



**SE2000**

(Part No. 2005457)

**Serial to Ethernet Converter  
with VoIP**

**User's Guide**

255373A  
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## 1 General Description

### 1.1 Introduction

The purpose of the SE2000 (Serial to Ethernet Converter) is to allow serial devices to communicate over an Ethernet network and provide audio decoding of digitized audio sent over the network.

The converter is configured with its own fixed IP address and port number. When packets of data are received over the Ethernet port that are addressed to the board's IP and port number, they are converted to serial data and sent out over the serial port. Likewise, any data coming into the serial port is converted to TCP/IP data packets and sent out over the Ethernet port to the Server's IP address. The unit also contains a digital to analog converter. This allows specially configured incoming data packets to be converted to audio, which is then filtered and sent out over a 600-ohm audio port.

The SE2000 is designed to utilize the FS Codespear interoperable, redundant server platform.

### 1.2 Features Summary

- User configurable IP address
- Digital to analog conversion allowing reception of Voice over Internet Protocol (VoIP)
- $\mu$ Law compander reduces bandwidth requirements and improve SNR
- Wide input supply range allowing connection to wide variety of power sources
- 600-ohm audio output for easy and universal audio interface
- Display LEDs to monitor Power, CPU, Link, LAN, TXD and RXD
- Integral FLASH drive, stores a web page that can be accessed from any web browser
- Integral local RS232 port for local control, configuration and programming
- Integral password protection and IP address firewall
- IP QoS prioritization using IP ToS precedence (RFC 791) or DSCP (RFC 2474)

Description

## 2 Specifications

### 2.1 Electrical

Input Voltage	10.5 - 95 VDC
Current Draw	<150 mA

### 2.2 Serial Port

Serial Port Protocol	RS232C, N, 8, 1 baud rate configurable
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### 2.3 Ethernet Port

Protocol	IEEE 802.3, 10BASE-T connection
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### 2.4 600 Ohm Audio Output Port

Protection	MOV and transorb surge protection
Impedance	600 ohms
Audio Output Level	Adjustable from 0.30 to 3.00 V <sub>p-p</sub> , (-17 dB to +2.7 dB) into 600 ohms

### 2.5 Connectors

JP1	600-Ohm Audio Output Port Balanced line output
JP2	JTAG Emulation Port
JP3	Pins 1 & 2 must be shorted (factory default configuration)

**JP4 RS232 Serial Port**

- 1 -
- 2 -
- 3 - Ground, 0.5 amps maximum current capacity
- 4 - Radio transmit data from PC, standard RS232 levels
- 5 - Radio receive data to PC, standard RS232 levels
- 6 - Ground, 0.5 amps maximum current capacity

**JP5 FLASH Programming and Converter Configuration Port**

- 1 -
- 2 - TX Data, standard RS232 levels
- 3 - RX Data, standard RS232 levels
- 4 - Ground
- 5 - Serial Clock input for FLASH programming, standard RS232 levels
- 6 - Processor Reset Not line, used in programming FLASH, 10K pull-up

**JP6 10.5-95 VDC Power Input**

- 1 - (-)
- 2 - (+)

**JP7 Resets board back to factory default settings**

**J1 Ethernet Network Port**

- 1 & 2 - Transmit data pair, balanced line
- 3 & 6 - Receive data pair, balanced line
- 4, 5, 7, 8 - AC coupled ground

**2.6 Indicators**

- D1 - CPU Heartbeat indicator, green
- D2 - Transmit data indicator, red
- D3 - Receive data indicator, yellow
- D4 - Power indicator, green

**2.7 Controls**

R1 - 600-ohm audio output level set

**2.8 Environmental**

Operating Temperature  
Humidity

-30 °C - +65 °C  
0 - 95% non-condensing

**2.9 Physical**

~ 2" height, 4" width, 6.5" length  
< 2 lbs weight

### **3 Network Information**

#### **3.1 Protocols supported**

- TCP/IP (only supported with FS Codespear servers)
- HTTP
- UDP (for future use)
- XML (for future use)
- XMPP (for future use)

#### **3.2 IP Ports used**

16887 (Codespear TCP/IP)  
80 (HTTP)  
3100 (UDP and TCP/IP Serial over IP – not currently using)  
3101 (UDP and TCP/IP Voice over IP – not currently using)

#### **3.3 IP Address**

User selectable

#### **3.4 ToS/DSCP (Type of Service)**

ToS (RFC 791) values 0-7 are used  
DSCP (RFC 2474) values 0-63 are used

#### **3.5 Bandwidth Requirements**

Voice over IP: 150K bps / connection  
Siren Activation: 450 bps / connection  
Siren Poll Response: 593 bps / connection

## 4 Testing and Alignment

### **WARNING**

Service or maintenance should be performed by qualified personnel familiar with Ethernet network equipment and power sources being used. ESD precautions must be used when handling electronic equipment.

This procedure can be used to test the SE2000 Serial to Ethernet converter to verify that it is operating properly and set to the appropriate audio output level.

### **4.1 Apply Power and Check Voltages**

Apply power to the Serial to Ethernet converter JP6  
Pin 1 = ground, Pin 2 = 10.5 - 95 VDC

Using TP3 as reference ground:

Check for 11 to 13 VDC at TP6

Check for 8 VDC +/- 5% at TP5

Check for 5 VDC +/- 5%V at TP4

### **4.2 FLASH / Programming Serial Port (JP5)**

(This step is for authorized service personnel and requires appropriate software and cables to complete. Contact the Customer Care Center at 800-524-3021 for further assistance.)

Plug the FLASH serial cable into a computer and JP5 on the unit.  
Start the "WINDOWS<sup>®</sup>" based FLASHing program. Then follow the instruction to "Update" the software of the unit.

This confirms that the FLASH serial port is functioning.

### 4.3 Micro-Controller

Confirm that the CPU heartbeat LED (middle green LED) is flashing.

### 4.4 Ethernet Port

Make an Ethernet connection between your PC and the SE2000 using either a straight through or crossover cable. If your SE2000 board has not been preconfigured, you will need to change your PC's Network Settings to match the board's default network settings as follows: **IP Address: 10.10.10.2 and Subnet Mask: 255.255.255.248**

If the board has been preconfigured, place your PC on an appropriate IP, Subnet and Gateway for the system you are working on. The SE2000 will reset itself every 30 seconds while it is trying to make a connection to a network server. You must wait for the board's CPU LED to blink and an Ethernet connection is established with your PC before reading the board's web page or sending a configuration to the board if the SE2000 has not already been connected to a network server.

Once your PC has been configured and a network connection has been established with the SE2000, use Internet Explorer to open the Ethernet board's web page by typing in the URL <http://10.10.10.1> (or the preconfigured IP address assigned to the board). After typing this URL and pressing the Enter key, the Ethernet board's web page should appear. If it does not appear, check your PC's network settings to be sure they are set described shown above. Once the web page comes up, you have successfully verified operation of the Ethernet port.

### 4.5 Ethernet Converted Serial Port (JP4) and 600-Ohm Audio Output

This test ties serial port JP4 to the board's programming port JP5. These two ports talk back and forth to verify both are working. If successful, the board will generate a 1kHz tone out of the 600-ohm audio port.

Connect JP4 to JP5 using an RJ11/RJ12, 6 conductor, crossover cable (standard telephone cable).

Cycle power to the board. On power-up the unit will send from one serial port to the other and then back again. If the data makes the full round trip then the serial ports are working and the board will generate a 1kHz tone out through the 600 ohm port.

Monitor the output of the 600-ohm port and adjust pot R1 until this level is  $354 \text{ mV}_{\text{RMS}}$ , +/- 10% (this is the nominal level used with FSC siren systems. R1 may be adjusted as necessary when connecting to other equipment).

## 5 Software Configuration

### 5.1 Configuring the Ethernet Board

Before using the board, it must first be configured with the proper network parameters. To configure these parameters, a web page exists on the board that can be accessed via the Ethernet port on the SE2000 board. Consult with your system Project Manager to make sure all network settings are identified for the system before configuring the SE2000.

To begin configuring your board, make sure you have an Ethernet connection between your PC and the SE2000. If your SE2000 board has not been preconfigured, you will need to change your PC's Network Settings to match the board's default network settings as follows: **IP Address: 10.10.10.2 and Subnet Mask: 255.255.255.248**

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## 5.2 Default Configuration Settings

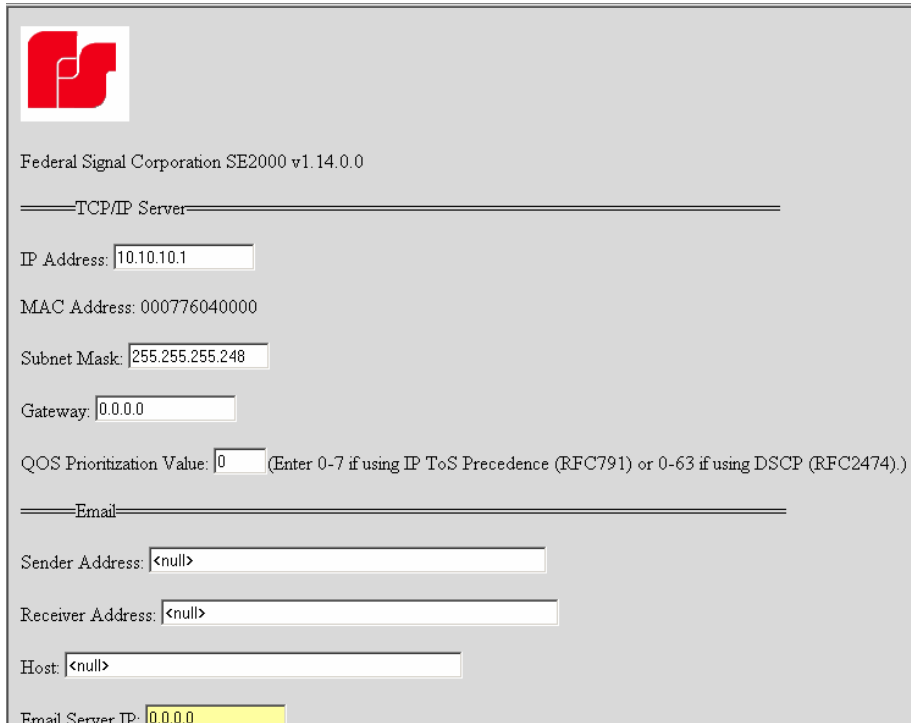
**IP Address:** 10.10.10.1  
**Subnet Mask:** 255.255.255.248  
**Gateway:** 0.0.0.0 (No gateway)  
**QOS:** 0 (No priority)  
**Email Settings:** <null>  
**Firewall Security:** <null>  
**Serial Port:** 9600 Baud  
**Smart Message Server:**

- Server IP – Blank
- Siren # - 1

**VOIP Under run delay:** 5  
**Username:** admin  
**Password:** fedsig

If the board is configured incorrectly or the configuration settings are lost, the board can be reset by manually shorting JP7 and cycling power to the board. Keep the jumper shorted until the CPU LED begins blinking before removing the jumper.

The web page for the board is shown below in the default configuration:



The screenshot displays the web configuration interface for the Federal Signal SE2000. It features a red logo in the top left corner and the text "Federal Signal Corporation SE2000 v1.14.0.0". The interface is divided into sections: "TCP/IP Server" with fields for IP Address (10.10.10.1), MAC Address (000776040000), Subnet Mask (255.255.255.248), Gateway (0.0.0.0), and QOS Prioritization Value (0). Below this is the "Email" section with fields for Sender Address, Receiver Address, Host, and Email Server IP (0.0.0.0).

## Software Configuration

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Firewall

Use Firewall Security  Checking this box restricts this device to accept connections from only these IP's.

IP 1:  IP 2:

IP 3:  IP 4:

IP 5:  IP 6:

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Serial Port

1200  -----2400

4800  -----9600

19200  -----38400

57600  -----115200

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SmartMSG Server

Server IP:

Siren Number:

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VOIP

Underrun delay seconds (1 - 60):

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Login

User Name:  New User Name:

Password:  New Password:

### 5.2.1 IP Address, Subnet, Gateway, and QoS Configuration

On the Configuration web page shown above, the first section is for configuring the board's network settings. The IP Address should be an address recognized on the network you are going to use. The Subnet Mask and Gateway must match the settings assigned to your network by the System Administrator.

The QoS Prioritization value is used for setting the Type of Service field in the IP Datagram. By setting this field, you can prioritize the network traffic generated by the Serial to Ethernet board. If your routing hardware is using IP ToS (RFC 791) then you will need to enter a value from 0-7. If your routing hardware is using DSCP (RFC 2474) then a value from 0-63 should be entered. Check with your System Administrator to determine how to implement QoS on your network. The default value should be used if QoS is not supported.

## Software Configuration

### 5.2.2 Email Configuration (reserved for future use)

The Email Setup parameters are for setting the device to issue an email. The parameters for configuring this are:

**Sender Address:** Your email address (email address sending from)  
**Receiver Address:** Recipient's email address  
**Host:** SMTP Email Server (i.e. smtp.myemailserver.com)  
**Email Server IP:** IP Address of SMTP Email Server

### 5.2.3 IP Address Firewall Configuration

In the next section, check the Use Firewall Security box if you wish to restrict access to the configuration web page. Only the IP addresses contained in the list will be able to connect to the board's web page. You can enter up to 6 different IP addresses. This setting does not affect TCP/IP connectivity for data or VoIP since this traffic uses other encryption and authentication methods.

### 5.2.4 Serial Port Configuration

Check the box for the Baud Rate you wish to use. The board is pre-configured for 8 data bits, no parity, 1 Stop bit and no flow control. 1200 baud is typically used for siren control and status monitoring. Larger systems may be configured to use higher baud rates. Verify that the data rate is correct for the network you are connecting to and that only one box is checked.

### 5.2.5 SmartMSG Configuration

**Server IP:**

Enter the IP address of the parent FS Codespear server in the Server IP field.

**Siren Number:**

This number identifies the RTU address on the FS Codespear network. Every SE2000 board used must have a unique Siren Number on the network and when used with a siren controller, this number must match the DIP switch setting of the siren control board.

### 5.2.6 VoIP

Under-run delay seconds:

This field sets the number of seconds audio is buffered before playback begins. If playback audio is interrupted do to low system throughput, increase this value.

### 5.2.7 Updating Configuration and Password Configuration

The last section is used for authenticate the user. Before configuration changes can be made, a correct User Name and Password must be entered. The board is initially shipped with the default settings:

**User Name:** admin

**Password:** fedsig

If you wish to change the User Name and Password, you must enter in the new User Name and Password in the text boxes labeled 'New...'. You must also enter in the current User Name and Password to make this change. If the new password assignments are lost, the board will have to be reset to factory defaults.

#### Notes:

1. You may have to refresh your Internet Explorer page to get the screen to update since the page may be cached.
2. Once the IP address/subnet of the board is changed, you will lose your connection with the board until you reconfigure your PC to the new IP/subnet scheme and redirect your web page to the new address.
3. Refresh the web page after making any configuration changes to make sure the changes were made successfully.

### 5.2.8 Network Testing

Once the SE2000 has been reconfigured, test all functions of the system from each network node to verify proper operation. Make sure both serial and audio (if used on the network) are tested. If more than one network server is used, automatic failover should be tested for all failover servers.