ELECTRONIC INDUSTRIES LTD.
CAR RADIO DIVISION
126-130 GRANT STREET, SOUTH MELBOURNE, S.C.4.

Bulletin: QJ-1
File: RECEIVERS AUTO
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SERVICE BULLETIN

MODEL — QJ

12 VOLT SUPERHETERODYNE TWO UNIT CAR RADIO RECEIVER

FOR OPERATION FROM: 12 Volt Accumulator
Negative connected to chassis.

WARNING MODEL 'QJ' RECEIVER MAY BE INSTALLED ONLY IN A CAR WHICH HAS THE NEGATIVE TERMINAL OF THE CAR BATTERY CONNECTED TO THE CAR CHASSIS.

BATTERY CONNECTION OF INCORRECT POLARITY WILL DAMAGE THE RECEIVER. e.g. Installation in a car which has the positive terminal of the battery connected to the car chassis.

BATTERY CONSUMPTION: 1.65 amps - 13 volts DC input includes 16 volt .2 amp dial lamp.

TUNING RANGE: 530 - 1610 Kilocycles
566.3- 186.3 Metres.

INTERMEDIATE FREQUENCY: 455 Kc/s.

THIS BULLETIN CONTAINS:

1. Alignment procedure
2. Electrical and mechanical parts list
3. Collector current adjustment.
4. Servicing precautions
5. Valve and transistor placement diagram.
6. Connections for transformers.
7. Push button replacement.

ALIGNMENT INSTRUCTIONS

EQUIPMENT:

Signal Generator:
Output Meter:
Mica Capacitor: 0.01MF Part No. PC145 for I.F.T. alignment.
Dummy Antenna: 65 MMF Part No. M486
Alignment Tools:
(a) Chisel point type Part No. M195 for trim. cond. adj.
(b) Hexagonal rod type Part No. 418/81 for I.F.T. iron core adj.
(c) Tuning unit iron core adj. tool. Part No. M471
(d) Tuning unit pointer pivot spanner Part No. M445.
I.F. Attenuator - Part No M447

ALIGNMENT CONDITIONS

Supply voltage: 13 volts DC.
Volume control: maximum volume (fully clockwise)
Output level; 25 milliwatts. speaker in circuit and output meter connected in parallel with voice coil.
Output meter impedance: 4 Ohms.
Tone control: Teble (fully-clockwise)
I.F. Frequency: 455 Kc/s.

I.F. TRANSFORMER ALIGNMENT

Remove the six screws fastening metal can to tuning unit. Slide can off the rear of the tuning unit.

IMPORTANT: It will be found that maximum output peaks will be obtained at two positions of the adjustable core: the correct setting is the one in which the cores are furthest apart.

NOTE: The final peaking of the cores nearest the top of the I.F. transformers should be carried out last. This is necessary so that the upper cores will not be disturbed when withdrawing the hex. alignment tool.

Oper. No.	Generator Connection	Generator Frequency	Dummy Antenna	Instructions
1.	To control grid of 6DR8 IF. valve(pin 2).	455 Kc/s.	0.01 MF mica cond. in series with generator.	Peak 2nd I.F. trans. pri. and sec. iron cores for max. output.
2.	To control grid of 6DS8 converter valve (pin 2)	455 Kc/s.	0.01MF mica cond. in series with generator	Turn tuning control until perm. tuner iron cores are out of the coil windings. Peak 1st I.F. trans. pri. and sec. iron cores for max. output. Do not repeak 2nd I.F. trans. iron cores.

BROADCAST ALIGNMENT

When iron cores and tuning coil assy is in original factory sealed condition.

1.	Antenna lead-in socket	1615 Kc/s.	Part No.M486 65 MMF in series with generator	Turn tuning control to the high freq. end of travel (iron cores full out) Adjust osc., trimmer cond. for max. output.
2.	Antenna lead-in socket	525 Kc/s.	Part No.M486 65 MMF in series with generator	Turn tuning control to low freq. end of travel (iron cores fully in). Adjust osc. shunt coil inductance trim, (iron core) for max. output.

NOTE: If the iron core of the osc. shunt coil is adjusted more than one half turn, repeat operation No.1

3. Connect I.F. attenuator (part No. M447) to the control grid of 6DR8 I.F. valve pin No.2

4.	Antenna lead-in socket	1200 Kc/s.	Part No.M486 65 MMF in series with generator	Tune the receiver to the generator frequency. Adjust the R.F. and antenna trimmer for max. output.

SETTING OF THE DIAL POINTER.

Disconnect the I.F. attenuator.
Disconnect the generator cable from the dummy antenna then connect 20 ft of ordinary wire to the terminal of the dummy antenna.

Accurately tune the receiver to a station marked on the dial near 800 Kc/s.

Using spanner (part No. M445) or a 3/32" hexagonal key wrench, adjust the eccentric pointer arm pivot so that the pointer coincides with the centre of the tuned station call sign.

Check dial logging and if necessary readjust eccentric pointer arm pivot.

NOTE: After this adjustment the eccentric section of the pointer arm pivot must be within $\pm 90^{\circ}$ of the rear position when the pointer is at the centre of the dial. Incorrect length of travel and logging will result if the eccentric section is outside these limits.

PROCEDURE FOR SETTING IRON CORES OF PERMEABILITY TUNING UNIT.

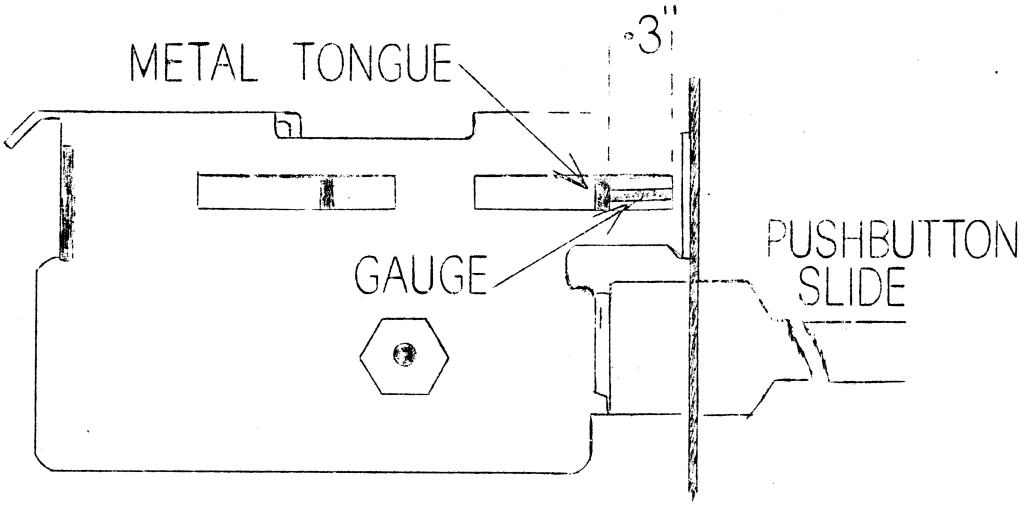
After replacement of tuning coils assy and / or iron cores.

1. Before fitting the tuning unit into the receiver turn the tuning control spindle until the perm tuner is against the high freq. end of travel spot. Adjust the iron cores so that distance between the extreme end of the formers protruding through the rubber grommets and the iron core in the former is 1.365"

2. Fit and wire the tuning unit into the receiver.

Oper. No.	Generator Connection	Generator Frequency	Dummy Antenna	Instructions
3.	Antenna lead-in socket.	1615 Kc/s.	Part No. M486 65MMF in series with generator.	Perm. tuner against high freq. end of travel stop. Adjust osc., aer, and R.F. trimmer cond. for max. output.

4. In the side of tuning unit near the volume control there are two slots. place a gauge in the form of a flat piece of metal 0.300" wide into the slot nearest the front of tuning unit. The .3" gauge is to be against front edge of the slot. refer diagram.



5. Turn the tuning control until the metal tongue in the slot touches the .3" gauge.

6.	Antenna lead-in socket	1200 Kc/s.	Part No.M486 65 MMF in series with generator.	Connect I.F. attenuator (Part No. M447) to the control grid of 6DR8 IF. valve pin No.2 and chassis. With the tuning unit set in position detailed in Para. 5. adjust the osc. aer and R.F. iron cores for max. output.

7. Turn tuning control to the low freq. end of travel (iron cores fully in). Tune the signal generator to approx. 525 Kc/s. The low freq. tuning limit should be between 520 and 530 Kc/s. If the receiver is outside these limits adjust osc. shunt coil as follows:-

8.	Antenna lead-in sockets	525 Kc/s.	Part No.M486 65 MMF in series with generator	Turn tuning control to the low freq. end of travel (iron cores fully in) Adjust osc. shunt coil inductance trim, (iron core) for max. output.

NOTE: If the iron core of the osc. shunt coil is adjusted more than one half turn, repeat operations 3, 4, 5, 6 and 7.

Align dial pointer as detailed on page 3.

Circuit No.	Description	± Tol.	Rating	Part No.
1.	11-90 MMF Trimmer condenser			PC954
2.	87 MMF Tubular ceramicon condenser	5%	500V DCW	C265
3.	200 MMF Disc ceramicon condenser	+50% -0%	500V DCW	C256
4.	.047 MF Paper condenser	20%	100V DCW	D4733
5.	,047 MF Paper condenser	20%	100V DCW	D4733
6.	.47 MF Paper condenser	20%	100V DCW	D4743
7.	120 MMF Disc ceramicon	10%	500V DCW	C153
8.	1.5-15 MMF Trimmer condenser			PC927
9	47 MMF Tubular ceramicon condenser	10%	500V DCW	C180
10.	200 MMF Disc ceramicon condenser	+50% -0%	500V DCW	C256
11.	200 MMF Disc ceramicon condenser	+50% -0%	500V DCW	C256
12.	56 MMF Disc ceramicon condenser	10%	500V DCW	C152
13.	3-30 MMF Wire wound trimmer condenser			PC663
14.	15 MMF Disc ceramicon condenser	1 MMF	500V DCW	C225
15.	.047 MF Paper condenser	20%	100V DCW	D4733
16.	.022 MF Paper condenser	20%	100V DCW	D2233
17.	200 MMF Disc ceramicon condenser	+50% -0%	500V DCW	C256
18	.01 MF Paper condenser	20%	100V DCW	D1033
19.				
20.				
21.	.0047 MF Paper condenser	20%	400V DCW	F4723
22.	.047 MF Paper condenser	20%	100V DCW	D4733
23.	.0015 MF Paper condenser	20%	400V DCW	F1523
24.	.022 MF Paper condenser	20%	100V DCW	D2233
25.	.022 MF Paper condenser	20%	100V DCW	D2233
26.	250MF Electrolytic condenser	+100% -10%	16V DCW	C299
27.	250 MF Electrolytic condenser	+100% -10%	16V DCW	C299
28.	.0022 MF Paper condenser	20%	400V DCW	F2223
29				
30.				
31.	150,000 Ohm carbon resistor	10%	½W	R1542
32.	1 Megohm carbon resistor	10%	½W	R1052
33	220 ohm carbon resistor	10%	½W	R2212
34.	220 ohm carbon resistor	10%	½W	R 2212
35.	220 ohm carbon resistor	10%	½W	R2212
36.	3300 ohm carbon resistor	10%	½W	R3322
37.	1200 ohm carbon resistor	10%	½W	R1222
38.	4.7 Megohm carbon resistor	10%	½W	R4752
39.	220 Ohm carbon resistor	10%	½W	R2212
40.	100,000 ohm carbon resistor	10%	½W	R1042
41.	220 Ohm carbon resistor	10%	½W	R2212
42.	15 Megohm carbon resistor	10%	½W	R1562
43.	47,000 Ohm carbon resistor	10%	½W	R4732
44.	3.3 Megohm carbon resistor	10%	½W	R3352
45.	220 Ohm carbon resistor	10%	½W	R2212
46.	2.2 Megohm carbon resistor	10%	½W	R2252
47.	1 Megohm carbon resistor	10%	½W	R1062
48.	Volume control and Tone control- concentric shaft potentiometers			

Circuit No.	Description	± Tol.	Rating	Part No.
	FRONT SECTION - 2 Megohm			
	REAR SECTION - 2 Megohm tapped at 800K Ohms. D.P.S.T. switch attached.			R175
	Same control as above except fitted with S.P.S.T. switch			R175-1
	Same control as above except fitted with push-pull type switch			R196
49.	220 Ohm carbon resistor	10%	½W	R2212
50.	10 Megohm carbon resistor	10%	½W	R1062
51.	120,000 Ohm carbon resistor	10%	½W	R1242
52.	220,000 Ohm carbon resistor	10%	½W	R2242
53.	270,000 Ohm carbon resistor	10%	½W	R2742
54.	4700 Ohm carbon resistor	10%	½W	R4722
55.	10 Megohm carbon resistor	10%	½W	R1062
56.	47 Ohm Wire wound resistor	10%	½W	PR853
57.	68 Ohm Wire wound resistor	10%	½W	PR997
58.	4 Ohm Disc type Negative temperature coefficient resistor	10%	1W	R160
59.	.75 ohm Wire wound resistor	10%	½W	PR996
60.	1 ohm rheostat - transistor bias adjustment	20%		R120
61	1500 ohm carbon resistor	10%	½W	R1522
62	.51 ohm wire wound resistor	5%	½W	R191
63.				
64.				
65.				
66,				
67.				
68.				
69.	Spark choke - antenna			L130
70.	Permeability tuner unit - complete, consists of			L290
	Tuning coil assy. - less iron cores			L335
	Iron core (3)			52/249
71.	Oscillator shunt coil			L337
72.	No.1 I.F. transformer			L339
73.	No.2 I.F. transformer			L340
74.	Diode filter-consists of 47K ohm resistor and (2) 100 MMF condensers			PA624
75	Choke			L130
76	Filter choke			T190
77.	Driver transformer - 5000: 50 ohm impedance 0 types DR6, FDL249 or NDL249			T189
78.	Speaker input transformer - 25 : 3.5 ohm impedance type TR14			T188
79.	Speaker.			
	6" permag. type 6M cone No. F80			K213
	6" permag. type 6H cone No. F81 (rear seat speaker)			K138
	6" x 9" permag. type 6-9L cone No. F69			K158 or K209
	5" x 7" permag. type 5-7L cone No. F85			K189
	5" permag type 5C cone No. F87			K196
	5"x 7" permag. type 5-7H cone No. F85			K202
	4" x 5" permag type 4-5C			K205

Circuit No.	Description	Part No.
80.	Dial lamp - 16V. Min. bay. base G3½ bulb	M440
81.	Fuse - 5 amp.	PM894
82.	6 pin socket	A102/366
83.	6 pin plug - units connecting cable	A101/366
84.	4 pin socket	580/250
85.	4 pin plug - speaker leads	584/250
86.	Switch - ON/OFF. part of volume control, circuit No. 48	

Nut-No. 10 N.F. transistor stud	15/478	Terminal strip assy 3 lug.	A591/30C
Insulating bush- " "	10/851	Terminal strip assy 7 lug.	A615/30C
Lead washer - transistor mt.	19/851	Terminal strip assy 5 lug.	A614/30C
Mica washer - " "	1/851	Terminal strip assy 4 lug.	A602/30C
s s 7 pin. socket (3)	A104/58	Terminal strip assy 1 lug.	63/30A
9 pin socket (2)	579/250	Terminal strip assy15 lug.	A630/30C
Antenna socket	585/250	Terminal strip assy 2 lug	A592/30C
Hash plate	20/394-1	Speednut (4) front of tuning unit	476/250-4
Chassis plate	21/394-1	Screw (4) ½" x No.6 self-tapping	38/560-17
Tapped spacer (2) speaker trans. mt.	7/851	Tuning spindle assy - part of perm tuner unit	A102/393
Retaining plate - speaker trans mt.	8/851	Horseshoe washers (2) tuning spindle bush	19/57-2
Speednut (4) audio unit cover	48/352-2	Retaining clip - tuning spindle	12/393
Dial lamp socket assy.	A154/392	Audio output unit - complete	A104/851
Spring - lamp socket	55/245		
Spring clip (2) IF Trans. mt.	510/250		
Spacer nut (2) control bush	7/347-5		

UNIVERSAL CONTROL HEAD PARTS - ASTOR

Push button knob - black	A195/392-5
includes letter "A" metcal insert	602/250-5
Push button knob - black	A195/392-6
includes letter "S" metcal insert	602/250-6
Push button knob - black	A195/392-7
includes letter "T" metcal insert	602/250-7
Push button knob - black	A195/392-2
includes letter "O" metcal insert	602/250-2
Push button knob - black	A195/392-1
includes letter "R" metcal insert	602/250-1
Knob - tuning control - black	A197/392
Knob - volume control - black	A196/392
Knob - tone control - black	551/81-3
Clip - tone knob	22/755
Knob - antenna matching control, on side of tuning unit case	341/81
Barrel nut (2) 17/304-16 Chrome washer (2) barrel nut	19/304
Moulded dial surround assy A162/392 Dial reading-group of four	A156/392-1
Screw (2) ¼" x 3/32" Whit. . . Escutcheon - chrome	23/392-3
rd. hd. 4/560-15 Dial pointer	10/393
"ASTOR" Metcal name strip 603/250 Dial background assy	A140/392
Dial background - plastic strip	63/392

TRANSISTOR COLLECTOR CURRENT ADJUSTMENT.

1. Connect RF. unit to audio unit. Disconnect the plug on end of speaker leads from the four pin socket of audio unit.

2. Insert the leads from 0-1 AMP D.C. meter into the socket pins normally bridged together when the speaker plug is inserted.

3. Switch the receiver "ON", turn the volume control fully anti-clockwise, min. volume.

4. Allow a minimum of one minute and a maximum of five minutes for thermal stabilization after initial switching-on.

5. Within the time specified in para. 4 carefully adjust bias rheostat so that the transistor collector current is .510 amps. If the receiver has been operating more than five minutes and it is required to adjust the bias rheostat, switch receiver off and allow it to cool before adjusting

NOTE: 1 If the negative temperature coefficient resistor (N.T.C.) or components mounted near the N.T.C. are replaced a short cooling period must be allowed after soldering before adjusting the bias rheostat.

NOTE: 2 After a long period of operation it will be noticed that the collector current will decrease slightly this is normal and is due to the action of the N.T.C., therefore no attempt should be made to readjust the bias rheostat.

NOTE: 3 The transistor bias rheostat should be readjusted if the transistor is replaced.

PRECAUTIONS WHEN TESTING TRANSISTOR RECEIVERS.

A. A transistor is extermely sensitive to heat. When a defective transistor is being replaced, use a soldering iron which supplies just the required heat for unsoldering the connections. The connection leads of the transistor should be held by a pair of long-nosed pliers as close as possible to the point of soldering. In this way excess heat is dissipated away from the internal elements of the transistor.

B. 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 ohm meter 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 is a safe means of measuring circuit voltages.

C. A screwdriver or similar instrument must not be used to short components together or to the metal chassis. The use of this method of checking for the existance of voltage or signal clicks may result in permanent damage to the transistor and/or components.

D. A safety link is incorporated in the speaker plug to prevent the receiver being operated with out the speaker connected. The receiver must not be operated at maximum power unless the secondary of the output transformer is loaded with either a speaker voice coil or a power output meter.

E. The metal mount face of the transistor and the lead washer are insulated from the finned heat sink by the black anodized finish of the heat sink. Some transistors are mounted with the addition of a thin mica washer between the lead washer and the heat sink.

When replacing a transistor it is important that the mating surfaces of the washers and the heat sink are not damaged or scraped in any way.

Before fitting the washers and transistor, remove all dust, grit or metal particles from the components then apply a thin film of silicone compound No.5 (part No. WX187) on to both sides of each of the washers, and the mount face of the transistor and the heat sink. Place the insulating bush on to the mount stud of the transistor before fitting the flat washer, lug, shakeproof washer and nut.

Securely tighten the nut then check insulation between the mount stud of transistor and metal of the heat sink. 30,000 ohm is the minimum permissible reading on an ordinary ohmmeter.

COIL AND TRANSFORMER CONNECTIONS

OUTPUT TRANS.

Green sleeving, finish of winding - COLLECTOR
Yellow sleeving, tap - SPEAKER VOICE COIL.
Black sleeving, start of winding - CHASSIS

DRIVER TRANS.

Primary, blue lead - PLATE 6ET6 VALVE
" red lead - B+
Secondary, green lead-BASE
" black lead - JUNCTION OF CIRCUIT NO. 58 and 60.

ANTENNA COIL

Blue lead - ANTENNA
Red lead - GRID

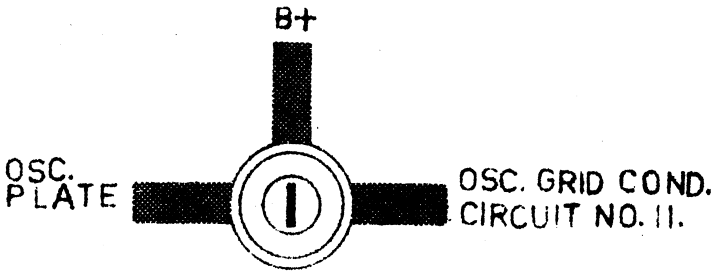
RF COIL

Blue lead - B+
Red lead - PLATE

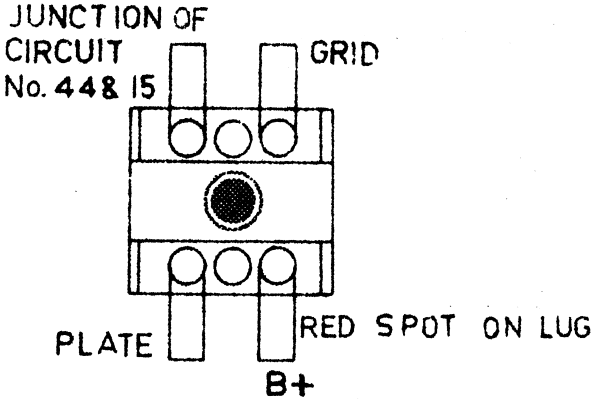
OSC. COIL

Green lead - B+
Yellow lead - OSC. PLATE

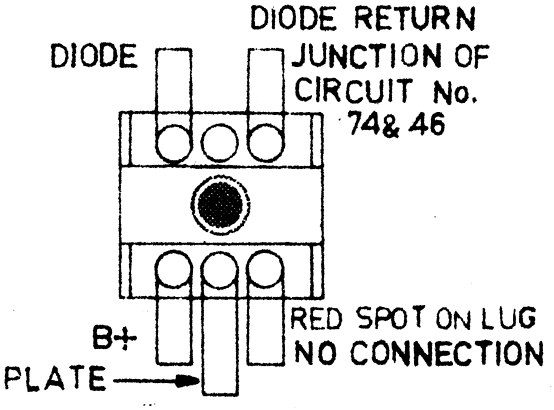
OSC. SHUNT COIL.



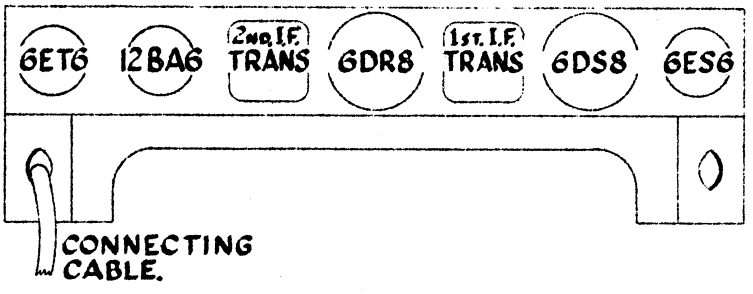
LUG VIEW OF COIL.

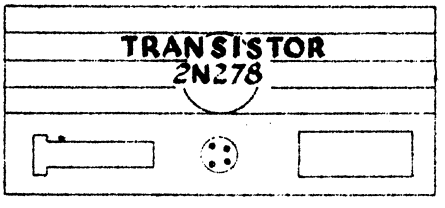


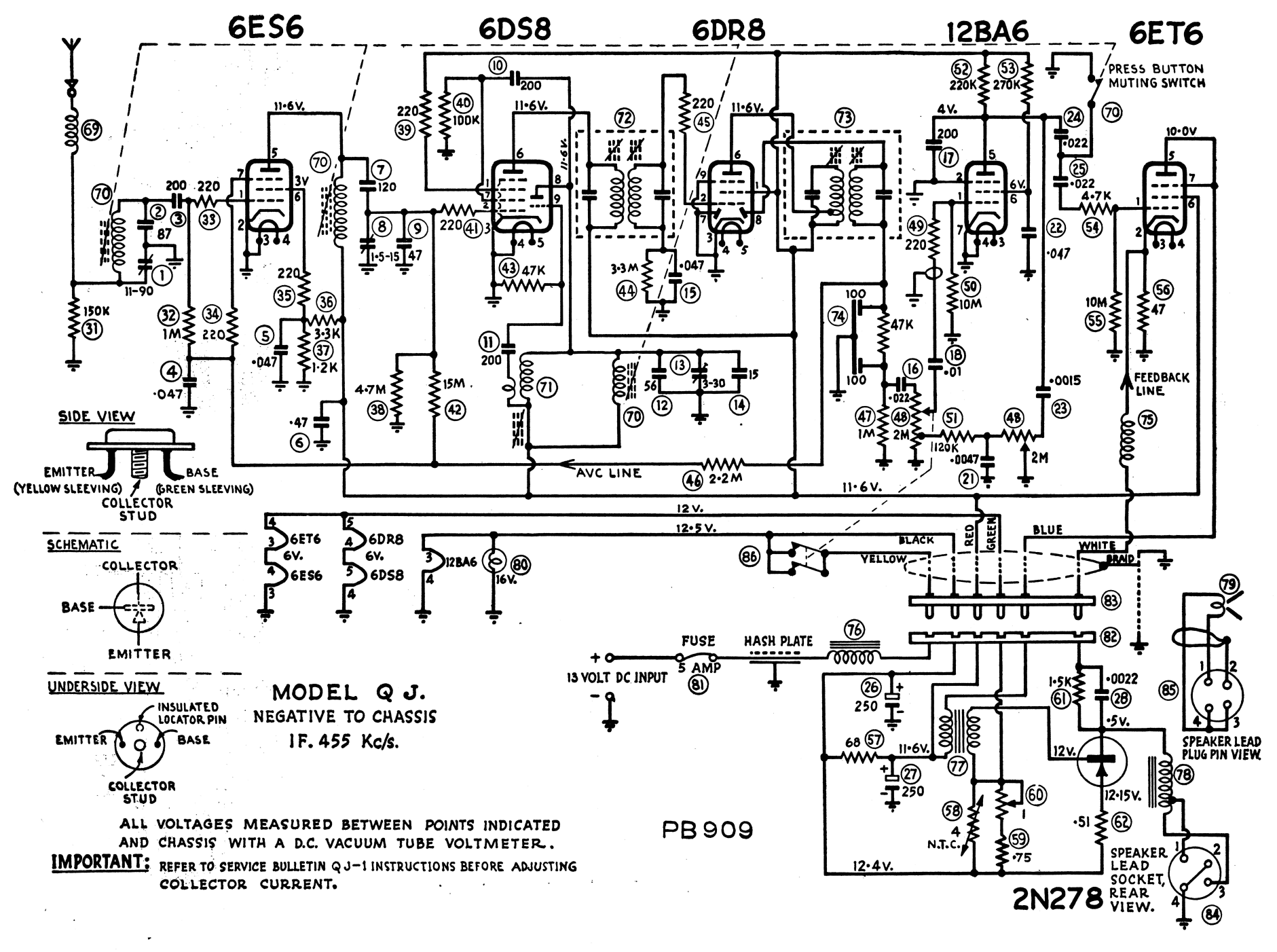
1ST I.F. TRANS.



2ND I.F. TRANS.






6ES6
6DS8
6DR8
12BA6
6ET6
PRESS BUTTON MUTING SWITCH
SIDE VIEW
EMITTER (YELLOW SLEEVING)
BASE (GREEN SLEEVING)
COLLECTOR STUD
SCHEMATIC
COLLECTOR
BASE
EMITTER
UNDERSIDE VIEW
INSULATED LOCATOR PIN
EMITTER
BASE
COLLECTOR STUD
AVC LINE
FEEDBACK LINE
FUSE
5 AMP
HASH PLATE
13 VOLT DC INPUT
BLACK
YELLOW
RED
GREEN
BLUE
WHITE
BRAD
SPEAKER LEAD PLUG PIN VIEW.
SPEAKER LEAD SOCKET, REAR VIEW.
2N278
N.T.C.
MODEL Q J.
NEGATIVE TO CHASSIS
I.F. 455 Kc/s.
PB 909
ALL VOLTAGES MEASURED BETWEEN POINTS INDICATED AND CHASSIS WITH A D.C. VACUUM TUBE VOLTMETER.
IMPORTANT: REFER TO SERVICE BULLETIN Q J-1 INSTRUCTIONS BEFORE ADJUSTING COLLECTOR CURRENT.

SETTING THE PUSH BUTTONS

The five push button knobs may be set so that each one when pushed selects a different station.

A. Pull one of the push buttons all the way out. This action unlocks the selector cam.

B. Turn the tuning knob until the selected station is accurately tuned.

C. Firmly press the push button fully in as far as it will go. This action locks the selector cam.

D. The selected station will now be automatically tuned each time this button is pressed.

E. The procedure for setting or changing the selected stations on the other four buttons is the same as detailed above.

TO REMOVE AND REFIT PUSH BUTTON KNOBS

A. Remove control knobs, barrel nuts and moulded dial surround escutcheon.

B. Pull push button knob all the way out.

C. Observe the small hole in the slide near the inside of the knob.

D. Obtain a nail, metal rod or piece of wire small enough to slip through this hole.

E. Bend the metal rod as shown in Figure 1.

F. Slip metal rod through the hole as shown and insert long nose pliers between rod and inside edge of knob (Figure 2.)

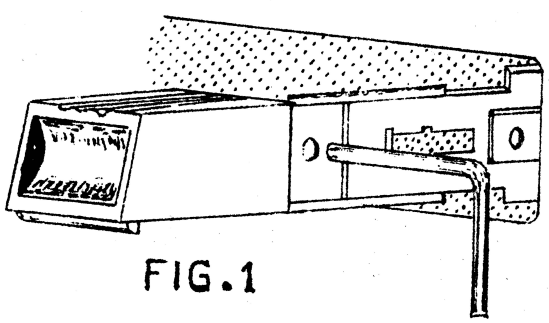


FIG.1

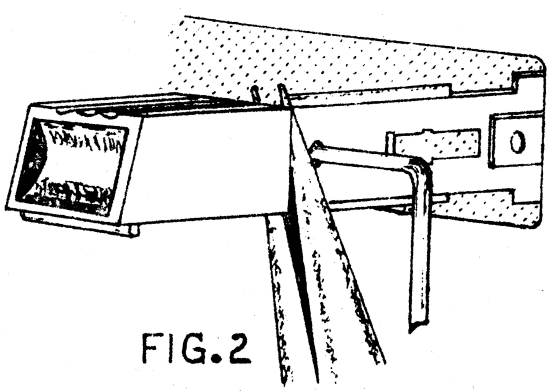


FIG.2

G. Lever knob off slide with end of pliers.

H. Before fitting a new push button knob press the slide all the way in.

I. The tongue of the slide must be heated before fitting a new knob. Apply a soldering iron to the slide until the metal of the tongue is seen to discolour near the inner end of the saw-toothed section of the slide. Press push button knob on to the slide until the inside face of the button touches the notched stop on the slide.

J. Do not move the knob until the assy. has cooled sufficiently to bond the two parts together.

K. Refit moulded dial surround escutcheon, washers barrel nuts and control knobs.

CIRCUIT MODIFICATIONS

After the first production run the following components were added.

Circuit No. 33 a 220 ohm tol ± 10% ½ watt resistor Part No. R2212.

Circuit No. 34 a 220 ohm tol ± 10% ½ watt resistor Part No. R2212.

Circuit No. 35 a 220 ohm tol ± 10% ½ watt resistor Part No. R2212.

Circuit No. 39 a 220 ohm tol ± 10% ½ watt resistor Part No. R2212/

Circuit No. 54 a4700 ohm tol ± 10% ½ watt resistor Part No. R4722.

The parts list on page 5 and 6 details the new parts. The changes are included in the circuit diagram in this bulletin.

SUBSTITUTE TRANSISTOR

During the first production run a quantity of Audio Output Units were fitted with type 2N174 transistor in place of type 2N278 transistor.

Should it be necessary to replace a type 2N174 transistor, a type 2N278 should be fitted without any alterations to the circuit.

CHANGE OF CHOKE TYPE

Circuit No.69 spark filter choke part No. L130 and circuit No.75 audio feedback filter choke part No.L130 have been changed to a new type insulated choke part No. L348

The new chokes are in appearance similar to a 1 watt moulded type resistors.

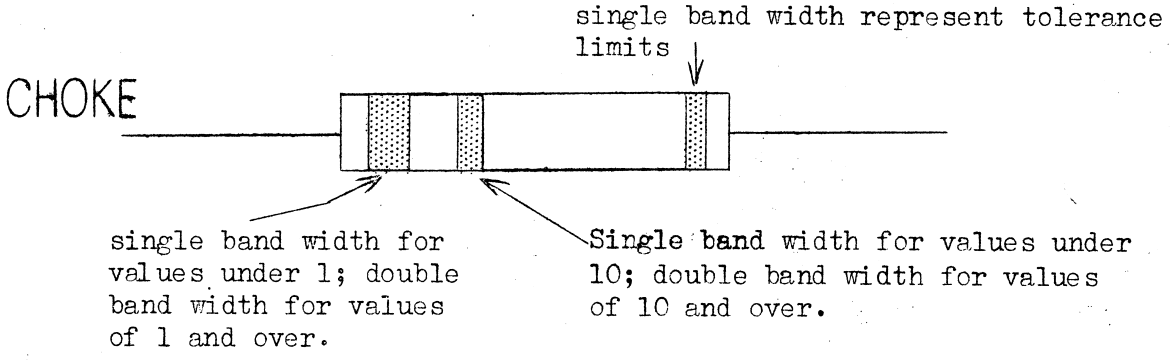
The external difference between the choke and resistor is the positioning of the colour bands on the moulded case.

The colour bands of a resistor are grouped together at one end of the case where as the choke colour bands (representing the inductance value) are located at one end, but with the inductance tolerance colour band at the extreme opposite end.

Diagrams of the choke and resistor are shown below with the position of the identification colour bands.

COLOUR CODING

Insulated Chokes are readily identified by the distinctive mottled green colour of their housings. A two band RETMA colour system indicates the values in microhenrys. A third single band at the extreme end of the unit indicates the tolerance. The wide band identifies the whole number (digit to the left of decimal point), and a narrow band indicates the decimal number (digit to the right of the decimal point). The standard RETMA colours are assigned to each figure.



Example: 0 - .91 two sindle bands
1.0 -9.1 double-single
10- 91 double-double