Serial Spec for Embedded Planer Moisture Sensor

This specification will describe the serial specification for the planer program in order that a in-line grader can receive the board by board data from the planer sensor via a serial channel.

The serial connection will be a three wire connection with GND, TX and RX. The sensor can operate in **four** modes; Full Mode, peak/average only, peak/average/Bundle and peak/average/Piece count. In full mode all of the readings are output and. at the end of the board, a packet with overall info is sent. In peak/average only mode only the peak and average are sent every board. In peak/average/bundle mode the peak, average and bundle number are sent. In peak/average/Piece count mode the peak, average and current numbers of pieces (since the last shift report) are sent.

The modes are selected in the Sensor Setup/Setup System Variables/Setup General System Variables form.

In all modes the grader can send data to the moisture sensor. The specification for this is at the end of the document.

The board ID can be added to all of the serial modes by enabling it in the sensor setup. All of the board packets will increase by one byte if it is enabled. The board ID will be a 4 byte ASCII string with the three byte ID (zero padded on left) with a null termination.

Full Mode

The sensor will send packets to the grader which are framed by start Tx (0x02) and End Tx (0x03) bytes. Byte two of the packet indicates what type of packet it is (0x30- End of Board, 0x31-reading, etc.).

When a board leaves the moisture sensor the sensor will transmit a package to the grader with the following format:

Byte	Description
0	0x02 – Start Transmit
1	0x30 – New board indication
2-11	ASCII string (10 char) with the bundle number
12-16	ASCII string (5 char) with the Average reading
17-21	ASCII string (5 char) with the peak reading
22	ASCII Char (0-9) - # of **First** readings deleted
23	ASCII Char (0-9) - # of **Last** readings deleted
24	ASCII Char (0-9) - # of **Highest** readings deleted
25	ASCII Char (0-9) - # of **Lowest** readings deleted
26-29	Board ID (ASCII string zero ended). Data only if BoardID appended.
26 or 30	0x03 – End Transmit

All ASCII strings will use the null character (0x00) to mark the end of the string. The average reading will be sent with a decimal in the string (ex. 28.5).

The sensor will send every reading that it takes on boards. This will include readings that we have excluded from the algorithm (i.e. delete highest, etc.). The packet format for these readings is as follows:

Byte	Description
0	0x02 – Start Transmit
1	0x31 – New reading indication
2	ASCII first character of reading (Ten's Digit)
3	ASCII second character of reading (One's Digit)
4	0x03 – End Transmit

The serial communication will be 19200, 8 bit, 1 stop, no parity.

The board data takes approximately 12mSec to transmit and will be transmitted as soon as the board leaves the sensor. It is up to the grader program to match this data to the board.

Peak/Average mode
The sensor will send a packet every board with the following format;

Byte	Description
0, 1	ASCII Peak value – 2 digits
1	0x20 – space
3, 4	ASCII Average value – 2 digits
5-8	Board ID (ASCII string zero ended). Data only if BoardID appended.
9 or 5	0x0D - CR
10 or 6	0x0A - LF

The serial communication will be 9600, 8 bit, 1 stop, no parity.

Peak/Average/Bundle Mode
The sensor will send packets to the grader which are framed by start Tx (0x02) and End Tx (0x03) bytes.

When a board leaves the moisture sensor the sensor will transmit a package to the grader with the following format:

Byte	Description
0	0x02 – Start Transmit
1-10	ASCII string (10 char) with the bundle number
11-15	ASCII string (5 char) with the Average reading
16-20	ASCII string (5 char) with the peak reading
21-24	Board ID (ASCII string zero ended). Data only if BoardID appended.
21 or 25	0x03 – End Transmit

All ASCII strings will use the null character (0x00) to mark the end of the string. The average reading will be sent with a decimal in the string (ex. 28.5).

Peak/Average/Piece Count Mode

The sensor will send packets to the grader which are framed by start Tx (0x02) and End Tx (0x03) bytes.

When a board leaves the moisture sensor the sensor will transmit a package to the grader with the following format:

Byte	Description
0	0x02 – Start Transmit
1-10	ASCII string (10 char) with the piece count
11-15	ASCII string (5 char) with the Average reading
16-20	ASCII string (5 char) with the peak reading
21-24	Board ID (ASCII string zero ended). Data only if BoardID appended.
21 or 25	0x03 – End Transmit

All ASCII strings will use the null character (0x00) to mark the end of the string. The average reading will be sent with a decimal in the string (ex. 28.5).

The board data takes approximately 12mSec to transmit and will be transmitted as soon as the board leaves the sensor. It is up to the grader program to match this data to the board.

The serial communication will be 19200, 8 bit, 1 stop, no parity.

Grader Communication Protocol

The following is the protocol for communication from the grader to the moisture sensor.

For compatibility, the following command will work with the sensor. It should not be used for new designs. The regular packet commands should be used.

The serial communication will be 19200 (9600 for Peak/Avg/Bundle mode), 8 bit, 1 stop, no parity.

The grader can send the character 0x30 to the sensor and the sensor will respond with a package of the following format:

Byte	Description
0	0x02 – Start Transmit
1	0x32 – Presence detect response
2-6	ASCII string (5 char) with the sensor version number
7	0x03 – End Transmit

Again the ASCII string will be null terminated and contain a decimal point (ex 4.11). This function could be used as a presence detect.

The rest of the communication with the sensor will take the form of a packet command. The commands are as follows:

Presence Detect command

Byte	Description
0	0x02 – Start Transmit
1	0x30 – Presence detect command
2	0x03 – End Transmit

The Moisture sensor will respond with a package of the following format:

Byte	Description
0	0x02 – Start Transmit
1	0x32 – Presence detect command
2-6	ASCII string (5 char) with the sensor version number
7	0x03 – End Transmit

Change Stock command

This command is to change the stock running. Note the stock number sent is zero based, i.e. the first stock is 0. A stock number outside the maximum number of stocks will not change the stock but will cause a shift change and report. There will be no response from the moisture sensor.

Byte	Description
0	0x33 – Change stock command
1	Stock number, zero based.

Board grade information command

This command is to give the moisture sorter the grade information of the last board. There will be no response from the moisture sensor.

Byte	Description
0	0x02 – Start Transmit
1	0x31 – Board information command
2, 3	ASCII String (2 chars) - Grade number (0 to 15)
4-19	ASCII String (16 chars) – Board Attributes (0 - On, 1 – Off)
20-30	Spare bytes (11)
7	0x03 – End Transmit

Board Attributes include defects, MSR information, etc.