Jenal Communications

Model SC-51

Selcall/Telcall/GPS interface

Programming Instructions

(Software Version GBA 1.01)

(PCB Version 1.00)

Programming the SC51 Selcall/Telcall/GPS module

The SC51 unit can be configured using the Jenal SC51P100.exe configuration programming software by following these steps:

1) Put the SC51 into programming mode by pressing and holding the PTT switch (or emergency call button) while powering on the unit. The unit will produce three beeps to signify that it is in programming mode. Release the PTT switch (or emergency call button).

2) Start the Jenal SC51P100.exe programme on your computer.

3) Connect the serial port of a PC or laptop to the GPS RS232 port of the SC51.

4) Follow the on-screen prompts on your PC.

5) At the end of programming disconnect the SC51 from your PC and switch it's power off and then back on to reset into operating mode. Check that the unit functions as you require.

The SC51P100.exe configuration programme can be downloaded from our web site by going to:

<p style="text-align:center">http://jenal.com/downloads</p>

and clicking on the SC51P100.exe link. The help file should also be downloaded by clicking on the SC51P100.hlp link.   Both files are included in a zip file which is available by clicking on the SC51P100.zip link.

Available Common Options

The SC51 has several programmable options some of which are not available for all the formats that can be selected. The following four types of calls are available in all formats:
   1) Selcall
   2) Telcall
   3) Beacon Request
   4) End of Call (Hang-up)

Sending of Telcalls is available fixed either in Barrett/Jenal format or Codan/Icom format. Alternatively, if the "Changeable Telcall Format" option is selected then the radio user can select between the two Telcall format options using a DTMF keypad microphone. Press # then 2 on the keypad for Barrett/Jenal format or press # then 3 for Codan/Icom format.

The selcall ID of the SC51 can be changed by clicking on the "CHANGE" button at the bottom of the "Selcall ID" box. The selcall ID is any four digit number between 0000 and 9999.

The length of the synchronising (reversals) sequence can be changed by clicking on one of the buttons marked 1 to 9 in the "Reversals - Seconds" box. Select 1 for a non-scanning system or (typically) 5 for a scanning system. Other periods can be selected to suit the system requirements.

Options not available for a particular format are disabled (greyed out) in the configuration screen.

The table opposite shows the other available options for the different formats.

SC51 Available Options

Option	Barrett	Codan	Icom	Jenal
Tx Selcall/GPS Emergcy	YES			YES
Mute/Scan	YES	YES	YES	YES
Changeable Telcall Format	YES	YES	YES	YES
Roger (End of Tx) Beep	YES	YES	YES	YES
Un-Kill Code enable [1]				YES
Kill Code enable [1]	YES			YES
PTT = Emergency Call [2]	YES			YES
GPS Baud rate selection	YES			YES

Notes:

1) When using the Barrett format the SC51 can be "killed" remotely but cannot be "un-killed", however when using the Jenal format the SC51 can be both "killed" and "un-killed" remotely. The Kill Code number and the Un-Kill Code number can be different.
When "killed" the SC51 will both disable the PTT circuit and operate the Mute circuit. The unit will still respond to Beacon Request and GPS Position Request calls as well as Kill and Un-Kill calls. The SC51 can also be "un-killed' locally by entering it's Un-Kill Code using a DTMF keypad microphone. The entry must be in the form "✱NNNNNNNN#" where NNNNNNNN is the 8 digit Un-Kill Code.

2) In some Automatic Vehicle Location (AVL or Tracking) systems it may be desirable to have the SC51 operate independently of the user. In this case the SC51 can be configured to send an Emergency call by grounding it's PTT lead using an "Emergency" button. The call sent will be either an Emergency Selcall or an Emergency GPS Position call depending on whether or not valid GPS data is available. When this option is selected the SC51 will ignore any DTMF signals it receives from a microphone except when the Kill Code is enabled and an UN-Kill Code is entered.

SC51 Interface connections

CN1 - GPS interface connector - Connect via ribbon cable to 9 way D female connector for GPS data

CN1	Colour	Description	DE9F
pin 1	Brown	GPS TTL data level input to TTL/RS232 converter	pin 1
pin 2	Red	not connected	pin 6
pin 3	Orange	RS232 output to GPS data port	pin 2
pin 4	Yellow	not connected	pin 7
pin 5	Green	RS232 input from GPS data port	pin 3
pin 6	Blue	not connected	pin 8
pin 7	Violet	GPS RS232 data level input from TTL/RS232 converter	pin 4
pin 8	Grey	not connected	pin 9
pin 9	White	Ground	pin 5
pin 10	Black	not connected	n/c

Note: when using a GPS with a TTL output then connect it to pin 1 of the 9 way D connector and link pins 3 and 4 of the 9 way D connector.

Programming cables

The connecting cable between the PC and the SC51 should only connect to pins 2, 3 and 5 of the DE9 socket on the SC51 ribbon cable. Do not connect any other pins.
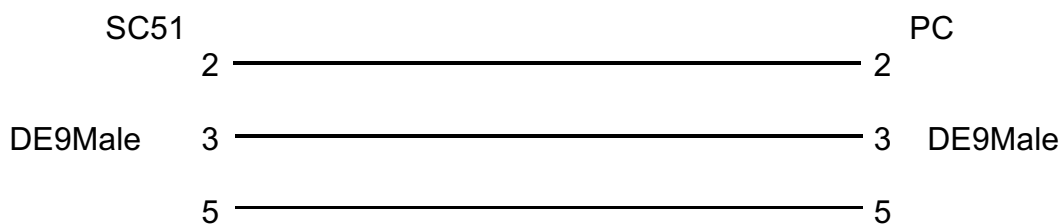
```
SC51                                           PC
        2 ──────────────────────── 2
DE9Male 3 ──────────────────────── 3   DE9Male
        5 ──────────────────────── 5
```
Fig.1 - 9 pin plug to 9 pin plug
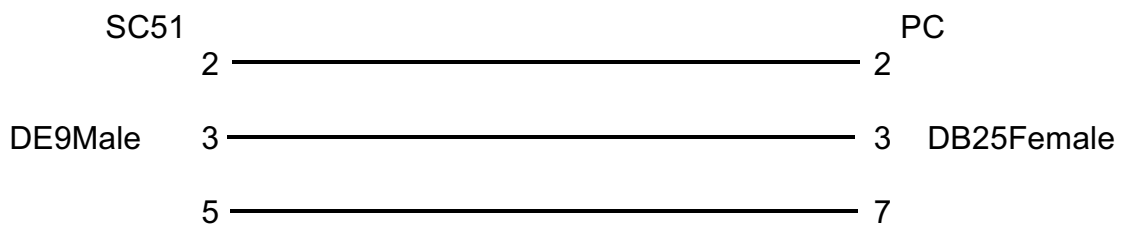
```
SC51                                           PC
        2 ──────────────────────── 2
DE9Male 3 ──────────────────────── 3   DB25Female
        5 ──────────────────────── 7
```
Fig.2 - 9 pin plug to 25 pin socket

CN2 - Radio internal interface
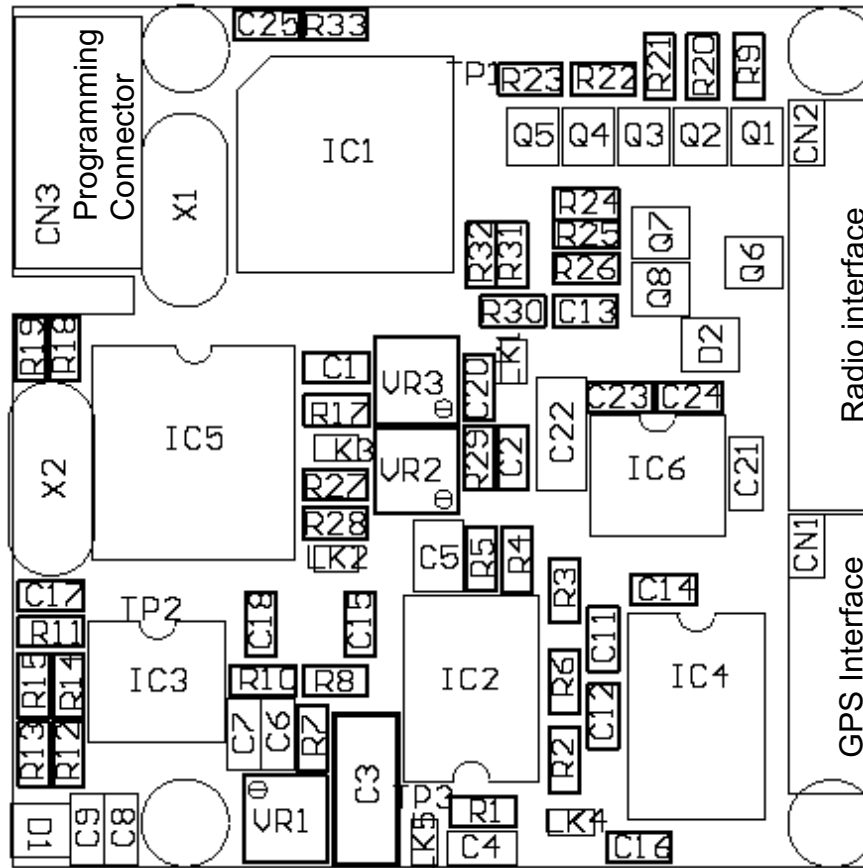
CN2	Colour	Description
pin 1	Brown	GROUND. Connect to "microphone" ground of radio to avoid ground loops.
pin 2	Red	MUTE line. Active low open collector output to control the radio mute circuit.
pin 3	Orange	SCAN PULSE line. Active low going pulses open collector output. Can be used to make the radio step through channels by pulsing UP or DOWN control lines.
pin 4	Yellow	SCAN STOP line. Active low open collector output to control the radio scan circuit. A low on this line tells the radio to stop scanning.
pin 5*	Green	VOICE PTT OUT line. Active low open collector output to control the radio PTT circuit when the microphone PTT is pressed. (Can be tied to pin 9 if required).
pin 6	Blue	LATCH ALARM line. Active low open collector output goes low when a call is received. Can be used to operate a relay to switch on an external alarm. Output is reset when a call is answered.
pin 7	Violet	CALLED LED line. Active low open collector output goes low when a call is received. Can be used to operate an LED. Output is reset when a call is answered.
pin 8	Grey	HORN ALARM. Active low open collector output. Pulses low after 30 seconds after a call is received. Can be used to operate a relay to switch on an external alarm. Output is reset when a call is answered or after two minutes.
pin 9*	White	SELCALL PTT OUT line. Active low open collector output to control the radio PTT circuit when the SC51 unit is sending. (Can be tied to pin 5 if required).
pin 10	Black	TRANSMIT AUDIO OUTPUT. Selcall transmit audio output has to be fed into the audio input of the transmitter. Adjust the level with VR3.
pin 11	Brown	VOICE PTT IN. Input from the microphone PTT circuit to control the SC51 unit. Also used as Emergency Call Button input in "One Button" mode.
pin 12	Red	ALARM AUDIO OUT. Alarm tones output should be fed into the radio audio amplifier (after the Mute gate). Adjust the level with VR2.
pin 13	Orange	RX AUDIO IN. Received audio input to the SC51. Should be taken from before the Mute gate in the radio.
pin 14	Yellow	DTMF AUDIO IN. DTMF audio input to the SC51 from the DTMF microphone. Normally connected to the microphone in pin of the transmitter.
pin 15	Green	12V DC INPUT. Power supply for the SC51 - between 6v DC and 14v DV.
pin 16	Blue	GROUND. Connect to "microphone" ground of radio to avoid ground loops.

* Some radios require separate PTTs for voice or sending selcalls (eg.Kenwood). If separate PTTs are not required these two pins (5 & 9) can be simply joined together and connected to the radio's PTT circuit.

Note: when using the SC51 the normal PTT input from the microphone should be broken at the microphone socket and the SC51 pin 11 connected to the microphone side of the break. SC51 pin 5 (and possibly pin 9) should be connected to the radio side of the break.

CN3 - Programming connector - CAUTION! Do not make any connections to these pins.

SC51 PCB Layout

Links

LK1 - Make this link to send the alarm audio tones back down the receive audio line.

LK2 - Make this link to give an increased audio alarm tones level

LK3 - Make this link to give an increased selcall transmit level

LK4/LK5 - Used for setting FSK detector centre frequency (see "Adjusting the SC51")

Join pins 5 & 9 if a
single PTT circuit
is required

+12

CN2
16PIN
1 Ground
2 Mute
3 Scan Pulse
4 Scan Stop
5 Scan PTT out
6 Latch Alarm
7 Called LED
8 Horn Alarm
9 Selcall PTT out
10 TX Audio Out
11 PTT in
12 Alarm Audio Out
13 RX Audio in
14 Alarm Audio in
15 DTMF Audio in
16 12v DC input
Ground

Interface connector

LK1
no

Link LK1 to send
Alarm tones down
Receive audio line

For GPS units with
TTL level interface
connect to DB9 pin 1
and link DB9 pin 3
to DB9 pin 4

GPS connector also
used for programming

CN1
10PIN
1 TTL in
2
3
4
5 RS232 out
6 RS232 in
7 TTL/RS232
8
9
10 Ground

GPS Connector
connect via ribbon
cable to DB9

Q1 - Q8 = BC846

Q2 Q4 Q6 Q8
Q1 Q3 Q5 Q7

R9 4k7
R20 4k7 R21 4k7 R22 4k7 R23 4k7 R24 4k7 R25 4k7 R26 4k7

TP1

C20 0u1   C13 0u1

R27 4k7   R30 4k7
Selcall Tx level
Link LK3 for
higher selcall
Transmit level

LK3 no   VR3 1k

R29 4k7
Alarm audio level for higher

LK2 no   VR2 1k
Link LK2 for
higher Alarm
Audio level

R28 4k7

R31 100k   D2 BAV99

+5

R32 4k7

IC4
MAX232
C1+ 1
C1- 3
C2+ 4
C2- 5
V+ 2
VCC 16
GND 15
V- 6
R1 IN 13
R2 IN 8
R1 OUT 12
R2 OUT 9
T1 IN 11
T2 IN 10
T1 OUT 14
T2 OUT 7

C11 0u1   C12 0u1
C14 0u1   C16 0u1
+5

IC1
MEGA16TQFP

PA4 33 PA5 32 PA6 31 PA7 30 AREF 29 GND 28 AVCC 27 PC7 26 PC6 25 PC5 24 PC4 23
PA3 PA2 PA1 PA0 VCC GND PB0 PB1 PB2 PB3
PB5 PB6 PB7 RESET VCC GND XTAL2 XTAL1 PD0 PD1 PD2
PC3 22 PC2 21 PC1 20 PC0 19 GND 18 VCC 17 PD7 16 PD6 15 PD5 14 PD4 13 PD3 12

CN3 PROG

+12   +5

R33 10k   C25 0u1   X1 8MHz

C17 0u1

R19 100k

C1 0u1

IC5 MV8870

R17 330k

+5

R18 100k

X2 3.579

+5

IC6
LM2931AZ-5
Vin +5V
GND

C22 100u
C23 0u1
C24 0u1
C21 1u0

+12

+5

C18 0u1

R3 10k   R8 150k   R7 18k
FREQ ADJ
VR1 10k
TP3 Freq
R1 100k
LK5 nc
C4 1u0
C6 10n

IC3:A LM358
TP2 Data
+5

R4 2M2
VCC 7 IN 8 OUT 1 VREF 10 Q 6 Q* 5 LOOP 11 R 12 I/P 3 C1LOCK 13 C2 4 GND 14
IC2 XR2211
C3 22n   C5 2u2

R2 10k   R5 150k   C2 0u1
LK4 no

C15 0u1

R10 100k   C7 47n

R11 22k   R12 330R   R14 22k   R15 22k
C8 10u   C9 10u
IC3:B LM358
D1 BAV99   R13 330R

Link LK5 and
open LK5 for
normal use

Link LK4 and
open LK5 for
adjusting
centre freq.

Adjust using
VR1 for a
frequency of
178Hz at TP3
FACTORY PRESET!

Title
SC35 GPS/Selcall/Telcall interface
Size A3
Number
Revision
Date: 8-NOV 2004
File: SCS1/1
Sheet of
Drawn By:

Adjusting the SC51

Selcall transmit level

The transmit level is set by sending a selcall and measuring the transmitted output power of the radio.

While sending a selcall adjust VR3 to give a reading of, preferably, between 30% and 40% of full power output (in no circumstances should you exceed 70% of full output power). If the transmit power level is too low it can be increased by placing a solder link across Link LK3.

Audio alarm level

The audio alarm level can be set by pressing keys on the DTMF microphone keypad while listening to the audio level out of the loudspeaker of the radio.

While pressing keys on the DTMF keypad adjust VR2 to give a suitable level of alarm tones out of the loudspeaker. If the level is too low it can be increased by placing a solder link across Link LK2.

If required the Audio alarm tones can be injected back into the receive audio line by placing a solder link across Link LK1

FSK detector centre frequency

The FSK detector centre frequency is pre-set before delivery and should not require adjustment.

If, for some reason, you need to re-set the FSK centre frequency then you will need a high impedance input frequency counter to measure the frequency. The procedure for the adjustment is as follows:

1) Close Link LK4 and open Link LK5
2) Connect the frequency counter to test point TP3
3) Adjust VR1 for a reading of 1785Hz on the frequency counter
4) Remove the frequency counter
5) Close Link LK5 and open Link LK4

The FSK detector centre frequency is now set up correctly and the unit should be tested to confirm correct operation.

Audible Alarm Tones

Alarm	Audio alarm sound
Key press	short high pitched tone
Error	long low pitched tone
Acknowledge	three short high pitched tones
Mute on	low to medium tone
Mute off	medium to high tone
Selcall received	one long telephone ring (one second) every three seconds
Telcall received	two short telephone rings every three seconds
Background Selcall alarm	one short beep every five seconds
Background Telcall alarm	two short beeps every five seconds
Power up	One long high beep
Killed power up	One long high beep followed by one longer low pitched tone

Note: The Audio Alarm may also be fed back down the receive input line by placing a solder link across Link LK1. The adjustment for the alarm level is still as above.

When a Selcall or Telcall is received the unit will make "ringing" tones for a period of time after which the SC51 will go into "background alarm" mode and make "beeps" every five seconds.

Using the SC51 Selcall/Telcall/GPS unit

To send a Selcall - enter four digit Selcall number
- press "#"
- press "#"

To send a Telcall - enter four digit Selcall number
- press "#"
- enter telephone number
- press "#"

To send Selcall - enter four digit Selcall number
beacon request - press "#"
- press "✱"

To send xx99 - enter four digit Selcall number (must end in 99)
beacon request - press "#"
- press "#"

To repeat a call - press "#"
or recall a caller - press "#"

To send a hang - press "#"
up command - press "8"
(to station last called)

To send a GPS - enter four digit Selcall number
position report - press "✱"
- press "✱"

To send a GPS - press "#"
emergency call - press "5" **Hold for at least two seconds (wait for 3 beeps)**

To select Barrett - press "#"
- press "2"

To select Codan - press "#"
- press "3"

Notes:

1) Mute/Scan (if enabled) is switched ON by pressing the "✱" key. Mute/Scan (if enabled) can be switched OFF by pressing the "✱" key or PTT. Mute/Scan must be switched OFF (or disabled) before any keyboard entries, except "✱", can be made.

2) Alarms can be cancelled by pressing the "✱" key or PTT. This automatically turns the mute OFF.

3) GPS emergency calls and GPS position report calls can only be sent in Barrett format.

4) If no GPS data is available then a Selcall Emergency call will be sent when a Send Emergency GPS call is requested. (Selcall Emergency calls cannot normally be sent.)

5) If no GPS data is available when a GPS position report call is sent then the error tone will be heard and no selcall will be sent.

Configuration details

Serial Number __ __ __ __ __

Selcall Number __ __ __ __

GPS Baud Rate _____

Reversals (Secs) ___

Kill Code __ __ __ __ __ __ __ ___

Un-Kill Code __ __ __ __ __ __ __ ___

Format :-
- ❏ Barrett
- ❏ Codan
- ❏ Icom
- ❏ Jenal

Options :-
- ❏ Tx Selcall/GPS Emergency
- ❏ Mute/Scan
- ❏ Changeable Telcall Format
- ❏ Roger (End of Tx) Beep
- ❏
- ❏ Un-kill Code Enable
- ❏ Kill Code Enable
- ❏ PTT = Emergency call

Technical notes: