IP3416 Diagnostics

Two diagnostic RLL programs are supplied with the IP-EPS software. One will test all the digital inputs and outputs and the other will test the two high-speed inputs. The filenames of these programs are, ***diag34.rll*** and ***diagHSI.rll*** and listings are provided below**.**

To test the inputs and outputs of the IP3416, wire them up as shown in Figure 1. Then download the ***diag34.rll*** RLL program into the IP3416. This program will cycle the outputs on/off and sense the inputs for the proper state. If the outputs and inputs do not match, then the program will stop cycling through the outputs and display an error. The error number indicates which input failed and if it was a high (upper green LED ON) or low (lower green LED ON) failure.

To test the high-speed inputs, download the ***diagHSI.rll*** RLL program into the IP3416 and wire X32 and X33 as shown in Figure 2. Y14 and Y15 will provide 1KHz. PWM outputs. This pulse train will then be counted and if the value is less than 1 kHz an error condition will occur and the appropriate input number will be displayed to indicate an error.

To test the analog inputs connect a 10 KΩ potentiometer to the specific input as show in Figure 3. Then place the following RLL into the PLC,

```
  |                                        |
  |                                        |Display analog value of X24.
1 |--------------------------------[A24]---|
  |                                        |
  |                                        |
2 |--------------------------------(E)-----|
```

The program will display the contents of the analog value. Vary the potentiometer and see the specific change in the analog input. Change rung 1 for the specific analog input you are testing.

The PLCs shipped from the factory contain the self diagnostic program that turns outputs on and off randomly, it is important that you download your own application program to the PLC before you wire it to any live equipment in the field.

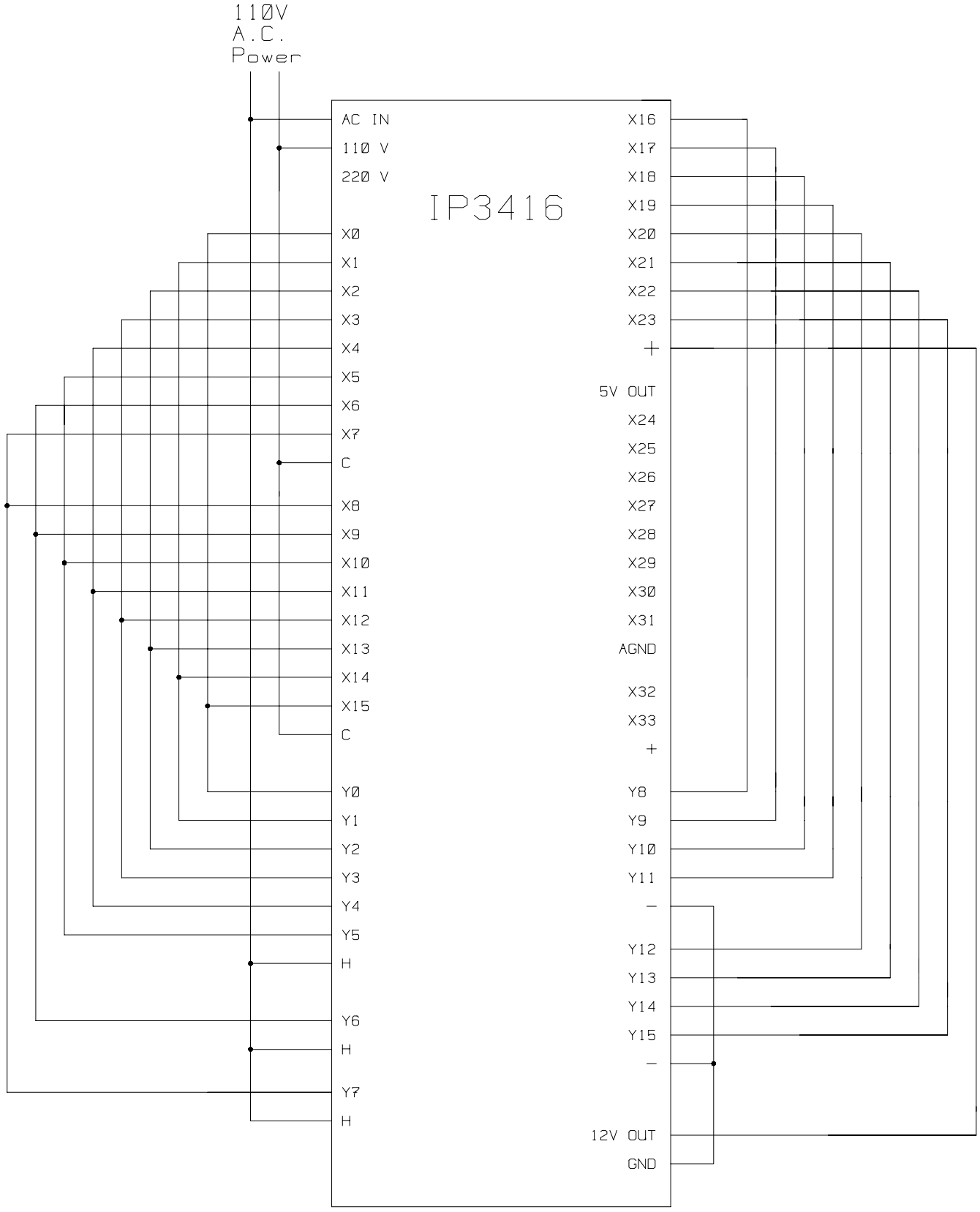

Figure 1. Wiring diagram for diagnostics

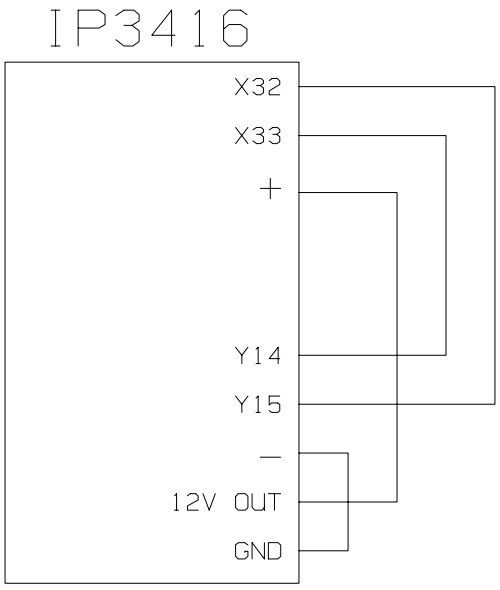

Figure 2. Wiring for high speed input diagnostics

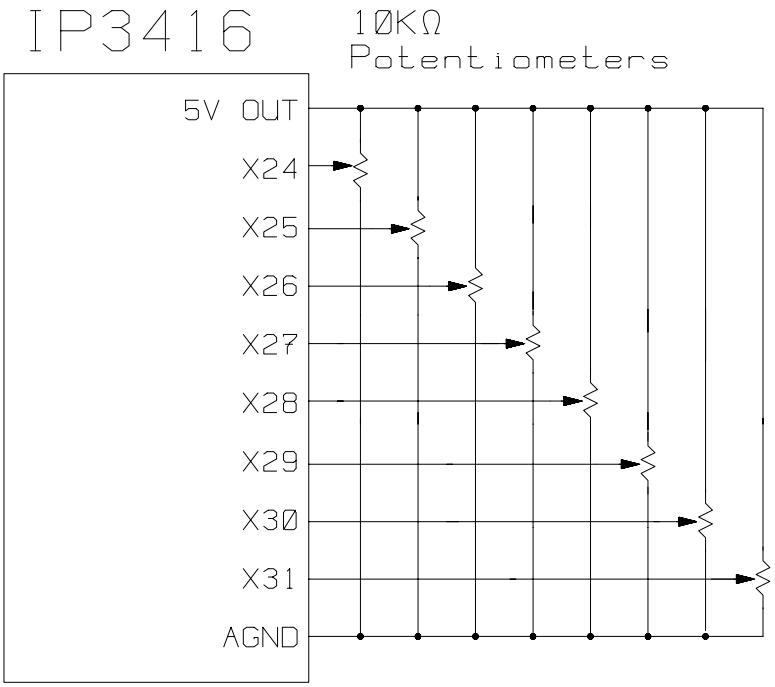

Figure 3. Wiring for analog input diagnostics

diag34

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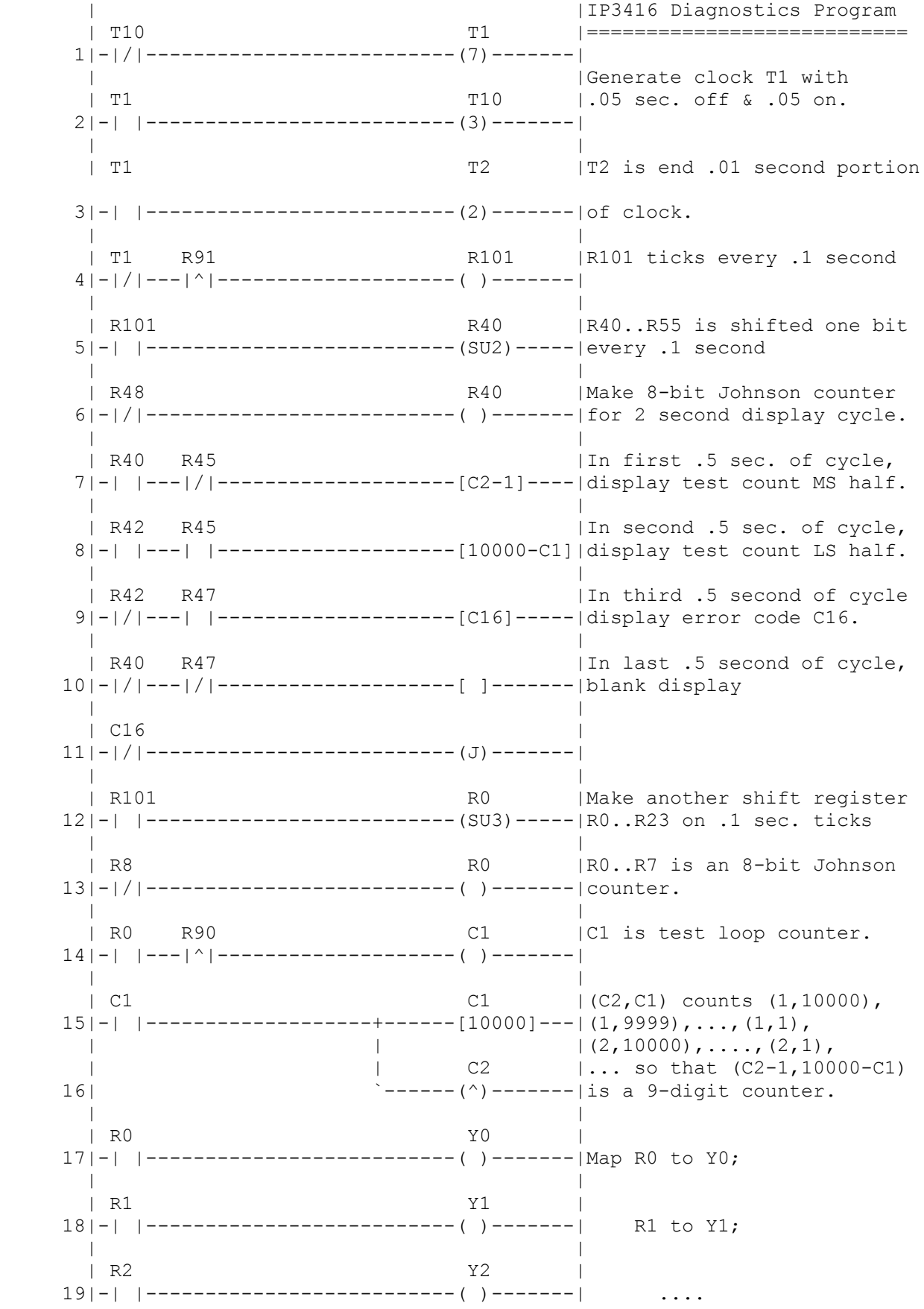
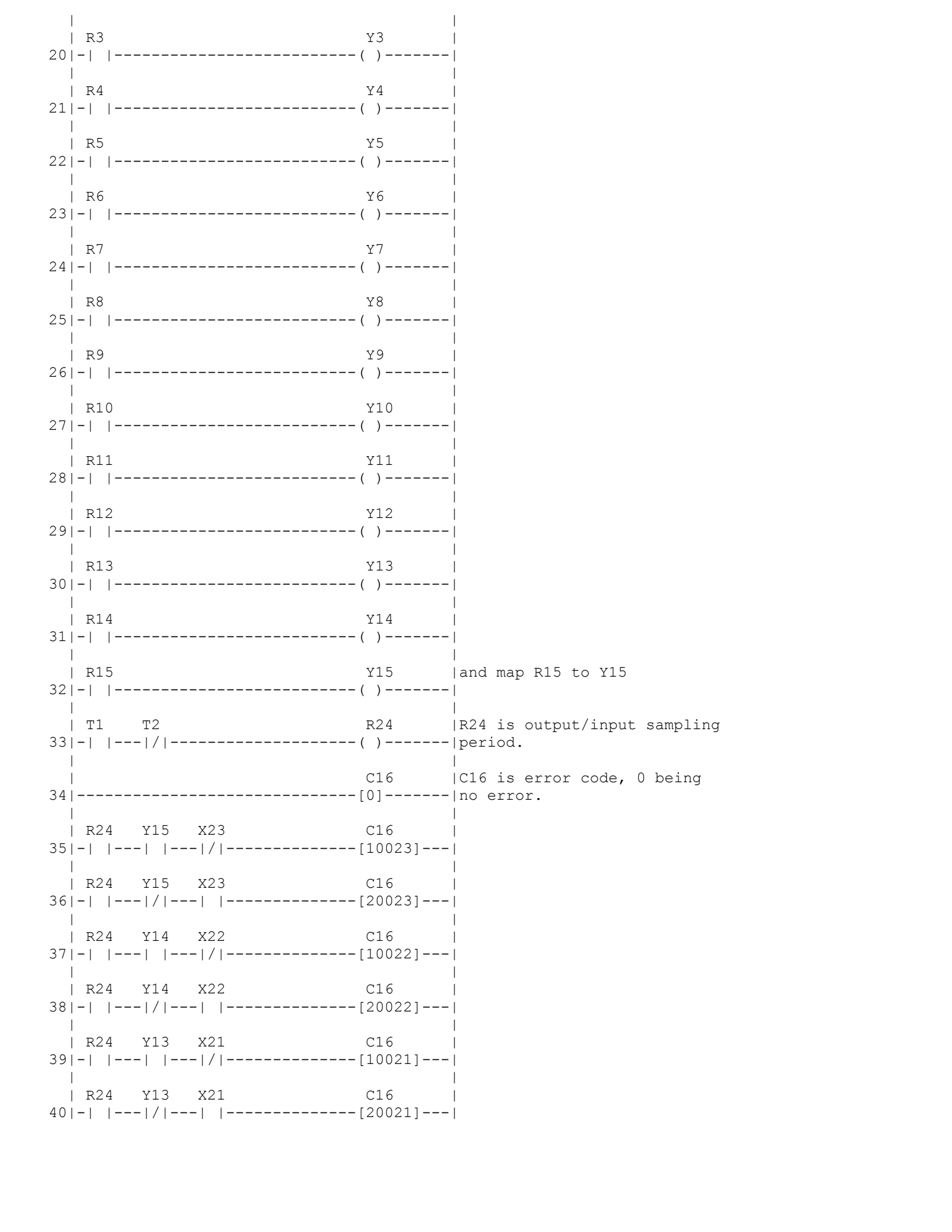
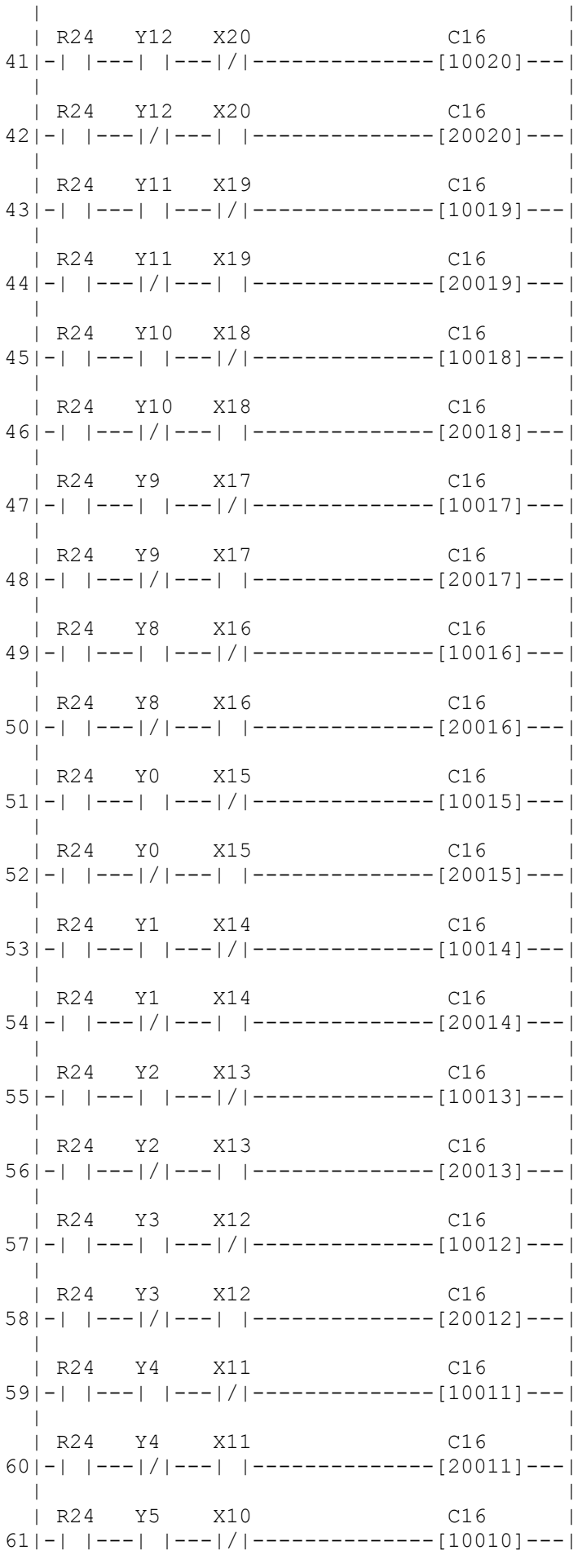
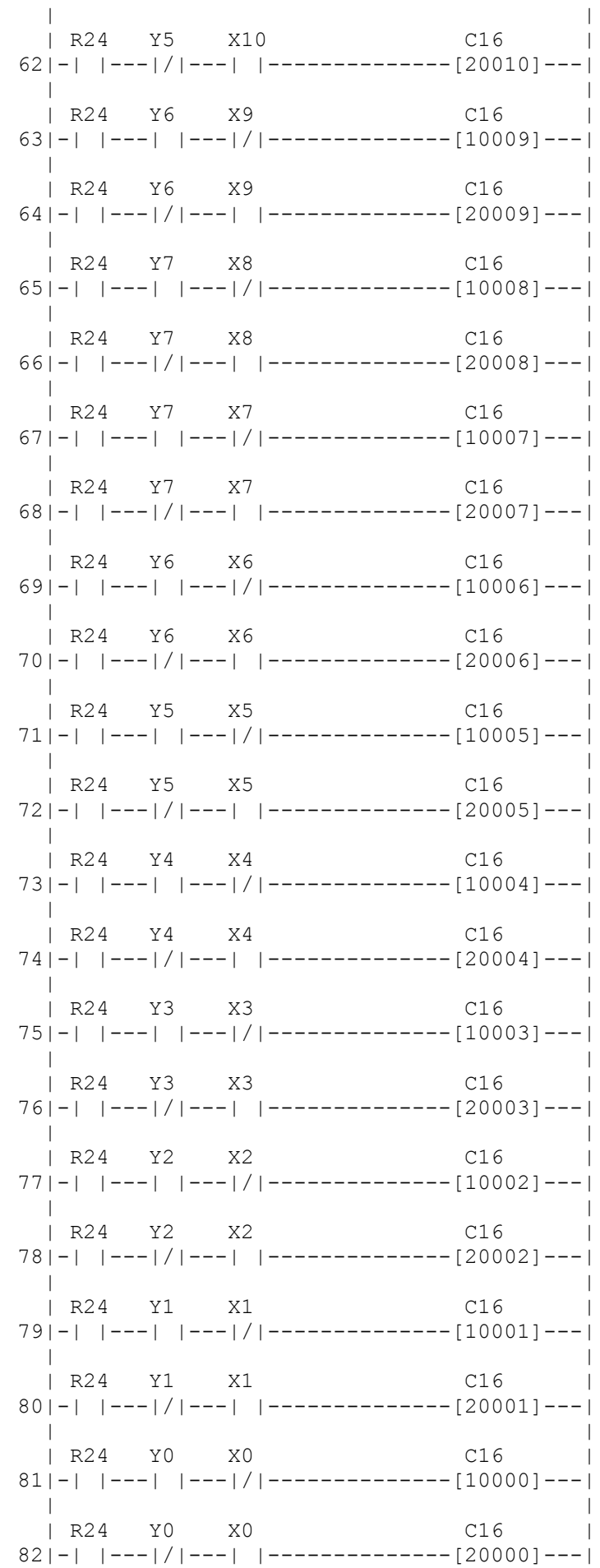



R3
Y3
R4
Y4
R5
Y5
R6
Y6
R7
Y7
R8
Y8
R9
Y9
R10
Y10
R11
Y11
R12
Y12
R13
Y13
R14
Y14
R15
Y15
and map R15 to Y15
T1
T2
R24
R24 is output/input sampling
period.
C16
C16 is error code, 0 being
no error.
[0]
R24
Y15
X23
C16
[10023]
R24
Y15
X23
C16
[20023]
R24
Y14
X22
C16
[10022]
R24
Y14
X22
C16
[20022]
R24
Y13
X21
C16
[10021]
R24
Y13
X21
C16
[20021]


R24 Y12 X20 C16 10020
R24 Y12 X20 C16 20020
R24 Y11 X19 C16 10019
R24 Y11 X19 C16 20019
R24 Y10 X18 C16 10018
R24 Y10 X18 C16 20018
R24 Y9 X17 C16 10017
R24 Y9 X17 C16 20017
R24 Y8 X16 C16 10016
R24 Y8 X16 C16 20016
R24 Y0 X15 C16 10015
R24 Y0 X15 C16 20015
R24 Y1 X14 C16 10014
R24 Y1 X14 C16 20014
R24 Y2 X13 C16 10013
R24 Y2 X13 C16 20013
R24 Y3 X12 C16 10012
R24 Y3 X12 C16 20012
R24 Y4 X11 C16 10011
R24 Y4 X11 C16 20011
R24 Y5 X10 C16 10010


R24 Y5 X10 C16 [20010]
R24 Y6 X9 C16 [10009]
R24 Y6 X9 C16 [20009]
R24 Y7 X8 C16 [10008]
R24 Y7 X8 C16 [20008]
R24 Y7 X7 C16 [10007]
R24 Y7 X7 C16 [20007]
R24 Y6 X6 C16 [10006]
R24 Y6 X6 C16 [20006]
R24 Y5 X5 C16 [10005]
R24 Y5 X5 C16 [20005]
R24 Y4 X4 C16 [10004]
R24 Y4 X4 C16 [20004]
R24 Y3 X3 C16 [10003]
R24 Y3 X3 C16 [20003]
R24 Y2 X2 C16 [10002]
R24 Y2 X2 C16 [20002]
R24 Y1 X1 C16 [10001]
R24 Y1 X1 C16 [20001]
R24 Y0 X0 C16 [10000]
R24 Y0 X0 C16 [20000]

diaghsi.prn

```
          IP3416 RELAY LADDER LOGIC

   |1st s                                    |On the first scan, set the PWM
   | R248                                    |parameters for Y14 and Y15 to
 1|-| |-------------------------(S26)-------|output a 1 kHz. signal.
   |                                         |
   |                            T15          |Start a 1 second timer to wait
 2|----------------------------(100)-------|for everything to initialize.
   |                                         |
   | T15                                     |If 1 second warm-up hasn't
 3|-|/|-------------------------(J)--------|happened, then skip program.
   |                                         |
   | X32                         C16         |Count the pulses on X32.
 4|-| |-------------------------(^)--------|
   |                                         |
   | T0                          T1          |
 5|-|/|-------------------------(51)-------|Start a 1 second periodic timer.
   |                                         |
   | T1                          T0          |
 6|-| |-------------------------(51)-------|
   |                                         |Every second calculate the
   | T1    R100                              |number of pulses on both HS
 7|-| |---|^|--------------------(S13)------|inputs.
   |                                         |
   | C5    T1                                |If C5 is 0, then there is no
 8|-| |---| |-+------------------[C10]------|error, so display number of
   |           |                             |passes.
   |           | R101              C10       |
 9|           `-|^|--------------[C10+1]----|Increment number of passes.
   |                                         |
   | C5    T1                                |
10|-| |---|/|--------------------[ ]--------|There was an error, so blink
   |                                         |display and display number of
   | C5                                      |input with error.
11|-|/|-------------------------[C5]-------|
   |                                         |
   |                                         |
12|-----------------------------(E)--------|==========================
   |                                         |CHECK HS INPUTS SUBROUTINE
   | C5                                      |==========================
13|-|/|-------------------------(RT)-------|Error already occurred, so skip
   |                                         |subroutine.
   |                              C31        |
14|------------------------------[C16-1000]|Check X32 for >= 1000 pulses.
   |Overf                                    |
   | R31                          C5         |
15|-| |-------------------------[32]-------| < 1000 pulses so set C5 to 32
   |                                         |to indicate error on X32.
   |                              C16        |
16|------------------------------[0]--------|
   |                                         |
   |                              C1         |Calculate current value of HSC.
17|-------------------------[D49*256+D48]---|
   |                                         |
   |                              C31        |Calculate number of pulse into
18|------------------------------[C1-C0]----|HSC.
   |Overf                                    |
   | R31                          C31        |HSC has wrapped around so
19|-| |---------------------[32767-C0+C1]---|perform calculation for pulses.
   |                                         |
   |                              C31        |
20|------------------------------[C31-1000]|Check X33 for >= 1000 pulses.
```

```
  |Overf                                  |
  | R31                    C5             | < 1000 pulses so set C5 to
21|-| |----------------------[C5*100+33]    | indicate X33 has error.
  |                                       |
  |                        C0             |Make current value of HSC into
22|-------------------------[C1]----------|previous value.
  |                                       |
  |                                       |Return from subroutine.
23|-------------------------(RT)----------|======================
  |                       PWM S           |PWM FORMAT SUBROUTINE
  |                        D53            |======================
24|-------------------------[5]-----------|Set PWM scale to 5 * 4 micro Sec
  |                       Y14 P           | = 0.02 msec
  |                        D42            |
25|-------------------------[50]----------|Set Y14 period to 50 * 0.02 msec
  |                       Y14 D           | = 1 msec
  |                        D46            |
26|-------------------------[40]----------|Set Y14 duty to 40 * 0.02 msec.
  |                       Y15 P           | = 0.8 msec.
  |                        D43            |
27|-------------------------[50]----------|Set Y15 period to 1 msec.
  |                       Y15 D           |
  |                        D47            |
28|-------------------------[40]----------|Set Y15 duty to 0.8 msec.
  |                                       |
  |                        C0             |Store current value of HSC into
29|----------------------[D49*256+D48]----|C0.
  |                                       |
  |                                       |
30|-------------------------(RT)----------|Return from subroutine
  |                                       |
  |                                       |
31|---------------------------------------|
```