

External Scripting Language

Robotics Commander Pro

By

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Introduction

The high level language of Robot Commander Pro allows the user to program remotely and 'on the fly' using a simple proprietary sequential language. The interface is quite simple yet feature rich and intuitive. The key innovative features of this Scripting Tool, Compiler are:

- 1) Intuitive analysis of the compiler to highlight any syntax errors for each line
- 2) Illustrative responses when running in debug mode to show the results of each line and interpretation of conditions to allow the developer to see if the program is behaving as desired

This document will illustrate how to use the Editor and Compiler as well as define the syntax of each command along with examples.

Command Summary

Command Syntax	Description
Basic Commands – CMUCam2, Pololu Beginner, Maestro 6,12 Advanced, Robotis and RoboBuilder	
<label>;	Label for Goto statement
G <label>;	Goto <label>
N<value>;	Set Max Goto Loops, 0 is infinite
F;	Reset Goto Loop counter
E;	End of Script
J<label>;	GoSub <label>
R;	Return from GoSub
D<value>;	Delay in Milli Seconds
O<space><h,m,s><space> < hh:mm:ss><space>G<space><label>;	If Time met then Goto Label
O<space><h,m,s><space> < hh:mm:ss><space>J<space><label>;	If Time met then GoSub Label
M<Port#><Space><Value>; (Value=9999 is Acc)	Move Servo Sync if Port>127 Forward motor id = port#-128, if Port>255 Rev motor id = port-256.
Basic Commands – Pololu Beginner, Maestro 6, 12 Advanced, Robotis and RoboBuilder	
V<Port#><Space><Value>;	Set Servo Speed
Intermediate Commands - Maestro 6, 12 Port, Robotis and RoboBuilder	
S<Port#><Space><GE,LT,EQ><Space><Value><Space>M<Port#><Space><Value>;	Move if sensor condition met (Value=9999 =Acc)
S<Port#><Space><GE,LT,EQ><Space><Value><Space>V<Port#><Space><Value>;	Set Speed if sensor condition met
I<Space>S<Port#><Space><GE,LT,EQ><Space><Value><Space>G<Label>;	if sensor met Goto Label
I<Space>S<Port#><Space><GE,LT,EQ><Space><Value><Space>J<Label>;	if sensor met GoSub Label
Maestro 6, 12 Advanced Only	
K<ID#>;	Set Maestro ID
A<Port#><Space><# of Ports><Space> <Value1>;	Move Servo ASynchronous
S<Port#><Space><GE,LT,EQ><Space><Value><Space>A<Port#><Space> <#Ports><Space> <Value>;	Async Move if sensor cond met
I<Space>S<Port#><Space><GE,LT,EQ><Space><Value><Space>P<Script#>;	if sensor condition met Run Script#
I<Space>S<Port#><Space><GE,LT,EQ><Space><Value><Space>H ;	if sensor met Stop Scripts
P<Script#>;	Start Internal Script
PPS<Script#><space><parameter>;	Start Internal Script
H;	Stop Internal Scripts
B<Port#><Space>G<Space><label>;	If Script# Busy Goto label
B<Port#><Space>J<Space><label>;	If Script# Busy Gosub label
B<Port#><Space>D<value>;	If Script# Busy Delay
B<Port#><Space>P<script#>;	If Script# Busy Run Script#
B<Port#><Space>H;	If Script# Busy Stop all Scripts
STO<space><value>	Set Accumulator value
ADD<space><value>	Add to Accumulator value
SUB<space><value>	Subtract from Accumulator value
Advanced Commands Maestro 12 Advanced Only	
C<[0,1]><Space><[1..127]>;	Initialise Cam (Also on CMUCam2)
X1<Space><GE,LT,EQ><Space><0-7><Space>M<Port#><Space><Value>;	Move if Cam X condition met
X1<Space><GE,LT,EQ><Space><0-7><Space>A<Port#><Space><Value><Space><Value>	Async Move if Cam X cond met
I<Space>X1<Space><GE,LT,EQ><Space> <0-7><Space>G<Label>;	if Cam X condition met Goto Label
I<Space>X1<Space><GE,LT,EQ><Space> <0-7><Space>P<Script#>;	if Cam X condition Run Script#
I<Space>X1<Space><GE,LT,EQ><Space> <0-7><Space> H ;	if Cam X condition met Stop Internal Scripts
Special Commands – Robotis Only	
W<Port#><Space><Address#><Space><Value>;	Update value at Address
S<Port#><Space><GE,LT,EQ><Space><Value><Space>W<Port#><Space><Value>;	if sensor met Update value at Address
Special Commands – RoboBuilder Only	
W<Port#><Space><value>;	Servo Continuous Forward
T<Port#><Space><value>;	Servo Continuous Reverse
P<Motion#>;	Start Motion
S<Port#><Space><GE,LT,EQ><Space><Value><Space>W<Port#><Space><Value>;	Continuous Forward if sensor met
S<Port#><Space><GE,LT,EQ><Space><Value><Space>T<Port#><Space><Value>;	Continuous Reverse if sensor met
I<Space>S<Port#><Space><GE,LT,EQ><Space><Value><Space>P<Motion#>;	if sensor met Run Motion#

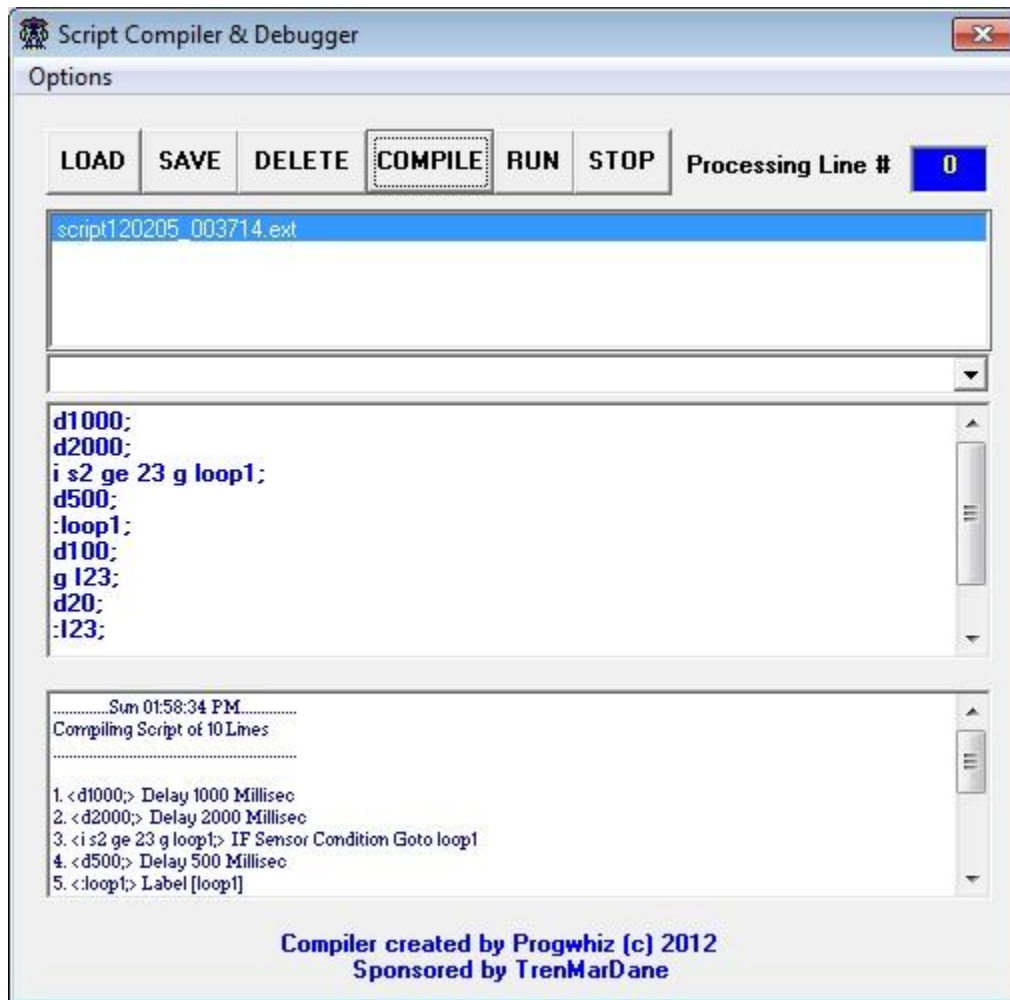
X,Y - Camera coordinates (See unique syntax for Z command), S – Sensor or Servo Port

Illustration

The following illustration will show step by step how to use the Editor & Compiler:

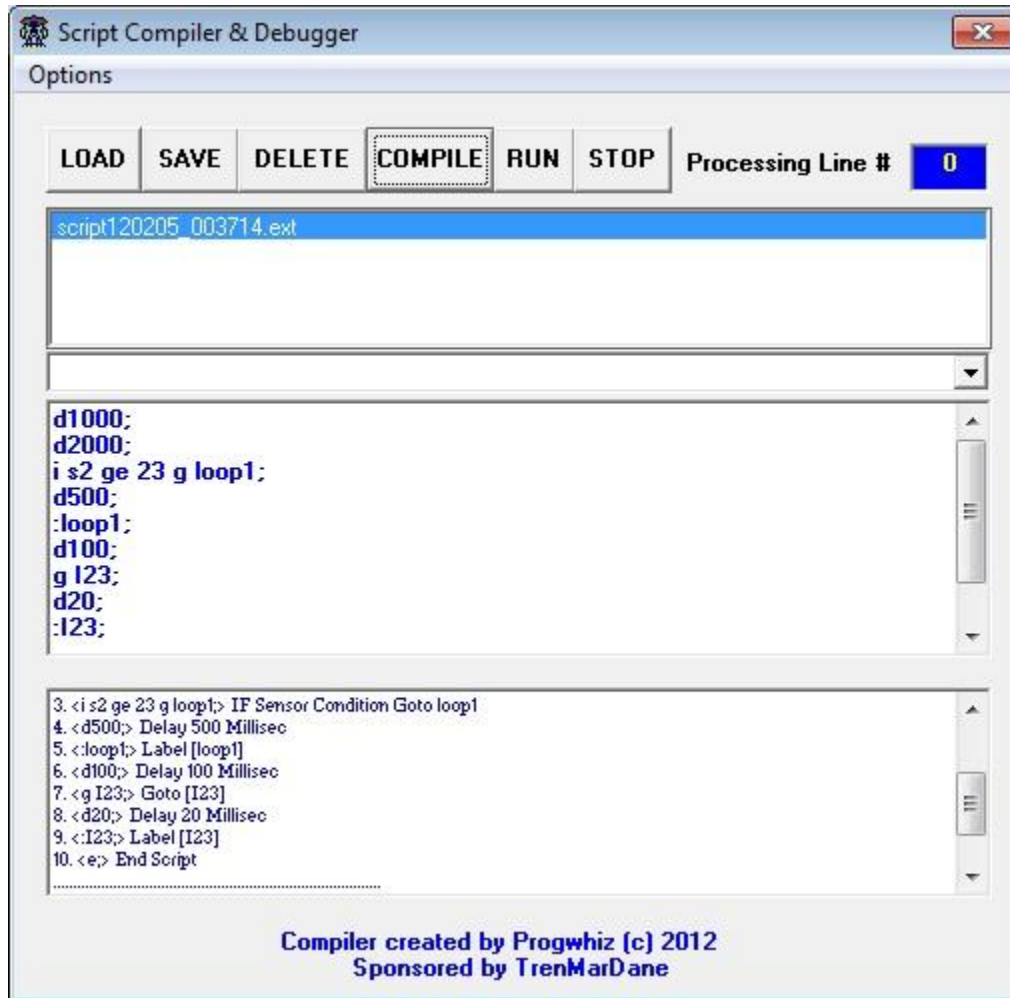
Step 1

Open (using the **Load** button) or write a script:



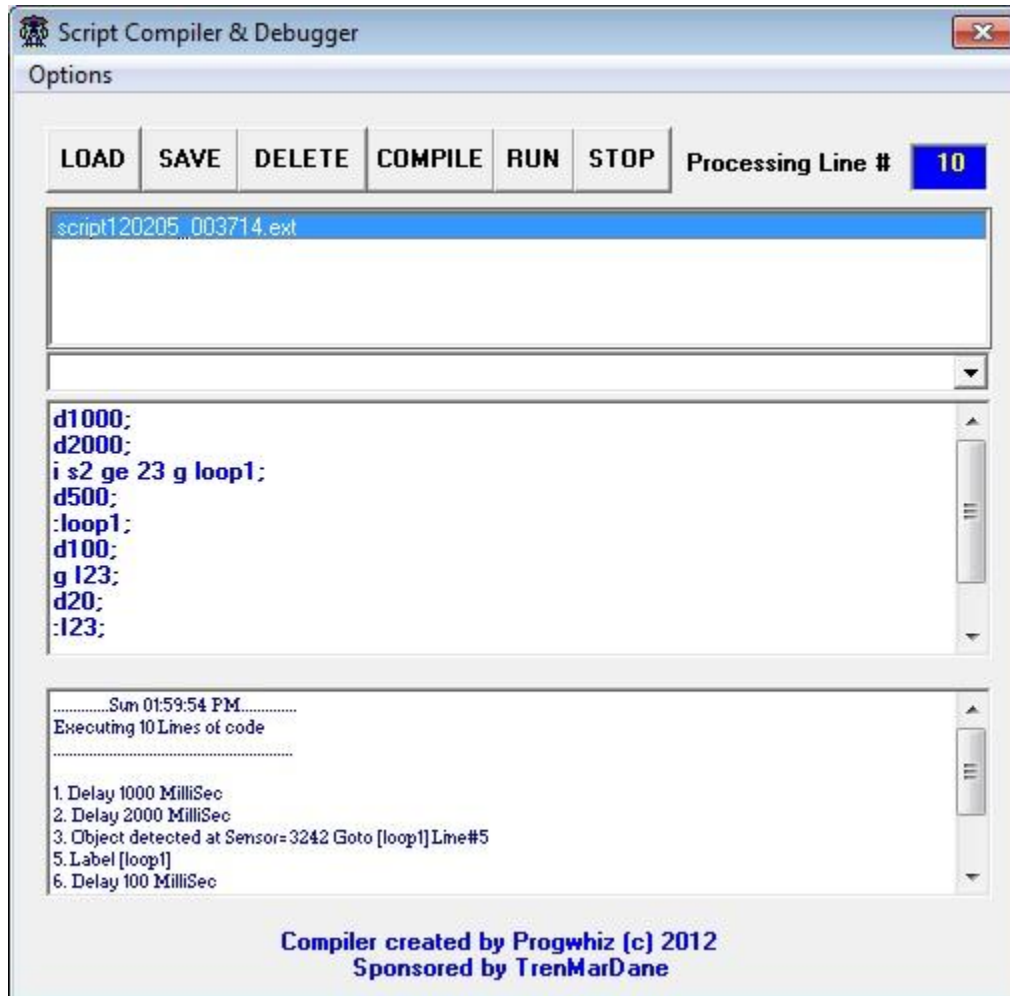
Step 2

Compile the script using the **Compile** button



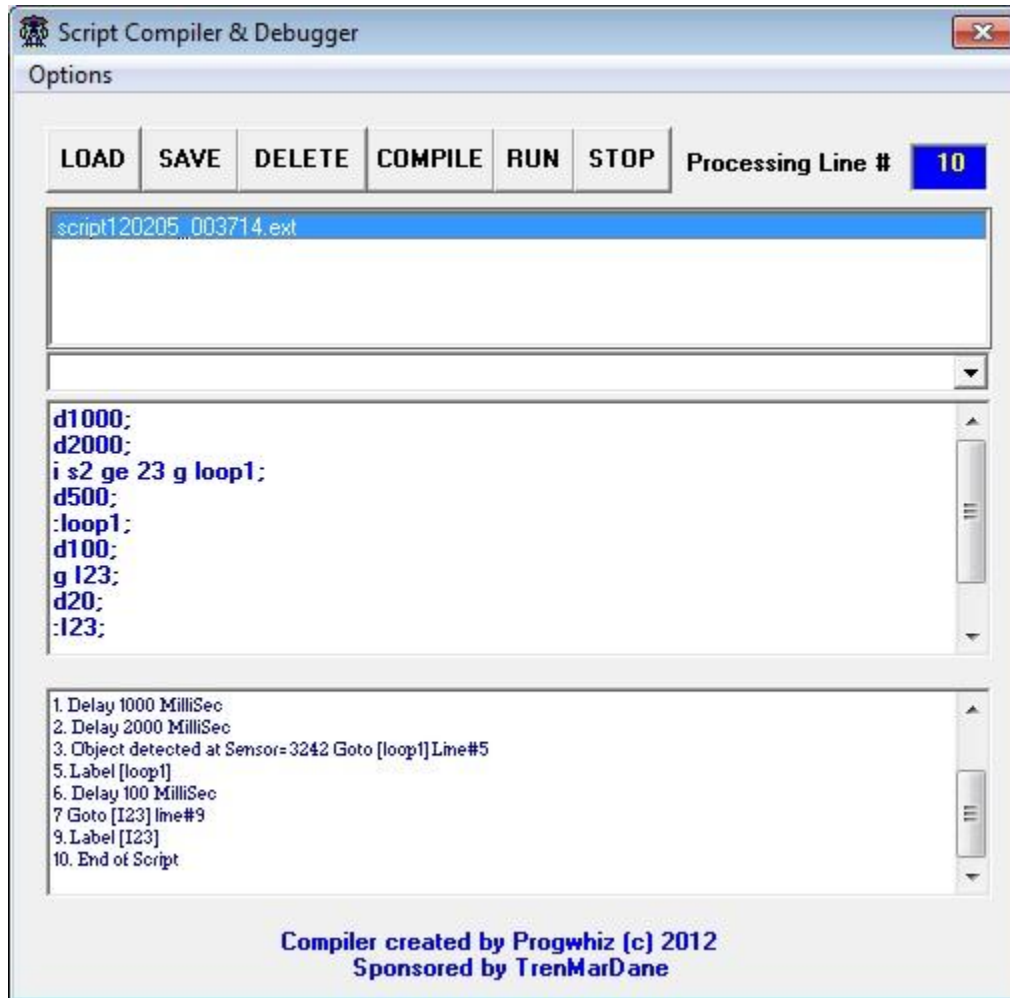
Step3

Run the compiled script:



Step 4

Run the script to completion:



Command Reference

Basic Commands for All Modules

Labeling

Syntax: <colon><Label Name>;

Example1: :loop1;

Command1: Goto Label

Syntax: G<Space><Label>;

Example: G loop1;

Command2: GoSub Label

Syntax: J<Space><Label>;

Example: J loop1;

Command3: Return from GoSub

Syntax: R;

Example: R;

Command4: End of Script

Syntax: E;

Example: E;

Command5: Delay in Millisecond

Syntax: D<Value>;

Example: D100;

Command6: Set Max Number of Goto Loops

Syntax: N<Value>;

Example: N3;

Command7: Reset Goto Loop Counter (Required if infinite Goto loops)

Syntax: F;

Example: F;

Servo – 6, 8, 12 Port Interfaces, CMU Cam and Robotis

Command8: Move Servo/Port Synchronous

Syntax: **M**<Port#><Space><Value><Space><Port#><Space><Value>;

Example1 : **M1 10**; – send value 10 to port 1

Example2: **M1 10 M3 45**;- send value 10 to port 1, value 45 to port 3

Servo - 6, 8, 12 Port Advanced Interface and Robotis

Command9: Set Servo Speed

Syntax: **V**<Port#><Space><Value><Space><Port#><Space><Value> ;

Example1 : **V1 10**; – Set Speed value 10 to port 1

Example2: **V1 10 M3 45**;- Set Speed value 10 to port 1, value 45 to port 3

Servo - 6 and 12 Port Advanced Interface

Command10: Move to Servo/Port ASynchronous

Syntax: **A**<Port#><Space><# of Ports><Space> <Value1><Space><Value2> ;

Example1: **A1 1 10**; – send value 10 to port 1

Example2: **A1 2 10 45**;- send value 10 to port 1, value 45 to port 2

Command11: Run Internal Script

Syntax: **P**<Script#>;

Syntax: **PPS**<Script#><space><parameter>;

Example1 : **P2**; – Run Internal Script#2

Example2: **PPS2 55**; – Run Internal Script#2 and pass vale 55 as a parameter

Command12: Halt All Internal Scripts

Syntax: **H**;

Example1 : **H**; – Stop All Internal Scripts

Standard Sensor – 6, 12 Port Advanced Interface and Robotis (Sync)

Command13: Conditional Sensor Send Value to Servo/Port Synchronous

Syntax: S<Port#><Space><GE,LT,EQ><Space><Value><Space>M<Port#><Space><Value> ;

Example1: S3 GE 25 M1 10; – send value 10 to port 1 when Sensor has value 25 or greater

Example2: S3 EQ 12 M1 10 M3 45; – send value 10 to port 1, value 45 to port 3 when Sensor has value 12

Example3: S3 LT 12 M1 10 M3 45; – send value 10 to port 1, value 45 to port 3 when Sensor value less than 12

Command14: Conditional Sensor Set Servo Speed

Syntax: S<Port#><Space><GE,LT,EQ><Space><Value><Space>V<Port#><Space><Value> ;

Example1: S3 GE 25 V1 10; – send value 10 to port 1 when Sensor has value 25 or greater

Example2: S3 EQ 12 V1 10 V3 45; – send value 10 to port 1, value 45 to port 3 when Sensor has value 12

Example3: S3 LT 12 V1 10 V3 45; – send value 10 to port 1, value 45 to port 3 when Sensor value less than 12

Command15: Conditional Sensor Send Value to Servo/Port ASynchronous

Syntax: S<Port#><Space><GE,LT,EQ><Space><Value><Space>A<Port#><Space> <# of Ports><Space> <Value1> <Space><Value2>; etc

Example1 : S3 GE 25 A1 1 10; – send value 10 to port 1 when Sensor has value 25 or greater

Example2: S3 EQ 12 A1 2 10 45; – send value 10 to port 1, value 45 to port 2 when Sensor has value 12

Example3: S3 LT 12 A1 2 10 45; – send value 10 to port 1, value 45 to port 2 when Sensor value less than 12

Command16: Conditional Sensor to Goto Label

Syntax: I<Space>S<Port#><Space><GE,LT,EQ><Space><Value><Space>G<Label> ;

Example1: I S3 GE 25 G T1; Goto Label T1 when Sensor has value 25 or greater

Example2: I S3 EQ 25 G T1; Goto Label T1 when Sensor has value 25

Example3: I S3 LT 25 G T1; Goto Label T1 when Sensor has value less than 25

Command17: Write to Address (Robotis Only)

Syntax: A<Port#><Space><# of Ports><Space> <Value1><Space><Value2> ;

Example1: W1 1 10; - Update address 1 to 10 at port 1

Example2: W1 2 10;– Update address 2 to 10 at port 1

Scripting - 6 and 12 Port Advanced Interface

Command18: Conditional Sensor Run Internal Script

Syntax: I<Space>S<Port#><Space><GE,LT,EQ><Space><Value><Space>P<Script#> ;

Example1: I S3 GE 25 P1; Run Script#1 when Sensor has value 25 or greater

Example2: I S3 EQ 25 P1; Run Script#1 when Sensor has value 25

Example3: I S3 LT 25 P1; Run Script#1 when Sensor has value less than 25

Command19: Conditional Sensor Halt All Internal Scripts

Syntax: I<Space>S<Port#><Space><GE,LT,EQ><Space><Value><Space>H ;

Example1: I S3 GE 25 H; Halt All Scripts when Sensor has value 25 or greater

Example2: I S3 EQ 25 H; Halt All Scripts when Sensor has value 25

Example3: I S3 LT 25 H; Halt All Scripts when Sensor has value less than 25

Command20: If Script# Busy Goto Label

Syntax: B<Port#><Space>G<Space> <Label>;

Example1: B1 G loop1; - If Scrip#1 Busy Goto Loop1

Command21: If Script# Busy GoSub Label

Syntax: B<Port#><Space>J<Space> <Label>;

Example1: B1 J loop1; - If Scrip#1 Busy GoSub Loop1

Command22: If Script# Busy Delay

Syntax: B<Port#><Space>D<Value>;

Example1: B1 D100; - If Scrip#1 Busy Delay 100 Millisec

Command23: If Script# Busy Run Script#

Syntax: B<Port#><Space>P<Script#>;

Example1: B1 P1; - If Scrip#1 Busy Run Script#1

Command24: If Script# Busy Stop All Internal Scripts

Syntax: B<Port#><Space>H;

Example1: B1 H; - If Scrip#1 Busy Stop All Internal Scripts

Camera Sensor – 12 Port Advanced Interface

Command25: Initialise Camera with detection sensitivity (Also on CMUCam2)

Syntax: C<[0,1]><Space><[1..127]>;

Example: C0 12; - capture image for Detection

N.B Always initiate this command when you want to set a new image to compare

Example: C1 12; - capture image for Archiving

Command26: Conditional Camera X coordinate Send Value to Servo/Port Synchronous

Syntax: X1<Space><GE,LT,EQ><Space><0-7><Space>M<Port#><Space><Value>;

Example1: X1 GE 2 M1 10; – send 10 to port 1 when Camera X has value 2 or greater

Example2: X1 EQ 1 M1 10 M3 45; – send 10 to port 1, 45 to port 3 when Camera X has value 1

Example3: X1 LT 7 M1 10 M3 45; – send 10 to port 1, 45 to port 3 when Camera X is less than 7

Command27: Conditional Camera X coordinate Set Servo Speed

Syntax: X1<Space><GE,LT,EQ><Space><0-7><Space>M<Port#><Space><Value>;

Example1: X1 GE 2 V1 10; – send 10 to port 1 when Camera X has value 2 or greater

Example2: X1 EQ 1 V1 10 V3 45; – send 10 to port 1, 45 to port 3 when Camera X has value 1

Example3: X1 LT 7 V1 10 V3 45; – send 10 to port 1, 45 to port 3 when Camera X is less than 7

Command28: Conditional Camera Y coordinate Send Value to Servo/Port Synchronous

Syntax: Y1<Space><GE,LT,EQ><Space><0-7><Space>M<Port#><Space><Value>;

Example1: Y1 GE 5 M1 10; – send 10 to port 1 when Camera Y has value 5 or greater

Example2: Y1 EQ 2 M1 10 M3 45; – send 10 to port 1, 45 to port 3 when Camera Y has value 2

Example3: Y1 LT 1 M1 10 M3 45; – send 10 to port 1, 45 to port 3 when Camera Y is less than 1

Command29: Conditional Camera Y coordinate Set Servo Speed

Syntax: Y1<Space><GE,LT,EQ><Space><0-7><Space>M<Port#><Space><Value> ;

Example1: Y1 GE 5 V1 10; – send 10 to port 1 when Camera Y has value 5 or greater

Example2: Y1 EQ 2 V1 10 V3 45; – send 10 to port 1, 45 to port 3 when Camera Y has value 2

Example3: Y1 LT 1 V1 10 V3 45; – send 10 to port 1, 45 to port 3 when Camera Y is less than 1

Command30: Conditional Camera X coordinate Send Value to Servo/Port ASynchronous

Syntax: X1<Space><GE,LT,EQ><Space><0-7><Space>A<Port#><Space><Value><Space><Value> ;

Example1: X1 GE 5 A1 1 10; – send 10 to port 1 when Camera X has value 5 or greater

Example2: X1 EQ 2 A1 2 10 45; – send 10 to port 1, 45 to port 2 when Camera X has value 2

Example3: X1 LT 1 A1 2 10 45; – send 10 to port 1, 45 to port 2 when Camera X is less than 1

Command31: Conditional Camera Y coordinate Send Value to Servo/Port ASynchronous

Syntax: Y1<Space><GE,LT,EQ><Space><0-7><Space>A<Port#><Space><Value><Space><Value> ;

Example1: Y1 GE 2 A1 1 10; – send 10 to port 1 when Camera Y has value 2 or greater

Example2: Y1 EQ 1 A1 1 10 45; – send 10 to port 1, 45 to port 2 when Camera Y has value 12

Example3: Y1 LT 5 A1 2 10 45; – send 10 to port 1, 45 to port 2 when Camera Y is less than 5

Command32: Conditional Camera X Coordinate to Goto Label

Syntax: I<Space>X1<Space><GE,LT,EQ><Space><0-7><Space>G<Label> ;

Example1: I X1 GE 5 G T1; Goto Label T1 when Camera X has value 5 or greater

Example2: I X1 EQ 5 G T1; Goto Label T1 when Camera X has value 5

Example3: I X1 LT 2 G T1; Goto Label T1 when Camera X has value less than 2

Command33: Conditional Camera Y Coordinate to Goto Label

Syntax: I<Space>Y1<Space><GE,LT,EQ><Space><0-7><Space>G<Label> ;

Example1: I Y1 GE 5 G T1; Goto Label T1 when Camera Y has value 5 or greater

Example2: I Y1 EQ 5 G T1; Goto Label T1 when Camera Y has value 5

Example3: I Y1 LT 2 G T1; Goto Label T1 when Camera Y has value less than 2

Command34: Conditional Camera X Coordinate to Run Internal Script #

Syntax: I<Space>X1<Space><GE,LT,EQ><Space> <0-7><Space> P<Script#> ;

Example1: I X1 GE 5 P1; Run Script#1 when Camera X has value 5 or greater

Example2: I X1 EQ 5 P1; Run Script#1 when Camera X has value 5

Example3: I X1 LT 2 P1; Run Script#1 when Camera X has value less than 2

Command35: Conditional Camera Y Coordinate to Run Internal Script #

Syntax: I<Space>Y1<Space><GE,LT,EQ><Space><0-7><Space>P<Script#> ;

Example1: I Y1 GE 5 P1; Run Script#1 when Camera Y has value 5 or greater

Example2: I Y1 EQ 5 P1; Run Script#1 when Camera Y has value 5

Example3: I Y1 LT 2 P1; Run Script#1 when Camera Y has value less than 2

Command36: Conditional Camera X Coordinate to Stop All Internal Scripts

Syntax: I<Space>X1<Space><GE,LT,EQ><Space> <0-7><Space>H ;

Example1: I X1 GE 5 H; Stop All Scripts when Camera X has value 5 or greater

Example2: I X1 EQ 5 H; Stop All Scripts when Camera X has value 5

Example3: I X1 LT 2 H; ; Stop All Scripts when Camera X has value less than 2

Command37: Conditional Camera Y Coordinate to Stop All Internal Scripts

Syntax: I<Space>Y1<Space><GE,LT,EQ><Space><0-7><Space>H ;

Example1: I Y1 GE 5 H; ; Stop All Scripts when Camera Y has value 5 or greater

Example2: I Y1 EQ 5 H; ; Stop All Scripts when Camera Y has value 5

Example3: I Y1 LT 2 H; ; Stop All Scripts when Camera Y has value less than 2

Command38: Conditional Camera XY Coordinates Send Value to Servo/Port Synchronous

Syntax: Z1<Space><GE,LT,EQ> <0-7><Space><GE,LT,EQ><Space><0-7><Space>M<Port#><Value> ;

Example1: Z1 GE 5 LT 5 M1 10; – send 10 to port 1 when Camera XY >= 5 and <5 respectively

Example2: Z1 EQ 2 GE 4 M1 10 M3 45; – send 10 to port 1, 45 to port 3 when Camera XY =2 and >=4

Example3: Z1 LT 1 EQ 1 M1 10 M3 45; – send 10 to port 1, 45 to port 3 when Camera XY <1 and =1

Command39: Conditional Camera XY Coordinates Set Servo Speed

Syntax: Z1<Space><GE,LT,EQ> <0-7><Space><GE,LT,EQ><Space><0-7><Space>M<Port#><Value> ;

Example1: Z1 GE 5 LT 5 V1 10; – send 10 to port 1 when Camera XY ≥ 5 and < 5 respectively

Example2: Z1 EQ 2 GE 4 V1 10 V3 45; – send 10 to port 1, 45 to port 3 when Camera XY =2 and ≥ 4

Example3: Z1 LT 1 EQ 1 V1 10 V3 45; – send 10 to port 1, 45 to port 3 when Camera XY < 1 and =1

Command40: Conditional Camera XY Coordinates Send Value to Servo/Port ASynchronous

Syntax: Z1<Space><GE,LT,EQ><Space><0-7><Space><GE,LT,EQ><Space><0-7><Space>A<Port#>
<Space><Value> <Space><Value>;

Example1: Z1 GE 5 EQ 4 A1 1 10; – send 10 to port 1 when Camera XY has value ≥ 5 and =4

Example2: Z1 EQ 2 GE 2 A1 2 10 45; – send 10 to port 1, 45 to port 2 when Camera XY =2 and ≥ 2

Example3: Z1 LT 1 LT 7 A1 2 10 45; – send 10 to port 1, 45 to port 2 when Camera XY < 1 and < 7

Command41: Conditional Camera XY Coordinates to Goto Label

Syntax: I<Space>Z1<Space><GE,LT,EQ><Space><0-7><Space><GE,LT,EQ><Space><0-7><Space>G<Label> ;

Example1: I Z1 GE 5 LT 5 G T1; Goto Label T1 when Camera XY has value ≥ 5 and < 5

Example2: I Z1 EQ 2 LT 6 G T1; Goto Label T1 when Camera XY has value =2 and < 6

Example3: I Z1 LT 2 EQ 3 G T1; Goto Label T1 when Camera XY has value < 2 and =3

Command42: Conditional Camera XY Coordinates to Run Internal Script #

Syntax: I<Space>Z1<Space><GE,LT,EQ><Space><0-7><Space><GE,LT,EQ><Space><0-7><Space>P<Script#> ;

Example1: I Z1 GE 5 LT 5 P1; Run Script#1 when Camera XY has value ≥ 5 and < 5

Example2: I Z1 EQ 2 LT 6 P1; Run Script#1 when Camera XY has value =2 and < 6

Example3: I Z1 LT 2 EQ 3 P1; Run Script#1 when Camera XY has value < 2 and =3

Command43: Conditional Camera XY Coordinates to Stop All Internal Scripts

Syntax: I<Space>Z1<Space><GE,LT,EQ><Space><0-7><Space><GE,LT,EQ><Space><0-7><Space>H ;

Example1: I Z1 GE 5 LT 5 H; Stop All Scripts when Camera XY has value ≥ 5 and < 5

Example2: I Z1 EQ 2 LT 6 H; Stop All Scripts when Camera XY has value =2 and < 6

Example3: I Z1 LT 2 EQ 3 H; Stop All Scripts when Camera XY has value < 2 and =3

Sensor Command Defined

Controller Type	Description/Examples
Maestro Advanced 6.12 Port	Sensor Ports 0 to 5 for 6 Port Model Sensor Ports 0 to 11 for 12 Port Model Eg: S0 – Port #0, S1 – Port#1, ... etc
Robotis	Sensor Ports 1 to 6 for Robotic CM700 Model Aux Ports Eg: S1 – Port #1, S2 – Port#2, ... etc
RoboBuilder	Sensor Ports 0 to 3 for RoboBuilderModel Eg: S0 – Distance Sensor S1 – X axis sensor S2 – Y axis sensor S2 – Z axis sensor

Environment Command

Command44: Compare Time if equivalent then Goto Label

Syntax: O<space><h,m,s><space><YY:MM:DD hh:mm:ss><space>G<space><Label>;

Example: O h 03:05:45 G loop2; - Goto loop2 when 3:05:45 (hh:mm:ss)

Example: O m 05:45 G loop2; - Goto loop2 when 05:45 (mm:ss)

Example: O s 45 G loop2; - Goto loop2 when 45 (ss)

Command45: Compare Time if equivalent then GoSub Label

Syntax: O<space><h,m,s><space><YY:MM:DD hh:mm:ss><space>J<space><Label>;

Example: O h 03:05:45 J loop2; - GoSub loop2 when 3:05:45 (hh:mm:ss)

Example: O m 05:45 J loop2; - GoSub loop2 when 05:45 (mm:ss)

Example: O s 45 J loop2; - GoSub loop2 when 45 (ss)

Command46: Set Maestro ID

Syntax: K<ID#>;

Example: K12; - Set Maestro ID = 12

Example: K16; - Set Maestro ID = 16