FM TRANSMITTER

TXF Series 2000-5000W

OPERATION MANUAL

Revision 2.5

Contents

1. Introduction

Please take a few minutes to read the manual and familiarize yourself with your new Technalogix FM power amplifier or transmitter.

This user manual, the Final Inspection Report, and of course our equipment, should be everything you need to get on the air with a superb audio signal. We understand that a capable and confident user will get the most out of our product and we have made every attempt to educate readers of all technical levels. If there is something that is not clear, or you require further information, please do not hesitate to contact us and we'll be glad to help out.

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All information that is specific to your unit is contained within the Final Inspection Report included in the shipped equipment container. This report summarizes performance specification and this manual provides wiring hookup details and outlines specific components found in the system.

We truly appreciate that you have chosen us as your RF equipment supplier. Happy transmission!

2. General Safeguards

This section is written as a general guide for safe operation of the equipment and is intended for those having previous knowledge and experience with these kinds of equipment. It is not intended to contain a complete statement of all safety precautions, which should be observed by personnel using this or other electronic equipment.

Documentation

Read, retain and follow these instructions before operating the equipment.

Environment

To reduce the risk of fire or electric shock, do not expose this equipment to rain or moisture. Refer all servicing to qualified service personnel.

Servicing

Do not attempt to service this equipment yourself as opening or removing covers can result in personal injury and will void the warranty. Refer all servicing to qualified service personnel.

2.1. Safety and First Aid

Personnel engaged in the installation, operation, maintenance, or servicing of this equipment are exposed to the hazard of high voltage. It is imperative that all safety regulations and precautions are consistently observed. Knowledge of first aid procedures is recommended. The following information is presented as a reference only. The user should ensure that they are trained in proper first aid and the necessary precautions, which may not be contained in this manual, are followed.

- At all times, avoid placing any part of the body in series between ground and circuit points, whether power is on or off.
- Dangerous voltage may be present in equipment even though power is off. Do not open the cabinet. Refer servicing to qualified service personnel.
- It is the duty of all personnel to be prepared to give adequate emergency first aid treatment and thereby prevent avoidable loss of life.
- Respiratory paralysis can cause death by suffocation within seconds. It is imperative that the approved methods of artificial respiration are initiated immediately and continue until the victim's breathing is normal.
- A muscular spasm of unconsciousness may render the victim unable to break free of the electric power. If this is the case, turn the power off immediately. Do not touch the victim or you may share the same predicament!
- If the power cannot be turned off immediately, very carefully loop a dry rope, article of clothing, length of strong cloth or a rolled-up newspaper around the victim and pull the victim free of the

power source. Carefully avoid touching the victim or clothing. Call for medical help immediately.

2.2. Operating Safeguards

Load Impedance

Technalogix FM equipment functions with a 50-ohm load impedances. It is imperative you maintain 50-ohm impedances throughout your system for your equipment to provide maximum power transfer to the antenna and decreased reflected power heading back towards the amplifier pallets. Failure to provide a 50-ohm path throughout the system may result in damage to your equipment. Before anything is turned on, ensure that there is a 50-ohm path from the output of each stage to the input of the next, all the way to the antenna.

Operating Warnings

Our FM equipment is designed to reliably generate a specific RF output power level. Failing to adhere to overdriven amplifier, high reflected power, and high temperature, and other warnings can decrease the reliability of your system and may result in damage to the unit. If you need to transmit to a little larger coverage, you are better off increasing antenna gain, and more importantly, antenna height above average terrain. On FM broadcast frequencies, insufficient antenna height puts an upper limit on your range, regardless of power levels, as the distance from your antenna to the radio horizon is limited.

The radiated power from the cabinet of this device is below the Industry Canada radio frequency exposure limits. The device should be used in such a manner that the potential for human contact with the antenna during normal operation is minimized.

3. Terms of Sale

Sales by Technalogix Ltd. (“Seller”) are made only on terms which are contained in this policy. Seller hereby gives notice of its objection to any different/additional terms and conditions. All sales are expressly conditional upon Buyers’ assent to the terms and conditions set forth below. These terms and conditions may be modified/ supplemented only by written document signed by authorized representative of the Seller. These terms and conditions supersede any prior and/or contemporaneous agreements/correspondence between Buyer and Seller. Any order received and accepted by Seller shall be construed as acceptance of Seller’s offer to sell its products to the Buyer in accordance with terms and conditions of sale set forth herein. No waiver, whether express or implied, by Seller of any of the terms or conditions hereof shall be deemed a continuing waiver or trade custom between parties, but shall apply solely to the instance to which the waiver is directed.

Ordering Information

All orders must be in writing and/or accompanied by a Purchase Order. A minimum down payment is required with all orders. No orders are considered an order until the payment has been made.

Pricing Policy

All prices are FOB shipping point and prices do not include freight, handling, and insurance. All prices published/quoted by Seller may be changed at any time without notice. Unless otherwise specified, written quotations expire 30 days from date issued and subject to change/termination by notice during this period.

Taxes

Prices for all products do not include any sales, use, excise or other taxes. Buyer agrees to pay all applicable taxes, duties and other fees on product and services ordered. If Buyer claims an exemption from any tax, Buyer shall submit to Seller the appropriate exemption certificates.

Shipping

Shipping is the responsibility of the Buyer. This includes all freight, customs and brokerage charges, duties, and insurance.

Terms of Payment

Seller will provide credit terms to Buyer at its discretion. Such terms are subject to change at all times. If credit is provided, Seller will invoice Buyer on the date the product is ordered. Such invoices will be due and payable net thirty (30) days from the date of invoice, subject to credit is not established or maintained, terms shall be net cash on or prior to the Delivery Date. Seller reserves the right, at its sole discretion at any time to revoke any credit previously extended. Past due accounts shall be charged two percent (2%) per month, or the highest rate permitted by Alberta law, whichever is less, and will be added to the outstanding balance. In the event Buyer defaults on the payment, Buyer shall be liable for all collection costs, including reasonable attorney’s fees and costs. Non-payment of past due accounts will result in a lien against parts and all subsequent assemblies or products that our components are in. Goods remain the property of Seller until invoice is paid in full.

Changes and Cancellation

Purchase orders that have been accepted by Seller may not be changed/ cancelled, in whole or part, without written Seller consent. All changes must be included in change order reflecting purchase order and submitted to the Seller. All other changes will not be accepted/acknowledged. Changes may affect delivery dates. Expenses incurred because of changes shall be charged to Buyer. Buyer will be liable for Seller's costs incurred, plus a reasonable profit, for the portion of work terminated, in accordance with generally accepted accounting principles, together with cancellation charges. Orders for standard product may be changed by Buyer, with no penalty to Buyer, provided that Buyer provides Seller notification at least 30 days prior to scheduled ship date. Order changes received within 30 days of scheduled ship date may be subject to an order change charge; a schedule detailing these charges will be forwarded to Buyer when Buyer's change order is acknowledged. In no event can any aspect of the order be changed after the product shipment has occurred. Custom orders may be cancelled by Buyer, provided that Buyer pays Seller for completed work allocated to Buyer's order at time of termination of the work at selling price and all costs for work-in-progress and costs resulting from cancellation and reasonable profit therein. Specific cancellation charges dependent on the type of custom product ordered. A schedule detailing these charges will be forwarded to Buyer when Buyer's cancellation fee of up to 100% of the order, depending on the stage of completion of the order at the date the cancellation or revised is accepted.

Custom Products Policy

Custom items are not returnable. Items other than "off the shelf" products are considered custom and are products/materials which have been altered, amended and customized to your order, and not resalable.

Returns

Product return without written authorization by Seller will not be accepted. Returns accepted only with a valid Return Material Authorization (RMA). To receive authorization for product return, call Seller. There is a standard 25% restocking cost assessed on most returns. All returned products (non-repair) must be unused, and in original condition. No refund/credit given for damaged products. We do not accept postage-due/ C.O.D. packages at any time.

Excusable Delay

Seller shall not be liable for any loss or damage resulting from any delay in delivery or failure to deliver which is due to any cause beyond Seller's control, including, without limitation, acts of nature, unavailability of supplies or sources of energy, riots, wars, fires, floods, epidemics, lockouts, strikes and slowdowns, delays in delivery by supplies, or acts or omissions of the Buyer. The Buyer shall be liable for stage charges, including but not limited to all third party costs and expenses incurred by Seller, in holding or storing products for the Buyer or at the Buyer's request.

Assignment

Buyer shall not assign any duties nor assign any order or any interest therein without written consent of the Seller. Any such actual or attempted assignment shall entitle Seller to cancel the order upon written notice to the Buyer.

Installation

Seller assumes no obligation to install any product sold to place any products in working order at Buyer's premises and not responsible for freight damage.

Validity of Separate Clauses

If any provisions of this agreement shall be held invalid, illegal, or unenforceable, the validity, legality or enforceability of the remaining provisions shall not be affected or impaired thereby.

4. Warranty

Technalogix products have been completely tested and found to meet specifications and be in proper operating condition. Technalogix-manufactured products are warranted to be free from defects in materials and workmanship for a period of two years from the date of shipment. Products sold through, but not directly manufactured by Technalogix, carry the original manufacturer's warranty. Seller will not be liable for damages of whatever nature arising out of or in connection with the equipment or its use thereof. Technalogix does not assume responsibility for injury or damage resulting from the practices of untrained or unqualified personnel in the handling of this equipment and does not include misuse, neglect or accident, incorrect wiring and/or improper installation, unauthorized repairs, modifications or use in violation of instructions issued by Seller, incidental or consequential damages as a result of any defect, reshipment cost or insurance of the unit or replacement units or parts, acts of nature, damages due to AC or DC power supplied by customer to power the equipment (see installation recommendation for surge protection), or acts of terrorism. Seller agrees, at our option, to remedy warranted defects or furnish a new part in exchange for any part of unit which, under normal installation, use and service, becomes defective. The user pays for transportation costs to and from repair facility. If you require on-site service, please contact our sales department for pricing and conditions.

5. Principle of Operation

The internal FM exciter found inside FM transmitter enclosures accepts analog, digital or MPX audio signals and modulates them onto an FM carrier. The analog signal can be either mono or stereo (both included as standard), while the digital inputs are accepted on AES3, S/PDIF optical (Toslink), or S/PDIF coaxial inputs. Also included on the Interface circuit board are amplifier stages to increase the modulated level from a few dBm up to approximately 1 Watt.

The RF power amplifier stages are designed to take a modulated FM carrier from the Exciter/Interface board and amplify the carrier to the specified power level. The power amplifier feeds the antenna through an inline wattmeter and transmission line. For broadcast and over-the-air amplifier systems, the pattern of the antenna then dictates the range and coverage area.

The amplification is accomplished by one or many amplifier pallets internal to the power amplifier system. If there is more than one amplifier pallet stage, then the first pallet acts as a driver feeding Intermediate Power Amplifiers (IPAs) and/or final stage pallets. If multiple final pallets are required, then a splitter and combiner are also required before and after the final stages.

Technalogix manufactures FM amplifiers and transmission systems suitable for 87.5 to 108.0 MHz. Custom frequencies are available upon request if you require carriers outside this range, including audio for VHF applications and other unique requirements.

The RF amplifiers utilize readily available RF components wherever possible, thus enhancing the serviceability of the equipment. The amplifier modules are stable for high reliability and long service life and feature ultra linear amplification and RF output filtering.

The Block Diagram is included in this manual to illustrate the specific component flow of the RF amplifier system and to provide specific configuration and model information.

6. Installation

This section contains unpacking, inspection, and installation instructions for the transmitter. Please read the following sections carefully prior to setting up the equipment.

6.1. Unpacking and Inspection

Check the outside of the container. Carefully open the container and remove the power amplifier or transmitter and any accessories. Retain all packing material that can be reassembled in the event that the equipment must be returned to the factory.

Exercise care in handling equipment during inspection to prevent damage due to rough or careless handling.

Visually inspect the enclosure of the power amplifier or transmitter for damage that may have occurred during shipment. Check for evidence of water damage, bent or warped chassis, loose screws or nuts, or extraneous packing material in connectors or fan failures. Inspect all connectors for bent connector pins. If the equipment is damaged, a claim should be filed with the carrier once the extent of the damage is assessed. Technalogix cannot stress too strongly the importance of immediate careful inspection of the equipment and subsequent immediate filing of the necessary claims against the carrier if necessary. If possible, inspect the equipment in the presence of the delivery person. If the equipment is damaged, the carrier is your first area of recourse. If the equipment is damaged and must be returned to the factory, phone for a return authorization number. Claims for loss or damage may not be withheld from any payment to Technalogix, nor may any payment due be withheld pending the outcome thereof. Technalogix cannot guarantee the carrier's performance.

6.2. Panel Connections

AC IN:	Single phase AC input to feed internal AC/DC switching power supplies. Check with factory as not all power supplies are universal 110/220V.
RF OUT:	FM modulated RF carrier output (N female or 7-16 DIN female)
RBDS/RDS (USB):	Configuration and control of RBDS/RDS encoder in transmitter accomplished through USB (female) connector.
REMOTE PORT:	Parallel parameter interface (DB25 female)
ETHERNET:	Remote control and monitoring via Ethernet (RJ45 jack) – same connector as SNMP.
SNMP:	Simple Network Management Protocol (SNMP) remote control and monitoring (RJ45) – same connector as Ethernet.
S/PDIF COAX:	Digital audio input, Sony/Phillips Digital Interface, coaxial (RCA female)
S/PDIF OPTICAL:	Digital audio input, Sony/Phillips Digital Interface, optical (Toslink female)
AES (digital) / RIGHT (analog):	Digital audio input, AES/EBU professional audio interface (XLR female) / Analog audio input, right channel, (XLR female). For Mono operation, use the Right input.
LEFT (analog):	Analog audio input, left channel, (XLR female)
MPX IN:	External MPX input. Used when external stereo encoders or processors present. (BNC female)
MPX OUT:	MPX output signal from exciter. Used for external processing. (BNC female)
SCA1/SCA2:	Input connection from SCA generator or source, intended for 60 to 99 kHz. Typically modulated to 10%, or 7.5 kHz deviation.

6.3. Initial Hook Up

1. Ensure that the antenna has been swept and, ideally, has a return loss of greater than 20dB (VSWR = 1.2:1). This should be done before connecting the antenna cable to the system's output. The power amplifier's control system allows the user to change the VSWR trip point up to a maximum level of 1.8:1, unless a custom VSWR protection system has been requested. Strive for the lowest possible return loss to maximize transmission distance and improve operating performance. Unless requested otherwise at the time of purchase, VSWR levels between the trip point set by the user and 1.8:1 (or custom VSWR trip point) will cause a fold back in power. VSWR levels past 1.8:1 (or custom VSWR trip point) will cause the system to shut down or fold back with attenuation to avoid damage.

2. Place the amplifier in its permanent location near a receptacle supplying the required AC or DC mains voltage.

3. Place an appropriate AC or DC power line protector, conditioner, and/or surge suppressor across the supply line. This small investment is highly recommended to protect the equipment from power surges and spikes (not covered by warranty).

4. Install a lightning surge arrestor or Gas Discharge Tube (GDT) on the coax near the antenna to protect the amplifier. This small investment is highly recommended to protect the equipment from lightning (not covered by warranty).

5. Connect the transmitting antenna cable to the RF OUT female connector on the PA enclosure's RF output. On units that have a separate filter or filter/power supply enclosure after the power amplifier enclosure, ensure to connect the transmitting antenna cable on the last enclosure in the chain to the RF Out and connect the RF coaxial between the power amplifier and the second enclosure in the chain. The system must be loaded into a 50-ohm load before any power is turned on for over-the-air systems. The Wiring Hookup is included in the shipping package and visually summarizes the aforementioned information.

6. Connect the desired audio source connection, analog mono or stereo, digital audio, or MPX. Subcarrier signals can be connected to the SCA1 or SCA2 BNC connectors.

7. Connect additional control/monitoring cables if desired. SNMP or Ethernet should be connected to the lower RJ45 on the back panel. Remote port connections are made to the DB25 connector and the internal RDS in controlled by RS232 on the DB9 connector.

At this stage, the system is set up and ready to do a preliminary start up, as outlined in the "Operating Procedure" section.

7. Operating Procedure

Assuming the previous installation instructions have been completed and cautions noted, and the power amplifier is ready to receive a properly modulated RF signal, proceed with the following steps to place the system in operation. The power amplifier has been factory aligned for a specific frequency (per system specification), signal levels and optimum performance.

IT IS HIGHLY RECOMMENDED THAT YOU RUN YOUR SYSTEM INTO A DUMMY LOAD BEFORE INSTALLING TO MAKE SURE THERE ARE NO DAMAGES CAUSED IN SHIPPING AND THE UNIT IS RUNNING PROPERLY

1. Verify that all control and RF cables are tight and properly seated in or on the mating connector.

2. Plug in the desired audio source: analog (left and right for stereo), digital or MPX. For mono audio use the Right XLR input.

3. With the power amplifier loaded into the antenna, cavity, alternative load, or dummy load power up the amplifier by turning on power supply either via the ON/OFF switch on the back of the power amplifier.

4. Verify that the power amplifier fans are all on. The power amplifier fans are powered via DC voltage so this is an indication that the power supply is started and running. There may be fans installed in the filter or power supply enclosures, if applicable.

5. The internal soft start circuitry will turn the bias voltages off until the power supply to the amplifier pallets is fully stable. The front display indicates when the soft start is running with either a displayed message when an LCD option is installed or via maximum attenuation when a touch screen option is installed. Once complete, the Forward and Reflected Power, Power Supply, and Temperature readings will appear on the display. Deviation is shown on the FM screen.

6. Adjust RF output power on the power amplifier to about 10% of rated forward power. The output power level is adjusted from the power amplifier's RF Levels screen. Turn the carrier on. If the unit contains more than one final amplifier pallet (illustrated in **Error! Reference source not found. Error! Reference source not found.**), ensure that the final pallet currents on the multiple finals all match within 10% of each other. With multiple finals, the final pallet currents should always match within this range under all operating conditions.

Front panel readings will vary slightly upon turn on. Steady state parameters can be taken after approximately one hour.

7. Ideally, the RFL Power should read zero. However, should a high VSWR be detected, the system will automatically fold back. Under normal conditions, a well installed and setup system should indicate RFL power less than 3% of FWD power.

8. Adjust RF output power on the power amplifier to desired level. The output power level can be adjusted from the power amplifier's RF Levels screen. Keep in mind that the system will fold back or shut down (depending on severity) should the forward RF output power level exceed the trip overdrive point.

Pease note that 100% should be the maximum FWD power. Typically, customers run the systems at 90% to avoid occasional AC power line spikes or transients from tripping the shutdowns. The difference of 10% will provide a marginal difference in range (tower height will have a much more significant effect on range in the case of over-the-air) or cavity excitation.

9. Verify that the power supply reads correctly (see supplied final inspection sheet for factory settings of power supply levels) on the display of the power amplifier. You should see no more than 3% fluctuations in DC supply voltage, and even less with a properly conditioned AC source to the power supply.

10. Look at the transmitted output using suitable test equipment. If the output quality is unsatisfactory, check the input signals, connections to the antenna system, antenna and transmission line VSWR, and the physical condition of the antenna.

11. Select the appropriate input from the FM Controls screen on the front panel.

12. Adjust the attenuation for the input if needed from the Audio Levels screen on the front panel. Check the modulation level on the main RF Display or FM display on the front panel.

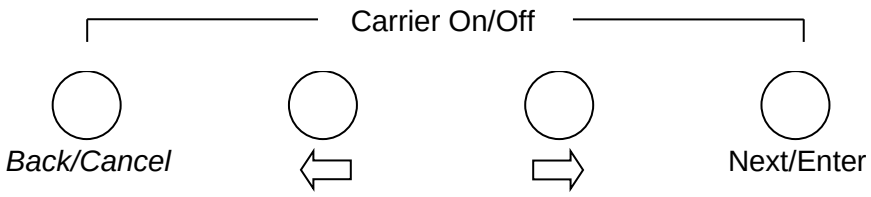
13. After warm up, compare the temperature of the equipment from the front display to the temperature recorded in the final inspection sheet, included in shipping. Assuming ambient temperatures are close (our factory is typically around 18 to 25˚C), your temperature reading should be very close to the factory reading. Use your temperature measurement as a method to monitor fan performance (though on higher power units, fan current is also monitored). A fan failure or air blockage will show an increase in temperature, assuming ambient temperature is not varying.

For FM broadcast applications, if the quality of transmission is unsatisfactory, the difficulty is often with the receiving antenna or with obstructions in the path between the amplifier/antenna and receiver. There is also a troubleshooting section located later in this manual.

At this time, Technalogix recommends that you document your measurements to use as a reference over time. The measurements can be made either from the front display, or remotely via the Remote Port (DB25), Ethernet (lower RJ45), or SNMP (lower RJ45), whose operation is explained in the Monitor and Control System sections.

8. Control Interface

8.1. Controls



The four control button are located directly below the display screen as shown above. Control options for various screens are shown below.

Back/Cancel :	Changes screen to previous tree or cancels a setting change without changing the setting
⇨ or ⇦	Changes between screens or settings
Next/Enter	Changes screens; Selects settings to change and saves a changed setting
Carrier Switch:	From any screen, the FM transmitter carrier can be turned on or off. To toggle carrier status, simultaneously touch the **Back** and **Next** buttons. Carrier status is shown in the bottom right corner of the display
	 Symbol present indicates carrier is on
	The same result occurs by turning on or off the system via the web or SNMP interface, or through controlling of the Remote Port. The power supplies will remain active while the carrier is turned off. The fans will power down after 1 minute
Carrier Lock:	If the PLL has locked onto the carrier frequency LOCK will be displayed. While the is no lock the unit will stay at minimum output power level.
Error Message	In the event of a fault condition the unit will try to fold back to a safe level, sound an audible alarm and display the event on the screen. This message will replace the Technalogix logo. Possible messages are OVERDRIVE, HIGH VSWR and HIGH TEMP

8.2. RF Info Screen

The RF Info Screen summarizes key parameters for the RF carrier of the FM signal, as illustrated in the sample screen below:

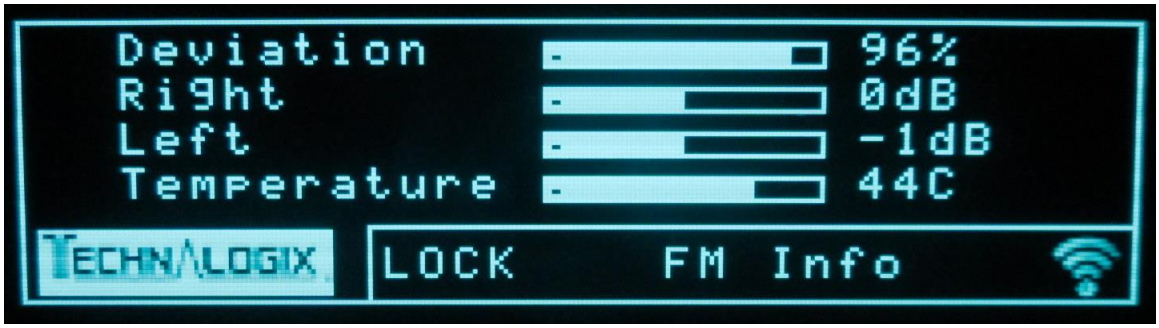
DEVIATION	The maximum frequency deviation from the carrier centre frequency is illustrated on this level bar. Typical maximum deviation, required by Industry Canada or FCC, is 75 kHz to avoid bleeding into adjacent channels. 100% represents a full 75 kHz deviation.
FORWARD POWER:	This is the power out of the transmitter to the antenna or load, measured in watts or scaled percentage, depending on how the units are set in the Settings Screen.
REFLECTED POWER:	This is the power coming back into the transmitter from the antenna or load, measured in watts or scaled percentage, depending on how the units are set in the Settings Screen. As there is no internal circulator or isolator installed within the enclosure, it is important to minimize VSWR with a good quality antenna installed using proper broadcast techniques. Ice build-up on the antenna and damages to 50 ohm transmission line can also generate damaging reflected power.
TEMPERATURE:	The temperature is measured on top of the heatsink near the final transistors and displayed here. User can toggle between Celsius and Fahrenheit from the Settings Screen. In the event that this temperature exceeds the factory set trip point, the RF carrier level will fold back to protect the unit. Common causes for high temperatures can include failed internal fans or air conditioning in the broadcast facility or a blocked fan.

Controls from RF Info Screen

⇦ or ⇨	Changes between screens or settings
Next	Goes to Currents screen

8.3. FM Info Screen

The FM Info Screen summarizes key parameters for the audio that resides on the RF carrier of the FM signal, as illustrated in the sample screen below:



DEVIATION:	The maximum frequency deviation from the carrier centre frequency is illustrated on this level bar. Typical maximum deviation, required by Industry Canada or FCC, is 75 kHz to avoid bleeding into adjacent channels. 100% represents a full 75 kHz deviation
RIGHT LEVEL:	Right level bar represents the audio level on the right audio input channel.
LEFT LEVEL:	Left level bar represents the audio evel on the left audio input channel.
TEMPERATURE:	The temperature is measured on top of the heatsink near the final transistors and displayed here. User can toggle between Celsius and Fahrenheit from the Settings Screen. In the event that this temperature exceeds the factory set trip point, the RF carrier level will fold back to protect the unit. Common causes for high temperatures can include failed internal fans or air conditioning in the broadcast facility or a blocked fan.

Controls from FM Info Screen

⇦ or ⇨	Goes to RF Info screen
Next	Goes to Currents screen

8.4. Currents Screen

This screen allows the user to view voltage and current readings. A sample Power Supplies Screen is displayed below:

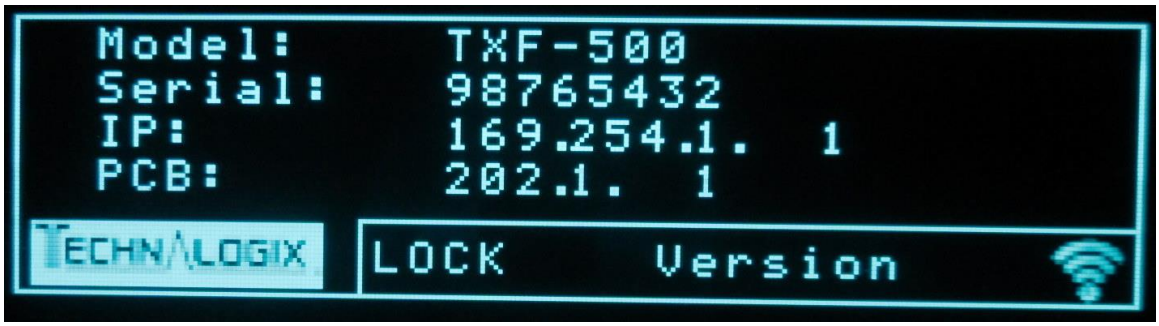
Currents shown are total current or split current and the cooling fan current. Split current can be for multiple amplifier pallets or multiple devices on one pallet. In the case of multiple pallets in the chain, typically the user should see matching of the final pallets to within approximately 10%. Anything outside this range is usually a sign that there may be an issue. Our team would be glad to walk you through any troubleshooting issues or questions you may have.

DC supply voltages are nominally 24 or 48Vdc depending on the system.

Controls from Currents Screen

⇨	Goes to Versions Info screen
Next	Goes to FM Settings screen
Back	Goes to RF Info screen

8.5. Version Screen



Model:	Shows the model number of the unit
Serial:	Shows the units unique serial number
IP:	Shows the IP address that can be used to connect to the unit via Ethernet or SNMP once it connects to your network or computer
PCB:	Shows the version for the exciter PCB and firmware

Controls from Version Screen

⇦	goes to Currents screen
⇨	goes to Contact screen
Next:	Goes to FM Settings screen
Back:	Goes to the RF Info screen

8.6. Contact Screen

The Contact Screen provides information for the user to get in touch with Technalogix for anything - whether that's a technical or installation question or product improvement ideas, Technalogix welcomes questions, feedback, and contact.

If you are in the area, please feel free to stop by to tour the facility, test drive some state of the art products, or get a refresher on some training.

Controls from Contact Screen

⇦	goes to Version screen
Next:	Goes to FM Settings screen
Back:	Goes to the RF Info screen

8.7. FM Settings

Frequency:	With the exciter being agile, the user can change frequency from 87.5MHz to 108.0 MHz in 0.1Mhz increments. The step size is 100 kHz. At the lower and upper frequency limits of the FM band, the frequency will wrap back around.
AGC:	Can set the desired Forward RF level between 1% and 105% of the rated power of the unit. The gain on the driver stage is adjusted to maintain the desired level
VSWR:	Choose the VSWR shutdown trip point to between 1.1:1 and 1.8:1. If the measured VSWR is above the set trip point then the system will fold back the forward power to a safe level.
Pre-Emphasis:	Pre-emphasis adds a boost to high frequencies in the FM signal to increase the signal above the noise floor. The FM signal then is de-emphasized at the radio receiver. Users can change the amount of pre-emphasis to suit their location and receivers. Setting the pre-emphasis to 0 µs turn off the pre-emphasis. The North American standard pre-emphasis is 75 µs, while most of the rest of the world incorporates 50 µs.

Controls from FM Settings Screen

⇦	Goes to FM Settings screen
⇨	Goes to Audio Levels screen
Next:	Enters selection mode to change options above
Back:	Goes to the Currents screen

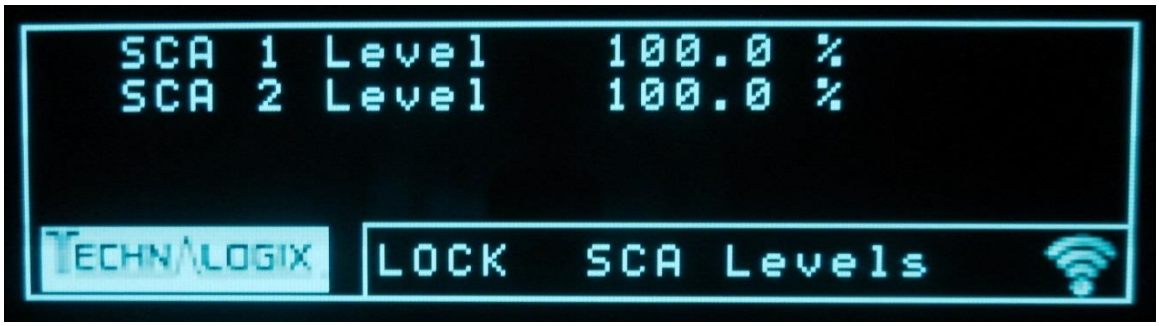
8.8. Audio Levels

Attenuation can be added to the Audio inputs on this screen. Only the audio inputs currently active are shown and can be changed. Right and left level apply to all the digital inputs as well as analog.

Controls from Audio Levels Screen

⇦	Goes to INPUTS screen
⇨	Goes to SCA Levels screen
Next/Enter:	Enters selection mode to change options above
Back:	Goes to the Currents screen

8.9. SCA Levels

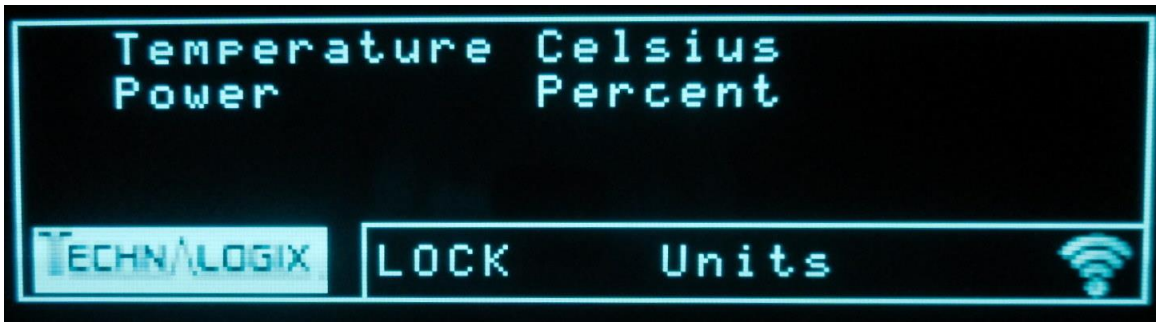


Attenuation can be added to the SCA inputs on this screen. SCA inputs are connected to the BNC connector on the back

Controls from SCA Levels Screen

⇦	Goes to Audio Levels screen
⇨	Goes to Units screen
Next/Enter:	Enters selection mode to change options above
Back:	Goes to the Currents screen

8.10. Units



Temperature:	Can set the displayed temperature to Celsius or Faherenheit.
Power:	Can set the displayed power to Watts or percent of full scale.

Controls from Units Screen

⇦	Goes to SCA Levels screen
⇨	Goes to Date & Time screen
Next/Enter:	Enters selection mode to change options above
Back:	Goes to the Currents screen

8.11. Date & Time

Shows the date and time the unit's clock is currently set to and allows it to be changed.

Controls from Units Screen

⇦	Goes to Units screen
⇨	Goes to Event History screen
Next/Enter:	Enters selection mode to change date and time
Back:	Goes to the Currents screen

8.12. Event History

Displays various events and errors and the date and time they occurred. Can scoll down to see the last 32 events.

Controls from Event History Screen

⇦	Goes to Date & Time screen
⇨	Goes to Event Reset screen
Next/Enter:	Enters scroll mode
Back:	Goes to the Currents screen

8.13. Event Reset

Allows the user to clear the Event History

Controls from Event Reset Screen

⇦	Goes to Units screen
⇨	Goes to Event History screen
Next/Enter:	Enters Event Reset mode
Back:	Goes to the Currents screen

9. Web Interface

The following pages outline the steps required to access the Technalogix Adrenaline Web Interface. Descriptions specific to the user's computer, router, or network setup are limited due to the differences in the multitude of networking equipment.

1. Connect Power Amplifier/Transmitter to your Network/PC

Connect an Ethernet cable from the RJ45 port (labelled ETHERNET) on the back panel of the power amplifier or transmitter to your network's Ethernet connection. Most new computers can do this with a standard Ethernet cable but older network cards may require a crossover Ethernet cable.

If preferred in place of the screen, a computer can be plugged directly into the Ethernet port on the power amplifier/transmitter to directly access the on-board web interface.

Turn on the transmitter to establish communication with the network.

The Adrenaline control system in the power amplifier or transmitter will source an internal IP from your router or you can set this manually (see Optimize User Parameter section).

2. Open web browser for monitor and control

The default internal address is http://adrenaline/index.htm. Type this default internal address into the URL address bar of your favorite web browser. The web pages cannot be accessed until you have established basic communication with the transmitter (turned on).

2.1. Web Page Password Protection

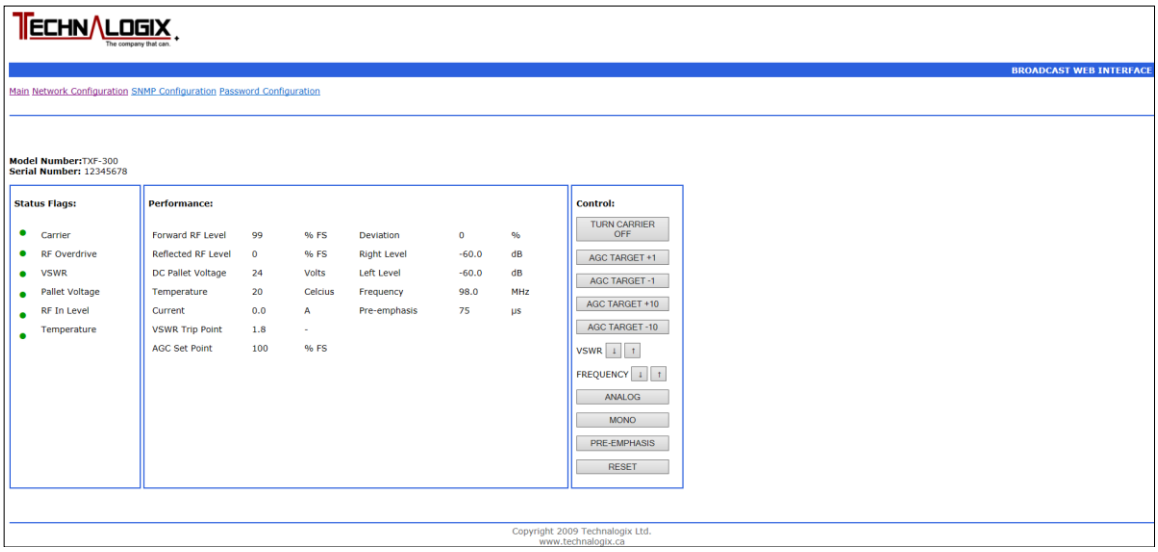
After entering the above internal address into a web browser, you will be asked for a password. Initially, please use the following:

username: admin
password: admin

The password can later be changed (see *Optimize user parameters* section).

2.2. Main Page Description

After entering the login information, the main page is then shown on the browser, as illustrated below for either single amplifier systems or multiple amplifier systems that are combined:



The model number and serial number of the unit are displayed in the top left of the browser screen.

The Status Flags section provides the user with feedback from the system. Specifically, there are status flags for:

- RF Carrier is on or off
- Forward RF in Overdrive (>110% Full Scale (FS))
- High VSWR
- Pallet Voltage Supply Good
- RF In Level Good
- High Temperature

The Performance section provides the user with specific parameters and measurements in the system. Measurements that can be viewed from the Performance box are:

- Forward RF Levels as a % of Full Scale (FS)
- Reflected RF Levels as a % of FS
- DC Supply Voltage in volts
- Temperature in °C
- Current of pallet(s) in Adc
- VSWR Trip Point Limit
- AGC measured against 100% FS
- Deviation
- Right Level/Left Level input attenuation
- Frequency in MHz

- Pre-Emphasis, selectable between 0, 25, 50, or 75 us

The Control section of the web interface screen allows the user to control functions inside the equipment, including:

- Turn Carrier On/Off - Turn the Carrier on/off
- AGC - Increase the Carrier by removing attenuation (steps of 1 or 10 dB)
- VSWR ↑↓ - Increase or Decrease the VSWR Trip point by 0.1 between 1.1:1 and factory determined limit.
- Frequency ↑↓ - Increase or Decrease the FM carrier frequency (MHz)
- Analog/Digital – Toggle between analog or digital audio inputs
- Mono/Stereo/MPX – Toggle between mono, stereo or MPX
- AES/TOSLINK/SPDIF – toggle between digital inputs
- Pre-Emphasis – Toggle between no added emphasis, or 25, 50, or 75 us emphasis
- Reset - Forces the system to reboot.

3. Optimize user parameters

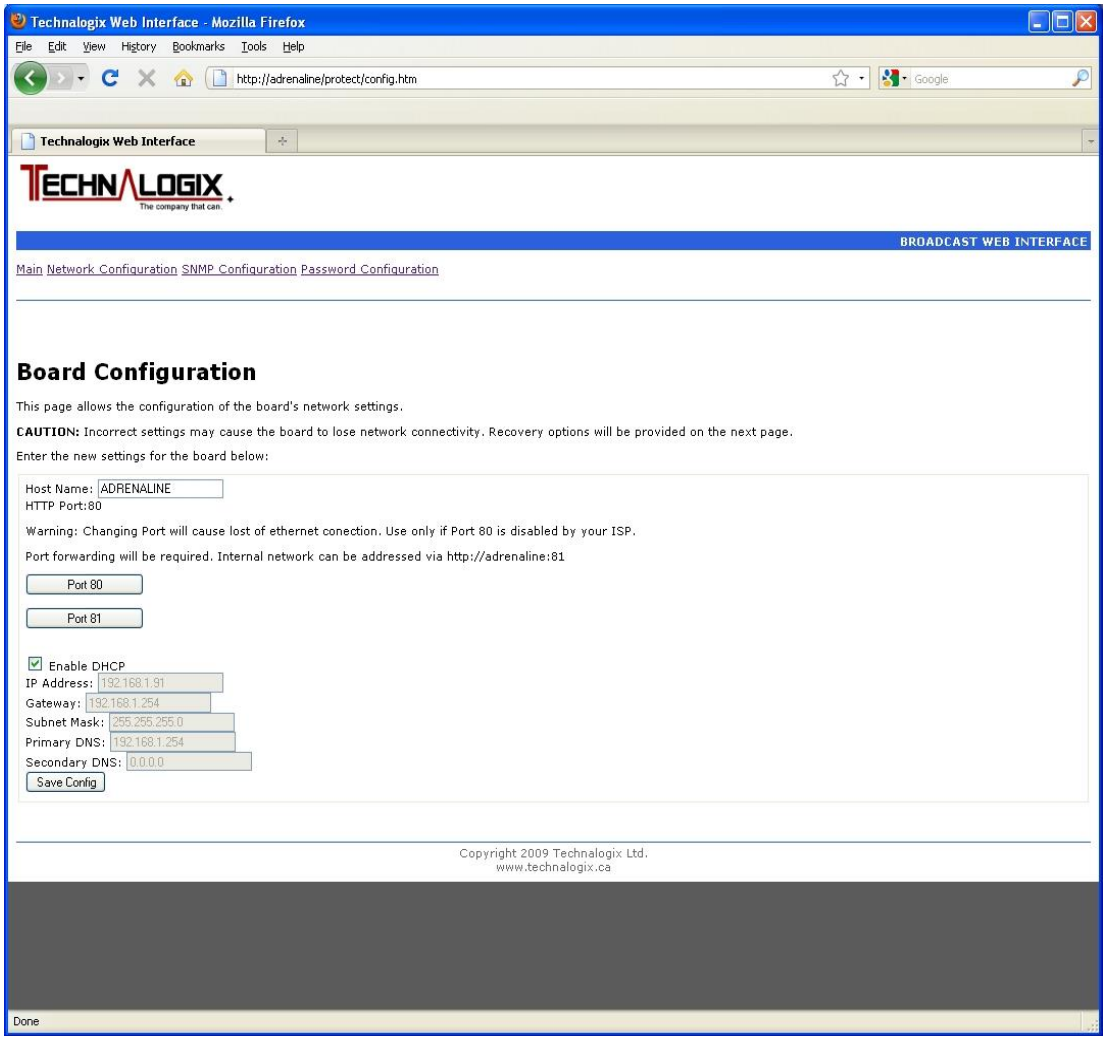
Also on the main web Ethernet page, along the top, are links to the other user parameter pages:

- Main – Returns to Main Index page
- Network Configuration
- SNMP Configuration
- Password Configuration

The following sections describe the user parameter pages in detail.

3.1. Network Configuration

The Network Configuration page allows the administrator to optimize the network settings to best suit their application.



3.1.1. Host Name

The Host Name shows the current webpage name (default is ADRENALINE). Enter a new name here if you wish to change this.

For example, entering YourCompany will make the web address:

http://yourcompany/index.htm

3.1.2. HTTP Port

The HTTP Port shows the current port used for internet access, 80 or 81. Port 80 is the default and is the accepted standard. Port 81 is available because some internet providers block access to port 80 unless you pay more.

Be very careful changing HTTP ports as it can be difficult to go back to an original port.

You can force a web browser to use port 81 by address to:

http://adrenaline:81/index.htm

To use this with an internet address will require port forwarding. Consult your routers manual to set this up.

3.1.3. IP Addressing

With DHCP enabled the system will automatically try to find a router and acquire an IP address. If you want to set this manually, uncheck the Enable DHCP box and enter it below then click Save Config.

To view the webpage from the internet rather than an internal network you need an external IP address, generally provided by your internet provider. Note that you can only have one web server using the same port. With this, anyone can access the system over the internet with something like:

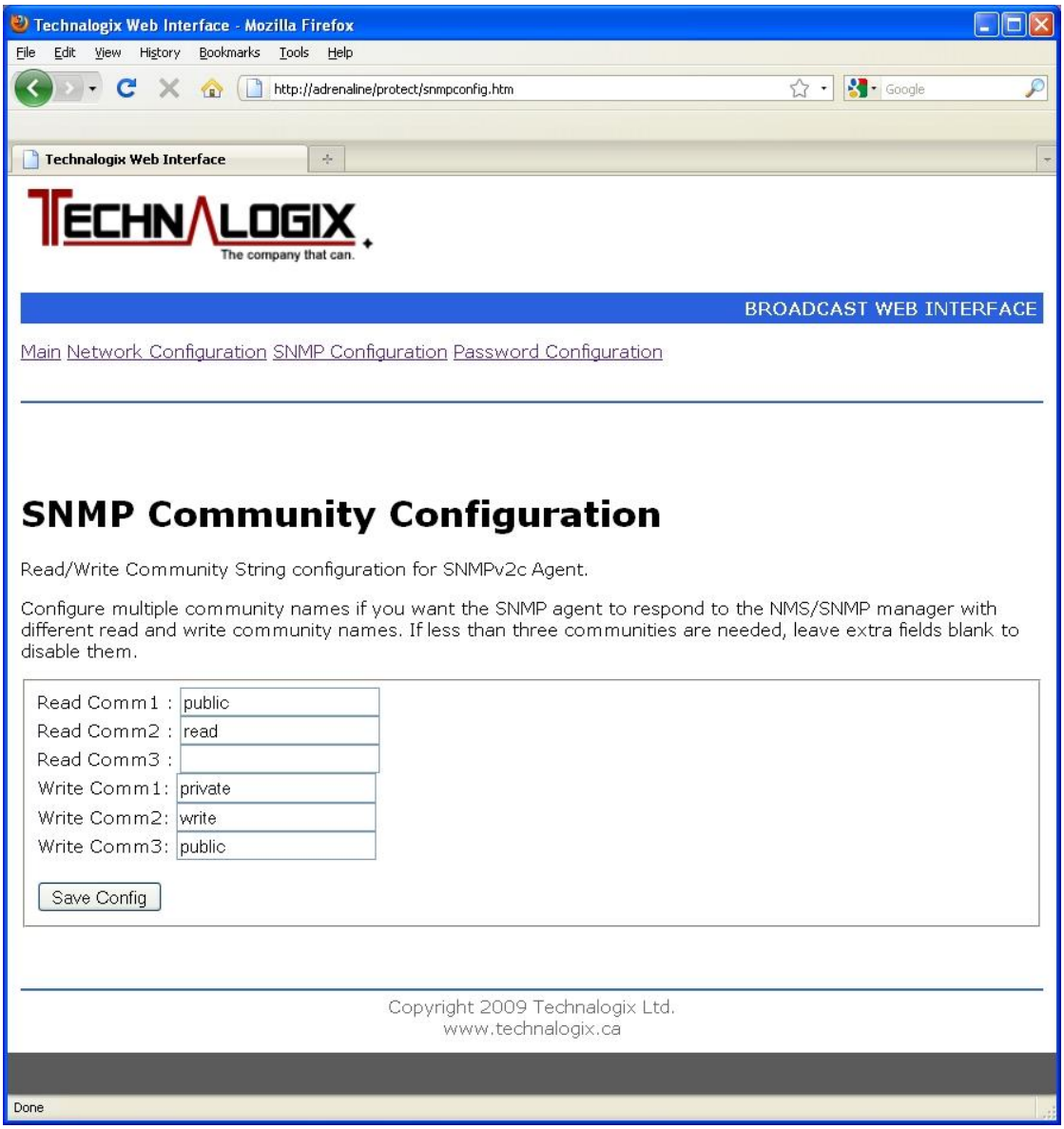
http://www.yourcompanywebaddress.com/adrenaline

3.2. SNMP Configuration

3.2.1. SNMP Communities

The SNMP Configuration page allows you to set the SNMP communities. Set these to limit access to the system via SNMP.

Default communities are:	READ:	Public Read
	WRITE:	Private Write Public



3.2.2. SNMP Management Information Base (MIB)

The Technalogix.mib file allows access to the following data via the SNMP protocol:

Read Only

Pallet Supply Voltage	- voltage level (Vdc)
Temperature	- temperature in (°C)
Total Current	- current on high voltage bus (Adc)
PA1 Current	- current to pallet or device 1 (Adc)
PA2 Current	- current to pallet or device 2 (Adc)
Fan Current	- current to cooling fan(s) (Adc)
Reflected Level	- reflected level as % rated full scale
Forward Level	- forward level as % rated full scale
Deviation	- modulation level as %
Left Level	- left audio input level shown as dB
Right Level	- right audio input level shown as dB
Serial Number	
Model Number	
SNMP Error Flag	- error flag, also for trap (see below)
VSWR Flag	- error flag for high VSWR
Overdrive	- error flag for overdrive
Temperature Flag	- error flag for high temperature
Pre-emphasis	- 0,25,50 or 75 us

Read/Write

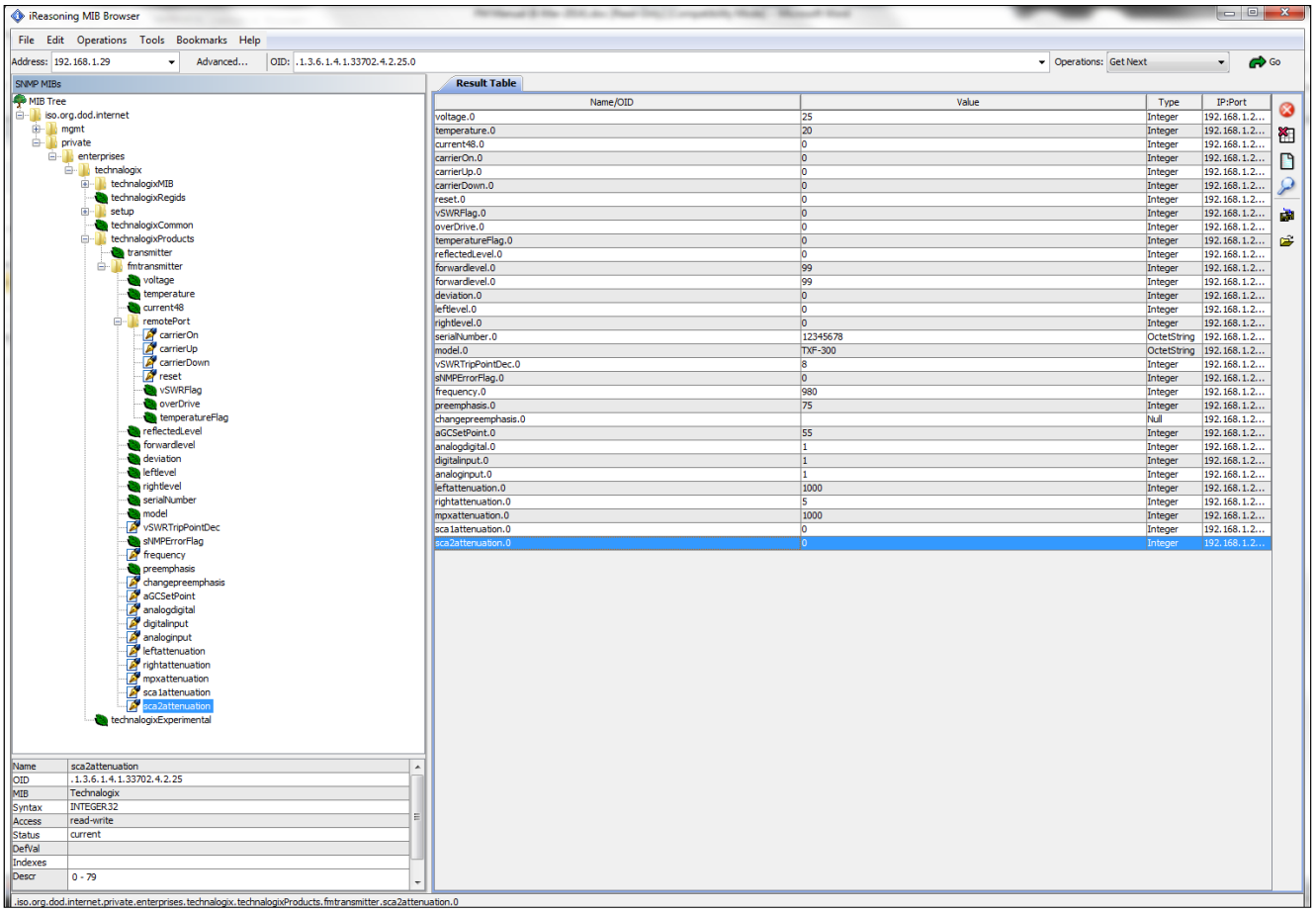
Reset	- 1 Reset System	0 Normal	
Carrier On	- 1 Carrier On	0 Carrier Off	
Carrier Up	- 1 Increase Carrier Level for AGC target 1%		
Carrier Down	- 1 Decrease Carrier Level for AGC target 1%		
VSWR Trip point	- 1-8 for 1.1:1 – 1.8:1		
Frequency	- 875 – 1080 for 87.5 to 108.0 MHz		
AGC Setpoint	- set target output power 0-100% rated power		
Analog/Digital	- 1 Analog audio input		
Digital Input	- 1 AES	2 SPDIF	3 TOSLINK
Analog Input	- 1 Mono	2 Stereo	3 MPX
Left Audio Level	- 0 – 255	0 = 0% 255 = 100%	
Right Audio Level	- 0 – 255	0 = 0% 255 = 100%	
MPX Level	- 0 – 255	0 = 0% 255 = 100%	
SCA1 Level	- 0 – 255	0 = 0% 255 = 100%	
SCA2 Level	- 0 – 255	0 = 0% 255 = 100%	

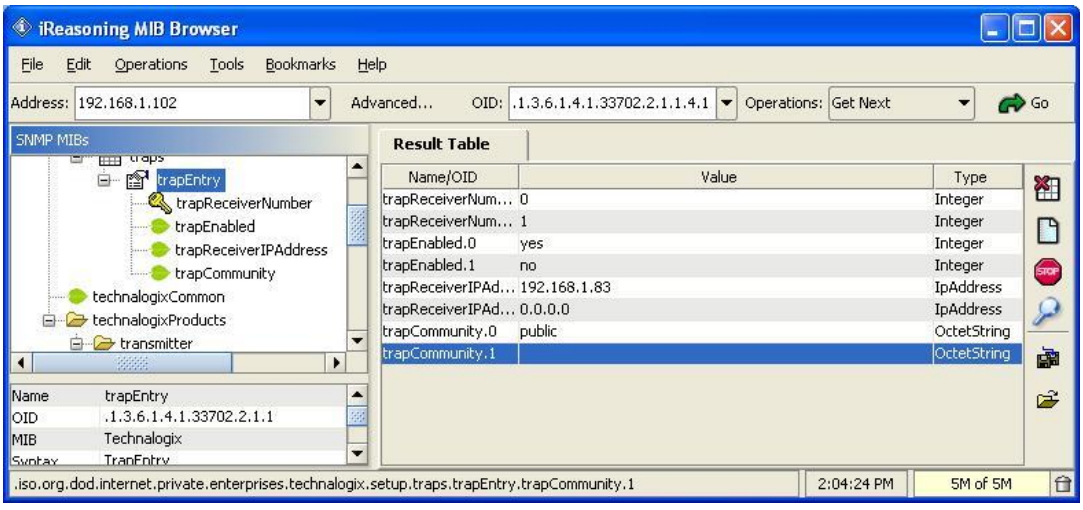
Read and Write communities can be set from the web interface, as described earlier in this section.

3.2.3. SNMP Traps

To enable the SNMP traps, within the MIB browser that you choose:

Set enable traps to 1 (or yes, depending on MIB browser).
Set the IP address to that of the receiving computer.
Set the community to one of the read communities set above.



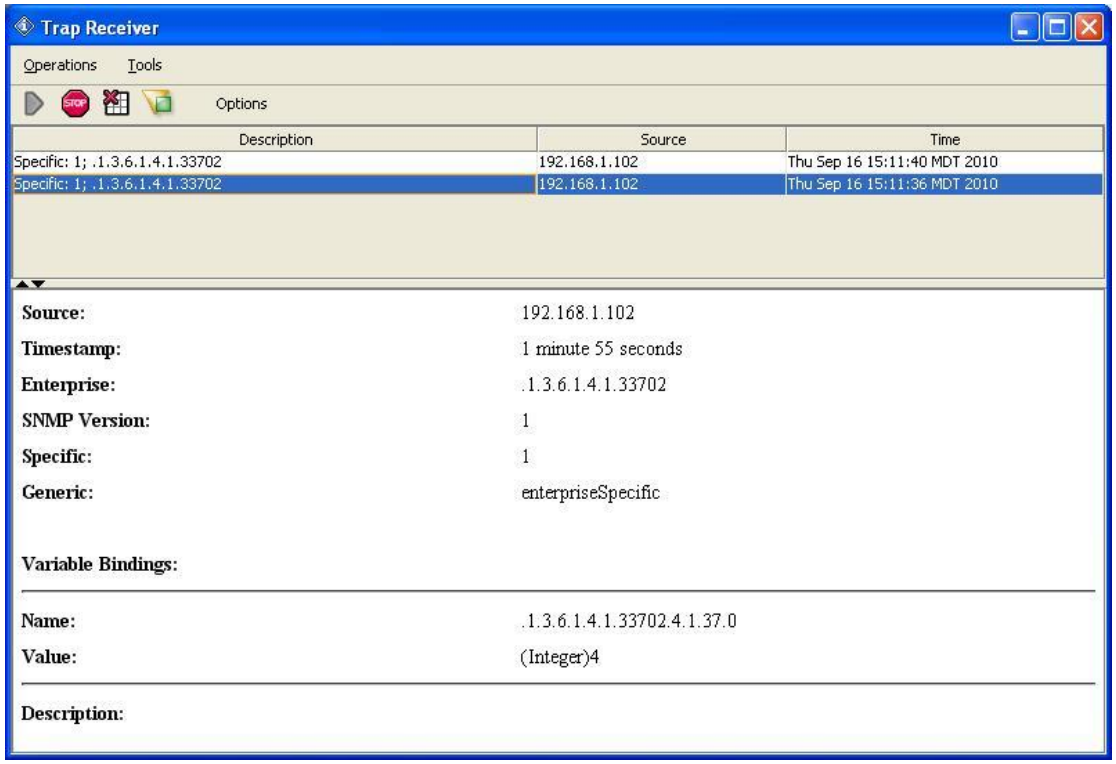


Make sure that your receiver's port is set to 162

The system will generate a general trap on any error flag and send an 8-bit value indicating the type of error, as follows:

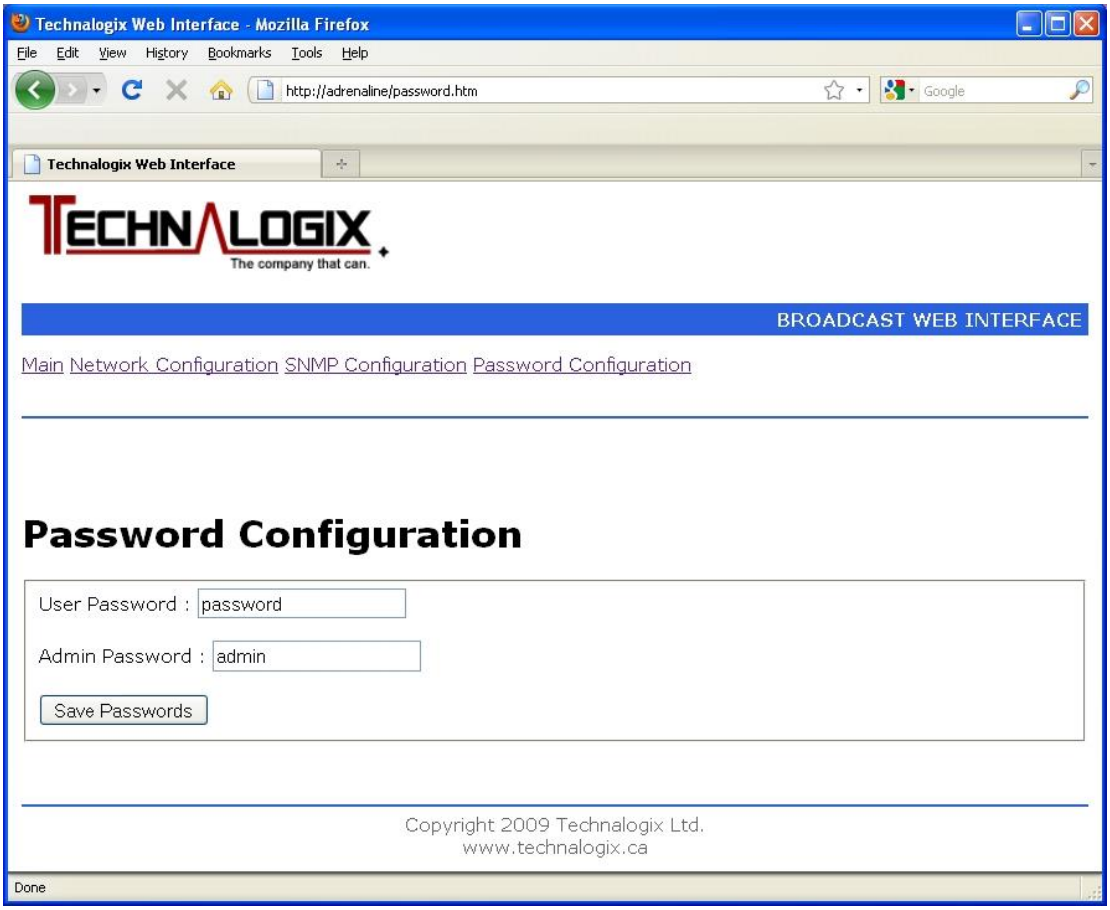
Bit 0(LSB)	Overdrive
Bit 1	High VSWR
Bit 2	High Temperature
Bit 3	High Speed Hardware Shutdown
Bit 4(MSB)	High Input Level

As an example, the following is a screen shot of a high temperature fault (Value 4).



3.3. Password Configuration

This page allows the setting of the web browser's User or Admin password, as illustrated below.



The User account allows access only to the main page. The Admin account allows access to the main and all the configuration pages.

Passwords are to be a maximum of 7 characters long. Don't forget your password. Resetting your password may cause a loss of all settings.

9.1. Remote Control (via DB25)

An additional option for remote control of the power amplifier/transmitter is through the DB25 connector found on the back panel of the power amplifier/transmitter

The overall functions of each pin on the Remote Port are indicated in the following DB25 pinout:

Pin Number	Description
1	Ground
2	Forward power sample[1]
3	Reflected power sample[1]
4	Carrier off[2]
5	Carrier on[2]
6	Increase carrier level 1% [2]
7	Decrease carrier level 1% [2]
8	Do not use
9	Reset [2]
10	Do not use
11	High temperature flag
12	High VSWR flag
13	Amplifier overdriven flag
14	+3.3Vdc (for testing only, do not load)
15-25	Do not use

Notes: 1. Analog output with voltage ranging from 0 to 3.3Vdc.
2. Ground input to activate. Triggered on falling edge

In addition to the DB25 parallel data connector, the user may choose to remotely control the RF amplifier/transmitter via an optional Ethernet web server or through an optional Simple Network Managed Protocol (SNMP) interface, described earlier in this section.

9.2. RBDS and RDS

Radio Broadcast Data System (RBDS) is commonly used for FM broadcast in North America, while the Radio Data System (RDS) is implemented in Europe. In 1998, the two standards were largely unified. Both systems are implemented as standard features on Technalogix FM transmitters, including the control, generator, and interface.

RBDS/RDS uses a subcarrier to embed the FM signal with information. This can be used to transmit time, station identification, programming information and more.

To control the RBDS/RDS connect to the USB port on the back. This will look like a COM port to your computer. Drivers should install automatically once you have connected if you have an internet connection or can be found here:

http://www.ftdichip.com/Drivers/D2XX.htm

To interface with the RBDS/RDS you need to install the Magic RDS software. Magic RDS software is found here:

http://www.pira.cz/rds/MagicRDS_Setup.exe.

General operating questions are answered here:

http://www.pira.cz/rds/show.asp?art=magic_rds_how_to.

The RBDS/RDS subcarrier level can be adjusted using R88 on the FM Exciter 2.02 circuit board. It should be set between 1.5 and 10% modulation.

If not needed, disable the RBDS/RDS on the INPUTS screen to give you the maximum available modulation.

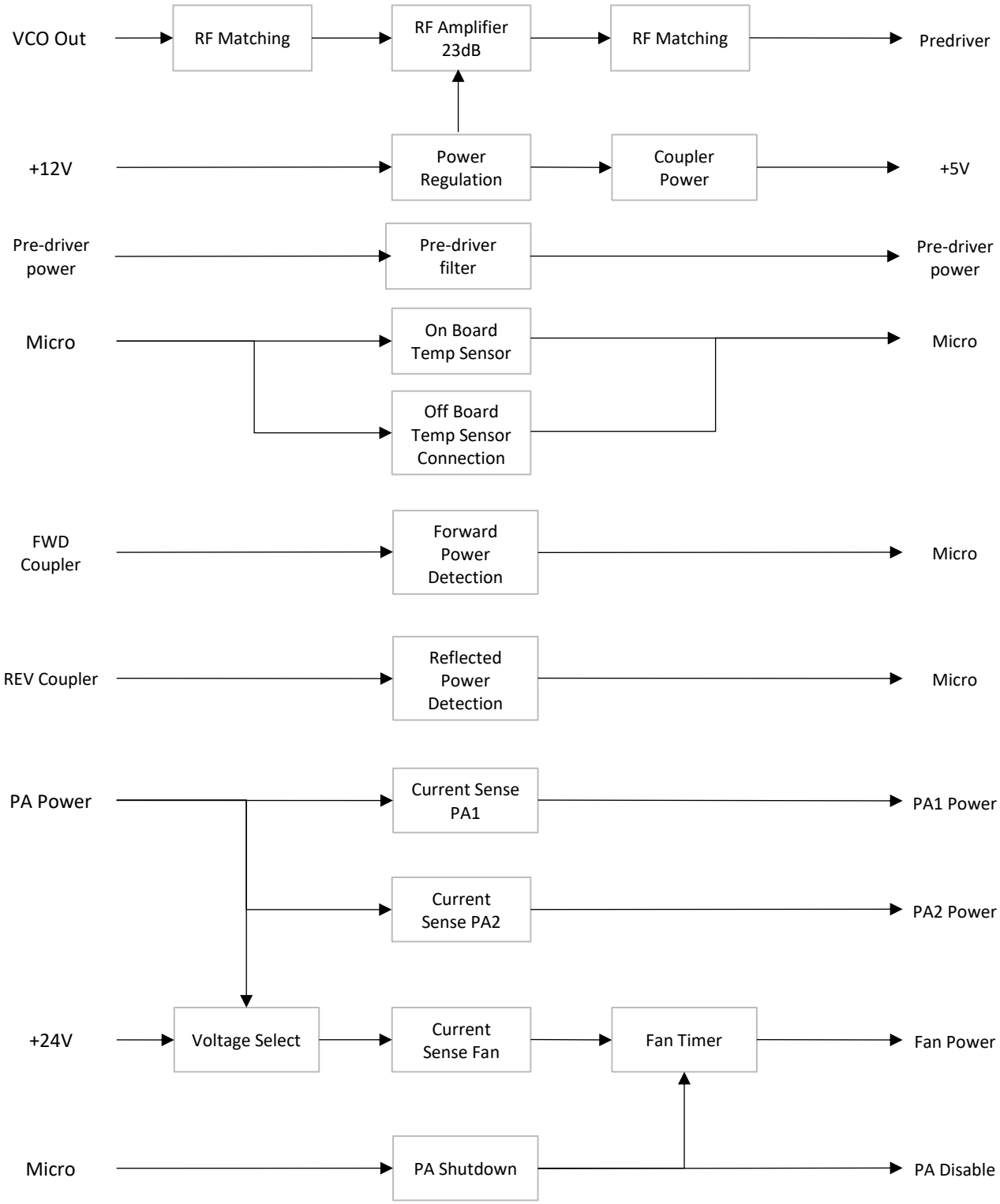
10. Monitor and Control System

10.1. Control System Overview

The control system is used for a variety of functions, the most important of which is ensuring that the amplifier or transmitter continues to operate in a safe manner. The control system also allows the user to monitor and control the amplifier or transmitter from both the front panel and remotely through the parallel port, Ethernet, or SNMP access port.

The control system is comprised of three modules. These modules work together to provide all the functions of the control system and include: OLED Display, Exciter, and Interface modules. The functions of the control system are illustrated in the following block diagrams.

10.2. FM Interface Board Block Diagram



11. Hardware Components

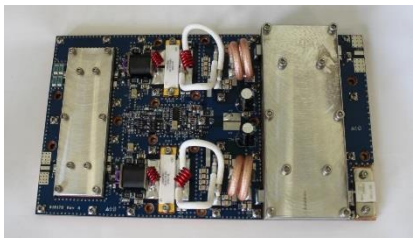
11.1. FM Amplifier Pallet

The exact bias and drain current of your system are found in the Final Inspection Report supplied in the shipping package. Output power levels are absolute maximum levels. Technalogix operates the pallet at reduced levels to improve performance and increase reliability.

Predriver: FM70MOT

Typical gain	18.5 dB
Input Power (max)	1.5W
Output Power (max)	80W
Frequency	86 – 110 MHz
ID (max)	4.5 Adc
VD (max)	28 Vdc

Driver: P1200FM-184XR



Typical gain	23 dB
Input Power (max)	7.5W
Output Power (max)	1200 W
Frequency	87.5 – 108.1 MHz
ID (max)	36 Adc
VD (max)	50 Vdc

11.2. Filter/Coupler

Our passive 50 ohm low-pass FM filter rejects spurious and harmonic output products and passes the modulated FM output carrier to the antenna or load. Forward and Reverse couplers are included on the board to detect forward and reflected powers.

2,000W LPF, with coupler

Frequency Range	87.5 – 108 MHz
Input Power (max)	2000 W continuous
Order	7th order Chebyshev
Insertion Loss (max)	0.5 dB
Return Loss (max)	24 dB
Rejection at 176 MHz	> -58 dB

11.3. Splitter

The splitter is used to provide the drive signal to the two 1200W pallets.

Frequency Range	10 - 250 MHz
Input Power (max)	25 W
Isolation	Up to 25dB
Insertion Loss above 3dB (max)	0.5 dB
Insertion Loss above 3dB (typ)	0.25 dB
Phase unbalance (max)	2 degrees
Amplitude unbalance (max)	0.25 dB

11.4. Combiner

The combiner is used to add the outputs of the two 1200W pallets.

Frequency Range	87.5 – 108 MHz
Input Power (max)	1000 W continuous each port
Output Power (max)	2100 W continuous
Isolation between Inputs (typ)	25dB
Insertion Loss (max)	0.2 dB
Return Loss (typ)	25 dB

11.5. Power Supply

Switching AC-DC power supplies are used to power the amplifier pallets, the control circuits, and all of the fans. The DC system voltage is set at either 28 or 48Vdc nominally, depending on the system. All fans run off this same DC supply. The specific DC system voltage is found in the Final Inspection Report.

AC is fed into the power supply enclosure via a filtered AC entry and then through a circuit breaker/switch. Specific AC current draw is documented in the Final Inspection Report. AC is then converted to DC using one or more AC-DC switching power supplies.

The following is the switching power supply data sheet(s) used to convert the AC to DC for the internal amplifier or transmitter components

Depending on the unit purchased power supplies may change:

TXF-2000: RSP-2000-48 x2
TXF-3000: RSP-2000-48 x3
TXF-5000: DRP-3200-48 x3

2000W Single Output Power Supply — RSP-2000 series

Features :

- Universal AC input / Full range
- Built-in 5V/0.3A, 12V/0.8A auxiliary power
- Built-in active PFC function, PF>0.97
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Forced air cooling by built-in DC fan with fan speed control
- Output voltage can be trimmed between 40~115% of the rated output voltage
- High Power density 21.4W/inch^3
- 1U low profile 41mm
- Active current sharing up to 8000W(3+1)
- Built-in remote ON-OFF control
- Built-in remote sense function
- DC OK signal, OTP alarm signal
- 5 years warranty

Parallel

SPECIFICATION

MODEL		RSP-2000-12	RSP-2000-24	RSP-2000-48
OUTPUT	DC VOLTAGE	12V	24V	48V
	RATED CURRENT	100A	80A	42A
	CURRENT RANGE	0 ~ 100A	0 ~ 80A	0 ~ 42A
	RATED POWER	1200W	1920W	2016W
	RIPPLE & NOISE (max.) Note.2	150mVp-p	200mVp-p	300mVp-p
	VOLTAGE ADJ. RANGE	10.5 ~ 14V	21 ~ 28V	42 ~ 56V
	VOLTAGE TOLERANCE Note.3	±2.0%	±1.0%	±1.0%
	LINE REGULATION	±1.0%	±0.5%	±0.5%
	LOAD REGULATION	±1.0%	±0.5%	±0.5%
	SETUP, RISE TIME	1500ms, 60ms/230VAC at full load		
	HOLD UP TIME (Typ.)	16ms/230VAC at 75% load	10ms/230VAC at full load	
INPUT	VOLTAGE RANGE Note.5	90 ~ 264VAC 127 ~ 370VDC		
	FREQUENCY RANGE	47 ~ 63Hz		
	POWER FACTOR (Typ.)	0.97/230VAC at full load		
	EFFICIENCY (Typ.)	87%	90.5%	92%
	AC CURRENT (Typ.) Note.5	13A/115VAC 7A/230VAC	16A/115VAC 10A/230VAC	16A/115VAC 10A/230VAC
	INRUSH CURRENT (Typ.)	COLD START 50A		
	LEAKAGE CURRENT	<2mA / 240VAC		
PROTECTION	OVERLOAD	105 ~ 125% rated output power		
		Protection type : Constant current limiting, unit will shut down o/p voltage after 5 sec. re-power on to recover		
	OVER VOLTAGE	14.7 ~ 17.5V	29.5 ~ 35V	57.6 ~ 67.2V
		Protection type : Shut down o/p voltage, re-power on to recover		
	OVER TEMPERATURE	Shut down o/p voltage, recovers automatically after temperature goes down		
FUNCTION	AUXILIARY POWER	5V @ 0.3A, 12V @ 0.8A		
	REMOTE ON/OFF CONTROL	By electrical signal or dry contact Power ON:open Power OFF:short, refer to function manual		
	REMOTE SENSE	Compensate voltage drop on the load wiring up to 0.5V, refer to function manual		
	DC OK SIGNAL	The isolated TTL signal out, refer to function manual		
	OUTPUT VOLTAGE TRIM	Adjustment of output voltage, possible between 40 ~ 115% of rated output, refer to function manual		
ENVIRONMENT	WORKING TEMP.	-35 ~ +70℃ (Refer to "Derating Curve")		
	WORKING HUMIDITY	20 ~ 90% RH non-condensing		
	STORAGE TEMP., HUMIDITY	-40 ~ +85℃, 10 ~ 95% RH		
	TEMP. COEFFICIENT	±0.03%/℃ (0 ~ 50℃)		
	VIBRATION	10 ~ 500Hz, 2G 10min./1cycle, 60min. each along X, Y, Z axes		
SAFETY & EMC (Note 4)	SAFETY STANDARDS	UL60950-1, TUV EN60950-1 approved		
	WITHSTAND VOLTAGE	I/P-O/P:3KVAC I/P-FG:2KVAC O/P-FG:0.5KVAC		
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG, O/P-FG:100M Ohms / 500VDC / 25℃/ 70% RH		
	EMC EMISSION	Compliance to EN55022 (CISPR22) Conduction Class B, Radiation Class A ; EN61000-3-2,-3		
	EMC IMMUNITY	Compliance to EN61000-4-2,3,4,5,6,8,11, EN61000-6-2 (EN50082-2), heavy industry level, criteria A		
OTHERS	MTBF	46.3K hrs min. MIL-HDBK-217F (25℃)		
	DIMENSION	295*127*41mm (L*W*H)		
	PACKING	1.95Kg; 6pcs/12.7Kg/1.15CUFT		

NOTE

1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature.
2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor.
3. Tolerance : includes set up tolerance, line regulation and load regulation.
4. The power supply is considered a component which will be installed into a final equipment. The final equipment must be re-confirmed that it still meets EMC directives.
5. Derating may be needed under low input voltages. Please check the derating curve for more details.
6. Under parallel operation ripple of the output voltage may be higher than the SPEC at light load condition. It will go back to normal ripple level once the output load is more than 5%.

3200W Rack Mountable Front End Rectifier DRP-3200 series

Dimension

L	*	W	*	H	
325	*	107	*	41 (1U)	mm
12.8	*	4.21	*	1.61(1U)	inch

Features

- Universal AC input / Full range
- Built-in active PFC function
- High efficiency up to 94.5%
- Forced air cooling by built-in DC fan
- Output voltage and constant current level programmable
- Built-in OR-ing FET, support hot swap (hot plug)
- Active current sharing up to 12800W for one 19" rack shelf
- Built-in I^2C interface, support PMBus protocol (Optional CANBus protocol)
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Optional conformal coating
- 5 years warranty

Certificates

- Safety: UL/EN/IEC 62368-1
- EMC: EN 55032 / 55024

Applications

- Industrial automation
- Distributed power architecture system
- Wireless/telecommunication solution
- Redundant power system
- Electric vehicle charger system
- Constant current source system

Description

DRP-3200 is a 3.2KW single output rack mountable front end AC/DC power supply with 1U low profile and high power density up to 37W/inch^3 . This series operates at 90~264VAC input voltage and offers the models with the DC output mostly demanded by the industry. Each model is cooled by the built-in DC fan with fan speed control and working for the temperature up to 70℃. DRP-3200 provides vast design flexibility by equipping various built-in functions such as the PMBus communication protocol, output programming, active current sharing (up to 25600W via two 19" rack shelves, DHP-1UT), remote ON/OFF control, auxiliary power, alarm signal, and etc.

Model Encoding / Order Information

DRP - 3200 - 24 ☐

- ☐ Communication protocol option
- 24 Output voltage(24V/48V)
- 3200 Output wattage
- DRP Series name

※ Note: 19" rack shelf, DHP-1UT, available.

Type	Communication Protocol	Note
Blank	PMBus protocol	In Stock
CAN	CANBus protocol	By request

12. Facility Recommendations

12.1. Building Recommendations

The quality of the building is of great importance if you are to expect long life and continued performance from the power amplifier or transmitter. The building must be clean, dry, temperature controlled and secure. Don't forget to allow space in the building for any additional racks to house test equipment, a workbench area, line regulating transformers, ladders, equipment and parts storage, first aid kit, emergency generator if used, as well as heating and cooling devices that may be unique to your installation. A sloping roof will tend to develop leaks less rapidly. The building should be well roofed with good material. The cooling load will be lowered with reflective or light colored roofing material.

12.2. Electrical Service Recommendations

Technalogix recommends that a qualified, licensed local electrician be consulted for the required electrical service. We suggest local electricians because:

- The personnel know the local codes
- The personnel can be on site readily
- You are apt to get better overall support if you cultivate business relationships with local suppliers

Technalogix recommends that proper AC line conditioning and surge suppression be provided on the primary AC input to the power amplifier or transmitter. If DC is used as a source, a DC-DC converter is recommended to provide isolation between the supply and the load. All electrical service should be installed with your national electrical code in your area, any applicable provincial or state codes, and good engineering practice. Special consideration should be given to lightning protection of all systems in view of the vulnerability of many sites to lightning. Lightning arrestors are recommended in the service entrance. Gas Discharge Tubes (GDT) may help in preventing lightning, which was forecast for another day, from creating a bad day. Straight and short grounds are recommended. The electrical serviced must be well grounded. Do not connect the unit to an open delta primary power supply, as voltage fluctuations could harm the unit. Branch your circuits. Do not allow your lights, your workbench plugs, and your transmitting or translating equipment to operate on one circuit breaker. Each amplifier or transmitter should have its own circuit breaker, so a failure in one does not shut off the whole installation.

12.3. Antenna and Tower Recommendations

Your preliminary engineering workgroup should establish your antenna and tower requirements, if applicable, both for receiving and transmitting antennas. Construction of sturdy, high quality antenna/tower systems will pay off in terms of coverage of your service area, the overall quality and sale-ability of your radiated signal, and reduced maintenance expenses. Technalogix provides complete turnkey antenna systems if needed. If your site is serving as a translator, your receiving antenna should be in line of sight to the originating station all year round. The foliage will change with season. Transmitting antennas can enhance or seriously impair the amplifier or transmitter output.

The selection, routing, and length of coaxial cable are extremely important in the installation. If there is a 3 dB line loss in the cable between your unit's output and the transmitting antenna, the unit will only deliver half power. Buy the best cable you can obtain, route it via the shortest way to the antenna, and keep it straight. Do not form it into sharp bends on its way. Do not use any more cable fittings for the installation than absolutely necessary. All cautions here apply equally to all coaxial cables in the system - input and output.

Pay attention to radial ice accumulation when designing the transmission system. It is not uncommon for at least an inch of ice to build up on a tower or antenna in some locations. This in turn significantly increases the weight, cross section, and wind loading of the system, not to mention creating issues from reflective power.

Attaching the transmission line to the tower is crucial to maintain a safe and reliable operation. Nylon wire ties and electrical tape will breakdown in the sunlight and ultimately fail, creating a potentially dangerous situation. It is important to use proper clamps and hoisting grips and also ensure that the transmission line is grounded to the tower in several locations. When high currents flow through the tower in the event of lightning strikes, some of that current will flow through the outer conductors of the transmission lines. Due to the resistance difference between the steel tower and copper transmission line, a significant voltage can be developed, often resulting in arcing between the outer jacket and outer conductor, thus pitting the conductor.

Preventative maintenance is crucial in ensuring that safety is maintained. Specifically, check that transmission line grounds are tight and are not missing any hardware. Frequently inspect support clamps or spring hangers. Consider investing in an ice break, if you haven't already done so, as shards of falling ice can damage the transmission line – and if it is going to happen, it will happen at an important time. Check the tower light photocells and conduit.

The better-known tower manufacturers offer complete technical and safety documentation with their towers. Be sure that you have this information as it regards wind loading, guying, etc. The best-designed antenna system will function poorly if shortcuts and compromises are used during installation. Follow the manufacturer's instructions exactly, along with any engineering data prepared for the site. Be absolutely safe and certain about this aspect as human lives may be at stake.

12.4. Shelter Security

The FCC requires that the equipment be secure from entry or control by unauthorized persons, and that any hazardous voltages or other dangers (including most tower bases) be protected by locks or fences as necessary to protect personnel and prevent unauthorized tampering or operation. Security of the building further implies that it be secure from wildlife. Use sturdy construction materials, including sheet metal if necessary. Holes around conduit, cable, and other similar entry points should be stuffed with steel wool and caulked to prevent entry of wildlife. Other features of security for your shelter may include its location with respect to the prevailing wind conditions. Locations leeward of some natural topographical feature will prevent wind damage and snowdrifts. Check the soil runoff conditions that may slow or hasten wind or water erosion and other concerns that may be unique to your location.

12.5. Heating and Cooling Requirements

The environment's temperature will contribute greatly to the length of the power amplifier's or transmitter's life. Technalogix recommends that the building's filtered air intake must have capacity for all air-flow in the building plus an additional 20%. Keep the intake below the roofline to avoid intake of solar heated air. Please ensure that the intake and exhaust areas are on the same side of the building to avoid pressure differentials during windy conditions. Also, do not position intake near exhaust's preheated air. If air conditioning is required to cool the shelter, discuss the situation with a qualified HVAC technician. Under average conditions, 12,000 BTUs will cool approximately 500 square feet to a comfortable level. The fans internal to the enclosures help cool the components.

13. Maintenance

If your unit employs a filter on the air inlet for the fans, the filter should be cleaned every 30 days. If the equipment is operated in a severe dust environment, the filters on the inlet fan may need to be cleaned more regularly. Turn the system off and unplug all of the AC inlet cords. The filter can be lifted off the fan and cleaned using an air compressor at low pressure. While the filter is out, clean the fan blades themselves with a small brush. The fans themselves do not need lubrication.

The interior of the cabinets should be cleaned and inspected annually. Turn the system off and unplug all of the AC inlet cords. Remove the top lid by unscrewing the 6-32 machine screws.

Use extreme caution when working near the AC input terminal. The power amplifier/transmitter and power supply store hazardous voltages.

Using either compressed air or a brush with soft bristles, loosen accumulated dust and dirt and then vacuum the interior of the cabinet. Complete a visual inspection of the interior, making sure there are no loose connections or discolorations on any components from heat. Nothing inside the power amplifier or transmitter enclosure exceeds a temperature that is not comfortable to the touch under normal operating conditions (unless it is RF!), so any signs of discoloration indicate potential damage.

All modular components inside the enclosure are attached to aluminum mounting plates for easy removal and replacement. Ensure that plates are secured and the mounting hardware is tight.

14. Troubleshooting

The first and most important aspect of troubleshooting anything is to be systematic. Note where you have looked and what you found.

Look first for the obvious.

- Make a physical inspection of the entire facility. Are all necessary connections properly made? Do you see any signs of obvious damage within the equipment?
- Is the AC power ‘ON’ to the site and the equipment? (Check fuses and circuit breakers if necessary.)
- Are all the switches in the correct operating position?
- Is the input signal present and at the correct level?
- Check display readings for presence of forward and reflected power and DC supply levels.

Thank you

for choosing

Technalogix Ltd.

If there is anything we can do to help in your success, please do not hesitate to contact us. We also welcome suggestions for product improvements or feature enhancements.