

1 T835 General Information

This section provides a brief description of the T835 receiver, along with detailed specifications and a list of types available.

The following topics are covered in this section.

Section	Title	Page
1.1	Introduction	1.5
1.2	Specifications	1.6
1.2.1	Introduction	1.6
1.2.2	General	1.7
1.2.3	RF Section	1.7
1.2.4	Audio Section	1.9
1.2.4.1	General	1.9
1.2.4.2	CTCSS	1.9
1.2.4.3	Mute Operation	1.10
1.2.5	Microcontroller	1.10
1.2.6	Test Standards	1.10
1.2.6.1	European Telecommunication Standard (ETS)	1.10
1.2.6.2	DTI CEPT Recommendation T/R-24-01	1.11
1.2.6.3	Telecommunications Industry Association	1.11
1.3	Product Codes	1.12
1.4	Standard Product Range	1.13

Figure	Title	Page
1.1	T835 Main Circuit Block Identification	1.4
1.2	T835 Front Panel Controls	1.4

replace A4 pages B1.3/B1.4 with A3 pages B1.3/B1.4

replace A4 pages B1.3/B1.4 with A3 pages B1.3/B1.4

1.1 Introduction

The T835 is a high performance microprocessor controlled FM base station receiver designed for single or multichannel operation in the 136 to 174MHz frequency range¹.

The receiver is a dual conversion superhet with a synthesised local oscillator. The first IF is 21.4MHz, allowing exceptionally high spurious signal rejection to be achieved in the receiver front end. The second IF section (455kHz) combines amplitude limiting, detection and RSSI within a single integrated circuit. This IC also drives a noise level detector for gating the audio output. RSSI can also be used to drive a carrier mute for audio output gating (link selectable).

The audio section output can be adjusted to deliver >+10dBm to a 600 ohm balanced output, and 1W to a local monitor speaker. A flat or de-emphasised audio response is link selectable.

The synthesiser frequency is programmed via the serial communications port. Eight channel select lines are accessible via an optional D-range connector (D-range 2 - T800-03-0000) at the rear of the set.

All components except those on the VCO board are mounted on a single PCB. This is secured to a die-cast chassis which is divided into compartments to individually shield each section of circuitry. Access to both sides of the main PCB is obtained by removing each of the two chassis covers. There is provision within the chassis to mount small option PCBs.

The front panel controls include gating sensitivity, line level, monitor volume and a monitor mute switch.

The T835 has a width of 60mm and occupies a single space in a Tait rack frame, which has the ability to accommodate up to seven standard modules.

1. Although capable of operating over the 136-174MHz frequency range, the T835 has a 3MHz switching range (see [Section 1.2.3](#) and [Section 3.1](#)).

1.2 Specifications

1.2.1 Introduction

The performance figures given are minimum figures, unless otherwise indicated, for equipment tuned with the maximum switching range and operating at standard room temperature (+22°C to +28°C) and standard test voltage (13.8V DC).

Where applicable, the test methods used to obtain the following performance figures are those described in the EIA and ETS specifications. However, there are several parameters for which performance according to the CEPT specification is given. Refer to [Section 1.2.6](#) for details of test standards.

Details of test methods and the conditions which apply for Type Approval testing in all countries can be obtained from Tait Electronics Ltd.

The terms “wide bandwidth”, “mid bandwidth” and “narrow bandwidth” used in this and following sections are defined in the following table.

	Channel Spacing	Modulation 100% Deviation	Receiver IF Bandwidth
Wide Bandwidth	25kHz	±5.0kHz	15.0kHz
Mid Bandwidth	20kHz	±4.0kHz	12.0kHz
Narrow Bandwidth	12.5kHz	±2.5kHz	7.5kHz

Sensitivity and distortion figures are stated for standard operating conditions which includes audio de-emphasis. Note that the sensitivity and distortion figures will be degraded when flat audio is selected.

	Link PL210	Link PL220
De-emphasised Audio	1-2	2-3
Flat Audio	2-3	1-2

1.2.2 General

Number Of Channels	.. 128 (standard) ¹
Supply Voltage:	
Operating Voltage	.. 10.8 to 16V DC
Standard Test Voltage	.. 13.8V DC
Polarity	.. negative earth only
Polarity Protection	.. crowbar diode
Supply Current:	
Standby	.. 350mA
Full Audio	.. 800mA
Operating Temperature Range	.. -30°C to +60°C
Dimensions:	
Height	.. 183mm
Width	.. 60mm
Length	.. 322mm
Weight	.. 2.13kg

1.2.3 RF Section

Frequency Range	.. 136-174MHz
Type	.. dual conversion superheterodyne
Frequency Increment	.. 5 or 6.25kHz 2.5 or 3.125kHz (T835-26-0000 only) ²
Switching Range	.. 3MHz (i.e. ±1.5MHz from the centre frequency)
Input Impedance	.. 50 ohms
Frequency Stability (see also Section 1.4)	.. ±2.5ppm, -30°C to +60°C (±1ppm available for special applications)
Signal Strength Indicator (RSSI)	.. -115dBm to -70dBm, 3.5 to 6.5V at approx. 15dB/V

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1. Additional channels may be factory programmed. Contact your nearest Tait Dealer or Customer Service Organisation.
 2. US markets only.

IF Amplifiers:

Frequencies	.. 21.4MHz and 455kHz
Bandwidths-	
Narrow Bandwidth (NB)	.. 7.5kHz
Mid Bandwidth (MB)	.. 12kHz
Wide Bandwidth (WB)	.. 15kHz

Sensitivity (De-emphasised Response):

Single Channel	.. -117dBm
Bandsread (12dB Sinad)	.. -115dBm (across switching range)

Sensitivity (Flat Response):

Single Channel	.. -111dBm
Bandsread (12dB Sinad)	.. -109dBm (across switching range)

Signal+Noise To Noise Ratio (Typical):

	<u>De-emphasised</u>	<u>Flat</u>
RF Level -107dBm (CEPT)	.. 30dB (WB) 25dB (NB)	25dB (WB) 20dB (NB)
RF Level -83dBm (CEPT)	.. 54dB (MB) 50dB (NB)	49dB (MB) 45dB (NB)
RF Level -57dBm (EIA)	... 55dB (WB)	52dB (WB)

Selectivity:

Narrow Bandwidth (± 12.5 kHz)	.. 86dB minimum, 89dB typical (CEPT)
Mid Bandwidth (± 20 kHz)	.. 87dB minimum, 90dB typical (CEPT)
Wide Bandwidth (± 25 kHz)	.. 92dB minimum, 95dB typical (EIA)

Offset Selectivity (Canada only) .. 20dB

Spurious Response Attenuation .. 100dB (typical)

Intermodulation Response Attenuation:

Narrow Bandwidth	.. 80dB CEPT (typical)
Mid Bandwidth	.. 80dB CEPT (typical)
Wide Bandwidth	.. 85dB EIA (typical)

Blocking .. 100dB

Co-channel Rejection .. 6dB

Amplitude Characteristic .. 3dB

Spurious Emissions:

Conducted	.. -90dBm to 4GHz
Radiated	.. -57dBm to 1GHz -47dBm to 4GHz

1.2.4 Audio Section

1.2.4.1 General

Outputs Available	..	line and monitor
Frequency Response	..	flat or de-emphasised (750µs) (link selectable)
Flat Response:		
Bandwidth	..	67 to 3400Hz
Response	..	within +1, -2dB of output level at 1kHz
De-emphasised Response:		
Bandwidth	..	300 to 3400Hz
Response	..	within +1, -3dB of a 6dB/octave de-emphasis characteristic (ref. 1kHz)
Line Output:		
Power	..	adjustable to >+10dBm
Load Impedance	..	600 ohms
Distortion (@ -70dBm signal level):		
		<u>De-emphasised</u> <u>Flat</u>
Wide Bandwidth	..	≤2% ≤2%
Mid & Narrow Bandwidth	..	≤2% ≤4%
Monitor Output:		
Power	..	1W
Speaker Impedance	..	4 ohms
Distortion	..	≤3%
		(@ -70dBm signal level, links set to de-emphasis)

1.2.4.2 CTCSS

Linkable High Pass Filter:		
Bandwidth	..	350 to 3400Hz
Response	..	within +1, -3dB of level at 1kHz
Hum And Noise	..	30dB min. at 250.3Hz
(1kHz at 60% system deviation		35dB typical (67 to 240Hz)
CTCSS at 10% system deviation)		
Tone Detect:		
Tone Squelch Opening	..	better than 6dB sinad 3dB sinad at 250.3Hz (typical) 4dB sinad at 100Hz (typical)
Tone Detect Bandwidth	..	±2.1Hz accept (typical) ±3.0Hz reject (typical)
Response Time	..	150ms open and close (typical)

1.2.4.3 Mute Operation

Systems Available .. noise mute and carrier mute

Noise Mute:

Operating Range	.. 6-20dB sinad
Hysteresis	.. 1.5 to 6dB
Threshold	.. adjustable to -105dBm
Opening Time	.. 20ms
Closing Time	.. 50ms

| Carrier Mute:

Operating Range	.. -115 to -80dBm
Hysteresis	.. 2 to 10dB
Opening Time	.. 5ms
Closing Time	.. 50ms

Note: The opening and closing times given above are for the standard set-up (SL210 linked and SL220 not linked - refer to [Section 3.8](#)).

1.2.5 Microcontroller

Auxiliary Ports:

Open Drain Type	.. capable of sinking 2.25mA via 2k2Ω
V _{ds} max.	.. 5V

1.2.6 Test Standards

Where applicable, this equipment is tested in accordance with the following standards.

1.2.6.1 European Telecommunication Standard**ETS 300 086 January 1991**

Radio equipment and systems; land mobile service; technical characteristics and test conditions for radio equipment with an internal or external RF connector intended primarily for analogue speech.

ETS 300 113 March 1996

Radio equipment and systems; land mobile service; technical characteristics and test conditions for radio equipment intended for the transmission of data (and speech) and having an antenna connector.

ETS 300 219 October 1993

Radio equipment and systems; land mobile service; technical characteristics and test conditions for radio equipment transmitting signals to initiate a specific response in the receiver.

ETS 300 279 February 1996

Radio equipment and systems; electromagnetic compatibility (EMC) standard for private land mobile radio (PMR) and ancillary equipment (speech and/or non-speech).

1.2.6.2 DTI CEPT Recommendation T/R-24-01**Annex I: 1988**

Technical characteristics and test conditions for radio equipment in the land mobile service intended primarily for analogue speech.

Annex II: 1988

Technical characteristics of radio equipment in the land mobile service with regard to quality and stability of transmission.

1.2.6.3 Telecommunications Industry Association**ANSI/TIA/EIA-603-1992**

Land mobile FM or PM communications equipment measurement and performance standards.

1.3 Product Codes

The three groups of digits in the T830 Series II product code provide information about the model, type and options fitted, according to the conventions described below.

The following explanation of T830 Series II product codes is not intended to suggest that any combination of features is necessarily available in any one product. Consult your nearest Tait Dealer or Customer Service Organisation for more information regarding the availability of specific models, types and options.

Model

The Model group indicates the basic function of the product, as follows:

<u>T83X</u> -XX-XXXX	T835 receiver
	T836 25W transmitter
	T837 exciter
	T838 50W power amplifier
	T839 100W power amplifier

Type

The Type group uses two digits to indicate the basic RF configuration of the product.

The first digit in the Type group designates the frequency range:

T83X- <u>X</u> -XXXX	'1' for 136-156MHz
	'2' for 148-174MHz

The second digit in the Type group indicates the channel spacing:

T83X-XX- <u>X</u> XXXX	'0' for wide bandwidth (25kHz)
	'3' for mid bandwidth (20kHz)
	'5' for narrow bandwidth (12.5kHz)
	'6' for narrow bandwidth (12.5kHz), United States market only

Options

T83X-XX- <u>XXXX</u>	The Options group uses four digits and/or letters to indicate any options that may be fitted to the product. This includes standard options and special options for specific customers. '0000' indicates a standard Tait product with no options fitted. The large number of options precludes listing them here.
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1.4 Standard Product Range

The following table lists the range of standard T835 types (i.e. no options fitted) available at the time this manual was published. Consult your nearest Tait Dealer or Customer Service Organisation for more information.

Frequency Range (MHz) ^a	136-156		
IF Bandwidth (kHz)	7.5	12	15
TCXO ^b ±2.5ppm -30°C to +60°C	•	•	•
Receiver Type: T835-	15-0000	13-0000	10-0000

Frequency Range (MHz) ^a	148-174			
IF Bandwidth (kHz)	7.5	7.5	12	15
TCXO ^b ±2.5ppm -30°C to +60°C	•	•	•	•
Receiver Type: T835-	26-0000 ^c	25-0000	23-0000	20-0000

- a. Selectable by solder links and the appropriate VCO - refer to [Section 3.7](#).
- b. A TCXO with a stability of ±1ppm (0°C to +60°C) is available to suit specific requirements. Contact your nearest authorised Tait Dealer or Customer Service Organisation for further details.
- c. US market only.

You can identify the receiver type by checking the product code printed on a label on the rear of the chassis ([Figure 1.1](#) in Part A shows typical labels). You can further verify the receiver type by checking the placement of an SMD resistor in the table that is screen printed onto the PCB (refer to [Section 6.1](#) for more details).

