Motoman XRC 2001 Controller

Concurrent I/O and Parameter Manual

for UP/SKX-Series Robots

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SECTION 1
INTRODUCTION

The XRC Concurrent I/O and Parameter manual provides information regarding various I/O signals and ladder editing programs. It also provides information regarding various parameter configurations.

This manual is intended to teach XRC and robot programming for operators, programmers, and engineers who design, install, use, and modify a Motoman robotic system.

1.1 About this Document

This manual provides details about XRC Concurrent I/O and Parameters and contains the following sections:

SECTION 1 – INTRODUCTION
General information about this manual, a list of reference documents, and customer service information.

SECTION 2 – SAFETY
Provides information for the safe use and operation of Motoman products.

SECTION 3 – XRC CONCURRENT I/O AND PARAMETERS
Provides detailed information about I/O signals and parameter configurations for the XRC controller.

1.2 Reference to Other Documentation

For additional information refer to the following:

- Operator's Manual for General Purpose (P/N 142099-1)
- Operator's Manual for Handling (P/N 142100-1)
- Operator's Manual for Spot Welding (P/N 142101-1)
- Operator's Manual for Arc Welding (P/N 142098-1)
- Motoman UP6, XRC Manipulator Manual (P/N 142104-1)
- Motoman SK16X, XRC Manipulator Manual (P/N 142105-1)
- Motoman SK45X, XRC Manipulator Manual (P/N 142106-1)
- Motoman UP130, XRC Manipulator Manual (P/N 142107-1)

1.3 Customer Service Information

If you are in need of technical assistance, contact the Motoman service staff at (937) 847-3200. Please have the following information ready before you call:

- Robot Type (UP6, SK16X, etc.)
- Application Type (welding, handling, etc.)
- Robot Serial Number (located on the back side of the robot arm)
- Robot Sales Order Number (located on back side of XRC controller)

NOTES

SECTION 2
SAFETY

2.1 Introduction

It is the purchaser's responsibility to ensure that all local, county, state, and national codes, regulations, rules, or laws relating to safety and safe operating conditions for each installation are met and followed.

We suggest that you obtain and review a copy of the ANSI/RIA National Safety Standard for Industrial Robots and Robot Systems. This information can be obtained from the Robotic Industries Association by requesting ANSI/RIA R15.06. The address is as follows:

Robotic Industries Association
900 Victors Way
P.O. Box 3724
Ann Arbor, Michigan 48106
TEL: (734) 994-6088
FAX: (734) 994-3338

Ultimately, the best safeguard is trained personnel. The user is responsible for providing personnel who are adequately trained to operate, program, and maintain the robot cell. **The robot must not be operated by personnel who have not been trained!**

We recommend that all personnel who intend to operate, program, repair, or use the robot system be trained in an approved Motoman training course and become familiar with the proper operation of the system.

This safety section addresses the following:

- Standard Conventions (Section 2.2)
- General Safeguarding Tips (Section 2.3)
- Mechanical Safety Devices (Section 2.4)
- Installation Safety (Section 2.5)
- Programming Safety (Section 2.6)
- Operation Safety (Section 2.7)
- Maintenance Safety (Section 2.8)

2.2 Standard Conventions

This manual includes information essential to the safety of personnel and equipment. As you read through this manual, be alert to the four signal words:

- DANGER
- WARNING
- CAUTION
- NOTE

Pay particular attention to the information provided under these headings which are defined below (in descending order of severity).

DANGER!

Information appearing under the DANGER caption concerns the protection of personnel from the immediate and imminent hazards that, if not avoided, will result in immediate, serious personal injury or loss of life in addition to equipment damage.

WARNING!

Information appearing under the WARNING caption concerns the protection of personnel and equipment from potential hazards that can result in personal injury or loss of life in addition to equipment damage.

CAUTION!

Information appearing under the CAUTION caption concerns the protection of personnel and equipment, software, and data from hazards that can result in minor personal injury or equipment damage.

NOTE: Information appearing in a NOTE caption provides additional information which is helpful in understanding the item being explained.

2.3 General Safeguarding Tips

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. General safeguarding tips are as follows:

- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation of this robot, the operator's manuals, the system equipment, and options and accessories should be permitted to operate this robot system.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the robot cell.
- Improper connections can damage the robot. All connections must be made within the standard voltage and current ratings of the robot I/O (Inputs and Outputs).
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- In accordance with ANSI/RIA R15.06, section 6.13.4 and 6.13.5, use lockout/tagout procedures during equipment maintenance. Refer also to Section 1910.147 (29CFR, Part 1910), Occupational Safety and Health Standards for General Industry (OSHA).

2.4 Mechanical Safety Devices

The safe operation of the robot, positioner, auxiliary equipment, and system is ultimately the user's responsibility. The conditions under which the equipment will be operated safely should be reviewed by the user. The user must be aware of the various national codes, ANSI/RIA R15.06 safety standards, and other local codes that may pertain to the installation and use of industrial equipment. Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. The following safety measures are available:

- Safety fences and barriers
- Light curtains
- Door interlocks
- Safety mats
- Floor markings
- Warning lights

Check all safety equipment frequently for proper operation. Repair or replace any non-functioning safety equipment immediately.

2.5 Installation Safety

Safe installation is essential for protection of people and equipment. The following suggestions are intended to supplement, but not replace, existing federal, local, and state laws and regulations. Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. Installation tips are as follows:

- Be sure that only qualified personnel familiar with national codes, local codes, and ANSI/RIA R15.06 safety standards are permitted to install the equipment.
- Identify the work envelope of each robot with floor markings, signs, and barriers.
- Position all controllers outside the robot work envelope.
- Whenever possible, install safety fences to protect against unauthorized entry into the work envelope.
- Eliminate areas where personnel might get trapped between a moving robot and other equipment (pinch points).
- Provide sufficient room inside the workcell to permit safe teaching and maintenance procedures.

2.6 Programming Safety

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. Programming tips are as follows:

- Any modifications to PART 1 of the controller PLC can cause severe personal injury or death, as well as damage to the robot! Do not make any modifications to PART 1. Making any changes without the written permission of Motoman will **VOID YOUR WARRANTY!**
- Some operations require standard passwords and some require special passwords. Special passwords are for Motoman use only. **YOUR WARRANTY WILL BE VOID** if you use these special passwords.
- Back up all programs and jobs onto a floppy disk whenever program changes are made. To avoid loss of information, programs, or jobs, a backup must always be made before any service procedures are done and before any changes are made to options, accessories, or equipment.
- The concurrent I/O (Input and Output) function allows the customer to modify the internal ladder inputs and outputs for maximum robot performance. Great care must be taken when making these modifications. Double-check all modifications under every mode of robot operation to ensure that you have not created hazards or dangerous situations that may damage the robot or other parts of the system.
- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to operate the system.

- Inspect the robot and work envelope to be sure no potentially hazardous conditions exist. Be sure the area is clean and free of water, oil, debris, etc.
- Be sure that all safeguards are in place.
- Check the E-STOP button on the teach pendant for proper operation before programming.
- Carry the teach pendant with you when you enter the workcell.
- Be sure that only the person holding the teach pendant enters the workcell.
- Test any new or modified program at low speed for at least one full cycle.

2.7 Operation Safety

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. Operation tips are as follows:

- Be sure that only trained personnel familiar with the operation of this robot, the operator's manuals, the system equipment, and options and accessories are permitted to operate this robot system.
- Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
- Inspect the robot and work envelope to ensure no potentially hazardous conditions exist. Be sure the area is clean and free of water, oil, debris, etc.
- Ensure that all safeguards are in place.
- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to operate the system.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the cell.
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller, external servo box, and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections.
- All modifications made to the controller will change the way the robot operates and can cause severe personal injury or death, as well as damage the robot. This includes controller parameters, ladder parts 1 and 2, and I/O (Input and Output) modifications. Check and test all changes at slow speed.

2.8 Maintenance Safety

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. Maintenance tips are as follows:

- Do not perform any maintenance procedures before reading and understanding the proper procedures in the appropriate manual.
- Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to operate the system.
- Back up all your programs and jobs onto a floppy disk whenever program changes are made. A backup must always be made before any servicing or changes are made to options, accessories, or equipment to avoid loss of information, programs, or jobs.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the cell.
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- Be sure all safeguards are in place.
- Use proper replacement parts.
- This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller, external servo box, and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections.
- All modifications made to the controller will change the way the robot operates and can cause severe personal injury or death, as well as damage the robot. This includes controller parameters, ladder parts 1 and 2, and I/O (Input and Output) modifications. Check and test all changes at slow speed.
- Improper connections can damage the robot. All connections must be made within the standard voltage and current ratings of the robot I/O (Inputs and Outputs).

YASNAC XRC
Concurrent I/O•Parameter

Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

MOTOMAN INSTRUCTIONS

MOTOMAN SETUP MANUAL
MOTOMAN-□□□ INSTRUCTIONS
YASNAC XRC INSTRUCTIONS
YASNAC XRC OPERATOR'S MANUAL
YASNAC XRC OPERATOR'S MANUAL for BEGINNERS

The YASNAC XRC operator's manuals above correspond to specific usage.
Be sure to use the appropriate manual.

YASKAWA MANUAL NO. RE-CKI-A410 ①

MANDATORY

- This manual explains the various components of the YASNAC XRC system and general operations. Read this manual carefully and be sure to understand its contents before handling the YASNAC XRC.
- General items related to safety are listed in Section 1: Safety of the Setup Manual. To ensure correct and safe operation, carefully read the Setup Manual before reading this manual.

CAUTION

- Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure all covers and shields are replaced before operating this product.
- The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.
- YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications. If such modification is made, the manual number will also be revised.
- If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the manual number listed on the front cover.
- YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids your product's warranty.

NOTES FOR SAFE OPERATION

Read this manual carefully before installation, operation, maintenance, or inspection of the YASNAC XRC.

In this manual, the Notes for Safe Operation are classified as “WARNING”, “CAUTION”, “MANDATORY”,or ”PROHIBITED”.

 WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.
 CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury to personnel and damage to equipment. It may also be used to alert against unsafe practices.
 MANDATORY	Always be sure to follow explicitly the items listed under this heading.
 PROHIBITED	Must never be performed.

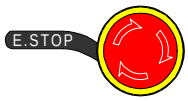
Even items described as “CAUTION” may result in a serious accident in some situations. At any rate, be sure to follow these important items.

To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “CAUTION” and “WARNING”.

WARNING

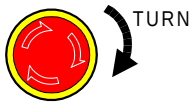
- Before operating the manipulator, check that servo power is turned off when the emergency stop buttons on the playback panel or programming pendant are pressed.
  When the servo power is turned off, the SERVO ON READY lamp on the playback panel and the SERVO ON LED on the programming pendant are turned off.

  Injury or damage to machinery may result if the emergency stop circuit cannot stop the manipulator during an emergency. The manipulator should not be used if the emergency stop buttons do not function.

Emergency Stop Button 

- Once the emergency stop button is released, clear the cell of all items which could interfere with the operation of the manipulator. Then turn the servo power ON

  Injury may result from unintentional or unexpected manipulator motion.

Release of Emergency Stop 

- Always set the Teach Lock before entering the robot work envelope to teach a job.

  Operator injury can occur if the Teach Lock is not set and the manipulator is started from the playback panel.

- Observe the following precautions when performing teaching operations within the working envelope of the manipulator :
  - View the manipulator from the front whenever possible.
  - Always follow the predetermined operating procedure.
  - Ensure that you have a safe place to retreat in case of emergency.

  Improper or unintended manipulator operation may result in injury.

- Confirm that no persons are present in the manipulator's work envelope and that you are in a safe location before:
  - Turning on the YASNAC XRC power
  - Moving the manipulator with the programming pendant
  - Running check operations
  - Performing automatic operations

  Injury may result if anyone enters the working envelope of the manipulator during operation. Always press an emergency stop button immediately if there are problems.The emergency stop button is located on the right side of both the YASNAC XRC playback panel and programming pendant.

CAUTION

- Perform the following inspection procedures prior to conducting manipulator teaching. If problems are found, repair them immediately, and be sure that all other necessary processing has been performed.
  -Check for problems in manipulator movement.
  -Check for damage to insulation and sheathing of external wires.

- Always return the programming pendant to the hook on the XRC cabinet after use.

  The programming pendant can be damaged if it is left in the manipulator's work area, on the floor, or near fixtures.

- Read and understand the Explanation of the Alarm Display in the setup manual before operating the manipulator.

Definition of Terms Used Often in This Manual

The MOTOMAN manipulator is the YASKAWA industrial robot product.
The manipulator usually consists of the controller, the playback panel, the programming pendant, and supply cables.
In this manual, the equipment is designated as follows.

Equipment	Manual Designation
YASNAC XRC Controller	XRC
YASNAC XRC Playback Panel	Playback Panel
YASNAC XRC Programming Pendant	Programming Pendant

Descriptions of the programming pendant and playback panel keys, buttons, and displays are shown as follows:

Equipment		Manual Designation
Programming Pendant	Character Keys	The keys which have characters printed on them are denoted with [ ] ex. [ENTER]
	Symbol Keys	The keys which have a symbol printed on them are not denoted with [ ] but depicted with a small picture. ex. page key  The cursor key is an exception, and a picture is not shown.
	Axis Keys Number Keys	“Axis Keys” and “Number Keys” are generic names for the keys for axis operation and number input.
	Keys pressed simultaneously	When two keys are to be pressed simultaneously, the keys are shown with a “+” sign between them, ex. [SHIFT]+[COORD]
	Displays	The menu displayed in the programming pendant is denoted with { }. ex. {JOB}
Playback Panel	Buttons	Playback panel buttons are enclosed in brackets. ex. [TEACH] on the playback panel

Description of the Operation Procedure

In the explanation of the operation procedure, the expression "Select • • • " means that the cursor is moved to the object item and the SELECT key is pressed.

1 Concurrent I/O

1 Concurrent I/O

Concurrent I/O control is an I/O control function that processes controls relative to the XRC I/O independent of the manipulator operation (in parallel with manipulator operation).

1.1 Features of Concurrent I/O

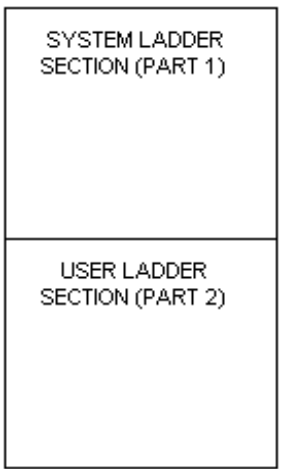
Terminals and connectors to which I/O signals are connected can be used effectively.
Terminals and connectors are provided for connecting I/O signals. Although the number of connections are limited, the terminals can be used effectively because only the necessary signals can be selected and connected to the desired terminal.

Instructions relative to the I/O (Robot Language: INFORM II) can be simplified for smooth manipulator operation.
Fixed procedures relative to the I/O can be registered as independent ladder programs, thus enabling simplification of I/O instructions of the job (operation program) and reducing interruptions.

Reserved signals can be accepted while the manipulator is operating.
Reserved signals can be accepted during operation since manipulator operation processing and I/O processing can be executed at the same time.

1.2 Construction and Specifications of the Concurrent I/O

The Concurrent I/O consists of the following two blocks.



Construction of Concurrent I/O Ladder Program

System Ladder Section	A standard ladder selected for your applications is prepared at the factory. For more information, see “1.13 Standard Ladder Program” The ladder program cannot be edited.
User Ladder Section	Specification of signal connections and interface signal with system ladder are prepared at the factory. The ladder program can be edited including these signals.

Concurrent I/O Specifications

Item	Contents
Control Method	Scan control by stored program
Programming	Relay ladder program symbology
Scan Time	10 msec
Memory Capacity	1500 steps (Option: Max. 3000 step)
Number of Instructions	33 types
General Input Port	192 points (Concurrent I/O → Manipulator Control Section)
General Output Port	192 points (Concurrent I/O ← Manipulator Control Section)
Specific Input Port	224 points including unspecified signals (Concurrent I/O → Manipulator Control Section)
Specific Output Port	304 points including unspecified signals (Concurrent I/O ← Manipulator Control Section)
Hardware Status Signal Points	96 points (Concurrent I/O → Manipulator Control Section)
Auxiliary Relays	704 points
External Inputs	256 points
External Outputs	256 points
Register (Numeric Data)	General Register 100 points (0-65535) System Register 50 points (0-65535) Analog output register 12 points (0-65535)
Pseudo Input Signal Points	32 points (Concurrent I/O ← System Parameter)
Power Failure Protective Function	Ladder Program (Battery Back-Up) Output status is reset.

Concurrent I/O Specifications

Item	Contents
Diagnostic Functions	Error Detection of CPU, system program and ladder programs. Ladder programming error detection as follows: Double Use of Output Relay No END Instruction Circuit Error Format Error Exceeded Program Capacity
Monitor Function	Monitor each signal status in concurrent I/O on CRT display.

1.3 Classification of I/O Signals

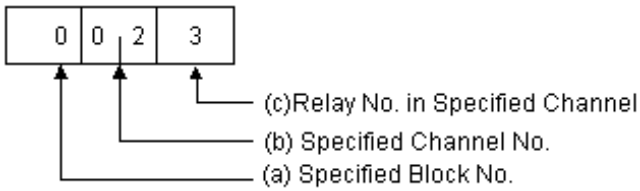
Classification of I/O signals

Logic Name	Classification	Description	Range
0 xxx	General Input	Referenced with input instruction of the job	0010 - 0247 (192 signals)
1 xxx	General Output	Referenced with output instruction of the job	1010 - 1247 (192 signals)
2 xxx	External Input	Signal No. corresponding to the input terminal	2010 - 2327 (256 signals)
3 xxx	External Output	Signal No. corresponding to the output terminal	3010 - 3327 (256 signals)
4 xxx	Specific Input	Signal to change the operating condition of the robot	4010 - 4287 (224 signals)
5 xxx	Specific Output	Signal notifying the operating condition of the robot	5010 - 5387 (304 signals)
7 xxx	Auxiliary Relay	Auxiliary relay in the concurrent I/O	7010 - 7887 (704 signals)
80 xxx 81 xxx	Control Status	Monitoring of the hardware signal status of the robot control section	8010 - 8127 (96 signals)
82 xxx	Pseudo Input	Pseudo input relay reading from the system parameter	8210 - 8247 (32 signals)
9 xxx	Network Input	Input signal from the network device	9010 - 9327 (256 signals)
M xxx	Register	1 word data (16 bits) General Register: M000 - M099 System Register: M100 - M149 Analog output register: M150 - M161	M000 - M161 (162 signals)

1.3.1 Input Signal

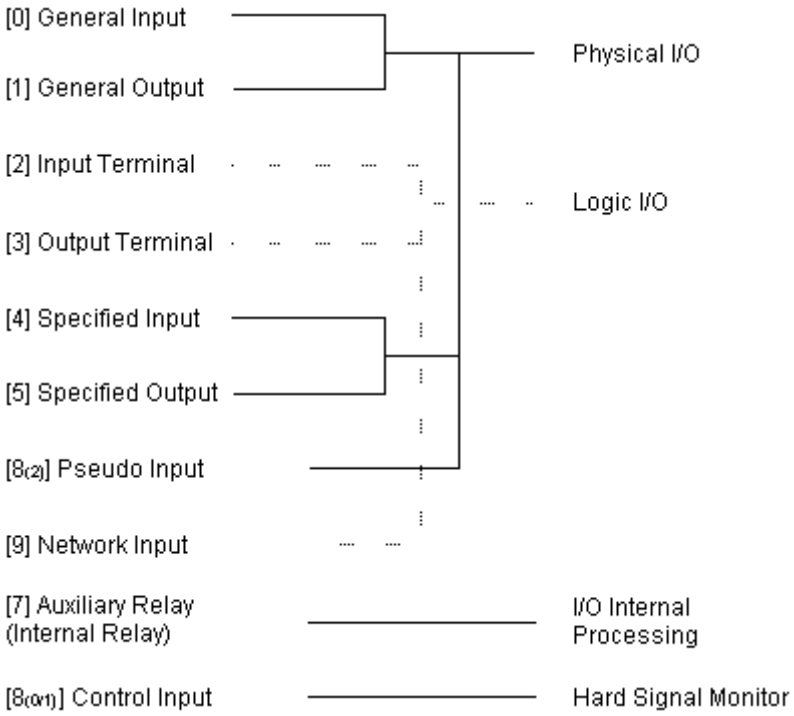
■ Meaning of Number

The I/O processing part and the manipulator operation processing part are connected by "Logical I/O". However, for the function, they are separated as a quite independent function. How to handle each signal is also different from the manipulator operation processing part. In ladder programming, to specify each signal unitedly, the number is set to as follows. "Relay number" is specified by the numerical value of four digits. This numerical value is composed of the following three information.



Specified Block Number

This is divided into the following block.



Specified Channel Number

Eight signals are defined as one channel.

[01] Last eight signals

↓

[nn] Last eight signals

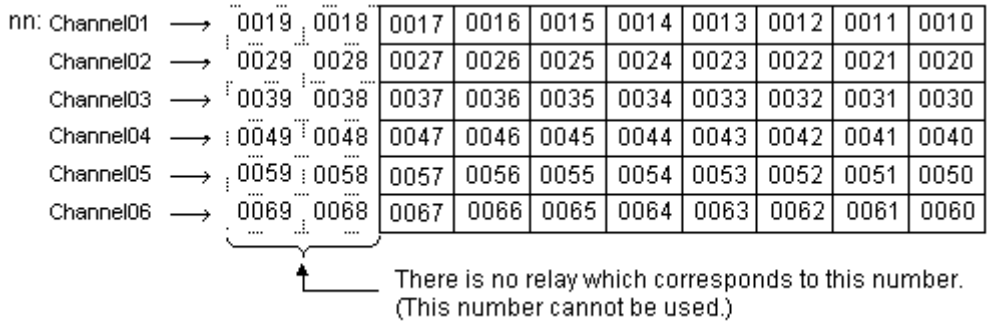
Refer to the undermentioned table for concrete channel number.

Relay Number in Specified Channel

One of eight signals is specified by numerical value (0-7).

As for each block, a minimum digit is specified by the numerical value to 0-7 for a relay number as understood from the table. In a word, it is a serial number which omits 8 and 9. Moreover, the first relay number of each block starts from xx10 because channel number enters between digits of 10 and 100.
The relay number will be specified by the numerical value of the fourth digit in the frame.

Block Number: 0
Relay Number: 0 nn m



NOTE The relay is occasionally treated by the units (8 bits) of the byte (channel) or the units (16bits) of the word.

1.3.2 Register

The register is data of each every word (16 bits).
General register (M000 - M099) and analog output register (M150 - M161) are readable and writable.
System register is readable only, and the data is set by the system.

NOTE The register is treated by the unit of one word (16 bits).
Therefore, it is not possible to handle it by the bit specification instruction (STR, AND, OR, and OUT, etc.) and the PLS instructions, etc.

■ General Register

This is composed of one word (16 bits).

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
M000																
M001																
:								:								
M099																

■ System Register

This is composed of one word (16 bits).

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
M100																
M101																
:								:								
M149																

■ Analog Output Register

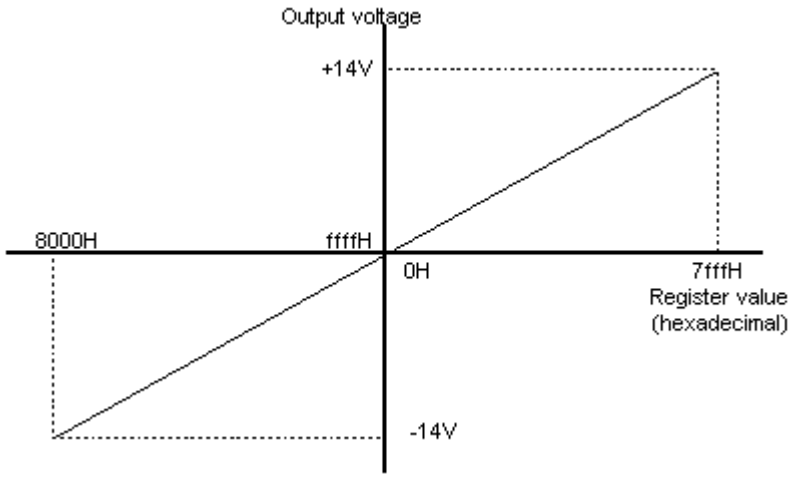
This is composed of one word (16 bits). The analog output registers (M150 - M161) Correspond to the analog outputs 1 to 12. Since an analog output board with different digital resolution (D/A circuit) is used in common with the analog output register, the data below the resolution is cut off at output.

Analog output	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
AOUT01	M150																
AOUT02	M151																
:	:								:								
AOUT12	M161																

8-bit resolution: Bit 8 to Bit 15 are valid data.
12-bit resolution: Bit 4 to Bit 15 are valid data.
16-bit resolution: Bit 0 to Bit 15 are valid data.

Resolution	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
8-bit		■	■	■	■	■	■	■	■								
12-bit		■	■	■	■	■	■	■	■	■	■	■	■				
16-bit		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

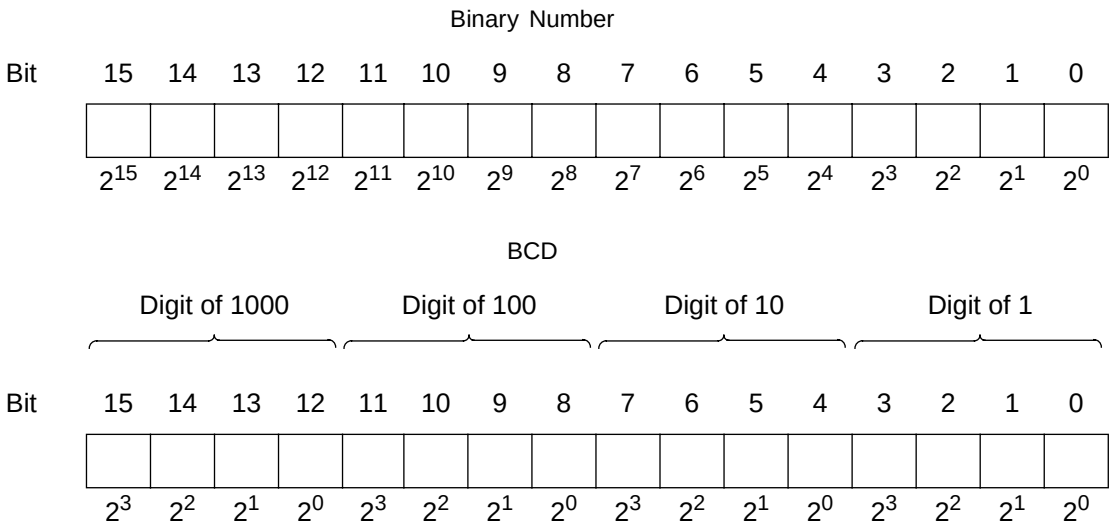
Regardless of the resolution, the register value per 1 V is:
1 (V) = 32767 (7fffH)/14(V) ≒ 2340(924H)



SUPPLE-MENT Analog output board (JANCD-XEW01-☐) uses a 12-bit resolution D/A circuit.

■ Numeric Data

Binary number is the one that the numeric data was expressed by 1(ON) and 0(OFF). Internal data of a usual computer is expressed by the binary number. On the other hand, BCD (Binary Code Decimal) makes one digit of the decimal number by using four bits of the binary number, that is, four digits, combines these, and shows the decimal number. The equipment connected with XRC occasionally uses BCD as an input and a output signal. When transferring the data between these, it is necessary to convert BCD into the binary number when XRC receives the data, and it is necessary to convert the binary number into BCD when outputting the data to the equipment. It is possible to convert the data by BIN and the BCD instruction in the concurrent I/O function.

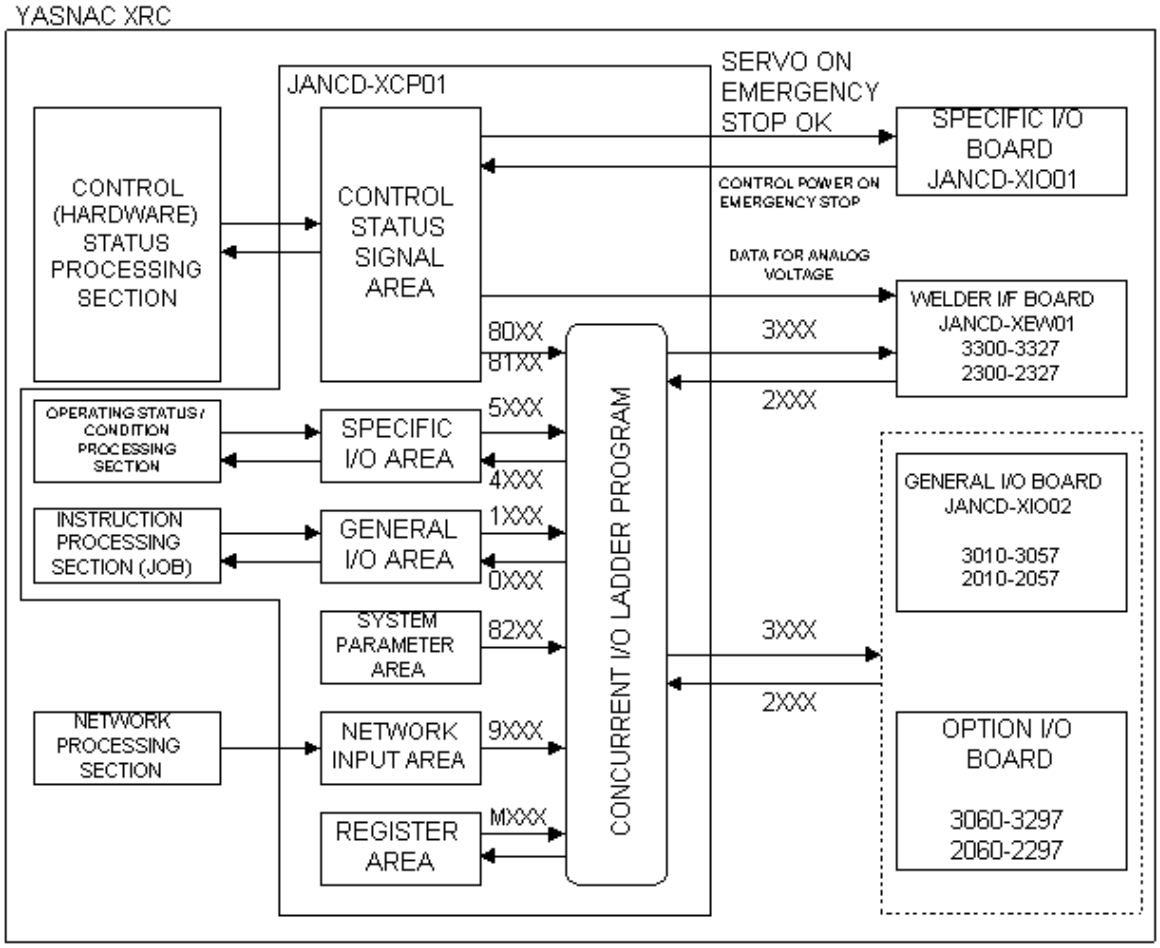


Binary number and BCD expression of the decimal number

Decimal Number	Binary	BCD
1	0000 0000 0000 0001	0000 0000 0000 0001
12	0000 0000 0000 1100	0000 0000 0001 0010
123	0000 0000 0111 1011	0000 0001 0010 0011
1234	0000 0100 1101 0010	0001 0010 0011 0100

1.4 Configuration of I/O Signals

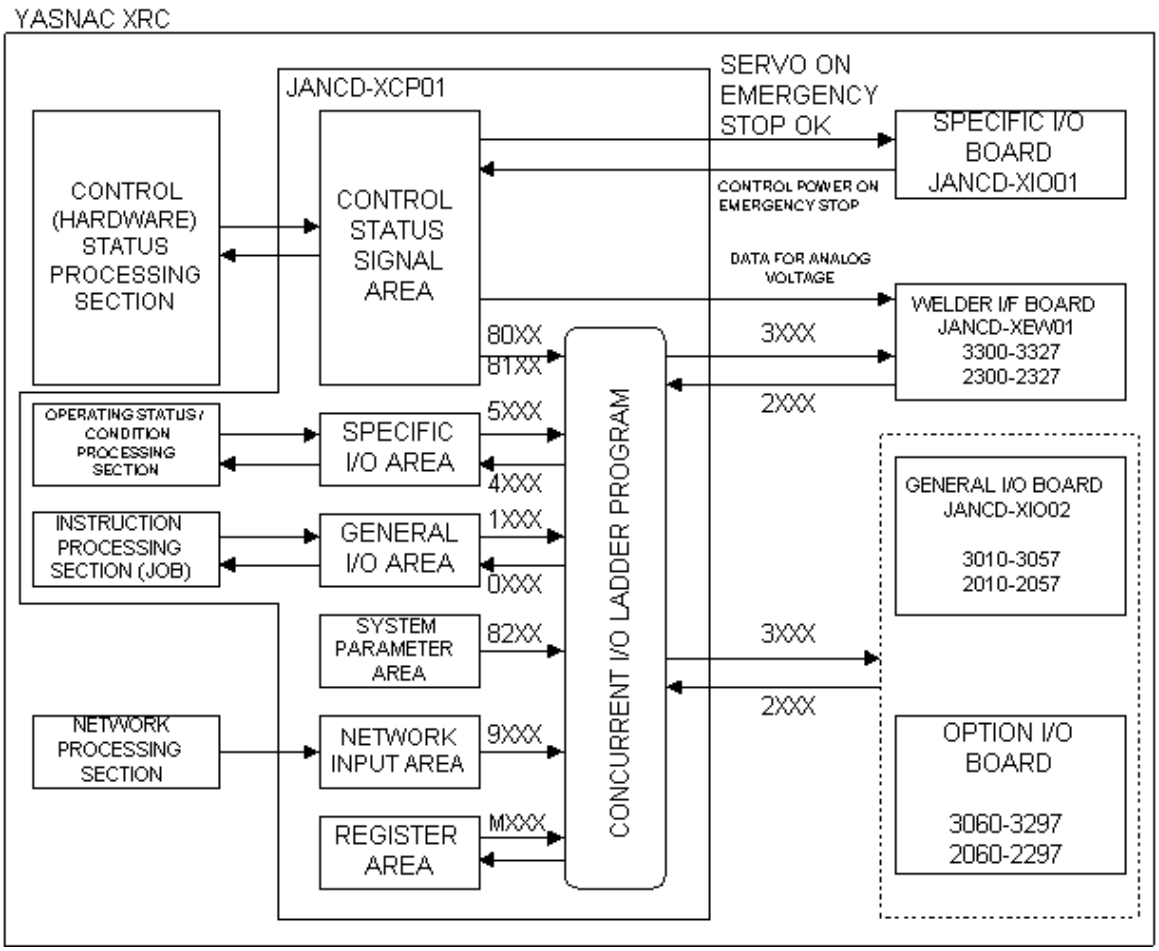
1.4.1 Arc Welding



How to Monitor Signal Status

To monitor a signal, verify the signal status of the signal logic number in the C. I/O monitor display.

1.4.2 Handling, Spot Welding, General-Purpose Applications



How to Monitor Signal Status

To monitor a signal, verify the signal status of the signal logic number in the C. I/O monitor display.

1.5 Specific Input Signals (4xxx)

1.5.1 Common for All Applications

4017	4016	4015	4014	4013	4012	4011	4010
	Safety Speed		Alarm Reset	User Msg Req	User Alm Req	System Msg Req	System Alm Req
4027	4026	4025	4024	4023	4022	4021	4020
User Alarm Code (Binary)			System Alarm Code (Binary)				
d2	d1	d0	d4	d3	d2	d1	d0
4037	4036	4035	4034	4033	4032	4031	4030
User Message Code (Binary)			System Message Code (Binary)				
d2	d1	d0	d4	d3	d2	d1	d0
4047	4046	4045	4044	4043	4042	4041	4040
INHB Weaving	Check Run	Ext Servo On	Ext Start		CMD Remote Sel	Play Mode Sel	Teach Mode Sel
4057	4056	4055	4054	4053	4052	4051	4050
Inhibit I/O	Inhibit PP. PPanel				Cont Cycle Sel	1 Cycle Sel	Step Cycle Sel
4067	4066	4065	4064	4063	4062	4061	4060
Ext Hold			Op Org Ret R1			Wait Job Seq R1J	Step Back R1J
4077	4076	4075	4074	4073	4072	4071	4070
Ext Servo Off 1			Ope Org Ret R2			Wait Job Seq R2J	Step Back R2J
4087	4086	4085	4084	4083	4082	4081	4080
Ext Servo Off 2			Ope Org Ret R3			Wait Job Seq R3J	Step Back R3J
4097	4096	4095	4094	4093	4092	4091	4090
		Sub Master Job5 Call	Sub Master Job4 Call	Sub Master Job3 Call	Sub Master Job2 Call	Sub Master Job1 Call	Master Job Call

4107	4106	4105	4104	4103	4102	4101	4100
		Sub Task 5Alarm Request	Sub Task 4Alarm Request	Sub Task 3Alarm Request	Sub Task 2Alarm Request	Sub Task 1Alarm Request	
4107	4106	4115	4114	4113	4112	4111	4110
4127	4126	4125	4124	4123	4122	4121	4120
4137	4136	4135	4134	4133	4132	4131	4130
4147	4146	4145	4144	4143	4142	4141	4140
4157	4156	4155	4154	4153	4152	4151	4150
4167	4166	4165	4164	4163	4162	4161	4160

1.5.2 Arc Welding

Device 1

4177	4176	4175	4174	4173	4172	4171	4170
Anti-Stick Req	Retry Ret Req	Retry Req	Nozzle Cleaned	Tip Changed	Time Measure	Work End Ans	Work Start Ans
4187	4186	4185	4184	4183	4182	4181	4180
	Clr Ant-Stk No	Clr Restart No	Clr Retry No	Restart Reset	Restart/ Wire	Restart/ Gas	Restart/ Arc
4197	4196	4195	4194	4193	4192	4191	4190
4207	4206	4205	4204	4203	4202	4201	4200
							Inhb Sensing

Device 2

4217	4216	4215	4214	4213	4212	4211	4210
Anti-Stick Req	Retry Ret Req	Retry Req	Nozzle Cleaned	Tip Changed	Time Measure	Work End Ans	Work Start Ans
4227	4226	4225	4224	4223	4222	4221	4220
	Clr Ant-Stk No	Clr Restart No	Clr Retry No	Restart Reset	Restart/ Wire	Restart/ Gas	Restart/ Arc
4237	4236	4235	4234	4233	4232	4231	4230
4247	4246	4245	4244	4243	4242	4241	4240
							Inhb Sensing

Device 3

4257	4256	4255	4254	4253	4252	4251	4250
Anti-Stick Req	Retry Ret Req	Retry Req	Nozzle Cleaned	Tip Changed	Time Measure	Work End Ans	Work Start Ans
4267	4266	4265	4264	4263	4262	4261	4260
	Clr Ant-Stk No	Clr Restart No	Clr Retry No	Restart Reset	Restart/ Wire	Restart/ Gas	Restart/ Arc
4277	4276	4275	4274	4273	4272	4271	4270
4287	4286	4285	4284	4283	4282	4281	4280
							Inhb Sensing

1.5.3 Handling

Device 1

4177	4176	4175	4174	4173	4172	4171	4170
					Time Measure	Work End Ans	Work Start Ans
4187	4186	4185	4184	4183	4182	4181	4180
Sensor Input 8	Sensor Input 7	Sensor Input 6	Sensor Input 5	Sensor Input 4	Sensor Input 3	Sensor Input 2	Sensor Input 1
4197	4196	4195	4194	4193	4192	4191	4190
4207	4206	4205	4204	4203	4202	4201	4200

Device 2

4217	4216	4215	4214	4213	4212	4211	4210
					Time Measure	Work End Ans	Work Start Ans
4227	4226	4225	4224	4223	4222	4221	4220
Sensor Input 8	Sensor Input 7	Sensor Input 6	Sensor Input 5	Sensor Input 4	Sensor Input 3	Sensor Input 2	Sensor Input 1
4237	4236	4235	4234	4233	4232	4231	4230
4247	4246	4245	4244	4243	4242	4241	4240

Device 3

4257	4256	4255	4254	4253	4252	4251	4250
					Time Measure	Work End Ans	Work Start Ans
4267	4266	4265	4264	4263	4262	4261	4260
Sensor Input 8	Sensor Input 7	Sensor Input 6	Sensor Input 5	Sensor Input 4	Sensor Input 3	Sensor Input 2	Sensor Input 1
4277	4276	4275	4274	4273	4272	4271	4270
4287	4286	4285	4284	4283	4282	4281	4280

1.5.4 Spot Welding

Device 1

4177	4176	4175	4174	4173	4172	4171	4170
Welding Stop					Time Measure		
4187	4186	4185	4184	4183	4182	4181	4180
4197	4196	4195	4194	4193	4192	4191	4190
4207	4206	4205	4204	4203	4202	4201	4200

Device 2

4217	4216	4215	4214	4213	4212	4211	4210
Welding Stop					Time Measure		
4227	4226	4225	4224	4223	4222	4221	4220
4237	4236	4235	4234	4233	4232	4231	4230
4247	4246	4245	4244	4243	4242	4241	4240

Device 3

4257	4256	4255	4254	4253	4252	4251	4250
Welding Stop					Time Measure		
4267	4266	4265	4264	4263	4262	4261	4260
4277	4276	4275	4274	4273	4272	4271	4270
4287	4286	4285	4284	4283	4282	4281	4280

1.5.5 General-Purpose Applications

Device1

4177	4176	4175	4174	4173	4172	4171	4170
					Time Measure	Work End Ans	Work Start Ans
4187	4186	4185	4184	4183	4182	4181	4180
4197	4196	4195	4194	4193	4192	4191	4190
4207	4206	4205	4204	4203	4202	4201	4200

Device2

4217	4216	4215	4214	4213	4212	4211	4210
					Time Measure	Work End Ans	Work Start Ans
4227	4226	4225	4224	4223	4222	4221	4220
4237	4236	4235	4234	4233	4232	4231	4230
4247	4246	4245	4244	4243	4242	4241	4240

Device3

4257	4256	4255	4254	4253	4252	4251	4250
					Time Measure	Work End Ans	Work Start Ans
4267	4266	4265	4264	4263	4262	4261	4260
4277	4276	4275	4274	4273	4272	4271	4270
4287	4286	4285	4284	4283	4282	4281	4280

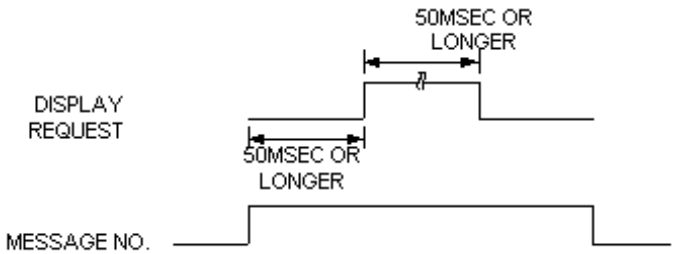
The following symbols are used in the explanation to represent the signal condition.

The signal takes effect while it is in ON state.

The rising edge is detected as the signal.

1.5.6 Displaying Alarms And Messages

Various information items about the application can be displayed as messages on the programming pendant display of the XRC.This section explains how to select already created messages. For registration, refer to “Registration of I/O Alarms and Messages”.



Signal Timing

Display request signal is a state signal, which continues to update the display while the signal is ON.

■ 4010: System Alarm Request

When this signal is ON, a system alarm occurs and the manipulator stops.At the same time, an alarm message corresponding to the alarm code of the specific inputs (4020 to 4024)appears on the programming pendant display.

4020 to 4024: System alarm No.(binary)

UP to 24 system alarm can be specified.Assign messages by coding decimals from 0 to 23 into binaries.The number specified upper than 24 is same as 23 specified.

No.	Setting Value 0: OFF 1: ON				
	4024	4023	4022	4021	4020
0	0	0	0	0	0
1	0	0	0	0	1
2	0	0	0	1	0
3	0	0	0	1	1
:	:	:	:	:	:
23	1	0	1	1	1

■ 4012: User Alarm Request

When this signal is on, a user alarm occurs and the manipulator stops. At the same time, an alarm message corresponding to the alarm code of the specific input (4025 to 4027) appears on the programming pendant display.

4025 to 4027: User Alarm No.

Up to 8 system alarms can be specified. Assign messages by coding decimals from 0 to 7 into binaries.

No.	Setting Value 0: OFF 1: ON		
	4027	4026	4025
0	0	0	0
1	0	0	1
2	0	1	0
3	0	1	1
:	:	:	:
7	1	1	1

■ 4011: System Message Request

When this signal is on, the message of the corresponding message code of specific inputs (4030 to 4034) appears on the programming pendant display. Manipulator operation will not be affected even if displayed.

4030 to 4034: System Message No. (Binary)

Up to 24 system messages can be specified. Assign message by coding decimals from 0 to 23 into binaries. When any number higher than 24 is designated, it is treated the same as if 23 was specified.

No.	Setting Value 0: OFF 1: ON				
	4034	4033	4032	4031	4030
0	0	0	0	0	0
1	0	0	0	0	1
2	0	0	0	1	0
3	0	0	0	1	1
:	:	:	:	:	:
23	1	0	1	1	1

■ 4013: User Message Request

When this signal is on, the message of the corresponding message code of specific inputs (4035 to 4037) appears on the programming pendant display. Manipulator operation will not be affected even if displayed.

4035 to 4037: User Message No. (Binary)

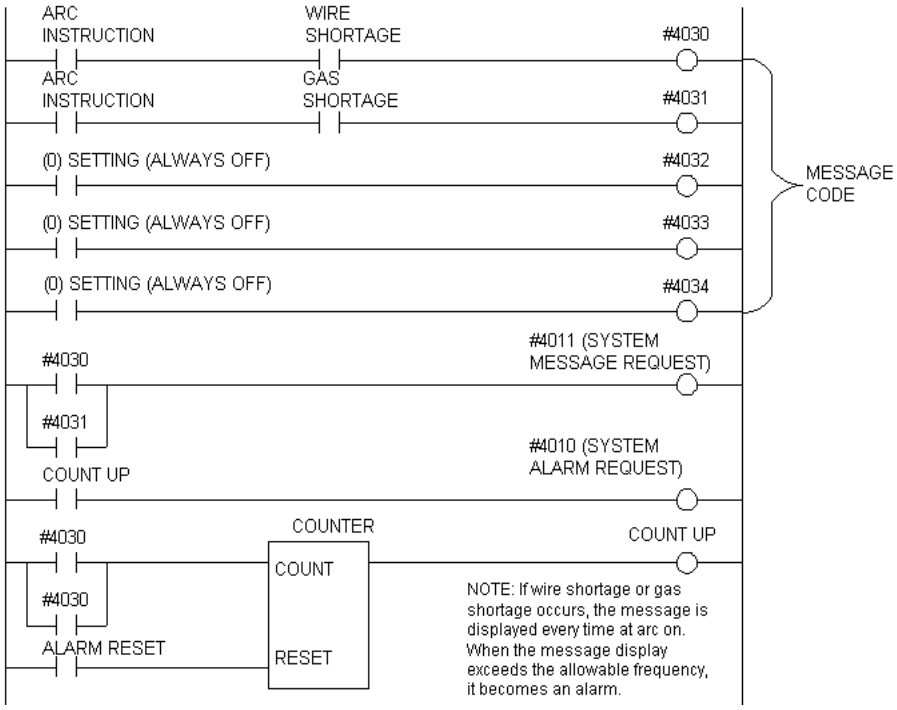
Up to 8 user messages can be specified. Assign message by coding decimals from 0 to 7 into binaries.

No.	Setting Value 0: OFF 1: ON		
	4037	4036	4035
0	0	0	0
1	0	0	1
2	0	1	0
3	0	1	1
:	:	:	:
7	1	1	1

■ 4014: Alarm Reset

This signal clears alarms or errors when there is a minor failure, system alarm, user alarm, or user error. Use this signal when desiring to reset an alarm or error from the outside.

<Example>



1.5.7 Selecting Mode/Cycle and Calling Master Job

■ 4040 to 4041: Selection of Mode

Rising

These signals have the same function as the mode select key on the playback panel. Use the signals when desiring to change mode specifications from the outside. If two or more modes are specified at the same time, the teach mode will have priority. These signals are invalid when “EXT. MODE SWITCH PROHIBIT” is shown on the teaching condition set 2 display.

■ 4042, 4056, 4057: Selection of Operating Modes

State

4042 CMD REMOTE SEL

This signal selects a command remote function such as transmission. When the system transmission function (optional) is valid, “CMD REMOTE SETTING” (5055) signal goes on and the XRC gets ready for transmission with the master computer.

4056 INHIB PP PANEL

When this signal is on, mode/cycle, start and servo on master job call from the playback panel and programming pendant are prohibited. However, when “I/O” is selected, for remote function, this prohibition is released by setting PPanel PP operation validated parameter. (S2C110)

4057 INHIBIT IO

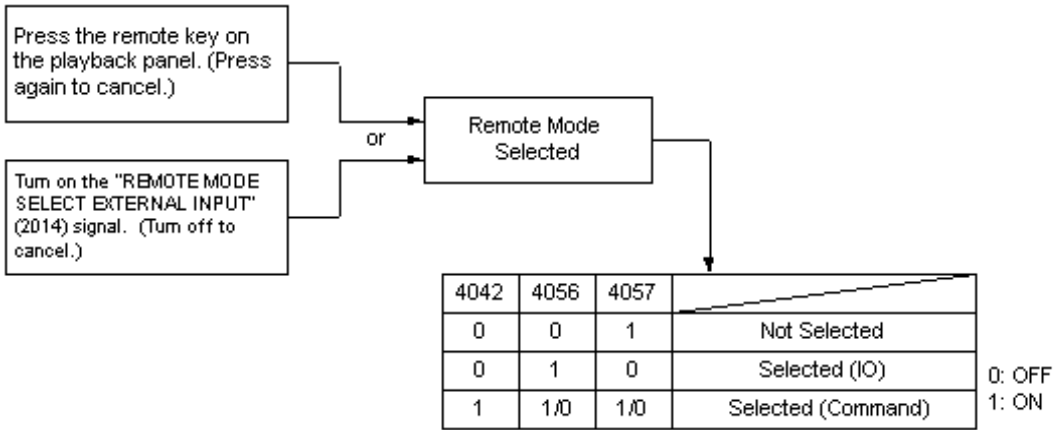
When this signal is on, the following operation from external input is prohibited.

- Selection of Mode (4040 to 4041)
- Selection of Cycle (4050 to 4052)
- Calling Up Master Job (4090)
- External Servo On (4045)

• External Start (4044)

When this signal is off or “COMMAND REMOTE SETTING” (5055) signal is on, the “REMOTE” lamp on the playback panel will blink.

Operation Mode Processing Standard Ladders



• For remote function selection, refer to the “1.15.3 Pseudo Input Signal Display”.
• Transmission function is an optional function.

■ 4050 to 4052: Selection of Cycles

Rising

These signals have the same function as the cycle select key on the playback panel. Use the signals when desiring to change cycle specifications from the outside. These can also be used when desiring to fix a specified cycle.
If two or more cycles are specified at the same time, or it is operated with the playback panel at the same time, the cycle will not change.
These are invalid when “EXT. MODE SWITCH PROHIBIT” is shown on the operating condition display.

■ 4090: Master Job Calling

Rising

This signal resets the operating sequence. When the signal is on, the heading of the master job (Line: 0) will be called up as an execution job. This can be used for executing system initialization automatically when the power is turned on.

However, it is invalid in the following cases:
• While the manipulator is operating (job is executing)
• While the “ENABLE” lamp on the programming pendant is blinking
• While setting the teach mode
• “MASTER CALLING UP PROHIBIT” is shown on the operating condition display.

1.5.8 External Servo On

■ 4045: External Servo On

This signal turns on the servo power. Use the signal when turning on the servo power from the outside.
To use this signal, connect the external servo on signal (EXSVON) on the I/O power on unit (JZNC-XIU01) to +24V (CN05 9-10). For details, see “1.11 I/O Except Concurrent I/O”. For safe use of the robot, it is recommended to use the above external servo on input on the I/O power on unit without intervention of the ladder.

This signal is invalid when “EXT. MODE SWITCH PROHIBIT” is shown on the operating condition display.

■ 4077 to 4087: External Servo Off

When these signals are on, the servo power supply is cut off and the manipulator stops. Use the signals when desiring to cut off the servo power supply from the outside or by ladder conditions for reasons other than the emergency stop. While these signals are on, the servo power remains off even if the servo on reference (from playback panel, programming pendant, or outside) is turned on.

■ 4044: External Start

This signal has the same function as the “START” button on the playback panel. Automatic operation starts in accordance with cycle specifications. When this signal is accepted, “OPERATING” (5070) and “PERMISSIBLE WORK OPERATING”(5087) signals will go on. The signal can be used when starting from a panel other than the XRC playback panel such as an external operator’s panel. Since only one place on the playback panel or external input can be specified as the “STARTING” base from the standpoint of safety, specify “EXTERNAL START PROHIBIT” on the operating condition display.

This signal is invalid under the following conditions:
- Servo power supply is turned off.
- Play mode is not selected.
- “EXTERNAL START PROHIBIT” is on the operating condition display.
- Manipulator is still operating. [When “OPERATING” (5070) signal is on].
- When “HOLDING” (5071) signal is on.
- “EXTERNAL HOLD” (4067) signal is on.

■ 4067: External Hold

This signal has the same function as the “HOLD” button on the playback panel. Use the signal when instructing “HOLD” from a location other than the playback panel or programming pendant. While the signal is on, the “HOLD” lamp on the playback panel is blinking and the “HOLDING” (5071) signal goes on.

1.5.9 Operating Instructions

■ 4016: In-Guard Safe Operating Instruction

State

When this signal is on, the playback panel operating speed is limited by in-guard safe operation speed. If approaching the manipulator during operation's unavoidable, the operating speed can be limited by turning the signal on. It will therefore be convenient to interlink the signal with the safety guardrail or safety mat.

NOTE

This signal is only to limit speed. Since the manipulator operates as taught, prepare the "EMERGENCY STOP" button so that it can be pressed at any time in the event of an emergency when one approaches the robot.

■ 4046: Check Operation

State

This signal is not a start instruction. When the signal is on, the work instruction in the job is not executed. Use the signal to check taught steps and motions. This signal is invalid when "CHECK/ MACHINE LOCK PROHIBIT" on the operating condition display is on.

■ 4047: Weaving Prohibition

State

When these signals are on, weaving in the job are not executed. Use the signals to check taught steps and motions with weaving off.

■ 4060 to 4070: 1-Step Back Operating Instruction

State

When these signals are on, at start up the manipulator moves to one step before the displayed step at low speed and stops there disregarding the cycle. These can be used for performing the operation one step before since some operations are difficult to be executed.

For a system with one manipulator, use signal No. 4060.

■ 4061 to 4071: Sequence Wait

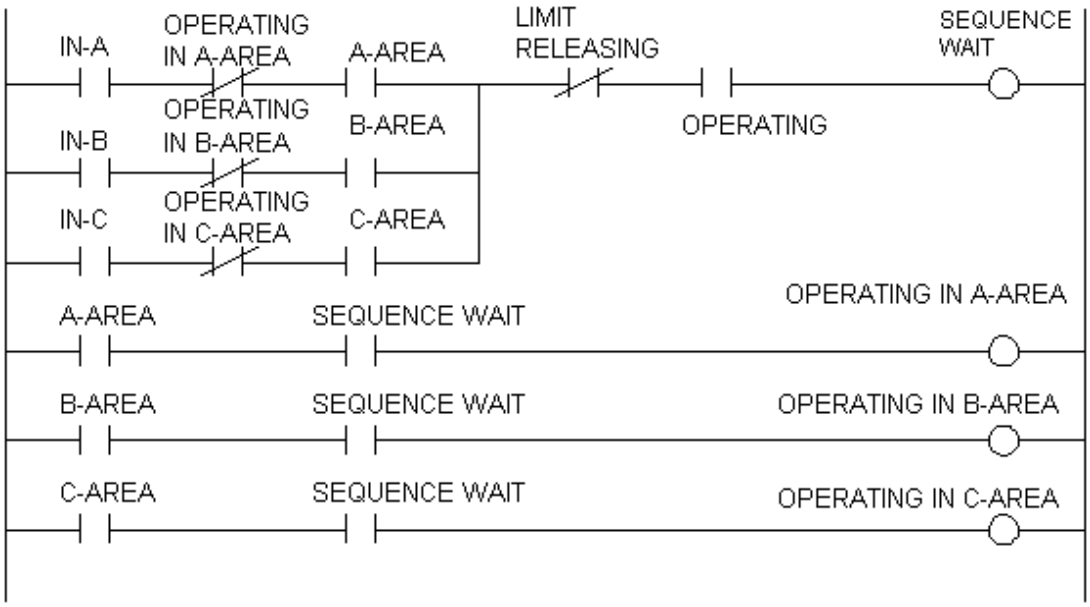
State

The manipulator pauses while this signal is on. Although it is functionally the same as "HOLD", it differs in the following ways:

1. When these signals are turned on while the manipulator is operating, the manipulator pauses temporarily, but it is still in an operating state. If these signals are turned on during an instruction other than a moving instruction (MOV), the instruction is continued. The "START" lamp remains lit and the "OPERATING" signal remains on. If the manipulator is operating at high speed when these signals are on, the manipulator reduces its speed and stops.
2. The status of these signals are controlled. Motion of the manipulator is automatically resumed when changing from on to off.

For system with one manipulator, use signal No. 4061.

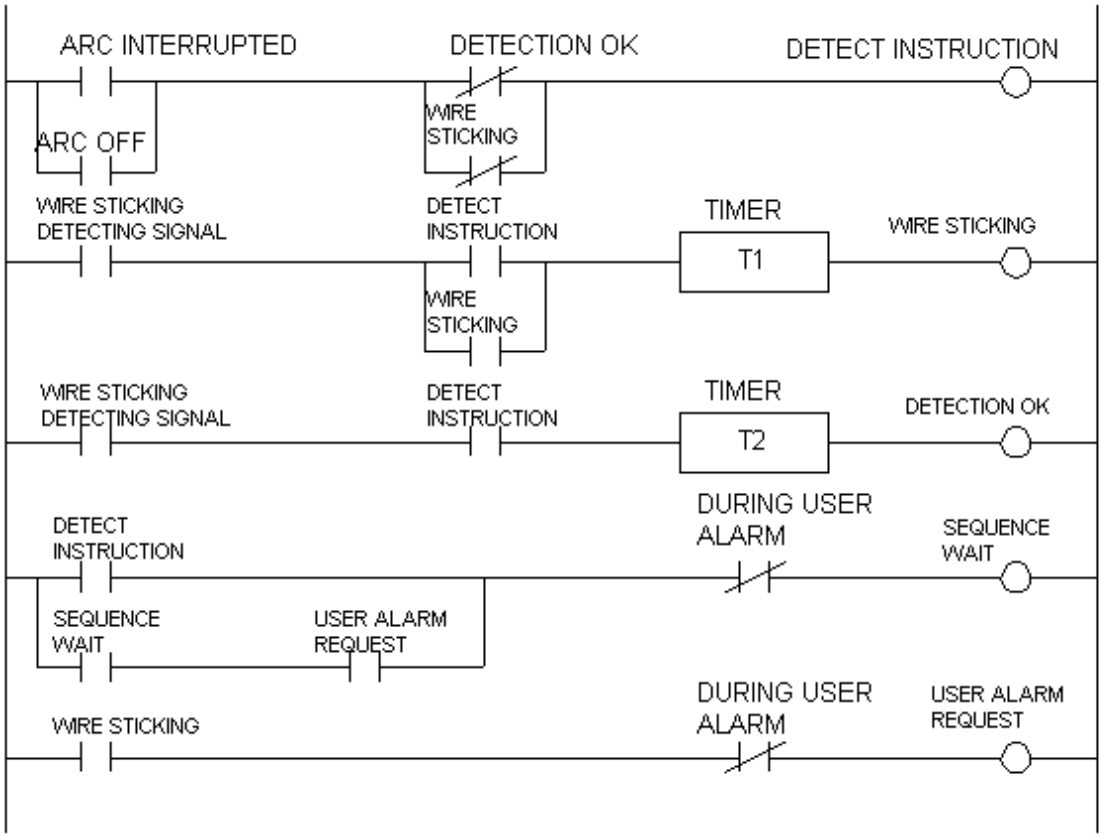
<Example 1>
The following is an example of using the signal to check S-Axis/ Cube Interference.



Explanation of ladder
Meaning of above terms
A, B, C: Area Name
e.g. S-Axis (right), Cube 1, etc.
IN-A, IN-B, IN-C: Status of the combined equipment input externally.

Area A, B, C: Individual status signals
(within the area or not; special output)
Operating signals in A, B, C: On when operating in the area.
This signal is assigned to the combined equipment.
If the combined equipment is in the area first, the SEQUENCE WAIT signal goes on and robot operation is stopped until the combined equipment leaves the area. When the combined equipment leaves the area, the SEQUENCE WAIT signal goes off and manipulator operation resumes.

<Example 2>
The following is an example of using the signal to detect wire sticking in arc welding.



Explanation of ladder
Monitor the state of welding when an ARC OFF instruction is issued, or if the arc is interrupted while the instruction is being issued. When detecting wire sticking the SEQUENCE WAIT REQUEST goes ON and the manipulator pauses.

Normal
Detection OK will be determined when the off state of the wire sticking detection signal continues for the prescribed time. SEQUENCE WAIT will then be released and the manipulator will resume operation.
Abnormal
Welding is determined abnormal if the on state of the wire sticking detecting signal continues longer than the prescribed time.
I/O alarm will occur if welding is abnormal, and SEQUENCE WAIT will then be cleared.

■ 4064, 4074, 4084: Work Home Position Return Request

Rising

The manipulator moves to the work home position at the speed of parameter SICxG056 at joint operation by starting up these signals in the play mode.
During returning to the home position, the "START" lamp is lit ("during start" is entered) and the message "Operation origin returning" is displayed on the programming pendant display.

Do not use these signals unless interlocking to check that the manipulator is at a position from which it can return to the home position.
For a system with one manipulator, use signal No. 4064.

1.5.10 Independent Control Signals (Optional)

■ 4101, 4102, 4103, 4104, 4105: SUB1, 2, 3, 4, 5 ALM REQ

These signals are used to stop the specified sub task with an alarm when system section alarm request (4010) or user section alarm request (4012) is issued.
Input the alarm request after setting the conditions of individual requirements.

Setting Value 0: OFF 1: ON					Meaning
4101	4102	4103	4104	4105	
0	0	0	0	0	Stops all tasks
1	0	0	0	0	Stops sub task 1
:	:	:	:	:	:
1	1	1	1	1	Stops sub task 1, 2, 3, 4, 5

■ 4091, 4092, 4093, 4094, 4095: SUB1, 2, 3, 4, 5 MASTER CALL

Operation sequence is reset. When these signals are turned on, the head of the master job in sub take 1, 2, 3, 4, or 5 is called up as an execution job.
These signals are invalid in any of the following cases: ì

- The manipulator is operating (during job execution).
- When the [ENABLE] key lamp on the programming pendant is blinking
- During teach lock
- “MASTER CALLING UP PROHIBIT” is shown on the operating condition setting display
- Master job is not registered

1.5.11 Application Signals

Signals from 0 to 4287 are classified into 3 blocks and assigned to input signals that have different meanings depending on the application. Most of these inputs are used by the system and they cannot be used from the outside of the XRC. This section explains exceptional signals available for using from the outside.

■ 4170, 4210, 4250: WORK START RESPONSE

■ 4175, 4215, 4255: RETRY REQUEST

■ 4176, 4216, 4256: RETRY RETURN REQUEST

The “WORK START RESPONSE” signal is used for response to the “WORK START INSTRUCTION” (5270, 5310, or 5350) signal. When the “RETRY REQUEST” signal is used simultaneously, retry operation is performed; when the “RETRY RETURN REQUEST” signal is used simultaneously, retry return operation is performed. By responding individually, the work start instruction is completed.
For a system with one application, use signal No. 4170, 4175, or 4176.

■ 4171, 4211, 4251: WORK END RESPONSE

■ 4177, 4217, 4257: AUTOMATIC ANTI-STICKING REQUEST

The “WORK END RESPONSE” signal is used for response to the “WORK START INSTRUCTION” (5271, 5311, 5351) signal. When the “AUTOMATIC ANTI-STICKING REQUEST” signal is used simultaneously, anti-sticking operation is performed.
By responding individually, the work start instruction is completed.
For a system with one application, use signal No. 4171 or 4177.

■ 4172, 4212, 4252: WORK TIME MEASURE

The time during which these signals are on is measured as the working time. This working time will be displayed on the system monitoring time display.
For a system with one application, use signal No. 4172.

■ 4173, 4213, 4253: TIP REPLACEMENT COMPLETED

When these signals are on, tip replacement is reset and the “TIP REPLACEMENT REQUEST” (5273, 5313, 5353) signal goes off.
For a system with one application, use signal No. 4173.

■ 4174, 4214, 4254: NOZZLE CLEANING COMPLETED

When these signals are on, nozzle cleaning time is reset and the “NOZZLE CLEANING REQUEST” (5273, 5313, 5353) signal goes off.
For a system with one application, use signal No. 4174.

■ 4180, 4220, 4260: RESTART REQUEST (ARC SHORTAGE)

■ 4181, 4221, 4261: RESTART REQUEST (GAS SHORTAGE)

■ 4182, 4222, 4262: RESTART REQUEST (WIRE SHORTAGE)

When these signals are on, restart operations are requested. The restart operation differs for each restart mode.
For a system with one application, use signal No. 4180, 4181, or 4182.

Multiple requests cannot be made.
The priority order of requests is arc shortage → gas shortage → wire shortage.

■ 4183, 4223, 4263: RESTART RESET PROCESS

When these signals are on, the restart process is released. When “manual intervention method” is selected as a restart method, use these signals to release the restart process after manual intervention. For the initial value, OT#190 (user open signal) is connected.

For a system with one application, use signal No. 4183.

■ 4184, 4224, 4264: RETRY TIMES CLEAR

When these signals are on, the number of retries is cleared.

For a system with one application, use signal No. 4184.

■ 4185, 4225, 4264: ARC SHORTAGE RESTART TIMES CLEAR

When these signals are on, the number of arc shortage restarts is cleared.

For a system with one application, use signal No. 4185.

■ 4186, 4226, 4265: AUTOMATIC ANTI-STICKING TIMES CLEAR

When these signals are on, the number of automatic anti-stickings are cleared.

For a system with one application, use signal No. 4186.

■ 4200, 4240, 4280: SENSING PROHIBIT

When these signals are on, sensing is not performed in the started job. Use the signals to check taught steps and motions with the sensing function off.

1.5.12 Handling

Signals from 4170 to 4287 are classified into three blocks and assigned to input signals that have each different meanings depending on the application. As most of these input signals are used for the system, they cannot be used from outside of the XRC.
This section explains exceptional signals that are available for external use.

■ 4170, 4210, 4250: WORK START RESPONSE

These signals are used for response to “WORK START INSTRUCTION” (5270, 5310, 5350) signal. The work start instruction is completed by the response.

For a system with one application, use signal No. 4170.

■ 4171, 4211, 4251: WORK END RESPONSE

These signals are used for response to “WORK END INSTRUCTION” (5271, 5311, 5351) signal. The work end instruction is completed by the response.
For a system with one application, use signal No. 4171.

■ 4172, 4212, 4252: WORK TIME MEASURE

The time during which these signals are on is measured as the working time.
This working time will be displayed on the system monitoring time display.

For a system with one application, use signal No. 4172.

■ 4180, 4187, 4220, 4227, 4263, 4264: SENSOR INPUT

These signals are specific inputs which can determine the signal status using the handling specific instruction “HSEN”. When using the “HSEN” instruction, connect it to the specific input of the XIO 02 board which is connected to these signals.
For a system with one manipulator, use signal Nos. 4180-4187.

1.5.13 Spot Welding

Signals from 4170 to 4287 are assigned to input signals for spot welding application. As most of these input signals are used for the system, they cannot be used from outside of the XRC.
This section explains exceptional signals that are available for external use.

■ 4172, 4212, 4252: WORK TIME MEASURE

The time during which these signals are on is measured as the working time.
This working time will be displayed on the system monitoring time display.

For a system with one application, use signal No. 4172.

■ 4177, 4217, 4257: WELDING STOP

State

This signal stops execution of the welding instruction.
While this signal is ON, the robot playback disregards the spot welding instruction.
Use this signal when the robot should return to the working home position, etc.

For a system with one application, use signal No. 4177.

1.5.14 General-Purpose Applications

Signals from 4170 to 4287 are classified into three blocks and assigned to input signals that have each different meanings depending on the application. As most of these input signals are used for the system, they cannot be used from the outside of the XRC.
This section explains exceptional signals that are available for external use.

■ 4170, 4210, 4250: WORK START RESPONSE

State

These signals are used for response to “WORK START INSTRUCTION” (5270, 5310, 5350) signal. The work start instruction is completed by the response.

For a system with one application, use signal No. 4170.

■ 4171, 4211, 4251: WORK END RESPONSE

State

These signals are used for response to “WORK END INSTRUCTION” (5271, 5311, 5351) signal.
For a system with one application, use signal No. 4171.

■ 4172, 4212, 4252: WORK TIME MEASURE

State

The time during which these signals are on is measured as the working time.
This working time will be displayed on the system monitoring time display.

For a system with one application, use signal No. 4172.

1.6 Specific Output Signals (5xxx)

1.6.1 Common For All Applications

5017	5016	5015	5014	5013	5012	5011	5010
COOLING FAN ERROR	ENCDR BTRY WEAK	MEM BTRY WEAK	ERROR OCCUR	USER ALM OCCUR	SYSTEM ALM OCCUR	MINOR ALM OCCUR	MAJOR ALM OCCUR
5027	5026	5025	5024	5023	5022	5021	5020
		TOP SUB MASTER JOB 5	TOP SUB MASTER JOB 4	TOP SUB MASTER JOB 3	TOP SUB MASTER JOB 2	TOP SUB MASTER JOB 1	TOP MASTER JOB
5037	5036	5035	5034	5033	5032	5031	5030
		SUB MASTER5 HELD	SUB MASTER4 HELD	SUB MASTER3 HELD	SUB MASTER2 HELD	SUB MASTER1 HELD	
5047	5046	5045	5044	5043	5042	5041	5040
		SUB MASTER5 ALARM OCCUR	SUB MASTER4 ALARM OCCUR	SUB MASTER3 ALARM OCCUR	SUB MASTER2 ALARM OCCUR	SUB MASTER1 ALARM OCCUR	
5057	5056	5055	5054	5053	5052	5051	5050
	TEACH-LOCK SET	CMD REMOTE SET	PLAY MODE SET	TEACH MODE SET	CONT CYCLE SET	1-CYCLE SET	STEP CYCLE SET
5067	5066	5065	5064	5063	5062	5061	5060
	POSITION CHECKED		CHECK RUN SET	SOFT LIMIT SET RELEASE	MACHINE LOCK SET	DRY RUN SET	SAFETY-SPEED SET
5077	5076	5075	5074	5073	5072	5071	5070
	JOG OPN INFORM	JOB EDIT INFORM		SERVO ON		HOLDING (HOLD LAMP)	OPERAT-ING
5087	5086	5085	5084	5083	5082	5081	5080
WORK PERMIT RUN R1J	LOCUS DEVIATE R1	WORK RESTART PROHIBIT R1J	SERVO FLOAT ON R1	SEARCH-ING R1J		CONT JOB R1J	WAIT JOB SEQ R1J

5097	5096	5095	5094	5093	5092	5091	5090
WORK PERMIT RUN R2J	LOCUS DEVIATE R2	WORK RESTART PROHIBIT R2J	SERVO FLOAT ON R2	SEARCH-ING R2J		CONT JOB R2J	WAIT JOB SEQ R2J
5107	5106	5105	5104	5103	5102	5101	5100
WORK PERMIT RUN R3J	LOCUS DEVIATE R3	WORK RESTART PROHIBIT R3J	SERVO FLOAT ON R3	SEARCH-ING R3J		CONT JOB R3J	WAIT JOB SEQ R3J
5117	5116	5115	5114	5113	5112	5111	5110
CUBE INTERFERENCE							
8	7	6	5	4	3	2	1
5127	5126	5125	5124	5123	5122	5121	5120
CUBE INTERFERENCE							
16	15	14	13	12	11	10	9
5137	5136	5135	5134	5133	5132	5131	5130
CUBE INTERFERENCE							
24	23	22	21	20	19	18	17
5147	5146	5145	5144	5143	5142	5141	5140
SPHERE INPUT R1 ADVANCE R3 INTRF	SPHERE INPUT R1 ADVANCE R2 INTRF	CRD WORKING R1R2	SPHERE INTRF R1R2			S-AXIS INTER-FERENCE R1 (L)	S-AXIS INTER-FERENCE R1 (R)
5157	5156	5155	5154	5153	5152	5151	5150
SPHERE INPUT R2 ADVANCE R3 INTRF	SPHERE INPUT R2 ADVANCE R1 INTRF	CRD WORKING R2R3	SPHERE INTRF R2R3			S-AXIS INTER-FERENCE R2 (L)	S-AXIS INTER-FERENCE R2 (R)
5167	5166	5165	5164	5163	5162	5161	5160
SPHERE INPUT R3 ADVANCE R2 INTRF	SPHERE INPUT R3 ADVANCE R1 INTRF	CRD WORKING R3R1	SPHERE INTRF R3R1			S-AXIS INTER-FERENCE R3 (L)	S-AXIS INTER-FERENCE R3 (R)
5177	5176	5175	5174	5173	5172	5171	5170
SV ON STATUS S5	SV ON STATUS S4	SV ON STATUS S3	SV ON STATUS S2	SV ON STATUS S1	SV ON STATUS R3	SV ON STATUS R2	SV ON STATUS R1

5187	5186	5185	5184	5183	5182	5181	5180
							SV ON STATUS S6
5197	5196	5195	5194	5193	5192	5191	5190
5207	5206	5205	5204	5203	5202	5201	5200
5217	5216	5215	5214	5213	5212	5211	5210
5227	5226	5225	5224	5223	5222	5221	5220
5237	5236	5235	5234	5233	5232	5231	5230
5247	5246	5245	5244	5243	5242	5241	5240
5257	5256	5255	5254	5253	5252	5251	5250
5267	5266	5265	5264	5263	5262	5261	5260
					ARITH ERROR FLAG	ARITH ZERO FLAG	ARITH CARRY FLAG

1.6.2 ARC WELDING

Device1

5277	5276	5275	5274	5273	5272	5271	5270
RETURN RETRY	RETRACT	INCHING	CLEAN NOZZLE	CHANGE TIP	INHB WORK CONT	END WORK	START WORK
5287	5286	5285	5284	5283	5282	5281	5280
RETRY REPLAY MODE	OVER ANTSTK NO	OVER RESTART	OVER RESTART	RETURN RESTART	RESTARTING/WIR	RESTARTING/GAS	RESTARTING/ARC
5297	5296	5295	5294	5293	5292	5291	5290
5307	5306	5305	5304	5303	5302	5301	5300

Device 2

5317	5316	5315	5314	5313	5312	5311	5310
RETURN RETRY	RETRACT	INCHING	CLEAN NOZZLE	CHANGE TIP	INHB WORK CONT	END WORK	START WORK
5327	5326	5325	5324	5323	5322	5321	5320
RETRY REPLAY MODE	OVER ANTSTK NO	OVER RESTART	OVER RESTART	RETURN RESTART	RESTARTING/WIR	RESTARTING/GAS	RESTARTING/ARC
5337	5336	5335	5334	5333	5332	5331	5330
5347	5346	5345	5344	5343	5342	5341	5340

Device 3

5357	5356	5355	5354	5353	5352	5351	5350
RETURN RETRY	RETRACT	INCHING	CLEAN NOZZLE	CHANGE TIP	INHB WORK CONT	END WORK	START WORK
5367	5366	5365	5364	5363	5362	5361	5360
RETRY REPLAY MODE	OVER ANTSTK NO	OVER RESTART	OVER RESTART	RETURN RESTART	RESTARTING/WIR	RESTARTING/GAS	RESTARTING/ARC
5377	5376	5375	5374	5373	5372	5371	5370
5387	5386	5385	5384	5383	5382	5381	5380

1.6.3 Handling

Device 1

5277	5276	5275	5274	5273	5272	5271	5270
SH-SNSR VALID	SH-SNSR FUNC SELECT				INHB WORK CONT	END WORK	START WORK
5287	5286	5285	5284	5283	5282	5281	5280
TOOL VALVE 4-2	TOOL VALVE 4-1	TOOL VALVE 3-2	TOOL VALVE 3-1	TOOL VALVE 2-2	TOOL VALVE 2-1	TOOL VALVE 1-2	TOOL VALVE 1-1
5297	5296	5295	5294	5293	5292	5291	5290
5307	5306	5305	5304	5303	5302	5301	5300

Device 2

5317	5316	5315	5314	5313	5312	5311	5310
SH-SNSR VALID					INHB WORK CONT	END WORK	START WORK
5327	5326	5325	5324	5323	5322	5321	5320
TOOL VALVE 4-2	TOOL VALVE 4-1	TOOL VALVE 3-2	TOOL VALVE 3-1	TOOL VALVE 2-2	TOOL VALVE 2-1	TOOL VALVE 1-2	TOOL VALVE 1-1
5337	5336	5335	5334	5333	5332	5331	5330
5347	5346	5345	5344	5343	5342	5341	5340

Device 3

5357	5356	5355	5354	5353	5352	5351	5350
SH-SNSR VALID					INHB WORK CONT	END WORK	START WORK
5367	5366	5365	5364	5363	5362	5361	5360
TOOL VALVE 4-2	TOOL VALVE 4-1	TOOL VALVE 3-2	TOOL VALVE 3-1	TOOL VALVE 2-2	TOOL VALVE 2-1	TOOL VALVE 1-2	TOOL VALVE 1-1
5377	5376	5375	5374	5373	5372	5371	5370
5387	5386	5385	5384	5383	5382	5381	5380

1.6.4 Spot Welding

Device 1

5277	5276	5275	5274	5273	5272	5271	5270
Welding ON/OFF	WORK SVSPOT	CHANGE TIP ALM	WEAR DETECT ERROR				
5287	5286	5285	5284	5283	5282	5281	5280
5297	5296	5295	5294	5293	5292	5291	5290
5307	5306	5305	5304	5303	5302	5301	5300

Device 2

5317	5316	5315	5314	5313	5312	5311	5310
Welding ON/OFF	WORK SVSPOT	CHANGE TIP ALM	WEAR DETECT ERROR				
5327	5326	5325	5324	5323	5322	5321	5320
5337	5336	5335	5334	5333	5332	5331	5330
5347	5346	5345	5344	5343	5342	5341	5340

Device 3

5357	5356	5355	5354	5353	5352	5351	5350
Welding ON/OFF	WORK SVSPOT	CHANGE TIP ALM	WEAT DETECT ERROR				
5367	5366	5365	5364	5363	5362	5361	5360
5377	5376	5375	5374	5373	5372	5371	5370
5387	5386	5385	5384	5383	5382	5381	5380

1.6.5 General-Purpose Applications

Device 1

5277	5276	5275	5274	5273	5272	5271	5270
					INHB WORK CONT	END WORK	START WORK
5287	5286	5285	5284	5283	5282	5281	5280
5297	5296	5295	5294	5293	5292	5291	5290
5307	5306	5305	5304	5303	5302	5301	5300

Device 2

5317	5316	5315	5314	5313	5312	5311	5310
					INHB WORK CONT	END WORK	START WORK
5327	5326	5325	5324	5323	5322	5321	5320
5337	5336	5335	5334	5333	5332	5331	5330
5347	5346	5345	5344	5343	5342	5341	5340

Device 3

5317	5316	5315	5314	5313	5312	5311	5310
					INHB WORK CONT	END WORK	START WORK
5327	5326	5325	5324	5323	5322	5321	5320
5337	5336	5335	5334	5333	5332	5331	5330
5347	5346	5345	5344	5343	5342	5341	5340

The following symbols are used in the explanation to represent the signal conditions.

The signal takes effect while it is in the on state.

The rising edge is detected as the signal.

1.6.6 Displaying Alarms and Messages

■ 5010 to 5014: ALARM/ERROR OCCURRENCE

These signals indicate the occurrence of alarms or errors. The “MAJOR ALM OCCUR” (5010) signal remains on until power is turned off.

Register M100 Alarm Code (Binary/BCD)
If an alarm occurs in the system, the corresponding alarm code is output. If there are two or more alarms, the code of the first occurring alarm is output. To switch binary and BCD data type, use the parameter (S2C161). Factory setting is binary.

Register M101 Alarm Code (Binary/BCD)
These signals are detailed information added to the alarm code.

■ 5015, 5016: BATTERY WEAK

These signals are on when voltage drops in the memory protection battery and the absolute encoder memory retention battery, to indicate that batteries need replacement. Loss of data in memory due to a weak battery causes much damage.
Take the signals as a kind of alarm and take appropriate action.

■ 5017: COOLING FAN ERROR

This signal is on when the CPU rack cooling fan inside XRC or the cooling fan connected to the power on unit is not operating normally, in order to inform that the cooling fan is required to be changed. Such a error as non-operating cooling fan causes damages to XRC and robot components.
Take the signal as a kind of alarm and take appropriate action.

1.6.7 Setting of Mode / Cycle and Particular Play Operation

■ 5050 to 5052: CYCLE SETTING

These signals indicate the status of specifications of current mode setting. The signal corresponding to the selected mode is turned on.

■ 5053 to 5054: MODE SETTING

These signals indicate the status of specifications of current mode settings. The signals are synchronized with the mode select key lamps on the playback panel. The signal corresponding to the selected mode is turned on.

■ 5055: COMMAND REMOTE SETTING

This signal indicates that the command remote function such as transmission is valid. When this signal is on, [or “PROHIBIT IO” (4057) signal is off], the “REMOTE” lamp on the playback panel is blinking.

■ 5056: TEACH LOCK SETTING

This signal indicates that the teach lock is set.

■ 5060: IN-GUARD SAFE OPERATION SETTING

This signal indicates that the manipulator is in the in-guard safe operation status.

■ 5061: DRY-RUN SETTING

This signal indicates that the dry-run is set.

■ 5062: MACHINE LOCK SETTING

This signal indicates that the machine lock is set.

■ 5063: SOFT LIMIT RELEASE SETTING

This signal indicates that the soft limit is released. Switching to play mode automatically releases the soft limit and turns off this signal.

■ 5064: CHECK OPERATION SETTING

This signal indicates the check operation is set.

1.6.8 Indication of Start/Stop and Status

■ 5170 to 5180: SERVO ON STATUS

These signals indicate that the servo power for each robot/station is on. With the signal on, the corresponding servo power for each robot/station is on.

■ 5066: POSITION CHECK COMPLETED

This signal indicates that the position check operation has been completed after “Alarm 4107: OUT OF RANGE (ABSO DATA)” occurred. The signal stays on if the alarm does not occur after power on.

■ 5070: OPERATING

This signal indicates that the manipulator has been started. That is, the manipulator is either executing the job, ready for reserved starting, ready for multi-series starting, or performing test run. This signal is synchronized with the state of the “START” button on the playback panel.

■ 5071: HOLDING

This signal indicates that “HOLD” is being instructed with the programming pendant and it can only be released with the programming pendant. Check this signal if the manipulator does not operate.

■ 5073: SERVO ON

This signal indicates that after the servo power is turned on, internal processing such as current position preparation has been completed and the system is ready to accept “START” instruction. This can be used for determining whether the system is ready for external start.

■ 5075: JOB EDITING OPERATION INDICATION

This signal indicates that the job to be executed has just been edited, searched, or manipulated with the cursor on. This can be used for determining starting conditions after editing.

■ 5076: JOG OPERATION INDICATION

This signal indicates that the manipulator was made to move an axis or FWD/BWD operation on the programming pendant. This signal goes off automatically when playback is started. This can be used for determining restarting condition.

■ 5087, 5097, 5107: PERMISSIBLE WORK OPERATING

This signals indicate that the manipulator is operating at actual workable speed. This signals are turned on being synchronized with “OPERATING” (5070) signal. The status of these signals during operations other than normal playback operation are shown below.

State 0: OFF 1: ON	Meaning
0	• Machine Lock Operation • Dry-Run Operation • Low-Speed Start-Up Operation
1	• During in-guard safety operation • During continuous operation with the teach pendant • When adjusting speed during operation • When speed is limited by the sensor

In the system with one manipulator, use R1J (5087).

■ 5080,5090,5100: SEQUENCE WAITING

These signals indicate that the manipulator is stopped by the “SEQUENCE WAIT” (4061,4071,4081) signal. After accepting the above signal and the manipulator has stopped, these signals go on. These signals go off before the manipulator starts operating when sequence wait is cleared.

For a system with one manipulator, use signal No. 5080.

■ 5081, 5091, 5101: SEQUENCE CONTINUING

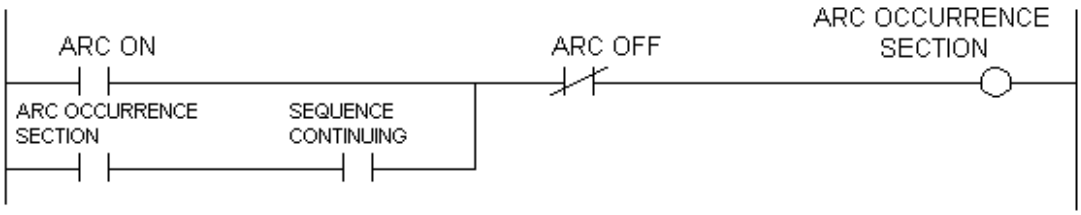
These signals indicate that manipulator operation is in executing state in the sequence of instruction as taught. These signals go on when the initial job is executed after power is turned on.
“FWD” and “TEST” operations on the programming pendant are the same as above.

These signals go off in the following cases.

- When the is moved by operation change such as of the line No. from the programming pendant when the manipulator is stopped.
- When a job is called up.
- When edit operation (addition, change, delete) is executed from the programming pendant.

For a system with one manipulator, use signal No. 5081.

<Example>
These signals can be used for intentional reset of work section information as shown below.



■ 5083, 5093, 5103: SEARCH START

State

These signals indicate that “SEARCH” instruction being executed. These signals can be used as effective sensing signals for external sensor.

For a system with one manipulator, use signal No. 5083.

■ 5020: HEAD OF MASTER JOB

State

This signal indicates that the execution position is at the head of the master job. These can be used as check signals calling for master job.

■ 5085, 5095, 5105: WORK RESTART PROHIBIT

State

When an emergency stop is executed during running at high-speed, the job instruction stop position may be advanced from the actual manipulator position due to the servo delay. At restarting, the manipulator moves for this delay, then the job is executed. When the instruction stop position is in the work section of arc welding, etc., these signals are on until the manipulator moves for the delay to reach the position of work start (Arc ON, etc.). and indicate the work restart prohibited status.

For a system with one manipulator, use signal No. 5085 (R1).

■ 5086, 5096, 5106: LOCUS DEVIATION

State

These signals indicate that the corresponding manipulators are deviating from the natural locus, as jog operation after emergency stop or motion stop.

For a system with one manipulator, use signal No. 5086.

1.6.9 Interference Signals

■ 5110 to 5137: IN-CUBE

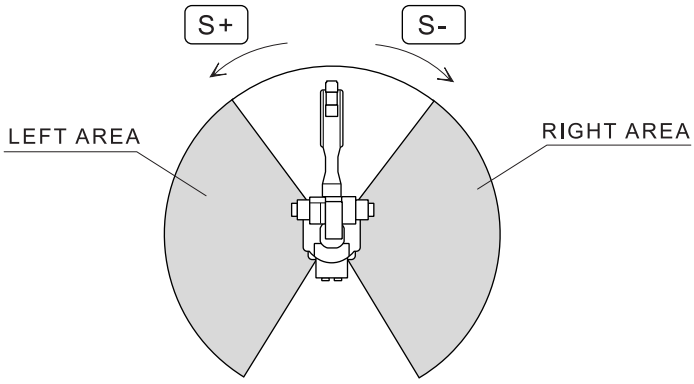
State

These signals indicate the area in which the current control point is positioned in the initially set area. Set the area by parameters (S2C003 to S2C074, S3C024 to S2C407). These can be used to prevent interference with other manipulators or jigs.

■ 5140, 5141, 5150, 5151, 5161, 5162: S-AXIS INTERFERENCE AREA

State

These signals indicate the area in which the current S-Axis is positioned in the initially set area. Set the area by parameters (S2C002, S3C018 to S3C023). These can be used to prevent interference with other manipulators or jigs.



Relation Between the Area and the Signal

■ 5144, 5154, 5164, 5146, 5156, 5166, 5147, 5157, 5167: MOVING SPHERE INTERFERENCE AREA

State

These signals indicate that interference exists by the moving sphere interference check. Areas set by parameters (S2C257 to S2C259, S3C409 to S3C411). These signals can be used for the manipulator interference check period.

1.6.10 Arithmetic Instruction Signal

■ 5260, 5261, 5262: Arithmetic Flag

State

This is a signal which reflects the result of the arithmetic instruction in the following steps. There are three kings of flag: Carry Flag(5060), Zero Flag(5061), Error Flag(5062).

1.6.11 Signals During Operation and for Jog Offset Junction (Optional)

■ 5021, 5022, 5023, 5024, 5025: TOP SUB1, 1, 2, 3, 4, 5 MASTER

State

These signals indicate that the execution position is at the head of the master job in sub task 1, 2, 3, 4, 5. Use as a checking signal of master job in each sub task call.

■ 5145, 5155, 5165: CRD WORKING

State

This signal indicates coordination jobs R1 and R2, R2 and R3, R3 and R1 are working. This signal is turned off when the job stops or the start lamp goes off.

■ 5141, 5142, 5143, 5144, 5155: SUB ALM OCCUR

State

These signals indicate that the sub task is generating an alarm individually during system section alarm occurrence (5012) or user section alarm occurrence (5013).

State 0: OFF 1: ON					Meaning
5041	5042	5043	5044	5045	
0	0	0	0	0	All tasks alarms occur
1	0	0	0	0	Sub task 1 alarm occurs
:	:	:	:	:	:
1	1	1	1	1	Sub tasks 1, 2, 3, 4, 5 alarms occur

■ 5152, 5153, 5154, 5155, 5156: SUB HELD

State

These signals indicate sub task 1, 2, 3, 4, 5 stops the operation by alarm occurrence or the “PAUSE” instruction. Operation can be restarted by pressing the [START] key on the playback panel or inputting external start (4044).
These signals are turned off when all tasks stop or the sub task is released.

1.6.12 Signals for Servo Float Function (Option)

■ 5084, 6094, 5104: Servo Float ON

State

These signals indicate the servo float operating status.

In the system with one manipulator, use signal No. 5084 (R1).

1.6.13 Arc Welding

Signals from 5270 to 5387 are classified into three blocks and assigned to output signals that have different meanings depending on the application. Most of these outputs are used by the system so they cannot be used from the outside of the XRC. This section explains exceptional signals that are available for external use.

■ 5270, 5310, 5350: WORK START INSTRUCTION

These signals indicate work starting and wait for inputting of the “WORK START RESPONSE” (4170, 4210, 4250) signal.

For a system with one application, use signal No. 5270.

■ 5271, 5311, 5351: WORK END INSTRUCTION

These signals indicate work ending and wait for inputting of the “WORK END RESPONSE” (4171, 4211, 4251) signal.

For a system with one application, use signal No. 4271.

■ 5272, 5312, 5352: WORK CONTINUING PROHIBIT INSTRUCTION

These signals indicate whether to continue the operation after stopping during the operation. When the signals are on, the operation is not continued.

For a system with one application, use signal No. 5272.

■ 5273, 5313, 5353: TIP REPLACEMENT REQUEST

These signals indicate that the preset tip replacement time has come. The signals are reset by the “TIP REPLACEMENT COMPLETED” (4173, 4213, 4253) signals.

For a system with one application, use signal No. 5273.

■ 5274, 5314, 5354: NOZZLE CLEANING REQUEST

These signals indicate that the set nozzle cleaning request time has come. These signals are reset by “NOZZLE CLEANING COMPLETED” (4174, 4214, 4254) signal.

For a system with one application, use signal No. 5274.

■ 5275, 5315, 5355: INCHING

These signals go on when using the inching of the work instructions.

For a system with one application, use signal No. 5275.

NOTE For normal inching, use signal No. 1246, 1236, 1226.

■ 5276, 5316, 5356: RETRACT

State These signals go on when using retract of the work instructions.

For a system with one application, use signal No. 5276.

NOTE For normal inching, use signal No. 1247, 1237, 1236.

■ 5277,5317,5357: RETRY RETURN PROCESSING

State These signals indicate that the retry returning is executed by the “RETRY RETURN REQUEST” (4176,4216,4256) signal.

For a system with one application, use signal No. 5277.

■ 5280, 5320, 5360: RESTART PROCESSING (ARC SHORTAGE)

State

■ 5281, 5321, 5361: RESTART PROCESSING (GAS SHORTAGE)

State

■ 5282, 5322, 5362: RESTART PROCESSING (WIRE SHORTAGE)

State These signals indicate that restarting is executed by the “RESTART REQUEST” (4180 to 4802, 4220 to 4222, 4620 to 4622) signals. These can be released by the “RESTART PROCESS RESET” (1245) signal.

For a system with one application, use signal No. 5280, 5281, or 5282.

■ 5283, 5323, 5363: RESTART RETURN PROCESSING

State These signals are one of the signals related to the restarting operations and indicate that the restart returning is executed.

For a system with one application, use signal No. 5283.

■ 5284, 5324, 5364: RETRY SETTING TIME EXCEEDED

These signals indicate that the accumulated number of restart times has been reached or exceeded the set value.

For a system with one application, use signal No. 5284.

■ 5285, 5325, 5365: ARC SHORTAGE RESTART SETTING TIMES EXCEEDED

These signals indicate that the accumulated number of arc shortage restart times has been reached or exceeded the set value.

For a system with one application, use signal No. 5285.

■ 5286, 5326, 5366: AUTOMATIC ANTI-STICKING SETTING TIMES EXCEEDED

These signals indicate that the accumulated number of automatic anti-sticking times has been reached or exceeded the set value.

For a system with one application, use signal No. 5286.

■ 5287, 5327, 5367: RETRY REPLAY MODE

These signals inform that arc retry is being executed in the replay operation mode.

For a system with one application, use signal No. 5287.

1.6.14 Handling

Signals from 5270 to 5387 are classified into three blocks and assigned to output signals that have different meanings depending on the application. Most of these outputs are used by the system so they cannot be used from the outside of the XRC. This section explains exceptional signals that are available for external use.

■ 5276, 5316, 5356: SHOCK SENSOR FUNCTION SELECT

This signal monitors the status of the shock sensor function use in the handling application.

For a system with one application, use signal No. 5276.

■ 5277, 5317, 5357: SHOCK SENSOR INPUT

State

These signals output the status signal to show whether the shock sensor input function is valid in the teach mode for the handling application. When concurrent I/O is the standard handling ladder, an alarm occurs by shock sensor input when these signals are on; only a message displayed on the programming pendant when these are off. “JOG” and other operations can be executed.

For a system with one application, use signal No. 5277.

■ 5280 to 5287, 5320 to 5327, 5360 to 5367: TOOL VALVE OUTPUT

State

These signals are specific output signals for valves which are turned on/off by handling the specific instruction “HAND”. When using the “HAND” instruction, connect it to the specific input section of the XIO 02 board which is connected to these signals.

For a system with one manipulator, use signal No. 5280 to 5287.

1.6.15 Spot Welding

Signals from 5270 to 5387 are assigned to output signals for spot welding applications. Most of these inputs are used by the system so they cannot be used from the outside of the XRC. This section explains exceptional signals that are available for external use.

■ 5274, 5314, 5354: WEAR DETECTION ERROR (Motor Gun)

State

These signals output pulses (pulse width: 500 msec) when the signal from sensor does not turn on/off properly at executing the wear detection with sensor.

For a system for one application, use signal No. 5274.

■ 5275, 5315, 5355: CHANGE TIP ALM (Motor Gun)

State

These signals output pulses (pulse width: 500 msec) when the electrode wear amount exceeds the alarm set value (parameter AxP016 and AxP017) at executing the wear detection.

For a system for one application, use signal No. 5275.

■ 5276, 5316, 5356: SVSPOT EXECUTE (Motor Gun)

State

These signals turn on while a SVSPOT instruction is executing in a job.

For a system for one application, use signal No. 5276.

■ 5277, 5317, 5357: WELDING ON/OFF

State

This signal monitors the welding on/off from the programing pendant.
Use this signal when the manual spot welding in the teach mode.

For a system with one application, use signal No. 5277.

1.6.16 General-Purpose Applications

Signals from 5270 to 5387 are classified into three blocks and assigned to output signals that have different meanings depending on the application. Most of these outputs are used by the system so they cannot be used from the outside of the XRC. This section explains exceptional signals that are available for external use.

■ 5270, 5310, 5350: WORK START INSTRUCTION

State

These signals indicate work starting and wait for inputting of the “WORK START RESPONSE” (4170, 4210, 4250) signal.

For a system with one application, use signal No. 5170.

■ 5271, 5311, 5351: WORK END INSTRUCTION

State

These signals indicate work ending and wait for inputting of the “WORK END RESPONSE” (4171, 4211, 4251) signal.

For a system with one application, use signal No. 5271.

■ 5272, 5312, 5352: WORK CONTINUING PROHIBIT INSTRUCTION

State

These signals indicate whether to continue the operation after stopping. When the signals are on, the operation is not continued.

For a system with one application, use signal No. 5272.

1.7 Internal Signal Used in Standard Ladder (7xxx)

1.7.1 Arc Welding

7017	7016	7015	7014	7013	7012	7011	7010
CONTROL POWER ON COMPLETED (NORMALITY ON)	SYSTEM RSV	SYSTEM RSV	REMOTE KEY	REMOTE KEY SIGNAL DIR CHANGE	REMOTE KEY PULSE	START RECEIVING PREPA-RATION OK	EXT. START
7027	7026	7025	7024	7023	7022	7021	7020
REMOTE SELECT (P.PANEL)	REMOTE SELECT (IO)	CMD REMOTE PROHIBIT			SEQUENCE WAIT REQUEST	WAITING UNTIL INTRF. IS OFF	ALARM OCCUR-RENCE
7037	7036	7035	7034	7033	7032	7031	7030
IN CUBE 4	IN CUBE 3	IN CUBE 2	IN CUBE 1	INTRF.4 ENTRANCE PROHIBIT	INTRF.3 ENTRANCE PROHIBIT	INTRF.2 ENTRANCE PROHIBIT	INTRF.1 ENTRANCE PROHIBIT
7047	7046	7045	7044	7043	7042	7041	7040
MOTOR STOP MEMORY	ARC OCCUR-RENCE PROHIBIT	PSUEDO ARC ON	STICKING DETECTION	WIRE SHORTAGE	GAS SHORTAGE	ARC SHORTAGE	ARC OCCUR-RENCE CHECK
7057	7056	7055	7054	7053	7052	7051	7050
WIRE RETRACT REQUEST	WIRE INCHING REQUEST	MOTOR RVS ROTATION PERMIT	MOTOR FWD ROTATION PERMIT	MOTOR RVS ROTATION MEMORY	MOTOR FWD ROTATION MEMORY	MOTOR DIR CHANGE PROHIBIT	MOTOR DIR CHANGE PERMIT
7067	7066	7065	7064	7063	7062	7061	7060
ARC ANS ERROR (SUB)	ARC OCCUR CONDITION OK	ARC OCCUR CONDITION MODE	ARC OCCUR CONDITION CYCLE	ARC MISSING	ARC ON INTERVAL	WIRE RETRACT	WIRE INCHING
7077	7076	7075	7074	7073	7072	7071	7070
STICKING (AT ON/OFF)	STICKING (AT ON)	STICKING (AT OFF)	STICKING DETECTION (AT OFF/ ERROR)	STICKING CHECK REQUEST	ARC OCCUR-RENCE MEMORY	ARC ON CONTINUING PROHIBIT	ARC OCCUR-RENCE
7087	7086	7085	7084	7083	7082	7081	7080
STICKING CHECKED (AT ARC ANS ERROR)	ARC SHORTAGE (AT ARC ON)	AUTO STICKING RELEASE COUNT	AUTO STICKING RELEASE	STICKING CHECKED	STICKING CHECK	NO STICKING	STICKING (FINAL)
7097	7096	7095	7094	7093	7092	7091	7090
RESTART RETURN MEMORY	RETRYING	RETRY COUNT	RETRY PROCES-SING	RETRY TESTED	RETRY REQUEST MEMORY	ARC ANS ERROR OUTPUT	ARC ANS ERROR (FINAL)

7107	7106	7105	7104	7103	7102	7101	7100
WIRE SHORTAGE MSG CONDITION	GAS SHORTAGE MSG CONDITION	ARC SHORTAGE ALM CONDITION	RESTART INVALID	RESTART-ING	RESTART MEMORY	ARC SHORTAGE RESTART MEM RESET	ARC SHORTAGE RESTART MEM
7117	7116	7115	7114	7113	7112	7111	7110
ARC SHORTAGE ALM COND WAITING 2	ARC SHORTAGE ALM COND WAITING 1	RESTART MSG INVALID				WIRE SHORTAGE ALM COND	GAS SHORTAGE ALM COND
7127	7126	7125	7124	7123	7122	7121	7120
		OPERATION CONTINUING	ARC STOP (AT ARC SHORTAGE RESTART)	WIRE SHORTAGE MSG COND WAITING 2	WIRE SHORTAGE MSG COND WAITING 1	GAS SHORTAGE MSG COND WAITING 2	GAS SHORTAGE MSG COND WAITING 1
7137	7136	7135	7134	7133	7132	7131	7130

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7887	7886	7885	7884	7883	7882	7881	7880

1.7.2 Handling

7017	7016	7015	7014	7013	7012	7011	7010
CONTROL POWER ON COMPLETED (NORMALLY-ON)	SYSTEM RSV	SYSTEM RSV	REMOTE RSV	REMOTE KEY SIGNAL DIR CHANGE	REMOTE KEY PULSE		START RECEIVING PREPA-RATION OK
7027	7026	7025	7024	7023	7022	7021	7020
REMOTE MODE SELECT (P.PANEL)	REMOTE SELECT (IO)	REMOTE SELECT			EX.HOLD	WAITING UNTIL INTRF. IS OFF	ALARM OCCUR-RENCE
7037	7036	7035	7034	7033	7032	7031	7030
IN CUBE 4	IN CUBE 3	IN CUBE 2	IN CUBE 1	INTRF. 4 ENTRANCE PROHIBIT	INTRF. 3 ENTRANCE PROHIBIT	INTRF. 2 ENTRANCE PROHIBIT	INTRF. 1 ENTRANCE PROHIBIT
7047	7046	7045	7044	7043	7042	7041	7040
	IN CUBE 7	IN CUBE 6	IN CUBE 5		INTRF. 7 ENTRANCE PROHIBIT	INTRF. 6 ENTRANCE PROHIBIT	INTRF. 5 ENTRANCE PROHIBIT
7057	7056	7055	7054	7053	7052	7051	7050
			AIR PRESSURE LOWERING INPUT	SHOCK SENSOR INPUT	WORK INST. CONTINUING PROHIBIT	WORK OPERATING	WORK INSTRUC-TION
7067	7066	7065	7064	7063	7062	7061	7060
PLAY/CONT SELECT	PLAY/CONT SELECTING	PLAY/1 CYCLE SELECT	PLAY/1 CYCLE SELECTING				

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7887	7886	7885	7884	7883	7882	7881	7880

1.7.3 Spot Welding

7017	7016	7015	7014	7013	7012	7011	7010
CONTROL OPWER ON COMPLETED (NORMALLY ON)	SYSTEM RSV	SYSTEM RSV	REMOTE KEY	REMOTE KEY SIGNAL DIR CHANGE	REMOTE KEY PULSE	START RECEIVING PREPA-RATION OK	EXT. START
7027	7026	7025	7024	7023	7022	7021	7020
REMOTE SELECT (P.PANEL)	REMOTE SELECT (IO)	REMOTE SELECT				WAITING INTRF. IS OFF	ALARM OCCUR-RENCE
7037	7036	7035	7034	7033	7032	7031	7030
IN CUBE 4	IN CUBE 3	IN CUBE 2	IN CUBE 1	INTRF. 4 ENTRANCE PROHIBIT	INTRF. 3 ENTRANCE PROHIBIT	INTRF. 2 ENTRANCE PROHIBIT	INTRF. 1 ENTRANCE PROHIBIT
7047	7046	7045	7044	7043	7042	7041	7040
						WELDING STOP INPUT	WELDING ON/OFF REQUEST
7057	7056	7055	7054	7053	7052	7051	7050
			GUN COOL WATER ERROR INPUT				TIMER COOL WATER ERROR INPUT
7067	7066	7065	7064	7063	7062	7061	7060
			AIR PRESSURE LOWERED INPUT				TRANS. THERMO. ERROR INPUT
7077	7076	7075	7074	7073	7072	7071	7070
							WELDING ON/OFF OUTPUT
7087	7086	7085	7084	7083	7082	7081	7080
				AIR PRESS LOWERED ALARM REQUEST	TRANS. THERMO. ALARM REQUEST	GUN COOL WATER ALARM REQUEST	TIMER COOL WATER ALARM REQUEST
7097	7096	7095	7094	7093	7092	7091	7090
			MANUAL WELDING MESSAGE REQUEST	AIR PRESS LOWERED MESSAGE REQUEST		GUN COOL WATER MESSAGE REQUEST	TIMER COOL WATER MESSAGE REQUEST
7107	7106	7105	7104	7103	7102	7101	7100

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7887	7886	7885	7884	7883	7882	7881	7880

1.7.4 General-Purpose Applications

7017	7016	7015	7014	7013	7012	7011	7010
CONTROL POWER ON COMPLETED (NORMALLY ON)	SYSTEM RESERVE	SYSTEM RESERVE	REMOTE KEY	REMOTE KEY SIGNAL DIR CHANGE	REMOTE KEY PULSE	START RECEIVING PREPA-RATION OK	EXT. START
7027	7026	7025	7024	7023	7022	7021	7020
REMOTE SELECT (P.PANEL)	REMOTE SELECT (IO)	REMOTE SELECT				WAITING UNTIL INTRF. IS OFF	ALARM OCCUR-RENCE
7037	7036	7035	7034	7033	7032	7031	7030
IN CUBE 4	IN CUBE 3	IN CUBE 2	IN CUBE 1	INTRF. 4 ENTRANCE PROHIBIT	INTRF. 3 ENTRANCE PROHIBIT	INTRF. 2 ENTRANCE PROHIBIT	INTRF. 1 ENTRANCE PROHIBIT
7047	7046	7045	7044	7043	7042	7041	7040
				WORK PROHIBIT	WORK INST. CONTINUING PROHIBIT	WORK OPERATING	WORK INST.
7057	7056	7055	7054	7053	7052	7051	7050

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7887	7886	7885	7884	7883	7882	7881	7880

1.8 Internal Control Status Signals (80xx)

1.8.1 Internal Control Status Signals

*: NC contact

8017	8016	8015	8014	8013	8012	8011	8010
SVON	START	HOLD		TEACH	PLAY	REMOTE	EDIT_LOCK

EDIT_LOCK	Editing Prohibit
REMOTE	Remote Mode Select
PLAY	Play Mode Select
TEACH	Teach Mode Select
*HOLD	Hold (Playback Panel)
START	Operation Start
SVON	Servo On (OR Signal for Playback Panel and Programming Pendant)

8027	8026	8025	8024	8023	8022	8021	8020
PBESP	PPESP	EXESP	ERRCPU	SAF_F	System reserve	System reserve	24VOK

24VOK	External Power 24 V OK Signal
*SAF_F	Safety Plug Input
*ERRCPU	XCO01 CPU Error (Emergency Stop)
*EXESP	External Emergency Stop
*PPESP	Programming Pendant Emergency Stop
*PBESP	Playback Panel Emergency Stop

8037	8036	8035	8034	8033	8032	8031	8030
EXSVON		EXHOLD	DSWIN	SAFRDY	FORCE	SYSRDY	System reserve

SYSRDY	Servo ON Condition 1
FORCE	Forced Release Input
SAFRDY	Servo ON Condition 2
DSWIN	Deadman Switch Input
*EXHOLD	External Hold
EXSVON	External Servo On

8047	8046	8045	8044	8043	8042	8041	8040
				System reserve		SPD1	SPD2

SPD2	Safe Speed 2
SPD1	Safe Speed 1

8057	8056	8055	8054	8053	8052	8051	8050
TUALM:2#2	BRX:2#1	SVMX:2#1		TUALM:1#1	BRX1#1	SVMX:1#1	

SERVOPACK #1

- Power ON unit 1

SVMX:1#1	Confirmation of Power ON of Servo Power Supply Group
BRX:1#1	Confirmation of Brake Release
*TUALM:1#1	Power ON Unit Signal Alarm (Emergency Stop)

- Power ON unit 2

SVMX:2#1	Confirmation of Power ON of Servo Power Supply Group
BRX:2#1	Confirmation of Brake Release
*TUALM:2#1	Power ON Unit Signal Alarm (Emergency Stop)

8067	8066	8065	8064	8063	8062	8061	8060
TUALM:2#2	BRX:2#2	SVMX:2#2		TUALM:1#2	BRX:1#2	SVMX:1#2	

SERVOPACK #2

- Power ON unit 1
  - SVMX:1#2 Confirmation of Power ON of Servo Power Supply Group
  - BRX:1#2 Confirmation of Brake Release
  - *TUALM:1#2 Power ON Unit Signal Alarm (Emergency Stop)
- Power ON unit 2
  - SVMX:2#2 Confirmation of Power ON of Servo Power Supply Group
  - BRX:2#2 Confirmation of Brake Release
  - *TUALM:2#2 Power ON Unit Signal Alarm (Emergency Stop)

8077	8076	8075	8074	8073	8072	8071	8070
TUALM:2#3	BRX:2#3	SVMX:2#3		TUALM:1#3	BRX:1#3	SVMX:1#3	

SERVOPACK #3

- Power ON unit 1
  - SVMX:1#3 Confirmation of Power ON of Servo Power Supply Group
  - BRX:1#3 Confirmation of Brake Release
  - *TUALM:1#3 Power ON Unit Signal Alarm (Emergency Stop)
- Power ON unit 2
  - SVMX:2#3 Confirmation of Power ON of Servo Power Supply Group
  - BRX:2#3 Confirmation of Brake Release
  - *TUALM:2#3 Power ON Unit Signal Alarm (Emergency Stop)

8087	8086	8085	8084	8083	8082	8081	8080
TUALM:2#4	BRX:2#4	SVMX:2#4		TUALM:1#4	BRX:1#4	SVMX:1#4	

SERVOPACK #4

- Power ON unit 1
  - SVMX:1#4 Confirmation of Power ON of Servo Power Supply Group
  - BRX:1#4 Confirmation of Brake Release
  - *TUALM:1#4 Power ON Unit Signal Alarm (Emergency Stop)
- Power ON unit 2
  - SVMX:2#4 Confirmation of Power ON of Servo Power Supply Group
  - BRX:2#4 Confirmation of Brake Release
  - *TUALM:2#4 Power ON Unit Signal Alarm (Emergency Stop)

8097	8096	8095	8094	8093	8092	8091	8090
TUALM:2#5	BRX:2#5	SVMX:2#5		TUALM:1#5	BRX:1#5	SVMX:1#5	

SERVOPACK #5

- Power ON unit 1
  - SVMX:1#5 Confirmation of Power ON of Servo Power Supply Group
  - BRX:1#5 Confirmation of Brake Release
  - *TUALM:1#5 Power ON Unit Signal Alarm (Emergency Stop)
- Power ON unit 2
  - SVMX:2#5 Confirmation of Power ON of Servo Power Supply Group
  - BRX:2#5 Confirmation of Brake Release
  - *TUALM:2#5 Power ON Unit Signal Alarm (Emergency Stop)

8107	8106	8105	8104	8103	8102	8101	8100
TUALM:2#6	BRX:2#6	SVMX:2#6		TUALM:1#6	BRX:1#6	SVMX:1#6	

SERVOPACK #6

- Power ON unit

  SVMX:1#6 Confirmation of Power ON of Servo Power Supply Group

  BRX:1#6 Confirmation of Brake Release

  *TUALM:1#6 Power ON Unit Signal Alarm (Emergency Stop)

- Power ON unit 2

  SVMX:2#6 Confirmation of Power ON of Servo Power Supply Group

  BRX:2#6 Confirmation of Brake Release

  *TUALM:2#6 Power ON Unit Signal Alarm (Emergency Stop)

8117	8116	8115	8114	8113	8112	8111	8110
				DIN1	DIN2	DIN3	

DIN3 Direct IN 3

DIN2 Direct IN 2

DIN1 Direct IN 1

8127	8126	8125	8124	8123	8122	8121	8120
OT	EXOT	SHOCK1	ERRSVCPU		FUCUT	ON-EN	SHOCK2

*SHOCK2	Shock Sensor Operation Hold
*ON-EN	Servo ON Enabled
*FUCUT	Brake Fuse Blowout
*ERRSVCPU	Servo CPU Error
*SHOCK1	Shock Sensor Operation Emergency Stop
*EXOT	External Axis Overtravel
*OT	Overtravel

The following symbols are used in the explanation to represent the signal conditions.

The signal takes effect while it is in the on state.

The rising edge is detected as the signal.

1.8.2 Internal Control Status Signal (Monitor)

■ 8010: EDITING PROHIBITION

These signals indicate the operating of the [EDIT LOCK] key on the subpanel in the playback panel.

■ 8011 to 8013: MODE SELECTION

These signals indicate the status of the mode selection of the playback panel.

■ 8015: *PLAYBACK PANEL HOLD

This signal indicates the operating status of the start key on the playback panel.

■ 8016: OPERATION START

This signal indicates the operating status of the “START” key on the playback panel.

■ 8017: SERVO POWER ON

This signal indicates the operating status of the “SERVO POWER” key on the playback panel.

■ 8020: 24VOK

This signal goes ON when 24V power for I/O is supplied normally.
For details of connecting I/O power, refer to “7 Description of Units and Circuit Boards”.

■ 8023: *SAFETY PLUG INPUT

This signal turns off when the safety guard input signal connected to the external input (XIO01 board) operates.
For the connection, refer to “1.11 I/O Except Concurrent I/O.”

■ 8024: *XCP01 CPU Error

This signal turns off when the servo turns off in the system (XCP01 CPU).

■ 8025: *EXTERNAL EMERGENCY STOP

This signal is OFF when the emergency stop signal connected to the external input (XIO01 board) is operating.Refer to the “1.11 I/O Except Concurrent I/O” for connection.

■ 8026: *PROGRAMMING PENDANT EMERGENCY

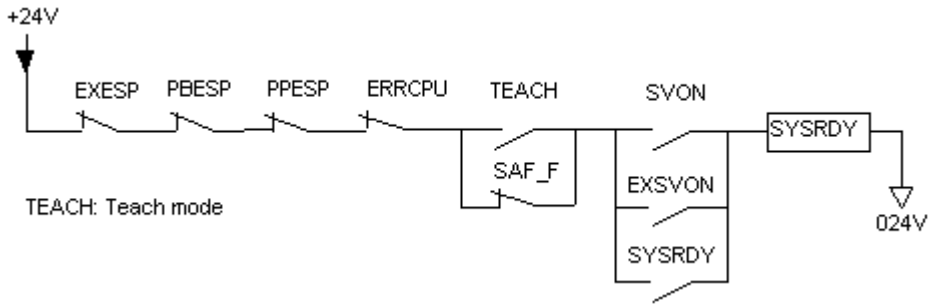
This signal is off when the emergency stop on the programming pendant is operating.

■ 8027: * PLAYBACK PANEL EMERGENCY STOP

This signal is off when the emergency stop on the playback panel is operating.

■ 8031: SERVO ON CONDITION 1

This signal turns on when the following signals satisfy the conditions for servo ON status.
When this signal turns off while the servo is ON, the servo power supply is shut down.



■ 8032: FORCED RELEASE INPUT

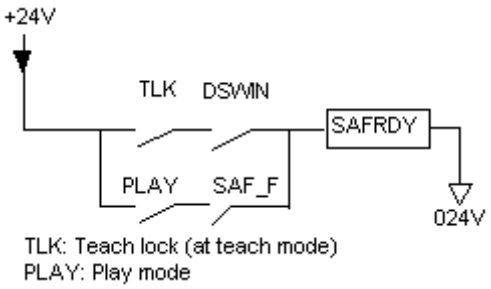
State

This signal indicates the operation status of the external forced release input signal.
This signal is input from the XIO01 board.
For the connection, refer to “1.11 I/O Except Concurrent I/O.”

■ 8033: SERVO ON CONDITION 2

State

This signal turns ON when the following signals satisfy the conditions for servo ON status.
When this signal turns off while the servo is on, the servo power supply is shut down.



■ 8034: DEADMAN SWITCH INPUT

State

This signal indicates the operation status of deadman switch input signal.
This signal turns on by holding the deadman switch and turns off by holding further until a sound “click” is made.

■ 8035: *EXTERNAL HOLD

State

This signal indicates the operation status of the hold signal from the outside. The signal is input from the XIO01 board. Refer to the “1.11 I/O Except Concurrent I/O” for connection.

■ 8037: EXTERNAL SERVO ON INPUT

State

This signal is on when the servo power on instruction is input from the outside. The signal is input from the XIO01 board. Refer to the “1.11 I/O Except Concurrent I/O” for connection.

■ 8040: SAFE SPEED 2

This signal turns on in the safe speed 2 condition.
This signal is available only for the XRC for European standard specifications.

■ 8041: SAFE SPEED 1

This signal turns on in the safe speed 1 condition.
This signal is available only for the XRC for European standard specifications

■ 8051, 8055, 8061, 8065, 8071, 8075, 8081, 8085, 8091, 8095, 8101, 8105: CONFIRMATION OF SERVO POWER ON

These signals indicate the operation status of the servo ON auxiliary relay in the servo power ON circuit.
Each signal corresponds to the power ON unit. The configurations of SERVOPACK and power ON unit differ depending on the system.

■ 8052, 8056, 8062, 8066, 8072, 8076, 8082, 8086, 8092, 8096, 8102, 8106: CONFIRMATION OF BRAKE RELEASE

These signals indicate the operation status of magnetizing circuit drive relay of brake for robot and station.
Each signal corresponds to the power ON unit. The configurations of SERVOPACK and power ON unit differ depending on the system.

■ 8053, 8057, 8063, 8067, 8073, 8077, 8083, 8087, 8093, 8097, 8103, 8107: POWER ON UNIT SIGNAL ALARM

These signals indicate the alarm status of power ON unit.
These signals indicate the operation status of overtravel (OT), external axis overtravel (EXOT), shock sensor operation emergency stop (SHOCK1), servo CPU error (ERRSVCPU), brake fuse blowout (FUCUT), and servo ON enabled (ON-EN).
Each signal corresponds to the power ON unit. The configurations of SERVOPACK and power ON unit differ depending on the system.

■ 8111 to 8113: DIRECT IN 1 to 3

These signals indicate the status of direct IN signals.
These signals are input from the XIO01 board.

■ 8120: *SHOCK SENSOR OPERATION HOLD

This signal indicate the detecting status of shock sensor operated detecting circuit.
This signal is input from the XIO01 board.
This signal is valid when “HOLD” is set for the shock sensor stop designation in the overrun and shock sensor release display.

■ 8121: *SERVO ON ENABLED

This signal indicate the detected status of servo ON enabled.
This signal is input from the XIO01 board.

■ 8123: *BRAKE FUSE BLOWOUT

This signal turns off when the fuse of brake magnetizing circuit is blown out.

■ 8124: *SERVO CPU ERROR

This signal turns off when an error is detected in the servo system (WRCA01 CPU).

■ 8125: *SHOCK SENSOR OPERATION EMERGENCY STOP

This signal indicate the detected status of the shock sensor operated detecting circuit.
This signal is input from the XIO01 board.
This signal is valid when “EMERGENCY STOP” is set for the shock sensor stop designation in the overrun and shock sensor release display.

■ 8126: *EXTERNAL AXIS OVERTRAVEL

This signal turns off when the external axis overrun LS operates.
This signal is input from the XIO01 board.

■ 8127: *OVERTRAVEL

This signal turns off when the robot axis overrun LS operates.

1.9 Pseudo Input Signals (82xx)

The following symbols are used in the explanation to represent the signal conditions.

The signal takes effect while it is in the on state.

The rising edge is detected as the signal.

1.9.1 Pseudo Input Signals

■ 8214 to 8216: REMOTE FUNCTION SELECTION

Setting whether the I/O, commands, programming pendant or playback box is to be used when the remote mode is selected can be done in the user's maintenance mode. These signals indicate the status set in the user's maintenance mode as shown below.

(0: OFF 1: ON)

8214	IO	0:Used	1:Not Used
8215	Command	0:Not Used	1:Used
8216	PP/PPanel	0:Used	1:Not Used

■ 8220 to 8224: SIGNAL SELECT STATUS (SPOT WELDING)

The use of the signal for the spot welding can be set in the pseudo input signal display.
If the setting is ON, the signal for the spot welding is assigned.
If the setting is OFF, the general output signal is assigned.

(0: OFF 1: ON)

8220	TIMER COOLING WATER ERROR INPUT	0:Not Used	1:Used
8221	GUN COOLING WATER ERROR INPUT	0:Not Used	1:Used
8222	TRANS. THERMO. ERROR INPUT	0:Not Used	1:Used
8223	AIR PRESSURE LOWERED INPUT	0:Not Used	1:Used
8224	WELDING ON/OFF OUTPUT	0:Not Used	1:Used

1.10 Network Input Signals (9xxx)

Network input signals are related to optional network functions. For the detailed information, refer to the operator's manual regarding each network function.

1.11 I/O Except Concurrent I/O

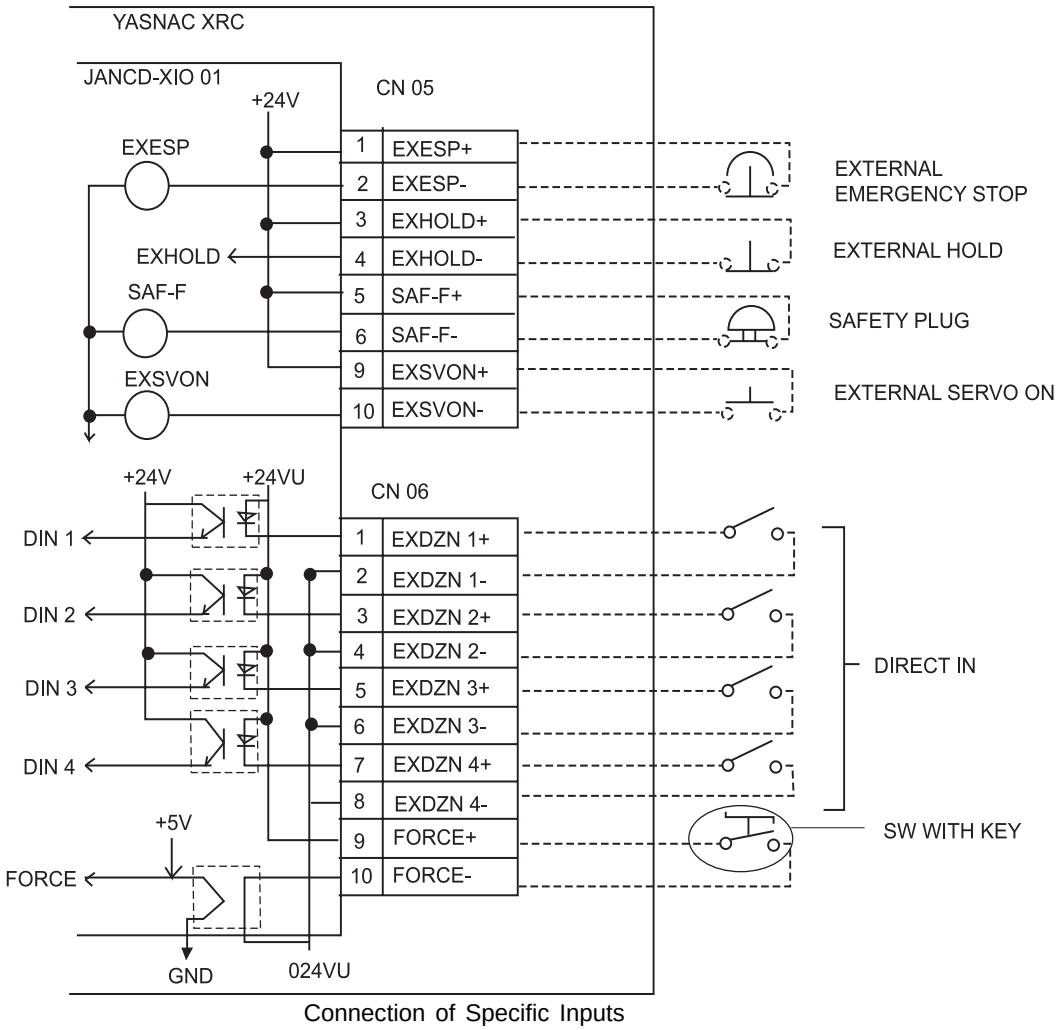
The following signal is connected directly to the manipulator control section without passing through the concurrent I/O.
Adequate care should be taken for switch setting and method of connection when using this signal.

1.11.1 Hardware Specific Input

CAUTION

- Before use, remove any jumper leads from the specific input signals.

  The unit may malfunctioning in injury or damage to equipment.



Connection of Specific Inputs

CAUTION

- Use the “FORCE” (Forced release) input with normally open circuit.
- Use the switch which has the key for “FORCE” input. The manager of the system is responsible for storage of the key.
- When “FORCE” is input, any deadman switch is invalidated.

■ EXESP: FOR EXTERNAL EMERGENCY STOP

This signal allows use of the emergency stop switch from an external source. When this signal is input, the servo power goes off, and job execution is stopped. At this time, the servo power cannot be turned on. This function becomes invalid by connecting the jumper wire.

■ EXHOLD: FOR EXTERNAL HOLD

This signal allows use of the hold switch from an external source. When this signal is input, the job execution stops. At this time, the start and axis functions cannot be used. This function becomes invalid by connecting the jumper wire.

■ SAF_F: FOR SAFETY PLUG

This signal turns off the servo power when the door of the safeguard is open. Install an interlock signal such as safety plugs in door of the safeguard. When the interlock signal is input, the servo power goes off, and the servo power cannot be turned on. However, this signal is invalid in the teach mode.

■ EXSVON: FOR EXTERNAL SERVO ON

This signal turns on the servo power. Use the signal to turn on the servo power from the outside. Apart from this signal, specific input (4045) for external servo on signal is provided. At this time, the function becomes invalid by connecting the jumper wire. For safer use of the robot, use of this signal (EXSVON) which has no intervention of ladder (software) is recommended.

■ DIN1 to 4: FOR DIRECT IN INPUT SIGNAL

This signal can be used in conjunction with the search function.

■ FORCE: FORCED RELEASE INPUT SIGNAL

This signal disables the deadman switch. Be sure to use a switch with the key for safety. Be sure a manager is in possession of the key.

1.12 Register

1.12.1 Common Usage

M009	M008	M007	M006	M005	M004	M003	M002	M001	M000
M019	M018	M017	M016	M015	M014	M013	M012	M011	M010
M029	M028	M027	M026	M025	M024	M023	M022	M021	M020
M039	M038	M037	M036	M035	M034	M033	M032	M031	M030
M049	M048	M047	M046	M045	M044	M043	M042	M041	M040
M059	M058	M057	M056	M055	M054	M053	M052	M051	M050
M069	M068	M067	M066	M065	M064	M063	M062	M061	M060
SYSTEM RESERVE									

1.12.2 Arc Welding

M079	M078	M077	M076	M075	M074	M073	M072	M071	M070
M089	M088	M087	M086	M085	M084	M083	M082	M081	M080
M099	M098	M097	M096	M095	M094	M093	M092	M091	M090
		STICK-ING RELEASE (PRE-SENT VALUE)	RESTART (PRE-SENT VALUE	RETRY (PRE-SENT VALUE	WIRE OPERA-TION SWITCH (PRE-SENT VALUE	ANTI-STICK-ING (PRE-SENT VALUE	NO STICK-ING CHECK (PRE-SENT VALUE	STICK-ING CHECK (PRE-SENT VALUE	ARC ANS ERROR (PRE-SENT VALUE
M109	M108	M107	M106	M105	M104	M103	M102	M101	M100
M119	M118	M117	M116	M115	M114	M113	M112	M111	M110
								ALARM DATA	ALARM CODE
M129	M128	M127	M126	M125	M124	M123	M122	M121	M120
		STICK-ING RELEASE (3 TIMES)	RESTART (1 TIMES)	RETRY (1 TIMES)	WIRE OPERA-TION SWITCH (0.5SEC)	ANTI-STICK-ING (0.3 SEC)	NO STICK-ING CHECK (0.2 SEC)	STICK-ING CHECK (1.0 SEC)	ARC ANS ERROR (3.0 SEC)
M139	M138	M137	M136	M135	M134	M133	M132	M131	M130
M149	M148	M147	M146	M145	M144	M143	M142	M141	M140
M159	M158	M157	M156	M155	M154	M153	M152	M151	M150
ANALOG OUTPUT 10	ANALOG OUTPUT 9	ANALOG OUTPUT 8	ANALOG OUTPUT 7	ANALOG OUTPUT 6	ANALOG OUTPUT 5	ANALOG OUTPUT 4	ANALOG OUTPUT 3	ANALOG OUTPUT 2	ANALOG OUTPUT 1
								M161	M160
								ANALOG OUTPUT 12	ANALOG OUTPUT 11

1.12.3 Handling

M079	M078	M077	M076	M075	M074	M073	M072	M071	M070
M089	M088	M087	M086	M085	M084	M083	M082	M081	M080
M099	M098	M097	M096	M095	M094	M093	M092	M091	M090
M109	M108	M107	M106	M105	M104	M103	M102	M101	M100
M119	M118	M117	M116	M115	M114	M113	M112	M111	M110
								ALARM DATA	ALARM CODE
M129	M128	M127	M126	M125	M124	M123	M122	M121	M120
M139	M138	M137	M136	M135	M134	M133	M132	M131	M130
M149	M148	M147	M146	M145	M144	M143	M142	M141	M140
M159	M158	M157	M156	M155	M154	M153	M152	M151	M150
ANALOG OUTPUT 10	ANALOG OUTPUT 9	ANALOG OUTPUT 8	ANALOG OUTPUT 7	ANALOG OUTPUT 6	ANALOG OUTPUT 5	ANALOG OUTPUT 4	ANALOG OUTPUT 3	ANALOG OUTPUT 2	ANALOG OUTPUT 1
								M161	M160
								ANALOG OUTPUT 12	ANALOG OUTPUT 11

1.12.4 Spot Welding

M079	M078	M077	M076	M075	M074	M073	M072	M071	M070
M089	M088	M087	M086	M085	M084	M083	M082	M081	M080
M099	M098	M097	M096	M095	M094	M093	M092	M091	M090
							AIR PRES-SURE LOW-ERED (PRE-SENT VALUE)	GUN COOL ERROR (PRE-SENT VALUE)	TIMER COOL ERROR (PRE-SENT VALUE)
M109	M108	M107	M106	M105	M104	M103	M102	M101	M100
M119	M118	M117	M116	M115	M114	M113	M112	M111	M110
								ALARM DATA	ALARM CODE
M129	M128	M127	M126	M125	M124	M123	M122	M121	M120
							AIR PRES-SURE LOW-ERED (3.0 SEC)	GUN COOL ERROR (3.0 SEC)	TIMER COOL ERROR (3.0 SEC)
M139	M138	M137	M136	M135	M134	M133	M132	M131	M130
M149	M148	M147	M146	M145	M144	M143	M142	M141	M140
M159	M158	M157	M156	M155	M154	M153	M152	M151	M150
ANALOG OUTPUT 10	ANALOG OUTPUT 9	ANALOG OUTPUT 8	ANALOG OUTPUT 7	ANALOG OUTPUT 6	ANALOG OUTPUT 5	ANALOG OUTPUT 4	ANALOG OUTPUT 3	ANALOG OUTPUT 2	ANALOG OUTPUT 1
								M161	M160
								ANALOG OUTPUT 12	ANALOG OUTPUT 11

1.12.5 General-Purpose Applications

M079	M078	M077	M076	M075	M074	M073	M072	M071	M070
M089	M088	M087	M086	M085	M084	M083	M082	M081	M080
M099	M098	M097	M096	M095	M094	M093	M092	M091	M090
M109	M108	M107	M106	M105	M104	M103	M102	M101	M100
M119	M118	M117	M116	M115	M114	M113	M112	M111	M110
								ALARM DATA	ALARM CODE
M129	M128	M127	M126	M125	M124	M123	M122	M121	M120
M139	M138	M137	M136	M135	M134	M133	M132	M131	M130
M149	M148	M147	M146	M145	M144	M143	M142	M141	M140
M159	M158	M157	M156	M155	M154	M153	M152	M151	M150
ANALOG OUTPUT 10	ANALOG OUTPUT 9	ANALOG OUTPUT 8	ANALOG OUTPUT 7	ANALOG OUTPUT 6	ANALOG OUTPUT 5	ANALOG OUTPUT 4	ANALOG OUTPUT 3	ANALOG OUTPUT 2	ANALOG OUTPUT 1
								M161	M160
								ANALOG OUTPUT 12	ANALOG OUTPUT 11

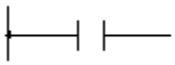
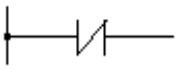
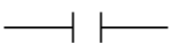
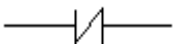
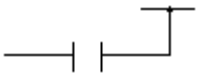
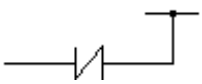
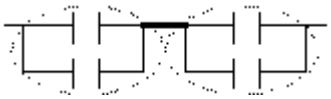
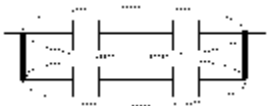
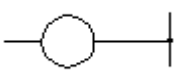
1.13 Standard Ladder Program

1.13.1 List of Usable Instructions

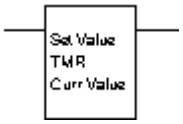
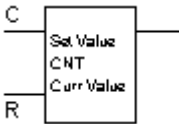
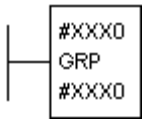
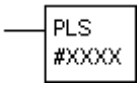
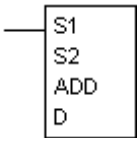
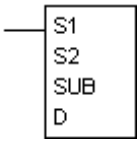
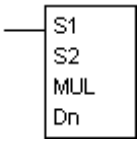
The following table shows a list of usable instructions in concurrent I/O.

SUPPLEMENT In the instruction, there are an instruction which uses the memory of one step and an instruction which uses the memory of two steps.

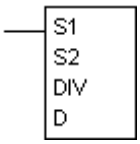
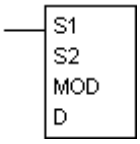
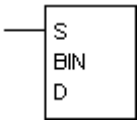
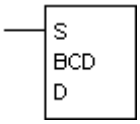
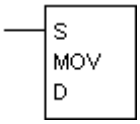
List of Usable Instructions in Concurrent I/O

Instruction	Symbol	Function	Format	Remarks
STR		Logic line starting Temporary storing of intermediate result in logical operation Relay No. #XXXX	STR #XXXX	1 Step Instruction
STR-NOT		NC contact used to start the logic line Temporary storing of intermediate result in logical operation Relay No. #XXXX	STR-NOT #XXXX	1 Step Instruction
AND		Logical AND Relay No. #XXXX	AND #XXXX	1 Step Instruction
AND-NOT		Logical AND negation Relay No. #XXXX	AND-NOT #XXXX	1 Step Instruction
OR		Logical OR Relay No. #XXXX	OR #XXXX	1 Step Instruction
OR-NOT		Logical OR negation Relay No. #XXXX	OR-NOT #XXXX	1 Step Instruction
AND-STR		Logical AND for intermediate are result	AND-STR	1 Step Instruction
OR-STR		Logical OR for intermediate are result	OR-STR	1 Step Instruction
OUT		External or internal output Relay No. #XXXX	OUT #XXXX	1 Step Instruction
PART		User/System Identification (Not displayed on the programming pendant)	PART N	1 Step Instruction
END		Program end (Not displayed on the programming pendant)	END	1 Step Instruction

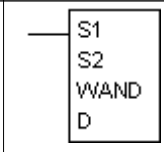
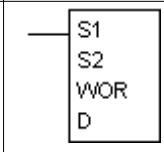
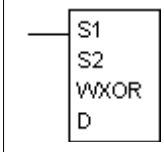
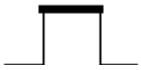
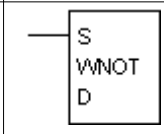
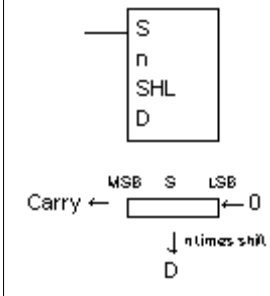
List of Usable Instructions in Concurrent I/O

Instruction	Symbol	Function	Format	Remarks
TMR		ON-delay time (100ms) Set Value (S) • Decimal (0-65535) • Register (M000-M161) Curr value (D) • Register (M000-M099)	TMR D,S	2 Steps Instruction
CNT		Subtract counter Set value (S) • Decimal (0-65535) • Register (M000-M161) Curr value (D) • Register (M000-M099)	CNT D,S	2 Steps Instruction
GSTR GOUT		Transmission of batch contents of 1 group (8 bits) Relay No. #XXXX	GSTR #XXX0 GOUT #XXX0	1 Step Instruction 1 Step Instruction
PLS		Rising up pulse output Relay No. #XXXX	PLS #XXXX	1 Step Instruction Exe Condition 
PLF		Rising down pulse output Relay No. #XXXX	PLF #XXXX	1 Step Instruction Exe Condition 
ADD	 D←S1+S2 Arith Flag: Carry=0/1; Zero=0/1; (Error=0)	Add 16 bits unsigned binary data (0-65535) S1, S2: Source • Decimal (0-65535) • Register (M000-M161) D: Destination • Register (M000-M099, M150-M161)	ADD S1,S2,D	2 Steps Instruction Exe Condition 
SUB	 D←S1-S2 Arith Flag: Carry=0/1; Zero=0/1; (Error=0)	Subtract 16 bits unsigned binary data (0-65535) S1, S2: Source • Decimal (0-65535) • Register (M000-M161) D: Destination • Register (M000-M099, M150-M161)	SUB S1,S2,D	2 Steps Instruction Exe Condition 
MUL	 Dn+1,Dn←S1xS2 Arith Flag: (Carry=0); (Zero=0); (Error=0)	Multiply 16 bits unsigned binary data (0-65535) S1, S2: Source • Decimal (0-65535) • Register (M000-M161) D_n, D_{n+1}: Destination D_n: Low data storing register D_{n+1}: High data storing register • Register (M000-M099, M150-M161)	MUL S1,S2,D	2 Steps Instruction Exe Condition 

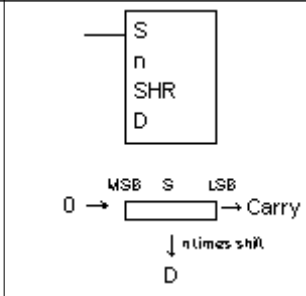
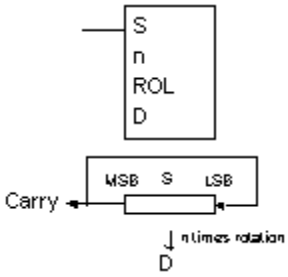
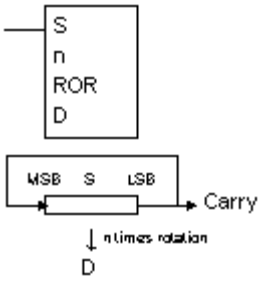
List of Usable Instructions in Concurrent I/O

Instruction	Symbol	Function	Format	Remarks
DIV	 D(Quotient)←S1/S2 Arith Flag: (Carry=0); (Zero=0); Error=0/1	Divide 16 bits unsigned binary data (0-65535) S1, S2: Source • Decimal (0-65535) • Register (M000-M161) D: Destination • Register (M000-M099, M150-M161)	DIV S1,S2,D	2 Steps Instruction Exe Condition 
MOD	 D(Modulus)←S1/S2 Arith Flag: (Carry=0); (Zero=0); Error=0/1	Modulus of 16 bits unsigned binary data (0-65535) S1, S2: Source • Decimal (0-65535) • Register (M000-M161) D: Destination • Register (M000-M099, M150-M161)	MOD S1,S2,D	2 Steps Instruction Exe Condition 
BIN	 D←S Arith Flag: Carry=0/1; (Zero=0); Error=0/1	Convert 8/16 bits data from BCD to BIN S: Source • Register (M000-M161) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0 D: Destination • Register (M000-M099, M150-M161)) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0	BIN S,D	2 Steps Instruction Exe Condition 
BCD	 D←S Arith Flag: Carry=0/1; (Zero=0); Error=0/1	Convert 8/16 bits data from BIN to BCD S: Source • Register (M000-M161) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0 D: Destination • Register (M000-M099, M150-M161) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0	BCD S,D	2 Steps Instruction Exe Condition 
MOV	 D←S Arith Flag: Carry=0/1; (Zero=0); (Error=0)	Transmit 8/16 bits data S: Source • Decimal (0-65535) • Register (M000-M161) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0 D: Destination • Register (M000-M099, M150-M161) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0	MOV S,D	2 Steps Instruction Exe Condition 

List of Usable Instructions in Concurrent I/O

Instruction	Symbol	Function	Format	Remarks
WAND	 D←S1∩S2	Logical AND of 8/16 bits data S1, S2: Source • Decimal (0-65535) • Register (M000-M161) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0 D: Destination • Register (M000-M099, M150-M161) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0	WAND S1,S2,D	2 Steps Instruction Exe Condition 
WOR	 D←S1∪S2	Logical OR of 8/16 bits data S1, S2: Source • Decimal (0-65535) • Register (M000-M161) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0 D: Destination • Register (M000-M099, M150-M161) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0	WOR S1,S2,D	2 Steps Instruction Exe Condition 
WXOR	 D←(S1∪S2) ∪ $\overline{(S1 \cup S2)}$	Exclusive OR of 8/16 bits data S1, S2: Source • Decimal (0-65535) • Register (M000-M161) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0 D: Destination • Register (M000-M099, M150-M161) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0	WXOR S1,S2,D	2 Steps Instruction Exe Condition 
WNOT	 D←$\overline{S}$	Logical NOT of 8/16 bits data S: Source • Decimal (0-65535) • Register (M000-M161) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0 D: Destination • Register (M000-M099, M150-M161) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0	WNOT S,D	2 Steps Instruction Exe Condition 
SHL	 Arith Flag: Carry=0/1; (Zero=0); (Error=0)	Left shift of 8/16 bits data S: Source • Decimal (0-65535) • Register (M000-M161) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0 n: Shift count • Decimal (0-16) D: Destination • Register (M000-M099, M150-M161) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0	SHL S,n,D	2 Steps Instruction Exe Condition 

List of Usable Instructions in Concurrent I/O

Instruction	Symbol	Function	Format	Remarks
SHR	 Arith Flag: Carry=0/1; (Zero=0); (Error=0)	Right shift of 8/16 bits data S: Source • Decimal (0-65535) • Register (M000-M161) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0 n: Shift count • Decimal (0-16) D: Destination • Register (M000-M099, M150-M161) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0	SHR S,n,D	2 Steps Instruction Exe Condition 
ROL	 (Note) Carry flag is not included in rotation. Arith Flag: Carry=0/1; (Zero=0); (Error=0)	Left rotation of 8/16 bits data S: Source • Decimal (0-65535) • Register (M000-M161) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0 n: Rotation count • Decimal (0-16) D: Destination • Register (M000-M099, M150-M161) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0	ROL S,n,D	2 Steps Instruction Exe Condition 
ROR	 (Note) Carry flag is not included in rotation. Arith Flag: Carry=0/1; (Zero=0); (Error=0)	Right rotation of 8/16 bits data S: Source • Decimal (0-65535) • Register (M000-M161) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0 n: Rotation count • Decimal (0-16) D: Destination • Register (M000-M099, M150-M161) • Relay No. (byte) #XXX0 • Relay No. (word) W#XXX0	ROR S,n,D	2 Steps Instruction Exe Condition 

#XXXX: Relay No., MXXX: Register Number, YYYY: Numerical Value (0-65535), N: Numerical Value (1-2)

1.13.2 Instruction Description

NOTE

Two or more time output to the same relay cannot be used.
The numbers available for output relays are only 0XXX, 3XXX, 4XXX, and 7XXX.
Up to 100 TMR/CNT instructions and operation instructions can be registered to use registers.
The multiple outputs of register that are used as a current value of TMR/CNT instruction can not be used. However, the multiple outputs of destination register of arithmetic instruction can be used.

■ STR Instruction

Format

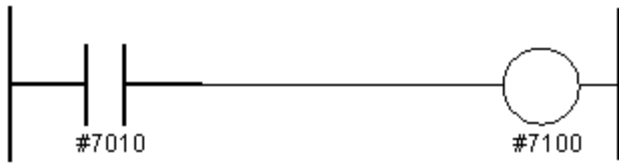
STR #XXXX
#XXXX: Relay No.

Function

Operates as a Normal Open at the beginning of logical line.
Stores temporarily the preliminary result of the logic operation.

Ladder Program Example

<Ladder Diagram>



< Program>
STR #7010
OUT #7100

■ STR-NOT Instruction

Format

STR-NOT #XXXX
#XXXX: Relay No.

Function

Operates as a Normal Close at the beginning of logical line.
Stores temporarily the preliminary result of the logic operation.

Ladder Program Example

<Ladder Diagram>

< Program>
STR-NOT #7010
OUT #7100

■ AND Instruction

Format

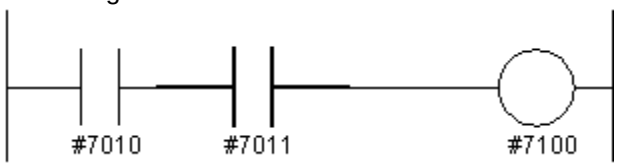
AND #XXXX
#XXXX: Relay No.

Function

Performs logical AND operation.

Ladder Program Example

<Ladder Diagram>



< Program>

```
STR      #7010
AND      #7011
OUT      #7100
```

■ AND-NOT Instruction

Format

AND-NOT #XXXX
#XXXX: Relay No.

Function

Performs logical AND negation operation.

Ladder Program Example

<Ladder Diagram>

< Program>

```
STR      #7010
AND-NOT  #7011
OUT      #7100
```

■ OR Instruction

Format

OR #XXXX
#XXXX: Relay No.

Function

Performs logical OR operation.

Ladder Program Example

<Ladder Diagram>

< Program>
STR #7010
OR #7011
OUT #7100

■ OR-NOT Instruction

Format

OR-NOT #XXXX
#XXXX: Relay No.

Function

Performs logical OR negation operation.

Ladder Program Example

<Ladder Diagram>

< Program>
STR #7010
OR-NOT #7011
OUT #7100

■ AND-STR Instruction

Format

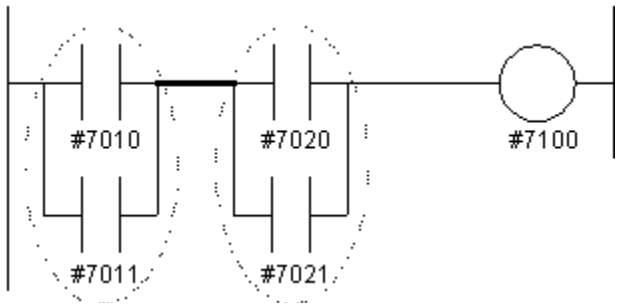
AND-STR

Function

Performs logical AND operation with the preliminary results.

Ladder Program Example

<Ladder Diagram>



< Program>

```
STR       #7010
OR        #7011
STR       #7020
OR        #7021
AND-STR
OUT       #7100
```

■ OR-STR Instruction

Format

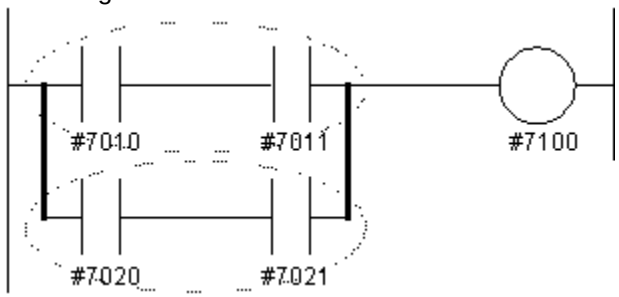
OR-STR

Function

Performs logical OR operation with the preliminary results.

Ladder Program Example

<Ladder Diagram>



< Program>

```
STR       #7010
AND       #7011
STR       #7020
AND       #7021
OR-STR
OUT       #7100
```

■ OUT Instruction

Format

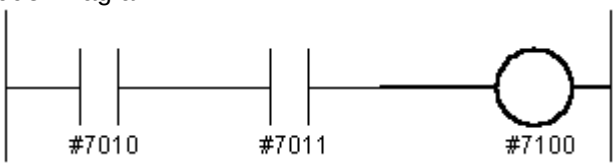
OUT #XXXX
#XXXX: Relay No.

Function

Outputs to the internal or the external.

Ladder Program Example

<Ladder Diagram>



< Program>

```
STR      #7010
AND      #7011
OUT      #7100
```

NOTE Two or more time output to the same relay cannot be used.

■ PART Instruction

Format

PART N
N: Ladder Identification Number (1: System Ladder, 2: User Ladder)

Function

Identifies the system ladder from the user ladder.

Ladder Program Example

<Ladder Diagram>

There is no symbol.

< Program>

```
PART     1
STR      #7010
OUT      #7100
   :
PART     2
   :
END
```

System

User

NOTE This instruction is not displayed in the programing pendant screen.

■ END Instruction

Format

END

Function

Ends the ladder program.

Ladder Program Example

<Ladder Diagram>

There is no symbol.

< Program>
STR #7010
OUT #7100
END

NOTE This instruction is not displayed in the programing pendant screen.

■ TMR Instruction

Format

TMR Curr Value, Set Value

Set Value: Register (M000-M161), Decimal (0-65535)

Curr Value: Register (M000-M099)

Set Value / Curr Value	Decimal	Register (M000 - M161)
Mxxxx (M000 - M099)	0 - 65535 (0.0 - 6553.5sec)	0 - 65535 (0.0 - 6553.5sec)

Function

This instruction is an On Delay Timer to handle the subtraction formula and counter circuit by binary value. The internal clock is 0.1 second.
Counting is not performed and Curr Value = Set value is maintained while start input is turning off. The TMR contact is turning off.
Curr Value is decremented every 0.1 seconds as soon as start input is turning on. The TMR contact is turning on when Curr Value equals to 0. This state is maintained while start input is at ON state.

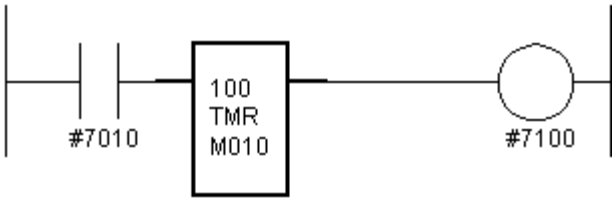
Start Input	Curr Value	TMR Contact
OFF	Set Value	OFF
ON (Curr Value > 0)	Decremented every 0.1 seconds	OFF
ON (Curr Value = 0)	0	ON
ON→OFF (Curr Value > 0)	Return to Set Value	OFF
ON→OFF (Curr Value = 0)	Return to Set Value	ON→OFF

Ladder Program Example

The timer is reset when the XRC control power is turned on. Therefore, Curr Value is Set Value by reset function even if the XRC control power is turned on when start input of the timer is at ON state.

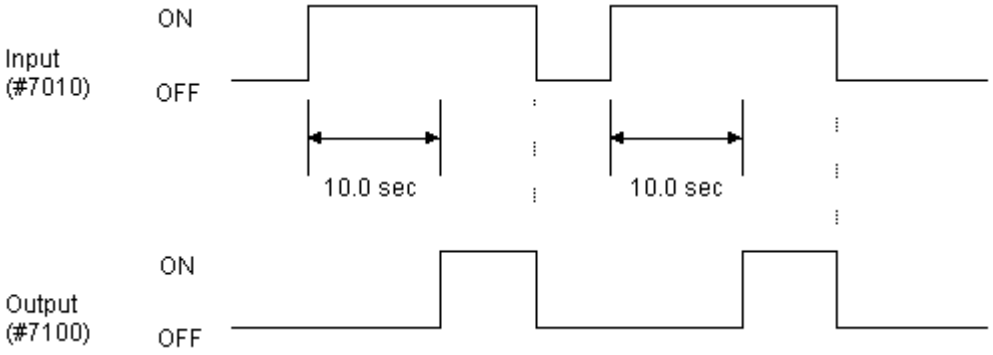
NOTE Two or more time output to the same relay cannot be used.
The multiple outputs of the register used as a current position of the TMR instruction and the CNT instruction cannot be used.

<Ladder Diagram>



< Program>

```
STR     #7010
TMR     M010,100
OUT     #7100
```



■ CNT Instruction

Format

CNT Curr Value, Set Value

Set Value: Register (M000-M161), Decimal (0-65535)

Curr Value: Register (M000-M099)

Set Value / Curr Value	Decimal	Register (M000 - M161)
Mxxxx (M000 - M099)	0 - 65535	0 - 65535

Function

Counting is not performed and Curr Value = Set value is maintained even if counter input is

turned to on while reset input is turning off.
Curr Value is decremented each time counter input is turning from off to on while reset input is at OFF state. The TMR contact is turning on when Curr Value equals to 0. This state is maintained while reset input is at OFF state.

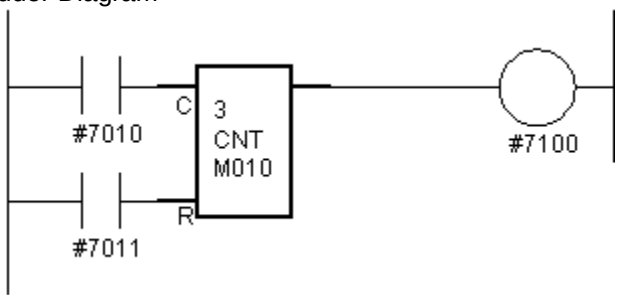
Start Input	Curr Value	TMR Contact
OFF	Set Value	OFF
ON (Curr Value > 0)	Decremented each time counter input ON→OFF	OFF
ON (Curr Value = 0)	0	ON
ON→OFF (Curr Value > 0)	Return to Set Value	OFF
ON→OFF (Curr Value = 0)	Return to Set Value	ON→OFF

Ladder Program Example

The counter input is ignored once the counter is counted up. Start counting after turning counter input from on to off. Reset input is given to priority when counter input and reset input are turned on at the same time.

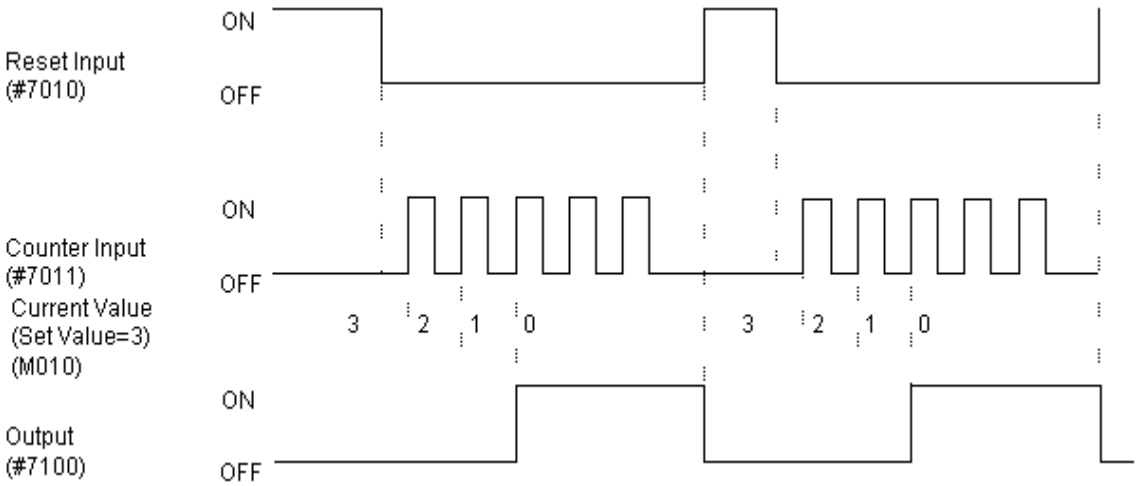
NOTE
Two or more time output to the same relay cannot be used.
The multiple outputs of the register used as a current position of the TMR instruction and the CNT instruction cannot be used.

<Ladder Diagram>



< Program>

```
STR  #7010      Counter Input
STR  #7011      Reset Input
CNT  M010, 3    CNT instruction
OUT  #7100      Output
```



■ GSTR Instruction / GOUT Instruction

Format

GSTR #XXX0
GOUT #XXX0
#XXX0: Relay No. (byte)

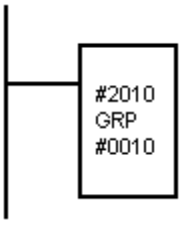
Function

The GSTR instruction stores the relay number(8 bits).
The GOUT instruction outputs 8 bits data stored by the GSTR instruction to the relay number(8 bits).

NOTE The GSTR instruction and the GOUT instruction should be pairs.
The output cannot be done to the same relay two or more times.

Ladder Program Example

<Ladder Diagram>



< Program>
GSTR #2010
GOUT #0010

■ PLS Instruction

Format

PLS #XXXX
#XXXX: Relay No.

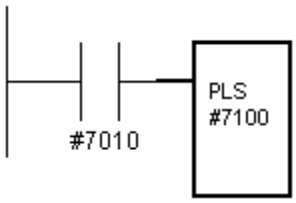
Function

Outputs one scanning pulse signal when specified signal is turned from off to on.

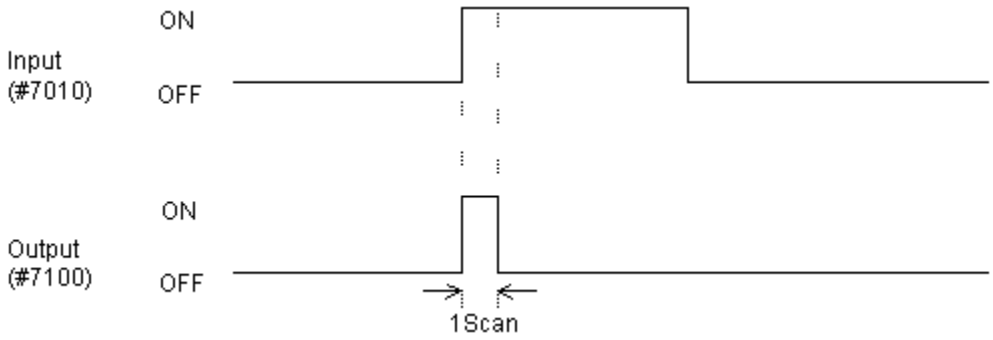
NOTE The output cannot be done to the same relay two or more times.

Ladder Program Example

<Ladder Diagram>



< Program>
STR #7010
PLS #7100



■ PLF Instruction

Format

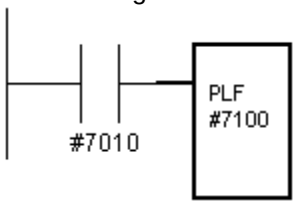
PLF #XXXX
#XXXX: Relay No.

Function

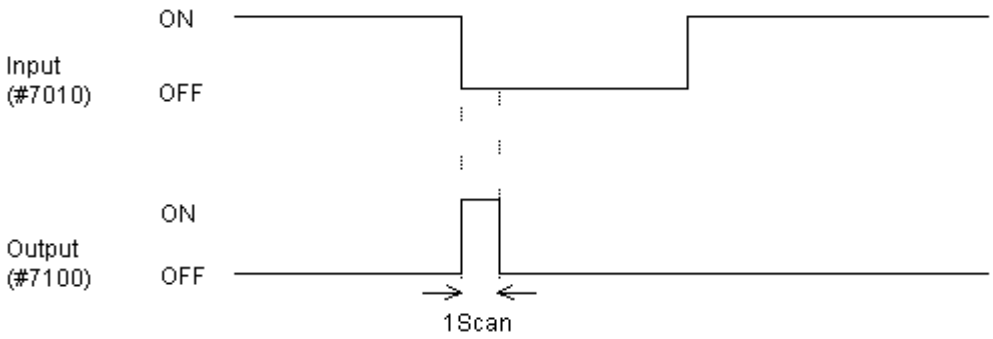
Outputs one scanning pulse signal when specified signal is turned from on to off.

Ladder Program Example

<Ladder Diagram>



< Program>
STR #7010
PLF #7100



■ ADD Instruction

Format

ADD S1, S2, D

S1: Source 1	Register (M000-M161) Decimal (0-65535)
S1: Source 2	Register (M000-M161) Decimal (0-65535)
D: Destination	Register (M000-M099, M150-M161)

Function

S1 and S2 (16 bits unsigned binary data) are added and the addition result is output to D when input signal is at ON state. As a result of calculation, the carry flag (#5260) and the zero flag (#5261) of a specific output are changed. The error flag (#5262) is not used.

<Arithmetic Flag>

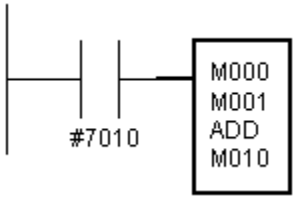
S1+S2	D	Carry Flag	Zero Flag	Error Flag
0	0	0	1	Not Used(0)
1-65535	1-65535	0	0	Not Used(0)
65536	0(S1+S2-65536)	1	1	Not Used(0)
65536 or more	S1+S2-65536	1	0	Not Used(0)

Unused flag is cleared.

Ladder Program Example

NOTE The multiple outputs of register used as a current position of the TMR instruction and the CNT instruction cannot be used.

<Ladder Diagram>



< Program>

```
STR   #7010
ADD   M000,M001,M010
```

■ SUB Instruction

Format

SUB S1, S2, D

S1: Source 1	Register (M000-M161) Decimal (0-65535)
S1: Source 2	Register (M000-M161) Decimal (0-65535)
D: Destination	Register (M000-M099, M150-M161)

Function

S1 and S2 (16 bits unsigned binary data) are subtracted and the subtraction result is output to D when input signal is at ON state. As a result of calculation, the carry flag (#5260) and the zero flag (#5261) of a specific output are changed. The error flag (#5262) is not used.

<Arithmetic Flag>

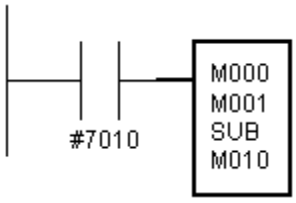
S1-S2	D	Carry Flag	Zero Flag	Error Flag
0	0	0	1	Not Used(0)
1-65535	1-65535	0	0	Not Used(0)
Negative Number	S1-S2+65536	1	0	Not Used(0)

Unused flag is cleared.

Ladder Program Example

NOTE The multiple outputs of register used as a current position of the TMR instruction and the CNT instruction cannot be used.

<Ladder Diagram>



< Program>

```
STR   #7010
SUB   M000,M001,M010
```

■ MUL Instruction

Format

MUL S1, S2, Dn

S1: Source 1	Register (M000-M161) Decimal (0-65535)
S1: Source 2	Register (M000-M161) Decimal (0-65535)
Dn+1(High), Dn(Low): Destination	Register (M000-M099, M150-M161)

Function

S1 and S2 (16 bits unsigned binary data) are multiplied and the multiplication result is output to D when the input signal is at ON state. The carry flag (#5260), the zero flag (#5261), and the error flag (#5262) are not used.

<Arithmetic Flag>

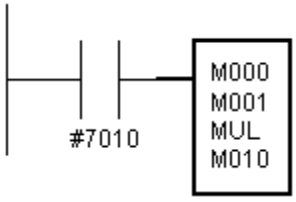
S1 x S2	Dn+1	Dn	Carry Flag	Zero Flag	Error Flag
0	0	0	Not Used(0)	Not Used(0	Not Used(0)
1-65535	0	1-65535	Not Used(0)	Not Used(0	Not Used(0)
65536 or more	High Word	Low Word	Not Used(0)	Not Used(0	Not Used(0)

Unused flag is cleared.

Ladder Program Example

NOTE The multiple outputs of the register used as a current position of the TMR instruction and the CNT instruction cannot be used.

<Ladder Diagram>



< Program>
STR #7010
MUL M000,M001,M010
When results=65536:
M011=1(0000000000000001 Binary Data)
M010=0(0000000000000000 Binary Data)

■ DIV Instruction

Format

DIV S1, S2, D

S1: Source 1	Register (M000-M161) Decimal (0-65535)
S1: Source 2	Register (M000-M161) Decimal (0-65535)
D: Destination (Quotient)	Register (M000-M099, M150-M161)

Function

S1 and S2 (16 bits unsigned binary data) are divided and the division result(Quotient) is output to D when input signal is at ON state. As a result of calculation, the error flag (#5262) of a specific output are changed. The carry flag (#5260) and the zero flag (#5261) are not used.

<Arithmetic Flag>

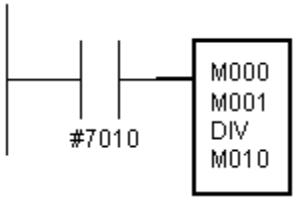
S1	S2	D	Carry Flag	Zero Flag	Error Flag
0-65535	Excepted for 0	Quotient	Not Used(0)	Not Used(0)	0
0-65535	0	No changes	Not Used(0)	Not Used(0)	1

Unused flag is cleared.

Ladder Program Example

NOTE The multiple outputs of the register used as a current position of the TMR instruction and the CNT instruction cannot be used.

<Ladder Diagram>



< Program>

```
STR   #7010
DIV   M000,M001,M010
```

■ MOD Instruction

Format

MOD S1, S2, D

S1: Source 1	Register (M000-M161) Decimal (0-65535)
S1: Source 2	Register (M000-M161) Decimal (0-65535)
D: Destination (Surplus)	Register (M000-M099, M150-M161)

Function

S1 and S2 (16 bits unsigned binary data) are divided and the division result(Modulus) is output to D when input signal is at ON state. As a result of calculation, the error flag (#5262) of a specific output are changed. The carry flag (#5260) and the zero flag (#5261) are not used.

<Arithmetic Flag>

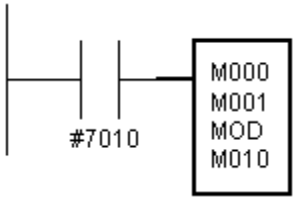
S1	S2	D	Carry Flag	Zero Flag	Error Flag
0-65535	Excepted for 0	Surplus	Not Used(0)	Not Used(0)	0
0-65535	0	No changes	Not Used(0)	Not Used(0)	1

Unused flag is cleared.

Ladder Program Example

NOTE The multiple outputs of the register used as a current position of the TMR instruction and the CNT instruction cannot be used.

<Ladder Diagram>



< Program>

```
STR   #7010
MOD   M000,M001,M010
```

■ BIN Instruction

Format

BIN S, D

S: Source	Register (M000-M161) Relay (byte) #XXX0 Relay (word) W#XXX0
D: Destination	Register (M000-M099, M150-M161) Relay (byte) #XXX0 Relay (word) W#XXX0

Function

S(BCD data) is converted to binary data and it is output to D when the input signal is at ON state. As a result of calculation, the carry flag (#5260) and the error flag (#5262) of a specific output are changed. The zero flag (#5261) are not used.

<Arithmetic Flag>

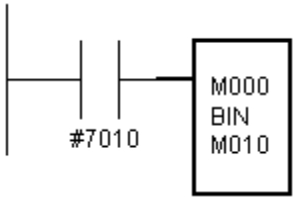
S	D	Carry Flag	Zero Flag	Error Flag
BCD	BIN	0/1	Not Used(0)	0
Excepted for BCD	No Changes	0	Not Used(0)	1

The carry flag is set when the conversion result is the relay(byte) and the conversion data is more than 256 (BCD). Unused flag is cleared.

Ladder Program Example

NOTE The output cannot be done to the same relay two or more times.
The multiple outputs of the register used as a current position of the TMR instruction and the CNT instruction cannot be used.

<Ladder Diagram>



< Program>

```
STR    #7010
BIN    M000,M010
```

■ BCD Instruction

Format

BCD S, D

S: Source	Register (M000-M161) Relay (byte) #XXX0 Relay (word) W#XXX0
D: Destination	Register (M000-M099, M150-M161) Relay (byte) #XXX0 Relay (word) W#XXX0

Function

S (binary data) is converted to BCD data and it is output to D when the input signal is at ON state. As a result of calculation, the carry flag (#5260) and the error flag (#5262) of a specific output are changed. The zero flag (#5261) are not used.

<Arithmetic Flag>

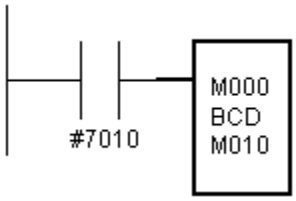
S	D	Carry Flag	Zero Flag	Error Flag
9999 or less (binary data)	BCD	0/1	Not Used(0)	0
10000 or more (binary data)	No Changes	0	Not Used(0)	1

The carry flag is set when the conversion result is the relay(byte) and the conversion data is more than 256 (BCD). Unused flag is cleared.

Ladder Program Example

The output cannot be done to the same relay two or more times.
The multiple outputs of the register used as a current position of the TMR instruction and the CNT instruction cannot be used.

<Ladder Diagram>



< Program>

```
STR   #7010
BCD   M000,M010
```

■ MOV Instruction

Format

MOV S, D

S: Source	Register (M000-M161) Decimal (0-65535) Relay (byte) #XXX0 Relay (word) W#XXX0
D: Destination	Register (M000-M099, M150-M161) Relay (byte) #XXX0 Relay (word) W#XXX0

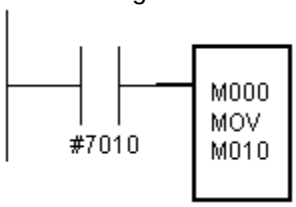
Function

S is output to D when the input signal is at ON state. As a result of calculation, the carry flag (#5260) of a specific output are changed. The zero flag (#5261)The error flag (#5262) are not used.The carry flag is set when the conversion result is the relay(byte) and the conversion data is more than 256 (BCD).

Ladder Program Example

NOTE The output cannot be done to the same relay two or more times.
The multiple outputs of the register used as a current position of the TMR instruction and the CNT instruction cannot be used.

<Ladder Diagram>



< Program>

```
STR   #7010
MOV   M000,M010
```

■ WAND Instruction

Format

WAND S1, S2, D

S1: Source S2: Source	Register (M000-M161) Decimal (0-65535) Relay (byte) #XXX0 Relay (word) W#XXX0
D: Destination	Register (M000-M099, M150-M161) Relay (byte) #XXX0 Relay (word) W#XXX0

Function

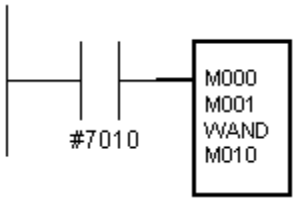
Logical AND operation between S1 and S2 is performed and the result is output to D when the input signal is at ON state. The logic operation is performed in each correspondence bit of S1 and S2.

D←S1∩S2		
S1	1100110011001100	Binary Data
S2	1010101010101010	Binary Data
	↓	
D	1000100010001000	Binary Data

Ladder Program Example

NOTE The output cannot be done to the same relay two or more times.
The multiple outputs of the register used as a current position of the TMR instruction and the CNT instruction cannot be used.

<Ladder Diagram>



< Program>

```
STR     #7010
WAND    M000,M001,M010
```

■ WOR Instruction

Format

WOR S1, S2, D

S1: Source S2: Source	Register (M000-M161) Decimal (0-65535) Relay (byte) #XXX0 Relay (word) W#XXX0
D: Destination	Register (M000-M099, M150-M161) Relay (byte) #XXX0 Relay (word) W#XXX0

Function

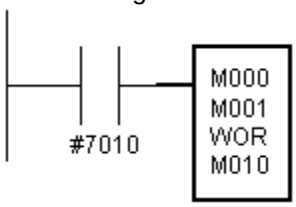
Logical OR operation between S1 and S2 is performed and the result is output to D when the input signal is at ON state. The logic operation is performed in each correspondence bit of S1 and S2.

D←S1∪S2		
S1	1100110011001100	Binary Data
S2	1010101010101010	Binary Data
	↓	
D	1110111011101110	Binary Data

Ladder Program Example

NOTE The output cannot be done to the same relay two or more times.
The multiple outputs of the register used as a current position of the TMR instruction and the CNT instruction cannot be used.

<Ladder Diagram>



< Program>
STR #7010
WOR M000,M001,M010

■ WXOR Instruction

Format

WXOR S1, S2, D

S1: Source S2: Source	Register (M000-M161) Decimal (0-65535) Relay (byte) #XXX0 Relay (word) W#XXX0
D: Destination	Register (M000-M099, M150-M161) Relay (byte) #XXX0 Relay (word) W#XXX0

Function

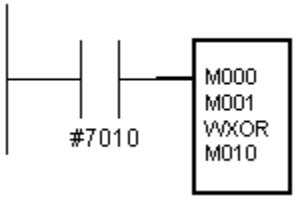
Exclusive OR operation between S1 and S2 is performed and the result is output to D when the input signal is at ON state. The logic operation is performed in each correspondence bit of S1 and S2.

$D \leftarrow (S1 \cup S2) \cap (\overline{S1 \cup S2})$		
S1	1100110011001100	Binary Data
S2	1010101010101010	Binary Data
	↓	
D	0110011001100110	Binary Data

Ladder Program Example

NOTE The output cannot be done to the same relay two or more times.
The multiple outputs of the register used as a current position of the TMR instruction and the CNT instruction cannot be used.

<Ladder Diagram>



< Program>

```
STR     #7010
XWOR    M000,M001,M010
```

■ WNOT Instruction

Format

WNOT S, D

S: Source	Register (M000-M161) Decimal (0-65535) Relay (byte) #XXX0 Relay (word) W#XXX0
D: Destination	Register (M000-M099, M150-M161) Relay (byte) #XXX0 Relay (word) W#XXX0

Function

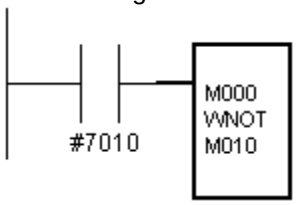
Logical negation operation of S is performed and the result is output to D when the input signal is at ON state. The logic operation is performed in each correspondence bit of S1 and S2.

$D \leftarrow \overline{S}$		
S1	1100110011001100	Binary Data
	↓	
D	0011001100110011	Binary Data

Ladder Program Example

NOTE The output cannot be done to the same relay two or more times.
The multiple outputs of the register used as a current position of the TMR instruction and the CNT instruction cannot be used.

<Ladder Diagram>



< Program>

```
STR     #7010
WNOT    M000,M010
```

■ SHL Instruction

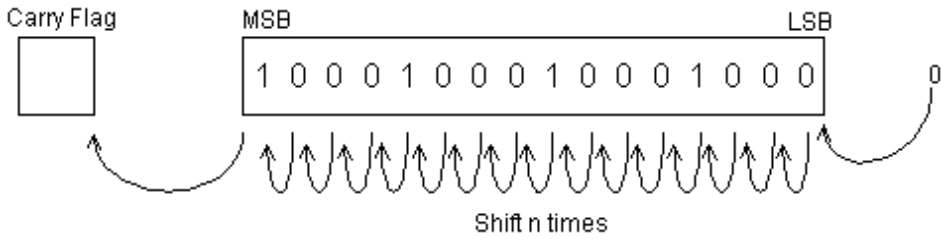
Format

SHL S, n, D

S: Source	Register (M000-M161) Decimal (0-65535) Relay (byte) #XXX0 Relay (word) W#XXX0
n: Shift count	Decimal (0-16)
D: Destination	Register (M000-M099, M150-M161) Relay (byte) #XXX0 Relay (word) W#XXX0

Function

16 bits data contents of S is shifted to the high bit direction (left) n times and the result is output to D when the input signal is at ON state. 0 is shifted to the lowest bit (LSB) and the highest bit (MSB) is shifted to the carry flag.

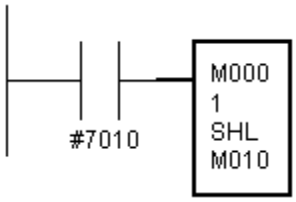


Ladder Program Example

NOTE

The output cannot be done to the same relay two or more times.
The multiple outputs of the register used as a current position of the TMR instruction and the CNT instruction cannot be used.
The operation is performed each scanning when the input signal is at ON state. Use the pulse output instruction (PLS, PLF) in the input circuit for one time operation.

<Ladder Diagram>



< Program>
STR #7010
SHL M000,1,M010

When M000 = 1000100010001000 (binary data), the result is as follow.
M010: 0001000100010000
Carry flag: 1

■ SHR Instruction

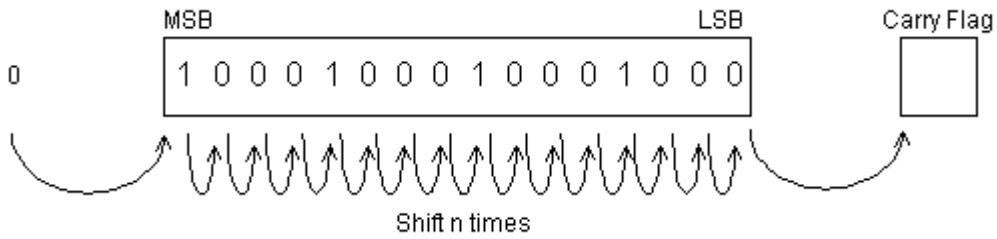
Format

SHR S, n, D

S: Source	Register (M000-M161) Decimal (0-65535) Relay (byte) #XXX0 Relay (word) W#XXX0
n: Shift count	Decimal (0-16)
D: Destination	Register (M000-M099, M150-M161) Relay (byte) #XXX0 Relay (word) W#XXX0

Function

16 bits data contents of S is shifted to the low bit direction (right) n times and the result is output to D when the input signal is at ON state. 0 is shifted to the highest bit (MSB) and the lowest bit (LSB) is shifted to the carry flag.

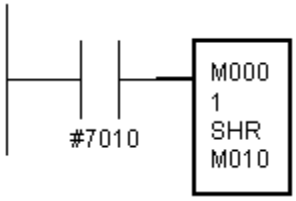


Ladder Program Example

NOTE

The output cannot be done to the same relay two or more times.
The multiple outputs of the register used as a current position of the TMR instruction and the CNT instruction cannot be used.
The operation is performed each scanning when the input signal is at ON state. Use the pulse output instruction (PLS, PLF) in the input circuit for one time operation.

<Ladder Diagram>



< Program>
STR #7010
SHR M000,1,M010

When M000 = 1000100010001000 (binary data), the result is as follow.
M010: 0100010001000100
Carry flag: 0

■ ROL Instruction

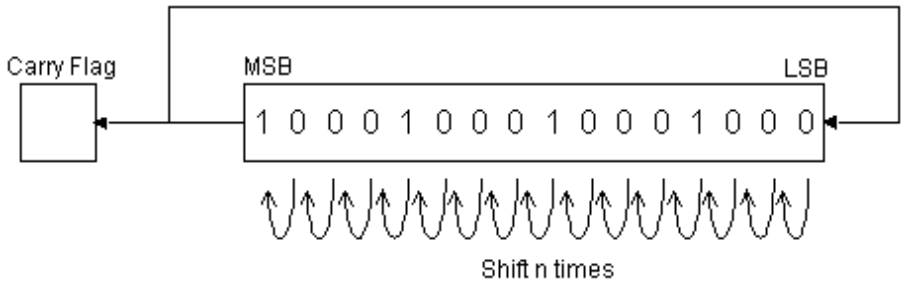
Format

ROL S, n, D

S: Source	Register (M000-M161) Decimal (0-65535) Relay (byte) #XXX0 Relay (word) W#XXX0
n: Shift count	Decimal (0-16)
D: Destination	Register (M000-M099, M150-M161) Relay (byte) #XXX0 Relay (word) W#XXX0

Function

16 bits data contents of S is shifted to the high bit direction (left) n times and the result is output to D when the input signal is at ON state. The highest bit (MSB) is shifted to the carry flag and the lowest bit (LSB).

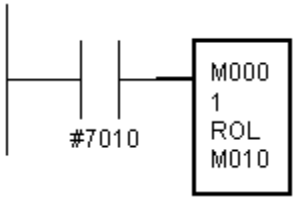


Ladder Program Example

NOTE

The output cannot be done to the same relay two or more times.
The multiple outputs of the register used as a current position of the TMR instruction and the CNT instruction cannot be used.
The operation is performed each scanning when the input signal is at ON state. Use the pulse output instruction (PLS, PLF) in the input circuit for one time operation.

<Ladder Diagram>



< Program>
STR #7010
ROL M000,1,M010

When M000 = 1000100010001000 (binary data), the result is as follow.
M010: 0001000100010001
Carry flag: 1

■ ROR Instruction

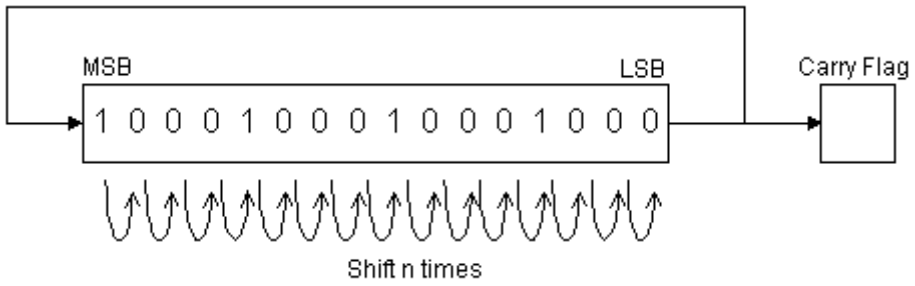
Format

ROR S, n, D

S: Source	Register (M000-M161) Decimal (0-65535) Relay (byte) #XXX0 Relay (word) W#XXX0
n: Shift count	Decimal (0-16)
D: Destination	Register (M000-M099, M150-M161) Relay (byte) #XXX0 Relay (word) W#XXX0

Function

16 bits data contents of S is shifted to the low bit direction (right) n times and the result is output to D when the input signal is at ON state. The lowest bit (LSB) is shifted to the carry flag and the highest bit (MSB).

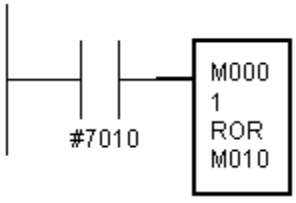


Ladder Program Example

NOTE

The output cannot be done to the same relay two or more times.
The multiple outputs of the register used as a current position of the TMR instruction and the CNT instruction cannot be used.
The operation is performed each scanning when the input signal is at ON state. Use the pulse output instruction (PLS, PLF) in the input circuit for one time operation.

<Ladder Diagram>



< Program>
STR #7010
ROL M000,1,M010

When M000 = 1000100010001000 (binary data), the result is as follow.
M010: 0100010001000100
Carry flag: 0

1.13.3 Arithmetic Flag

■ Flag Type

The arithmetic flag is a signal to reflect calculation result in the operation of the next steps. There are three types of flags. These flags are allocated to the following specific output.

- #5260: Carry Flag
- #5261: Zero Flag
- #5262: Error Flag

Refer to “1.13.1 List of Usable Instructions” for the instruction which influences the flag.

Carry Flag

Case of ADD Instruction:
This flag is set when the digit going up occurs as a result of the operation.
Case of SUB Instruction:
This flag is set when the result is negative.

Zero Flag

Case of ADD or SUB Instruction:
This flag is set when the result is 0.

Error Flag

This flag is set when the error occurs. The instruction is not executed.

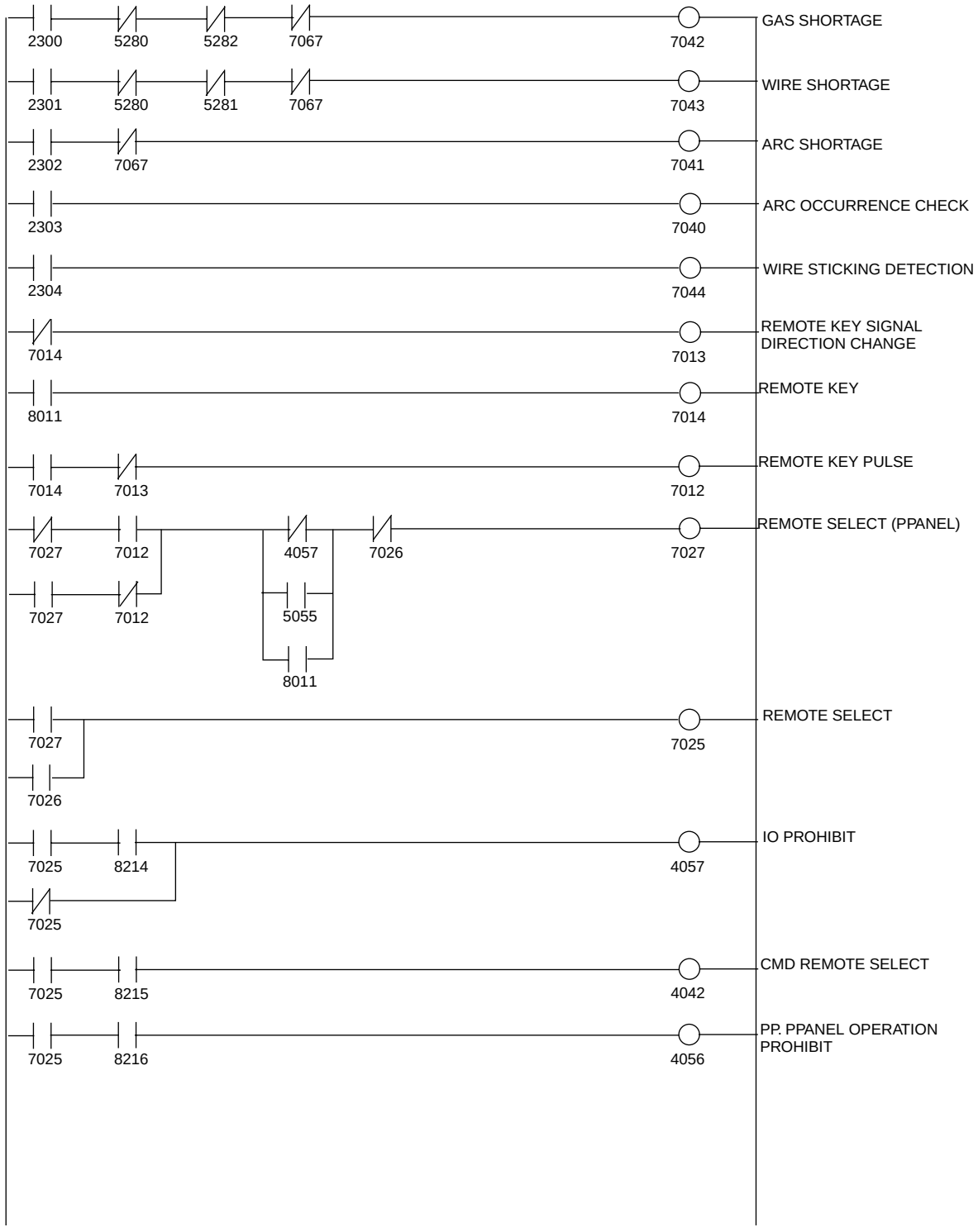
■ Flag Transition under Scanning

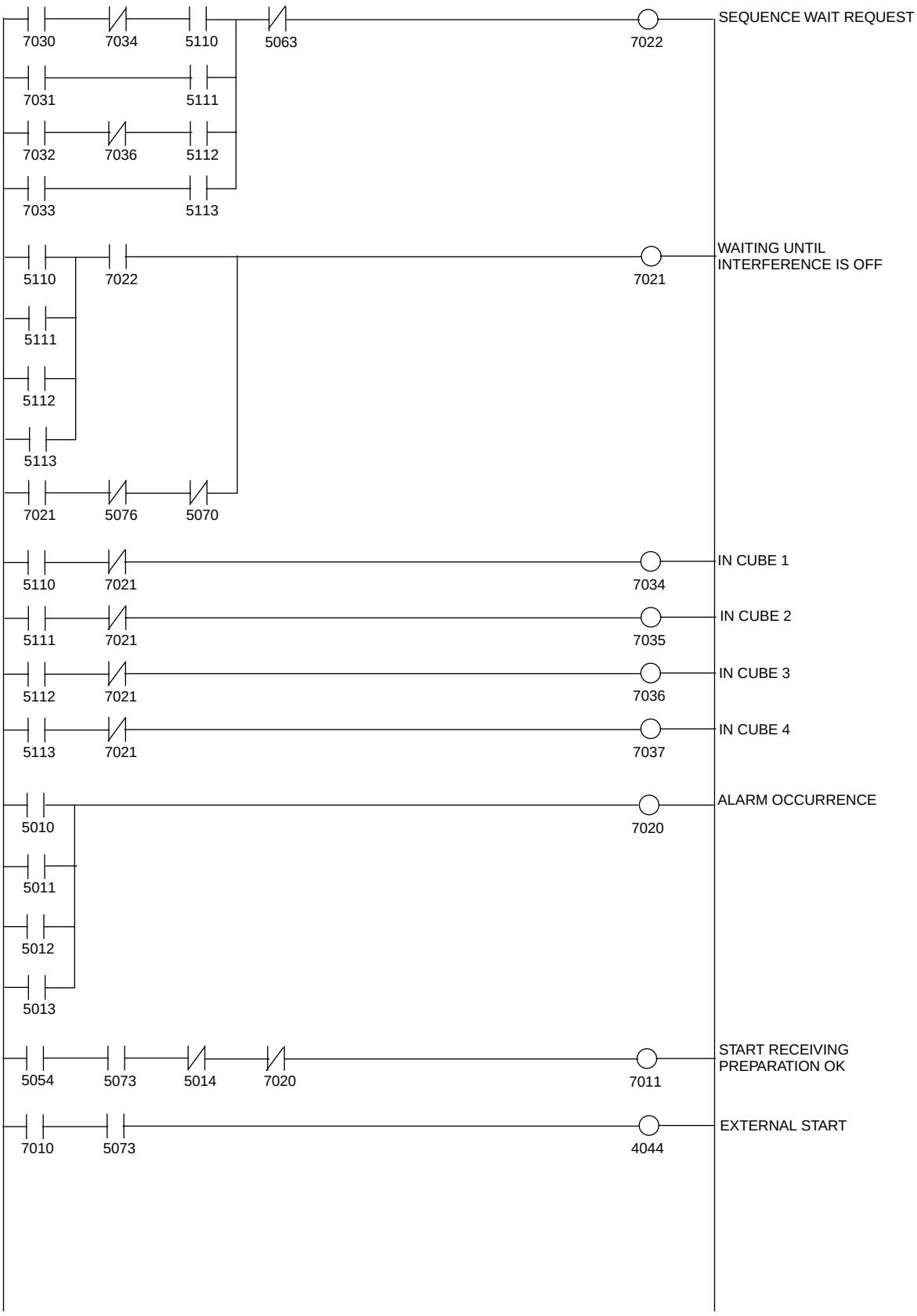
- The flag is cleared before ladder program processing of every scanning.
- When the processing of the instruction which influences the flag starts, the flag is set by the operation result when the execution condition of the instruction consists. The flag is cleared when the execution condition of the instruction is a failure.
- The state of the flag does not change regardless of execution or non-execution in the processing of the instruction which does not influence the flag.

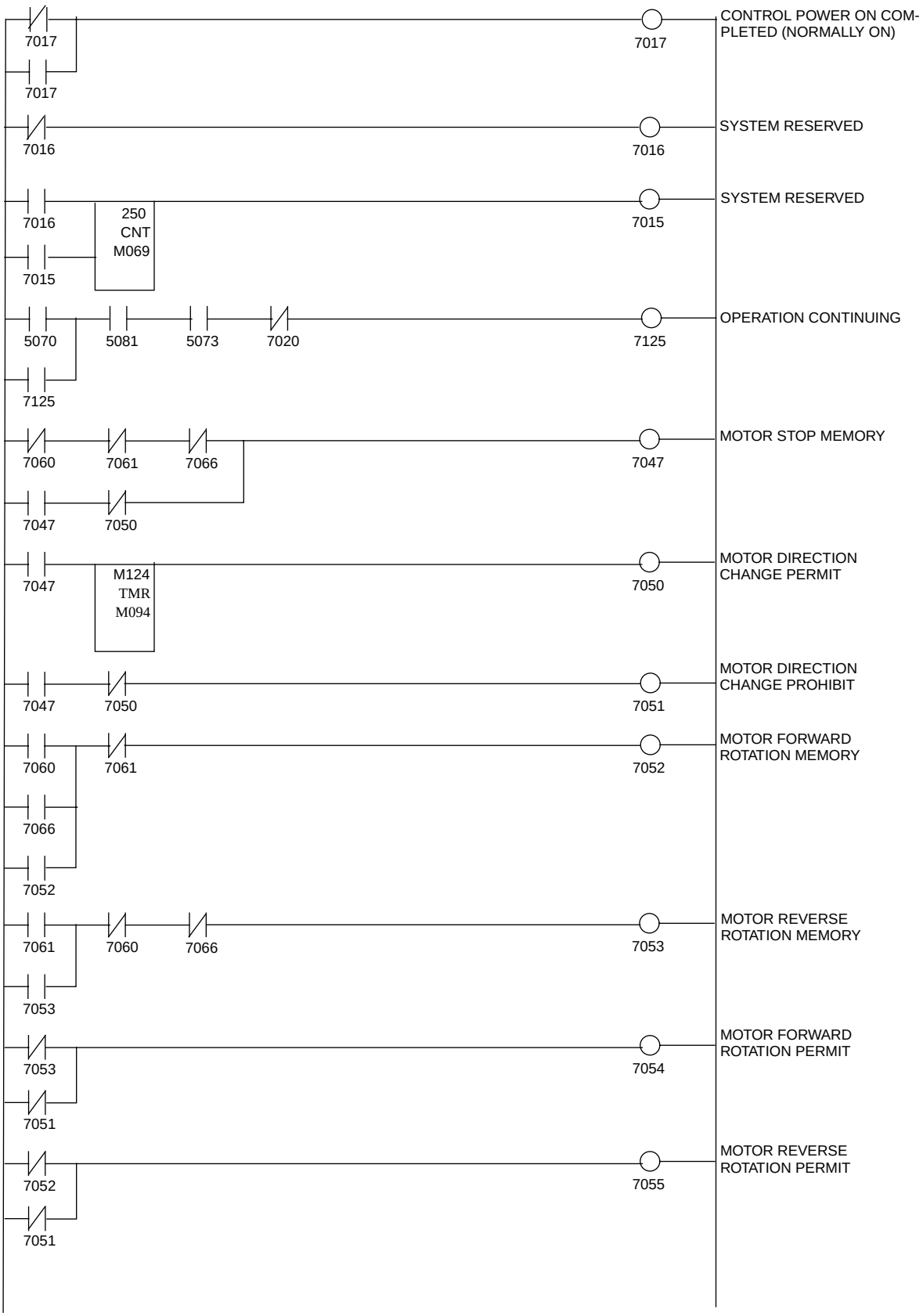
1.13.4 Arc Welding

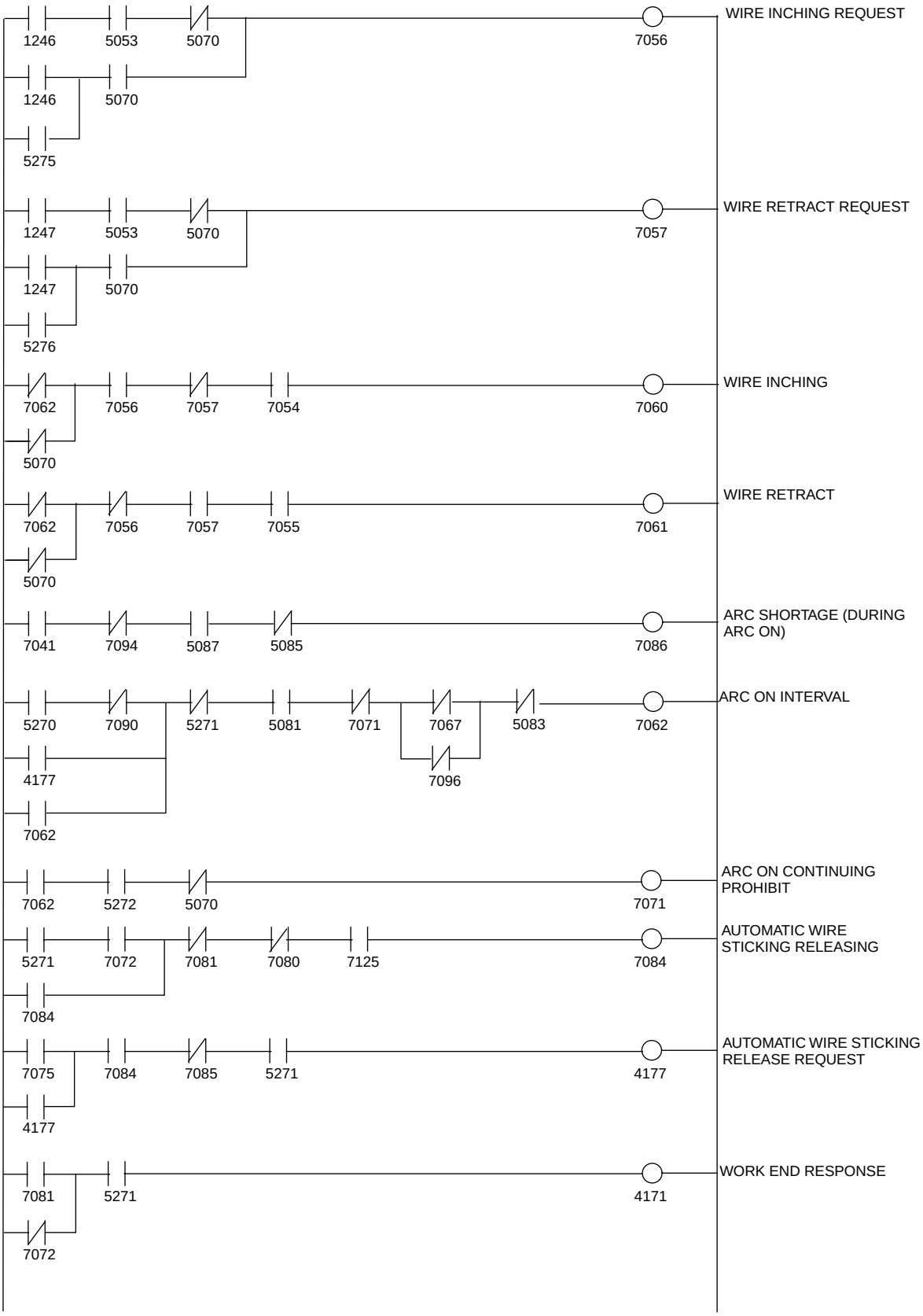
■ Ladder Program List

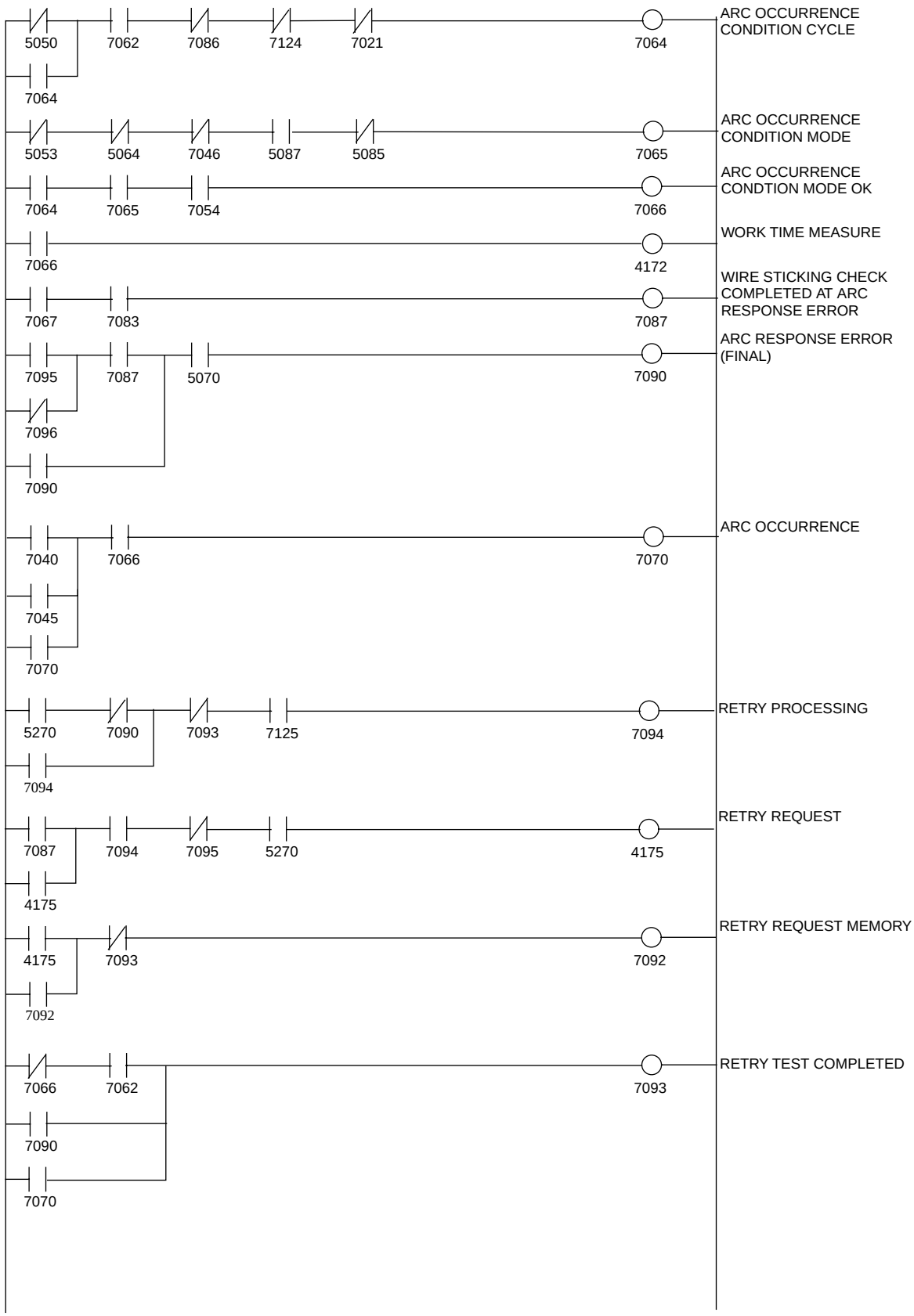
System Ladder Section
Standard ladders are prepared for each application prior to shipment. Ladder programs cannot be edited.

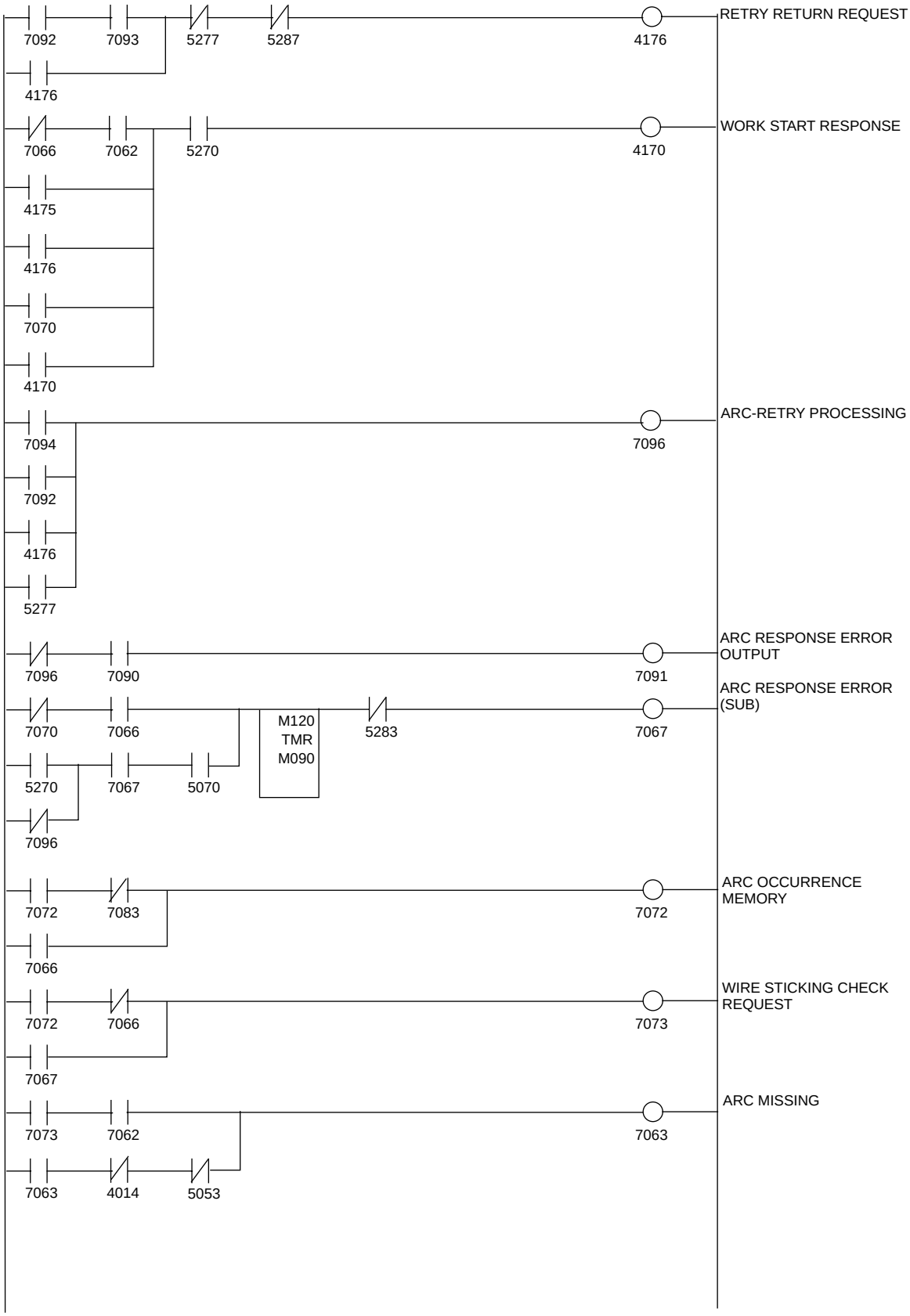


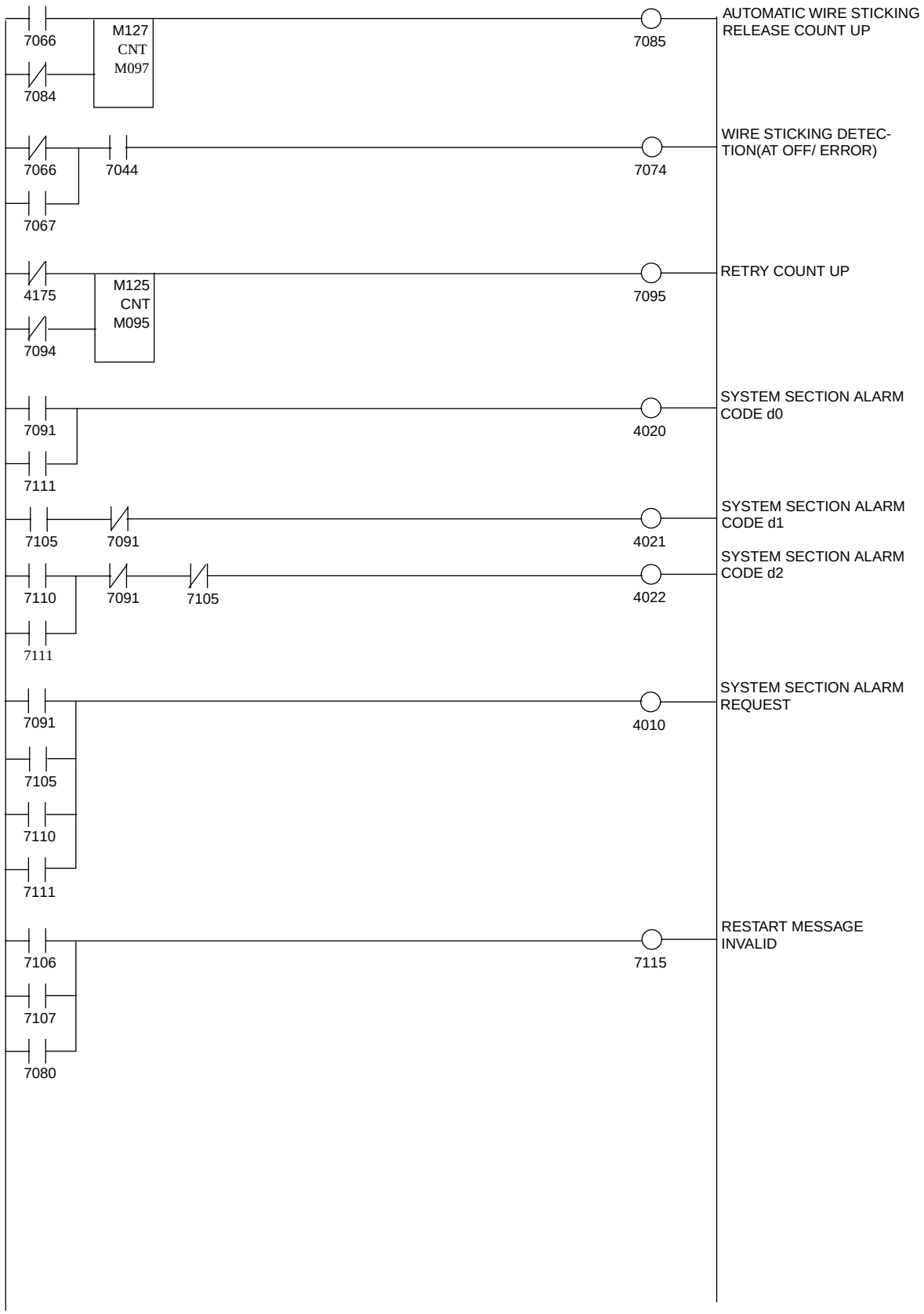

7030
7034
5110
5063
7022
SEQUENCE WAIT REQUEST
7031
5111
7032
7036
5112
7033
5113
5110
7022
7021
WAITING UNTIL
INTERFERENCE IS OFF
5111
5112
5113
7021
5076
5070
5110
7021
7034
IN CUBE 1
5111
7021
7035
IN CUBE 2
5112
7021
7036
IN CUBE 3
5113
7021
7037
IN CUBE 4
5010
7020
ALARM OCCURRENCE
5011
5012
5013
5054
5073
5014
7020
7011
START RECEIVING
PREPARATION OK
7010
5073
4044
EXTERNAL START

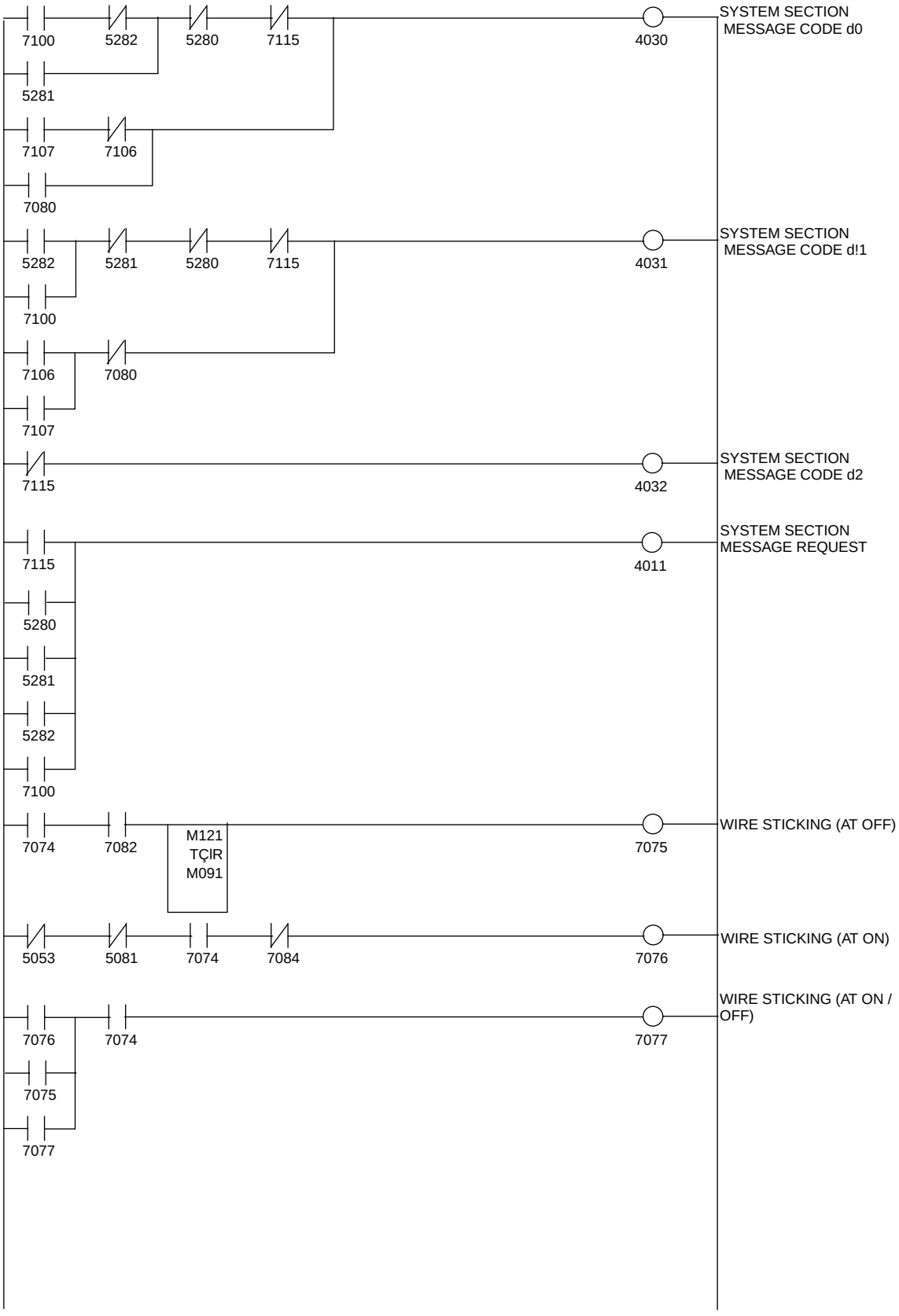

7017
7017
7017
CONTROL POWER ON COM-
PLETED (NORMALLY ON)
7016
7016
SYSTEM RESERVED
7016
250
CNT
M069
7015
7015
SYSTEM RESERVED
5070
5081
5073
7020
7125
7125
OPERATION CONTINUING
7060
7061
7066
7047
7047
7050
MOTOR STOP MEMORY
7047
M124
TMR
M094
7050
MOTOR DIRECTION
CHANGE PERMIT
7047
7050
7051
MOTOR DIRECTION
CHANGE PROHIBIT
7060
7061
7066
7052
7052
MOTOR FORWARD
ROTATION MEMORY
7061
7060
7066
7053
7053
MOTOR REVERSE
ROTATION MEMORY
7053
7051
7054
MOTOR FORWARD
ROTATION PERMIT
7052
7051
7055
MOTOR REVERSE
ROTATION PERMIT

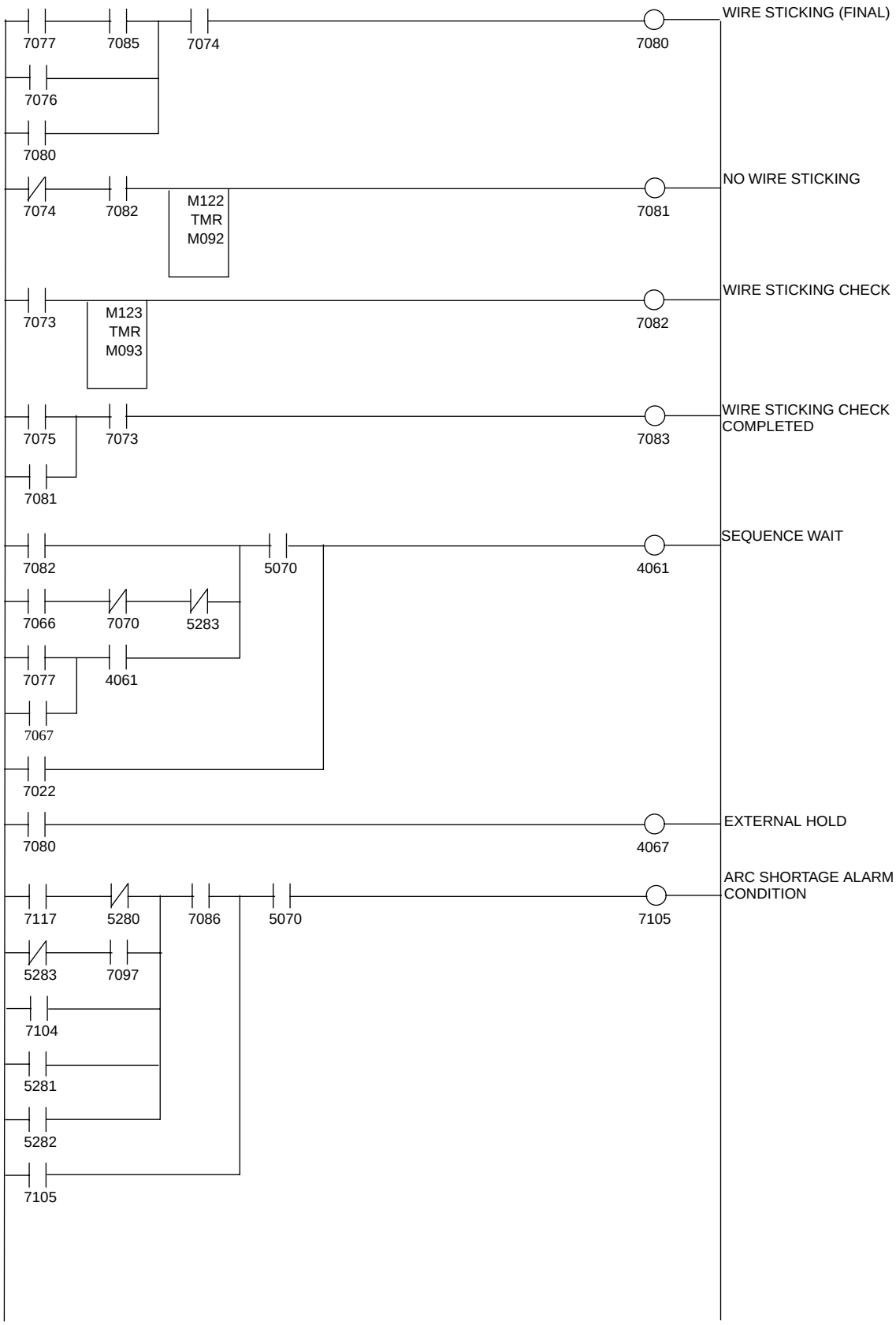

1246
5053
5070
7056
WIRE INCHING REQUEST
1246
5070
5275
1247
5053
5070
7057
WIRE RETRACT REQUEST
1247
5070
5276
7062
7056
7057
7054
7060
WIRE INCHING
5070
7062
7056
7057
7055
7061
WIRE RETRACT
5070
7041
7094
5087
5085
7086
ARC SHORTAGE (DURING ARC ON)
5270
7090
5271
5081
7071
7067
5083
7062
ARC ON INTERVAL
4177
7096
7062
7062
5272
5070
7071
ARC ON CONTINUING PROHIBIT
5271
7072
7081
7080
7125
7084
AUTOMATIC WIRE STICKING RELEASING
7084
7075
7084
7085
5271
4177
AUTOMATIC WIRE STICKING RELEASE REQUEST
4177
7081
5271
4171
WORK END RESPONSE
7072

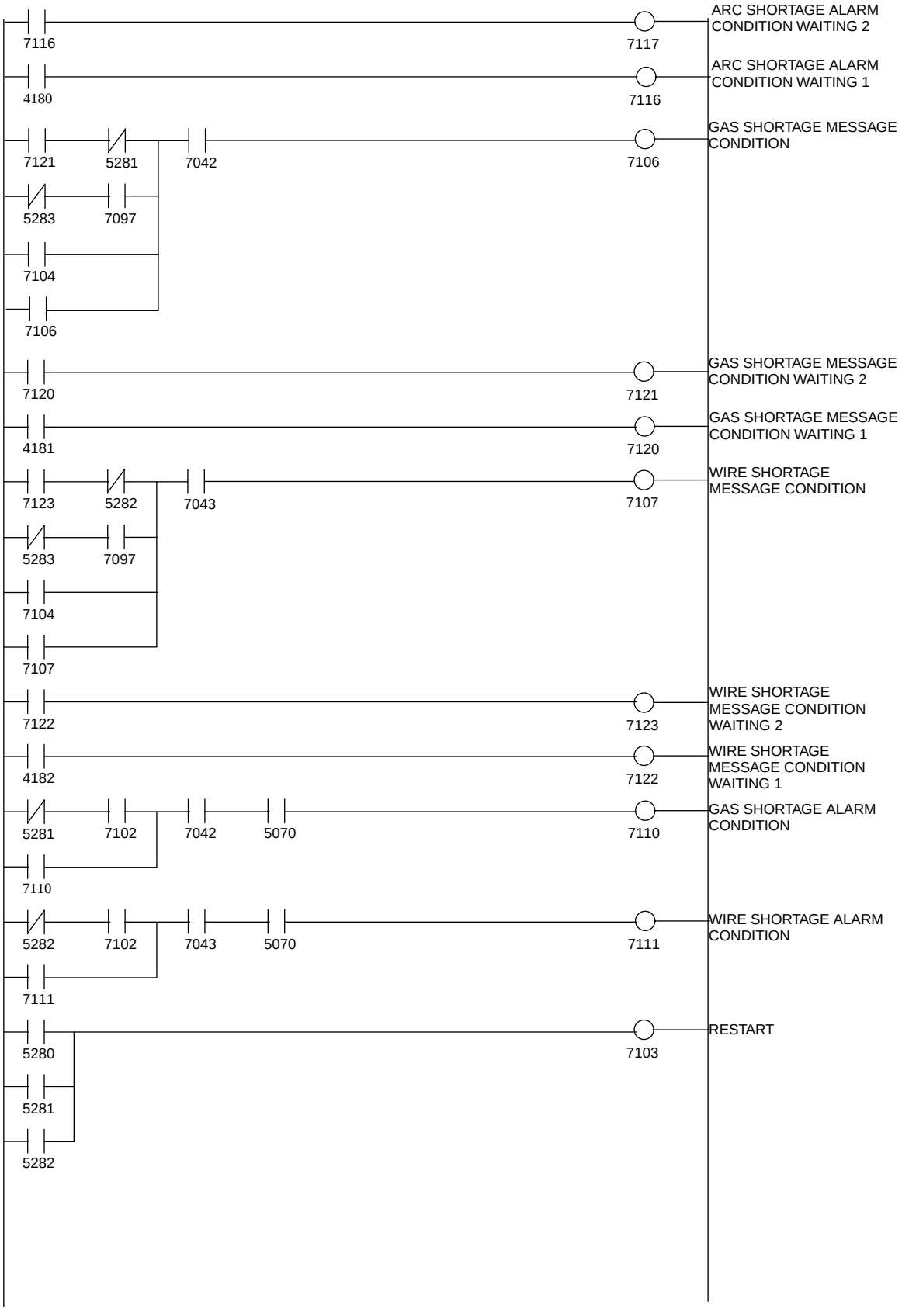

5050
7062
7086
7124
7021
7064
ARC OCCURRENCE CONDITION CYCLE
7064
5053
5064
7046
5087
5085
7065
ARC OCCURRENCE CONDITION MODE
7064
7065
7054
7066
ARC OCCURRENCE CONDTION MODE OK
7066
4172
WORK TIME MEASURE
7067
7083
7087
WIRE STICKING CHECK COMPLETED AT ARC RESPONSE ERROR
7095
7087
5070
7090
ARC RESPONSE ERROR (FINAL)
7096
7090
7040
7066
7070
ARC OCCURRENCE
7045
7070
5270
7090
7093
7125
7094
RETRY PROCESSING
7094
7087
7094
7095
5270
4175
RETRY REQUEST
4175
4175
7093
7092
RETRY REQUEST MEMORY
7092
7066
7062
7093
RETRY TEST COMPLETED
7090
7070

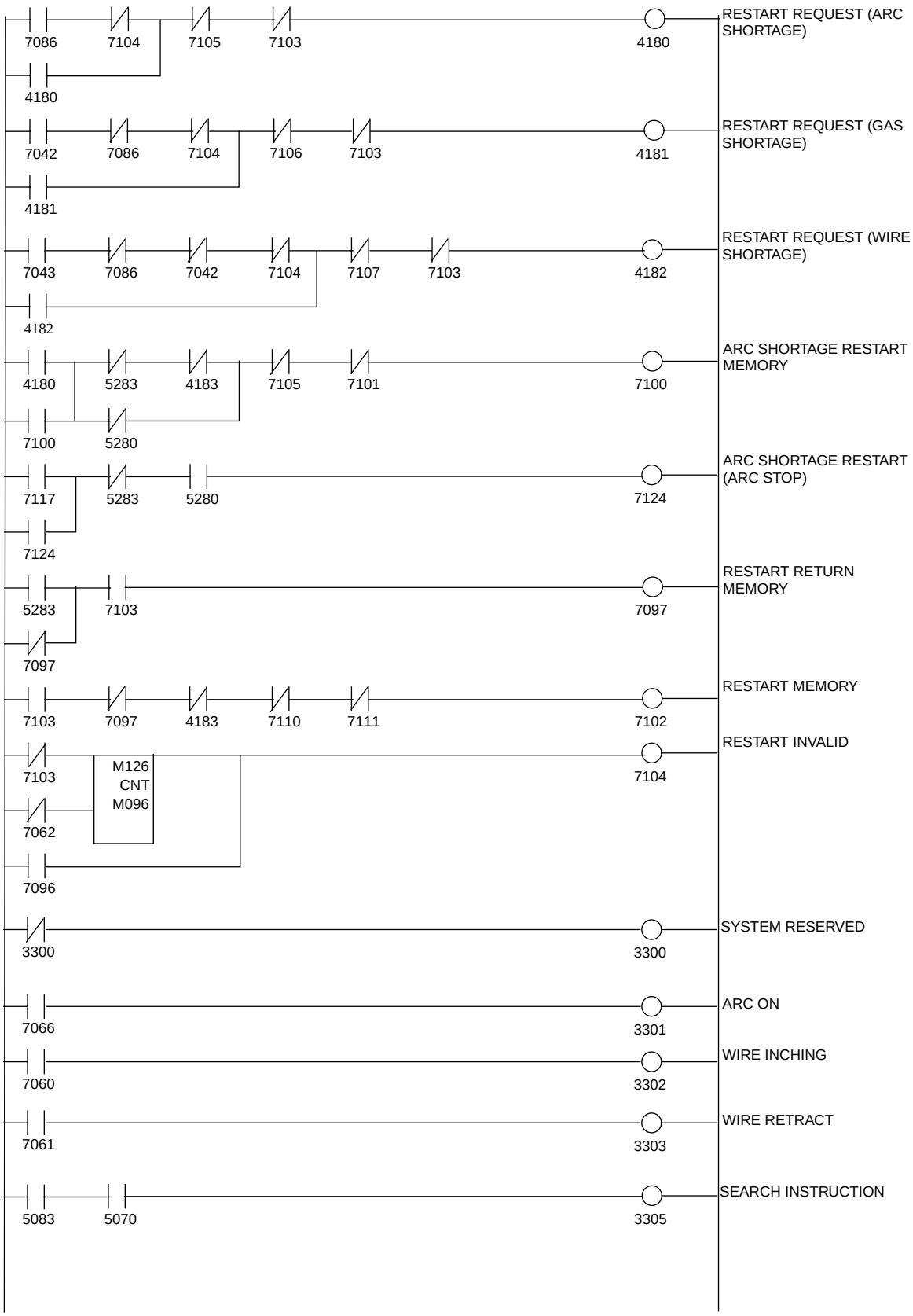

7092
7093
5277
5287
4176
RETRY RETURN REQUEST
4176
7066
7062
5270
4170
WORK START RESPONSE
4175
4176
7070
4170
7094
7096
ARC-RETRY PROCESSING
7092
4176
5277
7096
7090
7091
ARC RESPONSE ERROR OUTPUT
7070
7066
M120
TMR
M090
5283
7067
ARC RESPONSE ERROR (SUB)
5270
7067
5070
7096
7072
7083
7072
ARC OCCURRENCE MEMORY
7066
7072
7066
7073
WIRE STICKING CHECK REQUEST
7067
7073
7062
7063
ARC MISSING
7063
4014
5053


7066
M127
CNT
M097
7084
7085
AUTOMATIC WIRE STICKING RELEASE COUNT UP
7066
7044
7067
7074
WIRE STICKING DETEC-TION(AT OFF/ ERROR)
4175
M125
CNT
M095
7094
7095
RETRY COUNT UP
7091
7111
4020
SYSTEM SECTION ALARM CODE d0
7105
7091
4021
SYSTEM SECTION ALARM CODE d1
7110
7091
7105
7111
4022
SYSTEM SECTION ALARM CODE d2
7091
7105
7110
7111
4010
SYSTEM SECTION ALARM REQUEST
7106
7107
7080
7115
RESTART MESSAGE INVALID


7100
5282
5280
7115
4030
SYSTEM SECTION
MESSAGE CODE d0
5281
7107
7106
7080
5282
5281
5280
7115
4031
SYSTEM SECTION
MESSAGE CODE d!1
7100
7106
7080
7107
7115
4032
SYSTEM SECTION
MESSAGE CODE d2
7115
4011
SYSTEM SECTION
MESSAGE REQUEST
5280
5281
5282
7100
7074
7082
M121
TÇIR
M091
7075
WIRE STICKING (AT OFF)
5053
5081
7074
7084
7076
WIRE STICKING (AT ON)
7076
7074
7077
WIRE STICKING (AT ON /
OFF)
7075
7077

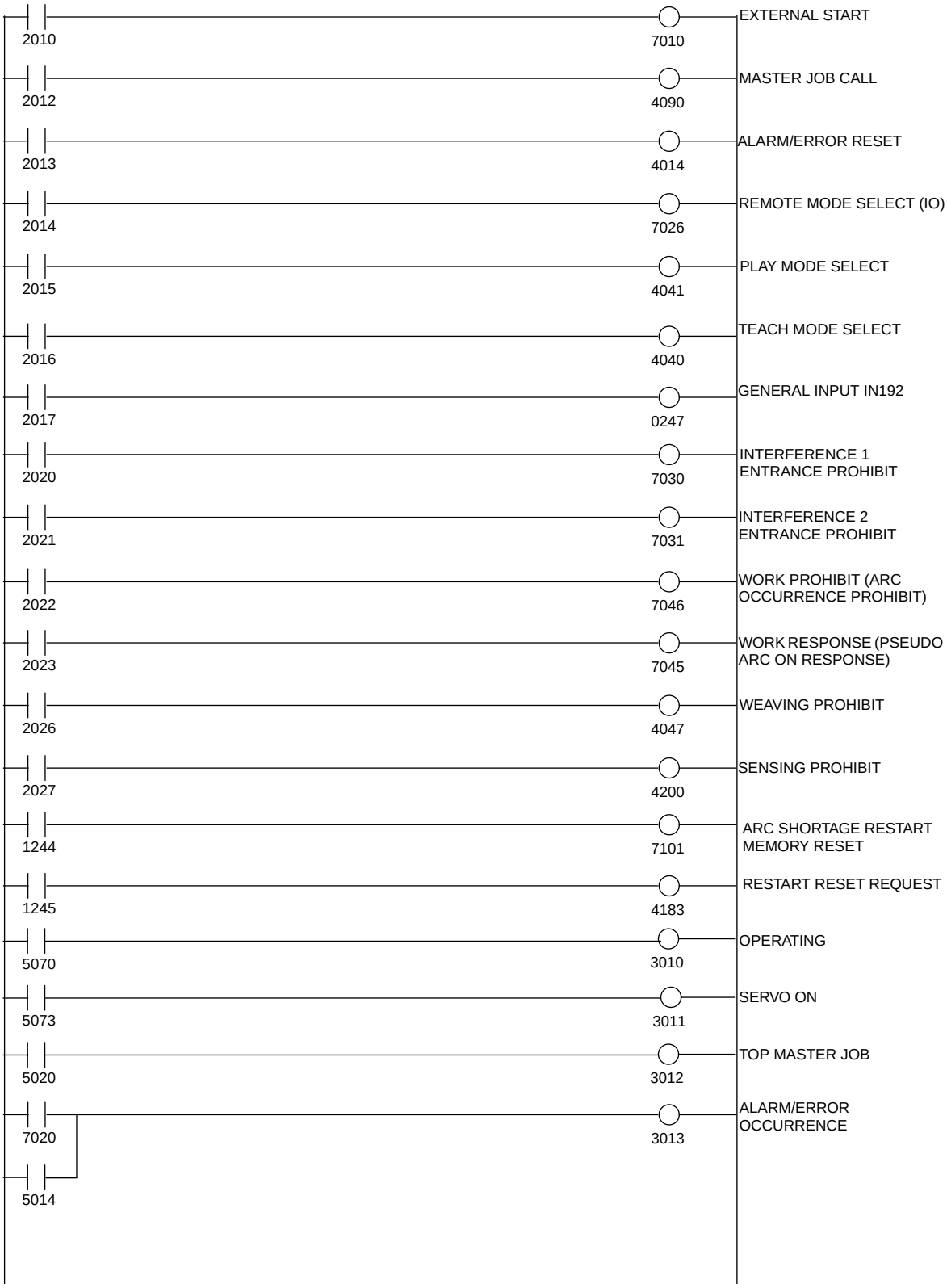

7077
7085
7074
7080
WIRE STICKING (FINAL)
7076
7080
7074
7082
M122
TMR
M092
7081
NO WIRE STICKING
7073
M123
TMR
M093
7082
WIRE STICKING CHECK
7075
7073
7083
WIRE STICKING CHECK
COMPLETED
7081
7082
5070
4061
SEQUENCE WAIT
7066
7070
5283
7077
4061
7067
7022
7080
4067
EXTERNAL HOLD
7117
5280
7086
5070
7105
ARC SHORTAGE ALARM
CONDITION
5283
7097
7104
5281
5282
7105

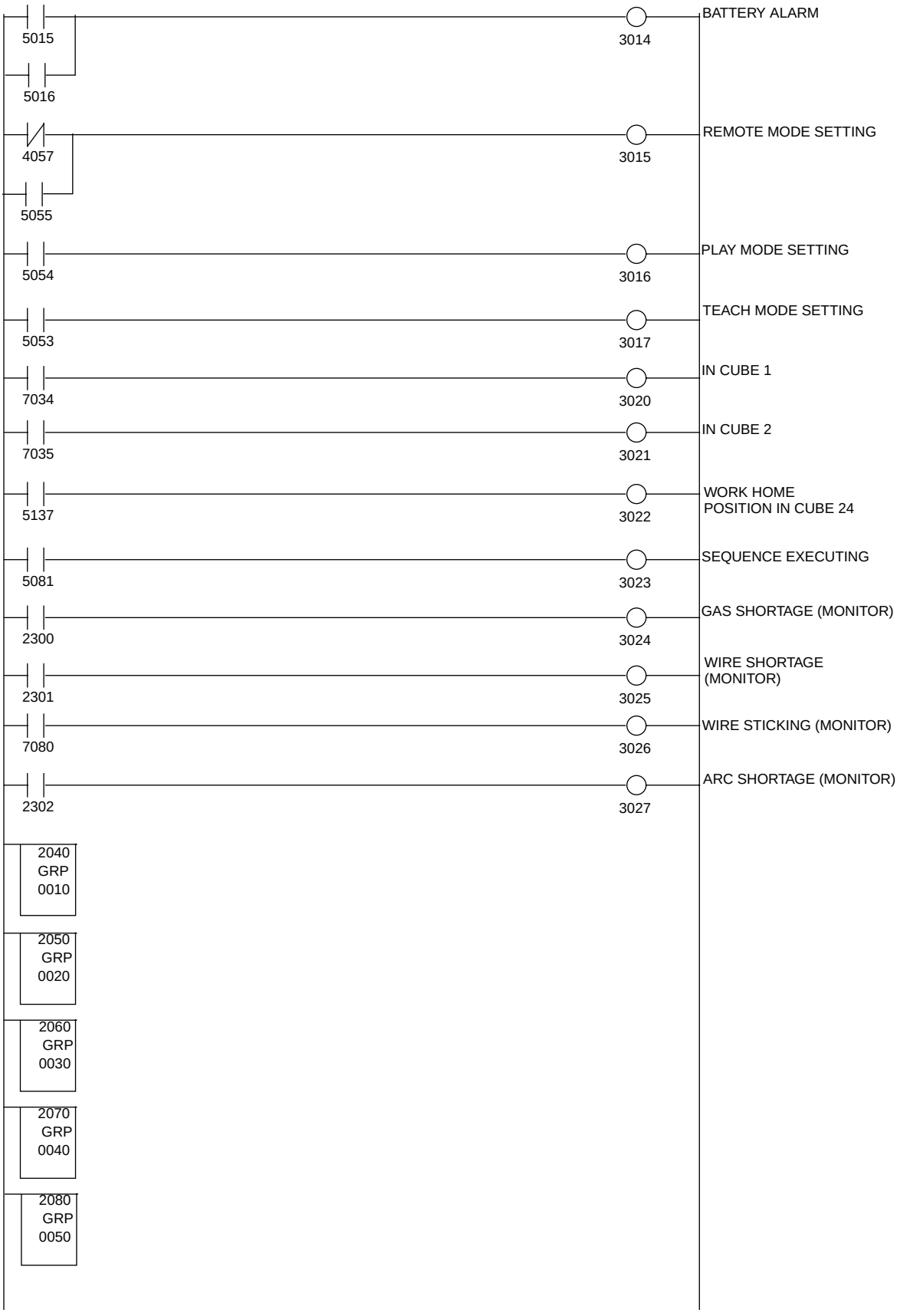

7116
7117
ARC SHORTAGE ALARM CONDITION WAITING 2
4180
7116
ARC SHORTAGE ALARM CONDITION WAITING 1
7121
5281
7042
7106
GAS SHORTAGE MESSAGE CONDITION
5283
7097
7104
7106
7120
7121
GAS SHORTAGE MESSAGE CONDITION WAITING 2
4181
7120
GAS SHORTAGE MESSAGE CONDITION WAITING 1
7123
5282
7043
7107
WIRE SHORTAGE MESSAGE CONDITION
5283
7097
7104
7107
7122
7123
WIRE SHORTAGE MESSAGE CONDITION WAITING 2
4182
7122
WIRE SHORTAGE MESSAGE CONDITION WAITING 1
5281
7102
7042
5070
7110
GAS SHORTAGE ALARM CONDITION
7110
5282
7102
7043
5070
7111
WIRE SHORTAGE ALARM CONDITION
7111
5280
7103
RESTART
5281
5282


7086
7104
7105
7103
4180
RESTART REQUEST (ARC SHORTAGE)
4180
7042
7086
7104
7106
7103
4181
RESTART REQUEST (GAS SHORTAGE)
4181
7043
7086
7042
7104
7107
7103
4182
RESTART REQUEST (WIRE SHORTAGE)
4182
4180
5283
4183
7105
7101
7100
ARC SHORTAGE RESTART MEMORY
7100
5280
7117
5283
5280
7124
ARC SHORTAGE RESTART (ARC STOP)
7124
5283
7103
7097
RESTART RETURN MEMORY
7097
7103
7097
4183
7110
7111
7102
RESTART MEMORY
7103
M126
CNT
M096
7104
RESTART INVALID
7062
7096
3300
3300
SYSTEM RESERVED
7066
3301
ARC ON
7060
3302
WIRE INCHING
7061
3303
WIRE RETRACT
5083
5070
3305
SEARCH INSTRUCTION

User Ladder Section

Signal connection specification and interface signals with system ladder are prepared prior to shipment. Including, these signals, ladder programs can be edited.

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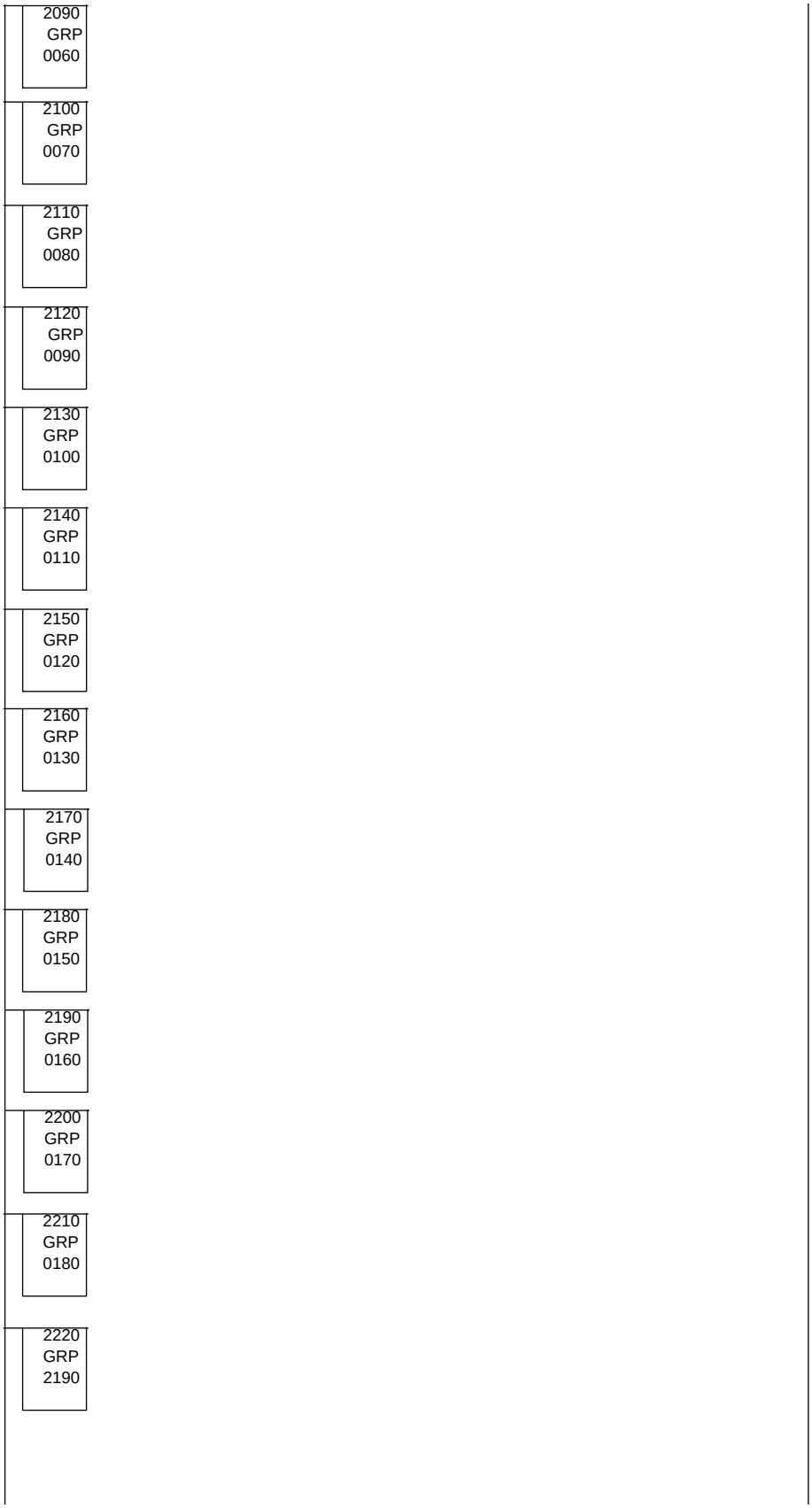
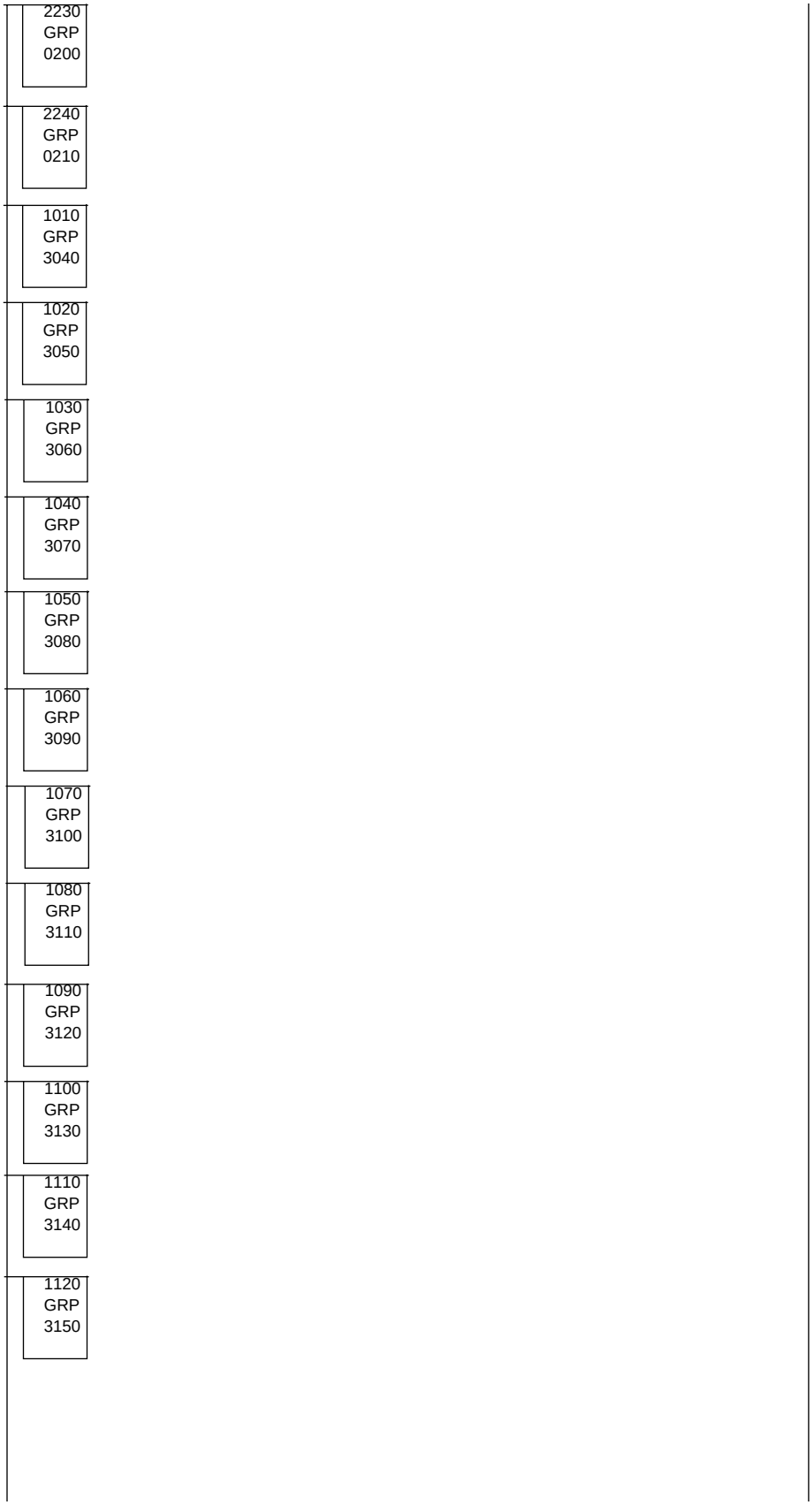
5016
3014
BATTERY ALARM
4057
5055
3015
REMOTE MODE SETTING
5054
3016
PLAY MODE SETTING
5053
3017
TEACH MODE SETTING
7034
3020
IN CUBE 1
7035
3021
IN CUBE 2
5137
3022
WORK HOME
POSITION IN CUBE 24
5081
3023
SEQUENCE EXECUTING
2300
3024
GAS SHORTAGE (MONITOR)
2301
3025
WIRE SHORTAGE
(MONITOR)
7080
3026
WIRE STICKING (MONITOR)
2302
3027
ARC SHORTAGE (MONITOR)
2040
GRP
0010
2050
GRP
0020
2060
GRP
0030
2070
GRP
0040
2080
GRP
0050


2090
GRP
0060
2100
GRP
0070
2110
GRP
0080
2120
GRP
0090
2130
GRP
0100
2140
GRP
0110
2150
GRP
0120
2160
GRP
0130
2170
GRP
0140
2180
GRP
0150
2190
GRP
0160
2200
GRP
0170
2210
GRP
0180
2220
GRP
2190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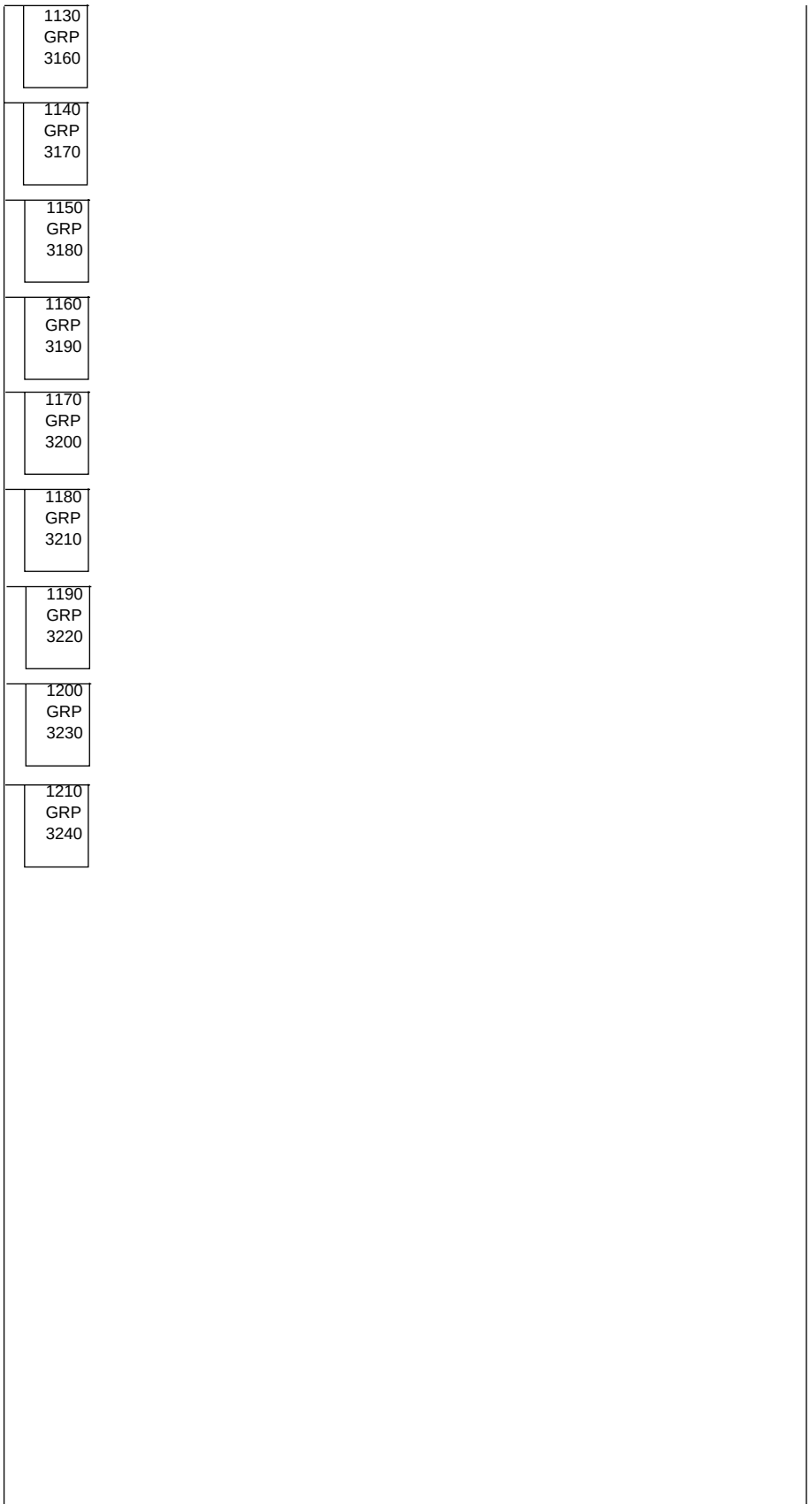
GRP
0200
2240
GRP
0210
1010
GRP
3040
1020
GRP
3050
1030
GRP
3060
1040
GRP
3070
1050
GRP
3080
1060
GRP
3090
1070
GRP
3100
1080
GRP
3110
1090
GRP
3120
1100
GRP
3130
1110
GRP
3140
1120
GRP
3150


1130
GRP
3160
1140
GRP
3170
1150
GRP
3180
1160
GRP
3190
1170
GRP
3200
1180
GRP
3210
1190
GRP
3220
1200
GRP
3230
1210
GRP
3240

■ I/O Alarm

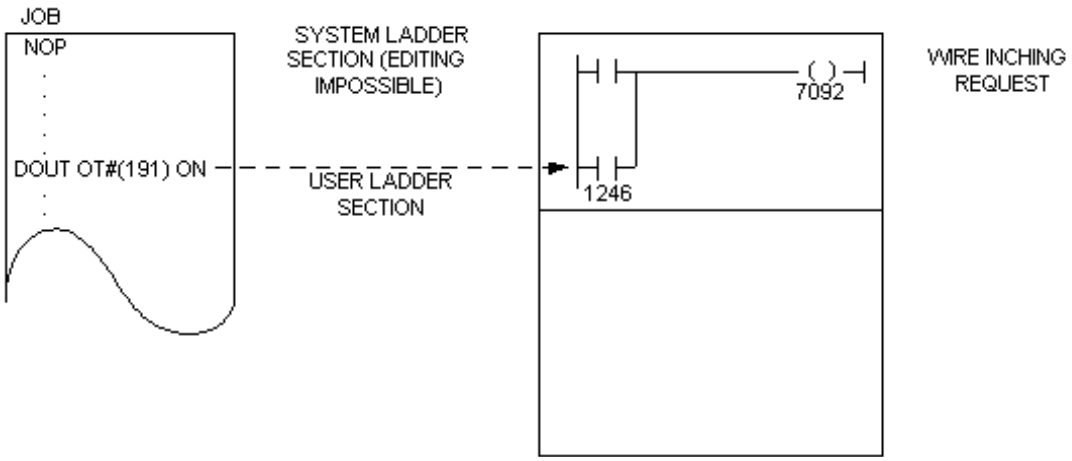
	Alarm No.	Register No.	I/O Alarm Message
System Section			
	9000	00	
	9010	01	MISSING ARC GENERATION CONFIRM
	9020	02	ARC SHORTAGE
	9030	03	
	9040	04	GAS SHORTAGE (RESTART)
	9050	05	WIRE SHORTAGE (RESTART)
	9060	06	
	9070	07	
	9080	08	
	9090	09	
	9100	10	
	9110	11	
	9120	12	
	9130	13	
	9140	14	
	9150	15	
	9160	16	
	9170	17	
	9180	18	
	9190	19	
	9200	20	
	9210	21	
	9220	22	
	9230	23	
User Section			
	9240	24	
	9250	25	
	9260	26	
	9270	27	
	9280	28	
	9290	29	
	9300	30	
	9310	31	

■ I/O Message

	Register No.	I/O Message
System Section		
	00	
	01	WIRE STICKING
	02	GAS SHORTAGE
	03	WIRE SHORTAGE
	04	RESTARTING FOR ARC
	05	RESTARTING FOR GAS
	06	RESTARTING FOR WIRE
	07	END OF ARC RESTARTING
	08	
	09	
	10	
	11	
	12	
	13	
	14	
	15	
	16	
	17	
	18	
	19	
	20	
	21	
	22	
	23	
User Section		
	24	
	25	
	26	
	27	
	28	
	29	
	30	
	31	

■ USER OPEN SIGNALS

Editing of system ladder is impossible, however, the seven signals which are necessary for user's operation are available. For example, wire inching can be programmed as shown below.



OT#189 to OT#192, OT#181 to OT#184, OT#173 to OT#176 USER OPEN SIGNALS

Output Number	Ladder Input Number	Meaning
OT#189, OT#181, OT#173	1244, 1234, 1224	Arc shortage restart memory reset
OT#190, OT#182, OT#174	1245, 1235, 1225	Restart reset
OT#191,OT#183,OT#175	1246,1236,1226	Inching
OT#192,OT#184,OT#176	1247,1237,1227	Retract

OT#189, OT#181,OT#173: ARC SHORTAGE RESTART MEMORY RESET

State

These signals are connected to signal Nos. 7101 and 7301 in the user ladder. When these signals are on, the arc shortage restart memory signal Nos. 7100 and 7300 are reset. Use the signals to reset the memory after taking necessary action, when "1: Output error and continue operation" is selected for the arc shortage restart method. For a system with one application, use output No. 189 and signal No. 7101 or 7100.

7100, 7300 ARC SHORTAGE RESTART MEMORY

These signals are turned on at inadvertent arc shortage if "1: Output error and continue operation" is selected for the arc shortage restart method. When these signals are turned on, a message "END OF ARC RESTARTING" is displayed on the programming pendant. Use the signals to check arc shortage during operation.

OT#190, OT#182, OT#174: RESTART RESET

These signals are connected to signal Nos. 4183, 4223, and 4263 in the user ladder. When these signals are on, restarting is cancelled. Use the signals to cancel restarting when “manual intervention” is selected for the restarting method.
For a system with one application, use output No. 190 and signal No. 4183.

OT#191 to OT#192, OT#183 to OT#184, OT#175 to OT#176 WIRE OPERATION

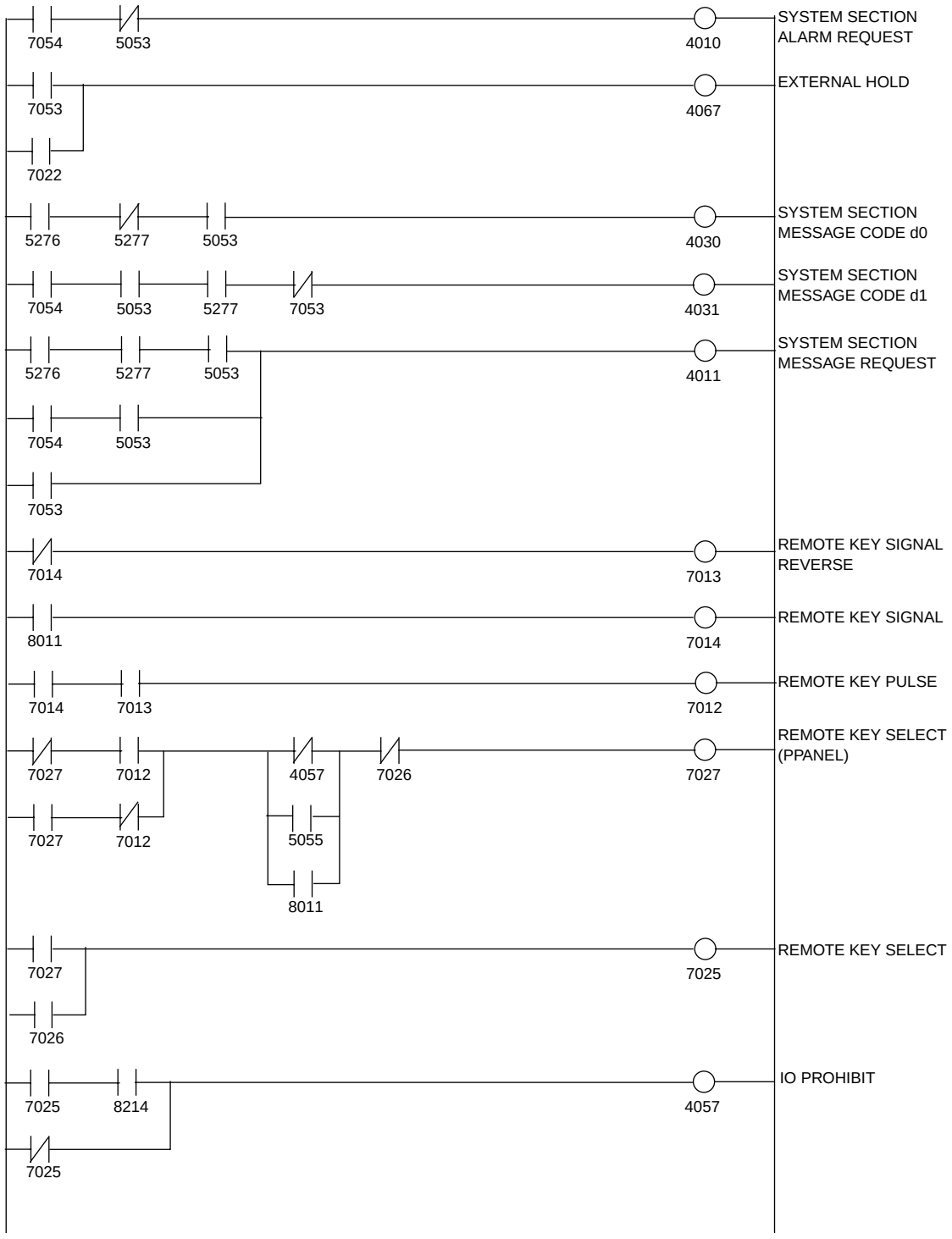
These signals are connected in the system ladder. When these signals are on, the wire operation output to the welder is executed. Use the signals to control wire in the job. The feed speed is determined by the last welding current output value in the playback. To control this speed, place the “ARCCUR” instruction before the wire operation.
For a system with one application, use output No. 191 or 192.

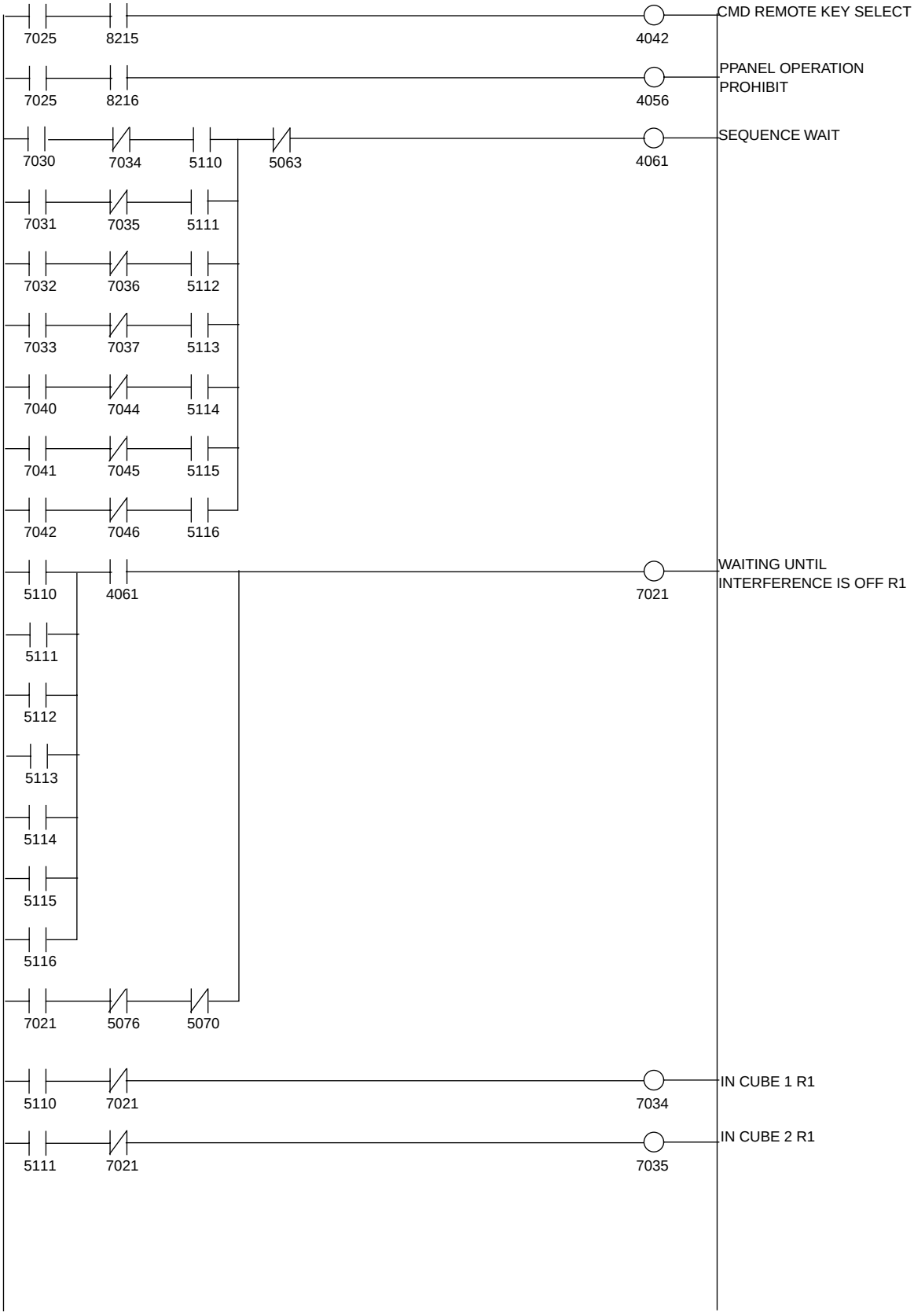
1.13.5 Handling

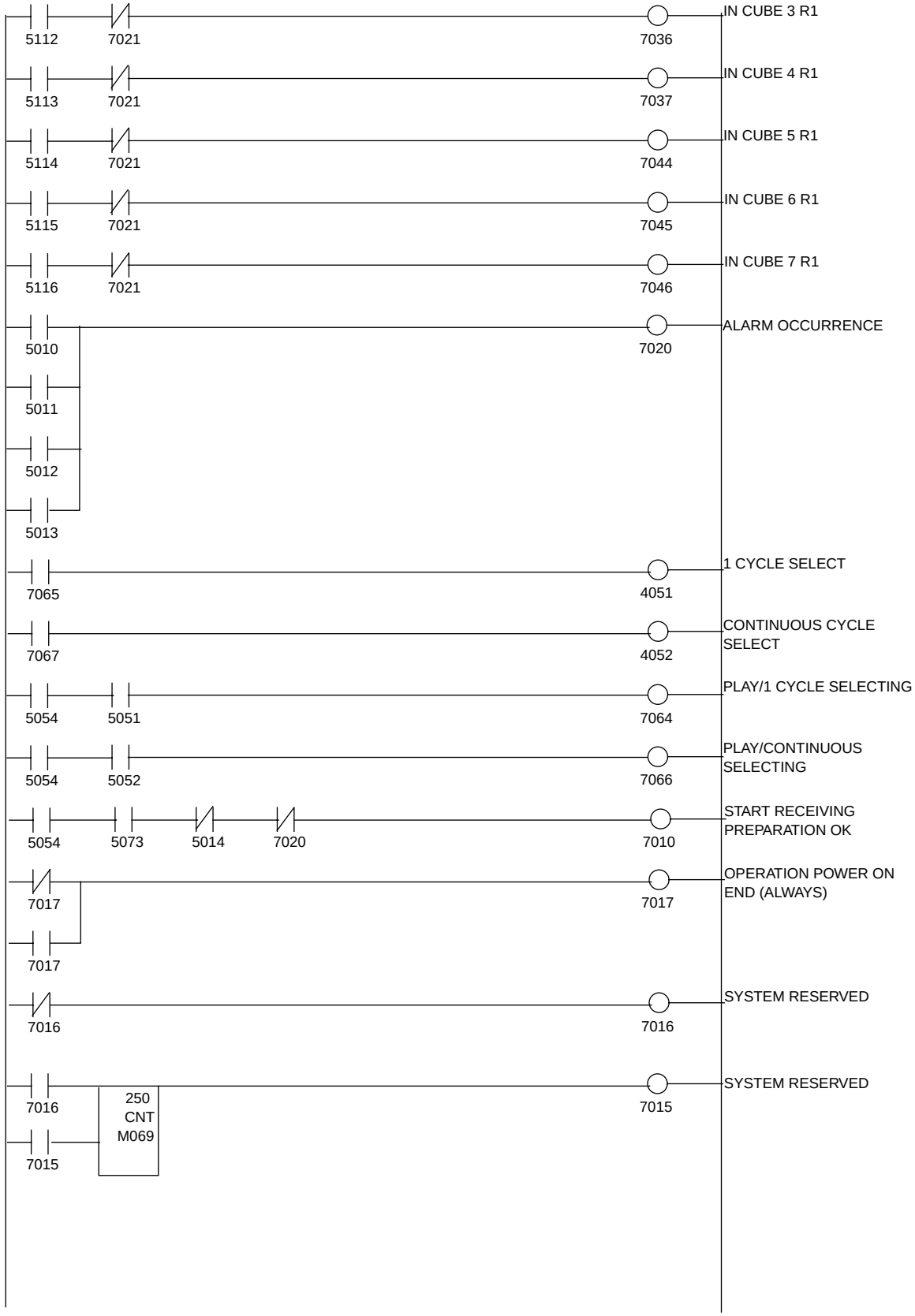
■ LADDER PROGRAM LIST

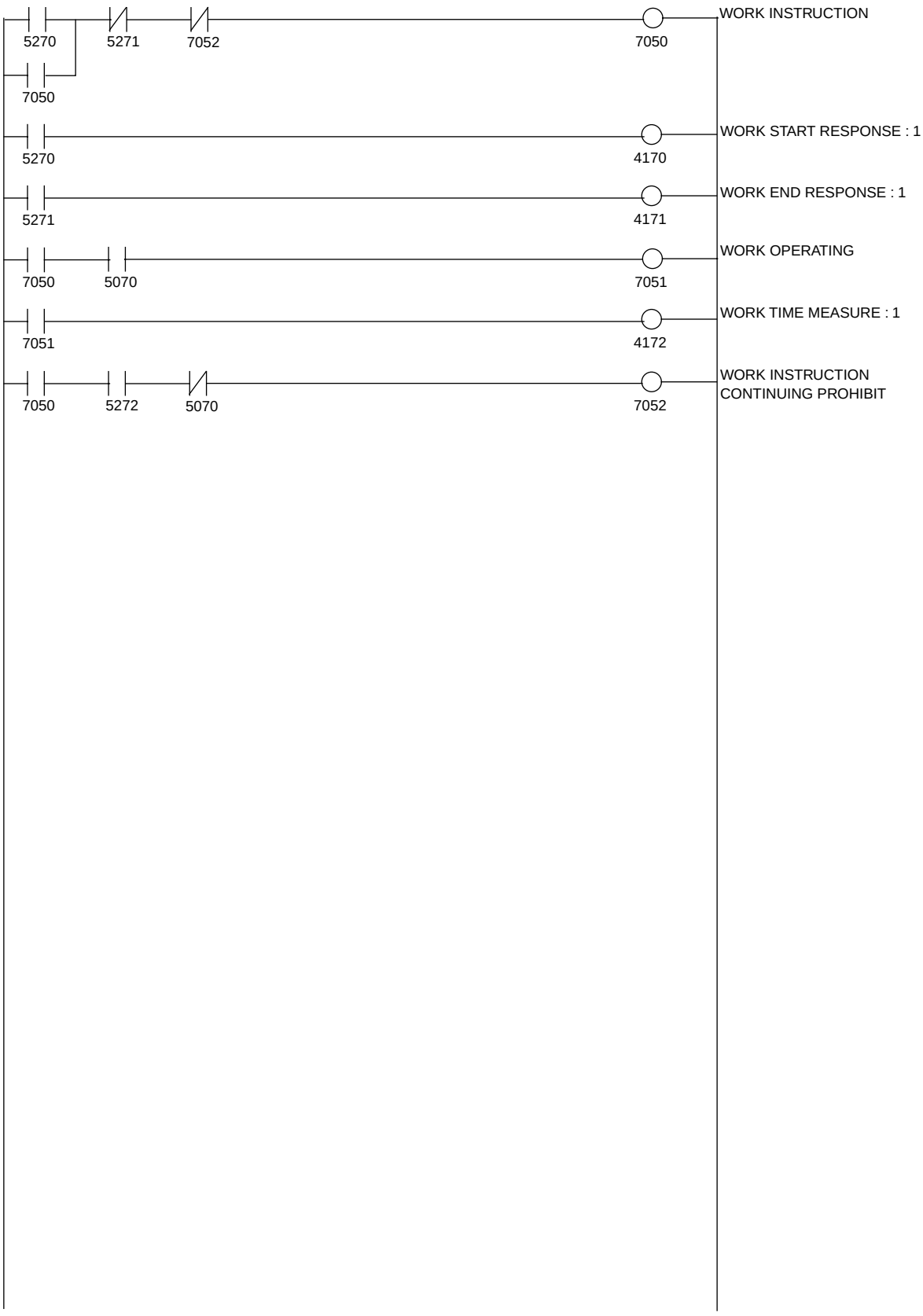
System Ladder Section

Standard ladders are prepared for each application prior to shipment. Ladder programs cannot be edited.



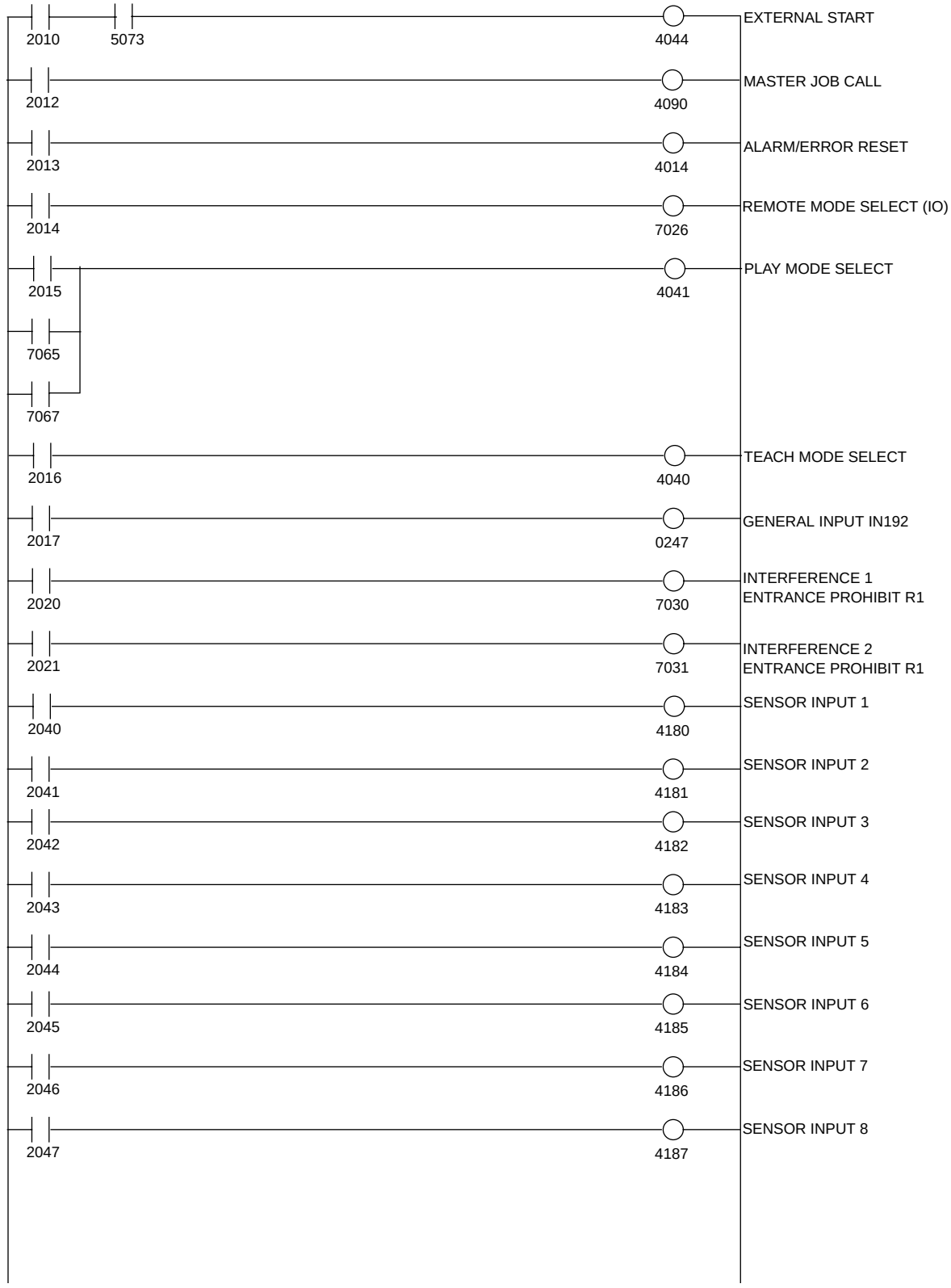

7025
8215
4042
CMD REMOTE KEY SELECT
7025
8216
4056
PPANEL OPERATION PROHIBIT
7030
7034
5110
5063
4061
SEQUENCE WAIT
7031
7035
5111
7032
7036
5112
7033
7037
5113
7040
7044
5114
7041
7045
5115
7042
7046
5116
5110
4061
7021
WAITING UNTIL INTERFERENCE IS OFF R1
5111
5112
5113
5114
5115
5116
7021
5076
5070
5110
7021
7034
IN CUBE 1 R1
5111
7021
7035
IN CUBE 2 R1

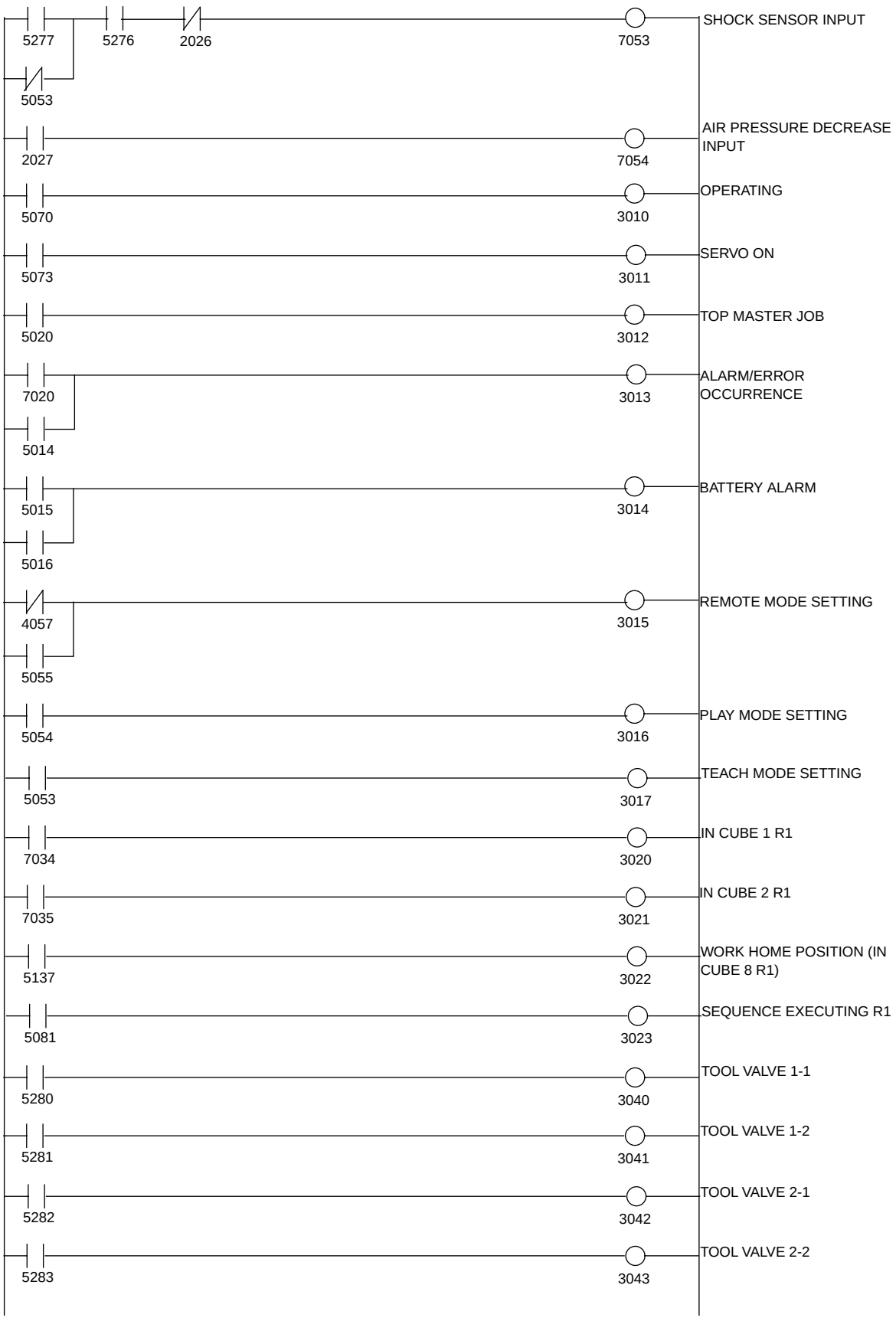

5112
7021
7036
IN CUBE 3 R1
5113
7021
7037
IN CUBE 4 R1
5114
7021
7044
IN CUBE 5 R1
5115
7021
7045
IN CUBE 6 R1
5116
7021
7046
IN CUBE 7 R1
5010
5011
5012
5013
7020
ALARM OCCURRENCE
7065
4051
1 CYCLE SELECT
7067
4052
CONTINUOUS CYCLE SELECT
5054
5051
7064
PLAY/1 CYCLE SELECTING
5054
5052
7066
PLAY/CONTINUOUS SELECTING
5054
5073
5014
7020
7010
START RECEIVING PREPARATION OK
7017
7017
7017
OPERATION POWER ON END (ALWAYS)
7016
7016
SYSTEM RESERVED
7016
7015
250
CNT
M069
7015
SYSTEM RESERVED

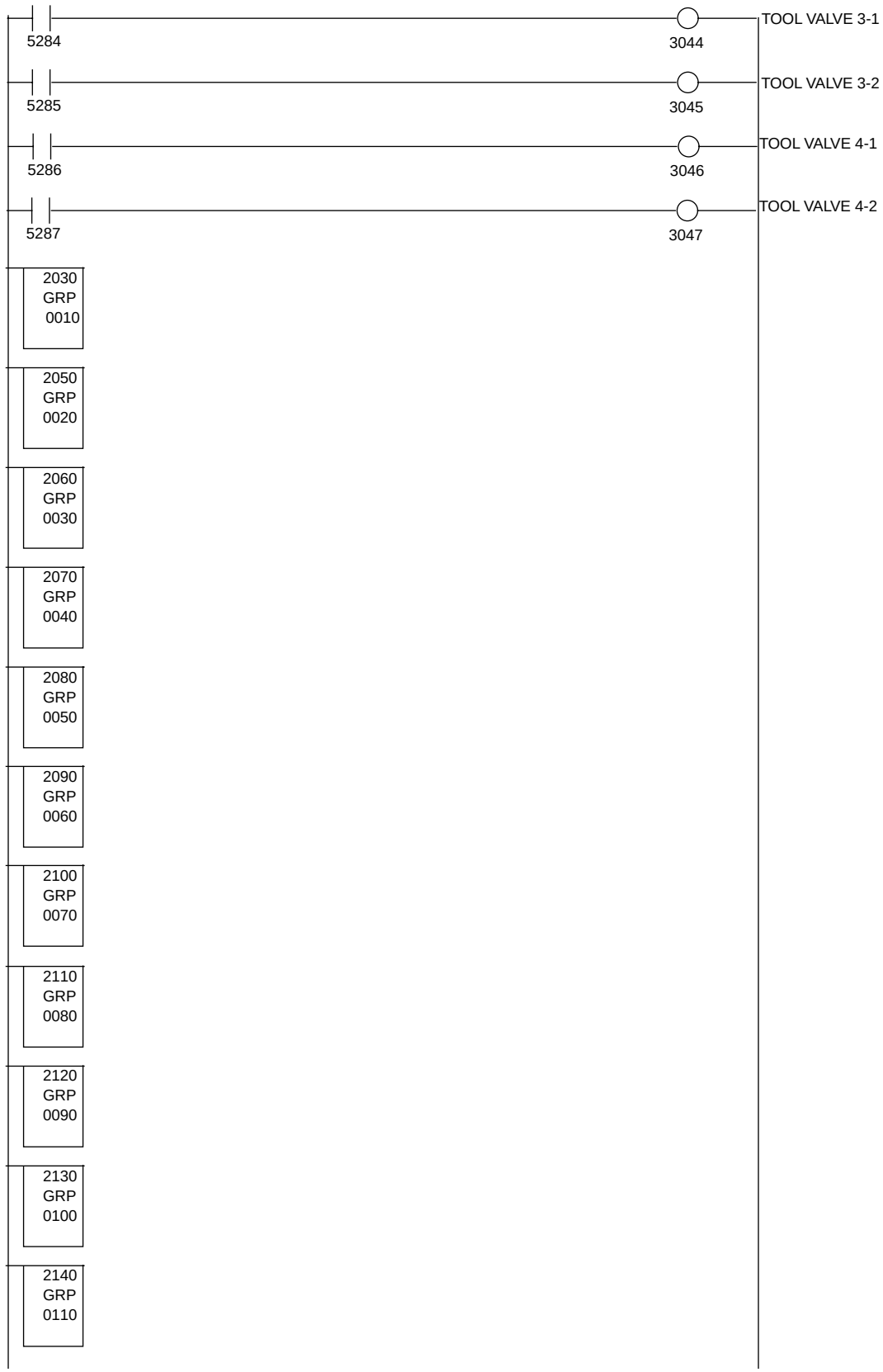

5270
5271
7052
7050
WORK INSTRUCTION
7050
5270
4170
WORK START RESPONSE : 1
5271
5271
4171
WORK END RESPONSE : 1
7050
5070
7050
WORK OPERATING
7051
7051
4172
WORK TIME MEASURE : 1
7050
5272
5070
7052
WORK INSTRUCTION
CONTINUING PROHIBIT

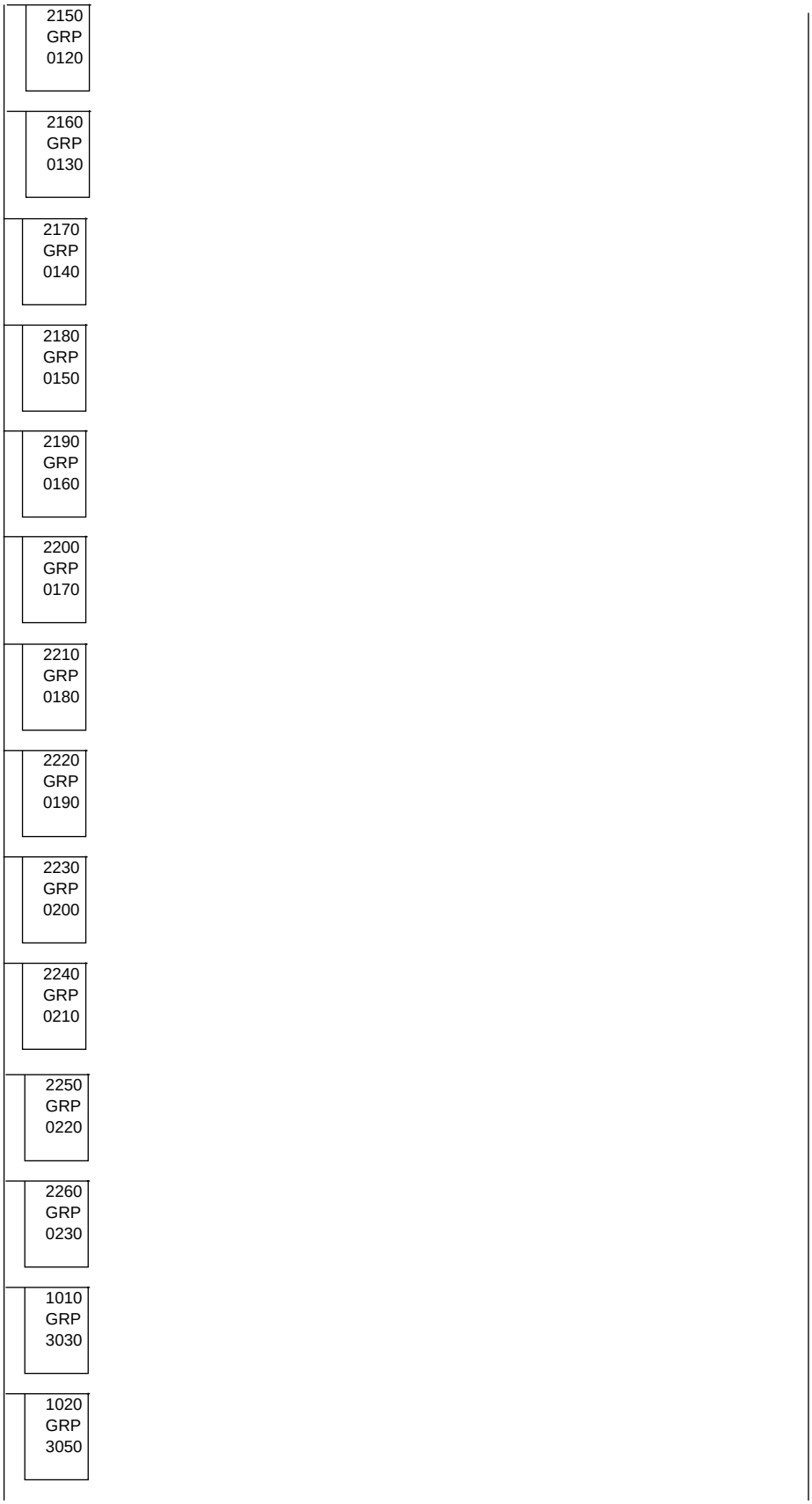
User Ladder Section

Signal connection specification and interface signals with system ladder are prepared prior to shipment. Including these signals, ladder programs can be edited.




5277
5276
2026
5053
7053
SHOCK SENSOR INPUT
2027
7054
AIR PRESSURE DECREASE INPUT
5070
3010
OPERATING
5073
3011
SERVO ON
5020
3012
TOP MASTER JOB
7020
5014
3013
ALARM/ERROR OCCURRENCE
5015
5016
3014
BATTERY ALARM
4057
5055
3015
REMOTE MODE SETTING
5054
3016
PLAY MODE SETTING
5053
3017
TEACH MODE SETTING
7034
3020
IN CUBE 1 R1
7035
3021
IN CUBE 2 R1
5137
3022
WORK HOME POSITION (IN CUBE 8 R1)
5081
3023
SEQUENCE EXECUTING R1
5280
3040
TOOL VALVE 1-1
5281
3041
TOOL VALVE 1-2
5282
3042
TOOL VALVE 2-1
5283
3043
TOOL VALVE 2-2


5284
3044
TOOL VALVE 3-1
5285
3045
TOOL VALVE 3-2
5286
3046
TOOL VALVE 4-1
5287
3047
TOOL VALVE 4-2
2030 GRP 0010
2050 GRP 0020
2060 GRP 0030
2070 GRP 0040
2080 GRP 0050
2090 GRP 0060
2100 GRP 0070
2110 GRP 0080
2120 GRP 0090
2130 GRP 0100
2140 GRP 0110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0120
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GRP
0130
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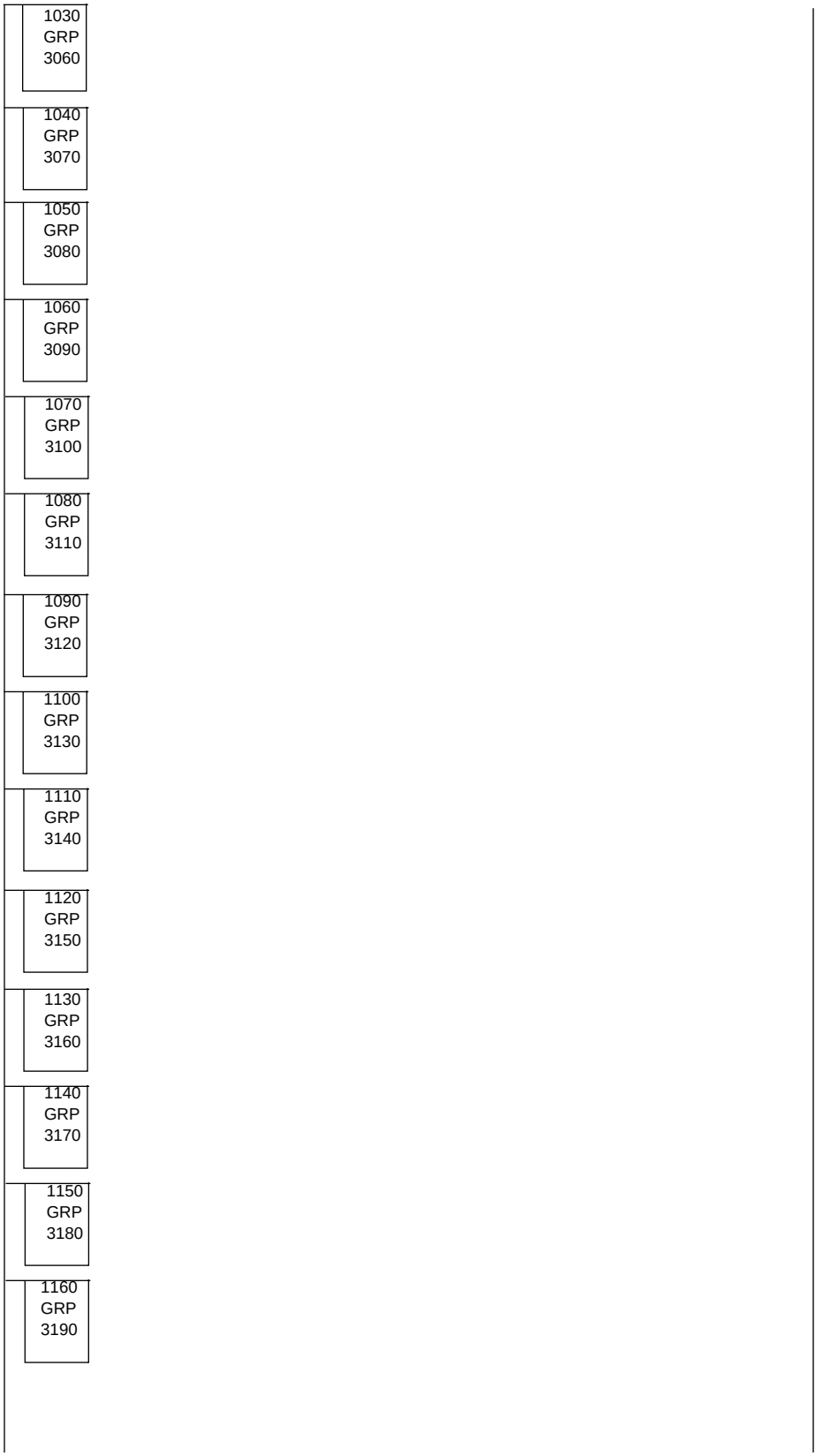
GRP
0140
2180
GRP
0150
2190
GRP
0160
2200
GRP
0170
2210
GRP
0180
2220
GRP
0190
2230
GRP
0200
2240
GRP
0210
2250
GRP
0220
2260
GRP
0230
1010
GRP
3030
1020
GRP
3050


1030
GRP
3060
1040
GRP
3070
1050
GRP
3080
1060
GRP
3090
1070
GRP
3100
1080
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3110
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3120
1100
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3130
1110
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GRP
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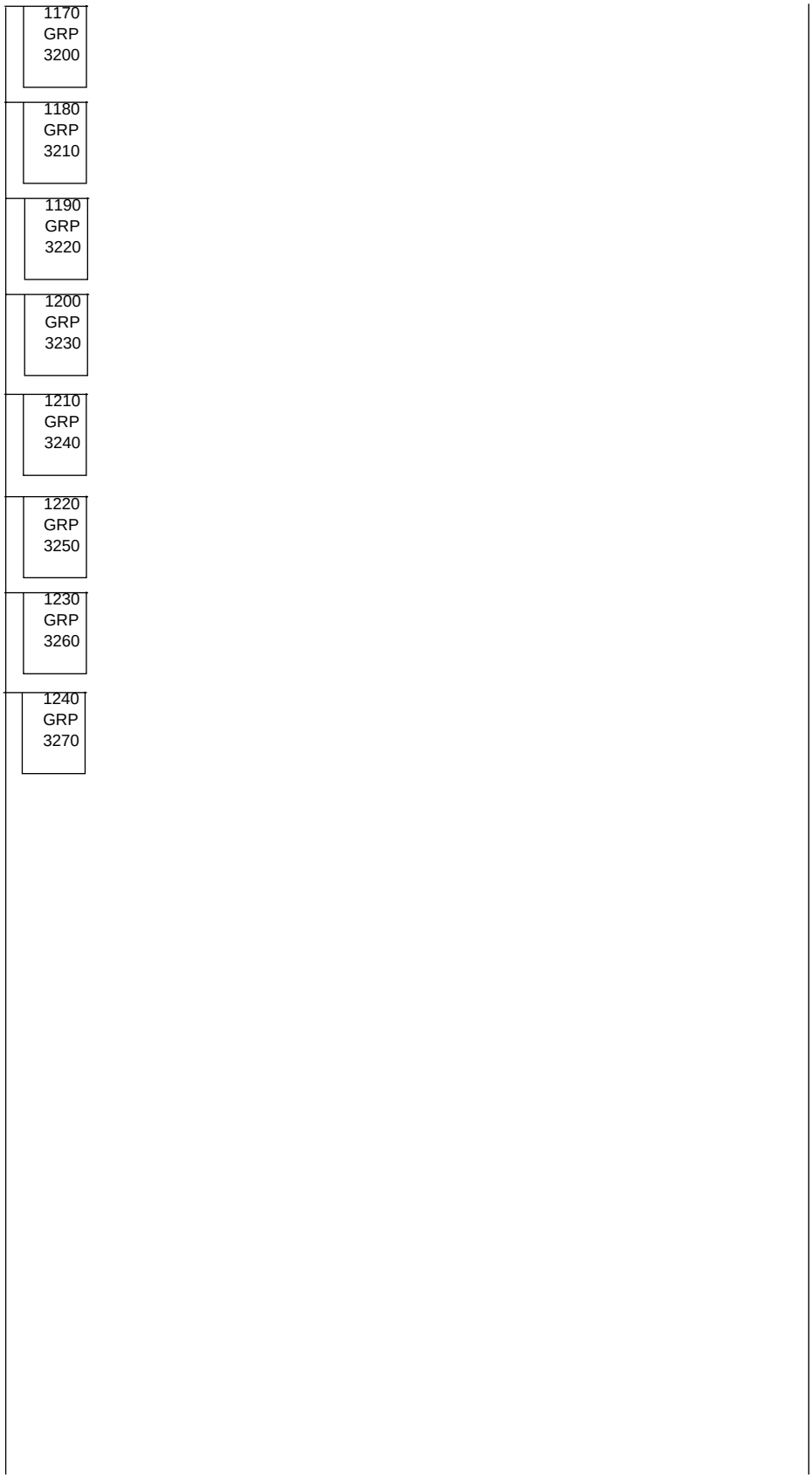
1150
GRP
3180
1160
GRP
3190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GRP
3200
1180
GRP
3210
1190
GRP
3220
1200
GRP
3230
1210
GRP
3240
1220
GRP
3250
1230
GRP
3260
1240
GRP
3270

■ I/O ALARM

	Alarm No.	Register No.	I/O Alarm Message
System Section			
	9000	00	AIR PRESSURE LOWERED
	9010	01	
	9020	02	
	9030	03	
	9040	04	
	9050	05	
	9060	06	
	9070	07	
	9080	08	
	9090	09	
	9100	10	
	9110	11	
	9120	12	
	9130	13	
	9140	14	
	9150	15	
	9160	16	
	9170	17	
	9180	18	
	9190	19	
	9200	20	
	9210	21	
	9220	22	
	9230	23	
User Section			
	9240	24	
	9250	25	
	9260	26	
	9270	27	
	9280	28	
	9290	29	
	9300	30	
	9310	31	

■ I/O Message

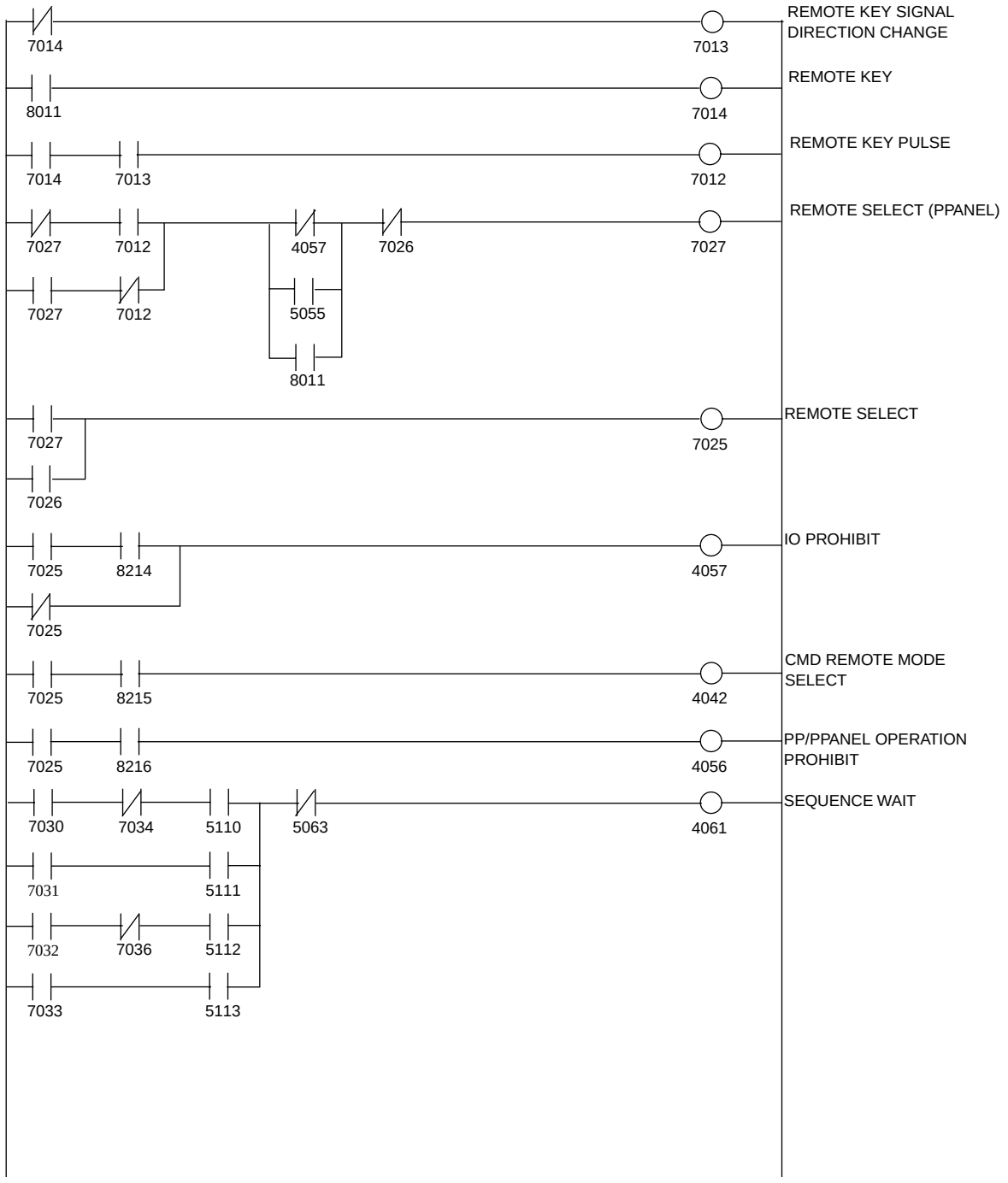
	Register No.	I/O Message
System Section		
	00	TOOL SHOCK SENSOR WORKING
	01	TOOL SHOCK SENSOR INP. RELEASING
	02	AIR PRESSURE LOWERING
	03	
	04	
	05	
	06	
	07	
	08	
	09	
	10	
	11	
	12	
	13	
	14	
	15	
	16	
	17	
	18	
	19	
	20	
	21	
	22	
	23	
User Section		
	24	
	25	
	26	
	27	
	28	
	29	
	30	
	31	

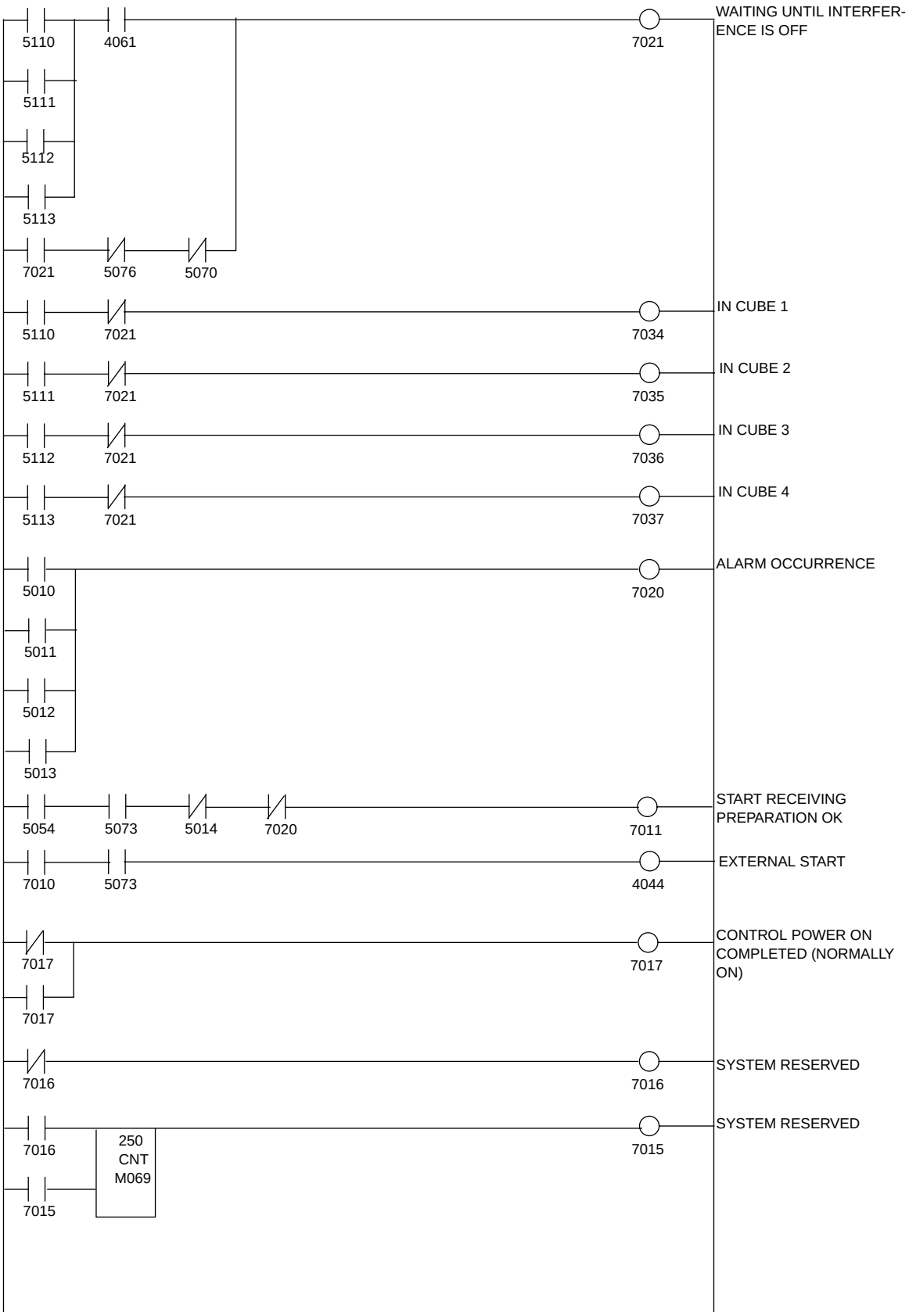
1.13.6 Spot Welding

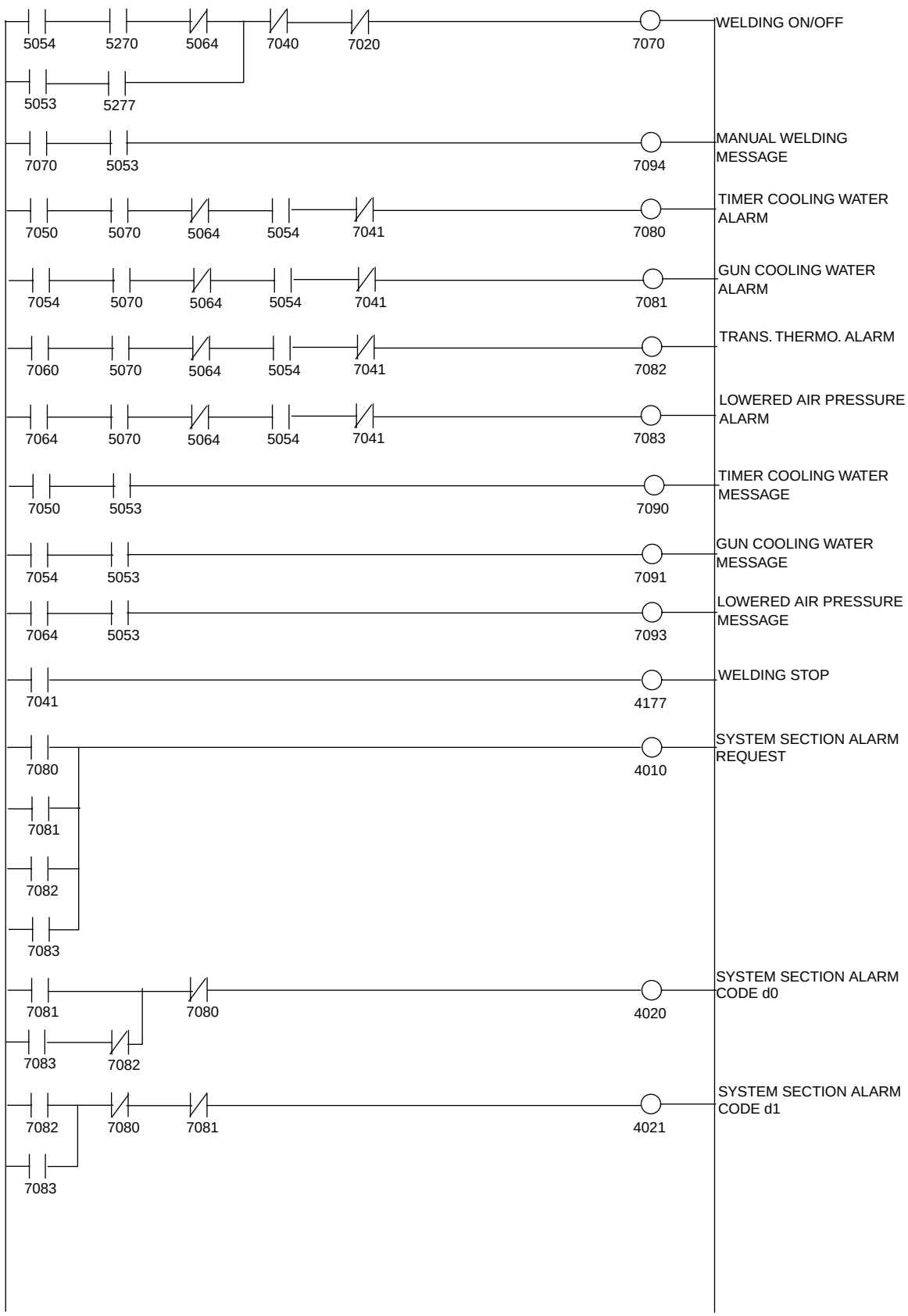
■ Ladder Program List

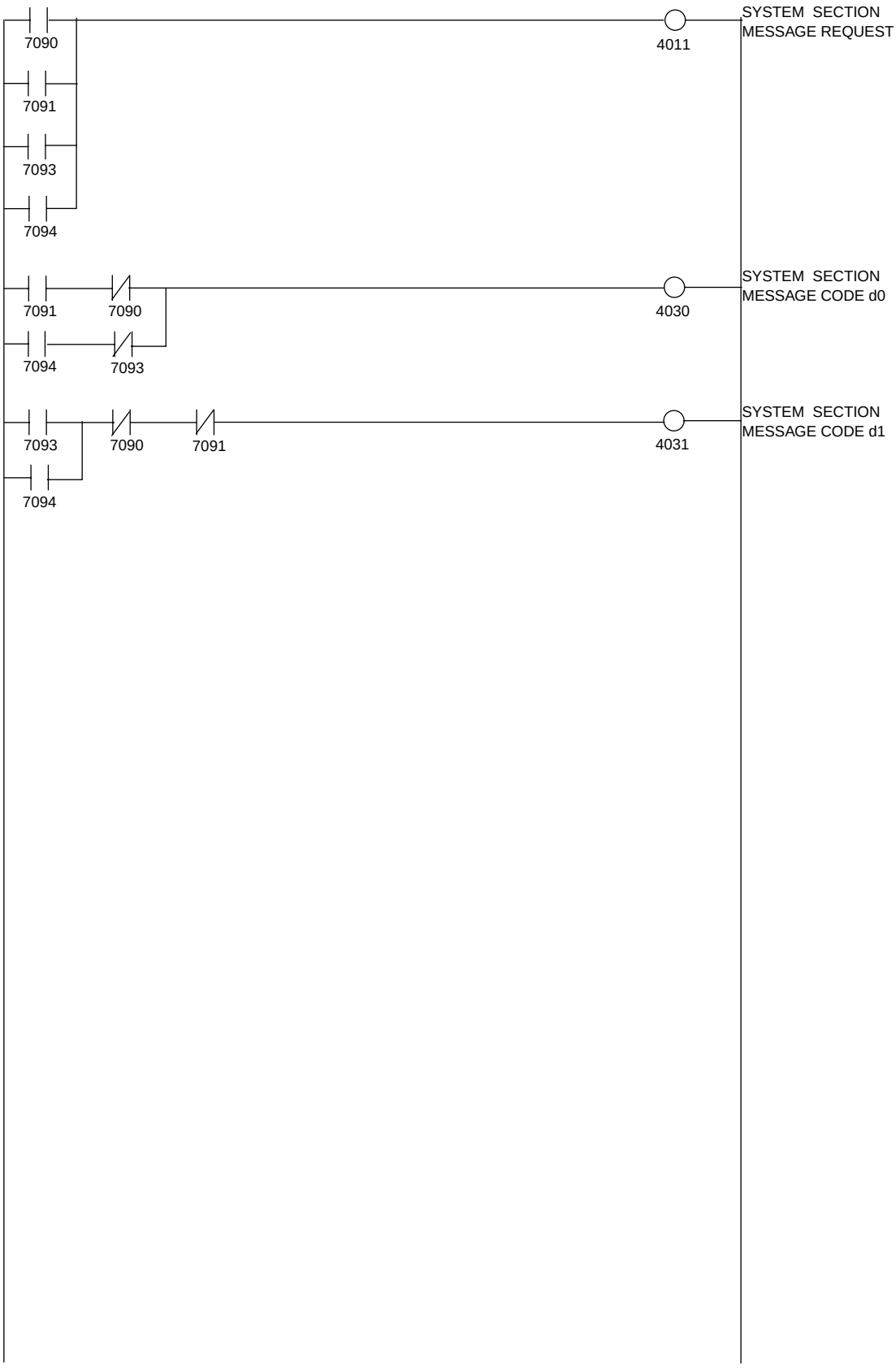
System Ladder Section

Standard ladders are prepared for each application prior to shipment. Ladder programs cannot be edited.



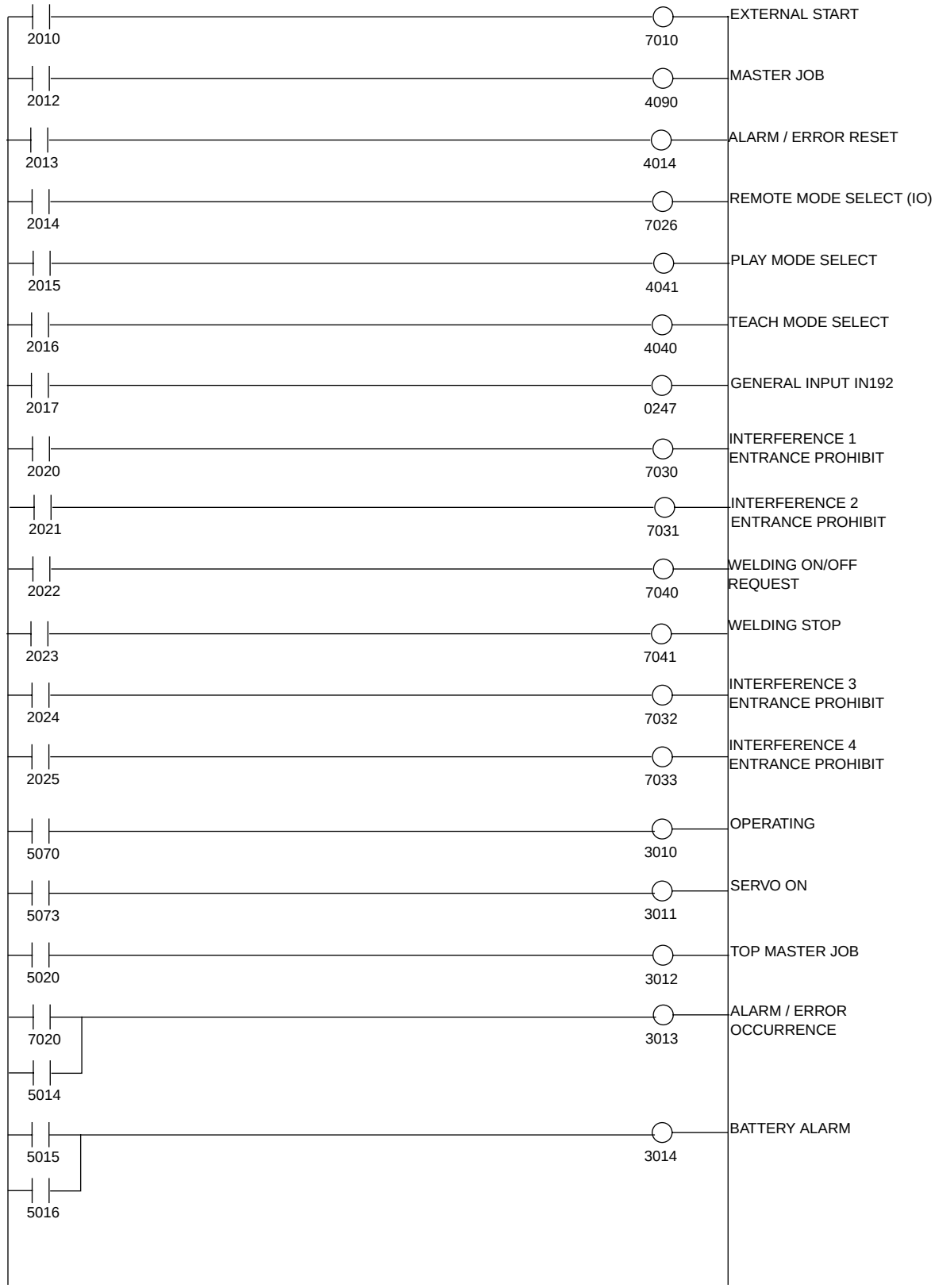

5110
4061
7021
WAITING UNTIL INTERFERENCE IS OFF
5111
5112
5113
7021
5076
5070
5110
7021
7034
IN CUBE 1
5111
7021
7035
IN CUBE 2
5112
7021
7036
IN CUBE 3
5113
7021
7037
IN CUBE 4
5010
7020
ALARM OCCURRENCE
5011
5012
5013
5054
5073
5014
7020
7011
START RECEIVING PREPARATION OK
7010
5073
4044
EXTERNAL START
7017
7017
7017
CONTROL POWER ON COMPLETED (NORMALLY ON)
7016
7016
SYSTEM RESERVED
7016
250
CNT
M069
7015
7015
SYSTEM RESERVED

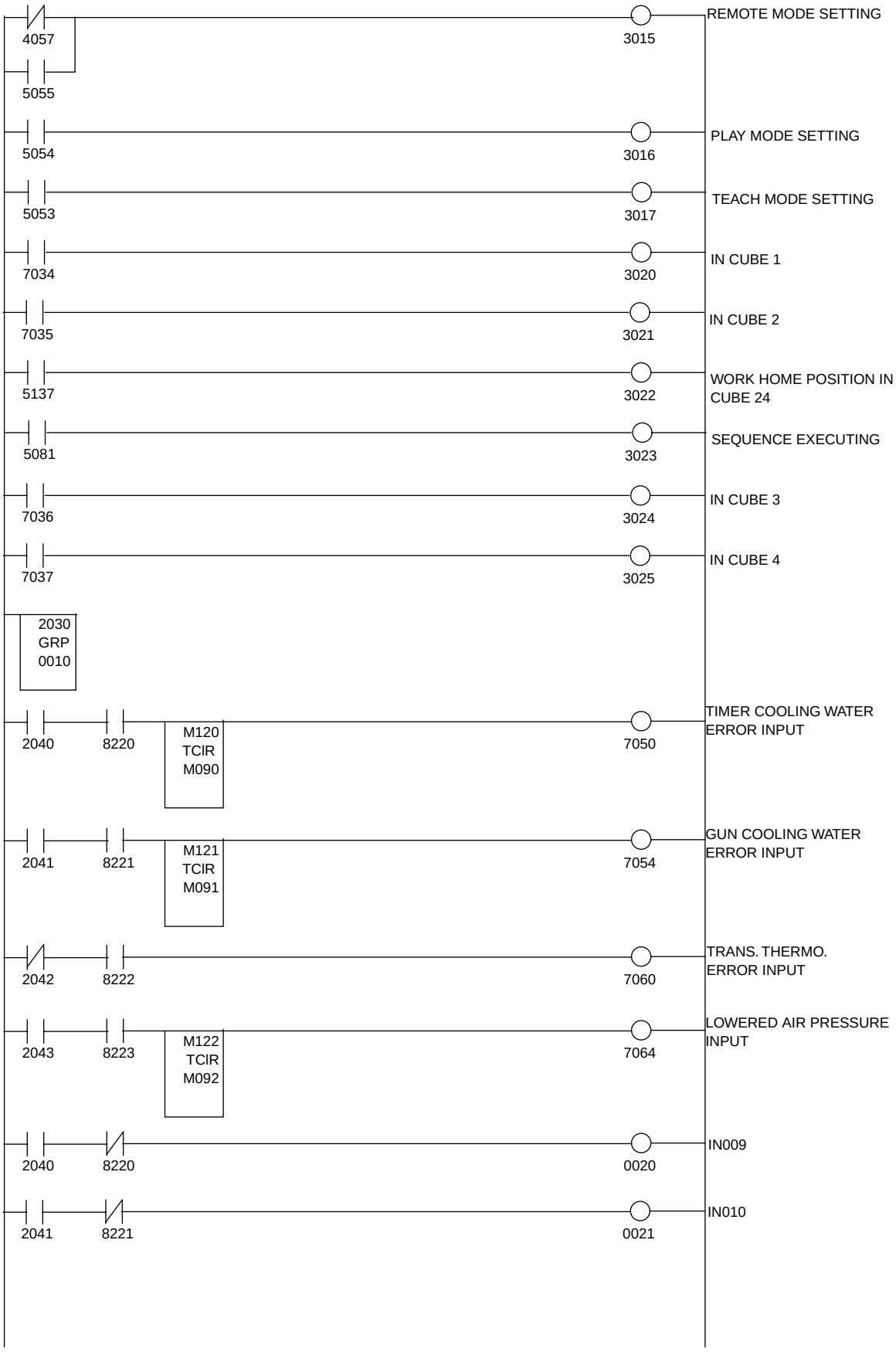

5054
5270
5064
7040
7020
7070
WELDING ON/OFF
5053
5277
7070
5053
7094
MANUAL WELDING MESSAGE
7050
5070
5064
5054
7041
7080
TIMER COOLING WATER ALARM
7054
5070
5064
5054
7041
7081
GUN COOLING WATER ALARM
7060
5070
5064
5054
7041
7082
TRANS. THERMO. ALARM
7064
5070
5064
5054
7041
7083
LOWERED AIR PRESSURE ALARM
7050
5053
7090
TIMER COOLING WATER MESSAGE
7054
5053
7091
GUN COOLING WATER MESSAGE
7064
5053
7093
LOWERED AIR PRESSURE MESSAGE
7041
4177
WELDING STOP
7080
4010
SYSTEM SECTION ALARM REQUEST
7081
7082
7083
7081
7080
4020
SYSTEM SECTION ALARM CODE d0
7083
7082
7082
7080
7081
4021
SYSTEM SECTION ALARM CODE d1
7083

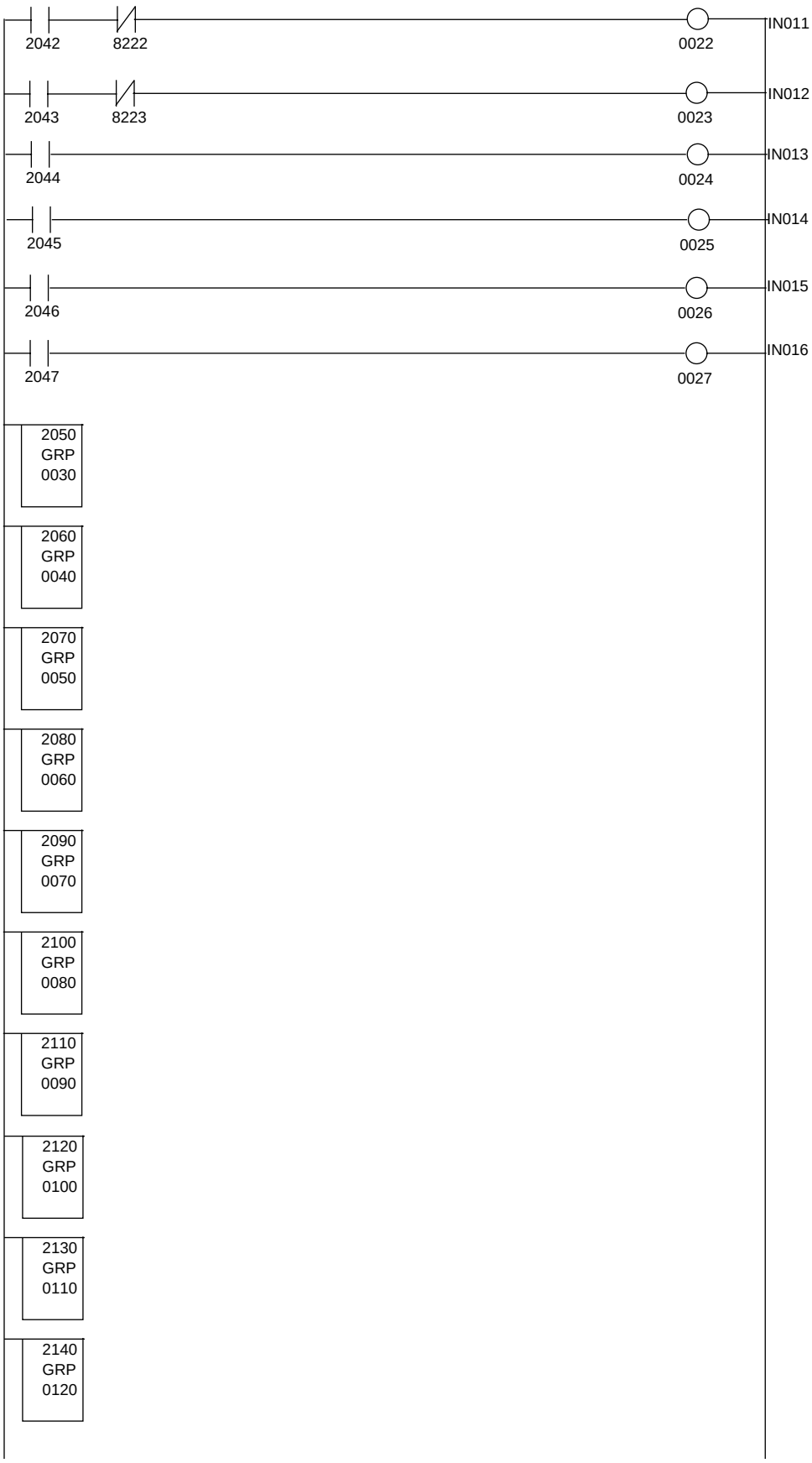

7090
7091
7093
7094
4011
SYSTEM SECTION
MESSAGE REQUEST
7091
7090
7094
7093
4030
SYSTEM SECTION
MESSAGE CODE d0
7093
7090
7091
7094
4031
SYSTEM SECTION
MESSAGE CODE d1

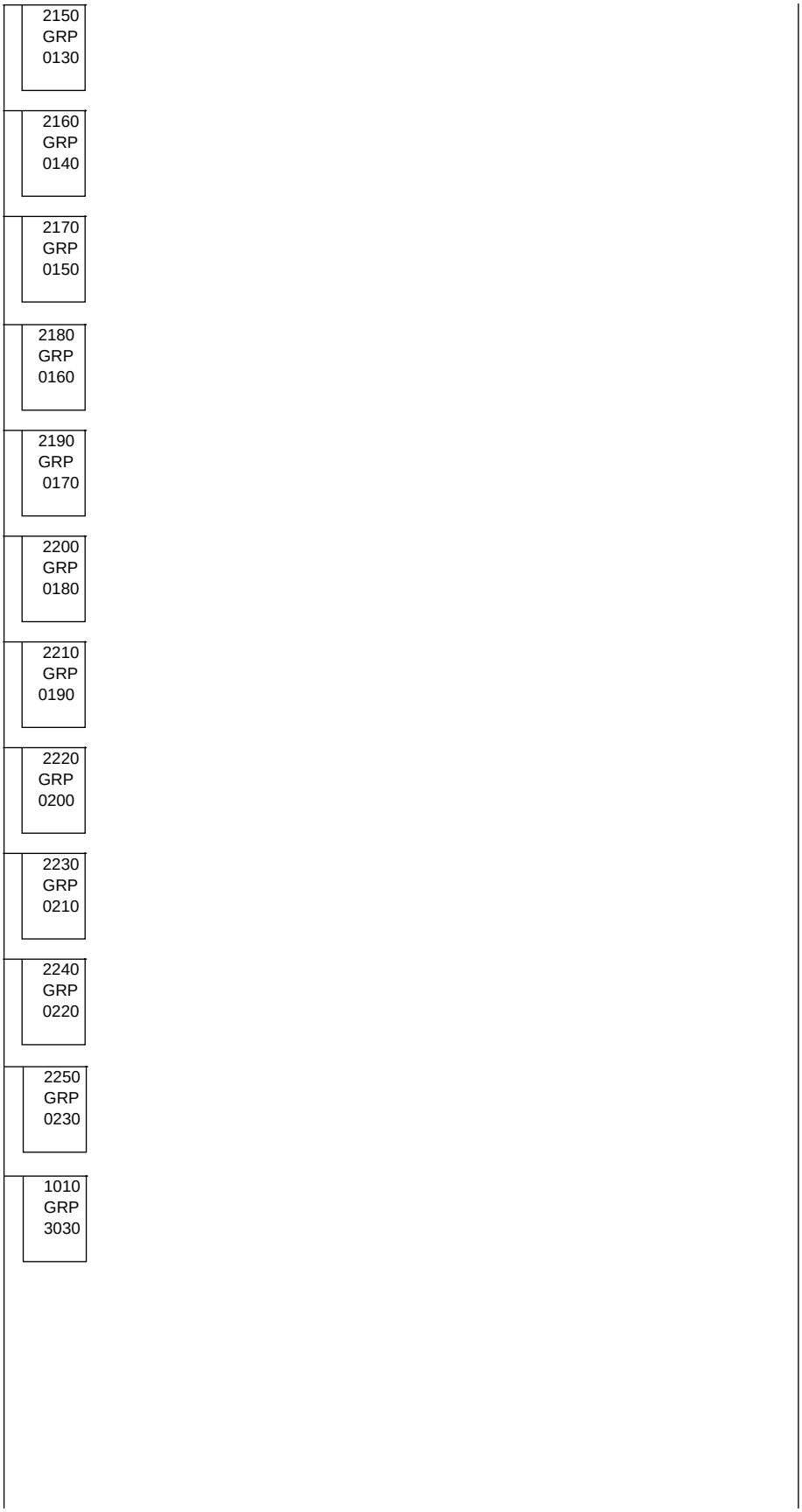
User Ladder Section

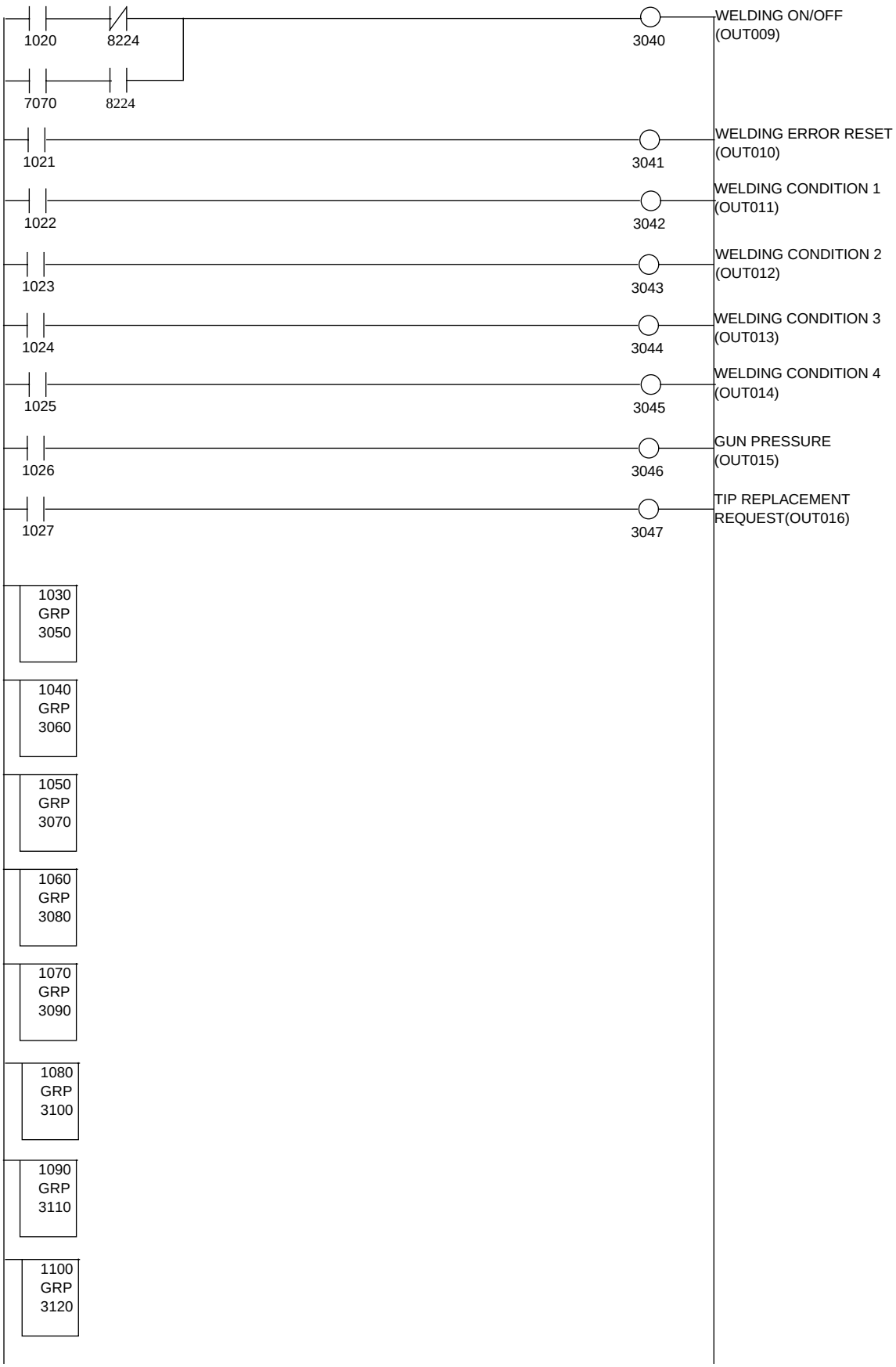
Signal connection specification and interface signals with system ladder are prepared prior to shipment. Including these signals, ladder programs can be edited.

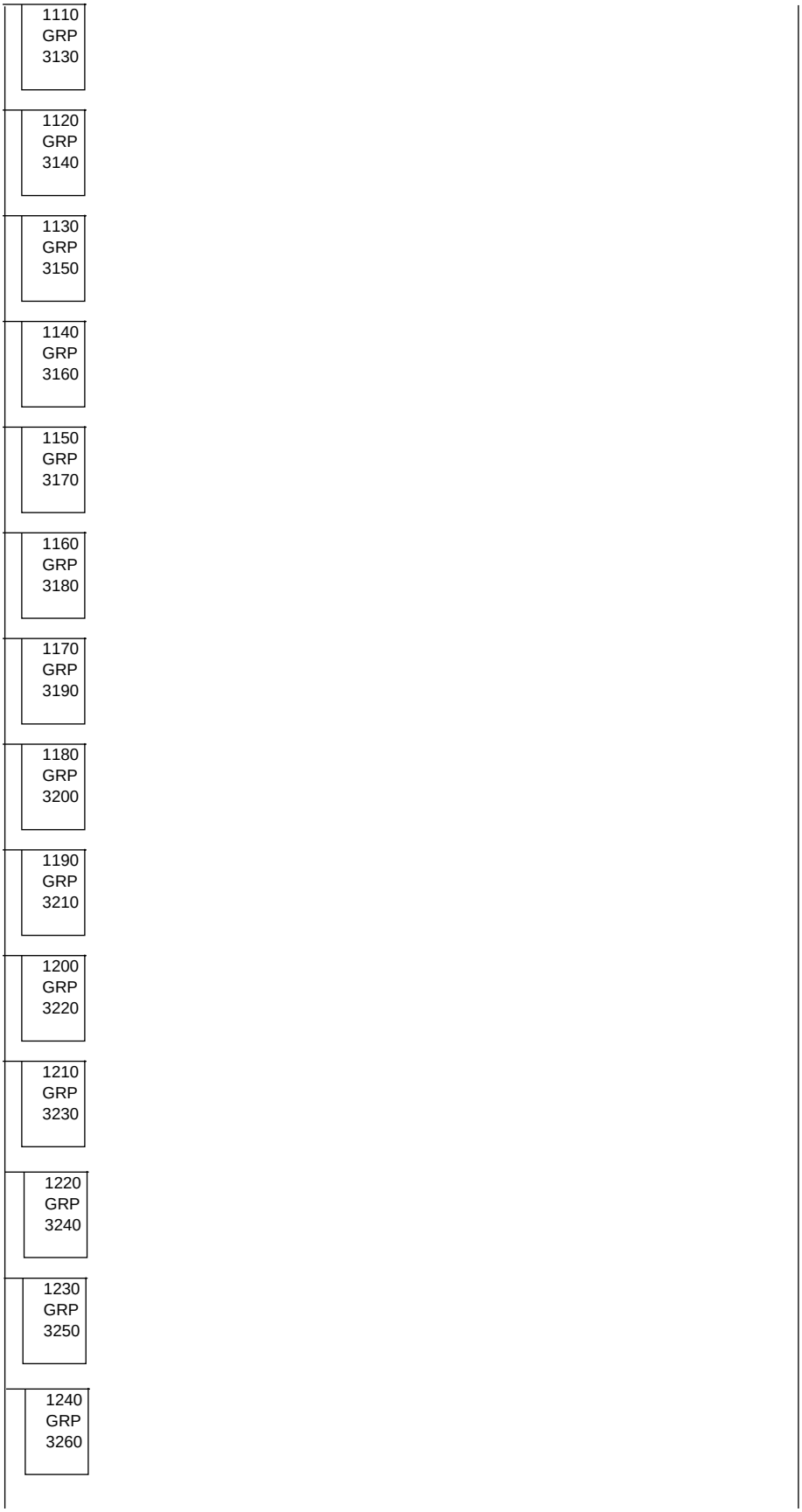



4057
5055
3015
REMOTE MODE SETTING
5054
3016
PLAY MODE SETTING
5053
3017
TEACH MODE SETTING
7034
3020
IN CUBE 1
7035
3021
IN CUBE 2
5137
3022
WORK HOME POSITION IN CUBE 24
5081
3023
SEQUENCE EXECUTING
7036
3024
IN CUBE 3
7037
3025
IN CUBE 4
2030 GRP 0010
2040
8220
M120 TCIR M090
7050
TIMER COOLING WATER ERROR INPUT
2041
8221
M121 TCIR M091
7054
GUN COOLING WATER ERROR INPUT
2042
8222
7060
TRANS. THERMO. ERROR INPUT
2043
8223
M122 TCIR M092
7064
LOWERED AIR PRESSURE INPUT
2040
8220
0020
IN009
2041
8221
0021
IN010


2042
8222
0022
IN011
2043
8223
0023
IN012
2044
0024
IN013
2045
0025
IN014
2046
0026
IN015
2047
0027
IN016
2050
GRP
0030
2060
GRP
0040
2070
GRP
0050
2080
GRP
0060
2090
GRP
0070
2100
GRP
0080
2110
GRP
0090
2120
GRP
0100
2130
GRP
0110
2140
GRP
0120


2150
GRP
0130
2160
GRP
0140
2170
GRP
0150
2180
GRP
0160
2190
GRP
0170
2200
GRP
0180
2210
GRP
0190
2220
GRP
0200
2230
GRP
0210
2240
GRP
0220
2250
GRP
0230
1010
GRP
3030


1020
8224
7070
8224
3040
WELDING ON/OFF
(OUT009)
1021
3041
WELDING ERROR RESET
(OUT010)
1022
3042
WELDING CONDITION 1
(OUT011)
1023
3043
WELDING CONDITION 2
(OUT012)
1024
3044
WELDING CONDITION 3
(OUT013)
1025
3045
WELDING CONDITION 4
(OUT014)
1026
3046
GUN PRESSURE
(OUT015)
1027
3047
TIP REPLACEMENT
REQUEST(OUT016)
1030
GRP
3050
1040
GRP
3060
1050
GRP
3070
1060
GRP
3080
1070
GRP
3090
1080
GRP
3100
1090
GRP
3110
1100
GRP
3120


1110
GRP
3130
1120
GRP
3140
1130
GRP
3150
1140
GRP
3160
1150
GRP
3170
1160
GRP
3180
1170
GRP
3190
1180
GRP
3200
1190
GRP
3210
1200
GRP
3220
1210
GRP
3230
1220
GRP
3240
1230
GRP
3250
1240
GRP
3260

■ I/O Alarm

	Alarm No.	Register No.	I/O Alarm Message
System Section			
	9000	00	ERR OF WELD TIMER COOLING WATER
	9010	01	ERROR OF GUN COOLING WATER
	9020	02	ERROR IN TRANSTHERMO OF GUN
	9030	03	AIR PRESSURE LOWERED
	9040	04	
	9050	05	
	9060	06	
	9070	07	
	9080	08	
	9090	09	
	9100	10	
	9110	11	
	9120	12	
	9130	13	
	9140	14	
	9150	15	
	9160	16	
	9170	17	
	9180	18	
	9190	19	
	9200	20	
	9210	21	
	9220	22	
	9230	23	
User Section			
	9240	24	
	9250	25	
	9260	26	
	9270	27	
	9280	28	
	9290	29	
	9300	30	
	9310	31	

■ I/O Message

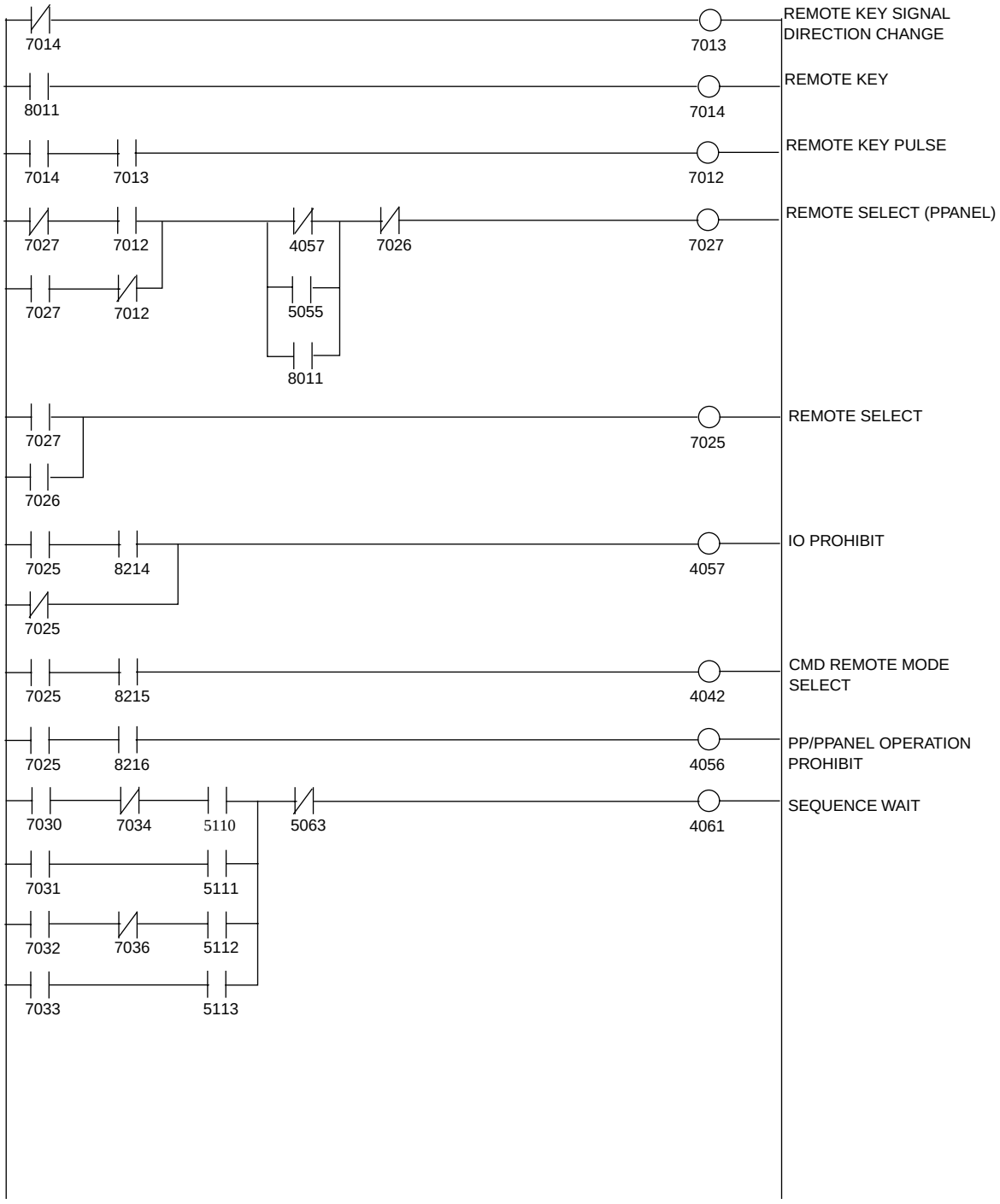
	Register No.	I/O Message
System Section		
	00	ERR OF WELD TIMER COOLING WATER
	01	ERROR OF GUN COOLING WATER
	02	AIR PRESSURE LOWERING
	03	AVAILABLE TO MANUAL SPOT WELDING
	04	
	05	
	06	
	07	
	08	
	09	
	10	
	11	
	12	
	13	
	14	
	15	
	16	
	17	
	18	
	19	
	20	
	21	
	22	
	23	
User Section		
	24	
	25	
	26	
	27	
	28	
	29	
	30	
	31	

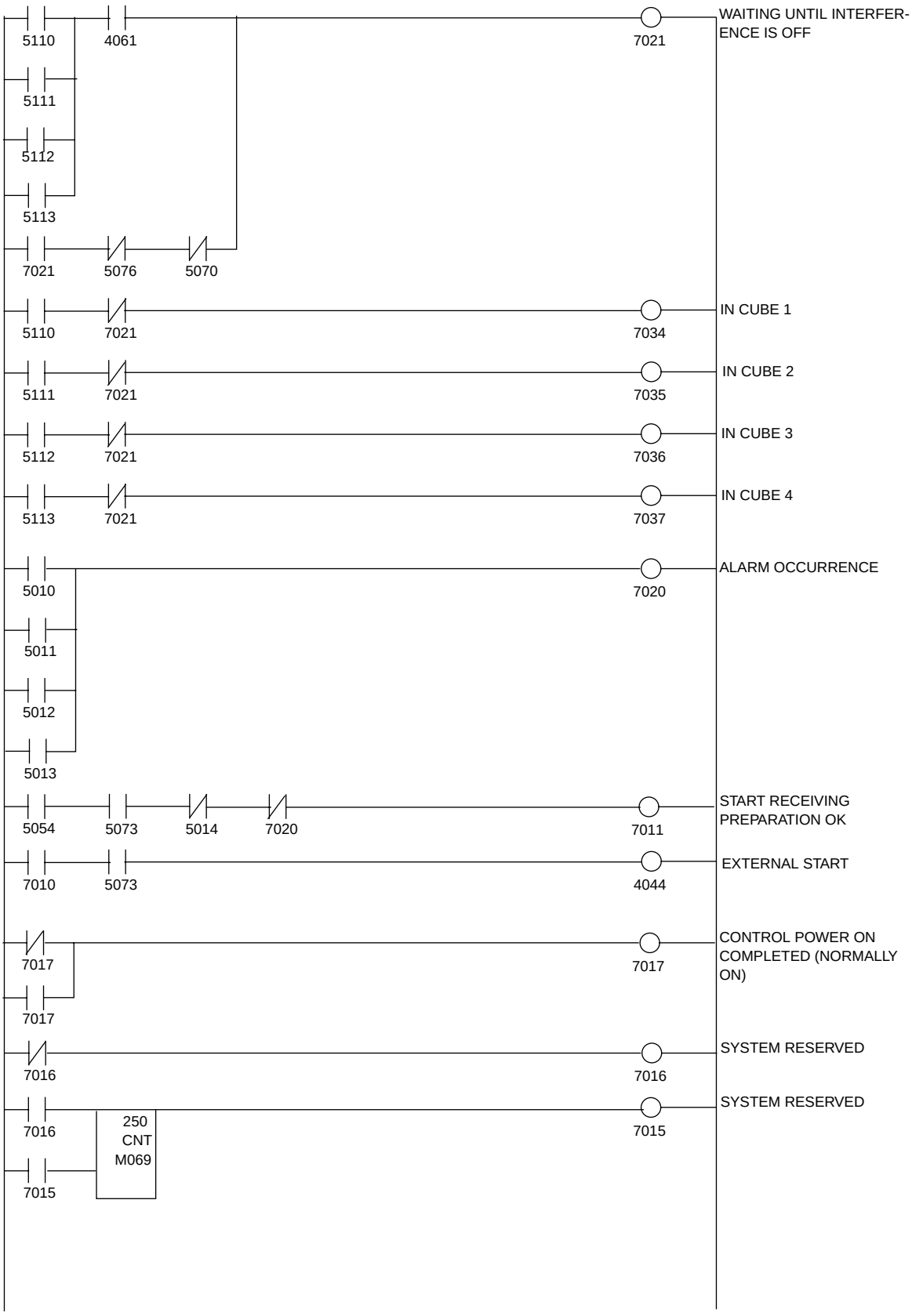
1.13.7 General-Purpose Applications

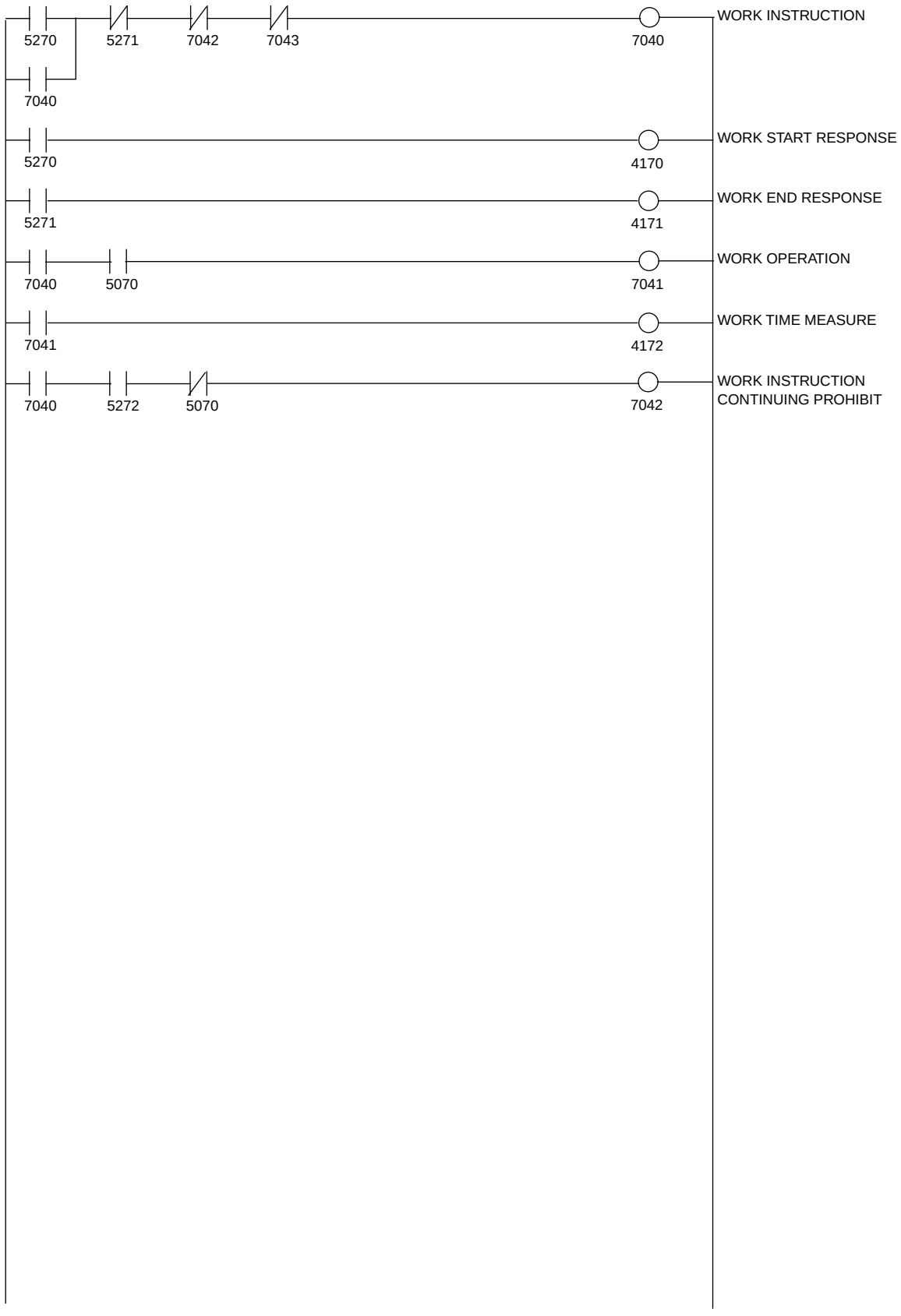
■ LADDER PROGRAM LIST

System Ladder Section

Standard ladders are prepared for each application prior to shipment. Ladder programs cannot be edited.

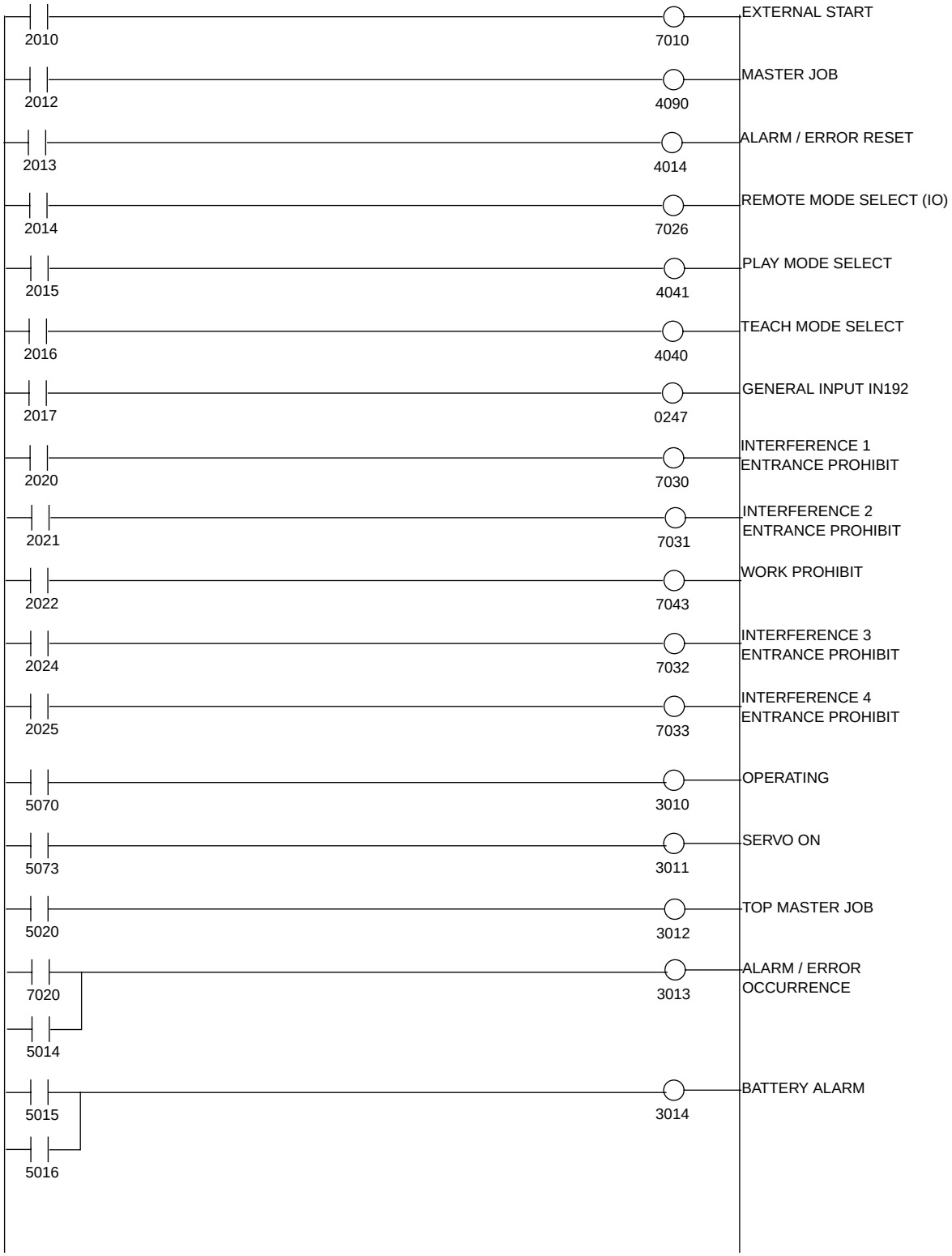


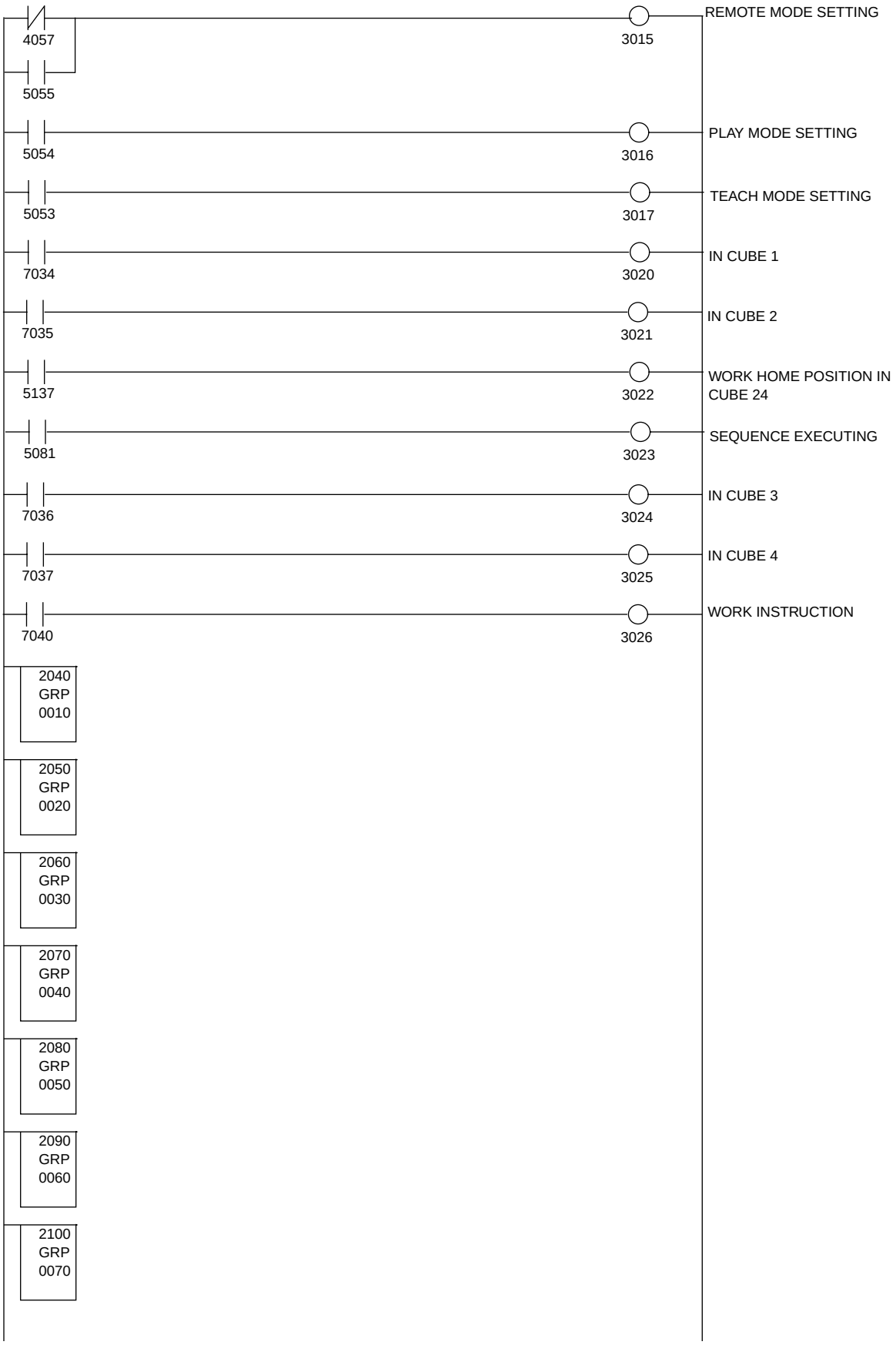

5110
4061
5111
5112
5113
7021
WAITING UNTIL INTERFERENCE IS OFF
7021
5076
5070
5110
7021
IN CUBE 1
7034
5111
7021
IN CUBE 2
7035
5112
7021
IN CUBE 3
7036
5113
7021
IN CUBE 4
7037
5010
ALARM OCCURRENCE
7020
5011
5012
5013
5054
5073
5014
7020
START RECEIVING PREPARATION OK
7011
7010
5073
EXTERNAL START
4044
7017
CONTROL POWER ON COMPLETED (NORMALLY ON)
7017
7017
7016
SYSTEM RESERVED
7016
7016
SYSTEM RESERVED
7015
250
CNT
M069
7015

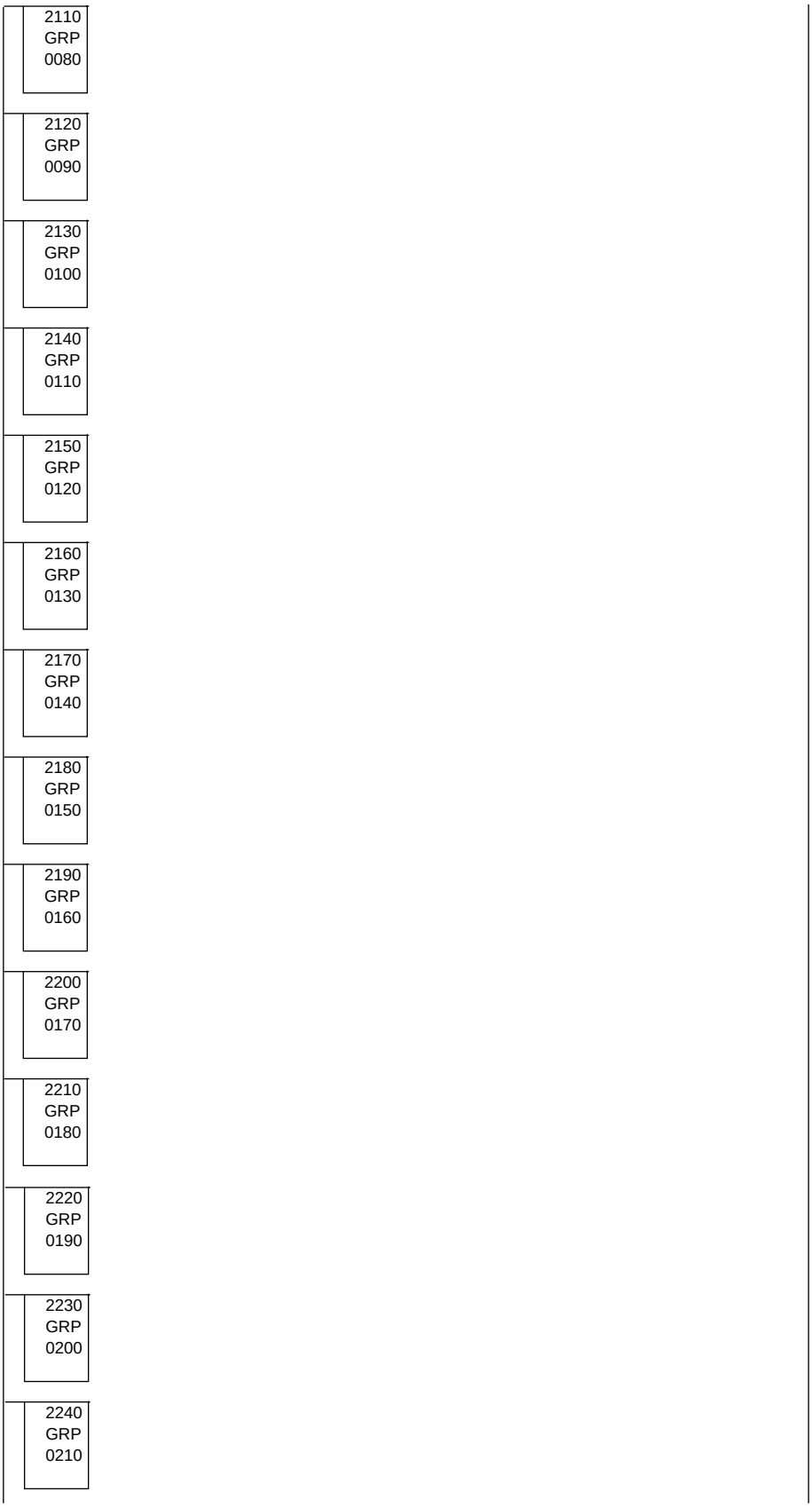

5270
5271
7042
7043
7040
WORK INSTRUCTION
7040
5270
4170
WORK START RESPONSE
5271
4171
WORK END RESPONSE
7040
5070
7041
WORK OPERATION
7041
4172
WORK TIME MEASURE
7040
5272
5070
7042
WORK INSTRUCTION
CONTINUING PROHIBIT

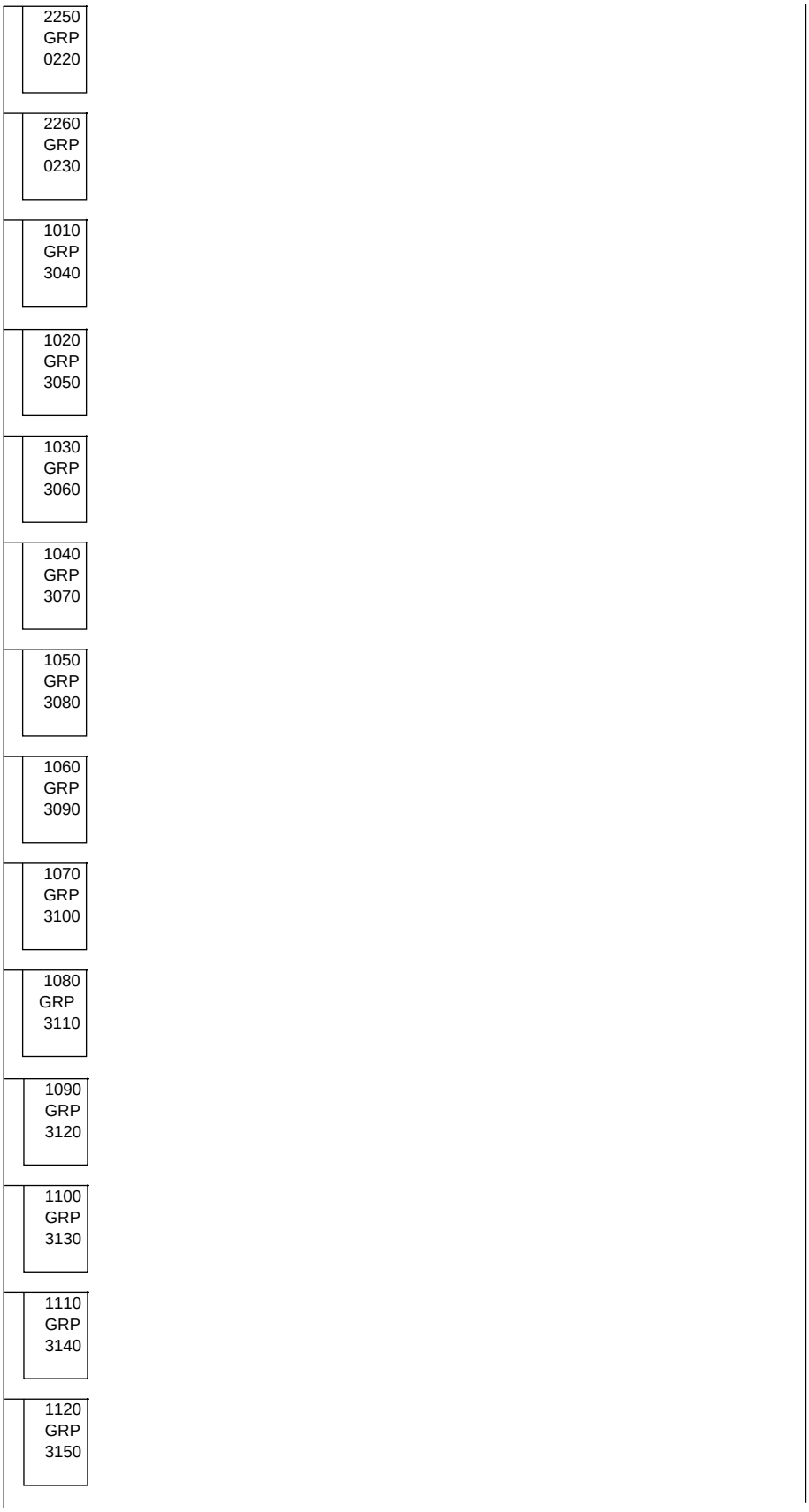
User Ladder Section

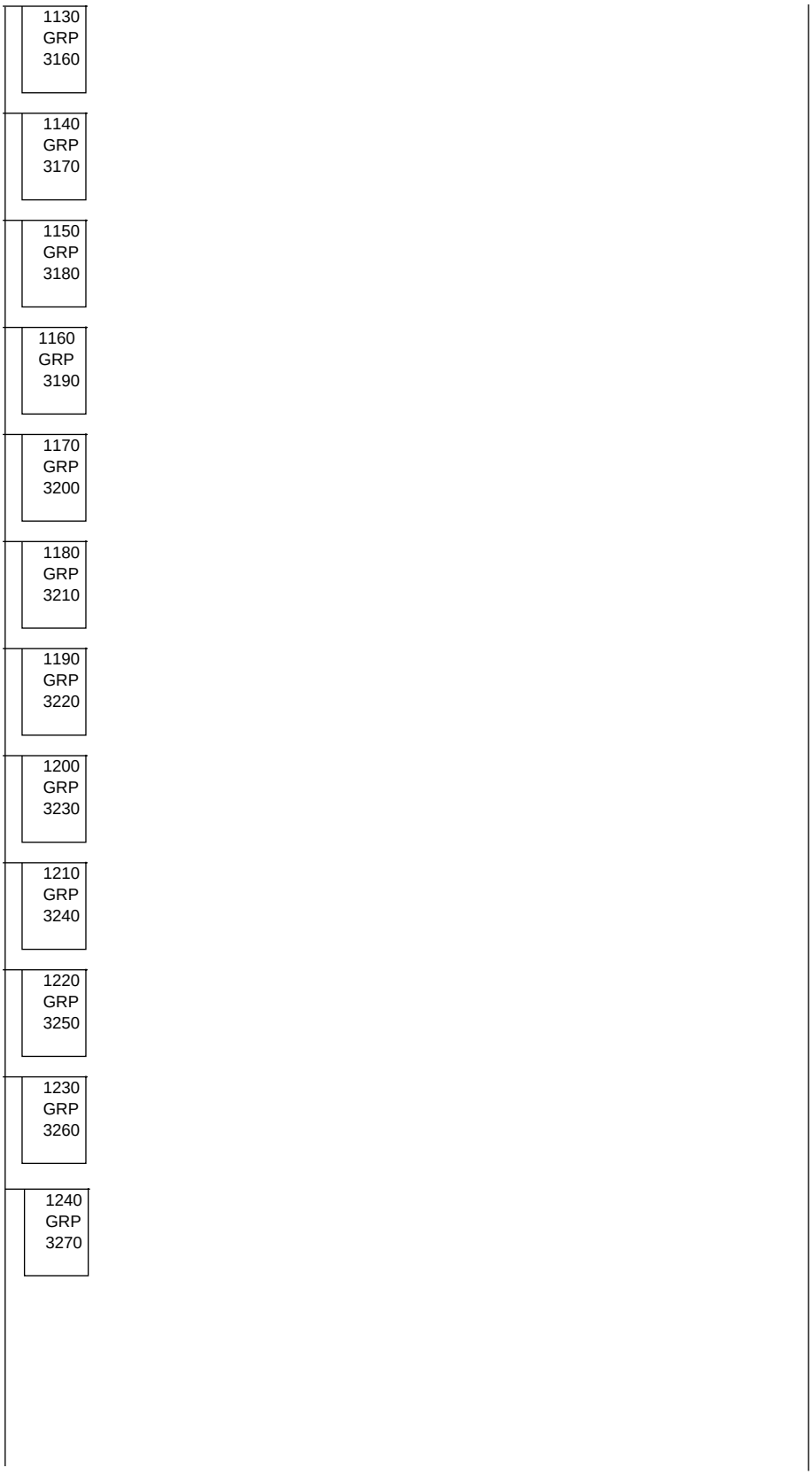
Signal connection specification and interface signals with system ladder are prepared prior to shipment. Including these signals, ladder programs can be edited.




4057
5055
3015
REMOTE MODE SETTING
5054
3016
PLAY MODE SETTING
5053
3017
TEACH MODE SETTING
7034
3020
IN CUBE 1
7035
3021
IN CUBE 2
5137
3022
WORK HOME POSITION IN CUBE 24
5081
3023
SEQUENCE EXECUTING
7036
3024
IN CUBE 3
7037
3025
IN CUBE 4
7040
3026
WORK INSTRUCTION
2040 GRP 0010
2050 GRP 0020
2060 GRP 0030
2070 GRP 0040
2080 GRP 0050
2090 GRP 0060
2100 GRP 0070


2110
GRP
0080
2120
GRP
0090
2130
GRP
0100
2140
GRP
0110
2150
GRP
0120
2160
GRP
0130
2170
GRP
0140
2180
GRP
0150
2190
GRP
0160
2200
GRP
0170
2210
GRP
0180
2220
GRP
0190
2230
GRP
0200
2240
GRP
0210


2250
GRP
0220
2260
GRP
0230
1010
GRP
3040
1020
GRP
3050
1030
GRP
3060
1040
GRP
3070
1050
GRP
3080
1060
GRP
3090
1070
GRP
3100
1080
GRP
3110
1090
GRP
3120
1100
GRP
3130
1110
GRP
3140
1120
GRP
3150


1130
GRP
3160
1140
GRP
3170
1150
GRP
3180
1160
GRP
3190
1170
GRP
3200
1180
GRP
3210
1190
GRP
3220
1200
GRP
3230
1210
GRP
3240
1220
GRP
3250
1230
GRP
3260
1240
GRP
3270

■ I/O ALARM

	Alarm No.	Register No.	I/O Alarm Message
System Section			
	9000	00	
	9010	01	
	9020	02	
	9030	03	
	9040	04	
	9050	05	
	9060	06	
	9070	07	
	9080	08	
	9090	09	
	9100	10	
	9110	11	
	9120	12	
	9130	13	
	9140	14	
	9150	15	
	9160	16	
	9170	17	
	9180	18	
	9190	19	
	9200	20	
	9210	21	
	9220	22	
	9230	23	
User Section			
	9240	24	
	9250	25	
	9260	26	
	9270	27	
	9280	28	
	9290	29	
	9300	30	
	9310	31	

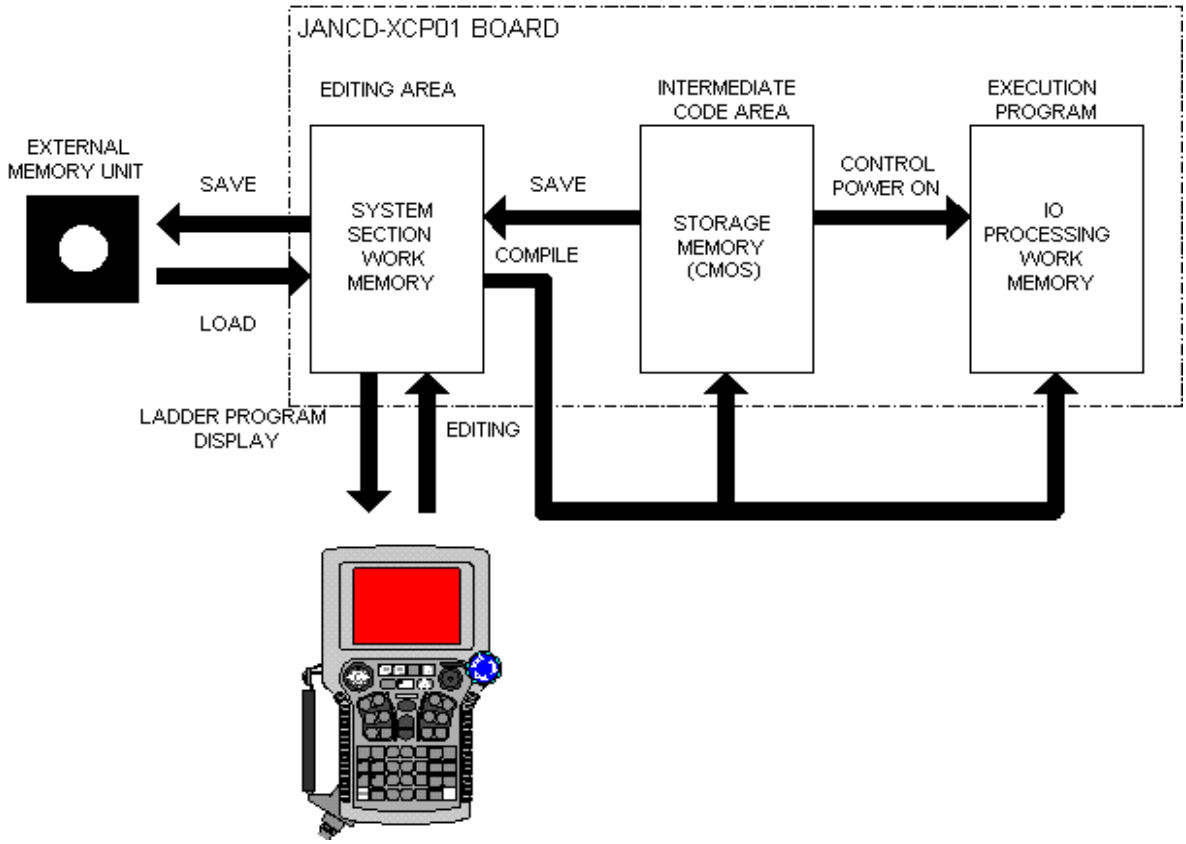
■ I/O MESSAGE

	Register No.	I/O Message
System Section		
	00	
	01	
	02	
	03	
	04	
	05	
	06	
	07	
	08	
	09	
	10	
	11	
	12	
	13	
	14	
	15	
	16	
	17	
	18	
	19	
	20	
	21	
	22	
	23	
User Section		
	24	
	25	
	26	
	27	
	28	
	29	
	30	
	31	

1.14 Editing Ladder Programs

1.14.1 Flow of Data By Ladder Programs

Flow of data in editing, storage, and execution areas by operation of ladder program is shown below.



NOTE

- Only the user ladder program can be edited. The system ladder program cannot be edited.
- When the system ladder program is changed, the ladder program from the external memory unit cannot be loaded.
- If control power is shut down while the ladder program is being edited, the edited ladder program is lost. The intact program remains in the execution area.
- During editing of ladder programs, “EDITING” is displayed on the upper right of the user section display. This indication appears only when the program in the editing area and that in the execution area do not match. Nothing is displayed after compilation of cancellation of editing when the programs in the two areas match.

1.14.2 Basic Operation

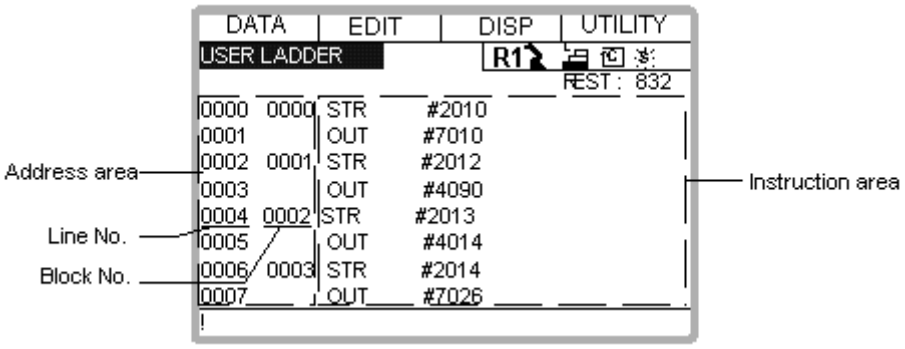
Ladder program is protected so that it cannot be easily changed. The following operations are authorized only to those who can input a user ID No (security:management mode).

Operation

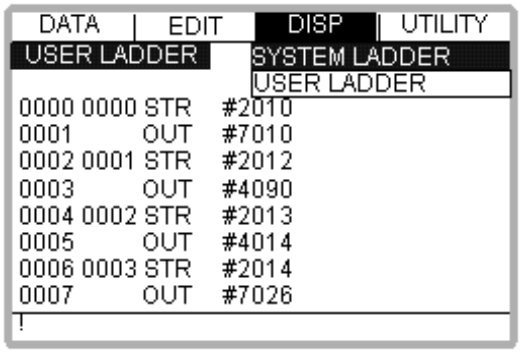
Select {I/O} from the top menu. ➡ Select {Ladder Program}*1 ➡ Edit Operation*2 ➡ Select {Data} under the menu. ➡ Select {Compile} ➡ Select [Yes]*3

Explanation

1 The C.I/O user section is displayed.

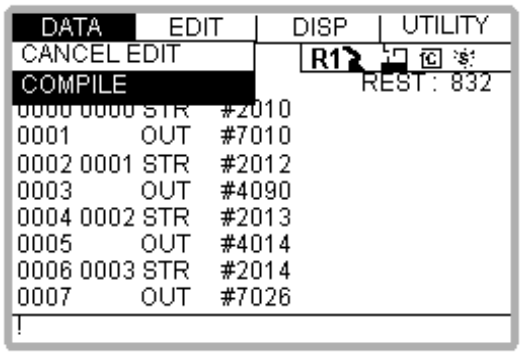


To confirm the system ladder program, press the PAGE KEY, or select [DISP] → [System Ladder] from under the menu.



2 Edit the ladder program. See " 1.14.3 Editing Operation " on the following pages. The system ladder program cannot be edited.

3 The edited ladder program is checked for syntax error. If no error is found, the new program is written into the execution area to run. If any error is found in the edited ladder program, the erroneous step is identified. In this case, the program stored in the execution area is left unchanged.



1.14.3 Editing Operation

The edit operation is divided into instruction registration (addition, change, and deletion) operation and the operand edit operation.

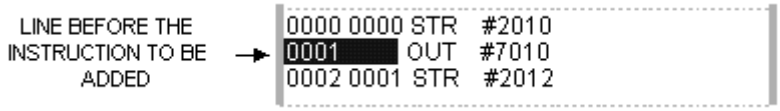
■ Inserting Instruction

Operation

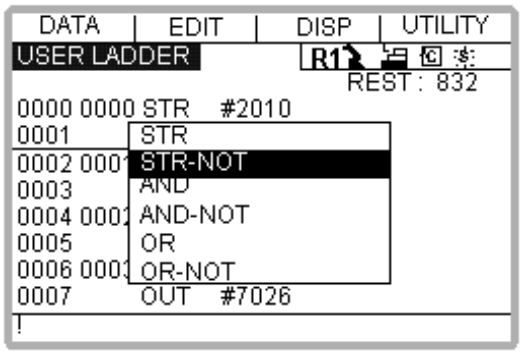
Move the cursor to the address area.*1 ➡ Select the line before the line you wish to add.*2 ➡ Select the instruction to be inserted.*3 ➡ Press [ADD]. ➡ Press [ENTER].*4

Explanation

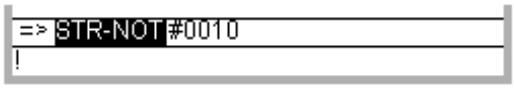
1



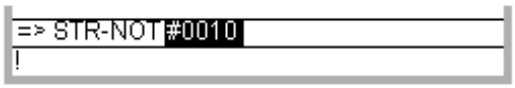
2 The instruction list dialog box is displayed. Move the cursor to the instruction list dialog, and the cursor in the address area becomes underlined.



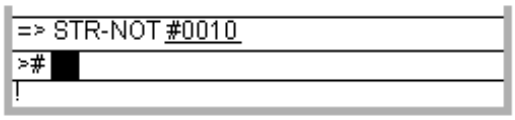
3 Move the cursor to the input buffer line instruction.



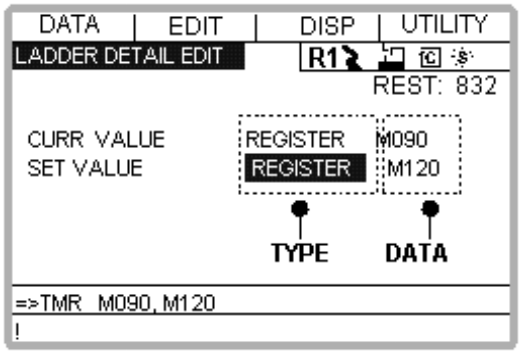
When there are more than two kinds of operand instructions, move the cursor in the instruction to and press [SELECT]. A detailed screen is displayed. When changing numeric data, move the cursor to the corrected data and press the [SHIFT] + [CURSOR KEY] simultaneously. The numeric data then increases and decreases.

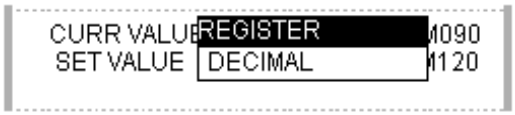


To directly input the numeric value, press [SELECT]. The input line is displayed, so input the data using the [NUMBER KEY] and press [ENTER].



- Instructions with Two or More Kinds of Operands
  The input line is displayed, so input the data using the [NUMBER KEY] and press [ENTER].
- Instructions with Two or More Kinds of Operands
  When changing the type of operand, move the cursor to the operand and press [SELECT] to select the operand type.

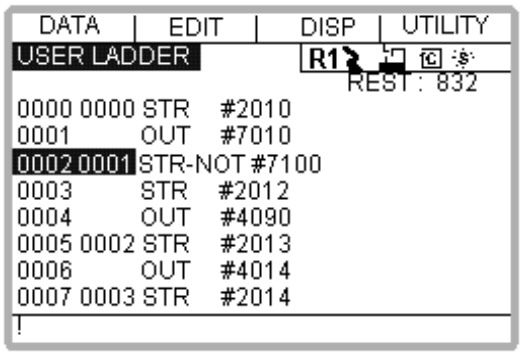




Move the cursor to the operand data and press [SELECT] to change the operand.

When the type of operand and data has been changed, press [ENTER]. The ladder detail edit display closes, and the ladder program display is shown.

4 When adding an instruction to the input buffer line
When adding an instruction just before the END instruction, do not press [ADD]. If there is a change, press [SELECT] in the instruction area, and repeat the numeric input operation.



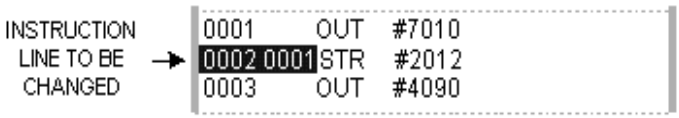
■ CHANGING INSTRUCTIONS

Operation

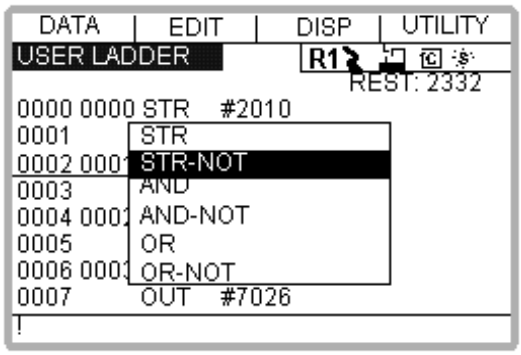
Move the cursor to the address area.*1 ➡ Select the line to be changed.*2 ➡ Select the instruction to be changed.*3 ➡ Press [MODIFY]. ➡ Press [ENTER].*4

Explanation

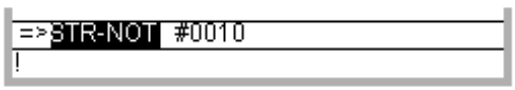
1



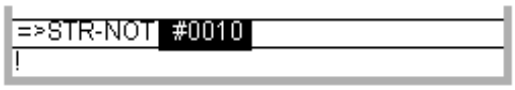
2 The instruction select dialog is displayed. Move the cursor to the instruction list dialog, and the cursor in the address area is underlined.



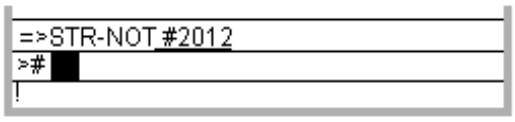
3 Move the cursor to the input buffer line instruction.



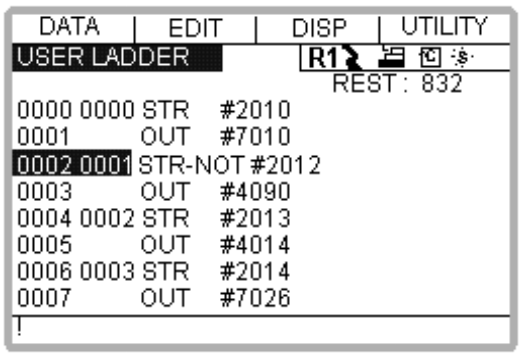
When there are more than two kinds of operand instructions, move the cursor in the instruction to and press [SELECT]. A detailed screen is displayed. When changing numeric data, move the cursor to the corrected data and press the [SHIFT] + CURSOR simultaneously. The numeric data then increases and decreases.



To directly input the numeric value, press [SELECT]. The input line is displayed, so input the data using the NUMBER KEY and press [ENTER].



4 The instruction displayed in the input buffer line is changed.



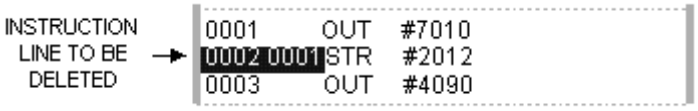
■ DELETE INSTRUCTIONS

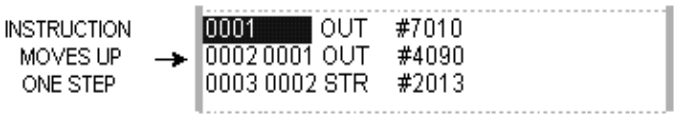
Operation

Move the cursor to the address area. ➡ Move the cursor to the line to be deleted ➡ Press [DELETE]. ➡ Press [ENTER].*1*

Explanation

1 The cursor line instruction is deleted.





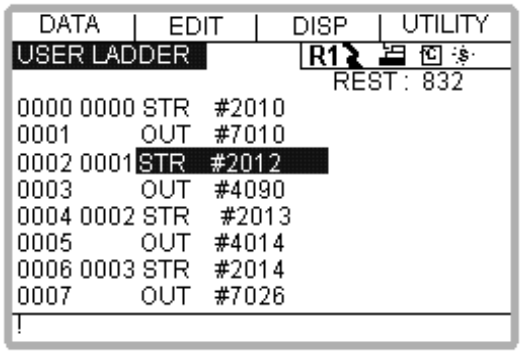
■ EDITING OPERANDS

Operation

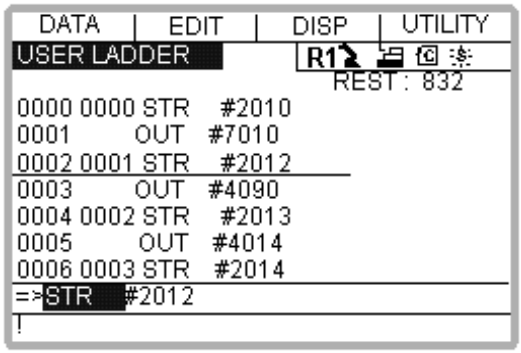
Move the cursor to the instruction area.*1 ➡ Select the line of the operand to be edited.*2 ➡ Edit operation *3 ➡ Press [ENTER].*4

Explanation

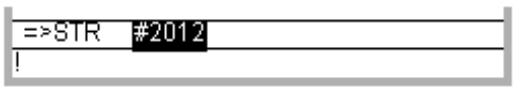
1



2 Move the cursor to the input buffer line instruction.

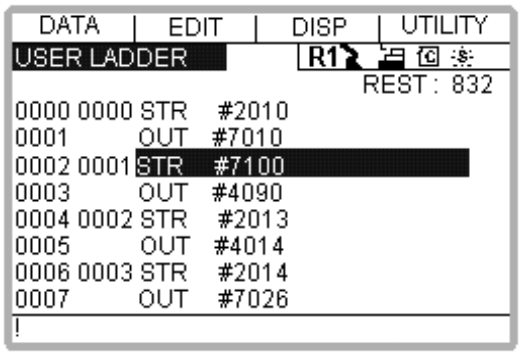


3 When there are more than two kinds of operand instructions, move the cursor in the instruction to and press [SELECT]. A detailed screen is displayed. When changing numeric data, move the cursor to the corrected data and press the [SHIFT] + CURSOR simultaneously. The numeric data then increases and decreases.



To directly input the numeric value, press [SELECT]. The input line is displayed, so input the data using the NUMBER KEY and press [ENTER].

4 The cursor line operand is changed.



■ CANCELLING EDITING

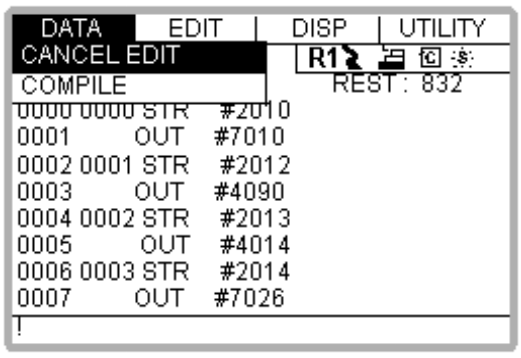
Use the following steps to cancel editing during the ladder program editing and to return to the preceding program.

Operation

Select {DATA} under the menu. ➡ Select {CANCEL EDIT}. ➡ Select "YES".*1

Explanation

1



The confirmation dialog is displayed. When "YES" is selected, the program returns to the ladder program (program execution) in effect before editing. When "NO" is selected, the cancel edit operation is cancelled, and the editing ladder program is displayed.

1.14.4 Compile

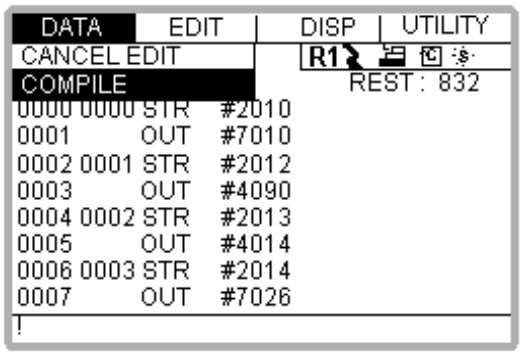
Use the following steps to compile the ladder program after editing.

Operation

Select {DATA} under the menu. ➡ Select {COMPILE}. *1

Explanation

1 The ladder program starts compiling.
The edited ladder program is checked for syntax error. If no error is found, the new program is written into the execution area to run.
If any error is found in the edited ladder program, the erroneous step is identified. In this case, the program stored in the execution area is left unchanged.



1.14.5 Search

The search function can be used at editing or confirmation.
Search can be executed when the cursor is either in the address area or the instruction area of the user ladder display or the system ladder display.

Operation

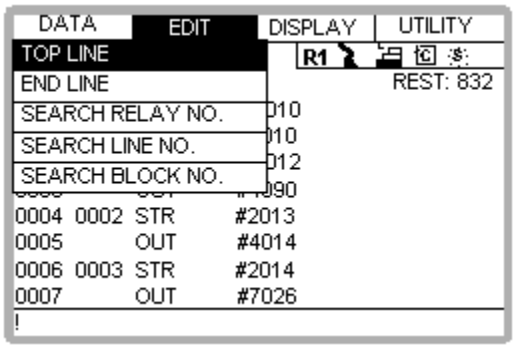
Select {I/O} under the top menu ➡ Select {LADDER PROGRAM}*1 ➡ Select {EDIT} under the menu *2 ➡ Select {DATA} under the menu. ➡ Select a desired search from the pulldown menu.

Explanation

1 The user ladder display or the system ladder display appears.

Press the PAGE KEY  to switch the display.

2 The pulldown menu is displayed.



The search is an operation to move the cursor to a specified line or relay No. line in the ladder display. This allows to find out a target position at once without the cursor.

■ TOP LINE, END LINE

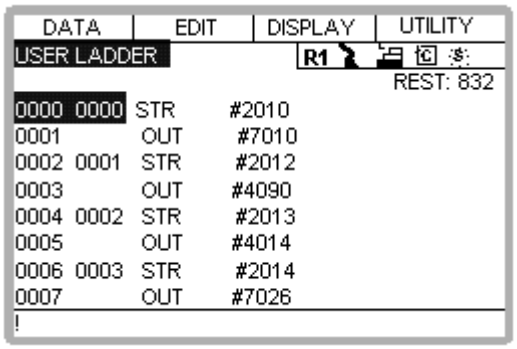
This is the operation to move the cursor to the first line or the last line in the current display.

Operation

Select “TOP LINE” or “END LINE” of the pulldown menu *1

Explanation

1 The cursor moves to “TOP LINE” or “END LINE” of the display and the selected line is displayed.



■ SEARCH FOR LINE NO. AND BLOCK NO.

This is the operation to move the cursor to a line or block in the current display.

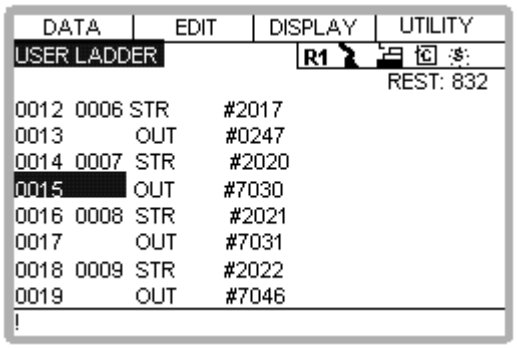
Operation

Select “SEARCH LINE NO.” or “SEARCH BLOCK NO.” *1 ➡ Input a line No. or block No. using the NUMBER KEYS. ➡ Press [ENTER]*2.

Explanation

1 Numbers can be input.

2 The cursor moves to the entered line No. or block No., and the selected line or block is displayed.



■ SEARCH FOR RELAY NO. AND REGISTER NO.

This is the operation to move the cursor to a relay No. or register line in the current display.

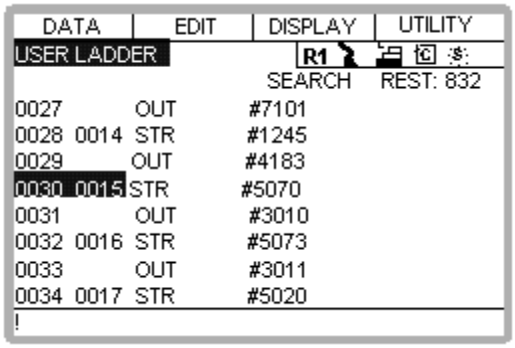
Operation

Select “SEARCH RELAY NO.” or “SEARCH REGISTER NO.” of the pulldown menu *1 ➡
Input a desired relay No. or register No. using the NUMBER KEYS ➡ Press [ENTER] *2
➡ Continues searching with the cursor *3

Explanation

1 Numbers can be input.

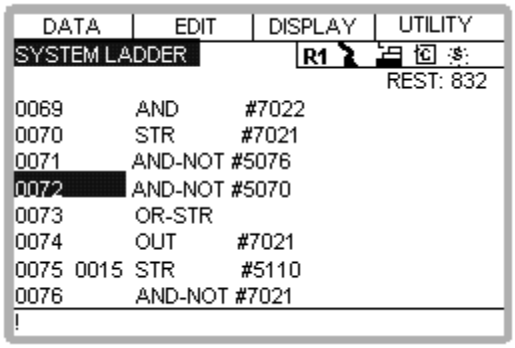
2 The cursor moves to the entered relay No. or register No. and the selected relay or register is displayed.



While searching, “SEARCH” is display in the screen.

3 In search status, forward and backward searching can be executed by [↓] and [↑] cursors.

Press the PAGE KEY  to switch the display between the user ladder and the system ladder to continue searching.
To end the search, press [Cancel] or move the cursor to the address area or the instruction area by using [→] and [←] cursors. The search status is canceled and the display of “SEARCH” disappears.



1.15 How to Monitor Signals

Signal status can be monitored in the following displays.

- To monitor by logic No. (2010, 2011, etc.)..... C.I/O monitor display
- To monitor by I/O No. (IN# 001, OUT# 001, etc.)..... I/O status display

1.15.1 I/O Display

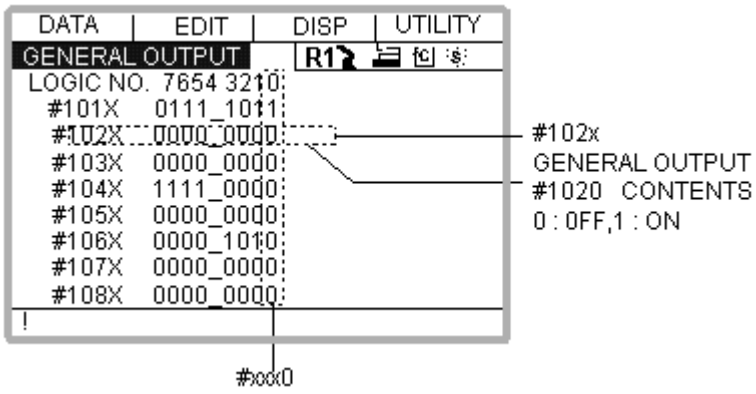
The following shows an example of an I/O monitor display. The example indicates the display of general input signals which can be also applied to other displays.

Operation

Select {I/O} from under the top menu. ➡ Select {GENERAL OUTPUT}.*1

Explanation

1 The general output display is shown.



1.15.2 I/O STATUS DISPLAY

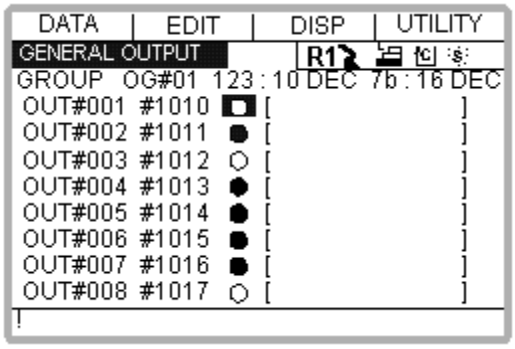
Signal status can be monitored by using input number (IN#) or output number (OUT#) in the display. In addition, signal names can also be monitored.

Operation

Select {DISP} under the menu. ➡ Select {DETAILS}.*1

Explanation

*1 The general output display is shown.



General Output Status ●: ON ○: OFF

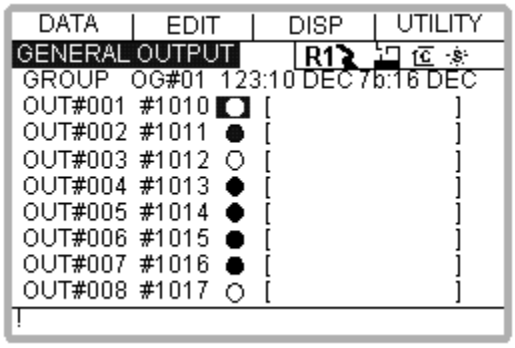
In the general output status display, an output signal on/off status can be changed. Once the status is changed, that status is maintained unless the next output instruction is executed.

Operation

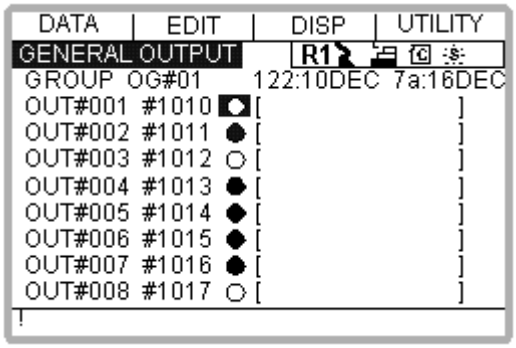
Select the signal to be changed.*1 ➡ Select the signal status.*2

Explanation

*1 In the general output display, move the cursor to the ○ or ● of the signal status to be changed.



2 Move the cursor to the signal status to be changed, and press [INTERLOCK]+[SELECT]. The status changes ●: ON status ○: OFF status).



The relationship between the logic number and the I/O number:
The relation between a logical number and the I/O number is as follows.

Logic Number
I/O Number

0017	0016	0015	0014	0013	0012	0011	0010
IN#008	IN#007	IN#006	IN#005	IN#004	IN#003	IN#002	IN#001
0027	0026	0025	0024	0023	0022	0021	0020
IN#016	IN#015	IN#014	IN#013	IN#012	IN#011	IN#010	IN#009

:
:

1017	1016	1015	1014	1013	1012	1011	1010
OUT#008	OUT#007	OUT#006	OUT#005	OUT#004	OUT#003	OUT#002	OUT#001
1027	1026	1025	1024	1023	1022	1021	1020
OUT#016	OUT#015	OUT#014	OUT#013	OUT#012	OUT#011	OUT#010	OUT#009

:

4017	4016	4015	4014	4013	4012	4011	4010
SIN#008	SIN#007	SIN#006	SIN#005	SIN#004	SIN#003	SIN#002	SIN#001
4027	4026	4025	4024	4023	4022	4021	4020
SIN#016	SIN#015	SIN#014	SIN#013	SIN#012	SIN#011	SIN#010	SIN#009

:

5017	5016	5015	5014	5013	5012	5011	5010
SOUT #008	SOUT #007	SOUT #006	SOUT #005	SOUT #004	SOUT #003	SOUT #002	SOUT #001
5027	5026	5025	5024	5023	5022	5021	5020
SOUT #016	SOUT #015	SOUT #014	SOUT #013	SOUT #012	SOUT #011	SOUT #010	SOUT #009

:

1.15.3 Pseudo Input Signal Display

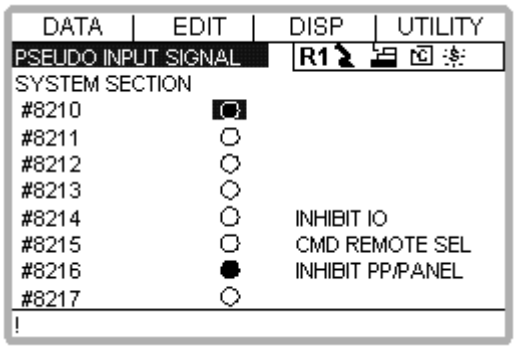
The pseudo input signal status can be checked, and see also signal name.

Operation

Select {IN/OUT} under the top menu ➡ Select {PSEUDO INPUT SIG}*1 ➡ Press the page key *1

Explanation

1 The pseudo input signal display is shown.



Pseudo Input Signal Condition ●: ON, ○: OFF

2 The system section (#8210-#8237) and the user section (#8240-#8247) are changed alternately.

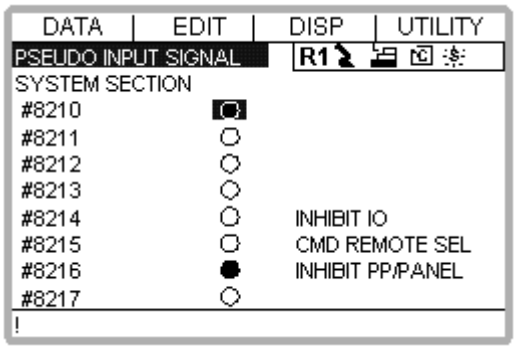
The signal can be turned ON/OFF in the pseudo input signal display in the management mode.

Operation

Move the cursor to desired signal*1 ➡ Select signal status*2

Explanation

1



2 "●" and "○" are changed alternately by pressing [INTERLOCK]+[SELECT].

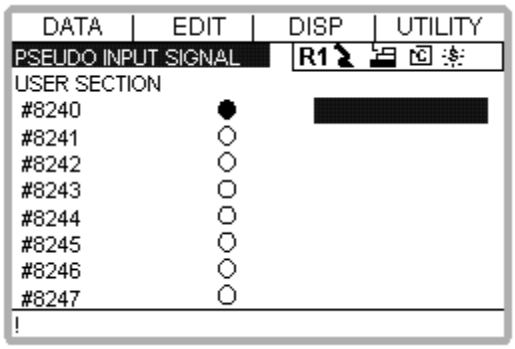
Signal name can be registered in the pseudo input signal display in the management mode.

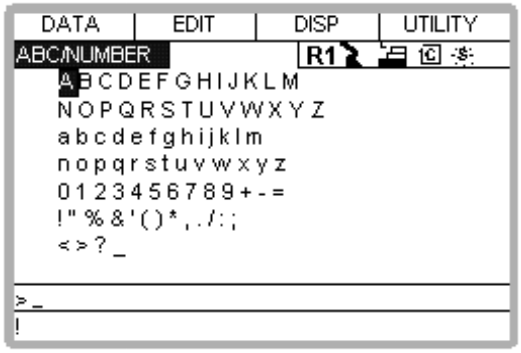
Operation

Select desired signal*1* ➡ Input signal name ➡ Press [ENTER]*2*

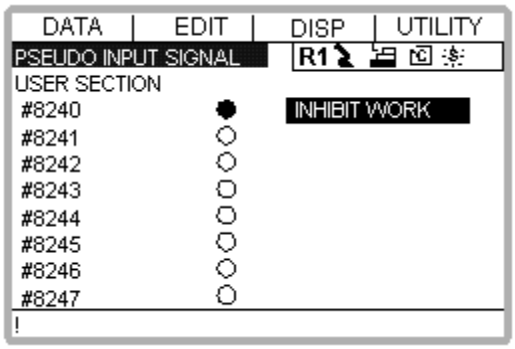
Explanation

1 Move the cursor to the name of desired signal and press [SELECT]. The input buffer line is displayed.





2 The name is registered.



1.15.4 Register Display

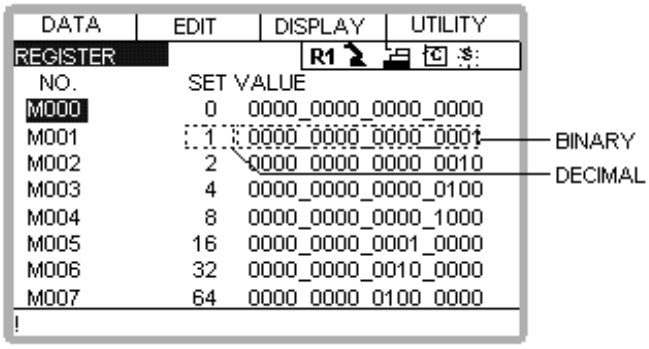
The registers can be confirmed in the Register display.

Operation

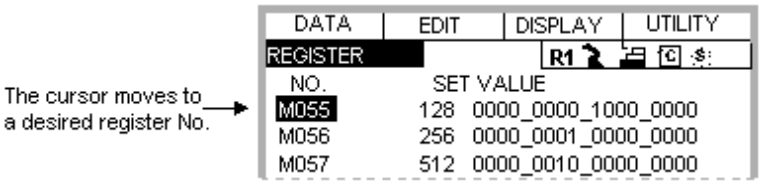
Select {I/O} under the top menu ➡ Select {REGISTER} *1 ➡ Move the cursor to a desired register No.

Explanation

1 The register display appears.



2 When a desired register No. is not displayed, move the cursor in the following manner. Move the cursor to “NO.” and press [SELECT]. Enter a desired register No. using the NUMBER KEYS, then press [ENTER]. The cursor moves to the entered register No.



In the manage mode, a register can be set.

NOTE The registers used as current value and operation result of TMR/CNT instruction can not be used.

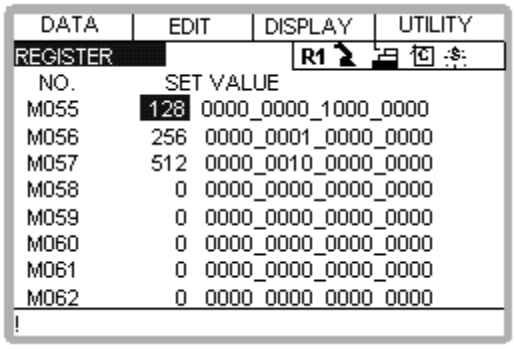
Operation

Select a register data to be set *1 ➡ Enter a desired numerical value *2 ➡ Press [ENTER] *3

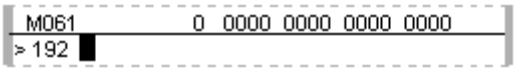
Explanation

1 Move the cursor to the data (decimal or binary) of the register No. to be set in the register display, and press [SELECT].

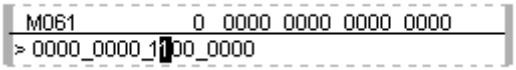
- When a decimal data is selected, enter a decimal value.
- When a binary data is selected, enter a binary value.



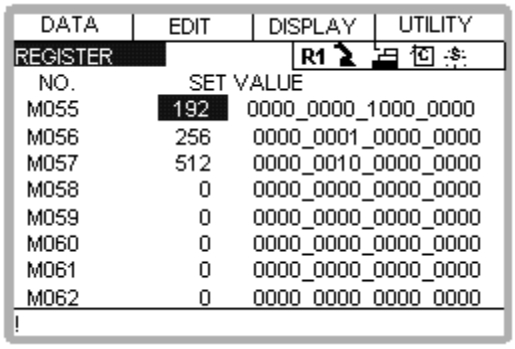
2 When a decimal value is selected, enter a decimal value data using the NUMBER KEYS.



When a binary value is selected, move the cursor to a binary data to be set in the input line, and press [SELECT]. Each time [SELECT] is pressed, “0” and “1” are displayed alternately.
Also, “0” and “1” can be entered using the NUMBERKEYS.



3 The entered numerical value is set at the cursor position.



1.15.5 Servo Power Status Display

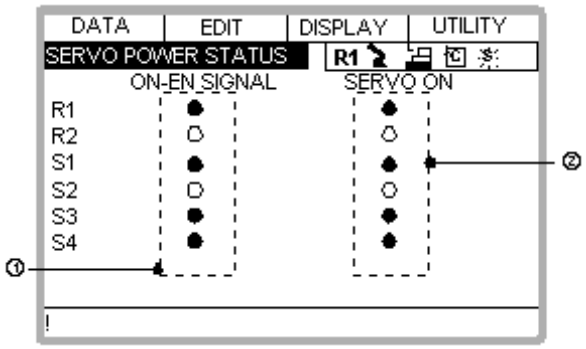
The status of “ON_EN” signals connected to each power ON unit and servo power supply of each control group can be confirmed in the Servo Power Status display.

Operation

Select {I/O} under the top menu ➡ Select {SERVO POWER STATUS} *1

Explanation

*1 The servo power status display appears.



① **ON_EN SIGNAL**

Displays the status of Power ON unit “ON_EN” signal that each control group is connected.

○: Open (OFF) status
The servo power supply is shut down.

●: Close (ON) status
When the servo ON lamp is lit, the servo power supply is turned ON.

② **SERVO ON**

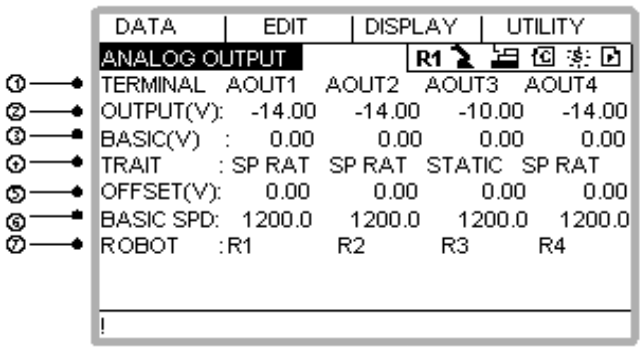
Displays the status (specific output 5170 to 5180) of servo power supply of each control group.

○: Servo power supply shut down

●: Servo power ON completed

1.15.6 Analog Output Display

The current settings can be confirmed in the Analog Output display.



①TERMINAL
The general-purpose analog output ports are displayed.
②OUTPUT (V)
The current output voltage is displayed.
③BASIC (V)
The basic voltage used for executing the analog output corresponding to speed is displayed.
The value can be overwritten by setting a new value using ARATION instruction.
④TRAIT
The current output characteristic of output port is displayed.
SP RAT: Executing analog output corresponding to speed.
STATIC: The output is fixed.
⑤OFFSET (V)
The offset voltage used for executing the analog output corresponding to speed is displayed.
The value can be overwritten by setting a new value using ARATION instruction.
⑥BASIC SPD
The basic speed used for executing the analog output corresponding to speed is displayed.
The value can be overwritten by setting a new value using ARATION instruction.
⑦ROBOT
The manipulator No. for the analog output corresponding to speed is displayed.

Operation

Select {I/O} under the top menu ➡ Select {ANALOG OUTPUT} *1

Explanation

1 The analog output display appears.
The display for the output terminal AOUT1 to 4, AOUT 5 to 8, and AOUT9 to 12 can be switched by pressing the PAGE KEY .

1.16 I/O Messages and I/O Alarms

1.16.1 Registering the User Section

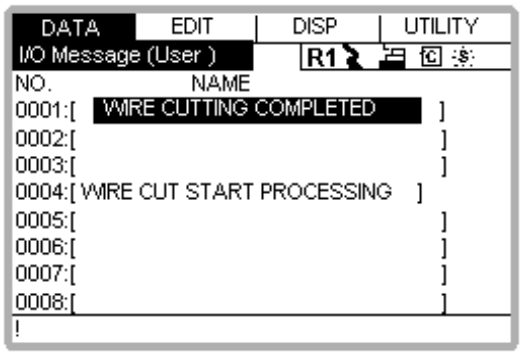
User section I/O alarms and I/O messages can be displayed or registered in the management mode by the following procedures:

Operation

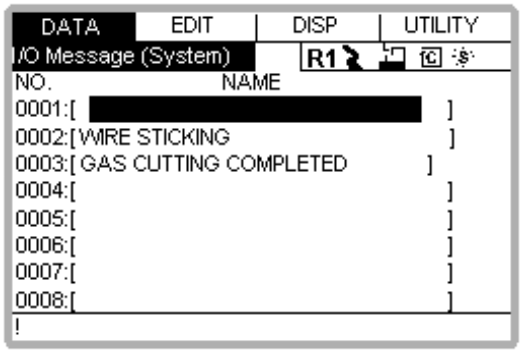
Select {I/O} under the top menu. ➡ Select {I/O ALARM} or {I/O MESSAGE}*1 ➡ Press PAGE KEY .*2

Explanation

1 The user section or the system section under the selected submenu (I/O Alarm or I/O Message) is displayed.



2 To change between the user section and the system section, use the PAGE KEY.



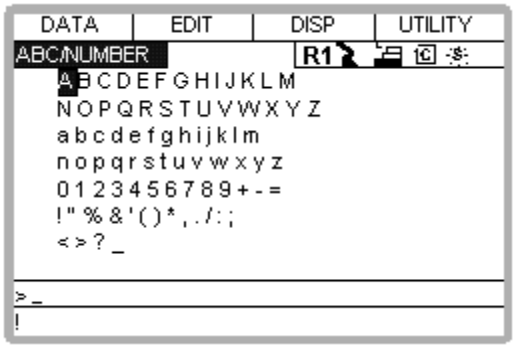
User section I/O alarms and I/O messages can be displayed or registered by the following procedures. However, the system I/O alarms and I/O messages cannot be edited.

Operation

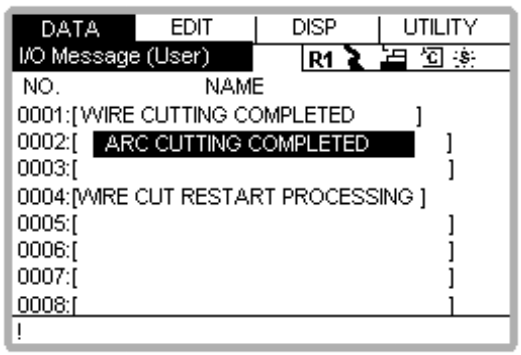
Select the name to be changed.*1 ➡ Input the I/O Alarm Name or the I/O Message Name ➡ Press [ENTER] *2

Explanation

1 Move the cursor to the name to be changed in either the I/O Alarm (User Section) Display or the I/ Message (User Section) Display, and press [SELECT]. The character input status display is shown. Up to 8 messages can be registered.



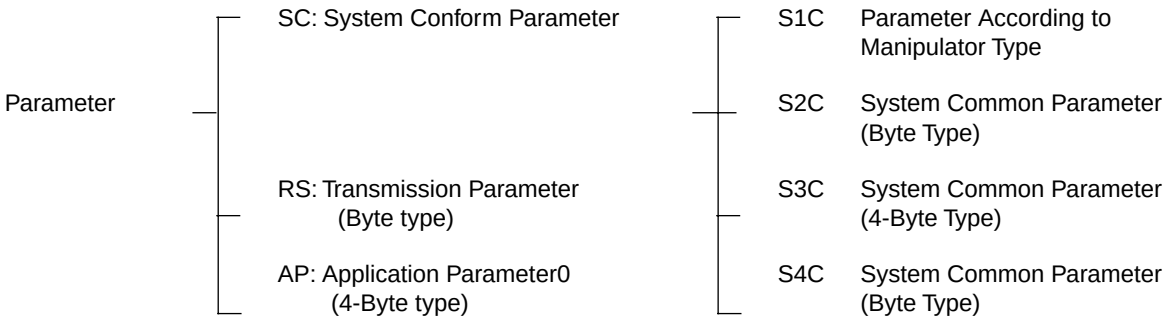
2 Input the name in the input line, and press [ENTER]. The name is displayed.



2 Parameter

2.1 Parameter Configuration

The parameters of XRC are configured as follows:



1. System Conform Parameter
   Data for creating an optimum robot system including the manipulator and the peripheral devices are registered.

2. Transmission Parameter
   Conditions for serial transmission are registered.

3. Application Parameter
   Data for creating an optimum application system are registered.

2.2 System Conform Parameters

2.2.1 S1CxG Parameter

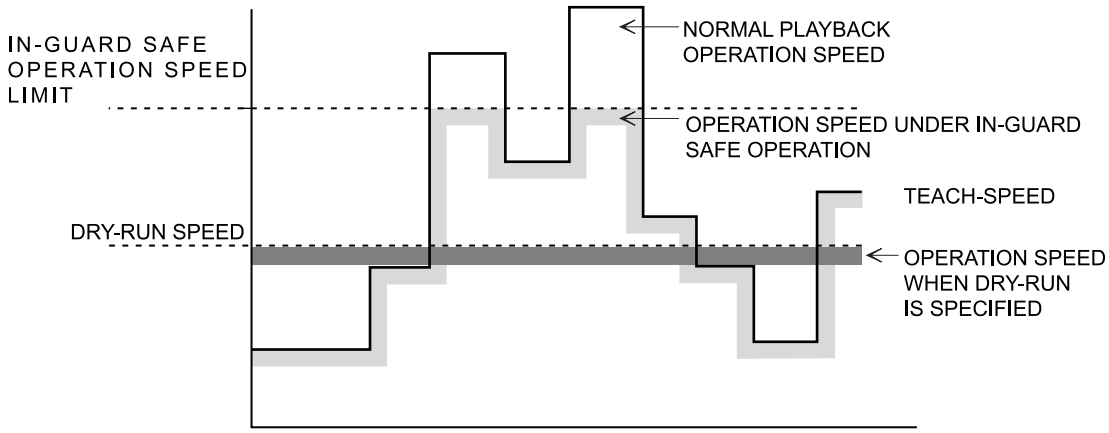
The initial value of these parameters depends on the manipulator type. For a system with two manipulators, two sets (SlC1G000 to SlC1G149 and SlC2G000 to SlC2G149) of parameters are prepared.

■ S1CxG000: IN-GUARD SAFE OPERATION MAX. SPEED

The upper speed limit is set for in-guard safe operation. Inform all concerned personnel of the maximum operation speed when actually confirmed.

■ S1CxG001: DRY-RUN SPEED

This is a dry-run operation speed setting value used when checking the locus. Take safety into consideration when setting changes are unnecessary.



■ S1CxG002 to S1CxG009: JOINT SPEED FOR REGISTRATION

The value set in these parameters is used when setting the joint speed. The percentage corresponding to the set value at each level is registered as 100% of the value set in the speed limit. Values greater than those set as speed limit values cannot be set.

■ S1CxG010 to S1CxG017: LINEAR SPEED FOR REGISTRATION

The value set in these parameters is used when setting the linear speed. Values greater than those set as playback speed limit values cannot be set.

■ S1CxG018 to S1CxG025: POSITION ANGLE SPEED

The value set in these parameters is used when setting the position angle speed. Values greater than those set as playback speed limit cannot be set.

■ S1CxG026 to S1CxG029: JOG OPERATION ABSOLUTE VALUE SPEED

These are setting values of jog operation speed set by the programming pendant. Values greater than those set as jog operation speed limit value (S1CxG040 to S1CxG042) cannot be set.

Low level	:	Jog operation speed when “LOW” manual speed is specified.
Medium level	:	Jog operation speed when “MEDIUM” manual speed is specified.
High level	:	Jog operation speed when “HIGH” manual speed is specified.
High-speed-level	:	Jog operation speed when the “HIGH SPD” key is pressed.

■ S1CxG030 to S1CxG032: INCHING MOVE AMOUNT

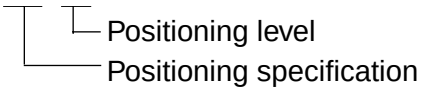
These parameters specify the amount per move at inching operation by the programming pendant. The referenced parameter differs according to the operation mode at inching operation.

Joint Operation	:	1 to 10 pulses
Perpendicular/cylindrical,user,tool	:	0.01 to 2.55mm in units of 0.01mm
Control point constant operation	:	0.1 to 1.0° in units of 0.1°

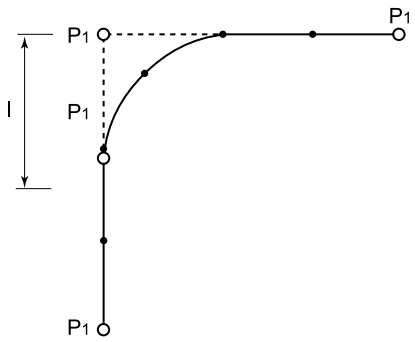
■ S1CxG033 to S1CxG036: POSITIONING ZONE

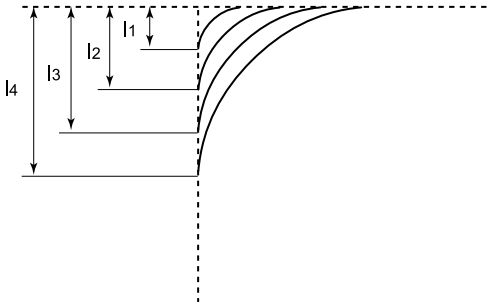
This parameter value will be referenced when positioning is specified with the “MOVE” instruction: MOVJ (joint movement) or MOVL (linear movement).

<Example> MOVL V=100.0 PL=1



The value set in this parameter specifies the range to enter in relation to the teach point for that step positioning. After entering the specified positioning zone, the manipulator starts moving to the next step. The system is also set up, so circular movement is carried out in the moving section when moving to the next locus; speed changeover is smooth.
Since operation will be turning inward during playback, as shown in the diagram, use setting values taking safety aspects into consideration.





NOTE This process becomes effective when change in direction of steps is between 30° and 179°.

SUPPLEMENT

Positioning Level

1. Positioning Level
   Positioning levels are divided into five stages of 0 to 4 with the “MOV” instruction.
   e.g. MOVL V=500 PL=1 (PL:Posiitoning Level)
   The functions at each level are as follows:
   0 : Complete positioning to the target point
   1-4 : Inward turning operation
   Following are explanations of the respective processing details and their relations with the parameter.

   (1) Level 0
   Determines positioning completion when the amount of deviation (number of pulses) to the target point of each axis comes within the position set zone specified by the parameter.
   The instruction system starts instruction to the next target point.

   (2) Level 1-4
   Recognizes virtual positioning before the target point. The distance of the virtual target position from the target point is specified at the positioning level.
   Distance data corresponding to each level are set in the parameter. Determination of the virtual target position is carried out in the instruction system.
   Set zone: The zone of each positioning level set in the parameter.

■ S1CxG044: LOW-SPEED START

This parameter specifies max. speed at low speed start. Specify the starting method for “initial operation of manipulator” (S2C097).

■ S1CxG045 to S1CxG048: JOG OPERATION LINK SPEED

These parameters prescribe the link speed at jog operation by the programming pendant. Specify the percentage (%) for the jog operation speed limit, the joint max. speed in the units of 0.01%.

■ S1CxG049 to S1CxG051: YAG LASER SMALL CIRCLE CUTTING

These parameters prescribe cutting operation at small circle cutting by YAG laser.

Minimum Diameter : Set the minimum diameter of a figure in the units of μm that can be processed by small-circle cutting machine.

Maximum Diameter : Set the maximum diameter of a figure in the units of μm that can be processed by small-circle cutting machine.

Maximum Speed : Set the maximum cutting speed at operation by CUT instruction in the units of 0.1mm/s.

■ S1CxG052 to S1CxG053: YAG LASER SMALL CIRCLE CUTTING DIRECTION LIMIT VALUE

These parameters set the cutting direction limits at small circle cutting by YAG laser.

+ Direction : Set the limit value in the positive direction of cutting angle DIR set by CUT instruction, in the units of 0.01°.

- Direction : Set the limit value in the negative direction of cutting angle DIR set by CUT instruction, in the units of 0.01°.

■ S1CxG054 to S1CxG055: YAG LASER SMALL CIRCLE CUTTING OVERLAP VALUE

These parameters set the overlapped value at small circle cutting by YAG laser.

Operation Radius : Set the operation radius at inner rotation in the units of 0.1 μm after overlapping by CUT instruction.

Rotation Angle : Set the rotation angle at inner rotation in the units of 0.1 μm after overlapping by CUT instruction.

■ S1CxG056: WORK HOME POSITION RETURN SPEED

This parameter specifies max. speed for returning to work home position.

■ S1CxG057: SEARCH MAX. SPEED

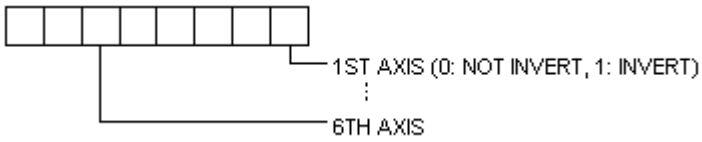
Specify the max. speed for searching in units of 0.1mm/sec.

■ S1CxG063, S1CxG064: PATTERN CUTTING DIMENSION

These parameters set the minimum diameter (S1CxG063) and the maximum diameter (S1CxG064) for the pattern cutting in units of μm.

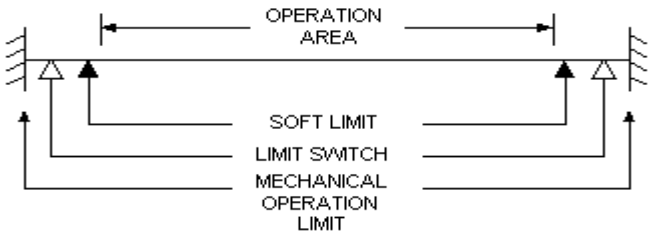
■ S1CxG065: MIRROR SHIFT SIGN INVERSION

This parameter sets which axis to be shifted (invert the sign).



■ S1CxG070 to S1CxG085: PULSE SOFT LIMIT

Soft limit is set independently for each axis by pulse value setting. Set current value (pulse value) of the axis at the soft limit set up position.



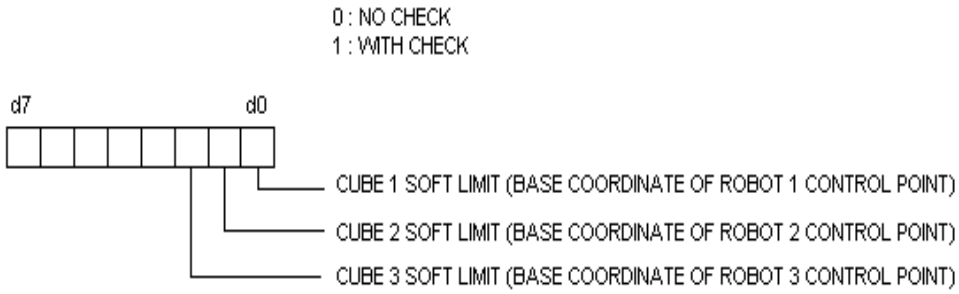
■ S1CxG086 to S1CxG093: ALLOWABLE MOVE AMOUNT AT STARTING

The difference between the position at which servo power was cut off for an emergency stop and the position at which the servo power was turned on again is compared with the value set in this parameter. If the difference in the positions compared is greater than the setting value in the parameter when restarting, an alarm is displayed. The allowable move amount check will not be executed on the axis in which “0” data have been set in this parameter.

2.2.2 S2C PARAMETERS

■ S2C001: CUBE SOFT LIMIT CHECK

This parameter specifies whether to check cube the soft limit. More than one soft limit can be specified.



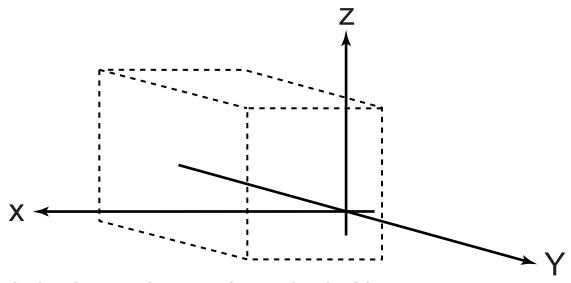
If “WITH CHECK” is selected, set up the parameters as in the table below.
S3C000 to S3C017 Cube Soft Limit

SUPPLE-MENT

Soft Limit

Soft limit is a software-type function to limit the range of movement of the manipulator. If the moving control point reaches the soft limit during operation, the manipulator stops automatically and no longer moves in that same direction. An alarm occurs if this soft limit is exceeded during playback. This soft limit is classified into two types by use.

1. Cube Soft Limit
   Soft limit is set with the absolute value on the base coordinate.



2. Pulse Soft Limit (Independent Axis Soft Limit)
   Refer to " S1CxG070 to S1CxG085: PULSE SOFT LIMIT ".

■ S2C002: S-AXIS INTERFERENCE CHECK

This parameter specifies whether to check for interference with each robot. If “WITH CHECK” is selected, set up the parameters as in the table below.
S3C018 to S3C023 S-axis Interference Area.

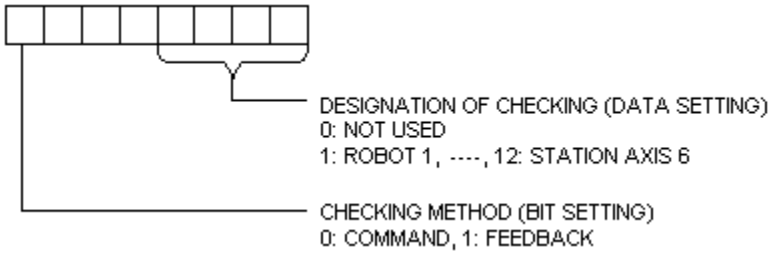
■ S2C003 to S2C026: CUBE INTERFERENCE CHECK

1. Designation of checking
   These parameters specify the cube to be used by bit.

0: Cube Interference/Axis Interference Not Used

1: Robot 1	2: Robot 2	3: Robot 3
4: Base Axis 1	5: Base Axis 2	6: Base Axis 3
7: Station Axis 1	8: Station Axis 2	9: Station Axis 3
10: Station Axis 4	11: Station Axis 5	12: Station Axis 6

2. Checking method
   Designates whether checking is performed by command or feedback.



SUPPLE-MENT

Checking method

The checking method differs according to ON/OFF status of servo power supply.

Checking method designation	Servo power supply ON	Servo power supply OFF
Command	Command	Feedback
Feedback	Feedback	Feedback

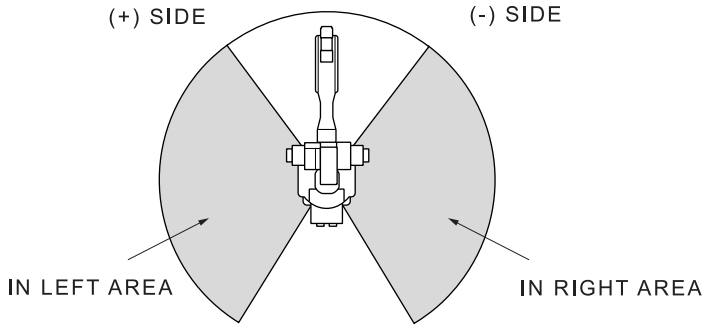
During the servo float function operation, checking is performed by feedback regardless of the checking method designation.

SUPPLE-MENT

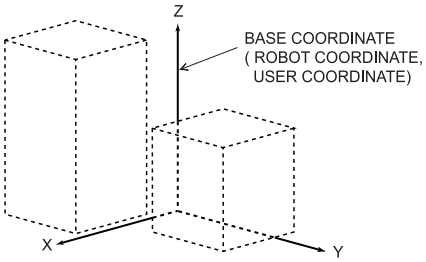
Interference Area

It is possible to output whether the control point during operation is inside or outside as a status signal, and to set the area to control the position by parameters S2C002 to S2C074. When the manipulator attempts to enter this area, the corresponding input signal (e.g. an “entrance prohibit signal”) is detected. The manipulator stops immediately if there is an input signal and goes into wait status until this signal is cleared. This signal is processing in the I/O section. Three methods of interference area settings are prepared for robots and stations. For a system with one robot, use robot 1.

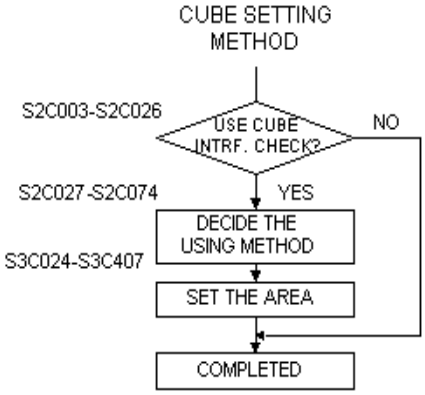
1. S-Axis Interference Area
   Position is controlled by the pulse value of the S-Axis.



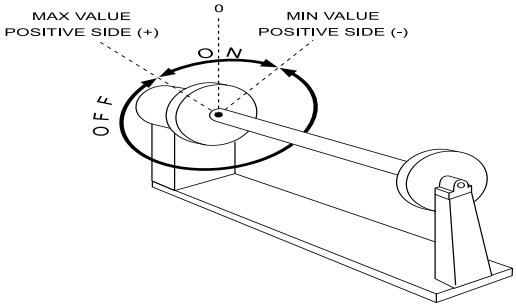
2. Cube Interference Area
   Up to 24 cubic area can be set. The edges of the cubes are set parallel to the robot coordinates of user coordinates.



TWENTY FOUR CUBIC AREAS CAN BE SET.
EACH CUBE IS SET PARALLEL TO THE SET COORDINATE.



3. Axis Interference Area
   Up to 24 areas can be set. Each operation area maximum and minimum value are set for the robot, base axis, and station axis plus and minus side.



■ S2C027 to S2C074: CUBE USING METHOD

These parameters specify the coordinates for defining the cube.If the user coordinates are selected, also specify the user coordinate system numbers.Set cube area referring to the cube interference areas shown in the table below.

Coordinate specification : Pulse (axis interference)

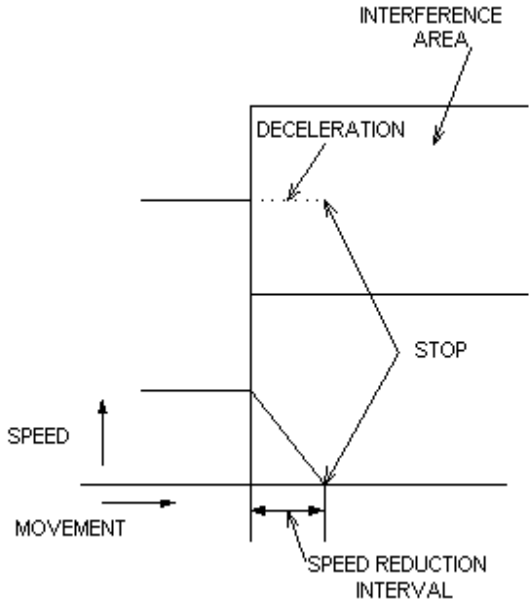
1 : Base coordinates
2 : Robot coordinates
3 : User coordinates

Coordinate No: Specify the user coordinate number when selecting “3: User Coordinate”.

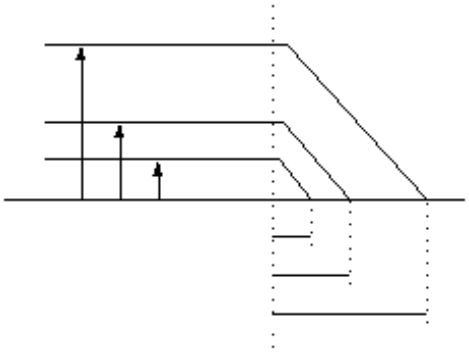
SUPPLEMENT

Precaution When Setting the Interference Area

It will be necessary to consider the following when setting the cubic interference and S-Axis interference areas. The manipulator is processed to decelerate to stop from the point where it enters in the area. Therefore, set the areas in consideration of the amount of the manipulator movement in the deceleration section shown in the figure below.



The move amount in the speed reduction section is dependent on the moving speed of the manipulator at that time:

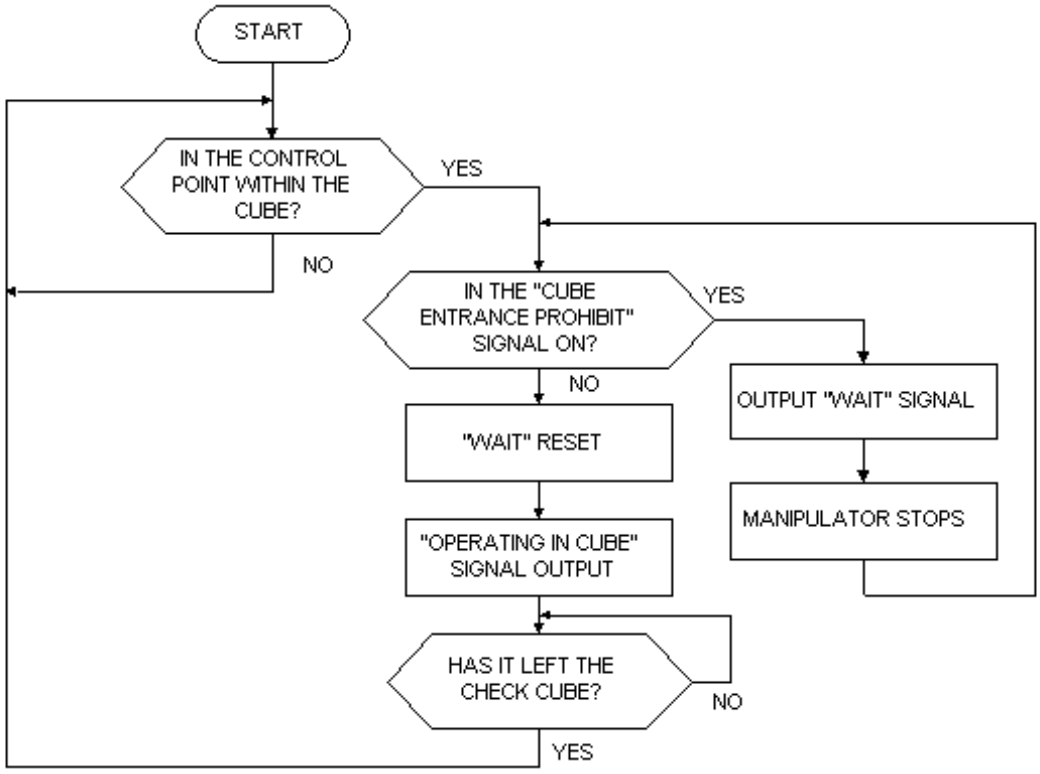


V = 1500mm/sec → approx. 300mm (Max.)
V = 1000mm/sec → approx. 160mm
V = 30mm/sec → approx. 3 to 4 mm
V = 20mm/sec → approx. 2mm

SUPPLE-MENT

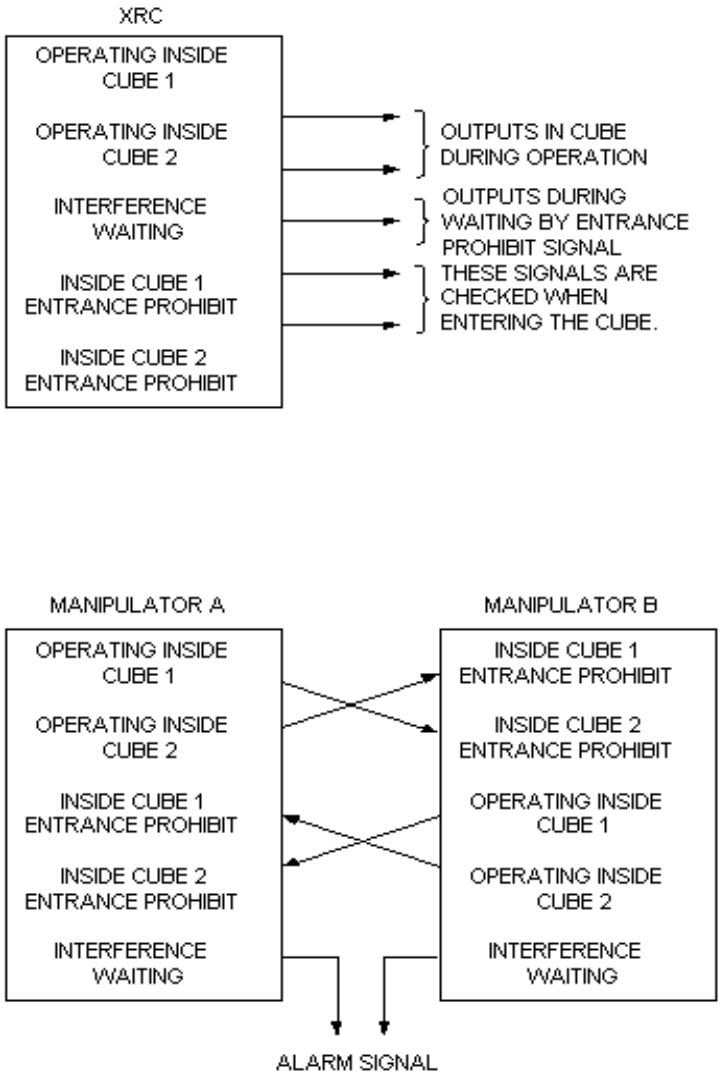
Interference Prevention in Interference Area

Processing to prevent interference is executed in the I/O processing section. The relation between the XRC I/O signal and manipulator operation is shown below.



In wait status with the entrance prohibit signal, the manipulator just barely enters the area for speed reduction processing and then stops.

SUPPLE-MENT



Connection Where Two Manipulators are Operated in the Same Area

■ S2C075: SECURITY MODE WHEN CONTROL POWER SUPPLY IS TURNED ON

The operation level when the control power supply is turned on is set.

0 : Operation Mode
1 : Editing Mode
2 : Management Mode

■ S2C076: SELECTION OF PERPENDICULAR/CYLINDRICAL

This parameter specifies whether the perpendicular mode or cylindrical mode is affected when perpendicular/cylindrical mode is selected by operation (coordinate) mode selection at axis operation of programming pendant. This specification is selected at the teaching condition set display.

■ S2C077: COORDINATE SWITCHING

This parameter specifies the execution units at step mode of “JOG” operation by the programming pendant.

■ S2C078: EXECUTION UNITS AT “FORWARD” OPERATION

This parameter specifies the execution units at step mode of “FORWARD” operation by the programming pendant.

Parameter Setting Value	Operation Units
0	MOVL DOUT TIMER DOUT MOVL  Stops at every instruction
1	MOVL DOUT TIMER DOUT MOVL  Stops at move instruction

■ S2C079: INSTRUCTION (EXCEPT FOR MOVE) EXECUTION AT “FORWARD” OPERATION

This parameter specifies the method of instruction (except for move) execution at “FORWARD” operation by the programming pendant.

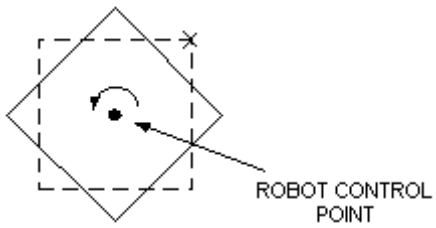
■ S2C081: POSTURE CONTROL AT PERPENDICULAR OPERATION OF JOG

This parameter specifies whether or not posture control is performed at perpendicular operation of “JOG” by the programming pendant. Use posture control normal type.

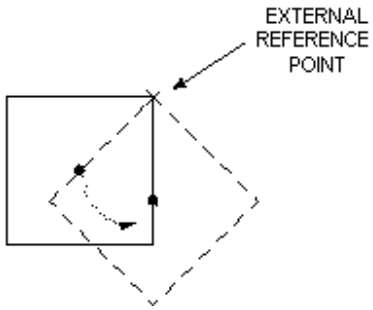
■ S2C082: OPERATION IN USER COORDINATE SYSTEM (WHEN EXTERNAL REFERENCE POINT CONTROL FUNCTION USED)

This parameter specifies the control point or reference point of constant operation when the user coordinate system is selected by the programming pendant when external reference point control function used.

0: When robot control point is selected



1: When external reference point is selected



■ S2C083: STEP ONLY CHANGING

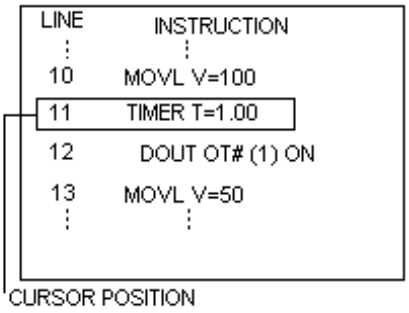
This parameter specifies whether to permit step only changes in an editing-prohibited job. Only position data can be changed but additional data such as speed cannot be changed. This specification can be set at the teaching condition set 1 display.

■ S2C084: MANUAL SPEED STORING FOR EACH COORDINATE

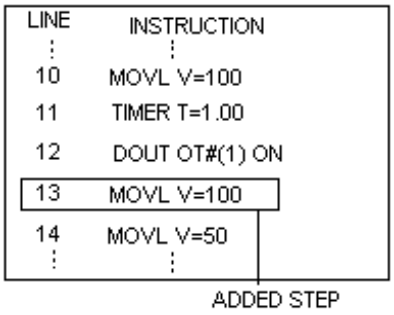
This parameter specifies whether to assign different manual speeds for the joint coordinates and other coordinates. If “NOT STORED” is selected, manual speed is not affected by changing the coordinates. If “STORED” is selected, manual speeds can be selected separately for the joint coordinates and other coordinates.

■ S2C086: ADDITIONAL STEP POSITION

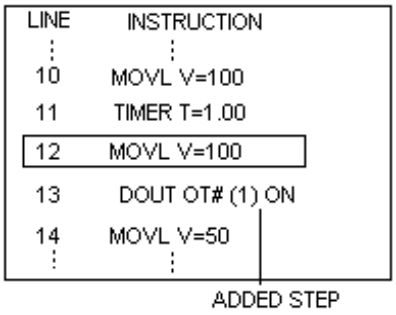
This parameter designates either “before next step” or “next to cursor position (between instructions)” as additional step position. This specification can be set at the teaching condition set display.
<Example>



S2C086-0 (Before the Step)



S2C086-1 (Between Instructions)



■ S2C087: MASTER JOB CHANGING OPERATION

This parameter specifies whether to permit or prohibit master job changing operation. If “PROHIBIT” is specified, the master job cannot be changed (or registered) easily. The specification can be set on the operating condition set display.

■ S2C088: CHECK AND MACHINE-LOCK KEY OPERATION IN PLAY MODE

This parameter specifies whether to permit or prohibit in play mode to change the operation that changes the operation condition. Even if an error occurs because of the operation with the keys, the manipulator does not stop.

■ S2C089: RESERVED WORK JOB CHANGING OPERATION

This parameter specifies whether to permit reserved work job changing operation.
The designation can be set in the operating condition set display.

■ S2C090: MASTER CALL OPERATION IN PLAY MODE

This parameter specifies whether the master call operation in play mode is permitted or not. When the independent control function is valid, the master job for sub-master is specified at the same time. The specification can be set on the operating condition set display.

■ S2C091: LANGUAGE LEVEL

This parameter specifies the level of the robot language (INFORM II). The levels simplify the instruction registering operation. With YASNAC XRC, all robot instructions can be executed regardless of specification of instruction sets. The specification can be set on the teaching condition set display.

1. Contracted Level
   Only frequently used robot instructions are selected to reduce the number of registered instructions. Robot instructions displayed on the soft keys are also reduced so that specification is simplified.

2. Standard/Expanded Level
   All the robot instructions are available in standard and expanded levels. The two levels are distinguished by the number of additional information items (tags) that can be used with robot instructions. At the expanded level, the flowing functions are available.
   - Local Variables and Array Variables
   - Use of Variables for Tags (Example: MOVJ VJ=I000)

   The above functions are not available at the standard level. This reduces the number of data required to register instructions, therefore simplifies operation.

■ S2C092: +MOV INSTRUCTION SPEED INPUT

This parameter specifies whether the speed inputting move instructions of the master robot in a coordination job are permitted or not.

<Example> 0: Not Provided

SMOVL V=100

+MOVL

Master Side

Speed Specification Not Provided

1: Provided

SMOV L V=100

+MOV L

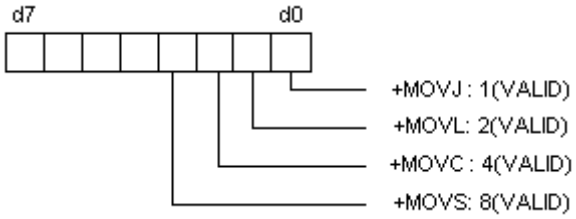
Master Side

V=100

Speed Specification Provided

■ S2C093: +MOV INSTRUCTION INTERPOLATION INPUT

This parameter specifies which interpolation is permitted for move instructions for the master robot in a coordination job. More than one instruction can be specified.



■ S2C094: INSTRUCTION INPUT LEARNING FUNCTION

This parameter specifies whether to set a line of instructions that has been input on the input buffer line when pressing the first soft key for each instruction. If “PROVIDED” is selected, the instructions are set.

■ S2C095: ADDRESS SETTING WHEN CONTROL POWER IS TURNED ON

This parameter specifies the processing of the job name, step No., and line No. that are set when the control power supply is turned ON.

0: Reproduces the address when power supply is turned ON.
1: Lead address (Line”0”) of the master job.

■ S2C096: JOB LIST DISPLAY METHOD AT JOB SELECTION

These parameters specify the job displaying method in the job list display at job selection.

0: Order of Names
1: Order of Date
2: Order of Registration

■ S2C097: INITIAL OPERATION OF MANIPULATOR

This parameter specifies the operation speed of the first section when starting. Specify the operation speed with the low-speed start (S1CxG044). When starting at low-speed, the robot stops after reaching the indicated step regardless of the cycle setting. If the robot is paused in low-speed operation, it moves at teaching speed when starting.

0: The specification can be set on the play condition set display. Operates at low speed only when low speed start is set. Operates at taught speed when not instructed.
1: Starts at low speed after editing regardless of soft key instructions.

■ S2C098: PLAYBACK EXECUTION AT CYCLE MODE “1- STEP”

Parameter Setting Value	Operation Units
0	MOVL DOUT TIMER DOUT MOVL  Stops at every instruction.
1	MOVL DOUT TIMER DOUT MOVL  Stops at move instruction.

NOTE When operating “FORWARD” by the programming pendant, the units for execution are set in another parameter (S2C078).

■ S2C099: EXTERNAL START

This parameter specifies whether a start instruction from external input is accepted or not.
The specification can be set on the operating condition set display.

■ S2C100: PLAYBACK PANEL START

This parameter specifies whether a start instruction from the playback panel is accepted or not.

■ S2C101: SPEED DATA INPUT FORM

This parameter specifies the units for speed data input and display.
mm/s: in units of 0.1 mm/sec.
cm/min: in units of 1cm/min.
The specification can be set on the operating condition set display.

■ S2C102: RESERVED START

This parameter specifies whether a reserved start instruction from the playback panel is accepted or not. The specification can be set on the play condition set display.

■ S2C104: JOB SELECTION AT REMOTE FUNCTION (PLAY MODE)

This parameter specifies whether a job selection in play mode at remote function is prohibited or not.

■ S2C105: EXTERNAL MODE SWITCH

This parameter specifies whether mode switching from the outside is accepted or not. The specification can be set on the operating condition set display.

■ S2C106: MODE SWITCHING FROM PLAYBACK PANEL

This parameter specifies whether mode switching from the playback panel is accepted or not. The specification can be set on the operating condition set display.

■ S2C107: EXTERNAL CYCLE SWITCHING

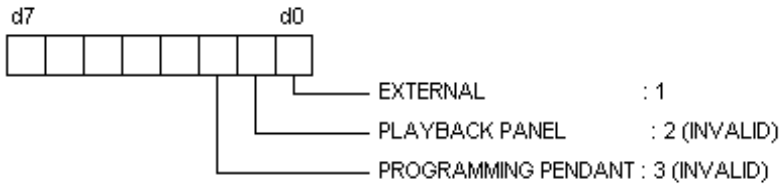
This parameter specifies whether cycle switching from the outside is accepted or not. The specification can be set on the operating condition set display.

■ S2C108: PROGRAMMING PENDANT CYCLE SWITCHING

This parameter specifies whether cycle switching from the programming pendant is accepted or not. The specification can be set on the operating condition set display.

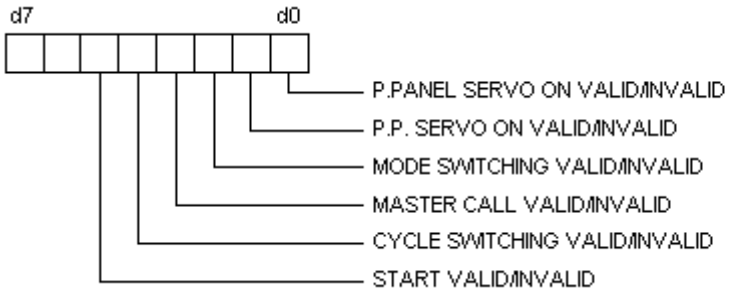
■ S2C109: SERVO ON PROHIBITION

This parameter specifies whether a servo on instruction is accepted or not. More than one instruction can be specified. For example, to permit the servo on instruction from an external input only, set “6”. In this case, servo on instruction from the playback panel or programming pendant are not accepted.The specification can be set on the operating condition set 2 display.



■ S2C110: PLAYBACK PANEL AND PROGRAMMING PENDANT OPERATION WHEN “IO” IS SELECTED FOR REMOTE MODE

This parameter specifies whether each operation of the following is valid when “IO” is selected for remote function selection. IO and command are available for remote function selection: “IO” is set prior to shipping. “Command” is valid when transmission function (optional) is specified.

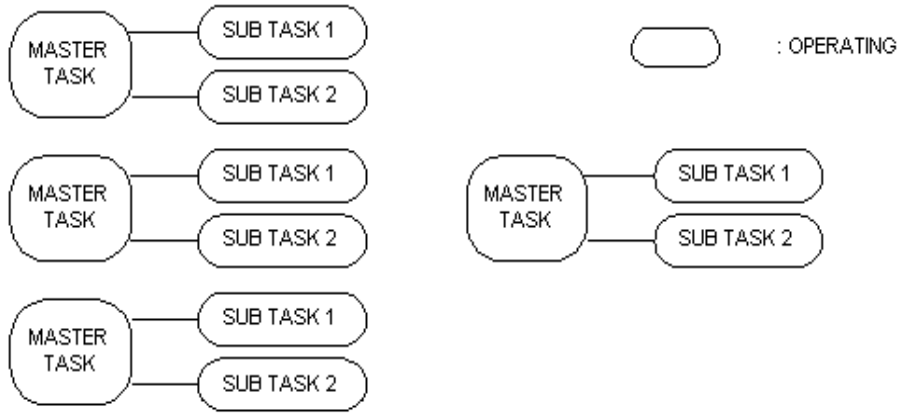


■ S2C111: OPERATION METHOD AT FWD/BWD OPERATION OR TEST RUN BY INDEPENDENT CONTROL

This parameter specifies the operation method at FWD/BWD operation or test run by independent control.

0: The job of the task that is currently displayed operates.

1: Jobs of all the tasks operate.



0: One of the task jobs that are currently displayed operates.

1: All task jobs operate.

■ S2C112: JOB AT CALLING MASTER OF SUBTASK 1, 2, 3, 4, 5 BY INDEPENDENT CONTROL

This parameter specifies the job which is called up when the master of the subtask is called up by independent control.

0: Master Job
1: Root Job

Master Job: Job registered in the master control display
Root Job: Job activated by PSTART instruction

■ S2C114: STEP EDITION AT TOOL NO. CHANGE

The edit operation of the teaching step when the tool number is changed can be set disabled. If prohibition is set, modification, deletion, and insertion of the teaching step are prohibited.

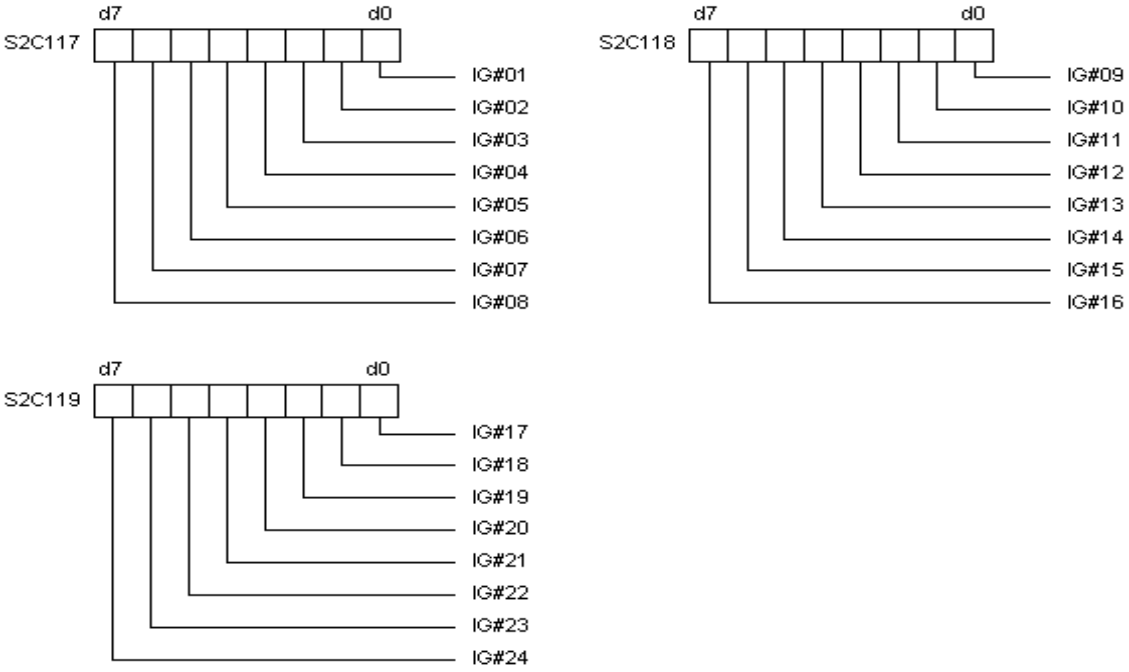
■ S2C115: GENERAL OUTPUT RELAY WHEN CONTROL POWER IS ON

This parameter specifies the state of the general output relays when the control power is on. Since the power off state, including peripheral devices, cannot be completely reproduced, take attention when restarting.

■ S2C117 to S2C119: PARITY OF GENERAL INPUT GROUPS

These parameters specify whether to execute priority checks with parameters when instructions covering the input group (1G#) are executed. The instructions covering the input groups are as shown below.

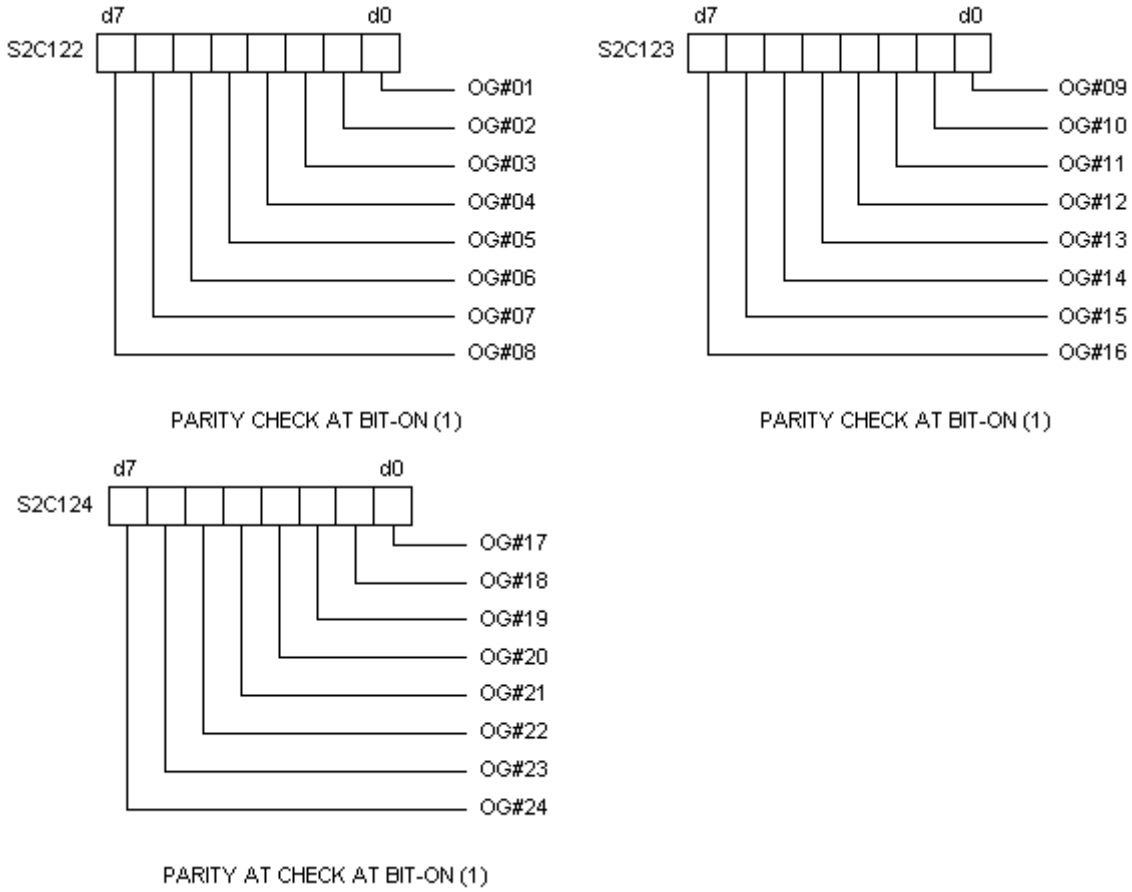
- IF Sentence (JUMP, CALL, RET, PAUSE)
- Pattern Jump, Pattern Job Call
- DIN
- WAIT



Parity bits are set as the highest level bits of each output group. If an error is detected during parity check, an alarm occurs and the manipulator stops. Remains unchanged if no parity check is specified.

■ S2C122 to S2C124: PARITY OF GENERAL OUPUT GROUPS

These parameters specify whether the output group instruction is executed with parity check (even parity).

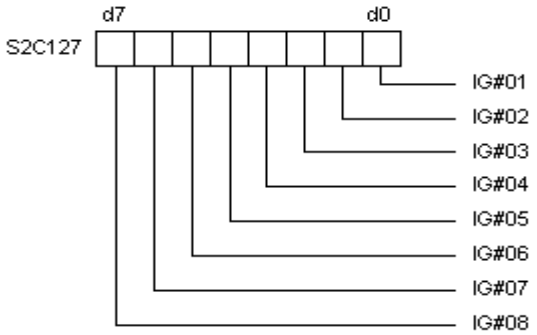


Parity bits are set as the highest level bits of each output group. For example, if OG#01 is specified with parity and DOUT OG# (1) 2 is executed, the result will be 00000010 if 2 is binary converted. Since there will be only one bit (odd) on at this time, the parity bit (highest level bit) will be set to on and 10000010 (130) will be output OG# (1).
As in the case of a variable such as DOUT OG# (1) B03 parity bits are added to the contents of the variable data. However, if the contents of the variable exceed 127, as in the case of DOUT OG# (1) 128, an alarm will occur. Remains unchanged if no parity check is specified.

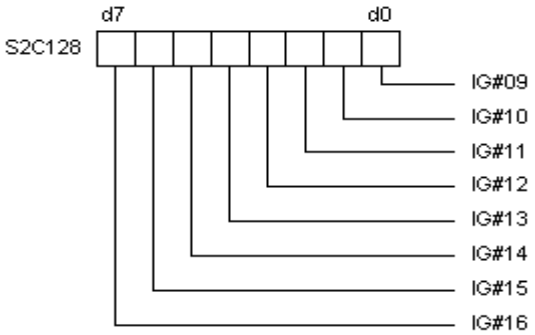
■ S2C127 to S2C129: DATA OF GENERAL INPUT GROUPS

These parameters specify whether to handle the input group data as binary data or as BCD data when an instruction for the input group (1G#) is executed. The instructions covering the input groups are as shown below.

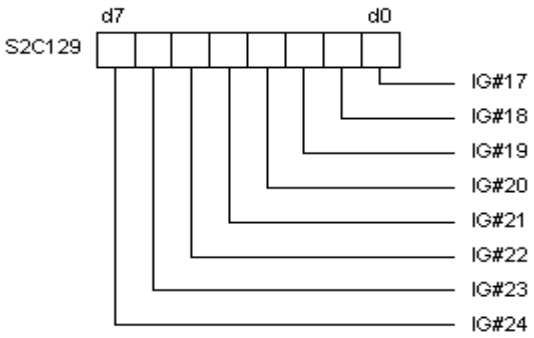
- IF Sentence (JUMP, CALL, RET, PAUSE)
- Pattern Jump, Pattern Job Call
- DIN
- WAIT



BCD DATA SPECIFICATION AT BIT-ON (1)



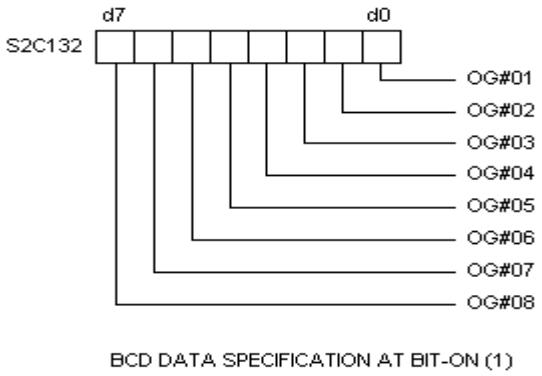
BCD DATA SPECIFICATION AT BIT-ON (1)



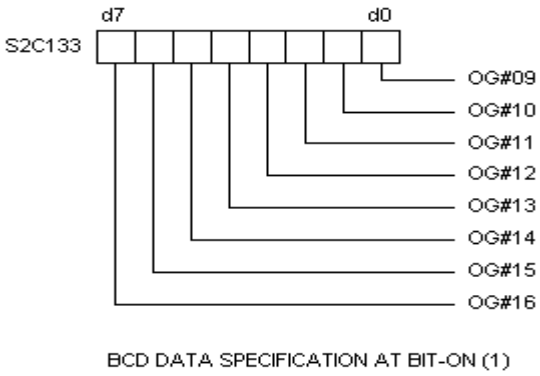
BCD DATA SPECIFICATION AT BIT-ON (1)

■ S2C132 to S2C134: DATA OF GENERAL OUTPUT GROUPS

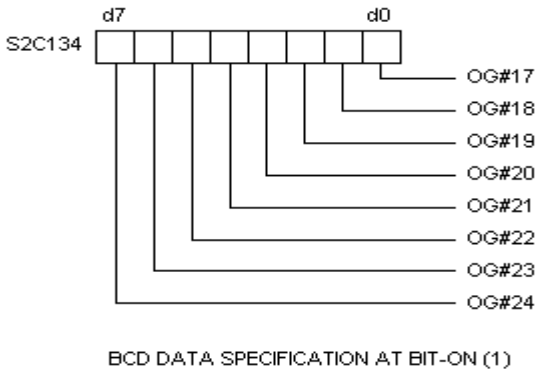
These parameters specify whether the output group instruction is executed with binary data or BCD data.



BCD DATA SPECIFICATION AT BIT-ON (1)



BCD DATA SPECIFICATION AT BIT-ON (1)



BCD DATA SPECIFICATION AT BIT-ON (1)

SUPPLEMENT

Differences Between Binary Data and BCD Data

For the input group and output group, the result will depend on whether the binary or BCD formula is used.

<Example> When the input function is [10101010]

INPUT GROUP
IG#1

INPUT NO.	STATE
IN#001	●
IN#002	○
IN#003	●
IN#004	○
IN#005	●
IN#006	○
IN#007	●
IN#008	○

STATE	BINARY	CASE	BCD		CASE	
1	$2^0 = 1$	1	$2^0 = 1$	TOTAL IS IN ONES	1	5
0	$2^1 = 2$	0	$2^1 = 2$		0	
1	$2^2 = 4$	4	$2^2 = 4$		4	
0	$2^3 = 8$	0	$2^3 = 8$		0	
1	$2^4 = 16$	16	$2^0 = 1$	TOTAL IS IN TENS	1	5
0	$2^5 = 32$	0	$2^1 = 2$		0	
1	$2^6 = 64$	64	$2^2 = 4$		4	
0	$2^7 = 128$	0	$2^3 = 8$		0	
		85				55
		BINARY DATA VALUE				BCD DATA VALUE

However, in the case of BCD data, because the upper bound value is 99, it is not possible to use any value which exceeds nine in the one or ten digit place.

■ S2C139: REMOTE FIRST CYCLE MODE

Set the cycle that changes from the local mode to the remote mode.

■ S2C140: LOCAL FIRST CYCLE MODE

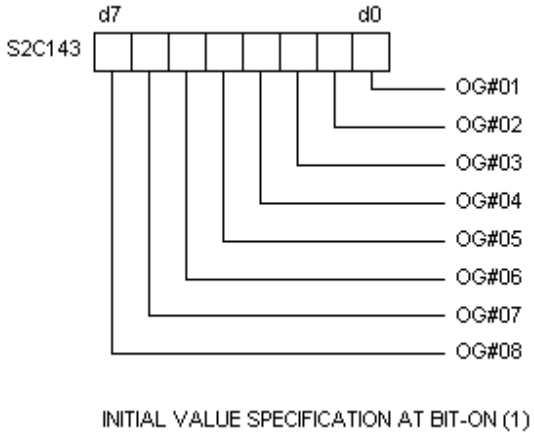
Set the cycle that changes from the remote mode to the local mode.

■ S2C141: GENERAL OUTPUT NO. WHEN ROBOT DROP ALLOWABLE RANGE ERROR OCCURS

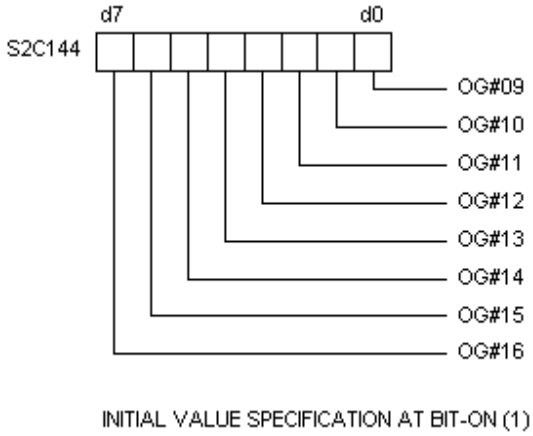
This parameter specifies the general output number to output the robot drop allowable range error alarm occurrence externally. When this function is not used, set “0”.

■ S2C143 to S2C145: GENERAL OUTPUT GROUP TO BE INITIALIZED AT SWITCHING MODE

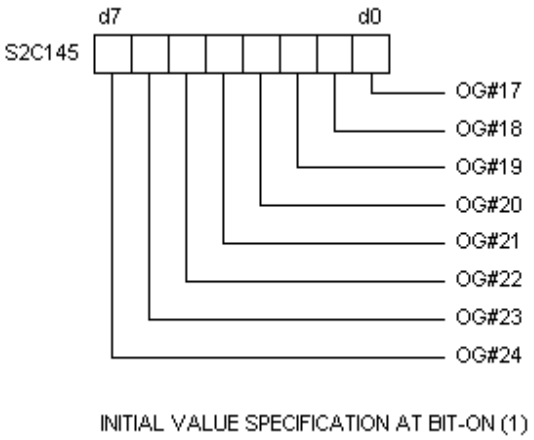
Set the general output group with bit to be initialized at switching mode. Use these parameters when using general output signals as work instructions for peripheral devices.



INITIAL VALUE SPECIFICATION AT BIT-ON (1)



INITIAL VALUE SPECIFICATION AT BIT-ON (1)



INITIAL VALUE SPECIFICATION AT BIT-ON (1)

■ S2C158: POWER ON FIRST CYCLE MODE

Set the first cycle mode for when the power is turned on.

■ S2C159: TEACH MODE FIRST CYCLE MODE

Set the cycle that changes from the play mode to the teach mode.

■ S2C160: PLAY MODE FIRST CYCLE MODE

Set the cycle that changes from the teach mode to the play mode.

■ S2C161: ALARM CODE SPECIFIC OUTPUT DATA

This parameter specifies the data type of the alarm code specific output.

■ S2C162: START CONDITION AFTER ABSOLUTE DATA ALLOWABLE RANGE ERROR OCCURS

This parameter specifies the activating method after the absolute data allowable range error occurs.

■ S2C166: CONTROLLED GROUP JOB TEACHING POSITION CHANGE

This parameter is used to change only the job teaching position of controlled group axis.

■ S2C167: COOLING FAN ALARM DETECTION

This parameter specifies a detection for cooling fan 1 to 3 with alarm sensor, connected to power ON unit.

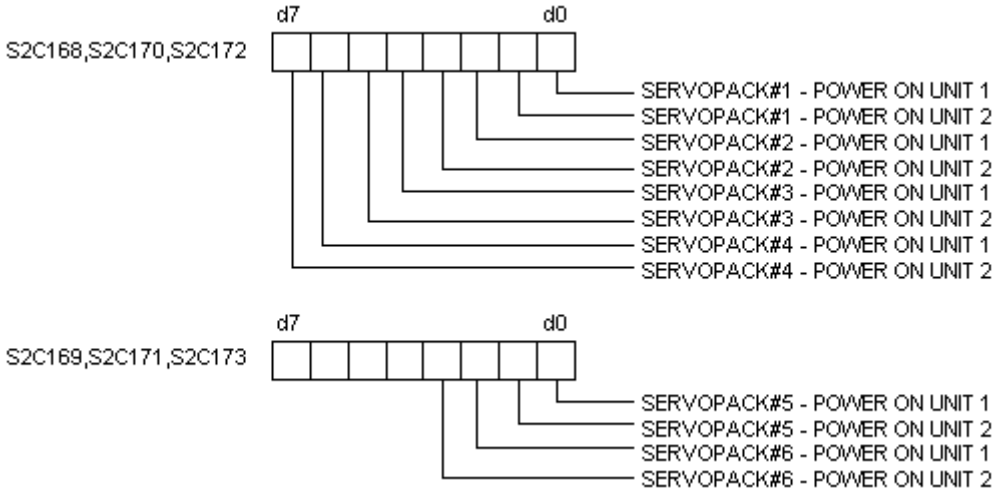
0: No detection
1: With detection and message display
2: With detection and message/alarm display

■ S2C168, S2C169: COOLING FAN ALARM 1 OPERATION

■ S2C170, S2C171: COOLING FAN ALARM 2 OPERATION

■ S2C172, S2C173: COOLING FAN ALARM 3 OPERATION

These parameters specify the operation of cooling fan 1 to 3 with alarm sensor, connected to power ON unit.
Each bit specifies the power ON unit to which the detecting sensor is connected.



■ S2C213 to S2C228: SETTING OF OPERATING RELAY NO.

Up to 16 output signals can be turned on/off with the programming pendant. The object relay no. is set in these parameters. Although it is possible to set optional values for output Nos. 1 to 192 in the parameters, the following must be taken into consideration.

①Avoid setting duplicate numbers.

②The signal turned on or off with the programming pendant is operated again or remains unchanged until the instruction is executed.

■ S2C229 to S2C244: OPERATING METHOD OF RELAYS

These parameters specify the operating method of output signals by the programming pendant. The operating method can be specified for each output signal.

Parameter Setting Value	Operation of Output Signal
0	⁻ON — ON ⁻OFF — OFF
1	⁻ON ON/OFF WITH THE KEY ON WHILE THE KEY IS PRESSED — ON OFF IF THE KEY IS NOT PRESSED — OFF

■ S2C245 to S2C249: TIME RESET

These parameters specify whether resetting operation of the specified times is permitted or not.

0: Prohibit Resetting

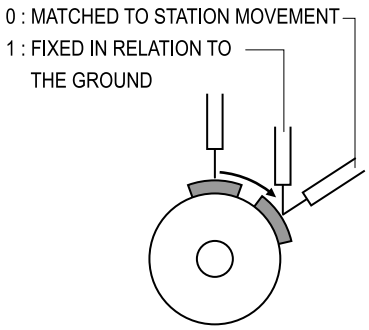
1: Permit Resetting

“PERMIT” is set as the initial value for the work time and motion time.

■ S2C250: POSTURE CONTROL OF SYNCHRONIZED MANIPULATOR (When Twin Synchronous Function Used)

Specify the posture control method for synchronized manipulator performing compensation during playback by using the twin synchronous function.

0: Matched to Station Movement
1: Fixed in Relation to the Ground



■ S2C251: POSTURE CONTROL OF MANIPULATOR IN MULTI-JOB (When Twin Synchronous Function Used)

Specify the posture control method for manipulator executing compensation at the linking side when job linking is performed during FWD/BWD operation by the twin synchronous function.

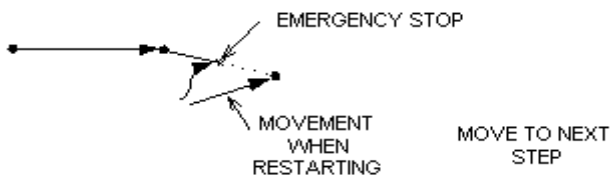
0: Matched to Station Movement
1: Fixed in Relation to the Ground

■ S2C252, S2C253: OPERATION AFTER RESET FROM LOCUS DEVIATION

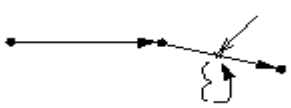
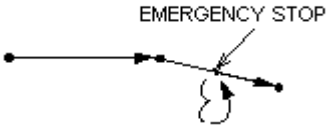
These parameters specify the method of restarting the manipulator that has deviated from the normal locus such as an emergency stop or jog operation.

0: Move to the indicated step (initial setting).
1: After moving from deviated position, move to the indicated step.
2: Move from the deviated position and stop.

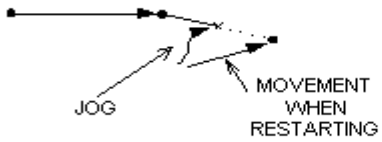
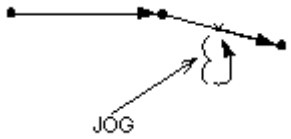
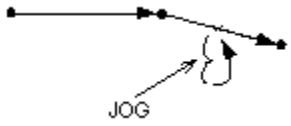
S2C252

Parameter Setting Value	Movement When Restarting
0	Move to next step. 

S2C252

Parameter Setting Value	Movement When Restarting
1	After moving deviated position, move to the indicated step.  MOVE FROM DEVIATED POSITION AND MOVE TO THE INDICATED STEP
2	 MOVE FROM DEVIATED POSITION AND STOP WHEN RESTARTING, MOVE TO THE INDICATED STEP

S2C253

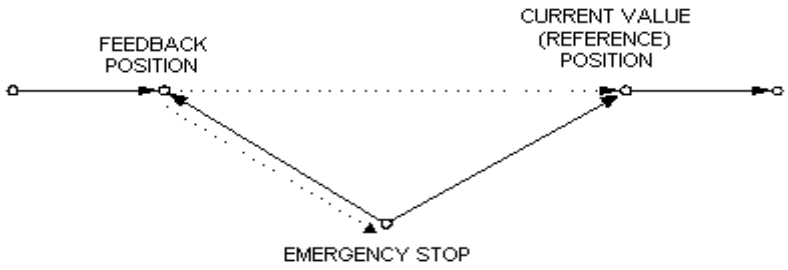
Parameter Setting Value	Movement When Restarting
0	Move to the next step.  MOVE TO NEXT STEP
1	After moving deviated position, move to the indicated step.  MOVE FROM DEVIATED POSITION AND MOVE TO THE INDICATED STEP
2	 MOVE FROM DEVIATED POSITION AND MOVE TO THE INDICATED STEP

*Moving speed from deviated position is the same as low-speed starting. It is linear movement. After resetting from deviation, the speed becomes the same as taught speed.

■ S2C254: DEVIATED POSITION

This parameter specifies whether deviated position is to be robot current (reference) position or feedback position.

0: Return to the feedback position.
1: Return to the current value (reference) position.



When emergency stop is applied during high-speed motion, the deviated position differs from the robot current value (reference) position and feedback position as shown in the following.

■ S2C257 to S2C259: ROBOT INTERFERENCE CHECK

This parameter specifies whether to check interference between robots 1, 2, and 3. Interference check is executed in the spherical range having the control point in the center. If “provided” is selected, also select the following parameters.

S3C409	ROBOT INTRF. CHECK	ROBOT1 SPHERE RADIUS
S3C410	in units of μm	ROBOT 2 SPHERE RADIUS
S3C411		ROBOT3 SPHERE RADIUS

■ S2C260: RELATIVE JOB OPERATION METHOD

This parameter specifies how to operate a relative job. A conversion method to convert a relative job into a standard job (pulse), and a conversion method to calculate the aimed position (pulse position) when a relative job is operated can be specified.

0: Previous Step With Priority
1: Form With Priority

■ S2C261: TOOL NO. SWITCHING

This parameter specifies whether two number switching is permitted or not. If “PERMIT” is selected, 24 types of tools from number 0 to 23 switched. If “NOT PERMIT” is selected, only number “0” can be used.

■ S2C263: POSITION TEACHING BUZZER

This parameter specifies whether the buzzer sound at position teaching is used or not.

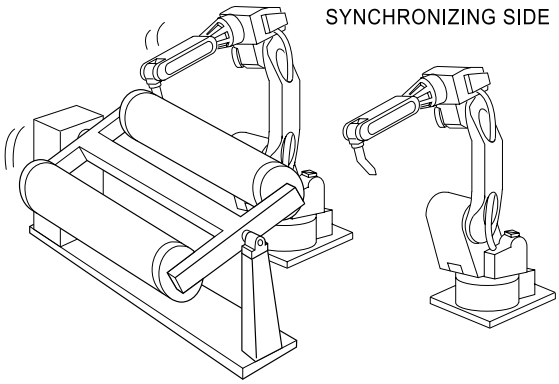
■ S2C264: JOB LINKING DESIGNATION (When Twin Synchronous Function Used)

Specify whether the manipulator at the synchronizing side is to be linked when the robot and the station at the synchronized side are performing FWD/BWD or test run, by using the twin synchronous function.

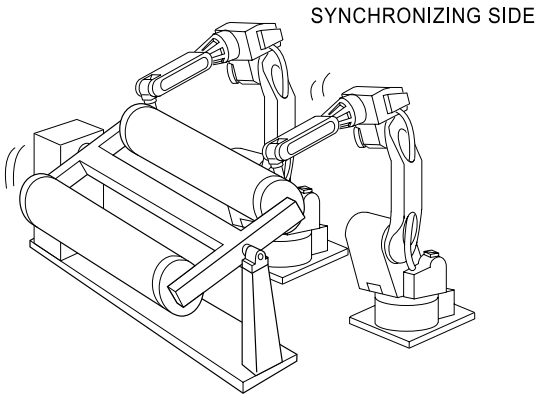
0: Not operating

1: Linking

0: Does not operate the synchronizing side while teaching the synchronized side.



1: Links the synchronizing side while teaching the synchronized side.



2.2.3 S3C Parameter

S3C parameters specify auxiliary functions of S2C parameters. For details of functions, see the explanation of the corresponding S2C parameters (“2.2.2 S2C PARAMETERS”).

Parameters	Meaning	Reference Parameters
S3C000-S3C017	Cube Soft Limit	S2C001
S3C018-S3C023	S-Axis Interference Area	S2C002
S3C024-S3C407	Cube Interference Area	S2C003-S2C026
S3C409, S3C410 S3C411	Robot Interference Area	S2C257-S2C259

■ S3C412: WORK HOME POSITION CUBE

This parameter specifies a side length of the cube for the work home position.

■ S3C413 to S3C415: POSITION CORRECTING FUNCTION DURING PLAYBACK

These parameters specify the necessary data for position correcting function (PAM) during playback operation.

S3C413 Specifies the limit of position correcting range

S3C414 Specifies the limit of speed correcting range

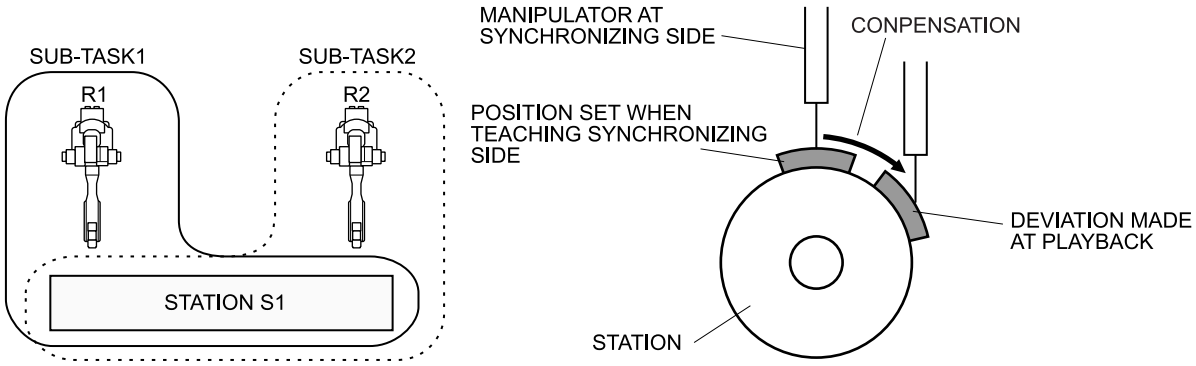
S3C415 Specifies the correcting coordinates
0: Base
1: Robot
2: Tool
3: User 1
to
26:User 24

■ S3C416: MAXIMUM DEVIATION ANGLE OF CURRENT STATION POSITION (When Twin Synchronous Function Used)

Used when the twin synchronous function is used. Specify the maximum deviation of the teaching position and the current station position.

0 : No deviation check

Other than 0 : Deviation Angle (unit: 0.1°)



In the above figure on the left, the follower R2 executes the job of subtask 2 in synchronization with the motion of the station axis which is moved by the R1 job. In this procedure, the job of subtask 2 controls only the R2 robot axis.
If the teaching position of the station in the subtask 2 differs from the station current position (controlled by the subtask 1 job), the difference is automatically offset so that R2 keeps the taught position in relation to the station.

Difference between the taught and the station current positions is always monitored if the difference exceeds a set value of the parameter, the message “PULSE LIMIT (TWIN COORDINATED)”.

■ S3C426 to S3C449: ANALOG OUTPUT FILTER CONSTANT (When analog output corresponding to speed function is used)

By setting a constant to filter, a filter processing can be performed for the output analog signal.

■ S3C450: CUT WIDTH CORRECTION VALUE (When form cutting function is used)

This parameter specifies the path correction value for pattern cutting operation. A value 1/2 of the cut width is set in units of μm.

2.2.4 S4C Parameter

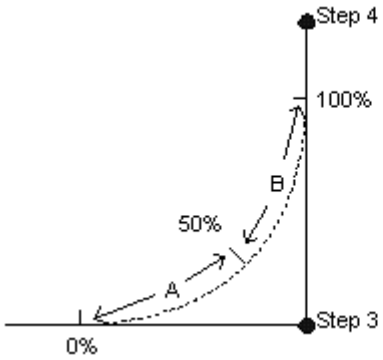
■ S4C015: CURSOR ADVANCE CONTROL FUNCTION

This parameter specifies whether to use the cursor advance control function or not.

0: Not use
1: Use

■ S4C016: CURSOR ADVANCE CONTROL FUNCTION CONT PROCESS COMPLETION POSITION

When the manipulator stops during moving inner conner by CONT process, this parameter specifies which position of the inner conner should be considered as the end of step.
The units is %.



When 50% is set, moves to Step 3 if the manipulator stops in A section, and to Step 4 if the manipulator stops in B section.

■ S4C017: CURSOR ADVANCE CONTROL FUNCTION WORK START INSTRUCTION STEP MOTION COMPLETION DELAY TIME

In order to recognize securely the completion of motion to the step of work start instruction (such as ARCON instruction), this parameter specifies the delay time for motion completion only of the work start instruction step.
The units is msec.

■ S4C040 to S4C045: TWIN DRIVE UNIVERSAL INPUT NO. DESIGNATION (WHEN TWIN DRIVE FUNCTION USED)

In the twin drive function, synchronous operation mode and single operation mode can be alternated by general input signal from an external device. These parameters specify the general input number to be used.

0 : Operates in the synchronous operation mode without any conditions.

1-192: General input number. When the specified general input signal is turned off, operation is performed in the synchronous operation mode. When it is turned on, operation is performed in the single operation mode.

■ S4C049: OPERATION OF JOB WITHOUT CONTROL GROUP SPECIFICATION

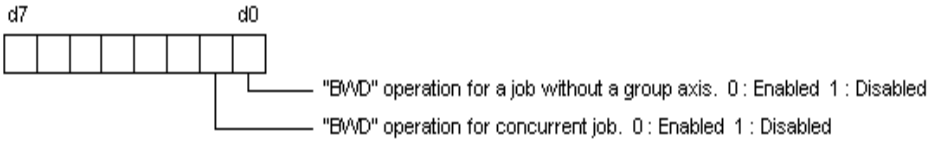
When the servo power supply is individually turned OFF where jobs in multiple number of tasks are operated using the independent control function, the job execution of the control group whose servo power supply is turned OFF is interrupted. The jobs of other control groups continue their execution.
For the jobs without control group specification such as master job, the conditions for execution can be set by the parameter.

0: Execution possible only when servo power supply to all the axes have been turned ON

1: Execution possible when servo power supply to any axis is turned ON.

■ S4C050: EXECUTION OF “BWD” OPERATION

This parameter prohibit step-back operation of a job without a step.



■ S4C052: PERMISSION TO CHANGE NON-MOVE INSTRUCTION TO MOVE INSTRUCTION

This parameter specifies prohibition/permission to change registered non-move to a move instruction.

0: Prohibited

1: Permitted

■ S4C053: STATION AXIS CURRENT VALUE DISPLAY FUNCTION

This parameter specifies whether the function to display the current value of the station axis in the following units is valid/invalid.

- Rotary Axis: Angle (deg)
- Traveling Axis: Distance (mm)

0: Invalid
1: Valid

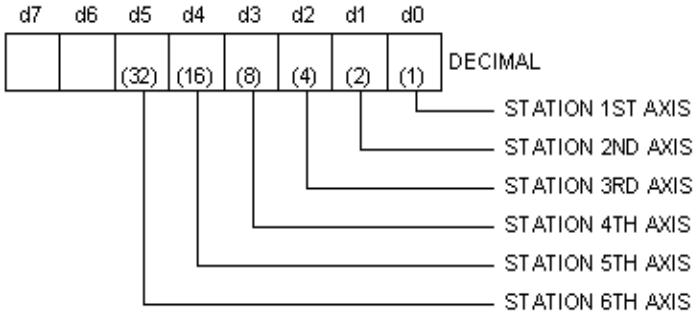
■ S4C054 to S4C059: STATION DISPLAYED UNIT

This parameter specifies the station displayed unit (bit specification).

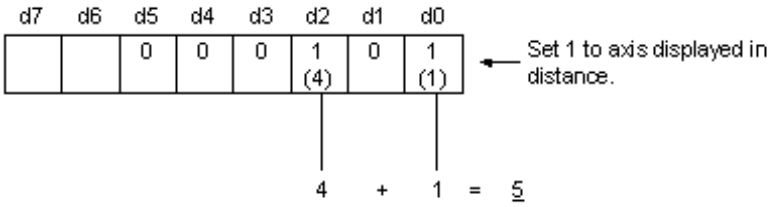
0: Display Angle (deg)
1: Display in Distance (mm)

Setting Method

Set a numerical value (decimal) where the bit of the axis to be displayed in the units of distance becomes 1.



<Example> When 1st and 3rd Axes of Station 1 are Displayed in the Units of Distance



Therefore, set parameter S4C054 of station 1 to 5.

■ S4C060: BASE AXIS OPERATION KEY ALLOCATION SETTING

Parameter Setting and Jog Operation Key Allocation

Coordinates/Parameter	S4C060= ”0”	S4C060= “1”
Joint	Axis number order	Specified
Cylinder	Axis number order	Specified
Rectangular	Specified	Specified
Tool	Specified	Specified
User	Specified	Specified

Axis number order: X: First Axis, Y: Second Axis, Z: Third Axis
Specified: X: X-Direction (RECT-X), Y: Y-Direction (RECT-Y), Z: Z-Direction (RECT-Z)

2.3 TRANSMISSION PARAMETERS

■ RS000: COMMUNICATION PROTOCOL

The protocol of the serial port of the XCP01 substrate is specified. When the FC1 procedure is selected, FC1/FC2 cannot be used in the port of the programming pendant.

0: No Protocol
2: Basic Protocol
3: FC1 Protocol

2.3.1 Basic Protocol

Specify when using Yaskawa data transmission functions.

■ RS030: NUMBER OF DATA BITS

This parameter specifies the data length.

■ RS031: NUMBER OF STOP BITS

This parameter specifies the number of stop bits.

■ RS032: PARITY

This parameter specifies the parity bits.

■ RS033: TRANSMISSION SPEED

This parameter specifies the transmission speed in units of bauds.

■ RS034: RESPONSE WAITING TIMER (TIMER A)

This timer monitors the sequence. It specifies the response waiting time for invalid or missing responses.

■ RS035: TEXT TERMINATION MONITORING TIMER (TIMER B)

This timer monitors text reception. Specify the monitoring time to wait for termination character.

■ RS036: NUMBER OF ENQ RE-TRANSMISSION RETRIES

This parameter specifies the number of re-transmission attempts of the control characters for invalid or missing responses.

■ RS037: NUMBER OF DATA RE-TRANSMISSION RETRIES

This parameter specifies the number of re-transmission attempts of text for block check error (NAK reception).

■ RS038: BLOCK CHECK METHOD

This parameter specifies the checking method for text transmission errors. Set “0” for this protocol.

2.3.2 FC1 Protocol

The following protocols naturally correspond to the external memory unit, YASNAC FC1 or FC2.

■ RS050: NUMBER OF DATA BITS

This parameter specifies the data length.

■ RS051: NUMBER OF STOP BITS

This parameter specifies the number of stop bits.

■ RS052: PARITY

This parameter specifies the parity bits.

■ RS053: TRANSMISSION SPEED

This parameter specifies the transmission speed in units of bauds.

■ RS054: RESPONSE WAITING TIMER (TIMER A)

This timer monitors the sequence. Specifies the response waiting time for invalid or missing responses.

■ RS055: TEST TERMINATION MONITORING TIMER (TIMER B)

This timer monitors text reception. Specify the monitoring time to wait for text termination character.

■ RS056: NUMBER OF ENQ RE-TRANSMISSION RETRIES

This parameter specifies the number of re-transmission attempts of the control characters for invalid or missing responses.

■ RS057: NUMBER OF DATA RE-TRANSMISSION RETRIES

This parameter specifies the number of re-transmission attempts of text for block check error (NAK reception).

■ RS058: FC2 FORMAT SPECIFICATION

Specify the format type of the floppy disk used with external memory (YASNAC FC2).
(Note) 720 kilobytes are unconditionally specified for YASNAC FC2 (2DD floppy disk exclusive use).

■ RS059: EXTERNAL MEMORY FILE OVERWRITE SPECIFICATION

Specify whether to accept the file overwrite of the external memory (YASNAC FC2 or FC1).

2.4 Application Parameters

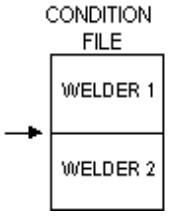
2.4.1 Arc Welding

■ AxP000: APPLICATION

This parameter specifies the application. Set “0” for arc welding.

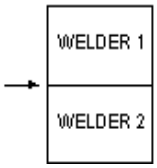
■ AxP003: WELDING ASSIGNMENT OF WELDING START CONDITION FILE

This parameter specifies the beginning condition number in the welding start condition file to be assigned to welder 2. Condition files of a lower number are automatically assigned to welder 1. For a system with one welder, set “49” (maximum value).



■ AxP004: WELDING ASSIGNMENT OF WELDING END CONDITION FILES

This parameter specifies the beginning condition number in the welding END condition file to be assigned to welder 2. Condition files of a lower number are automatically assigned to welder 1. For a system with one welder, set “13”.



■ AxP005: WELDING SPEED PRIORITY

This parameter whether the welding speed is specified by the “ARCON” instruction or by the welding start condition file or added to “MOV” instruction.

■ AxP009: WORK CONTINUING

This parameter specifies whether to output an “ARCON” instruction to restart after the manipulator stopped while the “ARCON” instruction is being output.

■ AxP010: WELDING INSTRUCTION OUTPUT

This parameter specifies the beginning number (0 to 12) of the analog output channel to the welder. “0”indicates that no welder exists.

■ AxP011, AxP012: MANUAL WIRE OPERATION SPEED

These parameters specify the manual wire operation speed as a percentage of the maximum instruction value. Instruction polarity is determined by the current instruction in the welder characteristic file. The setting range is from 0 to 100.

■ AxP013, AxP014: WELDING CONTROL TIME

These parameters specify the welding control time in units of minutes. The setting range is from 0 to 999.

■ AxP015 to AxP017: NUMBER OF WELDING CONTROL

These parameters specify the number of welding controls. The setting range is from 0 to 99.

■ AxP026 to AxP029: TOOL ON/OFF GENERAL OUTPUT NO. (Jigless system)

These parameters specify the general-purpose output number for the tool open/close operation by specific keys.

2.4.2 Handling Application

■ AxP002, AxP004: f1 KEY FUNCTION

These parameters set the output signal to assign for f1 key.

0: Not specified
1 to 4: Specific outputs for HAND-1 to HAND4-2
5: General purpose output (No. is specified by AxP004).

■ AxP003, AxP005: f2 KEY FUNCTION

These parameters set the output signal to assign for f2 key.

0: Not specified
1 to 4: Specific outputs for HAND-2 to HAND4-2
5: General purpose output (No. is specified by AxP005)

2.4.3 Spot Welding

■ AxP003: MAXIMUM NUMBERS OF CONNECTED WELDERS

The initial value is set to 4.

■ AxP004: GUN FULL OPEN STROKE ON/OFF SIGNAL

Bit specification for 8 guns. The initial value is set to 0.

```
0 0 0 0 0 0 0 0
| | | | | | | |
8 7 6 5 4 3 2 1    Gun Number
```

■ AxP005: STROKE CHANGE ANSWER TIME LIMIT

Setting range: 0.0 to 9.9 sec.
The initial value is set to 0.

■ AxP006: PARITY SPECIFICATION FOR WELDING CONDITIONS

Bit specification for 4 welder. (0: odd number, 1: even number) The initial value is set to 0.

```
0 0 0 0 0 0 0 0
        | | | |
        4 3 2 1    Welder Number
```

■ AxP007: ANTICIPATE TIME

The processing time for tag (ATT = ...) of SPOT instruction omitted. The initial value is set to 0.

■ AxP015: WELDING ERROR RESET OUTPUT TIME

This parameter sets the output time of the welding error reset signal to the welder when the alarm reset signal is input.
If the setting is "0", the welding error reset signal is not output to the welder even if the alarm reset signal is input.

■ AxP016, AxP017: ELECTRODE WEAR AMOUNT ALARM VALUE

These parameters set the electrode wear amount alarm values (AxP016: movable side, AxP017: fixed side) at the wear detection.

2.4.4 General-purpose Application

■ AxP009: WORK CONTINUE PROHIBIT

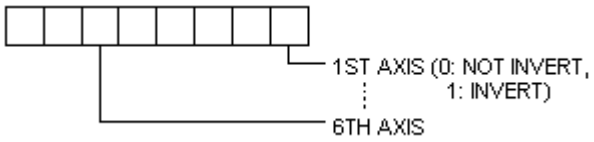
This parameter specifies whether to output TOOLON instruction or not at restarting when the work is stopped for some reasons during the output of TOOLON instruction.

2.5 Parameter List

2.5.1 S1CxG Parameter

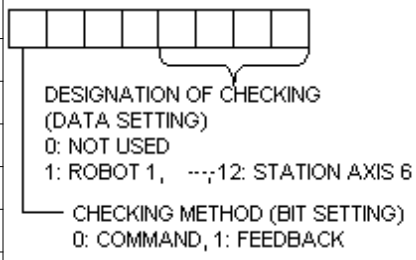
Parameter No.	Contents	Meaning		Initial Value
S1CxG000	In-guard Safe Operation Max. Speed	Specified by percentage of the max. speed Units:0.01%		*
S1CxC001	Dry-run Speed	Specified by percentage of the max. speed Units:0.01%		*
S1CxG002	Joint Speed for Registration	Level 1	Units: 0.01% (Max. 100%)	*
S1CxG003		Level 2		*
S1CxG004		Level 3		*
S1CxG005		Level 4		*
S1CxG006		Level 5		*
S1CxG007		Level 6		*
S1CxG008		Level 7		*
S1CxG009		Level 8		*
S1CxG010	Linear Speed for Registration	Level 1	Units: 0.1mm/sec (within range of max. play speed)	*
S1CxG011		Level 2		*
S1CxG012		Level 3		*
S1CxG013		Level 4		*
S1CxG014		Level 5		*
S1CxG015		Level 6		*
S1CxG016		Level 7		*
S1CxG017		Level 8		*
S1CxG018	Position Angle Speed for Registration	Level 1	Units: 0.1°/sec (within range of max. play speed)	*
S1CxG019		Level 2		*
S1CxG020		Level 3		*
S1CxG021		Level 4		*
S1CxG022		Level 5		*
S1CxG023		Level 6		*
S1CxG024		Level 7		*
S1CxG025		Level 8		*
S1CxG026	Jog Operation Absolute Value Speed	Low Level	Units: 0.1mm/sec (within range of max. jog speed)	*
S1CxG027		Medium Level		*
S1CxG028		High Level		*
S1CxG029		High Speed Level		*

Parameter No.	Contents	Meaning		Initial Value
S1CxG030	Inching Move Amount	Joint Operation: units: pulses		*
S1CxG031		Perpendicular/cylindrical operation (tool, user) Units: 0.1mm/sec		*
S1CxG032		Control Point Constant Operation Units: 0.1°		*
S1CxG033	Positioning Zone	Level 1	Units: μm Distance from target position	*
S1CxG034		Level 2		*
S1CxG035		Level 3		*
S1CxG036		Level 4		*
S1CxG037	System Reserved			0
S1CxG038				
S1CxG039				
S1CxG040				
S1CxG041				
S1CxG042				
S1CxG043				
S1CxG044	Low Speed Start	Specified by percentage of the max. speed Units: 0.01%		*
S1CxG045	Jog Operation Link Speed	Low Level	Units: 0.01% For job joint max. speed	*
S1CxG046		Medium Level		*
S1CxG047		High Level		*
S1CxG048		High Speed Level		*
S1CxG049	YAG Laser Small Circle Cutting	Min. Diame-ter	Size of figure Unit μm	400
S1CxG050		Max. Diam-eter		30000
S1CxG051		Max. Speed	Cutting speed Unit:0.1mm/s	1117
S1CxG052	YAG Laser Small Circle Cutting Direction Limit Value	+direction	Cutting angle DIR limit value Unit:0.01°	18000
S1CxG053		-direction		-18000
S1CxG054	YAG Laser Small Circle Cutting Overlapped Value	Motion radius	Unit: μm	1500
S1CxG055		Rotating speed	Unit: 0.01°	900
SICxG056	Work home Position Return Speed	Specified by percentage of the max. speed Units: 0.1%		5000
SICxG057	Search Max.Speed	0: Job speed Units: 0.1mm/s Other than 0: Search motion maximum speed		*
SICxG058 to SICxG062		Not Used		0
S1CxG063	Form Cutting Dimen-sions	Min. dia.	Units: μm	1000
S1CxG064		Max. dia	Units: μm	1000000

Parameter No.	Contents	Meaning		Initial Value
S1CxG065	Mirror Shift Sign Inversion	Specification of shift axis (inverts sign) 		*
S1CxG066 to S1CG069		Not used		0
SICxG070	Pulse Soft Limit (+)	1st Axis	Units: pulses	*
SICxG071		2nd Axis		*
SICxG072		3rd Axis		*
SICxG073		4th Axis		*
SICxG074		5th Axis		*
SICxG075		6th Axis		*
SICxG076		7th Axis		0
SICxG077		8th Axis		0
SICxG078	Pulse Soft Limit (-)	1st Axis	Units: pulses	*
SICxG079		2nd Axis		*
SICxG080		3rd Axis		*
SICxG081		4th Axis		*
SICxG082		5th Axis		*
SICxG083		6th Axis		*
SICxG084		7th Axis		0
SICxG085		8th Axis		0
SICxG086	Allowable Move Amount at Starting	1st Axis	Units: pulses	0
SICxG087		2nd Axis		0
SICxG088		3rd Axis		0
SICxG089		4th Axis		0
SICxG090		5th Axis		0
SICxG091		6th Axis		0
SICxG092		7th Axis		0
SICxG093		8th Axis		0
SICxG094 to SICxG149		Not Used		0

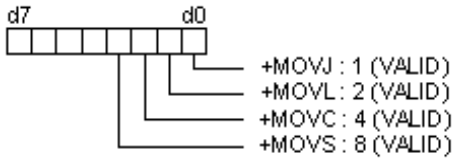
2.5.2 S2C Parameter

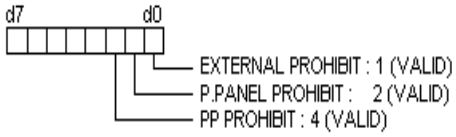
Parameter No.	Contents	Meaning		Initial Value
S2C000	System Reserved			0
S2C001	Cube Soft Limit Check 0: No Check 1: With Check (Bit Specification)	d0	Cube Soft Limit 1 Base Coordinate Value of Robot 1 Control Point	0
		d1	Cube Soft Limit 2 Base Coordinate Value of Robot 2 Control Point	
		d2	Cube Soft Limit 3 Base Coordinate Value of Robot 3 Control Point	
		d3		
		d4		
		d5		
		d6		
		d7		
S2C002	S-Axis Interference Check 0: No Check 1: With Check (Bit Specification)	d0	Robot 1	0
		d1	Robot 2	
		d2	Robot 3	
		d3		
		d4		
		d5		
		d6		
		d7		
S2C003	Interference Check	Interference 1	Checking specification 0: Not used 1: Robot 1 2: Robot 2 3: Robot 3 4: Base 1 5: Base 2 6: Base 3 7: Station 1 8: Station 2 9: Station 3 10: Station 4 11: Station 5 12: Station 6 Checking method Specified by the most significant bit 0: Command 1: Feedback	0
S2C004		Interference 2		
S2C005		Interference 3		
S2C006		Interference 4		
S2C007		Interference 5		
S2C008		Interference 6		
S2C009		Interference 7		
S2C010		Interference 8		
S2C011		Interference 9		
S2C012		Interference 10		
S2C013		Interference 11		
S2C014		Interference 12		
S2C015		Interference 13		
S2C016		Interference 14		
S2C017		Interference 15		
S2C018		Interference 16		

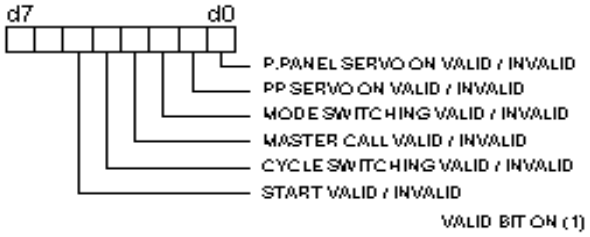
Parameter No.	Contents	Meaning		Initial Value
S2C019		Interference 17		0
S2C020		Interference 18		
S2C021		Interference 19		
S2C022		Interference 20		
S2C023		Interference 21		
S2C024		Interference 22		
S2C025		Interference 23		
S2C026		Interference 24		
S2C027	Interference 1 Using Method	Coordinate Specification	Coordinate Specification 0: Pulse 1: Base Coordinate 2: Robot Coordinate 3: User Coordinate Coordinate No. Specifies when the “3: User coordinate” is specified for the coordinate.	0
S2C028		Coordinate No.		0
S2C029	Interference 2 Using Method	Coordinate Specification		0
S2C030		Coordinate No.		0
S2C031	Interference 3 Using Method	Coordinate Specification		0
S2C032		Coordinate No.		0
S2C033	Interference 4 Using Method	Coordinate Specification		0
S2C034		Coordinate No.		0
S2C035	Interference 5 Using Method	Coordinate Specification		0
S2C036		Coordinate No.		0
S2C037	Interference 6 Using Method	Coordinate Specification		0
S2C038		Coordinate No.		0
S2C039	Interference 7 Using Method	Coordinate Specification		0
S2C040		Coordinate No.		0
S2C041	Interference 8 Using Method	Coordinate Specification		0
S2C042		Coordinate No.		0
S2C043	Interference 9 Using Method	Coordinate Specification		0
S2C044		Coordinate No.		0
S2C045	Interference 10 Using Method	Coordinate Specification		0
S2C046		Coordinate No.		0
S2C047	Interference 11 Using Method	Coordinate Specification		0
S2C048		Coordinate No.		0
S2C049	Interference 12 Using Method	Coordinate Specification		0
S2C050		Coordinate No.		0

Parameter No.	Contents	Meaning		Initial Value
S2C051	Interference 13 Using Method	Coordinate Specification	Coordinate Specification 0: Pulse 1: Base Coordinate 2: Robot Coordinate 3: User Coordinate Coordinate No. Specifies when the “3: User coordinate” is specified for the coordinate.	0
S2C052		Coordinate No.		0
S2C053	Interference 14 Using Method	Coordinate Specification		0
S2C054		Coordinate No.		0
S2C055	Interference 15 Using Method	Coordinate Specification		0
S2C056		Coordinate No.		0
S2C057	Interference 16 Using Method	Coordinate Specification		0
S2C058		Coordinate No.		0
S2C059	Interference 17 Using Method	Coordinate Specification		0
S2C060		Coordinate No.		0
S2C061	Interference 18 Using Method	Coordinate Specification		0
S2C062		Coordinate No.		0
S2C063	Interference 19 Using Method	Coordinate Specification		0
S2C064		Coordinate No.		0
S2C065	Interference 20 Using Method	Coordinate Specification		0
S2C066		Coordinate No.		0
S2C067	Interference 21 Using Method	Coordinate Specification		0
S2C068		Coordinate No.		0
S2C069	Interference 22 Using Method	Coordinate Specification		0
S2C070		Coordinate No.		0
S2C071	Interference 23 Using Method	Coordinate Specification		0
S2C072		Coordinate No.		0
S2C073	Interference 24 Using Method	Coordinate Specification		0
S2C074		Coordinate No.		0

Parameter No.	Contents	Meaning	Initial Value
S2C075	Function Setting for Operation	Power On Security Mode 0: Operation Mode 1: Editing Mode 2: Management mode	1
S2C076		Selection of Perpendicular/Cylindrical 0: Cylindrical Operation 1: Perpendicular Operation	1
S2C077		Coordinate switching at “JOG” operation 0: Tool & User Coordinates Switching 1: Tool Coordinate Switching Prohibit 2: User Coordinate Switching Prohibit 3: Tool & User Coordinates Switching Prohibit	0
S2C078		Execution units “FORWARD” operation 0: Every 1 line 1: Every 1 step	0
S2C079		Instruction (except for MOVE) execution at “FORWARD” operation 0: Executes at pressing simultaneously with [INTER LOCK] key 1: Executes only at pressing the [FWD] key 2: No instruction executed	0
S2C080		Not used	0
S2C081		Posture control at perpendicular operation at JOG 0: Provided 1: Not provided	0
S2C082		Operation in user coordinate system 0: Robot control point 1: External base point	0
S2C083		Step-only changing in the editing prohibited job 0: Permit 1: Prohibit	1
S2C084		Manual speed storing for each coordinate 0: Not stored 1: Stored	0
S2C085	Function Setting for Editing		0
S2C086		Additional step position 0: Before Next Step 1: Next to Cursor Position	0
S2C087		Master Job Changing Operation 0: Permit 1: Prohibit	0
S2C088		Check and Machine Lock Key Operation in Play Mode 0: Permit 1: Prohibit	0
S2C089		Reserved Work Job Changing Operation 0: Permit 1: Prohibit	0

Parameter No.	Contents	Meaning	Initial Value
S2C090	Function Setting in Editing	Master Call Operation in Play Mode 0: Permit 1: Prohibited	0
S2C091		Language Level 0: Contracted 1: Standard 2: Expanded	0
S2C092		MOV Instruction Speed Input 0: Not Provided 1: Provided	0
S2C093		MOV Instruction Interpolation Input 	2
S2C094		Instruction Input Learning Function	1

Parameter No.	Contents	Meaning	Initial Value
S2C095	Function Setting for General Operation	Address setting when the control power is turned on 0: Address when the power is off 1: Initialization (lead address of the master job)	0
S2C096		Job List Display Method at Job Selection 0: Order of Names 1: Order of Date 2: Order of Registration	2
S2C097		Initial Operating Speed of the Manipulator 0: Specified in “operating condition” display 1: Low-speed start after editing	0
S2C098		Playback execution at cycle mode “1-step” 0: Every one line 1: Every one step	0
S2C099		External Start 0: Permit 1: Prohibit	0
S2C100		Playback Panel Start 0: Permit 1: Prohibit	0
S2C101		Speed Data Input Form 0: mm/s 1: cm/min 2: inch/min 3: mm/min	1
S2C102		Reserved Start 0: Permit 1: Prohibit	1
S2C103			
S2C104		Job Selection at Remote Function (Play mode) 0: Permit 1: Prohibit	0
S2C105		External Mode Switching 0: Permit 1: Prohibit	0
S2C106		Mode Switching from Playback Panel 0: Permit 1: Prohibit	0
S2C107		External Cycle Switching 0: Permit 1: Prohibit	0
S2C108		Cycle Switching from the Programming Pendant 0: Permit 1: Prohibit	0
S2C109		Servo On Prohibition 	0

Parameter No.	Contents	Meaning	Initial Value
S2C110	Function Setting for General Operation	Playback Panel and Programming Pendant Operation When “IO” is Selected for Remote Mode 	0
S2C111		Operation Method at FWD/BWD Operation or Test Run by Independent Control 0: Job of Displayed Task 1: Start Job	0
S2C112		Job at calling master of sub task 1,2,3,4,5 by independent control 0: Master job 1: Root job	0
S2C113	Function Setting for General Operation	Not used	
S2C114		Registration of step with tool No. 0: Permit 1: Prohibit	0

Parameter No.	Contents	Meaning	Initial Value
S2C115	General I/O Relay Function	General output relay setting when the control power is on 0: Reset to power off 1: Initialization (All general relays are off)	0
S2C116			0
S2C117		Parity of general input group(IG#01-IG#08) 0: No parity check 1: With parity check Parity of general input group(IG#09-IG#16) 0: No parity check 1: With parity check Parity of general input group(IG#17-IG#24) 0: No parity check 1: With parity check	0
S2C118 S2C119			
S2C120			0
S2C121			0
S2C122		Parity of General Output Group (OG#01 to OG#08) 0: No Parity Check 1: With Parity Check	0
S2C123		Parity of General Output Group (OG#09 to OG#16) 0: No Parity Check 1: With Parity Check	
S2C124		Parity of General Output Group (OG#17 to OG#24) 0: No Parity Check 1: With Parity Check	
S2C125			0
S2C126			0
S2C127		Data of General Input Group (IG#01 to IG#08) 0: Binary Data 1: BCD Data	
S2C128		Data of General Input Group (IG#09 to IG#16) 0: Binary Data 1: BCD Data	0
S2C129		Data of General Input Group (IG#17 to IG#24) 0: Binary Data 1: BCD Data	0
S2C130			0
S2C131			0
S2C132		Data of General Output Group (OG#01 to OG#08) 0: Binary Data 1: BCD Data	0
S2C133		Data of General Output Group (OG#09 to OG#16) 0: Binary Data 1: BCD Data	0
S2C134		Data of General Output Group (OG#17 to OG#24) 0: Binary Data 1: BCD Data	0
S2C135			
S2C136			

Parameter No.	Contents	Meaning	Initial Value
S2C137			
S2C138			
S2C139	Remote Initial Cycle Mode	0: Step 1: 1 Cycle 2: Continuous Cycle 3: Not specified	1
S2C140	Local Initial Cycle Mode	0: Step 1: 1 Cycle 2: Continuous Cycle 3: Not specified	1
S2C141	General output number when robot drop allowable range error occurs	0: No output 1 to 192: General output	0
S2C142			
S2C143	General Output Group to be Initialized at Switching Mode	Output group (OG#1 to OG#08) Bit specification 0: Not initialized 1: Initialized	0
S2C144		Output group (OG#09 to OG#16) Bit specification 0: Not initialized 1: Initialized	0
S2C145		Output group (OG#17 to OG#24) Bit specification 0: Not initialized 1: Initialized	0
S2C146 to S2C157		Not Used	0
S2C158	Power On Initial Cycle Mode	0: Step 1: 1 Cycle 2: Continuous Cycle 3: Not specified	1
S2C159	Teach Mode Initial Cycle Mode	0: Step 1: 1 Cycle 2: Continuous Cycle 3: Not specified	1
S2C160	Play Mode Initial Cycle Mode	0: Step 1: 1 Cycle 2: Continuous Cycle 3: Not specified	1
S2C161	Alarm Code Specific Output Data	0: Binary Data 1: BCD Data 3: Not specified	0
S2C162	Start Condition After Absolute Data Allowable Range Error	0: Position Checking Operation Required 1: Low-speed Start	0
S2C163 to S2C165		Not used	0

Parameter No.	Contents	Meaning		Initial Value
S2C166	Job Teaching Position Change of Controlled Group	0: Possible 1: Not possible		0
S2C167	Cooling Fan Alarm Detection	Cooling fan alarm 0: Not detected 1: Detected with message display 2: Detected with message/alarm display		0
S2C168	Cooling Fan Alarm 1 Operation Specification	SERVOPACK #1 to #4 - Power ON unit connection specification		0
S2C169		SERVOPACK #5 to #6 - Power ON unit connection specification		0
S2C170	Cooling Fan Alarm 2 Operation Specification	SERVOPACK #1 to #4 - Power ON unit connection specification		0
S2C171		SERVOPACK #5 to #6 - Power ON unit connection specification		0
S2C172	Cooling Fan Alarm 3 Operation Specification	SERVOPACK #1 to #4 - Power ON unit connection specification		0
S2C173		SERVOPACK #5 to #6 - Power ON unit connection specification		0
S2C174 to S2C212		Not used		0
S2C213	Setting of Operating Relay Number	Setting 1	Logic Output Number (1-192)	0
S2C214		Setting 2		
S2C215		Setting 3		
S2C216		Setting 4		
S2C217		Setting 5		
S2C218		Setting 6		
S2C219		Setting 7		
S2C220		Setting 8		
S2C221		Setting 9		
S2C222		Setting 10		
S2C223		Setting 11		
S2C224		Setting 12		
S2C225		Setting 13		
S2C226		Setting 14		
S2C227		Setting 15		
S2C228		Setting 16		

Parameter No.	Contents	Meaning		Initial Value
S2C229	Operating Method of Relays	Setting 1	0: On at On Key, Off at Off Key 1: On/Off at On Key	0
S2C230		Setting 2		
S2C231		Setting 3		
S2C232		Setting 4		
S2C233		Setting 5		
S2C234		Setting 6		
S2C235		Setting 7		
S2C236		Setting 8		
S2C237		Setting 9		
S2C238		Setting 10		
S2C239		Setting 11		
S2C240		Setting 12		
S2C241		Setting 13		
S2C242		Setting 14		
S2C243		Setting 15		
S2C244		Setting 16		
S2C245	Control Power On Time Reset	0: Prohibit 1: Permit		0
S2C246	Servo Power On Time Reset			0
S2C247	Playback Time Reset			0
S2C248	Work Time Reset			1
S2C249	Moving Time Reset			1
S2C250	Posture Control of Synchronized Manipulator (When station twin synchronous function used)	0: Matched to station movement 1: Fixed in relation to the ground		0
S2C251	Posture Control of Manipulator in Multi-Job (When station twin synchronous function used)	0: Matched to station movement 1: Fixed in relation to the ground		0
S2C252	Operation After Reset From Locus Deviation	After Emergency Stop	0: Move to the indicated step 1: After moving from deviated position, move to the indicated step. 2: Move from deviated position and stop.	0
S2C253		After JOG Operation		0
S2C254	Deviated Position	0: Return to the feedback position. 1: Return to the current value position.		0
S2C255	System Reserved			0
S2C256	System Reserved			0

Parameter No.	Contents	Meaning	Initial Value
S2C257	Robot Interference Check	Interference Check Between Robot 1 and Robot 2 0: No Provided 1: Provided	0
S2C258		Interference Check Between Robot 1 and Robot 3 0: No Provided 1: Provided	0
S2C259		Interference Check Between Robot 2 and Robot 3 0: No Provided 1: Provided	0
S2C260	Relative Job Operation Method	0: Previous Step with Priority 1: Form with Priority	0
S2C261	Tool Number Switching	0: Prohibit 1: Permit	0
S2C262	System Reserved		0
S2C263	Position Teaching Buzzer	0: Used 1: Not Used	0
S2C264	Job Linking Designation	0: Not Operating 1: Linking	0
S2C265 to S2C499		Not used	0

2.5.3 S3C Parameter

Parameter No.	Contents	Meaning		Initial Value
S3C000	Cube 1 Soft Limit (Base Coordinate Value of Robot 1 Control Point)	1st Position X	Units: µm	0
S3C001		Y		0
S3C002		Z		0
S3C003		2nd Position X		0
S3C004		Y		0
S3C005		Z		0
S3C006	Cube 2 Soft Limit (Base Coordinate Value of Robot 2 Control Point)	1st Position X	Units: µm	0
S3C007		Y		0
S3C008		Z		0
S3C009		2nd Position X		0
S3C010		Y		0
S3C011		Z		0
S3C012	Cube 3 Soft Limit (Base Coordinate Value of Robot 3 Control Point)	1st Position X	Units: µm	0
S3C013		Y		0
S3C014		Z		0
S3C015		2nd Position X		0
S3C016		Y		0
S3C017		Z		0
S3C018	Robot 1 S-Axis Interference	S(+)	Units: pulses	0
S3C019		S(-)		0
S3C020	Robot 2 S-Axis Interference	S(+)	Units: pulses	0
S3C021		S(-)		0
S3C022	Robot 3 S-Axis Interference	S(+)	Units: pulses	0
S3C023		S(-)		0
S3C024	Cube Interference/Axis Interference (Signal 1) Position 1 (+)	Axis 1 (X)	Axis Interference (S2C027=0), Axis 1-8 (+) pulse Unit: pulse	0
S3C025		Axis 2 (Y)		0
S3C026		Axis 3 (Z)		0
S3C027		Axis 4 (Not Used)	Cube Interference (S2C027=1, 2, or 3), (+X, Y, Z) Unit: (µm)	0
S3C028		Axis 5 (Not Used)		0
S3C029		Axis 6 (Not Used)		0
S3C030		Axis 7 (Not Used)		0
S3C031		Axis 8 (Not Used)		0
S3C032	Cube Interference/Axis Interference (Signal 1) Position 2 (-)	Axis 1 (X)	Axis Interference (S2C027=0), Axis 1-8 (-) pulse Unit: pulse	0
S3C033		Axis 2 (Y)		0
S3C034		Axis 3 (Z)		0
S3C035		Axis 4 (Not Used)	Cube Interference (S2C027=1, 2, or 3), (-X, Y, Z) Unit: (µm)	0
S3C036		Axis 5 (Not Used)		0
S3C037		Axis 6 (Not Used)		0
S3C038		Axis 7 (Not Used)		0
S3C039		Axis 8 (Not Used)		0

Parameter No.	Contents	Meaning		Initial Value
S3C040	Cube Interference/Axis Interference (Signal 2) Position 1 (+)	Axis 1 (X)	Axis Interference (S2C028=0), Axis 1-8 (+) pulse Unit: pulse Cube Interference (S2C028=1, 2, or 3), (+X, Y, Z) Unit: (µm)	0
S3C041		Axis 2 (Y)		0
S3C042		Axis 3 (Z)		0
S3C043		Axis 4 (Not Used)		0
S3C044		Axis 5 (Not Used)		0
S3C045		Axis 6 (Not Used)		0
S3C046		Axis 7 (Not Used)		0
S3C047		Axis 8 (Not Used)		0
S3C048	Cube Interference/Axis Interference (Signal 2) Position 2 (-)	Axis 1 (X)	Axis Interference (S2C028=0), Axis 1-8 (-) pulse Unit: pulse Cube Interference (S2C028=1, 2, or 3), (-X, Y, Z) Unit: (µm)	0
S3C049		Axis 2 (Y)		0
S3C050		Axis 3 (Z)		0
S3C051		Axis 4 (Not Used)		0
S3C052		Axis 5 (Not Used)		0
S3C053		Axis 6 (Not Used)		0
S3C054		Axis 7 (Not Used)		0
S3C055		Axis 8 (Not Used)		0
S3C056 to S3C063	Cube Interference /Axis Interference (Signal 3) Position 1 (+)			0
S3C064 to S3C071	Cube Interference /Axis Interference (Signal 3) Position 2 (-)			0
S3C072 to S3C079	Cube Interference /Axis Interference (Signal 4) Position 1 (+)			0
S3C080 to S3C087	Cube Interference /Axis Interference (Signal 4) Position 2 (-)			0
S3C088 to S3C095	Cube Interference /Axis Interference (Signal 5) Position 1 (+)			0
S3C096 to S3C103	Cube Interference /Axis Interference (Signal 5) Position 2 (-)			0
S3C104 to S3C111	Cube Interference /Axis Interference (Signal 6) Position 1 (+)			0
S3C112 to S3C119	Cube Interference /Axis Interference (Signal 6) Position 2 (-)			0
S3C120 to S3C127	Cube Interference /Axis Interference (Signal 7) Position 1 (+)			0
S3C128 to S3C135	Cube Interference /Axis Interference (Signal 7) Position 2 (-)			0

Parameter No.	Contents	Meaning		Initial Value
S3C136 to S3C143	Cube Interference /Axis Interference (Signal 8) Position 1 (+)			0
S3C144 to S3C151	Cube Interference /Axis Interference (Signal 8) Position 2 (-)			0
S3C152 to S3C159	Cube Interference /Axis Interference (Signal 9) Position 1 (+)			0
S3C160 to S3C167	Cube Interference /Axis Interference (Signal 9) Position 2 (-)			0
S3C168 to S3C175	Cube Interference /Axis Interference (Signal 10) Position 1 (+)			0
S3C176 to S3C183	Cube Interference /Axis Interference (Signal 10) Position 2 (-)			0
S3C184 to S3C191	Cube Interference /Axis Interference (Signal 11) Position 1 (+)			0
S3C192 to S3C199	Cube Interference /Axis Interference (Signal 11) Position 2 (-)			0
S3C200 to S3C207	Cube Interference /Axis Interference (Signal 12) Position 1 (+)			0
S3C208 to S3C215	Cube Interference /Axis Interference (Signal 12) Position 2 (-)			0
S3C216 to S3C223	Cube Interference /Axis Interference (Signal 13) Position 1 (+)			0
S3C224 to S3C231	Cube Interference /Axis Interference (Signal 13) Position 2 (-)			0
S3C232 to S3C239	Cube Interference /Axis Interference (Signal 14) Position 1 (+)			0
S3C240 to S3C247	Cube Interference /Axis Interference (Signal 14) Position 2 (-)			0
S3C248 to S3C255	Cube Interference /Axis Interference (Signal 15) Position 1 (+)			0
S3C256 to S3C263	Cube Interference /Axis Interference (Signal 15) Position 2 (-)			0

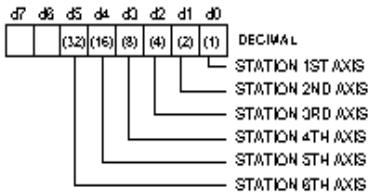
Parameter No.	Contents	Meaning		Initial Value
S3C264 to S3C271	Cube Interference /Axis Interference (Signal 16) Position 1 (+)			0
S3C272 to S3C279	Cube Interference /Axis Interference (Signal 16) Position 2 (-)			0
S3C280 to S3C287	Cube Interference /Axis Interference (Signal 17) Position 1 (+)			0
S3C288 to S3C295	Cube Interference /Axis Interference (Signal 17) Position 2 (-)			0
S3C296 to S3C303	Cube Interference /Axis Interference (Signal 18) Position 1 (+)			0
S3C304 to S3C311	Cube Interference /Axis Interference (Signal 18) Position 2 (-)			0
S3C312 to S3C319	Cube Interference /Axis Interference (Signal 19) Position 1 (+)			0
S3C320 to S3C327	Cube Interference /Axis Interference (Signal 19) Position 2 (-)			0
S3C328 to S3C335	Cube Interference /Axis Interference (Signal 20) Position 1 (+)			0
S3C336 to S3C343	Cube Interference /Axis Interference (Signal 20) Position 2 (-)			0
S3C344 to S3C351	Cube Interference /Axis Interference (Signal 21) Position 1 (+)			0
S3C352 to S3C359	Cube Interference /Axis Interference (Signal 21) Position 2 (-)			0
S3C360 to S3C367	Cube Interference /Axis Interference (Signal 22) Position 1 (+)			0
S3C368 to S3C375	Cube Interference /Axis Interference (Signal 22) Position 2 (-)			µ0
S3C376 to S3C383	Cube Interference /Axis Interference (Signal 23) Position 1 (+)			0
S3C384 to S3C391	Cube Interference /Axis Interference (Signal 23) Position 2 (-)			0

Parameter No.	Contents	Meaning		Initial Value
S3C392 to S3C399	Cube Interference /Axis Interference (Signal 24) Position 1 (+)			0
S3C400 to S3C407	Cube Interference /Axis Interference (Signal 24) Position 2 (-)			0
S3C408				0
S3C409	Robot Interference Check	Robot 1 Sphere Radius, Units: µm		0
S3C410		Robot 2 Sphere Radius, Units: µm		0
S3C411		Robot 3 Sphere Radius, Units: µm		0
S3C412	Side Length of Work Home Position Cube	Units: µm		100000
S3C413	Position Correcting Function During Play-back	Position Correcting Range, Units: µm		10000
S3C414		Speed Correcting Range, Units: 0.01%		5000
S3C415		Specifying Coordinate 0: Base 1: Robot 2: Tool 3: User 1 to 26: User 24		1
S3C416	Maximum Angle Difference of the Station Axis When Twin Synchronous Function Used	0: Not Checked Other than 0: Deviation Angle (Units: 0.1°)		0
S3C417 to S3C425	Not Used			0
S3C426	Analog Output 1 Filter Constant	Unit: msec	Primary filter constant	0
S3C427			Secondary filter constant	0
S3C428	Analog Output 2 Filter Constant	Unit: msec	Primary filter constant	0
S3C429			Secondary filter constant	0
S3C430	Analog Output 3 Filter Constant	Unit: msec	Primary filter constant	0
S3C431			Secondary filter constant	0
S3C432	Analog Output 4 Filter Constant	Unit: msec	Primary filter constant	0
S3C433			Secondary filter constant	0
S3C434	Analog Output 5 Filter Constant	Unit: msec	Primary filter constant	0
S3C435			Secondary filter constant	0
S3C436	Analog Output 6 Filter Constant	Unit: msec	Primary filter constant	0
S3C437			Secondary filter constant	0
S3C438	Analog Output 7 Filter Constant	Unit: msec	Primary filter constant	0
S3C439			Secondary filter constant	0
S3C440	Analog Output 8 Filter Constant	Unit: msec	Primary filter constant	0
S3C441			Secondary filter constant	0

Parameter No.	Contents	Meaning		Initial Value
S3C442	Analog Output 9 Filter Constant	Unit: msec	Primary filter constant	0
S3C443			Secondary filter constant	0
S3C444	Analog Output 10 Filter Constant	Unit: msec	Primary filter constant	0
S3C445			Secondary filter constant	0
S3C446	Analog Output 11 Filter Constant	Unit: msec	Primary filter constant	0
S3C447			Secondary filter constant	0
S3C448	Analog Output 12 Filter Constant	Unit: msec	Primary filter constant	0
S3C449			Secondary filter constant	0
S3C450	Form Cutting Function Cut Width Correction Value	Unit: μm		0
S3C451 to S3C499	Not used			0

2.5.4 S4C Parameter

Parameter No.	Contents	Meaning		Initial Value
S4C000 to S4C004		Not Used		0
S4C005 to S4C014		Not Used		0
S4C015	Cursor Advance Control Function	0: Invalid 1: Valid		1
S4C016	Cursor Advance Control Function CONT Process Completion Position	Unit: %		50
S4C017	Cursor Advance Control Function Work Start Instruction Step Operation Completion Delay Time	Unit: ms		10
S4C018 to S4C039		Not Used		
S4C040	Twin Drive Universal Input Number Designation (When Twin Drive Function Used)	Station 1	0: Operates in the Synchronous Operation Mode without Any Conditions 1-192: General Input Number. When the specified general input signal is turned off, operation is performed in the synchronous operation mode. When it is turned on, operation is performed in the single operation mode.	0
S4C041		Station 2		0
S4C042		Station 3		0
S4C043		Station 4		0
S4C044		Station 5		0
S4C045		Station 6		0
S4C046 to S4C048		Not Used		0
S4C049	Operation of Job Without Control Group Specification	0: Execution possible only when servo power supply to all the axes have been turned ON. 1: Execution possible when servo power supply to any axis is turned ON.		1
S4C050	Execution of “BWD” Operation	d0	“BWD” operation for a job without a group axis 0: Enabled 1: Disabled	2
		d1	“BWD” operation for a concurrent job 0: Enabled 1: Disabled	
S4C051				0

Parameter No.	Contents	Meaning		Initial Value
S4C052	Permission to Change Non-Move Instruction to Move Instruction	0: Prohibited 1: Permitted		0
S4C053	Station Axis Current Value Display Function	0: Invalid 1: Valid		0
S4C054	Station Display Unit	Station 1	Bit Designation 0: Display in angle (deg) 1: Display in distance (mm) 	0
S4C055		Station 2		0
S4C056		Station 3		0
S4C057		Station 4		0
S4C058		Station 5		0
S4C059		Station 6		0
S4C060	Base Axis Operation Key Allocation Setting	0: Based on operating coordinate 1: Fixed to travelling axis specification		0
S4C061 to S4C499		Not Used		0

2.5.5 Transmission Parameters

Common Section of Transmission Parameters

Parameter No.	Contents	Meaning	Initial Value
RS000	XCP01 Serial Port Protocol	0: NON 2: BSCLIKE 3: FC1	2
RS001	Not Used		0
RS002	Not Used		0
RS003	System Reserved		2
RS004	Not Used		0
RS005	System Reserved		0
RS006	System Reserved		1
RS007 to RS029	Not Used		0

Individual Section (2: For BSC Protocol)

Parameter No.	Contents	Meaning	
RS030	Number of Data Bits	7: 7 bit 8: 8 bit	8
RS031	Number of stop Bits	0: 1 bit 1: 1.5 bits 2: 2 bits	0
RS032	Parity	0: No Parity 1: Odd Parity 2: Even Parity	2
RS033	Transmission Speed	1: 150 2: 300 3: 600 4: 1200 5: 2400 6: 4800 7: 96000	7
RS034	Response Waiting Timer (Timer A)	Sequence Monitoring Time Units: 0.1sec (0-100) Control for invalid or missing response	30
RS035	Text Termination Monitoring timer (Timer B)	Text Reception Monitoring Timer Units: 0.1 sec (0 to 255) Control for the termination of the character	200
RS036	Number of ENQ Re-Transmission Retries	Re-transmission times of control characters for invalid or missing response: 0-30 times	10
RS037	Number of Data Re-Transmission Retries	Re-Transmission Times of Control Characters for Text Block Check Error (MAK Reception): 0-10	3
RS038	Block Check Method	0: Checksum	0
RS039 to RS049		Not Used	0

Individual Section of Transmission Parameters (3: For FC1 protocol)

Parameter No.	Contents	Meaning	Initial Value
RS050	Number of Data Bits	7: 7 bit 8: 8 bit	8
RS051	Number of stop Bits	0: 1 bit 1: 1.5 bits 2: 2 bits	0
RS052	Parity	0: No Parity 1: Odd Parity 2: Even Parity	2
RS053	Transmission Speed	1: 150 2: 300 3: 600 4: 1200 5: 2400 6: 4800 7: 96000	6
RS054	Response Waiting Timer (Timer A)	Sequence Monitoring Time Units: 0.1sec (0-255) Control for invalid or missing response	0
RS055	Text Termination Monitoring timer (Timer B)	Text Reception Monitoring Timer Units: 0.1 sec (0 to 255) Control for the termination of the character	0
RS056	Number of ENQ Re-Transmission Retries	Re-transmission times of control characters for invalid or missing response: 0-30 times	0
RS057	Number of Data Re-Transmission Retries	Re-Transmission Times of Control Characters for Text Block Check Error (MAK Reception): 0-10	0
RS058	FC2 Format Specification	0: 640 KB 1: 720 KB 2: 1.2 MB 3: 1.44 MB	3
RS059	External Memory File Overwrite Specification	0: Not specified 1: Specified	0
RS060 to RS069		Not Used	0
RS070 to RS099		Not Used	0

2.5.6 AP (Arc Welding) Parameters

The meaning of AP parameters differs according to the applications.

Parameter No.	Contents	Meaning	Initial Value
AxP000	Application	Arc Welding	0
AxP001	System Reserved		0
AxP002			0
AxP003	Welding Assignment of Welding Start Condition Files	Lead Condition No. of Welding End Condition File to be Assigned to Welder 2 Range: 1 to 49	49
		For Arc + Arc application (2 applications)	25
AxP004	Welding Assignment of Welding End Condition Files	Lead Condition No. of Welding End Condition File to be Assigned to Welder 2 Range: 1 to 13	13
		For Arc + Arc application (2 applications)	7
AxP005	Welding Speed Priority	0: Priority to Moving Instruction Speed (Local Speed) 1: Priority to Work Instruction Speed (Global Speed)	0
AxP006			0
AxP007			0
AxP008	System Reserved		1
AxP009	Work Continuing	0: Continue 1: Stop	0
AxP010	Welding Instruction Output	Lead no. of analog output channel to welder Range: 0 to 12	1
		For Arc + Arc application (2 applications): A2P010	4
AxP011	Manual Wire Operation Speed	Low-speed instruction value (%) Specified by max. instruction value (%) For instruction polarity, refer to current instruction polarity of welder characteristics file. Range: 0 to 100	20
AxP012		High-speed instruction value (%) Specified by max. instruction value (%) For instruction polarity, refer to current instruction polarity of welder characteristics file. Range: 0 to 100	80
AxP013	Welding Control Time	Tip Replacement Time (minute)	180
AxP014		Nozzle Cleaning Time (minute)	30
AxP015	Number of Welding Controls	Number of Retries	I0
AxP016		Number of Arc Shortage Restartings	10
AxP017		Number of Auto-Sticking Releasings	10
AxP018 to AxP025			0

Parameter No.	Contents	Meaning	Initial Value
AxP026	Jigless (arc) System Tool ON/OFF General Output No.	TOOL 1 ON Instruction (1 to 192)	9
AxP027		TOOL 1 OFF Instruction (1 to 192)	10
AxP028		TOOL 2 ON Instruction (1 to 192)	11
AxP029		TOOL 2 OFF Instruction (1 to 192)	12

2.5.7 AP (Handling) Parameters

Parameter No.	Contents	Meaning	Initial Value
AxP000	Application	Handling	1
AxP001	System Reserved		0
AxP002	f1 Key Function	0: Not Specified 1-4: Specific Output of Hand (1-4)-1 Specific Output 5: General Output of AxP004 Specification	0
AxP003	f2 Key Function	0: Not Specified 1-4: Specific Output of Hand (1-4)-2 Specific Output 5: General Output of AxP005 Specification	0
AxP004	f1 Key Function	General output number when AxP002 is 5	1
AxP005	f2 Key Function	General output number when AxP003 is 5	1
AxP006			0
AxP007			0
AxP008	System Reserved		0
AxP009			0
AxP010 to AxP029			0

2.5.8 AP (Spot Welding) Parameters

Parameter No.	Contents	Meaning	Initial Value
AxP000	Application	Spot Welding	2
		Motor Gun	7
AxP001			0
AxP002			0
AxP003	Maximum numbers of connected welders	The initial value is set to 4.	4
AxP004	Gun full open stroke ON/ OFF signal	Bit specification for 8 guns. 0: OFF signal, 1: ON signal	0
AxP005	Stroke change answer time limit	0 to 9.9 sec.	0
AxP006	Parity specification for welding condition	Bit specification for 4 welder. 0: odd, 1: even	0
AxP007	Anticipate time	The processing for tag (ATT=..) of SPOT instruction omitted.	0
AxP008 to AxP014			0
AxP015	Welding error reset output time	0: Reset signal is not output	10
AxP016	Electrode Wear Amount Alarm Value	Movable side (Units: μm)	0
AxP017		Fixed side (Units: μm)	0
AxP018 to AxP029			0

2.5.9 AP (General-Purpose Applications) Parameters

Parameter No.	Contents	Meaning	Initial Value
AxP000	Application	General-Purpose Applications	7
AxP001	System Reserved		0
AxP002			0
AxP003			0
AxP004			0
AxP005			0
AxP006			0
AxP007			0
AxP008	System Reserved		0
AxP009	Work Continuing	0: Continue 1: Stop	1
AxP010 to AxP029			0

YASNAC XRC
Concurrent I/O•Parameter

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YASKAWA ELECTRIC CORPORATION

YASKAWA

MANUAL NO. RE-CKI-A410 ②

Basic XRC Wiring

Power Sheet (NAS)

Power Sheet (JIS)

Dedicated Input

Common Wiring, Sheets 1 - 5

General Purpose Wiring, Sheets 1 - 5

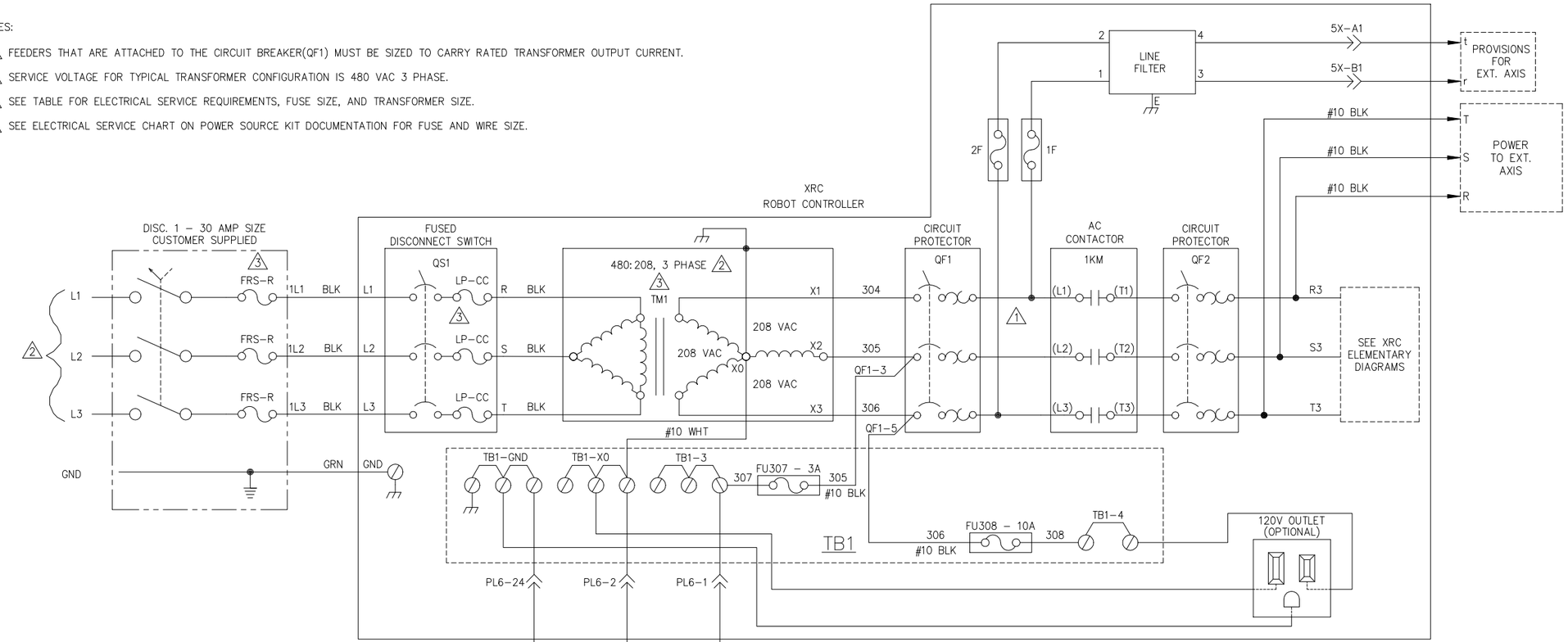
Basic Arc Welding, Sheets 1 - 5

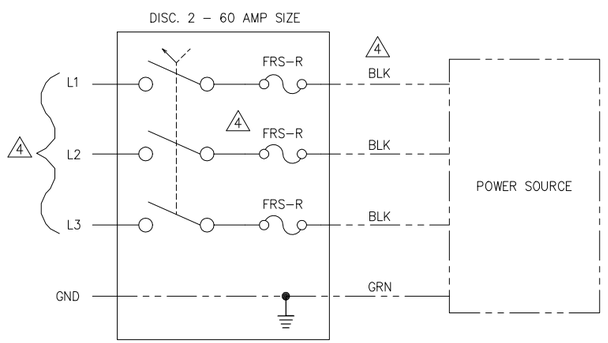
Basic Handling, Sheets 1 - 5

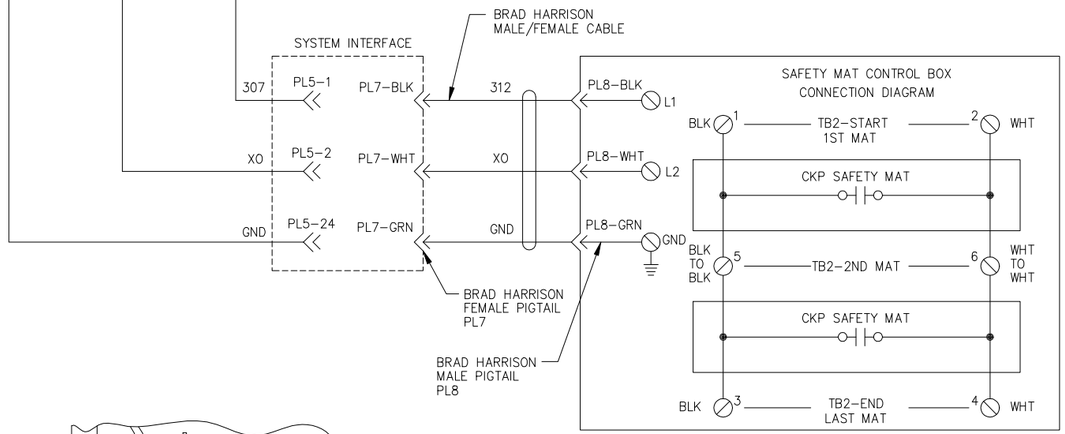
NOTES

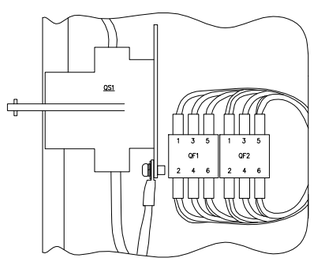
NOTES:

1. FEEDERS THAT ARE ATTACHED TO THE CIRCUIT BREAKER(QF1) MUST BE SIZED TO CARRY RATED TRANSFORMER OUTPUT CURRENT.
2. SERVICE VOLTAGE FOR TYPICAL TRANSFORMER CONFIGURATION IS 480 VAC 3 PHASE.
3. SEE TABLE FOR ELECTRICAL SERVICE REQUIREMENTS, FUSE SIZE, AND TRANSFORMER SIZE.
4. SEE ELECTRICAL SERVICE CHART ON POWER SOURCE KIT DOCUMENTATION FOR FUSE AND WIRE SIZE.









WARNING

ELECTRICAL AND GROUNDING CONNECTIONS MUST COMPLY WITH APPLICABLE PORTIONS OF THE NATIONAL ELECTRICAL CODE AND/OR LOCAL ELECTRICAL CODES.

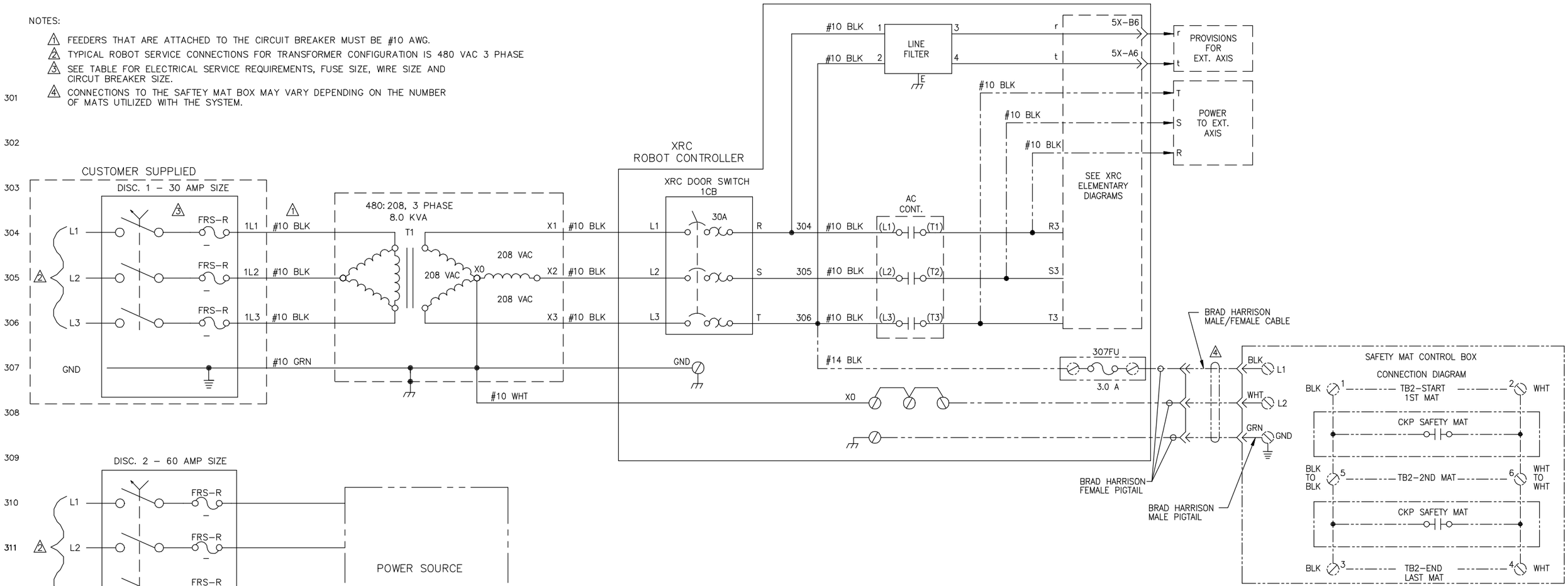
3 ELECTRICAL SERVICE REQUIREMENTS

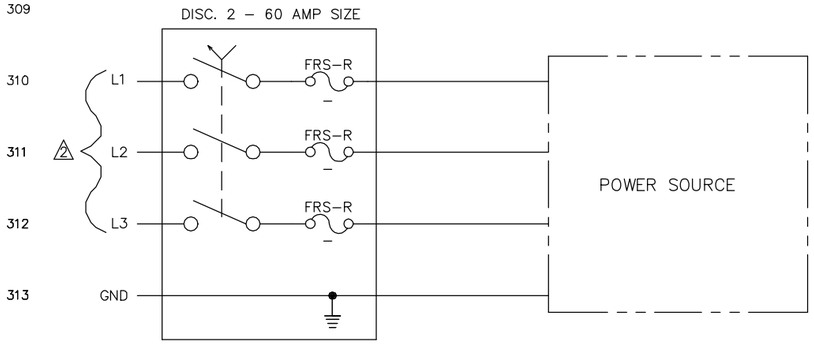
	SERVICE VOLTAGE	MINIMUM SERVICE FUSE	MAXIMUM QS1 FUSE SIZE	FACTORY SUPPLIED QS1 FUSE	X–FORMER SIZE	RATED X–FORMER OUTPUT CURRENT	ROBOT LOAD
SV3X	240	FRS–R–7½	LP–CC–6	ATDR–5	1.0 KVA	2.8	1.0 KVA
	480	FRS–R–4	LP–CC–3				
	575	FRS–R–3	LP–CC–2½				
UP6	240	FRS–R–30	LP–CC–25	ATDR–5	4.5 KVA	12.5	1.5 KVA
	480	FRS–R–15	LP–CC–12				
	575	FRS–R–12	LP–CC–10				
SK16X	240	FRS–R–30	LP–CC–25	ATDR–10	4.5 KVA	12.5	2.0 KVA
	480	FRS–R–15	LP–CC–12				
	575	FRS–R–12	LP–CC–10				
SK45X	240	FRS–R–35	LP–CC–30	ATDR–15	8.0 KVA	22.2	5.0 KVA
	480	FRS–R–25	LP–CC–20				
	575	FRS–R–25	LP–CC–20				
UP130	240	FRS–R–35	LP–CC–30	ATDR–20	8.0 KVA	22.2	7.5 KVA
	480	FRS–R–25	LP–CC–20				
	575	FRS–R–25	LP–CC–20				

Power Sheet for the XRC, North American Standard (NAS)

NOTES:

1. FEEDERS THAT ARE ATTACHED TO THE CIRCUIT BREAKER MUST BE #10 AWG.
2. TYPICAL ROBOT SERVICE CONNECTIONS FOR TRANSFORMER CONFIGURATION IS 480 VAC 3 PHASE
3. SEE TABLE FOR ELECTRICAL SERVICE REQUIREMENTS, FUSE SIZE, WIRE SIZE AND CIRCUT BREAKER SIZE.
4. CONNECTIONS TO THE SAFTEY MAT BOX MAY VARY DEPENDING ON THE NUMBER OF MATS UTILIZED WITH THE SYSTEM.





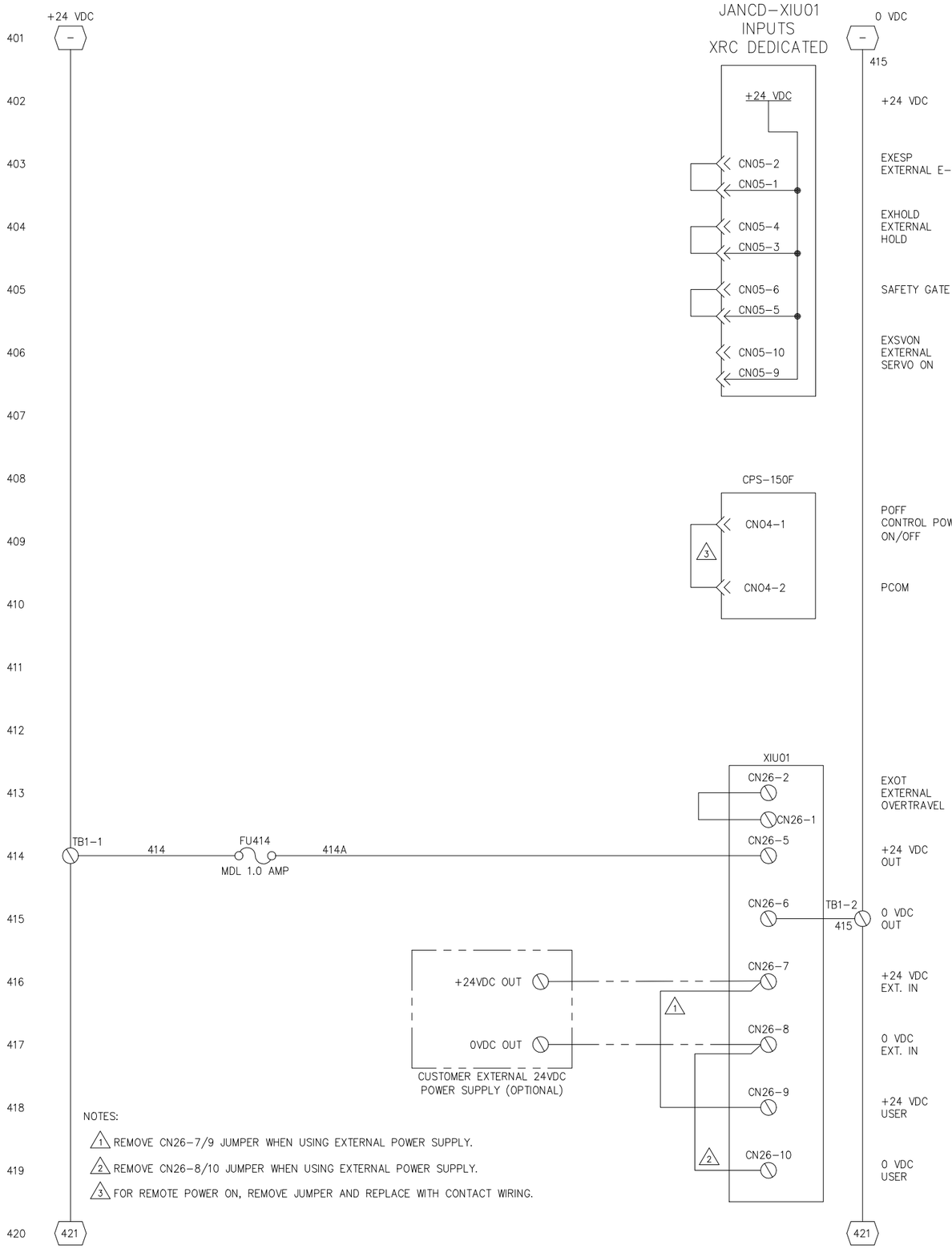
△3

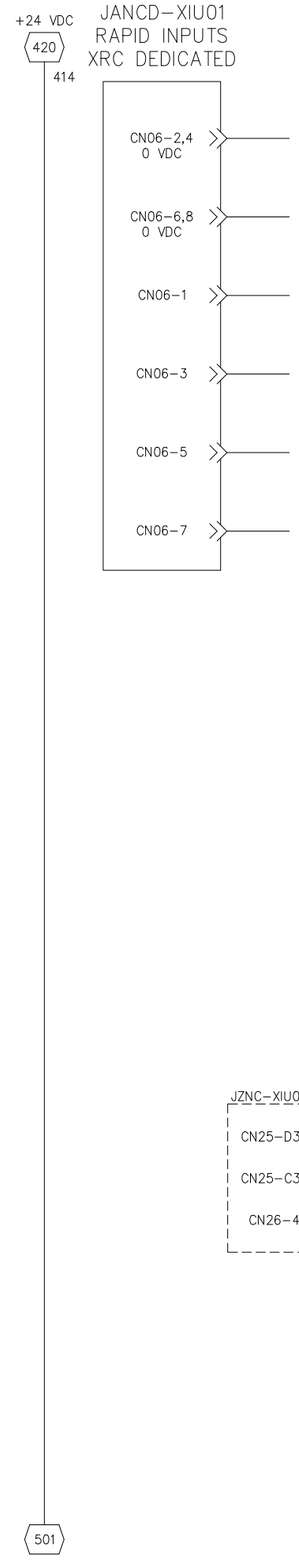
ELECTRICAL SERVICE REQUIREMENTS						
	SERVICE VOLTAGE	RATED AMPS	APPROX.* FUSE SIZE	X–FORMER SIZE	CIR. BKT. SIZE	APPROX.* WIRE SIZE
UP6	240	6.7	7.0	4.5 KVA	20A	#10
	480	3.4	4.0	4.5 KVA	20A	#10
	575	3.0	3.0	4.5 KVA	20A	#10
SK16X	240	8.6	9.0	4.5 KVA	20A	#10
	480	4.3	5.0	4.5 KVA	20A	#10
	575	3.6	4.0	4.5 KVA	20A	#10
SK45X	240	17.7	20.0	8.0 KVA	30A	#10
	480	8.9	9.0	8.0 KVA	30A	#10
	575	7.4	8.0	8.0 KVA	30A	#10
UP130	240	26.5	30.0	8.0 KVA	30A	#10
	480	13.2	15.0	8.0 KVA	30A	#10
	575	11.0	12.0	8.0 KVA	30A	#10
* BASED ON NEC 75C COPPER CONDUCTORS						

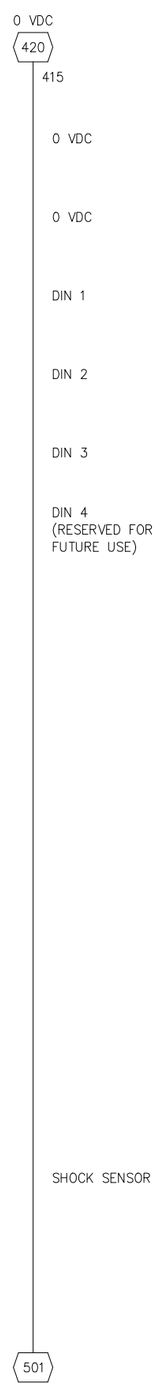
WARNING

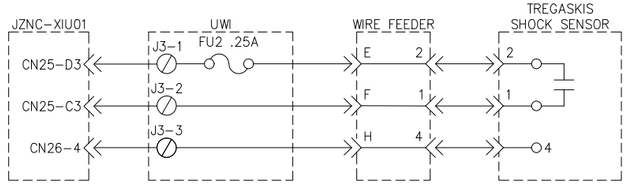
ELECTRICAL AND GROUNDING CONNECTIONS MUST COMPLY WITH APPLICABLE PORTIONS OF THE NATIONAL ELECTRICAL CODE AND/OR LOCAL ELECTRICAL CODES.

Power Sheet for the XRC, Japanese Ind. Standard (JIS)

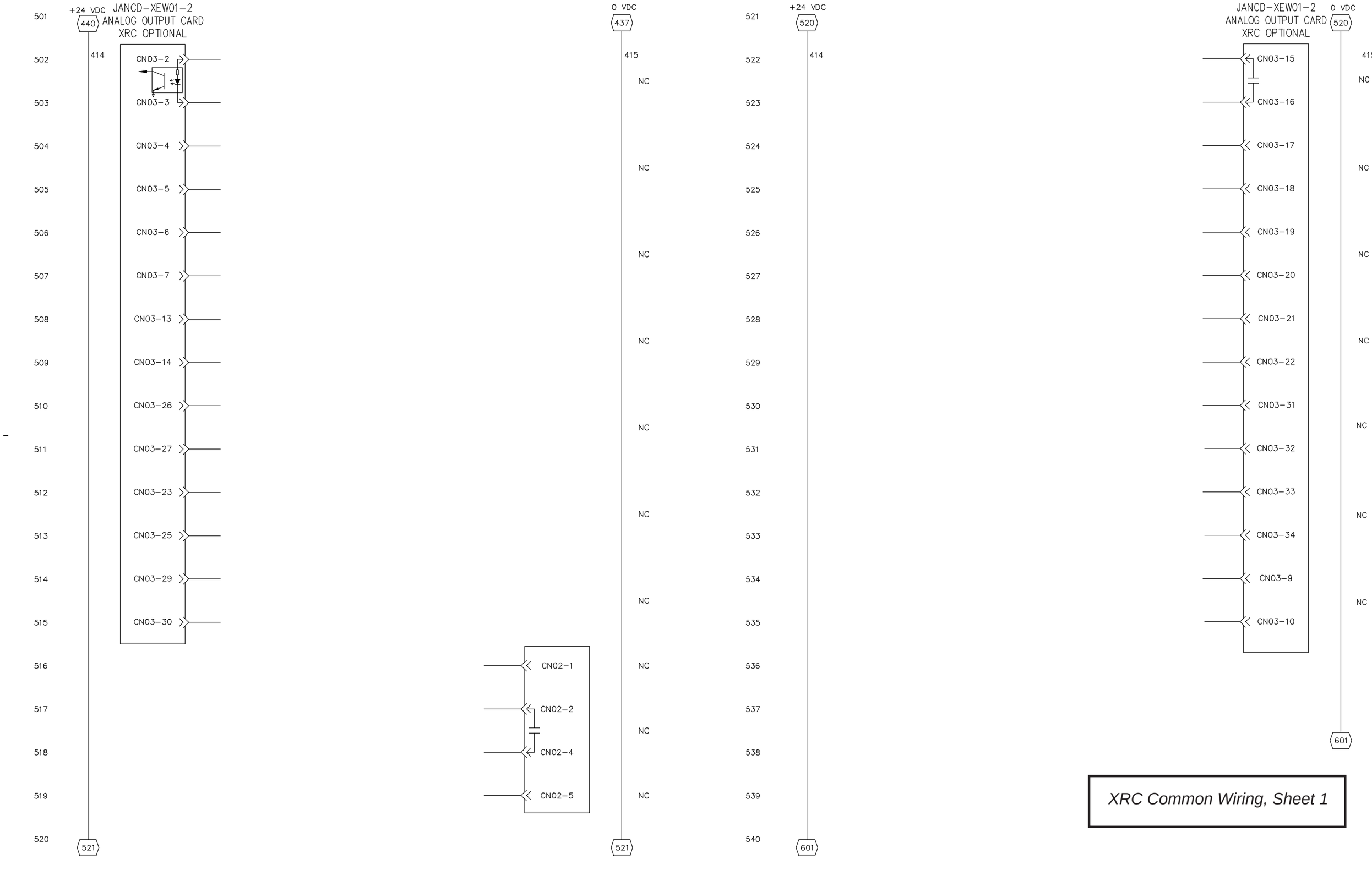




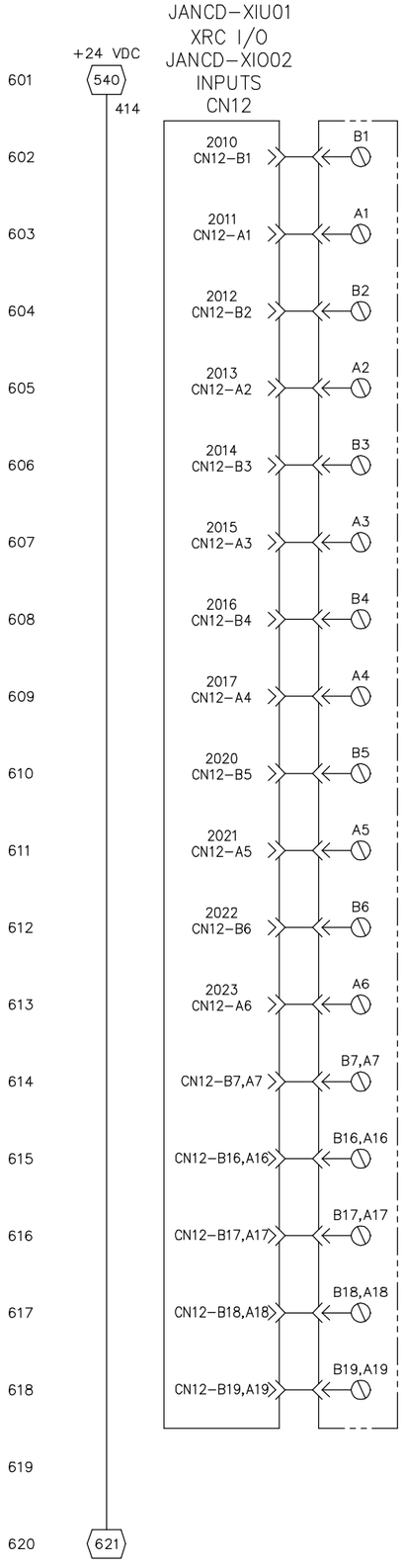


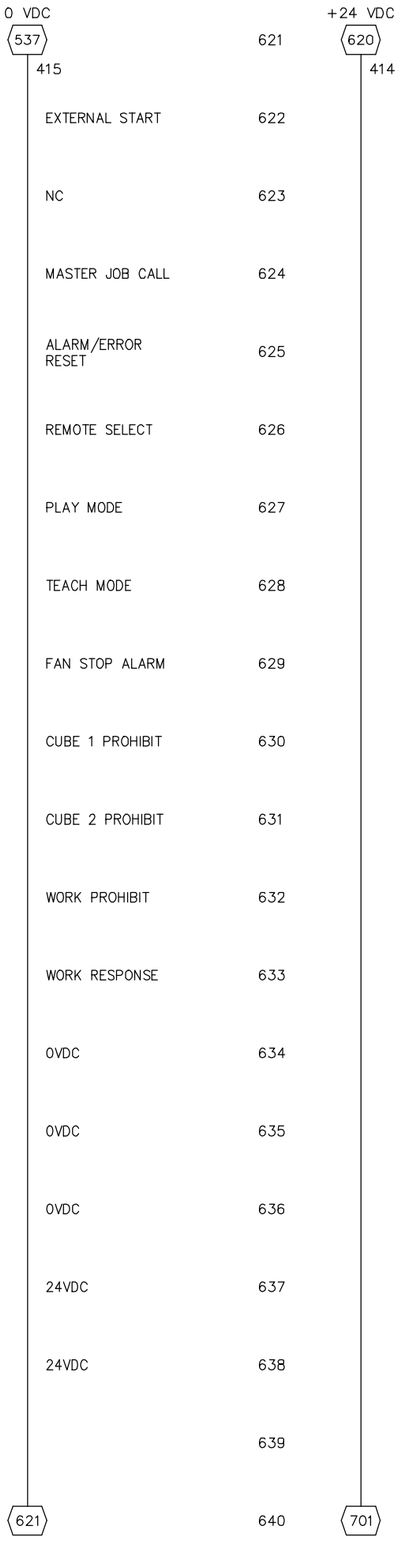


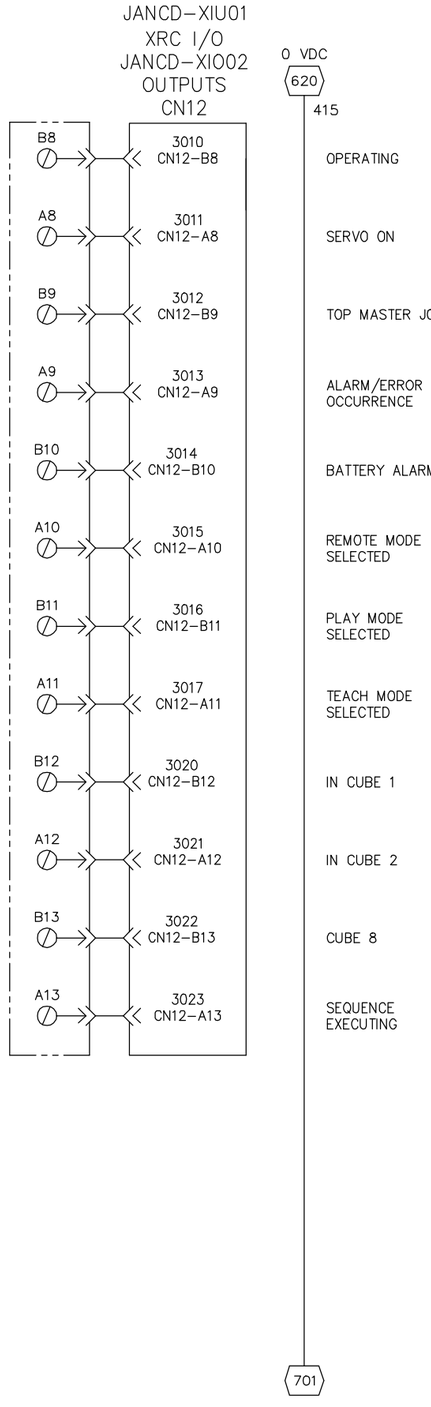
XRC Dedicated Input



XRC Common Wiring, Sheet 1

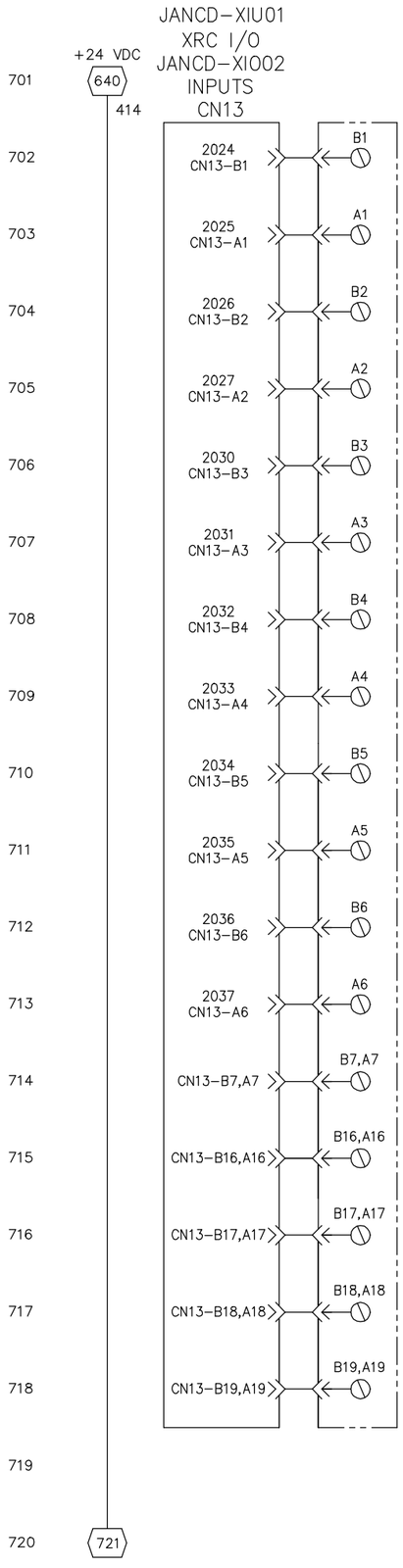


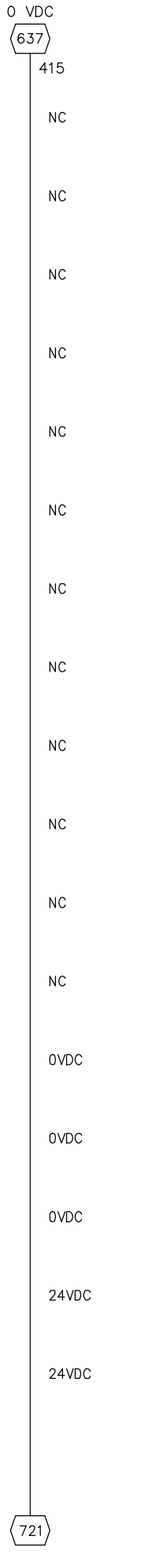


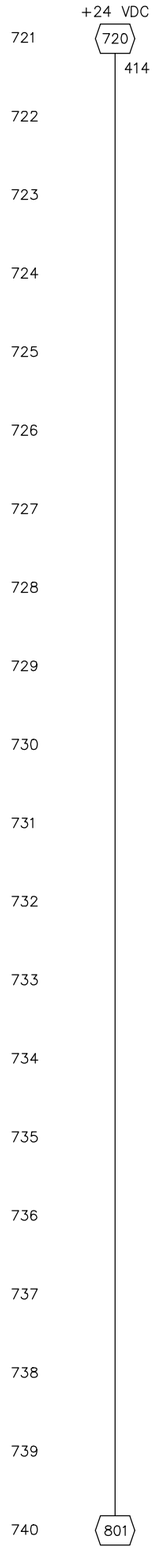


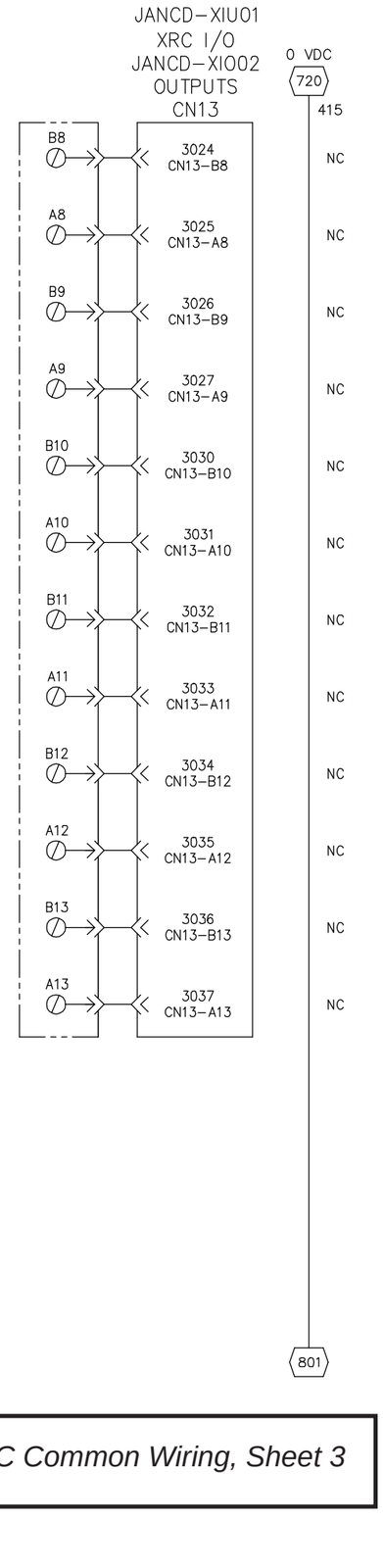
NOTE: NPN SINKING OUTPUTS 50mA MAX.

XRC Common Wiring, Sheet 2



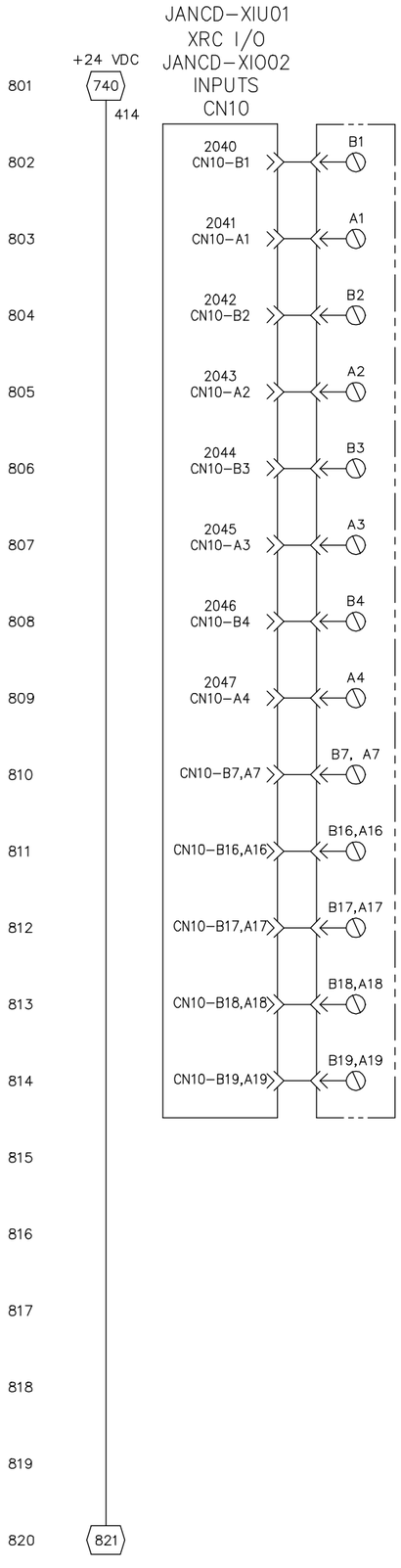


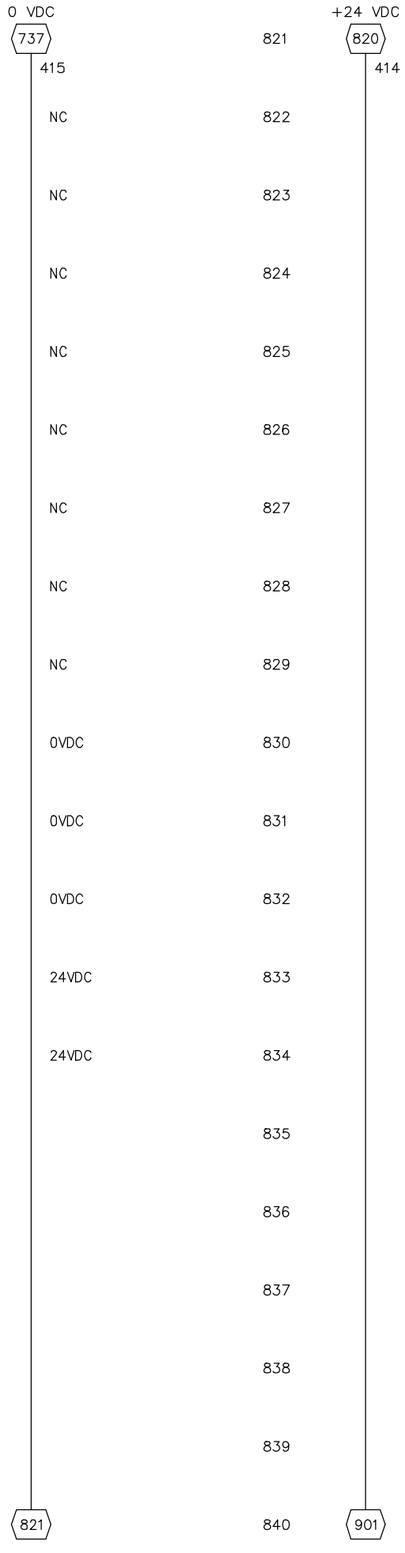


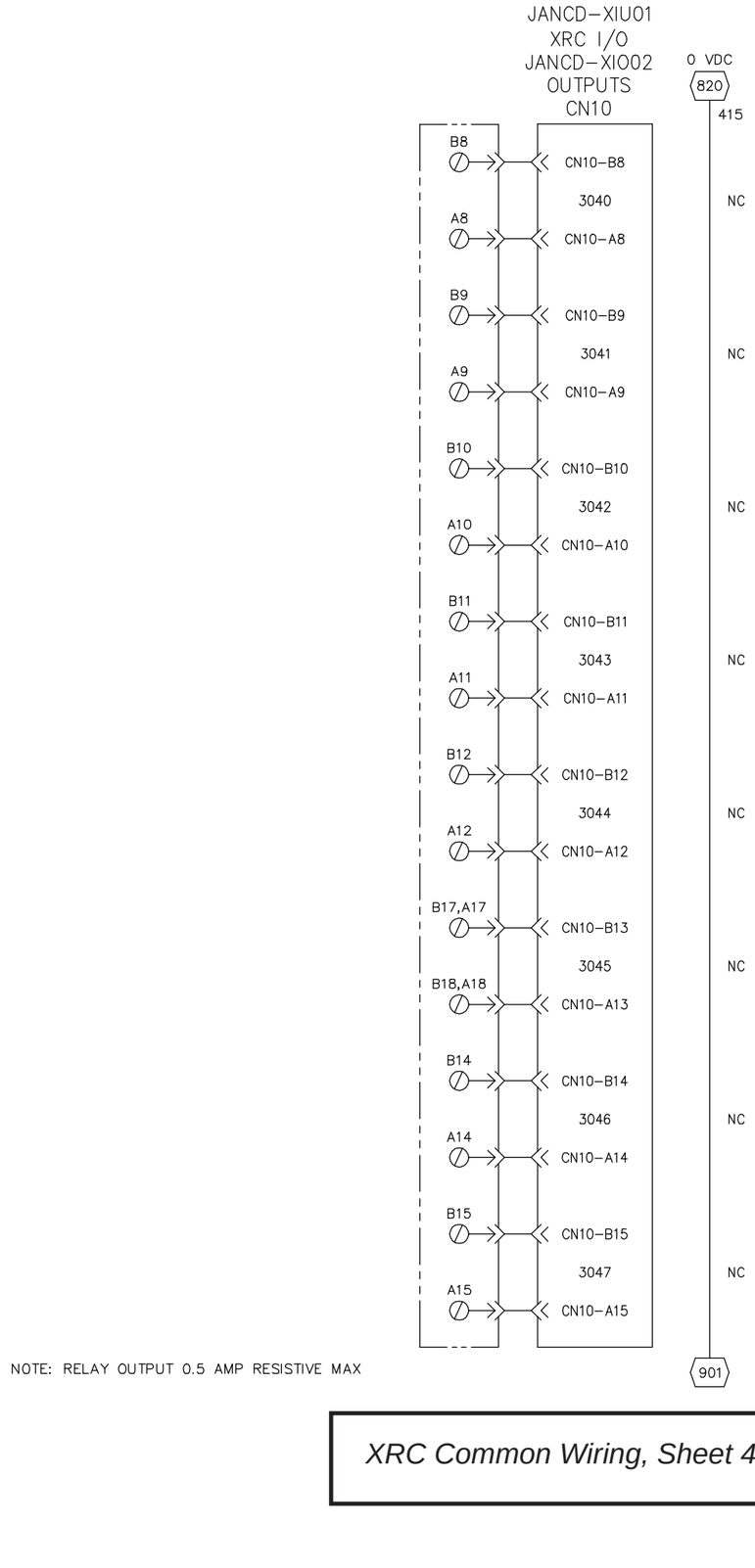


NOTE: NPN SINKING OUTPUTS 50mA MAX.

XRC Common Wiring, Sheet 3

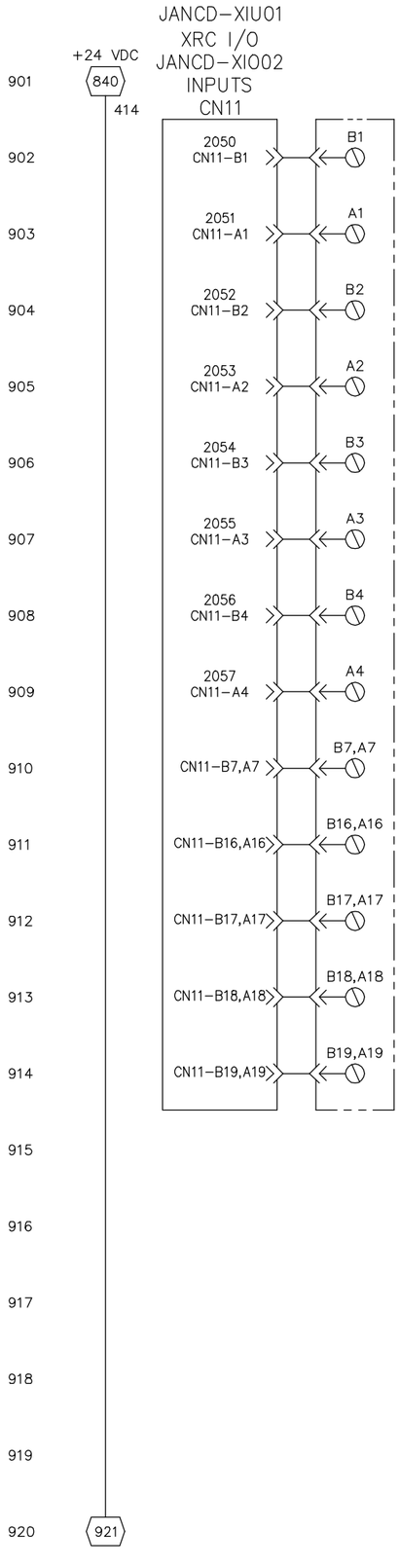


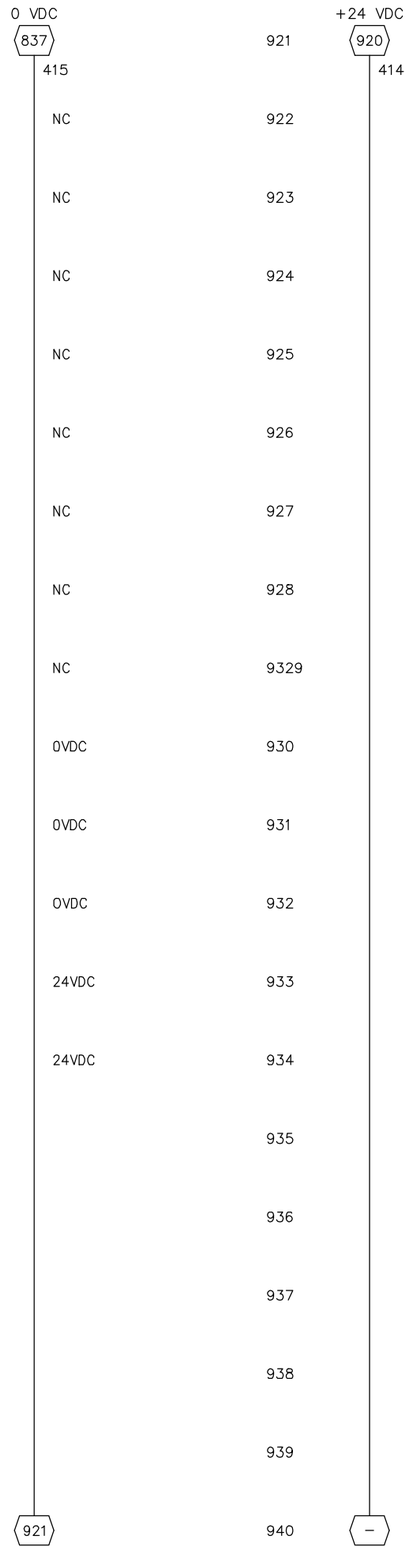


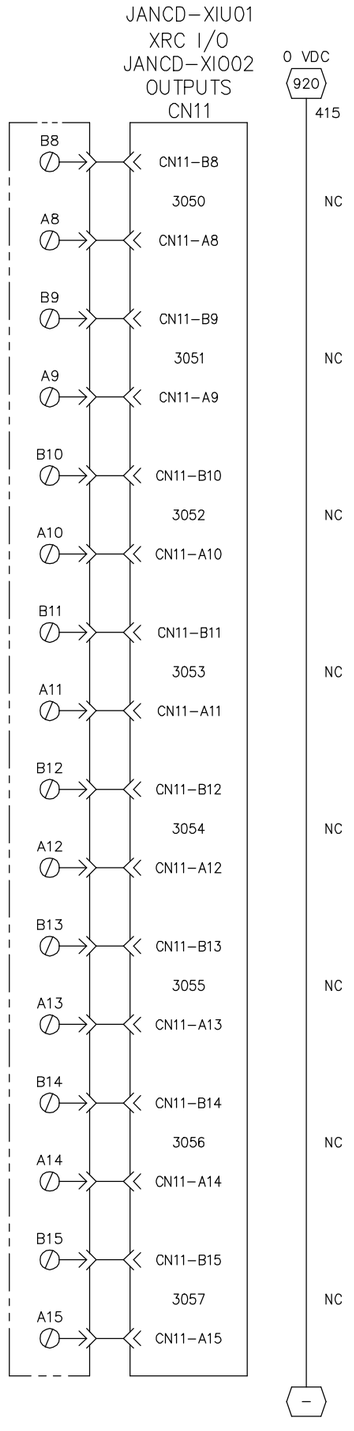


NOTE: RELAY OUTPUT 0.5 AMP RESISTIVE MAX

XRC Common Wiring, Sheet 4

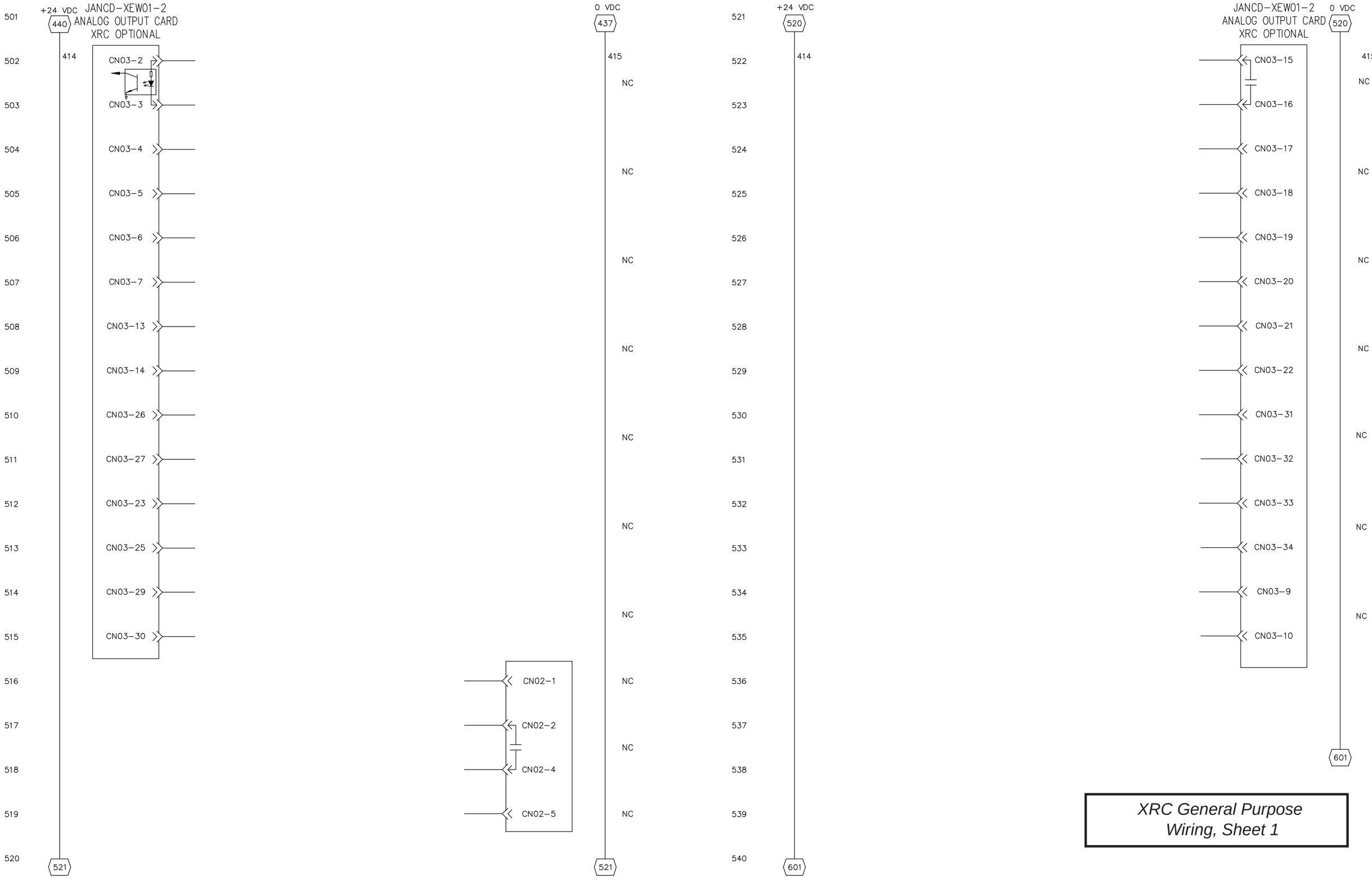






NOTE: RELAY OUTPUT 0.5 AMP RESISTIVE MAX

XRC Common Wiring, Sheet 5



XRC General Purpose Wiring, Sheet 1

JANCD-XIU01
XRC I/O
JANCD-XIO02
INPUTS
CN12

+24 VDC (540) — 414

601		
602	2010 CN12-B1	B1
603	2011 CN12-A1	A1
604	2012 CN12-B2	B2
605	2013 CN12-A2	A2
606	2014 CN12-B3	B3
607	2015 CN12-A3	A3
608	2016 CN12-B4	B4
609	2017 CN12-A4	A4
610	2020 CN12-B5	B5
611	2021 CN12-A5	A5
612	2022 CN12-B6	B6
613	2023 CN12-A6	A6
614	CN12-B7,A7	B7,A7
615	CN12-B16,A16	B16,A16
616	CN12-B17,A17	B17,A17
617	CN12-B18,A18	B18,A18
618	CN12-B19,A19	B19,A19
619		
620	(621)	

0 VDC (537) — 415

+24 VDC (620) — 414

621		
622	EXTERNAL START	
623	NC	
624	MASTER JOB CALL	
625	ALARM/ERROR RESET	
626	REMOTE SELECT	
627	PLAY MODE	
628	TEACH MODE	
629	FAN STOP ALARM	
630	CUBE 1 PROHIBIT	
631	CUBE 2 PROHIBIT	
632	WORK PROHIBIT	
633	NC	
634	0VDC	
635	0VDC	
636	0VDC	
637	24VDC	
638	24VDC	
639		
640	(621)	(701)

JANCD-XIU01
XRC I/O
JANCD-XIO02
OUTPUTS
CN12

0 VDC (620) — 415

B8	3010 CN12-B8	OPERATING
A8	3011 CN12-A8	SERVO ON
B9	3012 CN12-B9	TOP MASTER JOB
A9	3013 CN12-A9	ALARM/ERROR OCCURENCE
B10	3014 CN12-B10	BATTERY ALARM
A10	3015 CN12-A10	REMOTE MODE SELECTED
B11	3016 CN12-B11	PLAY MODE SELECTED
A11	3017 CN12-A11	TEACH MODE SELECTED
B12	3020 CN12-B12	IN CUBE 1
A12	3021 CN12-A12	IN CUBE 2
B13	3022 CN12-B13	CUBE 8
A13	3023 CN12-A13	SEQUENCE EXECUTING

NOTE: NPN SINKING OUTPUTS 50mA MAX.

(701)

XRC General Purpose Wiring, Sheet 2

JANCD-XIU01
XRC I/O
JANCD-XIO02
INPUTS
CN13

+24 VDC (640) — 414

701			
702	2024 CN13-B1	B1	
703	2025 CN13-A1	A1	
704	2026 CN13-B2	B2	
705	2027 CN13-A2	A2	
706	2030 CN13-B3	B3	
707	2031 CN13-A3	A3	
708	2032 CN13-B4	B4	
709	2033 CN13-A4	A4	
710	2034 CN13-B5	B5	
711	2035 CN13-A5	A5	
712	2036 CN13-B6	B6	
713	2037 CN13-A6	A6	
714	CN13-B7,A7	B7,A7	
715	CN13-B16,A16	B16,A16	
716	CN13-B17,A17	B17,A17	
717	CN13-B18,A18	B18,A18	
718	CN13-B19,A19	B19,A19	
719			
720	(721)		

0 VDC (637) — 415

721	
722	CUBE 3 PROHIBIT
723	CUBE 4 PROHIBIT
724	NC
725	NC
726	NC
727	NC
728	NC
729	NC
730	NC
731	NC
732	NC
733	NC
734	0VDC
735	0VDC
736	0VDC
737	24VDC
738	24VDC
739	
740	(721)

+24 VDC (720) — 414

(801)

JANCD-XIU01
XRC I/O
JANCD-XIO02
OUTPUTS
CN13

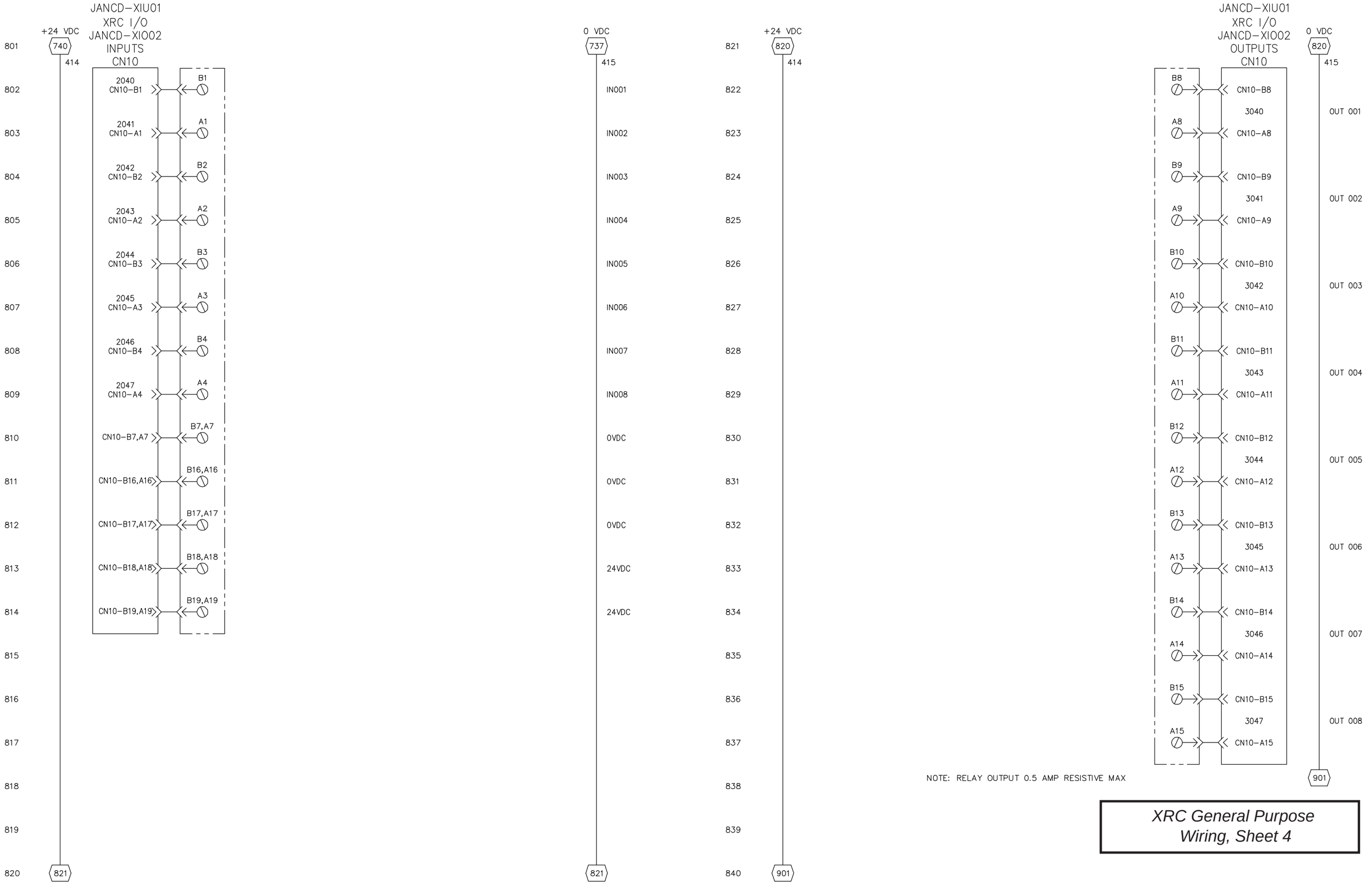
0 VDC (720) — 415

B8	3024 CN13-B8		IN CUBE 3
A8	3025 CN13-A8		IN CUBE 4
B9	3026 CN13-B9		WORK INSTRUCTION
A9	3027 CN13-A9		NC
B10	3030 CN13-B10		NC
A10	3031 CN13-A10		NC
B11	3032 CN13-B11		NC
A11	3033 CN13-A11		NC
B12	3034 CN13-B12		NC
A12	3035 CN13-A12		NC
B13	3036 CN13-B13		NC
A13	3037 CN13-A13		NC

NOTE: NPN SINKING OUTPUTS 50mA MAX.

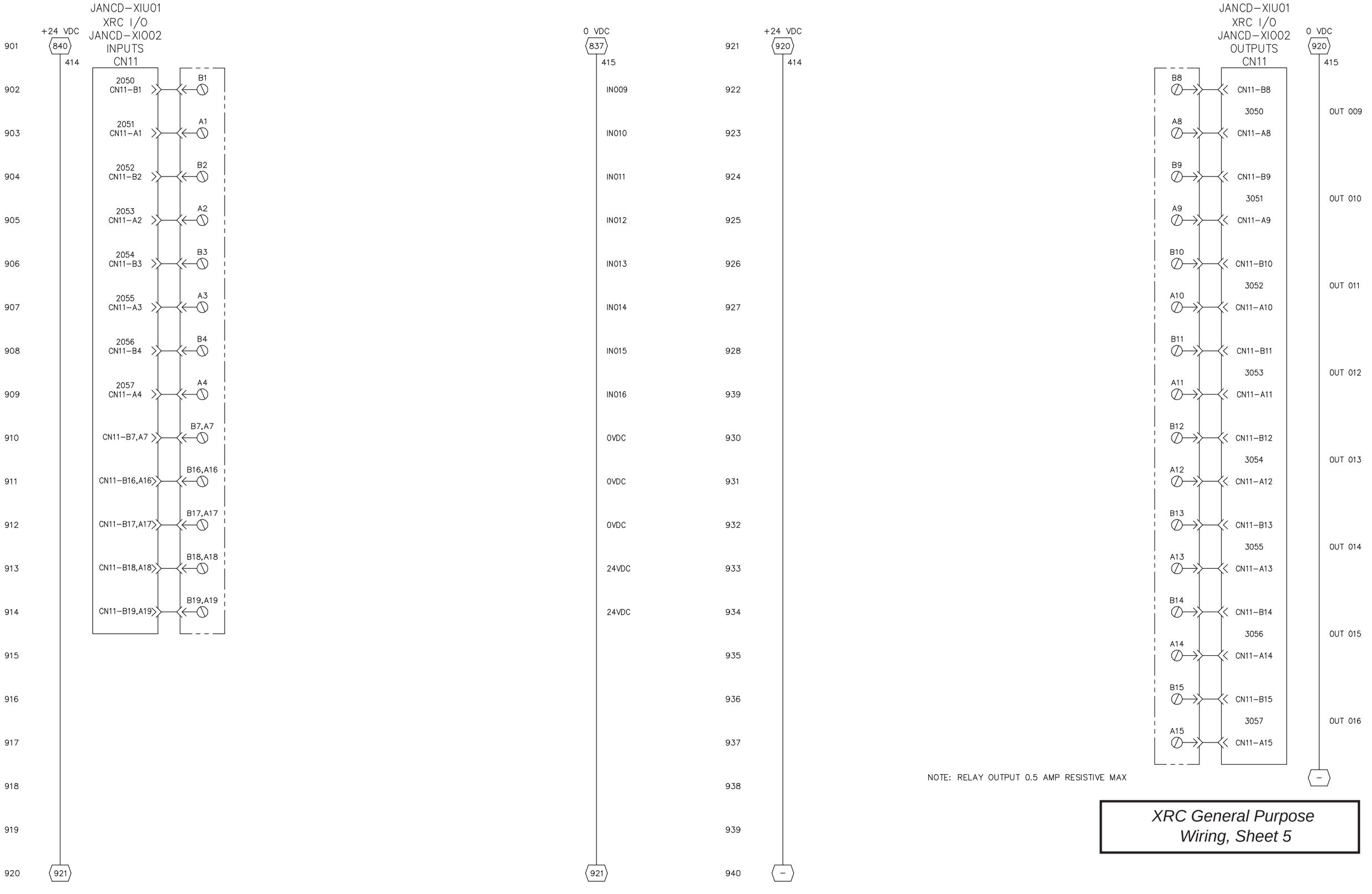
(801)

XRC General Purpose Wiring, Sheet 3



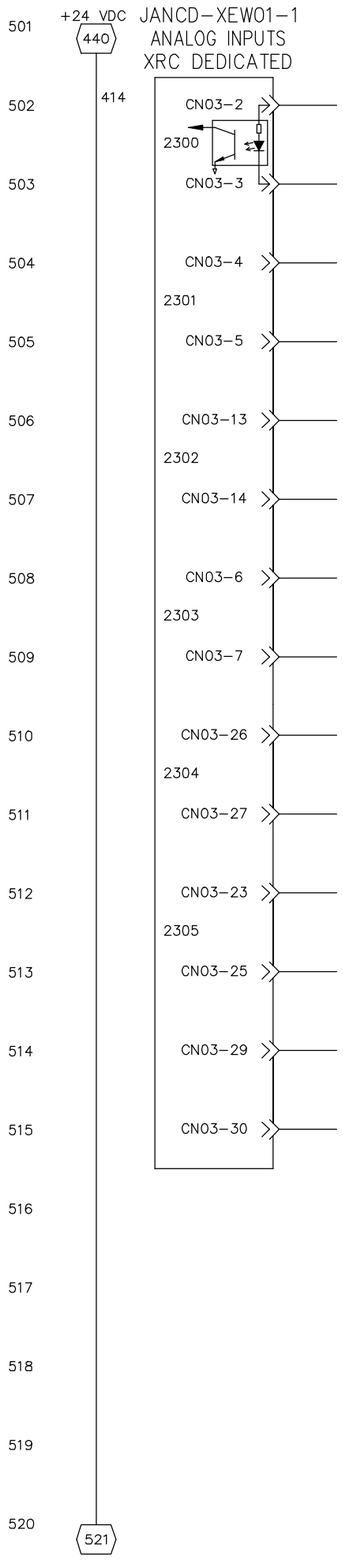
NOTE: RELAY OUTPUT 0.5 AMP RESISTIVE MAX

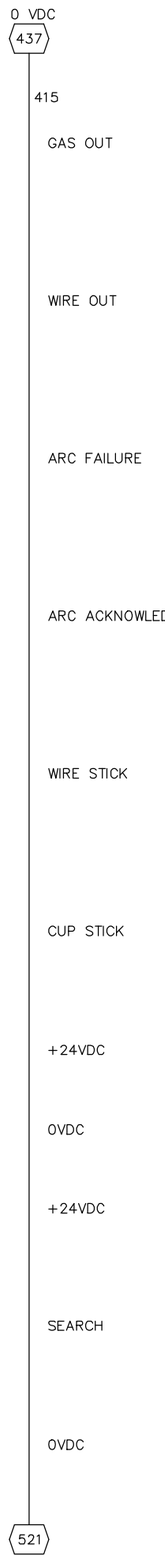
XRC General Purpose Wiring, Sheet 4

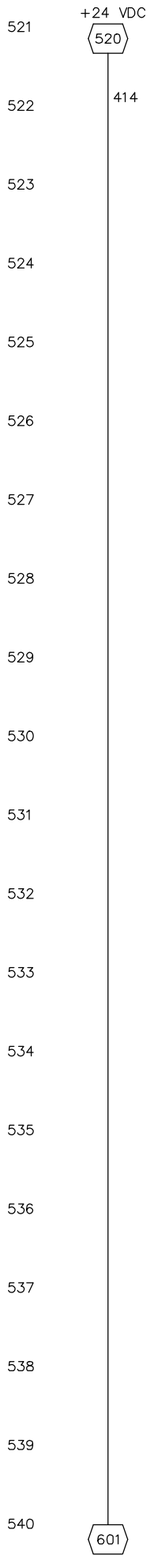


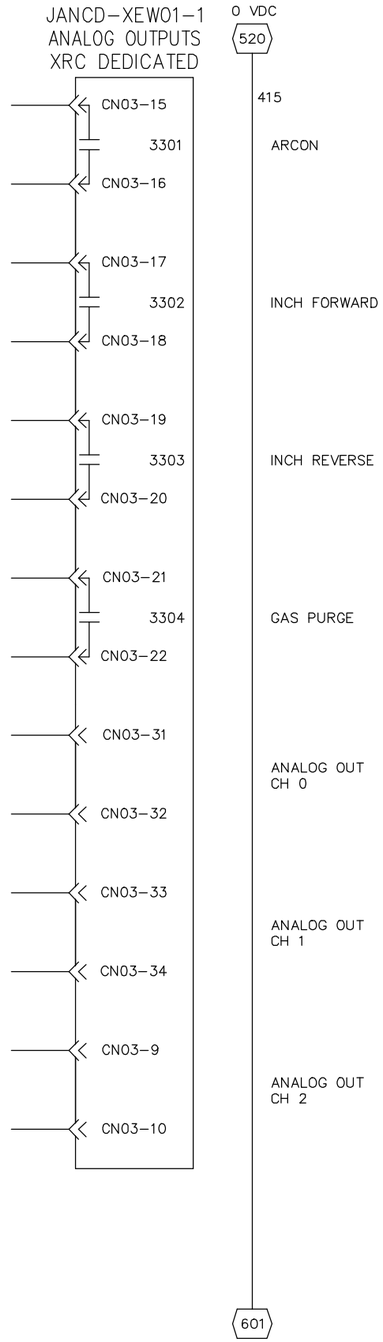
NOTE: RELAY OUTPUT 0.5 AMP RESISTIVE MAX

XRC General Purpose Wiring, Sheet 5

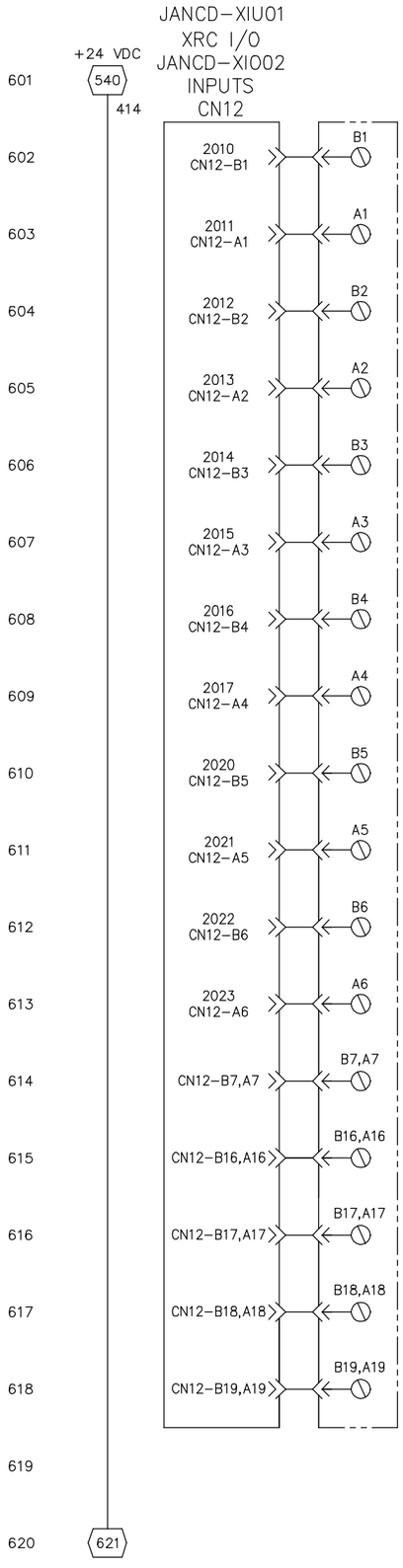


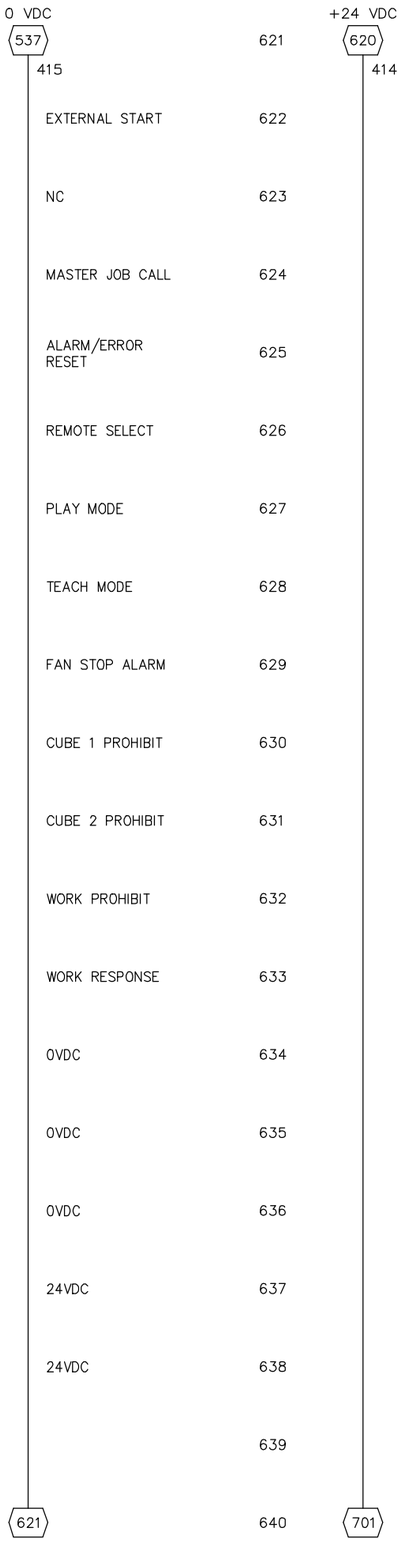


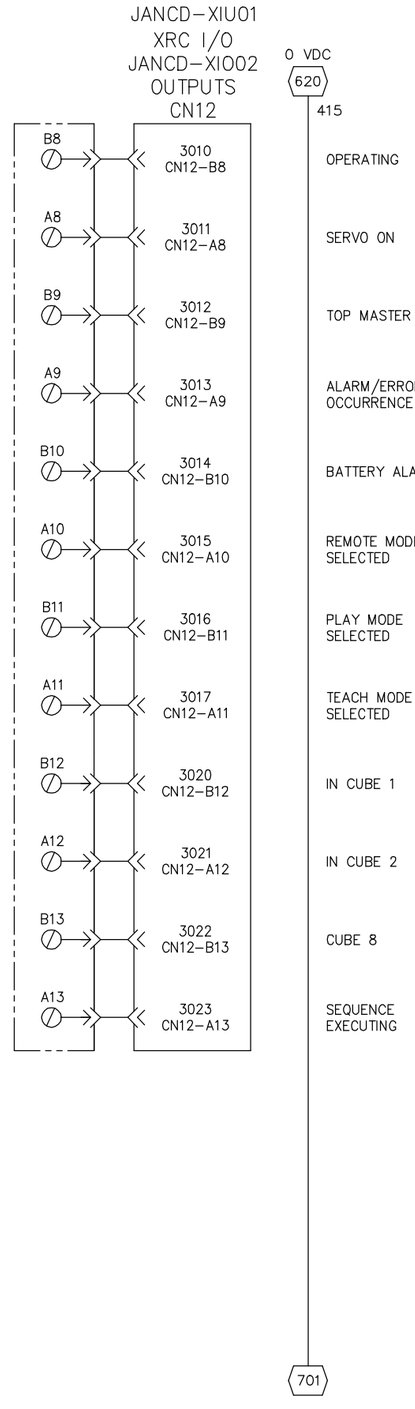




XRC Basic Arc Welding
Wiring, Sheet 1







NOTE: NPN SINKING OUTPUTS 50mA MAX.

XRC Basic Arc Welding
Wiring, Sheet 2

JANCD-XIU01
XRC I/O
JANCD-XI002
INPUTS
CN13

701	+24 VDC	640	414	
702	2024 CN13-B1	B1		
703	2025 CN13-A1	A1		
704	2026 CN13-B2	B2		
705	2027 CN13-A2	A2		
706	2030 CN13-B3	B3		
707	2031 CN13-A3	A3		
708	2032 CN13-B4	B4		
709	2033 CN13-A4	A4		
710	2034 CN13-B5	B5		
711	2035 CN13-A5	A5		
712	2036 CN13-B6	B6		
713	2037 CN13-A6	A6		
714	CN13-B7,A7	B7,A7		
715	CN13-B16,A16	B16,A16		
716	CN13-B17,A17	B17,A17		
717	CN13-B18,A18	B18,A18		
718	CN13-B19,A19	B19,A19		
719				
720	721			

721	0 VDC	637	415	
722	NC			
723	NC			
724	WEAVING PROHIBIT			
725	SENSING PROHIBIT			
726	NC			
727	NC			
728	NC			
729	NC			
730	NC			
731	NC			
732	NC			
733	NC			
734	0VDC			
735	0VDC			
736	0VDC			
737	24VDC			
738	24VDC			
739				
740	721			

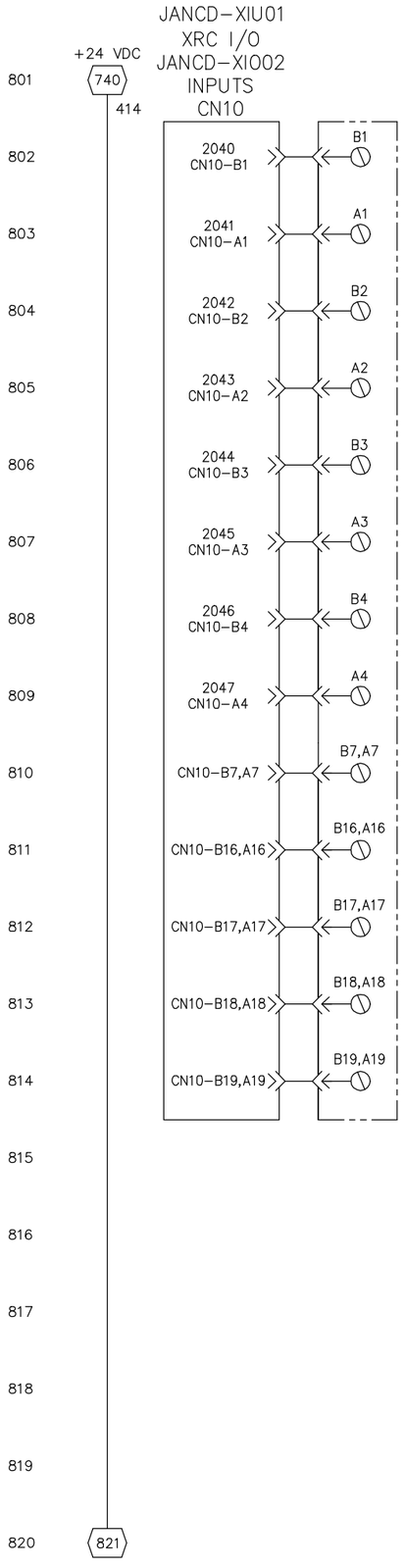
721	+24 VDC	720	414	
722				
723				
724				
725				
726				
727				
728				
729				
730				
731				
732				
733				
734				
735				
736				
737				
738				
739				
740	801			

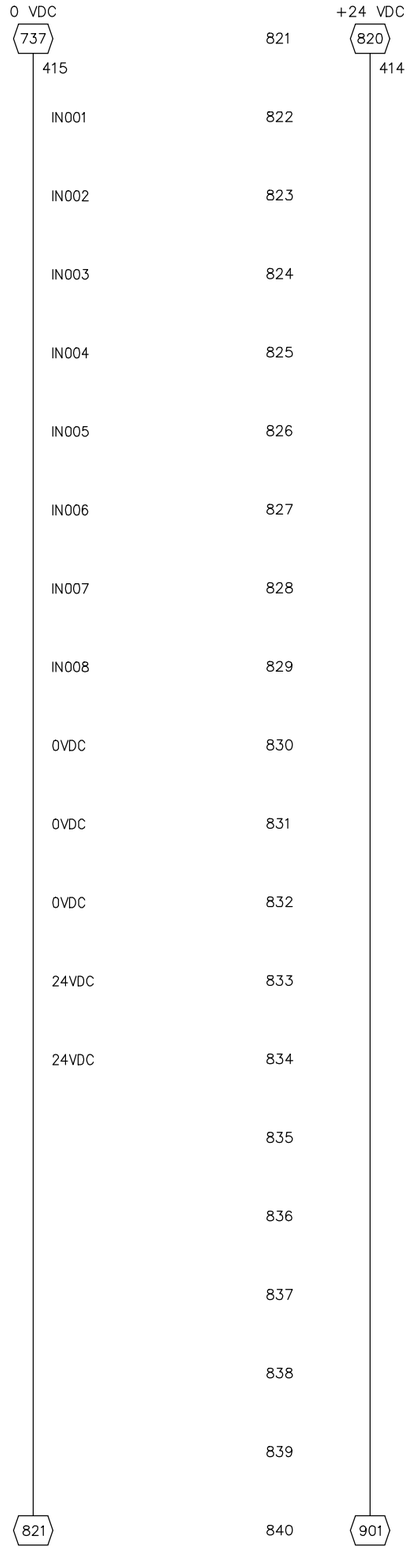
JANCD-XIU01
XRC I/O
JANCD-XI002
OUTPUTS
CN13

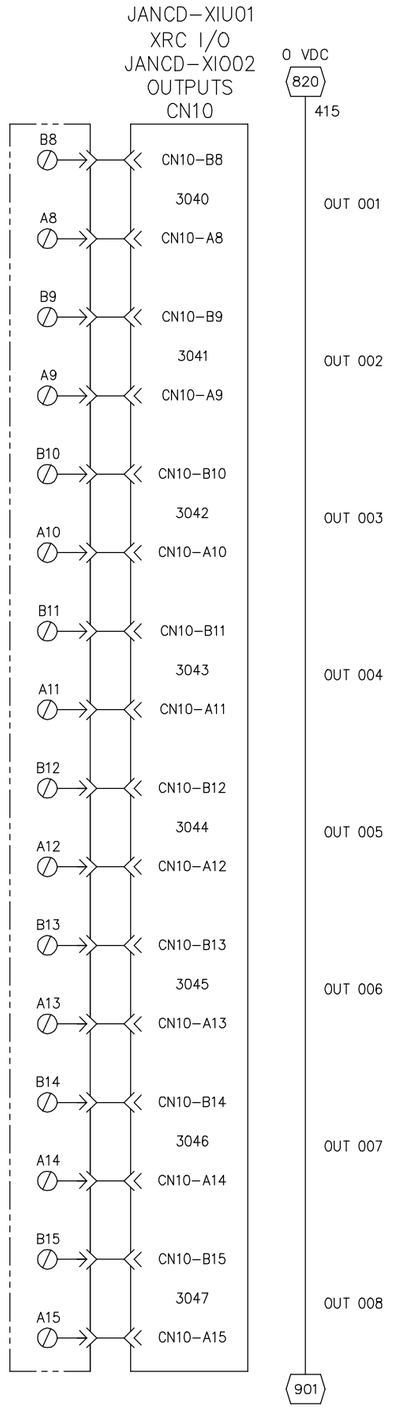
	0 VDC	720	415	
B8	3024 CN13-B8			GAS SHORTAGE
A8	3025 CN13-A8			WIRE SHORTAGE
B9	3026 CN13-B9			WIRE STICKING
A9	3027 CN13-A9			ARC SHORTAGE
B10	3030 CN13-B10			SEARCH INSTRUCTION
A10	3031 CN13-A10			NC
B11	3032 CN13-B11			NC
A11	3033 CN13-A11			NC
B12	3034 CN13-B12			NC
A12	3035 CN13-A12			NC
B13	3036 CN13-B13			NC
A13	3037 CN13-A13			NC
				801

NOTE: NPN SINKING OUTPUTS 50mA MAX.

XRC Basic Arc Welding Wiring, Sheet 3

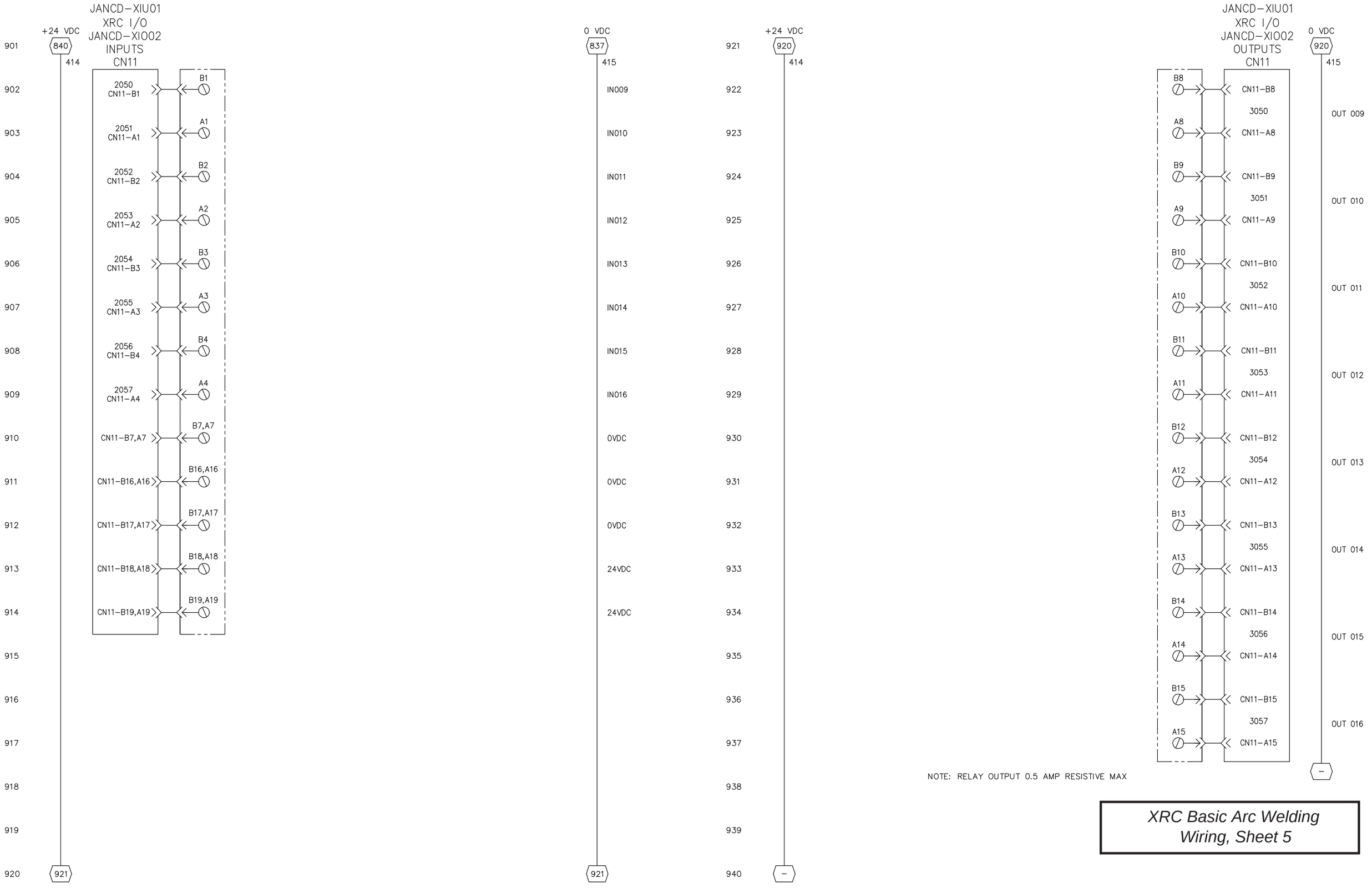






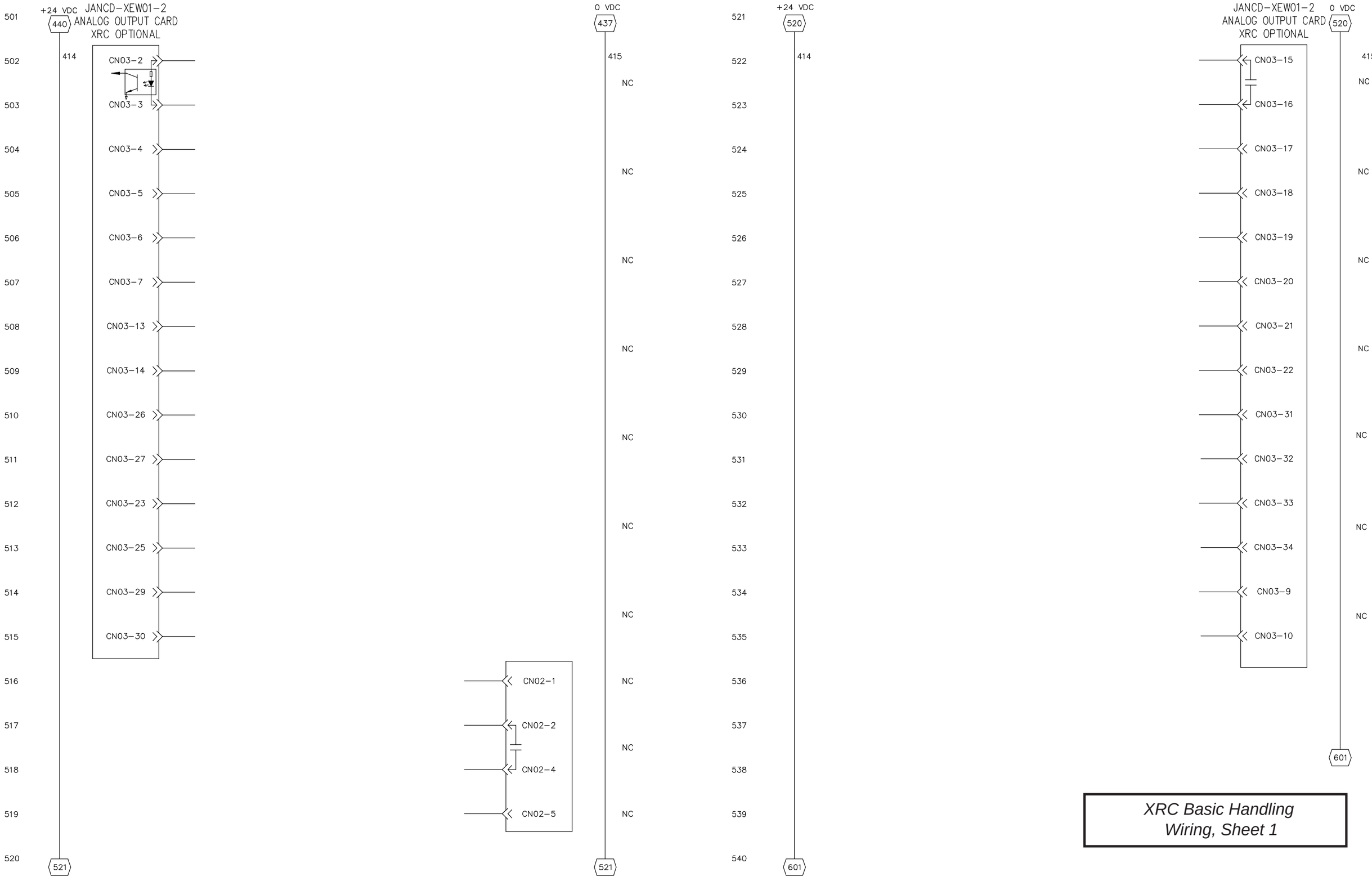
NOTE: RELAY OUTPUT 0.5 AMP RESISTIVE MAX

XRC Basic Arc Welding Wiring, Sheet 4



NOTE: RELAY OUTPUT 0.5 AMP RESISTIVE MAX

XRC Basic Arc Welding
Wiring, Sheet 5



XRC Basic Handling Wiring, Sheet 1

JANCD-XIU01
XRC I/O
JANCD-XIO02
INPUTS
CN12

+24 VDC (540) → 414

601		
602	2010 CN12-B1	B1
603	2011 CN12-A1	A1
604	2012 CN12-B2	B2
605	2013 CN12-A2	A2
606	2014 CN12-B3	B3
607	2015 CN12-A3	A3
608	2016 CN12-B4	B4
609	2017 CN12-A4	A4
610	2020 CN12-B5	B5
611	2021 CN12-A5	A5
612	2022 CN12-B6	B6
613	2023 CN12-A6	A6
614	CN12-B7,A7	B7,A7
615	CN12-B16,A16	B16,A16
616	CN12-B17,A17	B17,A17
617	CN12-B18,A18	B18,A18
618	CN12-B19,A19	B19,A19
619		
620	(621)	

0 VDC (537) → 415

+24 VDC (620) → 414

621		
622	EXTERNAL START	
623	NC	
624	MASTER JOB CALL	
625	ALARM/ERROR RESET	
626	REMOTE SELECT	
627	PLAY MODE	
628	TEACH MODE	
629	FAN STOP ALARM	
630	CUBE 1 PROHIBIT	
631	CUBE 2 PROHIBIT	
632	NC	
633	NC	
634	0VDC	
635	0VDC	
636	0VDC	
637	24VDC	
638	24VDC	
639		
640	(621)	(701)

JANCD-XIU01
XRC I/O
JANCD-XIO02
OUTPUTS
CN12

0 VDC (620) → 415

B8	3010 CN12-B8	OPERATING
A8	3011 CN12-A8	SERVO ON
B9	3012 CN12-B9	TOP MASTER JOB
A9	3013 CN12-A9	ALARM/ERROR OCCURRENCE
B10	3014 CN12-B10	BATTERY ALARM
A10	3015 CN12-A10	REMOTE MODE SELECTED
B11	3016 CN12-B11	PLAY MODE SELECTED
A11	3017 CN12-A11	TEACH MODE SELECTED
B12	3020 CN12-B12	IN CUBE 1
A12	3021 CN12-A12	IN CUBE 2
B13	3022 CN12-B13	CUBE 8
A13	3023 CN12-A13	SEQUENCE EXECUTING

NOTE: NPN SINKING OUTPUTS 50mA MAX.

(701)

XRC Basic Handling Wiring, Sheet 2

JANCD-XIU01
XRC I/O
JANCD-XIO02
INPUTS
CN13

+24 VDC (640) 414

701			
702	2024 CN13-B1	B1	
703	2025 CN13-A1	A1	
704	2026 CN13-B2	B2	
705	2027 CN13-A2	A2	
706	2030 CN13-B3	B3	
707	2031 CN13-A3	A3	
708	2032 CN13-B4	B4	
709	2033 CN13-A4	A4	
710	2034 CN13-B5	B5	
711	2035 CN13-A5	A5	
712	2036 CN13-B6	B6	
713	2037 CN13-A6	A6	
714	CN13-B7,A7	B7,A7	
715	CN13-B16,A16	B16,A16	
716	CN13-B17,A17	B17,A17	
717	CN13-B18,A18	B18,A18	
718	CN13-B19,A19	B19,A19	
719			
720			

721

0 VDC (637) 415

721	
722	NC
723	NC
724	SHOCK SENSOR
725	AIR PRESSURE LOWERED
726	IN 001
727	IN 002
728	IN 003
729	IN 004
730	IN 005
731	IN 006
732	IN 007
733	IN 008
734	0VDC
735	0VDC
736	0VDC
737	24VDC
738	24VDC
739	
740	

721

+24 VDC (720) 414

801

JANCD-XIU01
XRC I/O
JANCD-XIO02
OUTPUTS
CN13

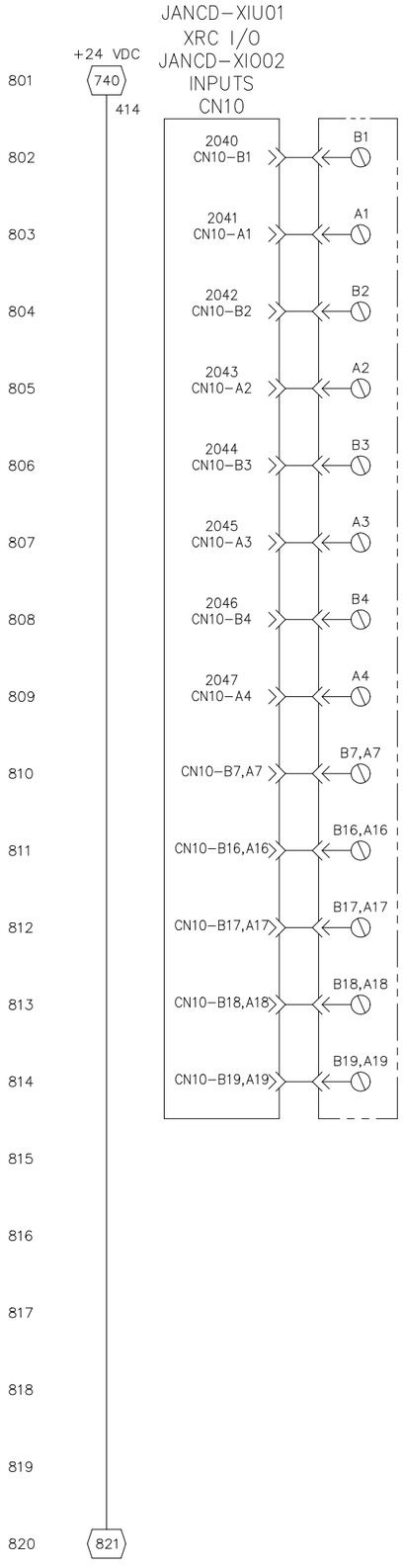
0 VDC (720) 415

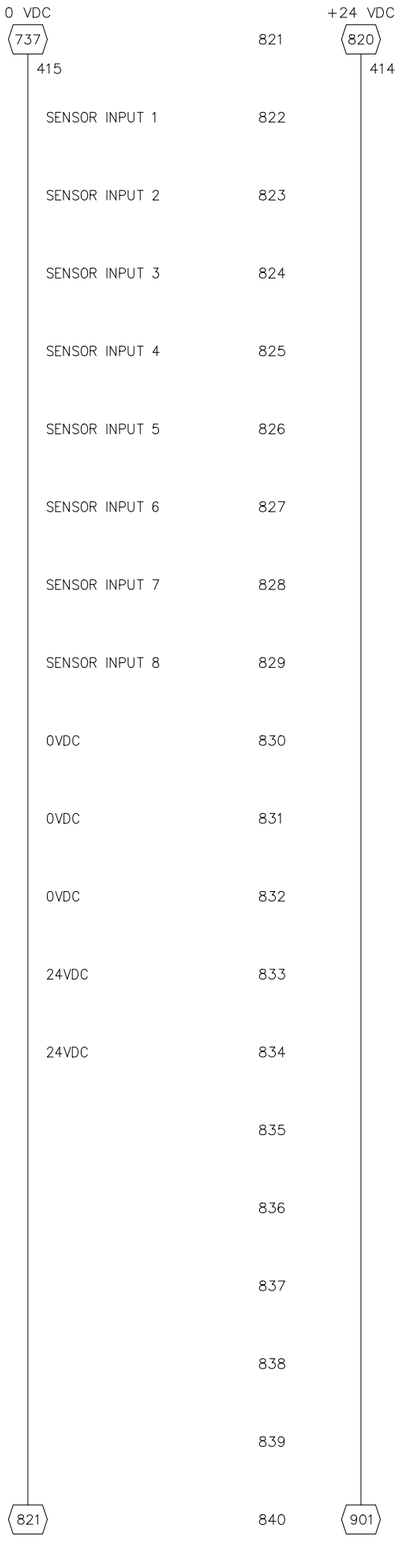
B8	3024 CN13-B8	NC
A8	3025 CN13-A8	NC
B9	3026 CN13-B9	NC
A9	3027 CN13-A9	NC
B10	3030 CN13-B10	OUT 001
A10	3031 CN13-A10	OUT 002
B11	3032 CN13-B11	OUT 003
A11	3033 CN13-A11	OUT 004
B12	3034 CN13-B12	OUT 005
A12	3035 CN13-A12	OUT 006
B13	3036 CN13-B13	OUT 007
A13	3037 CN13-A13	OUT 008

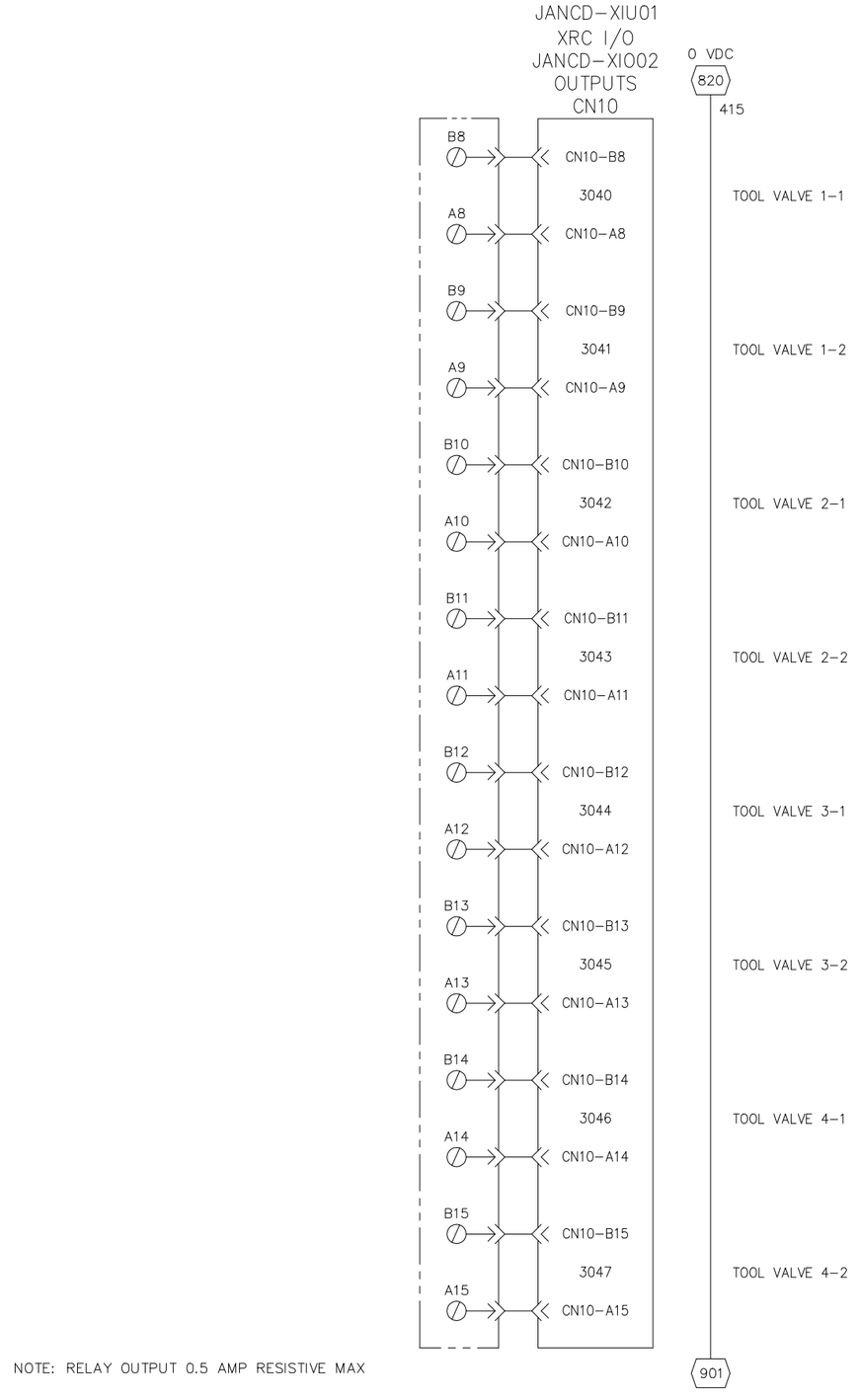
801

NOTE: NPN SINKING OUTPUTS 50mA MAX.

XRC Basic Handling
Wiring, Sheet 3

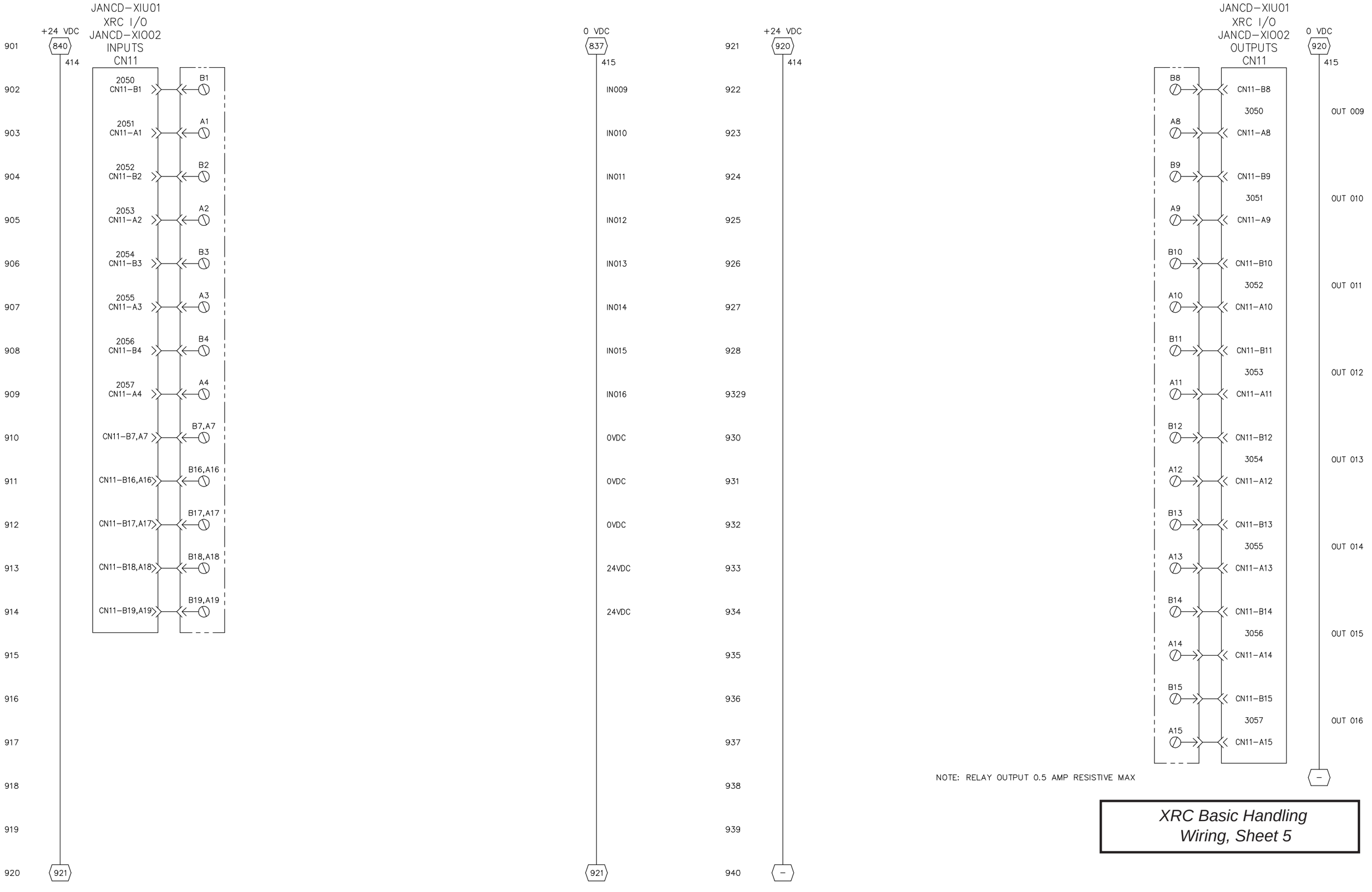




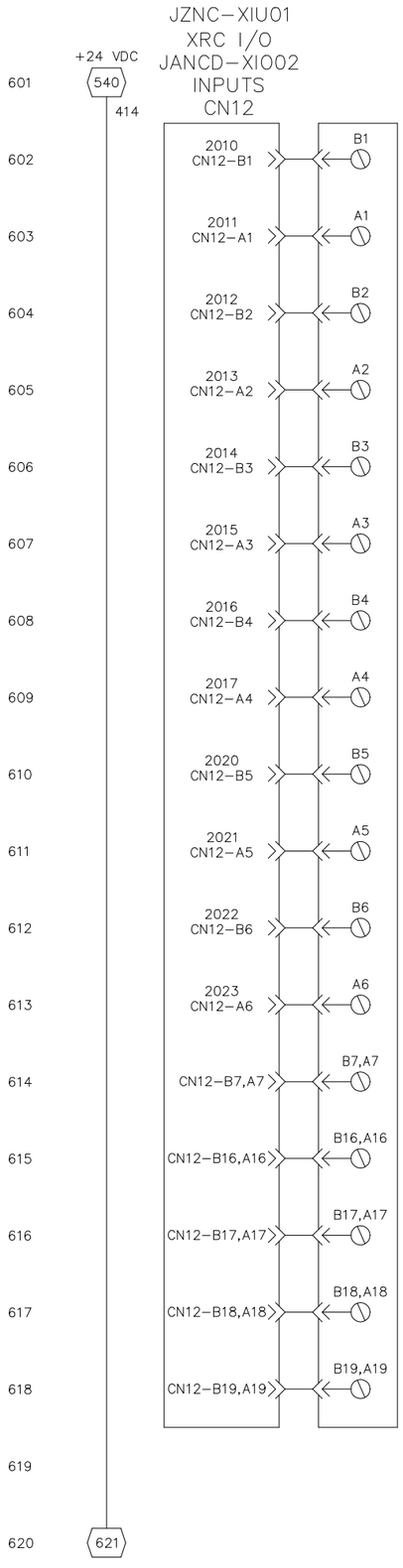


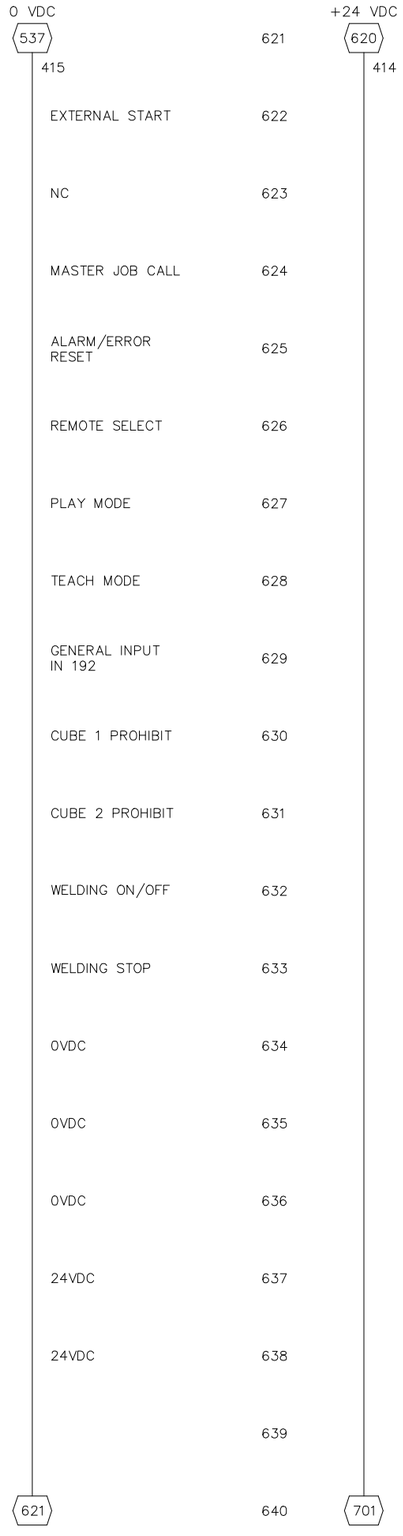
NOTE: RELAY OUTPUT 0.5 AMP RESISTIVE MAX

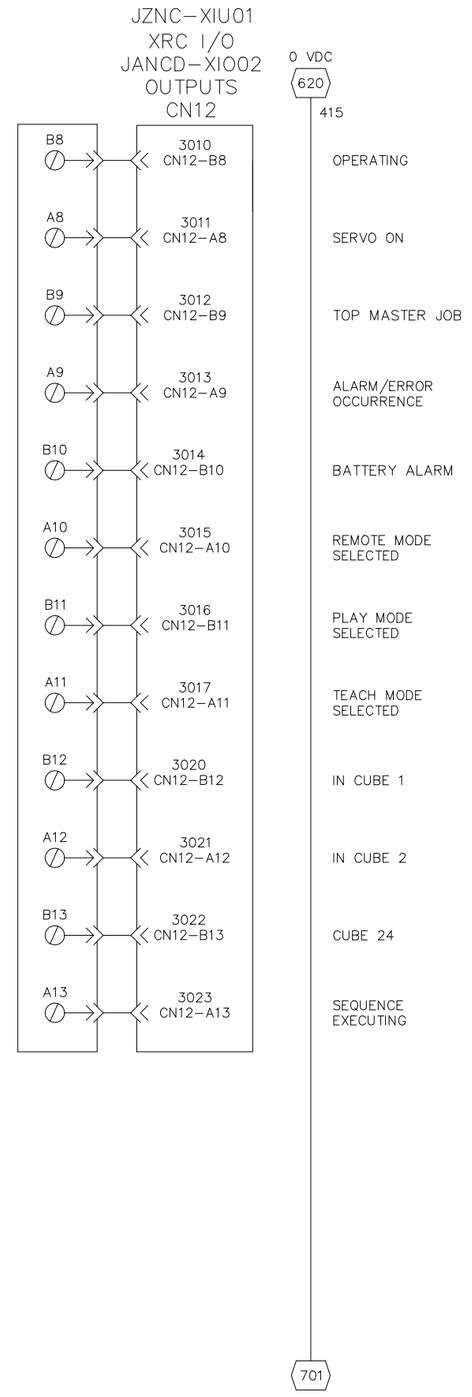
XRC Basic Handling
Wiring, Sheet 4



XRC Basic Handling
Wiring, Sheet 5







NOTE: NPN SINKING OUTPUTS 50mA MAX.

XRC Basic Spot Welding Wiring, Sheet 1

JZNC-XIU01
XRC I/O
JANCD-XIO02
INPUTS
CN13

701	+24 VDC (640)	414		
702			2024 CN13-B1	B1
703			2025 CN13-A1	A1
704			2026 CN13-B2	B2
705			2027 CN13-A2	A2
706			2030 CN13-B3	B3
707			2031 CN13-A3	A3
708			2032 CN13-B4	B4
709			2033 CN13-A4	A4
710			2034 CN13-B5	B5
711			2035 CN13-A5	A5
712			2036 CN13-B6	B6
713			2037 CN13-A6	A6
714			CN13-B7,A7	B7,A7
715			CN13-B16,A16	B16,A16
716			CN13-B17,A17	B17,A17
717			CN13-B18,A18	B18,A18
718			CN13-B19,A19	B19,A19
719				
720	(721)			

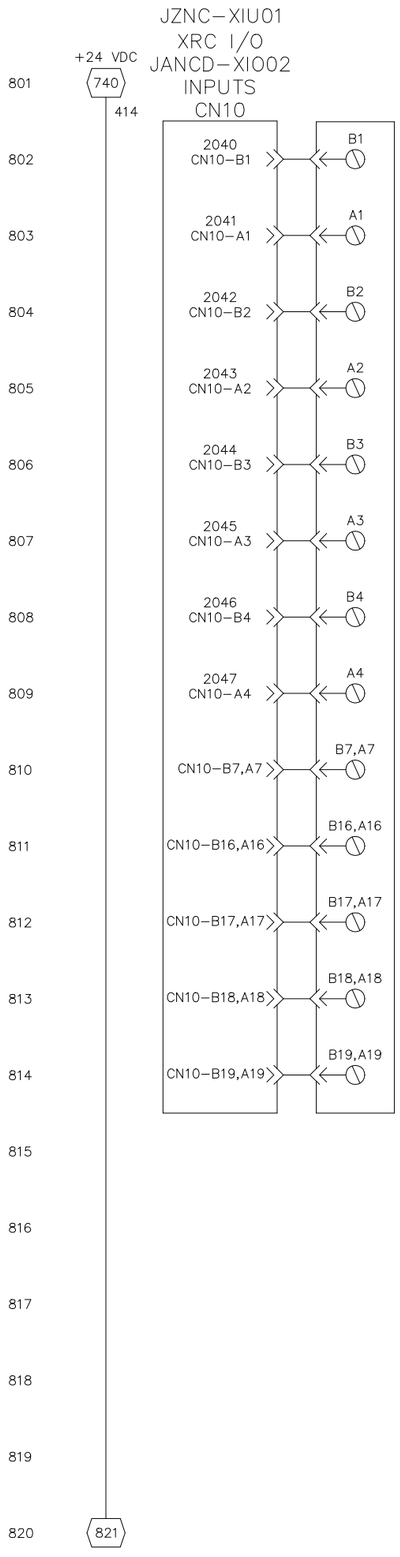
0 VDC (637)	415		
CUBE 3 PROHIBIT	722	+24 VDC (720)	414
CUBE 4 PROHIBIT	723		
NC	724		
NC	725		
IN 001	726		
IN 002	727		
IN 003	728		
IN 004	729		
IN 005	730		
IN 006	731		
IN 007	732		
IN 008	733		
0VDC	734		
0VDC	735		
0VDC	736		
24VDC	737		
24VDC	738		
	739		
(721)	740	(801)	

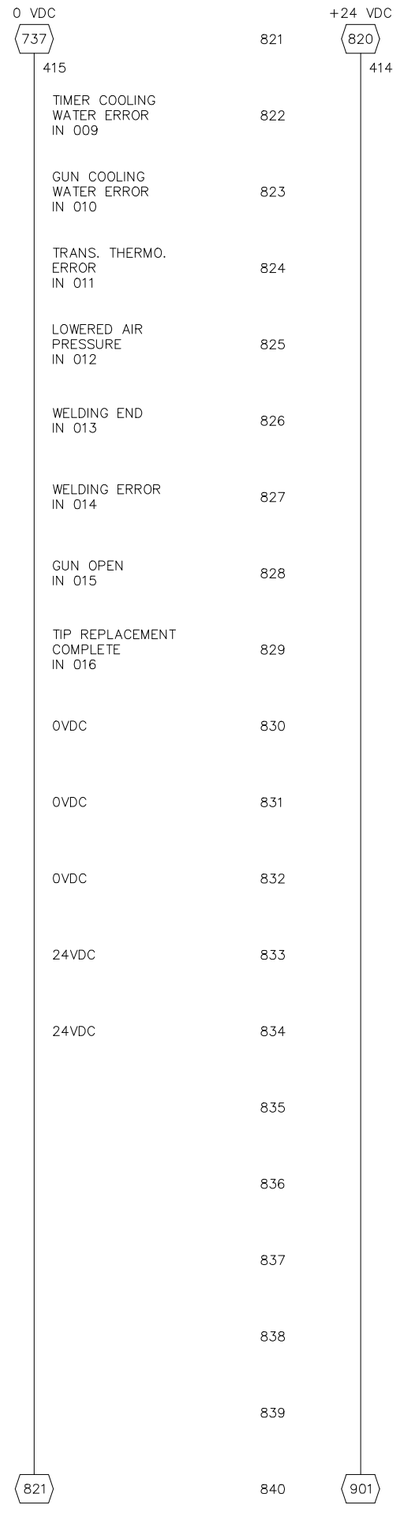
JZNC-XIU01
XRC I/O
JANCD-XIO02
OUTPUTS
CN13

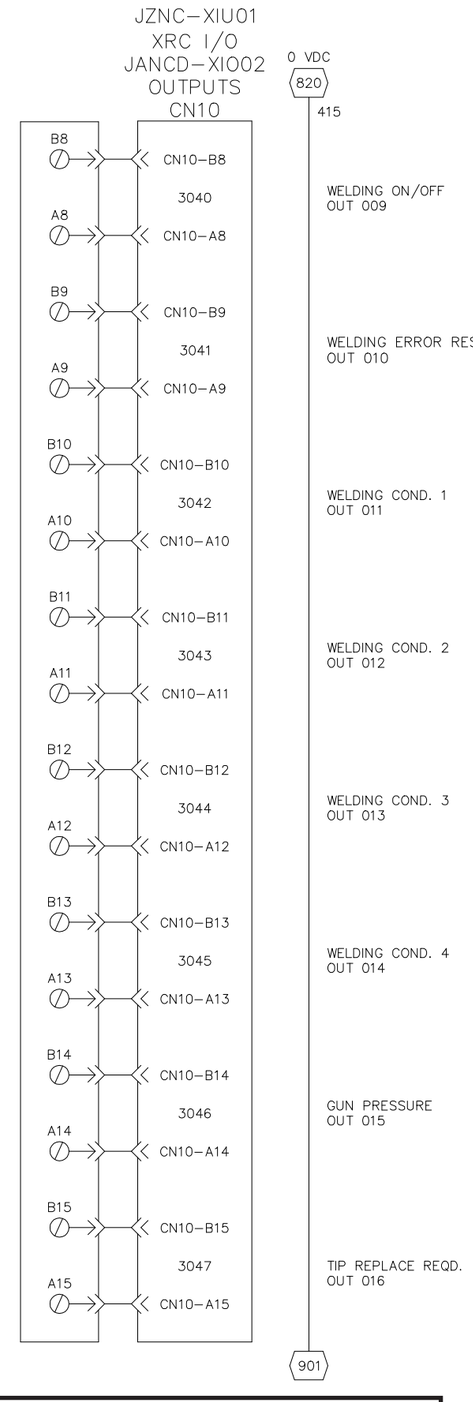
0 VDC (720)	415		
IN CUBE 3	B8	3024 CN13-B8	
IN CUBE 4	A8	3025 CN13-A8	
–	B9	3026 CN13-B9	
–	A9	3027 CN13-A9	
OUT 001	B10	3030 CN13-B10	
OUT 002	A10	3031 CN13-A10	
OUT 003	B11	3032 CN13-B11	
OUT 004	A11	3033 CN13-A11	
OUT 005	B12	3034 CN13-B12	
OUT 006	A12	3035 CN13-A12	
OUT 007	B13	3036 CN13-B13	
OUT 008	A13	3037 CN13-A13	
(801)			

NOTE: NPN SINKING OUTPUTS 50mA MAX.

XRC Basic Spot Welding Wiring, Sheet 2

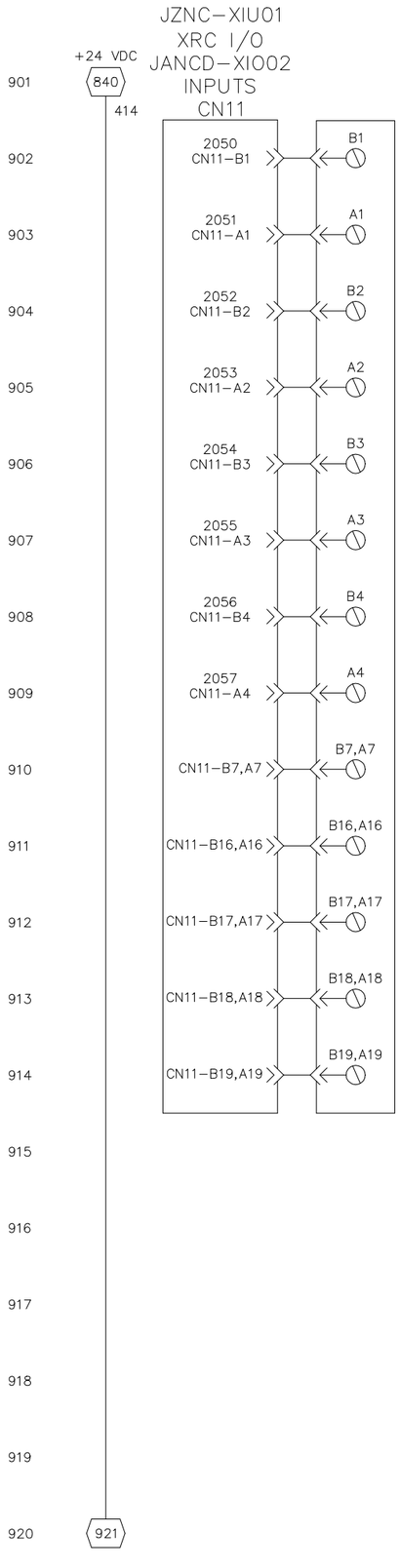


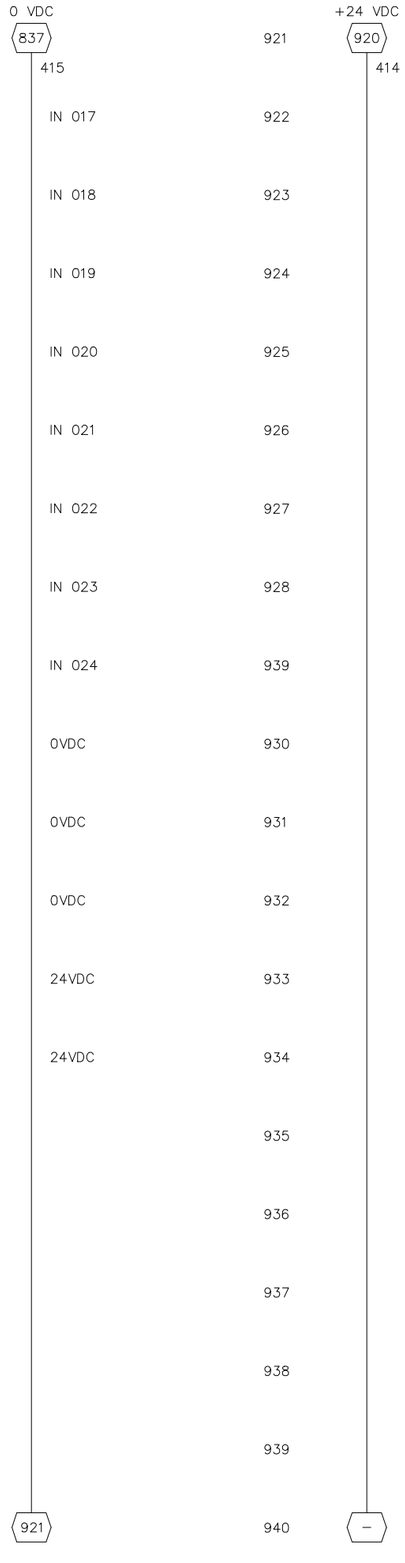


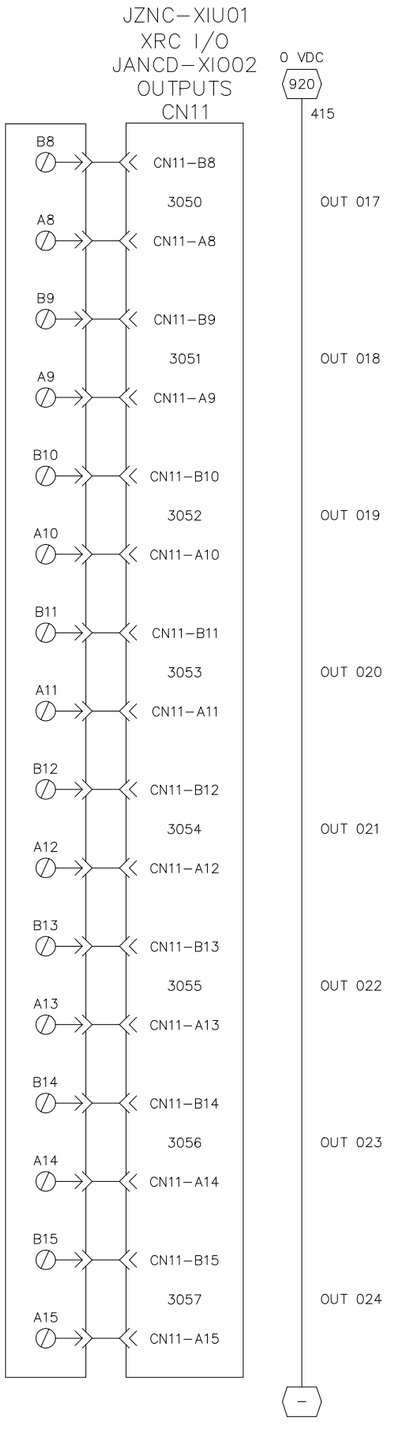


NOTE: RELAY OUTPUT 0.5 AMP RESISTIVE MAX

XRC Basic Spot Welding Wiring, Sheet 3







NOTE: RELAY OUTPUT 0.5 AMP RESISTIVE MAX

XRC Basic Spot Welding Wiring, Sheet 4