Pentair Pool Automation RS-485 Bus Protocol

Message format

Messages consist of eight fields, as shown below. The length of a message can vary from 10 to (theoretically) 265 bytes, depending on the length of the DATA field. In practice, I've not seen a message longer than 38 bytes.

1. HEADER	3 bytes: 0x00 0xFF 0xA5
2. PROTOCOL	1 byte protocol identifier
3. DESTINATION	1 byte destination identifier
4. SOURCE	1 byte source identifier
5. COMMAND	1 byte command code
6. DATA LENGTH	1 byte unsigned int data length (in bytes)
7. DATA	Length as specified by previous byte. Interpretation varies by command.
8. CHECKSUM	2 bytes: high-order byte followed by low order byte. The checksum is calculated by summing all the bytes in the message, starting on the third byte of the HEADER (0xA5) and ending with the last byte of the DATA. Any overflow is ignored (i.e., the checksum calculated mod 2^{16}).

Protocol

Most messages use 0x01
Intelliflo and Intelliflo Pumps use 0x00

Station (Destination and Source) Identifiers

	DST	SRC
Periodic status message:	0f	10
Remote layout request:	10	48
Remote layout response:	0f	10
Circuit state change request:	10	48
Circuit state change response:	48	10
Pump status request:	60	10
Pump status message:	10	60

The SunTouch (controller) is 10. The QuickTouch transceiver is 48. The ID 0f appears to be "anyone who might be interested." Intelliflo Pump is 60 (or 6X for X ∈ [0,f] if

there are multiple pumps).

Command Code Ox02 - System Status Message

Sent every 2 seconds by pool controller to report current system status.

```
BYTE                    VALUE
==== ============================================
 [0] 24-hr time in hours  (0-23, decimal)
 [1] Time in minutes      (0-59, decimal)
 [2] Circuits that are on:
     When SPA is on,          0x01 (2^0) bit is set
     When AUX1 (light) is on, 0x02 (2^1) bit is set
     When AUX2 (sweep) is on, 0x04 (2^2) bit is set
     When AUX3 is on,         0x08 (2^3) bit is set
     When POOL is on,         0x20 (2^5) bit is set
     When FEATURE1 is on,     0x10 (2^4) bit is set
     When FEATURE2 is on,     0x40 (2^6) bit is set
     When FEATURE3 is on,     0x80 (2^7) bit is set
     If SPA and POOL bits are both set, spa runs (not pool).
[3]  Additional circuits that are on:
     When FEATURE4 is on,     0x01 (2^0) bit is set
[4-8] All zero (Additional circuit bitmasks on fancier controllers)
[9]  Mode mask: 0x01 - Run Mode (Normal/Service), 0x04 - Temp Unit
(F/C),
     0x08 - Freeze Protection (Off/On), 0x10 - Timeout (Off/On).
[10] 0x0f if heater is on; 0x03 if heater is off
[11] Zero
[12] 0x4 (2^2) bit indicates DELAY on AUX2 (and perhaps other
circuits).
     Bits 0x30 appears to be on all the time. Don't know why.
[13] 0x08 (on 1.0 fw); 0x00 or 0x01 on 2.070 FW.
[14] Water Temperature (degrees, only meaningful when circulating)
[15]   "      "            "      "           "        "      "
[16] 0x01 on 1.0 FW; 0x02 of 2.070 FW. Major version number?
[17] Zero on 1.0 FW 0x46 (= 70 decimal) on 2.070 FW. Minor version num?
[18] Air Temperature (degrees)
[19] Solar Temperature (degrees)
[20] Zero
[21] 0x32 (50 decimal) in 2.070 FW
[22] Heat setting:
     Low order 2 bits are pool: 0 off, 1 heater, 2 solar pref, 3 solar
     Next 2 bits are spa: 0 off, 4 htr, 8 solar pref, 12 solar
[23] zero in 1.0 FW; 0x10 in 2.070 FW
```

[24-26] All zero
[27] 0x19 / 0x38
[28] 0x0A; 0x0B on 2.070 FW

Command Code 0x86 - Circuit Status Change Request

This message is sent by the QuickTouch remote control transceiver to effect a circuit state change. The first byte of the data is the circuit number. This is not byte [2] of status message! Rather, it is one of these codes: 0x01 represents the SPA, 0x02 is AUX1, 0x03 is AUX2, 0x04 is AUX3, and 0x05 is FEATURE1, 0x06 is POOL, 0x07 is FEATURE2, 0x08 is FEATURE3, 0x09 is FEATURE4, 0x85 is HEAT_BOOST. The second byte of the data represents the desired state of the circuit, 0x01 for on, 0x00 for off. So, for example, this command would turn the spa on:

```
<---HEADER---> PROT   DST  SRC    CMD   DLEN <--DATA->   CHECKSUM
0x00 0xFF 0xA5 0x01   0x10 0x48   0x86  0x02 0x01 0x01   0x01 0x88
```

Command Code Ox01 - Circuit Status Change Response

This message is sent in response to a circuit status change request, whether it had any effect or not. It has one byte of data, which is always 0x86.

Command Code OxE1 - Remote Layout Request

This message is sent periodically by the QuickTouch transceiver to request the button assignments for the remote. It has one byte of data, which is always 0x01.

Command Code Ox21 - Remote Layout Response

This message is sent by the controller to indicate which circuits are assigned to which row on the QuickTouch remote. The data consists of four bytes, which are the circuit codes corresponding to rows 1-4 on the remote. The circuit codes are POOL 0x06, SPA 0x01, AUX1 0x02, AUX2 0x03, AUX3 0x04, HEAT_BOOST 0x85.

Command Code Ox05 - Clock/Calendar Broadcast

This message is sent periodically by the controller to indicate the time (DST=0x0f, SRC=0x10). It's pretty useless on the SunTouch, which doesn't let you set the date.

```
BYTE                    VALUE
==== ============================================
 [0] 24-hr time in hours  (0-23, decimal)
 [1] Time in minutes      (0-59, decimal)
 [2] Day of week      (Sun=1, Mon=2, Tue=4, Wed=8, Thu=16, Fri=32,
Sat=64)
 [3] Day # in month (1-based)
 [4] Month (1-based)
 [5] Year (last two decimal digits)
 [6] Reputed to be "clock adjust" (whatever that is: I always see 0)
```

```
 [7] DST (1=Auto, 0=Manual)
```

Command Code 0x07 - Request or Provide Pump Status

Pumps reports status to the controller when requested by the controller (generally every 30 seconds).

BYTE	VALUE	
[0]	Pump Running:	
	Started	0x0a
	Stopped	0x04
[1]	Pump Mode:	
	Filter	0x00
	Manual	0x01
	Backwash	0x02
	Feature 1	0x06
	External Program 1	0x09
	External Program 2	0x0a
	External Program 3	0x0b
	External Program 4	0x0c
[2]	Pump State:	
	Running	0x02
	Priming	0x01
	System Priming	0x04
	Fault Mode	0x00