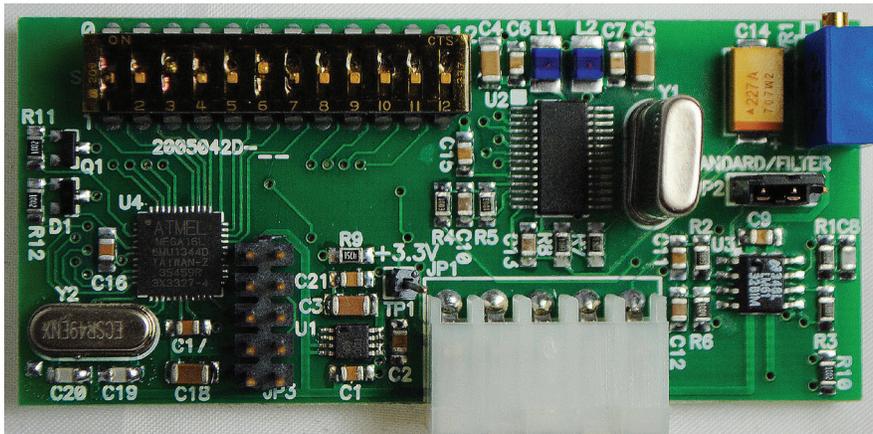


Tone and Digital Coded Squelch Module FS-PL1



For use with FC and UV systems that require a Private Line.

Description, Specifications, and Installation Manual

Limited Warranty

This product is subject to and covered by a limited warranty, a copy of which can be found at www.fedsig.com/SSG-Warranty. A copy of this limited warranty can also be obtained by written request to Federal Signal Corporation, 2645 Federal Signal Drive, University Park, IL 60484, email to info@fedsig.com or call +1 708-534-3400.

This limited warranty is in lieu of all other warranties, express or implied, contractual or statutory, including, but not limited to the warranty of merchantability, warranty of fitness for a particular purpose and any warranty against failure of its essential purpose.



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Safety Messages

⚠ WARNING

It is important to follow all instructions shipped with this product. This device is to be installed by trained personnel who are thoroughly familiar with the country electric codes and will follow these guidelines as well as local codes.

Listed below are important safety instructions and precautions you should follow:

Important Notice

Federal Signal reserves the right to make changes to devices and specifications detailed in the manual at any time in order to improve reliability, function or design. The information in this manual has been carefully checked and is believed to be accurate; however, no responsibility is assumed for any inaccuracies.

Installation and Service

- Electrocution or severe personal injury can occur when performing various installation and service functions such as making electrical connections, drilling holes, or lifting equipment. Therefore only experienced electricians should install this product in accordance with national, state and any other electrical codes having jurisdiction. Perform all work under the direction of the installation or service crew safety foreman.
- The sound output of sirens is capable of causing permanent hearing damage. To prevent excessive exposure, carefully plan siren placement, post warnings and restrict access to areas near the sirens. Sirens may be operated from remote control points. Whenever possible, disconnect all siren power including batteries before working near the siren.
- After installation or service, test the siren system to confirm that it is operating properly. Test the system regularly to confirm that it will be operational in an emergency.
- If future service personnel do not have these warnings and all other instructions shipped with the equipment to refer to, the siren system may not provide the intended audible warning and service personnel may be exposed to death, permanent hearing loss, or other bodily injury. File these instructions in a safe place and refer to them periodically. Give a copy of these instructions to new recruits and trainees. Also, give a copy to anyone who is going to service or repair the sirens.

Operation

Failure to understand the capabilities and limitations of your siren system could result in permanent hearing loss, other serious injuries or death to persons too close to the sirens when you activate them or to those you need to warn. Carefully read and thoroughly understand all safety notices in this manual and all operations-related-items in all instruction manuals shipped with equipment. Thoroughly discuss all contingency plans with those responsible for warning people in your community, company, or jurisdiction.

Read and adhere to all safety warnings in this manual before installing.

General Description

Introduction

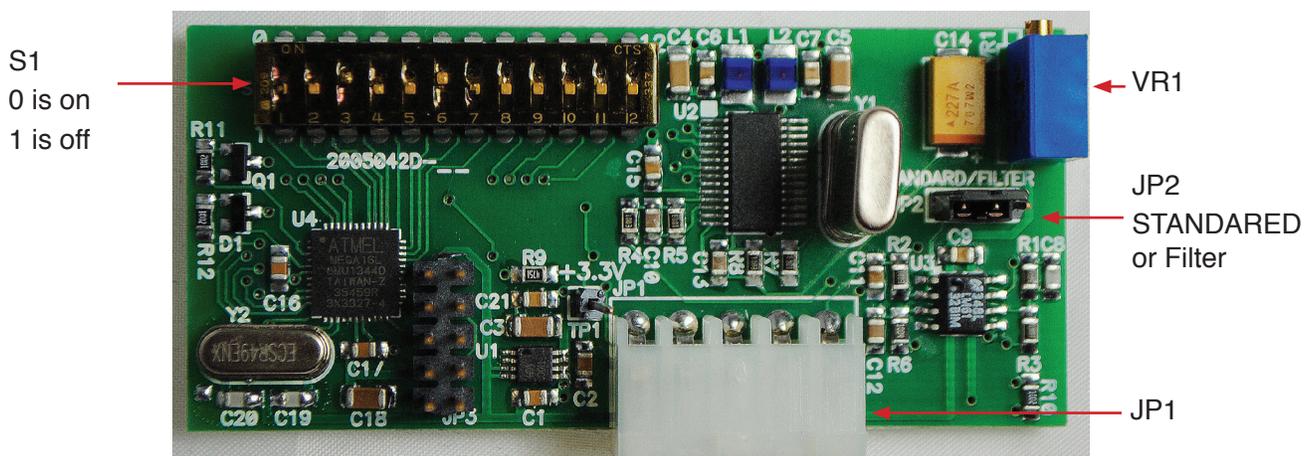
This manual describes the features, specifications, and installation of the Tone and Digital Coded Squelch Module (FS-PL1).

The Tone and Digital Coded Squelch Module (FS-PL1) is a plug-in board for FC or UV Controllers, which provides both encoding and decoding of Continuous Tone-Coded Squelch (CTCSS) and Digital Coded Squelch (DCS) Signals. Program FS-PL1 to the desired tone frequency or digital code by using the dip switches on the board. The FS-PL1 has been updated to include the functionality of both the FS-PL1 and FS-PL2.

Setting jumper JP2 to the STANDARD position, allows the unit to decode any digital or tone codes in the presence of other tones as low as 400 Hz. Setting jumper JP2 to the FILTERED position allows the unit to decode in the presence of other tones down to 300 Hz; however, it cannot decode digital codes or CTCSS codes over 200 Hz.

Use this module with Federal Signal FC and UV systems that require a Private Line. Refer to the Federal Signal Manual for your product at <http://www.fedsig.com>.

Figure 1 FS-PL1 Module



Features

The FS-PL1 Module has the following features:

- Small size that mounts on FC and UV control boards
- Rugged construction using surface-mount components
- Encode or decode all standard and non-standard CTCSS tones and standard digital codes
- Low current draw, excellent for battery powered operation
- Synthesized frequency selection
- Wide temperature operating range
- Excellent sensitivity

Specifications

Table 1 Electrical

Decode Input Level	50 to 2000 mVp-p for Tone and Digital signals
Decode Sensitivity	Better than 12 dB in the presence of other tones above 400 Hz with JP2 set for STANDARD. Better than 15 dB in the presence of other tones below 400 Hz with JP2 set for FILTERED.
Decode Turn on Time	< 200 ms
Decode Turn off Time	< 1.5 s
Digital decode Fade Time	1 second
Number of codes	60 - Tone, 83 Digital with JP2 set for STANDARD 51 - Tone only with JP2 set for FILTERED
Tone Frequency Range	62.5 to 254.1 Hz with JP2 set for STANDARD 62.5 to 199.5 Hz with JP2 set for FILTERED.
Tone Accuracy	> .05 Hz
Tone Decode Bandwidth	+/- 1.1%
Digital Encoding	Golay (23,12) 23 bit digital word
Digital Encoding Data Rate	134.4 Hz nominal
Controls	Transmit audio output level (VR1)

Installation Instructions

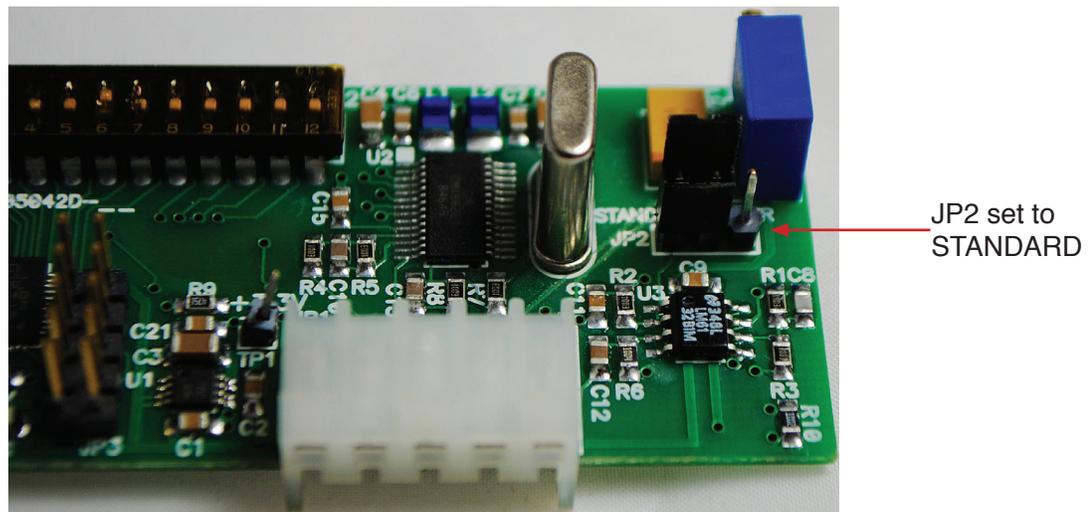
Installing FS-PL1 for Receive Private Line (Decoder)

This procedure is used most often.

To install FS-PL1 for receive private line, do the following:

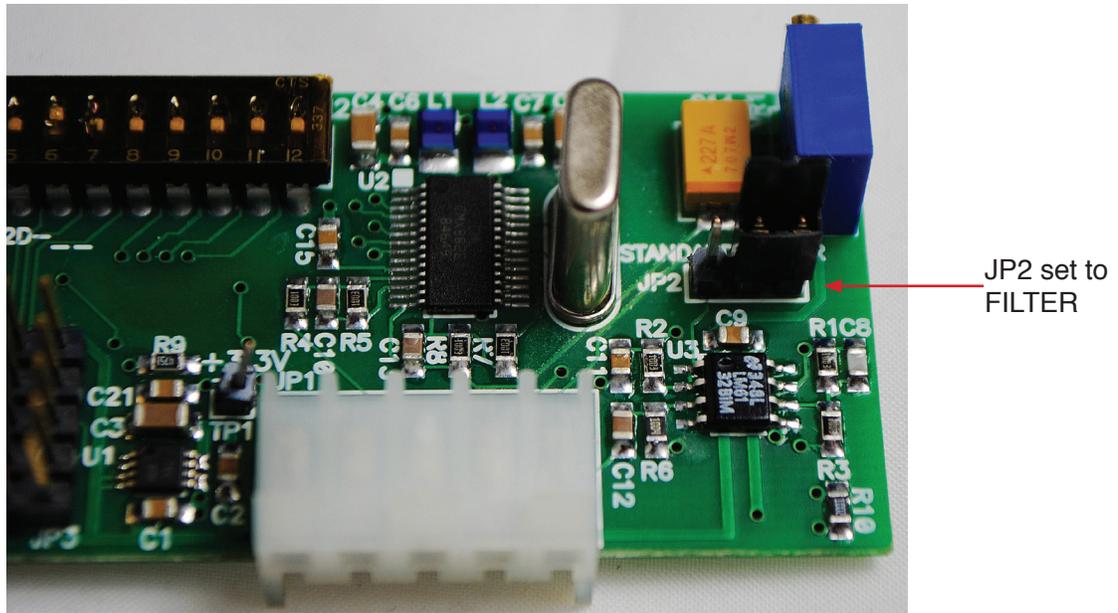
1. Set JP2 to either STANDARD or FILTER.

Figure 2 JP2 set to STANDARD position



Set jumper JP2 to the STANDARD position to allow the unit to decode any digital or tone codes in the presence of other tones as low as 400 Hz.

Figure 3 JP2 set to FILTER position



Set jumper JP2 to the FILTERED position to allow the unit to decode in the presence of other tones down to 300 Hz; however, it cannot decode digital codes or CTCSS codes over 200 Hz.

2. Set the switches to select the type of coded squelch and the tone or digital code. See the tables under the Setup section.
3. Install the FS-PL1 on your Federal Signal FC or UV control board.

Figure 4 Board without FS-PL1

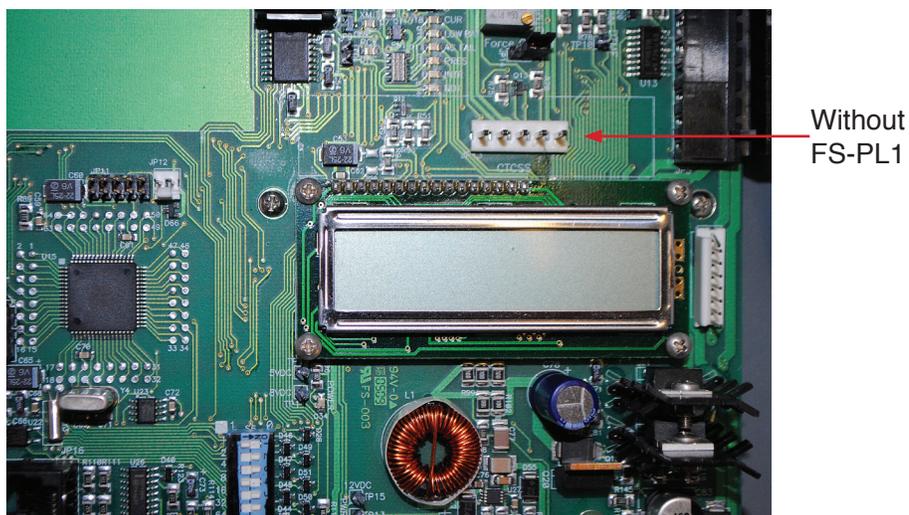
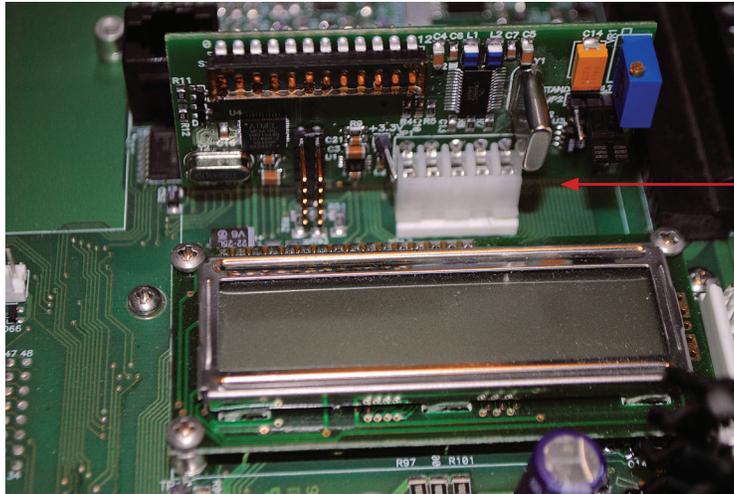
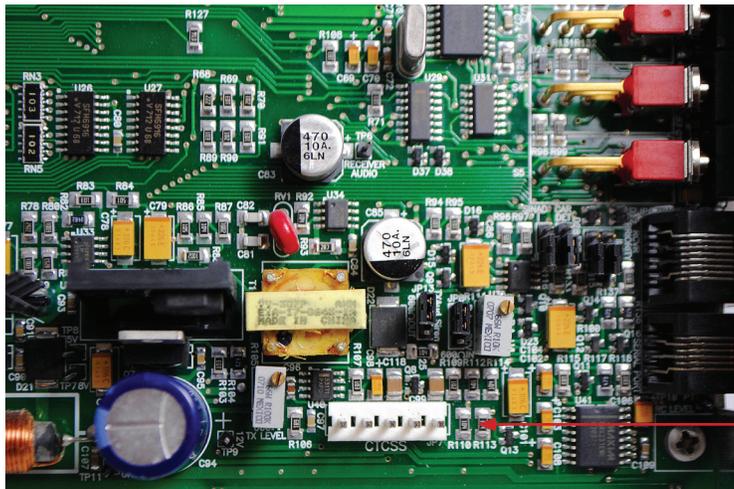


Figure 5 FC Board with FS-PL1



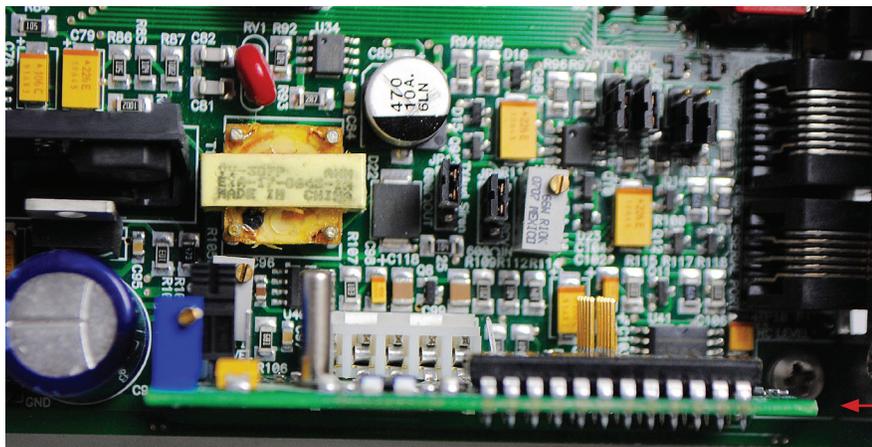
With
FS-PL1

Figure 6 UV Board without FS-PL1



Without
FS-PL1

Figure 7 UV Board with FS-PL1



With
FS-PL1

Installing FS-PL1 for Transmit Private Line (Encoder)

This procedure is rarely used.

If FS-PL1 is plugged into a controller that is connected to a transmitter and will be used to generate a coded squelch signal, set the transmit deviation.

To install the FS-PL1 for transmit private line, do the following:

1. Set JP2 to either STANDARD or FILTER.
2. Set the switches to select the type of coded squelch and the tone or digital code.
3. Set the siren controller to transmit its calibrate tone and insure that the deviation of the calibration tone is set to 1.5 kHz (3 kHz for wideband systems).
4. Install the FS-PL1 on your Federal Signal FC or UV control board.
5. Set the siren controller to transmit its calibrate tone again.
6. Using VR1, the transmit deviation pot, set the deviation to 1850 Hz (3750 Hz for wideband systems).

Setup

Use VR1 to set XMT deviation.

Set the switches one through twelve according to the following tables.

Table 2 Tone Coded Squelch Mode Switches

Switch Number	Definition
Switches 7 through 12	Must be in the 1 position, indicating that the unit is set for tone coded squelch

Table 3 Digital Coded Squelch Mode Switches

Switch Number	Definition
Switches 1 through 7	Sets the digital code
Switch 10	Sets the polarity of the transmit data (rarely used)
Switch 11	Sets the polarity of the receive data
Switch 12	Must be in the 0 position, indicating that the unit is set for digital coded squelch

Installation Instructions

Set the polarity switch to which ever position causes other units of the same type to decode or, if a service monitor is available that decodes digital codes, which ever switch position causes the monitor to decode.

Table 4 Tone Coded Squelch Programming

FREQ	CODE	SWITCH Number					
		1	2	3	4	5	6
62.5*		1	0	1	1	0	0
67.0	XZ	0	1	1	1	0	0
69.3*		1	1	1	1	0	0
71.9	XA	0	0	0	0	1	0
74.4	WA	1	0	0	0	1	0
77.0	XB	0	1	0	0	1	0
79.7	SP	1	1	0	0	1	0
82.5	YZ	0	0	1	0	1	0
85.4	YA	1	0	1	0	1	0
88.5	YB	0	1	1	0	1	0
91.5	ZZ	1	1	1	0	1	0
94.8	ZA	0	0	0	1	1	0
97.4	ZB	1	0	0	1	1	0
100.0	1Z	0	1	0	1	1	0
103.5	1A	1	1	0	1	1	0
107.2	1B	0	0	1	1	1	0
110.9	2Z	1	0	1	1	1	0
114.8	2A	0	1	1	1	1	0
118.8	2B	1	1	1	1	1	0
123.0	3Z	0	0	0	0	0	1
127.3	3A	1	0	0	0	0	1
131.8	3B	0	1	0	0	0	1
136.5	4Z	1	1	0	0	0	1
141.3	4A	0	0	1	0	0	1
146.2	4B	1	0	1	0	0	1
151.4	5Z	0	1	1	0	0	1
156.7	5A	1	1	1	0	0	1
159.8*		0	0	0	1	0	1
162.2	5B	1	0	0	1	0	1
167.9	6Z	0	1	0	1	0	1
171.3*		1	1	0	1	0	1
173.8	6A	0	0	1	1	0	1
177.3*		1	0	1	1	0	1
179.9	6B	0	1	1	1	0	1
183.5*		1	1	1	1	0	1
186.2	7Z	0	0	0	0	1	1

FREQ	CODE	SWITCH Number					
		1	2	3	4	5	6
189.9*		1	0	0	0	1	1
192.8	7A	0	1	0	0	1	1
196.6*		1	1	0	0	1	1
199.5*		0	0	1	0	1	1
203.5	M1	1	0	1	0	1	1
206.5*		0	1	1	0	1	1
210.7		1	1	1	0	1	1
218.1		0	0	0	1	1	1
225.7		1	0	0	1	1	1
229.1*		0	1	0	1	1	1
233.6		1	1	0	1	1	1
241.8		0	0	1	1	1	1
250.3		1	0	1	1	1	1
254.1*		0	1	1	1	1	1

1 = Off Switch

0 = On Switch

* = Non-EIA Standard Tones

SW7 – OFF

SW8 – Decode Drop-off Debounce; OFF = 1500 mS, On = 150 mS (Two-way Systems)

SW9 – SW12 ALL OFF

SW10 – OFF

SW11 – OFF

SW12 – OFF

Table 5 Digital Coded Squelch Programming

OCTAL CODE	SWITCH Number						
	1	2	3	4	5	6	7
023	0	0	0	0	0	0	0
025	1	0	0	0	0	0	0
026	0	1	0	0	0	0	0
031	1	1	0	0	0	0	0
032	0	0	1	0	0	0	0
043	1	0	1	0	0	0	0
047	0	1	1	0	0	0	0
051	1	1	1	0	0	0	0
054	0	0	0	1	0	0	0

Installation Instructions

OCTAL CODE	SWITCH Number
	1 2 3 4 5 6 7
065	1 0 0 1 0 0 0
071	0 1 0 1 0 0 0
072	1 1 0 1 0 0 0
073	0 0 1 1 0 0 0
074	1 0 1 1 0 0 0
114	0 1 1 1 0 0 0
115	1 1 1 1 0 0 0
116	0 0 0 0 1 0 0
125	1 0 0 0 1 0 0
131	0 1 0 0 1 0 0
132	1 1 0 0 1 0 0
134	0 0 1 0 1 0 0
143	1 0 1 0 1 0 0
152	0 1 1 0 1 0 0
155	1 1 1 0 1 0 0
156	0 0 0 1 1 0 0
162	1 0 0 1 1 0 0
165	0 1 0 1 1 0 0
172	1 1 0 1 1 0 0
174	0 0 1 1 1 0 0
205	1 0 1 1 1 0 0
223	0 1 1 1 1 0 0
226	1 1 1 1 1 0 0
243	0 0 0 0 0 1 0
244	1 0 0 0 0 1 0
245	0 1 0 0 0 1 0
251	1 1 0 0 0 1 0
261	0 0 1 0 0 1 0
263	1 0 1 0 0 1 0
265	0 1 1 0 0 1 0
271	1 1 1 0 0 1 0
306	0 0 0 1 0 1 0
311	1 0 0 1 0 1 0
315	0 1 0 1 0 1 0
331	1 1 0 1 0 1 0
343	0 0 1 1 0 1 0
346	1 0 1 1 0 1 0
351	0 1 1 1 0 1 0
364	1 1 1 1 0 1 0
365	0 0 0 0 1 1 0

OCTAL CODE	SWITCH Number
	1 2 3 4 5 6 7
371	1 0 0 0 1 1 0
411	0 1 0 0 1 1 0
412	1 1 0 0 1 1 0
413	0 0 1 0 1 1 0
423	1 0 1 0 1 1 0
431	0 1 1 0 1 1 0
432	1 1 1 0 1 1 0
445	0 0 0 1 1 1 0
464	1 0 0 1 1 1 0
465	0 1 0 1 1 1 0
466	1 1 0 1 1 1 0
503	0 0 1 1 1 1 0
506	1 0 1 1 1 1 0
516	0 1 1 1 1 1 0
532	1 1 1 1 1 1 0
546	0 0 0 0 0 0 1
565	1 0 0 0 0 0 1
606	0 1 0 0 0 0 1
612	1 1 0 0 0 0 1
624	0 0 1 0 0 0 1
627	1 0 1 0 0 0 1
631	0 1 1 0 0 0 1
632	1 1 1 0 0 0 1
654	0 0 0 1 0 0 1
662	1 0 0 1 0 0 1
664	0 1 0 1 0 0 1
703	1 1 0 1 0 0 1
712	0 0 1 1 0 0 1
723	1 0 1 1 0 0 1
731	0 1 1 1 0 0 1
732	1 1 1 1 0 0 1
734	0 0 0 0 1 0 1
743	1 0 0 0 1 0 1
754	0 1 0 0 1 0 1

1 = Off Switch

0 = On Switch

SW8 - Decode Drop-Off Debounce; OFF = 1500 mS, On = 150 mS (Two-way Systems)

SW9 - OFF

SW10 - OFF = TX DATA NON-INVERTED

SW10 - ON = TX DATA INVERTED

SW11 - OFF = RX DATA NON-INVERTED

SW11 - ON = RX DATA INVERTED

SW12 - OFF = TONE CODED SQUELCH

SW12 - ON = DIGITAL CODED SQUELCH

Testing the Unit

Testing the Decoder (Receive)

To test the decoder, do the following:

1. Set the switches for a tone code. See Table 2 Tone Coded Squelch Mode Switches.
2. If using a generator (radio service monitor) connected directly to the unit, generate the tone into the units input at a level of no more than 70 mV p-p.

If the unit is plugged into an RTU with a receiver, set the deviation to 350 Hz (750 Hz for wideband receivers).

3. Confirm that JP1 pin 4 pulls low while the tone is present.
4. Repeat this procedure with a digital code.

NOTE: Keep in mind that the receive polarity switch may have to be set up or down depending on the receiver that the unit is plugged into. See Table 3 Digital Coded Squelch Mode Switches. Use for the Digital Coded Squelch only.

Testing the Encoder (Transmit)

To test the encoder, do the following:

For a Tone Code

To test the encoder for a tone code, do the following:

1. Set the switches for a tone code. See Table 2 Tone Coded Squelch Mode Switches and Table 4 Tone Coded Squelch Programming.
2. Set VR1 fully clockwise, that is, all the way up.
3. The encode tone should be visible with a scope at pin 5 of JP1.
4. If the unit is plugged into a controller and transmitter, set the tone deviation to 350 Hz (750 Hz for wideband units). See Installing the FS PL1 for Receive Private Line (Decoder) or Installing the FS PL1 for Transmit Private Line (Encoder) for procedures.

For a Digital Code

To test the encoder for a digital code, do the following:

1. Set the switches for a digital code. See Table 3 Digital Coded Squelch Mode Switches and Table 6 Digital Coded Squelch Programming.
2. Short pin 4 of JP1 to ground.
3. The encode data should be visible with a scope at pin 5 of JP1.
4. If the unit is plugged into a controller and transmitter, set the tone deviation to 350 Hz (750 Hz for wideband receivers). See Installing the FS PL1 for Receive Private Line (Decoder) or Installing the FS PL1 for Transmit Private Line (Encoder) for procedures.

Getting Service

If you are experiencing any difficulties, contact Federal Signal Customer Care at: 800-548-7229 or 708-534-3400 extension 5822 or Technical Support at: 800-524-3021 or 708-534-3400 extension 7329 or through e-mail at: techsupport@fedsig.com. For instruction manuals and information on related products, visit: <http://www.fedsig.com/>



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