SOCIETÁ PER L'ELETTRONICA s.r.l.

EXPERT 1.3K-FA
EXPERT 1.5K-FA
EXPERT 2K-FA

Application Programmer's Guide

Rev. 1.1

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1. FOREWORD

Expert 1.3K-FA and Expert 2K-FA amplifiers can be controlled via USB/RS232 link using a proprietary protocol.

For this purpose the amplifiers are equipped with two ports, an USB and a RS232 (the RS232 is present on the 2K-FA starting from the s/n > xxxx102). These ports can be used independently but not simultaneously.

The serial communication is asynchronous and the setup parameters are:
8 Bits/char.
1 Stop bit,
No Parity Control.

The maximum speed is 115.200 kbps and the amplifier adapts automatically lower speeds.

S.P.E. provides two applications, KTerm_USB and KTerm_232 for the ports, to allow a complete remote display of the front panel, (display, keyboard and status leds) and to permit the upload of firmware updates (refer to the manuals).

A perfect copy of the display is packed and transferred to the host in less than 400 bytes, so the terminal appears to be reactive with very little band occupation.

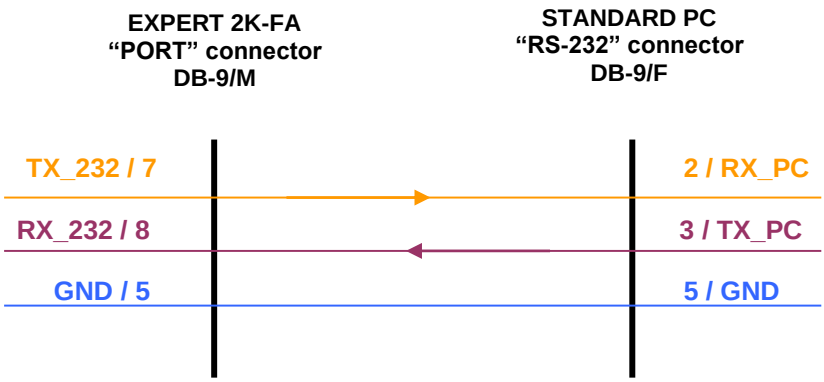
Nevertheless the operator would have the ability to integrate into his control software the basic data/controls from and to the Expert amplifiers. In this paper SPE provides the protocol and necessary explanations to fill that need.

With the integrated software, the operator can see all the relevant data coming from the amplifier and perform basic operations. The more complex operations such as settings, antenna preset, firmware update, etc., must be performed in the usual way with KTerm applications.

The following information is for software designers as SPE will not offer any advisory service regarding third party software and will deny any responsibility for damages produced.

2. INTERFACE CABLES

The USB port needs a standard cable, while the RS 232 port needs a cable with the following pin assignments:



SPE is not responsible for any failure resulting from misuse of hardware interfaces.

3. THE COMMAND/DATA PACKETS

The packets containing commands from the host to the amplifier and those containing data from the amplifier to the host, have the following format:

SYMBOL	MEANING
SYN	Synchronization characters: (*) 0x55 for packets from host to the amplifier (*) 0xAA for packets from the amplifier to the host
SYN	
SYN	
CNT	The number of bytes (data or commands) following, checksum excluded.
DATA_1	The content of the packet
...	
DATA_N	
CHK	Checksum caclculated by adding modulo-256 the data bytes DATA1..DATA_N

(*)Note: the numeric notation 0xNN indicates an 8-bit value expressed using hexadecimal format.

When a valid packet containing a keystroke code is received by the amplifier, a reply is generated that is either an acknowledge (ACK) or a Status_info (STATUS).
The ACK's Data contains the command just received. It's returned back to the host for control purpose.

Example: to change the amplifier's mode from STANDBY to OPERATE, send this sequence of bytes:

SYMBOL	MEANING
0x55	Three synchronization characters sent by the host
0x55	
0x55	
0x01	Only 1 bytes follow
0x0D	OPERATE key code
0x0D	Checksum of a single byte is the byte itself...

If the packet is received by the amplifier without errors, the following ACK packet is generated and sent back to the host:

SYMBOL	MEANING
0xAA	Three synchronization characters sent by the amplifier
0xAA	
0xAA	
0x01	Only 1 bytes follow
0x0D	Received command
0x0D	Checksum of a single byte is the byte itself...

4. COMMAND SET

The following table shows all the user commands supported starting from firmware releases:
15_05_15_A_3s for Expert 2K-FA and **15_05_15_A_15s** for Expert 1.3K-FA.
Note that the first three numbers of the release represent the date of issue.

COMMAND	DATA	NOTE
INPUT	0x01	These commands are the equivalent of the keyboard keystrokes.
BAND -	0x02	
BAND +	0x03	
ANTENNA	0x04	
L -	0x05	
L +	0x06	
C -	0x07	
C +	0x08	
TUNE	0x09	
SWITCH OFF	0x0A	
POWER	0x0B	
DISPLAY	0x0C	
OPERATE	0x0D	
CAT	0x0E	
LEFT ARROW	0x0F	
RIGHT ARROW	0x10	
SET	0x11	
BACKLIGHT ON	0x82	Control the backlight of the display can be useful when the amplifier is in a remote environment
BACKLIGHT OFF	0x83	
STATUS	0x90	To get the Status string

5. THE STRING STATUS

The string status describes the current situation in the amplifier and can be requested several times every second.

It is composed of three sync bytes, one byte containing the length of the significant data of the string, 67 bytes of data, two bytes for the modulo-256 checksum and terminated with bytes CR (13) and LF (10).

To request the Status string, the command request "0x90" must be sent from the host to the amplifier:

SYMBOL	MEANING
0x55	Three synchronization characters
0x55	
0x55	
0x01	Only 1 bytes follow
0x90	Get Status
0x90	Checksum of a single byte is the byte itself...

The amplifier response will be ASCII-comma-separated-values containing the relevant information for monitoring purposes:

SYMBOL	MEANING
0xAA	Three synchronization characters sent by the amplifier
0xAA	
0xAA	
0x43	0x43 = 67 dec = number of characters in the string, included commas and spaces
DATA0	67 characters
...	
DATA66	
CHK byte0	CHK byte0 = SUM(DATA0 --> DATA66) % 256 CHK byte1 = SUM(DATA0 --> DATA66) / 256
CHK byte1	
CR LF	2 bytes, Carriage Return and Line Feed

An example of the string is:

¬¬¬C,20K,S,R,x,1,00,1a,0r,L,0000, 0.00, 0.00, 0.0, 0.0, 33, 0, 0,N,N,%^,CRLF

All values are separated by commas forming 19 fields with fixed length.
The expected values are shown in **BOLD**.

FIELD	LENGHT	CONTENTS
ID	3 bytes	Identifier of PA, can be **20K** for 2K-FA or **13K** for 1.3K-FA
Standby/ Operate	1 byte	The value is **S** or **O**
RX / TX	1 byte	The value is **R** or **T**
Memory Bank	1 byte	The value is **A** or **B** for 1.3K-FA, 2K-FA shows always **x**
Input	1 byte	The value is **1** or **2** depending on the selected input port
Selected Band	2 bytes	Value from **00** (160m) to **11** (4m) for 1.3K-FA or to **10** (6m) for 2K- FA
TX Antenna and ATU status	2 bytes	Value from **0** to **4** for 1.3K-FA or to **6** for 2K-FA. The second byte can be **t** for tunable antenna, **b** ATU bypassed, **a** ATU enabled
RX Antenna	2 bytes	If an antenna is set for "RX only" is indicated, otherwise reads **0r**
Power Level	1 byte	**L** for LOW, **M** for MID and **H** for HIGH power level
Output Power	4 bytes	**0000** in Rx mode, measured output power in Watts on TX
SWR ATU	5 bytes	**_0.00** on Rx mode, measure VSWR before the ATU on TX
SWR ANT	5 bytes	**_0.00** on Rx mode, measure VSWR of the antenna on TX
V PA	4 bytes	Supply Voltage, **_0.0** on RX Mode, **48.0** on Operate mode High Power
I PA	4 bytes	Supply current, **_0.0** on Rx mode, absorbed current when on TX
Temperature (upr)	3 bytes	**025** Temp in °C or F of the heatsink, for 2K-FA is the upper heatsink
Temperature (lwr)	3 bytes	**025** Temp in °C or F of the lower heatsink, 1.3K-FA reads always **000**
Temperature (cmb)	3 bytes	**025** Temp in °C or F of the power combiner, 1.3K-FA reads always **000**
WARNINGS	1 byte	If no warnings reads **N**, for possible values go to the next table
ALARMS	1 byte	If no alarms reads **N**, for possible values go to the next table

WARNING	MEANING
M	ALARM AMPLIFIER
A	NO SELECTED ANTENNA
S	SWR ANTENNA
B	NO VALID BAND
P	POWER LIMIT EXCEEDED
O	OVERHEATING
Y	ATU NOT AVAILABLE
W	TUNING WITH NO POWER
K	ATU BYPASSED
R	POWER SWITCH HELD BY REMOTE
T	COMBINER OVERHEATING
C	COMBINER FAULT
N	NO WARNINGS

ALARMS	MEANING
S	SWR EXCEEDING LIMITS
A	AMPLIFIER PROTECTION
D	INPUT OVERDRIVING
H	EXCESS OVERHEATING
C	COMBINER FAULT
N	NO ALARMS

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