

WATER RESISTANT ENCLOSURE

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FORWARD

The purpose of this manual is to provide the customer with the operating procedures essential for the promotion of proper machine operation for its intended purpose. It is important to stress proper usage. All information in the manual should be **READ** and **UNDERSTOOD** before any attempt is made to operate the equipment.

SINCE THE MANUFACTURER HAS NO DIRECT CONTROL OVER EQUIPMENT APPLICATION AND OPERATION, CONFORMANCE WITH GOOD SAFETY PRACTICE IN THIS AREA IS THE RESPONSIBILITY OF THE USER AND HIS OPERATING PERSONNEL.

ALL PROCEDURES HEREIN ARE BASED ON THE USE OF THE EQUIPMENT UNDER PROPER OPERATING CONDITIONS, WITH NO DEVIATIONS FROM THE ORIGINAL DESIGN. ALTERATION AND/OR MODIFICATION OF THE EQUIPMENT IS STRICTLY FORBIDDEN WITHOUT WRITTEN APPROVAL FROM MICROTRONICS, INC..

REMEMBER, EQUIPMENT IS ONLY AS SAFE AS THOSE WHO OPERATE IT!

SECTION I INTROUCTION

INTRODUCTION

The purpose of this manual is to provide essential information concerning operating, troubleshooting and servicing of your Microtronics Radio Control.

The system is designed for use in mobile DC applications including truck mounted cranes, winches, concrete pumps, chutes, boom trucks, etc.. The unit will accept and control voltages from 10 VDC to 24 VDC. Any applications currently utilizing a "cable" remote may use the radio control.

The radio control system eliminates the restrictions of using a cable remote control allowing:

- ~ More freedom of movement for greater visibility.
- ~ Less downtime from broken or cut cables.
- ~ Increased safety by removing the operator from dangerous situations.
- ~ Protection from electrical shock.

WARNING:

STRICT OBSERVANCE AND EXECUTION OF ALL OPERATING AND SAFETY PROCEDURES SET FORTH IN THIS MANUAL WILL BETTER QUALIFY PERSONNEL TO PREFORM IN A SAFER, MORE PROFESSIONAL MANNER, BUT DOES NOT RELEASE USERS FROM THE RESPONSIBILITY OF OBTAINING, READING AND FULLY UNDERSTANDING THE OPERATION MANUALS WHICH ARE SHIPPED WITH EACH SPECIFIC RADIO REMOTE CONTROL.

SINCE THE MANUFACTURER HAS NO DIRECT CONTROL OVER THE APPLICATION AND OPERATION, CONFORMANCE WITH GOOD SAFETY PRACTICE IN THIS AREA IS THE RESPONSIBILITY OF THE USER AND OPERATING PERSONNEL.

SAFETY

The MICROTRONICS industrial remote control system offers the best solutions to safety, speed, ease of use, less downtime, and overall maneuverability. Like any device, there are precautions and common sense that work hand in hand to assure safe and reliable operations.

Operating any equipment posses a certain amount of risk. Ideally, the operator would not be tied to the equipment being operated either mechanically or by cable remote since electrocution could result should the equipment come in contact with electrical power lines. Also, the ideal distance from the equipment being operated would be greater than what the equipment could reach or clear of surrounding dangers. Using the MICROTRONICS industrial radio remote control systems allow the solutions to achieve these ideal situations. Being wireless allows the operator to operate their equipment at this safe distance and be electrically isolated should the equipment come in contact with electrical power lines.

Always operate at this safe distance and do not allow others within these boundaries. Never allow any operation until the operator has read all instructions and has become completely familiar with the total system. Should anything unexplained, unpredicted, or incorrect happen, immediately shut down the complete system and investigate! This includes shutting down all electronics, hydraulics, power take-offs, and engines.

NEVER resume operation until defect has been corrected!

COMPONENTS

The radio remote control system consists of a modulator/transmitter (transmitter) unit and a receiver/decoder (receiver) unit. The system operates on the 5 RF channels in accordance with FCC subpart D - Lower Power Communications Devices, part 15.117. Use of this device is subject to the provisions of FCC Part 25.103. A license is **NOT** required to operate this system.

SECTION II - THEORY OF OPERATION

TRANSMITTER

Several variations of the radio are available. These are for operation of the various types of mobile DC equipment. The transmitter generates an RF signal which is FM modulated. The modulation is a 120-bit data stream with start and stop bits, information concerning the selected switch being activated, and a specialized algorithm developed to ensure the validity of the transmission. Address information is also transmitted to enable the transmitter to "talk" to the associated receiver. This address information is set at the factory so no two devices will have the same address. There may be over 20,000 units in the same vicinity with no cross activation.

RECEIVER

The receiver receives the signal transmitted by the transmitter through an antenna, decodes the data stream, and checks for validity of the address and the start and stop bits of the received data. If this is correct, a proprietary software algorithm is performed to accept or reject the information to be passed on to the outputs. If, for any reason, this test fails no output will be allowed to function. Once this test has passed the appropriate output and valve will be activated to allow the machine to function.

EMERGENCY STOP FUNCTION

Each unit is equipped with an emergency stop switch-a momentary push-button switch. When initially using the radio remote control system, power to the receiver must be turned on first. This allows power to the microprocessor and waits for a special code from the transmitter to activate a relay which makes power available to the output driver circuit.

Should an emergency situation occur, the receiver can be "shut down" by pressing the emergency stop. When the receiver receives this special code, the power to the output driver circuit will be deactivated and the dump valve sends oil directly to the tank.

To resume operation the transmitter must again send the special code to reactivate the receiver. To achieve this, turn the transmitter power off and back on. The transmitter will go through its "start up" routine to initialize the receiver. Please instruct your operators how to use this emergency stop and insist that they operate this feature to become familiar with the characteristics involved.

SECTION III - INSTALLATION

TRANSMITTER

Each Unit's address code has been preset at the factory. (We advise not to change codes without first consulting the factory.) The transmitter is powered by a disposable 9 volt battery. (we do not recommend using a Ni-Cad since the operating time is drastically reduced.) To install the 9 volt battery, remove the battery cover on the rear of the transmitter. Removal of the battery cover is easily achieved by releasing the latch clip. Care should be taken not to use excessive force to prevent damage to the cover. Insert the battery making sure the polarity of the terminals is correct.

RECEIVER

The water resistant receiver can be mounted in a external or internal location. If installed in a tool box or compartment, care should be taken in routing cable and wires. So when tools or supplies are inserted or removed they do not snag or pull on the cabling.

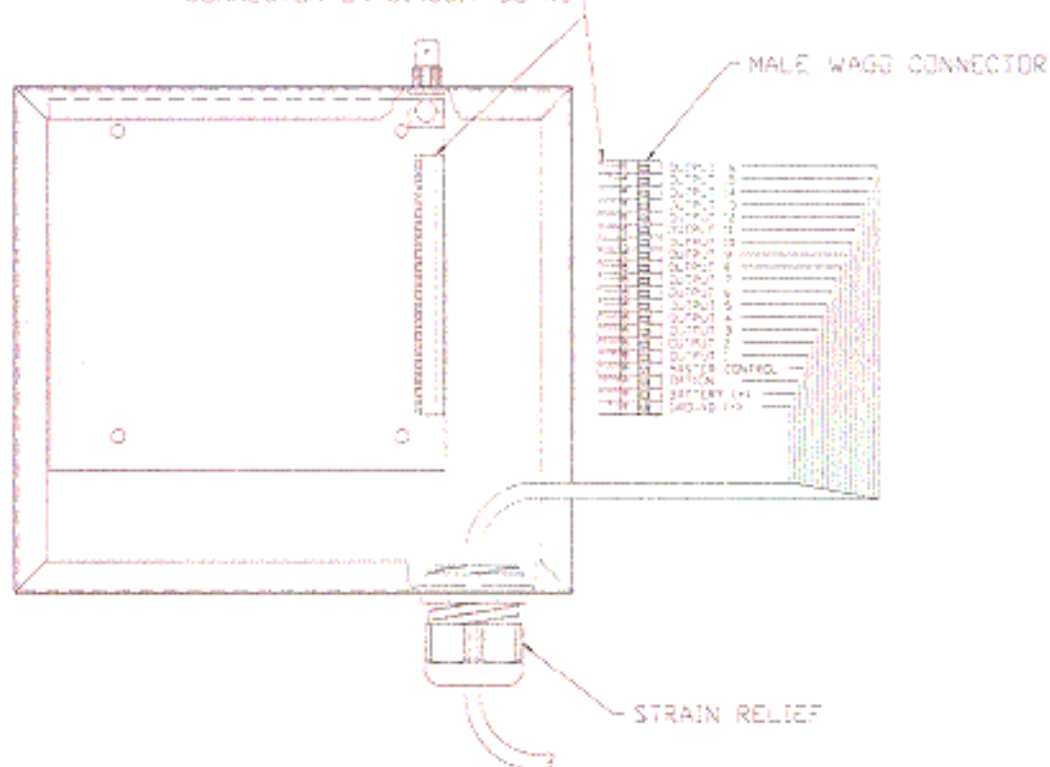
Use mounting holes on the receiver for securing system. (Review mounting and cabling locations prior to installation.)

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Drawing "A"

RECEIVER WIRING ILLUSTRATION

ONCE WIRING IS INSTALLED ON FEMALE CONNECTOR, ENCASE FEMALE CONNECTOR TO MALE CONNECTOR ON CIRCUIT BOARD



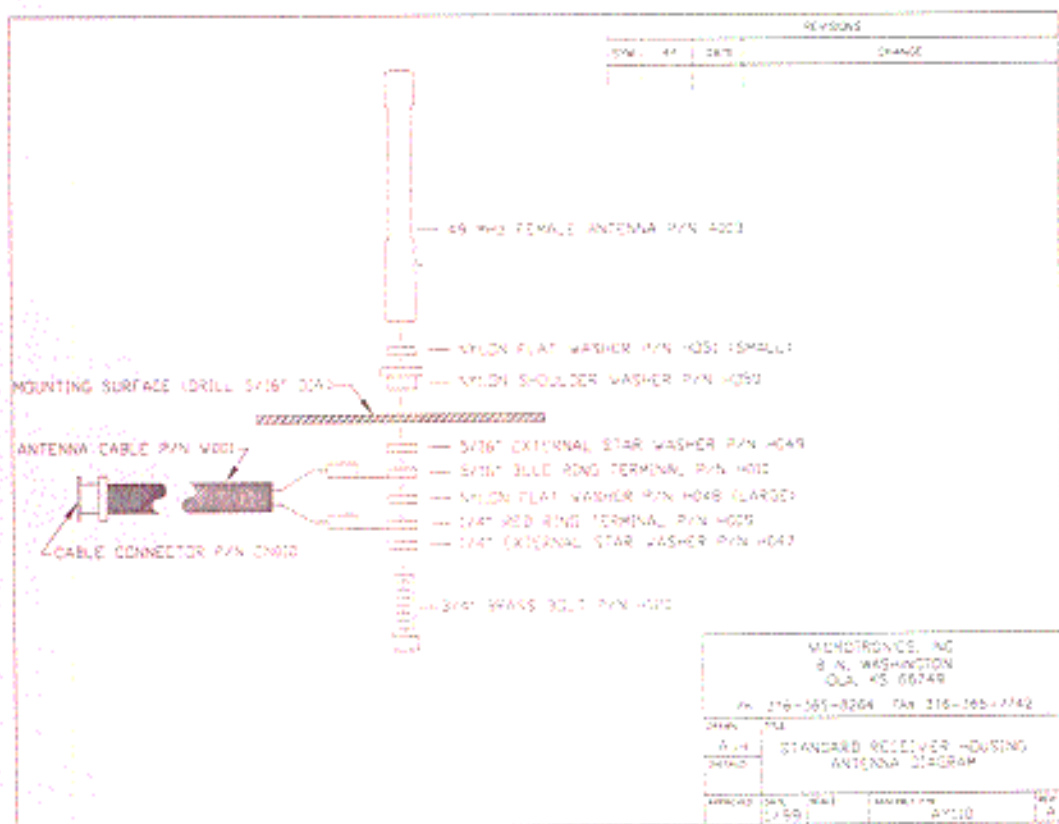
CONNECTOR INSTRUCTIONS

Adequate planning is required so function wires can be fed through strain relief to male wago connector. Strip all wires to be inserted into the male wago connector to a length of 3/8 to 1/2 inch. Insert a small straight blade screwdriver into the square hole of the desired pin. Prying opposite of the round hole below. Insert the appropriate stripped wire into the round hole directly below the screwdriver. Release the screwdriver and the connection is complete. This connector will accept wire sizes from 14 gauge to 22 gauge.

When connecting the individual wires, be sure that the connector clamps onto the bare stripped wire only. If any insulation gets into the connector it may cause a poor connection and result in intermittent or complete failure.

Keep in mind that the unit comes standard with 15 feet of antenna cable.

Drawing "B"



RECEIVER INPUT & OUTPUT

Each unit comes with a connector chart (chart C) with the appropriate input & output instructions for your unit. There are three (3) input to the receiver:

- A.) BNC connector
- B.) Positive D.C. current
- C.) Negative ground

The unit derives power from a 10 to 24 volt D.C. power system that is negative ground. First hook up power inputs to the receiver. It is required to install a power switch for the receiver in series (in-line) with the D.C. power system (battery).

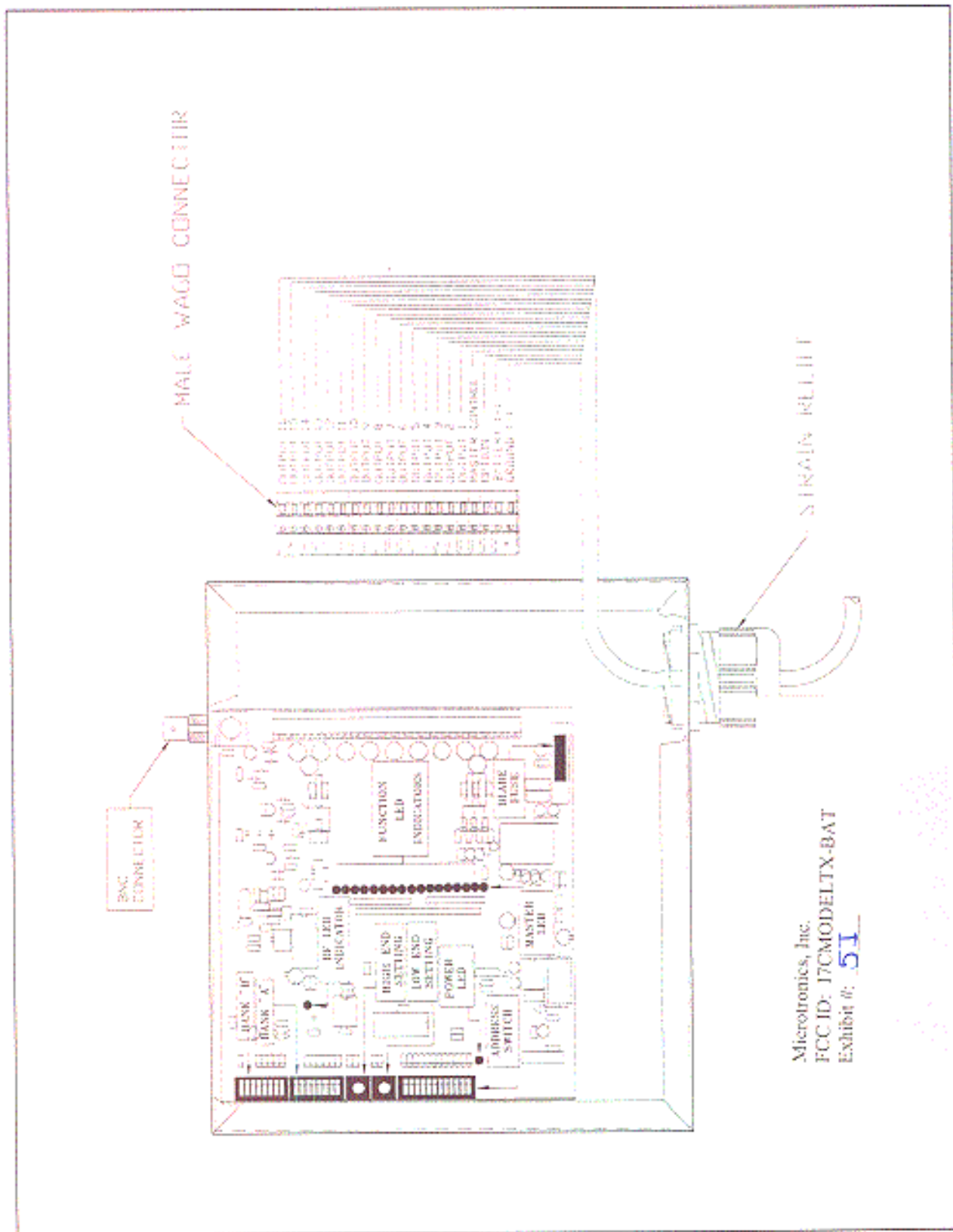
1. When power is supplied to the receiver the Power Indicator LED will come on. If not, verify correct polarity of power and condition of fuse.
2. Turn on the power to the transmitter. At this time, the transmitter will send out a 10 second signal to the receiver to initialize the system. The RF Indicator LED and the on-board relay will be energized. Once the initial 10 seconds has lapsed, the RF Indicator LED will illuminate each time the transmitter is activated. If only the RF Indicator LED illuminates when the transmitter is activated but does not energize the relay, verify that the 12 position

address switches on the receiver match those inside the transmitter.

3. Activate each function with the transmitter and notice that the appropriate output Function Indicator LED illuminates inside the receiver. (The LED's parallel to the orange connector.)
4. Turn power off to the receiver and transmitter.
5. Hook up outputs from receiver to electric solenoids. (Consult Chart C.)
6. Re-install the receiver cover.
7. With the equipment located in a clear, open air, test the complete system for operation.

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Drawing "C"



SECTION IV - SPECIFICATIONS

TRANSMITTER

~ Material	Die Cast Aluminum With Sealed Gasket For Lid
~ Color	Gray
~ Switch Type	Industrial Environmentally Sealed Toggle
~ Proportional	Single Axis Bat. Industrial
~ Dimension	7" L X 3 1/4" W X 2 1/4" D
~ Approx. Weight	3 Pounds
~ Power Source	9 Volt Battery (Disposable / Not Rechargeable)
~ Operating Temperature	-20 C To +50 C
~ Frequency	49 Mhz. Band
~ Antenna	External 6" Flex
~ Address Codes	> 20,000 Combinations Including RF Bands

RECEIVER

~ Material	18 Gauge Aluminum Housing
~ Approx. Weight	2 Pounds
~ Dimensions	10 1/2" X 8 1/8" x 3 1/4"
~ Number Outputs	1 To 17 (Unit can be customized for more output.)
~ Control Voltage Range	10 - 24 VDC
~ Power Supply Operation	10 - 24 VDC
~ Connector	Cage-Clamp Style Connection
~ Operating Temperature	-20 C To +50 C

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SECTION V - SERVICE

CARE and MAINTENANCE of TRANSMITTER

As with any electronic device, care should be taken not to subject the transmitter to excessive abuse. The MICROTRONICS transmitter is a very rugged instrument and will withstand normal use. The transmitter housing is made of a durable material and will serve many years of use. The toggle switches are industrial grade, self-cleaning, environmentally sealed switches. To remove dirt, grease, oil, and etc., wipe with a cloth soaked with soap and water. For those hard stains, a light alcohol based cleaner should be used. Should moisture build up inside the housing, remove the cover and allow to air dry. This process may speed up using a blow drier set on a low heat range.

TROUBLESHOOTING GUIDE

If problems occur follow these steps:

1. Make sure the 9 volt battery is good in the transmitter.
2. Be sure the antenna is free of vertical metal obstruction a minimum of 2 feet.
3. Any excess antenna cable should **NOT** be coiled together.
4. Be certain the antenna is properly installed (wire brush the area the antenna is mounted on) and that there is nothing touching the bare portion of wires at the antenna connection.
5. Review the antenna assembly checking to see if it is correctly installed.
6. Remove the lid, view the PC board in the receiver housing and refer to the installation instructions. Get familiar with the components on the PC board. Then furnish 12 volts (DC) and ground the proper connections on the orange connector. The power indicator LED should be "on".
7. Place a new 9 volt (DC) battery in the hand held transmitter and turn the power switch "on". The RF indicator LED should stay on for 10 seconds. Get familiar with the white label above the orange connector and make note of the bar of LED's that run left to right from the 15 amp fuse. When the toggle switch on the transmitter is activated (a momentary function such as boom up) there will be two output status indicator LED's light up on bar of LED's. One is the master control LED and the second is the function LED. Each output status indicator matches to one output on the orange connector. Using a test light or voltmeter, when function is activated the output on the orange connector can be tested for 12 volts (DC).
8. If you are testing a "LATCHING" function such as pump "on", you will only see one LED light up the bar of the output indicators and will stay on until the same toggle function is activated a second time, unless the radio system you are testing has a custom software program. If so, consult the factory.
9. **CALL THE FACTORY FOR FURTHER INSTRUCTIONS.**

SECTION VI - WARRANTY

Microtronics, Inc. will warrant all new equipment manufactured by it to be free of defects in material and workmanship for a period of one year, under normal use, from the date of purchase.

This warranty is limited only to the replacement or repair at the factory or other points designated by Microtronics, Inc. of the part or parts, as may appear to Microtronics, Inc. upon inspection, to be defective in material or workmanship.

This warranty shall not obligate Microtronics, Inc. to pay the cost of labor or transportation charges in connection with the replacement or repair of any parts found to be defective. This warranty shall not apply to any product upon which repairs or alterations have been made unless they were authorized by Microtronics, Inc. nor shall the warranty apply to products damaged by mishandling, abuse, misuse, accident, alteration, improper installation or repair after originally shipped by Microtronics, Inc..

No warranty is made with respect to accessories or other components that are manufactured by other companies and are covered under or subject to the warranties of their respective manufactures.

Microtronics, Inc. accepts no liability for oral representations made by sellers of its product.

Microtronics, Inc. reserves the right to change, modify or improve its products, their design, or change material at any time without any obligation to make changes or improvement to the equipment previously sold or contracted.

It is expressly understood that no warranty, expressed or implied, that the equipment manufactured by Microtronics, Inc. is fit for the purpose of lifting or moving persons or other improper use and there is no implied warranty for such purpose.

THIS WARRANTY STATES SELLER'S ENTIRE AND EXCLUSIVE LIABILITY AND CONTAINS BUYER'S EXCLUSIVE REMEDY FOR ANY SUCH DAMAGES IN CONNECTION WITH THE SALE OR FURNISHINGS BY MICROTRONICS, INC. OF PRODUCTS, THEIR DESIGN, SUITABLE FOR USE, INSTALLATION OR OPERATION, OR FOR ANY CLAIMED DEFECTS THERIN. SELLER WILL IN NO EVENT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES WHATSOEVER. LIABILITY IS LIMITED TO THE PRICE RECEIVED FOR GOODS, OR ANY PARTS THEREOF, FOR WHICH LIABILITY IS CLAIMED. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED. THERE ARE NO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

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