TA2549-01 Power Monitor and Alarm Interface
Service Manual

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Contents

Preface

Scope of Manual

The TA2549-01 Power Monitor and Alarm Interface Service Manual provides information on installing, operating and servicing the TA2549-01 hardware.

Enquiries and Comments

If you have any enquiries regarding this manual, or any comments, suggestions and notifications of errors, please contact Technical Support (refer to "Tait Contact Information" on page 2).

Updates of Manual and Equipment

In the interests of improving the performance, reliability or servicing of the equipment, Tait Electronics Ltd reserves the right to update the equipment or this manual or both without prior notice.

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Associated Documentation

TB8100 Installation and Operation Manual (IPN MBA–00005–05).

TB8100 Specifications Manual (IPN MBA–00001–06).

TB8100 Service Kit and Alarm Center User's Manuals and online Help (IPN MBA–00010–03)

TB8100 Calibration Kit User's Manual and online Help.

Technical notes are published from time to time to describe applications for Tait products, to provide technical details not included in manuals, and to offer solutions for any problems that arise.

All available TA2549-01 product documentation is provided on the CD supplied with the TA2549-01[1]. Updates may also be published on the Tait support website.

Document Conventions

Within this manual, four types of alerts may be given to the reader. The following illustrate each type of alert and its associated symbol.

Warning!! **This alert is used when there is a potential risk of death or serious injury.**

Caution **This alert is used when there is a risk of minor or moderate injury to people.**

Important This alert is used to warn about the risk of equipment damage or malfunction.

Note This alert is used to highlight information that is required to ensure procedures are performed correctly.

Publication Record

Issue	Publication Date	Description
1	September 2005	first release

1. Technical notes are only available in PDF format from the Tait support website. Consult your nearest Tait Dealer or Customer Service Organisation for more information.

Safety and Servicing Information

This chapter contains general information on safety and servicing procedures for the TA2549-01 Power Monitor and Alarm Interface Module.

Personal Safety

Explosive Environments

Warning!! **Do not operate TA2549-01 fitted BSS equipment near electrical blasting caps or in an explosive atmosphere. Operating the equipment in these environments is a definite safety hazard.**

Proximity to RF Transmissions

Do not operate the transmitter when someone is standing within 90 cm (3 ft) of the antenna. Do not operate the transmitter unless you have checked that all RF connectors are secure.

Equipment Safety

ESD Precautions

Important This equipment contains devices which are susceptible to damage from static charges. You must handle these devices carefully and according to the procedures described in the manufacturers' data books.

We recommend you purchase an antistatic bench kit from a reputable manufacturer and install and test it according to the manufacturer's instructions. The diagram below shows a typical antistatic bench set-up.

conductive wrist strap

dissipative rubber
bench mat

common point ground
(building ground or
mains ground via 1 M
ohm series resistor)
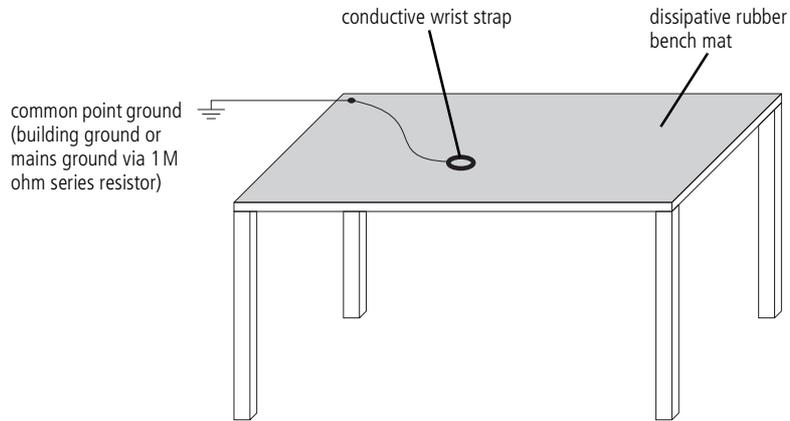
You can obtain further information on antistatic precautions and the dangers of electrostatic discharge (ESD) from standards such as ANSI/ESD S20.20-1999 or BS EN 100015-4 1994.

Aerial Load

The TA2549-01 equipped BSS equipment has been designed to operate safely under a wide range of aerial loading conditions. However, we strongly recommend that the transmitter should always be operated with a suitable load to prevent damage to the transmitter output power stage.

Identifying Screw Types

Torx Recess Head Screws

Torx recess head screws are the standard type of screw used in all TA2549-01 equipped BSS equipment, although Pozidriv and Allen recess head screws are also used in a few special applications.

The diagram below shows a typical Torx recess head screw (actual hardware may differ slightly from this illustration due to variations in manufacturing techniques).

"star" shaped recess with
six internal notches
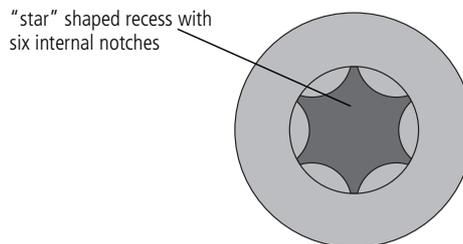
Allen Recess Head UNC Screws

Allen recess head 4–40 UNC thread screws are used to secure the RF power transistors in the TA2549-01 power amplifier and cannot be interchanged with M3 screws.

Pozidriv Recess Head Screws

Pozidriv recess head screws are used in TA2549-01 equipment in a few special applications. It is important that you use the correct type and size screwdriver to avoid damaging the screw head.

It is particularly important that you do not use Philips screwdrivers on Pozidriv screw heads as the tapered driving flutes of the Philips screwdriver do not engage correctly with the parallel-sided slots in the Pozidriv screw head. This can result in considerable damage to the screw head if the screwdriver tip turns inside the recess.

Note   If you find you need excessive downwards pressure to keep the screwdriver tip in the Pozidriv screw head, you are probably using the wrong type or size screwdriver.

The diagram below shows the main differences between typical Pozidriv and Philips screw heads and screwdriver tips (actual hardware may differ slightly from these illustrations due to variations in manufacturing techniques).
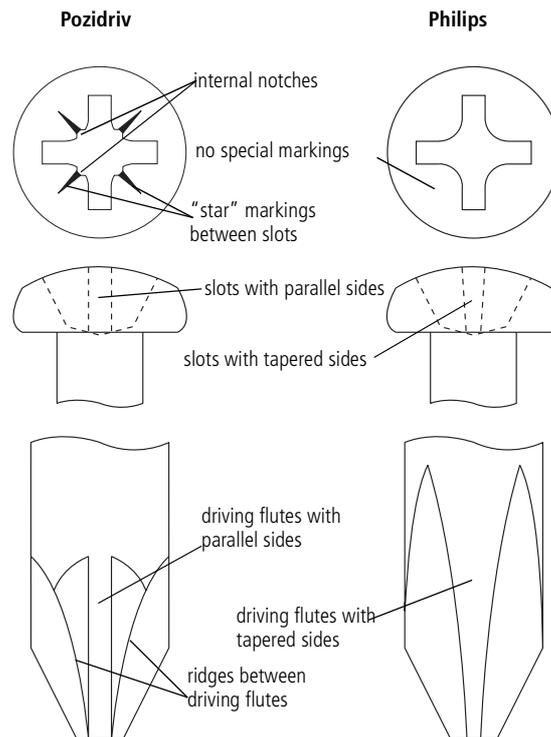
Recommended Tools

It is beyond the scope of this manual to list every tool that a service technician should carry. However, the tools specifically required for servicing TA2549-01 fitted BSS equipment are listed in the table below. You can also obtain the TBA0ST2 tool kit from your nearest Tait Dealer or Customer Service Organisation. It contains the basic tools needed to install, tune and service TA2549-01 fitted BSS equipment.

Driver/ Spanner	Size	Location / Function
Torx T8C*	M2.5	securing the SMA connector to the reciter and PA front panel
Torx T10*	M3	all M3 screws
Torx T20*	M4	all M4 screws
Pozidriv PZ3	M6	DC input terminals on the PMU
3/32 in Allen key	4-40 UNC	securing the RF power transistors to the PA heatsink
5.5 mm AF*	M3	securing the speaker to the control panel chassis
11 mm AF		securing the BNC/TNC connectors to the reciter rear panel

* included in the TBA0ST2 kit

Replacing Components

Ensure that any replacement components are of the same type and specifications as the originals. This will prevent the performance and safety of the TA2549-01 hardware from being degraded.

Surface Mount Devices

Important Surface mount devices (SMDs) require special storage, handling, removal and replacement techniques. This equipment should be serviced only by an approved Tait Dealer or Customer Service Organisation equipped with the necessary facilities. Repairs attempted with incorrect equipment or by untrained personnel may result in permanent damage. If in doubt, contact your nearest Tait Dealer or Customer Service Organisation.

Leaded Components

Whenever you are doing any work on the PCB that involves removing or fitting components, you must take care not to damage the copper tracks or pads. The two satisfactory methods of removing components from plated–through hole (PTH) PCBs are detailed below.

Desoldering Iron Method

This method requires the use of a desoldering station.

1. Place the tip over the lead and, as the solder starts to melt, move the tip in a circular motion.

2. Start the suction and continue the movement until three or four circles have been completed.

3. Remove the tip while continuing suction to ensure that all solder is removed from the joint, then stop the suction.

4. **Before** pulling the lead out, ensure it is not stuck to the plating.

5. If the lead is still not free, resolder the joint and try again.

Note   The desoldering iron does not usually have enough heat to desolder leads from the ground plane. Additional heat may be applied by holding a soldering iron on the tip of the desoldering iron (this may require some additional help).

Component Cutting Method

6. Cut the leads on the component side of the PCB.

7. Heat the solder joint **sufficiently** to allow **easy** removal of the lead by drawing it out from the component side: do **not** use undue force.

8. Fill the hole with solder and then clear with solderwick.

Cased Mica Capacitors

Cased mica capacitors can be removed by heating the top with a heavy–duty soldering iron and gently lifting the capacitor off the PCB with a solder–resistant spike or equivalent. Make sure that the solder at the tab solder joint is melted or removed before attempting to lift the capacitor.

Regulatory Information

Any modifications you make to this equipment which are not authorised by Tait Electronics Ltd may invalidate your compliance authority's approval to operate the equipment.

PCB Information

All PCBs are identified by a unique 10 digit IPN (internal part number) which is printed onto the PCB (usually on the top side), as shown in the example below.

```
220-02008-04
```

The last two digits of this number define the issue status, which starts at 01 and increments through 02, 03, 04 etc. as the PCB is updated.

1   General Information

The TA2549-01 Power Monitor and Alarm Interface Module is mounted to the rear of the TB8000 Reciter fitted with a SIF (System Interface) board. The module plugs directly into the SIF.

This product provides an interface from a Remote Console Unit (RCU) via a 25 way socket into the standard 25way SIF of the TB8100 Base station. It additionally provides alarm, channel change and forward RF power monitoring functions to connection points on the interface board

1.1   Product Features

Talk Through / Base Station Mode

The TB8100 normally operates as in Base Station Mode, however if digital input 9 is asserted (input is grounded) then the TB8100 will switch into talk through mode. A dip switch is provided on the interface board to enable talk through mode. When in talk through mode the receiver audio and RX gate will continue to be routed to the RCU. The RCU will also be able to key and pass audio to the transmitter, but only when the RX gate of the base station receiver is not asserted. In which case receiver audio is passed to the transmitter.

Power Monitor

The TB8100 does not provide an RF forward power metering signal. An external power monitor module is required to sense the forward RF power. An RCA-Cinch connector PL100 is supplied to input the signal from the monitor module. This input is then amplified/attenuated to get the required 0 to 5V output to represent RF power transmitted into the antenna feeder. The output voltage will be available on a screw type terminal SK100.

Alarm output

A floating dry-contact relay output is provided for alarm indication. The output can be either normally open or normally closed depending on a link PL102 setting.

Channel Selection

External channel selection of 255 channels are available to the TB8100 via two OR'ed together channel selection mechanisms.

- 8 switch dip switch SW101.
- External TTL input via 9 way D-range SK103.

1.2   Task Manager

The Task Manager is used to select the base station mode of operation, either talk through or base station, as determined by the state of digital input 9.

Base Station Mode

When digital input 9 of the SIF is not asserted (high) the TB8100 will operate in base station mode.

Talk Through Mode

When digital input 9 is asserted (grounded) the base station will operate in line controlled talk through mode. Except when the receiver gate is asserted, in which case the base station will disable the external transmit key input and allow only receiver audio to be transmitted.
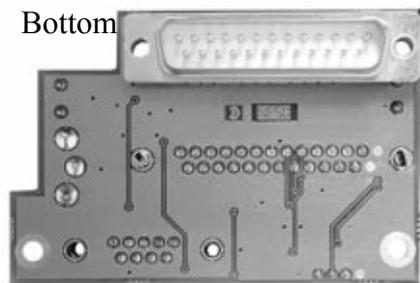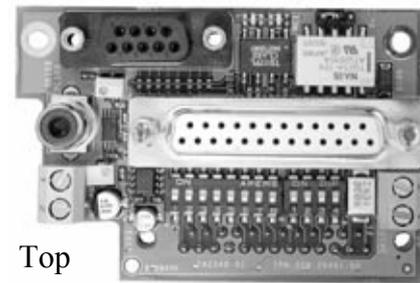
Alarm Output

If a base station alarm is detected then digital output 1 will be asserted.

1.3   Mechanical

The photographs illustrate the
TA2549-01 Power Monitor and
Alarm Interface Module.

For more information on
mechanical detail of this product,
see "Fitting the Module" on
page 19 of this manual.

Top

Bottom

2 Installation

2.1 Fitting the Module

The TA2549-01 Power Monitor and Alarm Interface Module is secured to the Reciter using the parts and instructions that follow:

Qty	IPN	Description
	303-20077-00	Cir Clip 5.0mm OD
	316-06847-00	Pnl Rear RF App Pcb T8K Rctr
	347-00011-01	Scrw 4-40*5.7mm
	349-00020-32	Scrw M3*8mm T/T P/P Bz
	319-30003-00	Spcr 11mm M3

1. Fit the two standoffs ① and finger–tighten.

2. Install the Board onto the Reciter D-range and fix in place with screws ②.

3. Screw into place with two M3 screws ③.
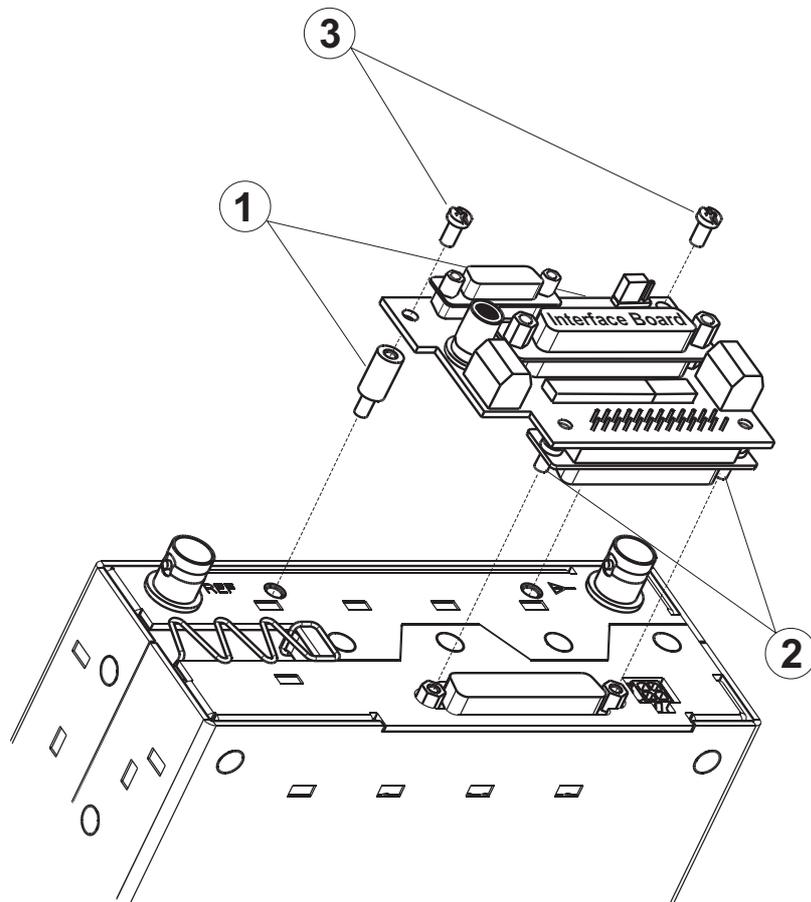
The correctly-installed TA2549-01 Power Monitor and Alarm Interface Module assembly will look like the following diagram.
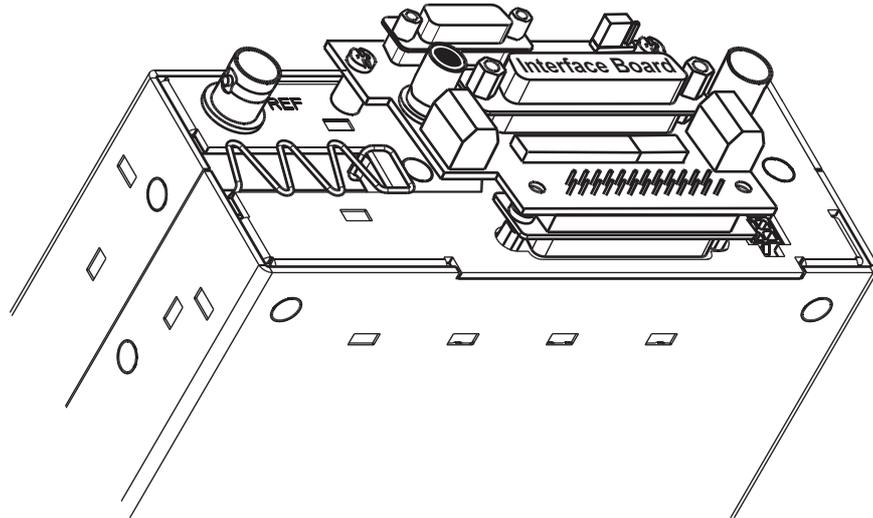
2.2 Wiring up the Module

Note The power monitor is **not** included with the TA2549-01
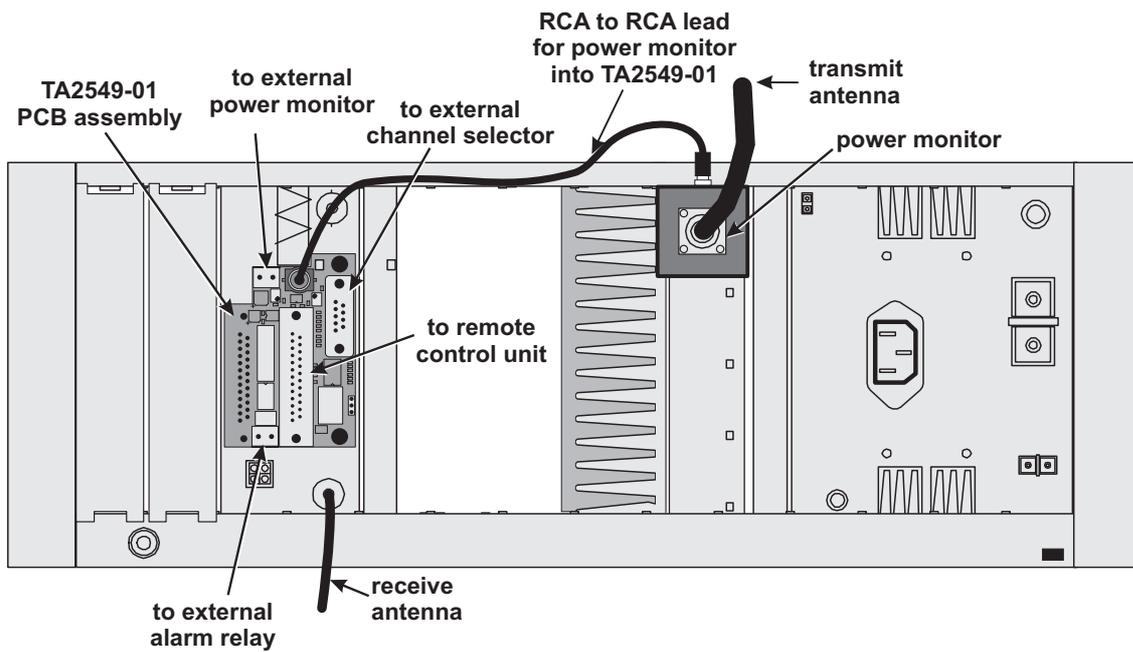
2.3   Installing the TB8100 Template

1.   Load the TB8100 template QA2549A8 to a PC running the TB8100 Service Kit into TB8100 Base Station.

2.   Open theTB8100 template using the TB8100 service kit

3.   Make any customer–specific changes (e.g. frequencies) to the TB8100 template. See the TB8100 Installation and Operation Manual for details.

4.   Configure the Power Monitor and Alarm Interface Task Manager script as required.

5.   Connect to TB8100 Base Station and download the updated TB8100 template to the Base Station.

3 Setup

3.1 Module Setup
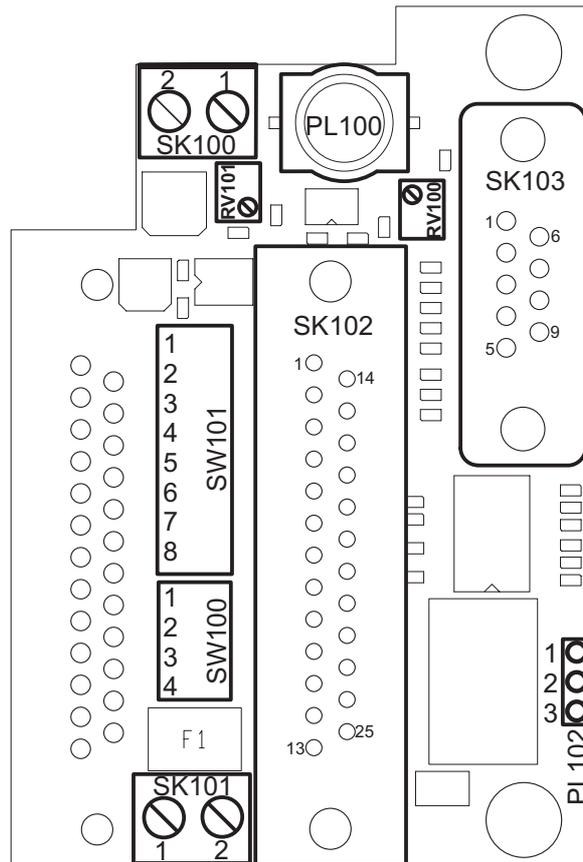
RF Power Monitor

After connecting the equipment as described in "Installation" on page 19.

Transmit on the TB8100 by switching position 3 of dip switch SW100 to on. Ensure the TB8100 is transmitting at its nominal power.

■ Adjust RV101 anti–clockwise until it reaches the end of its travel.

■ Measure on terminals SK100 with a DC volt meter

■ Adjust RV100 to until the DC volt meter reads the required power monitor voltage.

Note If RV100 reaches the end of its travel and the required voltage is not reached then adjust RV101 until the required voltage is achieved.

Channel Selection

Program the TB8100 with the required channels. Select the desired channel by entering the binary representation of the channel number on dip switches SW101 or by pulling down the appropriate lines on the 9 pin D-range SK103.

Alarm Output Operation

The dry contact alarm output can be configured as normally closed or normally open for a no alarm condition from the base station.

■ To select the normally closed contact output place the shorting link on PL102 to short the top two positions, pins 1 and 2.

■ To select the normally open contact output place the shorting link on PL102 to short the bottom tow positions, pins 2 and 3.

Talk Through or Base Station Mode Selection

Once the QA2549A8 template is loaded the TB8100 operating mode can be selected via dip switch SW100 position 1. When switched to the on position the TB8100 will operate in talk through mode, when in the off position the TB8100 will operate in Base Station mode.

Talk Through Priority Selection

The power monitor and alarm interface task manger script is configured as standard to give priority to the receiver audio when transmitting in Talk Through mode. This means that when the receiver gate opens audio from the receiver is repeated and audio from the line is stopped. This priority can however be reversed with audio from the receiver being stopped and audio from the line being transmitted.

To reverse the standard operation once the QA2549A8 template is loaded.

■ Open the Task Manger section of the service kit.

■ Select and open the general folder.

■ Select the "Disable External TX key" comment.

■ Select the "Enable/Disable" button to disable this section of the task manger script.

■ Program the base station.

Alarm Configuration

Once the QA2549A8 template has been loaded onto the base station and configured for desired operation as described in the TB8100 installation guide. Alarms can be configured in the service kit alarm section, once configured the task manger script will automatically change the state of the dry contact relay upon detection of an alarm by the base station.

Dip Switches
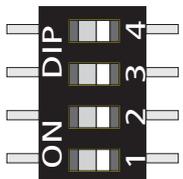
Dip Switch SW100	SW		Description
	1	On	talk through mode
		Off	base station mode
	2	On	digital input 10 asserted
		Off	digital input 10 released
	3	On	Tx key asserted
		Of	Tx key released
	4	On	na
		Off	na

Dip Switch SW101	SW		Description
	1	On	channel 1
		Off	
	2	On	channel 2
		Off	
	3	On	channel 4
		Of	
	4	On	channel 8
		Off	
	5	On	channel 16
		Off	
	6	On	channel 32
		Off	
	7	On	channel 64
		Of	
	8	On	channel 128
		Off	

4   Wiring Specification

Once the TA2549-01 Power Monitor and Alarm Interface Module is installed, you need to connect up to other equipment. This chapter also provides information on the inputs and outputs used.

Note   All cables to and from the TA2549-01 should be routed along the side of the cabinet to avoid restricting the cooling airflow.

4.1   TA2549-01 Connections

The TA2549-01 Power Monitor and Alarm Interface Module has the following connections:

- PL101 25-way D Range Plug – Channel Interface (Local)
- SK102 25-way D Range Socket – Remote Console Unit Interface
- SK100 2-way Screw Terminal – Power Monitor Out
- SK101 2-way Screw Terminal – Alarm Out
- SK102 9-way D Range Socket – Channel Selection Interface
- PL100 RCA Socket – RF Power Monitor Input

PL101 25-way D Range plug
Channel Interface (Local)

Pin	Signal Name	Signal Type	Notes
1	Rx line out +	audio output	non-isolated AC coupled line
2	Rx line out −		
3	Rx audio out	audio output	AC coupled
4	ground	ground	
5	Tx audio in	audio input	AC coupled
6	Tx line in +	audio input	non-isolated AC coupled line
7	Tx line in −		
8	RSSI	DC signal	
9	Rx gate	output	open collector
10	Tx key	input	active low
11	digital out 1	output	open collector
12	digital out 2		
13	+AUX_V	power output	from auxiliary DC input
14	digital in 1	input	5V TTL logic active low
15	digital in 2		
16	digital in/out 3		
17	digital in/out 4		
18	digital in/out 5		
19	digital in/out 6		
20	digital in 7		
21	digital in 8		
22	digital in 9		
23	digital in 10		
24	Tx relay	output	open collector
25	ground	ground	

SK102 25-way D Range Socket
Remote Console Interface

Pin	Signal Name	Notes
1	RX line out +	non-isolated AC coupled line
2	RX line out -	
3	RX audio out	AC coupled
4	TX audio in	
5	TX audio in	AC coupled
6	TX line in	AC coupled line
7	RSSI	
8	RX gate +	
9	RX gate -	open collector
10	TX key +	
11	TX Key -	open collector
12	Digital out 2	
13	Aux volts	
14	Channel select 1	5V logic
15	Channel select 2	
16	Channel select 3	
17	Channel select 4	
18	Channel select 5	
19	Channel select 6	
20	Channel select 7	
21	Channel select 8	
22	Repeater/Talk through select	
23	Digital in 10	
24	TX relay	open collector
25	Ground	

SK103 - 9-way D-range connector plug
Channel Selection Interface

.

Pin	Description	Notes
1	Channel select 1	
2	Channel select 2	
3	Channel select 3	
4	Channel select 4	
5	Channel select 5	
6	Channel select 6	
7	Channel select 7	
8	Channel select 8	
9	ground	
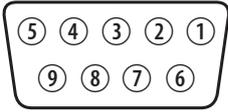
⑤ ④ ③ ② ①
⑨ ⑧ ⑦ ⑥

front view

PL100 - RCA Socket
RF Power Monitor Input

Pin	Description
1 (inner)	power monitor input
2 (outer)	ground

SK100 - 2 way Screw Terminal
Power Monitor Out

Pin	Description
1	RF power out
2	ground

SK101 - 2 way Screw Terminal
Alarm Out

Pin	Description
1	contact 1
2	contact 2

5 Ancillary Equipment

To utilize the power monitor feature on the TA2549-01 a power monitor similar to the one below may be used or ordered from Tait Electronics Ltd.

5.1 Power Monitor

PM-2A-XXX (IPN:009-00000-0X)

Model	Frequency	DC	IPN
PM-2A-50	30-88 MHz	Dual direction 1000 Watts	009-00000-01
PM-2A-300	118-512 MHz	Dual direction (50 MHz BW) 1000 Watts	009-00000-02
PM-2A-900	806-960 MHz	Dual direction (50 MHz BW) 1000 Watts	009-00000-03

The Telewave PM–2A–XXX series are dual–direction, forward/ reverse RF power monitors which produce a DC voltage proportional to an RF signal. An internal trimmer allows each monitor to be recalibrated after installation. Two RCA connectors provide access to the proportional DC output.

Specifications

Frequency ranges	**PMA-2A-50** 30 - 88 mHz **PMA-2A-300** 118 - 512 mHz **PMA-2A-900** 806 - 960 mHz
Bandwidth	50 MHz
Power input (max.)	1000 watts
VSWR (max.)	1.1:1
Insertion loss (typ.)	0.1 dB
Dimensions (HWD)	1.375″ x 2.25″ x 1.25″
Weight	0.5 lb.
RF input/output connectors	N–Male / Female
DC output connectors	RCA

Note Bandwidth is the approximate maximum range over which accu-rate power readings may be obtained without readjustment.

6   Circuit Description

The diagram below illustrates the functional relationship between the TA2549-01 Power Monitor and Alarm Interface Module and external interfaces.
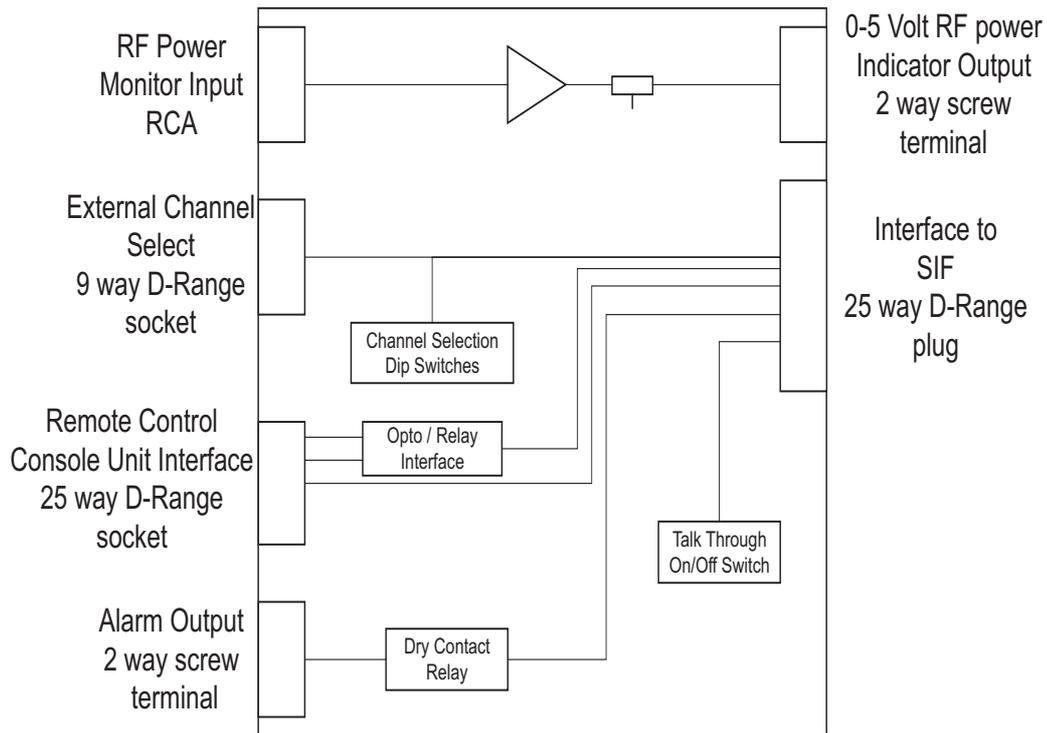
6.1   TA2549-01 Power Monitor and Alarm Interface

Power Supply

The interface is supplied with 13.8 volts from the Auxiliary voltage output of the TB8100 SIF card. This is then passed to an 8 volt regulator which supplies 8 volts to the RF power monitor, TX key and RX gate circuits.

RF Power Monitor

The RF power monitor circuit accepts a DC input from an external power coupler. This DC input can then be either attenuated via RV100 or have gain applied via RV101. U101 is a rail to rail op–amp and is capable of providing an adjustable DC output up to a maximum of 8 volts.

TX Key Input

The TX key input accessed via the remote console interface D-range SK102 provides an opto coupled isolated input to the TX key line of the TB8100 SIF. It is configured as standard to operate with a pull down on TX Key –, but can be configured for 48 volt operation across TX Key – and + by removing R109.

On the TB8100 SIF side of the opto coupler provides a pull down on the TX key line of the SIF. There is additionally connected to a green LED DS101 to give a visual indication on the interface board of the assertion of the TX key input.

RX Gate Output

The RX gate output is accessed via the remote console interface D-range SK102 and provides a MOSFET relay output. In the standard configuration the RX gate + line, is pulled low upon assertion of the RX gate output of the SIF. The output can be configured for 48 volt operation across RX gate + and – by removing R107 and R108.

On the TB8100 SIF side of the relay, the relay is activated when the RX gate line from the SIF is pulled low, a red LED provides indication of the active state of the relay.

Alarm Output

A dry contact relay output is supplied for signalling base station alarms. The relay is normally energised via the assertion of digital output 1 of the SIF when the base station is running and no alarm condition is detected, by the task manager. This provides a positive failure mechanism should power be removed from the base station. The relay can be configured as normally open or normally closed via link PL102.

Channel Change Input

The interface provides two mechanisms for selecting the channel change, one is an on board bank of dip switches SW101 and the other is an external 9 way D-range SK103. Dip switches SW101 provide a binary selection input to the channel select lines of the TB8100 SIF, when a switch is in the on state then this is the equivalent of a binary '1'. The external channel selection D-range SK103 asserts a binary '1' on a channel select line when that input is pulled low.

Talk Through / Base Station Selection and TX Key Assertion

Dip switch SW100 position 1 is used to select Talk Through or Base Station mode of operation via assertion of digital input 9 of the TB8100 SIF. The task manager script monitors this input and when asserted i.e.: the switch is in the on position, the base station will operate in Talk Through mode.

Position 3 of the SW100 can be used to key the base station when switched into the on position, this achieved by asserting the TX key line on the SIF. This also results in the TX key LED being illuminated.

7 PCB Information

The following information is included for the XA2549-01 Board:

■ The parts list contains all information for each part and designator. The "IPN" column refers to the Tait internal part number, and "Description" is how the part is described on the Tait Database. The "PCB" column provides a grid reference to the PCB layouts. The "Circuit" column provides a grid reference to the circuit diagram. Note that the initial number indicates the circuit diagram page.

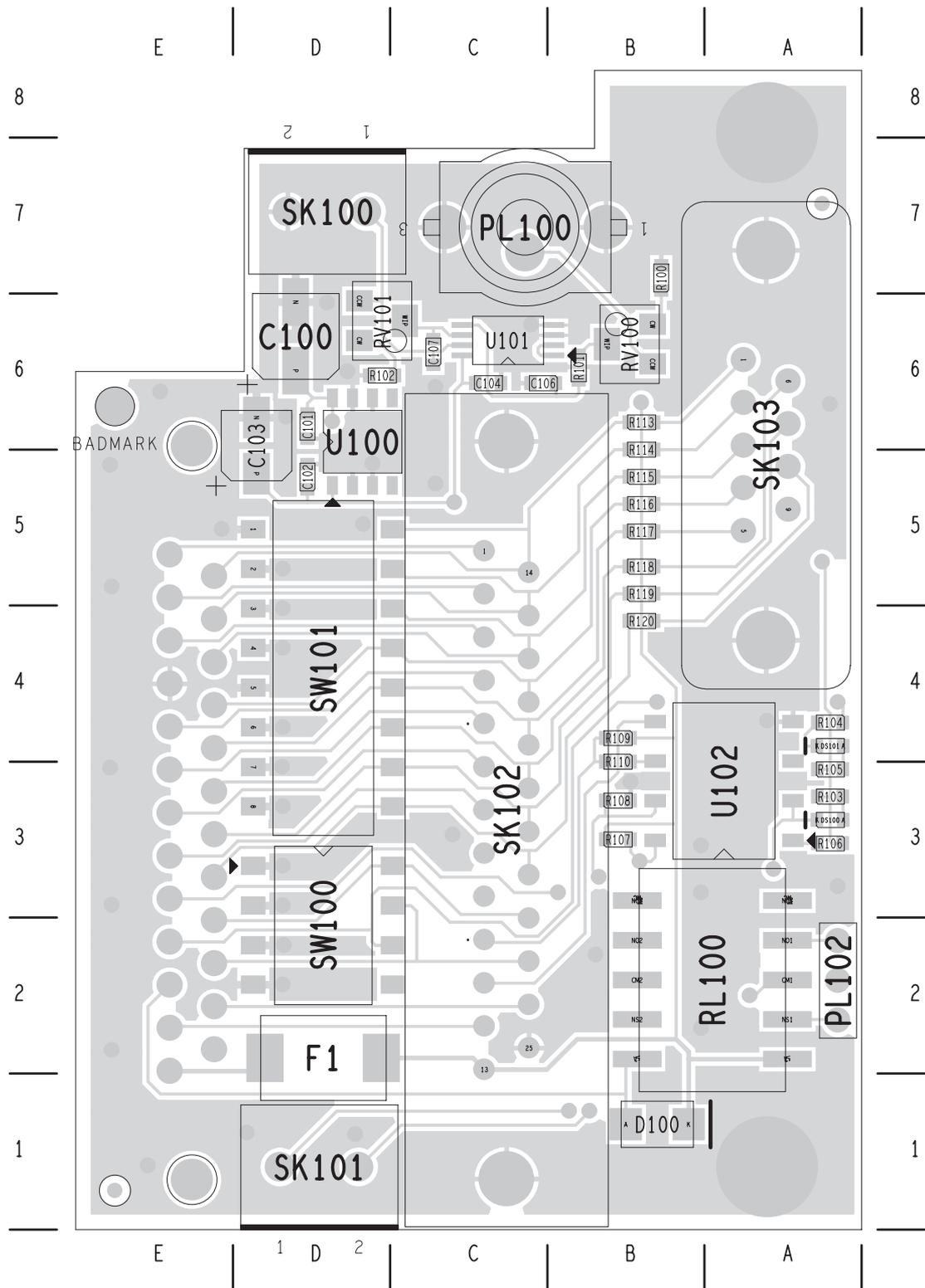■ PCB layout drawings for both sides of the board

■ Circuit diagram

7.1 XA2549-01-PBA (Rev001)

Parts List

Part	IPN	Description	PCB	Circuit
	228-25491-00	PCB TA2549-01 TB8K KCRC Intfc		
C100	016-08100-03	Cap Elec SMD 10uF 35V 105/2000	D6	1B1
C101	018-15100-00	Cap 0603 10n 50v X7r ±10%	D6	1B2
C102	018-15100-00	Cap 0603 10n 50v X7r ±10%	D5	1B3
C103	016-07100-01	Cap Elec SMD 1M 6*4 20% 50v	D6	1B3
C104	018-16100-00	Cap 0603 100n 16v x7r + - 10%	C6	1B4
C106	018-12330-10	Cap 0603 33p 50v NPO ±1%	C6	1J5
C107	018-12330-10	Cap 0603 33p 50v NPO ±1%	C6	1J6
D100	001-10011-74	Diode SMD MRA4004T3 1a/400v	B1	1G4
DS100	008-10111-20	LED SMD 0603 Red	A3	1H7
DS101	008-10004-00	LED SMD 0603 Green KGKT	A4	1G8
F1	265-10055-00	Fuse SMD 0.3a Rstbl 030-2	D2	1E4
PL100	240-02612-00	Skt RCA Phono Vert TH Black	B7	1K2
PL101	240-00010-87	Plg 25w Drng Pcb Mtg	E5	1E2
PL102	240-00020-59	Hdr 3w 1row Pcb Mtg	A2	1J10
R100	038-15100-10	RES 0603 10k 1% 1/10W	B7	1J4
R101	038-14680-10	RES 0603 6k8 1% 1/10W	B6	1K5
R102	038-15100-10	RES 0603 10k 1% 1/10W	D6	1J6
R103	038-13560-10	RES 0603 560R 1% 1/10W	A3	1H7
R104	038-13100-10	RES 0603 100R 1% 1/10W	A4	1G8
R105	038-13560-10	RES 0603 560R 1% 1/10W	A3	1G8
R106	038-13680-00	RES 0603 680R 5% 1/10W	A3	1H8
R107	038-15100-10	RES 0603 10k 1% 1/10W	B3	1H9
R108	038-10000-00	RES 0603 0R	B3	1G10
R109	038-13560-10	RES 0603 560R 1% 1/10W	B4	1G9
R110	038-13560-10	RES 0603 560R 1% 1/10W	B4	1G9
R113	038-13560-10	RES 0603 560R 1% 1/10W	B6	1D11
R114	038-13560-10	RES 0603 560R 1% 1/10W	B6	1D11
R115	038-13560-10	RES 0603 560R 1% 1/10W	B5	1D11
R116	038-13560-10	RES 0603 560R 1% 1/10W	B5	1C11
R117	038-13560-10	RES 0603 560R 1% 1/10W	B5	1C11

Part	IPN	Description	PCB	Circuit
R118	038-13560-10	RES 0603 560R 1% 1/10W	B5	1C11
R119	038-13560-10	RES 0603 560R 1% 1/10W	B5	1C11
R120	038-13560-10	RES 0603 560R 1% 1/10W	B4	1C11
RL100	237-10010-00	Relay 12v Dpdt 10pin SMD	A2	1J11 1G3
RV100	042-16100-10	Res Pre TH 100k 10% 5t Top	B6	1K4
RV101	042-16100-10	Res Pre TH 100k 10% 5t Top	D6	1J6
SK100	240-04030-09	Term Block 2w Pcb Mtg 5mm	D7	1J13
SK101	240-04030-09	Term Block 2w Pcb Mtg 5mm	D1	1J13
SK102	240-02020-20	Skt 25w Drng Pcb + Full H/W	C5	1E13
SK103	240-02011-30	Skt 9w Drng Pcb Mtg Fxd Scrw	A6	1C13
SW100	230-10004-20	Sw SMD Dip 4way SODip	D2	1C5
SW101	230-10010-44	Sw SMD Spst 16dil X8	D4	1B8
U100	002-10078-08	IC SMD 78l08 8v Reg S08	D6	1B2
U101	002-10227-21	IC SMD TLC2272CPW 0-amp	C6	1J5 1B4 1H5
U102	002-10117-00	IC SMD TS117 Opto 8p Fpak	A3	1G9 1H9

PCB Layout (top side)

PCB Layout (bottom side)

Circuit Diagram