



SOCIETÀ PER L'ELETTRONICA s.r.l.

EXPERT 1K-FA

COMMUNICATION PROTOCOL SPECIFICATIONS

Rev. 2.0



TABLE OF CONTENTS

Foreword.....	3
EXPERT 1K-FA: the communication protocol.....	4
The COMMAND/DATA packets.....	5
COMMAND SET.....	7
The STATUS data packet.....	9
[00] SYN Byte.....	10
[01] SYN Byte.....	10
[02] SYN Byte.....	10
[03] CNT Byte.....	10
[04] STATUS_CODE Byte.....	10
Bit 0 STARTUP: Startup mode bit.....	10
[05] FLAGS Byte.....	10
Bit 7 T_SCALE: Internal temperature measurement unit.....	10
Bit 6 BEEP: Keyboard acoustic feedback status bit.....	10
Bit 5 CONTEST: CONTEST mode status bit.....	10
Bit 4 MODE: Output power mode status bit.....	10
Bit 3 ALARM: Alarm status bit.....	10
Bit 2 TX: Transmission status bit.....	10
Bit 1 OP/STBY: OPERATE/STANDBY status bit.....	10
Bit 0 TUNE: TUNE operation status bit.....	10
[06] DISPLAY_CTX Byte.....	11
[06] DISPLAY_CTX == 0x03: CAT info is being displayed.....	12
[06] DISPLAY_CTX == 0x06: "SETUP OPTIONS" menu is being displayed.....	15
[06] DISPLAY_CTX == 0x07: "SET ANTENNA" menu is being displayed.....	16
[06] DISPLAY_CTX == 0x08: "SET CAT" menu is being displayed.....	18
[06] DISPLAY_CTX == 0x09: "SET YAESU" menu is being displayed.....	18
[06] DISPLAY_CTX == 0x0A: "SET ICOM" menu is being displayed.....	18
[06] DISPLAY_CTX == 0x0B: "SET TEN-TEC" menu is being displayed.....	19
[06] DISPLAY_CTX == 0x0C: "SET BAUDRATE" menu is being displayed.....	19
[06] DISPLAY_CTX == 0x0D: "MANUAL TUNE" menu is being displayed.....	20
[06] DISPLAY_CTX == 0x0E: "BACKLIGHT" setup is being displayed.....	21
[06] DISPLAY_CTX == 0x1D: "ALARM HISTORY" report is being displayed.....	21
[18] BAND INPUT Byte.....	23
[19] SUB_BAND Byte.....	23
[20] FREQ_LO Byte.....	23
[21] FREQ_HI Byte.....	23
[22] ANTENNA CAT Byte.....	24
[23] SWR_LO/GAIN_LO Byte.....	24
[24] SWR_LO/GAIN_HI Byte.....	24
[25] TEMPERATURE Byte.....	24
[26] PA_OUT_LO Byte.....	25
[27] PA_OUT_HI Byte.....	25
[28] PR_LO Byte.....	25
[29] PR_HI Byte.....	25
[30] VA_LO Byte.....	25
[31] VA_HI Byte.....	25
[32] IA_LO Byte.....	26
[33] IA_HI Byte.....	26
[34] CHECKSUM Byte.....	26

Foreword.

This document describes in detailed form the communication protocol of the EXPERT 1K-FA Linear Amplifier produced by SPE srl.

With the term “communication protocol” we intend the “set of rules” that can be used to remotely control the functionality of the Linear Amplifier itself using all the features provided by its embedded firmware.

By following the syntax description of the available command and response types hereafter depicted, a medium-skill computer programmer can build his own customized remote control application.

The sample Windows application “EXPERT_Console.exe”, freely downloadable from our website, only wants to be a simple programming example which duplicates (with some little improvements) the EXPERT’s front panel “touch and feel” and it’s not intended to be an “on demand customizable software”.

In other terms SPE srl:

- is not involved in any communication software development concerning the EXPERT 1K-FA Linear Amplifier
- doesn’t operate any form of consulting activity concerning software development
- doesn’t take any responsibility about communication software developed by third party

All the technical information included in this document can be freely used without any limit by anyone who wants to build, for any use, his own communication application.

IMPORTANT NOTICE.

The technical information contained in this document only applies to the “CE/FCC Compliant Second Series” models whose firmware release is equal or greater than 07_07_07_M.

For earlier firmware releases, please refer to the online document “EXPERT 1K-FA - COMMUNICATION PROTOCOL SPECIFICATIONS Rev. 1.0” freely downloadable from www.linear-amplifier.com .

EXPERT 1K-FA: the communication protocol.

The communication protocol of the EXPERT Linear Amplifier is implemented via a RS-232 serial link available on the rear panel of the device itself and enables any computer provided with the proper serial interface to easily implement a sort of “remote control” that can behave either as a “second front panel” or, for example, as a “reduced command-set” interface tailored for the customer’s purpose: it all depends on the skill and imagination of the programmer (and on the power of the computer hardware involved).

The protocol’s nature is “general purpose” (it is not bound to any particular or proprietary hardware architecture) and is very efficient because all the information needed are packed together in a very short data record that is sent by the Linear Amplifier in a time of about 40 ms.

The serial communication is asynchronous and the setup parameters are:

- 9600 Baud
- 8 Bit/char
- 1 Stop bit
- No parity control

The interface cable equipped with the amplifier is a simple “straight-through” serial cable having the following connections:

P.C side DB-9/F connector	EXPERT side DB-9/M connector
2 TX -->	2
-----+-----+-----	
3 RX <--	3
-----+-----+-----	
4 DTR -->	4
-----+-----+-----	
5 GND	5
-----+-----+-----	

Although, according to EIA specifications, the maximum RS-232 cable length should not be over 50 feet (15 meters), we successfully tested, in our laboratory, a connection longer than 200 feet (60 meters) made with an inexpensive two pair telephone cable and wired following the above pin assignment.

It can be noted that, in addition to the canonical TX, RX and GND interfacing lines, the DTR control line is connected as well.

It is used to turn the Linear Amplifier on by simply raising it at a voltage level greater than +5 Vdc (in software terms it is the equivalent of activating this line in its ON state).

The complete remote turn on operation takes a time variable from about 3 seconds up to 4.5 seconds depending on some factors like environmental temperature and other electrical parameters of the internal power-up circuitry.

To turn the amplifier off, this control line has to be reset in its OFF state (this is equivalent to setting the bias level to 0 Vdc or below).

This operation takes about 1 second to be completed because the DTR off status has to be sampled for about 500 ms at least. An equivalent way to turn the Linear Amplifier off is to send it the proper “OFF” command sequence described later in the “COMMAND SET” section.

When the DTR line is put to its high state (a voltage level greater than +5 V) and left unchanged, it takes the power control of the Linear Amplifier and, as a result, the user will not be able to turn off the Linear Amplifier itself using the “OFF” key on its front panel because the power mastering is owned by the PC remote control line.

Once started, the Linear Amplifier internal firmware doesn’t send any message through the serial line; to make this possible (and to interact with it) a proper sequence of bytes composing the various commands accepted by the Linear Amplifier must be sent to it.

The commands supported are the equivalent of the front panel keys that compose the keyboard plus three “special functions” that enable/disable the Remote Console Update mode and provide a further CAT control mode.

The COMMAND/DATA packets.

The command/data packets supported by the firmware of the Linear Amplifier have the following format:

SYMBOL	MEANING
SYN	Synchronization characters: their individual value is <ul style="list-style-type: none"> • (*)0x55 for the host (PC) endpoint • (*)0xAA for the Linear Amplifier endpoint
SYN	
SYN	
CNT	The count of command/data bytes (checksum excluded) expected to be sent/received.
DATA_1	The total amount of command/data bytes contained in the packet.
...	
DATA_N	
CHK	The checksum computed by adding modulo-256 the data bytes DATA_1.. DATA_N.

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

The response to a well-formed (valid) command will be either an Acknowledge (ACK) or a Status_Info (STATUS) packet.

The response to a command in which an error has been detected will be a Not_Acknowledge (NAK) packet.

If the command is not recognized the response will be an Unknown_Command (UNK) packet.

If, for example, we want to put the Linear Amplifier in OPERATE mode while in STANDBY mode, we have to send this sequence of bytes:

BYTE	MEANING
0x55	Three synchronization characters preceding the data and sent by the PC
0x55	
0x55	
0x02	Two bytes of data follow.
0x10	KEY_PRESSED command.
0x1C	OPERATE key code.
0x2C	Resulting checksum (0x10 + 0x1C = 0x2C).

The Linear Amplifier will respond either with a STATUS packet (we'll see it later) or with an ACK packet that indicates that the command has been recognized; the ACK packet is depicted in the following table:

BYTE	MEANING
0xAA	Three synchronization characters preceding the data and sent by the Linear Amplifier.
0xAA	
0xAA	
0x01	One byte of data follows.
0x06	ACK byte
0x06	Resulting checksum

If, for example, we try to send the previous command affected by a checksum error, we'll see the following:

BYTE	MEANING
0x55	Three synchronization characters preceding the data and sent by the PC
0x55	
0x55	
0x02	Two bytes of data follow.
0x10	KEY_PRESSED command.
0x1C	OPERATE key code.
0x3C	Resulting wrong checksum (0x10 + 0x1C = 0x3C).

The Linear Amplifier will respond with a NAK packet indicating that the command is affected by an error (or has a total amount of bytes different from the expected total):

BYTE	MEANING
0xAA	Three synchronization characters preceding the data and sent by the Linear Amplifier.
0xAA	
0xAA	
0x01	One byte of data follows.
0x15	NAK byte
0x15	Resulting checksum

If, for example, we try to send an unknown command (an unexistent op-code):

BYTE	MEANING
0x55	Three synchronization characters preceding the data and sent by the PC
0x55	
0x55	
0x01	One byte of data follows.
0x20	Unknown command.
0x20	Resulting checksum.

The Linear Amplifier will respond with UNK packet that indicates that the command has not been recognized::

BYTE	MEANING
0xAA	Three synchronization characters preceding the data and sent by the Linear Amplifier.
0xAA	
0xAA	
0x01	One byte of data follows.
0xFF	UNK byte
0xFF	Resulting checksum

COMMAND SET.

The following table shows all the user commands supported by the current firmware release (Rel. 06_11_06_x and further).

They fall into three categories:

- Keystroke commands
- Remote Console Update commands
- Remote tuning driven by RS-232 CAT.

COMMAND	CODE	DATA	MEANING	NOTE
KEY_ON	0x10	0x30	"L-" Key	These codes are the equivalent of the left-side keyboard keystrokes.
		0x31	"L+" Key	
		0x32	"C -" Key	
		0x33	"L+" Key	
		0x34	"TUNE" Key	
		0x28	"IN" Key	These codes are the equivalent of the center-side keyboard keystrokes.
		0x29	"BAND-" Key	
		0x2A	"BAND+" Key	
		0x2B	"ANT" Key	
		0x2C	"CAT" Key	
		0x2D	"<--" Key	
		0x2E	"-->" Key	These codes are the equivalent of the right-side keyboard keystrokes.
		0x2F	"SET" Key	
		0x18	"OFF" Key	
		0x1A	"MODE" Key	
	0x1B	"DISPLAY" Key		
	0x1C	"OPERATE" Key		
RCU_ON	0x80	---	Remote Console Update ON	Enables the Remote Console Update
RCU_OFF	0x81	---	Remote Console Update OFF	Disables the Remote Console Update
CAT_232	0x82	Freq_Lo	Low byte of frequency value expressed in KHz.	This command allows the Linear Amplifier to be tuned by RS-232 CAT.
		Freq_Hi	High byte of frequency value expressed in KHz.	

Let's see them in more detail:

- The KEY_ON command requires a subcode (DATA field) that specifies the keystroke we want to emulate: in the previous paragraph we took as an example the "OPERATE" keystroke to be sent, so the correct bytes sequence of the whole command was [0x10, 0x1C]. If we want, for example, to turn the Linear Amplifier off the command we need to send is [0x10, 0x18] which forms, with all the other requested control bytes, the sequence [0x55, 0x55, 0x55, 0x02, 0x10, 0x18, 0x28].
- The RCU_ON command sets the Remote Console Update mode which allows the connected host to get informed about all the activities of the Linear Amplifier itself. In a nutshell, the LCD display mounted on the front panel of the Linear Amplifier is updated from 5 to 8 times a second with the "living information" bound to the internal activities of the amplifier itself. When we enable the Remote Console Update we can get, in a coded form, almost all the information managed by the LCD display; this way we are able to build our "special remote control panel" using a suitable programming tool equipped, for example, with proper graphic development tools, libraries and so on. When the linear amplifier is turned on it is (by default) reset to RCU_OFF state so, if we want to put it to RCU_ON state, we have to send it the proper [0x55, 0x55, 0x55, 0x01, 0x80, 0x80] bytes sequence.
- The RCU_OFF command is the counterpart of the above described RCU_ON command and disables the timed host update; its activation sequence is [0x55, 0x55, 0x55, 0x01, 0x81, 0x81].
- The CAT_232 command allows the Linear Amplifier internal tuner to be managed by a suitable application running on the connected host computer: in this case we have to enable in advance the proper CAT interface (RS-232) using either the provided CAT menu on the EXPERT front panel or the equivalent remote console commands.

Note: as the most frequent command types are the ones that emulate the keystrokes (KEY_ON set), it is important to consider the kind of the expected feedback response. It depends on whether the Remote Console Update is enabled or not:

- if the RCU is ON we get an ACK packet as a response and it can be fairly discarded because its meaning is only a key-code validation. Following this kind of response (and when the updating timeout expires) a STATUS packet containing the data related to the current context will be sent. The updating info streaming will continue until we, eventually, send either a RCU_OFF command or we turn the amplifier off.
- if the RCU is OFF we have as a response a STATUS packet that contains all the information available at the time the key-code is sent; if we want to pick information up at a rate timed by the application running on the host, we can send the “catch-all” RCU_OFF sequence [0x55, 0x55, 0x55, 0x01, 0x81, 0x81] that causes no action and return the STATUS packet as a response. It is advisable, in this case, not to press hard upon the unit with data requests. Remember that, for a satisfactory working of the Linear Amplifier, a suitable serial line activity must not go over 8 requests per second (the refreshing rate of the LCD display), otherwise the global performance could be considerably slowed.

The STATUS data packet.

This is the context-sensitive data response sent back by the Linear Amplifier either by a proper opcode transmitted by the host while in RCU_OFF mode or at a scheduled timing while in RCU_ON mode.

It is a 30 bytes data packet (plus 5 byte of framing and checksum control) that is detailed in the following table:

	[Offset]	BYTE	MEANING
HEADER	[00]	SYN	Three synchronization bytes (0xAA) that indicates a data packet coming from the Linear Amplifier.
	[01]	SYN	
	[02]	SYN	
	[03]	CNT	
CONTEXT INFO	[04]	STATUS_CODE	Identification code (0xA0 or 0xA1) of the STATUS_INFO record (*).
	[05]	FLAGS	Flags byte.
	[06]	DISPLAY_CTX	Display contextual status byte.
	[07]	SETUP_0	This is an array of 11 info bytes that carry out (when needed) some useful information related to the IDX_DISPLAY field.
	[08]	SETUP_1	
	[09]	SETUP_2	
	[10]	SETUP_3	
	[11]	SETUP_4	
	[12]	SETUP_5	
	[13]	SETUP_6	
	[14]	SETUP_7	
[15]	SETUP_8		
[16]	SETUP_9		
[17]	SETUP_10		
MEASURE INFO	[18]	BAND INPUT	Selected input and related selected band.
	[19]	SUB_BAND	Selected sub-band related to INPUT.
	[20]	FREQ_LO	Frequency info expressed in KHz in the form Low_Byte/High_Byte.
	[21]	FREQ_HI	
	[22]	ANTENNA CAT	Selected CAT and Antenna info related to INPUT.
	[23]	SWR_LO / GAIN_LO	SWR info (STANDBY mode) or GAIN info (OPERATE mode) expressed in the form Low_Byte/High_Byte.
	[24]	SWR_HI / GAIN_HI	
	[25]	TEMPERATURE	Internal temperature info expressed in Celsius degrees.
	[26]	PA_OUT_LO	Exciter output power (STANDBY mode) or Power Amplifier output power (OPERATE mode) expressed in the form Low_Byte/High_Byte.
	[27]	PA_OUT_HI	
	[28]	PR_LO	Reverse power measured in OPERATE mode and expressed in the form Low_Byte/High_Byte.
	[29]	PR_HI	
	[30]	VA_LO	Internal power supply voltage measured in OPERATE mode and expressed in the form Low_Byte/High_Byte.
	[31]	VA_HI	
[32]	IA_LO	Internal power supply current measured in OPERATE mode and expressed in the form Low_Byte/High_Byte.	
[33]	IA_HI		
FOOTER	[34]	CHECKSUM	Checksum byte: it is the sum modulo-256 of all the data bytes ([04]..[33]).

(*) The STATUS_CODE byte value can assume one the following values depending on the programmed startup mode of the device:

- 0xA0: the Linear Amplifier had been previously programmed to start in STANDBY mode after power-up.
- 0xA1: the Linear Amplifier had been previously programmed to start in OPERATE mode after power-up.

All the details regarding the implemented data coding will be described In the following pages.

[00] SYN Byte

1	0	1	0	1	0	1	0
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Resulting code: 0xAA

[01] SYN Byte

1	0	1	0	1	0	1	0
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Resulting code: 0xAA

[02] SYN Byte

1	0	1	0	1	0	1	0
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Resulting code: 0xAA

[03] CNT Byte

0	0	0	1	1	1	1	0
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Resulting code: 0x1E

[04] STATUS_CODE Byte

1	0	1	0	0	0	0	STARTUP
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 0 **STARTUP**: Startup mode bit.

- 1 : The Linear Amplifier had been previously programmed to start in OPERATE mode after power-up.
- 0 : The Linear Amplifier had been previously programmed to start in STANDBY mode after power-up.

[05] FLAGS Byte

T_SCALE	BEEP	CONTEST	MODE	ALARM	TX	OP/STBY	TUNE
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7 **T_SCALE**: Internal temperature measurement unit.

- 1 : Internal temperature value represented in Celsius degrees (°C)
- 0 : Internal temperature value represented in Fahrenheit degrees (°F)

Bit 6 **BEEP**: Keyboard acoustic feedback status bit.

- 1 : Keyboard beep ON
- 0 : Keyboard beep OFF

Bit 5 **CONTEST**: CONTEST mode status bit.

- 1 : CONTEST mode ON
- 0 : CONTEST mode OFF

Bit 4 **MODE**: Output power mode status bit.

- 1 : FULL mode selected
- 0 : HALF mode selected

Bit 3 **ALARM**: Alarm status bit.

- 1 : Alarm in progress
- 0 : Normal operation

Bit 2 **TX**: Transmission status bit.

- 1 : The connected transceiver is in TX mode
- 0 : The connected transceiver is in RX mode

Bit 1 **OP/STBY**: OPERATE/STANDBY status bit.

- 1 : OPERATE mode selected
- 0 : STANDBY mode selected

Bit 0 **TUNE**: TUNE operation status bit.

- 1 : Automatic TUNING operation in progress
- 0 : Normal operation

[06] DISPLAY_CTX Byte

0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

This byte of information reflects the current status of the LCD screen with the following meanings:

	CODE	MEANING
OP_STATUS	0x00	The LOGO image is being displayed (STANDBY mode).
	0x01	The PA_OUT and I_PA level bars are being displayed (OPERATE mode).
	0x02	The PW_REV and V_PA level bars are being displayed (OPERATE mode).
INFO_STATUS	0x03	CAT info is being displayed.
	0x04	Used for debugging purpose (it must be ignored).
	0x05	“DATA STORED!” message is being displayed.
SETUP_STATUS	0x06	“SETUP OPTIONS” menu is being displayed.
	0x07	“SET ANTENNA” menu is being displayed.
	0x08	“SET CAT” menu is being displayed.
	0x09	“SET YAESU” menu is being displayed.
	0x0A	“SET ICOM” menu is being displayed.
	0x0B	“SET TEN-TEC” menu is being displayed.
	0x0C	“SET BAUDRATE” menu is being displayed.
	0x0D	“MANUAL TUNE” setup is being displayed.
WARNING_STATUS	0x0E	“BACKLIGHT” setup is being displayed.
	0x0F	Used for debugging purpose (it must be ignored).
	0x10	Used for debugging purpose (it must be ignored).
	0x11	WARNING message raised when, into OPERATE mode, the power supply voltage drops below 20 Vdc (HALF mode).
	0x12	WARNING message raised when, into OPERATE mode, the power supply voltage drops below 26 Vdc (FULL mode).
	0x13	WARNING message raised when, into OPERATE mode, the power supply voltage rises above 50 Vdc (HALF mode).
	0x14	WARNING message raised when, into OPERATE mode, the power supply voltage rises above 50 Vdc (FULL mode).
	0x15	WARNING message raised when, into OPERATE mode, the power supply current rises above 40 Amps (HALF mode).
	0x16	WARNING message raised when, into OPERATE mode, the power supply current rises above 50 Amps (FULL mode).
	0x17	WARNING message raised when, into OPERATE mode, the internal temperature measurement rises above 90 °C (194 °F).
	0x18	WARNING message raised when, into OPERATE mode, the input power coming from the transceiver rises above its maximum expected value.
	0x19	Used for debugging purpose (it must be ignored).
	0x1A	Used for debugging purpose (it must be ignored).
0x1B	WARNING message raised when, into OPERATE mode, the reverse power rises above 300 Wpep.	
0x1C	WARNING message raised when, into OPERATE mode, there is an intervention of the internal diagnostics related to the Power Amplifier protection.	
ALARM_HISTORY	0x1D	The “ALARM HISTORY” report is being displayed
SHUTDOWN	0x1E	The “SHUTDOWN” message is being displayed and the amplifier is being turned off.

This is a fundamental info byte as it reflects the current status of the Linear Amplifier and allows the user to decide which command to send to enable the Linear Amplifier itself to perform the same actions as in the manual mode (through the front panel keyboard).

While most of the time the code itself documents the current display status (for example as in the WARNING_STATUS codes), there are certain cases (for example the SETUP_STATUS codes) in which the DISPLAY_CTX code is not enough; in these cases the “auxiliary bytes” SETUP_0..SETUP_10 work as parameters for it.

In the following pages will be detailed all the involved cases.

[06] DISPLAY_CTX == 0x03: CAT info is being displayed.

[07] SETUP_0

0	0	0	0	CAT #1 Info			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 3-0 **CAT #1 Info:** Selected CAT interface for input #1 (all values are in binary format)

- 0000: SPE
- 0001: ICOM
- 0010: KENWOOD
- 0011: YAESU
- 0100: TEN-TEC
- 0101: FLEX-RADIO
- 0110: RS-232
- 0111: NONE

[08] SETUP_1

0	0	0	0	CAT #1 Model			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 3-0 **CAT #1 Model:** Model definition for selected CAT interface for input #1 (all values are in binary format)

- If SETUP_0 == ICOM
 - 0000: CI-V interface
 - 0001: VOLTAGE_BAND analog interface
- If SETUP_0 == YAESU
 - 0000: FT 100
 - 0001: FT 757 GX2
 - 0010: FT 817/847
 - 0011: FT 840/890
 - 0100: FT 897
 - 0101: FT 900
 - 0110: FT 920
 - 0111: FT 900
 - 1000: FT 1000
 - 1001: FT 1000 MP1
 - 1010: FT 1000 MP2
 - 1011: FT 1000 MP3
 - 1100: FT 2000
 - 1101: FT 9000 D
 - 1110: BAND_DATA BCD interface
- If SETUP_0 == TEN-TEC
 - 0000: OMNI VII
 - 0001: ORION I/II
 - 0010: JUPITER
 - 0011: ARGONAUT
- Otherwise
 - 0000: Null value

[09] SETUP_2

0	0	0	0	0	0	BAUD-RATE #1	
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 1-0 **BAUD-RATE #1:** Baud-rate setting for CAT #1 (all values are in binary format)

- 00: 1200 Baud
- 01: 2400 Baud
- 10: 4800 Baud
- 11: 9600 Baud

[06] DISPLAY_CTX == 0x03: CAT info is being displayed. (continued)

[10] SETUP_3

0	0	0	0	CAT #2 Info			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 3-0 **CAT #2 Info:** Selected CAT interface for input #2 (all values are in binary format)

- 0000: SPE
- 0001: ICOM
- 0010: KENWOOD
- 0011: YAESU
- 0100: TEN-TEC
- 0101: FLEX-RADIO
- 0110: RS-232
- 0111: NONE

[11] SETUP_4

0	0	0	0	CAT #2 Model			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 3-0 **CAT #2 Model:** Model definition for selected CAT interface for input #2 (all values are in binary format)

- If SETUP_0 == ICOM
 - 0000: CI-V interface
 - 0001: VOLTAGE_BAND analog interface
- If SETUP_0 == YAESU
 - 0000: FT 100
 - 0001: FT 757 GX2
 - 0010: FT 817/847
 - 0011: FT 840/890
 - 0100: FT 897
 - 0101: FT 900
 - 0110: FT 920
 - 0111: FT 900
 - 1000: FT 1000
 - 1001: FT 1000 MP1
 - 1010: FT 1000 MP2
 - 1011: FT 1000 MP3
 - 1100: FT 2000
 - 1101: FT 9000 D
 - 1110: BAND_DATA BCD interface
- If SETUP_0 == TEN-TEC
 - 0000: OMNI VII
 - 0001: ORION I/II
 - 0010: JUPITER
 - 0011: ARGONAUT V
- Otherwise
 - 0000: Null value

[12] SETUP_5

0	0	0	0	0	0	BAUD-RATE #2	
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 1-0 **BAUD-RATE #2:** Baud-rate setting for CAT #2 (all values are in binary format)

- 00: 1200 Baud
- 01: 2400 Baud
- 10: 4800 Baud
- 11: 9600 Baud

[06] DISPLAY_CTX == 0x03: CAT info is being displayed. (continued)

[13] SETUP_6

RELEASE_SERIAL_1				RELEASE_SERIAL_2			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-4 **RELEASE_SERIAL_1**: Decimal packed BCD serial number info (digit 1)

Bit 3-0 **RELEASE_SERIAL_2**: Decimal packed BCD serial number info (digit 2)

[14] SETUP_7

RELEASE_SERIAL_3				RELEASE_SERIAL_4			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-4 **RELEASE_SERIAL_3**: Decimal packed BCD serial number info (digit 3)

Bit 3-0 **RELEASE_SERIAL_4**: Decimal packed BCD serial number info (digit 4)

[15] SETUP_8

RELEASE_SERIAL_5				RELEASE_SERIAL_6			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-4 **RELEASE_SERIAL_5**: Decimal packed BCD serial number info (digit 5)

Bit 3-0 **RELEASE_SERIAL_6**: Decimal packed BCD serial number info (digit 6)

[16] SETUP_9

SERIAL_LITERAL							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-0 **RELEASE_LITERAL**: An ASCII uppercase character [A..Z] that terminates the release serial number.

[17] SETUP_10

0	0	0	0	0	0	0	0
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Note: The Release Serial Info indicates the firmware creation date and it is structured according to the form DD_MM_YY_X where:

- DD is the DAY component of the creation date.
- MM is the MONTH component of the creation date.
- YY is the YEAR component of the creation date.
- X is an uppercase alpha character [A..Z] that represents the stable deployed release.

So, for example, the release version "05_06_07_C" indicates "5th June 2007" (stable version C) as its creation date.

[06] DISPLAY_CTX == 0x06: "SETUP OPTIONS" menu is being displayed.

[08] SETUP_1

0	0	0	0	SELECTED_ITEM			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 3-0 **SELECTED_ITEM**: The "SETUP OPTIONS" menu selected item code (all values are in binary format).

- 0000: "ANTENNA" item selected
- 0001: "CAT" item selected
- 0010: "MANUAL TUNE" item selected
- 0011: "BACKLIGHT" item selected
- 0100: "CONTEST" item selected
- 0101: "BEEP" item selected
- 0110: "START" item selected
- 0111: "TEMP." item selected
- 1000: "QUIT" item selected

[06] DISPLAY_CTX == 0x07: "SET ANTENNA" menu is being displayed.

[07] SETUP_0

0	0	0	0	MAIN_IDX			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 4-0 **MAIN_IDX**: The "SET ANTENNA" menu primary index (all values are in binary format).

- 0000: "160 m" antenna array selected
- 0001: " 80 m" antenna array selected
- 0010: " 40 m" antenna array selected
- 0011: " 30 m" antenna array selected
- 0100: " 20 m" antenna array selected
- 0101: " 17 m" antenna array selected
- 0110: " 15 m" antenna array selected
- 0111: " 12 m" antenna array selected
- 1000: " 10 m" antenna array selected
- 1001: " 6 m" antenna array selected
- 1010: "SAVE" item selected

[08] SETUP_1

DEF_ANT	160 m ANTENNA #2			0	160 m ANTENNA #1		
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

[09] SETUP_2

DEF_ANT	80 m ANTENNA #2			0	80 m ANTENNA #1		
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

[10] SETUP_3

DEF_ANT	40 m ANTENNA #2			0	40 m ANTENNA #1		
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

[11] SETUP_4

DEF_ANT	30 m ANTENNA #2			0	30 m ANTENNA #1		
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

[12] SETUP_5

DEF_ANT	20 m ANTENNA #2			0	20 m ANTENNA #1		
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

[13] SETUP_6

DEF_ANT	17 m ANTENNA #2			0	17 m ANTENNA #1		
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

[14] SETUP_7

DEF_ANT	15 m ANTENNA #2			0	15 m ANTENNA #1		
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

[15] SETUP_8

DEF_ANT	12 m ANTENNA #2			0	12 m ANTENNA #1		
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

[16] SETUP_9

DEF_ANT	10 m ANTENNA #2			0	10 m ANTENNA #1		
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

[17] SETUP_10

DEF_ANT	6 m ANTENNA #2			0	6 m ANTENNA #1		
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7 **DEF_ANT**: The default antenna index relative to the coded 2-antennas array (all values are in binary format).

- 0: ANTENNA #1 selected
- 1: ANTENNA #2 selected

[06] **DISPLAY_CTX == 0x07**: "SET ANTENNA" menu is being displayed. (continued)

Bit 6-4 **XXX m ANTENNA #2**: Setting code for antenna #2 relative to the XXX m band (all values are in binary format).

- 000: Antenna #1
- 001: Antenna #2
- 010: Antenna #3
- 011: Antenna #4
- 100: No antenna

Bit 2-0 **XXX m ANTENNA #1**: Setting code for antenna #1 relative to the XXX m band (all values are in binary format).

- 000: Antenna #1
- 001: Antenna #2
- 010: Antenna #3
- 011: Antenna #4
- 100: No antenna

Note: the "SET ANTENNA" menu selection is made using two numerical indexes:

- the primary index **MAIN_IDX** reported by **SETUP_0** whose function is to select the band (or the SAVE menu item)
- the secondary index **DEF_ANT** whose function is to select the default antenna from the 2-antennas array belonging to each band

[06] DISPLAY_CTX == 0x08: "SET CAT" menu is being displayed.

[08] SETUP_1

0	0	0	0	SELECTED_ITEM			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 3-0 **SELECTED_ITEM**: The "SET CAT" menu selected item code (all values are in binary format).

- 0000: SPE
- 0001: ICOM
- 0010: KENWOOD
- 0011: YAESU
- 0100: TEN-TEC
- 0101: FLEX-RADIO
- 0110: RS-232
- 0111: NONE

Note: This menu selection is relative to the **STATUS.INPUT** setup.

[06] DISPLAY_CTX == 0x09: "SET YAESU" menu is being displayed.

[08] SETUP_1

0	0	0	0	SELECTED_ITEM			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 3-0 **SELECTED_ITEM**: The "SET YAESU" menu selected item code (all values are in binary format).

- 0000: FT 100
- 0001: FT 757 GX2
- 0010: FT 817/847
- 0011: FT 840/890
- 0100: FT 897
- 0101: FT 900
- 0110: FT 920
- 0111: FT 900
- 1000: FT 1000
- 1001: FT 1000 MP1
- 1010: FT 1000 MP2
- 1011: FT 1000 MP3
- 1100: FT 2000
- 1101: FT 9000 D
- 1110: BAND_DATA BCD interface

Note: This menu selection is relative to the **STATUS.INPUT** setup.

[06] DISPLAY_CTX == 0x0A: "SET ICOM" menu is being displayed.

[08] SETUP_1

0	0	0	0	SELECTED_ITEM			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 3-0 **SELECTED_ITEM**: The "SET ICOM" menu selected item code (all values are in binary format).

- 0000: CI-V interface
- 0001: VOLTAGE_BAND analog interface

Note: This menu selection is relative to the **STATUS.INPUT** setup.

[06] DISPLAY_CTX == 0x0B: "SET TEN-TEC" menu is being displayed.

[08] SETUP_1

0	0	0	0	SELECTED_ITEM			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 3-0 **SELECTED_ITEM**: The "SET TEN-TEC" menu selected item code (all values are in binary format).

- 0000: OMNI VII
- 0001: ORION I/II
- 0010: JUPITER
- 0011: ARGONAUT V

Note: This menu selection is relative to the **STATUS.INPUT** setup.

[06] DISPLAY_CTX == 0x0C: "SET BAUDRATE" menu is being displayed.

[08] SETUP_1

0	0	0	0	SELECTED_ITEM			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 3-0 **SELECTED_ITEM**: The "SET BAUDRATE" menu selected item code (all values are in binary format).

- 0000: 1200 Baud
- 0001: 2400 Baud
- 0010: 4800 Baud
- 0011: 9600 Baud

Note: This menu selection is relative to the **STATUS.INPUT** setup.

[06] **DISPLAY_CTX == 0x0D**: "MANUAL TUNE" menu is being displayed.

[08] **SETUP_1**

0	L_OUT						
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-0 **L_OUT**: A 7 bit binary coding of the tuner's Lout parameter relative to the current sub-band setup of the **STATUS.INPUT** selected. The resulting values are the Lout uH (microHenry) multiplied by 10 (i.e. read 63 for a Lout of 6.3 uH and so on). The total values extension is within the range [0.0 .. 12.7 uH).

[09] **SETUP_2**

C_OUT_LO							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-0 **C_OUT_LO**: Low byte of the word (10 bits) representing the value of the tuner's Cout parameter relative to the current sub-band setup of the **STATUS.INPUT** selected.

[10] **SETUP_3**

0	0	0	0	0	0	C_OUT_HI	
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-0 **C_OUT_HI**: High byte of the word (10 bits) representing the value of the tuner's Cout parameter relative to the current sub-band setup of the **STATUS.INPUT** selected.

Note: The correct interpretation of the Cout resulting value has to be done taking into account, for every weighted bit, the assigned values of the following list:

- Bit 0: 3.6 pF
- Bit 1: 6.4 pF
- Bit 2: 12.1 pF
- Bit 3: 18.9 pF
- Bit 4: 40.8 pF
- Bit 5: 81.5 pF
- Bit 6: 158.0 pF
- Bit 7: 321.5 pF
- Bit 8: 641.6 pF
- Bit 9: 1250.0 pF

So, for example, a 10-bit binary value of 0001001101 has to be read as 192.6 pF.

[06] DISPLAY_CTX == 0x0E: "BACKLIGHT" setup is being displayed.

[08] SETUP_1

BACKLIGHT_SETUP							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-0 **BACKLIGHT_SETUP**: An 8-bit binary coding of the "slider" representing the current backlight setting of the LCD display; its values range varies from 0 (about 30% of maximum light intensity) to 255 (the maximum light intensity allowed).

[06] DISPLAY_CTX == 0x1D: "ALARM HISTORY" report is being displayed.

[07] SETUP_0

WRN_IDX				WRN_NO			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-4 **WRN_IDX**: The "visual index" (from 10 to 1) of the displayed alarm messages on the LCD display (max. four at a time and in reverse order as in a stack fashion).

Bit 3-0 **WRN_NO**: The total amount of the stored alarm codes.

- 0000: Alarm buffer is empty.
- 0001: One alarm code stored.
- ...
- 1010: Ten alarm codes stored.

[08] SETUP_1

IDX_IN	WARNING_CODE_1						
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

[09] SETUP_2

IDX_IN	WARNING_CODE_2						
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

[10] SETUP_3

IDX_IN	WARNING_CODE_3						
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

[11] SETUP_4

IDX_IN	WARNING_CODE_4						
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

[12] SETUP_5

IDX_IN	WARNING_CODE_5						
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

[13] SETUP_6

IDX_IN	WARNING_CODE_6						
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

[14] SETUP_7

IDX_IN	WARNING_CODE_7						
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

[15] SETUP_8

IDX_IN	WARNING_CODE_8						
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

[16] SETUP_9

IDX_IN	WARNING_CODE_9						
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

[06] **DISPLAY_CTX == 0x1D**: "ALARM HISTORY" report is being displayed. (continued)

[17] **SETUP_10**

IDX_IN	WARNING_CODE_10						
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

In this case the SETUP_1..SETUP_10 bytes are used to contain the warning codes and the related input (the one that was alarmed); remember that the alarm buffer is managed as a stack (the first stored is the last displayed) so, for example, WARNING_CODE_10 has to be intended as more recent with respect to WARNING_CODE_9.

Bit 7 **IDX_IN**: An 1-bit code of the alarmed input

- 0: Input #1.
- 1: Input #2.

Bit 6-0 **WARNING_CODE_x**: A 7-bit code reflecting the **DISPLAY_CTX.WARNING_STATUS** code that caused the alarm.

[18] BAND | INPUT Byte

BAND				INPUT			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-4 **BAND**: Selected band for tuner setup (all values are in binary format).

- 0000: 160 m band
- 0001: 80 m band
- 0010: 40 m band
- 0011: 30 m band
- 0100: 20 m band
- 0101: 17 m band
- 0110: 15 m band
- 0111: 12 m band
- 1000: 10 m band
- 1001: 6 m band

Bit 3-0 **INPUT**: Selected input for tuner setup (all values are in binary format).

- 0000: IN 1 selected
- 0001: IN 2 selected

[19] SUB_BAND Byte

0	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 6-0 **SUB_BAND**: Selected sub-band for tuner setup according to the following list (all values are in decimal format).

- [000..023]: Values range belonging to 160 m band.
- [024..052]: Values range belonging to 80 m band.
- [053..068]: Values range belonging to 40 m band.
- [069..071]: Values range belonging to 30 m band.
- [072..080]: Values range belonging to 20 m band.
- [081..083]: Values range belonging to 17 m band.
- [084..094]: Values range belonging to 15 m band.
- [095..097]: Values range belonging to 12 m band.
- [098..116]: Values range belonging to 10 m band.
- [117..126]: Values range belonging to 6 m band.

[20] FREQ_LO Byte

0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-0 **FREQ_LO**: Low byte of the word (16 bit) representing the frequency value coming from the transceiver.

[21] FREQ_HI Byte

0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-0 **FREQ_HI**: High byte of the word (16 bit) representing the frequency value coming from the transceiver.

Note: the frequency value is expressed in KHz and its extension is included in the range [0..55000]. It has to be interpreted according to the following:

- When the **FLAGS.TX** bit is 1 it represents the transceiver TX frequency.
- When the **FLAGS.TX** bit is 0 it represents the RX frequency value coming from the CAT interface (if enabled and working), otherwise its value is 0.

[22] ANTENNA | CAT Byte

CAT				ANTENNA			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-4 **CAT**: Selected CAT interface for tuner setup (all values are in binary format)

- 0000: SPE
- 0001: ICOM
- 0010: KENWOOD
- 0011: YAESU
- 0100: TEN-TEC
- 0101: FLEX-RADIO
- 0110: RS-232
- 0111: NONE

Bit 3-0 **ANTENNA**: Selected antenna for tuner setup (all values are in binary format).

- 0000: Antenna #1 selected.
- 0001: Antenna #2 selected.
- 0010: Antenna #3 selected.
- 0011: Antenna #4 selected.
- 0100: No antenna selected.

[23] SWR_LO/GAIN_LO Byte

0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-0 **SWR_LO/GAIN_LO**: Low byte of the word (16 bit) representing either the SWR value or the PA_GAIN value.

[24] SWR_LO/GAIN_HI Byte

0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-0 **SWR_LO/GAIN_HI**: High byte of the word (16 bit) representing either the SWR value or the PA_GAIN value.

Note: The interpretation of this word has to be done according to the following:

- If the **FLAGS.OP/STBY** bit is reset to 0 (STANDBY mode) the word represents the SWR value multiplied by 100 (i.e. read 123 for SWR == 1.23 and so on); there are two special values indicating “out of range” conditions:
 - 0000: No TX signal to evaluate.
 - 9999 SWR value tending to infinity.
- If the **FLAGS.OP/STBY** bit is set to 1 (OPERATE mode) the word represents the Power Amplifier Gain expressed in dB multiplied by 10 (i.e. read 167 for PA_GAIN == 16.7 dB and so on). Remember that the whole treated range can vary from 10.0 dB to 20.0 dB, so a reading of 99 means “PA_GAIN < 10.0 dB” while a reading of 201 means “PA_GAIN > 20.0 dB”.

[25] TEMPERATURE Byte

0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-0 **TEMPERATURE**: Internal heatsink temperature value expressed either in Celsius degrees or in Fahrenheit degrees according to the value of the **FLAGS.T_SCALE** bit. The values range can vary from 0 to 90°C (32 to 194°F) using an integer format (no decimal digits); over the maximum limit (90°C/194°F) there is the internal hardware protections intervention.

[26] PA_OUT_LO Byte

0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-0 **PA_OUT_LO**: Low byte of the word (16 bit) representing the output power emitted by the Linear Amplifier.

[27] PA_OUT_HI Byte

0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-0 **PA_OUT_HI**: High byte of the word (16 bit) representing the output power emitted by the Linear Amplifier.

Note: The interpretation of this word has to be done according to the following:

- In **STANDBY** mode it represents the Exciter's driving power that is directly bypassed to the selected antenna connector.
- In **OPERATE** mode it represents the Linear Amplifier's output power that is redirected to the selected antenna connector.

In any case, the resulting value represents the Wpep multiplied by 10 (i.e read 10245 for a PA_OUT of 1024.5 Wpep) and its ranges of variation are:

- [0..200.0] Wpep when in STANDBY mode
- [0..600.0] Wpep when into OPERATE mode with HALF mode setting
- [0..1200.0] Wpep when into OPERATE mode with FULL mode setting

[28] PR_LO Byte

0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-0 **PR_LO**: Low byte of the word (16 bit) representing the amount of the reverse power during transmission.

[29] PR_HI Byte

0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-0 **PR_HI**: High byte of the word (16 bit) representing the amount of the reverse power during transmission.

The resulting value represents the Wpep multiplied by 10 (i.e read 1234 for a PR of 123.4 Wpep) and its range is [0..200.0] Wpep.

[30] VA_LO Byte

0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-0 **VA_LO**: Low byte of the word (16 bit) representing the internal power supply voltage measured when in OPERATE mode.

[31] VA_HI Byte

0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-0 **VA_HI**: High byte of the word (16 bit) representing the internal power supply voltage measured when in OPERATE mode.

The resulting value represents the DC Volts multiplied by 10 (i.e read 432 for a VA of 43.2 Volts) and its range is [0..60.0] Volts.

[32] IA_LO Byte

0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-0 **IA_LO**: Low byte of the word (16 bit) representing the internal power supply current measured when in OPERATE mode.

[33] IA_HI Byte

0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-0 **IA_HI**: High byte of the word (16 bit) representing the internal power supply current measured when in OPERATE mode.

The resulting value represents the DC Amps multiplied by 10 (i.e read 384 for an IA of 38.4 Amps) and its range is [0..50.0] Amps.

[34] CHECKSUM Byte

0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Bit 7-0 **CHECKSUM**: This is the sum modulo-256 (i.e. truncated to one byte) of all the data bytes comprised in the range [04]..[33] (the bytes from **STATUS_CODE** to **IA_HI**); this information is provided to make a received data final check in order to establish whether the acquired **STATUS** data packet has to be considered valid or not.

Note: this checking rule should be applied also in the case of a non-complex response to be parsed (for instance an ACK response). The method is fairly simple: during reception, the communication program should compute an incremental checksum on the incoming data bytes (whose total is stated by the value of **CNT**) and, at the end of the data stream, compare the obtained result with the last (**CHECKSUM**) incoming byte; if there is a match, the acquisition can be considered good and the significant data bytes can be processed as required.

All the features described in this document are used by the EXPERT_Console PC software (currently available for the Windows platform only) so, in order to have a working example of all the above treated issues, we suggest anyone interested to load and try to run it (it is freely downloadable from www.linear-amplifier.com).



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