Written By Evan Brink
Inspiration from http://support.robotis.com/en/product/actuator/dynamixel_pro/communication/instruction_status_packet.htm

Instruction/Return Packet Structure

Instruction Packet

Header	Length	Instruction	Parameter			CRC	
0xFF	LEN	Instruction	P1	...	PN	CRC_L	CRC_H

1) Header: indicates start of Packet
2) Packet Length: the length after Packet length field (Instruction + Parameters + CRC), hence number of parameters +3
3) Instruction: this is the field that defines the purpose of the packet

Value	Instruction	Description
0x01	Ping	Instruction that checks whether the packet has arrived
0x02	Pour	Instruction to pour specified amounts of specified ingredients
0x03	Stop	Instruction to stop all pumps
0x04	Reverse	Instruction to run specified pumps in reverse

7) Parameter: As the auxiliary data field for Instruction, its purpose is different for each instruction
8) CRC: This is the field that checks if the packet has been damaged during communication
- To calculate checksum, add all parameters, excluding the header (disregard any overflow)

Return Packet

Header	Instruction	Status	CRC
0xFF	Instruction	Status	CRC

1) Header: indicates start of Packet
2) Instruction: indicates which instruction the packet is responding to
3) Status: indicates whether the instruction was completed or if an error occurred

Value	Status
0x01	Success
0x02	Failure
0x03	CRC Error
0x04	Packet Error

4) CRC: Same as instruction packet

Types of Instructions

Ping Instruction (0x01)

1) Description: Checks to see if communication is working
2) Instruction Packet Parameter: None
3) Example:

Ping Instruction Packet				
Header	Length	Instruction	CRC	
0xFF	0x03	0x01	0x04	0x00

Ping Return Packet			
Header	Instruction	Status	CRC
0xFF	0x01	0x01	0x02

Pour Instruction (0x02)

1) Description: Instructs the arduino to pump specified ingredients for a specified amount of time
2) Instruction Packet Parameters:

Section	Description
Parameter 1	Pump 1 ID
Parameter 2	Low-order byte of the pump 1 time (in ms)
Parameter 3	High-order byte of the pump 1 time (in ms)
...	...
Param 3(X-1) +1	Pump X ID
Param 3(X-1) +2	Low-order byte of the pump X time (in ms)
Param 3(X-1) +3	High-order byte of the pump X time (in ms)

* NOTE: Time=0xFFFF is free run!
Timed pouring is supported up to 65533ms at a time

3) Example:

Pour Instruction Packet (130 ms from pump 6)							
Header	Length	Instruction	Parameter			CRC	
			ID	TIME_L	TIME_H		
0xFF	0x06	0x02	0x06	0x82	0x00	0x90	0x00

Pour Return Packet			
Header	Instruction	Status	CRC
0xFF	0x02	0x01	0x03

Stop Instruction (0x03)

1) Description: Instructs the arduino to stop all pumps (even if the pump time is not up)

2) Instruction Packet Parameters: None

3) Example:

Stop Instruction Packet				
Header	Length	Instruction	CRC	
0xFF	0x03	0x03	0x06	0x00

Stop Return Packet			
Header	Instruction	Status	CRC
0xFF	0x03	0x01	0x04

Reverse Instruction (0x04)

1) Description: Instructs the arduino to pump specified ingredients for a specified amount of time in reverse

2) Instruction Packet Parameters: (same as Pour)

Section	Description
Parameter 1	Pump 1 ID
Parameter 2	Low-order byte of the pump 1 time (in ms)
Parameter 3	High-order byte of the pump 1 time (in ms)
...	...
Param 3(X-1) +1	Pump X ID
Param 3(X-1) +2	Low-order byte of the pump X time (in ms)
Param 3(X-1) +3	High-order byte of the pump X time (in ms)

* NOTE: Time=0xFFFF is free run!
Timed pouring is supported up to 65533ms at a time

3) Example:

Reverse Instruction Packet (Free run from pumps 5 and 12)										
Header	Length	Instruction	First Pump Params			Second Pump Params			CRC	
			ID	TIME_L	TIME_H	ID	TIME_L	TIME_H		
0xFF	0x09	0x04	0x05	0xFF	0xFF	0x0C	0xFF	0xFF	0x1A	0x04

Pour Return Packet			
Header	Instruction	Status	CRC
0xFF	0x04	0x01	0x05