Informer Series
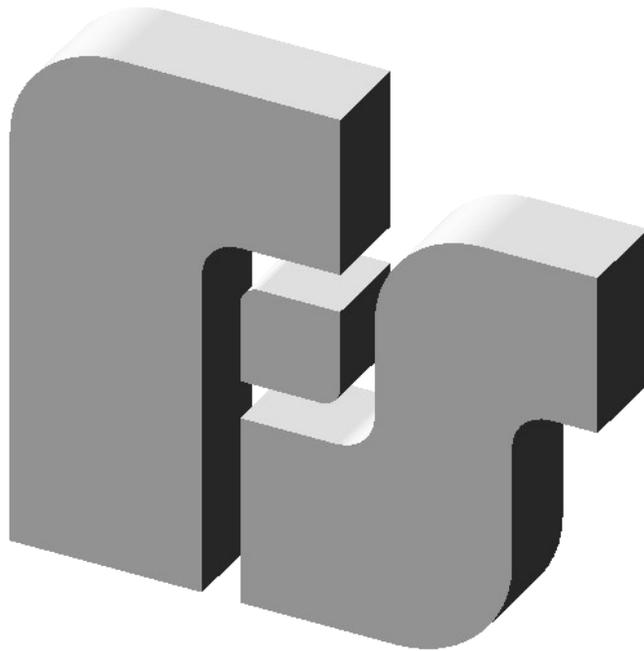# Tone Alert Receivers

I-SW©
Programming and Radio Alignment
Manual

Federal Signal Corporation
University Park, IL 60466

FEDERAL SIGNAL CORPORATION

Informer Series
Tone Alert Receiver

I-SW
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Manual

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University Park, Illinois 60466
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The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance instructions.

- Read and Follow Instructions - All the safety and operating instructions should be read before the TAR is operated. Follow all instructions in this manual and the 255334 Operation Manual.

- Retain Instructions - The safety and operating instructions should be retained for future reference.

- Heed Warnings - All warnings on the TAR and in the operating instructions should be adhered to.

- Programming Warning – The TAR may fail to operate as intended if programmed incorrectly. Programming should only be performed by personnel thoroughly familiar with the TAR's operating instructions and the intended method of use.

  Always test the TAR for proper operation after programming and before placing into use.

- RF Alignment Warning - The TAR may fail to operate as intended if the radio is aligned incorrectly. RF alignment should only be performed by a qualified radio technician thoroughly familiar with the TAR's operating instructions and the intended method of use.

  Always test the TAR for proper operation after alignment and before placing into use.

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TABLE OF CONTENTS

SECTION I
PROGRAMMING INSTRUCTIONS

⚠ **WARNING**

The TAR must be correctly programmed per the user's specific application before placing into use. Programming should only be performed after thoroughly reading this manual. Always test the TAR for proper operation after programming and before placing into use.

When the TAR is used for personnel warning applications, a warning plan should be developed and all users should be trained on the use of the warning system.

1-1   What's Included in I-SW?

The Federal Signal model I-SW consists of a CD ROM containing the I-SW application program. A serial programming cable is also provided to connect the Informer to the programming PC.

1-2   Operating Requirements

- Personal Computer with:
    - MS Windows 2000, XP® operating system
    - CD ROM drive
    - 5MB free Hard drive space
    - RS232 port
    - Mouse
    - Printer (Optional)
- I-SW Software
- I-SW Serial Cable

1-3   Software Installation

The I-SW software program must be installed from Windows. A self-installation utility is provided on a CD ROM. Execute the setupx_x.exe file to begin installation. The installation program will place the program in the Windows programs folder. After installation, the program can be started by clicking Start, Programs, I_SW.

1-4   RS232 Cable Connections

Before the Informer can be programmed or its programming data can be read by I-SW, the Informer must be connected to the serial port of the PC. Plug the modular cable provided with I-SW into the Informer and plug the other end into the computer's serial port. Select the appropriate serial port number using the Setup menu.

1-5   Software Description

The Informer I-SW programming application software runs on the Microsoft Windows 2000/XP® operating system. Its purpose is to configure the "personality" of the Informer and program into EEPROM memory. The configuration parameters can also be read from the Informer using this software program.

I-SW can program the complete operating system of the Informer into the Informer's FLASH memory. This is useful for installing software upgrades. All programming is accomplished over a standard RS232 port without requiring disassembly of the Informer. The software prompts the user to enter the appropriate parameter for each configuration item and saves the configuration to disk. All configuration information is viewable from a single screen. Saved configurations can be loaded from disk, edited and sent to the printer.

Help prompts are provided when a data entry point is selected with the mouse. These prompts identify the type of information to be entered and the range of allowable entries

The configurable parameters are shown in the following screen layout.

1-6   Screen Layout

1-7   GUI Description

Serial Number – This field is read from the unit. The factory programs the serial number when the Informer is built. The serial number cannot be changed.

File Name and Unit's Software Version – These text boxes display the current configuration file name loaded and the current version of the executable program loaded in the Informer.

Receive Frequency – RF receive frequencies can be entered for four separate RF channels. The user must manually type in the RF frequency in MHz.

CTCSS – Each RF frequency can have either a tone or digital PL assignment. User can pick from all available PL's using a scroll bar.

Codes 1 to 6 - Up to six different activation codes can be set up. For each code the user may select Cancel (Y/N), Test LED (Y/N), Speaker (Auto Reset, Timed Reset, or Manual Reset), Audible Alarm (Steady tone, Warble tone, Beep tone, Hi-Lo tone, Soft Steady tone, Soft Warble tone, Soft Beep tone, Soft Hi-Lo tone or none), Relay Output #1 & #2 (Auto Reset, Timed Reset, or Manual Reset). Soft tones have a low level audio output.

The type of coding scheme can be selected for each code. The possible selections are Single-Tone, Two-Tone sequential, DTMF, Digital, and EAS.

CODING SCHEMES

- **Single Tone –** Possible length selections range from 0.5 to 8 seconds. Selection is made from a scroll bar menu. A tone frequency between 300 and 3000 Hertz must be entered.

- **Two Tone –** Possible selections range from 0.5 to 8 seconds for the 1st tone and 0.25 to 8 seconds for the 2nd tone. Tone duration selections are made from scroll bar menus. Tone frequencies between 300 and 3000 Hertz must be entered for each tone. If the frequencies of a tone pair are within 3% of each other, the boxes will turn red, as a warning that the tones may be too close.

- **DTMF –** Any valid DTMF digit string can be entered from 1-12 digits. "Wild card" digits must be preceded by the apostrophe, (') character. The # digit is the default "Wild Card" digit which will be accepted as a valid digit in addition to the digit preceded by the apostrophe character. For added security, a minimum of three DTMF digits is recommended to be used.

- **Digital –** Any valid Commander function (1-50) can be selected from a scroll bar. To activate the Informer, a matching Commander function must be decoded. Any one or combination of 16 zones can be selected from clicking on a check box. The zone selection applies to all digital Informer codes. A unit number, 0 to 255, can be entered. Codes sent for this unit number will activate the Informer. All-Call commands will also be decoded by the Informer. (Federal Signal Digital decoding is an optionally purchased option.) A Digital Unit Number may be entered to allow the Informer to be individually controlled. Blank or zero (0) = All-Call.

- **EAS –** For each EAS code type the user can select valid event codes from a scroll bar menu. Characters in the event code can be replaced by a question mark (?) to make the character a wildcard, meaning that any character will be accepted as a match. Up to three EAS location codes can be entered. If the unit is programmed for a 1/9 county, it will always respond to "all county " and "all state" commands as well. (EAS decoding is an optionally purchased option.)

Disable Monitor – If this check box is checked the unit will not be able to enter monitor mode when the monitor button is pressed.

Monitor Mode Squelch – This checkbox with enable the selection of PL or carrier based squelch.

128-Bit Encryption Key (I-FSK Option Only) – The 128-Bit Encryption Key is used to decode encrypted transmissions from the Federal Commander Digital System. The key consists of 16 numbers that can range from 0-255. Each number must match the corresponding encryption key used at the Commander's base station encoder. An encryption key of all zeros disables encryption.

Each number should be set to 0 if the Informer is programmed with V2.16 or earlier Hex code. Pre-encryption program files will have an encryption code of 255 in all fields. I-SW (V2.20 and greater) software will automatically convert encryption keys containing all 255s to 0 (encryption disabled) when the Informer is programmed. The Encryption Key is not used if Digital decoding is not used.

Auto Reset Time – Selects the number of seconds to wait before resetting after carrier is dropped. Can be set from 0-127 seconds in 0.5-second steps, i.e. 126.5 seconds.

Audible Alarm Length – Number of seconds the audible alarm will sound. Can be set from 0-254 seconds in 1-second steps.

Speaker Timed Reset Time – Number of seconds the Monitor function will be active after an activation command is received. Can be set from 0-3600 seconds in 1-second steps. Note that the Audible Alarm Length time must expire before the speaker audio can be heard.

Relay #1 & Relay #2 Timed Reset – The relay on duration, off duration and total relay activation duration can be set. The on and off times can be set from 0-127 seconds in 0.5 second steps. The total time can be set from 0-3600 seconds in 1-second steps. (Relay outputs are an optionally purchased option.)

ICONS – ICONS are provided for: Open File, Save to Disk, Program Unit, Read from Unit, and Print Label. These options are also available from the file menu.

File Menu – Enables selection of: Open File, Save to Disk, Program Unit, Read from Unit, Print Label, Update Software, Exit, and About TAR (TAR software version number info).

Update Software Menu – This menu item is selected from the file menu. This feature is used to select the Informer executable program (HEX file) for downloading into the unit.

Setup Menu – Setup allows the user to select COM1 – COM4 to be used for programming the Informer.

Help – Help screens are provided from the HELP menu and when a selection box is selected with the mouse.

SECTION II
RF ALIGNMENT AND TEST INSTRUCTIONS

⚠ **WARNING**

The TAR has been aligned at the factory to cover the specified range of frequencies and should not require re-alignment if the unit is programmed to a frequency within this range. The ranges are; 30 - 50 mHz, 150 - 170 mHz and 450 - 470 mHz.

Always use appropriate ESD prevention to prevent damage to the Informer and test the Informer after programming.

2-1   Equipment Required

A Communications Analyzer with following features is required to align the radio:
- RF Signal Generator
- RF Frequency counter
- SINAD meter
- Modulation meter
- Volt meter
- Oscilloscope (optional)

The appropriate encoders are required to encode Tone, DTMF, CTCSS, EAS or Digital codes as applicable.

2-2   Alignment and Test Procedure

<u>Preparation:</u>

1. Verify the RF frequency(s) and coding sequence(s) to be aligned and tested have been properly programmed into the Informer.

2. Remove the Informer PCB from the plastic housing. Remove the battery connection from the PCB. Do not remove the keypad and speaker from the PCB. Place on a non-conductive surface adjacent to the housing.

Connections:

1. Connect the 9 VDC power supply to the Informer

2. Plug the power supply to the AC outlet.

Informer Test Point and Parts Location Drawing

Checking the VCO frequency range:

1. Confirm the voltage on TP2 is less then 1 Volt indicating that the synthesizer is in lock.

Setting the Synthesizer on frequency:

1. Using a service monitor set in receive mode, monitor the frequency of the VCO by placing a pickup loop on top of the VCO/ /Synthesizer, U9.

ALIGNMENT AND TEST INSTRUCTIONS

2. The VCO frequency should be the receive frequency - 21.4 MHz, unless the unit is a Low band VHF unit, in which case the frequency will be 21.4 MHz + the receive frequency.

3. Adjust the frequency of the VCO using the trimmer cap in TCXO U6 until the frequency is within +/- 300 Hz.

Aligning the receiver and setting squelch:

1. **For Low Band (30 - 50 mHz) High Band (150 - 170 mHz) and UHF (450 - 470 mHz**, the units have been pre-tuned to cover these frequency ranges and require no further front end tuning. The discriminator, L1, and the I.F., C74, have been aligned by the factory, and should not need to be re-aligned when changing programming (steps 3, 4, and 5). The alignment procedure follows.

2. Inject a 100 uV signal into the receiver and modulate the signal with a 1 kHz tone at 3 kHz (1.5 kHz for narrowband) deviation.

3. Monitor the receive audio at test point TP6 with an Oscilloscope, and *carefully* adjust coil L1 for the most level.

4. The level at test point TP6 should be 900 mVp-p +/- 200 mV.

5. Connect a Distortion meter to TP6 and *slowly* adjust variable cap C74 for lowest distortion. Should be less than 3.0%.

6. Connect a SINAD meter to test-point TP6 and reduce the level of the RF signal from the service monitor until the SINAD meter reads 12 dB. This should be less than 0.35 uV for all bands.

7. Press the monitor button to monitor speaker audio. Adjust the squelch pot (R3) until squelch just breaks. Verify the 1 kHz tone is heard over the speaker when the unit is un-squelched and the speaker is muted when squelched.

8. Radio alignment is now complete.

Testing the Decoders

Set the RF level to 0.5 micro Volts for all decode tests. Run the appropriate decode tests matching the programming of the Informer.

CTCSS

1. This test should be performed with Monitor Mode Squelch selected when the Informer is programmed. Place the Informer in Monitor Mode.

2. Modulate the service monitor with the proper CTCSS tone @ 750 Hz (375 Hz for narrowband) of deviation and inject a 1 kHz tone @ 3 kHz (1.5 kHz for narrowband) deviation for a total deviation of 3.75 kHz (1.875 kHz for narrowband). Confirm that the 1 kHz is heard in the speaker when the CTCSS tone is present.

3. Remove the CTCSS tone and confirm that the speaker quiets.

Single Tone and 2-Tone Sequential

1. Encode the appropriate Single or Two Tone sequential tones @ 3 kHz (1.5 kHz for narrowband) deviation.

2. Confirm that the unit decodes each tone set and that the ALERT LED flashes unless the TEST LED is programmed to turn on.   (Note that the TAR cannot decode 2-tone codes while a tone is being generated by the TAR.)

DTMF

1. Set the encoder to send DTMF codes with a timing of 50 ms. digit on time and 50 ms. digit off time @ 3 kHz (1.5 kHz for narrowband) of deviation.

2. Encode the appropriate DTMF strings as programmed into the Informer. Confirm that the unit decodes each set of DTMF codes, and that the ALERT LED flashes after each decode (unless the TEST LED is programmed to turn on).

EAS and Digital

1. Set the encoder to send EAS or Digital codes @ 4 kHz (2 kHz for narrowband) of deviation.

2. Encode the appropriate EAS or Digital codes as programmed into the Informer. Confirm that the unit decodes each set of codes and that the ALERT LED flashes after each decode (unless the TEST LED is programmed to turn on).

<u>Checking the Power Supplies</u> (to be tested if a supply problem is suspected)

1. Turn the "Battery" switch ON.

2. Confirm +6.75 to 6.90 VDC at test point TP4.

3. Confirm +5 VDC +/- .10 V at test point TP3.

4. Confirm that the Green "AC POWER" LED is on steady.

5. Unplug the wall transformer and confirm that the "AC POWER" LED starts to flash.

6. Reduce the voltage of the variable supply to 5.0 VDC and Confirm that the unit shuts off.

<u>Testing the Display and Controls (Confirms proper re-assembly)</u>

1. Disconnect the service monitor from the unit.

2. Re-assemble the Informer into the housing after alignment is complete.

3. Press the MONITOR button and Confirm that the ALERT LED lights steady red. (Monitor must be enabled in software to perform this test)

4. Press and hold the MONITOR button for longer than 5 seconds.
   Confirm that squelch noise is heard in the speaker.

5. Press the "Volume Up" button and confirm that the volume of the noise goes up.

6. Press the "Volume Down" button and confirm that the volume of the noise goes down.

7. Press the RESET button and confirm the following actions occur:
   (a) Squelch noise is shut off.
   (b) Confirm that a beep is heard from the speaker.
   (c) Confirm that the TEST and the ALERT LED's (yellow and red) light
        momentarily.

8. End of Alignment and Test.