RS232 to PLCBUS Control Transport

Protocol

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1. Introduction:

1. 1 This Protocol is used the data transfer between computer and terminal devices.

1. 2 Signal Explain:

Name	Explain	Algorism	Hex	Remark
STX	Frame Start Bit	02	02H	
ETX	Frame End Bit	03	03H	

1. 3 Computer COM Setup:

Computer COM baud rate setup as:： 9600bps.

Each Frame Date: 1 Start Bit, 1Length Bit, 5 or 6 Data Bits, and 1 End Bit.

Computer COM Definition as following:

Pin No.	Pin Name	Purpose	Remark
1	RS232 CD	Data Carrier Detected	NO USE
2	RS232 RXD	Receive Data	Use to receive Data.
3	RS232 TXD	Transmit Data	Use to transmit Data.
4	RS232 DTR	Data Terminal Ready	NO USE
5	GND	Ground	Ground
6	RS232 DSR	Data Set Ready	NO USE
7	RS232 RTS	Request To Send	NO USE
8	RS232 CTS	Clear To Send	NO USE
9	RS232 RI	Ring Indicate	NO USE

1. 4 Computer --- Terminal RS232 Interface Circuit:

Adopt Chip max232, Figure overleap.

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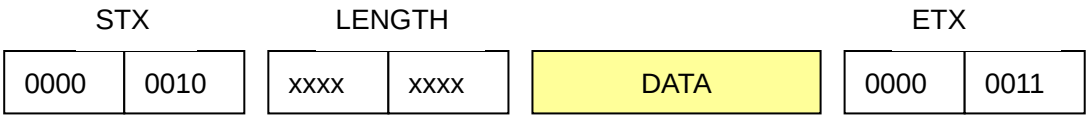
2. PC Transmit Command Format:

2. 1 Command basic communicate Frame Format: (See below Figure)

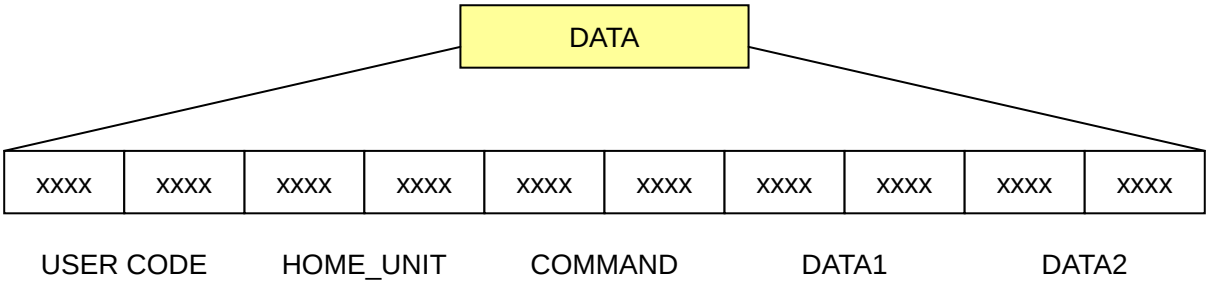


Here: STX is Frame Start Bit **02H**, LENGTH is DATA length, DATA is Data Bit, and ETX is Frame End Bit **03H**.

2. 2 DATA Format:

Described as above, the Length of DATA is changeable.

When the Data transmitted is PLCBUS Command (is provided with USERCODE, HOME_UNIT, COMMAND, DATA1, DATA2 ）, the Length of DATA is **5**.



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2．3 Command Definition:

<table>
<tr><th>DATA Type</th><th>DATA</th><th>Explanation</th></tr>
<tr><td>USER CODE</td><td>8 Bit Register</td><td>The main function is to setup the address (User Code) of Transmitter, and distinguish among different family houses.
The main reason: PLCBUS System, no needing to fix any filters.</td></tr>
<tr><td>HOME_UNIT</td><td>8 Bit Register</td><td>The main function is to distinguish different Houses and Units. The high 4 Bits are Home address; and then, the low 4 Bits are Unit address.
<table>
<tr><td>Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td></tr>
<tr><td colspan="4">HOME</td><td colspan="4">UNIT</td></tr>
</table>
HOME CODE
A: 0000
B: 0001
C: 0010
D: 0011
E: 0100
F: 0101
G: 0110
H: 0111
I: 1000
J: 1001
K: 1010

UNIT CODE
1: 0000
2: 0001
3: 0010
4: 0011
5: 0100
6: 0101
7: 0110
8: 0111
9: 1000
10: 1001
11: 1010</td></tr>
<tr><td>COMMAND</td><td>8 Bit Register</td><td>The main function is to load and receive control command. (See Figure 1)</td></tr>
<tr><td>DATA1, DATA2</td><td>8 Bit Register</td><td>Additional Data Bit.</td></tr>
</table>

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COMMAND Register

COMMMAND Register is 8 Bit Read-Write one, the main function is to load and receive control command.

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
LINK	REPRQ	ACK_PULSE	COMMAND				

Bit7 ： 1 Extend Address Command, is used to “extend address” or “Special Scene” in the future;

0 Non-extend, it is “0”

Bit6 ： 1 For “3-phase power line” only, is used to send COMMAND to “3-phase Coupler”, and then transmitted by “3-phase Coupler”. At this time, any receivers can no respond COMMAND.

0 Generally is 0, at this time, receivers can respond COMMAND.

Bit5 ： 1 Demand to transmit “ACK_PULSE” feedback signal;

0 Non-Demand to transmit “ACK_PULSE” feedback signal.

Bit4-Bit0：Each kind of Controller COMMAND:

COMMAND Function List:

00	ALL UNIT OFF	In Same HOME, “All Units Off”.
01	ALL LTS ON	In Same HOME, “All Lights On”.
02	ON #	In Same HOME +UNIT, “One UNIT On”.
03	OFF #	In Same HOME + UNIT,”One UNIT Off”.
04	DIM *#	In Same HOME + UNIT,”One UNIT Dim”.
05	BRIGHT *#	In Same HOME + UNIT,”One UNIT Brighten”
06	ALL LIGHT OFF	In Same HOME, “All Lights Off”.
07	ALL USER LTS ON	Under Same USER, “All USER Lights On”.
08	ALL USER UNIT OFF	Under Same USER, “All USER Units Off”.
09	ALL USER LIGHT OFF	Under Same USER, “All USER Lights Off”.

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0A	BLINK *#	In Same HOME+ UNIT, “One Light Blink”.
0B	FADE STOP #	In Same HOME+ UNIT, “One light Stop Dimming”.
0C	PRESETDIM *#	In Same HOME+UNIT, “Preset Brightness Level”.
0D	STATUS ON *	Status feedback as “ON”.
0E	STATUS OFF	Status feedback as “OFF”.
0F	STATUS REQ	Status Checking
10	(R)MASTER ADDRS SETUP*#	Setup the main address of Receiver.
11	(T)MASTER ADDRS SETUP*#	Setup the main address of Transmitter.
12	SCENES ADDRS SETUP*	Setup Scene address
13	SCENES ADDRS ERASE	Clean Scene address under the same HOME+UNIT
14	ALL SCENES ADDRS ERASE*#	Clean all the Scene addresses in each receiver.
15	FOR FUTURE*	
16	FOR FUTURE*	
17	FOR FUTURE*	
18	GET SIGNAL STRENGTH #	Check the Signal Strength.
19	GET NOISE STRENGTH #	Check the Noise Strength.
1A	REPORT SIGNAL STRENGTH*	Report the Signal Strength.
1B	REPORT NOISE STRENGTH*	Report the Noise Strength.
1C	GET ALL ID PULSE (THE SAME USER AND THE SAME HOME) Check the ID PULSE in the same USER + HOME.	
1D	GET ONLY ON ID PULSE (THE SAME USER AND THE SAME HOME) Check the Only ON ID PULSE in the same USER+ HOME.	
1E	REPORT ALL ID PULSE（For 3-phase power line only）	
1F	REPORT ONLY ON PULSE（For 3-phase power line only）	

Signal needing feedback.

* Command with Data Bit.

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Usage for Data Bit:

In the following, it is Command and Usage explanations with Data Bit:

04	DIM	DATA1	——

DATA1 is DIM Fade rate.

05	BRIGHT	DATA1	——

DATA1 is BRIGHT Fade rate.

0A	BLINK	DATA1	——

DATA1 is BLINK interval Data.

0C	PRESETDIM	DATA1	DATA2

DATA1 is Light Brightness Level Data.

DATA2 is Light Dimmer Fade rate.

0D	STATUS ON	DATA1	DATA2

DATA1 is Light Brightness Level Data.

DATA2 is Light Dimmer Fade rate.

10	(R)MASTER ADDRS SETUP	DATA1	DATA2

DATA1 is New USER Code

DATA2 is New HOME+UNIT Code

11	(T)MASTER ADDRS SETUP	DATA1	DATA2

DATA1 is New USER Code

DATA2 is New HOME+UNIT Code

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1A	REPORT SIGNAL STRENGTH	DATA1	DATA2

DATA1 is SIGNAL Strength

1B	REPORT NOISE STRENGTH	DATA1	DATA2

DATA1 is NOISE Strength

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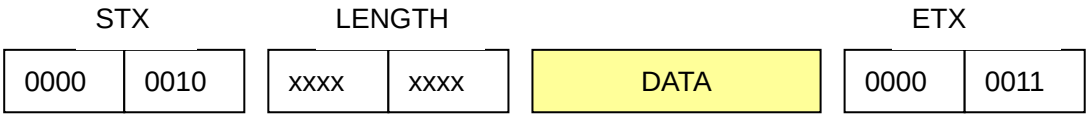
3. PC Receive Command Format:

3. 1 Command basic communicate Frame Format: (See below Figure):

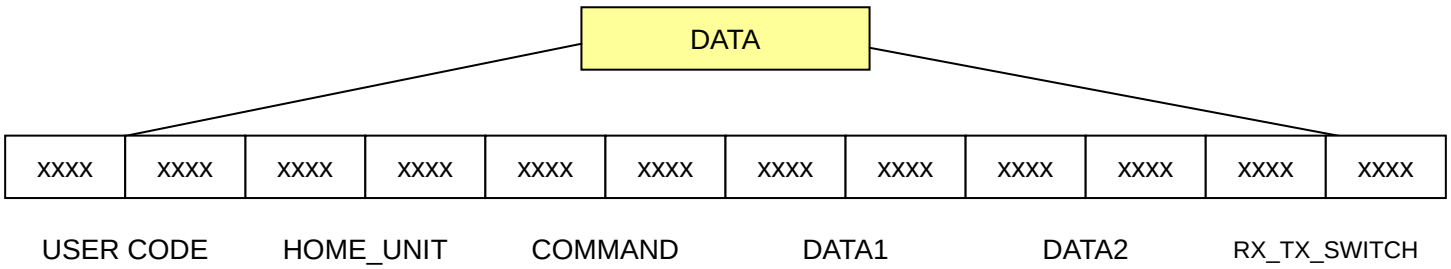


Here: STX is Frame Start Bit **02H**, LENGTH is DATA length, DATA is Data Bit, and ETX is Frame End Bit **03H**.

3. 2 DATA Format:

Described as above, the Length of DATA is changeable.

When the Data received is PLCBUS (RISC) Command (is provided with USERCODE, HOME_UNIT, COMMAND, DATA1, DATA2), the Length of DATA is **6**. Additional one Data is "RX_TX_SWITCH" .



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3. 3 RX_TX_SWITCH Register

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
——	R_ID_SW	R_ACK_SW	R_ITSELF	R_RISC	R_SW	XXXX	XXXX

Bit6：1 Finishing receiving ID Feedback Signal.

0 Not ID Feedback Signal.

The ID Feedback Data received will be saved in DATA1、DATA2.

Bit5：1 ACK Feedback Signal received.

0 No ACK Feedback Signal received.

ACK Feedback received.

Bit4：1 PLCBUS Signal is transmitted by itself.

0 PLCBUS Signal is transmitted from outside (By other controllers)

The Symbol Bit means that the signal transmitted is received by itself successfully.

Bit3：1 The PLCBUS Signal received accord with RISC Command.

0 The PLCBUS Signal does not accord with RISC Command..

The transfer between PLCBUS and RISC Register is finished, “1” is the PLCBUS Signal can be transferred to RISC Protocol.

Bit2：1 Receive the correct PLCBUS Signal.

0 Non-Receive PLCBUS Signal.

If it is “1”, means it has finished receiving the PLCBUS DATA from Power Line.

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4. Interface Communication between PC and PLCBUS:

When PC transmits standard command introduced in **Item 2** to PLCBUS Interface, PLCBUS Interface will send PLCBUS Signal to power line automatically. The transmitting time is 400 Millisecond. During sending PLCBUS Signal, PLCBUS Interface will not receive any command from PC. The signal sent from PC to PLCBUS Interface should be transmitted continuously twice at least, the time interval between the two times is 12.5 mS.

After the PLCBUS Interface has received **ACK**、**ID** or standard PLCBUS carrier wave signal, it will transfer the signal to PC by 232 according to the command format introduced in **Item 3**. And send **once only**.

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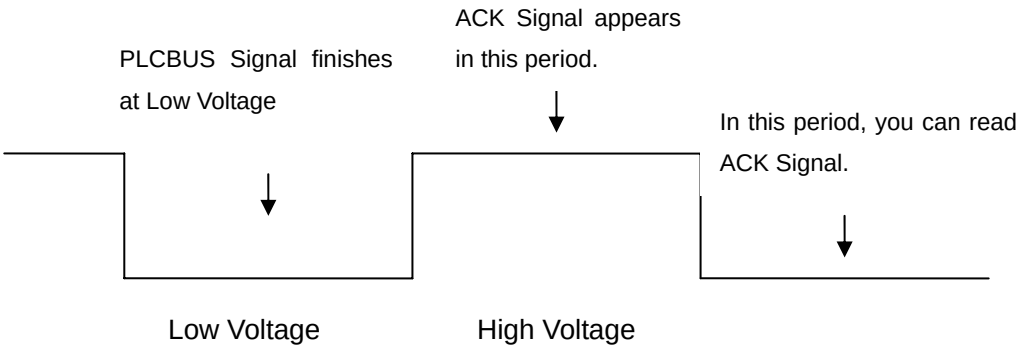
Glossary:

ACK Pulse

The ACK Pulse is a single PLCBUS Pulse generated by a PLCBUS receiving device that is used to inform the transmitting device that the PLCBUS Communication Packet was accepted (had a correct checksum and ID information). The ACK Pulse is immediately following the end of a PLCBUS Message.

In PLCBUS Signal, ACK Feedback Ordinal Figure:



At the first cycle High Voltage after PLCBUS Signal is received, ACK Signal begins feedback. You can estimate whether there is ACK Feedback Signal by reading R_ACK_PULSE bit from RX_TX_SWITCH Register.

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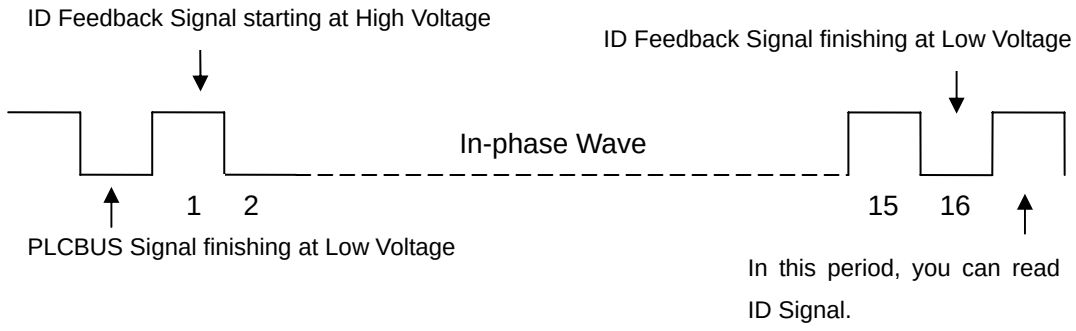
Glossary:

The ID Pulse

The ID Pulse is a single PLCBUS Pulse that is generated in the PLCBUS Frame (immediately following the end of a PLCBUS Message) that corresponds to the receiving device's Unit ID. For instance, if the receiving device's Unit ID are 12 then it will generate its ID Pulse 12 frames (half-cycles) after the end of the received PLCBUS Message. The main purpose of the ID Pulse is to indicate to the transmitting device which receiving devices properly received a broadcasted message. A PLCBUS device only generates the ID Pulse when it receives and accepts a PLCBUS Communication Packet that has the ID-bit set to 1.

NOTE: Devices that broadcast PLCBUS Messages with the ID-bit set to 1 should allow for 16 frames after the packet for all possible ID Pulses to be generated on the power line.

In PLCBUS Signal, ID Feedback Ordinal Figure:



At the first cycle High Voltage after PLCBUS Signal is received, ID Signal begins feedback. After 16 and a half-cycle, it will finish in Low Voltage Cycle. You can estimate whether ID Signal has been received finishing by reading R_ID_PULSE bit from RX_TX_SWITCH Register. If received finishing, reading ID Signal by Register R-DATA1、R-DATA2:

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R-DATA1 :

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
UNIT16	UNIT15	UNIT14	UNIT13	UNIT12	UNIT11	UNIT10	UNIT09

R-DATA2 :

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
UNIT08	UNIT07	UNIT06	UNIT05	UNIT04	UNIT03	UNIT02	UNIT01

Denotation: In the same “USER+HOME”, one UNIT status; 0 is for having no ID Feedback, and 1 is for having ID Feedback.

-- End -- 01042006

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