

# TSR20 Speed Sign Radar

## Communication Protocol

### V1.0.7

#### 1.1 Protocol description

The data communication of speed sign radar TSR20 adopts RS232 asynchronous serial port, baud rate is 115200bps, 1 start bit, 8 data bits, 1 stop bit, no check.

#### 1.2 Protocol message

(1) When a target enters or leaves the radar detection area, the radar uploads the data package of "target status", as defined in table 1.

Table 1 the definition of radar sends object data packet

No.	Name	Data type	Content
1	Frame header	2Byte	0xAAAA
2	Frame type	2Byte	0x70C (low byte first)
3	Target direction	1Byte	0-coming, 1-leaving, 2-no direction
4	Reserve	4Byte	0x00
5	Object speed	2Byte	See remarks for calculate
6	Reserve	1Byte	0x00
7	Frame tail	2Byte	0x5555

Remark: speed value=  $[B0(\text{high-8 bit}) * 256 + B1(\text{low-8 bit})] / 10$  unit: m/s

If the coming vehicle speed is 360km/h, then output the data like:

AA AA 0C 07 00 00 00 00 03 8E 00 55 55

The "Speed variable" is Speed, the array received by the serial port is array [], where the target Speed is indexed by array [9] and array [10], and the Speed unit obtained is m/s.

Conversion code examples:

Speed = ((array[9]<<8)|array[10])/10;

(2) "radar parameter setting" command packet, defined as table 4, the radar receives and uploads the "confirm" packet.

Table2 the definition package for radar parameter setting

No.	Name	Data type	Content
1	Frame header	2Byte	0xAAAA
2	Frame type	2Byte	0x200 (low byte first)
3	The instruction of parameter setting	1Byte	0x8E
4	Installation mode +work mode	1Byte	
5	Sensitivity	1Byte	1-3(total 3 levels, default is 3)
6	Speed lower limit	1Byte	1-200km/h(default is 5)
7	Installation angle	1Byte	0-30(default is 0)
8	Response time	1Byte	1-7(50ms、100ms、200ms、300ms、500ms、1000ms、2000ms, default is 5)
9	Speed upper limit	1Byte	10~250km/h(default 200km/h)
10	Direction	1Byte	0-coming,1-leaving, 2-no direction(default is 0)
11	Frame tail	2Byte	0x5555

The 4th byte is composed as follows:



Note: The working mode occupies the low 4 digits, and the installation mode occupies the high 4 digits. Installation mode 0—crosswise installation, 1—lengthwise installation, default is crosswise installation(0).

Working mode 0-touch, 1-last, default is last (1).

Assume that the working mode is set to last, the installation method is: crosswise installation, sensitivity is 1, speed lower limit is: 5km / h, installation angle is 5 °, the refresh rate is 300ms, the speed upper limit is 200km/h, and the direction is both. The entire frame of data is:

AA AA 00 02 8E 10 01 05 05 04 C8 00 55 55

The setting parameter must be within the range in the table, otherwise the setting parameter is invalid and automatic return back to the default value.

(3) For “read radar parameter” instruction data package, defined as table 5.

It will upload “radar parameter” data package after radar receives instruction, the definition show as table 4.

Table3 the definition of “read radar parameter” instruction data package

No.	Name	Data type	Content
1	Frame head	2Byte	0xAAAA
2	Frame type	2Byte	0x200 (low byte first)
3	Instruction of read parameter	1Byte	0x71
4	Reserve	7Byte	0x00

5	Frame tail	2Byte	0x5555
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The total frame date is: AA AA 00 02 71 00 00 00 00 00 00 00 55 55

Upload radar data package, Show as below table

Table 4 the definition of return radar parameter data package

No.	Name	Data type	Content
1	Frame head	2Byte	0xAAAA
2	Frame type	2Byte	0x701 (low byte first)
3	Parameter instruction	1Byte	0x71
4	Installation mode +work mode	1Byte	
5	Sensitivity	1Byte	
6	Speed lower limit	1Byte	
7	Installation angle	1Byte	
8	Response time	1Byte	
9	Speed upper limit	1Byte	
10	Reserve	1Byte	
11	Frame tail	2Byte	0x5555

The 4th byte has the same format as the setting, refer to the definition package for radar parameter setting.

If return: working mode is last, installation mode: crosswise installation, sensitivity is 1, speed lower limit is 5km / h, installation angle is 5°, refresh rate is 300ms, speed upper limit is 200km/h, direction is both. Then the entire frame of data is:

AA AA 01 70 71 10 01 05 05 04 C8 00 55 55

(4) The instruction package of read “version NO.”, the definition show as table 5. Radar upload “version No” after receives instruction, show as table 6.

Table 5 the definition of instruction package to read version No.

No.	Name	Data type	Content
1	Frame head	2Byte	0xAAAA
2	Frame type	2Byte	0x200 (low byte first)
3	Parameter instruction	1Byte	0x02
4	Reserve	7Byte	0x00
5	Frame tail	2Byte	0x5555

The total frame data is: AA AA 00 02 02 00 00 00 00 00 00 00 55 55

Table 6 the definition of data package for radar return version No.

No.	Name	Data type	Content
1	Frame head	2Byte	0xAAAA
2	Frame type	2Byte	0x400 (low byte first)
3	Parameter instruction	1Byte	0x82
3	Version No.	3Byte	See instruction for details
4	Reserve	4Byte	0x00
5	Frame tail	2Byte	0x5555

Instruction: Version No.= $(B0 \ll 16) \mid (B1 \ll 8) \mid B2$

(5) Reserve the current setting

No.	Name	Data type	Content
1	Fame head	2Byte	0xAAAA
2	Fame type	2Byte	0x200 (low byte first)
3	Parameter instruction	1Byte	0xFF
4	Reserve	7Byte	0x00
5	Frame tail	2Byte	0x5555

The total frame data is: AA AA 00 02 FF 00 00 00 00 00 00 00 55 55

Note: After sending the radar parameter setting or pole type instruction, this instruction should be sent at the same time. Otherwise, the parameter setting will only be saved to RAM, it's not going to store in flash.

(6) Factory reset

No.	Name	Data type	Content
1	Frame head	2Byte	0xAAAA
2	Frame type	2Byte	0x200 (low byte first)
3	Parameter instruction	1Byte	0xF2
4	Reserve	7Byte	0x00
5	Frame tail	2Byte	0x5555

The total frame data is: AA AA 00 02 F2 00 00 00 00 00 00 00 55 55