Example 1

WinProladder   FP-07

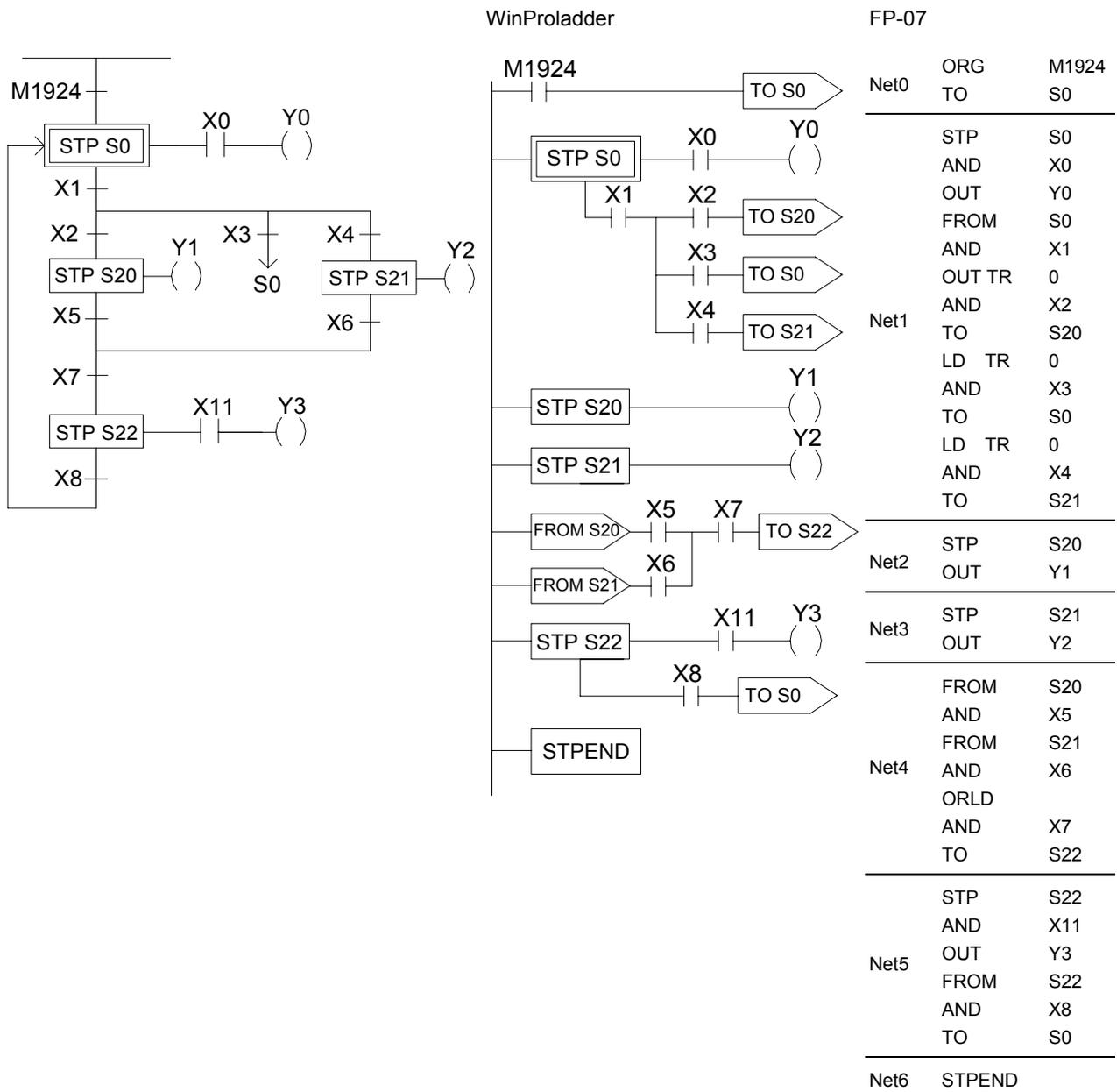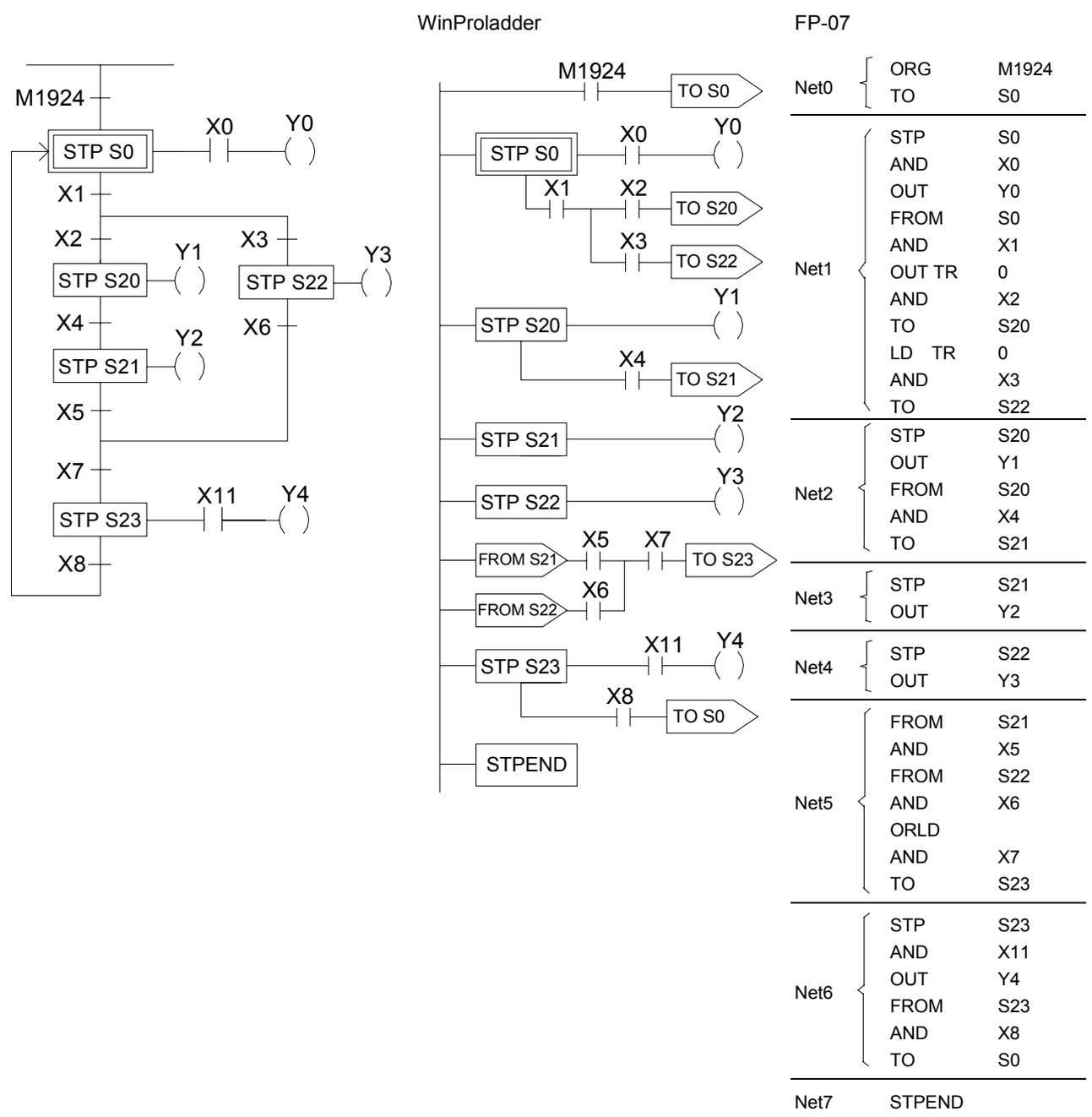|		
Net0	ORG	M1924
	TO	S0
Net1	STP	S0
	AND	X0
	OUT	Y0
	FROM	S0
	AND	X1
	OUT TR	0
	AND	X2
	TO	S20
	LD TR	0
	AND	X3
	TO	S0
	LD TR	0
	AND	X4
	TO	S21
Net2	STP	S20
	OUT	Y1
Net3	STP	S21
	OUT	Y2
Net4	FROM	S20
	AND	X5
	FROM	S21
	AND	X6
	ORLD	
	AND	X7
	TO	S22
Net5	STP	S22
	AND	X11
	OUT	Y3
	FROM	S22
	AND	X8
	TO	S0
Net6	STPEND	

Description   1. Input the condition to initial step S0

2. Input the S0 and the divergent conditions of S20, S0 and S21

3. Input the S20

4. Input the S21

5. Input the convergence of S20 and S21
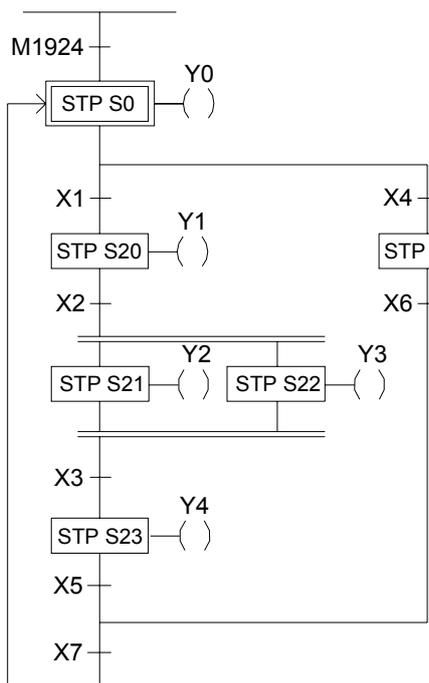
6. Input the S22

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Example 2

WinProladder   FP-07

M1924 ─┤├──[TO S0 >

| Net0 | ORG | M1924 |
| | TO | S0 |

STP S0 ──X0──Y0──( )

Net1	STP	S0
	AND	X0
	OUT	Y0
	FROM	S0
	AND	X1
	OUT TR	0
	AND	X2
	TO	S20
	LD TR	0
	AND	X3
	TO	S22

Net2	STP	S20
	OUT	Y1
	FROM	S20
	AND	X4
	TO	S21

| Net3 | STP | S21 |
| | OUT | Y2 |

| Net4 | STP | S22 |
| | OUT | Y3 |

Net5	FROM	S21
	AND	X5
	FROM	S22
	AND	X6
	ORLD	
	AND	X7
	TO	S23

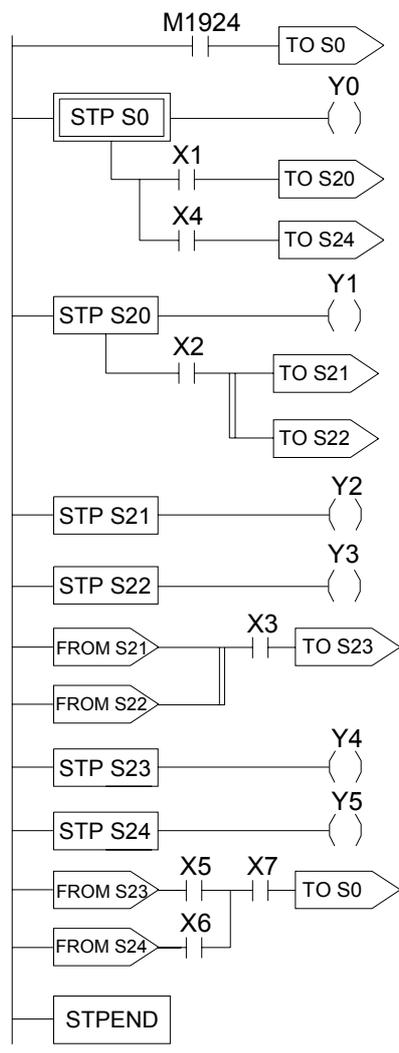| Net6 | STP | S23 |
	AND	X11
	OUT	Y4
	FROM	S23
	AND	X8
	TO	S0

| Net7 | STPEND | |

Description

1. Input the condition to initial step S0

2. Input the S0 and the divergent condition of S20 and S22

3. Input the S20

4. Input the S21

5. Input the S22

6. Input the convergence of S21 and S22

7. Input the S23
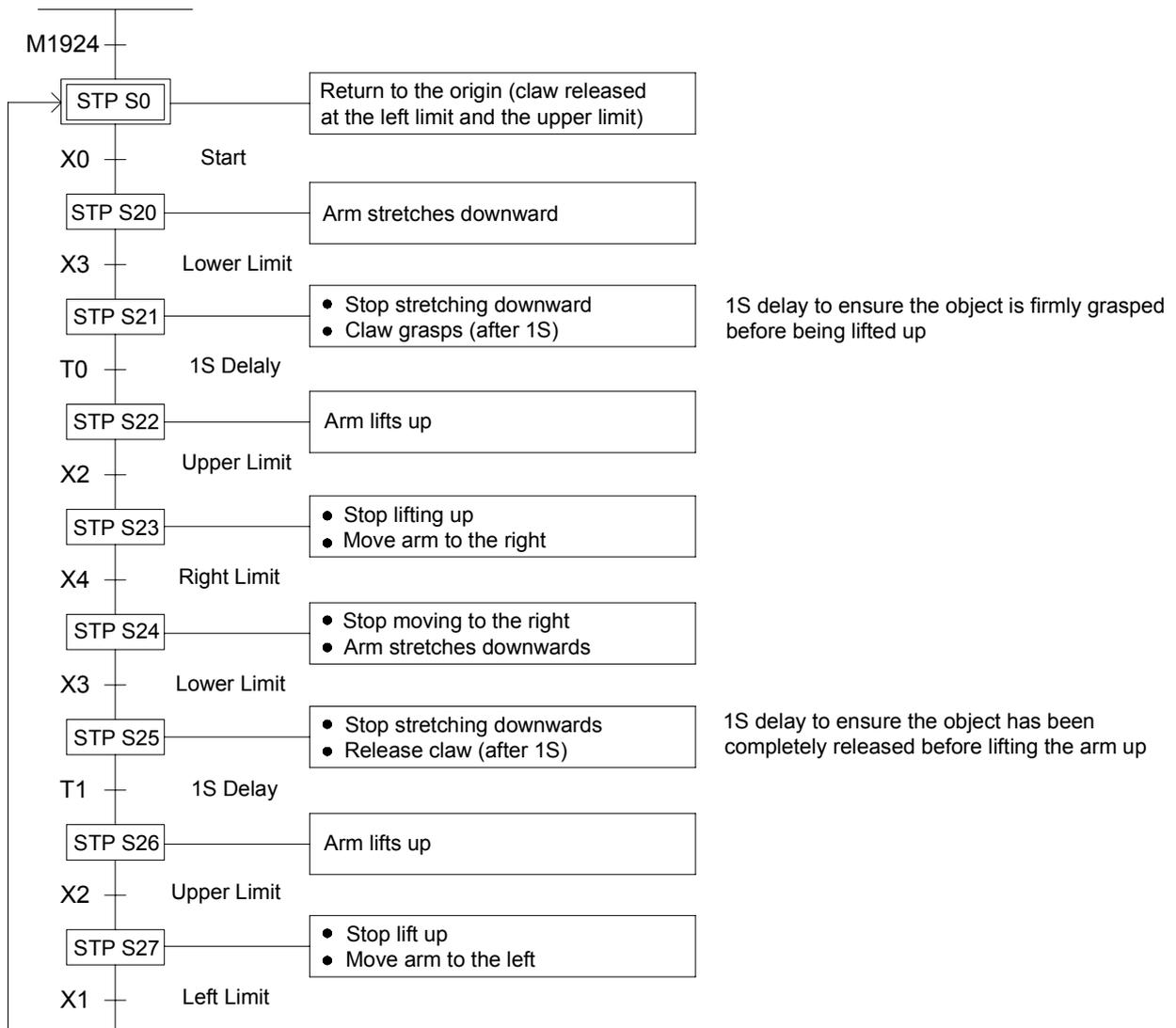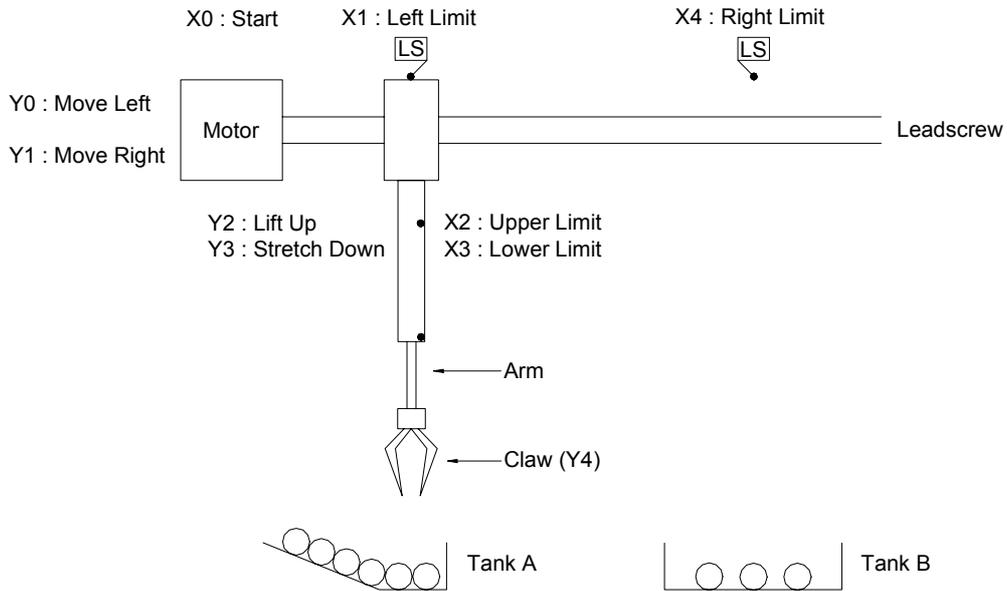
Example 3

WinProladder

FP-07

| Net0 | ORG | M1924 |
| | TO | S0 |

Net1	STP	S0
	OUT	Y0
	FROM	S0
	OUT TR	0
	AND	X1
	TO	S20
	LD TR	0
	AND	X4
	TO	S24

Net2	STP	S20
	OUT	Y1
	FROM	S20
	AND	X2
	TO	S21
	TO	S22

| Net3 | STP | S21 |
| | OUT | Y2 |

| Net4 | STP | S22 |
| | OUT | Y3 |

Net5	FROM	S21
	FROM	S22
	AND	X3
	TO	S23

| Net6 | STP | S23 |
| | OUT | Y4 |

| Net7 | STP | S24 |
| | OUT | Y5 |

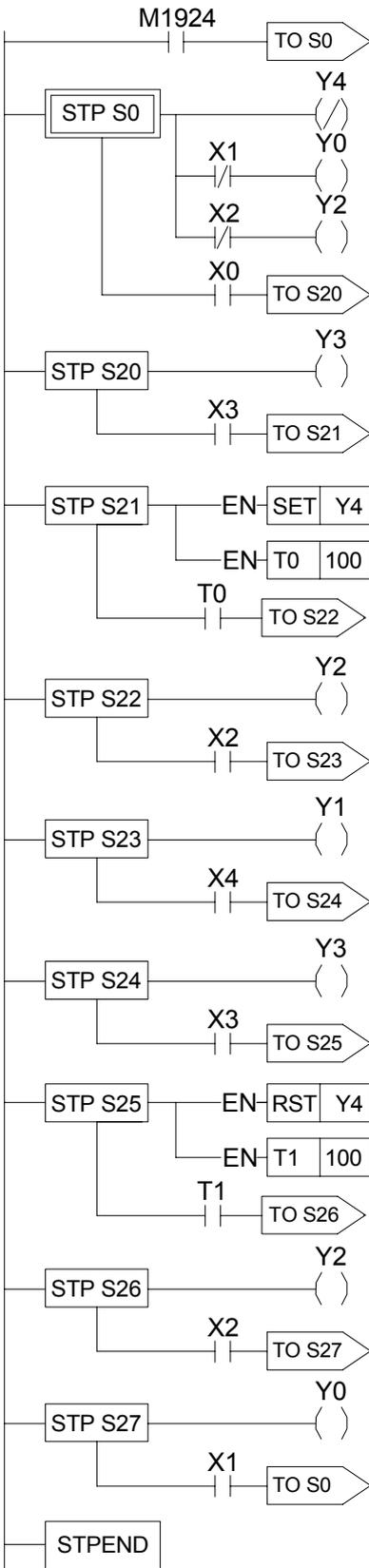| Net8 | FROM | S23 |
	AND	X5
	FROM	S24
	AND	X6
	ORLD	
	AND	X7
	TO	S0

| Net9 | STPEND | |

Description

1. Input the condition to initial step S0
2. Input the S0 and the divergences of S20 and S24
3. Input the S20
4. Input the S20 and the divergences of S21 and S22
5. Input the S21
6. Input the S22
7. Input the convergences of S21 and S22
8. Input the S23
9. Input the S24
10. Input the convergences of S23 and S24

8.5 Application Examples

Example 1 Grasp an object from tank A and put it in Tank B

X0 : Start   X1 : Left Limit   X4 : Right Limit

Y0 : Move Left   Motor   Leadscrew

Y1 : Move Right

Y2 : Lift Up   X2 : Upper Limit
Y3 : Stretch Down   X3 : Lower Limit

Arm

Claw (Y4)

Tank A   Tank B

M1924

STP S0 — Return to the origin (claw released at the left limit and the upper limit)

X0 — Start

STP S20 — Arm stretches downward

X3 — Lower Limit

STP S21 — • Stop stretching downward • Claw grasps (after 1S)   1S delay to ensure the object is firmly grasped before being lifted up

T0 — 1S Delay

STP S22 — Arm lifts up

X2 — Upper Limit

STP S23 — • Stop lifting up • Move arm to the right

X4 — Right Limit

STP S24 — • Stop moving to the right • Arm stretches downwards

X3 — Lower Limit

STP S25 — • Stop stretching downwards • Release claw (after 1S)   1S delay to ensure the object has been completely released before lifting the arm up

T1 — 1S Delay

STP S26 — Arm lifts up

X2 — Upper Limit

STP S27 — • Stop lift up • Move arm to the left

X1 — Left Limit

Ladder Description	Instruction List
	ORG M1924
M1924 — TO S0	TO S0
	STP S0
STP S0 — Y4 (/)	OUT TR 0
Release claw	OUT NOT Y4
X1 — Y0 ( )	AND NOT X1
Return to the left limit	OUT Y0
X2 — Y2 ( )	LD TR 0
Return to the upper limit	AND NOT X2
X0 — TO S20	OUT Y2
Turn the switch ON before moving to S20	FROM S0
	AND X0
STP S20 — Y3 ( )	TO S20
Stretch arm downward	STP S20
X3 — TO S21	OUT Y3
Move to S21 after stretching to the lower limit	FROM S20
	AND X3
STP S21 — EN SET Y4	TO S21
Claw grasps (since the SET instruction is used, Y4 should remain ON after departing from STP S21)	STP S21
EN T0 100	SET Y4
T0 — TO S22	T0 PV: 100
Divergent into S22 after 1S	FROM S21
	AND T0
STP S22 — Y2 ( )	TO S22
Lift the arm up	STP S22
X2 — TO S23	OUT Y2
Divergent into S23 after reaching the upper limit	FROM S22
	AND X2
STP S23 — Y1 ( )	TO S23
Move arm to the right	STP S23
X4 — TO S24	OUT Y1
Divergent into S24 after moving to the right limit	FROM S23
	AND X4
STP S24 — Y3 ( )	TO S24
Stretch the arm downward	STP S24
X3 — TO S25	OUT Y3
Divergent into S25 after stretching to the lower limit	FROM S24
	AND X3
STP S25 — EN RST Y4	TO S25
Release claw	STP S25
EN T1 100	RST Y4
T1 — TO S26	T1 PV: 100
Delay for 1S	FROM S25
Transfer into S26 after 1S	AND T1
	TO S26
STP S26 — Y2 ( )	STP S26
Lift the arm up	OUT Y2
X2 — TO S27	FROM S26
Divergent into S27 after reaching the upper limit	AND X2
	TO S27
STP S27 — Y0 ( )	STP S27
Move the arm to the left	OUT Y0
X1 — TO S0	FROM S27
Divergent into S0 after moving to the left limit (a complete cycle)	AND X1
	TO S0
STPEND	STPEND

Example 2   Liquid Stirring Process
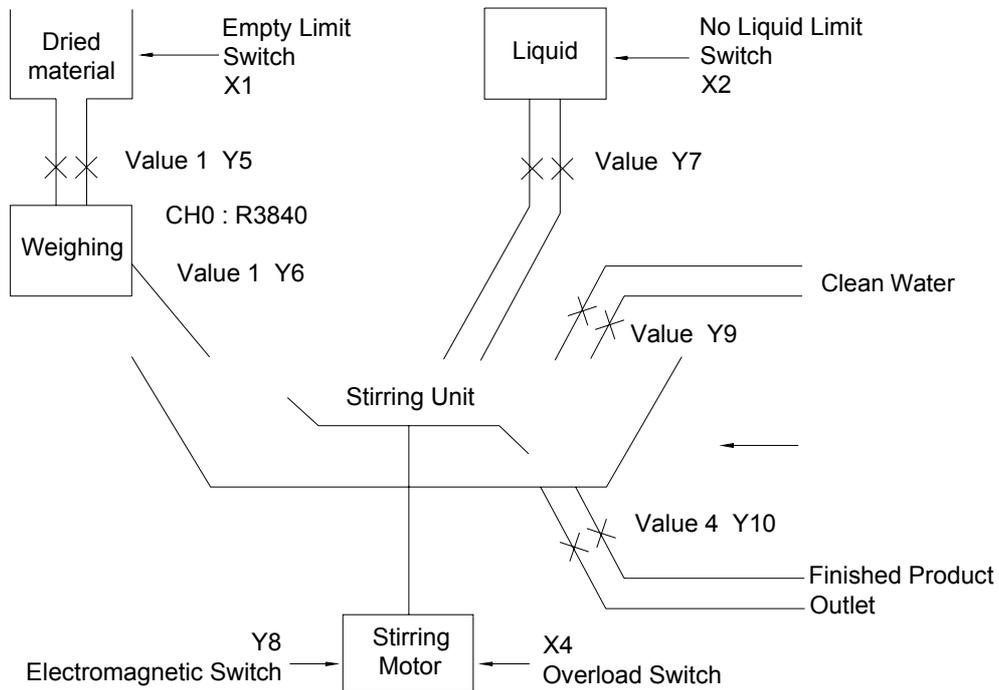
- Input Points: Empty limit switch X1
  - No liquid limit switch X2
  - Empty limit switch X3
  - Over-load switch X4
  - Warning clear button X5
  - Start button X6
  - Water washing button X7

- Warning Indicators: Empty dried material Y1
  - Insufficient liquid Y2
  - Empty stirring unit Y3
  - Motor over-load Y4

- Output Points: Dried material inlet valve Y5
  - Dried material inlet valve Y6
  - Liquid inlet valve Y7
  - Motor start electromagnetic valve Y8
  - Clean water inlet valve Y9
  - Finished product outlet valve Y10

- Weighing Output: CH0（R3840）

- M1918=0

WinProladder

```
        M1924
        ┤├──────────────[ TO S0 ]

              X1
[STP S0]──────┤/├────────[ SET Y1 ]
              X2
        ──────┤/├────────[ SET Y2 ]
              X3
        ──────┤├─────────[ SET Y3 ]        Warning indicators
              X4
        ──────┤├─────────[ SET Y4 ]
              X5
        ──────┤├─────────[ RST Y1 ]
        ─────────────────[ RST Y2 ]
        ─────────────────[ RST Y3 ]        Reset warning
        ─────────────────[ RST Y4 ]
              X6 Y1 Y2 Y3 Y4
        ──────┤├┤/├┤/├┤/├┤/├──[ TO S20 ]   Production start
              X7 Y3 Y4
        ──────┤├┤/├┤/├──────[ TO S24 ]     Water washing start

                              Y5
[STP S20]────────────────────( )

              ┌─17CMP──┐        M0
              │Sa : R3840│──────( )        Input weighing
              │Sb : R0  │        M1
              └─────────┘──────( )
              M0
        ──────┤├───────────[ TO S21 ]      Status after weighing
              M1
        ──────┤├───────────[ TO S22 ]      Divergent into S21 and S22

                              Y6
[STP S21]────────────────────( )           Input material to stirring
        ──────────────EN─[ T0  500 ]       unit

                              Y7
[STP S22]────────────────────( )
        ──────────────EN─[ T1  800 ]

              T0  T1
[FROM S21]────┤├──┤├──────[ TO S23 ]       Add liquid to stirring unit

[FROM S22]

                              Y8            Complete dried material
[STP S23]────────────────────( )           and liquid input, transfer
        ──────────────EN─[ T2  4500 ]      the status to S23
              X4              Y4
        ──────┤├─────────────( )           Stirring timer

[STP S24]─────────────EN─[ T3  500 ]       Wash stirring unit
              T3              Y9
        ──────┤├─────────────( )           Input clean water
        ──────────────EN─[ T4  1500 ]
              T4              Y10
        ──────┤/├────────────( )           Drain water out

              T2
[FROM S23]────┤├──────────[ TO S25 ]
              T4
[FROM S24]────┤├
              X3            Y10
[STP S25]─────┤/├────────────( )           Output finished product
              S25         ┌─15DP─┐         and accumulate the cycle
        ──────┤├──────────┤+1  R10│
              X3           └──────┘
        ──────┤/├────────────[ TO S0 ]

[STPEND]
```

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ORG	M1924	
TO	S0	
STP	S0	
OUT TR	0	
AND NOT	X1	
SET	Y1	
LD TR	0	
AND NOT	X2	
SET	Y2	
LD TR	0	
AND	X3	
SET	Y3	
LD TR	0	
AND	X4	
SET	Y4	
LD TR	0	
AND	X5	
RST	Y1	
RST	Y2	
RST	Y3	
RST	Y4	
FROM	S0	
OUT TR	1	
AND	X6	
AND NOT	Y1	
AND NOT	Y2	
AND NOT	Y3	
AND NOT	Y4	
TO	S20	
LD TR	1	
AND	X7	
AND NOT	Y3	
AND NOT	Y4	
TO	S24	
STP	S20	
OUT	Y5	
FUN	17	
Sa:R3840		
Sb:R0		
FO	0	
OUT	M0	
FO	1	
OUT	M1	
FROM	S20	
LD	M0	
OR	M1	
ANDLD		
TO	S21	
TO	S22	
STP	S21	
OUT	Y6	
T0 PV:	500	

STP	S22	
OUT	Y7	
T1 PV:	800	
FROM	S21	
FROM	S22	
AND	T0	
AND	T1	
TO	S23	
STP	S23	
OUT TR	0	
OUT	Y8	
LD TR	0	
T2 PV:	4500	
LD TR	0	
AND	X4	
OUT	Y4	
STP	S24	
OUT TR	0	
T3 PV:	500	
LD TR	0	
AND NOT	T3	
OUT	Y9	
LD TR	0	
T4 PV:	1500	
LD TR	0	
AND NOT	T4	
OUT	Y10	
FROM	S23	
AND	T2	
FROM	S24	
AND	T4	
ORLD		
TO	S25	
STP	S25	
OUT TR	0	
AND	X3	
OUT	Y10	
LD TR	0	
AND TU	S25	
FUN	15DP	
D:R10		
FROM	S25	
AND NOT	X3	
TO	S0	
STPEND		

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Example 3   Pedestrian Crossing Lights

Y0 (Red)
Y1 (Amber)
Y2 (Green)

Y3 (Red)

Y4 (Green)

X1

Y4
(Green)

X0
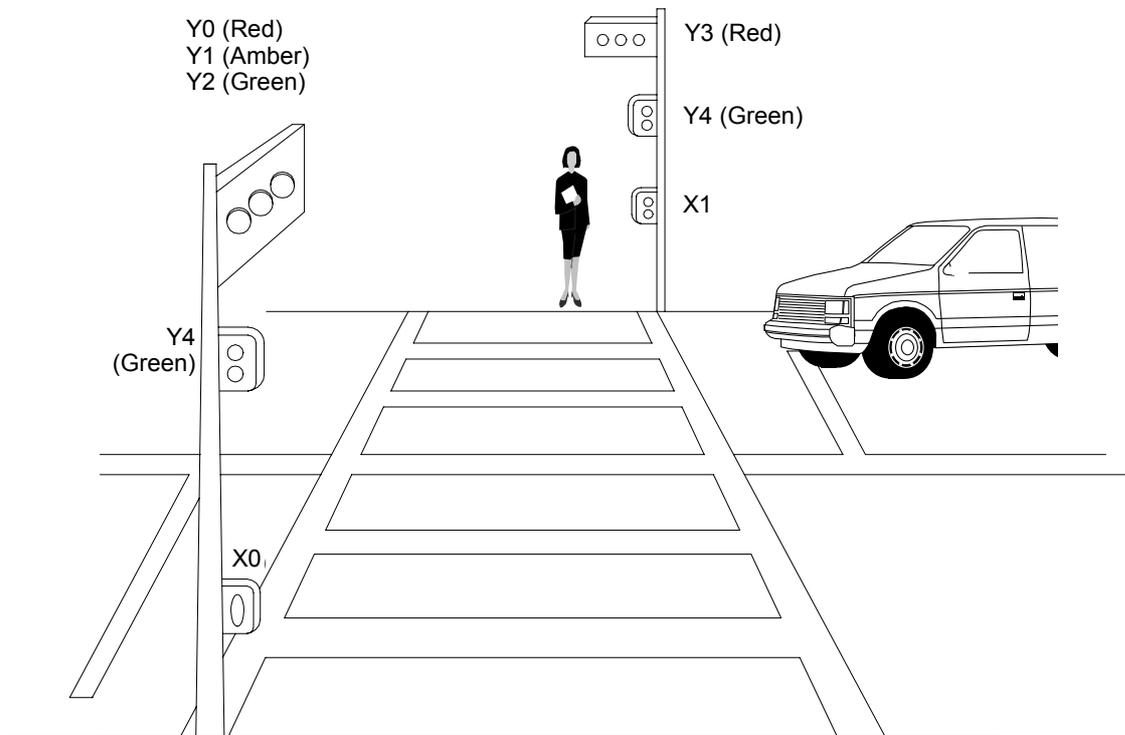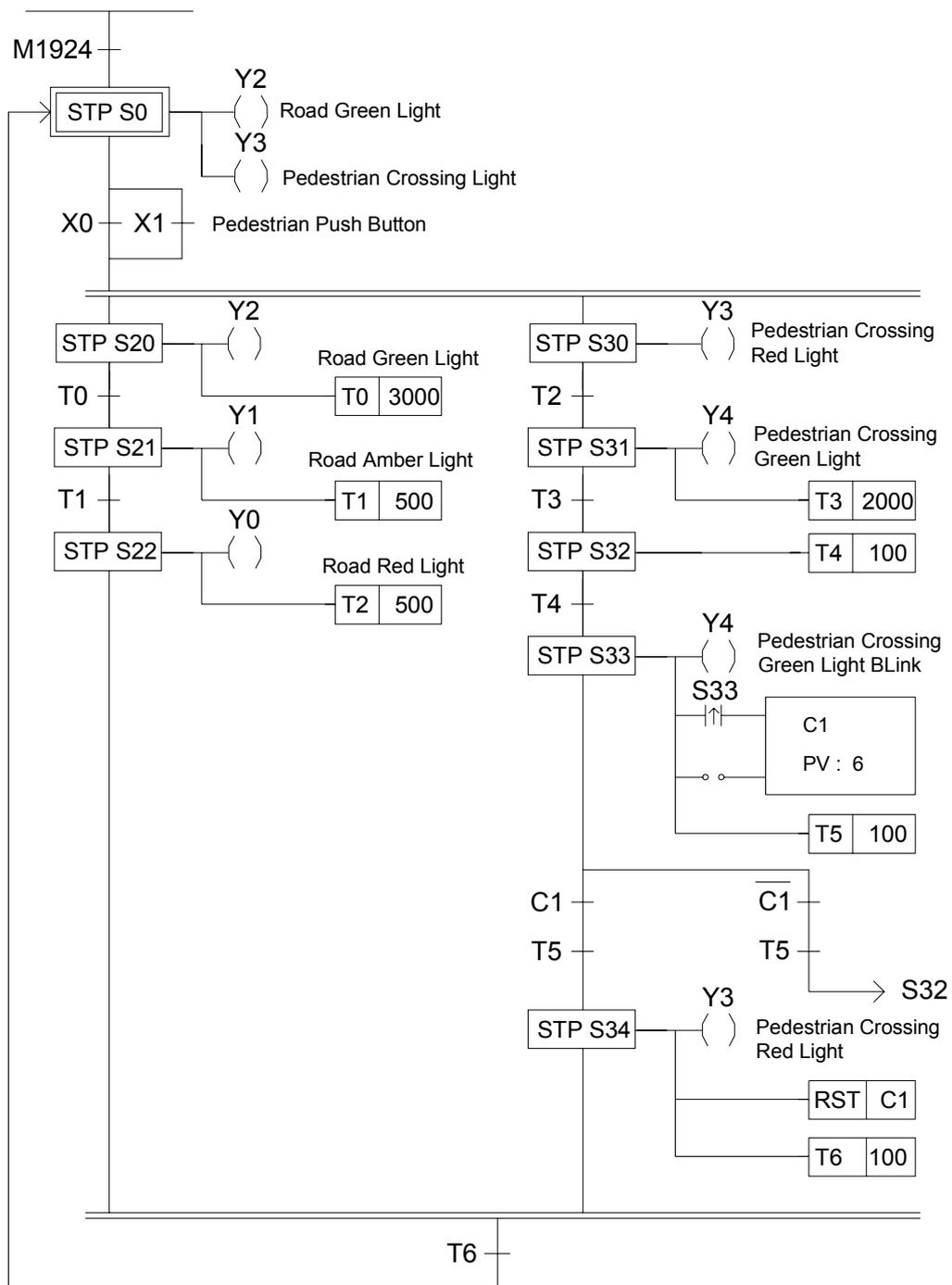
- Input Points: Pedestrian Push Button X0
                   Pedestrian Push Button X1

- Output Points: Road Red Light Y0
                    Road Amber light Y1
                    Road Green Light Y2
                    Pedestrian Crossing Red Light Y3
   Pedestrian Crossing Green Light Y4

- M1918=0

● Pedestrian Crossing Lights Control Process Diagram

M1924 —|

STP S0 —(Y2) Road Green Light
       —(Y3) Pedestrian Crossing Light

X0 —|/|— X1 —| Pedestrian Push Button

STP S20 —(Y2) Road Green Light
T0 —|
        | T0 | 3000 |

STP S21 —(Y1) Road Amber Light
T1 —|
        | T1 | 500 |

STP S22 —(Y0) Road Red Light
        | T2 | 500 |

STP S30 —(Y3) Pedestrian Crossing Red Light
T2 —|

STP S31 —(Y4) Pedestrian Crossing Green Light
T3 —|
        | T3 | 2000 |

STP S32 —
        | T4 | 100 |
T4 —|

STP S33 —(Y4) Pedestrian Crossing Green Light BLink

S33 —|↑|—   C1
             PV : 6
—o o—

        | T5 | 100 |

C1 —| C̄1 —|
T5 —| T5 —| ──→ S32

STP S34 —(Y3) Pedestrian Crossing Red Light

        | RST | C1 |

        | T6 | 100 |

T6 —|

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● Pedestrian Crossing Lights Control Program

WinProladder
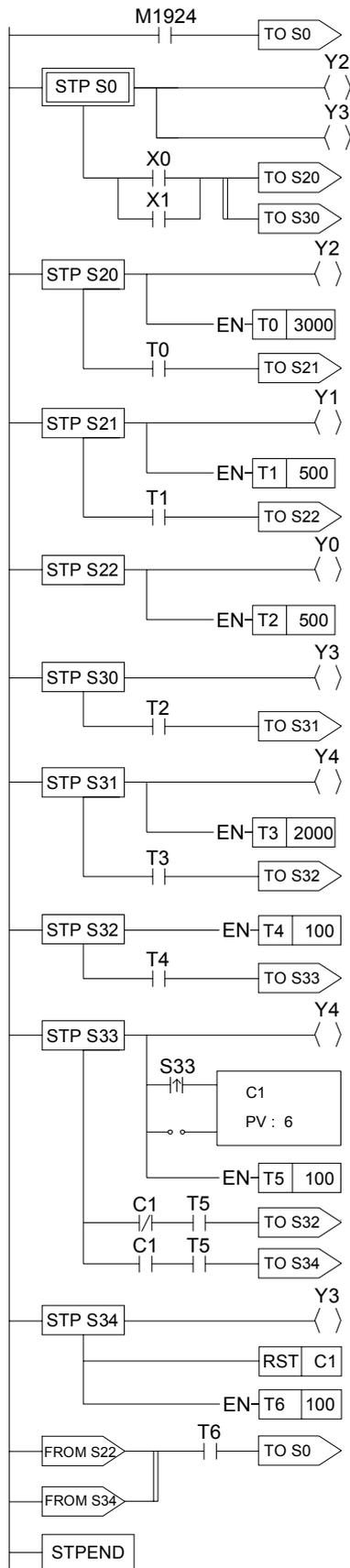
FP-07

ORG	M1924		STP	S32
TO	S0		T4 PV:	100
STP	S0		FROM	S32
OUT	Y2		AND	T4
OUT	Y3		TO	S33
FROM	S0		STP	S33
LD	X0		OUT TR	0
OR	X1		OUT	Y4
ANDLD			LD TR	0
TO	S20		AND TU	S33
TO	S30		LD	OPEN
STP	S20		C1 PV:	6
OUT	Y2		LD TR	0
T0 PV:	3000		T5 PV:	100
FROM	S20		FROM	S33
AND	T0		OUT TR	1
TO	S21		AND NOT	C1
STP	S21		AND	T5
OUT	Y1		TO	S32
T1 PV:	500		LD TR	1
FROM	S21		AND	C1
AND	T1		AND	T5
TO	S22		TO	S34
STP	S22		STP	S34
OUT	Y0		OUT	Y3
T2 PV:	500		RST	C1
STP	S30		T6 PV:	100
OUT	Y3		FROM	S22
FROM	S30		FROM	S34
AND	T2		AND	T6
TO	S31		TO	S0
STP	S31		STPEND	
OUT	Y4			
T3 PV:	2000			
FROM	S31			
AND	T3			
TO	S32			

8-21

8.6 Syntax Check Error Codes for Step Instruction

The error codes for the usage of step instruction are as follows:

E51 : TO(S0-S7) must begin with ORG instruction.

E52 : TO(S20-S999) can't begin with ORG instruction.

E53 : TO instruction without matched FROM instruction.

E54 : To instruction must comes after TO, AND, OR, ANDLD or ORLD instruction.

E56 : The instructions before FROM must be AND, OR, ANDLD or ORLD

E57 : The instruction after FROM can't be a coil or a function

E58 : Coil or function must before FROM while in STEP network.

E59 : More than 8 TO# at same network.

E60 : More than 8 FROM# at same network.

E61 : TO(S0-S7) must locate at first row of the network.

E62 : A contact occupies the location for TO instruction.

E72 : Duplicated TO Sxx instruction.

E73 : Duplicated STP sxx instruction.

E74 : Duplicated FROM sxx instruction.

E76 : STP(S0~S7) without a matched STPEND or STPEND without a matched STP(S0~S7).

E78 : TO(S20~S999), STP (S20~S999) or FROM instructions comes before or without STP(S0~S19).

E79 : STP Sxx or FROM Sxx instructions comes before or without TO Sxx.

E80 : FROM Sxx instruction comes before or without STP Sxx.

E81 : The max. level of branches must <=16.

E82 : The max. no. of branches with same level must <=16.

E83 : Not place the step instruction with TO->STP->FROM sequence.

E84 : The definition of STP# sequence not follow the TO# sequence.

E85 : Convergence do not match the corresponding divergence.

E86 : Illegal usage of STP or FROM before convergent with TO instruction.

E87 : STP# or FROM# comes before corresponding TO#.

E88 : During this branch, STP# or FROM# comes before the corresponding TO#.

E89 : FROM# comes before corresponding TO# or STP#.

E90 : Invalid To# usage in the simultaneous branch.

E91 : Flow control function can not be used in the step ladder region.