TTL Communication Protocol

A. General: This document specifies the TTL communications protocol used in UPS. The protocol provides the following features:

1. Monitor charger status.
2. Monitor battery status and condition.
3. Monitor the utility status.

Computer will control information exchange by a query followed by <cr>. UPS will respond with information followed by a <cr> or action.

B. Hardware:

BAUD RATE..... : 2400 bps
DATA LENGTH..... : 8 bits
STOP BIT..... : 1 bit
PARITY..... : NONE

COMPUTER		UPS
RX	<----------	TX (pin 6)
TX	---------->	RX (pin 8)
GND	<------->	GND (pin 2)
+5V	<------>	+5V (pin4)

C. COMMUNICATIONS PROTOCOL:

1. Status Inquiry:

Computer : Q1<cr>

UPS : UPS status data stream, such as

(MMM.M NNN.N PPP.P QQQ RR.R S.SS TT.T b7b6b5b4b3b2b1b0<cr>

UPS status data stream :There should be a space character between every field for data separation. The meaning of each field is list as followed:

a. Start byte : (
b. I/P voltage: MMM.M (M is an integer number ranging from 0 to 9. The unit is Volt)
c. I/P fault voltage : NNN.N (N is an integer number ranging from 0 to 9. The unit is Volt)
d.O/P voltage : PPP.P (P is an integer number ranging form 0 to 9. The unit is Volt)
e.O/P current : QQQ (QQQ is a percentage of maximum current, not an absolute value)
f.O/P frequency : RR.R (R is an integer number ranging from 0 to 9. The unit is Hz)
g.Battery voltage : SS.S or S.SS
S is an integer number ranging from 0 to 9. For on-line units battery voltage/cell is provided in the form S.SS. For standby units actual battery voltage is provided in the form SS.S. UPS type in UPS status will determine which reading was obtained.
h.Temperature : TT.T (T is an integer number ranging form 0 to 9. The unit is degree celsius)
i. UPS Status : <U>

<U> is one byte of binary information such as <b7b6b5b4b3b2b1b0>. Where bn is a ASCII character '0' or '1'.

UPS status :

Bit	Description
7	1 : Utility Fail (Immediate)
6	1 : Battery Low
5	1 : AVR 0: NORMAL
4	1 : UPS Failed
3	1 : UPS Type is Line-Interactive (0 is On_line)
2	1 : Test in Progress
1	1 : Shutdown Active
0	1 : Beeper On

j. Stop Byte : <cr>

Example: Computer : Q1<cr>
UPS : (208.4 140.0 208.4 034 59.9 2.05 35.0 00110000<cr>
Means : I/P voltage is 208.4V.
I/P fault voltage is 140.0V.
O/P voltage is 208.4V
O/P current is 34 %.
I/P frequency is 59.9 HZ.
Battery voltage is 2.05V.
Temperature is 35.0 degrees of centigrade.
UPS type is on-line , UPS failed. AVR active , and shutdown not active.

2. Turn On/Off beep -- Toggle the UPS beeper :

Computer : Q<cr>

When the AC power failed, UPS will generate a warning beep to inform the manager. Manager could toggle the warning beep by sending this command .

3. UPS Rating Information:

Computer: F<cr>

UPS : #MMM.M QQQ SS.SS RR.R<cr>

This function makes the UPS answer the rating value of UPS. There should be a space character between every field for separation. The UPS's response contains following information field:

a. Rating Voltage : MMM.M
b. Rating Current : QQQ
c. Battery Voltage : SS.SS or SSS.S
d. Frequency : RR.R

4. UPS Password

Computer : M<cr>

UPS : C<cr> RUN formula

5. Inverter fault state query

Computer : G? <cr>

If UPS normal, UPS will answer: "Normal 04<cr>Fa"<cr>

If UPS overload, UPS will answer: "Over Load"<cr>

6. Inverter charger action query

Computer: D<cr>

If Inverter charging, UPS will answer: “ACK”<cr>

If Inverter not charging, UPS will answer: “NAK”<cr>

D. COMMAND SUMMARY:

ITEM	COMMAND	DESCRIPTION
1	Q1	Status Inquiry
2	Q	Turn On/Off beep (buzzer silence command)
3	F	UPS Rating Information
4	D	Inverter Charger Action Query