

## GENERAL

The Trio DataCom TC-900DS is a full duplex 848-960MHz Base Station version of our proven TC-900DR featuring a fully integrated 4800/9600 bps data radio modem and cavity diplexer.

The complete unit employs individual transmit and receive RF decks, our TC-DFM9 modem, front panel control PCB and diplexer.

The unit is housed within a 2RU 19" rack mount enclosure providing the user with visible LED indications of critical parameters.

Capabilities and functionality of the unit are the same as the TC-900DR.

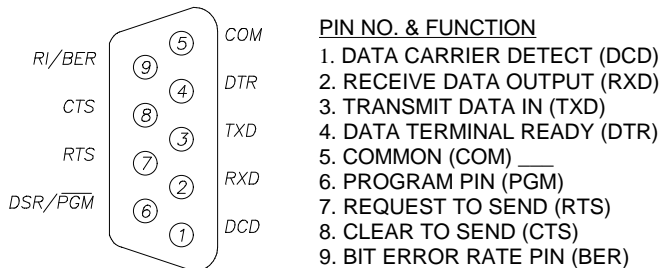
Configuration of the unit is fully programmable, with parameters held in non volatile memory (NVRAM). All configuration parameters are accessible using the TC-DRPROG installation package, consisting of a programming lead, manual and software which will run on a PC under Windows 95/98/NT. It is essential that each unit is programmed to suit individual requirements prior to operation. For detailed information refer to the TC-900DR Handbook.

## DATA CONNECTION

The data connection is via a DB9 connector labelled 'Port A' (shown below), which is wired as a DCE.

### User Serial "Port A" Pin Assignment.

#### EXTERNAL VIEW OF 'PORT A'

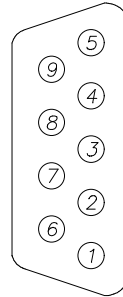


**NOTE:** Pin 6 and pin 9 provide a dual function which depends on the mode that the TC-900DS is operating in.

### User Serial "Port B" Pin Assignment.

Port B can be used as a secondary data stream (independent of Port A) once configured by the programmer. Port B also has one connection that may be of use for installation. This connection (Pin 9) is Receive Signal Strength Indicator (RSSI) output. 0-5V where 1.5V typically indicates -110dBm and every 0.5V increase indicates an improvement of » 10dBm.

#### EXTERNAL VIEW OF 'PORT B'



#### PIN NO. & FUNCTION

1. DATA CARRIER DETECT (DCD)
2. RECEIVE DATA O/P (RxD)
3. TRANSMIT DATA O/P (TxD)
4. UNUSED
5. COMMON
6. DATA SET RECEIVE (DSR)
7. UNUSED
8. UNUSED
9. RECEIVE SIGNAL STRENGTH

**NOTE:** Port B Pin 9 output has a high impedance of around 50K OHMS and loading will decrease accuracy of the RSSI measurement.

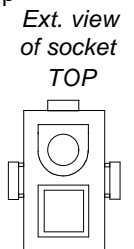
## POWER CONNECTIONS

The power required is 13.8VDC nominal, at 1.8 Amp (4Watt Tx). Power is supplied by way of the DC Connector supplied on the rear of the unit.

**NOTE:** The front panel includes a 3A slow blo fuse.

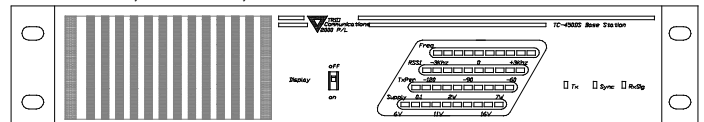
#### POWER CONNECTOR PIN ASSIGNMENT

POWER CONNECTOR	PIN ASSIGNMENT
TOP PIN	+VE (13.8vdc)
BOTTOM PIN	GROUND



## USER INDICATIONS

The TC-900DS provides a front panel LED bar display that shows status information to the user - FREQUENCY, RSSI, TXPOWER, SUPPLY, RXSIG LED and SYNCH LED.



The FREQUENCY bar graph indicates the incoming received frequency error.

The RSSI bar graph indicates the amount of Received Signal Strength.

The TRANSMITTER bar graph show RF output power.

The SUPPLY bar graph shows DC volts level.

RXSIG LED (yellow) indicates the level of RSSI signal from the radio IF strip, compared to a threshold level set in the configuration data programmed by the user. If the signal is above the threshold, then the LED indicator is turned on.

In all operation modes except "Programmer mode", the SYNC LED (yellow) indicates when the modem has detected a valid data stream. The SYNC LED is activated, when the modem detects a valid HDLC flag sequence, and remains active until an invalid sequence of seven or more consecutive "1" bits is detected.

The SYNC LED will not be turned on if the RSSI signal strength (as indicated by the RXSIG LED) is below the minimum threshold. This prevents false SYNC detection from noise.

## **FRONT PANEL SWITCH FUNCTIONALITY**

The front panel switch is a two position type used to turn the front panel display ON or OFF.

### **SPECIAL MODES OF OPERATION**

Part of the power-up/reset initialisation phase of the TC-900DS are tests to determine whether the modem should enter one of 2 "special operation" modes. Whilst in these modes the TC-900DS won't operate in its standard run mode.

- | Programmer mode.
- | Bit error rate test mode.

These modes are only entered if the required setup conditions are present at power up. An error mode of operation can also be entered into, if during normal operation, an error condition occurs.

### **PROGRAMMER MODE**

CABLE - Pins 2, 3, 4, 5 straight through with Pin 6 on the DB9 connector of Port A, connected to pin 5. When the modem is powered up with this fitted, the controller senses this and attempts to enter "Programmer mode" and the "SYNC" LED will flash approx. once per second. (Note, the TC-DRPROG programming software and lead has the required connections). Failure to supply the correct password in time, will cause the modem to abandon the "Programmer mode" attempt, and go on with it's normal power-up procedure.

### **BIT ERROR RATE TEST MODE**

Pin 9 of the DB9 connector of Port A, is normally the Ring Indicate output line. However, if this pin is driven positive (typically by connecting it to pin 6), then the modem's data transmitter and receiver will enter the BER test mode. To activate the transmitter, connect pin 6 to pin 9 (BER mode) to pin 7 (PTT) this will generate a scrambled bit pattern which should be decoded at a receiver as a constant logic "1" level in the unscrambled data. Any errors in the decoded bitstream, will be "0", and the receiver portion of the modem in this mode, will activate the SYNC LED every time it sees a "0" bit.

Note: As the TC-900DS is full duplex this test can operate in both directions simultaneously.

Every error bit detected, will activate the SYNC LED. For error rates of 1 in 103 and above, the SYNC LED will be ON most of the time. A 1 in 104 error rate will show the SYNC LED active for approximately 10% of the time. This function provides a crude indication of Bit Error Rate for installation purposes. Note: Error count messages (ET:XXXX) for every 10,000 bits are presented to Port A for the user. If pin 9 ceases to be driven positive, then the BER Test mode is terminated, and the modem restarts it's initialisation phase.

### **ERROR INDICATION MODES**

There are 3 error conditions that will cause the RXSIG and SYNC LEDs to be used for error indications and not their normal purpose. Two are fatal conditions, that cause the modem to restart after the duration of the error indication phase.

## **TRANSMIT POWER LOW**

While the modem activates the radio transmitter, it periodically checks the transmit power. If the power measurement is less than a threshold set in the non-volatile memory, then the RXSIG and SYNC LEDs are made to alternate, approximately 4 times per second. The TXMIT LED will also be on during this process. This indication condition will persist for the duration of the transmission. As soon as the transmission is discontinued, the error indication will cease, and the two LEDs revert to their normal function.

## **NVRAM READ ERROR**

The TC-DFM9 modem accesses the non-volatile memory as part of it's initialisation phase, to read programming configuration data. If the communication protocol with the device is violated, or the non-volatile memory CRC checksum is found to be incorrect, then the modem indicates this by flashing the RXSIG and SYNC LEDs twice alternately. That is, one LED operates ON and OFF twice, then the other. A total of five cycles of this occurs, then the modem restarts initialisation.

## **SYNTHESISER LOCK DETECT ERROR**

If at any time during normal operation, BER mode the frequency synthesiser indicates an out of lock condition, the modem enters an error indication mode for a short time before restarting.

One LED is turned ON (☼), the LEDs are swapped, then both turned OFF (●). Then the latter LED ON again, swap LEDs, and then OFF. This will give the appearance of a sweeping motion between the LEDs. The following table shows all error condition displays.

Tx PWR Err		NVRAM Err		SYNTH Err	
RXSIG	SYNC	RXSIG	SYNC	RXSIG	SYNC
☼	●	☼	●	☼	●
●	☼	●	●	●	☼
☼	●	☼	●	●	●
●	☼	●	●	●	☼
☼	●	●	☼	☼	●
●	☼	●	●	●	●
☼	●	●	☼		repeat
●	☼	●	●		
continue			repeat		

## **MOUNTING AND ANTENNA CONNECTION**

The TC-900DS is a 19" 2RU rack mount unit which is naturally cooled. It is advisable to allow at least 1RU clearance top and bottom for cooling purposes.

The RF connector is located at the rear of the unit. It is an N Type Female for connection directly to the antenna feeder tail.

A grounding lug is also provided at the rear of the unit to connect a secure earthing strap.