



SX800 TRANSCEIVER OPERATING INSTRUCTIONS

1892 1277

These operating instructions are intended to provide the user with sufficient information to install and operate the unit correctly.

The Wood and Douglas SX800 UHF transceiver is designed for low power telemetry applications.

The transceiver is approved to the EN 300 220 specification for use throughout Europe. The module is also approved to the EMC specification ETS 300 683.

These two approvals restrict the use of the equipment and so should only be used in the following manner:

Module use	Mobile and Portable
Power Supply	6.0 - 15VDC (but not approved for use with a vehicular power supply)
Antenna	the gain of any antenna used with the SX800 must be limited in line with the band of operation and the setting of the output power
Labelling	The labelling requirements for the modules are shown in the Table 1 which also details the various frequency bands available in the 868 - 870 MHz band with the associated power and duty cycle.

General Telemetry and Telecommand			
Sub-band (MHz)	Max. Power erp (mW)	Duty cycle	Label Requirement
868.0 - 868.6	25	<1%	CEPT SRD 1f GB
868.7 - 869.2	25	<0.1%	CEPT SRD 1g GB
869.3 - 869.4	10	<10%	CEPT SRD 1h GB
869.4 - 869.65	500	[<10%]	CEPT SRD 1i GB
869.7 - 870	5	Up to 100%	CEPT SRD 1k GB
Alarms			
868.6125, 868.6375, 868.6625, 868.6875	10	<0.1%	CEPT SRD 7a GB
869.2125, 869.2375	10	<0.1%	CEPT SRD 7b GB
869.2625, 869.2875	10	<0.1%	CEPT SRD 7c GB
869.6625, 869.2875	25	<10%	CEPT SRD 7d GB
<p>NOTE: The channel spacing for the SX850 is 25kHz. The centre of the first channel is at a distance of 12.5kHz from the lower frequency band edge.</p>			

Table 1 Labelling Requirements

INSTALLATION

NOTES: Pin spacing on all connectors is 2.54mm (0.1")
All dimensions in millimetres

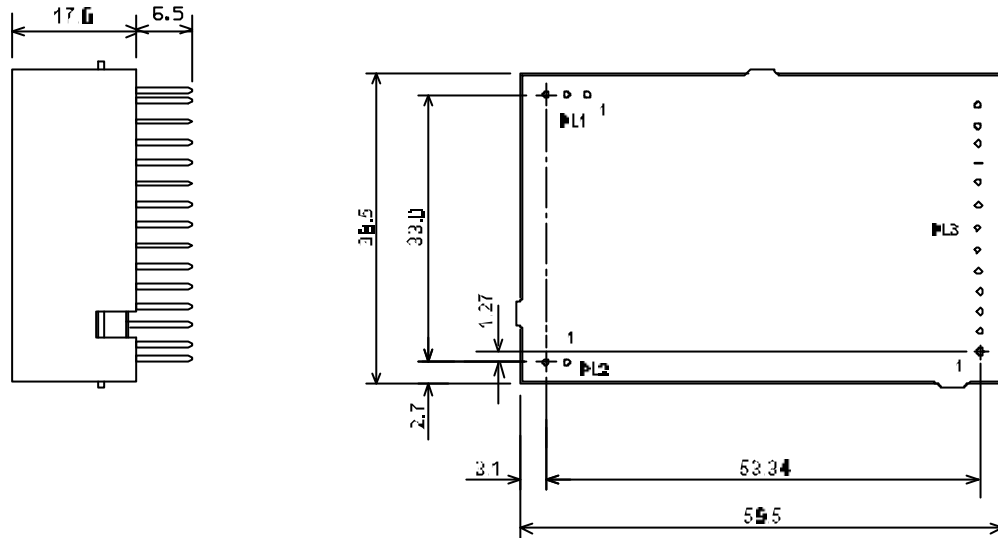


Figure 1 SX800 Outline Drawing

CONNECTION

Connections to the SX800 transceiver are via PL1, PL2 and PL3 which plug directly into the user's own equipment. The location of these connectors is shown in Figure 1 and detailed in the following tables.

PL1 PIN	NAME	FUNCTION	REMARKS
1	0V	0 volts	common ground
2	RF O/P	RF output	50 ohms output
3	0V	0 volts	common ground

Table 2 PL1 Pin Connections

PL2 PIN	NAME	FUNCTION	REMARKS
1	+VRAW	DC Supply Input	6.0 - 15 VDC input
2	0V	0 volts	common ground

Table 3 PL2 Pin Connections



PL3 PIN	NAME	FUNCTION	REMARKS
1		Transmit Enable	< 0.5V = Transmit ON (internal 20kS pullup)
2	n/c		
3	AI	Analogue Input	Analogue : 750 mV p-p nominal
4	RSSI	Received Signal Strength Indication	RSSI: 0.5 - 2.0 V, 60dB dynamic range (<33kS output impedance)
5		Squelch	Open drain to <0.4V with 10kS load. Low = No Signal
6	AF	Audio Output	250mV p-p nominal (~1kS output impedance) Note inversion of audio from TX input to RX output
7	CTCSS	Audio output	De-emphasised audio output without low frequency filtering which can be used for tone selective calling
8	+VOUT	+ 5 volt supply output	VOUT= 50mA maximum current drain Note: This is a low current output which should not be connected to any circuitry which may induce noise onto the line.
9	0V	0 volts	common ground
10	RS232 I/P	serial programming i/p	TTL/RS232 programming input
11	RB1	parallel frequency select	internal pull-up to +5V, active low
12	RB2		
13	RB3		

Table 4 PL3 Pin Connections

FREQUENCY PROGRAMMING

An area of the PIC memory is re-programmable and allows up to 24 channels to be set to random frequencies and 232 channels to be set to sequential frequencies. The first 8 of the random frequencies can be accessed in parallel mode using the three programming pins RB1, 2 and 3. To access the rest of the channels, the serial programming mode is required. The channel change can be controlled through this serial input.

the 868 - 870 MHz band of frequencies is detailed in Table 4. This frequency table is programmed as a sequential table in the SX800. The 8 channels (0 - 7) which can be changed in parallel mode can be re-programmed to any of the available channels using the Windows® based software supplied with the SX800 transceiver. This software allows both a new channel to be selected as well as the re-programming of the internal frequency information.

The software can be run on a PC with the serial port connected to PL3 of the SX800 transceiver via a suitable adaptor as shown in Figure 2. If the internal stored data is to be accessed, the read-back function is desired, then PL3 pin 13 of the transceiver must be connected to pin 2 of the PC serial port via a buffer circuit. A 1k pull-up resistor to +5V must also be provided as shown.

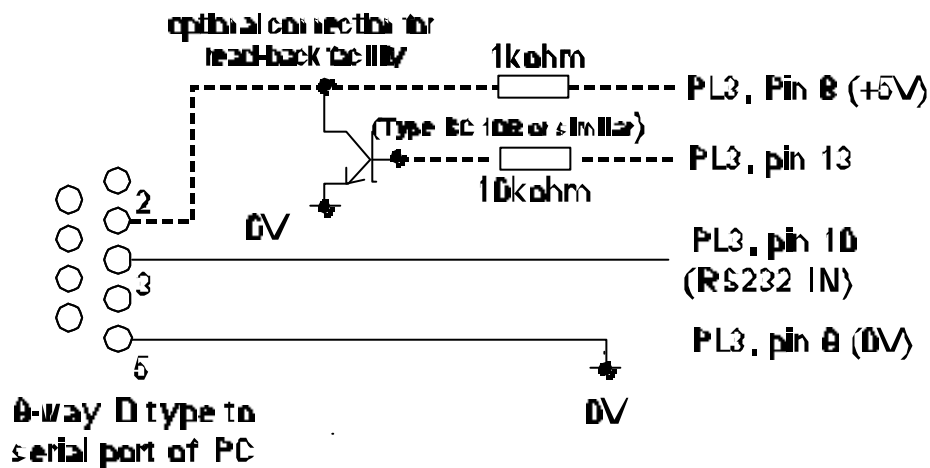


Figure 2 Programming Adaptor

868 - 870 MHz SRD Band Allocations

Channel No.	Frequency MHz	TX Power mW	Duty Cycle %	Application
	868.000000			Band Edge
0	868.012500	25	<1	General SRDs
1	868.037500	25	<1	General SRDs
2	868.062500	25	<1	General SRDs
3	868.087500	25	<1	General SRDs
4	868.112500	25	<1	General SRDs
5	868.137500	25	<1	General SRDs
6	868.162500	25	<1	General SRDs
7	868.187500	25	<1	General SRDs
8	868.212500	25	<1	General SRDs
9	868.237500	25	<1	General SRDs
10	868.262500	25	<1	General SRDs
11	868.287500	25	<1	General SRDs
12	868.312500	25	<1	General SRDs
13	868.337500	25	<1	General SRDs
14	868.362500	25	<1	General SRDs
15	868.387500	25	<1	General SRDs
16	868.412500	25	<1	General SRDs
17	868.437500	25	<1	General SRDs
18	868.462500	25	<1	General SRDs
19	868.487500	25	<1	General SRDs
20	868.512500	25	<1	General SRDs
21	868.537500	25	<1	General SRDs
22	868.562500	25	<1	General SRDs
23	868.587500	25	<1	General SRDs
	868.600000			Band Edge
24	868.612500	10	< 0.1	General Alarms
25	868.637500	10	< 0.1	General Alarms
26	868.662500	10	< 0.1	General Alarms
27	868.687500	10	< 0.1	General Alarms
	868.700000			Band Edge
28	868.712500	25	< 0.1	General SRDs
29	868.737500	25	< 0.1	General SRDs
30	868.762500	25	< 0.1	General SRDs
31	868.787500	25	< 0.1	General SRDs
32	868.812500	25	< 0.1	General SRDs
33	868.837500	25	< 0.1	General SRDs
34	868.862500	25	< 0.1	General SRDs
35	868.887500	25	< 0.1	General SRDs
36	868.912500	25	< 0.1	General SRDs
37	868.937500	25	< 0.1	General SRDs
38	868.962500	25	< 0.1	General SRDs
39	868.987500	25	< 0.1	General SRDs
40	869.012500	25	< 0.1	General SRDs
41	869.037500	25	< 0.1	General SRDs
42	869.062500	25	< 0.1	General SRDs
43	869.087500	25	< 0.1	General SRDs
44	869.112500	25	< 0.1	General SRDs
45	869.137500	25	< 0.1	General SRDs
46	869.162500	25	< 0.1	General SRDs
47	869.187500	25	< 0.1	General SRDs
	869.200000			Band Edge

Channel No.	Frequency MHz	TX Power mW	Duty Cycle %	Application
48	869.212500	10	< 0.1	Social Alarms
49	869.237500	10	< 0.1	Social Alarms
50	869.262500	10	< 0.1	Security Alarms
51	869.287500	10	< 0.1	Security Alarms
	869.300000			Band Edge
52	869.312500	10	< 10	Home Automation
53	869.337500	10	< 10	Home Automation
54	869.362500	10	< 10	Home Automation
55	869.387500	10	< 10	Home Automation
	869.400000			Band Edge
56	869.412500	500	< 10	General SRDs
57	869.437500	500	< 10	General SRDs
58	869.462500	500	< 10	General SRDs
59	869.487500	500	< 10	General SRDs
60	869.512500	500	< 10	General SRDs
61	869.537500	500	< 10	General SRDs
62	869.562500	500	< 10	General SRDs
63	869.587500	500	< 10	General SRDs
64	869.612500	500	< 10	General SRDs
65	869.637500	500	< 10	General SRDs
66	869.650000			Band Edge
	869.662500	25	< 0.1	General Alarms
67	869.687500	25	< 0.1	General Alarms
	869.700000			Band Edge
68	869.712500	5	100	General SRDs
69	869.737500	5	100	General SRDs
70	869.762500	5	100	General SRDs
71	869.787500	5	100	General SRDs
72	869.812500	5	100	General SRDs
73	869.837500	5	100	General SRDs
74	869.862500	5	100	General SRDs
75	869.887500	5	100	General SRDs
76	869.912500	5	100	General SRDs
77	869.937500	5	100	General SRDs
78	869.962500	5	100	General SRDs
79	869.987500	5	100	General SRDs
	870.000000			Band Edge

Table 5 868 - 870 MHz Frequency Allocations

Software Installation

The s/w is installed by following the normal procedures for installing windows based software.

Insert CD or the first floppy disk and run the "setup.exe" program. Follow the on-screen instructions and the s/w will be installed into the c:\program files\sxn00 directory (WIN98) or c:\programs\sxn00 (WIN95) directories. A program icon will be placed in the s/w group designated during the installation routine.

Running the Software

The s/w is accessed after installing by a single click on the SXn00 icon. A screen page is displayed through which all functions are accessed.

The fields shown in colour can be accessed and modified. Those field shown in grey are fixed by the hardware of the SX800 and cannot be changed by the user.

Data is accessed by moving through the fields using the mouse or the TAB key. Where data can be modified, a short description of the data is shown at the bottom of the screen as an aide-memoir.

There are 4 main areas of the screen plus the drop-down menu buttons at the top of the screen. The default settings of the screen give the user access to the common data to be modified through these four areas:

Random Channel Table	This gives access to the first 24 channels which can be set to any random frequency.
Sequential Channel Table	This gives access to the 232 channels which can only be sequential
Current Settings	This sets up the program parameters
Unit Program Commands	This area sets up the data transfer to and from the SX800

Top Level Menu

File *Load* Load a pre-stored set of data.

A file list is displayed which can be selected and loaded by using the mouse, highlighting and double clicking.

Save Save the current set of data

A set of directories are displayed. When in the correct directory, overwrite the default file name displayed and click or hot <ENTER>.

Print Print the current set of data.

The currently selected Windows default printer will be used.

Exit Exit the program.

View *Internal EEPROM Contents*

This displays in a separate window the contents of the units EEPROM. The data displayed is for the functions and channels displayed on the main screen at that time. While this window is displayed, no access is available to the main screen. The window must be cleared down by clearing the "tick" in the View drop-down menu.

Unit Settings

PIC Code only displayed when the Readback function has been used to download the contents of the EEPROM.

Current Settings Data

COM port	Select the correct serial port for the connection to the SX800, default COM1.
Intermediate Frequency	The Intermediate Frequency is fixed by the hardware and cannot be accessed
Fosc	The oscillator frequency is fixed by the hardware and cannot be accessed.
Comparison Freq. (Fc)	The channel step size is fixed by the hardware at 12.5 kHz. For 25kHz or other channel spacings, set the Table Step size accordingly.

Minimum Frequency The minimum frequency is used by the software as a base-line for all other frequency information. This frequency is determined by the physical build of the unit and how it has been aligned. The s/w will not allow a frequency below this minimum to be selected. This frequency is stored in the non-volatile EEPROM in the unit.

Receiver Offset The normal operation of the SX800 is with the transmit and receive frequency the same. If an offset is required, a fixed offset can be made between the frequencies by double-clicking to bring up a selection of offsets. If a frequency outside the alignment band is selected then the operation of the SX800 will no longer be to the stated specification

Max. Channel Number This number will determine how many sequential channels are programmed into the table.

Serial/Parallel To ensure the correct operation of the unit after programming set this flag accordingly. After programming the unit the serial or parallel mode will be set according to this selection.

Serial Channel No. To change channel select a new channel number by right-clicking to bring up a list or double-clicking to select the field to modify.

Random Channel Table

The first 24 channels of the SX800 can store randomly selected channels, which are non-sequential or separated by a common gap. To change an existing frequency, double-click the particular channel. Either type in a new frequency or select from a displayed list of allowed frequencies.

Sequential Channel Table

To program these frequencies, ensure that the Max. Channel Number field in the “Current Settings” is set correctly. Under the “Sequential Channel Table” area enter the start frequency and the Table Step size to set the frequencies in the table.

Unit Programming Commands

To access these 4 functions, double-click on the text or highlight and press ENTER. When accessed, the relevant data areas on the other three screen areas are highlighted to show which data is being transferred.

Set parallel ch. mode Changes the SX800 from serial channel selection mode to/from parallel.

Read from the unit Download the data from the SX800, assuming that the correct interface lead has been made.

Program unit Send all the data displayed on the screen to the unit.

Program serial channel Send the new serial channel number to the unit.

Parallel Channel Selection

Three inputs RB1, RB2 and RB3 applied to PL3 pins 11, 12 and 13 respectively, select the operating channel as shown in the following table:

CHANNEL SELECTION			
Most Significant Bit		Least Significant Bit	CHANNEL
PIN 13	PIN 12	PIN 11	
LOW	LOW	LOW	7
LOW	LOW	HIGH	6
LOW	HIGH	LOW	5
LOW	HIGH	HIGH	4
HIGH	LOW	LOW	3
HIGH	LOW	HIGH	2
HIGH	HIGH	LOW	1
HIGH	HIGH	HIGH	0

The logic levels are: LOW = < 0.8V,
HIGH = > 2V or floating

TECHNICAL SPECIFICATION

Transceiver (Overall)		
Frequency Range	868 - 870 MHz	
Switching Bandwidth	5MHz	
Channel Spacing	25 kHz	
Number of RF Channels	8 selectable with an external 3 line select 255 selectable via a serial interface 24 random and 232 sequential	
Frequency Stability	±2.5ppm	
Supply Voltage	6.0 - 15 VDC	
Supply Current	Transmit Receive	<110mA at 7.2 VDC < 40mA at 7.2 VDC
Duty Cycle	100% max	
Interface Connections	Refer to Figure 1	
RF Connection	Via PCB Pins	
Size	59.5 l x 38.5 w x 17.0 h mm	
Weight	• 30gms	
Temperature (operating)	-25°C +55°C	
Temperature (storage)	-30°C +80°C	
Approvals	ETS 300 086, ETS 300 279	

Transmitter	
RF Output Power	25mW ±1.5dB (normal use), +2/-3 dB at extremes
Receive to Transmit Switching Time	<25ms
Power-on settling time	<60ms
Modulation Input	Analogue : 750 mV p-p nominal
Frequency Response	<10 - 3400 Hz flat (at +1/-3dB)

Receiver	
Sensitivity	#-114dBm/12dB SINAD #-107dBm/20dB SINAD with psophometric filtering
AF Output	250mV p-p into 10kS (muted by Squelch)
RSSI Output	0.5 - 2.0V with 60dB range and 33kS o/p impedance
Squelch Type	Noise operated with hysteresis.
Squelch Flag	Open collector to <0.4V with 10kS load. Low = No Signal