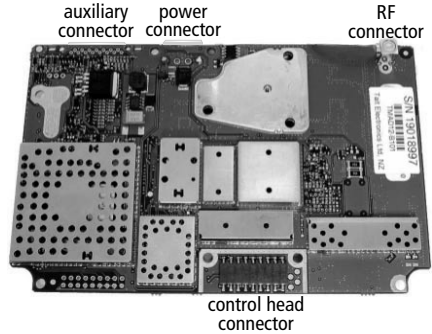


TM8115 Main Board

The TMAD-1AA TM8000 RF Assembly is available as an unassembled part. Based on TMAD12-xx01, it differs from the standard only in that the standard RF connector is replaced with an MCX socket.



Main Board Operation

The main board contains the receiver and transmitter circuitry. There are different main boards available covering different frequency bands and with different RF performances. For current information refer to the TaitWorld website.

The main board assembly also incorporates the digital unit.

The board requires additional heat dissipation and there are areas which must be in thermal contact with heat sinks. Refer to “Dissipation of Heat”, on page 2.

Specifications

Refer to the TM8100 Service Manual for main board specifications.

Regulatory Compliance

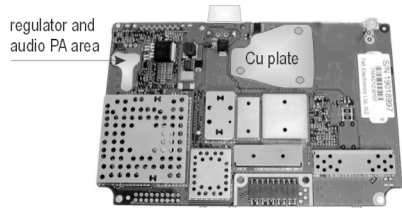
This TM8115 main board assembly is not intended to be operated as is and must be appropriately integrated with other equipment and an enclosure prior to use. It has not been tested to be compliant with any RF performance, EMC, or safety standards in its bare form.

The responsibility for obtaining all the necessary compliance approvals to operate the integrated equipment resides with the system integrator.

Dissipation of Heat

Important: This assembly must not be operated without providing additional heatsinking. Heat needs to be dissipated in particular, from the following components:

- 9 V regulator
- audio PA (power amplifier)
- RF PA
- driver for RF PA



Dissipation of Heat from Regulator and Audio PA

Heat from the regulator and audio PA should be conducted to suitable heatsinking via underside of the PCB where the components are mounted. A coating of thermal paste should be applied to the board in the area shown above.

Dissipation of Heat from RF PA and Driver

Heat from the RF PA and driver is conducted via the copper (Cu) plate fixed to the underside of the PCB beneath these components. Suitable heatsinking should be provided and a coating of thermal paste on the plate to ensure the necessary thermal contact between the surfaces. Refer to the “Installation Procedure”, on page 3 for attachment details.

Apply Thermal Paste to Main Board Assembly

Before assembling the main board, apply thermal paste:

1. Thermal paste is required over the complete surface of the copper plate and regulator/audio PA areas.
2. Inspect the areas requiring thermal paste, as well as the corresponding area on the heatsink. If paste has been previously applied and has been contaminated with dirt, clean off the paste.
3. Obtain Dow Corning 340 silicone heat-sink compound (IPN 937-00000-55) or the equivalent. Apply 0.1 cm^3 of thermal paste to the copper plate, and 0.01 cm^3 of thermal paste to the regulator/audio PA area.
4. Use a stiff brush to apply the paste in a thin film to the required area on the copper plate. Ensure that no bristles from the brush come loose and remain embedded in the paste. The paste needs to be completely free of contaminants.

Installing the Main Board

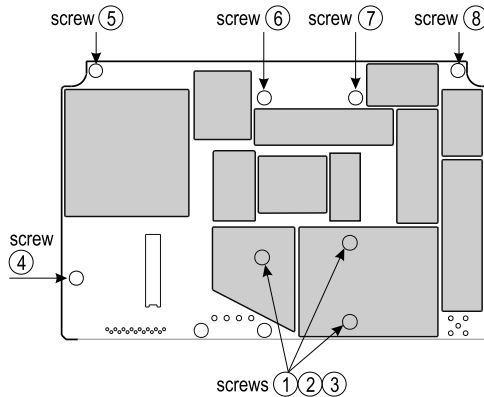
Important: This equipment contains devices that are susceptible to high voltage and static discharge. The procedures outlined in this installation guide should therefore be carried out in a static-safe environment. You can obtain information on antistatic precautions and the dangers of electrostatic discharge (ESD) from standards such as ESD S4.1-1997 (revised) or BS EN 100015-4 1994. The Electrostatic Discharge Association website is <http://www.esda.org/>.

Parts Required

The following parts are required to install the main board into a chassis.

Item	IPN	Description	Quantity	Drive type	Torque (N·m)	Torque (lbf·in)
1,2,3	349-02066-xx	M3 x 10 screw	3	Torx T10	1.7	15
4,5,6,7,8	349-02066-xx	M3 x 10 screw	5	Torx T10	1.9	17

The characters **xx** in an IPN stand for the issue number. We recommend you order the latest available issue of a part.



Installation Procedure

1. Attach a heatsink to the copper plate area using three M3 x 10 screws. Different length screws may be required depending on the heatsink you are using. Ensure that good thermal contact is made between the copper plate and the heatsink then use a Torx T10 torque-driver to tighten the screws to 1.7 N·m (15 lbf·in).
2. Screw in the five internal screws in the order shown above. Tighten by hand as far as possible. Ensure that the screws start easily and are not cross-threaded, then use a Torx T10 torque-driver to tighten the screws to 1.9 N·m (17 lbf·in).

Important: Ensure that the flatness of the board is maintained at all times.

Recalibration and Reprogramming

If the main board needs to be recalibrated or programmed, read the default parameters and save before making adjustments.

Testing

Important: This assembly must not be operated without providing additional heatsinking.

Carry out tests to confirm the transmitter functions below as necessary for the intended application.

Test	Limits
Error in transmit frequency	+100 Hz to -100 Hz
Transmit power: <ul style="list-style-type: none"> • High • Medium • Low • Very low 	23.2 W to 29.2 W 11.1 W to 14.0 W 4.6 W to 5.8 W 0.9 W to 1.2 W
Current at high power: <ul style="list-style-type: none"> • B1-band radios • D1-band radios • H5-band radios • H6-band radios 	< 5.5 A < 5.5 A < 6.5 A < 6.5 A
Peak deviation (sweep tone of 300 Hz to 3 kHz): <ul style="list-style-type: none"> • Narrow-band • Medium-band • Wide-band 	≤ 2.5 kHz ≤ 4.0 kHz ≤ 5.0 kHz
Distortion: <ul style="list-style-type: none"> • 1 kHz at 1.5 kHz deviation (narrow-band) • 1 kHz at 3.0 kHz deviation (wide-band) 	< 3% < 3%
CTCSS (continuous-tone-controlled subaudible signalling) deviation: <ul style="list-style-type: none"> • Narrow-band • Medium-band • Wide-band 	250 to 350 Hz 500 to 560 Hz 580 to 680 Hz

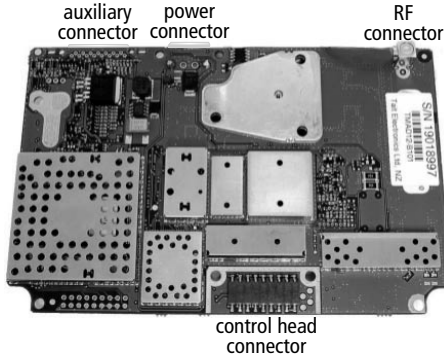
Carry out tests to confirm the receiver functions below.

Test	Limits
Receive sensitivity	≤ 118 dBm for 12 dB SINAD
Mute opening: <ul style="list-style-type: none"> • Country • City • Hard 	<ul style="list-style-type: none"> >6 dB and < 10 dB SINAD >8 dB and < 14 dB SINAD > 18 dB and < 22 dB SINAD
Audio power (maximum volume at -47 dBm): <ul style="list-style-type: none"> • At "Rx Audio/SINAD" connector on test unit • At pins 3 (SPK-) and 4 (SPK+) of power connector on radio 	<ul style="list-style-type: none"> > 500 mV_{rms} > 5.00 V_{rms}
Distortion (at -47 dBm, 60% rated system deviation at 1 kHz, with volume set to give 3 W into 16 Ω load)	< 3.00%

Carry out tests to confirm the general radio functions below.

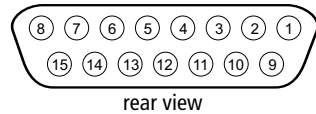
Test	Description
PTT switch	Check that PTT switch functions
Microphone	Check operation of microphone Check operation of hook-switch
Data communications	Test 1200 baud data transmission (standard) Test Tait high-speed data transmission (if feature is enabled)
Direct-connect GPS (global positioning system)	Check that GPS poll returns correct position (if feature is enabled)
Selcall	Check that radio encodes selcall Check that radio decodes selcall
Audio tap points and digital I/O	Check configuration of programmed options and test operation of these lines to confirm that Customer requirements are satisfied

Connectors



Auxiliary Connector

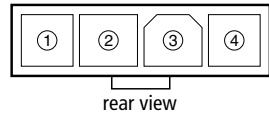
The auxiliary connector allows connection of various external devices, such as a hands-free microphone or external modem. The connector is a 15-way, standard-density D-Range socket.



Pin	Signal	Description
1	AUX GPIO7	General purpose port for data input and output
2	AUX GPIO5	General purpose port for data input and output
3	AUX RXD	Asynchronous serial port for input of receive data to radio
4	AUX GP13	General-purpose port for input of data
5	AUX GP12	General-purpose port for input of data
6	RSSI	Analogue RSSI output signal
7	AUD TAP IN	Programmable tap point into receive or transmit audio-processing chain
8	+13V85W	Switched output of external power supply for radio
9	AUX GPIO6	General purpose port for data input and output
10	AUX GPIO4	General purpose port for data input and output
11	AUX TXD	Asynchronous serial port for output of transmit data from radio
12	AUX GP1	General-purpose port for input of data
13	AUD TAP OUT	Programmable tap point out of receive or transmit audio-processing chain
14	AUX MIC AUD	Audio input signal from auxiliary microphone
15	AGND	Analogue ground

Power Connector

The power connector in this application is the standard TM8100 power connector. It is the interface for the primary 13.8V power source and the external speaker. The primary power source can be the vehicle battery or a mains-fed DC power supply. The power connector provides connection for an external speaker.



Pin	Signal Name	Signal Type
1	GND	Ground
2	SPK-	Negative audio output signal for external speaker
3	SPK+	Positive audio output signal for external speaker
4	+13V8 BATT	External power supply for radio

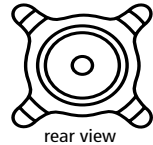
Warning!!

Danger of Fire! The protection mechanisms rely on the correct fuses in both the negative and positive power supply leads being present. Failure to fit the correct fuses may result in fire or damage to the radio.

RF Connector

The RF connector is the primary RF interface to the antenna. The RF connector is a standard MCX socket with an impedance of 50Ω

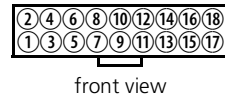
Important: The maximum RF input level is +27 dBm. Higher levels may damage the radio.



Pin	Signal	Signal Type
1	RF	RF analogue
2	GND	RF ground

Control Head Connector

The control head connector is normally used for connecting the TM8115 control head to the radio, but may also be used to connect another main board for duplex operation.



Pin	Signal	Description	Signal type
1	RX_AUD	Receive audio output. Post volume control. AC-coupled.	Analogue
2	+13V8	Power supply output from radio body power source. (Can be switched or unswitched)	Power
3	CH_TXD	Asynchronous serial port - Transmit data.	Digital. 3V3 CMOS.

Pin	Signal	Description	Signal type
4	CH_PTT	PTT input from microphone. Also carries the hookswitch signal.	Digital
5	CH_MIC_AUD	Fist microphone audio input.	Analogue
6	AGND	Analogue ground.	Ground
7	CH_RXD	Asynchronous serial port - Receive data.	Digital. 3V3 CMOS.
8	DGND	Digital ground.	Ground
9	CH_ON_OFF	Hardware power on/software-controlled power off input. Active low.	Digital
10	VOL_WIP_DC	DC signal from TM8115 volume pot wiper.	Analogue
11	CH_SPL_DO	Data output signal to TM8115 control head.	Digital. 3V3 CMOS.
12	CH_LE	Latch enable output to TM8115 control head.	Digital. 3V3 CMOS.
13	CH_GPIO1	General purpose digital input/output.	Digital. 3V3 CMOS input. Open collector output with pullup.
14	+3V3	Power supply to control head digital circuits.	Power
15	CH_SPL_DI	Data input from TM8115 control head.	Digital. 3V3 CMOS.
16	CH_SPL_CLK	Clock output to TM8115 control head.	Digital. 3V3 CMOS.
17	SPK-	Speaker audio output for non-remote control head. Balanced load configuration.	Analogue
18	SPK+	Speaker audio output for non-remote control head. Balanced load configuration.	Analogue

Detection of Control Head

For operation with a TM8105 blank control head, the radio must be programmed to power up when power is applied, and 13V8 power-sense hardware link LK1 must be fitted. For more information on hardware links refer to the TM8100 Service Manual.

PCB Information Packs

A PCB information pack for a circuit board consists of relevant BOM grid reference index, PCB layouts, and circuit diagram. (Grid reference indexes give the locations of components on the layouts and circuit diagrams.) An information pack is compiled whenever there is a major change in the board layout. All PCB information packs are published on the Technical Support website. In service documentation, however, only the PCB information pack for the current release is included.

More Information

Refer to the TM8100 Mobile Radio Service and Accessories Manual (product code MM8100-01-00-812) and TM8000 3DK Hardware Developer's Kit Application Manual (product code MMAA30-01-00-807) for more information.