Radiation Survey Instrument Simulators

Model TXR-21 Owner's Manual

TELETRIX CORPORATION

TXR-21 SURVEY METER SIMULATOR

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SAFETY PRECAUTIONS

Electric Shock Hazards

The Model TXR-21 Survey Meter Simulator is powered by its self-contained battery pack that is charged by one of the supplied chargers. To reduce the risk of electric shock, make certain that the charger is removed before removing the cover of the TXR-21 Survey Meter Simulator. To prevent fire or shock hazard, do not expose any component part of the Survey Meter Simulator package to rain or moisture.

There are no user serviceable parts within the TXT-21 Remote Controller except for the battery. If the battery is suspect, refer to qualified personnel only.

When repair or adjustment is required in either the TXR-21 or TXT-21, refer to qualified personnel, as the risk of electric shock exists in these units.

******** CAUTION ********

Battery Charger is intended for 120 VAC indoor use only. Do not attempt to charge the TXR-21 Survey Meter Simulator or the TXT-21 Remote Controller with any charger other than the supplied charger with UL listing and CSA certification to avoid potential hazard from electric shock or fire.

Regarding RF Emissions

The 900 Series Remote Controller, TXT-21, uses RF (Radio Frequency) transmission for communications with the TXR-21. The operating frequencies are on 8 user-selectable channels between 902 and 928 MHz.

******** CAUTION ********

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

It is recommended that nuclear plant instrument personnel be notified of the operation of such a device if it is to be operated within or close to plant boundaries.

A copy of the technical report filed with the FCC will be supplied upon request if compliance data is needed. Contact us at:

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INTRODUCTION

Congratulations on your purchase of the Teletrix Survey Meter Simulator. The simulator has been designed with reliability of operation and simplicity of purpose and should yield years of trouble free operation with the proper maintenance and care. This manual is intended to provide the end-users with instructions on the functions, operations and care of the simulator.

ABOUT THE SURVEY METER SIMULATOR

The Teletrix Survey Meter Simulator is an operating replica of an actual GM survey meter radiation detector. The Teletrix Survey Meter Simulator produces an artificial reading of radiation levels by way of remote control versus directly reading a "live" source. The TXR-21 Simulator does not detect radiation. Instead, the TXT-21 Remote Controller excites the TXR-21 with a modulated RF data stream to produce an artificial reading of radiation levels. The operator of the TXT-21 Remote Controller merely sets a particular level of simulated radiation that the operator of the TXR-21 Survey Meter Simulator should be reading as a result of the actions being taken. The operator of the TXR-21 will be able to manipulate the controls on the TXR-21 to achieve the proper reading as transmitted by the TXT-21 Remote Controller.

The complete instrument package you have received is ready for operation and comes with the following:

1 -- TXR-21 Survey Meter Simulator
1 -- TXT-21 Remote Controller
2 – Battery Chargers

CONTROLS AND INDICATORS

The controls and indicators on the TXR-21 provide the functions of an actual survey meter. The TXT-21 has only 3 controls that vary the indications obtained from the TXR-21.

Locations

TXR-21 Survey Meter Simulator

- Meter -- Located on the front of the TXR-21 the meter is scaled from 0-500 COUNTS/MIN with a BATT TEST span and a high voltage scale from 0 to 2.5 KV.
- Range Switch -- Located on the top of the TXR-21 this is a 6-position switch with 4 decades of range selection, BAT check, and ON/OFF function.
- 6 external adjustment pots, one per range of indication, HV, and DIS located on the front of the case.
- AUD -- 2-position toggle switch located on the front of the TXR-21 used to enable or disable the audio output.
- F-S -- This switch is located on the front of the TXR-21 and used for controlling meter response.
- RES -- A pushbutton located on the front of the TXR-21 used to reset the meter.
- HV -- A pushbutton located on the front of the TXR-21 used to check the high voltage setting.

- BNC Connector -- Is provided to allow for attachment of a probe or probe simulator.
- Charger Receptacle -- Mounted on the bottom edge of the case top.

TXT-21 Remote Controller

The controls and indicators on the TXT-21 and their locations are as follows:

- ON/OFF -- This is a slide switch located on the front of theTXT-21.
- COUNTS PER MINUTE -- The main output control knobs are located on the front of the TXT-21 with the BACKGROUND control in white and the CONTAMINATION control in yellow.
- BACKGROUND/CONTAMINATION -- This pushbutton is on the front of the unit and indicates which of the above mentioned output control settings are being transmitted to the TXR-21.
- BATTERY -- This red indicator is only visable when the unit is on or charging.
- Charger Receptacle -- Mounted on the bottom edge of the case.

Functions

- Range Switch -- The functions of this 6-postion switch are as follows:
  - OFF -- Interrupts power to the TXR-21.
  - BAT -- Displays battery condition on the meter. An indication within the BATT TEST range indicates that the unit can be operated properly
  - 1K -- This is the 1000 times multiplier for meter reading
  - X100 -- This is the 100 times multiplier for meter reading
  - X10 -- This is the 10 times multiplier for meter reading
  - X1 -- This is the times 1 multiplier for meter reading
- AUD -- This 2-position toggle switch is used to enable or disable the audio output of the internal speaker.
- F-S -- This switch is located on the front of the TXR-21 and used for controlling meter response. The selections are FAST and SLOW. Response can be varied between approximately 4 and 22 seconds for a reading 90% of full scale for slow and fast settings respectively.
- Reset -- This pushbutton is used to reset the meter when saturated. The meter will zero then return to the existing reading.
- BNC Connector -- Is provided to allow for attachment of a probe simulator.
- Charger Receptacle -- Mounted on the top end near the latching mechanism, this connector is used with the supplied charger only.

TXT-21 Remote Controller

The controls and indicators on the TXT-21 and their locations areas follows:

- ON/OFF -- This slide switch applies and interrupts power to the TXT-21. When the battery charger unit is plugged into the TXT-21, the unit will not transmit any signal even if the switch is in the ON position.

- COUNTS PER MINUTE -- These are the main output control. They are single-turn knobs that cover all four (4) decades of range selection available on the TXR-21. There are two controls to allow for selecting a background setting as well as a contamination setting. Only one of these controls is active at a time as determined by the companying pushbutton. Color-coding is used as a visual aid. The reading on the TXR-21 will correspond to the chosen reading on the TXT-21 within approximately 5-10% of the selected scale.

- BACKGROUND/CONTAMINATION -- This pushbutton selects which output control is active. This allows the instructor to set a background setting and a contamination setting independently of each other and then switch between the two during an exercise with the highest degree of repeatability.

- BATTERY—This indication relates to the operator of the TXT-21 four types of intelligence:
    - If the unit is turned OFF or the charge on the battery is insufficient for proper operation of the TXT-21 the indication is extinguished. Automatic shutdown of the TXT-21 occurs to prevent damage to the battery cells and extend the life of the batteries,
    - If the battery condition is satisfactory for operation the indication blinks at a rate of once every 2 seconds,
    - If the battery condition is approaching a level that will require a charge to remain operating the TXT-21, the indication blinks at a rate of twice the normal rate. This occurs for a period of about 4 minutes prior to the unit shutting itself down.
    - When the TXT-21 is being charged with the supplied charger, the indication is continuously lit. A charge of 12-14 hours will fully charge the TXT-21 for approximately 2 days of operation.
- Charger receptacle -- Mating jack for charging unit

Operation of the Instrument Package

The complete TXR-21 Survey Meter Simulator instrument package comes ready for simulation with the TXT-21 Remote Controller. The TXR-21 is a replica of an actual survey meter and therefore the controls perform the functions necessary to make this an operating replica.

The TXT-21 Remote Controller is the instrument performing the functions that control the TXR-21. The TXT-21 has 3 controls that are designed for ease of operation in reliably simulating contamination. The main output controls each cover 4 decades of ranges from 0-500,000 CPM in a single turn. The CONTAMINATION/BACKGROUND pushbutton selects which output control's setting is being transmitted to the TXR-21.

As an example, an exercise can be set up with the following parameters:

- A piping system has a leaking valve.
- The background radiation present is 100 CPM.
- The valve has contamination present at a level of 4000 CPM.

In preparing for the exercise the instructor will prepare the TXT-21 by setting the background control to 100 CPM and the contamination control to 4000 CPM. The unit is now set for the exercise. The only control to operate during the exercise will be the pushbutton. When released, the pushbutton directs the TXT-21 to transmit the background setting. When depressed, the contamination setting is transmitted. During the exercise, when the student is frisking the valve, the only action necessary for the instructor to take is that of depressing the pushbutton when the student approaches the valve area to initiate the transmission of the contamination setting.

The TXR-21 instrument package uses RF communications in the 900 MHz range to transmit control signal from the TXT-21 to the TXR-21. This is a reliable communications link within an area of 100-200 feet and perhaps greater outdoors.

Operating the simulators in these areas prior to using the instrument package should be experimented with in order to identify dead areas or problem areas with the communications. This will aid the operators to most effectively operate the instruments.

In addition to examining the operating area the instruments to be used in conjunction with each other should be properly teamed to avoid problems. Each instrument package, when delivered, is set to a certain frequency, or channel, so that the TXR-21 and TXT-21 in each package matches. There are 8 frequencies, or channels, which the instruments can be operated on, therefore there can only be 8 instrument packages operated in the same area at the same time. Instruments on the same channel will not function properly when used in proximity to each other at the same time. When shipped, like serial numbered sets match each other in channel selection.

To maintain the frequency match between TXR-21 and TXT-21 use the serial numbers, which are labeled on the sides and ends of the instruments. Match the TXR-21 serial number to the TXT-21 serial number and a frequency, or channel, match is ensured. The channel, or frequency, of each instrument is also marked. These channels are for aiding the user in selecting optimum frequency spacing when using multiple instruments.

CARE AND MAINTENANCE

The proper care and maintenance of the TXR-21 Survey Meter Simulator will provide years of trouble-free and reliable operation. Following a few prescribed maintenance methods regarding handling and battery care, the maintenance of this instrument package can become a regular routine when preparing it for operation.

Handling

When operating or storing the TXR-21 Survey Meter Simulator instrument package the units must be protected from moisture as his can cause electric shock hazards as well as corrosion of internal parts, causing degradation of operating parameters.

When cleaning the units in the instrument package use a damp cloth along with a mild soap solution, as this will remove most dirt and stains. The painted surfaces are not protected against the use of harmful acidic or abrasive cleaning solvents.

Batteries

Included within both the TXR-21 and TXT-21 is a battery pack. In each the battery provides the primary source of power. Each is a rechargeable NiMH pack. The supplied charger is supplied for charging the units at a rate that will provide a full charge from a fully discharged pack in approximately 6 hrs. NiMH battery care employs a few major considerations to ensure long, reliable service.

When discharging the units, avoid discharging for prolonged periods of time as this may deteriorate the charge efficiency of the battery packs.

Avoid overcharging as this also may deteriorate the charge efficiency of the battery packs.

Avoid charging the battery packs at low temperatures, below 40^{o}F, and high temperatures, above 120^{o}F. Charging at low temperatures increases the gas pressure inside the individual cells of the battery packs and may operate the safety vent in the individual cells eventually deteriorating the capacity of the pack. Charging efficiency decreases at high temperatures causing the deterioration of cell materials.

If the TXR-21 and TXT-21 are stored for long periods of time, they should be stored with the batteries in a discharged state. Even though the capacity of the batteries will be less than normal at the first charging after long-term storage, it will be recovered within a few charge/discharge cycles. Also for long-term storage the units along with the battery packs should be stored in normal, dry, ambient conditions, preferably at room temperatures. When the time comes to replace a battery pack, the entire pack should be disposed of properly. Do not incinerate or disassemble the battery pack or the individual cells. Replace the battery packs only with new batteries of the same type and capacity. Teletrix Corporation will supply replacement battery packs, complete with the correct connectors, upon request for a nominal charge.