

## The New Classic AR3030

## SERVICE INFORMATION

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*General Coverage Receiver 30 kHz ~ 30 MHz* 



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AR3030 RECEIVER, FUNCTIONAL BLOCK DIAGRAM.

FIG 1 (SHEET X)



2 380

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IF-AF P.C.Board. Schematic Diagram. Figure 3. (Sneet 1/3)





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- 15 V.

U NO.	TYPE	+ 5 Y	+ 9 V
U 4	NJM45580		8
U S	74HC40EEAP	14	
U 6	NJH45580		8
U 7	74HC4094AP	15, 16	
U S	741010844	15, 18	









U No. U1



	+5 ¥	010
9258	12	14

VHF AIR CONVERTER, Schematic Diagram Figure 1. Sheet 1/11





VHF AIR CONV. P.C. Board





U No.	TYPE	+ 27	+ 5Y	00
UI	SN16913P	8		4
U 2	74HOUGLAP	and a second second	14	14
U 3	C078258-1		12	7
U 4	74H0.044P		14	7



15 744C390AP 18 2. 8.	_
J 5 74HC390AP 18 2. 8.	14
J 8 HC145458CP 16 8. 10.	11

Frequency Synthesizer. Schematic Diagram Figure & (Sheet 1/1)





CPU P.J.Board Schematic Diagram. Figure 6 (Sheet 1/1)



VR PCB. RS-232 P.C.Board. Schematic Diagram. Figure 7. (Sheet 1/1)





UENCY	U 1	FREQUENCY
39.89 194	0.5	7.0 - 10.99999 Mt
1.79999 #*	0.8	11 - 17.88899 Mt
3. 49899 Miz	07	18 - 29.89999 Mt
6.95999 MHz	8 0	WE

U NO.	TIPE	+ 5 V	+ 9 V	CND
U 1	744C4094AP	15.16		8

RF P.C.Board, Schematic Diagram. Figure 2, (Sheat 1/2)



UNO.	TIPE	+ 5 V	+ 9 ¥	040
U Z	7440438442	15,16		8



RF P.C.Board, Schematic Diagram. Figure 2, (Sheet 2/2)





AR3030, Chassis Assesbly, Schepatic Diegram Figure 8 (Sest 1/1)

U



F-AF P.C. B.oard

020 848 2 井물 (012) g1 110 12 (-) 2 8 ± ti NO PLS 013 F64 018 Z, 852 F#2 **B4** 11 082 11 **R61** DIS -Ri i C7 K CEI 5 -14 22 Ra B 05 -R21 (<del>]</del>8 A19 R1 RJ. Pł C44 1º 18 1 1°1 5 ₿<sup>⊥</sup>T T<sup>1</sup>3 F 52 G 5 2 5 18 T ‡8 51 8 +2 8 e T<sup>8</sup> a 1º 1g I Q1 T I I 5 6 517 Ξ 5 -3 HI. đ PZZ 1g T 12 2 27 CII -I H -1 1-T 117 1g C31 -1 1-CLIF ALIS -11-3 C12 5 G 8T 21 5 6119 118 ş 5 R3 BI 2 cse DB 2 C22 + F ٦F T 11 92 ±₽ T C32 -1 1-C40 -1 -TB C13 -----10 5 100 Īg 8 18 E1 I al Ξ 5 ς S -11-051 8<u>1</u> 81 T 14 DIS-K-11 ē, 123 B12 Ha -->->->10 A15 08) D12 P28 Rā ×011 X Ca (2) 5 ł R21 (04) (03) (02) (05) 0 13 P27 2 R30 f25 Ę R28 -11-068 낢 (01) R33 8 F 017 B41 + + 27 L -5 S -11-020 011 5 lg T<sup>g</sup> 6 842 ā g Z st ts F 107 5 3 1g T 01) 1 g st ē dez ĝ h (8 -1+# 68 0:0 8 +8 RAJ. 1.30 7 R74 11-0123 Rea Ta F&1 579 ā F68 -1 1-6122 - 41--- F -1 }-C118 17 5 -+ - --C25 C117 C118 - H-C128 r 1 ថ្ម 38 - F 5 A73 0159 -1 1-R/1 -1 F G -++8 8-1+ ++8 R 13 41-2. ç - F . 72 C107 418 RV2 -1 -111 C108 CIZ 0 1 H 000 104 310 19 F62 ç 1 R ‡왕 1 - 015 - - 0124 QUIT 1 1.30 g (018) 0.6 1-031 6 E 13 150 000 1 Tg 1 (019) 15 18 8t 1 T 112 14 843

RF P. C. Board

(13)

Joir-V °C 1214 0 o 810 O 0 110 0 0 110 0 0 0 0 0 0 o 0 0 113 E13 •  $\oplus$ Has or AT 0 K-0 0 DES DIO O o ..... 0 9 TOPOTON P o • ø TUCKOUP R 「日本のないない」 13A

RF PCB IC-TR- COIL 1994.01.25



VCO P. C. Board



OPJ P. C.Burrt Parts Stat

(IS



BFO P.C. Board



RS-232/VR P.C. Board



U N	TIPE	+ 5V	CHD
U I	74H0004AP	14	7
U 2	74HC4024AP	14	2.7

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BFO P.C.Board, Schematic Diagram. Fig 5, (Sheet 1/1)



CPU P.C.BOARD PARTS SIDE



## Fitting the VHF converter to the AR3030 receiver (Rev 1.1)

The following information is applicable to both the VHF AM (airband) and VHF NFM (marine converter). Only one converter may be fitted at a time (they are not intended to be interchangeable). Both are in fact capable of all mode reception.

The fitting is recommended to be carried out in an experienced specialist receiver workshop.

## STEP 1

Check that the following parts have been included in the packaging (cable colours may vary):

- 1. Fitting sheet (this page).
- 2. VHF converter usually wrapped in foil.
- 3. 3 cable ties and four screws.
- 5 leads as follows:

A = Grey mini coaxial screened lead with a mini coaxial plug on one end and bare tinned wire contacts on the other (approx 38cm).

B = Long grey screened lead with 2 pin connector on either end (approx 27cm).

C = Short grey screened lead with 2 pin connector on either end (approx 19cm).

D = Coloured blue / white cable (2 blue & one white) with 3 pin connector on either end (approx 28cm).

E = Coloured purple / white cable (three purple & one white) with 4 pin connector on either end (approx 20cm).

## STEP 2

It is assumed at this stage that the receiver has been tested and is working normally. Carry out the following on a "soft surface" to prevent marking the set in any way... use the correct size cross head screwdriver to avoid slipping and damaging screw heads.

Switch Off the receiver, disconnect the power supply and aerials, external speaker etc.

Remove the top case. There are FOUR COUNTERSUNK screws on the top and FOUR CHEESE-HEAD screws on the side (two either side).

Remove the bottom case. There are FOUR COUNTERSUNK screws on the top and FOUR CHEESE-HEAD screws on the side (two either side). Disconnect the two pin speaker lead/connector from the bottom I.F. PCB (located adjacent to the external speaker socket).

## STEP 3

Remove the foil from the VHF converter making sure none remains which could cause a short circuit.

Fit the VHF converter into the internal vacant position in the top right of the receiver next to the RF & VCO PCBs. Refer to the diagram to ensure the correct orientation... the coaxial connection J1 is in the top right corner.

The VHF converter PCB has six connectors J1, 2, 3, 4, 5 & 6 (refer to the diagram).



## EXISTING LEAD

A 4 pin connector (3 blue wires and one white) already exists inside the receiver, usually taped to the right hand side of the chassis (or held with a cable tie) near to the VHF converter position. This lead is terminated on the CPU PCB. Connect this 4 pin lead to J6 of the VHF converter.

## LEAD D

Connect lead "D" (3 wire blue/white) between the vacant 3 pin connector of the RF PCB (see diagram) and J2 of the VHF converter.

## LEAD C

Connect lead "C" (short grey screened lead) between the vacant 2 pin connector of the VCO PCB (see diagram) and J3 of the VHF converter.

## LEAD E

Connect lead "E" (4 wire purple/white) between the vacant 4 pin connector of the RF PCB (see diagram) and J5 of the VHF converter.

## LEAD B

Connect lead "B" (Long grey screened lead with 2 pin connectors) between the vacant 2 pin connector of the RF PCB (see diagram) and J4 of the VHF converter.

## LEAD A

Connect lead "A" (coaxial cable with one end un-terminated) using the miniature coaxial connection to J1 of the VHF converter. Feed the un-terminated end through the rear left hand corner of the chassis into the bottom cabinet.

Turn the set upside down and solder the coaxial cable to the currently unused VHF BNC connector. The centre connector being soldered to the centre pin and the outer braid to the earth of the BNC connector... there is no earth tag so solder to the BNC thread directly (A VERY HOT SOLDERING IRON IS REQUIRED - BUT DON'T MELT THE COAX!).

## Cable ties

Return the set to the right-way-up.

Cable tie together lead "A", "B" & "D" just above the VHF converter toward the rear of the cabinet. Keep lead "C" as far away from the other leads as possible running it high above the PCBs.

Use a second cable tie about 10cm to the left, again strapping leads "A", "B" & "D" together.

The third cable tie is used to secure lead "C" high away from the input / output leads leading to J4, J5 & J1.

## STEP 3A (MARINE converter only)

The MARINE converter requires an additional supply feed which is taken from the RF PCB PIN 1 of J5 (refer to diagram 2). The MARINE converter has an additional flying lead connected to the PCB.

For neatness carefully pull J5 of the RF PCB out of the socket and remove the wire feeding PIN 1 (usually white), it is held with a barb so lift the plastic retainer using a very small screwdriver or pin. Neatly solder the flying lead from the converter to the wire of Pin 1 and re-insert the connector into the plug.



FRONT

Alternatively remove the insulation from the wire feeding Pin 1 then solder to the wire the flying lead from the converter and apply insulating tape to protect the connection.

## STEP 4

Connect power & a speaker to the receiver, power it up and test. Sensitivity should be far better than 1uV (-107dBm) for 10dB S/N on AM and 12dB SINAD on NFM.

Airband converter: Guaranteed frequency coverage is 108 - 146 MHz (airband & 2m HAM bands).

Marine converter (general): Guaranteed coverage 146 - 165 MHz but likely coverage is 108 - 165+ MHz (the top range accepted by the AR3030 microprocessor being 173.99999 MHz).

This means that the marine converter will also cover the 2M HAM band and VHF airband. However, due to the wider frequency coverage there is less band pass filtering incorporated than in the airband version of the converter.

Refit the bottom and upper case halves remembering to plug the speaker lead back into the RF PCB (close to the external speaker socket). Remember that the side case halves use cheese-head screws and the upper lower surfaces use countersunk screws.

END

## AOR LTD, 2-6-4 Misuji, Taito-ku, Tokyo 111, JAPAN Tel: 03 3865 1681



## Fitting optional Collins filters to the AR3030 receiver

To limit marking of the case, we recommend placing the receiver onto a clean soft duster rather then directly onto a rubber bench mat. Ensure a "tight fitting" screw driver is used to limit marking to the black screw heads. Don't slip with the screwdriver! All sets are quality control tested / cosmetically inspected before shipping, however it is advisable to confirm correct operation prior to disassembly.

### All filter options:

- a. Remove the bottom case. Ensure that the speaker connection plug is "carefully" unplugged noting it's position and avoiding damage to the lead.
- Remove the two screws securing the RS232 socket from the rear panel.
- c. Remove the 2 screws from the wire ANT terminal.
- Place the set upside down with the front panel facing towards you.
- Carefully unplug the blue/white lead which emanates from the rear case direction (about 7 o'clock from the speaker connector).
- Carefully pull the coax cable from PCB ANT connector.
- g. Remove (de-solder) the wire from BNC connector.

h. Gently lift the I.F. PCB upward in a folding motion from the rear. The underside of the PCB is now acceptable for filter fitment.

The choice of filter position is as follows:

<u>CW filter only</u> - Collins 526 8634 010 or 526 8693 010 Optional CW position.

## SSB filter only - Collins 526 8635 010 or 526 8694 010

Originally it had been suggested that if no CW filter is fitted, the Collins SSB filter could be fitted to the CW OPTION PCB position to allow use of both the ceramic and Collins filters. In practice, the [NOR] [NRW] display flags cannot be selected in USB, LSB and FAX modes. The final production units require the Collins SSB filter to be fitted in place of the standard Murata filter... the operating manual is incorrect on this subject.

Remember: The SSB Collins filter option "must" be fitted in place of the standard ceramic Murata filter rather than in the CW option position.

## CW & SSB filters at the same time -

Fit the Collins CW filter in the optional position and Collins SSB filter in place of the ceramic SSB filter.

Wider AM filter - Collins standard 526 8636 010 or 526 8695 010 (option 526 8561 020) It is theoretically possible to fit a wider Collins 8.5kHz/-3dB AM filter (special order) in place of the 6kHz filter. There should be little call for this wide filter option and it is not largely referred to.

## Install the filter(s) in an appropriate position followed by adjustment of the coils:

Note: Do not adjust the coils unrelated to the filter(s) installed.

## CW filter

For CW filter installation the following simplified method is adequate. Ultimately use of sweep generator and oscilloscope is desirable.

- 1. Solder the Collins CW filter into the optional position.
- The switching resistor of 560 OHMS may not be fitted to the I.F. PCB just in front of the filter. If it is not fitted solder an appropriate resistor in place.
- 3. Fit the LF. PCB back into place but do not re-fit the case at this time.
- 4. Switch the receiver to CW mode (the BFO engages automatically) and select the narrow filter bandwidth.
- 5. Inject an unmodulated signal from a signal generator into the aerial socket.
- 6. While receiving a signal at S-3 level rotate the coils on either side of the filter (in line with it!) until the S-meter deflects to the maximum point. "Carefully" rotate the coils as the S-meter reading will only change gradually.

## SSB filter

In case of the SSB filter installation using the simplified method is unable to remove PASS-BAND ripple. Use of a spectrum analyser and tracking generator or sweep generator and oscilloscope is required to achieve accurate adjustments.

It is desirable to change the BFO heterodyne crystals if the Collins SSB filter is installed. The replacement USB crystal frequency is 456.53kHz and LSB 453.45kHz. Replacement crystals will be available from end April 1994 at a cost of £10.00 per pair including VAT.

- 1. Remove the standard fitted Murata ceramic SSB filter and install the Collins SSB filter into the SSB position.
- 2. Fit the LF. PCB back into place but do not re-fit the case at this time.
- 3. Switch the receiver to SSB.
- Inject an unmodulated signal from a signal generator into the aerial socket.
- 5. Use the spectrum analyser and tracking generator or sweep generator and oscilloscope to optimise the results.
- Select the appropriate re-insertion points by pressing and holding the [3] key and pressing the RESET switch simultaneously. Release RESET SW followed by releasing [3] key to complete the frequency adjustment procedure.



The sequence is keyed through the AR3030 numeric keypad:

## [4] [8] [0] [0] [ENT] for 4800 bps operation

or

## [9] [6] [0] [0] [ENT] for 9600 bps operation

To restore normal "local" operation to the AR3030 either key in the sequence Q [CR] via the RS232 or switch the AR3030 Off, wait for 5 seconds then switch On again.

# AR3030 General Coverage Receiver addendum

Please note the following points regarding the AR3030 receiver:

## 1. Microprocessor reset.

There is a 'small' chance that the receiver will not power up correctly when switched on for the first time. This is due to the buildup of a static charge during transit from the packaging etc. Should this occur, simply switch the set off, disconnect the power supply and leave for a few minutes. Reconnect and test. Should a problem still persist, please refer to page 46/47 section (9) of the operating manual.

N.B. An additional SOFTWARE FULL RESET is available by depressing the [ENT] key (either of the mode keys on some production units) while switching the receiver On. Hold in the [ENT] key while all the LCD segments appear and keep it depressed until the set returns to 10.000 MHz, only then release the key, this will ensure a "full" reset. This may be useful should the standard reset not appear to "fully" reset the unit.

See the later note regarding the SSB filter option (if fitted).

# Optional Collins 2.5 kHz SSB filter (USB/LSB/FAX).

Should you wish to fit the optional SSB filter it MUST be fitted in the standard SSB filter position replacing the Murata 2.4 kHz filter, it CANNOT be fitted in the CW narrow position (page 13 section 5-8 of the operating manual). Nor is it possible to fit an additional AM filter in the CW narrow position.

[3030-NTE terration 5]

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Should the Collins SSB filter be fitted and the receiver's microprocessor reset you must hold the [3] key while resetting via the bottom case reset switch. This action alters the carrier re-insertion point to optimise the SSB filter's characteristics.

To "fully optimise" the Collins SSB filter performance, the carrier crystals may be replaced at a small additional charge.

## 3. BFO in CW mode.

The BFO is permanently engaged in the CW mode (page 29 section 6-10).

## 4. Collins filter identifying numbers.

Two filters of identical specification are used in the receiver as listed below:

526 8636 010 or 526 8695 010	526 8635 010 or 526 8694 010	526 8634 010 or 526 8693 010
10 or	10 or	10 or
0 9298 926	526 8635 0	526 8634 0
AIM IIITEL	SSB filter (option)	CW filter (option)

## 5. Collins label.

The red Collins Inside label on the top case is of a reusable design. We acknowledge that such a label may not be to everyone's taste so have chosen a non-adhesive design. Should you wish to remove it, simply peel the label off.



## 6. Carton box.

Despite the carton box being durable, it is of a basic design. The cardboard carton has been intentionally chosen for environmental reasons being degradable... unlike traditional polystyrene.



## 7. Audio quality on AM

The AR3030 has been designed to provide the very best selectivity for shortwave broadcast listening. Should you listen to strong signals such as Radio 4 (198 kHz), more treble may be produced by moving the passband. Off-tune the receiver by 1 kHz UP or DOWN and reassess the audio. Of course this technique cannot be used for synchronous AM listening (S.AM).



## 8. REMOTE RS232C

To place the AR3030 into RS232C control mode, the initialisation key sequence must first be keyed in through the keypad (not via the RS232 port).







## AOR (UK) Ltd Radio Communications Products

## AR3030 Bulletin Page

Fitting Optional Collins Filters

Scan Reset

Reset

Operating manual addendum - RS232 access etc



## **Microprocessor Reset**

There is a 'small' chance that the receiver will not power up correctly when switches on for the first time. This is due to the build up of a static charge during transit from the packaging etc. Should this occur, simply switch the set off, disconnect the power supply and leave for a few minutes.

Should you experience problems with the receiver "apparently doing something unexpected", simply switch off the receiver using the main power switch and leave for about 10 seconds. Switch the receiver back on again and check if the problem has been cleared.

If this does not appear to solve the problem disconnect all connections and peripherals such as tape recorders, weather facsimile printers, aerials and the power supply. Switch the receiver off and leave for one minute. Reconnect the power supply and test again.

Should the receiver still refuse to operate correctly, turn the set up-side-down and locate a small hole in the bottom cabinet close to the main rotary tuning control. This hole provides access to the microprocessor rest switch.

With the AR3030 connected to it's power supply and switched On, momentarily press this switch and release using preferably a non conductive thin probe such as a cocktail stick or cotton bud. This action will reset the microprocessor.

Should the receiver fail to power up, check the power supply and main fuse. The AR3030 does contain an internal DC power fuse but should it blow we suggest you contact your dealer for advise and service...there must be a reason for the fuse to blow!

An additional SOFTWARE reset a FULL RESET is available by depressing the [ENT] key (either of the mode keys on some production units) while switching the receiver ON. Hold in the [ENT] key while all the LCD segments appear and keep it depressed until the set returns to 10.000MHz, only then release the key, this will ensure a "full" reset. This may be useful should the standard reset not appear to fully reset the unit.



\*Should the Collins filter be fitted and the receiver's microprocessor reset you must hold the [3] key while resetting via the bottom case rest switch: This action alters the carrier re-insertion point to optimise the SSB filters characteristics\*

TOP

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- it's position and avoiding damage to the lead.
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e. Carefully unplug the blue/white lead which emanates from the rear case direction (about 7 o'clock from the speaker connector).

f. Carefully pull the coax cable from PCB ANT connector.

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1. Remove the standard fitted Murata ceramic SSB filter and install the Collins SSB filter into the SSB position.

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3. Switch the receiver to SSB.

4. Inject an unmodulated signal from a signal generator into the aerial socket.

5. Use the spectrum analyser and tracking generator or sweep generator and oscilloscope to optimise the results.

6. Select the appropriate re-insertion points by pressing and holding the [3] key and pressing the RESET switch simultaneously. Release RESET SW followed by releasing [3] key to complete the frequency adjustment procedure.

TOP

## AR3030 scan reset

 Fill each memory with a frequency, it can be the same frequency so doesn't actually take too long, start at 00 and fill to 99 then re-fill 00 again.
Press [SCAN] [ATT] [0] [0] [.] [9] [9] [ENT]



That's it ... Press [VFO] [SCAN] to start scan.

3. To clear all memory channels and reset unit press and hold [ENT] while powering the unit, do not release [ENT] key until 10.000 MHz is displayed on LCD.

If you have a Collins filter fitted, refer to the fitting sheet for initialisation key sequence.

TOP

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Due to continuous developments, AOR reserves the right to make design and specification changes for product improvement without prior notice. The performance specification figures indicated are nominal values of production units. There may be some deviation from these values in individual units.

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### AOR (UK) LTD

Unit 9, Dimple Road Business Centre Dimple Road, Matlock, Derbyshire DE4 3JX Tel: 01629 581222 Fax: 01629 580070 VAT REG: GB 580 8336 25

