

# PART C Diagnostics and fault finding

This part provides information on diagnosing faults in Tait Orca handportables.

The information in the fault finding charts should be used in combination with the test facilities, and it may also be helpful to examine the radio programming software data using the programming system for Tait Orca conventional or trunked radios.

---

## Contents

<b>Test facilities .....</b>	<b>C-3</b>
Error codes .....	C-3
Test commands .....	C-5
Calculating the parameters required for test command 101 .....	C-7
<b>Fault finding charts .....</b>	<b>C-8</b>
Fault finding – Radio cannot be switched on .....	C-9
Fault finding – Cannot change channel (Orca Elan and Orca Excel) .....	C-10
Fault finding – No serial communication .....	C-11
Fault finding – Receive faults .....	C-12
Fault finding – Cannot transmit .....	C-13
Fault finding – No transmit audio .....	C-14



---

# Test facilities

---

Standard test facilities provide a way of testing the radio's functions independently of normal radio operation. A series of test commands can be sent to a radio in two ways:

- using the calibration system; or
- using a terminal program.

See the *User's Manual: Calibration System for Tait Orca Radios* for information on using the calibration system to send test commands to a radio.

When using a terminal program, use the following settings:

- baud rate: 9600
- number of data bits: 8
- number of stop bits: 1
- parity: none
- flow control: none.

To put the radio into computer-controlled test mode, send ^ (**Shift-6**), wait for a return prompt (v), then immediately send % (**Shift-5**). You can then begin sending test commands to the radio.

A full list of test commands is given in Table C-1. Table C-2 shows how to calculate the parameters necessary for test command 101.

If using the calibration system to send test commands to a radio, the parameters for command 101 are automatically calculated from the frequency value entered.

## Error codes

The errors you may receive while the radio is in test mode are outlined below. If the radio must be returned for repair (e.g. the DSP needs to be replaced), contact your Tait dealer for more information.

### {C01}

An invalid command code has been received. Try sending the command again.

### {C02}

A (valid) command code has been received but with invalid parameters. Check the parameters and try sending the command again.

### {C03}

A (valid) command code has been received but it cannot be processed at this time. Try sending the command again.

If the error persists, turn the radio off, then on again and put the radio into test mode. If the error still persists, contact your Tait dealer.

### {C04}

An error occurred during the initialisation of test mode. Turn the radio off, then on again and put the radio into test mode.

If the error persists, contact your Tait dealer.

### {X01}

EPROM checksum error. The software code in the flash has been corrupted. Re-download the radio software.

If the error persists, the flash needs to be replaced. Contact your Tait dealer.

### {X02}

Internal RAM failed. The RAM in the microprocessor is faulty and the microprocessor needs to be replaced. Contact your Tait dealer.

### {X03}

External RAM failed. The RAM in the ASIC is faulty and the ASIC needs to be replaced. Contact your Tait dealer.

**{X04}**

The DSP is not responding. Check the DSP for pin connections.

If the error persists, the DSP needs to be replaced. Contact your Tait dealer.

**{X05}**

The DSP version number is incorrect. The radio software and DSP software are incompatible. The DSP needs to be replaced with a later version. Contact your Tait dealer.

**{X06}**

The MCU internal configuration is incorrect. Contact your Tait dealer.

**{X09}**

The prototype timer has expired. This error will only occur on prototype software releases when the radio usage time has expired.

New radio software must be downloaded into the radio and the new software must have a different software version number.

**{X31}**

Model configuration checksum error. This error indicates that the radio's model configuration checksum is incorrect. Contact your Tait dealer.

**{X32}**

Database checksum error. This error indicates that the radio's database checksum is incorrect. Contact your Tait dealer.

**{X33}**

ESN error. The radio's electronic serial number is incorrect. Contact your Tait dealer.

**{X35}**

Temperature is above the T1 threshold and turn down of transmit power is impending. Allow the radio to cool down before continuing.

**{X36}**

Temperature is above the T2 threshold and turn off of the transmitter is impending. Allow the radio to cool down before continuing.

**{X37}**

Voltage is less than the V1 threshold; the radio will give a low battery warning. Replace the battery or use a DC service adaptor.

**{X38}**

Voltage is less than the V2 threshold. The radio turns itself off after indicating this error and so will be unable to respond to the reset command character.

Replace the battery or use a DC service adaptor.

Table C-1: Test commands

Function	Description	CCTM code	Parameters	
Signalling	Set modem to send zeros	10	None	
	Set modem to send ones	11	None	
	Set modem to send preamble	12	None	
	Disable modem signalling	13	None	
	Read modem receive string (continuous)	14	None	
	Disable all signalling	15	None	
	Enable subaudible signalling	16	None	
	Read subaudible signalling decode status	17	Returns: 0 = signal not detected, 1 = signal detected	
Mute	Force Rx audio muted	20	None	
	Force Rx audio unmuted	21	None	
	Mute DSP input	22	None	
	Unmute DSP input	23	None	
	Let squelch control Rx audio	24	None	
	Read RX_BUSY status	25	Returns: 0 = busy inactive, 1 = busy active	
	Relax Rx mute control	26	None	
Rx/Tx	Inhibit PA (transmit mode)	30	None	
	Enable PA (transmit mode)	31	None	
	Set radio to Rx	32	None	
	Set radio to Tx	33	None	
	Set transmit to low power	34	None	
	Set transmit to mid power	135	None	
	Set transmit to high power	35	None	
	Set transmit to max power	36	None	
	Set transmit to no power	137	None	
	Activate economy mode	42	None	
	Deactivate economy mode	43	None	
	Read battery level	46	Returns: 0 to 255	
	Read temperature level	47	Returns: 0 to 255	
	Set keypad test on	50	None	
	Set keypad test off	51	None	
	Set display test on	52	IN: 0, 1, 2 or 3	
	Set display test off	53	None	
	Read averaged RSSI level	63	Returns: 0 to 255	
Read L1 threshold	64	Returns: 0 to 255		
Read L2 threshold	65	Returns: 0 to 255		
Miscellaneous	Select normal micro clock	70	None	
	Select birdie micro clock	71	None	
	Read synth lock status	72	Returns: 0 = not in lock, 1 = in lock	
	Disable internal speaker	74		
	Enable internal speaker	75		
	Stop the MCU clock	79	None	
	Select wide band	84	None	
	Select medium band	85	None	
	Select narrow band	86	None	
	Select city squelch	88	None	
	Select country squelch	89	None	
	(continued on next page)			

Table C-1: Test commands (continued)

Function	Description	CCTM code	Parameters
Radio info	Read radio serial number	94/131	Returns: 6 digit number (hex)
	Read DSP software version number	132	Returns: 4 digit number (hex)
	Read radio software version number	96	Returns: 4 digit number
	Read radio type	130	Returns: radio type (P or M), frequency band (B-J), channel spacing (1 or 2)
	Read radio hardware version number*	133	Returns: 4 digit number
Synth	Load absolute synth frequency	101	ttttt T rrrrr R F (see Table C-2)
	Load synth reference divider	102	8 to 16383
	Load synth prescaler†	103	0 = 64/65 1 = 128/129
Config	Set volume pot	110	0 to 255
	Set transistor gate bias	111	0 to 255
	Set TCXO mod	112	0 to 255
	Set VCO mod	113	0 to 255
	Set Tx power level	114	0 to 255
	Set TCXO coarse frequency	115	0 to 255
	Set TCXO fine frequency	116	0 to 255
	Set Rx front end tuning	117	0 to 255
	Set squelch threshold	118	0 to 255
	Set CTCSS modulation	120	0 to 32767
	Set DCS modulation	121	0 to 32767
	Set FFSK modulation	122	0 to 32767
	Set Selcall modulation	123	0 to 32767
	Set DTMF modulation	124	0 to 32767
	Set voice modulation	125	0 to 32767
	Force DCS signalling (023 tone)	126	None
	Force CTCSS signalling (67.0 Hz)	127	None
	Force Selcall signalling (2000 Hz for 2 seconds)	128	None
	Force DTMF signalling (tone A)	129	IN: 1 = start encoding, 0 = stop encoding
	Read calibrated volume setting	136	Returns: 0 to 255
Select bottom microphone*	138	None	
Select top microphone*	139	None	
Disable both microphones*	140	None	
Enable both microphones*	141	None	

\* This test command is only supported in radios with hardware version greater than 0004 and radio software versions greater than:

Orca Elan conventional	v 1.07
Orca Excel conventional	v 1.07
Orca Eclipse conventional	v 1.05
Orca Elan trunked	v 3.03
Orca Excel trunked	v 3.03

† This test command is only supported in radios with radio software versions greater than:

Orca Elan conventional	v 1.09
Orca Excel conventional	v 1.09
Orca Eclipse conventional	v 1.07

Table C-2: Calculating the parameters required for test command 101

**Calculating parameters for test command 101**

Enter the parameters in the format ttttt T rrrrr R F

- ttttt represents the transmit frequency  
See Example 1
- T and R represent channel spacing  
0 = 5 kHz  
1 = 6.25 kHz
- rrrrr represents the receive frequency  
See Example 2
- F indicates whether the test command changes the calibration values  
0 = do not change calibrated values  
1 = recalculate the calibrated values based on new frequencies

Note: ttttt and rrrrr may be up to 6 digits long.

**Example 1: Calculating ttttt for an H band radio**

$$\begin{aligned}
 \text{ttttt} &= \frac{\text{transmit frequency (MHz)}}{\text{channel spacing (MHz)}} \\
 &= \frac{461.025 \text{ MHz}}{6.25 \text{ kHz}} \\
 &= \frac{461.025 \times 10^6 \text{ Hz}}{6.25 \times 10^3 \text{ Hz}} \\
 &= 73764
 \end{aligned}$$

**Example 2: Calculating rrrrr for an H band radio**

$$\begin{aligned}
 \text{rrrrr} &= \frac{\text{receive frequency (MHz)} - *IF \text{ (MHz)}}{\text{channel spacing (MHz)}} \\
 &= \frac{461.025 \text{ MHz} - 45.1 \text{ MHz}}{6.25 \text{ kHz}} \\
 &= \frac{415.925 \times 10^6 \text{ Hz}}{6.25 \times 10^3 \text{ Hz}} \\
 &= 66548
 \end{aligned}$$

Note: IF depends on the radio's switching band.

- For A, B, C and D bands radios, the IF is 21.4 MHz.  
\* For A band radios, add the IF (MHz) in the formula (Band A radios use high side injection).
- For E, F, G, H, I, J and K band radios, the IF is 45.1 MHz.

---

# Fault finding charts

---

The fault finding charts in Figures C-1 to C-6 address the faults you are most likely to find.

If you experience other faults that do not fall into these categories, contact your Tait dealer.

They are:

- radio cannot be switched on;
- cannot change channel (Orca Elan and Orca Excel);
- no serial communications;
- receive faults;
- cannot transmit; and
- no transmit audio.



Figure C-1: Fault finding – Radio cannot be switched on

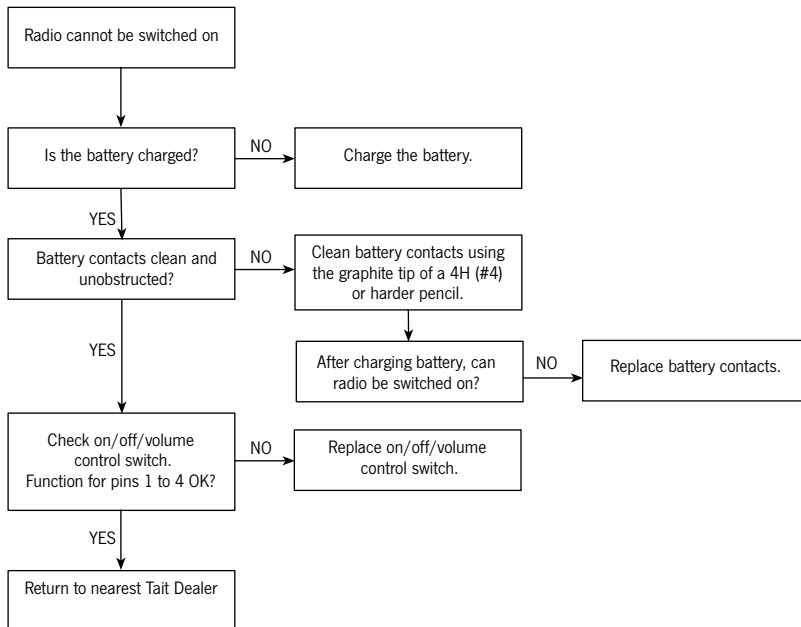


Figure C-2: Fault finding – Cannot change channel (Orca Elan and Orca Excel)

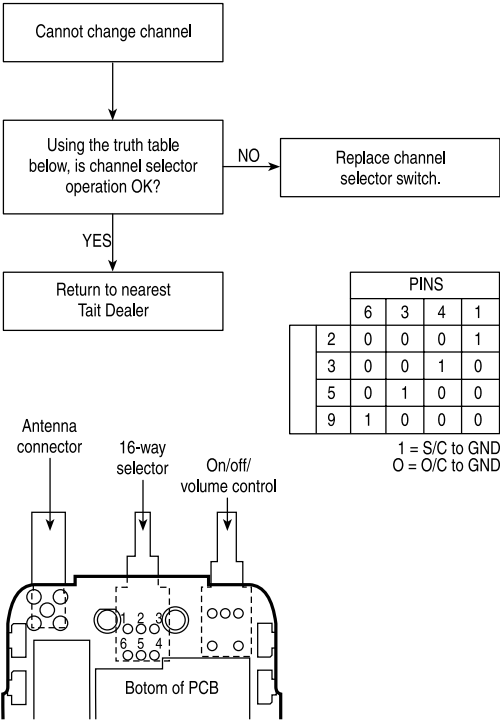


Figure C-3: Fault finding – No serial communication

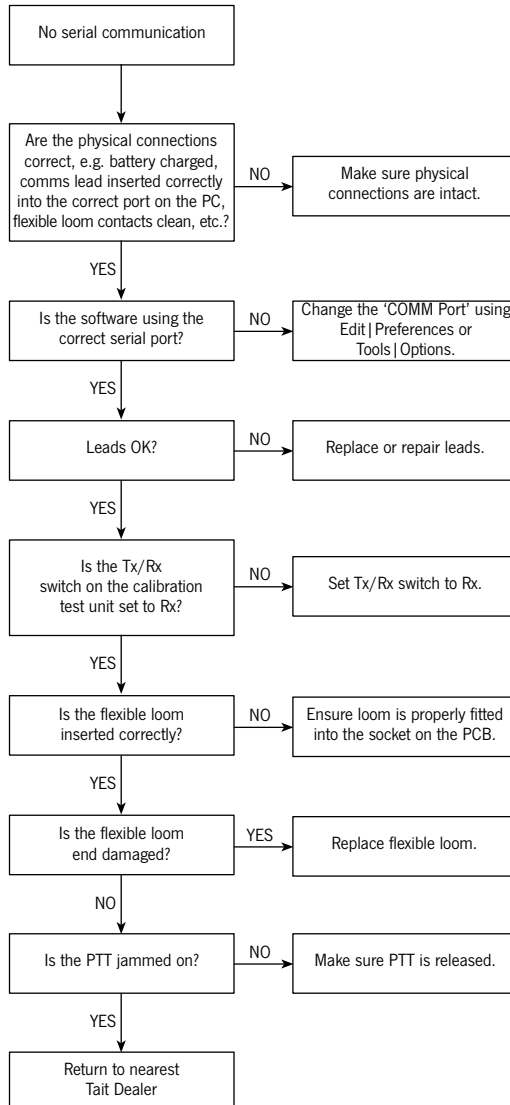


Figure C-4: Fault finding – Receive faults

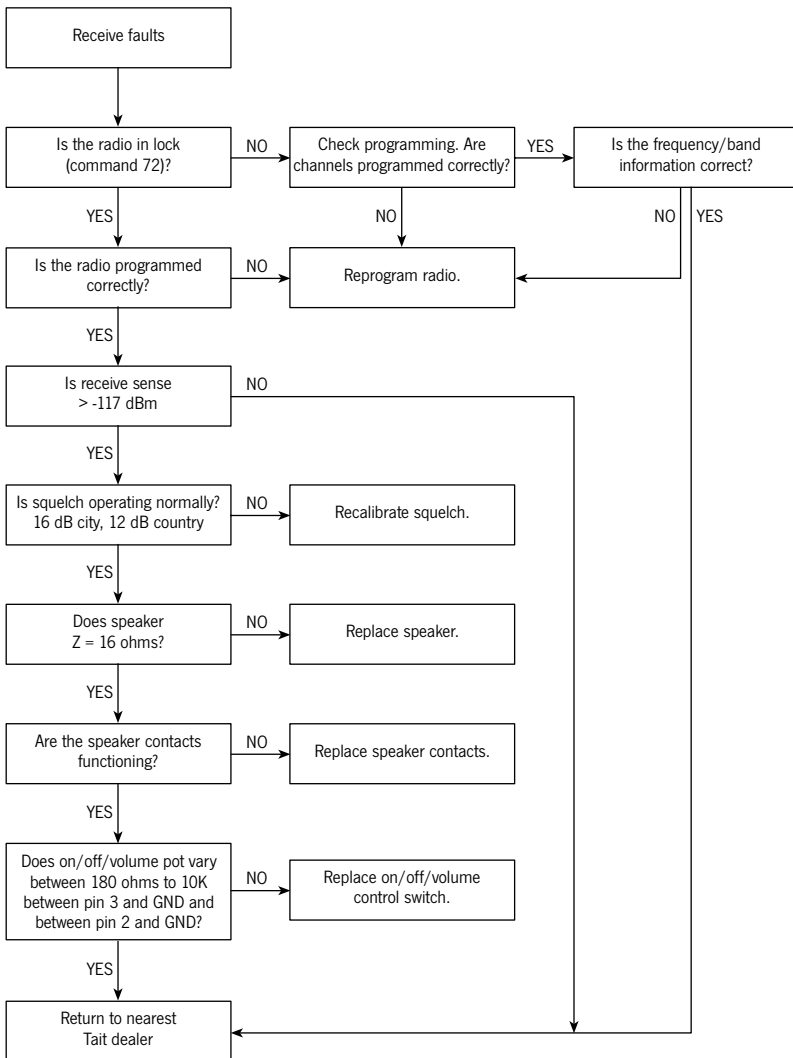


Figure C-5: Fault finding – Cannot transmit

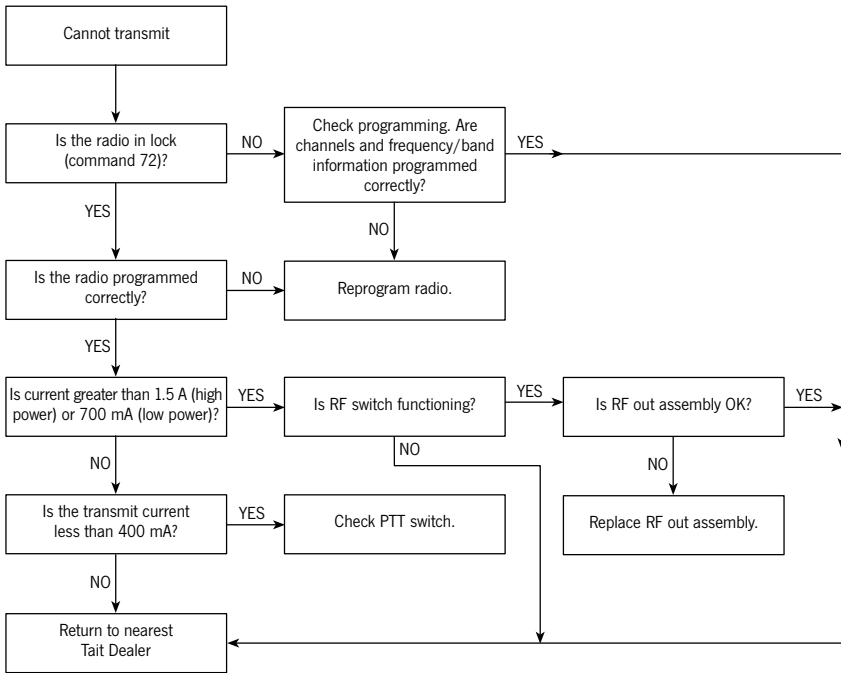


Figure C-6: Fault finding – No transmit audio

