

K-Series Quick Reference Guide

KP & KB models of Radio



Introduction

Welcome to the Quick Reference Guide AND Quick Start Guide for the K-Series KP & KB models of radio. For a general overview of the K-Series operation, consult this Quick Reference Guide. For a step-by-step instruction on setting up a Point to Point radio link, turn this page over and consult the Quick Start Guide. For further details on the KP900 and KB900 Please refer to the K-Series user manual.

KB900

KP900



Mounting and Environmental Considerations

The radio should be mounted in a clean and dry location, protected from water, excessive dust, corrosive fumes, extremes of temperature and direct sunlight. In high power or high temperature applications, please allow sufficient passive or active ventilation.

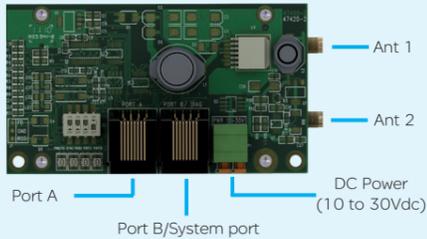
Connecting Antennas and RF Feeders

The RF antenna system should be installed in accordance with the manufacturers notes. Antenna gain must be considered when setting Transmit Power. Refer to Compliance notices at the end of this document.

The RF connectors are SMA Type female connectors. Always use good quality low loss feeder cable, selected according to the length of the cable run. Ensure all external connections are waterproofed using amalgamating tape.

Preset directional antennas in the required direction using a compass, GPS, or visual alignment and ensure correct polarisation (vertical or horizontal).

Note: Use ANT1 for Point to Point systems.



Power Supply Requirements

Tx: Nominal 13.8 V @ 500 mA (Max 1A)
Rx: Nominal 13.8V @ 110 mA
Safe Operating Voltage 10- 30 V (24V @ 300 mA)

Power Supply Protection and Precautions

The K-Series radio modem will operate from a 10 to 30 volt (filtered) DC supply. The radio must be fitted with an external (3 Amp) fuse to protect from permanent damage if the voltage exceeds 30V DC.

The current requirement is typically 110mA @ 13.8V in receive mode, and will vary in transmit mode according to RF output power level.

CAUTION

The radio modem can also be damaged if there is any potential difference between the chassis-ground, RS232 signal ground, power (-) input, or antenna coaxial shield.

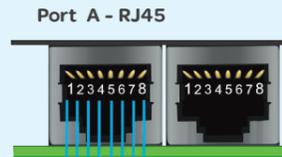
Before connecting any wiring, ensure all components are earthed to a common ground point. Connect the antenna and RS 232 plugs BEFORE applying power to the unit. Lastly, before inserting the power plug, please re-check that the polarity and voltage on the DC power plug is correct using a multimeter.

Communications Ports

Ports A,B and the system port pinouts are configured as DTE (Terminal) instead of DCE. This is to allow use of a Schneider Electric SCADAPack RTU programming cable to communicate through Port A or configure the radio.

Port A -RJ45

Serial PORT A on the Trio KP900/240 and KB900/240 radios can be configured as an RS-232 or RS-485 serial communication port. Connections are made through a RJ-45 modular connector. The following diagram shows the pin connections for the RJ-45 port connector for Port A.

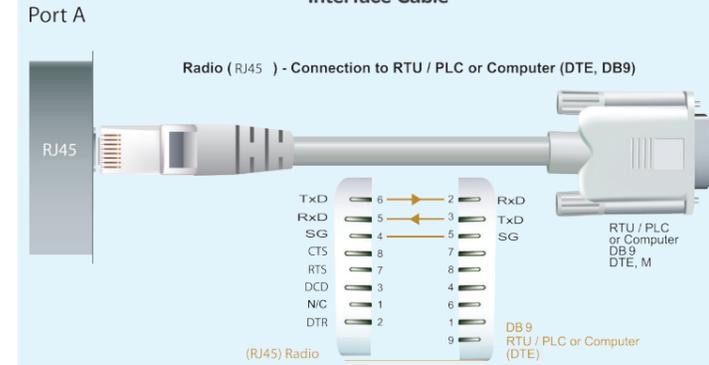


In most systems flow control is not required, in which case only 3 wires need to be connected between the radio and the application device.

3 Wire Connection:

- Pin 5 (Rx) - data input from the radio modem,
- Pin 6 (Tx) - data output to the radio modem,
- Pin 4 (SG) - signal ground.

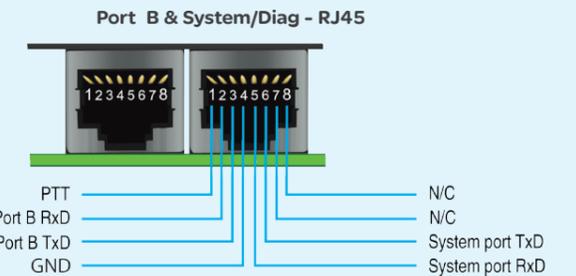
Interface Cable



Port B & System/Diag Port - RJ45

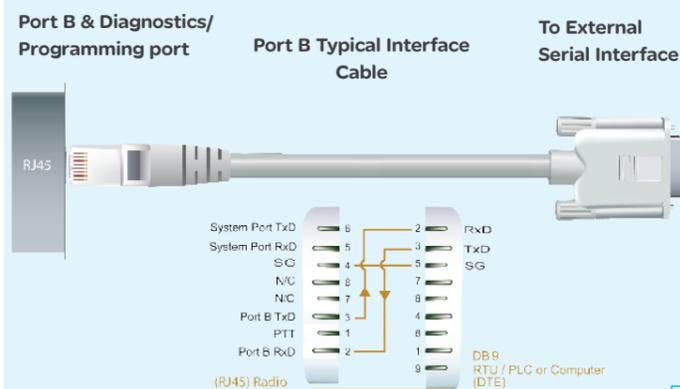
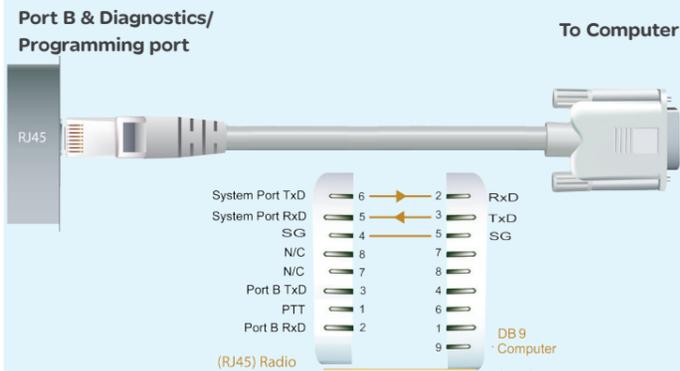
The Port B & System/Diag port on the Trio KP900/240 and KB900/240 is designed with two independent ports, integrated within the single RJ-45 socket. Port B can be used for RS232 serial communications only. The system/diag port is used for programming / configuration of the radio and can be used for remote diagnostics connections.

The following diagram shows the pin outs of port B and system diag port.



A non-standard cable is required to configure the radio and access Diagnostics signals. For ordering information on this cable, please contact your local sales representative.

Diagnostics/Programming Interface Cable

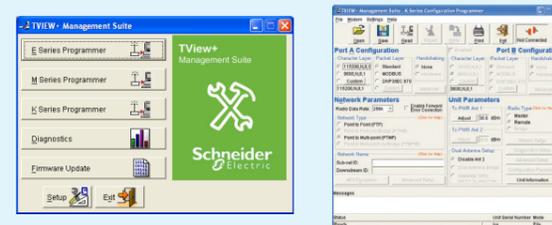


TVIEW+ Management Suite

Radio Configuration

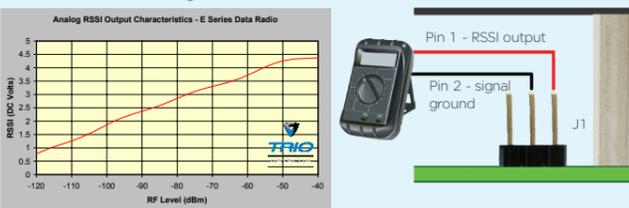
TVIEW+ offers a number of features including: Configuration (Local, or Remote - over-the-air), Remote Diagnostics Facilities and Firmware Upgrades. Example: Local configuration session -

- 1/ Attach the programming cable from a PC RS232 Port to the System Port
 - 2/ Launch TVIEW+ & Select "K-Series Programmer"
 - 3/ Select Basic Mode or Advanced Mode (Some items not available in Basic)
 - 4/ Click on the "Read" icon
 - 5/ Change the configuration as required
 - 6/ Click on "Write" to write the parameters back to the radio
- Refer to the KP & KB User Manual for detailed operation of advanced features.



Optimising the Antenna for Rx Signal

When using a directional antenna, it will be necessary to align the antenna for the best received signal. This can be done using TVIEW+ Diagnostics or by measuring the RSSI output. The RSSI output can be measured by connecting a volt meter from J1 pin 1, (RSSI output) to J1 pin 2 (GND). J1 is accessible through the open end of the enclosure. This voltage can be converted to dBm using the chart below.



LED Indicators

DC Power

If all the LEDs are off, no DC power is reaching the radio modem or the external fuse is open. Successful power-up is indicated by the Pwr/Tx LED showing a continuous GREEN state for Remotes or an alternating Red/Green for Masters.

When the transmitter is active the Pwr/ Tx LED is in a RED state.

Received Signal Indicator

A regular flashing GREEN LED indicates that the modem is synchronised to its Master. The GREEN LED will also flash when the modem is receiving data.

A regular flashing RED LED indicates the REMOTE is not synchronised to a MASTER or BRIDGE. Check the antenna, all RF connections, and the radio configuration as the Subnet ID may not match the Master or there may be insufficient RX signal or too much interference.

Port A and Port B/Diagnostics Port Data Flow

The Rx/D/TxD LEDs indicate data flow into and out of the two user ports. Data being received at the port for transmission is indicated by a RED flash, and data being received over the air and then sent from the port is shown as a GREEN flash.

Error LED Indications

In some circumstances the radio will indicate an error state. This is shown as all LEDs flashing RED for 500ms and then a pattern of green LEDs for 500ms. The pattern of green LEDs indicate the type of error:

Pwr/Tx	Sync/NoRx	Port A	Port B	Error Type
Green	Off	Green	Off	High VSWR - Check antenna and RF connections
Green	Green	Green	Off	High Temperature - Cool the radio
Green	Green	Green	Green	External Voltage too high or too low - Out of spec

FCC Compliance Notices

FCC Part 15 Notice
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received including interference that may cause undesired operation.

FCC Approved Antennas
This device can only be used with Antennas listed in the Appendix of the K-Series User Manual. Please Contact Trio Datacom if you need more information or would like to order an antenna.

RF Exposure
To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of 23 cm or more should be maintained between the antenna of this device and persons during device operation. To ensure compliance, operations at closer than this distance is not recommended. The antenna used for this transmitter must not be co-located in conjunction with any other antenna or transmitter.

MAXIMUM EIRP
FCC Regulations allow up to 36 dBm effective isotropic radiated power (EIRP). Therefore, the sum of the transmitted power (in dBm), the cabling loss and the antenna gain (in dBi) cannot exceed 36 dBm.

AUSTRALIAN COMPLIANCE NOTICE: MAXIMUM EIRP
ACMA Regulations allow up to 30 dBm (1 Watt) of effective isotropic radiated power (EIRP) in the 915MHz license free band and 36 dBm (4 Watts) of EIRP in the 2.4GHz band. Therefore, the sum of the transmitted power (in dBm), the cabling loss and the antenna gain cannot exceed the above stated EIRP limits.

Contact Details

Technical Support: The Americas
Available Monday to Friday 8:00am - 6:30pm Eastern Time
Toll free within North America: 1-888-226-6876
Direct Worldwide: +1-613-591-1943
Email: SupportTRSS@schneider-electric.com

Technical Support: Europe
Available Monday to Friday 8:30am - 5:30pm Central European Time
Direct Worldwide: +31 (71) 579 1655
Email: euro-support@controlmicrosystems.com

Technical Support: Asia
Available Monday to Friday 8:30am - 6:30pm Eastern Time (North America)
Direct Worldwide: +1-613-591-1943
Email: SupportTRSS@schneider-electric.com

Technical Support: Australia
Inside Australia: 1 300 369 233
Email: au.help@schneider-electric.com

Manufactured by Trio Datacom Pty Ltd
41 Aster Avenue, Carrum Downs
VIC, 3201, Australia.
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K-Series Quick Start Guide

KP & KB models of Radio

Step-by-Step Point to Point Setup

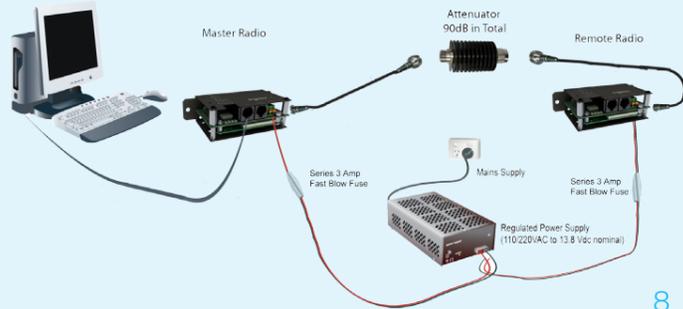
Introduction

This document describes the 10 key steps required for configuring the radio and demonstrating remote diagnostics on a pair of K-Series radios operating in Point to Point (PTP) mode. After successful diagnostics polling is achieved, subsequent testing can then be done on user equipment such as RTUs or PLCs.

For more information consult the following documents:

- K-Series User Manual
- TView+ Diagnostics Quick Start Guide
- TView+ Diagnostics User Manual

Typical Radio Setup



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Step 1 - RF and DC power connection

RF Connection

It is recommended that whip antennas are used to simulate a long distance RF link. RF attenuators are far superior to antennas for short-distance bench testing as the attenuation of the RF signals between both radios is consistent and is not subject to external interference. Alternatively 90dB of separation can be achieved with 50 ohm dummy loads or small whip antennas (minimum separation 5m/20ft).

- 1/ If the TX power of each radio is set to 20dBm (100mW) then lowpower, low cost attenuators can be used.
- 2/ Small whip antennas should only be used if the test area is known to be free from interference and signal into the receiving radio is no greater than -30dBm and Tx power is set to 10dBm.

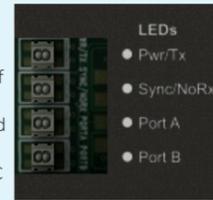
DC Power Connection

Ensure each radio is wired using the correct polarity and that power supply for has adequate current delivering capacity.

Step 2 - Power Up Radios

Nominal Power Supply Requirements 13.8V @500 mA
Apply DC power to the radios.

The "Pwr" LED should now be steady GREEN if the radio is configured as a Remote (factory default) or flash GREEN then RED if configured as a Master. If there is no LED indication, re-check the DC power cables and ensure the DC voltage is between 10V and 30V. The external fuse may be open.

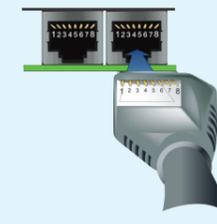


Step 3 - Setup for Radio Configuration

Connect the Master or remote radio to the computer using the Programming and Diagnostics cable by inserting the diagnostics DB-9 side of the programming cable into the PC serial port and the RJ-45 connector into Port B/Diagnostics port as shown in the following figures.
Note: For more details on programmer & diagnostics connection, see over, or consult the K-Series User Manual and TView Diagnostics User Manual.

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Port B & System/Diag - RJ45



KP & KB programming cable Cable.
Part Number: CAB-TVIEW+KBKPAPT

Step 4 - Start TView+ Management Suite on your PC



4.1 Select K-Series
Click on the "K-Series Programmer" Button to start the K-Series specific configuration program. A window will appear prompting for a Basic or Advanced user. For this example, select Advanced. The following screen will then be shown.

4.2 Read Radio Configuration

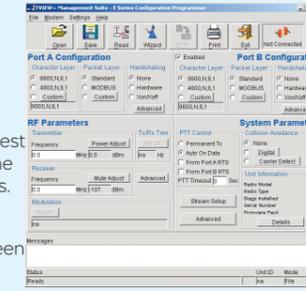
Click on the "Read" icon to read the configuration of the radio. The "connection" symbol in the top right hand corner of the screen will turn from Red to Green to indicate a successful configuration connection.



4.3 Apply Wizard

The Wizard facility is the quickest way to configure the bulk of the radio configuration parameters. Click on the Wizard icon.

The Configuration Wizard Screen will appear



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4.4 Select Point to Point
Click on (1) Point to Point Link (PTP)

Select Master or Remote depending on the unit you are configuring. This will preconfigure the radio to a known working configuration. Upon configuring the master, a manual entry of trusted remote serial number is required, this is configured within the advanced unit setup.

The Wizard does not set the SubNet ID or Tx Power. This is done in step (5).

Step 5 - Select SubNet ID and Tx Power

5.1 Set SubNet ID

Spread Spectrum radios use a Frequency Hopping Pattern which determines which frequencies are used and in what order. Interference from other systems is minimized by selecting a unique Hopping Pattern not used by other radios in the area.

K-Series radios derive their hopping pattern from the SubNet ID. The SubNet ID should be a descriptive name for the radio link. It MUST be identical in both Master and Remote radios for correct operation to occur. The factory default settings cannot be left unchanged. Up to 20 printable characters can be used.

Example: "Murray Network1" will have a different Hopping Pattern to "Murray System1" and "Murray Network2"

5.2 Set Tx Power

For this demonstration set Tx Power to 15 dBm

5.3 Write Configuration

Click on the "Write" button to send this configuration to the radio

Step 6 - Configure Remote Radio

Repeat steps (3) to (5) for the Remote radio.

Step 7 - Verify Modem Operation

The radio modems are now ready for operation. Allow upto 15 seconds for the Remote radio to synchronise with the Master radio.

7.1 Master Tx

Pwr/Tx LED will be Green but flash Red once per second.

7.2 Remote Rx

Pwr/Tx LED will be Green and Sync/NoRX LED will flash Green once per second.

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7.3 SCADA Application Check

Confirm correct operation of your application by directly connecting the PC to your RTU with a serial cable (This typically requires a cross over cable).

7.4 System Check using Port A

Confirm correct operation of the radio link by connecting the PC to Port A of one of the radios, and the RTU to Port A of the other radio.

At each radio, when data is received and sent at Port A, the Port A LED will flash GREEN for Rx, RED for Tx (Orange when Tx and Rx together)

Step 8- Diagnostics Configuration & Testing

Exit the K-Series programming software and start the TView+ Diagnostics software. This can be done by clicking on the "Diagnostics" button so long as the whole TView+ installation package has been installed. This will launch TView+ Diagnostics. To utilise the diagnostics facilities, a database must be created which includes the individual serial numbers, alarm thresholds and various other parameters of each radio modem.



8.1 Create Database
Create a New database using the menu option File -> New.

or
Open an existing database using menu option File->Open.

If a new database, the Individual Unit Database Setup window will open.

8.2 Add Radios to Database

Add the two radios you wish to monitor with TView+ diagnostics software to the database using the File -> Add/Edit/Delete option.

To add a new radio, click on Add New button. Enter an appropriate Unit Name, Location, and the Unit Serial Number.

Select the Radio Model and Type as "K-Series" & "Master" for the Master Radio and "Remote" for the Remote radio.

The communications port should be set to Serial.

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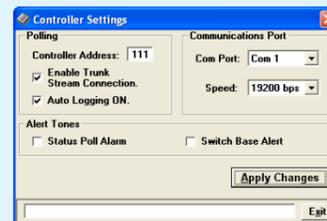
8.3 Set Alarm Limits

Adjust the TxPwr alarm limits to High = 17dBm and Low = 13dBm since the radio TX power was set to 15 dBm in Step (5).

8.4 - Controller Settings

The TView+ diagnostics controller has several settings which must be configured to be compatible with the radio which is connected to the computer running diagnostics.

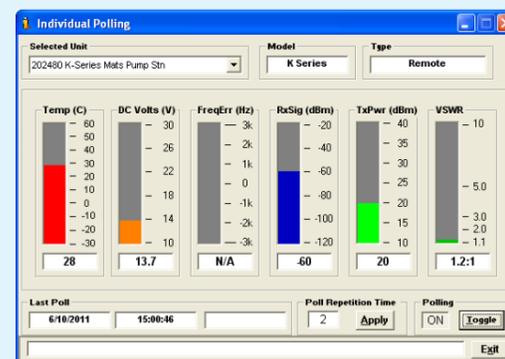
Select Settings > Controller Settings from the File menu



- 1/ Enable Trunk Stream Connection: This option should be ticked when connected to the "System Port" on an K-Series radio.
- 2/ Com Port: Select the serial port you have connected to the radio to on your PC.
- 3/ Speed: This should be set to 19200 bps.

Step 9 - Diagnostics Polling

To view the diagnostics parameters of each radio, open the Individual Polling screen by "Polling -> Individual Polling."



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Select the Master radio using the drop down "Selected Unit" entry box. After the master unit has been selected, turn on polling by clicking on the "Polling" button. The Polling indicator should show "ON" as the status. The status bars should update with radio diagnostics information as shown in the following example.

This confirms the local diagnostics setup and configuration is correct.

Now select the remote unit using the "Selected Unit" drop down box. Turn polling on. The status bars should update as shown in the example above. This now confirms the remote diagnostics setup and configuration is correct.

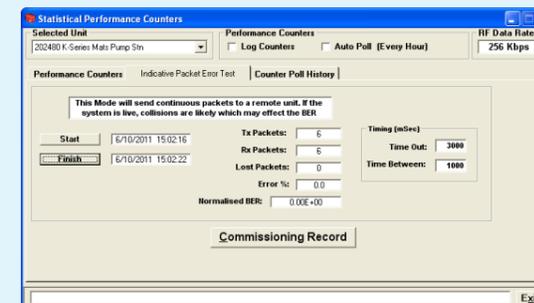
Note: Some diagnostics parameters (such as RxSig and TxPwr) will not display actual values until data has been sent or received via RF. RxSig, TxPwr and FreqErr are peak-held measurements (they show the last known readings).

Step 10 - Indicative Packet Error Testing

This tool provides a useful way to test a radio communications link by transmitting data packets between two units in a loop-backed mode.

To start the test select Tools -> Statistical Performance.

Choose the unit to test using the "Selected Unit" drop down box Start the test using the "Start" button and press the "Finish" when the required numbers of packets have been sent to finish the test. You can then print a commissioning record by clicking the "Commissioning Record" button.



This completes the basic demonstration

The Point to Point Link is set up between the two Radio Modems.

Data can now be exchanged between Master Port A and Remote Port A.

Diagnostics Information can be read at either end of link.

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Important Notices for Class I, Division 2 Groups A, B, C & D Hazardous Locations

Applies to models Kx900-xxxx-xHx(CSA Marked)

This product is suitable for use in Class I, Division 2, Groups A, B, C & D hazardous locations or non hazardous locations only. Such locations are defined in Article 500 of the US National Fire Protection Association (NFPA) publication NFPA 70, otherwise known as the National Electrical Code and in Section 18 of the Canadian Standards Association C22.1 (Canadian Electrical Code).

The transceiver has been recognised for use in these hazardous locations by the Canadian Standards Association (CSA) International. CSA certification is in accordance with CSA Standard C22.2 No. 21 3-M1 987 and UL Standard 1604 subject to the following conditions of approval:

1. The radio modem must be mounted in a suitable enclosure so that a tool is required to gain access for disconnection of antenna, power and communication cables.
2. The antenna, DC power and interface cables must be routed through conduit in accordance with the National Electrical Codes.
3. Installation, operation and maintenance of the radio modem should be in accordance with the radio modem's user manual and the National Electrical Codes.
4. Tampering or replacement with non-factory components may adversely affect the safe use of the radio modem in hazardous locations and may void the approval.
5. A power connector with locking screws as supplied by Trio Datacom MUST be used.

WARNING EXPLOSION HAZARD