



Service Manual
EASI - 2000

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08/00

General Description

Installation

System Tuning

Transmitter

Receiver

Troubleshooting

General Technical Description

The EASI Article Surveillance System uses a swept radio frequency (RF) signal to detect resonant circuit tags. The system is designed to be compatible with all 8.2MHz, 9.5 MHz, and 10.0 MHz resonant RF tags. A single aisle system consists of a low voltage power supply, one receiver antenna, and one transmitter antenna. Power requirements of the standard system are 110 volt Vac/60 Hz. Power supplies with other input voltages are available upon request.

How the System Works

The transmitting circuit board continuously generates and broadcasts through its' antenna a low power electronic signal to the receiving antenna(s) where it is processed by the receiver circuit board(s). As a tagged item passes through the zone or detection field between the transmitter and receiver, the resonant circuit in the tag creates a small distortion in the signal. Digital and analog circuits within the receiver circuit board confirm the authenticity of this signal and create an audible alarm indicating that a tagged item has been moved through the zone.

In normal shoplifting prevention situations, the tag is removed or deactivated either manually or electronically at the point of sale when a valid purchase is made.

EASI Detection System Specification

The following is an outline of the overall system and its components:

System Technology

RF (Radio Frequency)

System/Antennas

KB-1

Size:	Height:	60 Inches - 152.4 cm
	Width:	11.25 Inches - 28.6 cm
	Depth:	1.25 Inches - 3.2 cm

Weight:	35 lbs. -	15.9 kg per system
	17.5 lbs -	7.9 per antenna

Color:	Gray
	White/Almond
	Black

KB-2

Size:	Height:	60 Inches - 152.4 cm
	Width:	14 Inches - 35.6 cm
	Depth:	1 Inch - 2.54 cm

Weight:	21 lbs. -	9.6 kg per system
	10.5 lbs -	4.8 per antenna

Color:	Chrome with Black Circuit Board Covers
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Antenna Separation

Spacing between antennas can create aisle widths up to 6 feet (1.83m) depending on tags or labels used.

Optional Baseplates (Users Installed Systems)

Single Aisle System Baseplate - (36 inches - 91.5 cm)

Size: 20 inches X 40 inches - 50.8 cm X 101.6 cm

Weight: 39 lbs. - 17.7 kg

Color: Black, ribbed rubber

Single Aisle System Baseplate - (48 inches - 122 cm)

Size: 20 inches X 51.5 inches - 50.8 cm X 130.8 cm

Weight: 53 lbs. - 24.0 kg

Color: Black, ribbed rubber

Dual or Wide Aisle System Baseplate - (72 inches - 183 cm)

Size: 20 inches X 75.5 inches - 50.8 cm X 191.8 cm

Weight: 63 lbs. - 28.6 kg

Color: Black, ribbed rubber

Power Supply

Standard 100/120/220 Vac 1.1A 50/60 Hz

Note 1: Type of supply must be designated

Note 2: Individual power supplies can be used for each antenna

Tags and Labels

EASI EAS systems are compatible with virtually all types of RF tags and labels (e.g. hard tags, custom flex tags, and flap tags).

Pre-Installation Guidelines

The EASI system operates using resonant frequencies. Mechanical and electrical devices or metal objects too close to the antennas can occasionally induce a spurious resonance or noise, causing a system malfunction. For this reason, the EASI system should be installed in an area as free as **reasonably possible** of these items.

Important: In order for the system to operate effectively it is recommended that the following guidelines be observed. Adhering to as many of the suggestions listed below and taking a few precautions now will help create a trouble free and effective environment for proper tag detection.

If in any doubt about the environment be sure to test the system in the intended location before the permanent installation.

- Try to avoid installing any electrical wiring within 3 feet (91.4cm) and parallel to the system antennas (e.g. vertical power poles from counter to ceiling, from floor to ceiling).
- Avoid having tagged merchandise within 3 feet (91.4cm) of the system.
- When **possible** the antennas should **not** be installed closer than 2 feet (61cm) to any mechanical or electrical devices (e.g. soda machines, vending machines, ice cream machines, computers, neon lights, telephones) and their associated wiring.
- When possible the antennas should not be installed closer than **2 feet** (61cm) to any metal object, such as windows, display fixtures, shelving, columns, and metal railings.
- The system must be installed at least **2 feet** (61cm) from the exit door. This will greatly reduce the possibility of resonances caused by moving metal door frames and door security systems. If the doors swing inward, the door arc must not come closer than **1 foot** (30.5cm) to the antennas. The doors should not swing between the antennas (refer to system placement diagrams).

- High voltage AC power cables or electrical conduit should **never** be run near the antennas or underneath the base plate (e.g. incoming electrical wiring for system, extension cords, etc.). The systems **low voltage AC power cables** must be run either along the floor or from under the system. This wiring should **not** be run into the ceiling parallel to the antennas (e.g. in the door or window framing) and then to the system antennas, as this is likely to cause noise and resonance problems. If power is available only from the ceiling, the low voltage AC power cable must be run from the ceiling to the floor at least **2 feet** (61cm) from all points of the antennas.

Helpful Hints

- Some locations experience the problem of children climbing on the antennas. It is possible to eliminate this problem by covering the antennas with non-metallic/non-conductive materials.
- During the holidays problems can be caused by the hanging of decorative lights or garland on or in close proximity to the system. These items should not be hung on or placed near the system.

Important Note:

The user is cautioned that changes or modifications to this system not expressly approved by EASI could void the user's FCC authority to operate this equipment.

System Placement Diagram Single-Aisle System

DOOR SWINGING IN

A minimum of 12" (30.5cm)
from door frame to front
edge of the systems
baseplate.

DOOR SWINGING

OUT

A minimum of 24" (61cm)
from door frame to front edge of
the systems baseplate.

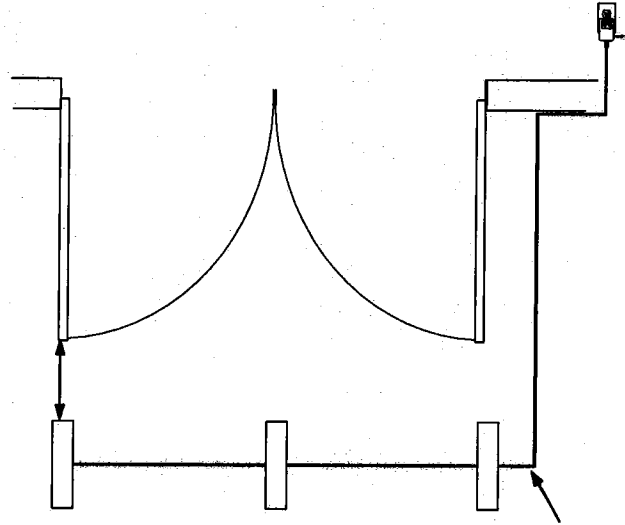
A minimum of 6" (15.25cm)
before turning 90 degrees.

A minimum of 6" (15.25cm)
before turning 90 degrees.

System Placement Diagram Dual-Aisle System

DOORS SWINGING IN

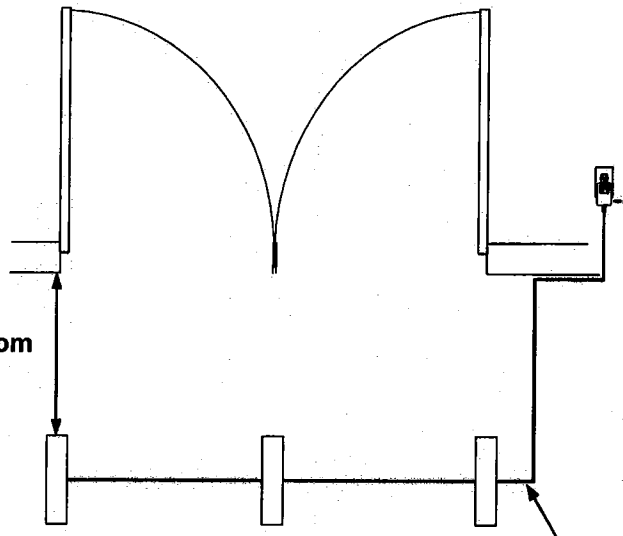
A minimum of 12" (30.5cm)
from door frame to front
edge of the systems
baseplate.



A minimum of 6" (15.25cm)
before turning 90 degrees.

DOOR SWINGING OUT

A minimum of 24" (61cm) from
door frame to front edge of
the systems baseplate.



A minimum of 6" (15.25cm)
before turning 90 degrees.

Floor Mount Installations

Please read the pre-installation guidelines thoroughly before proceeding with the following.

The antennas should be installed first. If the system is a single aisle, there will be one transmitting antenna and one receiving antenna. If the system is a dual aisle, there will be one transmitting antenna (in the middle) and two receiving antennas (one on each side). A three aisle system consists of two transmitting antennas and two receiving antennas in alternating sequence.

Step 1

Remove the screws from the circuit board covers at the bottom of the antennas then pull up and out. Place antennas in an upright position on the floor in the approximate position where they are to be installed. This should be done carefully as the antennas have very narrow bases and could easily fall over. As indicated previously, the antennas should be positioned at least 2 feet (30.5cm) or more from the doorway and should not interfere with traffic flow. Maximum distance between antennas (i.e., aisle width) is 66 inches (168cm) center to center. The center to center aisle width is determined by the type of detection label being used. Use the following table for the recommended aisle widths for label type.

Label Type	Recommended Aisle Width
1.5" x 1.5" Soft Label	36" (91.4cm)
2" x 2" Soft Label	48" (122cm)
1 5/8" Small Round Hard Label	48" (122cm)
Large Hard Label	66" (168cm)
Flap Label	36" (91.4cm)

Step 2

Measure the distance center to center of each antenna and make sure that the aisle width is appropriate for the installation site and the size of the detection tag (reference the above table). Square up each antenna with each other and to the aisle path.

Important: Before drilling holes for bolting the antennas to the floor, the installer should check with the person in charge to be absolutely sure the positioning of the system is acceptable.

Step 3

Mark the floor through the two outside holes in the base of each antenna (center hole is for wires coming into the antenna circuit board). After marking the hole positions, move the antennas out of the way.

Important: If the system is to be installed on carpet, holes approximately 1 inch square must be cut in the carpet before holes are drilled. Drilling without cutting the carpet may cause damage to the carpet. Mark hole position on the carpet before cutting.

Step 4

Drill the antenna mounting holes using a heavy rotary hammer. Drill the holes the size and depth appropriate for the anchors being used and the type of floor being installed on. If the system is being installed on a wooden floor we recommend the use of lag bolts to anchor the system.

Step 5

Clean out holes, install anchors in place (remember to compensate for the width of the baseplate) and bolt antennas in place loosely (this will allow the cables to be placed under the base of antenna).

Multiple System Installations

Note: This section addresses installations with no more than three transmitters installed in the same location. For installations that require more than three transmitters in the same location you should contact the EASI service department for assistance.

The EASI transmitter operates essentially like a small radio station. Therefore if you install a transmitter in close proximity to another transmitter operating at the same center frequency, certain steps must be taken to eliminate the potential interference between them.

There are two methods that can be used to eliminate the interference. The decision as to which method to use is mostly based on the distance between the transmitters. If the transmitters are greater than 20 feet (6.09m) apart it is possible to offset the modulation rate of the systems to lessen the interference between transmitters. If the transmitters are less than 20 feet (6.09m) apart then it will be necessary to master/slave the transmitters.

Note: Of the two methods, offsetting the modulation frequency is the easiest to do. Regardless of the distance between transmitters you may wish to try this method before attempting the master/slave method.

Offsetting Modulation Frequency

The EASI transmitter sweeps the tuned frequency range at a specified rate. This rate is normally set to 81.4 Hz at the factory. If the distance between transmitters is greater than 20 feet (6.09m) success has been achieved by changing the modulation sweep rate on one of the systems to 79.7 Hz. The following diagram shows the location of the **transmitter (TX)** and **receiver (RX)** jumpers and the positions they will be in when set matching modulation frequencies.

Note: If you change the modulation sweep rate on the transmitter you must also change the associated receiver(s) modulation frequency to match the transmitter (this must be done to all receiver(s) paired with the transmitter).

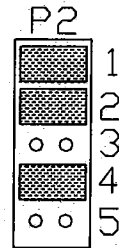
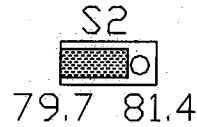
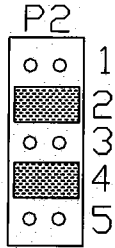
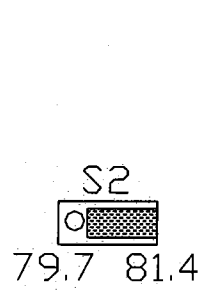
Offsetting Modulation Frequency Jumper Settings

81.4 Hz (NORMAL)
TX

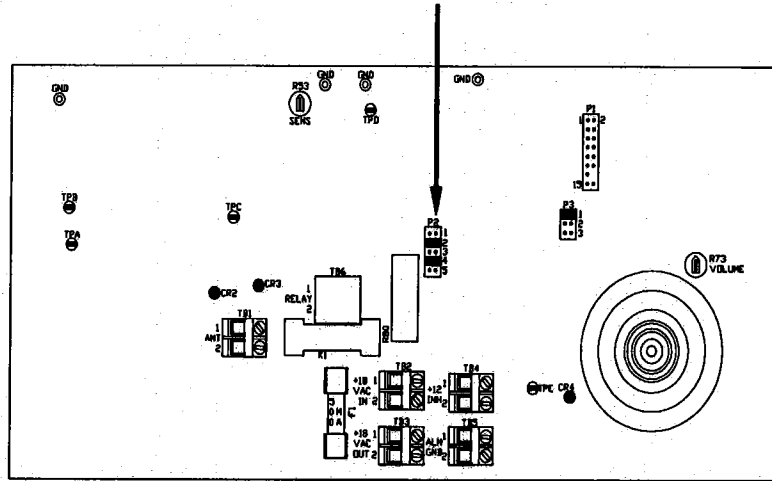
RX

79.7 Hz (OFFSET)
TX

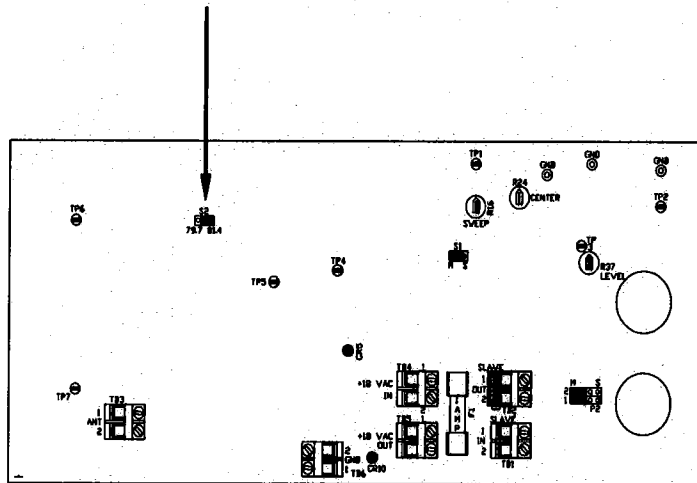
RX



RECEIVER (RX) P2



TRANSMITTER (TX) S2



Master/Slave Method

Once that it has been determined that it is necessary to wire the systems as master and slaves you must select the transmitter that would best serve as the master. It will be necessary to leave one of the transmitters in the master mode and change all other transmitters to the slave mode. It will then be necessary to wire all of the remaining transmitters together.

When the following steps are completed the master transmitters will provide the RF and sweep frequency for all slaved transmitters. The slaved transmitters will only act as amplifiers for the RF signal generated by the master and will be synchronized with the master transmitter.

Master/Slave Jumper Settings

All transmitters are shipped from the factory configured in the master mode. To reconfigure to the slave mode you must move the jumpers at location S1 and P2 on the transmitter from the master (M) side of the jumper block to slave (S) side of the jumper block (see detail in Master/Slave diagram #1).

Note: The above changes are to be made only to the transmitter(s) designated as slave(s).

When two or more systems are designated for installation at the same site they may be shipped from the factory with offset modulation frequencies. All of the transmitters and receivers must have their modulation frequencies set to the modulation frequency of the **master** transmitter. (Reference **offsetting modulation frequency** section of this manual.)

Master/Slave Wiring

Connect the master transmitter to the slave transmitter following the **master/slave diagram #1**. Be sure to have wires connected to the proper terminal blocks with the correct polarity (see detail in master/slave diagram #1). EASI recommends using a 22 AWG., shielded, 2 pair/twisted wire (see list below for the recommended cable manufacturers and their corresponding part numbers).

Manhattan #4473

Alpha #2466

Belden #8723

Note: The last slaved transmitter on the slaved wire must have a 51 OHM resistor installed in position TB2 (see detail in master/slave diagram #1).

Low Voltage AC Power Wiring (Reference Diagrams #1, #2, #3, and #4)

The low voltage AC power supply is normally installed no farther than 10 running feet (3.05m) from the antenna. If the distance is greater than 10 feet (30.5m) use 18 gauge wire to increase the length of the low voltage AC power supply wire. Refer to the Cable Placement Diagram #1 for the general placement of low voltage AC or slave wiring. All wires entering an antenna should be 90 degrees (at a right angle) to the antenna base and enter as close as possible to the center of the antenna base. In all cases the cables from the transmitter antenna must exit at 90 degrees to the antenna and travel at least 6 inches (15.25cm) before turning. If the installation will not allow the power supply wire to make a 6 inch (15.25cm) straight run into the transmitter, install the receiver antenna on the side closest to the power supply and the transmitter antenna on the other side.

To connect the low voltage AC power wires to the system, refer to the applicable Power Wiring Diagrams #2, #3 or #4. Use the following table to select to correct wiring diagram.

System Configuration	Diagram #
Single Aisle no Lights	2
Single Aisle with Lights	3
Dual Aisle no lights	4
Dual Aisle with Lights	4

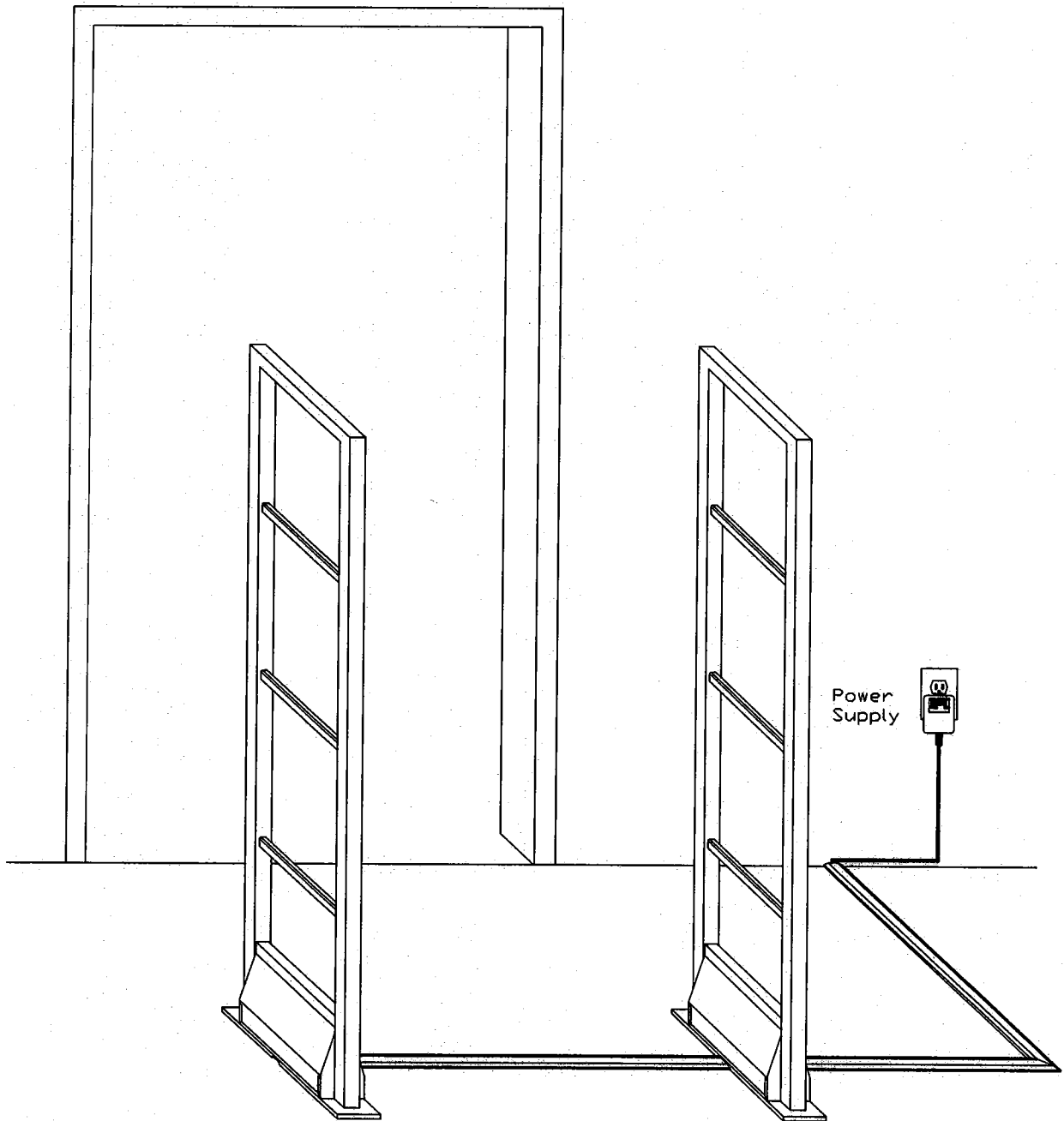
Powering Transmitter First

If the low voltage AC power is brought in on the transmitter side, connect the red wire to transmitter TB4 terminal 1 and connect the black wire to transmitter TB4 terminal 2. Connect the red wire of the interconnect pair (Belden 9740) to the transmitter TB5 terminal 1. Connect the black wire of the interconnect pair to the receiver TB2 terminal 1. Then connect the black wire of the interconnect pair to the receiver TB2 terminal 2.

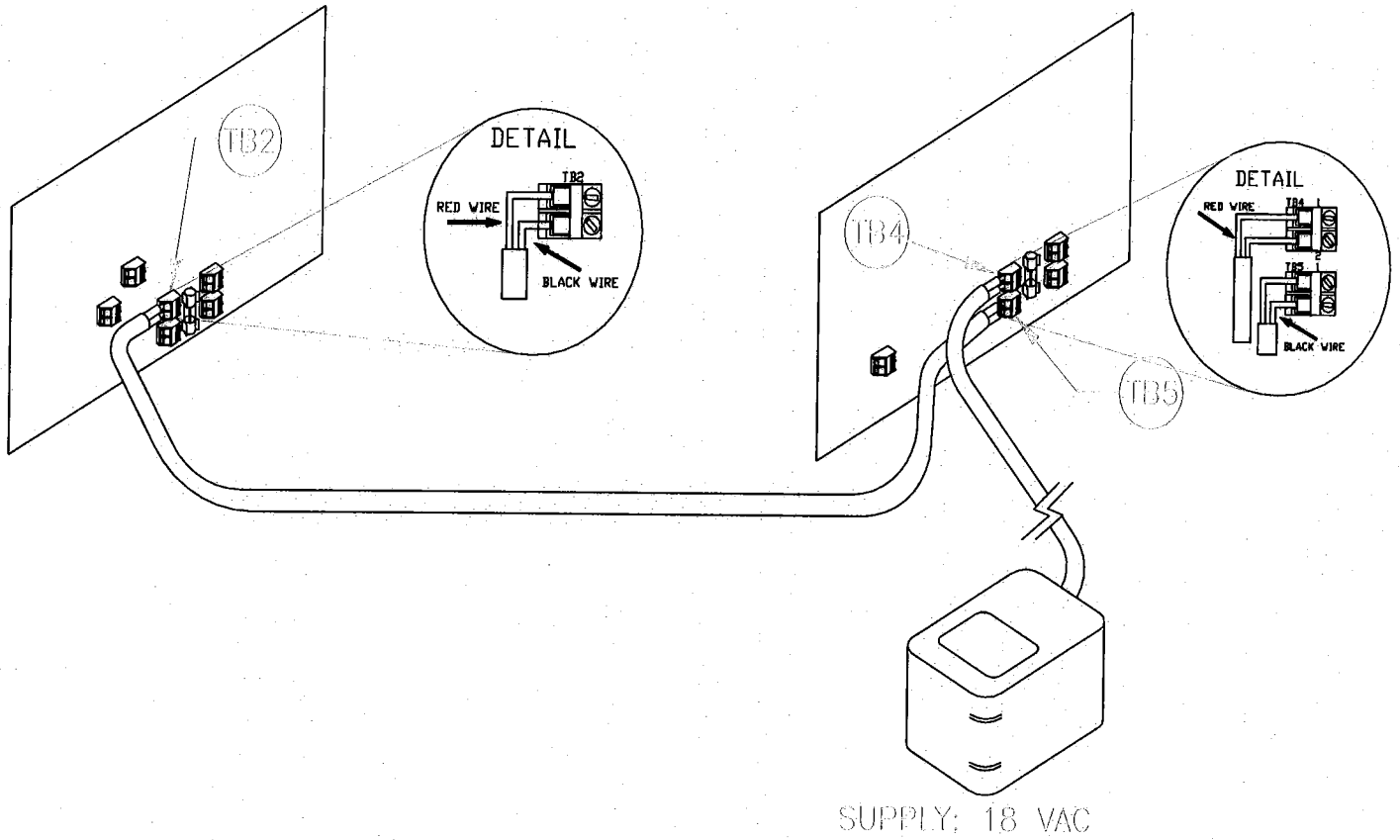
Power Receiver First

If the low voltage AC power is brought in on the receiver side, connect the red wire to receiver TB2 terminal 1 and connect the black wire to the receiver TB2 terminal 2. Connect the red wire of the interconnect pair (Belden 9740) to the receiver TB3 terminal 2. On the transmitter connect the red wire of the interconnect pair to the transmitter TB4 terminal 1. Then connect the black wire of the interconnect pair to the transmitter TB4 terminal 2.

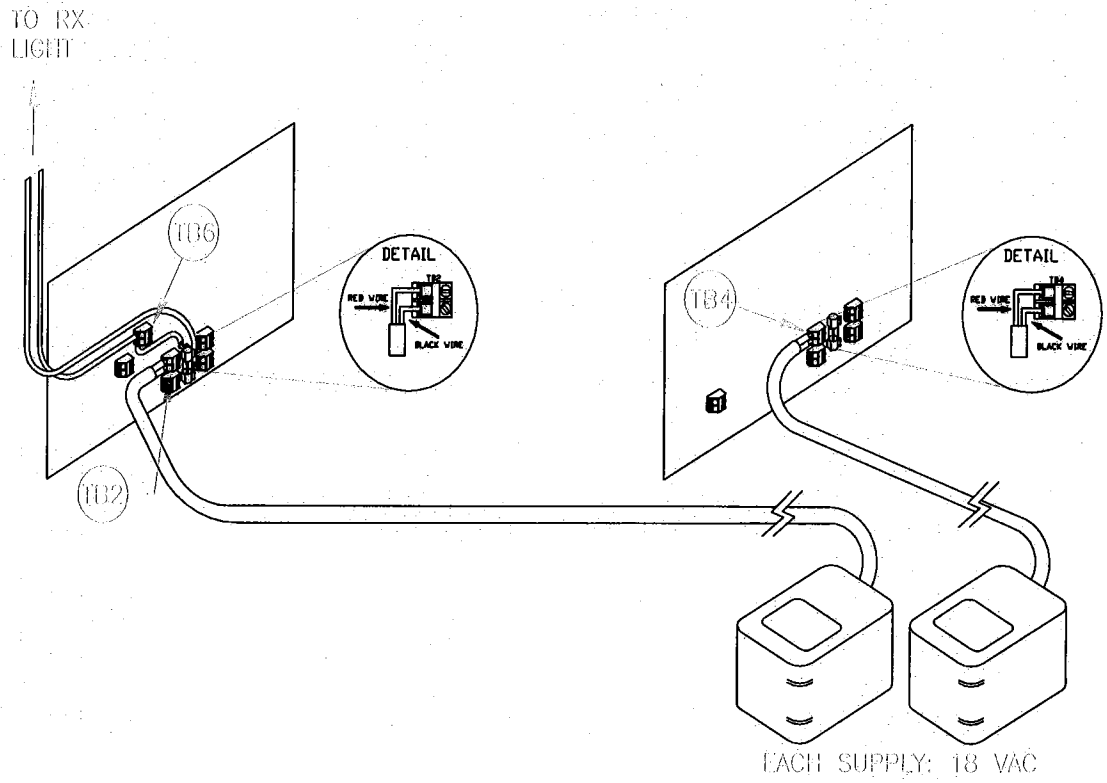
Low Voltage AC Wiring Diagram #1



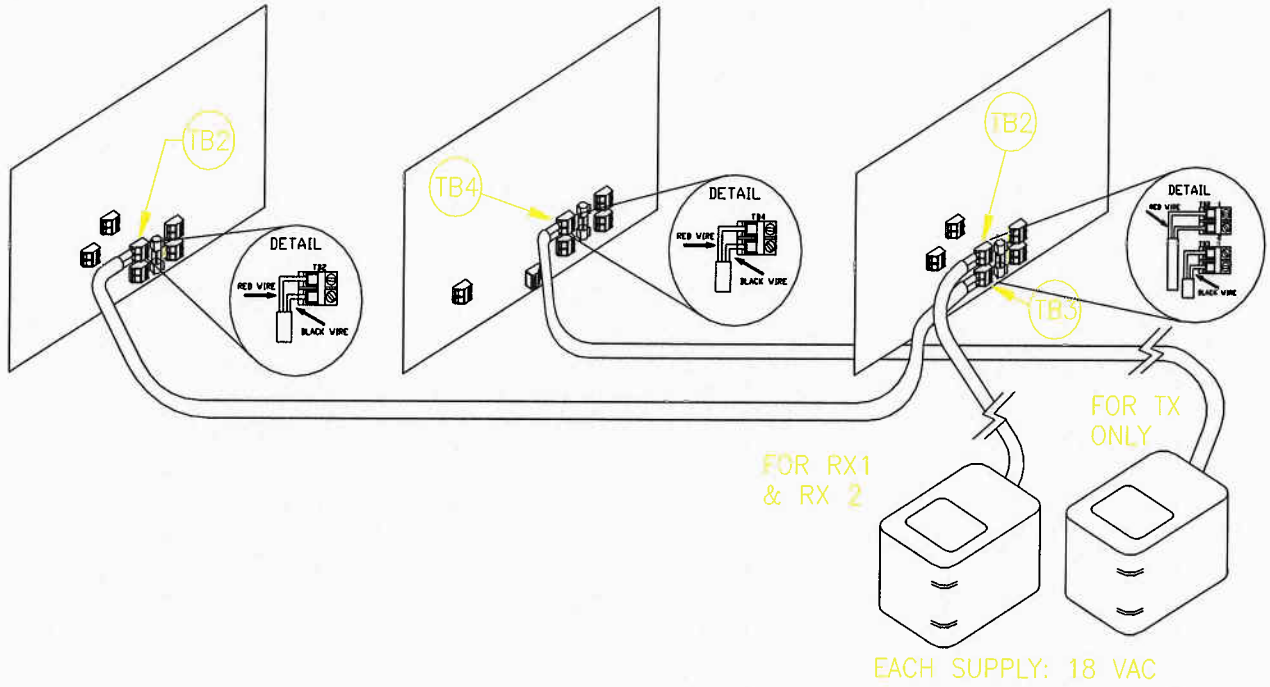
Low Voltage Power Wiring Diagram #2



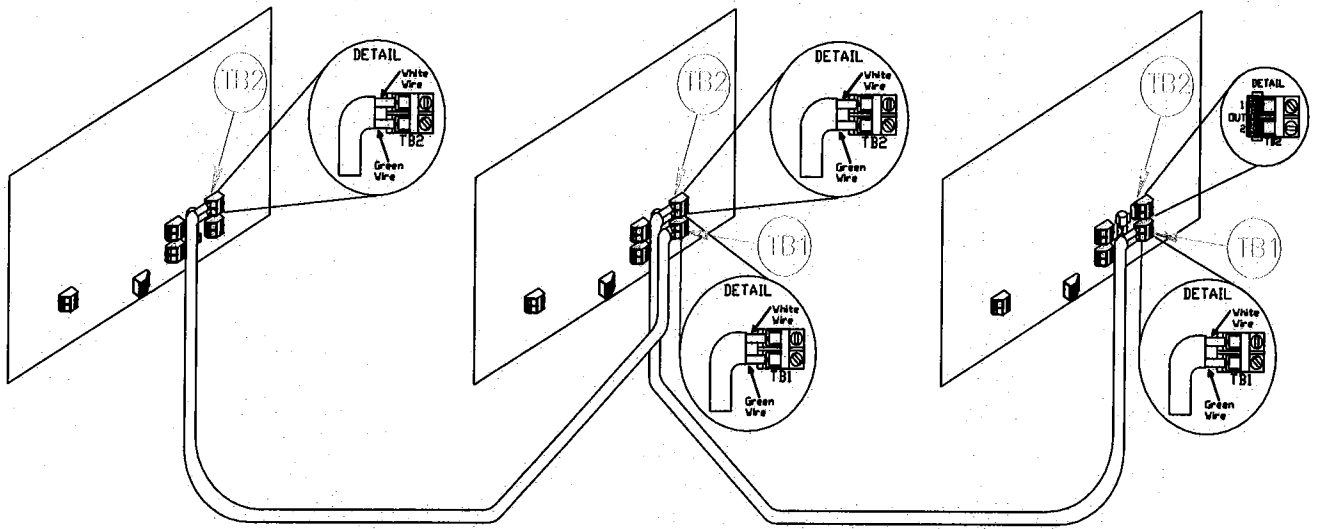
Low Voltage AC Power Wiring Diagram #3



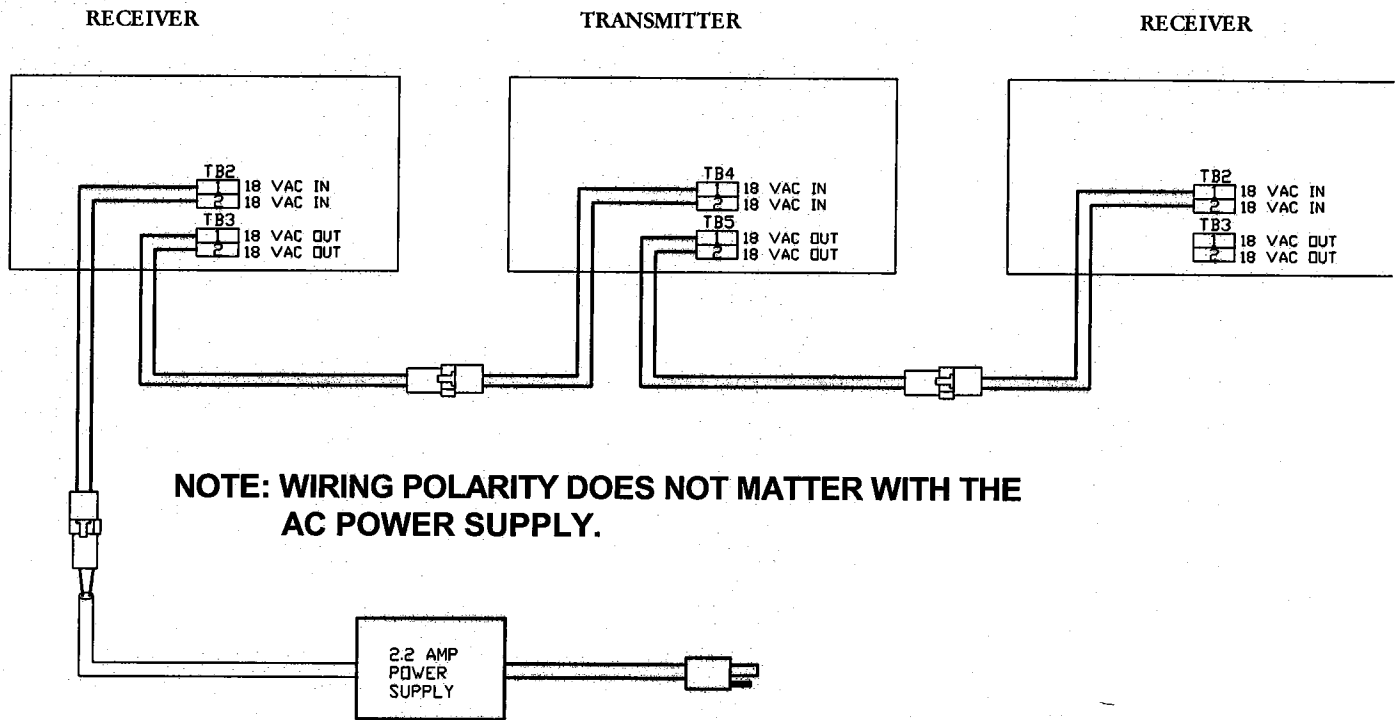
Low Voltage AC Wiring Diagram #2



Master/Slave Wiring Diagram #1



Dual Aisle Wiring Diagram 2.2 AMP Power Supply



Baseplate Installations

In some locations it may be desirable or required to install the EASI system on a portable baseplate. This baseplate is made of bent steel and is covered in a rubber mat. This provides a firm mounting surface at a preset aisle width that also eliminates the need to drill holes in the customers floor.

The portable baseplates are available from EASI in 3 foot (91.4cm), 4 foot (122cm), and 6 foot (182cm) widths. The correct width of the baseplate is determined by the type of detection label being used. Refer to the "detection tag" section of this manual for the proper widths.

The following steps are for the assembly of the EASI system to a baseplate.

Single-Aisle System

(Reference Baseplate Installation Diagram #1 & #2)

- 1) Remove the two antennas and the baseplate from their packaging.
- 2) Remove the four antenna mounting bolts and the power supply from the box.
- 3) Place the baseplate on the floor tilted on one edge. Slide the interconnect cables located at the bottom of each of the antennas through the holes in the base. Using the antenna mounting bolts, hand-tighten the antennas to the base.

Note: A single aisle system without lights will have one antenna with 2 wires. This antenna should be mounted on the side of the baseplate nearest the power supply.

- 4) Connect the two gray interconnect cables underneath the base together.

Note: The ends of the interconnects are keyed and can only be plugged together one way.

- 5) Before tightening all mounting bolts, make sure that none of the wires are being pinched under the bases of the antennas.
- 6) Attach the provided wire clips between the channels on the bottom of the moveable base and place the gray interconnect wires into the clips.

Important: During manufacturing, an oil is applied to the metal baseplate and must be cleaned with a solvent before adhering the wire clips.

- 7) Connect the power supply cable to the 1 foot black power cable attached to the antenna.
- 8) Stand the system upright and plug the systems power supply into the required voltage source.

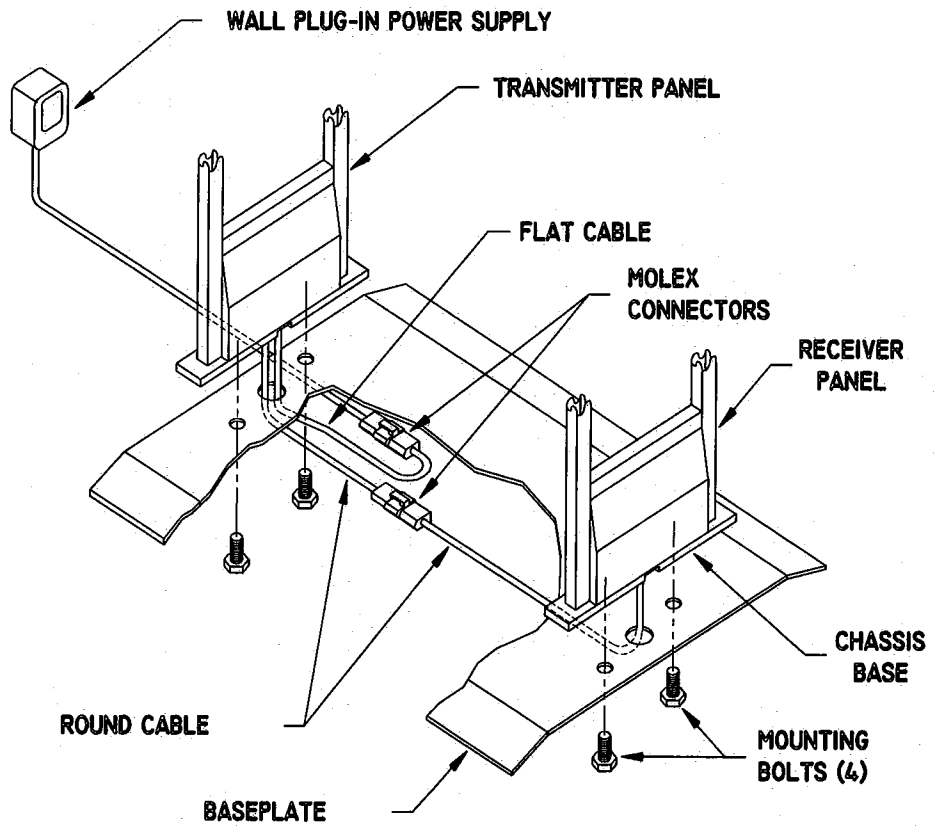
Dual-Aisle System (Reference Baseplate Installation Diagram #3 & #4)

The dual aisle system is assembled the same as a single system except for the following:

A dual-aisle system consists of a transmitter and two receivers. The antennas are marked at the factory by a label attached to the antennas specifying the transmitting antenna. **The transmitter antenna must be mounted in the center position.**

Note: All system tuning instructions and operational guidelines are the same for a baseplate mounted system and a floor mounted system.

Baseplate Installation Diagram #1



Baseplate Installation Diagram #2

