuning indicator 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 indicator disc and dial reading.
9. Refit rear section of plastic case and fasten in position with two screws previously removed.

TO REMOVE TUNING INDICATOR DISC AND FIT NEW TUNING DIAL READING

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

1. A set of four dial readings are stored in the metal dial reading holder located behind the tuning indicator disc.
2. Remove the locking screw from the centre of the tuning indicator disc by turning the screw anti-clockwise.
3. Lift off tuning indicator disc, note the position of the rubber washers.
4. Carefully prise the metal lugs of the dial reading holder upward off the dial readings.
5. Lift out transparent cover and dial readings then select the required reading.
6. Refit dial readings into dial reading holder, selected dial reading last.
7. Place transparent cover on top of dial readings then fold down metal lugs of dial reading holder.
8. Reposition the rubber washers then refit tuning indicator disc.
9. Refit locking screw to centre of tuning indicator disc. Turn clockwise to tighten.
10. 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 tuning indicator disc is to be adjusted for optimum logging.

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.

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.

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

Circuit No.	Description	+ - Tol.	Rating	Part No.
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%	$\frac{1}{2}$ W	R5632
31	12,000 Ohm carbon resistor	10%	$\frac{1}{2}$ W	R1232
32	2,200 Ohm carbon resistor	10%	$\frac{1}{2}$ W	R2222
33	47,000 Ohm carbon resistor	10%	$\frac{1}{2}$ W	R4732
34	2,200 Ohm carbon resistor	10%	$\frac{1}{2}$ W	R2222
35	330 Ohm carbon resistor	10%	$\frac{1}{2}$ W	R3312
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. or Eveready type 1015	M491 M551
	Socket (6) transistor	A142/849
	Earpiece, cord and jack assy.	M485
	Battery holder assy. - includes lugs eyelets and springs	A131/849
	Speaker clip ring	21/849
	Slab aerial mount (2) moulded	691/81
	Locking screw - chrome - tuning indicator disc	151/849
	Moulded bush - tuning cond. shaft extension	686/81
	Washer - rubber - moulded bush	68/849
	Tuning indicator disc.	768/81
	Dial reading holder	82/849
	Dial reading - N.S.W.	48/395-2
	Dial reading - VIC./TAS.	48/395-3
	Dial reading - QLD.	48/395-4
	Dial reading - SA./WA.	48/395-5
	Dial reading cover - transparent	83/849
	Hexagonal spacer - fastens receiver into cabinet	32/849
	Screw (2) $\frac{5}{8}$ " x No.4 Csk. Hd. self-tapping, fastens battery box to cabinet	36/560-20
	Tuning condenser mount bracket	22/849
	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
	Screw - $\frac{3}{8}$ " x $\frac{1}{8}$ " Whit. hex. hd. - cabinet front	16/609-2
	Nut (2) $\frac{1}{8}$ " Whit.	3/478-2
	Linen tape - $9\frac{1}{2}$ " long. battery removal	OC082
	Organdie - black	G0151
	Plastic carry bag - complete, includes shoulder strap and earphone pouch which are not available as separate items	2205/250

STYLING

CABINET FRONT ASSY:- consists of escutcheon, cabinet front section
cardboard gasket and organdie.

Escutcheon / Cabinet Front

SAND	/	CHARCOAL	A141/849-4
WEDGEWOOD BLUE	/	CHARCOAL	A141/849-5
PINE	/	CHARCOAL	A141/849-6
CHARTREUSE	/	CHARCOAL	A141/849-7
CINNAMON	/	CHARCOAL	A141/849-8
PINE	/	TAN	A144/849-1
PINE	/	DARK GREEN	A144/849-9
PINE	/	LIME	A144/849-8
PINE	/	CHERRY RED	A144/849-3

Cabinet Front

Escutcheon

CHARCOAL	758/81-4	SAND	781/81-4
TAN	758/81-1	WEDGEWOOD BLUE	781/81-5
DARK GREEN	758/81-9	PINE	781/81-6
LIME	758/81-8	CHARTREUSE	781/81-7
CHERRY RED	758/81-3	CINNAMON	781/81-8

Cardboard gasket
Organdie - black

162/849
G0151

Cabinet Back

SAND	545/81-4	WEDGEWOOD BLUE	545/81-5
PINE	545/81-6	CHARTREUSE	545/81-7
CINNAMON	545/81-8		

Volume Control Disc

CHARCOAL	765/81-4	WHITE	765/81-6
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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.

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

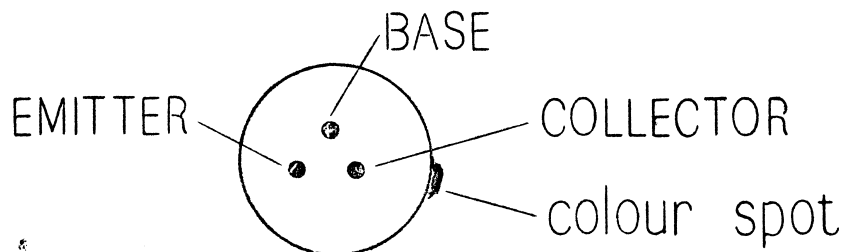
} Matched pair

E.	Converter	2N412	A. W. V.	} Matched pair
	1st IF.	2N410	"	
	2nd IF.	2N410	"	
	1st Audio	TS2	S. T. C.	
	Output	2N408	A. W. V.	
	Output	2N408	"	
F.	Converter	2N412	A. W. V.	} Matched pair
	1st IF.	2N410	"	
	2nd IF.	2N410	"	
	1st Audio	TS3	S. T. C.	
	Output	2N408	A. W. V.	
	Output	2N408	"	
G	Converter	2N412	A. W. V.	} Matched pair
	1st IF.	2N410	"	
	2nd IF.	2N410	"	
	1st Audio	TS3-Z	S. T. C.	
	Output	2N408	A. W. V.	
	Output	2N408	"	

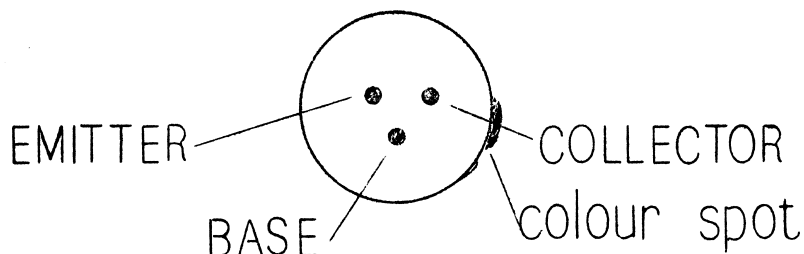
When the transistor complements detailed in Groups D, E, F and G are used the following modifications are required.

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.
3. Circuit No. 33 47K ohm resistor is to be deleted.

2N406, 2N408, 2N410, 2N412 — PIN VIEW



TS2, TS3, TS3-Z — PIN VIEW



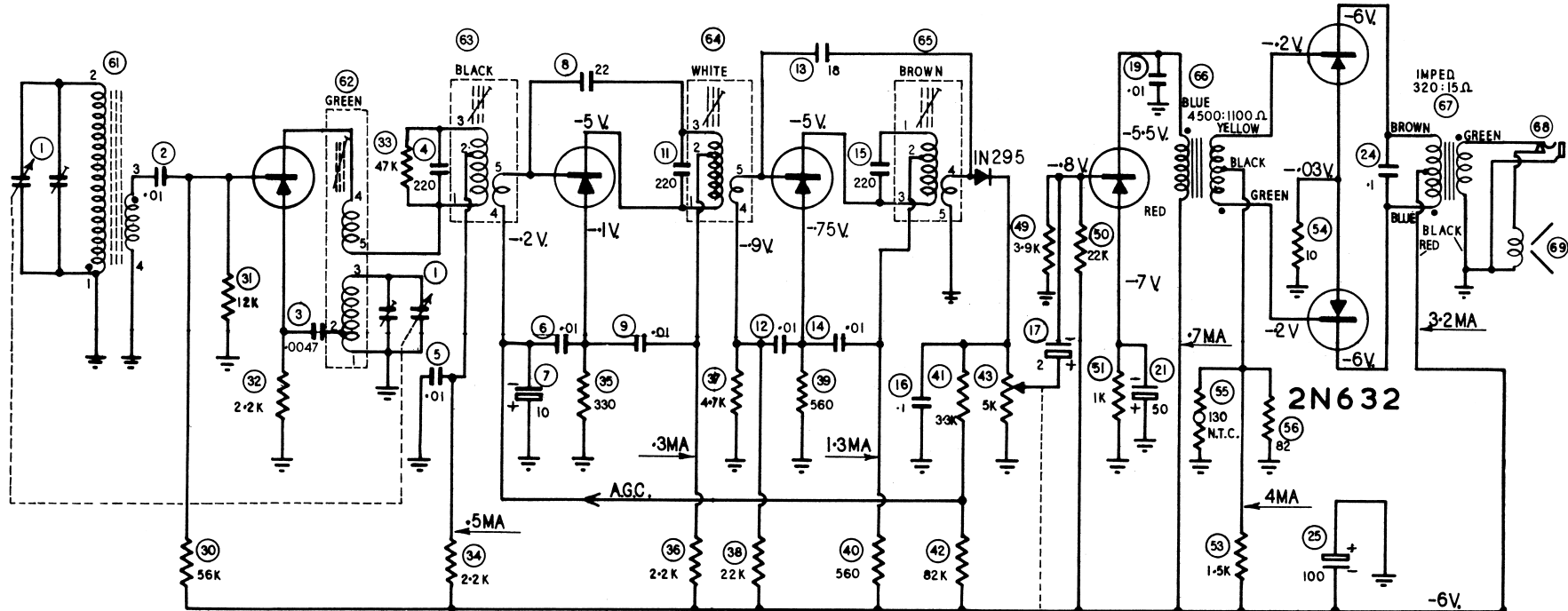
2N486

2N484

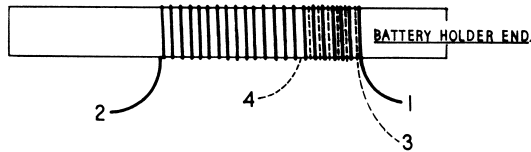
2N483

2N362

2N632



FERRITE SLAB AERIAL.



ALL VOLTAGES MEASURED BETWEEN POINTS INDICATED AND COMMON POSITIVE WITH A D.C. VACUUM TUBE VOLTMETER, NO INPUT SIGNAL.

CURRENTS INDICATED ARE MEASURED WITH AVO MULTIMETER—MODEL 8.

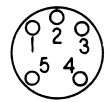
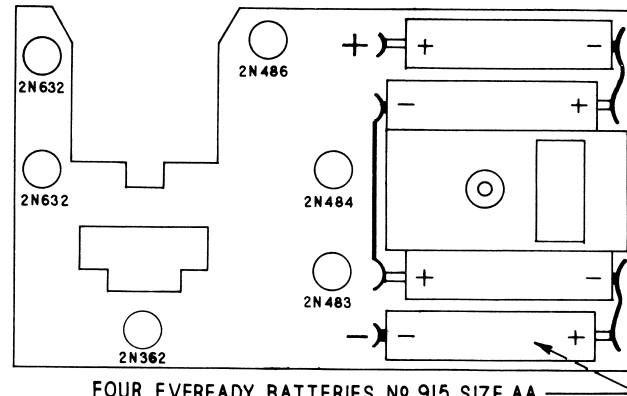
MODEL-FRX.

I.F. 455 Kc/s.

COLLECTOR

BASE

EMITTER

TRANSISTOR SOCKET
UNDERSIDE VIEWI.F. & OSC.
TRANSFORMER
BASES
PIN VIEW

FOUR EVEREADY BATTERIES No. 915 SIZE AA.

NUMBERS ASSIGNED TO TERMINALS OF COILS AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT BE FOUND ON THE UNIT.

PB1131