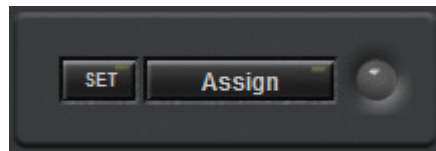


# HamSphere 4.0

## INTERFACE ADAPTER

### Users Manual v.1.2

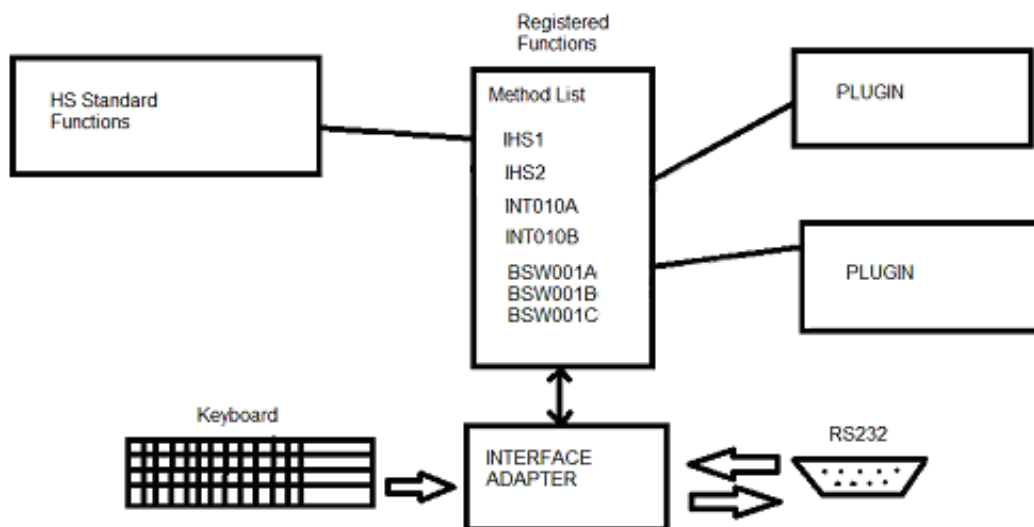


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3. Assigned values
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# 1. Introduction

Thank you for purchasing the versatile Interface Adapter plugin for HamSphere 4.0. The purpose of the module is to tie Keyboard Keys to different functions in the HamSphere 4.0 transceiver and plugins. It also has a fully fledged RS232 interface/adaptor making connection to external hardware possible.

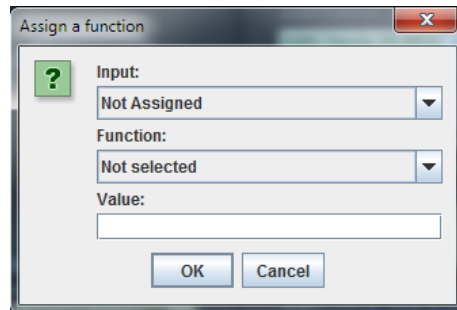
The schematic view of the HamSphere 4.0 external interfacing. A table called “Registered Functions” is held in the transceiver’s memory. Each Plugin can register its functionality for external access in the table. The Interface Adapter can then read the table and access the functions and tie these to either keys or com port signals.



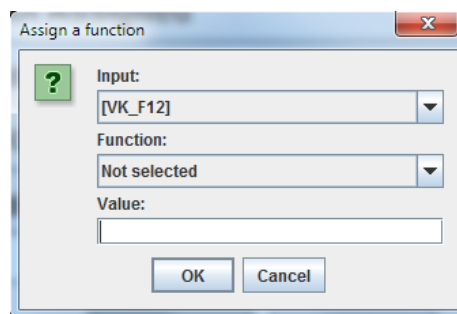
By clicking the key you can easily find the wanted functionality and set its parameters. All settings are automatically saved in the rig’s memory, but you can also export a so called “Key setting file” that can be distributed to other HamSphere 4.0 users for fast implementation.

## 2. Assigning keys

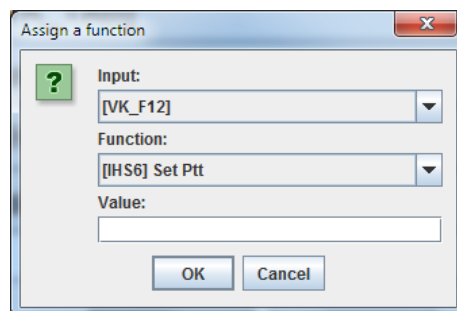
Start by clicking “Assign” and it will bring up the Function assign window.



You can now click any key you want to use. Here as an example we click the F12 key and the Input selector automatically identifies the key and selects it:



Next step is to select a function from the function list. Here we select IHS6 which is PTT. IHS stands for (Internal HamSphere System) and means that you are requesting a standardized function in the HamSphere subsystem. Click OK to save.

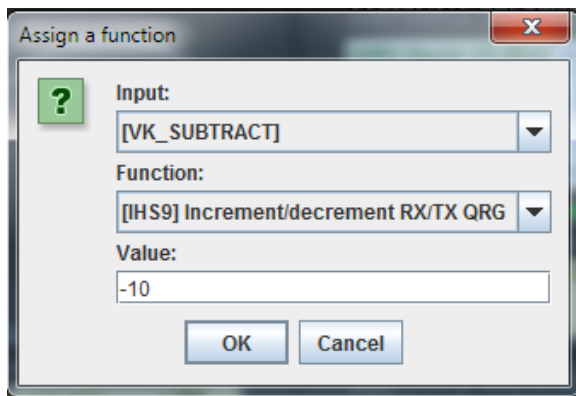


Now you have “assigned” F12 to trigger PTT when pressed.

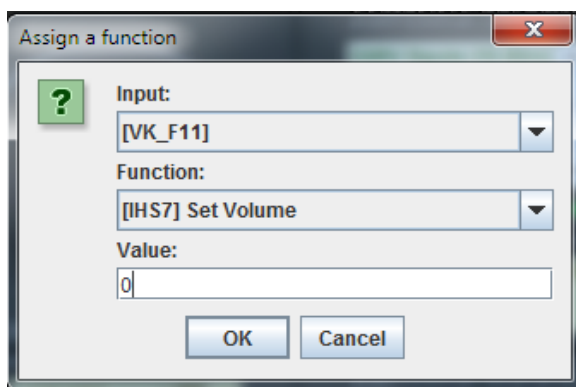
### 3. Assigning Values

Some functions require values to be set. As an example we will assign the minus key to step 10 Hz. Just bring up the Assign window and click the minus key on the keyboard. The system automatically finds the key in the list (VK\_SUBTRACT). Then browse down to the IHS9 Increment/decrement QR/TX QRG and enter a value of -10. Then click OK.

Now whenever/wherever you click the Minus key, the transceiver will tune 10 Hz down.



You can also assign static values such as "Set Speaker Off" by assigning 0 to ISH7 Set Volume. The example below we have assigned the F11 key to set the volume off.



## 4. Assigning Com Port signals

There are many USB-Serial interfaces available in the market. The interface cable or dongle is primarily what is called a "USB-UART Bridge". It will create a Virtual COM Port on your system. Since most modern computers do not feature hardware legacy serial port interfaces (COM ports) anymore, the only alternative is to use the USB port on the machine to emulate a COM port. An interface cable/dongle essentially has a special chip in it that performs the required USB to UART interface conversion. Some of the popular chips used are FTDI FT232R/RL, Prolific PL2303/XA/XHA/TA/TB/EA/RA/SA, SiLabs CP21xx series or Microchip MC2200, etc. Other than this, another chip is required for converting UART TTL levels to RS232 Serial Port protocol standards. For this, the most popular and widely used chip is Maxim MAX232 or MAX3232. Unlike TTL, the RS232 has +/-12V logic levels. However commercially available cheap RS232 implementations often may not have +/-12V but as low as +/-3V logic levels. In our use with the CW plugin, these levels do not really matter. We have tested and validated the plugin compatibility with cables and interfaces using all the above mentioned chips. Our Interface Adapter plugin works perfectly.

The DB9 RS232 interface consists of 9 pin male connector on the USB-Serial cable. The cable behaves like a native hardware COM port interface of the computer (DTE - Data Terminal Equipment). There are 2 data pins called RxD and TxD for transmitting and receiving serial data over RS232. There is also 1 ground pin. Rest of the pins are for controlling communication over the serial data link and are called "Flow Control" pins. These pins are DCD, DTR, DSR, RTS, CTS and RI. We need not go into details of these Flow Control pins.

BEWARE of the following selection pitfalls:

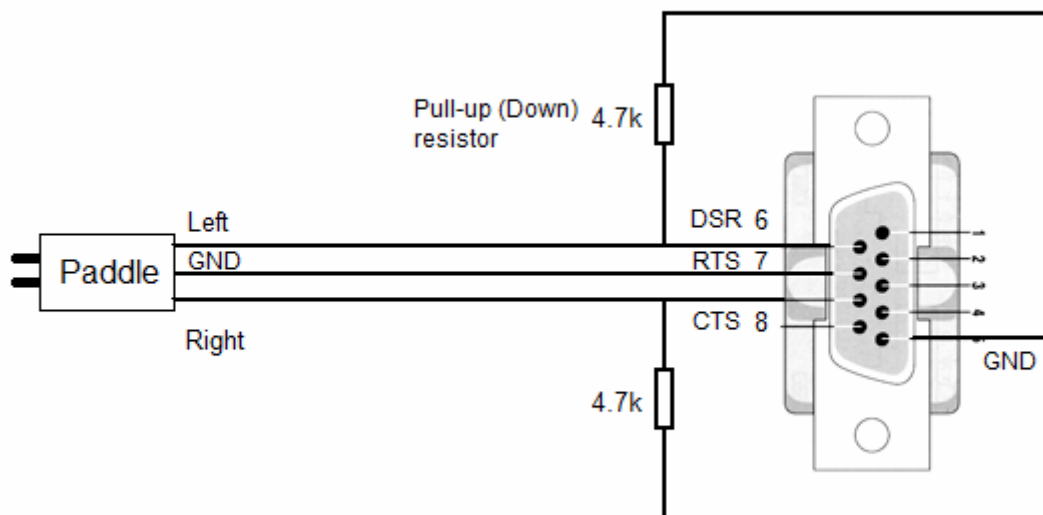
- 1) We find several USB-Serial cables in the market that do not faithfully implement the Flow Control logic. They may work fine with many of your computer serial port applications but they won't work with our plugin. They are only suitable for Xon/Xoff software flow control serial communication applications.
- 2) Two flow control pins DCD (Data Carrier Detector) and RI (Ring Indicator) are now treated as legacy functions and are not really needed even for proper hardware flow control. They were only needed during the days of PPP dial-up internet modems. Since that is all history, many of these cables do not implement these pins properly... However, our plugin requires RI pin to function, please ensure that the cable you buy has RI (pin #9) implemented. You need not bother about DCD (pin #1).
- 3) If your cable/dongle is built using the Prolific PL2303 chip, you must ensure that it comes from a proper source. We are putting out this warning because there are many clones of this chip that are made in China. These imitations do not perform well. In worst case, they may not even be supported by the original Microsoft signed drivers. They will throw up a Yellow mark and "Error Code 10" on the driver under Device Manager.

4) The Prolific chip is very popular and the market is flooded with cables based on these chips. Those who run Windows 8/8.1, please note that cables made using PL2303/H/HX/XA/HXA do not support your operating system. However they are good up to Windows 7 (32bit and 64bit), but PL3203/H does not even support Windows 7 64 bit... All newer PL2303 versions TA/TB/EA/RA/SA are good for all Windows versions. Most of the cables will automatically install Virtual Serial Port drivers on your computer transparently, if the Windows Update is active and you are connected to the Internet. Some of them may however require driver installation. This is a trivial task. You may be provided with a driver CD along with the cable or can download it from the chip manufacturer's website.

Lastly, please remember to add pull-up resistors (In this case pull-down) as specified by drawing below. This is necessary because of the nature of CMOS/NMOS input logic. If you fail to use the pull-up resistors then the voltage at the input pins will float up and down due to charge accumulation or dissipation resulting in false keying and tone generation by the plugin. Floating input pins are never permitted in CMOS circuits unlike TTL, where an open input always means high logic level.

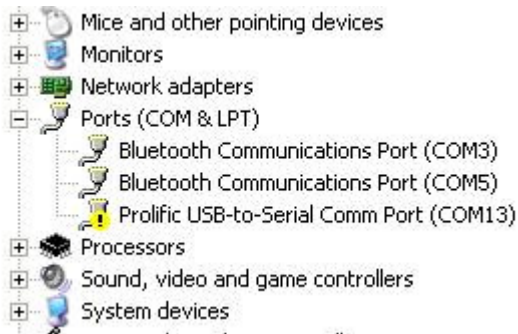
In our case we feed the Paddle/Key with positive voltage from RTS (Request To Send) and pull the inputs to Ground by two 4.7 kohm resistors.

RS232 Text provided by Basu (VU2NSB)



# Installation of the USB driver

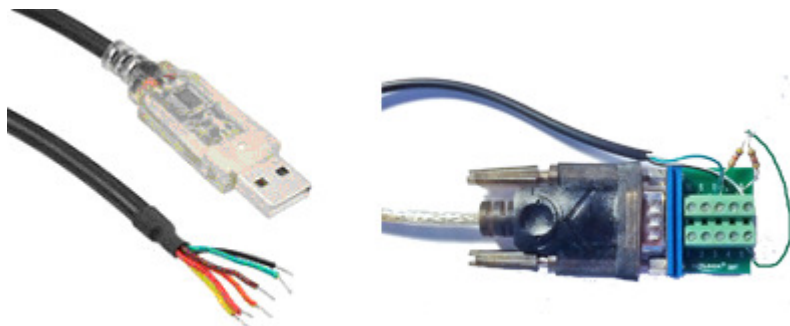
Most USB adapters install their own driver by default. Normally you do not need to do any work for this. But as stated in the description, there are quite a few bad USB adapters out there that may not install correctly. Here is an example of A BAD Prolific PL3202 cable installation...



This is what it should look like. A GOOD Prolific PL3202 cable installation...



The USB RS232 is usually sold as a cable seen below.



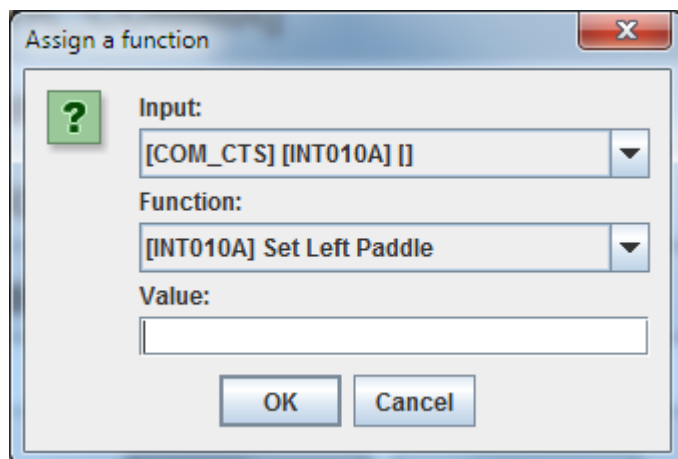
You can use a 9-pin patch terminal to connect your CW Key or other equipment.

## Assigning Com Port signals

Click ASSIGN on the Interface Adapter and select a COM PORT signal such as the CTS signal (COM\_CTS). If you have the CW Keyer plugin installed (INT010) it will turn up as [INT010A] Set Left Paddle in the Function selector. Simply select that and press OK.

Now your left paddle key is connected to the CW Keyer left paddle function = IAMBIC Dits. Then do the same for the COM\_DSR and assign that to the right paddle = IAMBIC Dash.

If you use a straight key you can select either of the left or right paddle inputs.



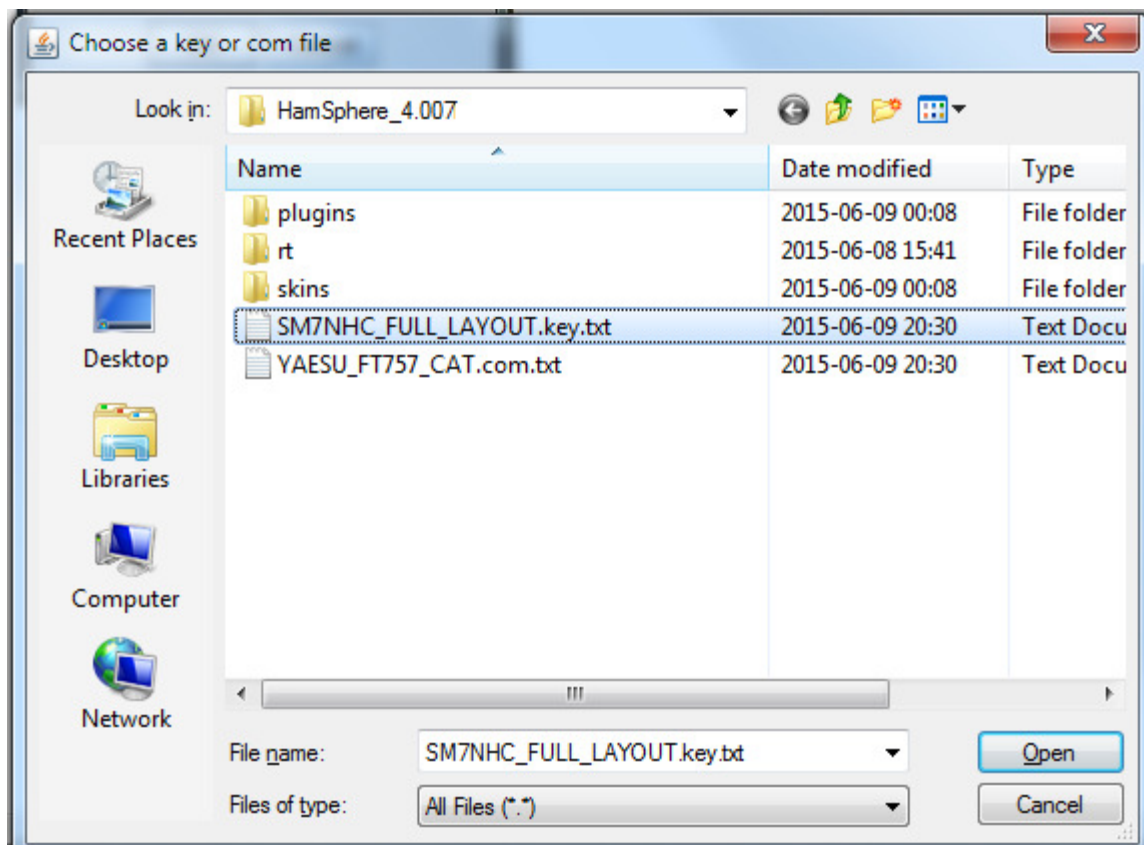
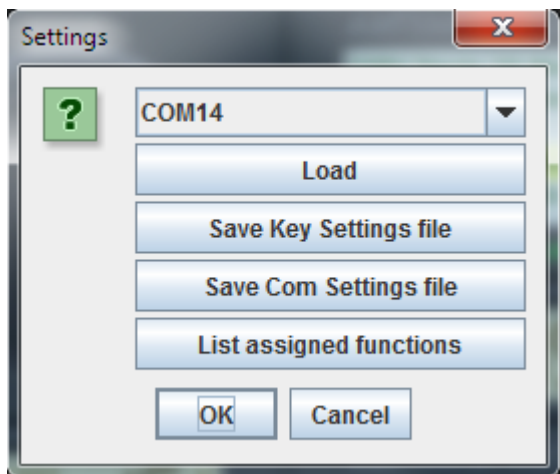


## 5. Load and Save files

The Interface Adapter can save a load separate Keyboard / Com port setting files. This is most useful for pre-made CAT-Interface settings or operators sharing Keyboard settings.

Operators can easily set up a suitable keyboard layout for the HamSphere 4.0 transceiver and distribute their settings to other operators etc.

Click SET button on the Interface Adapter. When loading files the system looks that the file extension key.txt or com.txt to determine what function to load.



## 6. Pitfalls

The Interface Adapter uses a so called “Global Key Handler”. This means that even if you have HamSphere 4.0 running in the background it will listen for keyboard input.

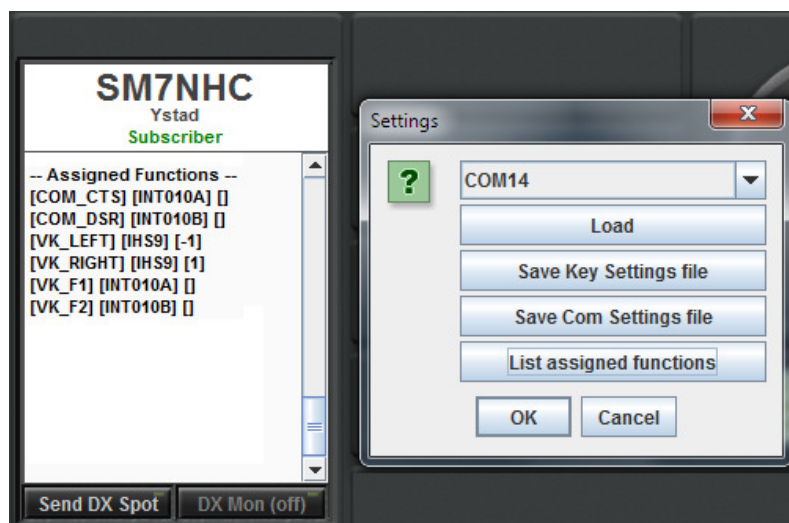
Some operators may find keying the transmitter with the space key very useful. The problem is however that the space key is used everywhere in the computer today. It is used in anything from writing emails, checking facebook or writing a document.

We therefore strongly suggest that you assign keys that are not usually used in common text applications such as F1-F12, keypad, function keys etc.

In the current version of the Interface Adapter it only supports F1-F12. But in later version we will implement CTRL+F1-F12 and ALT+F1-F12 which will enable a lot more suitable keys.

## 7. List assigned functions

By selecting the “List Assigned Functions” in the Set window, a list of assigned keys/com is printed in the DX Monitor window. This is very useful when you want to find available keys. The list consists of the Key code/Com signal, Plugin ID and Value.



## 8. HamSphere Plugin/Function list

Plugin ID	Plugin Name	Offering functions (Subject to change)
ACT004	Antenna Rotator 216x72	No
ATC001	Antenna Rotator 216x288	No
ATC002	Antenna Rotator 216x216	Yes
ATC003	Antenna Selector 216x144	Yes
AUC001	Audio Control 216x72	No
AUC003	Filter Panel 216x72	No
AUC004	Mini Mic Pwr 216x72	No
AUC005	Mini Volume 216x72	No
AUC007	Volume Panel Vert 72x432	No
AUC007	Volume Panel 432x72	No
AUC008	Recorder 432x72	No
AUD002	Speaker 216x288	No
BSW001	Band Selector 216x144	No
BSW002	Button Panel 216x216	No
BSW003	Button Panel 216x288	No
BSW004	Group Switcher 648x432	Yes
BSW005	VFO 216x216	Yes
BSW007	Button Panel 216x144	No
BSW008	Codec Selector 216x72	Yes
BSW009	Interface Adapter 216x72	No
BSW010	BC Panel 216x72	No
CPL001	Copyright Plate 216x72	No
CPL002	Cover Plate 216x144	No
CPL003	Cover Plate 216x216	No
CPL004	Cover Plate 216x288	No
CPL005	Cover Plate 216x360	No
CPL006	Cover Plate 216x432	No
CPL007	Cover Plate 216x72	No
CPL008	Cover Plate 432x144	No
CPL009	Cover Plate 432x144	No
CPL010	Cover Plate 576x432	No
CPL011	Cover Plate 648x360	No

CPL012	Cover Plate 648x72	No
CPL013	Cover Plate 72x288	No
CPL014	Cover Plate 72x360	No
CPL016	Cover Plate 72x432	No
CPL017	Cover Plate 72x504	No
CPL018	Cover Plate 72x576	No
CPL019	Lightup Callsign 216x72	No
CPL020	Custom Nameplate 648x72	No
CPL021	Custom Nameplate 432x72	No
HND001	Left Handle 72x288	No
HND002	Left Handle 72x360	No
HND003	Left Handle 72x432	No
HND004	Left Handle 72x504	No
HND005	Left Handle 72x576	No
HND006	Right Handle 72x288	No
HND007	Right Handle 72x360	No
HND008	Right Handle 72x432	No
HND009	Right Handle 72x504	No
HND010	Right Handle 72x576	No
INS001	Band Scope 432x144	No
INS002	LCD 216x144	No
INS003	LCD Memory 432x144	No
INS004	Oscilloscope 216x144	No
INS005	S-Meter 216x144	No
INS006	S-Meter LCD 216x144	No
INS007	S-Meter Plus 216x144	No
INS008	UTC Clock 216x72	No
INS009	Azimuth Display 216x72	No
INS010	Power Display 216x72	No
INS011	Waterfall 432x144	No
INS012	S-Meter Lit 216x144	No
INT001	DX Monitor 216x360	No
INT002	Log Book 648x360	No
INT003	DX Monitor 216x432	No
INT004	Lookup Box 216x72	No
INT010	CW Keyer 216x72	Yes
MOD001	HF Propagation 216x360	No

MOD002	Image Viewer 648x360	No
MOD003	Grayline Map 432x144	No

### Internal HamSphere Functions (IHS)

Function	Description	Values
IHS1	Set RX Freq 1000-99000	1000-99000
IHS2	Set TX Freq 1000-99000	1000-99000
IHS3	Set Mode (0-3)	CW = 0 LSB = 1 USB = 2 FM = 3
IHS4	Set Band (1-15)	1 = 160m 2 = 80m 3 = 60m 4 = 48m 5 = 40m 6 = 30m 7 = 20m 8 = 17m 9 = 15m 10 = 12m 11 = 11m 12 = 10m 13 = 6m 14 = 2m 15 = 70cm
IHS5	Set Filter (0-7)	0 = 3.2 wide 1 = 2.8 2 = 2.3 3 = 1.8 4 = 1.4 5 = 0.8 6 = CW1 7 = CW2

IHS6	Set PTT	
IHS7	Set Volume	0-255
IHS8	Set RF Gain	0-255
IHS9	Increment/decrement RX/TX QRG	+/- Hz
IHS10	RX/TX frequency in Hz	1801000- 434900000
IHS11	Set AGC	0 Fast 1 Medium 2 Slow
IHS12	Set VOX Delay	0-255
IHS13	Set VOX Gain	0-255
IHS14	Set VOX	0 = Off 1 = On
IHS15	Set Power	0-255 = 0-100 Watts
IHS16	Set Mic Level	0-255

## 12. Com Code list

Com Code	Description	
COM_CTS	Clear To Send	
COM_DSR	Data Set Ready	
COM_RTS	Request To Send	
COM_DTR	Data Terminal Ready	
COM_RI	Ring Indicator	
COM_CD	Carrier Detect	
COM_CAT1	Reserved CAT command	
COM_CAT2	Reserved CAT command	
COM_CAT3	Reserved CAT command	
COM_CAT4	Reserved CAT command	
COM_CAT5	Reserved CAT command	
COM_CAT6	Reserved CAT command	
COM_CAT7	Reserved CAT command	
COM_CAT8	Reserved CAT command	
COM_CAT9	Reserved CAT command	
COM_CAT11	Reserved CAT command	
COM_CAT12	Reserved CAT command	
COM_CAT13	Reserved CAT command	
COM_CAT14	Reserved CAT command	
COM_CAT15	Reserved CAT command	
COM_CAT16	Reserved CAT command	
COM_CAT17	Reserved CAT command	
COM_CAT18	Reserved CAT command	
COM_CAT19	Reserved CAT command	
COM_CAT20	Reserved CAT command	

## 10. Key Code list

### **VK\_0**

VK\_0 thru VK\_9 are the same as ASCII '0' thru '9' (0x30 - 0x39)

### **VK\_1**

### **VK\_2**

### **VK\_3**

### **VK\_4**

### **VK\_5**

### **VK\_6**

### **VK\_7**

### **VK\_8**

### **VK\_9**

### **VK\_A**

VK\_A thru VK\_Z are the same as ASCII 'A' thru 'Z' (0x41 - 0x5A)

### **VK\_ACCEPT**

Constant for the Accept or Commit function key.

### **VK\_ADD**

### **VK\_AGAIN**

### **VK\_ALL\_CANDIDATES**

Constant for the All Candidates function key.

### **VK\_ALPHANUMERIC**

Constant for the Alphanumeric function key.

### **VK\_ALT**

### **VK\_ALT\_GRAPH**

Constant for the AltGraph function key.

### **VK\_AMPERSAND**

### **VK\_ASTERISK**

### **VK\_AT**

Constant for the "@" key.

### **VK\_B**



**VK\_BACK\_QUOTE****VK\_BACK\_SLASH**

Constant for the back slash key, "\"

**VK\_BACK\_SPACE****VK\_BEGIN**

Constant for the Begin key.

**VK\_BRACELEFT****VK\_BRACERIGHT****VK\_C****VK\_CANCEL****VK\_CAPS\_LOCK****VK\_CIRCUMFLEX**

Constant for the "^" key.

**VK\_CLEAR****VK\_CLOSE\_BRACKET**

Constant for the close bracket key, "]"

**VK\_CODE\_INPUT**

Constant for the Code Input function key.

**VK\_COLON**

Constant for the ":" key.

**VK\_COMMA**

Constant for the comma key, ","

**VK\_COMPOSE**

Constant for the Compose function key.

**VK\_CONTEXT\_MENU**

Constant for the Microsoft Windows Context Menu key.

**VK\_CONTROL****VK\_CONVERT**

Constant for the Convert function key.

**VK\_COPY****VK\_CUT****VK\_D**

**VK\_DEAD\_ABOVEDOT**

**VK\_DEAD\_ABOVEERING**

**VK\_DEAD\_ACUTE**

**VK\_DEAD\_BREVE**

**VK\_DEAD\_CARON**

**VK\_DEAD\_CEDILLA**

**VK\_DEAD\_CIRCUMFLEX**

**VK\_DEAD\_DIAERESIS**

**VK\_DEAD\_DOUBLEACUTE**

**VK\_DEAD\_GRAVE**

**VK\_DEAD\_IOTA**

**VK\_DEAD\_MACRON**

**VK\_DEAD\_OGONEK**

**VK\_DEAD\_SEMIVOICED\_SOUND**

**VK\_DEAD\_TILDE**

**VK\_DEAD\_VOICED\_SOUND**

**VK\_DECIMAL**

**VK\_DELETE**

**VK\_DIVIDE**

**VK\_DOLLAR**

Constant for the "\$" key.

**VK\_DOWN**

Constant for the non-numpad **down** arrow key.

**VK\_E**

**VK\_END**

**VK\_ENTER**

**VK\_EQUALS**

Constant for the equals key, "="

**VK\_ESCAPE**

**VK\_EURO\_SIGN**

Constant for the Euro currency sign key.

**VK\_EXCLAMATION\_MARK**

Constant for the "!" key.

**VK\_F**

**VK\_F1**

Constant for the F1 function key.

**VK\_F10**

Constant for the F10 function key.

**VK\_F11**

Constant for the F11 function key.

**VK\_F12**

Constant for the F12 function key.

**VK\_F13**

Constant for the F13 function key.

**VK\_F14**

Constant for the F14 function key.

**VK\_F15**

Constant for the F15 function key.

**VK\_F16**

Constant for the F16 function key.

**VK\_F17**

Constant for the F17 function key.

**VK\_F18**

Constant for the F18 function key.

**VK\_F19**

Constant for the F19 function key.

**VK\_F2**

Constant for the F2 function key.

**VK\_F20**

Constant for the F20 function key.

**VK\_F21**

Constant for the F21 function key.

**VK\_F22**

Constant for the F22 function key.

**VK\_F23**

Constant for the F23 function key.

**VK\_F24**

Constant for the F24 function key.

**VK\_F3**

Constant for the F3 function key.

**VK\_F4**

Constant for the F4 function key.

**VK\_F5**

Constant for the F5 function key.

**VK\_F6**

Constant for the F6 function key.

**VK\_F7**

Constant for the F7 function key.

**VK\_F8**

Constant for the F8 function key.

**VK\_F9**

Constant for the F9 function key.

**VK\_FINAL**

**VK\_FIND**

**VK\_FULL\_WIDTH**

Constant for the Full-Width Characters function key.

**VK\_G**

**VK\_GREATER**

**VK\_H**

**VK\_HALF\_WIDTH**

Constant for the Half-Width Characters function key.

**VK\_HELP**

**VK\_HIRAGANA**

Constant for the Hiragana function key.

**VK\_HOME**

#### **VK\_I**

##### **VK\_INPUT\_METHOD\_ON\_OFF**

Constant for the input method on/off key.

#### **VK\_INSERT**

##### **VK\_INVERTED\_EXCLAMATION\_MARK**

Constant for the inverted exclamation mark key.

#### **VK\_J**

##### **VK\_JAPANESE\_HIRAGANA**

Constant for the Japanese-Hiragana function key.

##### **VK\_JAPANESE\_KATAKANA**

Constant for the Japanese-Katakana function key.

##### **VK\_JAPANESE\_ROMAN**

Constant for the Japanese-Roman function key.

#### **VK\_K**

##### **VK\_KANA**

##### **VK\_KANA\_LOCK**

Constant for the locking Kana function key.

##### **VK\_KANJI**

##### **VK\_KATAKANA**

Constant for the Katakana function key.

##### **VK\_KP\_DOWN**

Constant for the numeric keypad **down** arrow key.

##### **VK\_KP\_LEFT**

Constant for the numeric keypad **left** arrow key.

##### **VK\_KP\_RIGHT**

Constant for the numeric keypad **right** arrow key.

##### **VK\_KP\_UP**

Constant for the numeric keypad **up** arrow key.

#### **VK\_L**

##### **VK\_LEFT**

Constant for the non-numpad **left** arrow key.

##### **VK\_LEFT\_PARENTHESIS**

Constant for the "(" key.

**VK\_LESS**

**VK\_M**

**VK\_META**

**VK\_MINUS**

Constant for the minus key, "-"

**VK\_MODECHANGE**

**VK\_MULTIPLY**

**VK\_N**

**VK\_NONCONVERT**

Constant for the Don't Convert function key.

**VK\_NUM\_LOCK**

**VK\_NUMBER\_SIGN**

Constant for the "#" key.

**VK\_NUMPAD0**

**VK\_NUMPAD1**

**VK\_NUMPAD2**

**VK\_NUMPAD3**

**VK\_NUMPAD4**

**VK\_NUMPAD5**

**VK\_NUMPAD6**

**VK\_NUMPAD7**

**VK\_NUMPAD8**

**VK\_NUMPAD9**

**VK\_O**

**VK\_OPEN\_BRACKET**

Constant for the open bracket key, "["

**VK\_P**

**VK\_PAGE\_DOWN**

**VK\_PAGE\_UP**

**VK\_PASTE****VK\_PAUSE****VK\_PERIOD**

Constant for the period key, "."

**VK\_PLUS**

Constant for the "+" key.

**VK\_PREVIOUS\_CANDIDATE**

Constant for the Previous Candidate function key.

**VK\_PRINTSCREEN****VK\_PROPS****VK\_Q****VK\_QUOTE****VK\_QUOTEDBL****VK\_R****VK\_RIGHT**

Constant for the non-numpad **right** arrow key.

**VK\_RIGHT\_PARENTHESIS**

Constant for the ")" key.

**VK\_ROMAN\_CHARACTERS**

Constant for the Roman Characters function key.

**VK\_S****VK\_SCROLL\_LOCK****VK\_SEMICOLON**

Constant for the semicolon key, ";"

**VK\_SEPARATER**

This constant is obsolete, and is included only for backwards compatibility.

**VK\_SEPARATOR**

Constant for the Numpad Separator key.

**VK\_SHIFT****VK\_SLASH**

Constant for the forward slash key, "/"

**VK\_SPACE**

**VK\_STOP**

**VK\_SUBTRACT**

**VK\_T**

**VK\_TAB**

**VK\_U**

**VK\_UNDEFINED**

This value is used to indicate that the keyCode is unknown.

**VK\_UNDERSCORE**

Constant for the "\_" key.

**VK\_UNDO**

**VK\_UP**

Constant for the non-numpad **up** arrow key.

**VK\_V**

**VK\_W**

**VK\_WINDOWS**

Constant for the Microsoft Windows "Windows" key.

**VK\_X**

**VK\_Y**

**VK\_Z**



# 11. Antenna list

1	10-meter Yagi 8 elements at 35' above average ground
2	40-meter Yagi 8 elements at 100ft above average ground
3	15-meter 3-element high-gain quad at 95ft above average ground
4	135ft 30-degree inverted-V, 40 meters, 55ft above average ground
5	165 ft terminated folded dipole, 160 meters, 95 ft above avg ground
6	17-meter 6-element quad at 95ft above average ground
7	20-meter Yagi 8 elements at 95' above average ground
8	GP Monopole with 256 Radials (20m)
9	1/4-wl monopole with 4 radials elevated 20' above ground, 20m
10	20-meter 6-element quad at 95' above average ground
11	G5RV Dipole (10-80m)
12	GP Monopole with 256 Radials (10m)
13	GP Monopole with 256 Radials (15m)
14	GP Monopole with 256 Radials (40m)
15	GP Monopole with 256 Radials (80m)
16	GP Monopole with 256 Radials (160m)
17	GP Monopole with 256 Radials (17m)
18	GP Monopole with 256 Radials (11m)
19	GP Monopole with 256 Radials (30m)
20	NVIS antenna for 160m with extremely good ground
21	NVIS antenna for 80m with extremely good ground
22	15-meter Yagi 8 elements at 95' above average ground
23	80-meter Yagi 8 elements at 75ft above average ground' above GND
24	Equilateral Delta Loop for 40m with 30ft base height
25	Half Square for 40m with 10ft base height, very good ground
26	Lazy-H multi-band for 10, 15, 20 and 40m, 88ft x 44ft, 95ft ab. GND.
27	IDC Vertical Antenna (10-40m)
28	H-Quad Loop (10-80m)
29	40-meter Yagi 3 elements short boom at 100ft above average ground
30	40-meter Yagi 2 elements driver-reflector at 100ft above avg GND
31	4-square array monopoles for 40m, very good ground
32	4-square array monopoles for 80m, very good ground
33	Cardioid Antenna (20m)
34	Cardioid Antenna (40m)
35	Vertical Co-phased Collinear (20m)
36	Vertical Co-phased Collinear (40m)
37	8-element Yagi at 95 ft (12m)
38	8-element Yagi at 95 ft (17m)
39	8-element Yagi at 95 ft (30m)
40	8-element Yagi at 95 ft (60m)
41	IDC Vertical Antenna (160-48m)
42	GP Monopole with 256 Radials (12m)
43	GP Monopole with 256 Radials (60m)
44	NVIS antenna for 60m with extremely good ground
45	3 Element Yagi for 10m at 95 feet height
46	3 Element Yagi for 11m at 95 feet height
47	3 Element Yagi for 12m at 95 feet height
48	3 Element Yagi for 15m at 95 feet height
49	3 Element Yagi for 17m at 95 feet height
50	3 Element Yagi for 20m at 95 feet height
51	3 Element Yagi for 30m at 95 feet height
52	3 Element Yagi for 40m at 95 feet height
53	3 Element Yagi for 48m at 95 feet height
54	3 Element Yagi for 60m at 95 feet height
55	3 Element Yagi for 80m at 95 feet height

56	3 Element Yagi for 160m at 95 feet height
57	Tri-band Dipole 10m @ 33ft: Freq=28.45 MHz
58	Dipole 15m @ 33 ft
59	Dipole 20m @ 33 ft
60	Dipole 60m @ 132 ft
61	Dipole 80m @ 132 ft
62	Dipole 160m @ 132 ft
63	5-element Yagi at 80 ft (10m)
64	5-element Yagi at 80 ft (11m)
65	5-element Yagi at 80 ft (12m)
66	5-element Yagi at 80 ft (15m)
67	5-element Yagi at 80 ft (17m)
68	5-element Yagi at 80 ft (20m)
69	5-element Yagi at 132 ft (30m)
70	5-element Yagi at 132 ft (40m)
71	5-element Yagi at 132 ft (60m)
72	4-5el Quad at 66ft (10m)
73	4-5el Quad at 66ft (11m)
74	4-5el Quad at 66ft (12m)
75	4-5el Quad at 66ft (15m)
76	4-5el Quad at 66ft (17m)
77	4-5el Quad at 66ft (20m)
78	5-element Yagi at 165 ft (80m)
79	Cardioid (10m)
80	Cardioid (11m)
81	Cardioid (12m)
82	Cardioid (15m)
83	Cardioid (17m)
84	Cardioid (20m)
85	Cardioid (30m)
86	Cardioid (40m)
87	Cardioid (48m)
88	Cardioid (60m)
89	Cardioid (80m)
90	Cardioid (160m)
91	Inverted-V Dipole @ 45 f (11m)
92	Inverted-V Dipole @ 66 ft (40m)
93	2 el Fan Dipole Yagi @ 70 ft (10m)
94	2 el Fan Dipole Yagi @ 70 ft (12m)
95	2 el Fan Dipole Yagi @ 70 ft (15m)
96	2 el Fan Dipole Yagi @ 70 ft (17m)
97	2 el Fan Dipole Yagi @ 70 ft (20m)
98	5-element Yagi at 132 ft (160m)
99	5 bands 2-el Fan Dipole yagi (10, 12, 15, 17 and 20m)
100	6 bands 4-5el Quad at 66ft (10, 11, 12, 15, 17 and 20m)
101	Tri-band Dipole 20-15-10 @ 33ft
102	Tri-band Dipole 160-80-60 @ 132ft
103	IDC Vertical (10-160m)
104	VColMon (Not Active)
105	Beverage 300m very good ground (80, 60, 48 and 40m)
106	Super Beverage 160m, 3600m
107	Super Beverage 80m, 3600m
108	Super Beverage 60m, 3600m
109	Super Beverage 3200m
110	V-Collinear (10m)
111	V-Collinear (12m)
112	V-Collinear (15m)
113	V-Collinear (17m)
114	V-Collinear (30m)

115	BC Phased Array
116	VU2NSB OmniDX Array
117	VU2NSB OmniDX Array
118	VU2NSB OmniDX Array
119	VU2NSB OmniDX Array
120	VU2NSB OmniDX Array
121	VU2NSB OmniDX Array
122	VU2NSB OmniDX Array