RNK Products, Inc.

TR-1/EF
Telephonic Stethoscope
Installation and Operation Manual

TR-1/EF Telephonic Stethoscope Installation and Operation Manual
Revision 1.1

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This product meets the safety requirements of IEC 60601-1-1 for Type BF protection using a medical grade power supply providing 9 vdc - 12 vdc at a maximum of 600 mA.

Vdc: ⎓ Type BF applied part:

This product may be used in continuous operation.

This product is not suitable for use in the presence of a flammable anesthetic mixture with air or with continuous oxygen or nitrous oxide.

This product 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 undesirable operation.

Normal use for this product is at an ambient temperature range of +10° to +40°C, a relative humidity range of 30% to 75%, an atmospheric pressure range of 700 hPa to 1,065 hPa. It may be transported and stored at temperatures from 0°C to 50°C.

For questions or comments, contact RNK Products, Inc., 4195 US Hwy 1, Suite 101, Rockledge, FL 32955.

I. Introduction and Overview

The TR-1/EF Telephonic Stethoscope provides high quality remote auscultation with a number of valuable and unique features.

- Low bandwidth while achieving quality auscultation. The TR-1/EF connects to the system Data Channel via an RS232 interface operating at 19.2 Kb/s.
- Same model can be configured for Transmit operation or Receive operation.
- Plugging in the Chest Piece Assembly automatically puts the unit into Transmit Mode and illuminates the TX Mode light.
- In Transmit Mode, the same auscultation sounds that are sent to the remote TR-1/EF unit are also presented at the Headset jack for local monitoring.
- Leaving the Chest Piece input jack empty automatically puts the unit into Receive Mode and illuminates the RX light.
- Volume control for adjusting the sound level delivered to the Headset jack. The Volume control works in Receive Mode for sounds received from a remote TR-1/EF unit or in Transmit Mode for monitoring sounds generated from the Chest Piece Assembly plugged into that local unit.
- B/D Switch for an enhanced Bell/Diaphragm selection. The Bell (B) position cuts off the high end at 250 Hz and boosts the low frequencies below 100 Hz for enhanced heart auscultation. The Diaphragm (D) position slightly reduces the very low frequency sounds and extends the high frequencies to 1,400 Hz. The B/D Switch works in Receive Mode for sounds received from a remote TR-1/EF unit or in Transmit Mode for monitoring sounds generated from the Chest Piece Assembly plugged into that local unit.

The TR-1/EF Telephonic Stethoscope is for prescription use by medical care professionals.

II. Installation

Installing the TR-1/EF Telephonic Stethoscope is as easy as applying power and connecting the unit to a functional Data Channel.

A. Power

Power is provided to the TR-1/EF unit from a small, wall mount Power Supply. Plug the Power Supply into a 115 vac wall outlet and insert the plug at the end of the power cable into the jack at the left rear of the TR-1/EF unit.

If there is no Chest Piece Assembly plugged into the unit, the RX Mode light will be lit and the TX Mode light will be OFF. If a Chest Piece Assembly is plugged into the unit, then the TX Mode light will be lit and the RX Mode light will be OFF.

B. Data Communications Channel

The TR-1/EF Telephonic Stethoscope data interface is in asynchronous format with:

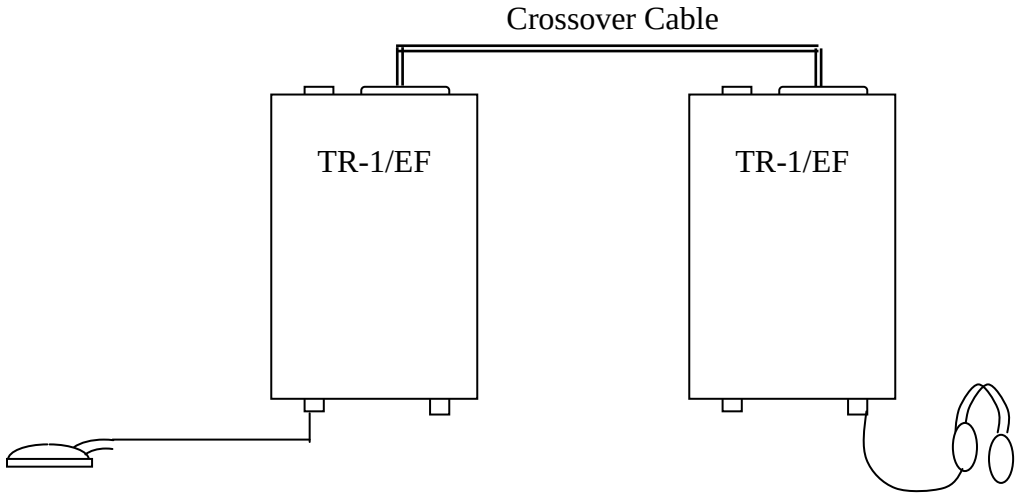
- RS232 electrical voltage levels
- 19.2 Kb/s data rate.
- 8-bits per character.
- No Parity.
- One Stop bit.

The Data Communication Channel interface must be set up to match this specification.

The TR-1/EF Telephonic Stethoscope functions as a DTE in terms of data communications. If the Data Channel linking the transmitting TR-1/EF unit to the receiving TR-1/EF unit is to be a modem, multiplexer or other similar DCE, then (probably) a straight-through cable should be used to connect the TR-1/EF units to the Data Channel interface. The TR-1/EF unit has a male DB-9 connector at the rear of the unit. Typically, DCE equipment will have a female DB-9 connector for its data communications interface. In that case, a female DB-9 to male DB-9 straight through cable should be used. Sometimes DCE equipment will have a DB-25 connector for its interface. In that case a DB-9 to DB-25 adapter may be used, or a cable with a female DB-9 connector at one end and a male DB-25 connector at the other end.

If a PC is used for the Data Channel interface, then it is important to know that the Serial Port (COM Port) of a PC is a DTE interface. In that case (or any situation where the Data Channel equipment interface is DTE), a cross-over (or null modem) cable is needed with a female DB-9 at both ends of the cable.

Before connecting the TR-1/EF units to the Data Channel (or if data communications problems arise), it is a good idea to test the TR-1/EF units back-to-back to verify that they are working properly by themselves. Apply power to both TR-1/EF units and interconnect them with a male DB-9 to male DB-9 cross-over cable as shown below.



If sounds from the Chest Piece are heard at the headset, then the TR-1/EF units are working properly and if problems arise in connecting the unit to the Data Channel, it is appropriate to the concentrate on getting the signal through the Data Communications Channel.

C. Mode Selection

If there is no Chest Piece Assembly plugged into the Chest Piece jack of the unit, then the unit will be in Receive Mode and the RX Mode light will be illuminated. The TX Mode light will be OFF.

If a Chest Piece Assembly is plugged into the Chest Piece jack of the unit, then the unit will be in Transmit Mode and the TX Mode light will be illuminated. The RX Mode light will be OFF.

III. Operation

For a normal remote auscultation exam, the TR-1/EF unit located with the patient is in Transmit Mode and the TR-1/EF unit with the clinician is in the Receive Mode.

A. TX Mode

To operate as an auscultation transmitting unit the TR-1/EF must have a Chest Piece Assembly plugged into the Chest Piece jack. That will put the unit into Transmit Mode and illuminate the TX Mode light located just over the Chest Piece jack. Sounds from the Chest Piece will be converted to digital signals and sent out over the RS232 data interface.

In addition to transmitting the digital signals, the auscultation sounds from the Chest Piece are looped back and presented at the local Headset jack. Thus, with an optional Headset, the local user can listen to the same auscultation sounds that the listener at the remote TR-1/EF (in Receive Mode) would hear.

Volume to the Headset can be increased by turning the Volume control clockwise. Increasing the volume too high can cause distortion in the Headset and will also increase the background noise. Start with the lowest volume necessary to hear the sounds, then turn up the volume as needed to focus in on specific sounds.

The B/D Switch can be used in an auscultation exam similarly to a traditional stethoscope. The Bell (B) position cuts off the high end at 250 Hz and boosts the low frequencies below 100 Hz for enhanced heart auscultation. The Diaphragm (D) position slightly reduces the very low frequency sounds and extends the high frequencies to 1,400 Hz.

Adjusting the Volume or changing the B/D Switch only affects what the local listener hears and does not affect what the remote TR-1/EF listener would hear. The remote TR-1/EF listener has independent Volume and B/D Switch controls.

B. RX Mode

Without a Chest Piece Assembly plugged into the Chest Piece jack of the TR-1, the unit is automatically in the Receive Mode. With the Data Communications Channel established and a Headset plugged into the Headset jack of the unit, the clinician is set up to hear the stethoscope sounds from the remote TR-1/EF (in Transmit Mode).

Volume to the Headset can be increased by turning the Volume control clockwise. Increasing the volume too high can cause distortion in the Headset and will also increase the background noise. Start with the lowest volume necessary to hear the sounds, then turn up the volume as needed to focus in on specific sounds.

The B/D Switch can be used in an auscultation exam similarly to a traditional stethoscope. The Bell (B) position cuts off the high end at 250 Hz and boosts the low frequency sounds below 100 Hz for enhanced heart auscultation. The Diaphragm (D) position slightly reduces the very low frequencies and extends the high frequencies to 1,400 Hz.

IV. Maintenance and Calibration

There is no scheduled maintenance required for the TR-1/EF Telephonic Stethoscope.

There is no calibration required for the TR-1/EF Telephonic Stethoscope.

If problems should arise with the TR-1/EF Telephonic Stethoscope, the table in the following section may be used to trouble shoot the problem. Any failed units should be returned for repair.

The TR-1/EF Telephonic Stethoscope may be cleaned with a damp cloth.

V. Trouble Shooting

Following is a chart to assist in trouble shooting problems which may arise during installation or operation.

Symptoms	Possible Causes and Solutions
Neither TX Mode nor RX Mode lights come ON	Power plug not inserted all the way into the jack. *Make sure the power plug is fully seated.* No power at the wall outlet. *Try a lamp or other electrical item at that wall outlet to determine if there is power.* *If there is no power, fins a power outlet that does provide the proper 115 vac.* If there is power at the wall outlet, *Try another TR-1/EF Power Supply.*

	If the TR-1/EF works, return the Power Supply for repair/replacement. *If the TR-1/EF unit still does not work, return the TR-1/EF unit for repair/replacement.*
Chest Piece is plugged in, but the RX Mode light stays ON and the TX Mode light is OFF.	The Chest Piece Assembly is not plugged in all the way. *Make sure Chest Piece Assembly plug is fully seated.* The TR-1/EF unit has failed. *Return the TR-1/EF unit for repair/replacement.*
Nothing is plugged into Chest Piece jack, but the TX Mode light is ON and RX Mode light is OFF	The TR-1/EF unit has failed. *Return the TR-1/EF unit for repair/replacement.*
The Chest Piece is plugged in, the TX Mode light is lit, but there is no sound heard in the local Headset.	The Chest Piece Assembly is not plugged in all the way. *Make sure Chest Piece Assembly plug is fully seated.* The Headset is not plugged in all the way. *Make sure Headset plug is fully seated.* The Chest Piece Assembly and Headset are plugged into the wrong jacks. *Make sure Chest Piece Assembly and Headset are plugged into the proper jacks and are fully seated.*
The Chest Piece is plugged in, the TX Mode light is lit, sounds can be heard in the local Headset, but there is no sounds heard in the Headset of the remote TR-1/EF.	The remote TR-1/EF unit is not in Receive Mode. *Make sure that on the remote unit, the Headset is fully seated in the Headset jack and nothing is plugged into the Chest Piece jack. The RX Mode light should be ON.* Test the TR-1/EF units back-to-back with a cross-over cable. *If that test fails, then one of the two TR-1/EF units or the cable is bad. Test with a third unit and new cable to determine which has failed.* *Return the failed unit for repair/replacement.* If the TR-1/EF units test good back-to-back, trouble shoot the Data Communications Channel. *See Section II. B. for proper Data Communication Channel setup.*