User Manual

DABTX350

With Integrated COFDM Modulator
and Doherty RF Amplifier

WARNING!

This Transmitter is capable of generating high RF potential. Touching internal parts, or the connected antenna system, will cause serious RF burns. Antenna systems should be installed such that exposure by any person to RF fields cannot exceed safe limits. The permitted limits vary from country to country. Expert advice should be sought about the safe installation of this transmission system.

RISK OF FIRE!

RF (Radio Frequency) energy could cause ignition of combustible surfaces during fault conditions. Installation should be left to qualified personnel. RF can cause burns to skin. Ensure antenna systems and feeder cables are not situated near, or could fall onto, any combustible surface.

WARNING!

Never operate this device without a suitable 50 ohm load connected to the RF OUTPUT socket, or without a suitably installed and matched antenna system connected. Although the output of this transmitter is protected against antenna load faults, MIS-OPERATION MAY RESULT IN DAMAGE NOT COVERED BY ANY WARRANTY.

IMPORTANT!

Correct operation of the cooling fans in this product is vital to reliable continuous operation. Schedule bi-annual maintenance checks. We strongly advise the use of a standby transmitter system for use during maintenance events or fault conditions, to prevent prolonged breaks in transmission.

IMPORTANT!

Consideration should be given to fitting a suitably rated UPS if power interruptions are likely. Similarly, telemetry reset of power may be advisable for transmitters in remote areas, or having restricted access arrangements.

IMPORTANT!

Always reduce the RF Output power to minimum before changing the transmission frequency. Once the new frequency is active, slowly increase the RF output power control to provide the required power output level.

Introduction

The TXDAB350 is a powerful 350W (DAB) transmitter with integrated COFDM modulator and Doherty RF power amplifier.

The product is tested for compliance to UKCA and CE standards, and meet the requirements of broadcast regulators.

TX Digicast's reliable range of transmitters are used by broadcasters worldwide, and benefit from 25 years of engineers' design experience.

At the heart of the TXDAB350 is a high quality COFDM modulator, and the Doherty RF Power Amplifier uses the latest MOSFET devices, achieving new levels of efficiency and reliability.

This all-in-one complete DAB broadcast solution also has TCP/IP connectivity, as well as TTL remote control and monitoring, which allows easily integration into systems with automated back-up.

Before operating

These instructions should be read in full before the transmitter is operated.

The safety and operating instructions should be retained for future reference.

All warnings on the transmitter and in the operating instructions should be adhered to.

All operation and user instructions should be followed.

Use of this device into a radiating antenna requires a valid licence from a Spectrum Management Authority in most countries.

Use of this device as part of a transmission system, or combined transmission system not specified by the manufacturer, may require further testing to ensure that it remains compliant with the essential requirements and other relevant provisions of current EU Low Voltage, EMC and Radio Equipment Directives. Approval and clearance from the Spectrum Management Authority may also be required.

Installation must adhere to safety regulations and the requirements of the relevant authorities. We recommend that at least two people are present during installation. Keep a file containing installation instructions and plans, including details of the transmission system (antennas, feeders, filters, etc) and operating instructions for all equipment at the transmission site at all times. Display posters detailing first aid treatment and treatment for electrical shock, along with telephone numbers for contacting the emergency services in the event of personal injury.

Ensure antenna system lightning strike protection is in place.

To reduce the risk of electrical shock, do not remove the cover, or any screws. There are no user serviceable parts inside; refer servicing to qualified personnel.

Do not expose this appliance to rain or moisture. The transmitter should not be used near water. Care should be taken so that objects do not fall - and liquids are not spilled - into the enclosure through openings.

To reduce the risk of fire, always replace fuses with the same type and rating.

The transmitter should be mounted into a well-ventilated standard 19 inch equipment rack, using slide supports. It should be situated so that its location or position does not interfere with its proper ventilation.

The transmitter should be situated away from heat sources.

The transmitter should be connected to a power supply only of the type described in the operating instructions or as marked on the unit. Precautions should be taken so that the grounding or polarisation of this appliance is not defeated.

The unit should be cleaned only as recommended by the manufacturer.

The transmitter should be serviced by qualified service personnel if it does not appear to operate normally, exhibits a marked change in performance, has been subjected to shock, damage, moisture, or if foreign objects have ingressed.

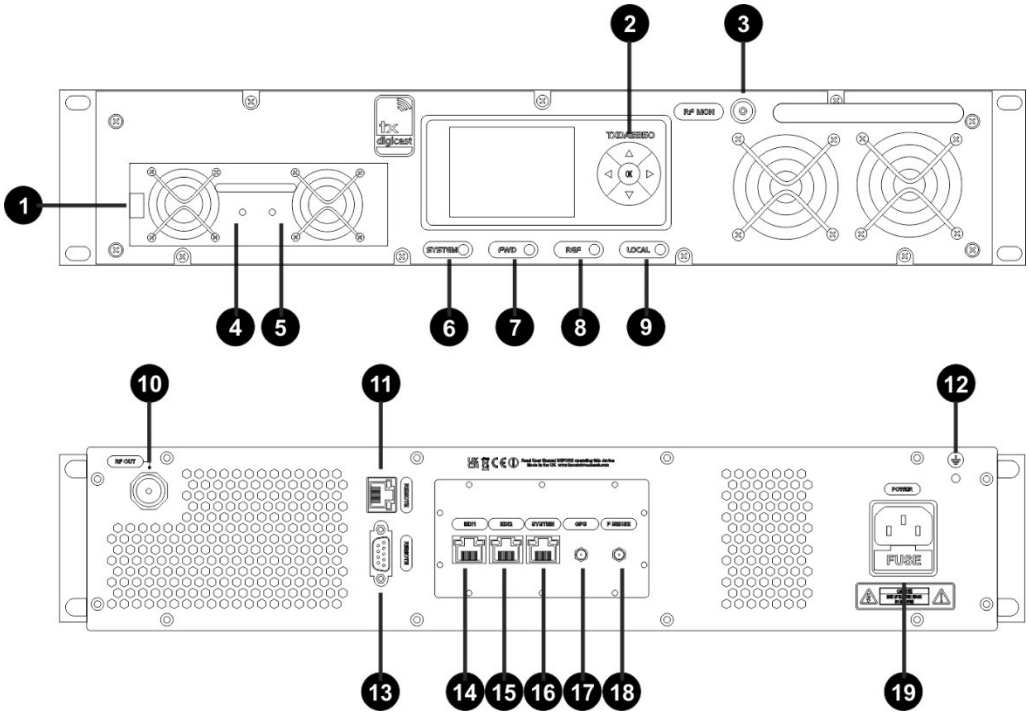
The user should not attempt to service the transmitter beyond that which is described in the Operating Instructions. All other servicing should be referred to qualified service personnel.

This appliance may become warm under normal operating conditions.

Recycle according to WEEE regulations.

Controls and Connectors

1. Front and Rear Panels...



1. PSU RETAINING CLIP Push to the right in order to release the PSU, then pull forward gently, using the handle.

2. MULTI-FUNCTION KEYS Push-button controls for UP, DOWN, LEFT, RIGHT and OK. For navigation of the LCD menu.

3. RF MON BNC RF monitoring point. Provides a sample of the output RF at approximately -40dB. Do not use for measuring compliance.

4. PSU DC OK This LED indicates that the Power Amplifier Supply (48V DC) is working.

5. PSU AC OK This LED indicates that the AC mains power is connected.

6. SYSTEM. If this LED is green, all system parameters are operating correctly. If it is red, the transmitter needs urgent attention.

7. FWD If this LED is green, the forward RF power is operating. If this LED is red, the RF power is not present. This may be intentional, due to user settings, or it may be due to a fault with the connected antenna system.

8. REF If this LED is green, the forward reflected RF power is within acceptable levels. If this LED is red, the reflected power from the antenna system is too high, and must be rectified.

9. LOCAL If this LED is green, the system is operating normally and can be accessed remotely, via TCP/IP ethernet. If it is red, the systems settings are being accessed locally (via the front panel display menu), which takes precedence.

10. RF OUTPUT 'N'-type socket. This is the RF power output for the antenna system. Connect the mask filter and antenna to this socket.

11. ETHERNET RJ45 ICP/IP Socket. If internet connectivity is required, connect the LAN to this socket. Ensure that the local router has maximum security and Firewall protection enabled.

12. EARTH STUD M4 threaded earth stud. Connect additional earthing to this point, in accordance with local regulations.

13. REMOTE . This 9-way 'D-sub' socket can be used for remote control and monitoring of the transmitter. It also enables automatic switching of N+1 back-up system configurations.

Pin 1. This output pulls-low when the RF forward power condition is OK. It will float high when an 'alarm' condition (no RF output) is present.

Pin 2. This output pulls-low when the RF reflected power condition is OK. It will float high when an 'alarm' condition (reflected power too high) is present.

The above 'Open Collector' outputs are capable of operation up to 50V and sinking a current of 75mA maximum. The normally high, (ie. 'pull low' upon alarm condition) provides inherent 'power failure' or 'cable connection failure' signalling.

Pin 3. Grounding this pin will mute the RF output of the transmitter.

14. EDI1 IN. RJ45 ICP/IP Socket. Connect the main EDI feed from the multiplexer to this input.

15. EDI2 IN. RJ45 ICP/IP Socket. Connect the reserve or secondary EDI feed from the multiplexer to this input.

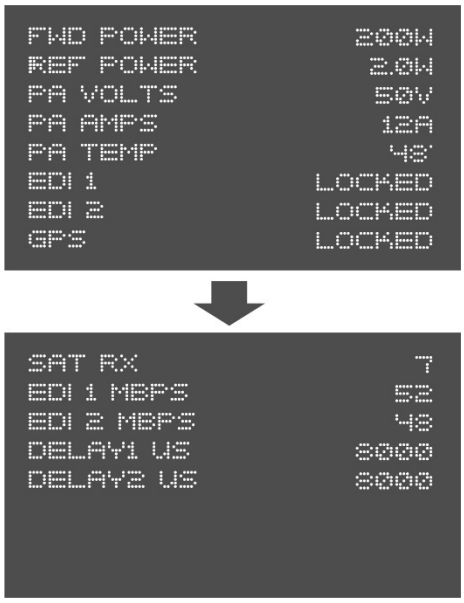
16. SYSTEM. RJ45 ICP/IP Socket. This is reserved for use by the manufacturer for system changes and firmware updates, and should not be used.

17. GPS. SMA connector. Connect the external GPS antenna to this socket.

18. F SENSE. SMA Connector. The filter output should be connected to this socket, via a suitable coupling mechanism. This allows the modulator to automatically optimise the COFDM signal to compensate for the mask filter's characteristics.

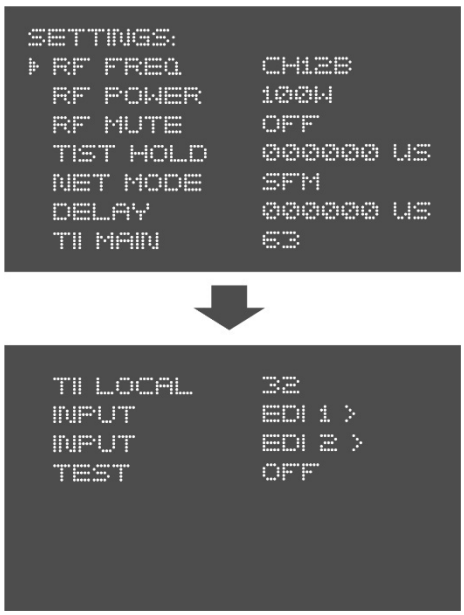
19. POWER. Connect a power lead with an IEC C13 connector (and a 13 amp fuse in the plug or at the distribution panel) to this socket. Two T12 amp (time delay) fuses are fitted within this connector's Fuse carrier.

Display & Menu



The front panel LCD shows the transmission parameters. Press the down key to see the remaining items.

To enter the settings menu, press and hold the 'OK' key for 3 seconds. The DABTX350 will enter LOCAL mode and the following settings will be displayed:



Use the UP and DOWN buttons to choose the setting to be adjusted. Once selected, press ENTER and the corresponding setting will now be highlighted. Press the UP and DOWN buttons to selected the desired setting and then press ENTER to store it.

When selecting EDI1 or EDI2 parameters, a new screen will appear, allowing the respective input to be enabled or disabled and all of the network parameters to be edited.

Installation

IMPORTANT! Connect a suitable rated RF test load to the RF OUPUT socket before connecting the unit to mains power. FAILURE TO DO SO MAY RESULT IN DAMAGE NOT COVERED BY WARRANTY.

Never carry the transmitter by the front panel handle. This is provided purely to pull the transmitter forward, to assist in removal from an equipment rack.

Install the TXDAB350 in a suitable 19" equipment rack with adequate clearance and cooling airflow. Use front-to-back rack supports on both sides of the transmitter, and slide the unit into the rack. NEVER ALLOW THE FRONT PANEL FIXINGS TO TAKE THE WEIGHT OF THE UNIT.

First, connect a suitably rated test load to the RF OUT socket on the transmitter's rear panel.

Connect the EDI feed(s), GPS antenna and then the mains lead.

Switch on the mains power.

Press the 'OK' key for 3 seconds to enter the settings menu.

Select the RF Power Output setting and reduce the power to its minimum level. Press OK to store the value.

Now enter the desire channel frequency. Press OK to store the value.

Ensure that the RF Mute setting is disabled (OFF).

Enter the required TIST Hold value. Press OK to store the value.

Select the required mode (SFM or MFM). Press OK to store the value.

Set the required Delay amount. Press OK to store the value.

Set the TII MAIN identifier as required. Press OK to store the value.

Set the TII Local identifier as required. Press OK to store the value.

Select INPUT (EDI1). Enable the input, and enter the required network settings. Press OK to store the values.

Select INPUT (EDI2). Enable the input, if required, and enter the required network settings. Press OK to store the values.

The transmitter has a TEST MODE. If enabled, the COFDM modulator will transmit a test signal. For normal operation ensure this mode is disabled (OFF).

Operation

Once all settings are set as required, power down the transmitter and connect the filter and antenna system. Connect the RF sample from the coupler post filter to the SMA F-SENSE connector on the rear panel.

Power-up the transmitter and, via the settings menu, increase the RF power output to the required power level.

Correct operation is confirmed by a front panel green SYSTEM LED. Should this turn red, the transmission system may shut down its RF output and will, in any case, require URGENT attention.

The transmitter is designed for continuous reliable transmission, however the fans, air vents and air tunnels must be periodically checked for correct operation and free airflow.

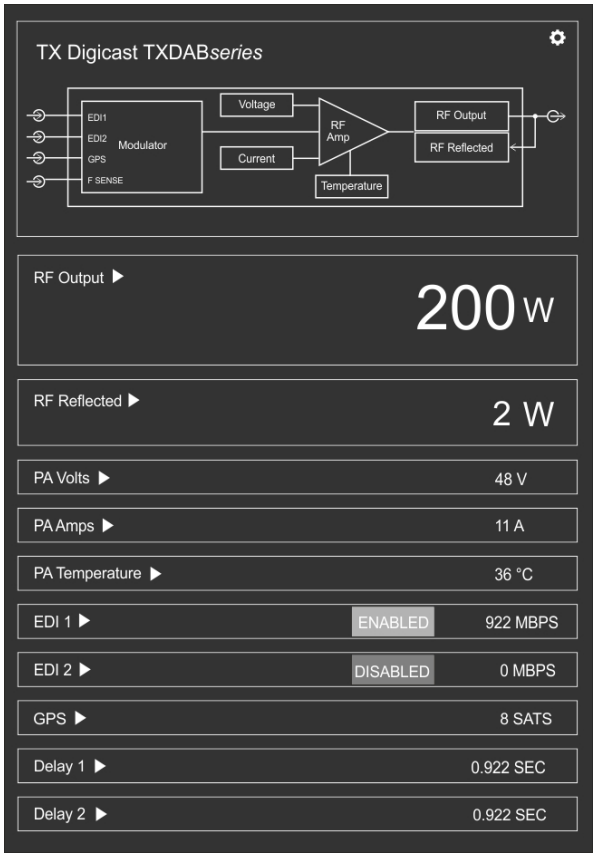
The cooling fans should be replaced after 60,000 hours of cumulative operation. This life rating is for guidance only and is subject to ideal environmental operating conditions. Replace any fan that fails or becomes slow or noisy, immediately. It is recommended that replacement work must be carried out by the manufacturer or an approved agent.

Network Connection

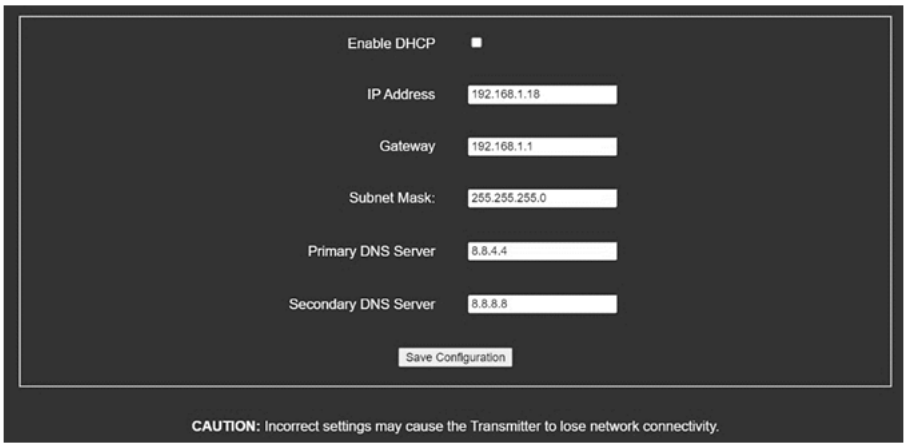
The DABTX350 will be supplied with a notification of its factory-set IP address, username and password. KEEP THESE DETAILS SAFE. Whilst the transmitter's network configuration can be changed, the username and password are fixed. Enter the factory-set IP address in the address bar of an internet browser.

IMPORTANT: Accessing the transmitter's front panel menu will enter the TXDAB350 into 'local mode', where front panel settings take precedence over the ethernet connection. The network readings and settings will not be available until the local menu has been exited, and the main screen is displayed on the LCD.

Select 'Continue'. Upon successful log-in, the TXDAB350's status page will appear.



The IP address and associated network configurations can be changed by selecting the settings (‘gear’) icon:



DCHP can be set, or a new IP address entered. Include the Gateway address of the local Router, and the desired Primary and Secondary DNS server addresses, if different.

New browser sessions will prompt for a Username and Password. When continuing within the current browser session there will be no prompt to enter a Username or Password.

Like most ethernet enabled devices, the client web browser may flag the internet connection as 'Not secure'. This can be ignored, because hardware devices don't usually serve ‘https’ (secure) pages to clients.

However, general network security is VERY IMPORTANT. It is up to the user to ensure adequate overall security for the internet connection. Like all computers, on all networks, the transmitter's network port will be continually subject to external hack and ‘Ping of Death’ attacks. Connect the transmitter’s network port to the Internet via a Router with port forwarding configured in such a way as to ensure maximum local network security. Schedule regular checks, on an on-going basis, to ensure that the Router is running the very latest manufacturer’s firmware.

TX Digicast take no liability whatsoever for damage or losses caused by a successful network attack.

Technical Specifications

RF:	
RF Output Power:	350W (DAB)
Power stability:	Better than 0.25dB
RF output:	N female 50 ohm
Load mismatch:	VSWR 2:1 (all phase angles)
IP shoulder (pre-filter):	>-30dB
Spurious (post filter):	ETSI EN302077-1
RF Monitoring:	
RF monitor (front panel)	BNC 50 ohm (approx. -40dB)
Remote I/O:	
I/O Control:	9-way D-sub female
Inputs:	
EDI1:	RJ45 TCP/IP Ethernet
EDI2:	RJ45 TCP/IP Ethernet
GPS input:	SMA female
Sense input:	SMA female
Network:	
LAN:	TCP/IP RJ45
Power Supply:	
Voltage:	100/240Vac 50/60Hz
Consumption:	
Mechanical:	
Dimensions (2U):	88 x 482 x 550 HxWxD (mm)
Weight:	18kg
Environmental:	
Operating Temperature:	0 to 40 degrees C

We reserve the right to alter specifications without notice. E&OE.

EC Declaration of Conformity to R&TTE Directive 1999/5/EC

We, TX Digicast
Clay Pit Lane
Roecliffe
York
YO51 9FS

hereby take sole responsibility to confirm that the product:

TXDAB350 v2

which this declaration refers to, conforms to the essential requirements of Directive 2014/53/EU and is CE marked accordingly:

Low Voltage Directive:

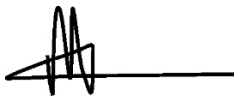
EN60215
Safety Requirements for Radio Transmitting Equipment

ERM/EMC:

ETSI EN 302 077 V2.2.0
Transmitting equipment for the
Digital Audio Broadcasting (DAB) service

The following operation conditions and installation arrangements are to be presumed:

(i) According to Operating Instruction Manual
(ii) Connected lead lengths of 2 metres or less



M. O'Rorke, Director
September 2020

WEEE - Waste Electrical and Electronic Equipment

The equipment that you bought has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems. Those systems will reuse or recycle most of the materials of your end life equipment in a sound way.

The crossed-out wheeled bin symbol invites you to use those systems.

If you need more information on the collection, reuse and recycling systems, please contact your local or regional waste administration.

IMPORTANT!

NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE WITH RESPECT TO THIS PRODUCT. Do not misconstrue any information as our recommendation to use any product, process, or equipment in conflict with any regulatory authority or patent.

Ensure compliance with all applicable safety requirements when installing or using this equipment, and operate in accordance with local laws governing the use of radio transmission equipment.

TX Digicast shall not be liable for any direct, indirect, incidental, consequential or other damage or loss alleged in connection with the supply or use of this product.

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