TOP5000 Accessory Connector Kits Installation Instructions

This document describes the installation of the:

- TOPA-AA-006G accessory connector with P-Clip
- TOPA-AA-106G accessory connector with green D-Clip
- TOPA-AA-007G RF accessory connector with P-Clip
- TOPA-AA-107G RF accessory connector with green D-Clip

Note: These accessory connector kits are for Tait Orca radios built after September 2002 only, with a product code of TOP-xxxxx-Bx.

Use the accessory connector kit to connect a third-party external accessory, such as a speaker-microphone or headset, to a Tait Orca radio.

Caution: The radio produces a specific audio level at the maximum rated power. It is the sole responsibility of the end-user to establish the applicability of, and to ensure compliance with, all relevant legal regulations defining the noise level an individual can be subjected to.

Figure 1 TOP5000 accessory connector kit components

1. strain relief (selection) suitable for 4.3mm, 4.6mm, 4.7mm, 5.3mm or 6.0mm diameter cable
2. PCB assembly
3. strain relief crimp
4. seal
5. main body

402-00065-00

Step 1: Check Accessory Compatibility

Make sure that the accessory to be used is compatible with the accessory connector on the radio. Table 1 on page 3 describes the accessory connector pins and signals.

In particular, the accessory must meet the following specifications:

- speaker power: 0.5 W into 32 Ω via the external speaker port
- speaker impedance: 32 Ω (16 Ω min.)
- microphone: Electret type, approximately 1 kΩ

Note: Do not use an accessory that has a PTT switch in series with a microphone. The PTT signal cannot be multiplexed on any other signal. It must be a separate signal, made available separately at the accessory connector.

Accessory connector pins and signals

The accessory connector on the radio provides 16 contacts. See Figure 2, Table 1 on page 3 and Table 2 on page 4.

PCB link options

There are two optional links on the accessory connector PCB. To turn off the radio's internal speaker, short link 1 (LINK1 in Figure 2). If an external switch is to be used to control the EXT-PTT line, for example in a hands-free vehicle kit, short link 2 (LINK2 in Figure 2).

PCB connections

Solder pads P1 to P16 on the bottom side of the accessory connector PCB are for connection to external accessories.

Figure 2 shows the location of the solder pads, the spring probes 1 to 16, and links 1 and 2.

Figure 2 Accessory connector PCB (bottom side)

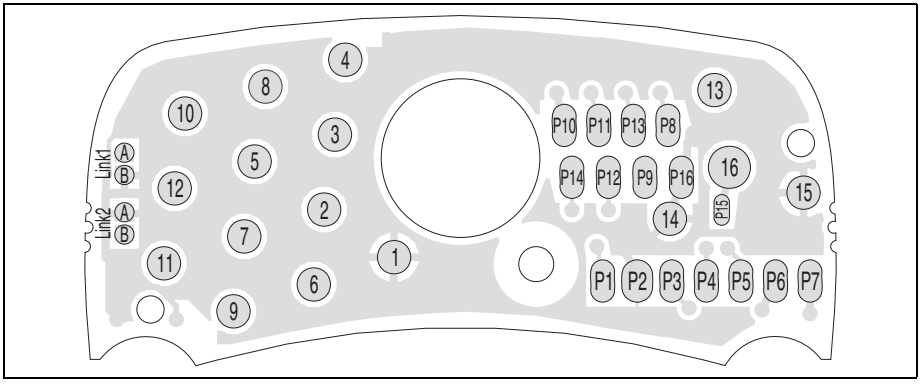


Table 1 Accessory connector signal specifications

Pin	Signal Name	Description	Signal Type	Signal Level	Output Impedance/ Current	Input Impedance
1	GND	External microphone ground (electret)	Ground			
2	+7V5-ACC	Accessory power	DC supply	7.0V[a] nominal	20mA (max)	–
3	RXD-ACC	Serial receive data	CMOS	high = 0 low = 1	–	–
4	RX-DET-AF-ACC	Unmuted receive audio	Analog audio 1.15-1.6VDC	53-225mV$_{rms}$	2.2kΩ	–
5	TXD-ACC	Serial transmit data	CMOS	high = 0 low = 1	1mA (max)	–
6	EXT-MIC	External microphone input (electret)	Analog audio	11mV$_{pp}$ (typical) DC coupled	–	1kΩ
7	SENSE-1-ACC	Accessory sense	CMOS	high = 1 low = 0	1mA (max)	–
8	MOD-AUDIO	Modulator input	Analog audio	0-4.8V$_{pp}$ 2.4VDC	–	470Ω
9	EXT–SPKR	External speaker differential output	Analog audio	±6.5V$_{pp}$ differential	To drive 16Ω differentially	–
10	SENSE-0-ACC	Accessory sense (internal speaker disable)	CMOS			
11	EXT+SPKR	External speaker differential output	Analog audio	±6.5V$_{pp}$ differential	To drive 16Ω differentially	–
12	EXT-PTT	External press-to-talk input	Analog DC	0-5V, PTT = 0V	–	27kΩ
13-15[b]	GND	Analog ground	Ground			
16[b]	RF	Accessory antenna connection	Radio frequency	Tx: 5W$_{rms}$ (max)	50Ω	–

a. Dependent on battery charge level.
b. Only used with TOPA-AA-007G and TOPA-AA-107G. Pins 13-16 are not fitted to TOPA-AA-006G and TOPA-AA-106G.

Table 2 Accessory connector signal descriptions

Pin	Signal	Description
1	GND	The GND pin is the ground point of the accessory connector.
2	+7V5-ACC	The +7V5-ACC line supplies +7.5V to accessories and is limited to 20mA maximum. The output voltage itself will change depending on the battery voltage level, and there will be some voltage differential between the battery voltage and 7V5-ACC, depending on the current drawn by the accessory.
3	RXD-ACC	The RXD-ACC line carries data from the accessory connector to the controller during tasks such as radio programming and calibration.
4	RX-DET-AF-ACC	The RX-DET-AF-ACC line carries unprocessed receive audio from the output of the detector IC.
5	TXD-ACC	The TXD-ACC line is a digital data line from the microprocessor and carries synchronous data from the controller to the accessory connector during tasks such as radio programming and calibration.
6	EXT-MIC	The EXT-MIC signal is an analogue input from the microphone of an accessory. Connecting a microphone to EXT-MIC automatically turns off the radio's internal microphone.
7	SENSE-1-ACC	On conventional radios, SENSE-1-ACC is an output which follows the squelch detect line. On trunked radios, SENSE-1-ACC is a currently unused input.
8	MOD-AUDIO	The MOD-AUDIO line is used during calibration to set up the modulation balance and by some accessories, such as modems.
9	EXT+SPKR	The EXT SPKR +/– line can be used to drive an external speaker. Neither terminal should be grounded, as the output is differential.
10	SENSE-0-ACC	SENSE-0-ACC is used to turn off the radio's internal speaker. To turn off the internal speaker, tie SENSE-0-ACC to GND by shorting link 1 (LK1). The external speaker outputs are always active.
11	EXT–SPKR	The EXT SPKR +/– line can be used to drive an external speaker. Neither terminal should be grounded, as the output is differential.
12	EXT-PTT	The EXT-PTT is an analogue signal from the accessory interface to the control area and indicates an external request for PTT and external function buttons.
13-15[a]	GND	These pins provide a direct ground connection to the radio chassis. They are generally used with accessories requiring RF, such as the RF speaker microphone.
16[a]	RF	This pin provides a connection for accessories requiring RF, such as the RF speaker microphone. When an RF accessory is connected, the main antenna is switched out.
—	BUTTON-1 BUTTON-2	There are two external accessory function buttons: BUTTON-1 and BUTTON-2. The sensing of the external function buttons is determined by a voltage divider on EXT-PTT. This consists of a 27kΩ pull up to 5V inside the radio and a pull down resistor on the accessory PCB. The resistor pull-downs for BUTTON-1 and BUTTON-2 are as follows: – PTT function: resistor pull-down 0Ω, voltage level on EXT-PTT is 0V; – BUTTON-1 function: resistor pull-down 12kΩ, voltage level on EXT-PTT is 1.5V; – BUTTON-2 function: resistor pull-down 27kΩ, voltage level on EXT-PTT is 2.5V. These resistors are already fitted to the accessory PCB.

a. Only used with TOPA-AA-007G and TOPA-AA-107G. Pins 13-16 are not fitted to TOPA-AA-006G and TOPA-AA-106G.

Step 2: Attach the Accessory to the Accessory Connector Kit

Important: The accessory connector kit is not sealed against water and dust ingress. If waterproofing or dustproofing is essential, apply a suitable glue or sealant while attaching the accessory to the accessory connector kit. For more information, please contact Tait Technical Support at www.taitworld.com/technical.

To attach the accessory to the accessory connector kit:

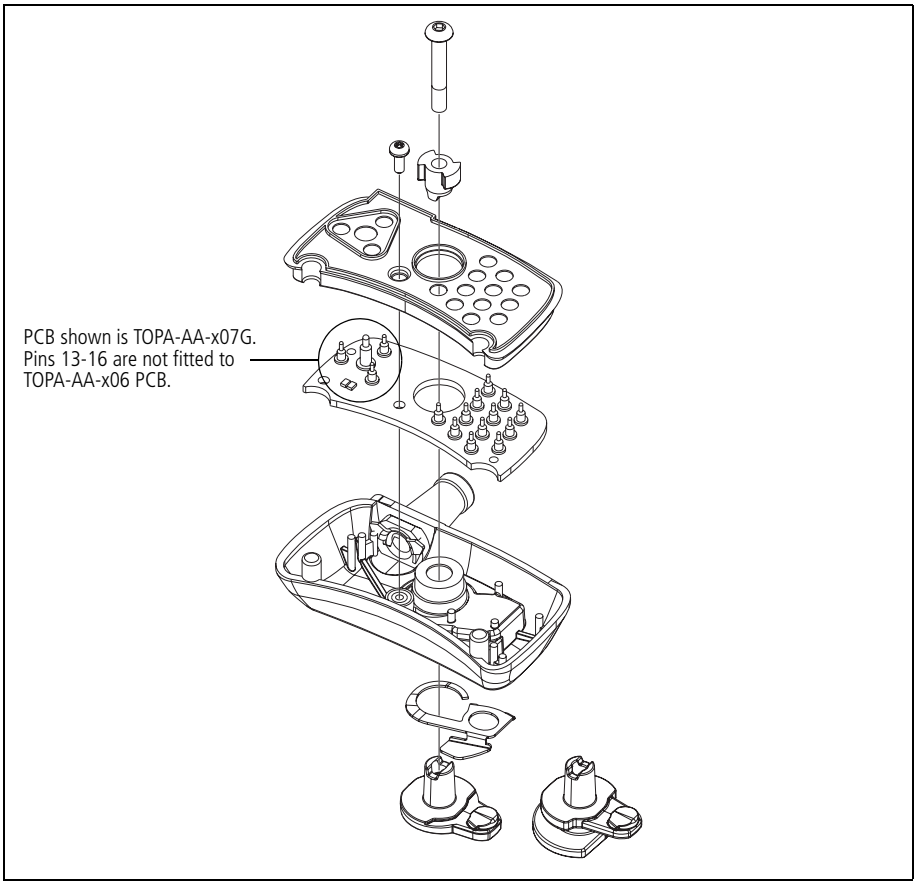
1. Strip approximately 18mm (recommended) from the end of the accessory cable.
2. Select the strain relief that best fits the diameter of the accessory cable. **The strain relief must fit tightly around the accessory cable**.
3. Insert the stripped end of the accessory cable into the smaller end of the strain relief. Pull the accessory cable through the strain relief.

Important: Do not short ACC SPKR+ or ACC SPKR– and do not connect either of these lines to GND. Voltage is present on both lines: together they provide the differential voltage that drives the speaker.

4. Solder the accessory lines to the correct pads on the accessory connector PCB.
5. Fit the PCB links to the accessory connector PCB, as required.
6. Crimp the cable at an appropriate distance along the cable, approximately in line with the edge of the PCB.
7. Use narrow-nose pliers to pull out the appropriate plugs in the seal and fit it onto the PCB.
8. Fit the grommet and PCB/seal into the housing and secure it with the supplied screw. Torque the screw to 3in·lb (0.34N·m) using a Torx T6 screwdriver.

You can now attach the accessory to the accessory connector on the radio.

Figure 3 Assembling the accessory connector kit



Connecting a headset

The headset must meet the following basic specifications:

- Speaker impedance: 32Ω (16Ω min);
- Speaker power: 1/4 W_{rms} (min);
- Microphone: Electret, approximately 1kΩ; and
- PTT: Switch **not** in-line with microphone. If connecting a headset that has a PTT in-line with the microphone, you can use the TOPA-AA-005G Tait Orca 5000 7.5mm accessory adapter.

Refer to Table 1 on page 3 to determine the compatibility of your headset. If the headset is compatible, follow the assembly procedure in Figure 3.

Solder the headset wires to the accessory connector PCB pads as indicated in Table 3.

Table 3 Accessory connector headset connections

Solder to these pads	Signal from headset
P1	MIC
P2	GND
P3	PTT
P6	SPEAKER–
P7	SPEAKER+

To turn off the radio speaker and have only the headset speaker on, short link 1 (LK1). This ties SENSE-0-ACC to GND, telling the radio to turn off the speaker.

Note: SPEAKER+ and SPEAKER– must not short to GND or to any other signal.

Figure 4 Tait Orca accessory connector - circuit diagram

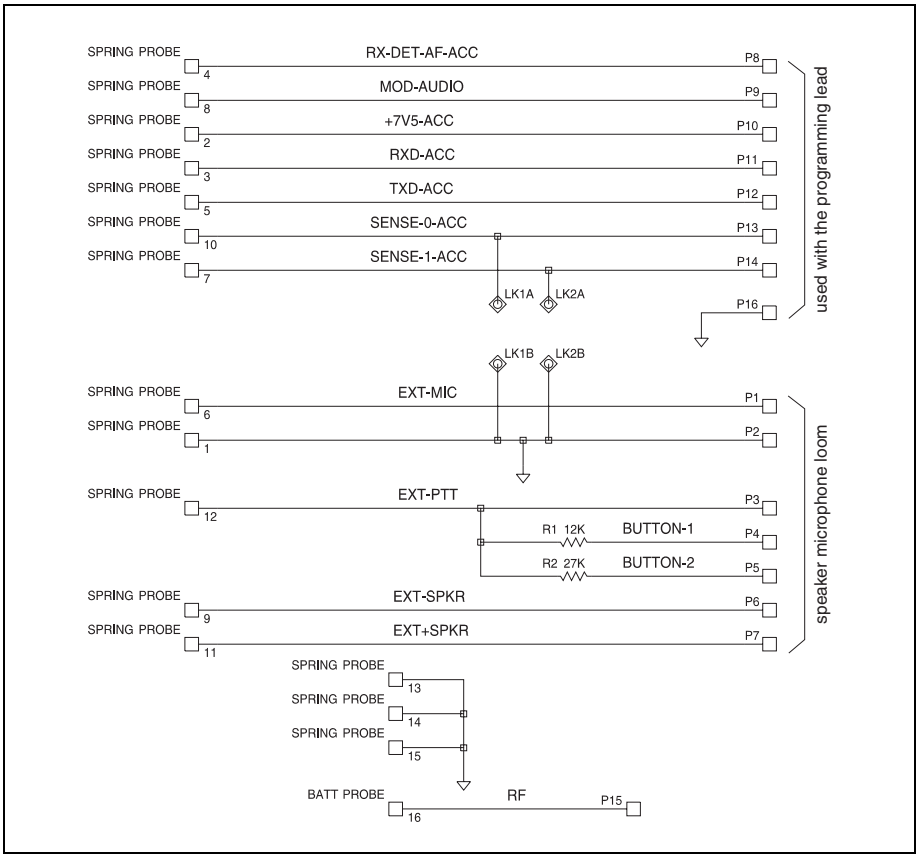
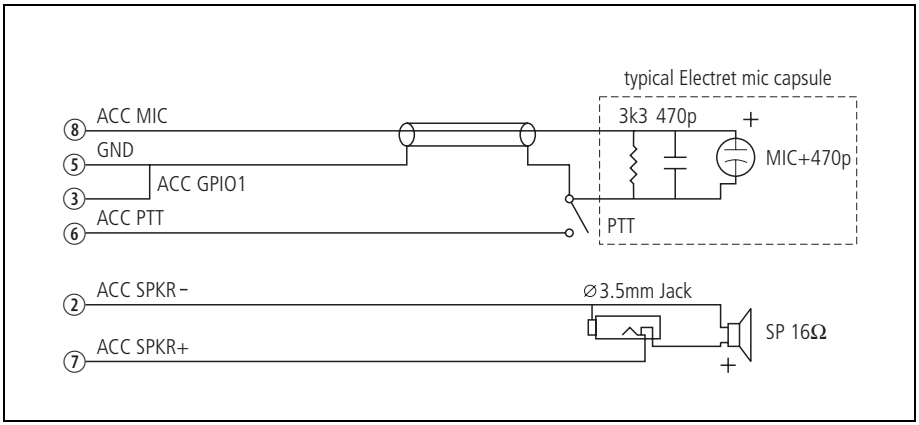


Figure 5 and Figure 6 show typical connections used when attaching an external accessory. Circled numbers refer to the signals described in Table 1 on page 3.

Pins ① and ⑨ are not connected.

Figure 5 Attaching an external speaker-microphone



Note: In Figure 6, a 100Ω resistor has been added in order to limit the volume output to the earpiece. See the Caution on page 1.

Figure 6 Attaching a headset