The following provides some details of the HF open-standard 6-digit selcall protocol as defined in the United Nations Working Group on Emergency Telecommunications inter agency standards specifications. This is applicable primarily to HF SSB land mobile radio communications.

The HF open-standard 6-digit selcall protocol has unrestricted release to all manufacturers and vendors of HF equipment and provides the following selcall features:

| 1. Selcall | 8. Pagecall (SMS) |
| 2. Group Call | 9. GPS Send |
| 3. Sub-Group Call | 10. GPS Request |
| 4. All Call | 11. Status Request (Net. Diagnostics) |
| 5. Beacon Call | 12. Emergency Selcall with GPS |

Diagrams for (i) All Call, (ii) Group Call, and (iii) Sub-Group Call facilities are not provided. These features are a simple variant of the main selcall feature as follows:

<table>
<thead>
<tr>
<th>4 Digit Calling</th>
<th>6 Digit Calling</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Call is XOOO</td>
<td>All Call is XXXOOO</td>
</tr>
<tr>
<td>Group Call is XXOO</td>
<td>Group Call is XXXXOO</td>
</tr>
<tr>
<td>Sub-Group Call is XXXO</td>
<td>Sub-Group Call is XXXXXO</td>
</tr>
</tbody>
</table>

The transceiver lock (stun) facility is a security feature whereby remote transceivers can be disabled using a selcall derivative. It is essential that this facility is PIN protected with each transceiver having a unique and programmable PIN code (of 8 components or more) to prevent unauthorized use of this feature. Similarly, the enabling of a locked transceiver must require the input of the transceivers unique PIN code via the front panel or programming software.

Desirable parameters are serial number, firmware version, supply voltage, s/n ratio, VSWR.
UN OPEN 6-DIGIT SELCALL

TYPE: CCIR 493-4 / UN

INFORMATION SOURCE: UNITED NATIONS

**Dot Pattern**
- Mark: 1870 Hz
- Space: 1700 Hz

**Phasing Preamble**
- Sync Character
- 126, 125, 126, 105, 104

**Selective Call Message**
- Selective Call
- A1, A2, A3, 100, 11, 12, 13, 17, 17

**Message**
- 126, A1, A2, A3, 100, 11, 12, 13, 17, 17

**Legend**
- A1, A2, A3: 3 bytes of destination ID.
- N1, N2, N3: 3 bytes of caller's self ID.
- PV1: Calculated vertical parity for top line of data.
- PV2: Calculated vertical parity for bottom line of data.
- N: Number of digits in the telephone number sent.
- T1, T3: 2 bytes of telephone number (0-96 digits).
- S1, S10: 10 bytes of transceiver status bytes.
- D1, D10: 10 bytes of paging information.

**Data Transmission**
- All data transmitted as binary digits. Each bit is transmitted for 10 ms.

**a) Select Call**
- 126, 125, 126, 126, A1, A2, A3, 100, 11, 12, 13, 17, 17

**b) Hangup Call**
- 126, 125, 125, 126, A1, A2, A3, 100, 11, 12, 13, 17, 17, 17

**c) Telephone Format**
- 126, A1, A2, A3, 100, 11, 12, 13, 102, N, T1, T2, T3, T4, T6, T7, T8, PV1, 17, 17

**d) Page Call**
- 126, A1, A2, A3, 100, 11, 12, 13, 102, N, T1, T2, T3, T4, T6, T7, T8, PV1, 17, 17

**e) GPS Request**
- 126, A1, A2, A3, 100, 11, 12, 13, 125, 25, 17, 17, 17

**f) Status Request**
- 126, A1, A2, A3, 100, 11, 12, 13, 125, 25, 17, 17, 17

**g) Beacon Call**
- 126, 125, 125, A1, A2, A3, 100, 11, 12, 13, 17, 17

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UN OPEN 6-DIGIT SELCALL [ GPS CALL ]

TYPE: CCIR 493-4 / UN

INFORMATION SOURCE: UNITED NATIONS

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Dot Pattern

Mark = 1.870 kHz

0 0 0 0 1 0 1 1 1 0 1

*Space* = 1700 Hz

Phasing Preamble

Sync Character

125 125 125 125 125 125 125

106 106 106 107 106 105 104

Count

GPS data Selcall

128 A1 A2 A3 10 11 121 12 13 21 26 A3 26 106 A1 2 1

Example:

Lat: 32°05.714 South
Long: 115°48.307 East

78 78 00 78 00 78 00 00 64 00 0C 00 22 64 38 0C 7A 22 02 38 03 7A 14 02 39 03 0E 14 0B 38 36 0E 50 0B 24 38 68 50 75 24 75 68 75 75

BCD: Dec:

A1 = 00 00
A2 = 00 00
A3 = 00 00
1 = 0C 12
2 = 22 34
3 = 38 56
SB = 02
D1 = 03 03
D2 = 14 20
D3 = 39 57
D4 = 5E 14
D5 = 0B 11
D6 = 39 57
D7 = 50 80
D8 = 24 37

---

SB - STATUS BYTE (8 bit)

<table>
<thead>
<tr>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>NF</td>
<td>NR</td>
<td>SC</td>
<td>GC</td>
<td>WE</td>
</tr>
</tbody>
</table>

Where:

- **NF** = not implemented
- **NR** = 0 = OK  1 = No response from destination GPS unit
- **SC** = 0 = OK  1 = Selcall checksum error
- **GC** = 0 = OK  1 = GPS data checksum error
- **WE** = 0 = West  1 = East
- **SN** = 0 = South  1 = North

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UN OPEN 6-DIGIT SELCALL [ EMERGENCY SELCALL ]

TYPE: CCIR 493-4 / UN

INFORMATION SOURCE: UNITED NATIONS

Dot Pattern
'Mark' = 1870Hz

0 1 0 1 0 1 0 1 0 1

'Space' = 1700Hz

Phasing Preamble
Sync Character
125 125 125 125 125 125 125
109 106 104 105 107 106 109

Count:

Legend:
SB - Status Byte
GDP - GPS data Parity. Calculated by XOR'ing all GPS data bytes.
ie: D1 xor D2 xor D3 xor D4 xor D5 xor D6 xor D7 xor D8

a) Emergency Selcall without GPS data

126 A1 A2 A3 100 11 12 13 119 119

b) Emergency Selcall with GPS data

126 A1 A2 A3 10 11 12 13 122 SB D1 D2 D3 D4 D5 D6 D7 D8 GDP 117 117 117

Example:
Lat: 52.05,714 South
Long: 115.48,037 East

7B 7B 00 78 00 78 00 00 64 00 0C 64 22 64 3D 7A 22 02 38 03 7A 14 02 39 03 0E 14 0B 39 36 0E 50 0B 24 36 6B 6B 75 24 75 6B 75 75

BCD Dec
A1 = 00 00
A2 = 00 00
A3 = 00 00
I1 = 0C 12
I2 = 22 34
I3 = 38 56
SB = 02 02
D1 = 03 03
D2 = 14 20
D3 = 39 57
D4 = 0E 14
D5 = 08 11
D6 = 39 57
D7 = 50 80
D8 = 24 37

SB - STATUS BYTE (8 bit)

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<td>NF</td>
<td>NR</td>
<td>SC</td>
<td>GC</td>
</tr>
</tbody>
</table>

Where:
- => not implemented
NF => 0 = OK 1 = GPS unit not fitted in destination
NR => 0 = OK 1 = No response from destination GPS unit
SC => 0 = OK 1 = Selcall checksum error
GC => 0 = OK 1 = GPS data checksum error
WE => 0 = West 1 = East
SN => 0 = South 1 = North

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UN OPEN 6-DIGIT SELCALL [ TRANSCEIVER LOCK CALL ]

DOT PATTERN

'Space' = 1700Hz

Data

| 126 | A1 | A2 | A3 | 100 | H1 | I1 | 2 | D | H2 | 18 | D | 1 | 2 | D | 1 | 3 | P1 | P2 | P3 | P4 | P5 | P6 | P7 | D8 | VP | 117 | 117 | 117 |
|-----|----|----|----|-----|----|----|---|---|----|----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|
| 120 |    |    |    | 100 |    |    |   |   |    |    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |    |

WHERE:

A1/A2/A3 = Destination ID
H1/H2 = Source ID
D = Length of Transceiver Pin (08 by default)
P1..P8 = Encrypted Pin Digits (only P1, P2, P3 and P4 are used)

Pin encryption:

\[
\begin{align*}
E1 & = (A1 \text{xor} A2 \text{xor} A3) \text{xor} (H1 \text{xor} 02 \text{xor} 13) \text{(Assume E1 is a seed)} \\
P1 & = E1 \text{xor} (8\text{DC} \text{of P/N first 2 digits}) \\
P2 & = P1 \text{xor} (8\text{DC} \text{of P/N second 2 digits}) \\
P3 & = P2 \text{xor} (8\text{DC} \text{of P/N third 2 digits}) \\
P4 & = P3 \text{xor} (8\text{DC} \text{of P/N fourth 2 digits}) \\
\end{align*}
\]

E.g. A1A2 = 123456 (bcd is 0123456)
H1 = 634231 (bcd is 472153)
P/N = 12345678 (bcd is 022384)

Data encryption:

\[
\begin{align*}
E1 & = 63 \text{ (hex)} \\
P1 & = (69 \text{xor} 0c) = 65 \\
P2 & = (65 \text{xor} 22) = 47 \\
P3 & = (47 \text{xor} 38) = 71 \\
P4 & = (71 \text{xor} 4a) = 31 \\
\end{align*}
\]

VP = Vertical Parity byte