Ultra•Max Phasing Tool (900MHz)

Kit 0100-2321-01

Case	1	0400-1187-01
Transmitter (900MHz)	2	0100-2320-01
Receiver (900MHz)	1	0100-2319-01
Sense coil	2	0300-2274-01
12' BNC cable	2	0650-0211-01
3' BNC cable	1	0650-0211-02
Antenna (900MHz)	3	3411-0005-01
Bracket	2	0400-1182-01
Battery	1	4007-0004-01
Power cord	2	6003-0007

Ultra•Max detectors and deactivators derive their timing from the zero crossing of the ac power line. Ultra•Max detectors and deactivators may interfere with each other if there are ac line phasing differences between systems.

The Phasing tool is used to synchronize the timing of all Ultra•Max systems located in a store, shopping center, or mall. A reference system is selected and then all other systems are synchronized to the reference system.

The basic steps to synchronize all systems are as follows:

A. Set up a reference transmitter at the reference system.

B. Synchronize all other systems within the range of the reference transmitter.

C. Use the second transmitter to extend the range of the reference transmitter.

Repeat steps B and C until all systems in the store, shopping center, or mall are synchronized.

Phase all of the systems first! Don't spend a lot of time tuning systems until all systems have been phased.

Cover as much area as possible from a single transmitter location. There will be some error build up for each time a new transmitter is used.

If you have a team of CE's with several phasing tools, you can efficiently phase an entire mall. See **Phasing Team** on **page 4**.

Before you begin, do the following:

- Survey the site to identify the location and type of EAS systems present. Systems that can not be phased may need to be upgraded. Upgrading of older equipment should be planned in advance.
- Locate all possible sources of 900 MHz interference including cellular, cordless and computer equipment. Where possible, avoid using either the transmitter or the receiver in those immediate areas. No interference has been found with wireless equipment but the presence of such equipment will reduce the effective range of the Phasing tool.
- Based on the proximity of the systems to be phased, choose a starting reference system. This is often the most difficult part. Choosing the right reference system can minimize the amount of phasing required.

Begin with steps A and B and then repeat steps C and B until all systems are synchronized.

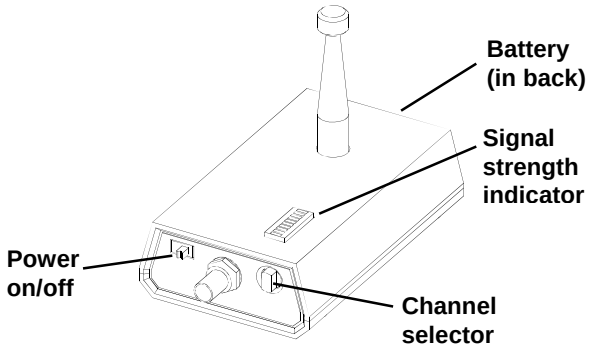
A. Setting up a reference transmitter at the reference system.

1. Using the receiver, find the channel with minimal interference.

Power on the receiver and rotate through the 8 available channels (position 0-7 only). Observe the signal strength indicator and select the channel with the lowest signal strength.

Note: Channels with steady or fluctuating high levels of activity will not provide the maximum range.

Figure 1. Receiver



2. Set up the transmitter.

a. Set the first transmitter to the same channel as the receiver.

b. Locate a power outlet at or near the reference system and plug in the first transmitter.

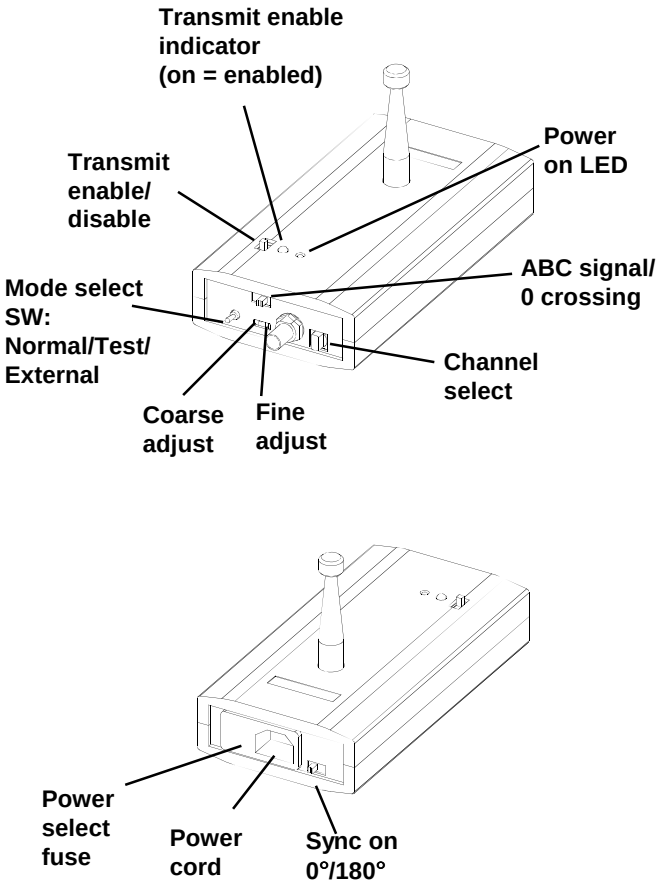
CAUTION: Make sure the power select fuse on both transmitters is set for the correct ac voltage. To change the setting, use the blade of a small scewdriver to pry out the power select module. Rotate and insert the module so that the correct voltage (115, 125, 230, 250) is opposite the arrow.

Locate the transmitter in a clear and open area that will provide the best possible line of site to all of the systems to be phased.

Note: Avoid locating the transmitter in the ceiling or any metal enclosed areas.

c. Set the switches of the transmitter to **Normal mode** and **ABC Signal**.

Figure 2. Transmitter



3. Verify receiver operation.

a. On the receiver's signal strength indicator, you should see a steady, strong signal.

b. Connect the output of the receiver to channel 1 of an oscilloscope with the short BNC cable and the sense coil to channel 2 with the long BNC cable.

c. Verify that channel 1 shows the proper ABC signal from the transmitter. (One wide, 3ms, negative going pulse followed by two narrow, 1ms, negative going pulses with a separation of 5.556ms for 60Hz and 6.667ms for 50Hz.) Best viewed at 1ms/division.

4. Align the reference transmitter

a. Beginning at the transmitter antenna of the reference system, place the sense coil against or near the transmitter coil. Position the coil for the strongest possible signal.

Note: The sense coil is a cylindrical coil and is very orientation specific. It must be in the proper orientation for maximum sensitivity.

b. Verify that channel 2 shows the proper transmitter burst signal.

Note: In general, the reference system should be one with **No Delay**. If the system has been phased, you should consider first setting it back to the **No Delay** default.

c. While watching the receiver signal and burst signal on the oscilloscope, adjust the Phase Adjustment pot on the first transmitter so that the burst signal starts at the **Falling Edge** (beginning) of any one of the three pulses. Use the “180° Flip” switch if more adjustment range is needed.

Note: In general, you will want to make a coarse adjustment with scope at a large scale (e.g. 500µs or 1ms/division) and then fine tune the adjustment with the scope at 50µs/division.

Note: Depending on the type of system being adjusted, there will be some timing jitter in the signals displayed. In this case, adjust the transmitter such that the jitter is divided equally between leading and lagging. (Average the variation.)

Tip: The transmitter can attract unwanted attention when placed in a visible area of a mall. Place a non-metallic item such as a plastic caution cone over the transmitter to hide it from view.

You are ready to begin phasing other systems to the reference signal.

B. Synchronize systems within the range of the reference transmitter.

1. **At the next system, place the sense coil at or near the transmitter antenna.**

2. **Verify that you are still receiving a clear ABC signal from the receiver.**

3. **Align the system to the reference transmitter.**

   While watching the receiver signal and the system burst on the oscilloscope, adjust the phase of the system so that the burst starts at the **Falling Edge** (beginning) of any one of the three pulses.

   Note: In general, you will want to make a coarse adjustment with scope at a large scale (e.g. 500µs or 1ms/division) and then fine tune the adjustment with the scope at 50µs/division.

4. **Attach a sticker to the system indicating the date that it was phased.**

5. **Continue phasing all of the systems within range of the first transmitter signal.**

C. Extend the range of the reference transmitter.

1. **Locate a power outlet within the range of the first transmitter's signal.**

2. **Using the receiver, find another channel with minimal interference.**

   Power on the receiver and rotate through the 8 available channels (position 0-7 only). Observe the signal strength indicator and select a channel with low signal strength.

3. **Set up the second transmitter.**
   a. Set the second transmitter to the same channel as the receiver.
   b. Switch the second transmitter's signal **OFF**.
   c. Set the switches of the second transmitter to **Normal mode** and **ABC Signal**.

4. **Using the oscilloscope, align the second transmitter.**
   a. Disconnect the sense coil from the BNC cable.
   b. Attach the BNC cable to the second transmitter and channel 2 of the oscilloscope.
   c. Switch the receiver back to the same channel as the first transmitter.

   Note: Channel 1 of the oscilloscope is attached to the output of the receiver.

   d. While watching the first and second transmitters' signals on the oscilloscope, adjust the Phase Adjustment pot on the second transmitter so that the second transmitter's signal starts at the **Falling Edge** (beginning) of the first transmitter pulse. Use the "180° Flip" switch if more adjustment range is needed.

   Note: In general, you will want to make a coarse adjustment with scope at a large scale (e.g. 500µs or 1ms/division) and then fine tune the adjustment with the scope at 50µs/division.

5. **Verify receiver operation.**
   a. Turn on the second transmitter's signal.
   b. Switch the receiver channel to the channel used by the second transmitter and verify that the receiver signal from the second transmitter is aligned properly. You can verify that it is aligned properly by comparing it with systems phased previously using the scope and sense coil.

Continue phasing systems as described in Step B. No timing adjustment are required because of the second transmitter.

Remove the first transmitter and use it as necessary to extend beyond the range of the last transmitter location and so on. Each time you setup a new transmitter, you must realign the new signal with the current reference signal as done in step C.

Phasing Team: If you have a team of CE's with several transmitters and receivers, you can efficiently phase an entire mall using the following approach:

1. **Start by identifying your reference system and set up a transmitter at that site.**
2. **Using the receiver and an oscilloscope, travel to the edge of the transmitted signal.**
3. **Place and phase another transmitter where the signal gets weak. Remember to use a different channel for each transmitter.**
4. **Repeat this process until you have a large area or the entire mall covered.**
5. **Once all the transmitters are set up, phase all systems. When phasing a system, set the receiver to the channel with the strongest signal strength.**

This technique allows CE's to work independently and multiple systems can be aligned at the same time. An average-size mall can be phased in less than a day.

Declarations

Regulatory Compliance

EMC: .....47 CFR, Part 15

FCC COMPLIANCE: This equipment complies with Part 15 of the FCC rules for intentional radiators and Class A digital devices when installed and used in accordance with the instruction manual. Following these rules provides reasonable protection against harmful interference from equipment operated in a commercial area. This equipment should not be installed in a residential area as it can radiate radio frequency energy that could interfere with radio communications, a situation the user would have to fix at their own expense.

EQUIPMENT MODIFICATION CAUTION: Equipment changes or modifications not expressly approved by Sensormatic Electronics Corporation, the party responsible for FCC compliance, could void the user's authority to operate the equipment and could create a hazardous condition.