Automatic Anti-fan out control system

Duration: September 2017-October 2018

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In support with:

1. CTP
2. Maintenance

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Appendix

PROBLEM: Manual control of anti-fan out system

SOLUTION: Automation of anti- fan out system

PURPOSE: To initiate waste reduction and quality improvisation.

IDEA: To implement a closed loop control system with an image processing sensor and automatically adjusting the air supply to the paper and thereby correcting the registration.

CAUSES OF FAN OUT PROBLEM:

- The undesirable expansion of a sheet of paper on the press, caused either by moisture absorption or by mechanical stretching of the paper.

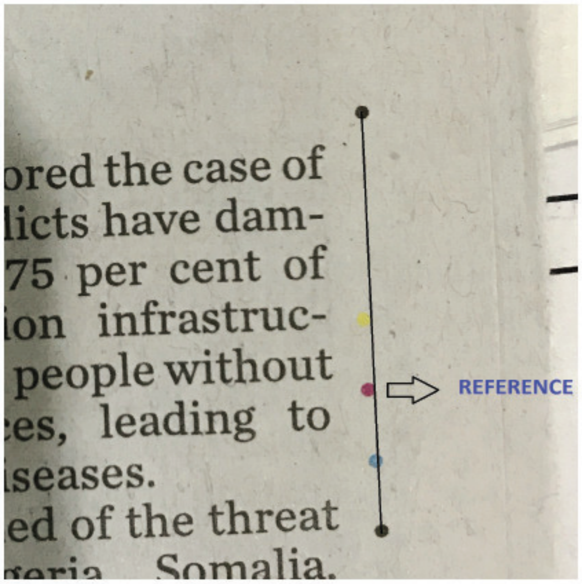
- Fanout happens because as a printed image passes through successive print units, it picks up moisture. Between each print unit tension is being controlled across and in the direction of the web. This stretching that takes place literally increases the size of the web marginally. Once the first printed image reaches the last printed unit, there will already be a noticeable difference of register on the edges.

- Fan-out produced mechanically commonly occurs on the impression cylinder, as the pressure exerted in the nip of the impression and blanket cylinders irons the sheet out, causing it to expand at its tail end just prior to being printed. After leaving the impression nip, the sheet returns to nearly its original dimensions, but the image is narrowed at its tail end.

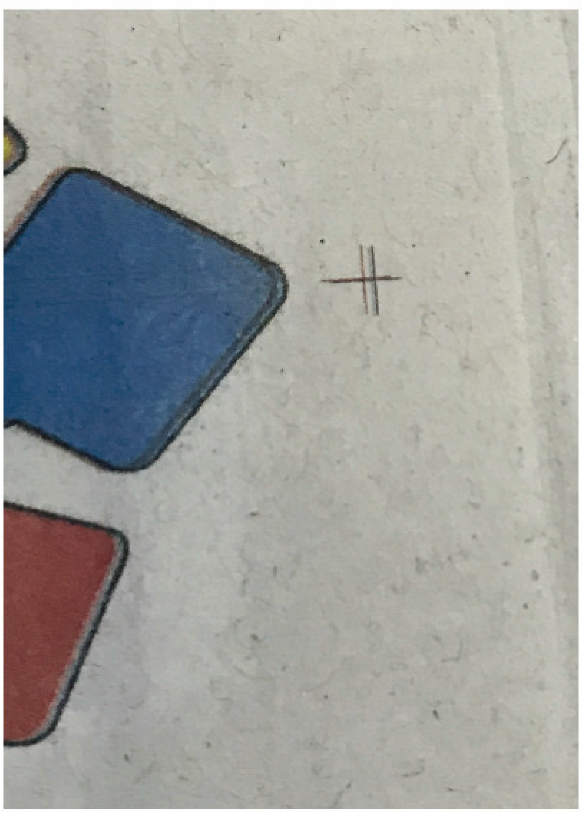
- When the sheet is then passed through successive printing units, the sheet will fan out again, but the successive images will print with narrower tails than the preceding ones, resulting in poor registration of images.

PICTORIAL ILLUSTRATION OF FAN OUT PROBLEM:

IMAGES:



Here, Magenta dot is the reference. The Black dots have shifted towards the edge, Causing registration problem as shown below.



METHODS USED FOR CONTROLLING FANOUT PROBLEM IN INDUSTRIES:

- **Relative print size** is the industry term to describe the difference of one printed image to another. In our example above, the relative print size difference is the largest between the black and yellow since the black expanded the most. Fan out problem is one of the reasons for Relative print size. So if the relative print size difference is larger, Mismatch in registration mark is also larger.

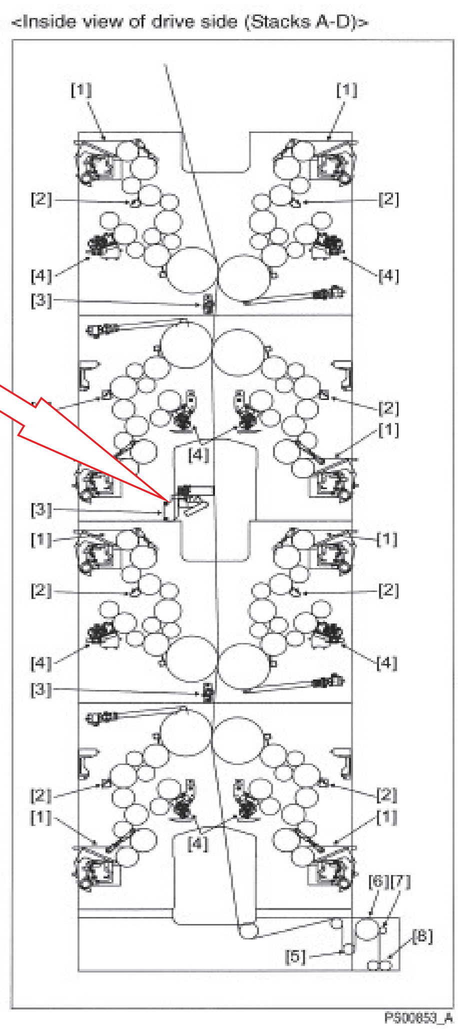
- Controlling fanout starts with having good register marks on all extremities of the printed copy as well as the middle like the ones pictured. There are 2 main ways of controlling fanout.

  1. Many web presses have wheels mounted between each printing unit. These wheels will ride on the web and literally stretch it apart in difference places as it enters the printing unit. The drawback is that it can cause setoff since physical contact is required with the web. Careful placement can avoid this.

  2. A more popular alternative as of late are **air bustles**. These are simply a controlled blast of air pushing the web up in strategic places. Our press has the latter control for Anti-fan out.

Air gun present in between stacks.

No.	Name
[1]	Ink feed unit (fountain)
[2]	Ink doctor
[3]	Air gun
[4]	Dampening device
[5]	Infeed tension controller
[6]	Infeed roller
[7]	Trolley roller (spiral roller)
[8]	Web severer device
[9]	Ink clutch
[10]	Drive unit
[11]	Register adjustment device (drive side)
[12]	Register adjustment device (operation side)
[13]	Ink fountain roller drive unit
[14]	Vibrated drive unit
[15]	Impression OFF device



AUTOMATION OF ANTI FANOUT SYSTEM IN OUR PRESS:

ANTI FANOUT SYSTEM IN OUR PRESS:

The Existing Anti Fanout control system in our press can be operated manually by the operators. Our project main objective is to automate the existing system in our press. Below, we are going to discuss the suggested methods and ideas for implementation of the project.

PROJECT PREREQUISITES:

1. SENSOR REQUIREMENT:

The Project requires an Image Processing sensor (Suitably a camera) that satisfies the following criteria as mentioned below,

- To capture the Magenta, Black and cyan color registration dots of diameter 0.9mm.
- To identify the deviation of Black and cyan dots from the reference Magenta Color, in both direction and giving an output.
- It should be able to capture copies at high speed of 80000 Copies/Hr.
- It should have high accuracy and high repeatability.
- It should have provision for Encoder inputs (A, B & Z pulse) in order to operate at different speeds.

2. CAMERA POSITION DETECTION:

- As we need to capture and control registration marks at four different positions such as Near, Near center, Far center and Far depending on the reel width, the project requires position detection sensor to identify the camera position precisely.

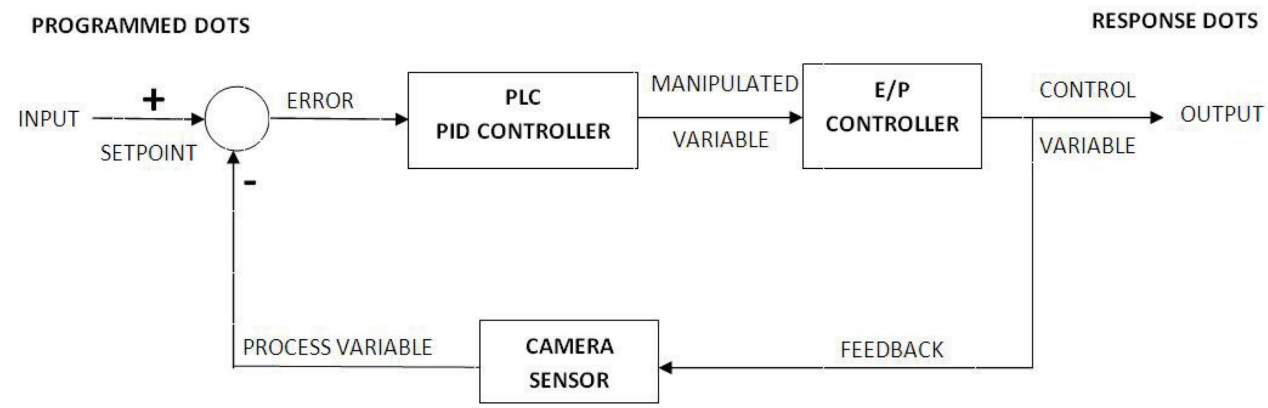
- Limit switch or Proximity sensor can be used for this purpose.

3.CONTROL SYSTEM REQUIREMENT:

- Based on the output given by sensor, Programmable Logic controller should be programmed in such a way that it will increase or decrease the air blown to the paper.

- Already E/P convertor is present which will convert the electric signals to pneumatic signals (0 to 0.5MPa).

PICTORIAL ILLUSTRATION OF THE CONTROL LOOP:



CONTROL SYSTEM DESIGNING SEQUENCES

1. Requirements from Printing Engineers

Screen View:

N	NC	FC	F
VALUE	**VALUE**	**VALUE**	**VALUE**
LMT	LMT	LMT	LMT

AUTO/MAN AUTO/ MAN AUTO/ MAN AUTO/MAN

AT1	AT2	AT5

Description:

- **AUTO/MAN** – The operator can choose Auto or Manual mode when it needed.
- **VALUE** - E/P air pressure
- **RANGE**- 0 Mpa to 0.2 Mpa.
- **LMT** – The limit option will blink when the air pressure needed is more than 0.12 Mpa.

CASE (1): At Starting

N	NC	FC	F
0.04	0.04	0.04	0.04
LMT	LMT	LMT	LMT

- For the full width reel, all the four values equals to **0.04 Mpa** in Auto mode. Once the printing started the operators will choose the mode of operation for separate air gun

- The camera will capture and process **every seventh** copy at starting. These values are variable as it depends upon the number of copies between Air gun and camera position. If the camera position has to be adjusted likely, these values are subjected to change.

- For each second it will increase or decrease the value by **0.01 Mpa ≈ 100 microns**

- For **Auto mode** the allowable range is 0 Mpa to 0.12 Mpa

- At speed of **30000IPH during start-up, the 600 microns = 0.6 mm** registration variation can be adjusted within 6 seconds (i.e) **48 copies.**

- Anti-fan out control should take corrective actions within 50 copies after ink adjust. So at 30000 IPH and processing 4 samples, controller should have high response so that corrective action should be finished within 50 copies.

CASE (2) : Range.

N	**NC**	**FC**	**F**
0.0	0.04	0.07	0.12
LMT	LMT	LMT	LMT

- When the air pressure is above 0.12 and below 0 Mpa, the **LMT option will Blink.** So the operator can change the mode from Auto to manual and set the required value.

CASE (3) : At Pasting.

- While pasting the maximum variation will be **200-300 microns,** this can be adjusted within 2 seconds (i.e) 32 copies.

- Pasting occurs usually at the speed of **60000 IPH = 16 copies / second.**

- The Camera should go to Blind mode once the pasting cycle is completed i.e after cutter/knife action is done.

- After 40 copies from the knife action, the camera should continue the inspection process as usual.

CASE (4) : Different width Reels

N	NC	FC	F
VALUE	VALUE	VALUE	VALUE
LMT	LMT	LMT	LMT

- When we print with 3/4 or Half width reels, the respected positions only available for the operations others will be in disabled
- The above one is 3/4 width reel aligned by Drive side.
- The unused portion will be in off/disable condition based on reel position and reel length.
- The unused position will be determined based on the camera feedback signal. For example, when 3/4 width reel aligned by DS is loaded, Camera at OS will be in NC and camera at DS will be in F, hence the unused position near will be disabled/in off condition.

CASE (5) : Plate Fixing Error & Right Left Variation.

- In this case the camera will adjust up to some range, if that is not satisfied the operator can go with manual mode.

Query raised by Electronics Engineers:

1. **Query about Camera positioning**

   - It is mentioned as Auto/Manual option is to be provided for all four positions. For instance, in Full width configuration, two cameras will be in Near and Far position at the end points. In this case the Auto function will work only for Near and Far positions. In this case, Near centre and Far centre could be operated only manually.
   - For **any reel width** configuration, Auto mode is possible for only two extreme positions out of four positions. The rest two positions have to be adjusted manually only. So whether 2 out of 4 is sufficient for Anti-fan out control system?

Illustration of the above query

Instance one: Full width configuration

Camera 1 **Camera 2**

N	**NC**	**FC**	**F**
VALUE	**VALUE**	**VALUE**	**VALUE**
LMT	LMT	LMT	LMT
AUTO/MAN	MAN	MAN	AUTO/MAN

AT1	**AT2**	**AT5**

Instance two: 3/4th reel at DS position

CAMERA 1 **CAMERA 2**

N	**NC**	**FC**	**F**
VALUE	**VALUE**	**VALUE**	**VALUE**
LMT	LMT	LMT	LMT
MAN	AUTO/ MAN	MAN	AUTO/MAN

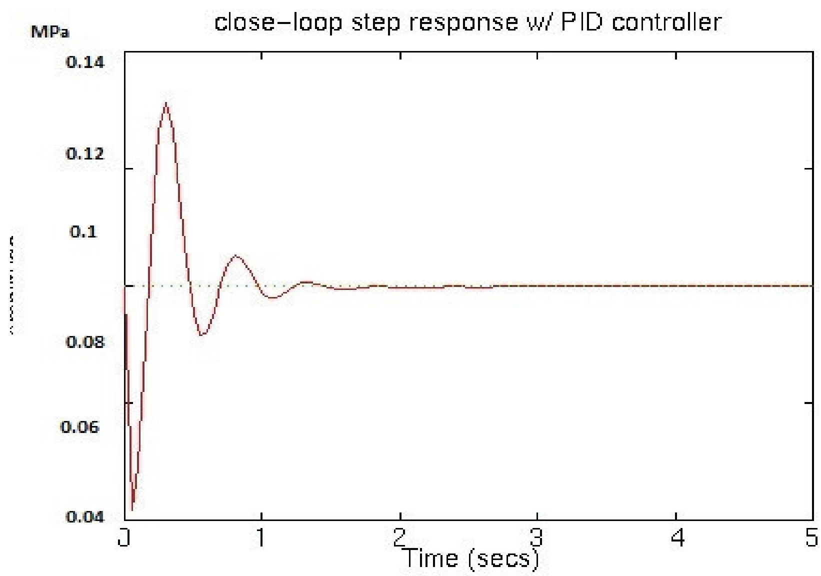
AT1	**AT2**	**AT5**

- So, camera positions will be sensed with the help of sensors and its corresponding positions only will be in Auto mode.

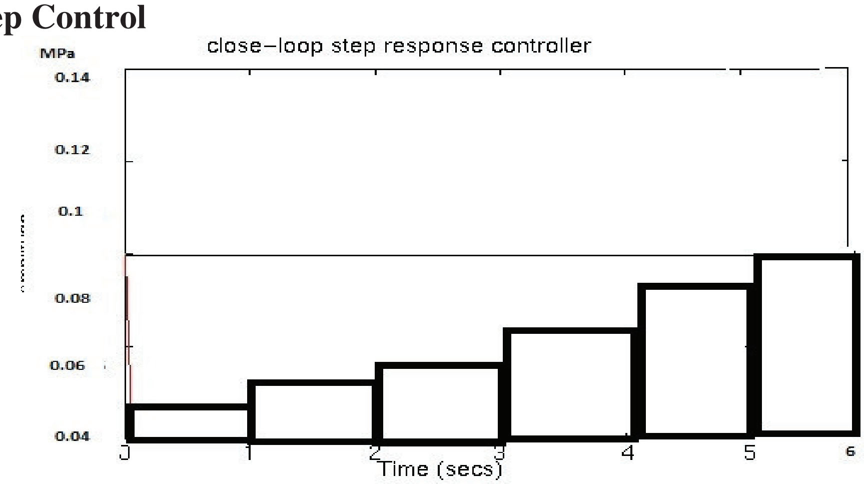
2. Query about Controller Selection:

a. PID Control:

- As requested, the corrective controller actions should be in steps of 0.01MPa. Our idea was to design a PID controller, which takes corrective action in ramp instead of step.
- It means, the controller will take huge corrective action at the starting as the error will be very high. It slows down and settles at a point where the error will be null or minimum.
- The reason for suggesting PID controller is that, its corrective action will be very quick and efficient. Instead, if we use step control action, initially, there will be a lag to reduce error. This can be explained by below graph.



b. Step Control



- On comparing the above two controller response, it can be clearly seen that PID achieves the steady state for example 0.09 Mpa in this case within 2 or 3 seconds.

- Instead, if we are about to go for step controller, the steady state is achieved only at 6 seconds in this case. And also, In PID, the output of controller can be varied in terms of 0.001 Mpa thereby having high resolution.

- For example, if the necessary air is 0.095 Mpa, the step controller will vary continuously between 0.08Mpa and 0.09Mpa, whereas PID controller will vary between 0.090Mpa to 0.099Mpa, having accurate control.

- Anti-fan out can be done by either step or PID controller. Our suggestion is to go for PID controller. **So between PID and Step Controller action, which controller action will be appropriate for Anti fan out process?**

- **Reply from Printing team for the above query**

  - As for this project, inspection have to be taken at every seventh copy at start up, E/P controller response time have to be calculated. The response time of E/P controller is that the time for electrical signals to convert into pneumatic signal. This response time is a variable quantity as it depends on the Gain of the controller. The gain of controller is a variable from 1 to F hex values, while default value is at 9. These can be increased to F for faster response but at the same time controller stability gets affected at high values. So, nominal values have to be chosen so that response time and stability should not be compromised.

  - If required, Camera position inputs can be programmed instead of sensors provided that operator doesn’t make mistake. Sensors are recommended to know the feedback of camera position.

  - For innovative productions for example flap/pop up, Anti-fan out control will be in manual mode as only four positions are available.

  - 8400 high speed camera Vs 8200 low speed camera to be analyzed based on corrective action. So their performances also have to be analyzed for choosing PID or Step controller.

  - And, also when going for PID controller, the shoot value (air output) to be tested in production. If shoot value is high, PID should be tuned so that shoot will be low as there is a possibility of web break. If not, step controller action will be taken and its response should be checked in production.

SENSOR STUDY AND SELECTION:

1.SICK RS10 Sensor

- It is a color detection sensor which will sense the presence of dots. But our application has moving dots so it is difficult for the sensor to capture as it is mounted permanently. So we have to go for Image Processing techniques.

2.SICK PIM60 Inspector 2D Vision

- It is a monochrome camera. It is able to capture black dots 100% whereas the repeatability of capturing magenta and cyan dots is very less.
- Size of the dots is not a problem as it failed to capture big cyan and magenta dots. It is because of the screening problem and hence we need to go for Color vision camera.

3.COGNEX

- Here varieties of color cameras are available which satisfies our required criteria. It can detect dots less than 0.9dia at high speed. But the problem with low end camera is its ability to provide only digital outputs which is a concern for us.
- We need analogue output to identify the deviated dots i.e. either left or right side with respect to reference. Speed plays a factor in this application, so we need to go for high speed camera.
- Insight 8000 series matches our fit. In this demo was tested with 7400 series and we concluded that 8200 series also have the same performance as that of 7400 at a compensated speed.

4. OMRON

- This application was done with the help of a external camera and a standalone controller. All dots were captured at table level.
- But the cost involved in going for controller is bit high. Also, Keyence and Baumer couldn't able to give solution for this application.

PLC LOGIC DESIGN:

1. DRIVER SIDE:

- Normally paper expands in A stack (Black), so black mark moves towards the outer edge away from the correct position.
- Therefore, to bring back the black mark we must supply sufficient air. If the air supply has gone more than necessary, the black dot moves away from the correct position in other way.
- So, air supply must be decreased. Camera can be positioned on any one of the paper sides (i.e. AL or AR).

2. OPERATOR SIDE:

- Normally paper expands in A stack (Black), so black mark moves towards outer edge away from the correct position.
- Therefore, to bring back the black mark we must supply sufficient air. If the air supply has gone more than necessary, the black dot moves away from the correct position in other way.
- So, air supply must be decreased. Any of the paper sides (AL or AR) can be chosen to inspect.

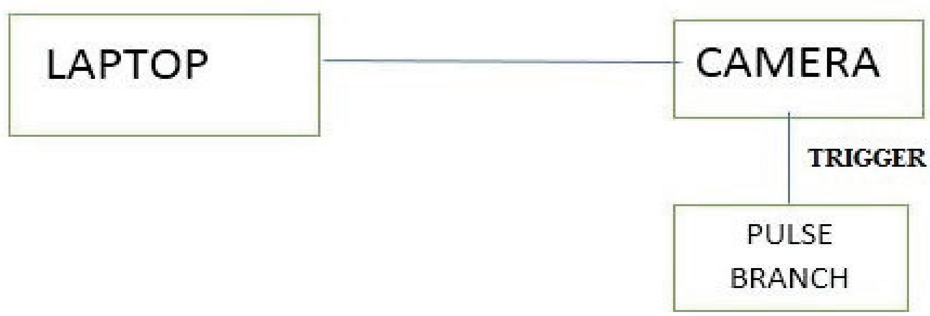
- **After studying and testing various sensors in the market, we have narrowed it to Cognex vision system because of its high repeatability, high accuracy and its compatibility with our speed requirements**

DEMO STUDY WITH THE SELECTED SENSOR FROM COGNEX:

1ST DEMO - COGNEX IN VISION 7400 Series:

- For Anti Fan-out project, the 7400 series Cognex demo camera was fixed and tested on 22/11/2017 in AT5 L position.

Demo Setup:



- Initially the camera was mounted first near the OS Near position and trigger pulse was given from pulse branching equipment. The trigger pulse was set from channel 8 of the pulse branching equipment with Z pulse on at 3200 and Z pulse off at 3220.

- The camera started capturing images based on the trigger input but with an offset error of 350mm. So, Z pulse was calculated based on the offset and modified with Z on at 900 and Z off at 920. The camera was moved to Near Center but still the problem persisted.

- Therefore, the camera was mechanically moved to the dot position in the paper and now the dots capturing was perfect.

OBSERVATION

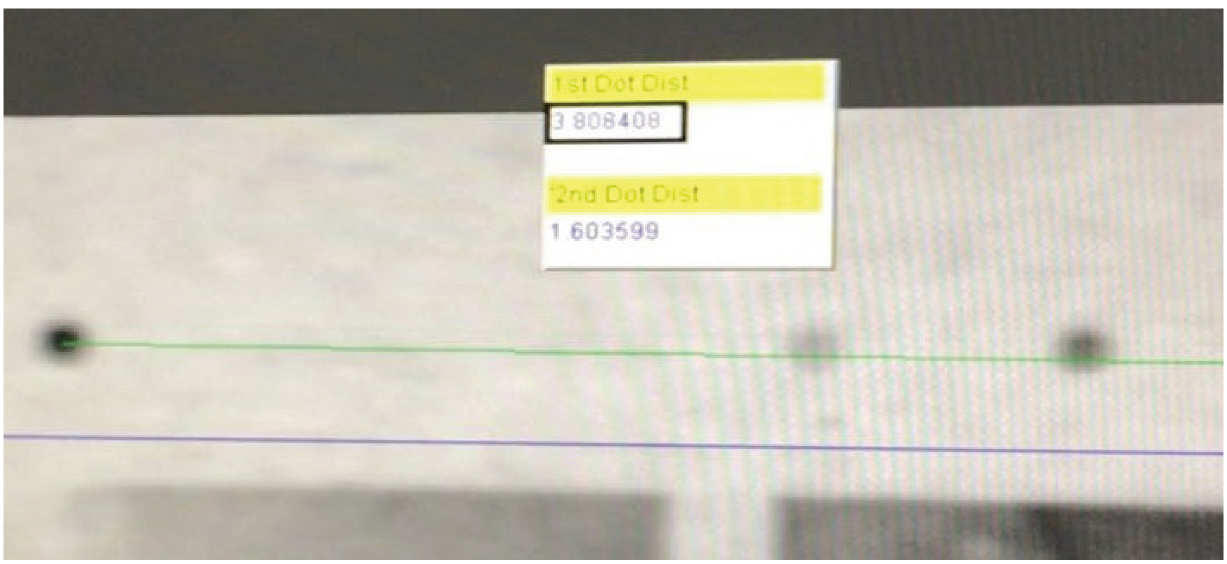
- The following tests were done to capture the deviated values.

1. Initially the machine ran at 30000IPH and the camera was tested for identifying the deviated dot values. The camera was taught to capture the registration pattern i.e. the Magenta and Cyan dots with respect to black dots. The deviated values of the dots were monitored using the PC. It was found to be Ok.

2. Then the speed was increased to 60000IPH and the camera was tested for the registration pattern. The camera captured the deviated dots with accuracy.

3. After that machine speed was increased to 65000IPH and checked for the above pattern again. The sensor captured the dots with same accuracy.

Reference picture:



4. The Magenta and Cyan dots were moved purposely by varying registration motor in either directions and checked with camera. The monitored values were found to varying in the PC.

5. The values were monitored in the PC in the Pixel range. (1 pixel = 63 microns). The normal deviated output values were in pixels in the range between -1.70 to 2.50.

6. The Yellow dot and Cyan dot color density in the gray scale value was monitored. Yellow dot gray value was found to be 163 and cyan dot gray value was found to be 131. (Gray scale value 0-black and 255-White)

INFERENCE

1. During 1st demo, trigger pulses was directly given to camera from pulse branch. In order to capture the dots, camera was physically moved from its ideal position.

2. In ideal condition the camera will be fixed and these pulses have to be varied by operator for capturing. So we are in need of receiving these total 3600 pulses and triggering a specific pulse as per our need.

3. For this purpose, we need to go for QD62 pulse counter module.

4. This 7400 camera captured alternate copies at a speed of 65000IPH i.e 9 alternate copies per second. This performance is similar to 8400.

5. For 8200 series, the following theoretical calculations have been arrived based on this demo,

Specifications	**8400**	**8200**
Capture speed	200fps = 5ms	60fps = 16ms
Processing speed	25 ms	25 ms
Total time for single copy Inspection (Capture + Processing)	30 ms	41 ms
Maximum copies based on single inspection time	33 copies	24 copies
1 Copy speed @80000IPH	45ms	45ms
6 Copy speed @80000IPH	360 ms	360ms

6. Based on the above theoretical calculation, our actual inspection is at every 6 copies because of the distance between camera and fan out bar.

7. Minimum time required for an inspection is **41 ms** for 8200, whereas our actual minimum time required for an inspection at every 6 copies under 80000IPH is **360ms**. So, this camera suits our application much sufficiently.

8. The laptop was connected to the camera directly. In our system, for monitoring and control, we need to go for a personal computer and a PLC in interface through a Hub.

9. Personal computer is for monitoring and operational purposes whereas PLC is for controlling the Anti-fan out control system.

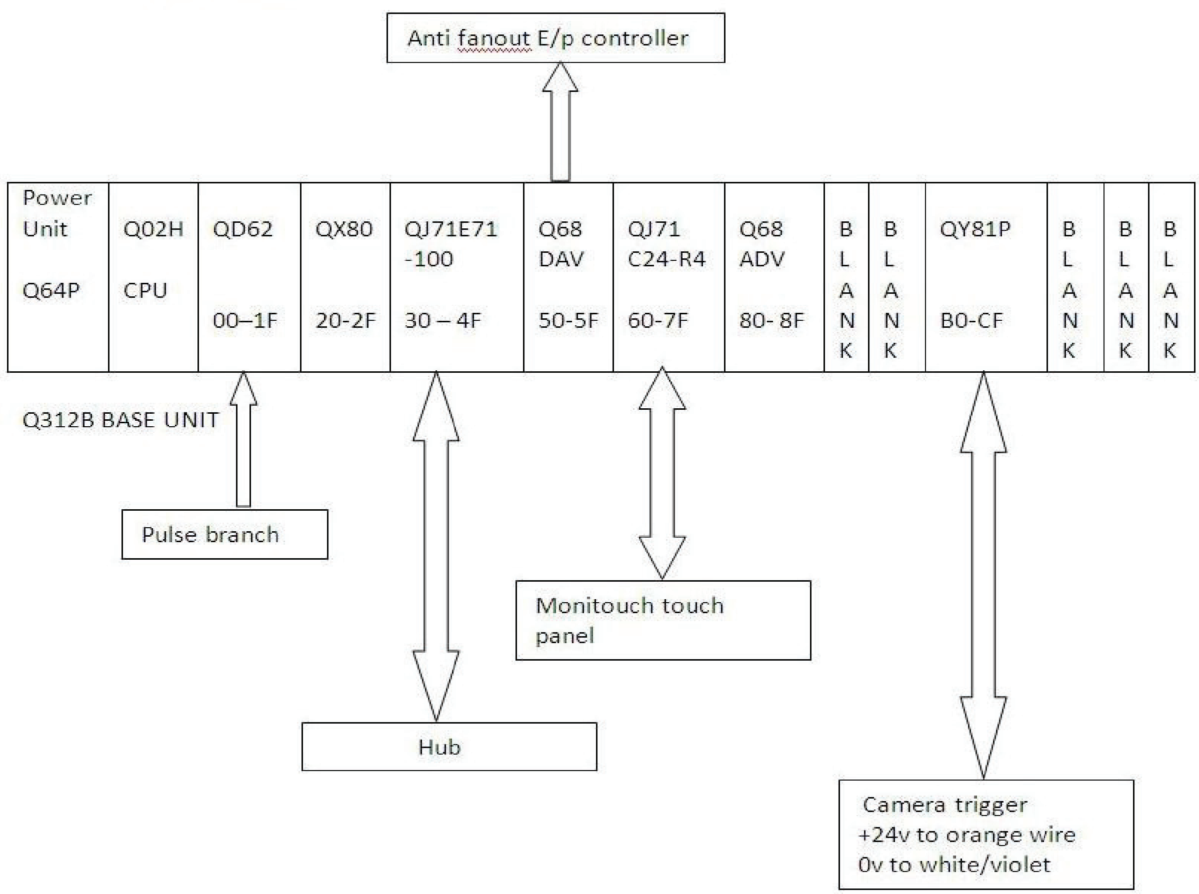
Hardware and Software Description of Control system

A. Components required

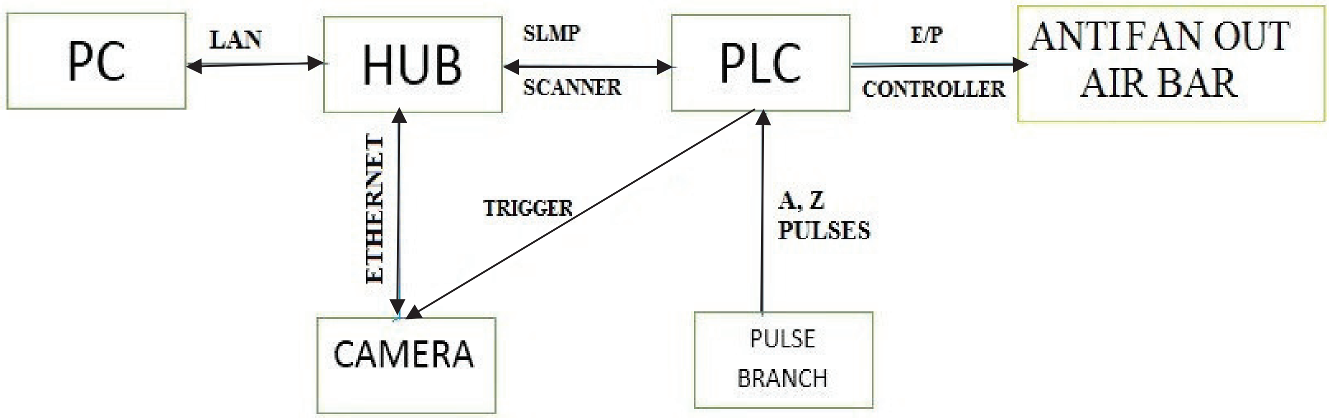
1. Cognex 8200 camera
2. Sensor selection – proximity sensor
3. PC with network card for image display
4. Network switch
5. Cognex Insight Vision software
6. CPU Q02H
7. Ethernet module QJ71E71-100
8. QD62 speed counter module
9. Serial communication module QJ71C24-R4
10. Input/output module QX80/QY81P
11. DAV module Q68DAVN

B. System Interface Diagram

A. PLC module side



C. Block diagram



D. Use of PLC words and devices

PURPOSE	DEVICE NAME	DESCRIPTION
	D1000	NEAR AIR VALUE
	D1001	NEAR CENTER AIR VALUE
	D1002	FAR CENTER AIR VALUE
	D1003	FAR AIR VALUE
	D1998	CAMERA COUNT
	D1999	CYAN DISTANCE
	D2000	PV DISPLAY
	D2001	SET VALUE DISPLAY
	D2003	MV AIR DISPLAY
	D3007	DAV CH8 O/P
USER DEFINED DEVICES	L3010	NEAR BUTTON LAMP
	L3011	NEAR CENTER BUTTON LAMP
	L3012	FAR CENTER BUTTON LAMP
	L3013	FAR BUTTON LAMP
	M10	ERROR LIMIT LAMP
	M11	MV UPPER LIMIT ERROR
	M12	MV LOWER LIMIT ERROR
	M20	NEAR POSITION ON
	M21	NEAR CENTER POSITION ON
	M22	FAR CENTER POSITION ON
	M23	FAR POSITION ON
USER DEFINED DEVICES	M3010	NEAR BUTTON
	M3011	NEAR CENTER BUTTON

	M3012	FAR CENTER BUTTON
	M3103	FAR BUTTON
	Y58	DAV CH8 ON
PID CONTROL DEVICES	D500	NO OF PID LOOP
	D501	NO OF PID LOOP
	D502	FORWARD OPERATION
	D503	SAMPLING CYCLE (S)
	D504	PROPORTIONAL CONSTANT
	D505	INTEGRAL CONSTANT
	D506	DERIVATIVE CONSTANT
	D507	FILTER COEFFICIENT
	D508	MV LOWER LIMIT
	D509	MV UPPER LIMIT
	D510	MV CHANGE RATE
	D511	PV CHANGE RATE
	D512	NULL
	D513	DERIVATIVE GAIN
	D514	NULL
	D515	NULL
	D600	INTIAL PROCESSING
	D610	SET VALUE
	D611	PROCESS VALUE
	D612	PID MV
	D615	AUTOMATIC MODE
	D673	PID MV
	D674	PID MV DISPLAY
	L3000	PID CONTROL ON LAMP
	M0	PID CONTROL ON
	M15	PID OFF
	M3000	PID CONTROL BUTTON
	SD794	PID -VE LIMIT WORKING
MANUAL CONTROL DEVICES	D670	MANUAL MV
	D671	MANUAL MV
	D672	MANUAL MV DISPLAY
	D680	MANUAL SV
	L3002	MANUAL CONTROL ON LAMP
	L3200	SV + ADJ LAMP
	L3201	SV - ADJ LAMP
	L3210	MV + ADJ LAMP
	L3211	MV - ADJ LAMP
	M17	MANUAL CONTROL OFF
	M2	MANUAL CONTROL ON
	M3002	MANUAL CONTROL BUTTON
	M3200	SV + ADJ
	M3201	SV – ADJ

MANUAL CONTROL DEVICES	M3210	MV + ADJ
	M3211	MV – ADJ
	M5	SV + ADJ ON
	M6	SV - ADJ ON
	M7	MV + ADJ ON
	M8	MV - ADJ ON
	T1	SV + HOLD TIMER
	T2	SV - HOLD TIMER
	T3	MV + HOLD TIMER
	T4	MV - HOLD TIMER
STEP CONTROL DEVICES	D675	STEP MV
	D676	STEP MV DISPLAY
	D690	STEP MV
	D695	STEP SV
	L3001	STEP CONTROL ON BUTTON
	M1	STEP CONTROL ON
	M16	STEP CONTROL OFF
	M3001	STEP CONTROL BUTTON
	M4001	6 COPY TRIGGER
QD62 COUNTER MODULE DEVICES	C1	6 COPY COUNTER
	D10	TRIGGER COUNT
	D11	NO OF 32000 TRIGGER COUNT
	D1500	PRESET VALUE
	D1501	COINCIDENCE VALUE
	D1502	RING COUNTER MIN
	D1503	RING COUNTER MAX
	D200	PULSE COUNT
	D3	OFFSET Z ON PULSE VALUE
	D4	OFFSET Z OFF PULSE VALUE
	M 3015	OFFSET – ADJ
	M3014	OFFSET + ADJ
	M4000	Z ON PULSE
	M5000	NETWORK TRIGGER ENABLE
	M5001	NETWORK TRIGGER
	X24	COUNTER DISABLE
	Y0BB	CAMERA TRIGGER
	Y4	COUNT ENABLE

E. Explanation

- PC, PLC and camera was interfaced in same ip address with 192.168.0.n , where n is 3,4,5 for PLC, camera and PC respectively.
- Pulse branch equipment gives A pulses to Plc. In plc, trigger pulses can be adjusted according to dots. Trigger wiring is connected via output module.
- In pulse branch equipment, channel 8 was configured for anti-fan out control system and its z pulse is used for **homing** PLC with pulse branch.
- In PLC, manual mode allows to increase/decrease air supply manually by 0.01Mpa.
- In PID control mode, it monitors in a interval of every 2 copies and gives the controller output to Anti-fan out bar.
- In step control mode, it will increase or decrease air supply once in every 6 copies by steps of 0.01Mpa automatically.
- SLMP scanner settings to be configured in both Cognex software and Gx developer.
- Device address must be set up in both Cognex software and Gx developer for receiving dot distance and for network trigger.
- Format of the information, to be received from camera also must be configured in Cognex software.

➢ Cognex software details

- First, separate black dot will be identified. Next the other black dot will be identified and a plot between two dots will be drawn.
- The, magenta and cyan dots will be identified and its center(x,y) will be identified.
- Then, the distance between magenta dot-line, cyan dot-line will be found and sent to PLC via address specified in SLMP scanner.
- All the other dots tools are added in offset to the separate black dot. If the tool for separate black dot oscillates, the other dot tools also moves.
- If the paper moves, edge tool will find the edge and correspondingly move the separate black dot tool.

➢ Additional Inputs

- Error routine for density based rejection to be made. Additional errors based on camera position, camera dirt, plate mistake error can be programmed in input modules.
- Development has to be done for two pulse branch equipment. So a program can be added for selecting master pulse branch in double delivery.
- Pasting/splicing input should be configured in Input module for making the camera go blind during pasting cycle.

Designing and interfacing of control system stage wise report :

The control design was done in stages and was altered according to pros and cons.

Weekly Report:

➢ 24.11.2017

- Discussion for doing with standalone PLC or Interfacing with existing PLC
- Alarm system for error
- Control design with PID controller
- PID Auto mode without disturbing manual mode
- Camera position selection depending on Reel width status

➢ 05.12.2017

- PID Set point selection by operator
- Camera live image display in HMI
- Offset adjustment for trigger
- Manual operation in standalone PLC
- Camera demo
- Counter module spare

➢ 08.12.2017

- Pulse branch pulse diving setting to be checked
- Quote for V8 series to display camera live image

➢ 15.12.2017

- Omron Camera to be tested
- Q68ADV and QD62 indent as high speed counting instructions not possible.

➢ 22.12.2017

- SMC E/P connector (response time checking)
- Scanning time of PLC
- Response time of the control system
- Omron camera table testing
- Possibility to go for 6x version.
- Suggestions about Anti fan out requirements from Subramani
- QD62 trigger programming make ready

➢ 29.12.2017

- Vision System Keyence contact for Dot capturing

➢ 04.01.2018

- Cognex 8200 series quote
- 8200 Vs 8400 details

➢ 12.01.2018

- Request of SAPCODE for Cognex camera- Ashwath ram sir
- PO rise for Cognex camera
- Proximity sensor for determining camera position
- Mounting of the Camera – Subramani
- Cognex 8200 camera dimensions
- Split price list quote for Cognex 8200
- PC requirement for displaying dot deviations(CTP)
- Switch hub for interfacing all the devices together
- Display images in touch screen – Cognex karthikeyen
- Mitsubishi GOT model name Bangalore
- Q02H/Q06H Processing time
- Cognex demo planning within 29- January
- E/P SMC with gauge checking

➢ 19.01.2018

- One to one 8200 checking with 8400
- Studying in depth of PID design. 1 copy Vs 6 copy
- QY81p module oscilloscope checking. Or need for frequency multiplier IC
- Or possibility for network trigger

➢ 26.01.2018

- Interfacing of cognex camera with PLC using SLMP scanner
- Checking the trigger and results using network
- Interfacing all devices via Ethernet
- Viewing using cognex vision software in spare PC.

➢ 02.02.2018

- Teaching of cognex pattern capturing program by cognex team
- Understanding of parameters and usage of tools in cognex software

➢ 05.02.2018

- In AT5AB(1) cabinet, PLC op for far position device was given through selector switch.
- Left position- normal system. right position- automation system.
- Air supply was increased and decreased through normal as well as test kit.
- Normalized to actual system via switch during production. Connector name: 51CN3-A7.
- Two LAN cable was made ready for connecting PLC to hub, PC to hub.
- Cable between PLC QD62 and pulse branch equipment was made ready
- Cable between PLC DAV and Anti-fan out device was made ready and kept in folder.

➢ 06.02.2018

- Pulse branch channel 8 z pulse zero setting was done in Ds pulse branch.
- Z on – 0 to 10 pulse
- Count values synced with plc and pulse branch
- PC, Plc interfacing was done but tuning of dots to be done.

➢ 07.02.2018

- Positioning of camera was done and location of camera was fixed to avoid daily tuning.
- OS pulse branch channel 8 setting was done. Z on 0-10.

➢ 08.02.2018

- Threshold and light intensity was altered to capture dots.
- Tools were adjusted to our position.
- Offset adjustment was added in touch screen to change trigger position

➢ 09.02.2018

- Dots were tuned and the resulting deviation distance was captured and displayed.
- Dots were fine tuned to avoid false dots.
- 100 base t – analysis of bit transfer
- Detailing with block diagrams
- Cable properties and hub properties

➢ 12.02.2018

- Dots were tuned and the resulting deviation distance was captured and displayed.
- Anti-fanout control loop was checked
- Firstly 0.03 Mpa was set in Manual mode, error value in camera was shown as 2.7 pixel.
- Then 'PID Control' was switched on during that the air value increased upto 0.08 Mpa
- And then settled at 0.07 Mpa.
- Now the error value was observed to be 0.09 pixel which was closer to 0.
- Secondly, Mechanical Engineer adjusted the auto register magenta value by 2 points.
- At that time PID was switched ON, the air value increased from 0.07 Mpa to 0.09 MPa

➢ 14.02.2018

- Dots were tuned and the resulting deviation distance was captured and displayed.
- Anti fanout control loop was checked and tested in entire metro day production.
- Values were at 0.04-0.05Mpa in auto mode and pixels were close to zero.
- Sample copies were taken and Anti-fan out control system was working perfect.

➢ 16.02.2018

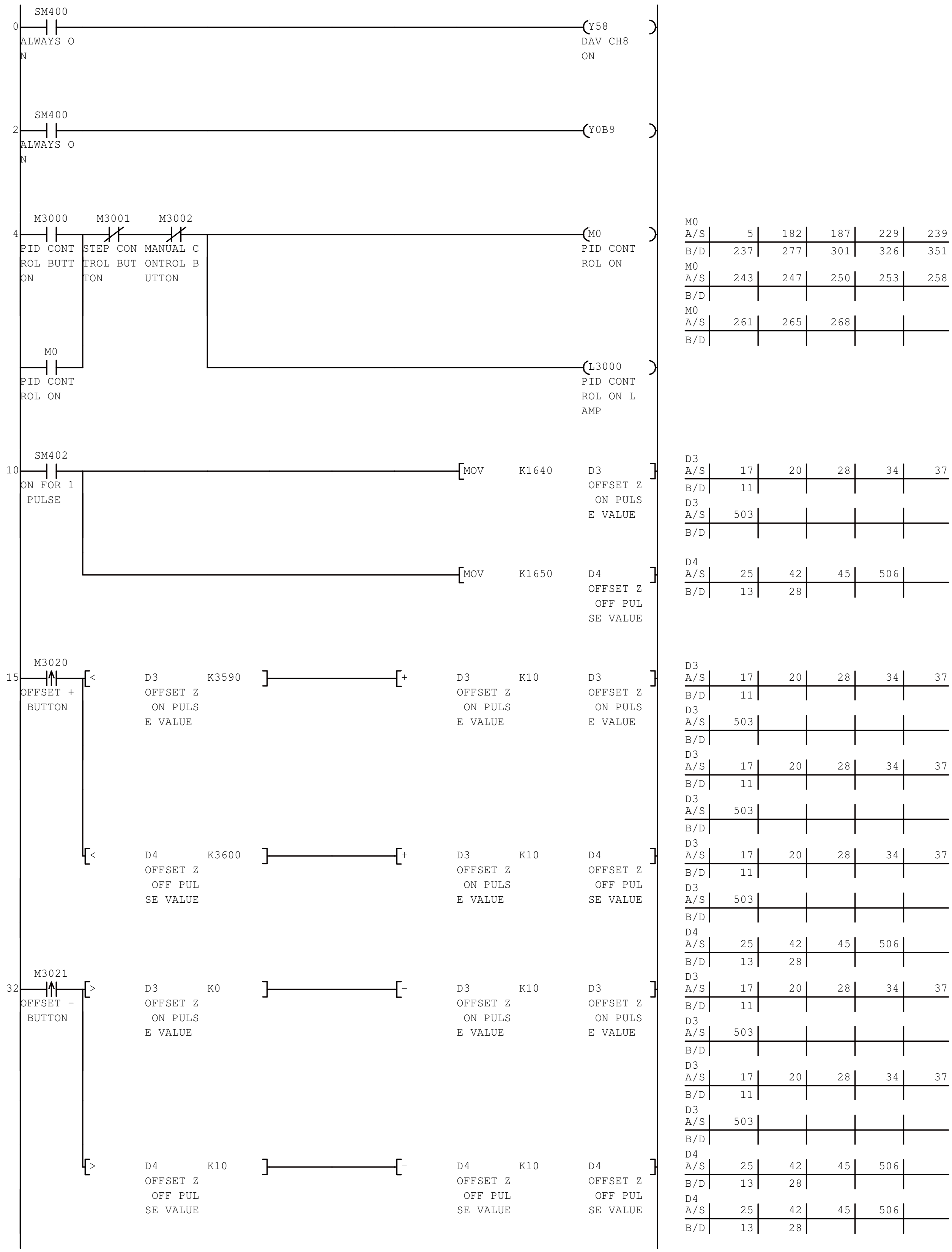
- Connection diagram and PLC ladder documentation
- Blob screen documentation
- Device addressing in cognex software explanation
- Development on QD62 channel 2 for both OS and DS.
- Error routine for density based, position, camera dirt and plate misalignments
- Diamond eye Pulse branch provision for trigger
- Six camera visualization in a single window.
- Speed Input / pasting input from Mitsubishi
- After splicing, masking 40 copies

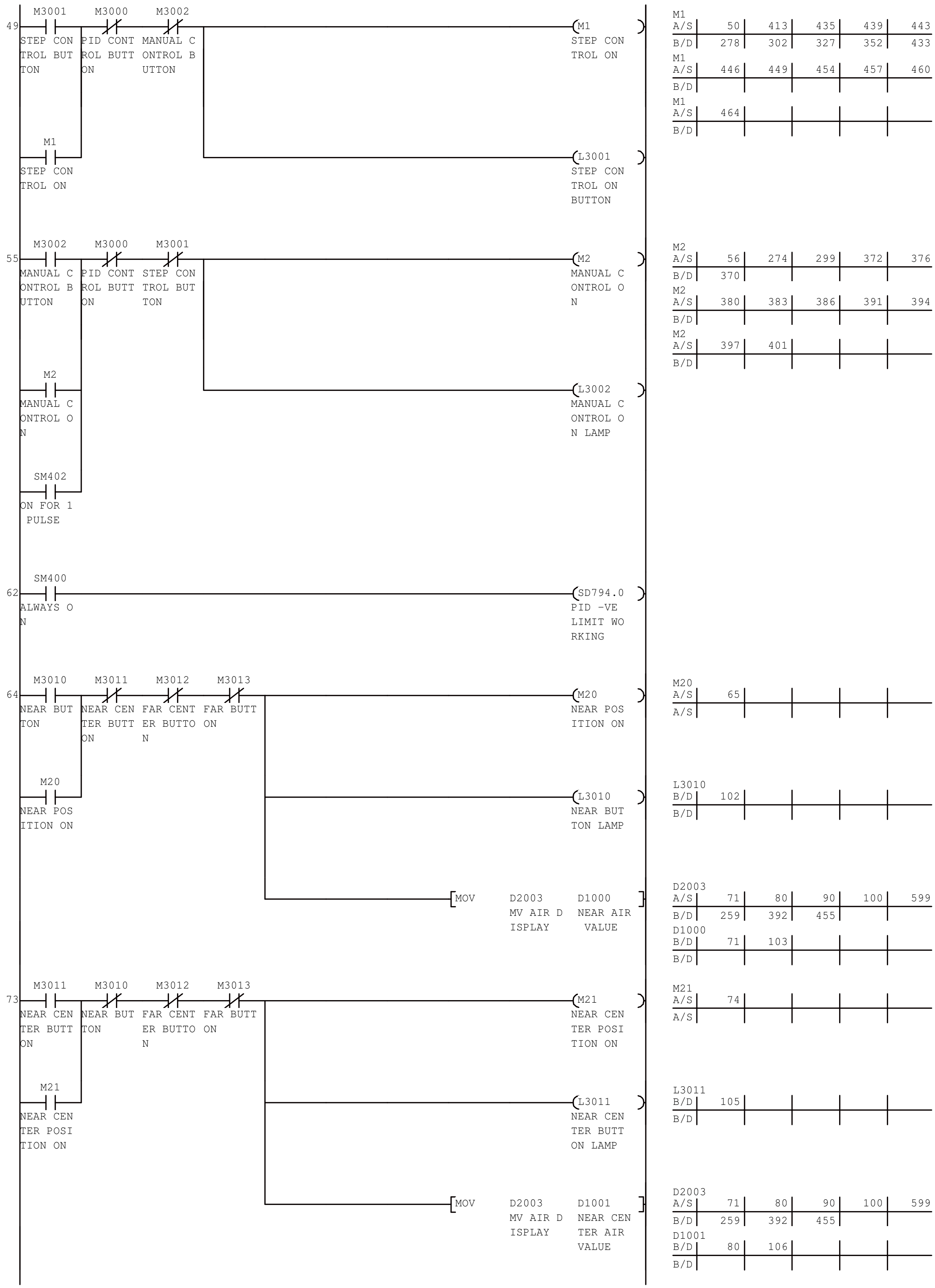
➢ 23.02.2018

- Modification of block diagram
- Mention output system in diagram
- Pixel conversion checking

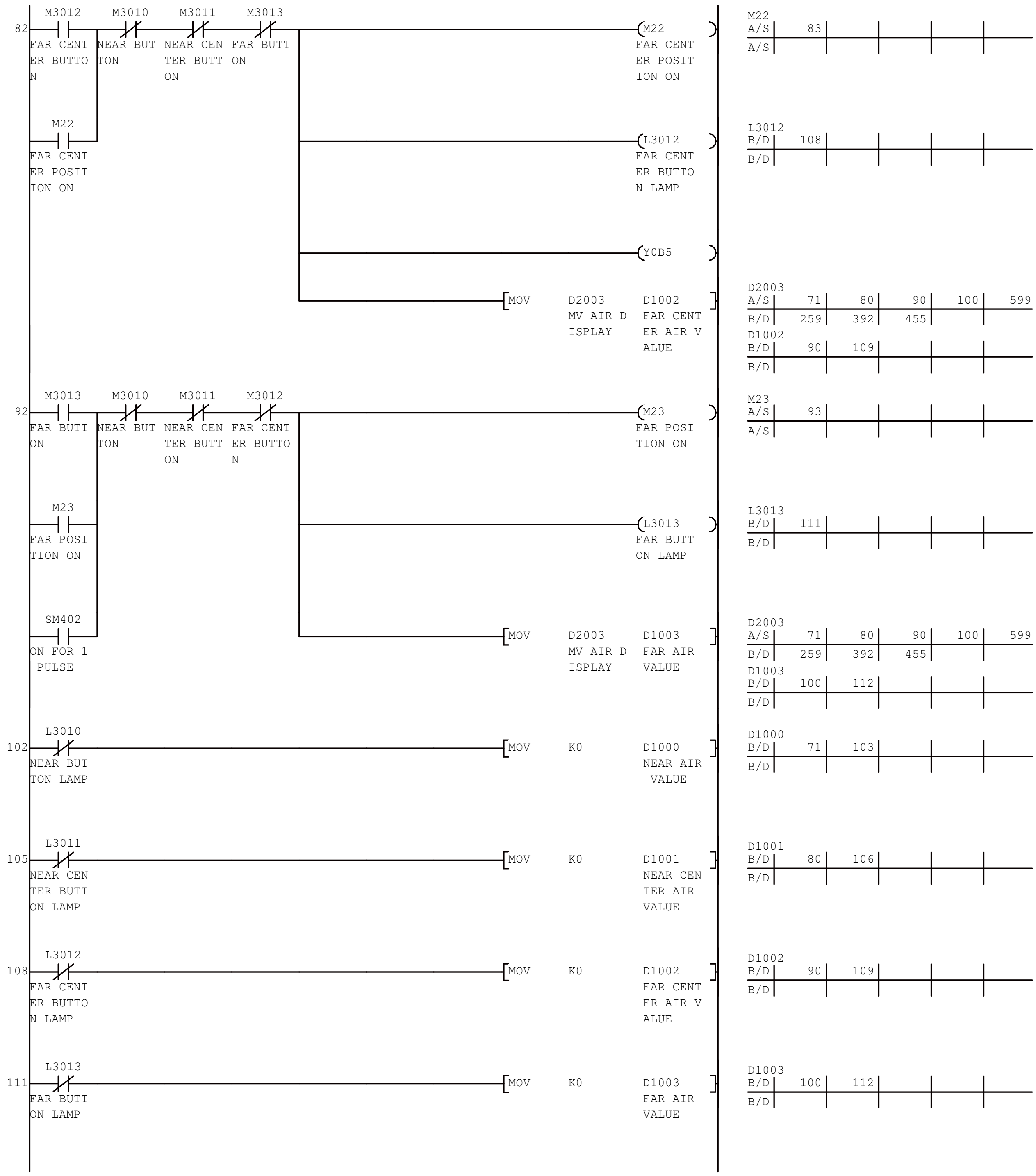
APPENDIX

A. PLC LADDER PROGRAMMING



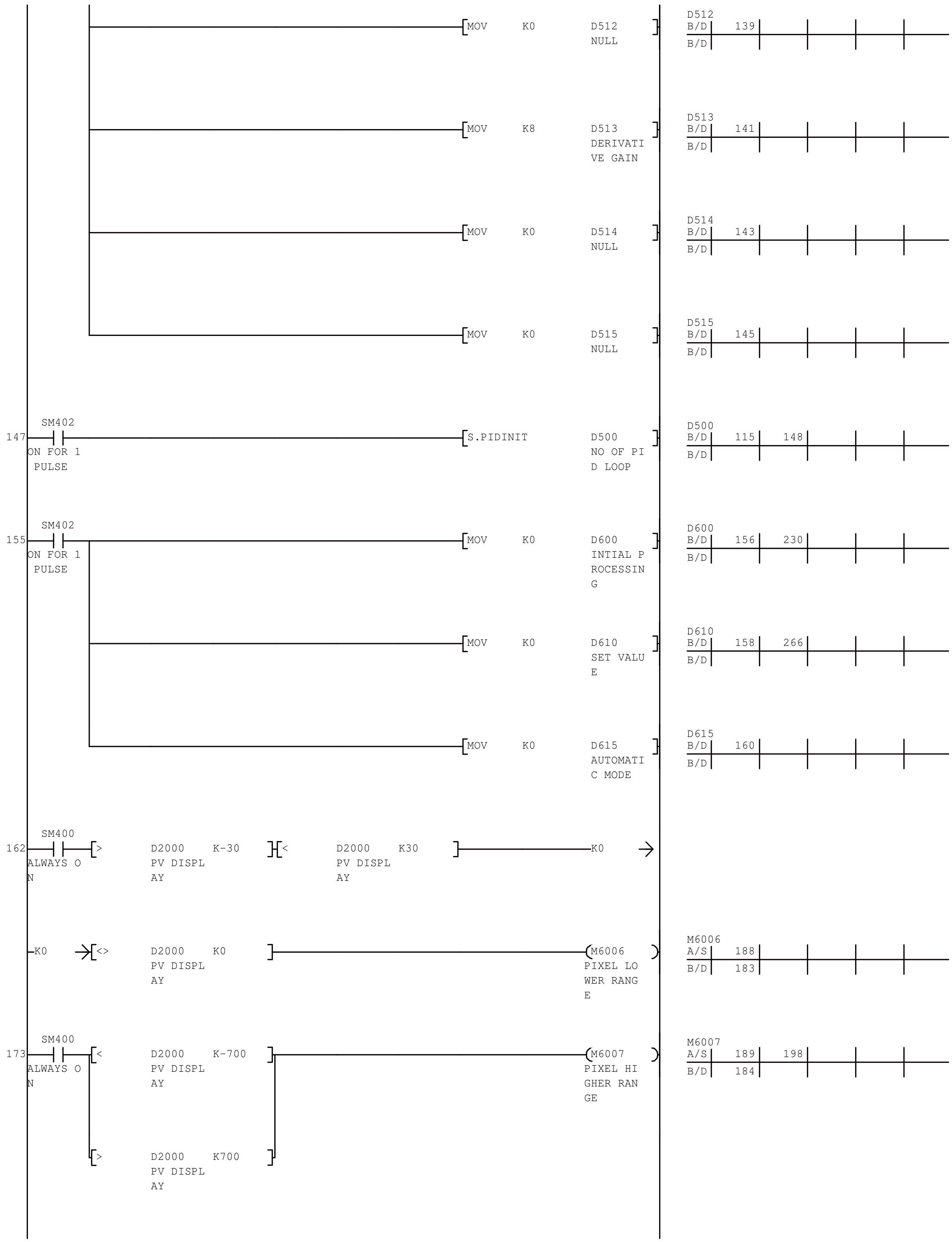


49
M3001 STEP CONTROL BUTTON
M3000 PID CONTROL BUTTON
M3002 MANUAL CONTROL BUTTON
M1 STEP CONTROL ON
M1 STEP CONTROL ON
L3001 STEP CONTROL ON BUTTON
M1 A/S 50 413 435 439 443
B/D 278 302 327 352 433
M1 A/S 446 449 454 457 460
B/D
M1 A/S 464
B/D
55
M3002 MANUAL CONTROL BUTTON
M3000 PID CONTROL BUTTON
M3001 STEP CONTROL BUTTON
M2 MANUAL CONTROL ON
SM402 ON FOR 1 PULSE
M2 MANUAL CONTROL ON
L3002 MANUAL CONTROL ON LAMP
M2 A/S 56 274 299 372 376
B/D 370
M2 A/S 380 383 386 391 394
B/D
M2 A/S 397 401
B/D
62
SM400 ALWAYS ON
SD794.0 PID -VE LIMIT WORKING
64
M3010 NEAR BUTTON
M3011 NEAR CENTER BUTTON
M3012 FAR CENTER BUTTON
M3013 FAR BUTTON
M20 NEAR POSITION ON
M20 NEAR POSITION ON
L3010 NEAR BUTTON LAMP
MOV D2003 MV AIR DISPLAY D1000 NEAR AIR VALUE
M20 A/S 65
A/S
L3010 B/D 102
B/D
D2003 A/S 71 80 90 100 599
B/D 259 392 455
D1000 B/D 71 103
B/D
73
M3011 NEAR CENTER BUTTON
M3010 NEAR BUTTON
M3012 FAR CENTER BUTTON
M3013 FAR BUTTON
M21 NEAR CENTER POSITION ON
M21 NEAR CENTER POSITION ON
L3011 NEAR CENTER BUTTON LAMP
MOV D2003 MV AIR DISPLAY D1001 NEAR CENTER AIR VALUE
M21 A/S 74
A/S
L3011 B/D 105
B/D
D2003 A/S 71 80 90 100 599
B/D 259 392 455
D1001 B/D 80 106
B/D

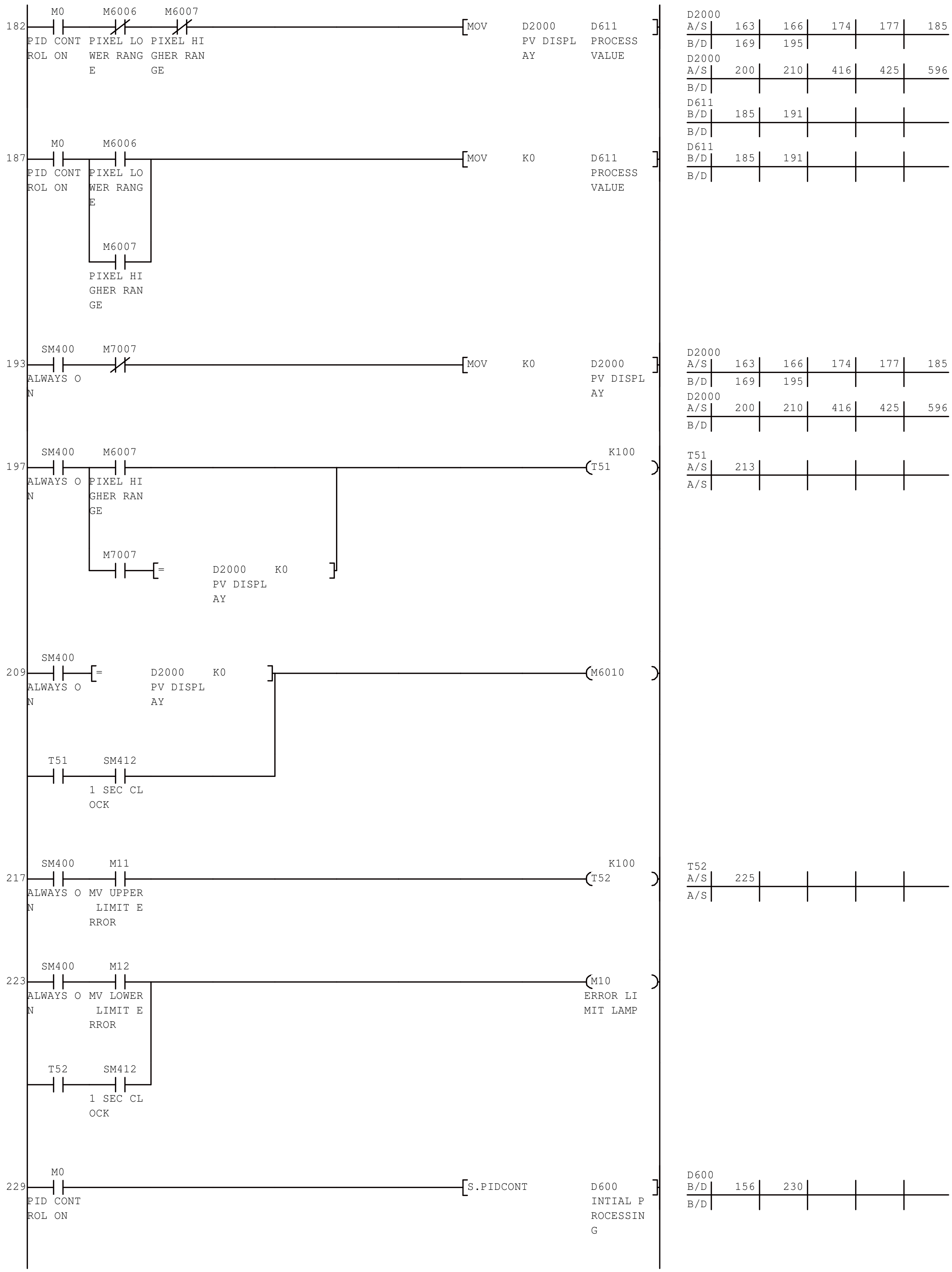

82
M3012
FAR CENTER BUTTON
M3010
NEAR BUTTON
M3011
NEAR CENTER BUTTON
M3013
FAR BUTTON
M22
FAR CENTER POSITION ON
M22
FAR CENTER POSITION ON
L3012
FAR CENTER BUTTON LAMP
Y0B5
MOV
D2003
MV AIR DISPLAY
D1002
FAR CENTER AIR VALUE
M22
A/S 83
A/S
L3012
B/D 108
B/D
D2003
A/S 71 80 90 100 599
B/D 259 392 455
D1002
B/D 90 109
B/D
92
M3013
FAR BUTTON
M3010
NEAR BUTTON
M3011
NEAR CENTER BUTTON
M3012
FAR CENTER BUTTON
M23
FAR POSITION ON
M23
FAR POSITION ON
SM402
ON FOR 1 PULSE
L3013
FAR BUTTON LAMP
MOV
D2003
MV AIR DISPLAY
D1003
FAR AIR VALUE
M23
A/S 93
A/S
L3013
B/D 111
B/D
D2003
A/S 71 80 90 100 599
B/D 259 392 455
D1003
B/D 100 112
B/D
102
L3010
NEAR BUTTON LAMP
MOV K0
D1000
NEAR AIR VALUE
D1000
B/D 71 103
B/D
105
L3011
NEAR CENTER BUTTON LAMP
MOV K0
D1001
NEAR CENTER AIR VALUE
D1001
B/D 80 106
B/D
108
L3012
FAR CENTER BUTTON LAMP
MOV K0
D1002
FAR CENTER AIR VALUE
D1002
B/D 90 109
B/D
111
L3013
FAR BUTTON LAMP
MOV K0
D1003
FAR AIR VALUE
D1003
B/D 100 112
B/D

114 SM402 ON FOR 1 PULSE

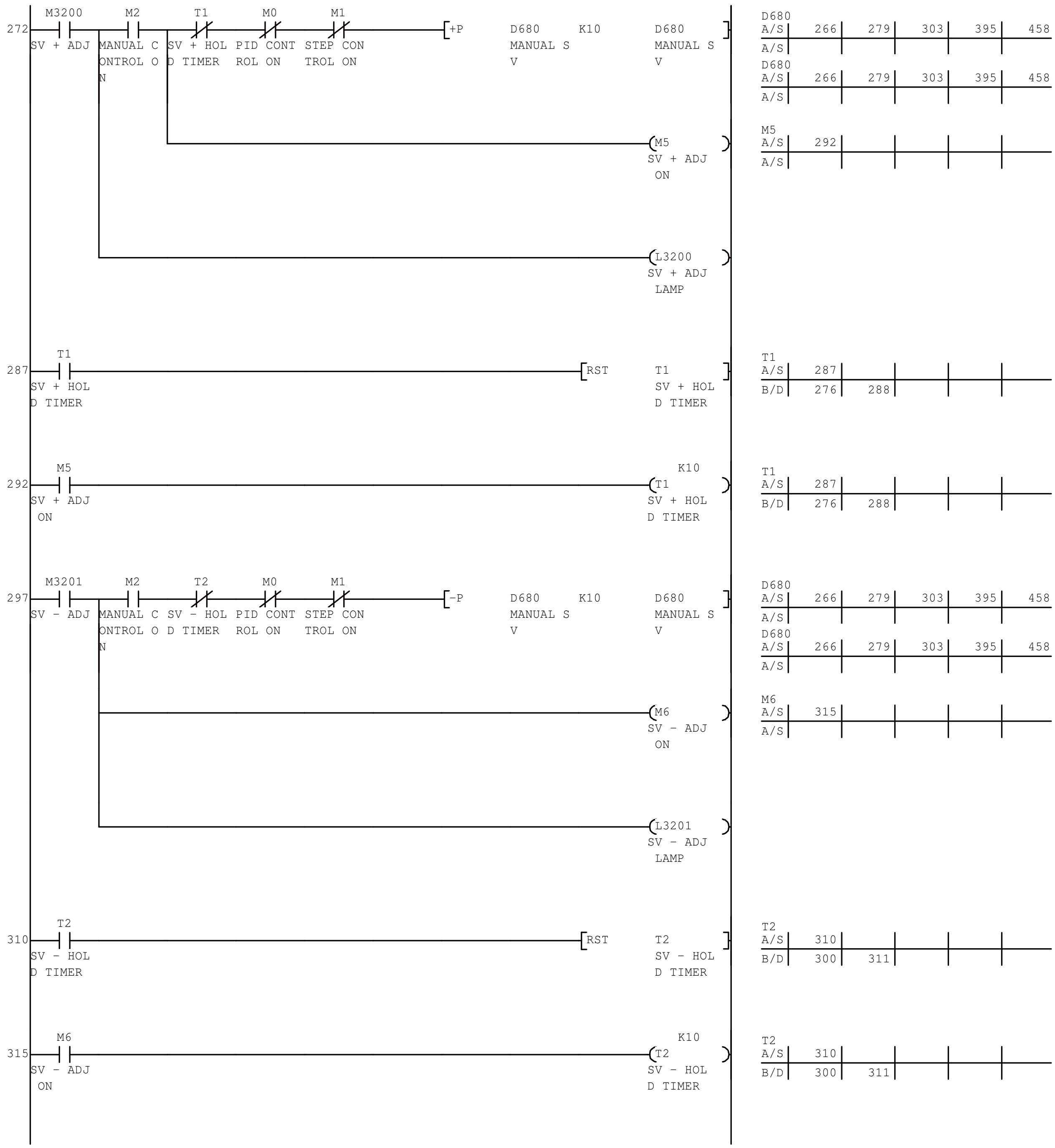
Instruction	Source	Destination	Comment	Cross-reference
MOV	K1	D500	NO OF PID LOOP	D500 B/D 115 148
MOV	K1	D501	NO OF PID LOOP	D501 B/D 117
MOV	K0	D502	FORWARD OPERATION	D502 B/D 119
MOV	K100	D503	SAMPLING CYCLE (S)	D503 B/D 121
MOV	K10	D504	PROPORTIONAL CONSTANT	D504 B/D 123
MOV	K5	D505	INTEGRAL CONSTANT	D505 B/D 125
MOV	K0	D506	DERIVATIVE CONSTANT	D506 B/D 127
MOV	K0	D507	FILTER COEFFICIENT	D507 B/D 129
MOV	K0	D508	MV LOWER LIMIT	D508 B/D 131
MOV	K800	D509	MV UPPER LIMIT	D509 B/D 133
MOV	K800	D510	MV CHANGE RATE	D510 B/D 135
MOV	K900	D511	PV CHANGE RATE	D511 B/D 137

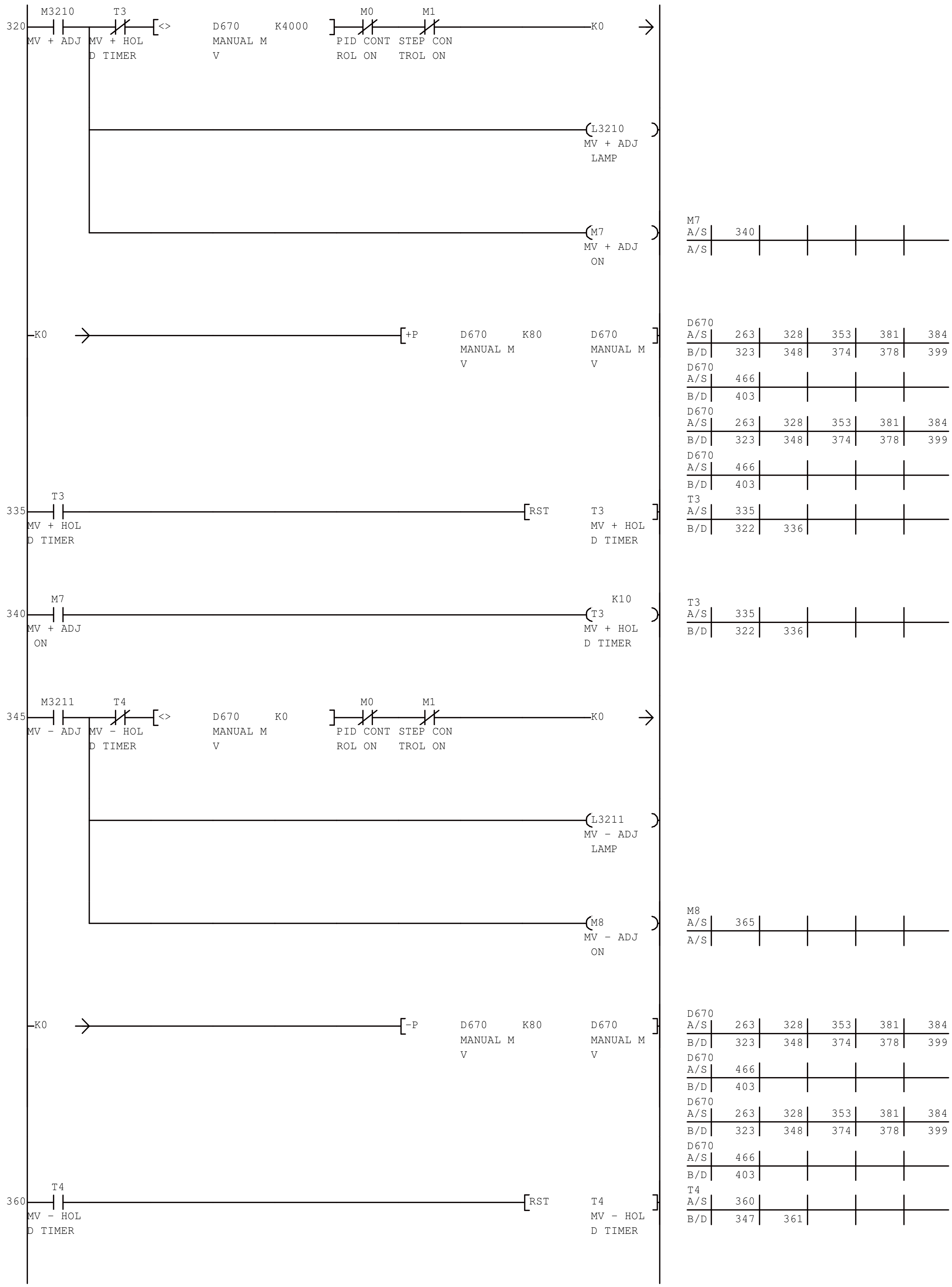


MOV K0 D512 NULL
D512 B/D 139 B/D
MOV K8 D513 DERIVATI VE GAIN
D513 B/D 141 B/D
MOV K0 D514 NULL
D514 B/D 143 B/D
MOV K0 D515 NULL
D515 B/D 145 B/D
147 SM402 ON FOR 1 PULSE
S.PIDINIT D500 NO OF PI D LOOP
D500 B/D 115 148 B/D
155 SM402 ON FOR 1 PULSE
MOV K0 D600 INTIAL P ROCESSIN G
D600 B/D 156 230 B/D
MOV K0 D610 SET VALU E
D610 B/D 158 266 B/D
MOV K0 D615 AUTOMATI C MODE
D615 B/D 160 B/D
162 SM400 ALWAYS O N
> D2000 PV DISPL AY K-30
< D2000 PV DISPL AY K30
K0
K0
<> D2000 PV DISPL AY K0
M6006 PIXEL LO WER RANG E
M6006 A/S 188 B/D 183
173 SM400 ALWAYS O N
< D2000 PV DISPL AY K-700
> D2000 PV DISPL AY K700
M6007 PIXEL HI GHER RAN GE
M6007 A/S 189 198 B/D 184


182
M0
PID CONTROL ON
M6006
PIXEL LOWER RANGE
M6007
PIXEL HIGHER RANGE
MOV D2000 D611
PV DISPLAY
PROCESS VALUE
D2000 A/S 163 166 174 177 185
B/D 169 195
D2000 A/S 200 210 416 425 596
B/D
D611 B/D 185 191
B/D
187
M0
PID CONTROL ON
M6006
PIXEL LOWER RANGE
M6007
PIXEL HIGHER RANGE
MOV K0 D611
PROCESS VALUE
D611 B/D 185 191
B/D
193
SM400
ALWAYS ON
M7007
MOV K0 D2000
PV DISPLAY
D2000 A/S 163 166 174 177 185
B/D 169 195
D2000 A/S 200 210 416 425 596
B/D
197
SM400
ALWAYS ON
M6007
PIXEL HIGHER RANGE
M7007
= D2000 K0
PV DISPLAY
K100
T51
T51 A/S 213
A/S
209
SM400
ALWAYS ON
= D2000 K0
PV DISPLAY
T51
SM412
1 SEC CLOCK
M6010
217
SM400
ALWAYS ON
M11
MV UPPER LIMIT ERROR
K100
T52
T52 A/S 225
A/S
223
SM400
ALWAYS ON
M12
MV LOWER LIMIT ERROR
T52
SM412
1 SEC CLOCK
M10
ERROR LIMIT LAMP
229
M0
PID CONTROL ON
S.PIDCONT D600
INTIAL PROCESSING
D600 B/D 156 230
B/D

```
     M0                                                                        M15
237 -|↓|-----------------------------------------------------------------( M15 )     A/S  398  461
     PID CONT                                                                 PID OFF      A/S
     ROL ON

     M0       M3501                                                                  D612
239 -| |------|↑|-------------------------------[MOV   K240      D612    ]            A/S  248  251  399  462
     PID CONT AUTO RUN                                              PID MV           B/D  241  245  263  270
     ROL ON    INTIAL
               AIR

     M0       M3502                                                                  D612
243 -| |------|↑|-------------------------------[MOV   K0        D612    ]            A/S  248  251  399  462
     PID CONT NO RUN Z                                              PID MV           B/D  241  245  263  270
     ROL ON   ERO AIR

     M0                                                                              D612
247 -| |----------------------------------------[MOV   D612      D3007   ]            A/S  248  251  399  462
     PID CONT                                        PID MV    DAV CH8               B/D  241  245  263  270
     ROL ON                                                    O/P                   D3007
                                                                                     A/S  409  548
                                                                                     B/D  248  381  405  444

     M0                                                                              D612
250 -| |----------------------------------------[MOV   D612      D673    ]            A/S  248  251  399  462
     PID CONT                                        PID MV    PID MV                B/D  241  245  263  270
     ROL ON                                                                          D673
                                                                                     A/S  254
                                                                                     B/D  251

     M0                                                                              D673
253 -| |----------------------------[/     D673      K8        D674    ]              A/S  254
     PID CONT                              PID MV              PID MV D              B/D  251
     ROL ON                                                    ISPLAY                D674
                                                                                     A/S  259
                                                                                     B/D  254

     M0                                                                              D674
258 -| |----------------------------------------[MOV   D674      D2003   ]            A/S  259
     PID CONT                                        PID MV D  MV AIR D              B/D  254
     ROL ON                                          ISPLAY    ISPLAY                D2003
                                                                                     A/S   71   80   90  100  599
                                                                                     B/D  259  392  455

     M0       M17                                                                    D670
261 -| |------|↑|-------------------------------[MOV   D670      D612    ]            A/S  263  328  353  381  384
     PID CONT MANUAL C                               MANUAL M  PID MV                B/D  323  348  374  378  399
     ROL ON   ONTROL O                               V                               D670
              FF                                                                     A/S  466
                                                                                     B/D  403
                                                                                     D612
                                                                                     A/S  248  251  399  462
                                                                                     B/D  241  245  263  270

     M0                                                                              D680
265 -|↑|----------------------------------------[MOV   D680      D610    ]            A/S  266  279  303  395  458
     PID CONT                                        MANUAL S  SET VALU              A/S
     ROL ON                                          V         E                     D610
                                                                                     B/D  158  266
                                                                                     B/D

     M0       M16                                                                    D690
268 -| |------|↑|-------------------------------[MOV   D690      D612    ]            A/S  270  403  420  429  444
     PID CONT STEP CON                               STEP MV   PID MV                B/D  437  441  462  466
     ROL ON   TROL OFF                                                               D690
                                                                                     A/S  447
                                                                                     B/D
                                                                                     D612
                                                                                     A/S  248  251  399  462
                                                                                     B/D  241  245  263  270
```


272
M3200
SV + ADJ
M2
MANUAL CONTROL ON
T1
SV + HOLD TIMER
M0
PID CONTROL ON
M1
STEP CONTROL ON
+P
D680
MANUAL SV
K10
D680
MANUAL SV
M5
SV + ADJ ON
L3200
SV + ADJ LAMP
D680
A/S 266 279 303 395 458
A/S
D680
A/S 266 279 303 395 458
A/S
M5
A/S 292
A/S
287
T1
SV + HOLD TIMER
RST
T1
SV + HOLD TIMER
T1
A/S 287
B/D 276 288
292
M5
SV + ADJ ON
K10
T1
SV + HOLD TIMER
T1
A/S 287
B/D 276 288
297
M3201
SV - ADJ
M2
MANUAL CONTROL ON
T2
SV - HOLD TIMER
M0
PID CONTROL ON
M1
STEP CONTROL ON
-P
D680
MANUAL SV
K10
D680
MANUAL SV
M6
SV - ADJ ON
L3201
SV - ADJ LAMP
D680
A/S 266 279 303 395 458
A/S
D680
A/S 266 279 303 395 458
A/S
M6
A/S 315
A/S
310
T2
SV - HOLD TIMER
RST
T2
SV - HOLD TIMER
T2
A/S 310
B/D 300 311
315
M6
SV - ADJ ON
K10
T2
SV - HOLD TIMER
T2
A/S 310
B/D 300 311


320
M3210
MV + ADJ
T3
MV + HOL
D TIMER
<>
D670
MANUAL M
V
K4000
M0
PID CONT
ROL ON
M1
STEP CON
TROL ON
K0
L3210
MV + ADJ
LAMP
M7
MV + ADJ
ON
M7
A/S 340
A/S
K0
+P
D670
MANUAL M
V
K80
D670
MANUAL M
V
D670
A/S 263 328 353 381 384
B/D 323 348 374 378 399
D670
A/S 466
B/D 403
D670
A/S 263 328 353 381 384
B/D 323 348 374 378 399
D670
A/S 466
B/D 403
335
T3
MV + HOL
D TIMER
RST
T3
MV + HOL
D TIMER
T3
A/S 335
B/D 322 336
340
M7
MV + ADJ
ON
K10
T3
MV + HOL
D TIMER
T3
A/S 335
B/D 322 336
345
M3211
MV - ADJ
T4
MV - HOL
D TIMER
<>
D670
MANUAL M
V
K0
M0
PID CONT
ROL ON
M1
STEP CON
TROL ON
K0
L3211
MV - ADJ
LAMP
M8
MV - ADJ
ON
M8
A/S 365
A/S
K0
-P
D670
MANUAL M
V
K80
D670
MANUAL M
V
D670
A/S 263 328 353 381 384
B/D 323 348 374 378 399
D670
A/S 466
B/D 403
D670
A/S 263 328 353 381 384
B/D 323 348 374 378 399
D670
A/S 466
B/D 403
360
T4
MV - HOL
D TIMER
RST
T4
MV - HOL
D TIMER
T4
A/S 360
B/D 347 361

365 M8 (MV - ADJ ON) — (T4 K10) MV - HOLD TIMER

T4					
A/S	360				
B/D	347	361			

370 M2 (MANUAL CONTROL ON) — (M17) MANUAL CONTROL OFF

M17					
A/S	262	465			
A/S					

372 M2 (MANUAL CONTROL ON) M3501 (AUTO RUN INTIAL AIR) — [MOV K240 D670] D670 MANUAL MV

D670					
A/S	263	328	353	381	384
B/D	323	348	374	378	399

D670					
A/S	466				
B/D	403				

376 M2 (MANUAL CONTROL ON) M3502 (NO RUN ZERO AIR) — [MOV K0 D670] D670 MANUAL MV

D670					
A/S	263	328	353	381	384
B/D	323	348	374	378	399

D670					
A/S	466				
B/D	403				

380 M2 (MANUAL CONTROL ON) — [MOV D670 D3007] D670 MANUAL MV, D3007 DAV CH8 O/P

D670					
A/S	263	328	353	381	384
B/D	323	348	374	378	399

D670					
A/S	466				
B/D	403				

D3007					
A/S	409	548			
B/D	248	381	405	444	

383 M2 (MANUAL CONTROL ON) — [MOV D670 D671] D670 MANUAL MV, D671 MANUAL MV

D670					
A/S	263	328	353	381	384
B/D	323	348	374	378	399

D670					
A/S	466				
B/D	403				

D671					
A/S	387				
B/D	384				

386 M2 (MANUAL CONTROL ON) — [/ D671 K8 D672] D671 MANUAL MV, D672 MANUAL MV DISPLAY

D671					
A/S	387				
B/D	384				

D672					
A/S	392				
B/D	387				

391 M2 (MANUAL CONTROL ON) — [MOV D672 D2003] D672 MANUAL MV DISPLAY, D2003 MV AIR DISPLAY

D672					
A/S	392				
B/D	387				

D2003					
A/S	71	80	90	100	599
B/D	259	392	455		

394 M2 (MANUAL CONTROL ON) — [MOV D680 D2001] D680 MANUAL SV, D2001 SET VALUE DISPLAY

D680					
A/S	266	279	303	395	458
A/S					

D2001					
B/D	395				
B/D					

397 M2 (MANUAL CONTROL ON) M15 (PID OFF) — [MOV D612 D670] D612 PID MV, D670 MANUAL MV

D612					
A/S	248	251	399	462	
B/D	241	245	263	270	

D670					
A/S	263	328	353	381	384
B/D	323	348	374	378	399

D670					
A/S	466				
B/D	403				

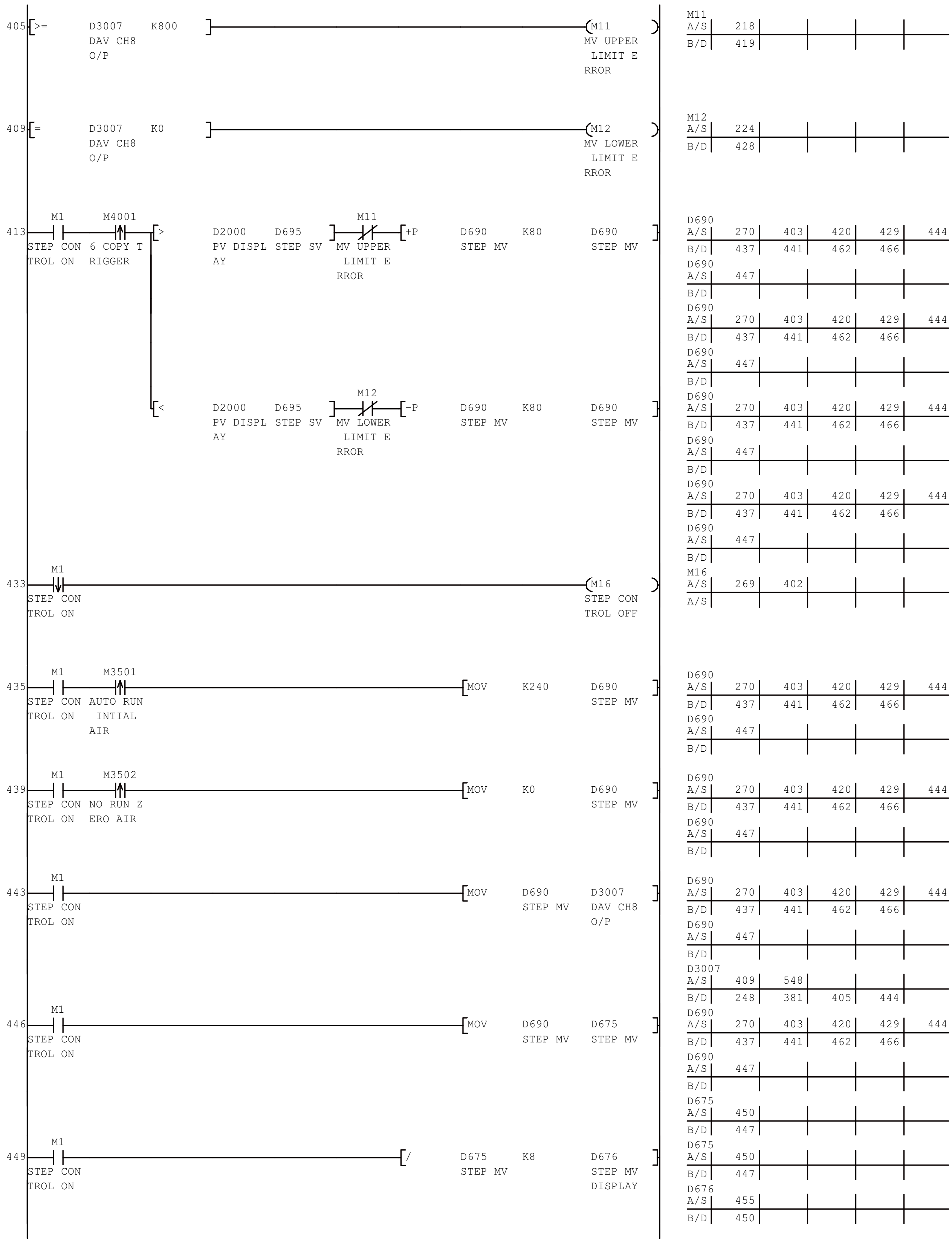
401 M2 (MANUAL CONTROL ON) M16 (STEP CONTROL OFF) — [MOV D690 D670] D690 STEP MV, D670 MANUAL MV

D690					
A/S	270	403	420	429	444
B/D	437	441	462	466	

D690					
A/S	447				
B/D					

D670					
A/S	263	328	353	381	384
B/D	323	348	374	378	399

D670					
A/S	466				
B/D	403				



405 [>= D3007 DAV CH8 O/P K800] (M11 MV UPPER LIMIT ERROR)
M11 A/S 218 B/D 419
409 [= D3007 DAV CH8 O/P K0] (M12 MV LOWER LIMIT ERROR)
M12 A/S 224 B/D 428
413 M1 STEP CONTROL ON M4001 6 COPY TRIGGER [> D2000 PV DISPLAY D695 STEP SV] M11 MV UPPER LIMIT ERROR [+P D690 STEP MV K80 D690 STEP MV]
[< D2000 PV DISPLAY D695 STEP SV] M12 MV LOWER LIMIT ERROR [-P D690 STEP MV K80 D690 STEP MV]
D690 A/S 270 403 420 429 444 B/D 437 441 462 466
D690 A/S 447 B/D
433 M1 STEP CONTROL ON (M16 STEP CONTROL OFF)
M16 A/S 269 402 A/S
435 M1 STEP CONTROL ON M3501 AUTO RUN INTIAL AIR [MOV K240 D690 STEP MV]
439 M1 STEP CONTROL ON M3502 NO RUN ZERO AIR [MOV K0 D690 STEP MV]
443 M1 STEP CONTROL ON [MOV D690 STEP MV D3007 DAV CH8 O/P]
D3007 A/S 409 548 B/D 248 381 405 444
446 M1 STEP CONTROL ON [MOV D690 STEP MV D675 STEP MV]
D675 A/S 450 B/D 447
449 M1 STEP CONTROL ON [/ D675 STEP MV K8 D676 STEP MV DISPLAY]
D676 A/S 455 B/D 450

454 M1 STEP CONTROL ON — [MOV D676 STEP MV DISPLAY, D2003 MV AIR DISPLAY]

D676					
A/S	455				
B/D	450				
D2003					
A/S	71	80	90	100	599
B/D	259	392	455		

457 M1 (↑) STEP CONTROL ON — [MOV D680 MANUAL SV, D695 STEP SV]

D680					
A/S	266	279	303	395	458
A/S					
D695					
A/S	416	425			
B/D	458				

460 M1 STEP CONTROL ON, M15 (↑) PID OFF — [MOV D612 PID MV, D690 STEP MV]

D612					
A/S	248	251	399	462	
B/D	241	245	263	270	
D690					
A/S	270	403	420	429	444
B/D	437	441	462	466	
D690					
A/S	447				
B/D					

464 M1 STEP CONTROL ON, M17 (↑) MANUAL CONTROL OFF — [MOV D670 MANUAL MV, D690 STEP MV]

D670					
A/S	263	328	353	381	384
B/D	323	348	374	378	399
D670					
A/S	466				
B/D	403				
D690					
A/S	270	403	420	429	444
B/D	437	441	462	466	
D690					
A/S	447				
B/D					

468 SM1038 —
[DTOP H0 H0 K0 K1]
[DTOP H0 H4 K1000 K1]
[DTOP H0 H14 K0 K1]
[DTOP H0 H16 K3600 K1]

493 SM400 ALWAYS ON — [SET Y4 COUNT ENABLE]

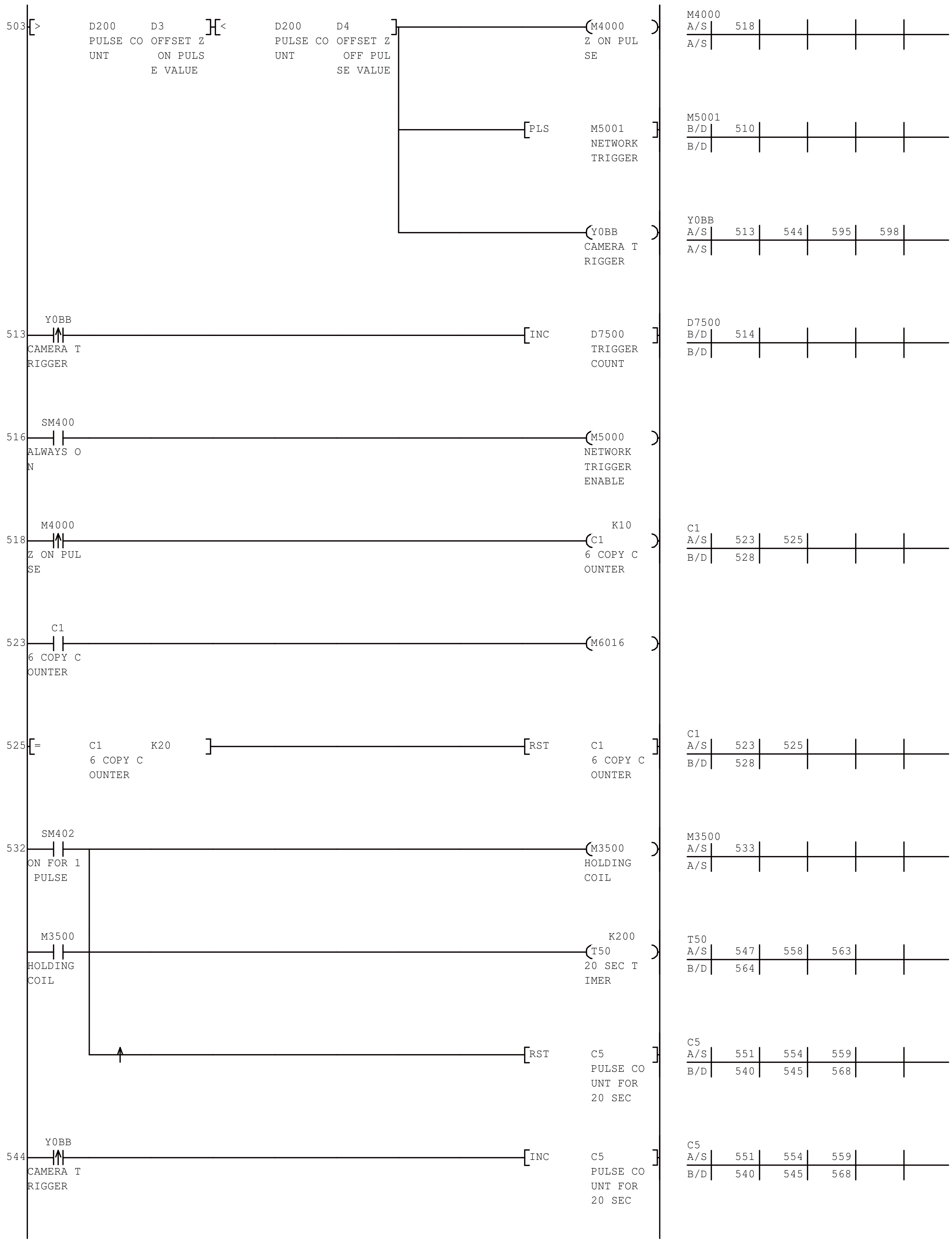
Y4					
A/S	494				
B/D	496				

495 X34 — [RST Y4 COUNT ENABLE]

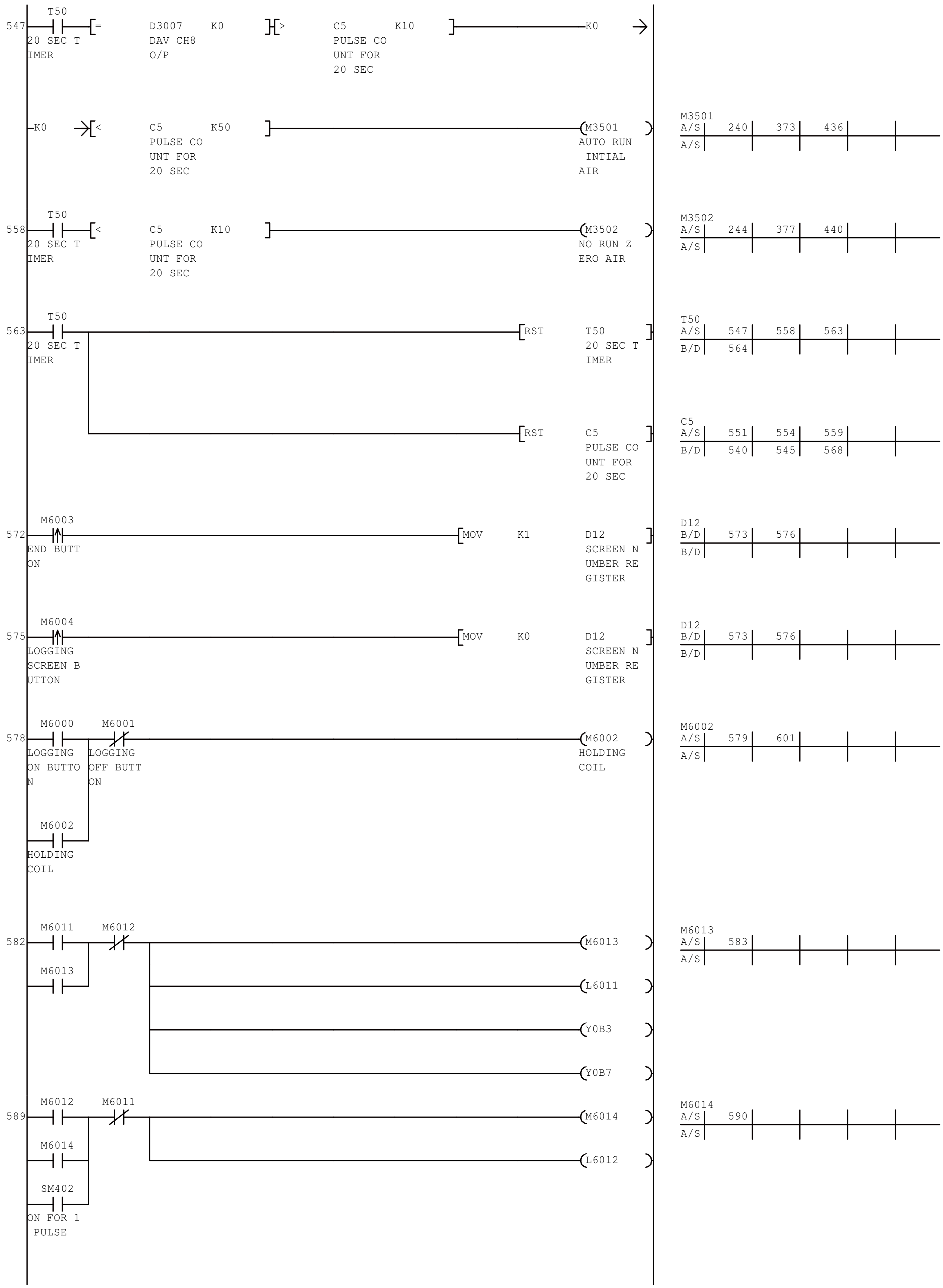
Y4					
A/S	494				
B/D	496				

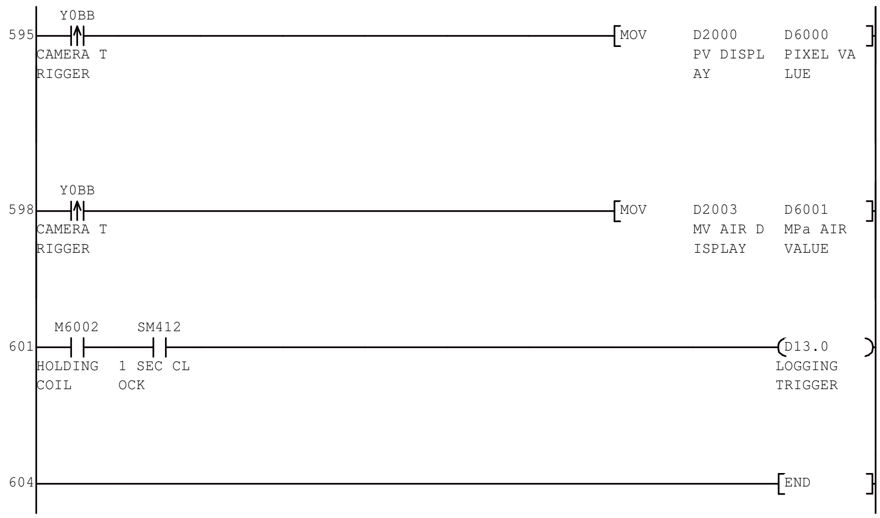
497 SM400 ALWAYS ON — [DFRO H0 H2 D200 PULSE COUNT K1]

D200					
A/S	503	506			
B/D	498				



503
> D200 PULSE COUNT D3 OFFSET Z ON PULSE VALUE
< D200 PULSE COUNT D4 OFFSET Z OFF PULSE VALUE
M4000 Z ON PULSE
PLS M5001 NETWORK TRIGGER
Y0BB CAMERA TRIGGER
M4000 A/S 518 A/S
M5001 B/D 510 B/D
Y0BB A/S 513 544 595 598 A/S
513
Y0BB CAMERA TRIGGER
INC D7500 TRIGGER COUNT
D7500 B/D 514 B/D
516
SM400 ALWAYS ON
M5000 NETWORK TRIGGER ENABLE
518
M4000 Z ON PULSE
K10 C1 6 COPY COUNTER
C1 A/S 523 525 B/D 528
523
C1 6 COPY COUNTER
M6016
525
= C1 6 COPY COUNTER K20
RST C1 6 COPY COUNTER
C1 A/S 523 525 B/D 528
532
SM402 ON FOR 1 PULSE
M3500 HOLDING COIL
M3500 A/S 533 A/S
M3500 HOLDING COIL
K200 T50 20 SEC TIMER
T50 A/S 547 558 563 B/D 564
RST C5 PULSE COUNT FOR 20 SEC
C5 A/S 551 554 559 B/D 540 545 568
544
Y0BB CAMERA TRIGGER
INC C5 PULSE COUNT FOR 20 SEC
C5 A/S 551 554 559 B/D 540 545 568


547
T50
20 SEC TIMER
=
D3007
DAV CH8 O/P
K0
>
C5
PULSE COUNT FOR 20 SEC
K10
K0
K0
<
C5
PULSE COUNT FOR 20 SEC
K50
M3501
AUTO RUN INTIAL AIR
M3501
A/S 240 373 436
A/S
558
T50
20 SEC TIMER
<
C5
PULSE COUNT FOR 20 SEC
K10
M3502
NO RUN ZERO AIR
M3502
A/S 244 377 440
A/S
563
T50
20 SEC TIMER
RST
T50
20 SEC TIMER
T50
A/S 547 558 563
B/D 564
RST
C5
PULSE COUNT FOR 20 SEC
C5
A/S 551 554 559
B/D 540 545 568
572
M6003
END BUTTON
MOV
K1
D12
SCREEN NUMBER REGISTER
D12
B/D 573 576
B/D
575
M6004
LOGGING SCREEN BUTTON
MOV
K0
D12
SCREEN NUMBER REGISTER
D12
B/D 573 576
B/D
578
M6000
LOGGING ON BUTTON
M6001
LOGGING OFF BUTTON
M6002
HOLDING COIL
M6002
HOLDING COIL
M6002
A/S 579 601
A/S
582
M6011
M6012
M6013
M6013
L6011
Y0B3
Y0B7
M6013
A/S 583
A/S
589
M6012
M6011
M6014
SM402
ON FOR 1 PULSE
M6014
L6012
M6014
A/S 590
A/S



D2000

A/S	163	166	174	177	185
B/D	169	195			

D2000

A/S	200	210	416	425	596
B/D					

D6000

B/D	596				
B/D					

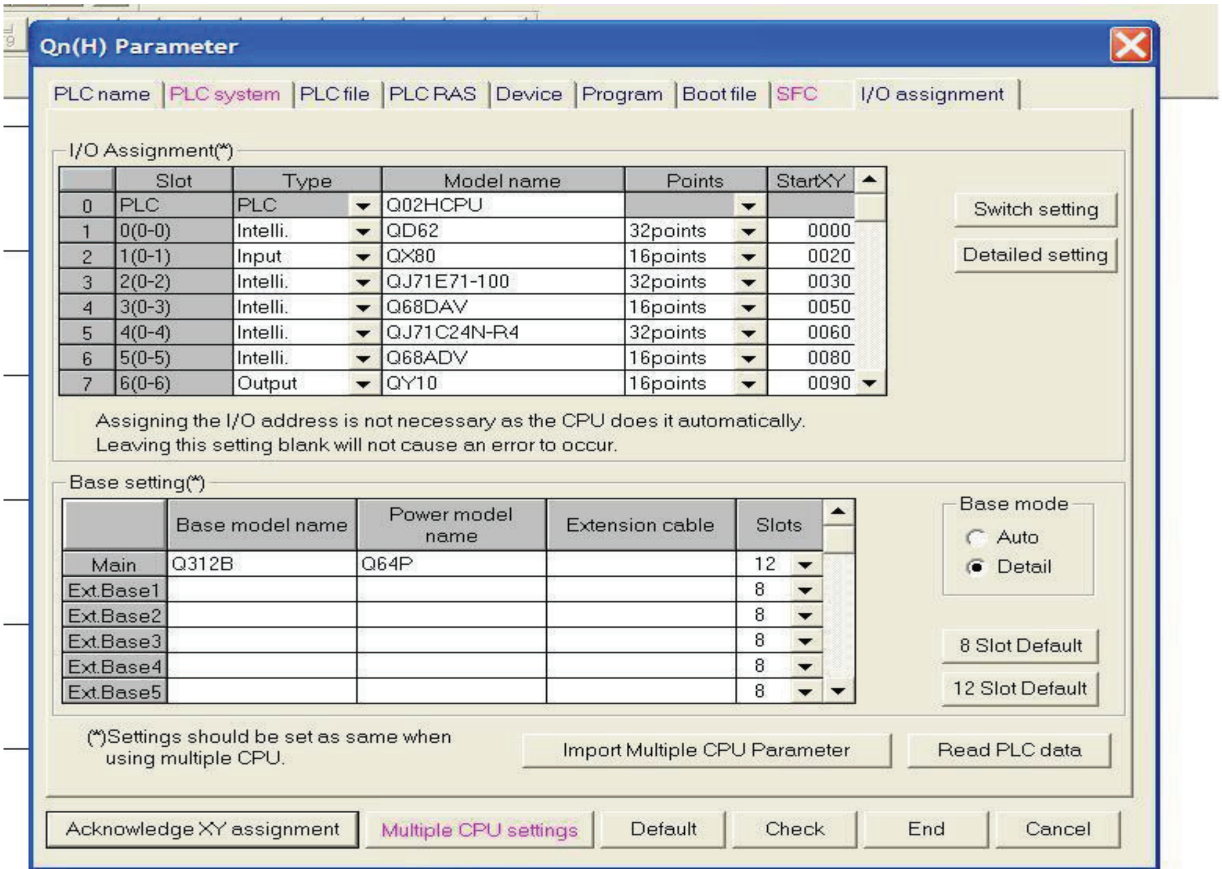
D2003

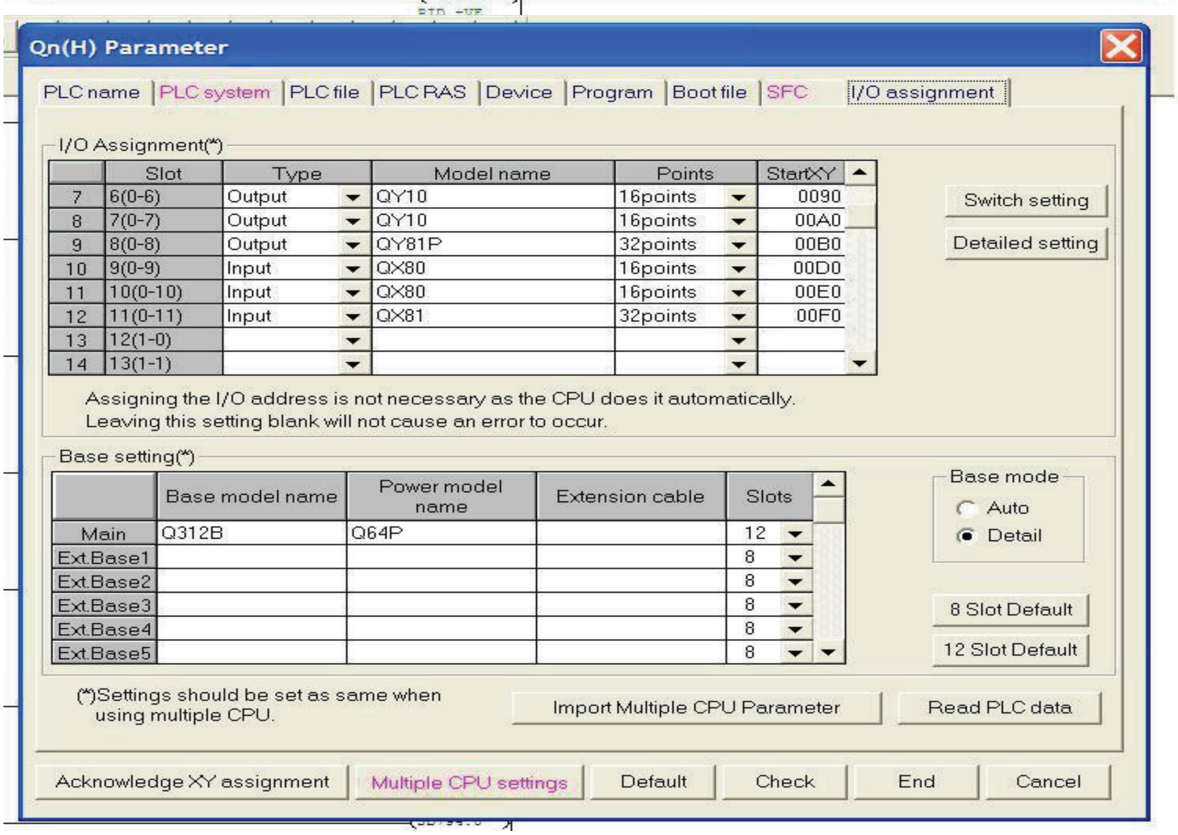
A/S	71	80	90	100	599
B/D	259	392	455		

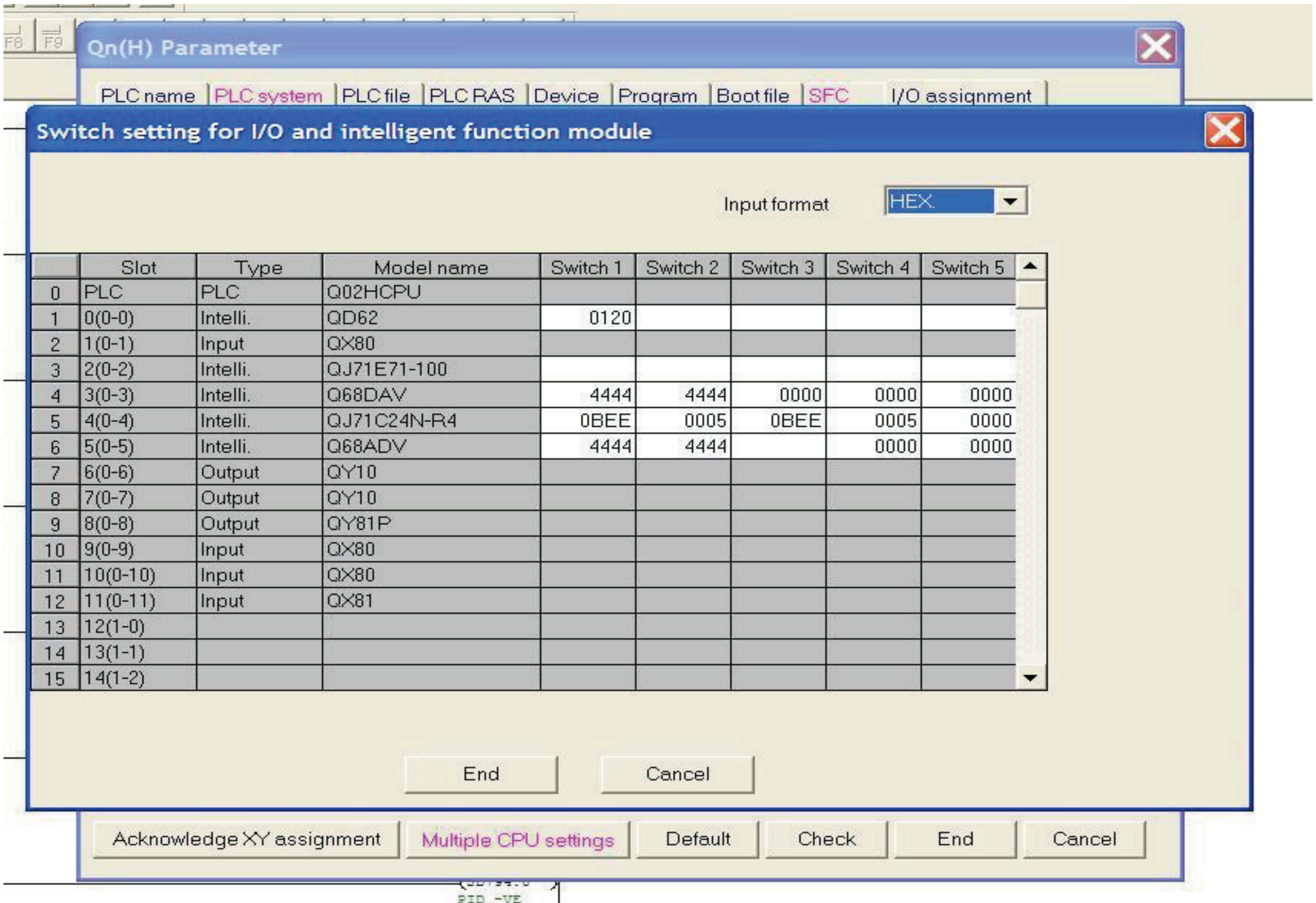
D6001

B/D	599				
B/D					

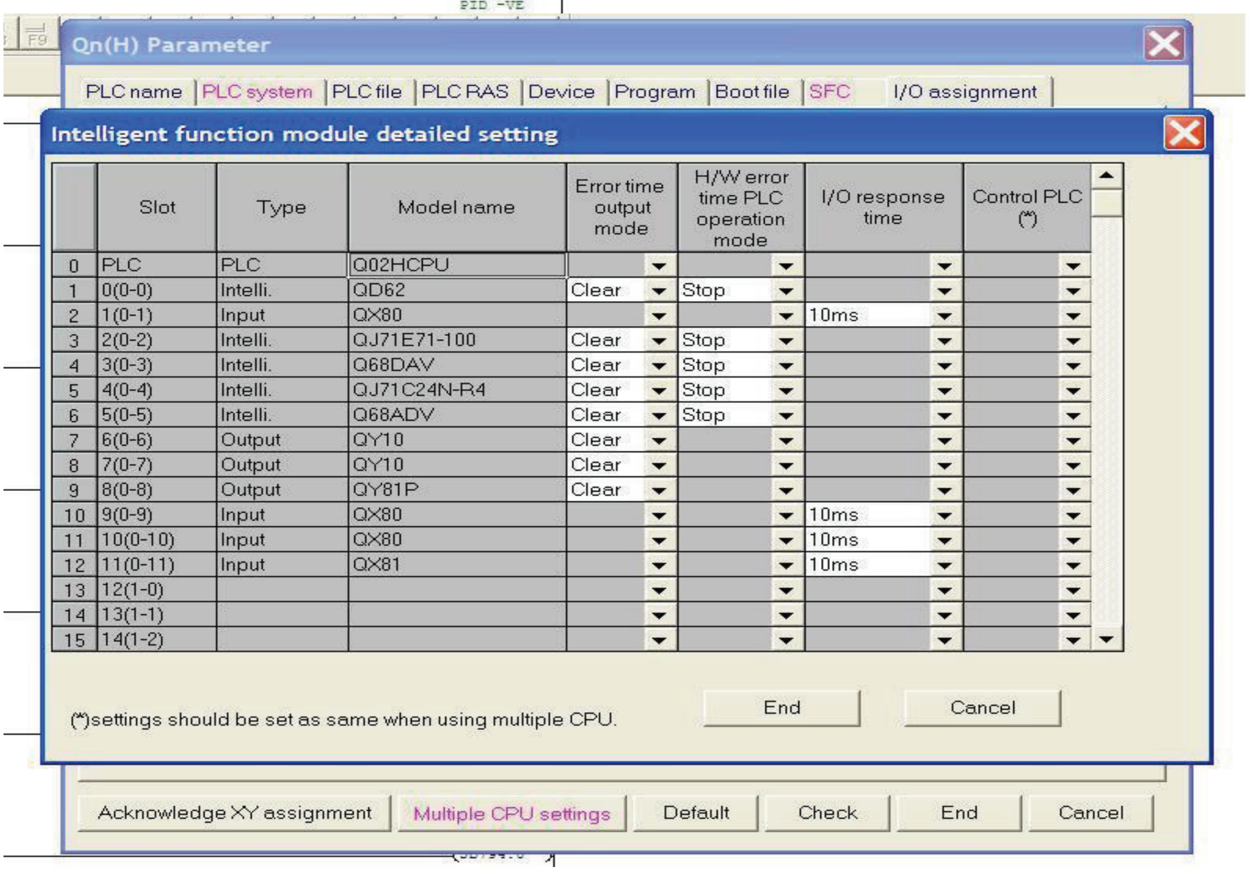
B.PLC GX DEVELOPER SETTINGS



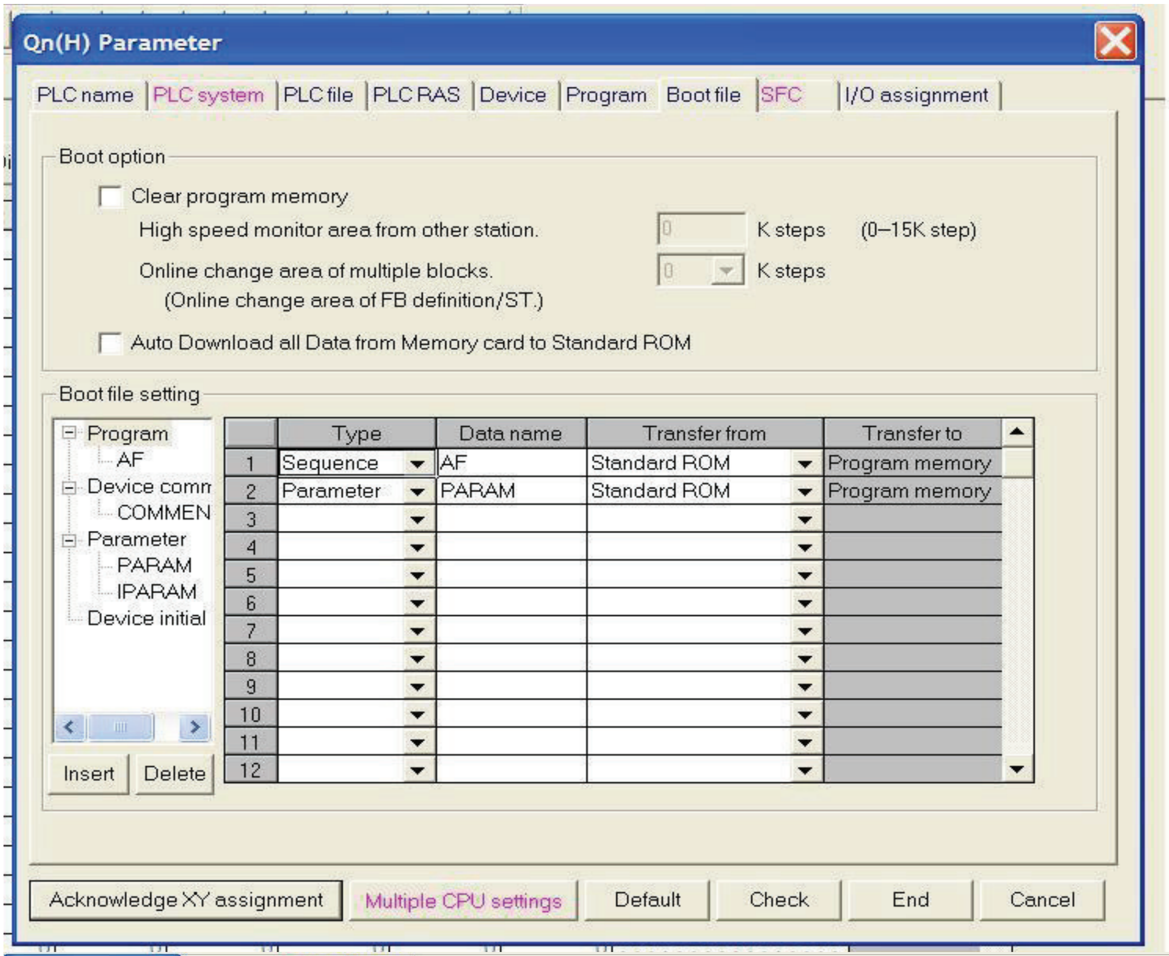




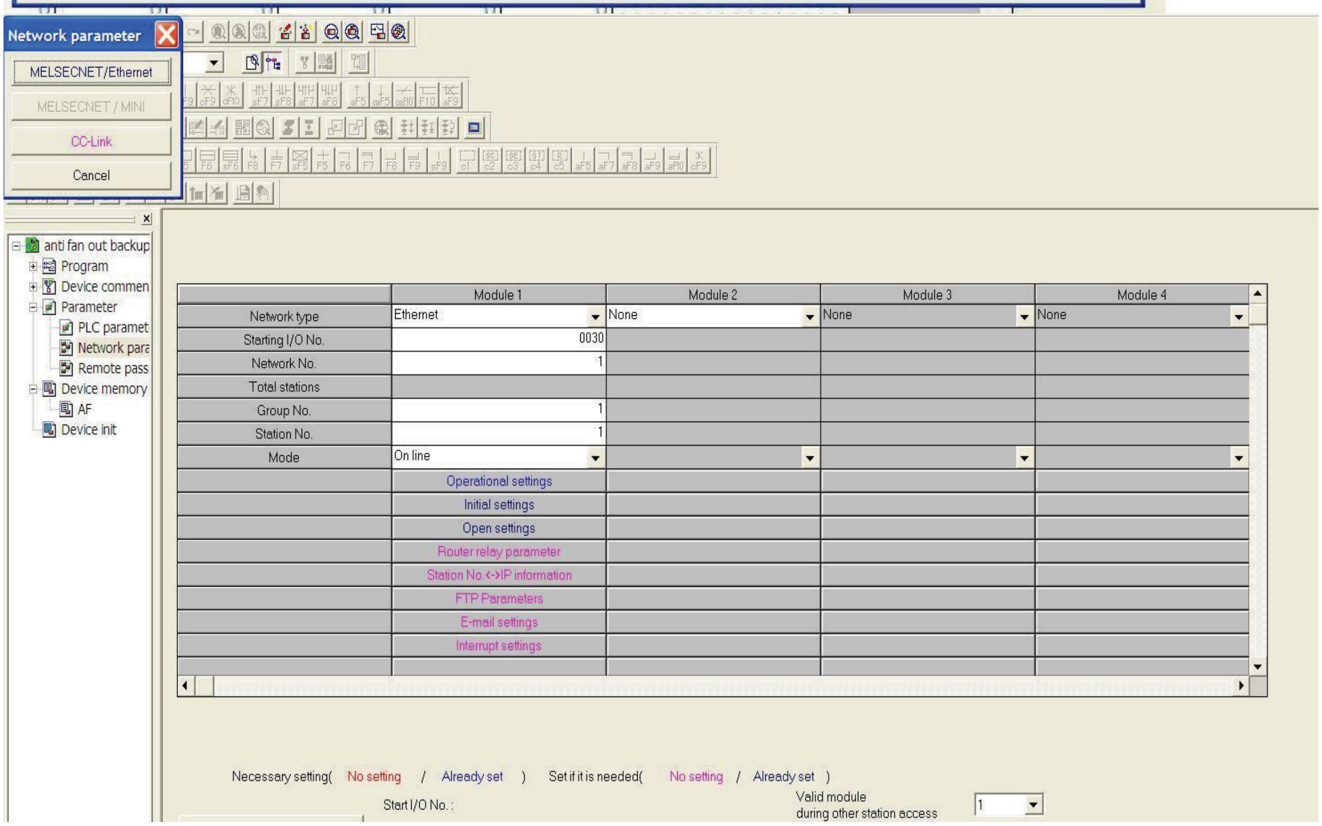
	Slot	Type	Model name	Switch 1	Switch 2	Switch 3	Switch 4	Switch 5
0	PLC	PLC	Q02HCPU					
1	0(0-0)	Intelli.	QD62	0120				
2	1(0-1)	Input	QX80					
3	2(0-2)	Intelli.	QJ71E71-100					
4	3(0-3)	Intelli.	Q68DAV	4444	4444	0000	0000	0000
5	4(0-4)	Intelli.	QJ71C24N-R4	0BEE	0005	0BEE	0005	0000
6	5(0-5)	Intelli.	Q68ADV	4444	4444		0000	0000
7	6(0-6)	Output	QY10					
8	7(0-7)	Output	QY10					
9	8(0-8)	Output	QY81P					
10	9(0-9)	Input	QX80					
11	10(0-10)	Input	QX80					
12	11(0-11)	Input	QX81					
13	12(1-0)							
14	13(1-1)							
15	14(1-2)							



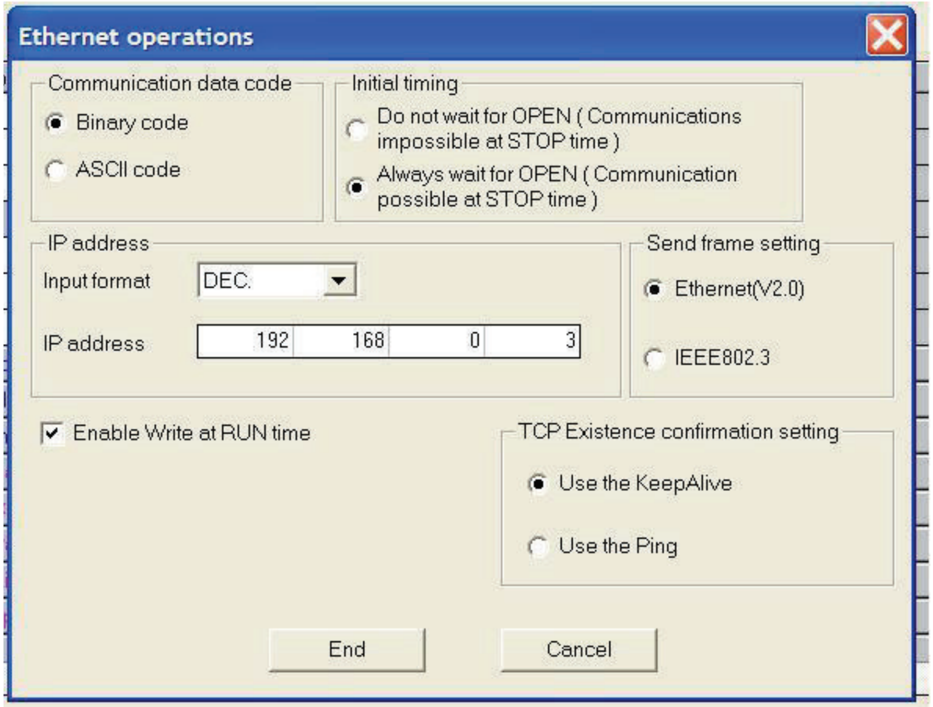
	Slot	Type	Model name	Error time output mode	H/W error time PLC operation mode	I/O response time	Control PLC (*)
0	PLC	PLC	Q02HCPU				
1	0(0-0)	Intelli.	QD62	Clear	Stop		
2	1(0-1)	Input	QX80			10ms	
3	2(0-2)	Intelli.	QJ71E71-100	Clear	Stop		
4	3(0-3)	Intelli.	Q68DAV	Clear	Stop		
5	4(0-4)	Intelli.	QJ71C24N-R4	Clear	Stop		
6	5(0-5)	Intelli.	Q68ADV	Clear	Stop		
7	6(0-6)	Output	QY10	Clear			
8	7(0-7)	Output	QY10	Clear			
9	8(0-8)	Output	QY81P	Clear			
10	9(0-9)	Input	QX80			10ms	
11	10(0-10)	Input	QX80			10ms	
12	11(0-11)	Input	QX81			10ms	
13	12(1-0)						
14	13(1-1)						
15	14(1-2)						



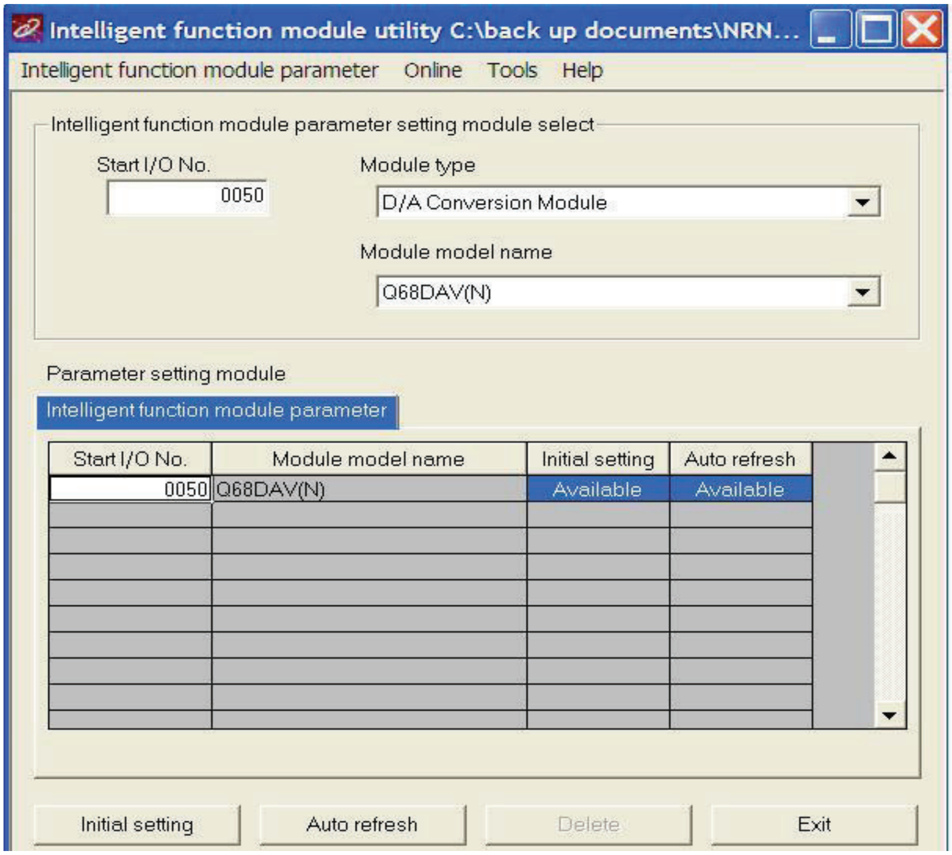
Qn(H) Parameter
PLC name
PLC system
PLC file
PLC RAS
Device
Program
Boot file
SFC
I/O assignment
Boot option
Clear program memory
High speed monitor area from other station.
K steps
(0–15K step)
Online change area of multiple blocks.
(Online change area of FB definition/ST.)
K steps
Auto Download all Data from Memory card to Standard ROM
Boot file setting
Program
AF
Device comm
COMMEN
Parameter
PARAM
IPARAM
Device initial
Type
Data name
Transfer from
Transfer to
1 Sequence AF Standard ROM Program memory
2 Parameter PARAM Standard ROM Program memory
3
4
5
6
7
8
9
10
11
12
Insert
Delete
Acknowledge XY assignment
Multiple CPU settings
Default
Check
End
Cancel

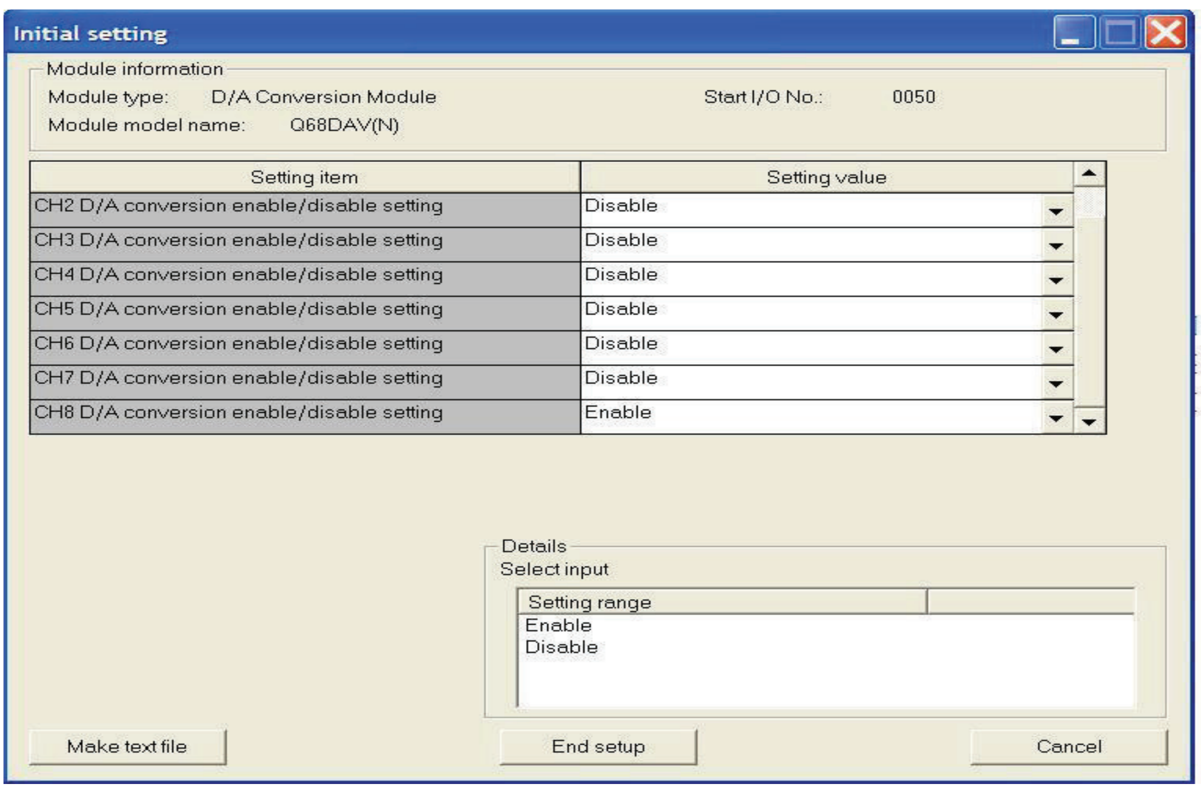


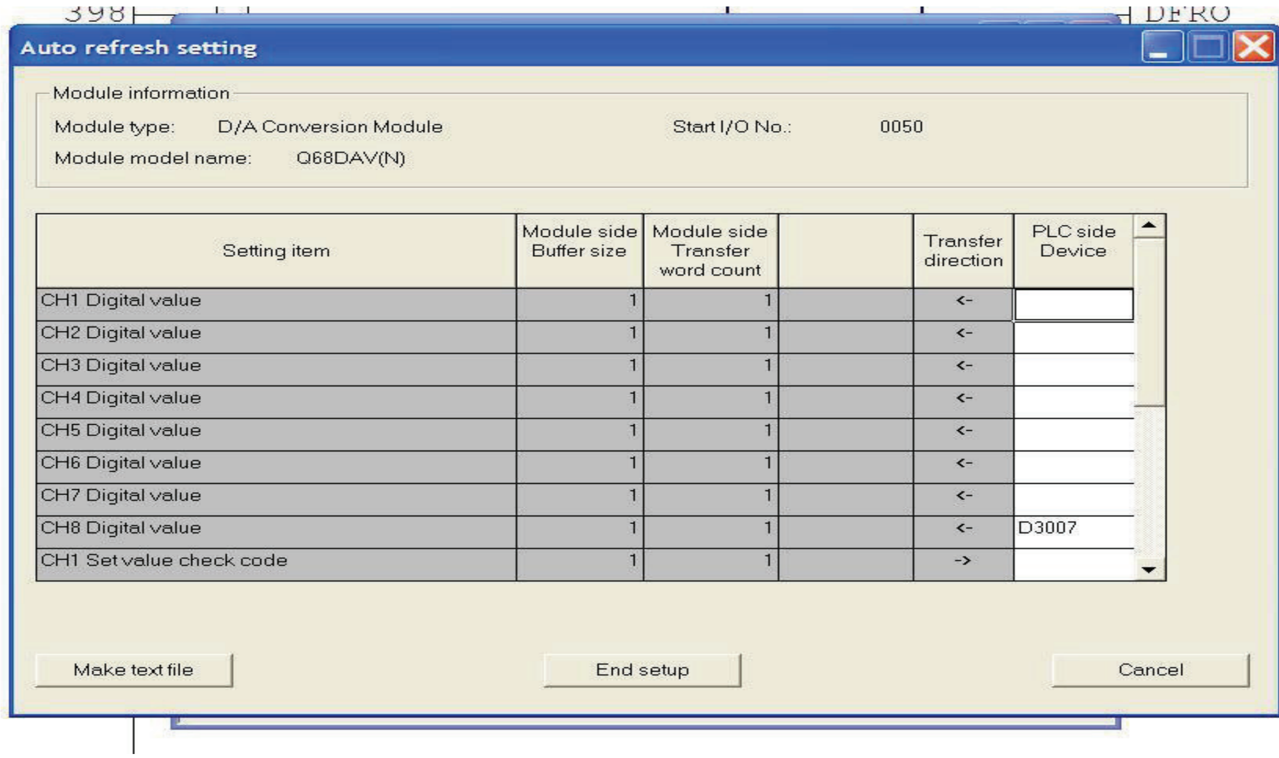
Network parameter
MELSECNET/Ethernet
MELSECNET / MINI
CC-Link
Cancel
anti fan out backup
Program
Device commen
Parameter
PLC paramet
Network para
Remote pass
Device memory
AF
Device init
Module 1
Module 2
Module 3
Module 4
Network type
Ethernet
None
None
None
Starting I/O No.
0030
Network No.
1
Total stations
Group No.
1
Station No.
1
Mode
On line
Operational settings
Initial settings
Open settings
Router relay parameter
Station No.<->IP information
FTP Parameters
E-mail settings
Interrupt settings
Necessary setting(No setting / Already set) Set if it is needed(No setting / Already set)
Start I/O No. :
Valid module during other station access
1

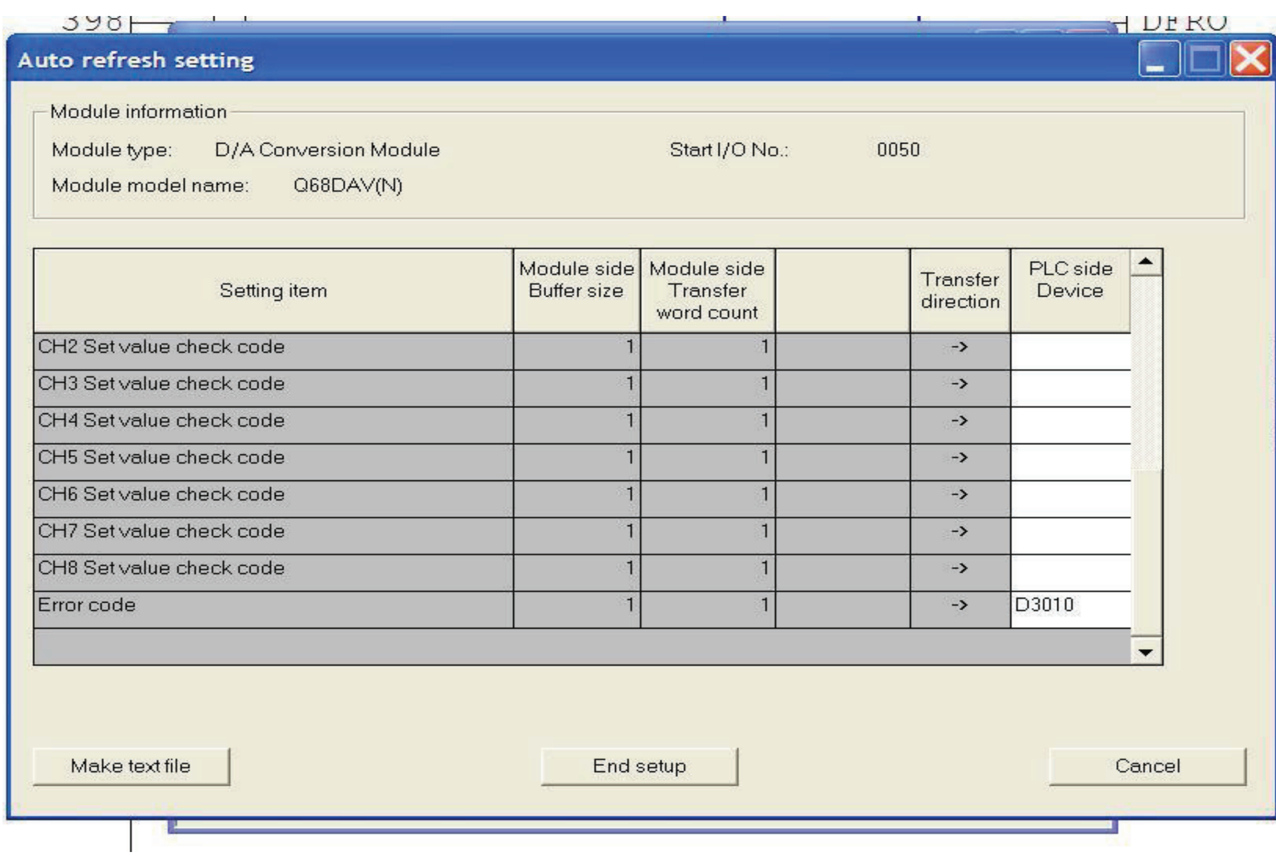


	Protocol	Open system	Fixed buffer	Fixed buffer communication procedure	Pairing open	Existence confirmation	Host station Port No.	Transmission target device IP address	Transmission target device Port No.
1	TCP	Unpassive	Send	Procedure exist	Disable	Confirm	3000		
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									

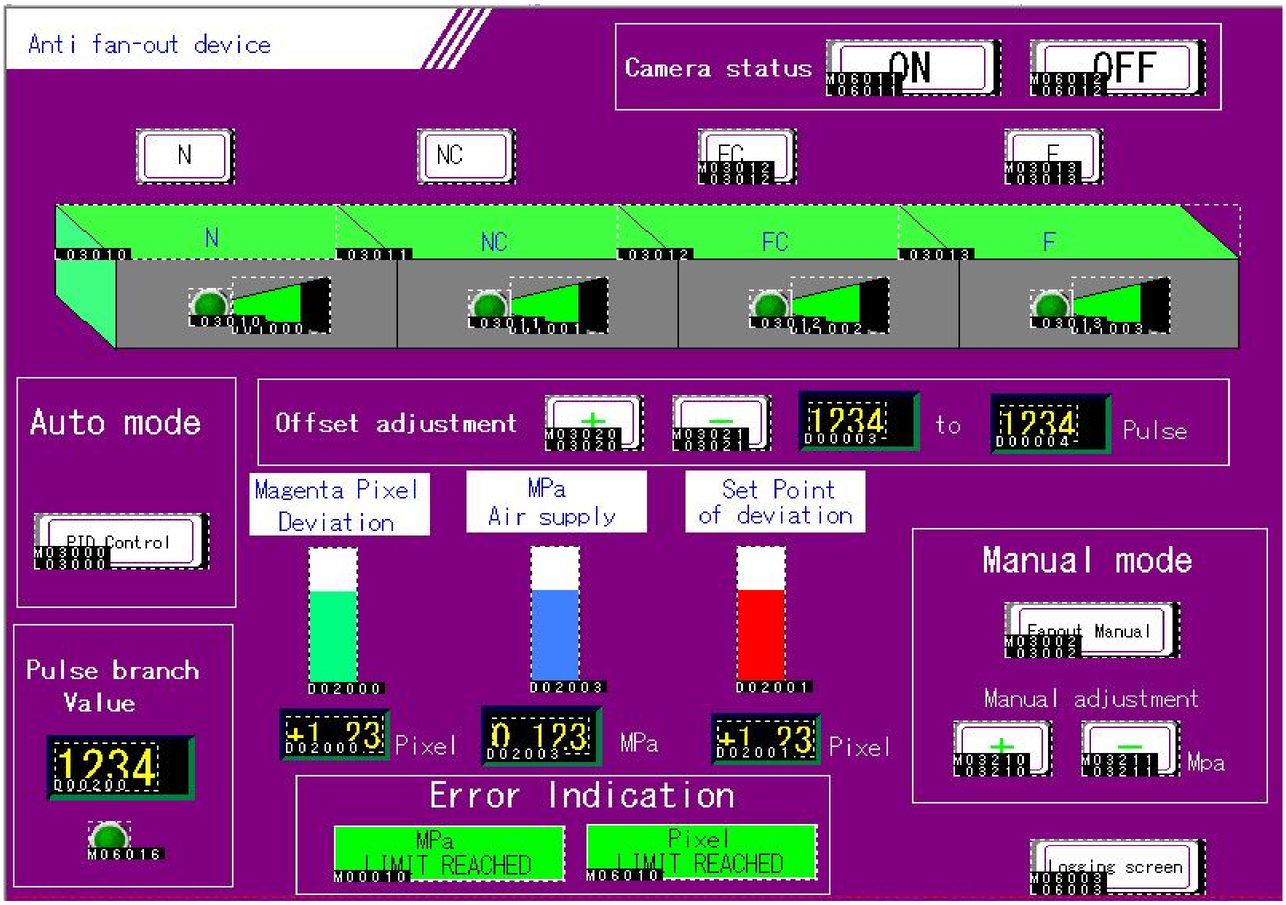

Intelligent function module utility C:\back up documents\NRN...
Intelligent function module parameter
Online
Tools
Help
Intelligent function module parameter setting module select
Start I/O No.
0050
Module type
D/A Conversion Module
Module model name
Q68DAV(N)
Parameter setting module
Intelligent function module parameter
Start I/O No.
Module model name
Initial setting
Auto refresh
0050
Q68DAV(N)
Available
Available
Initial setting
Auto refresh
Delete
Exit

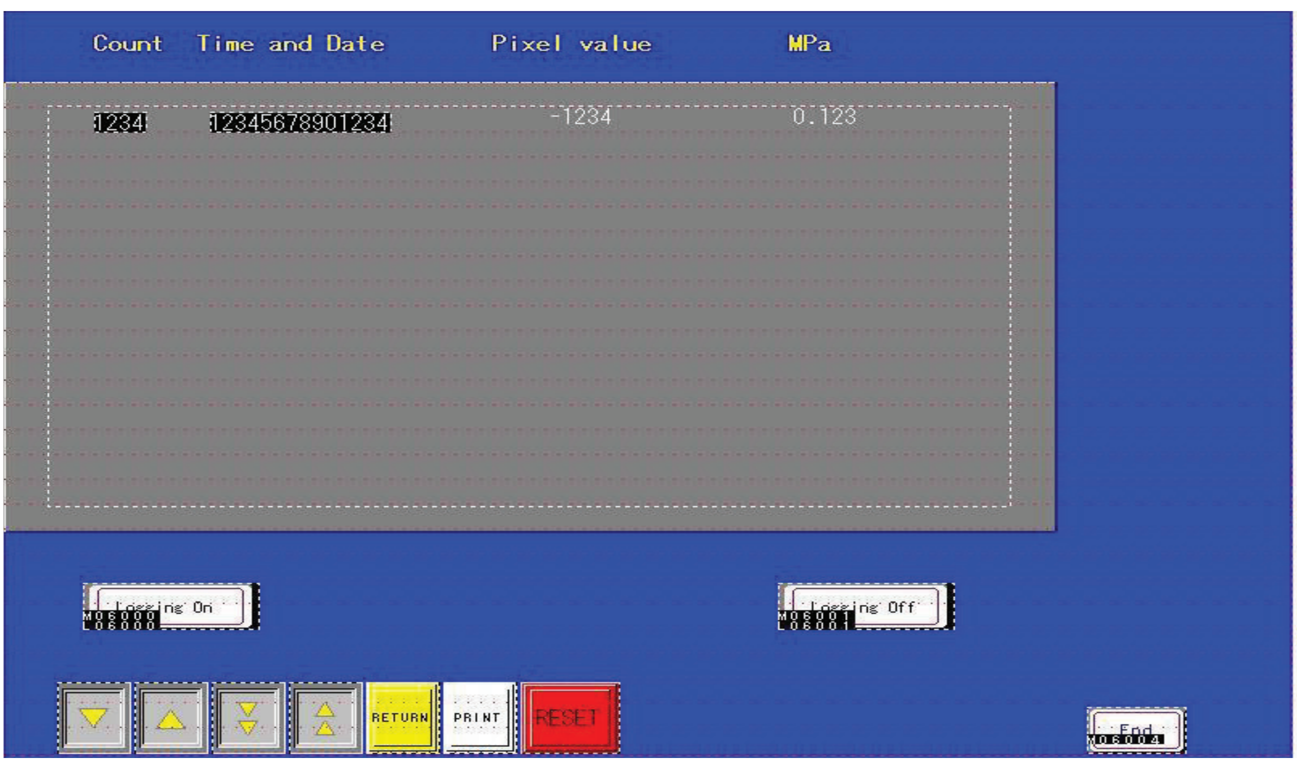

Initial setting
Module information
Module type: D/A Conversion Module
Start I/O No.: 0050
Module model name: Q68DAV(N)
Setting item
Setting value
CH2 D/A conversion enable/disable setting
Disable
CH3 D/A conversion enable/disable setting
Disable
CH4 D/A conversion enable/disable setting
Disable
CH5 D/A conversion enable/disable setting
Disable
CH6 D/A conversion enable/disable setting
Disable
CH7 D/A conversion enable/disable setting
Disable
CH8 D/A conversion enable/disable setting
Enable
Details
Select input
Setting range
Enable
Disable
Make text file
End setup
Cancel


Auto refresh setting
Module information
Module type: D/A Conversion Module
Start I/O No.: 0050
Module model name: Q68DAV(N)
Setting item
Module side Buffer size
Module side Transfer word count
Transfer direction
PLC side Device
CH1 Digital value 1 1 <-
CH2 Digital value 1 1 <-
CH3 Digital value 1 1 <-
CH4 Digital value 1 1 <-
CH5 Digital value 1 1 <-
CH6 Digital value 1 1 <-
CH7 Digital value 1 1 <-
CH8 Digital value 1 1 <- D3007
CH1 Set value check code 1 1 ->
Make text file
End setup
Cancel

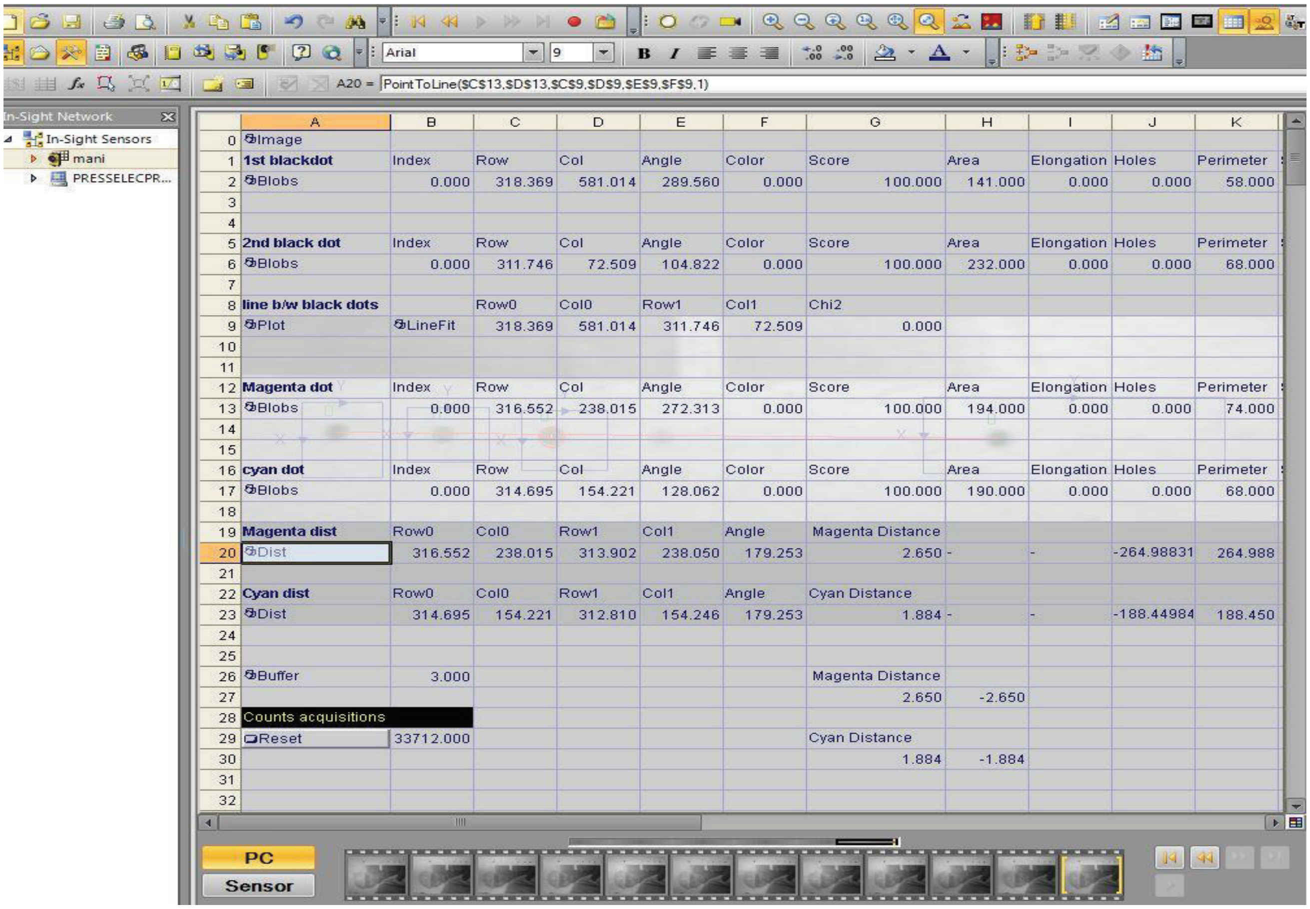

Auto refresh setting
Module information
Module type: D/A Conversion Module
Start I/O No.: 0050
Module model name: Q68DAV(N)
Setting item
Module side Buffer size
Module side Transfer word count
Transfer direction
PLC side Device
CH2 Set value check code 1 1 ->
CH3 Set value check code 1 1 ->
CH4 Set value check code 1 1 ->
CH5 Set value check code 1 1 ->
CH6 Set value check code 1 1 ->
CH7 Set value check code 1 1 ->
CH8 Set value check code 1 1 ->
Error code 1 1 -> D3010
Make text file
End setup
Cancel

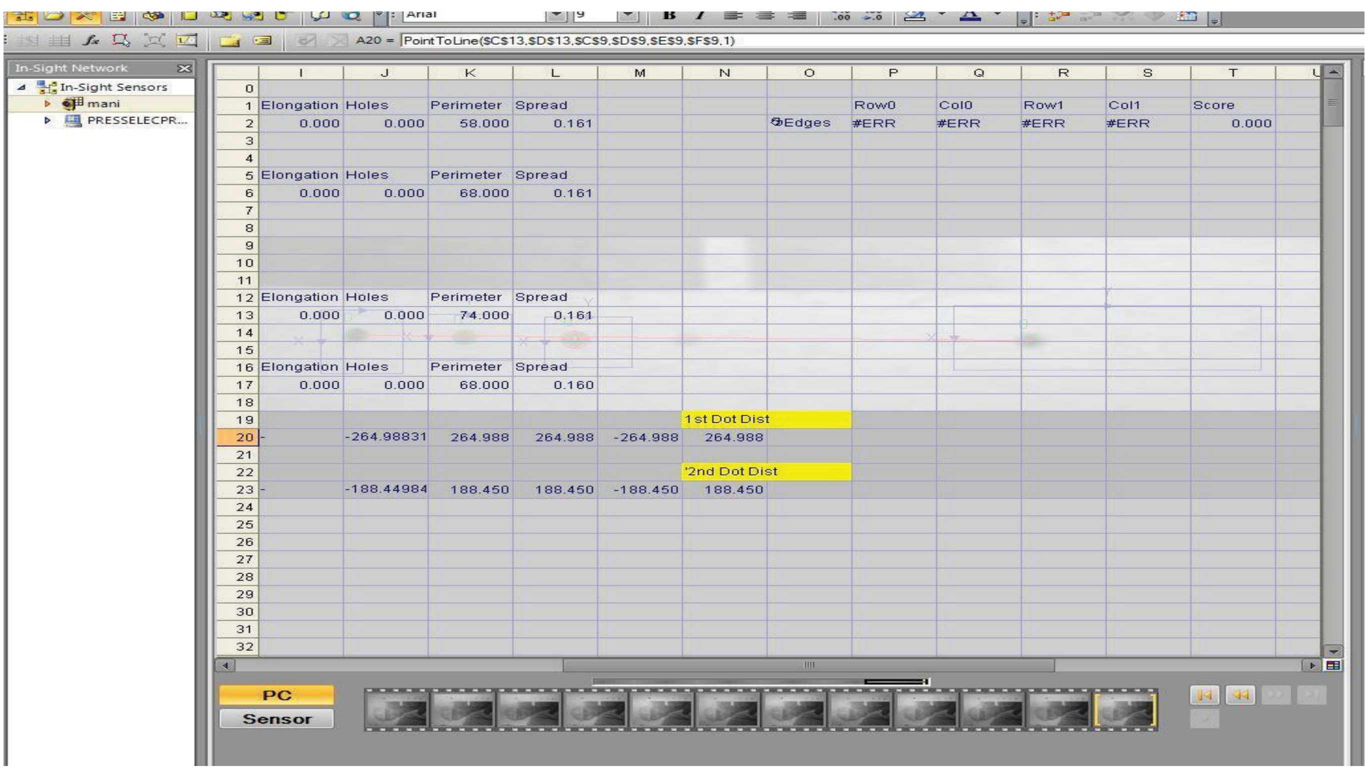
C.V7 SERIES TOUCH SCREEN SCREENSHOT WITH MEMORY

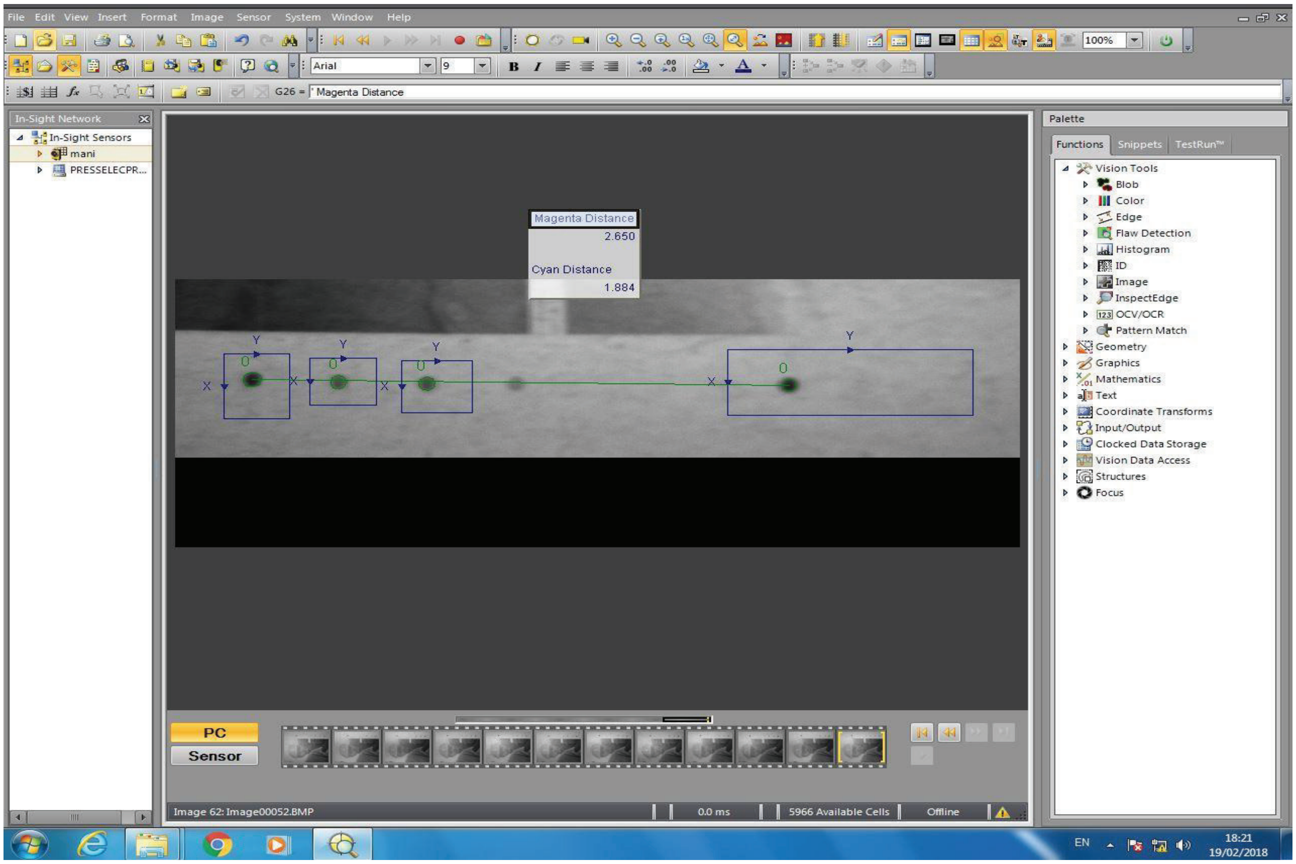


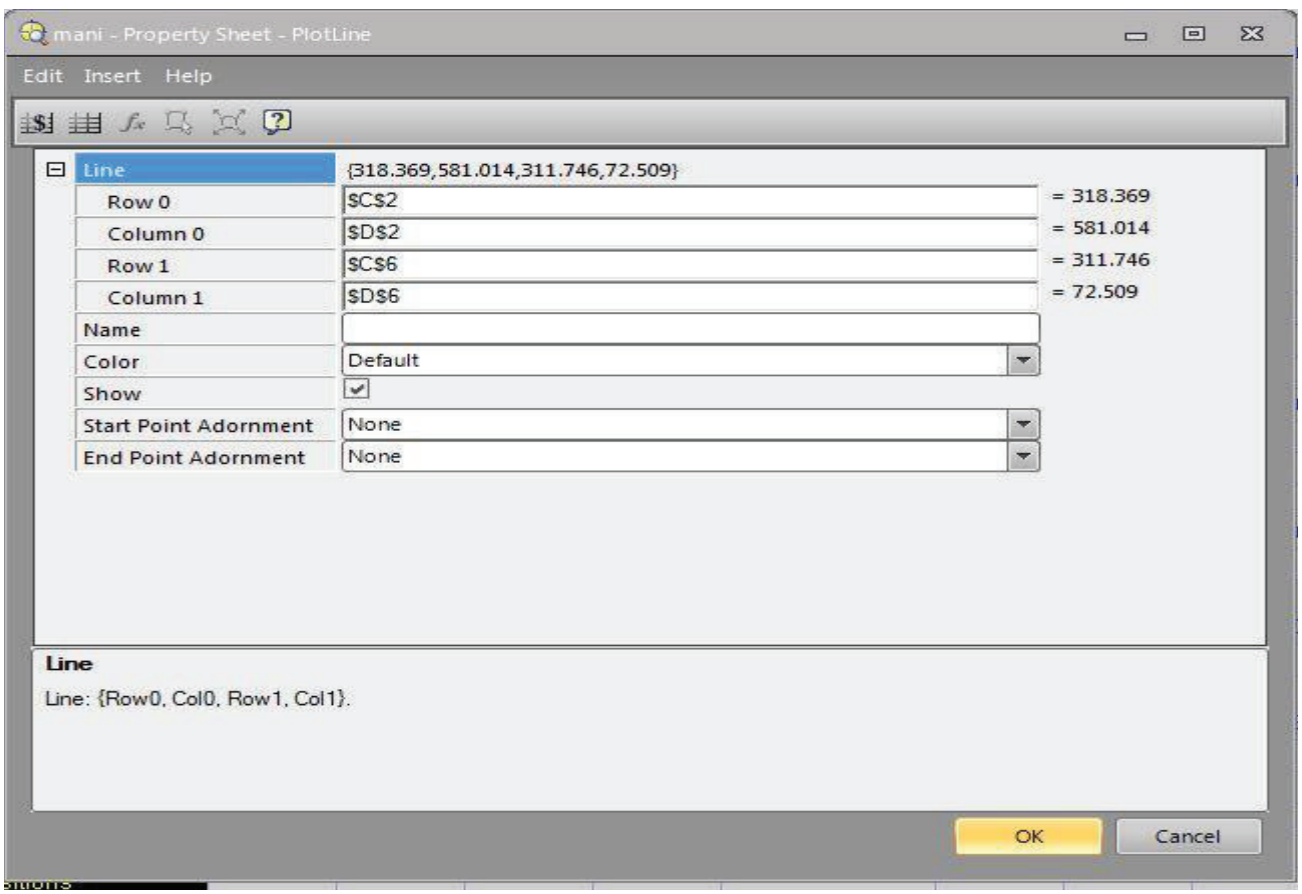


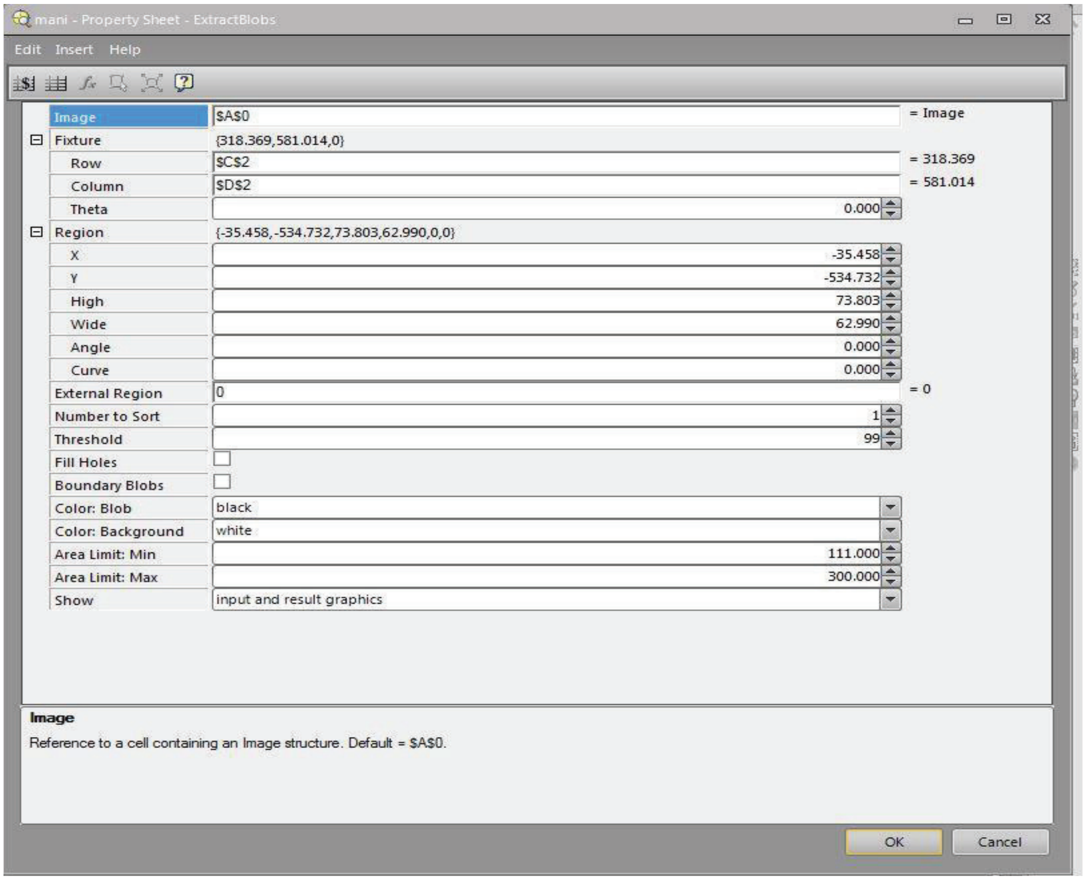
D.COGNEX SOFTWARE SETTINGS

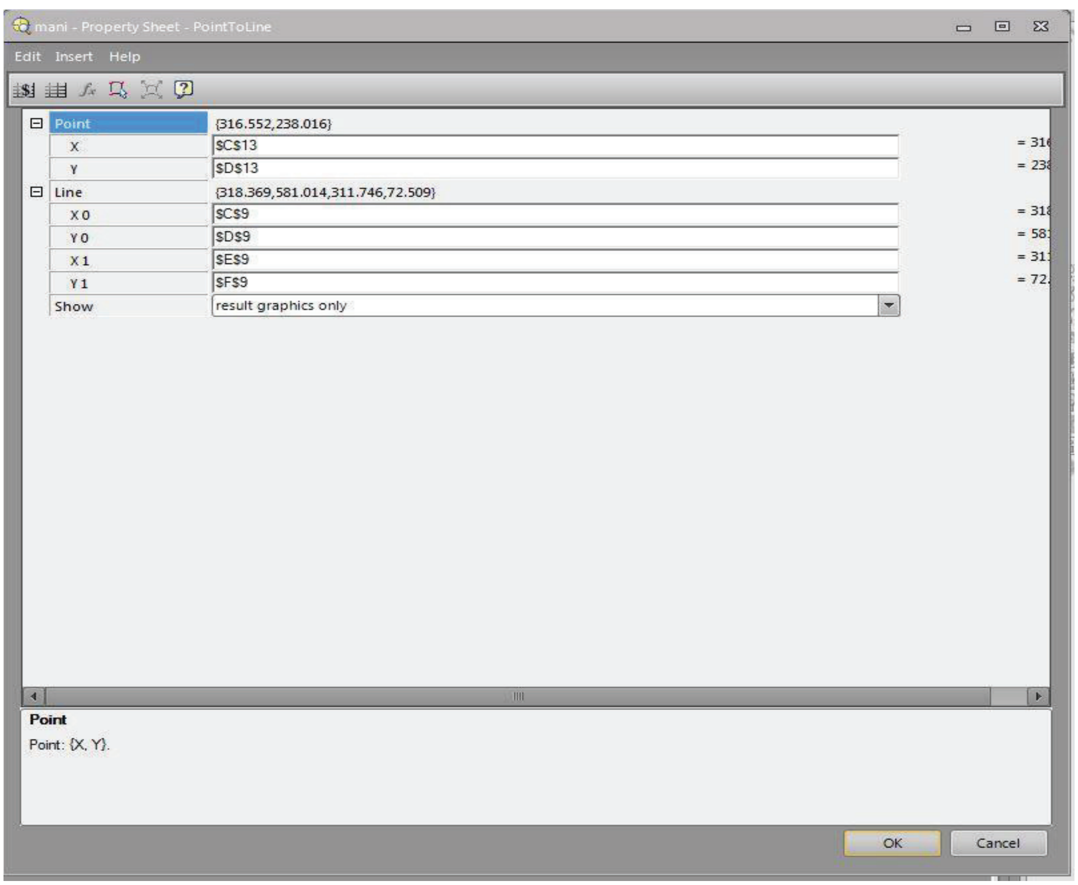


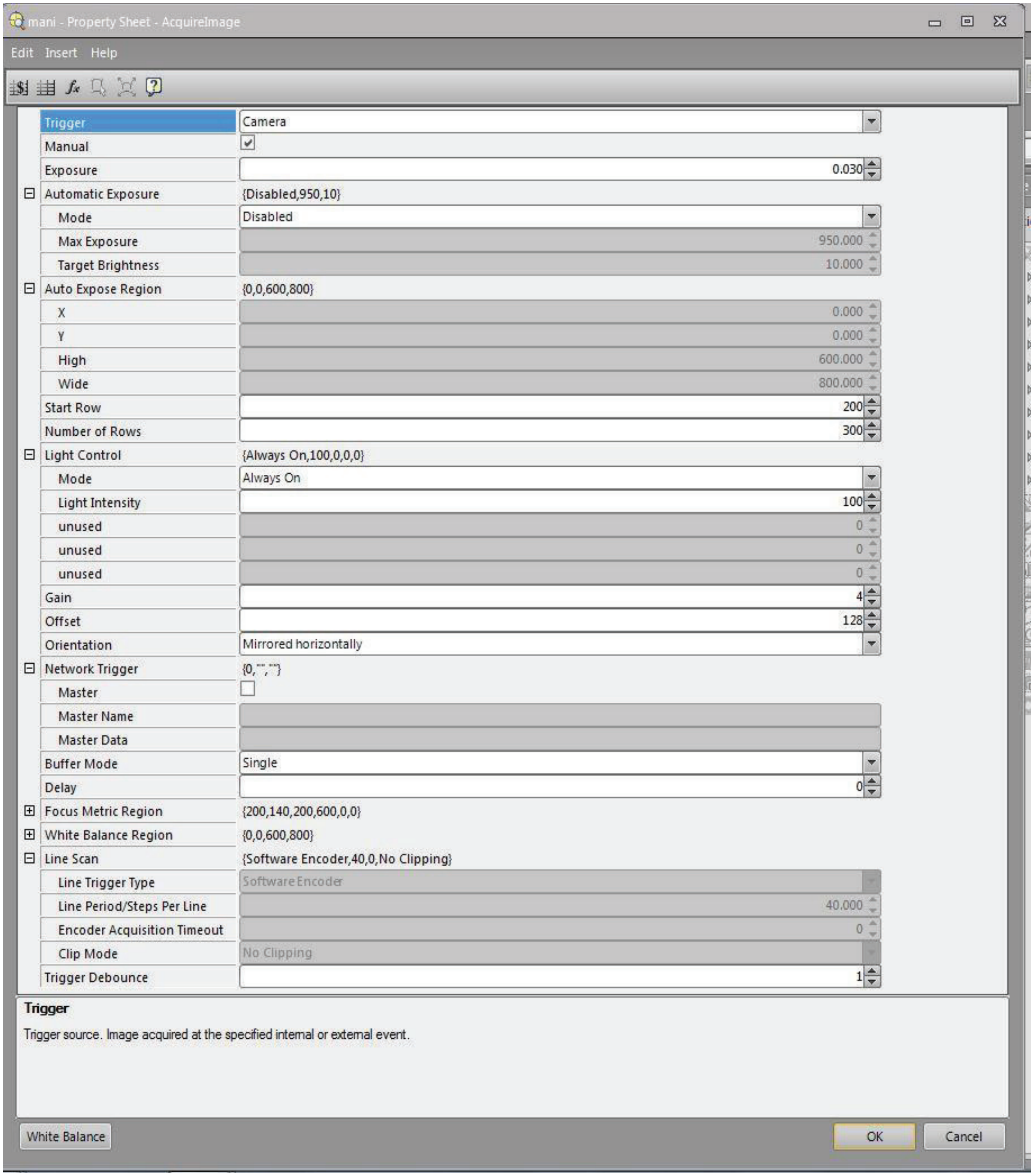


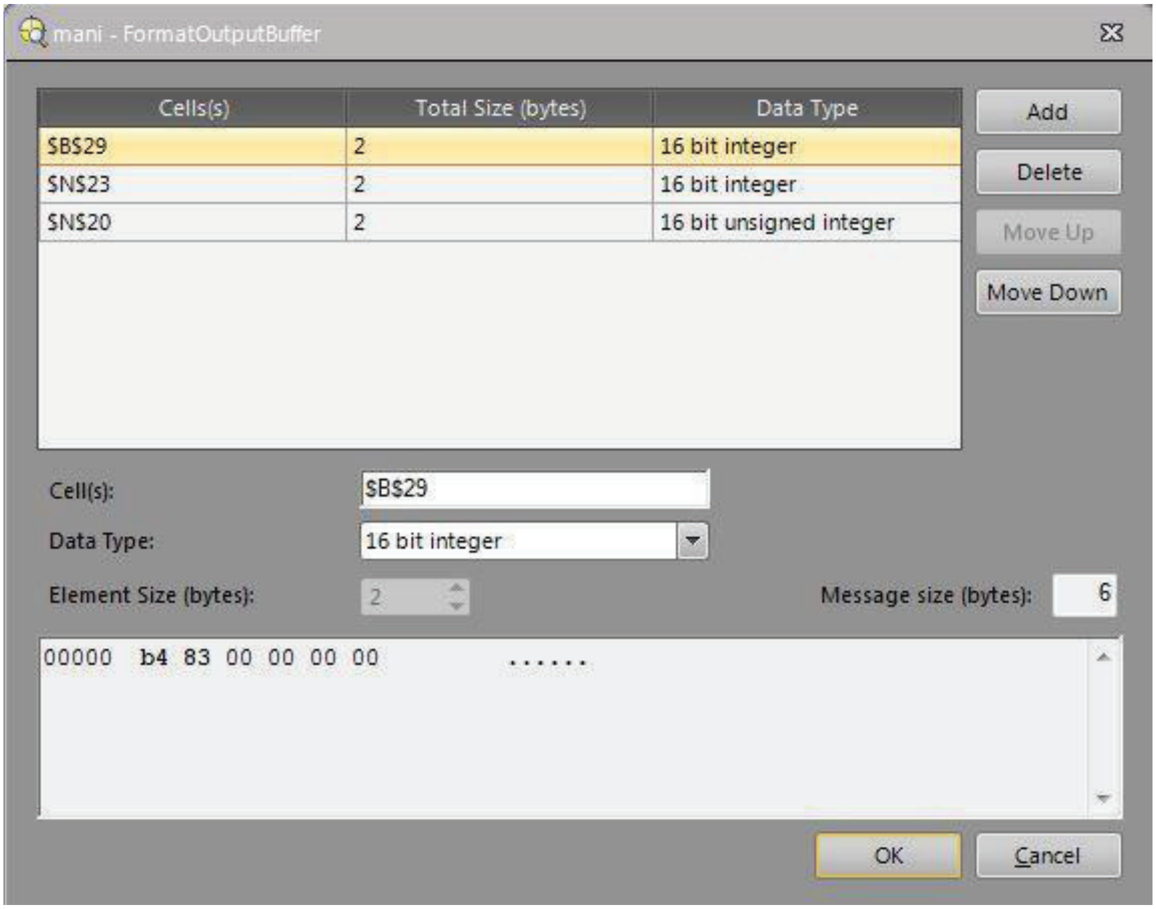

File Edit View Insert Format Image Sensor System Window Help
G26 = " Magenta Distance
In-Sight Network
In-Sight Sensors
mani
PRESSELECPR...
Magenta Distance
2.650
Cyan Distance
1.884
PC
Sensor
Image 62: Image00052.BMP
0.0 ms
5966 Available Cells
Offline
Palette
Functions
Snippets
TestRun™
Vision Tools
Blob
Color
Edge
Flaw Detection
Histogram
ID
Image
InspectEdge
OCV/OCR
Pattern Match
Geometry
Graphics
Mathematics
Text
Coordinate Transforms
Input/Output
Clocked Data Storage
Vision Data Access
Structures
Focus
EN
18:21
19/02/2018

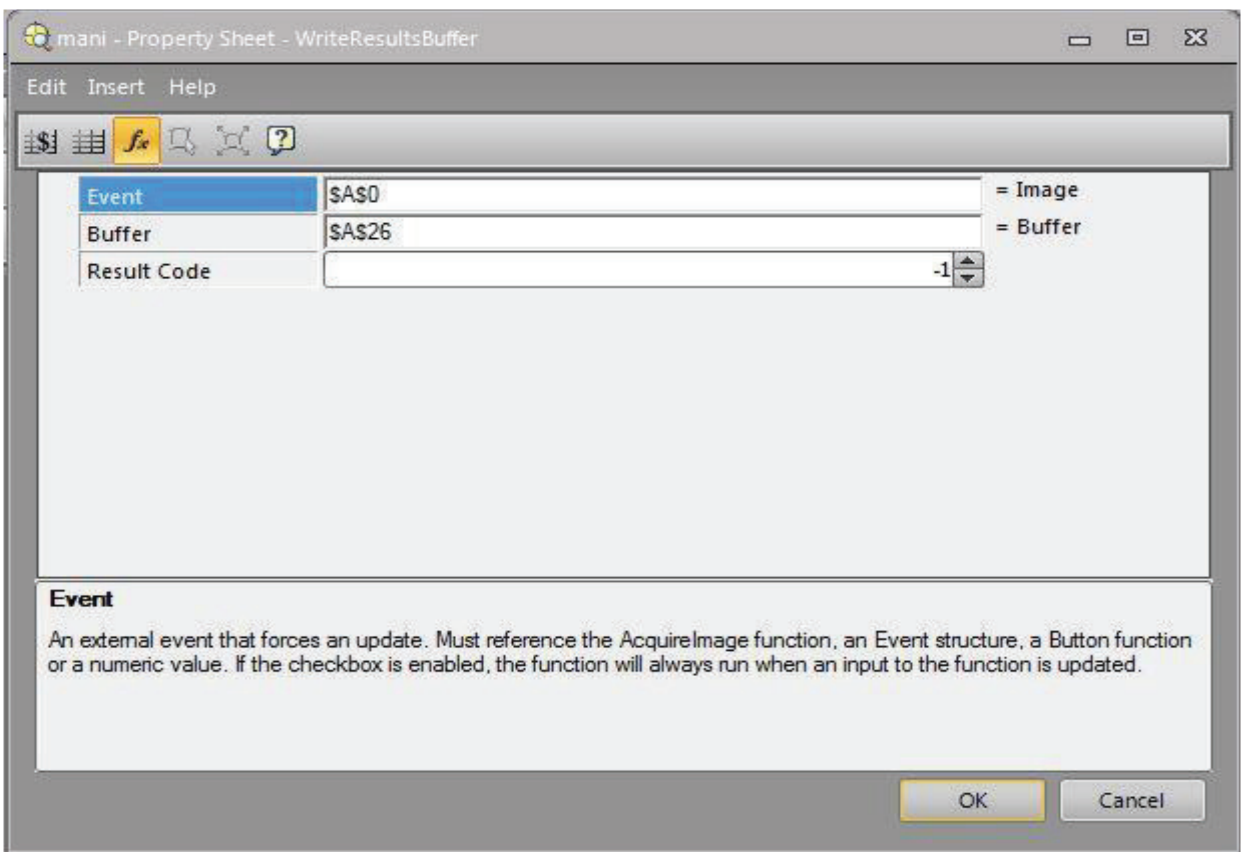

mani - Property Sheet - PlotLine
Edit Insert Help
Line {318.369,581.014,311.746,72.509}
Row 0 C2 = 318.369
Column 0 D2 = 581.014
Row 1 C6 = 311.746
Column 1 D6 = 72.509
Name
Color Default
Show
Start Point Adornment None
End Point Adornment None
Line
Line: {Row0, Col0, Row1, Col1}.
OK
Cancel

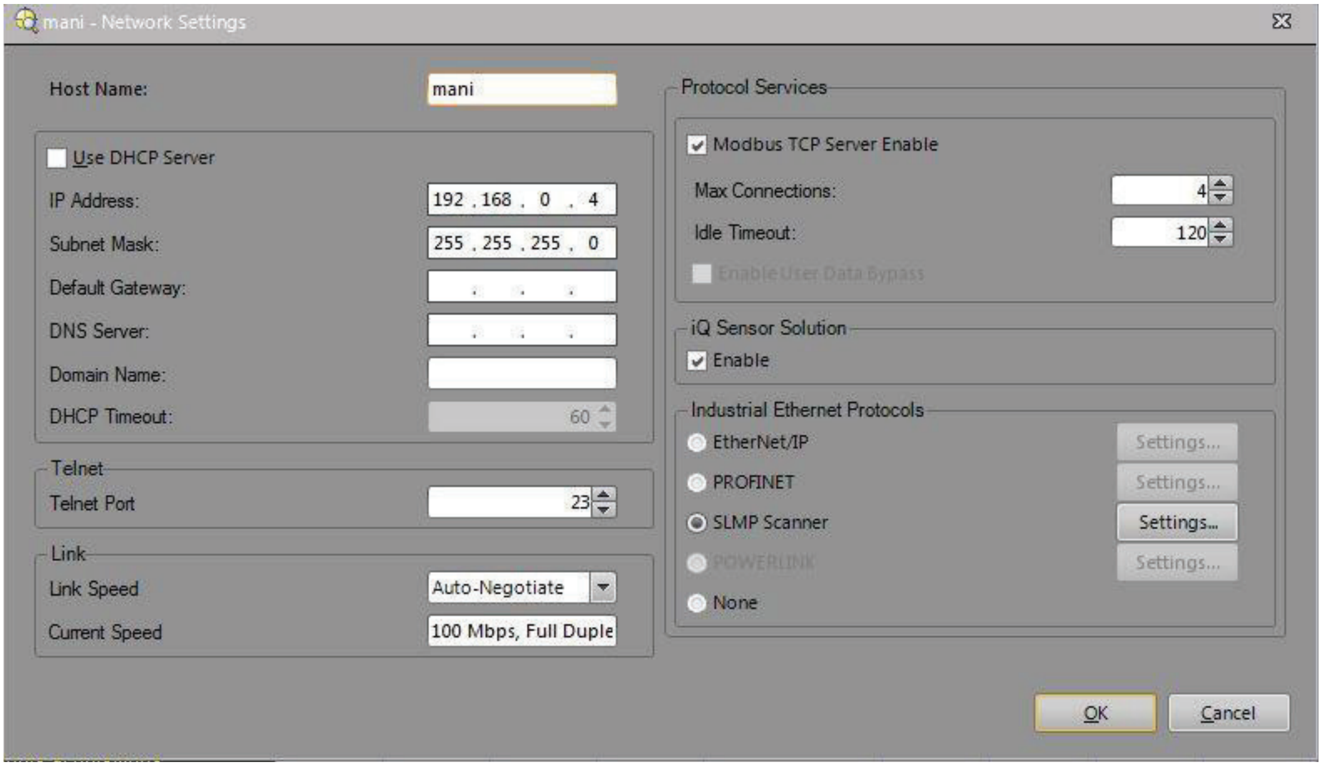

mani - Property Sheet - ExtractBlobs
Edit Insert Help
Image A0 = Image
Fixture {318.369,581.014,0}
Row C2 = 318.369
Column D2 = 581.014
Theta 0.000
Region {-35.458,-534.732,73.803,62.990,0,0}
X -35.458
Y -534.732
High 73.803
Wide 62.990
Angle 0.000
Curve 0.000
External Region 0 = 0
Number to Sort 1
Threshold 99
Fill Holes
Boundary Blobs
Color: Blob black
Color: Background white
Area Limit: Min 111.000
Area Limit: Max 300.000
Show input and result graphics
Image
Reference to a cell containing an Image structure. Default = A0.
OK
Cancel

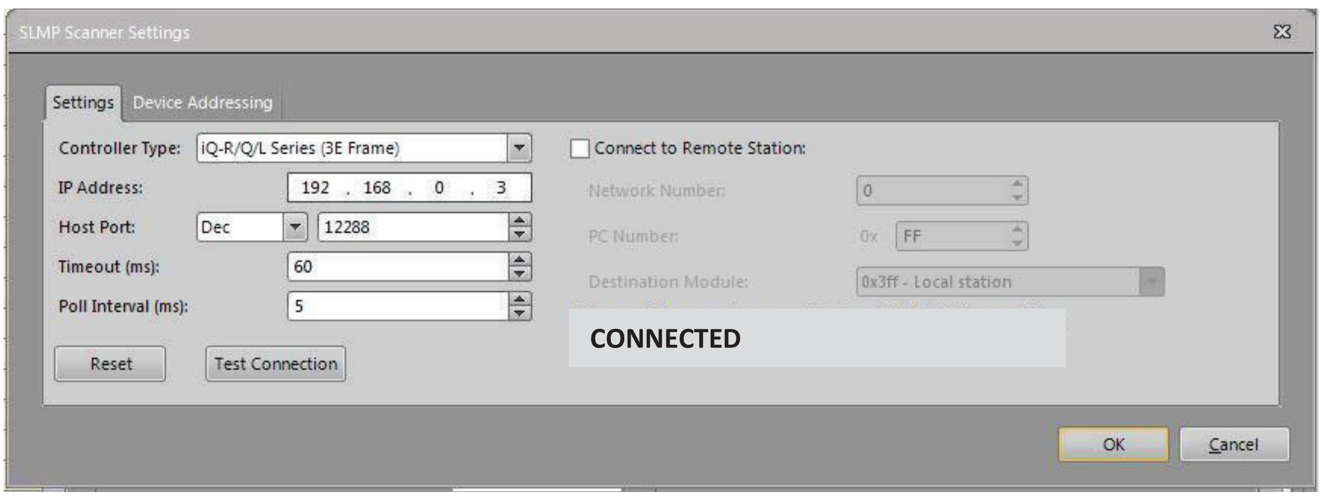

mani - Property Sheet - PointToLine
Edit Insert Help
Point {316.552,238.016}
X C13
Y D13
Line {318.369,581.014,311.746,72.509}
X 0 C9
Y 0 D9
X 1 E9
Y 1 F9
Show result graphics only
Point
Point: {X, Y}.
OK
Cancel

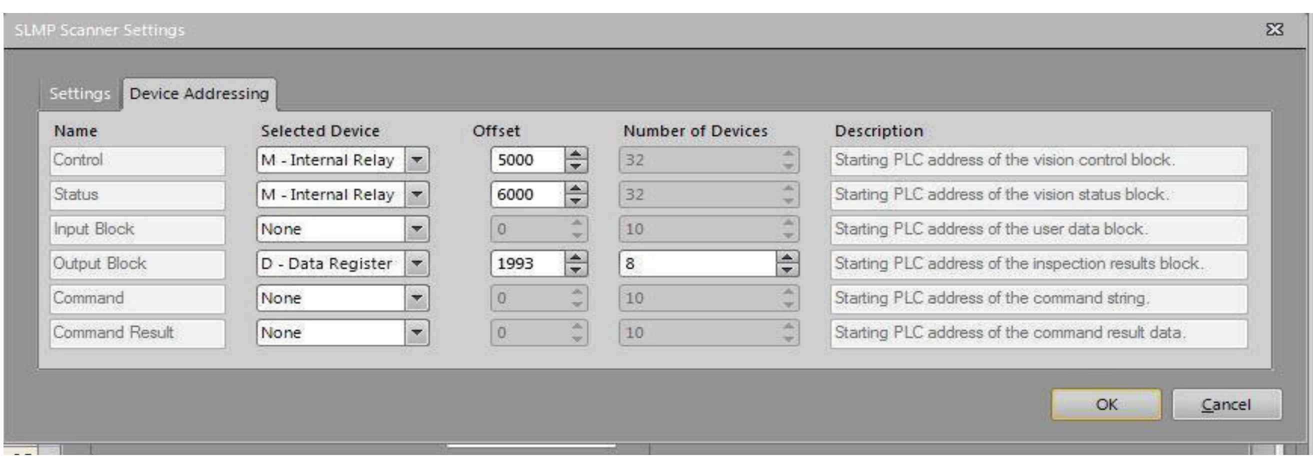

mani - Property Sheet - AcquireImage
Edit Insert Help
Trigger Camera
Manual
Exposure 0.030
Automatic Exposure {Disabled,950,10}
Mode Disabled
Max Exposure 950.000
Target Brightness 10.000
Auto Expose Region {0,0,600,800}
X 0.000
Y 0.000
High 600.000
Wide 800.000
Start Row 200
Number of Rows 300
Light Control {Always On,100,0,0,0}
Mode Always On
Light Intensity 100
unused 0
unused 0
unused 0
Gain 4
Offset 128
Orientation Mirrored horizontally
Network Trigger {0,"",""}
Master
Master Name
Master Data
Buffer Mode Single
Delay 0
Focus Metric Region {200,140,200,600,0,0}
White Balance Region {0,0,600,800}
Line Scan {Software Encoder,40,0,No Clipping}
Line Trigger Type Software Encoder
Line Period/Steps Per Line 40.000
Encoder Acquisition Timeout 0
Clip Mode No Clipping
Trigger Debounce 1
Trigger
Trigger source. Image acquired at the specified internal or external event.
White Balance
OK
Cancel

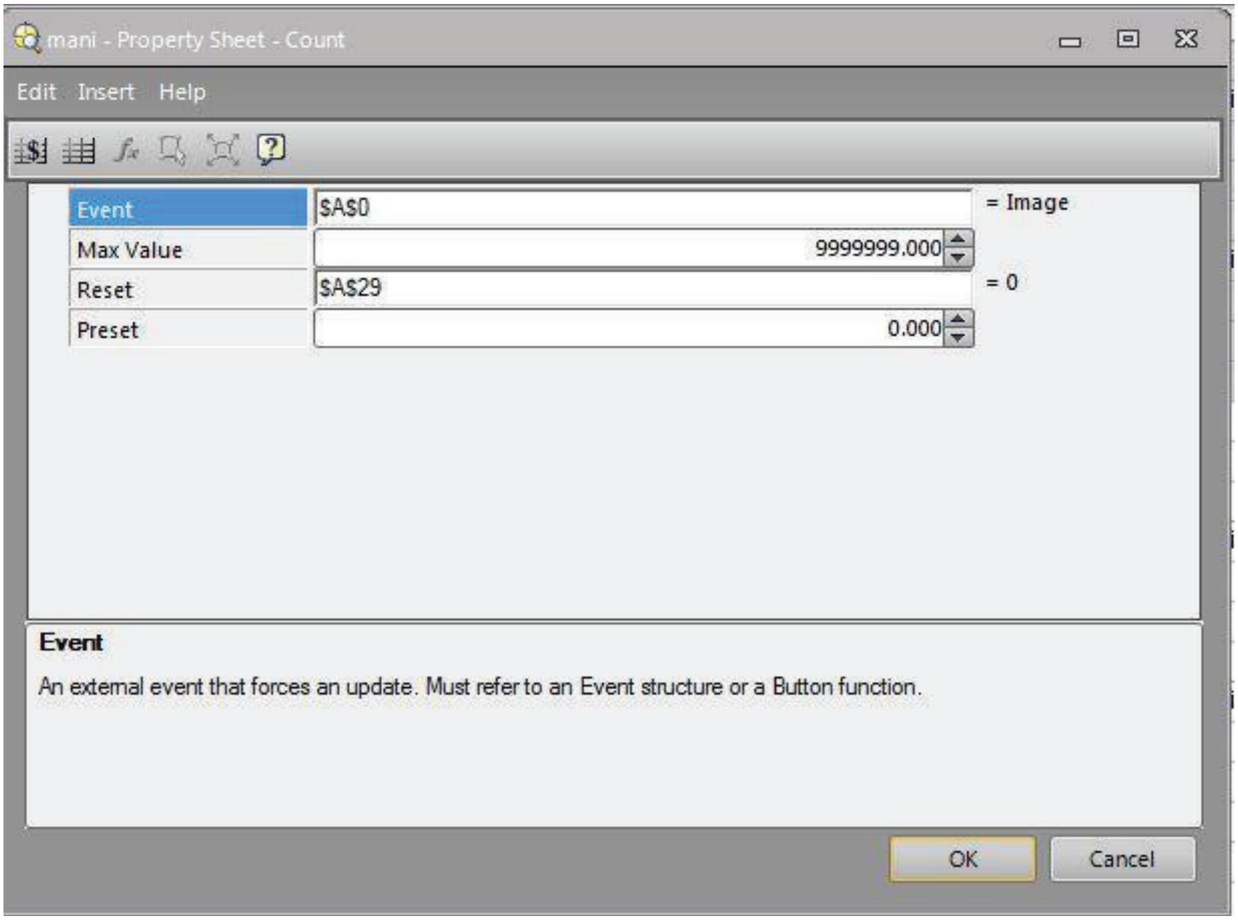

mani - FormatOutputBuffer
Cells(s)
Total Size (bytes)
Data Type
B29
2
16 bit integer
N23
2
16 bit integer
N20
2
16 bit unsigned integer
Add
Delete
Move Up
Move Down
Cell(s):
B29
Data Type:
16 bit integer
Element Size (bytes):
2
Message size (bytes):
6
00000 b4 83 00 00 00 00 ......
OK
Cancel

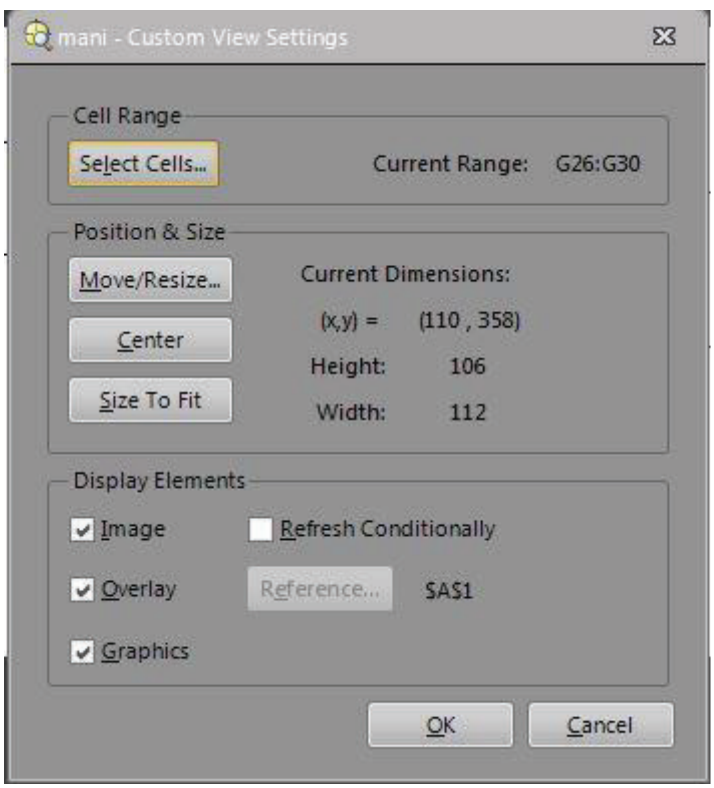

mani - Property Sheet - WriteResultsBuffer
Edit
Insert
Help
Event
A0
= Image
Buffer
A26
= Buffer
Result Code
-1
Event
An external event that forces an update. Must reference the AcquireImage function, an Event structure, a Button function or a numeric value. If the checkbox is enabled, the function will always run when an input to the function is updated.
OK
Cancel


mani - Network Settings
Host Name: mani
Use DHCP Server
IP Address: 192 . 168 . 0 . 4
Subnet Mask: 255 . 255 . 255 . 0
Default Gateway:
DNS Server:
Domain Name:
DHCP Timeout: 60
Telnet
Telnet Port 23
Link
Link Speed Auto-Negotiate
Current Speed 100 Mbps, Full Duple
Protocol Services
Modbus TCP Server Enable
Max Connections: 4
Idle Timeout: 120
Enable User Data Bypass
iQ Sensor Solution
Enable
Industrial Ethernet Protocols
EtherNet/IP Settings...
PROFINET Settings...
SLMP Scanner Settings...
POWERLINK Settings...
None
OK
Cancel


SLMP Scanner Settings
Settings
Device Addressing
Controller Type: iQ-R/Q/L Series (3E Frame)
IP Address: 192 . 168 . 0 . 3
Host Port: Dec 12288
Timeout (ms): 60
Poll Interval (ms): 5
Reset
Test Connection
Connect to Remote Station:
Network Number: 0
PC Number: 0x FF
Destination Module: 0x3ff - Local station
CONNECTED
OK
Cancel

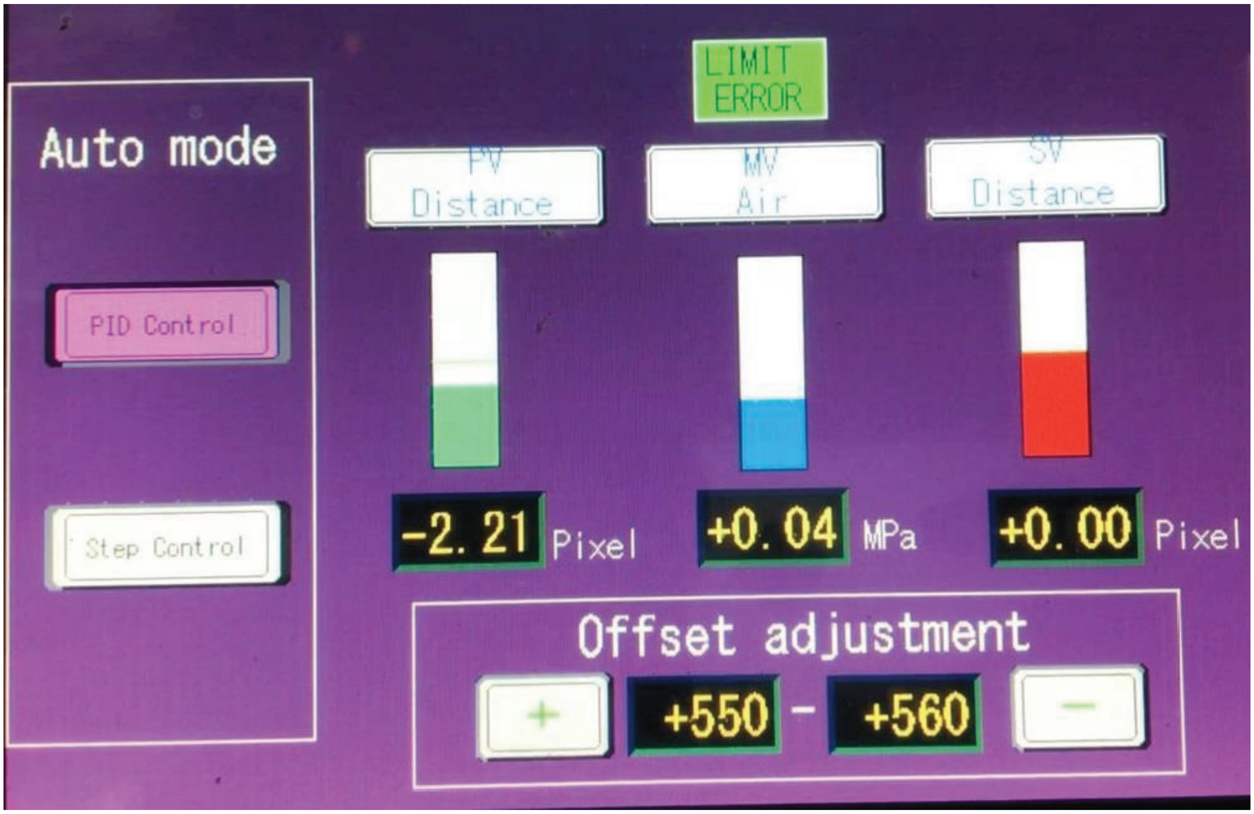

SLMP Scanner Settings
Settings
Device Addressing
Name
Selected Device
Offset
Number of Devices
Description
Control
M - Internal Relay
5000
32
Starting PLC address of the vision control block.
Status
M - Internal Relay
6000
32
Starting PLC address of the vision status block.
Input Block
None
0
10
Starting PLC address of the user data block.
Output Block
D - Data Register
1993
8
Starting PLC address of the inspection results block.
Command
None
0
10
Starting PLC address of the command string.
Command Result
None
0
10
Starting PLC address of the command result data.
OK
Cancel


mani - Property Sheet - Count
Edit Insert Help
Event
A0
= Image
Max Value
9999999.000
Reset
A29
= 0
Preset
0.000
Event
An external event that forces an update. Must refer to an Event structure or a Button function.
OK
Cancel


mani - Custom View Settings
Cell Range
Select Cells...
Current Range: G26:G30
Position & Size
Move/Resize...
Current Dimensions:
Center
(x,y) = (110 , 358)
Height: 106
Size To Fit
Width: 112
Display Elements
Image
Refresh Conditionally
Overlay
Reference...
A1
Graphics
OK
Cancel

D.PID CONTROL SNAPSHOT

Before PID control – 2.21 pixel [1392.3 microns] deviation



After PID control -0.04 pixel [25.2 microns] deviation

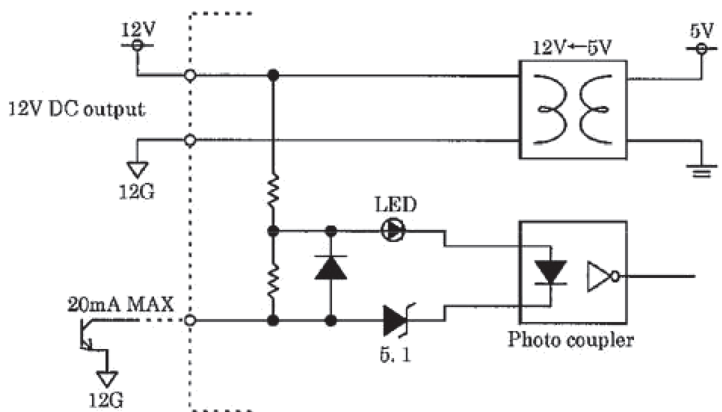
E.PULSE BRANCH SETTINGS

4. External interface

4.1 Encoder signal input

CN1 : 178289-3 (Amp, Ltd.)

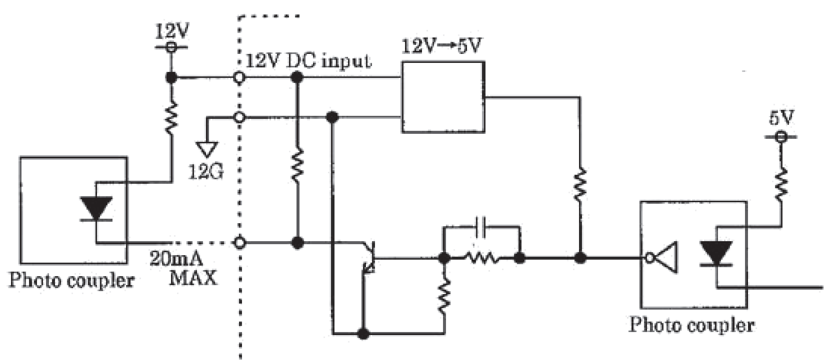
PIN No.	Name		Specification	Input	Output	Kind of wire	Wiring
A1	Power		12VDC		○	Brown (Red)	
B1	COM		100mA MAX		○	Blue (Black)	
A2	Input signal	A_0 phase	Photo coupler	○		Black (White)	
B2		B_0 phase	input	○		White (Green)	
A3		Z_0 phase	20mA MAX	○		Orange (Yellow)	
B3	S H				○	—	



4.2 Extension output

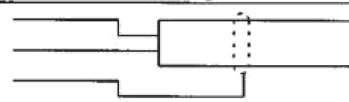
CN2 : 178289-3 (Amp, Ltd.)

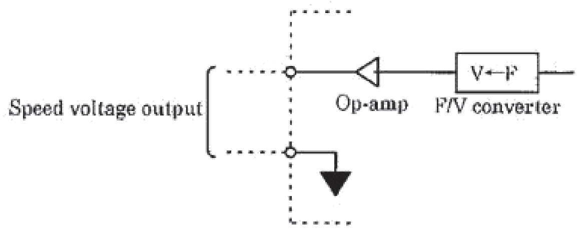
PIN No.	Name		Specification	Input	Output	Wiring
A1	Power		12V DC	○		
B1	COM		100mA MAX	○		
A2	Extension output	A_1 phase	Open Collector		○	
B2		B_1 phase	20mA MAX		○	
A3		Z_1 phase			○	
B3	S H			○		



4.3 Speed voltage output

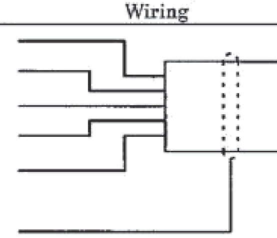
CN3, CN4 : 1-178288-3 (Amp, Ltd.)

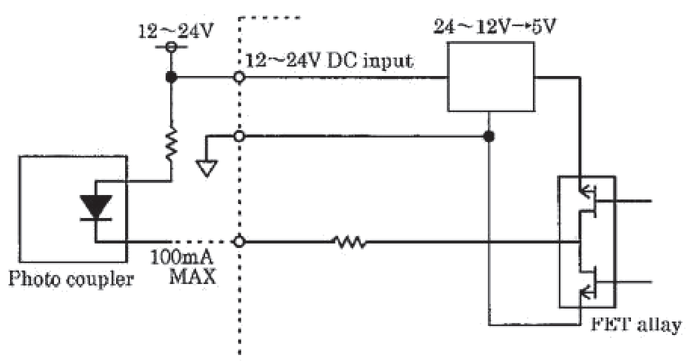
PIN No.	Name	Specification	Input	Output	Wiring
1	FV+	0~10V DC		○	
2	FV−	Load 2k Ω and		○	
3	S H	over	○		



4.4 Divided pulse output

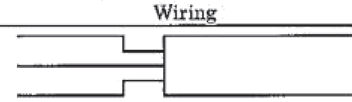
CN5~CN12 : 178289-3 (Amp, Ltd.)

PIN No.	Name		Specification	Input	Output	Wiring
A1	Power		12~24V DC	○		
B1	COM		500mA and over	○		
A2	Divided	A_2 phase	Complimentary		○	
B2	pulse	B_2 phase	output		○	
A3	output	Z_2 phase	100mA MAX		○	
B3	S H				○	



4.5 Power supply

P47-SJT-C0028A 3×18AWG L=2000 H-22 (Hitachi Cable, Ltd.)

PIN No.	Name	Specification	Input	Output	Wiring
1	R	100V AC±10%	○		
2	S	1A MAX	○		
3	G			○	

5. Name of parts

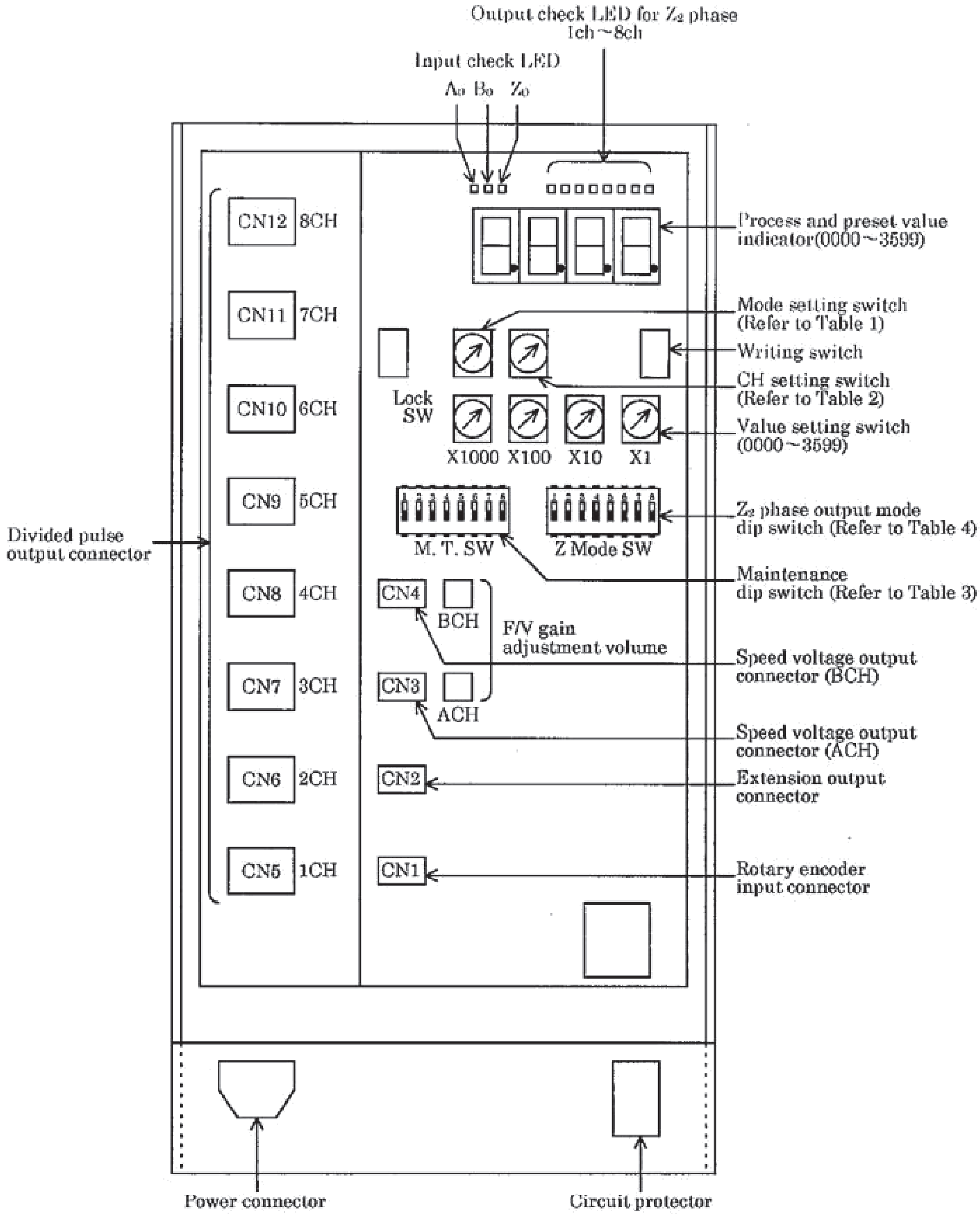


Table 1 Mode setting switch

0 : Usual (operating)

1 : Resolution of encoder setting

2 : Offset angle for Z_2 phase pulse setting

3 : Divided pulse setting

4 : Angle for Z_2 phase pulse comes on setting

5 : Angle for Z_2 phase pulse comes off setting

6 : F/V converter testing

7 : 7-segment LED testing

8 : Reserve

9 : Reserve

A : BOM1 (Use for shipping examination)

B : BOM2 (Use for shipping examination)

C : Reserve

D : Reserve

E : Reserve

F : Reserve

Table 2 CH setting switch

0 : Usual (operating) (F/V converter testing)

1 : 1CH ·········· F/V converter testing 1 (Pulse frequency for testing : 7.8125KHz)

2 : 2CH ·········· F/V converter testing 2 (Pulse frequency for testing : 15.625KHz)

3 : 3CH ·········· F/V converter testing 3 (Pulse frequency for testing : 31.25KHz)

4 : 4CH ·········· F/V converter testing 4 (Pulse frequency for testing : 62.54KHz)

5 : 5CH

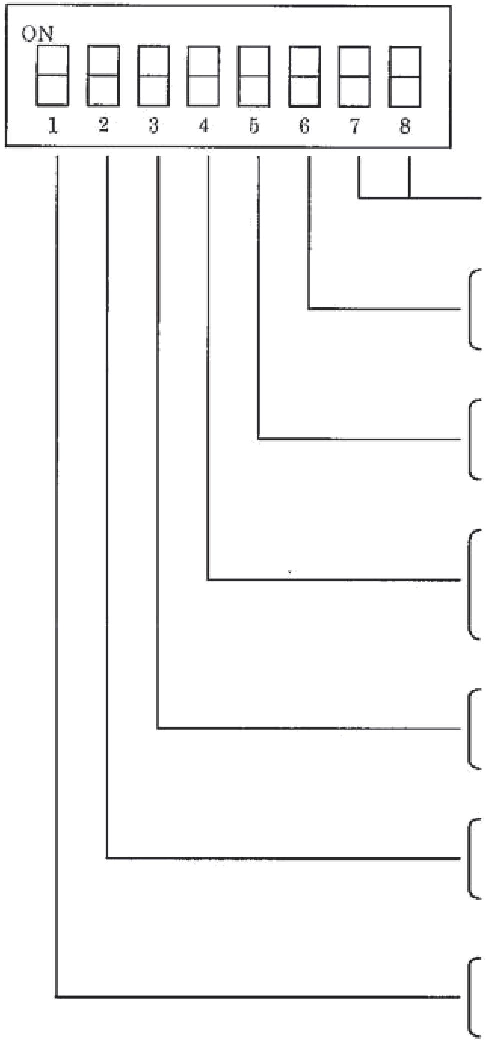
6 : 6CH

7 : 7CH

8 : 8CH

9 : Reserve

Table 3 Maintenance dip switch (M. T. SW)



[7] [8] Reserve

[6] Synchronous edge of Z_0 phase selecting (after offsetting)
OFF : Active Hi synchronizing (standard)
ON : Active Lo synchronizing

[5] Synchronous edge of Z_0 phase selecting
OFF : Active Hi synchronizing
ON : Active Lo synchronizing (standard)

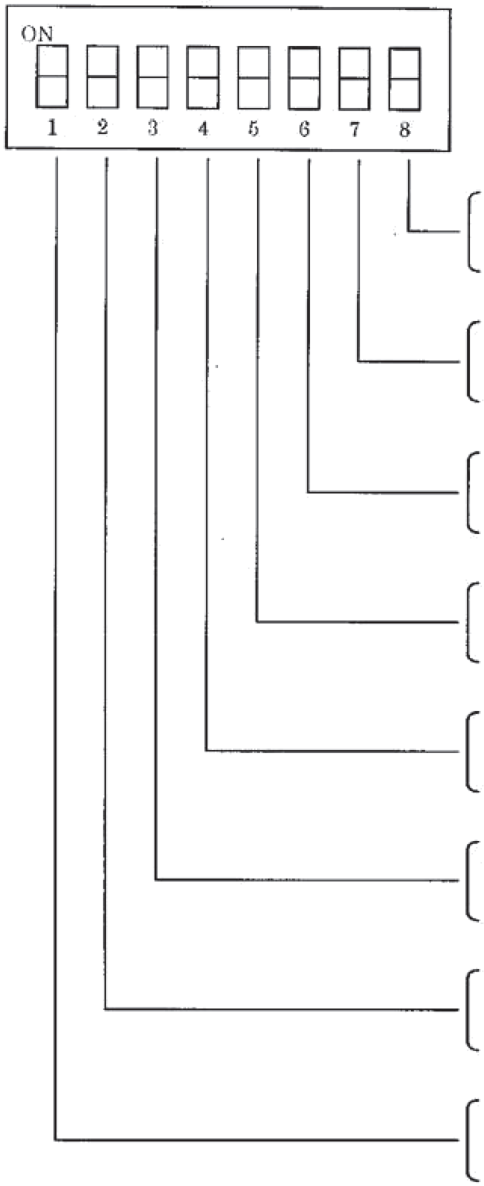
[4] Positive rotary direction setting
OFF : Watching from encoder shaft, CW
ON : Watching from encoder shaft, CCW
(In the case of adjusting speed voltage output, set ON)

[3] Z_0 phase logic
OFF : Positive logic (standard)
ON : Negative logic

[2] B_0 phase logic
OFF : Positive logic (standard)
ON : Negative logic

[1] A_0 phase logic
OFF : Positive logic (standard)
ON : Negative logic

Table 4 Z_2 phase output mode dip switch (Z Mode SW)



8 — 8CH Z_2 phase output mode setting
ON : 1 pulse/plate cylinder one rotation
OFF : 1 pulse/plate cylinder two rotation

7 — 7CH Z_2 phase output mode setting
ON : 1 pulse/plate cylinder one rotation
OFF : 1 pulse/plate cylinder two rotation

6 — 6CH Z_2 phase output mode setting
ON : 1 pulse/plate cylinder one rotation
OFF : 1 pulse/plate cylinder two rotation

5 — 5CH Z_2 phase output mode setting
ON : 1 pulse/plate cylinder one rotation
OFF : 1 pulse/plate cylinder two rotation

4 — 4CH Z_2 phase output mode setting
ON : 1 pulse/plate cylinder one rotation
OFF : 1 pulse/plate cylinder two rotation

3 — 3CH Z_2 phase output mode setting
ON : 1 pulse/plate cylinder one rotation
OFF : 1 pulse/plate cylinder two rotation

2 — 2CH Z_2 phase output mode setting
ON : 1 pulse/plate cylinder one rotation
OFF : 1 pulse/plate cylinder two rotation

1 — 1CH Z_2 phase output mode setting
ON : 1 pulse/plate cylinder one rotation
OFF : 1 pulse/plate cylinder two rotation

6. Setting

6.1 How to set resolution of encoder (shipment setting : 3600)

1) Release Lock switch.
2) Change Mode setting switch into 1.
3) Change CH setting switch into 0.
4) Set Value setting switch appropriately(0~3600).
5) Turn on Writing switch to Writing side.

6.2 How to set offset angle for Z_2 phase pulse (shipment setting : 0)

1) Release Lock switch.
2) Change Mode setting switch into 2.
3) Change CH setting switch into 0.
4) Set Value setting switch appropriately(0~3599).
5) Turn on Writing switch to Writing side.

6.3 How to set divided pulse (shipment setting : 0 (each CH))

1) Release Lock switch.
2) Change Mode setting switch into 3.
3) Change CH setting switch into appropriate CH (Refer to Table2).
4) Set Value setting switch appropriately(1~99).
5) Turn on Writing switch to Writing side.

Set value	Corresponding encoder
1	3600ppr
2	1800ppr
3	1200ppr
4	900ppr

Set value	Corresponding encoder
6	600ppr
10	360ppr
12	300ppr
80	45ppr

(resolution of Corresponding encoder)=(3600ppr)／(set value)

6.4 How to set angle for Z_2 phase pulse comes on (shipment setting : 0 (each CH))

1) Release Lock switch.
2) Change Mode setting switch into 4.
3) Change CH setting switch into appropriate CH (Refer to Table2).
4) Set Value setting switch appropriately(0~3599).
5) Turn on Writing switch to Writing side.

6.5 How to set angle for Z_2 phase pulse comes off (shipment setting : 0 (each CH))

1) Release Lock switch.
2) Change Mode setting switch into 5.
3) Change CH setting switch into appropriate CH (Refer to Table2).
4) Set Value setting switch appropriately(0~3599).

5) Turn on Writing switch to Writing side.

6.6 Other matters

1) Please turn on Lock switch to Lock side, change Mode setting switch into 0, and change CH setting switch into 0 after you complete each setting.

2) If you make this system indicate current preset value which you set in each of chap.6.1～6.5, please practice 2)～4) of each chapter.

3) If you make this system run without turning on Lock switch to Lock side, the indicator flicker. And if you turn on Writing switch to Writing side by mistake in this situation, this system has the trouble that each set value changes.

7. Speed voltage output adjusting

1) Release Lock switch.
2) Change Mode setting switch into 6.
3) Turn on M. T. SW No.4.
4) Change CH setting switch into appropriate CH (refer to Table2).
5) Adjust voltage between voltage output terminal FV+ and FV− with gain adjustment volume of each voltage output cannel (CN3 : ACH, CN4 : BCH) as follows.
(Please turn on Lock switch to Lock side, change Mode setting switch into 0, change CH setting switch into 0, and turn off M. T. SW No.4 after you complete adjusting.)

(1) Maximum speed=450rpm

CH setting switch	Voltage at maximum speed				
	10V	8V	6V	5V	
4	—	—	—	—	Output voltage
3	—	9.26V	6.94V	5.79V	
2	5.79V	4.63V	3.47V	2.89V	
1	2.89V	2.31V	1.74V	1.45V	

(2) Maximum speed=500rpm

CH setting switch	Voltage at maximum speed				
	10V	8V	6V	5V	
4	—	—	—	—	Output voltage
3	—	8.33V	6.25V	5.21V	
2	5.21V	4.17V	3.13V	2.60V	
1	2.60V	2.08V	1.56V	1.30V	

(3) Maximum speed=700rpm

CH setting switch	Voltage at maximum speed				
	10V	8V	6V	5V	
4	—	—	8.93V	7.44V	Output voltage
3	7.44V	5.95V	4.46V	3.72V	
2	3.72V	2.98V	2.23V	1.86V	
1	1.86V	1.49V	1.12V	0.93V	

(4) Maximum speed=750rpm

CH setting switch	Voltage at maximum speed				
	10V	8V	6V	5V	
4	—	—	8.33V	6.94V	Output voltage
3	6.94V	5.56V	4.17V	3.47V	
2	3.47V	2.78V	2.08V	1.74V	
1	1.74V	1.39V	1.04V	0.87V	

(5) Maximum speed=800rpm

CH setting switch	Voltage at maximum speed				
	10V	8V	6V	5V	
4	—	—	7.81V	6.51V	Output voltage
3	6.51V	5.21V	3.91V	3.26V	
2	3.26V	2.60V	1.95V	1.63V	
1	1.63V	1.30V	0.98V	0.81V	

(6) Maximum speed=1000rpm

CH setting switch	Voltage at maximum speed				
	10V	8V	6V	5V	
4	—	8.33V	6.25V	5.21V	Output voltage
3	5.21V	4.17V	3.12V	2.60V	
2	2.60V	2.08V	1.56V	1.30V	
1	1.30V	1.04V	0.78V	0.65V	

$$\left(\text{Test voltage}\right)=\frac{(\text{Test frequency})}{\left(\text{Maximum speed[rpm]}\right)/60\times3600}\times\left(\text{Maximum voltage}\right)$$

NEW PULSE BRANCH SETTING

	mode	ch0	ch1	ch2	ch3	ch4	ch5	ch6	ch7	ch8
Encoder resolution setting	1	3600								
Z2 angle offset	2	0								
DIVIDED PULSE RATIO	3				10	6				
Z PULSE ON	4		899	2699		3593	X-10	(X-10)+900		
Z PULSE OFF	5		1799	3599		3599	X+10	(X+10)+900		
SPEED VOLATGE RATIO	6		1.3	2.6	5.21	10.46				

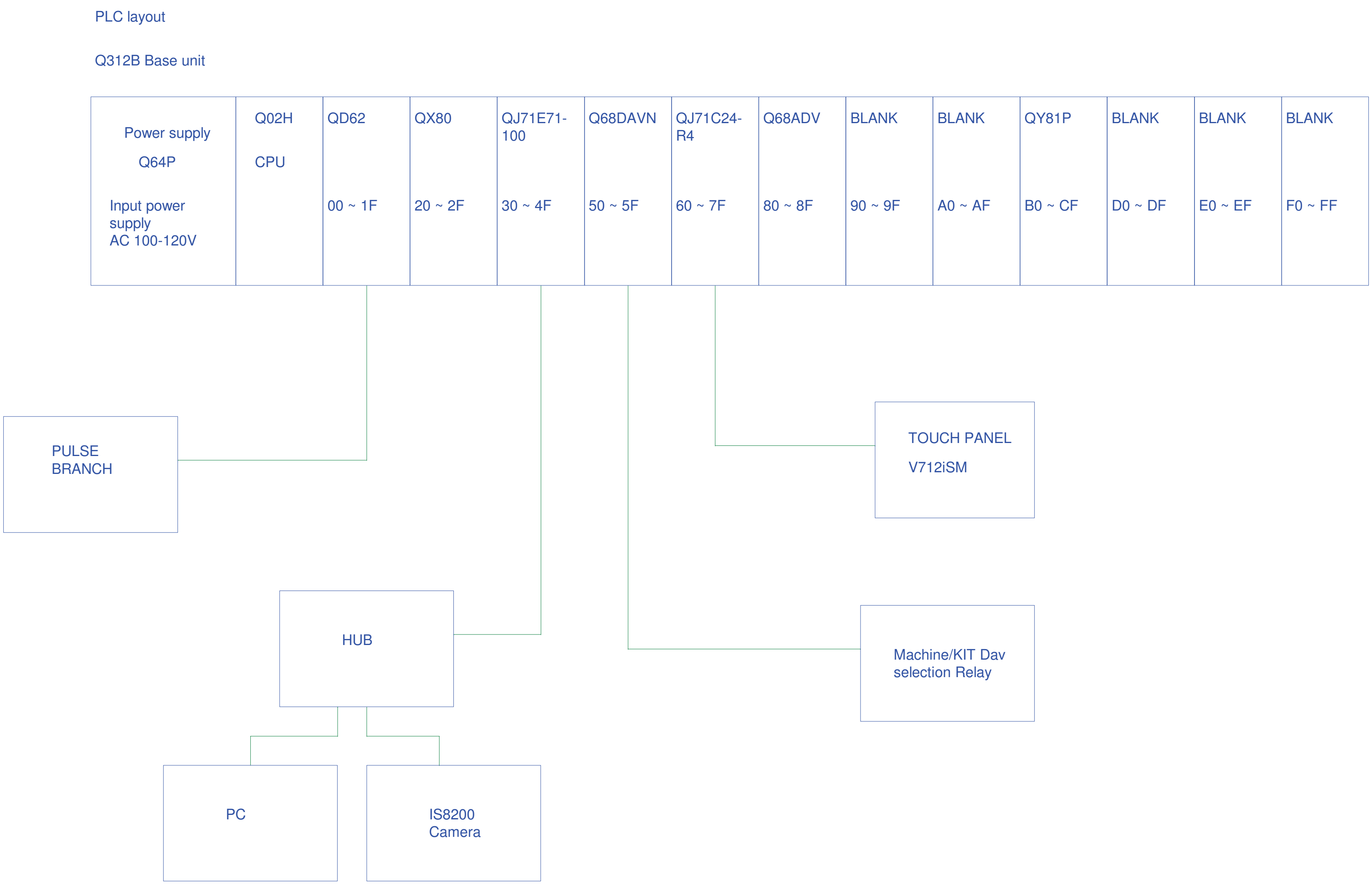
OLD PULSE BRANCH SETTING

	mode	ch0	ch1	ch2	ch3	ch4	ch5	ch6	ch7	ch8	ch9
Encoder resolution setting	1	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
Z2 angle offset	2	0	0	0	0	0	0	0	0	0	0
DIVIDED PULSE RATIO	3	----	0	0	10	6	0	0	0	0	---
Z PULSE ON	4	----	899	2699	0	3593	1622	2522	0	0	---
Z PULSE OFF	5	----	1799	3599	0	3599	1642	2542	0	0	---
SPEED VOLATGE RATIO	6 CN3	1.5	1.5	3.0	6.2	12.4	12.4		0	0	
	CN4	1.5	1.5	3.0	6.2	12.4	12.4				

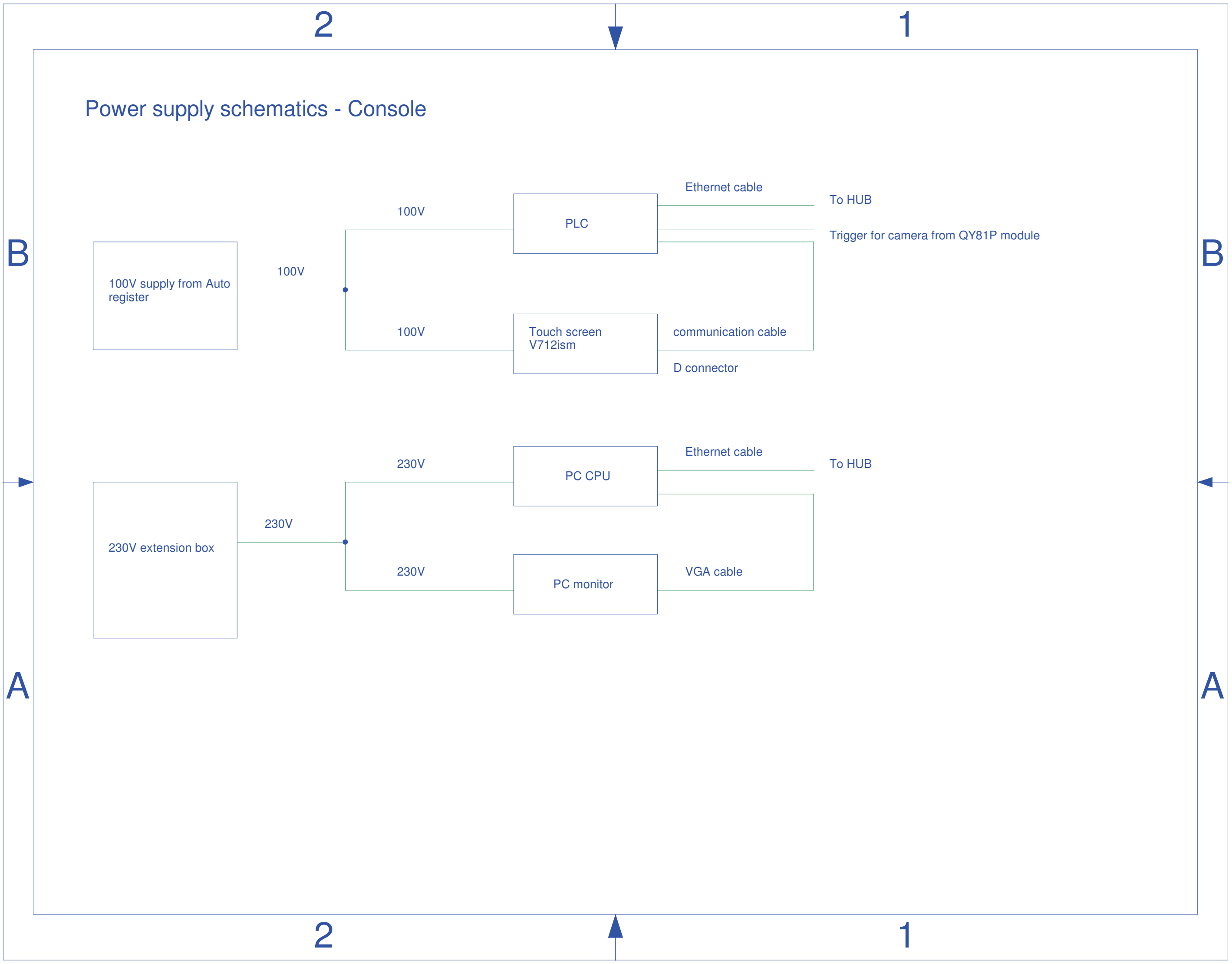
F_ _- F_ _1 F_ _2 F_ _3 F_ _4 F_ _-

F. SCHEMATICS / CONNECTION DIAGRAM OF CONTROL SYSTEM

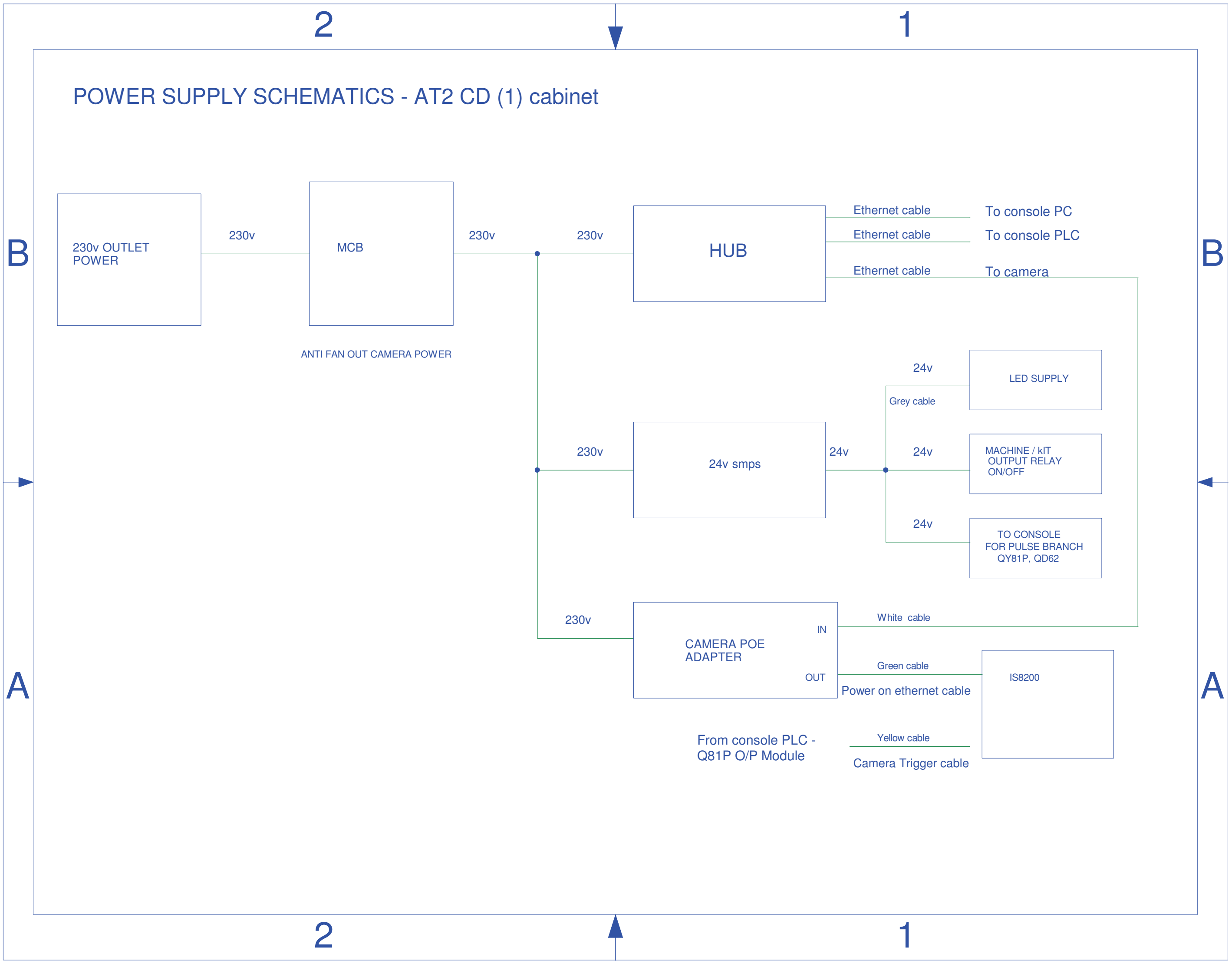
Schematics - PLC layout

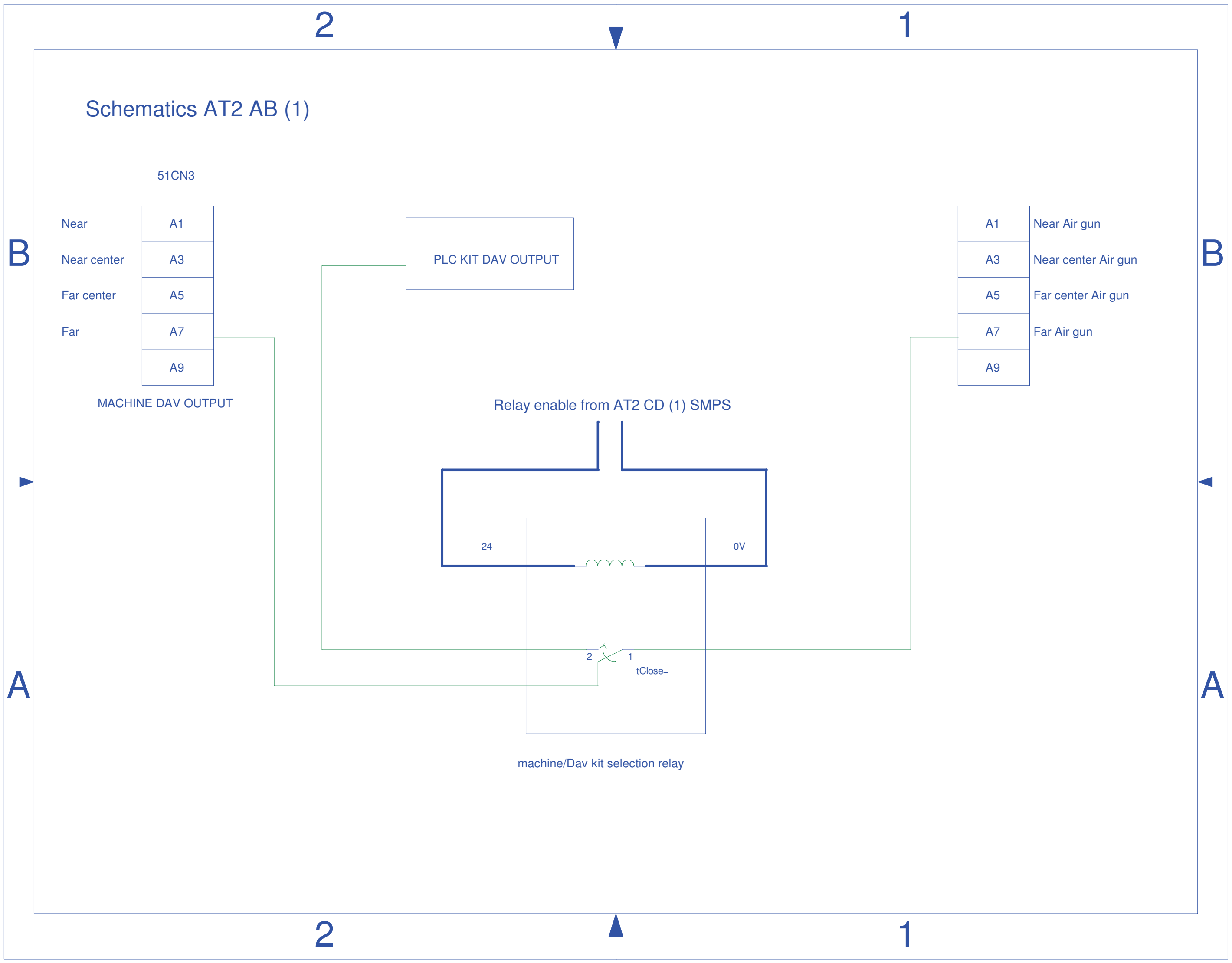


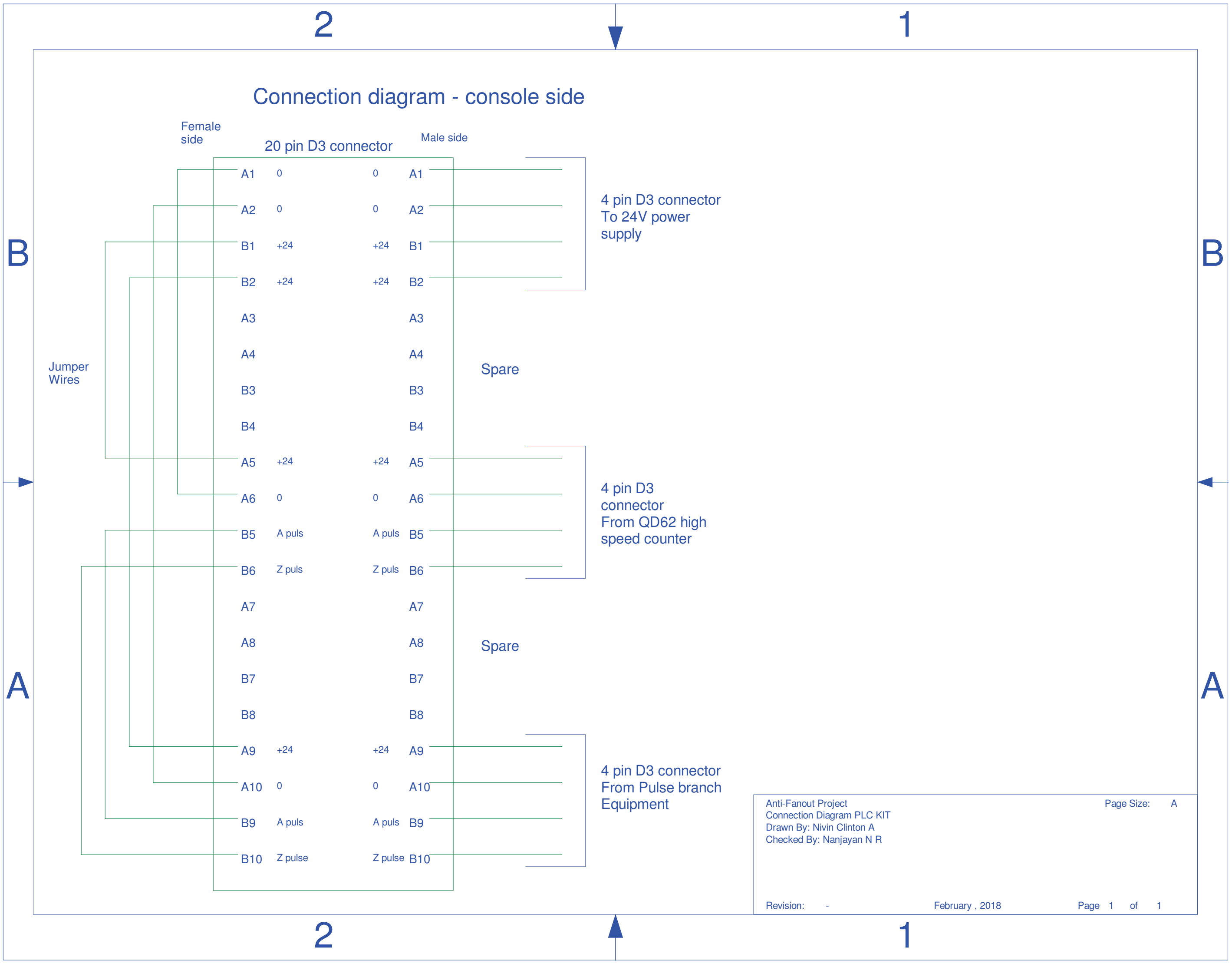
Power supply schematics - Console



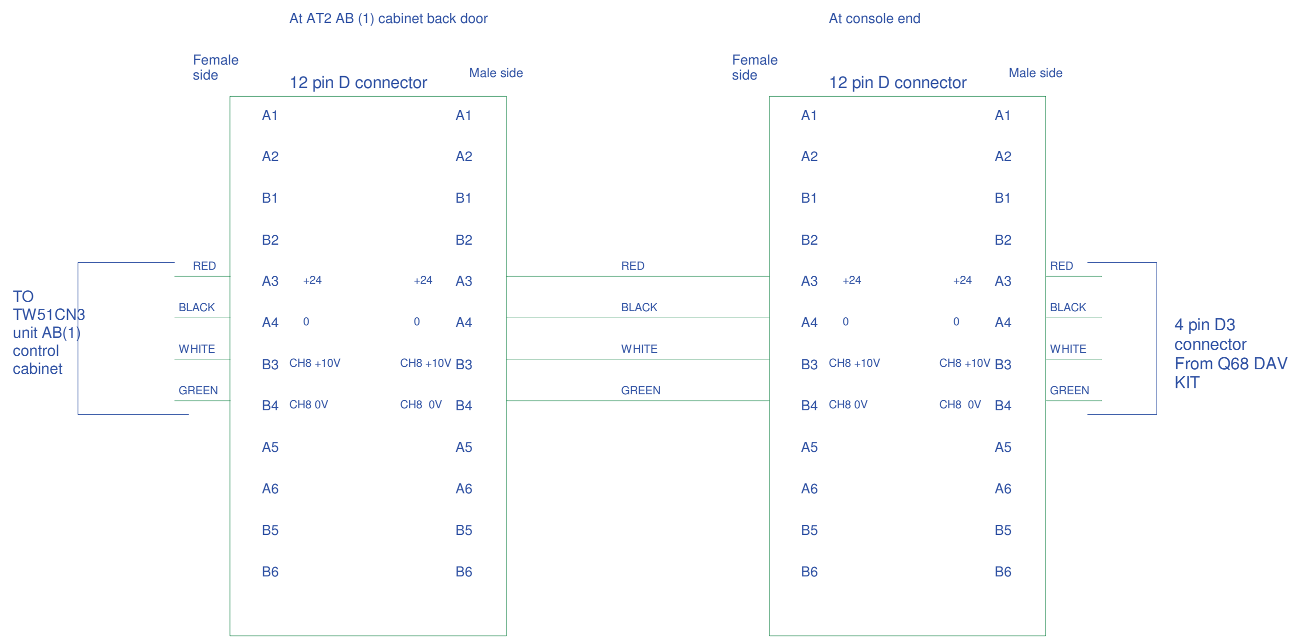
POWER SUPPLY SCHEMATICS - AT2 CD (1) cabinet




2
1
Schematics AT2 AB (1)
51CN3
Near
A1
Near center
A3
Far center
A5
Far
A7
A9
MACHINE DAV OUTPUT
PLC KIT DAV OUTPUT
A1
Near Air gun
A3
Near center Air gun
A5
Far center Air gun
A7
Far Air gun
A9
B
B
Relay enable from AT2 CD (1) SMPS
24
0V
2
1
tClose=
A
A
machine/Dav kit selection relay
2
1


Connection diagram - console side
Female side
20 pin D3 connector
Male side
A1 0 0 A1
A2 0 0 A2
B1 +24 +24 B1
B2 +24 +24 B2
A3 A3
A4 A4
B3 B3
B4 B4
A5 +24 +24 A5
A6 0 0 A6
B5 A puls A puls B5
B6 Z puls Z puls B6
A7 A7
A8 A8
B7 B7
B8 B8
A9 +24 +24 A9
A10 0 0 A10
B9 A puls A puls B9
B10 Z pulse Z pulse B10
Jumper Wires
4 pin D3 connector To 24V power supply
Spare
4 pin D3 connector From QD62 high speed counter
Spare
4 pin D3 connector From Pulse branch Equipment
Anti-Fanout Project
Connection Diagram PLC KIT
Drawn By: Nivin Clinton A
Checked By: Nanjayan N R
Page Size: A
Revision: -
February , 2018
Page 1 of 1
2
1
B
A

Connection diagram of DAV

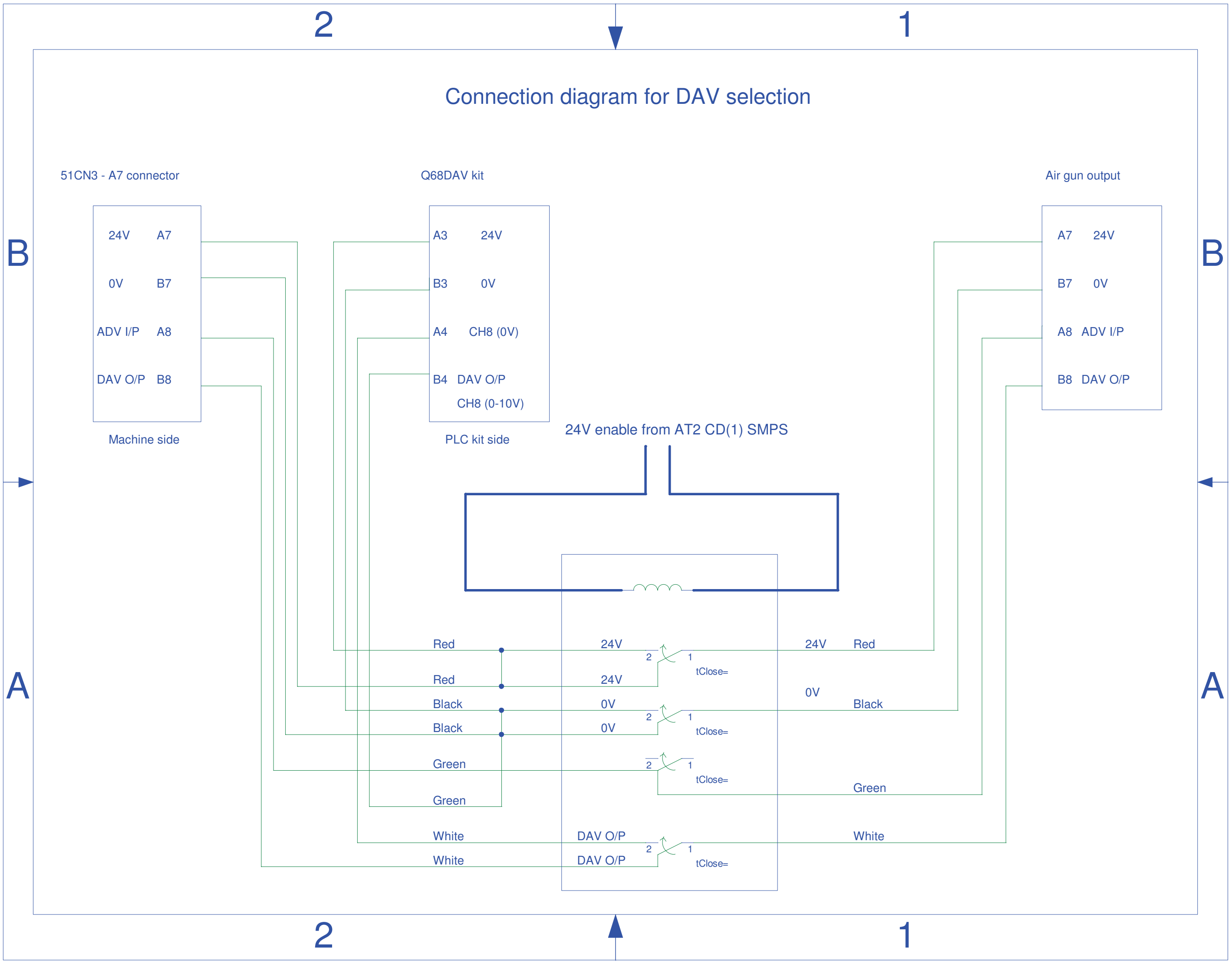


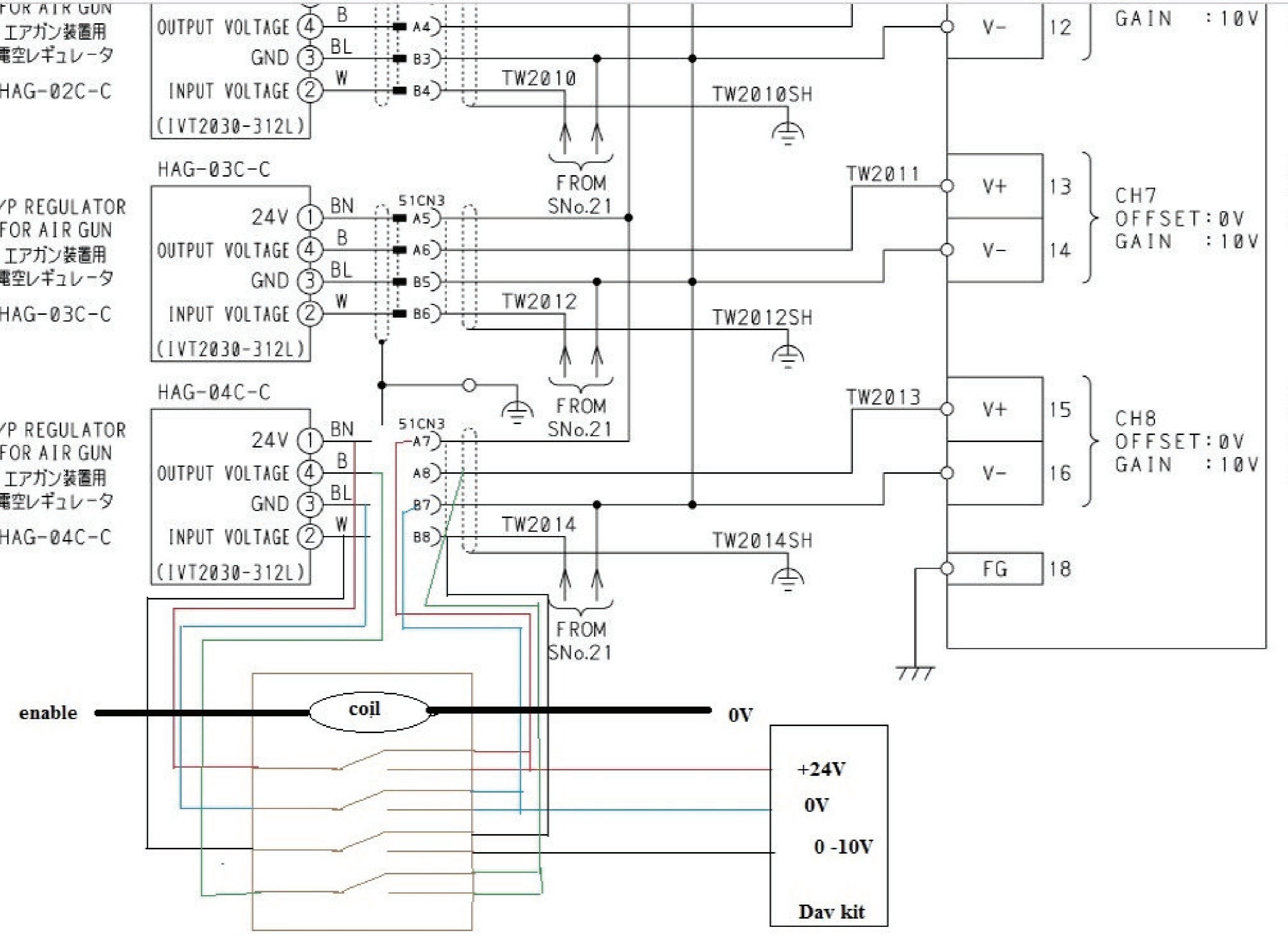
Anti-Fanout Project
Connection Diagram PLC KIT
Drawn By: Nivin Clinton A
Checked By: Nanjayan N R

Page Size: A

Revision: -   February , 2018   Page 1 of 1

Connection diagram for DAV selection





FOR AIR GUN
エアガン装置用
電空レギュレータ
HAG-02C-C
OUTPUT VOLTAGE
GND
INPUT VOLTAGE
(IVT2030-312L)
HAG-03C-C
V/P REGULATOR
FOR AIR GUN
エアガン装置用
電空レギュレータ
HAG-03C-C
24V
OUTPUT VOLTAGE
GND
INPUT VOLTAGE
(IVT2030-312L)
HAG-04C-C
V/P REGULATOR
FOR AIR GUN
エアガン装置用
電空レギュレータ
HAG-04C-C
24V
OUTPUT VOLTAGE
GND
INPUT VOLTAGE
(IVT2030-312L)
BN
B
BL
W
51CN3
A4
B3
B4
A5
A6
B5
B6
A7
A8
B7
B8
TW2010
TW2010SH
TW2011
TW2012
TW2012SH
TW2013
TW2014
TW2014SH
FROM SNo.21
V+
V−
FG
12
13
14
15
16
18
GAIN :10V
CH7
OFFSET:0V
GAIN :10V
CH8
OFFSET:0V
GAIN :10V
enable
coil
0V
+24V
0V
0 -10V
Dav kit