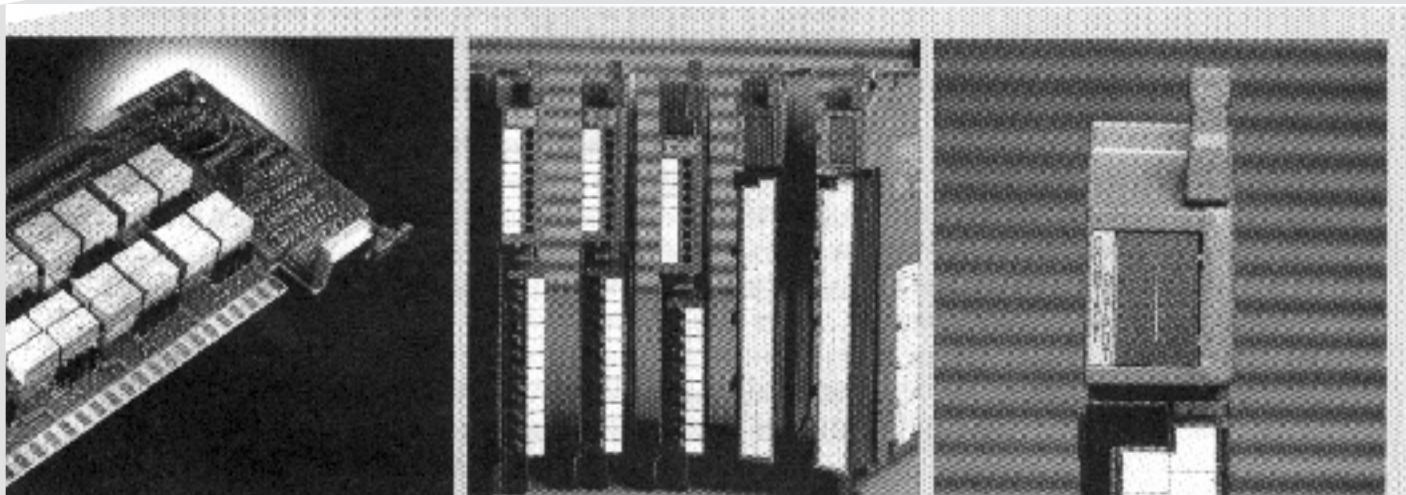# 1771 Digital I/O
Relay Contact Output Modules

(Cat. Nos. 1771-OW, -OW16, -OWN, -OWNA, -OX, -OYL, -OZL)

Product Data

Eliminate leakage current. Relay contact output modules offer dry circuits, that is, circuits without leakage current. Leakage currents are present on solid-state outputs; these currents are capable of energizing highly sensitive output load devices such as low-power latching relays. Open contacts on output relays assure that no leakage currents occur in critical applications.

Select the configuration mode for outputs. Allen-Bradley relay contact output modules offer either normally-open (Form A) or normally-closed (Form B) configurations. You can select the form configuration for four of the contact output modules, the 1771-OW, -OW16, -OWN, and -OX. The 1771-OW has eight selectable outputs. The 1771-OW16 has eight normally-open and eight selectable outputs. The 1771-OWN has 32 selectable outputs.The 1771-OX has four selectable outputs. Selectable–configuration means you can predetermine whether an output will be on or off when local power is lost to the control system or the output module. The 1771-OWNA has 32 non-selectable normally-open contacts.

Rockwell Automation

Allen-Bradley

Benefits

Provide output isolation. Isolation helps assure that a failure on one output circuit does not pull down another output circuit, thus increasing overall system integrity. This isolation also protects the backplane logic from line transients on the output circuits.

Increase flexibility in applied voltages. You can apply either ac or dc voltages to relay contact output circuits. The range of these voltages can be broad (within the module's operating specifications) without impacting the module's performance.

Sink or source power. Contacts on relays permit dc outputs to be sinking or sourcing as required by the devices being controlled. Solid-state outputs require specific compatibility with the load device as to current sinking or sourcing.

Switch analog signals through relays. You can use analog module inputs for different devices by switching circuits through relays. Analog signals are typically low voltage (+10V dc) and low current (4-20 mA). Contact resistance can be critical, and should be accounted for in low-impedance circuits.

Using This Publication

This publication provides you with information about Allen-Bradley's relay contact output modules. The publication is divided into two sections. The first section contains general information that pertains to all of the relay modules; the second section contains module-specific information. The following table lists the relay contact modules and the page number on which you can find information about each.

Relay Contact Output Modules

For more information about this module:	Refer to page:
1771-OW (8 outputs/selectable)	15
1771-OW16 (8 fixed, 8 selectable)	15
1771-OWN (32 outputs/selectable)	17
1771-OWNA (32 outputs)	19
1771-OX (4 outputs/power)	21
1771-OYL (24V/8outputs)	23
1771-OZL (24V/8outputs)	25

Allen-Bradley relay contact output modules use one of the following relay types:

Relay Type	Catalog Number
Electromechanical	1771-OW 1771-OW16 1771-OWN 1771-OWNA
Dry-Reed	1771-OYL, 1771-OYZ
Mercury-Wetted	1771-OX

Electromechanical Relays

Electromechanical relays contain the most economical design for power applications. These modules typically can handle line surges and noise through closed contacts. Electromechanical relays are not recommended for low voltage/low current applications. Electromechanical relays are generally slower than dry-reed relays. They are not recommended for use in environments with contaminants such as acid, ammonia, nitrogen, or chlorine (noxious environments) because they are not hermetically sealed. Allen-Bradley modules that use electromechanical relays include the 1771-OW, 1771-OW16, 1771-OWN, and 1771-OWNA modules.

Dry-Reed Relays

Dry-reed relays are noted for their speed. These relays are well-suited for low-voltage, low-power applications. They are hermetically sealed and thus offer protection in noxious environments. Dry reeds, however, cannot handle surge currents due to their low-voltage design. Allen-Bradley modules that use dry-reed relays are the 1771-OYL and 1771-OZL modules.

Mercury-Wetted Relays

The mercury-wetted relay is a power version of the dry-reed switch. These relays feature long life and high contact reliability because the mercury re-coats the contacts on every operation. Mercury-wetted relays are also hermetically sealed and have no bounce on outputs and offer a clean switch. Of the three types of relays, mercury-wetted relays are the slowest (10 ms). ATTENTION: The 1771-OX module contains mercury-wetted relays. At the end of the equipment's life, it should be collected separately from any unsorted municipal waste.

System Compatibility

The following table lists the Allen-Bradley relay contact output modules and shows compatibility and use of data table for each.

System Compatibility and Use of Data Table

Module Cat No.	Module Series	Output Image Bits Used	Addressing			Compatible Chassis
			2-slot	1-slot	1/2-slot	
1771-OW	A	8	Y	Y	Y	A,B
1771-OW16	B	16	R	Y	Y	B
1771-OWN	A	32	N	R	Y	B
1771-OWNA	A	32	N	R	Y	B
1771-OX	A	8 (4 actual outputs)	Y	Y	Y	A,B
1771-OYL	A	8	Y	Y	Y	A,B
1771-OZL	A	8	Y	Y	Y	A,B

A = Compatible with superseded chassis (1771-A1, -A2, -A4)
B= Compatible with current chassis (1771-A1B, -A2B, -A3B, -A3B1, -A4B, -AM1, -AM2)
Y = Compatible without restriction
N = Not compatible
R = Conditional module placement; you must use an input module and an output module in an
    odd/even pair of slots of the I/O chassis beginning with slot 0.

Power Supply Requirements

Relay contact output modules receive power through the 1771 I/O chassis backplane from the chassis power supply. Refer to the module specifications on pages 11 through 24 for the current required from the power supply (in mA) to operate the module. You should total the current requirements for all the modules in the chassis to avoid overloading the power supply or the I/O chassis backplane.

Keying

Plastic keying bands shipped with each I/O chassis let you configure your I/O slots to accept only one type of module. You can configure any backplane connector in an I/O chassis to receive your contact output module except for the leftmost connector, which is reserved for adapter or processor modules. Since mixed voltages are often used on relay modules, most of the contact output relay modules all have the same keying slots. Refer to the module specifications for specific keying positions.

Status Indicators

Status indicators on the front of each module show the system logic side status of the output relays. Each module has one indicator per output. When the indicator is on, it means the output relay coil is energized; when the indicator is off, it means the output relay coil is not energized. You can quickly isolate many types of external hardware-related faults by comparing these indicators with their corresponding output devices, and the control program.

Application Considerations

When using relay contact output modules, you must consider the following:

Limited Life

Relays have a finite number of operations during their life. This varies depending on the current loads and voltages you apply relative to the relay's design specifications. A relay that is always operating at the same load conditions has a very predicatable life. A low power load delivers longer contact life when the minimum load conditions are met. Varying load conditions can drastically shorten contact life. Do not operate a contact at low current or voltage conditions after operating the same relay under high power conditions. Operate at low power first, then at high power.

Electromechanical relays typically have a longer life than dry-reed relays. When selecting a relay type, we recommend that you consider the number of operations expected over time and the load placed on the relay.

The switching frequency of a relay is limited by its mechanical characteristics. To obtain maximum relay life, do not exceed the maximum switching frequency of the module.

Excitation, Contact Closure, Speed, and Bounce

All types of relay outputs have a specified time in which contact is made or broken (pull-in or drop-out times). Dry-reed relays are notably faster than electromechanical. Electromechanical and dry-reed relays have contact bounce. Mercury-wetted relays do not have bounce.

Load Characteristics

All wiring between the module and the load creates a certain amount of capacitive loading for the relay contacts. This capacitance is discharged during contact closure. The resulting peak current flow causes additional wear of the contact. Avoid this effect by keeping your cable lengths as short as possible, and, if possible, insert a resistor in series with your load. Locate the resistor as near as possible to the field wiring arm. Size the resistor properly.

Many loads (relays, coils, motor starters, solenoids, motors, etc.) contain a certain amount of inductance. This inductance does not allow an instantaneous change of current when the relay contacts open. As a result, the voltage across the contacts rises to a very high level, and causes arcing between the contacts. This arcing reduces the life of the contacts.We recommend you use a resistor-capacitor (RC) network (also called a "snubber") across the contacts in all circuits.

> ⚠ **ATTENTION:**   Failure to use a resistor-capacitor (RC) network across the relay contacts can result in generation of electromagnetic noise which could disrupt nearby electrical equipment, including the 1771 I/O chassis.

The best location for the RC network is across the relay contact terminals on the field wiring arm. This location suppresses the noise where it is generated, and does not let the noise radiate along the wiring going to the load.

The 1771-OW, -OW16, -OWN, -OWNA, -OYL, and -OZL modules are not approved by UL/CSA for use with reactive loads.   The 1771-OX module is designed with selectable dc surge protection circuitry.

The formula necessary to determine the appropriate values for the RC network is shown below. Use a capacitor with an ac voltage rating greater than the maximum voltage seen across the contacts. Use a 5%, 1 Watt carbon composition resistor.

Resistor-Capacitor Network Calculation of Values
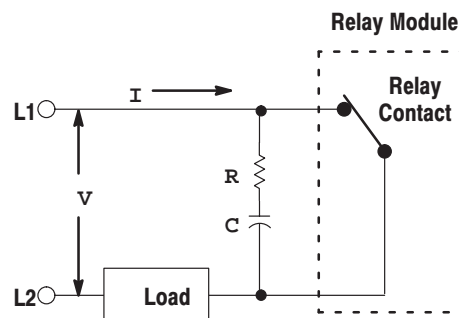
$$C = I^2/10 \text{ in } \mu F$$

$$R = V/(10I^a) \text{ in ohms}$$

Where: I = Amps
       V = Volts
       a = 1 + (50/V)

Incandescent lamps also create a spike due to their low turn-on resistance before they become hot. Therefore, you must use derating or surge suppression (for example Allen-Bradley surge suppressors 1492-H2K120, 1492-H2K024, and 1492-H2K240). Specified relay current is typically derated at ten times the steady-state current of the incandescent lamp load. For derating, you can calculate cold-start load by measuring the cold load resistance. You can also experience large current surges when bulbs burn out (e.g. 20-50 amps).

Environments

The operating temperature of the relay greatly influences the life of the relay contacts. The 1771 relay contact output modules have a maximum operating temperature of 60°. Operation at lower temperatures will extend relay contact life.

Since electromechanical relays are not hermetically sealed, they are not recommended in environments with contaminants such as acid, ammonia, nitrogen, and chlorine— especially with voltages under 24V ac/dc or for prolonged periods without operation. Such environments contaminate the relay contacts, causing reliability problems. Higher voltage usage, between 24 and 120V ac/dc, and continued operation help keep contacts clean as a result of the burning off of contact contaminants. Relays are also subject to reliability problems under high vibration environments as mechanical motion can intermittently break contacts.

Mercury-wetted relays and dry-reed relays are hermetically sealed from the environments, thus preventing environmental reliability problems. Mercury-wetted relays are generally sensitive to mounting position.

Output Module Loading

The life of the relays in the output modules is directly affected by the load through the contacts and the operating temperature.

Minimum currents and voltages specified for 1771 relay contact output modules are selected to provide clean contacts throughout the life of the contacts. The relays can operate below the minimum specifications, but operation will not be reliable.

Exceeding the maximum power ratings for the module will shorten the life of the relay contacts. Do not operate relay contact output modules at power levels greater than maximum specifications.

By using the operating range graphs, you can determine if you are within the operating capability of the relay. You only need to know any two of the following:

- voltage
- load current (mA)
- load power consumption (W)

Using Figure 1, follow this example:

Given a 30V dc, 4W indicator, is this in operating range?

1. Locate the vertical line for 30V.

2. Locate the angled line for 4W; it is at this angle (\).

3. Find where the two lines cross. If this is within the shaded area of the graph, you are in the permissible operating area for the relay contact output module. (In this example, you are in the permissible operating range.)

Refer to the following operating range graphs to determine the operating capability of the relay.

Figure 1
1771-OW, -OWN, -OWNA ac and dc Operating Load Range[1]
(Relay Contacts)
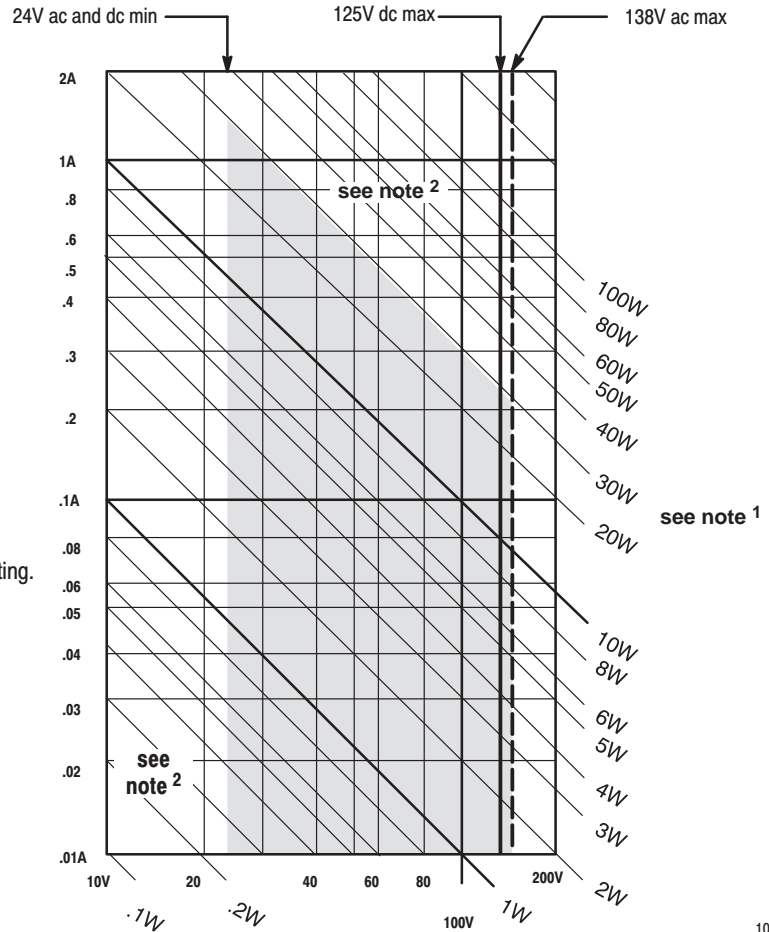
[1] Spikes, peaks and surges must be within the power rating. Resistive loads only.   ac or dc power = 30W max.

[2] **CAUTION!** Do not operate in this area.

Figure 2
1771-OW16 ac and dc Operating Load Range[1]
(Relay Contacts)
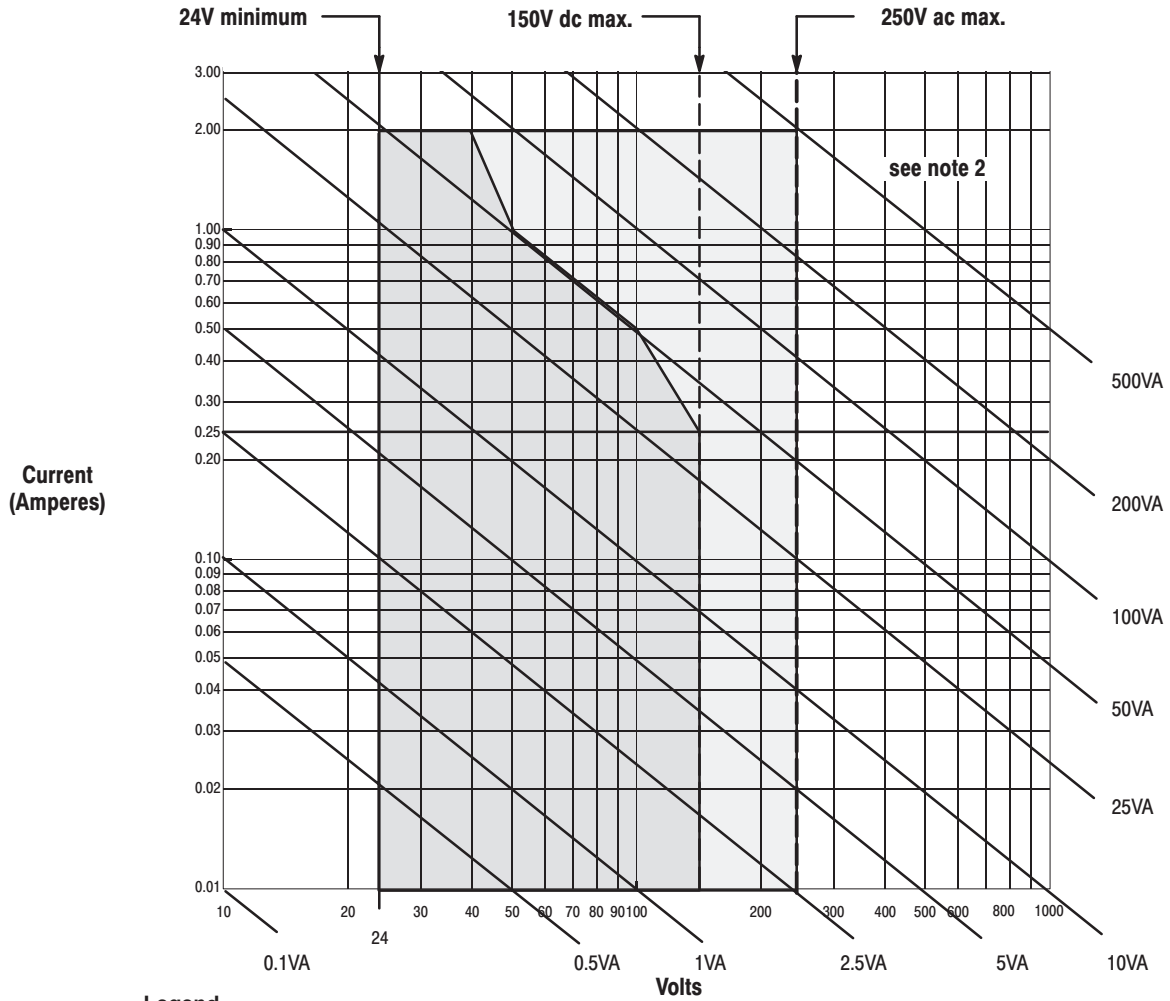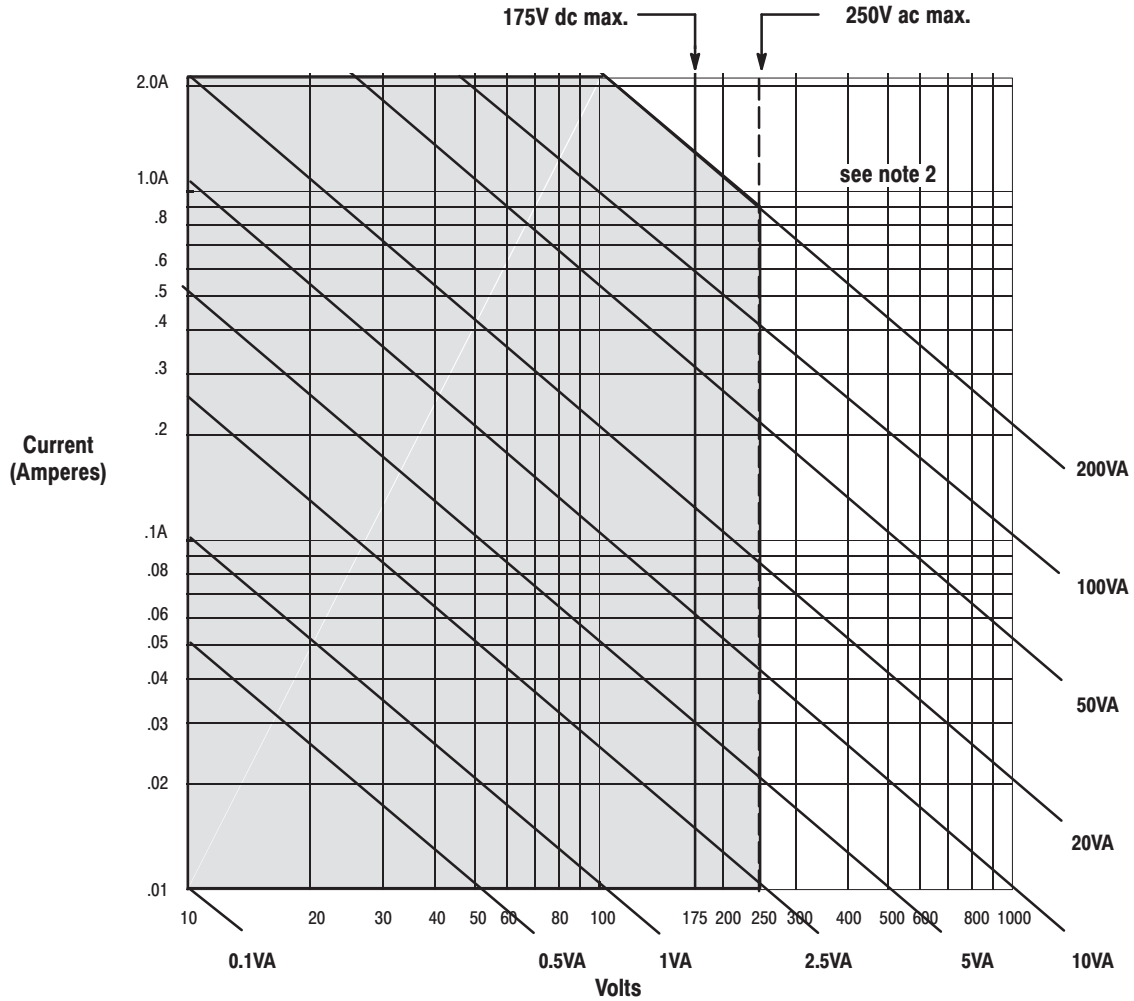

Legend

ac and dc	
ac only	

[1] Spikes, peaks and surges must be within the power rating.
Resistive, capacitive or inductive loads only.
ac power = 500VA max; dc power = 80W max.

[2] **CAUTION!** Do not operate in this area.

10507–I

Figure 3
1771-OX ac and dc Operating Load Range[1]
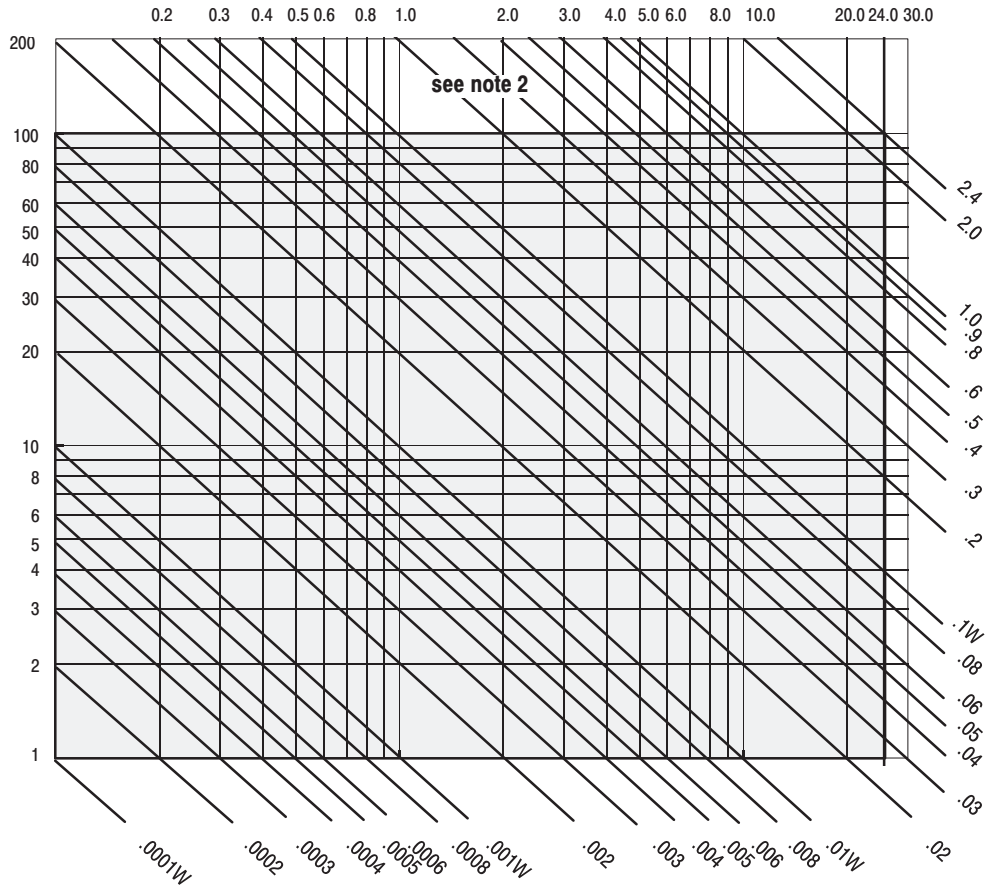**(Relay Contacts)**

[1] Spikes, peaks and surges must be within the power rating.
Resistive or inductive loads only.
ac or dc power = 200VA max.

[2] **CAUTION!** Do not operate in this area.

10507–I

Figure 4
1771-OYL, -OZL ac and dc Operating Load Range[1]
(Relay Contacts)

10508–I

[1] Resistive loads only. ac or dc power = 2.4W max.

[2] **CAUTION!** Do not operate in this area.

Compliance to European Union Directives

If this product has the CE mark it is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

EMC Directive

This product is tested to meet Council Directive 89/336/EEC Electromagnetic Compatibility (EMC) and the following standards, in whole or in part, documented in a technical construction file:

- EN 50081-2EMC – Generic Emission Standard, Part 2 – Industrial Environment
- EN 50082-2EMC – Generic Immunity Standard, Part 2 – Industrial Environment

This product is intended for use in an industrial environment.

Low Voltage Directive

This product is tested to meet Council Directive 73/23/EEC Low Voltage, by applying the safety requirements of EN 61131–2 Programmable Controllers, Part 2 – Equipment Requirements and Tests.

For specific information required by EN 61131-2, see the appropriate sections in this publication, as well as the following Allen-Bradley publications:

- Industrial Automation Wiring and Grounding Guidelines For Noise Immunity, publication 1770-4.1
- Guidelines for Handling Lithium Batteries, publication AG-5.4
- Automation Systems Catalog, publication B111

Agency Certification

Individual discrete I/O modules can also comply with various other agency requirements when product or packaging is so marked.

| Agency Certification (when product or packaging is marked)	• CSA certified • CSA Class I, Division 2, Groups A, B, C, D certified • UL listed • CE marked for all applicable directives

Module Information

Refer to the following pages for detailed information about each Allen-Bradley relay contact output module. This information includes:

- simplified schematic
- application notes
- connection diagram
- driving an input module with an output module
- switch and jumper settings
- specifications

For more information about this module:	Refer to page:
1771-OW (8 outputs/selectable)	15
1771-OW16 (8 fixed, 8 selectable)	15
1771-OWN (32 outputs/selectable)	17
1771-OWNA (32 outputs)	19
1771-OX (4 outputs/power)	21
1771-OYL (24V/8outputs)	23
1771-OZL (24V/8outputs)	25

Selectable Relay Contact Output Module (Cat. No. 1771-OW)

Simplified Schematic

10509–I
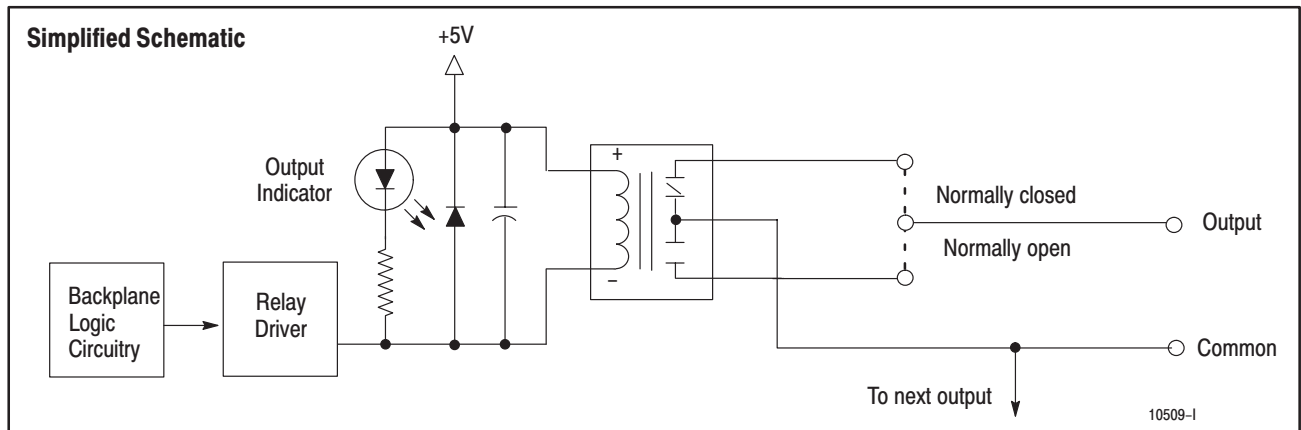
Application Notes

Load Type. 1771-OW modules do not contain surge limiting circuitry. Use these modules for switching resistive loads only (e.g., lamps, indicators, heating elements). They are not recommended for inductive or capacitive loads (e.g., motor starters, solenoids, relays).

Isolation. Outputs on the 1771-OW module are arranged in 4 groups of 2, each group with its own common. Each output is electrically isolated from module logic circuitry. The module can simultaneously switch all 8 outputs to separate loads, each conducting a maximum load of 1.0A continuously, at rated power. AC loads switched by the modules should have a power factor of 1.0.

Connection to Input Modules. You can use the 1771-OW module to drive an input of the following ac modules: 1771-IA, -IA2, -IAD, -IAN, -ID, -ID16, -IN, -IND. The 1771-OW module can drive an input of the following dc modules at nominal voltage: 1771-IB, -IBD, -IBN, -IH, -IQ, -IQ16, -IT, -IV, and -IVN. For reliable operation, a load current of at least 10mA should be maintained.

No Increase from Parallel Operation. Do not attempt to increase load current or wattage capability beyond the rating by connecting two or more outputs in parallel. The slightest variation in output relay switching time may cause one set of the contacts to switch the total load current.

Configuring Output Selection. When the output image table bit at the address corresponding to any output is energized (set to 1), the corresponding relay contact is closed or opened, respective to the jumper setting.

All outputs are individually selectable for either normally-open or normally-closed operation. They are preset for normally-open operation at the factory. See next page for relay output jumper setting.

Connection Diagram
(internal circuits on left; external circuits on right.)
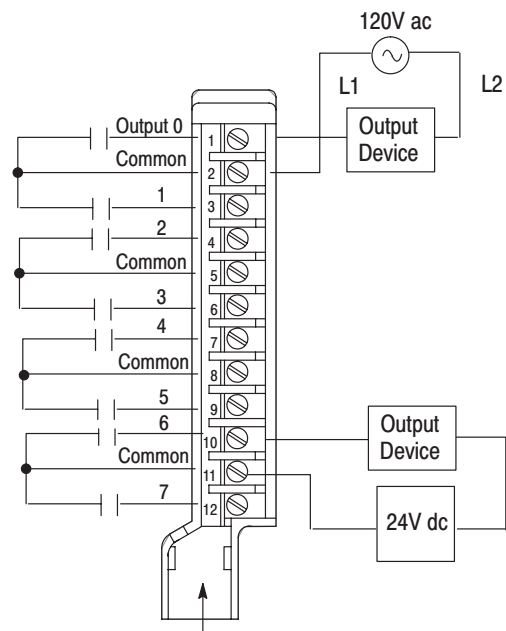
(Actual wiring runs in this direction.)

Note: Contacts are shown in N.O. configuration for simplicity. Placement of each relay's jumper sets N.O. or N.C. operation.

10510–I

Specifications (Cat. No. 1771-OW)

Outputs per Module	8 (4 groups of 2)
Module Location	1771 I/O chassis
Voltage Rating	24 – 138V ac rms 24 – 125V dc
Current Rating[1]	1A per output (maximum)
Surge Current	1A maximum per output (at rated power)[2]
Power Rating	dc: 30W per output (resistive) ac (suppressed)[2]: 30W per output (resistive)
Minimum Contact Load	dc: 10mA @ 24V ac: 10mA @ 24V
Operate/Release Time	5ms($\pm$1ms) typical
Bounce Time	1ms maximum
Switching Frequency	10Hz maximum
Power Dissipation	3.7 Watts (max.); 3.3 Watts (min.)
Thermal Dissipation	12.6 BTU/hr (max.); 11.3 BTU/hr (min.)
Backplane Current	700mA maximum
Isolation Voltage	1000V between open contacts 1500V between coil and contact
Conductors Wire Size Category	14 gauge (2mm[2]) stranded maximum 3/64 inch (1.2mm) insulation maximum 1[3]

Environmental Conditions
    Operating Temperature
    Storage Temperature
    Relative Humidity
	
	0 to 60ºC (32 to 140ºF)
	–40 to 85ºC (–40 to 185ºF)
	5 to 95% (without condensation)

Keying	Between 6 and 8 Between 16 and 18
Field Wiring Arm	1771-WD
Wiring Arm Screw Torque	7-9 inch-pounds
Agency Certification (when product or packaging is marked)	• CSA certified • CSA Class I, Division 2, Groups A, B, C, D certified • UL listed • CE marked for all applicable directives
Installation Data	1771-2.110

[1] Spikes peaks and surges must be within the power rating. Resistive loads only. ac or dc power = 30W max.

[2] Surge limiting circuitry is not provided in the module. For reliable operation, the user must ensure that surges do not exceed either the voltage or current rating of the module.

[3] You use this conductor category information for planning conductor routing as described in the system level installation manual.
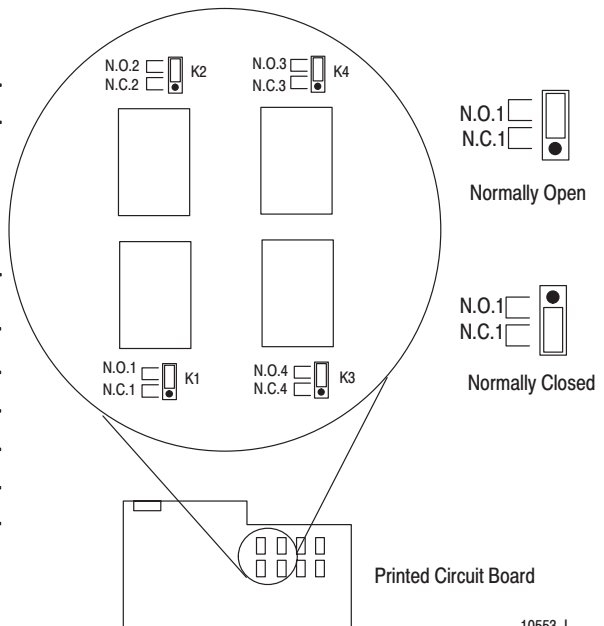
Output	Jumper	Output	Jumper
0	K1	4	K5
1	K2	5	K6
2	K3	6	K7
3	K4	7	K8

Sample Connection Diagram for the 1771-OW Module Driving a 120V ac Input Module
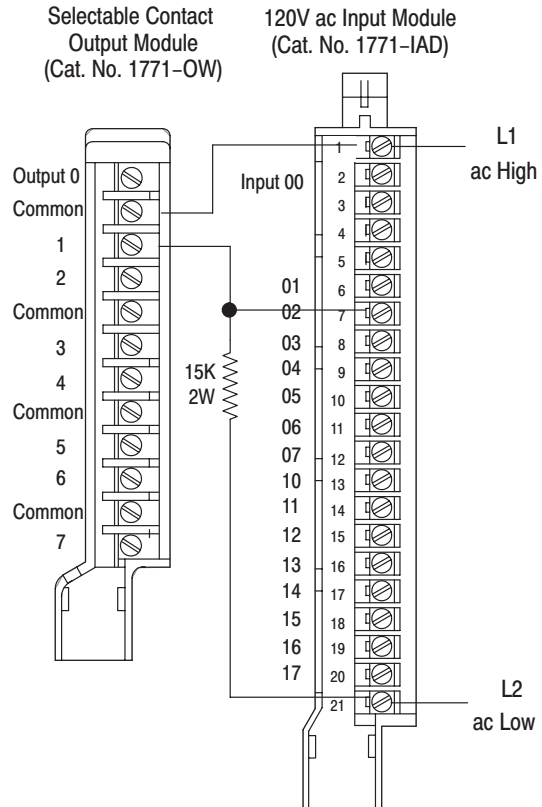
10511–I

Relay Output Jumper Setting

10553–I

Selectable Relay Contact Output Module (Cat. No. 1771-OW16 Series B)

Simplified Schematic

10512–I
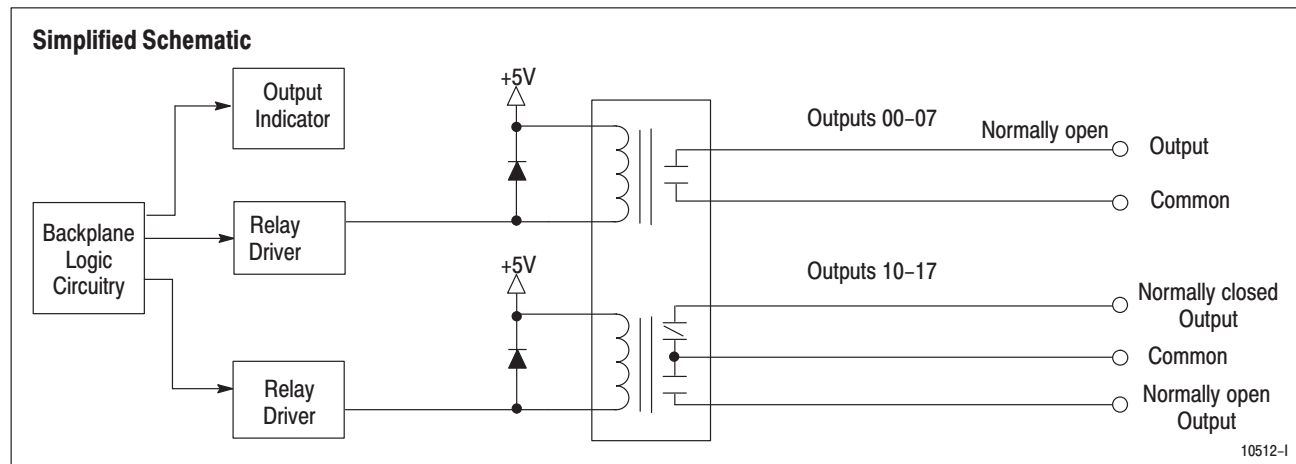
Application Notes

Load Type. 1771-OW16 modules do not contain surge limiting circuitry. With properly chosen surge limiting devices, this module can be used to switch resistive (e.g., lamps, indicators, heating elements), capacitive and inductive loads (e.g., motor starters, solenoids, relays). When driving inductive or high current loads, a resistor-capacitor network should be placed across the module's relay contacts at the field wiring arm. This will help reduce the generation of electromagnetic noise created by the contacts when changing state.
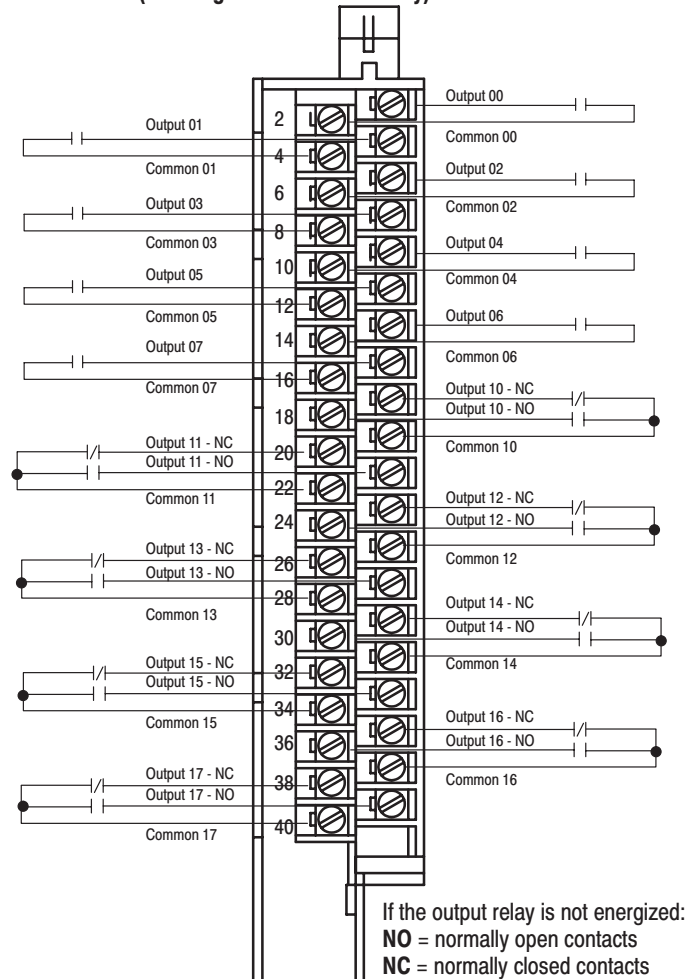
Isolation. Outputs on the 1771-OW16 module are arranged in 2 groups of 8. Each output has a separate common and is electrically isolated from module logic circuitry. The first group of outputs are arranged as normally-open contacts. The second group of outputs are selectable normally-open or normally-closed. The module can simultaneously switch all 16 outputs to separate loads. Each output can conduct a maximum load of 2.0A continuously at 500VA for ac loads, and 80W maximum for dc loads, but the total output power of the module cannot exceed 1440VA or 1280W.

Connection to Input Modules. You can use the 1771-OW16 module to drive an input of the following ac modules: 1771-IA, -IA2, -IAD, -IAN, -ID, -ID16, -IN, -IND. The 1771-OW16 module can drive an input of the following dc modules at nominal voltage: 1771-IB, -IBD, -IBN, -IH, -IQ, -IQ16, -IT, -IV, and -IVN. For reliable operation, a load current of at least 10mA should be maintained.

No Increase from Parallel Operation. Do not attempt to increase load current or wattage capability beyond the rating by connecting two or more outputs in parallel. The slightest variation in output relay switching time may cause one set of the contacts to switch the total load current.

Configuring Output Selection. When the output image table bit at the address corresponding to any output is energized (set to 1), the corresponding relay contact is closed or opened, respective to the jumper setting.

**Connection Diagram
(showing internal circuits only)**

If the output relay is not energized:
NO = normally open contacts
NC = normally closed contacts

10513–I

Specifications (Cat. No. 1771-OW16 Series B)

Outputs per module	16
Module Location	1771-A1B thru -A4B I/O Chassis; 1771-AM1 or -AM2
Voltage Rating	24-250V ac (rms), 47-63Hz; 24-150V dc
Power Rating[1]	dc: 80 Watts per output (max); 1280 Watts per module (max.) ac: 500 VA per output (max); 1440 VA per module (max.) **cos** $\Phi \geqslant$ **0.4**
Current Rating (maximum per channel)[2]	ac: 2A per output at rated power dc: 2A per output up to 40V; 1A per output at 50V 0.5A per output at 100V; 0.25A per output at 150V
Maximum Surge Current	dc: 2A maximum per output (at rated power); ac: Refer to Table A below
Minimum Contact Load	10mA
Operate/Release Time	10ms maximum; 5ms ($\pm$1ms) typical
Bounce Time Maximum	4ms
Switching Frequency Maximum	1/3Hz @ maximum load
Expected Life of Electrical Contacts	300K operations @ 25ºC (**cos** Φ = **1**)
Power Dissipation	All relays off: 0.015 Watts; All relays on: 6.55 Watts
Thermal Dissipation	All relays off: 0.05 BTU/hr; All relays on: 22.24 BTU/hr
Backplane Current	1.3A maximum
Maximum Cable Length	1000ft (304.8m)
Isolation Voltage	1500V ac for 1 second customer side to system side; 1500V ac for 1 second channel to channel; relay rated 4000V coil to contact
Conductors Wire Size Category	14 gauge (2mm^2) stranded maximum[3] 3/64 inch (1.2mm) insulation maximum 1[4]

Environmental Conditions
     Operational Temp.
     Storage Temperature
     Relative Humidity
	0º to 60ºC (32º to 140ºF)
	-40º to 85ºC (-40º to 185ºF)
	5 to 95% (without condensation)

Keying	Between 2 and 4 Between 32 and 34
Field Wiring Arm	Catalog Number 1771-WN
Wiring Arm Screw Torque	7-9 inch-pounds
Agency Certification (when product or packaging is marked)	• CSA certified • CSA Class I, Division 2, Groups A, B, C, D certified • UL listed • CE marked for all applicable directives
Installation Data	1771-2.206

[1] An individual output should not be subjected to high power loads and then be required to run low power loads.
[2] Output current maximum per module is limited by the maximum output power rating.
[3] 14 gauge wire connected to all terminals may not allow the field wiring arm cover to close. A smaller wire size may be required.
[4] You use this conductor category information for planning conductor routing as described in the system-level installation manual.

Sample Connection Diagram for the 1771-OW16 Module Driving a 120V ac Input Module

10514–I

Table A
Maximum ac Surge Current

	Maximum Contact Rating				
ac Voltage	Amperes		Continuous Carrying Current	Maximum VoltAmperes	
	Make	Break		Make	Break
120	30	3	2	3600	360
240	15	1.5	2	3600	360

Selectable Relay Contact Output Module (Cat. No. 1771-OWN)

Simplified Schematic

10512–I
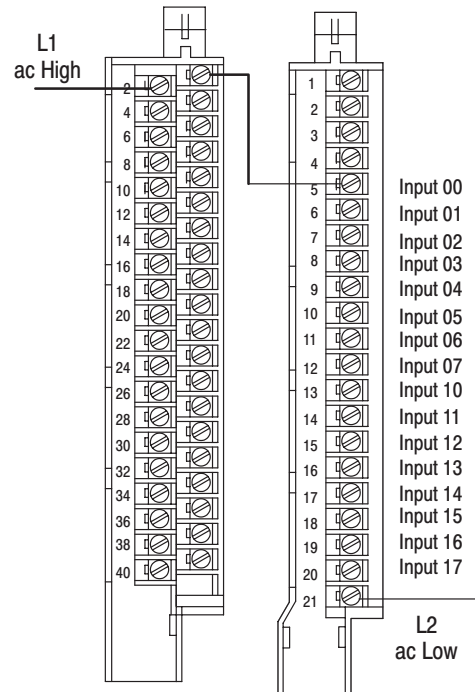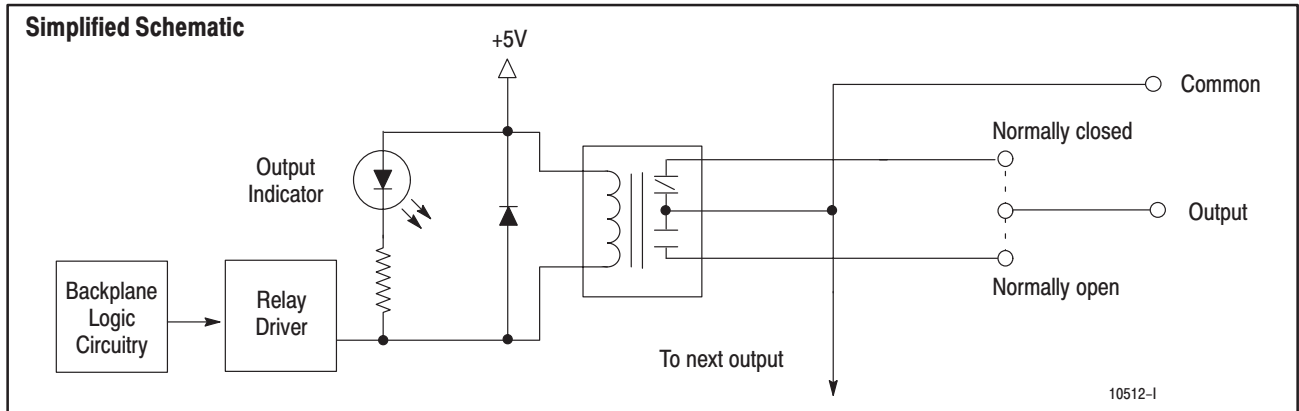
Application Notes

Load Type. 1771-OWN modules do not contain surge limiting circuitry. Use these modules for switching resistive loads only (e.g., lamps, indicators, heating elements). They are not recommended for inductive or capacitive loads (e.g., motor starters, solenoids, relays).

Isolation. Outputs on the 1771-OWN module are arranged in 4 groups of 8, each group with its own common. Each output is electrically isolated from module logic circuitry. The module can simultaneously switch all 32 outputs to separate loads, with a maximum of 12A per module. Each output can conduct a maximum load of 1.0A continuously at 30W maximum. AC loads switched by the modules should have a power factor of 1.0.

Connection to Input Modules. You can use the 1771-OWN module to drive an input of the following ac modules: 1771-IA, -IA2, -IAD, -IAN, -ID, -ID16, -IN, -IND. The 1771-OWN module can drive an input of the following dc modules at nominal voltage: 1771-IB, -IBD, -IBN, -IH, -IQ, -IQ16, -IT, -IV, and -IVN. For reliable operation, a load current of at least 10mA should be maintained.

No Increase from Parallel Operation. Do not attempt to increase load current or wattage capability beyond the rating by connecting two or more outputs in parallel. The slightest variation in output relay switching time may cause one set of the contacts to switch the total load current.

Configuring Output Selection. When the output image table bit at the address corresponding to any output is energized (set to 1), the corresponding relay contact is closed or opened, respective to the jumper setting.

All outputs are individually selectable for either normally-open or normally-closed operation. They are preset for normally-open operation at the factory. See next page for relay output jumper settings.

Connection Diagram
(showing internal circuits only)
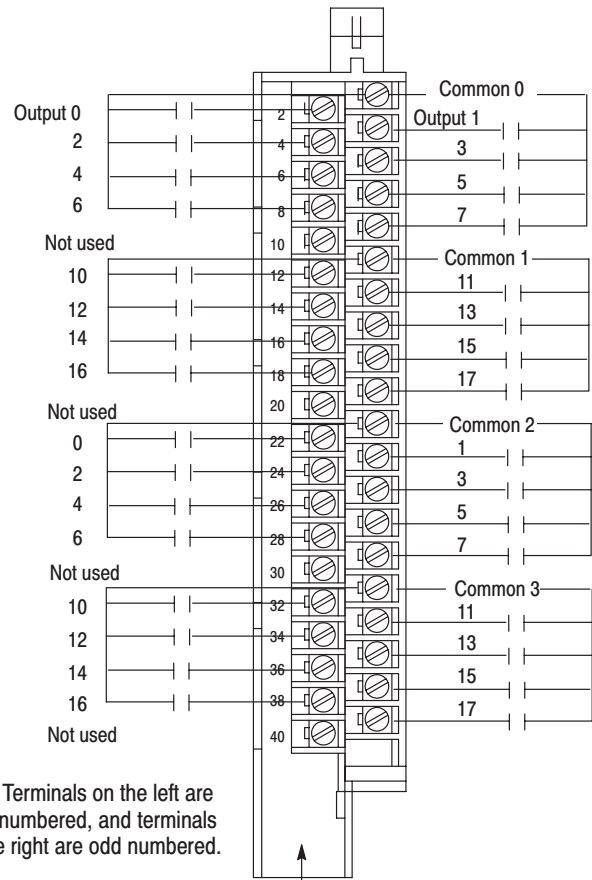
Note: Terminals on the left are even numbered, and terminals on the right are odd numbered.

(Actual wiring runs in this direction.)

Note: Contacts shown in N.O. configuration for simplicity.

10513–I

Specifications (Cat. No. 1771-OWN)

|	
Outputs per module	32 (4 groups of 8)
Module Location	1771–A1B thru –A4B, 1771–AM1, -AM2 Chassis
Voltage Rating	24 – 138V ac rms; 24 – 125V dc

Current Rating[1]
  Max. per output
  Max. per module
  Max. per group
	
	1A derate linearly .033A/$^{\circ}$C above 45°C
	12A derate linearly .4A/$^{\circ}$C above 45°C
	4A derate linearly .133A/$^{\circ}$C above 45°C

Surge Current	1A (max) per output (at rated power)[2]
Power Rating	dc: 30W per output (resistive) maximum ac: 30W per output (resistive) maximum
Minimum Contact Load	10mA
Operate/Release Time	5ms ($\pm$1ms) typical
Bounce Time	1ms (max)
Switching Frequency	10Hz (max)
Power Dissipation	All relays off: 15mW; All relays on: 12.5W (max.)
Thermal Dissipation	All relays off: 0.05 BTU/hr; All relays on: 42.75 BTU/hr (max.)
Backplane Current	2.5A maximum; 1.8A nominal
Isolation Voltage	1000V between open contacts 1500V between coil and contact
Interconnect Cable Length	1000 ft. (304.8 meters) max
Conductors Wire Size Category	14 gauge (2mm^2) stranded (max) 3/64 inch (1.2mm) insulation (max) 1[3]

Environmental Conditions
  Operational Temp.
  Storage Temperature
  Relative Humidity
	
	0 to 60°C (32 to 140°F)
	–40 to 85°C (–40 to 185°F)
	5 to 95% (without condensation)

Keying	Between 6 and 8 Between 16 and 18
Field Wiring Arm	1771-WN
Wiring Arm Screw Torque	7-9 inch-pounds
Agency Certification (when product or packaging is marked)	• CSA certified • CSA Class I, Division 2, Groups A, B, C, D certified • UL listed • CE marked for all applicable directives
Installation Data	1771-5.37

[1] Spikes peaks and surges must be within the power rating. Resistive loads only. ac or dc
   power = 30W max.
[2] Surge limiting circuitry is not provided in the module. For reliable operation, the user
   must ensure that surges do not exceed either the voltage or current rating of the module.
[3] You use this conductor category information for planning conductor routing as described
   in the system level installation manual.

Output	Jumper No.
Outputs 00 – 07	L–00 – L–07
Outputs 10 – 17	L–10 – L–17
Outputs 20 – 27	H–00 – H–07
Outputs 30 – 37	H–10 – H–17

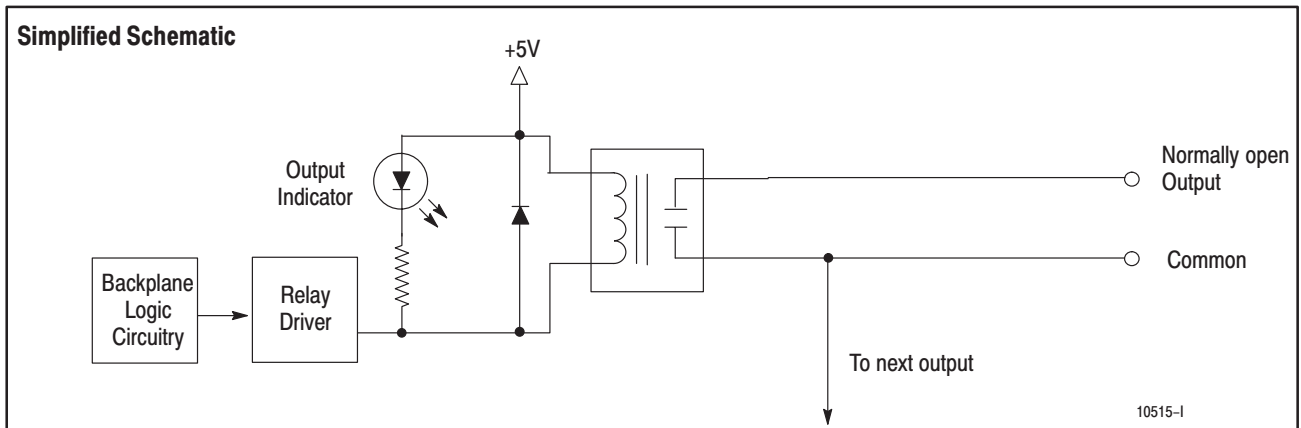### Sample Connection Diagram for the 1771-OWN Module Driving a 120V ac Input Module

10514–I
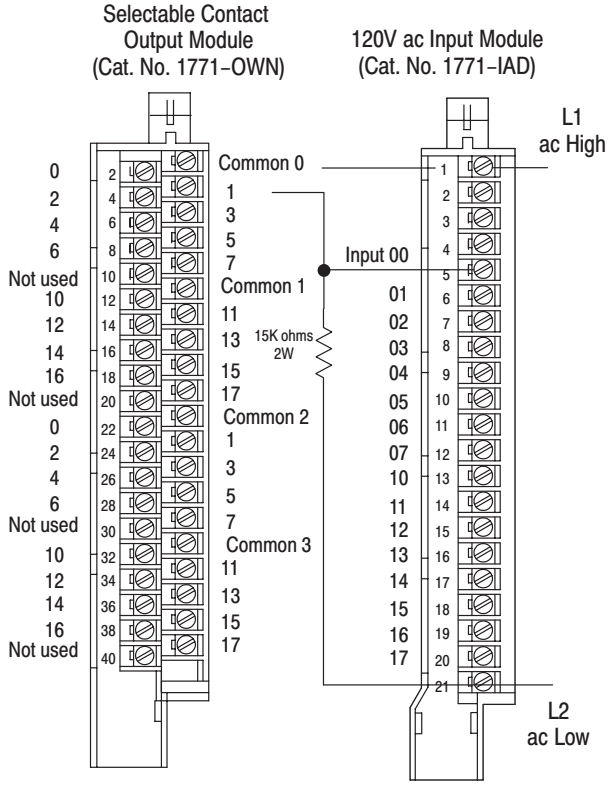
Relay Output Jumper Setting
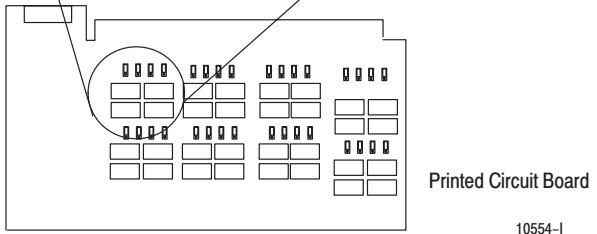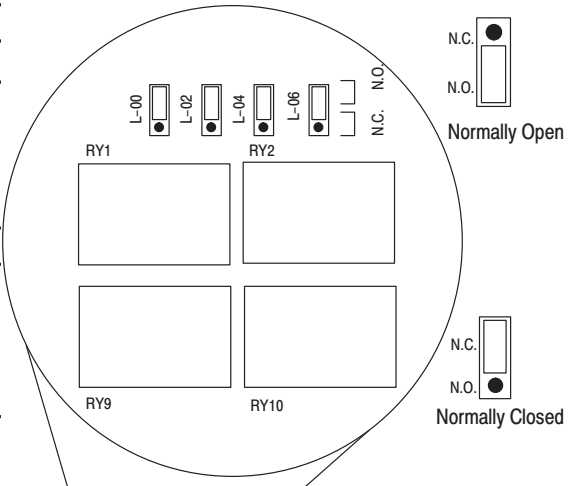
10554–I

Relay Contact Output Module (Cat. No. 1771-OWNA)

Simplified Schematic

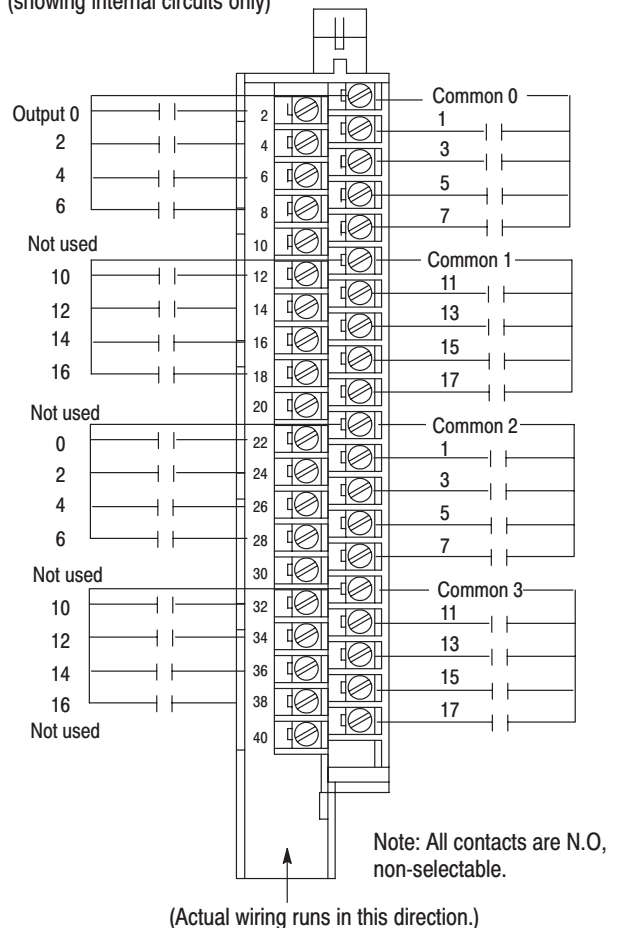10515–I

Application Notes

Load Type. 1771-OWNA modules do not contain surge limiting circuitry. Use these modules for switching resistive loads only (e.g., lamps, indicators, heating elements). They are not recommended for inductive or capacitive loads (e.g., motor starters, solenoids, relays).

Isolation. Outputs on the 1771-OWNA module are arranged in 4 groups of 8, each group with its own common. The module can simultaneously switch all 32 outputs to separate loads, with a maximum of 12A per module. Each output can conduct a maximum load of 1.0A continuously at 30W maximum. AC loads switched by the modules should have a power factor of 1.0.

Connection to Input Modules. You can use the 1771-OWNA module to drive an input of the following ac modules: 1771-IA, -IA2, -IAD, -IAN, -ID, -ID16, -IN, -IND. The 1771-OWNA module can drive an input of the following dc modules at nominal voltage: 1771-IB, -IBD, -IBN, -IH, -IQ, -IQ16, -IT, -IV, and -IVN. For reliable operation, a load current of at least 10mA should be maintained.

No Increase from Parallel Operation. Do not attempt to increase load current or wattage capability beyond the rating by connecting two or more outputs in parallel. The slightest variation in output relay switching time may cause one set of the contacts to switch the total load current.

Connection Diagram
(showing internal circuits only)

Note: All contacts are N.O, non-selectable.

(Actual wiring runs in this direction.)

10516–I

Specifications (Cat. No. 1771-OWNA)

Outputs per module	32 (4 groups of 8)
Module Location	1771–A1B thru –A4B, and 1771-AM1, -AM2 I/O Chassis
Voltage Rating	24 – 138V ac rms 24 – 125V dc

Current Rating[1]
    Max. per output
    Max. per module
    Max. per group
	
	1A derate linearly .033A/°C above 45°C
	12A derate linearly .4A/°C above 45°C
	4A derate linearly .133A/°C above 45°C

Surge Current	1A (max) per output (at rated power)[2]
Power Rating	dc: 30W per output (resistive) maximum ac: 30W per output (resistive) maximum
Minimum Contact Load	10mA
Operate/Release Time	5ms (±1ms) typical
Bounce Time	1ms (max)
Switching Frequency	10Hz (max)
Power Dissipation	All relays OFF: 15mW; All relays ON: 12.5W (max.)
Thermal Dissipation	All relays OFF: 0.05 BTU/hr; All relays ON: 42.75 BTU/hr (max.)
Backplane Current	2.5A maximum; 1.8A nominal
Isolation Voltage	1000V between open contacts 1500V between coil and contact
Interconnect Cable Length	1000 ft. (304.8 meters) max

Conductors
    Wire Size
 	
    Category
	
	14 gauge (2mm^2) stranded (max)
	3/64 inch (1.2mm) insulation (max)
	1[3]

Environmental Conditions
    Operating Temperature
    Storage Temperature
    Relative Humidity
	
	0 to 60°C (32 to 140°F)
	–40 to 85°C (–40 to 185°F)
	5 to 95% (without condensation)

Keying	Between 6 and 8 Between 16 and 18
Field Wiring Arm	Cat. No. 1771-WN
Wiring Arm Screw Torque	7-9 inch-pounds
Agency Certification (when product or packaging is marked)	• CSA certified • CSA Class I, Division 2, Groups A, B, C, D certified • UL listed • CE marked for all applicable directives
Installation Data	1771-5.38

[1] Spikes peaks and surges must be within the power rating. Resistive loads only. ac or dc power = 30W max.

[2] Surge limiting circuitry is not provided in the module. For reliable operation, the user must ensure that surges do not exceed either the voltage or current rating of the module.
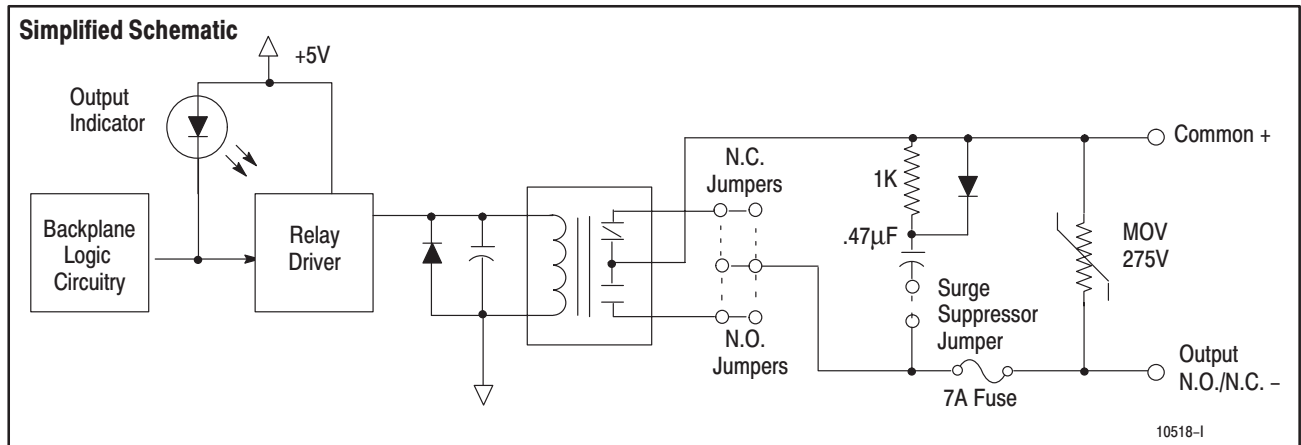
[3] You use this conductor category information for planning conductor routing as described in the system level installation manual.

Sample Connection Diagram for the 1771-OWNA Module Driving a 120V ac Input Module

10517–I

Power Relay Contact Output Module (Cat. No. 1771-OX)

Simplified Schematic

10518–I
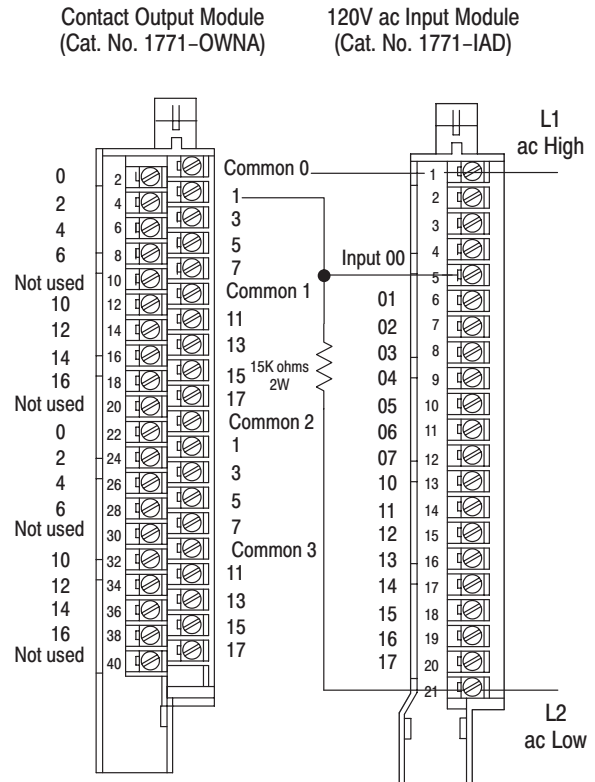
Application Notes

Vibration. The 1771-OX module contains mercury-wetted relays. Handle the module carefully and avoid excessive vibration. This can cause damage to the glass bulb which houses the mercury and contacts. Failure to observe this caution may cause damage to the module's circuitry.
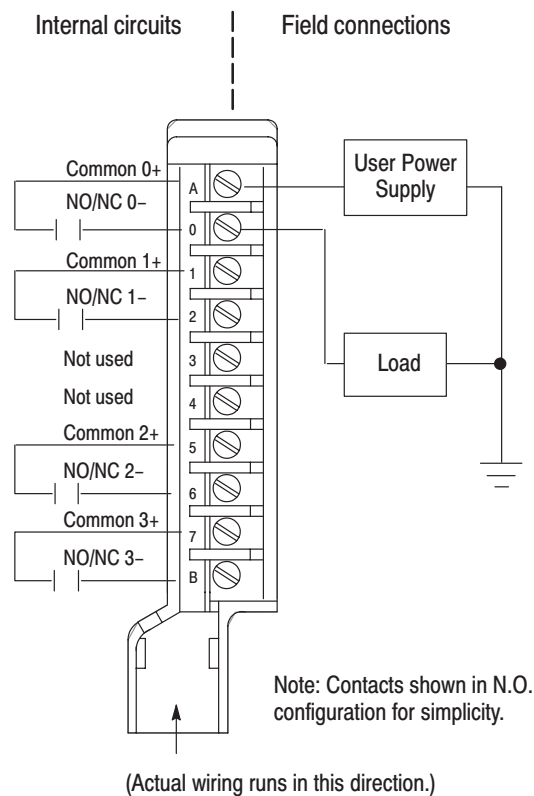
Mounting. The power contact output module **must** be mounted within 30° of vertical for the mercury-wetted relays to function. After installation, wait 3 minutes, or manually operate the relays 16 times, before powering up the module in an actual application.

Surge Suppression. The 1771-OX module includes a selectable RC network for switching dc voltages. When switching these voltages, include the on-board surge suppression. When switching inductive ac voltages, you must supply an external rc network as close as possible to the load terminals. These are listed below.

No Increase from Parallel Operation. Do not attempt to increase load current or wattage capability beyond the rating by connecting two or more outputs in parallel. The slightest variation in output relay switching time may cause one set of the contacts to switch the total load current.

Connection Diagram

Note: Contacts shown in N.O. configuration for simplicity.

(Actual wiring runs in this direction.)

10519–I

Starter Size	Starter Voltage	Number of Poles	R(Ω)	C(μF)	Leakage Current	Electrocube PN
0	120V ac	2–5	68	0.1	8mA	RG 1782–4
	240V ac	2–5	270	0.027	4.5mA	
1	120V ac	2–5	68	0.1	8mA	RG 1782–4
	240V ac	2–5	270	0.027	4.5mA	
2	120V ac	2–3	68	0.1	8mA	RG 1782–4
	120V ac	4–5	47	0.1	8mA	RG 1782–3
	240V ac	2–3	270	0.027	4.5mA	
	240V ac	4–5	180	0.047	7.5mA	
3	120V ac	2–3	47	0.1	8mA	RG 1782–3
	240V ac	2–3	150	0.047	8mA	
	240V ac	4–5	100	0.1	16mA	RG 1782–6
4	240V ac	2–3	100	0.1	16mA	RG 1782–6

Specifications (Cat. No. 1771-OX)

Outputs per Module	4 N.O/N.C.
Module Location	1771 I/O chassis
Voltage Rating	0–250V ac rms; 0–175V dc
Current Rating	2A (maximum)
Surge Current (Repeatable every 10 seconds)	5.5A ac peak for 5 seconds 6A dc for 5 seconds 15A dc for 500ms
Power Rating	200VA
On–state Contact Resistance	0.25 ohms maximum
Operate/Release Time	10ms maximum
Power Dissipation	2.9 Watts (max.), 2.6 Watts (min.)
Thermal Dissipation	9.9 BTU/hr (max.), 8.9 BTU/hr (min.)
Backplane Current	550mA maximum
Isolation Voltage	2500V ac rms
Conductors Wire Size Category	14 gauge ($2mm^2$) stranded maximum 3/64 inch (1.2mm) insulation maximum 1[1]

Environmental Conditions
    Operating Temperature
    Storage Temperature
    Relative Humidity
	
	0 to 60°C (32 to 140°F)
	–40 to 85°C (–40 to 185°F)
	5 to 95% (without condensation)

Keying	Between 6 and 8 Between 16 and 18
Fuse	7A, 250V Type 3AG Slo Blow (1 per circuit) Bussman MSL 7.0; Littelfuse 313007
Field Wiring Arm	1771-WC
Wiring Arm Screw Torque	7-9 inch-pounds
Agency Certification (when product or packaging is marked)	• CSA certified • CSA Class I, Division 2, Groups A, B, C, D certified • UL listed • CE marked for all applicable directives
Installation Data	1771-2.43

[1] You use this conductor category information for planning conductor routing as described in the system level installation manual.

Caution: The power contact output module **must** be mounted within 30° of vertical for the mercury-wetted relays to function. After installation, wait 3 minutes, or manually operate the relays 16 times, before powering up the module in an actual application.
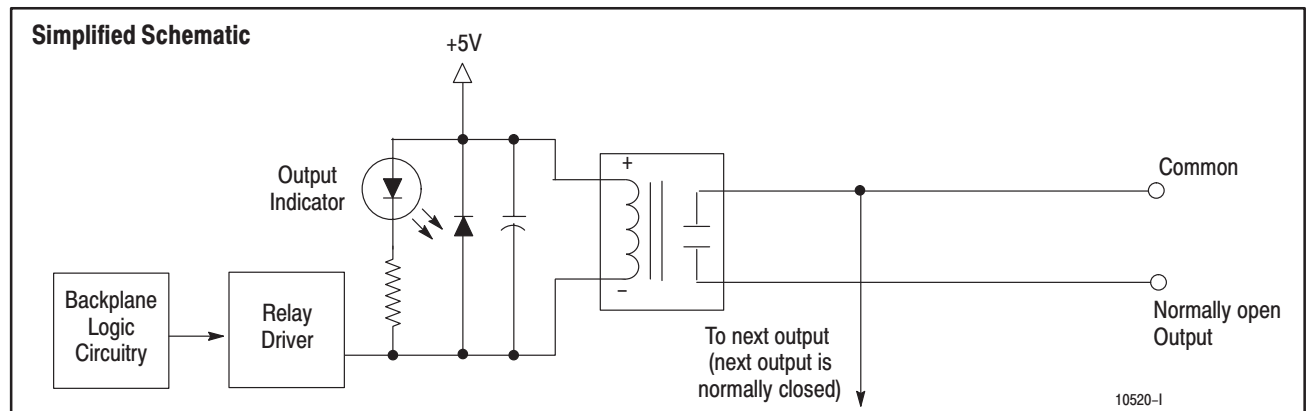
Jumper Locations
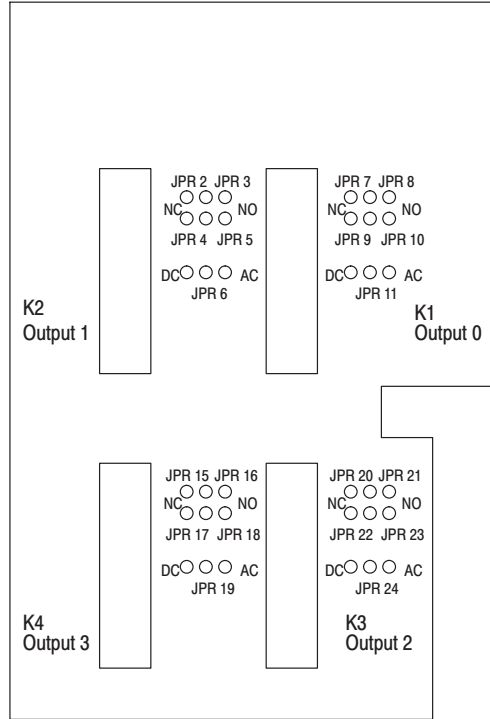
10555–I

ac and dc Programming Plug Selections

Output	Jumper (JPR)
0	11
1	6
2	24
3	19

Normally-open and Normally-closed Programming Plug Locations

Module output	Normally–open	Normally–closed
0	JPR 8, 10	JPR 7, 9
1	JPR 3, 5	JPR 2, 4
2	JPR 21, 23	JPR 20, 22
3	JPR 16, 18	JPR 15, 17

0-24V Relay Contact Output Module (Cat. No. 1771-OYL)

Simplified Schematic

+5V

Output
Indicator

Backplane
Logic
Circuitry

Relay
Driver

+

−

To next output
(next output is
normally closed)

Common

Normally open
Output
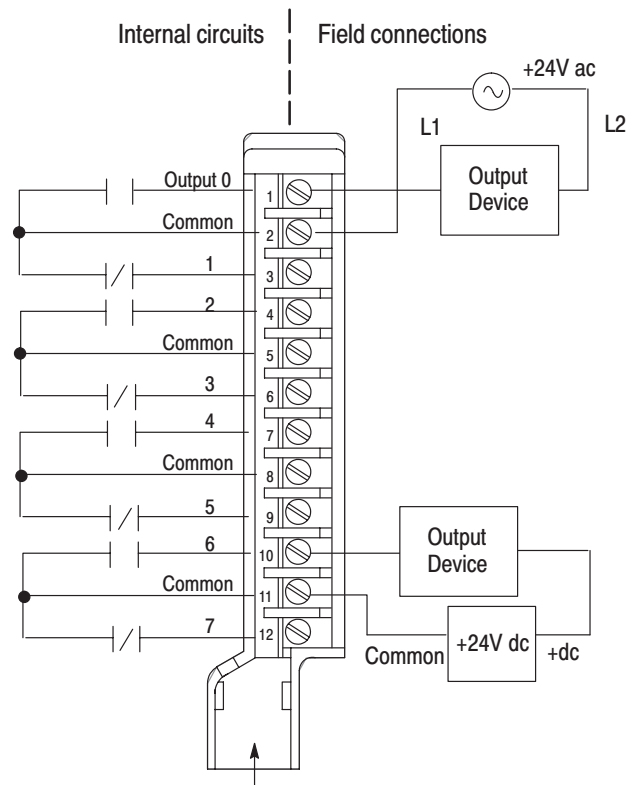
10520–I

Application Notes

Load Type. 1771-OYL modules do not contain surge limiting circuitry. Use these modules for switching resistive loads only (e.g., lamps, indicators, heating elements). They are not recommended for inductive or capacitive loads (e.g., motor starters, solenoids, relays).

Isolation. The 1771-OYL module has 4 normally-open (Form A) and 4 normally-closed (Form B) relays. Outputs are arranged in 4 groups of 2, each group with its own common. Each output is is electrically isolated from module logic circuitry. The module can simultaneously switch all 8 outputs to separate loads, each conducting a maximum load of 100mA continuously at rated power. AC loads switched by the modules should have a power factor of 1.0.

Connection to Input Modules. You can use the 1771-OYL module to drive an ac input module up to 24V ac. The 1771-OYL module can drive an input of the following dc modules: 1771-IB, -IBD, -IBN, -IG, -IGD,-IH, -IN, -IND, -IQ, -IQ16, -IT, -IV, and -IVN.

No Increase from Parallel Operation. Do not attempt to increase load current or wattage capability beyond the rating by connecting two or more outputs in parallel. The slightest variation in output relay switching time may cause one set of the contacts to switch the total load current.

Connection Diagram

Internal circuits | Field connections

+24V ac

L1   L2

Output 0
Common
1
2

Output
Device

1
2
Common
3
3
4

4
Common
5
5
6

6
7
Common
7
8

Output
Device

5
9
6
10
Common
11
7
12

Common   +24V dc   +dc

(Actual wiring runs in this direction.)

10521–I

Specifications (Cat. No. 1771-OYL)

Outputs per Module	8 (4 groups of 2)
Module Location	1771 I/O chassis
Contact Configuration	4 Form A (N.O.), 4 Form B (N.C.)
Voltage Rating	0–24V ac rms; 0–24V dc
Current Rating[1]	100mA per output (maximum)
Surge Current	100mA maximum per output[2] (at rated power)
Power Rating	dc: 2.4W per output (resistive) ac (suppressed)[2]: 2.4W per output (resistive)
Minimum Contact Load	dc: 1mA @ 0–24V ac: 1mA @ 0–24V
Operate/Release Time	1ms maximum
Bounce Time	1ms maximum
Switching Frequency	10Hz maximum
Power Dissipation	2.2 Watts (max.), 2 Watts (min.)
Thermal Dissipation	7.6 BTU/hr (max.), 6.9 BTU/hr (min.)
Backplane Current	420mA maximum
Isolation Voltage	1000V between open contacts 1500V between coil and contact
Conductors Wire Size Category	14 gauge ($2mm^2$) stranded maximum 3/64 inch (1.2mm) insulation maximum 1[3]

Environmental Conditions
     Operating Temperature
     Storage Temperature
     Relative Humidity
	
	0 to 60°C (32 to 140°F)
	–40 to 85°C (–40 to 185°F)
	5 to 95% (without condensation)

Keying	Between 6 and 8 Between 16 and 18
Field Wiring Arm	1771-WD
Wiring Arm Screw Torque	7-9 inch-pounds
Agency Certification (when product or packaging is marked)	• CSA certified • CSA Class I, Division 2, Groups A, B, C, D certified • UL listed • CE marked for all applicable directives
Installation Data	1771-2.184

[1] Spikes, peaks, and surges must be within the power rating. Resistive loads only. ac or dc power = 2.4W maximum

[2] Surge limiting circuitry is not provided in the module. For reliable operation, the use must ensure that surges do not exceed either the voltage or current rating of the module.
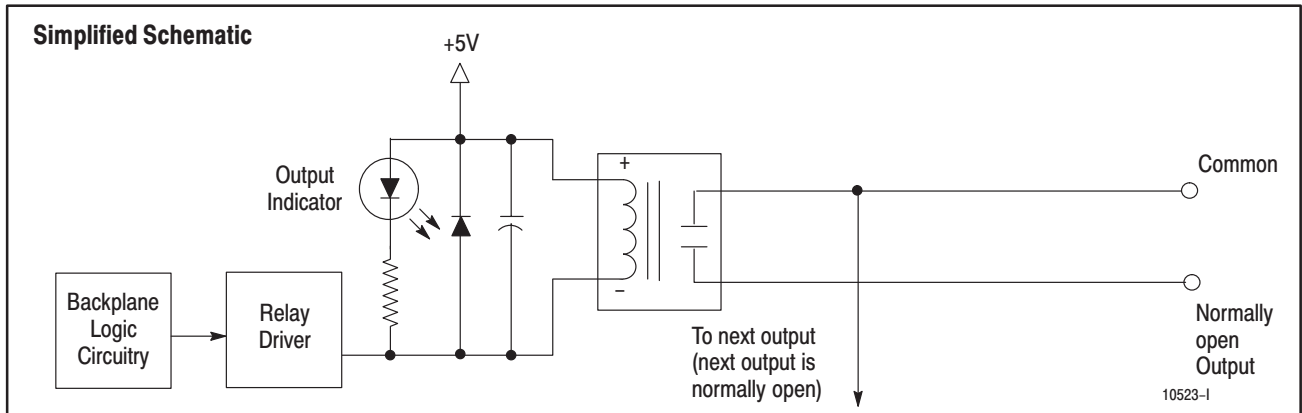
[3] You use this conductor category information for planning conductor routing as described in the system level installation manual.

Sample Connection Diagram for the 1771-OYL Module Driving an ac Input Module

10522–I

0-24V Relay Contact Output Module (Cat. No. 1771-OZL)

Simplified Schematic


10523–I
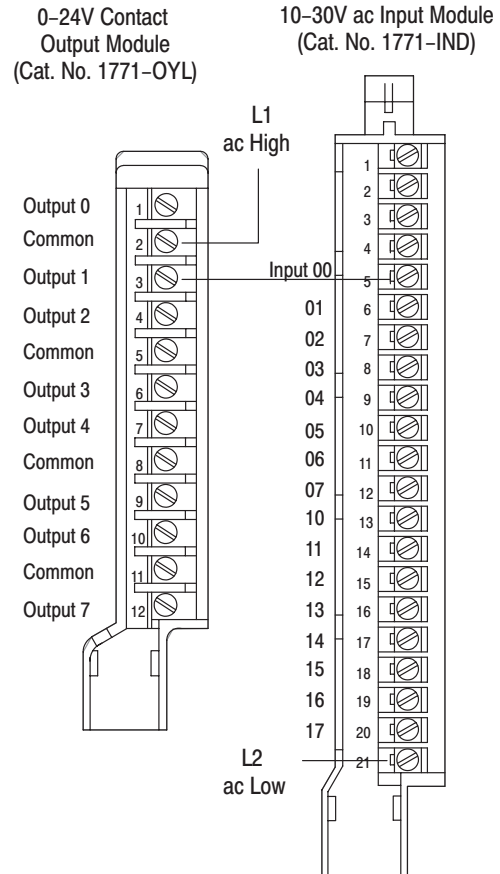
Application Notes

Load Type. 1771-OZL modules do not contain surge limiting circuitry. Use these modules for switching resistive loads only (e.g., lamps, indicators, heating elements). They are not recommended for inductive or capacitive loads (e.g., motor starters, solenoids, relays).

Isolation. The 1771-OZL module has 8 normally-open (Form A) relays.The outputs are arranged in 4 groups of 2, each with its own common. Each output is electrically isolated from module logic circuitry. The module can simultaneously switch all 8 outputs to separate loads, each conducting a maximum load of 100mA continuously, at rated power. AC loads switched by the modules should have a power factor of 1.0.

Connection to Input Modules. You can use the 1771-OZL module to drive an ac input module up to 24V ac. The 1771-OYL module can drive an input of the following dc modules: 1771-IB, -IBD, -IBN, -IG, -IGD,-IH, -IN, -IND, -IQ, -IQ16, -IT, -IV, and -IVN.

No Increase from Parallel Operation. Do not attempt to increase load current or wattage capability beyond the rating by connecting two or more outputs in parallel.The slightest variation in output relay switching time may cause one set of the contacts to switch the total load current.

Connection Diagram
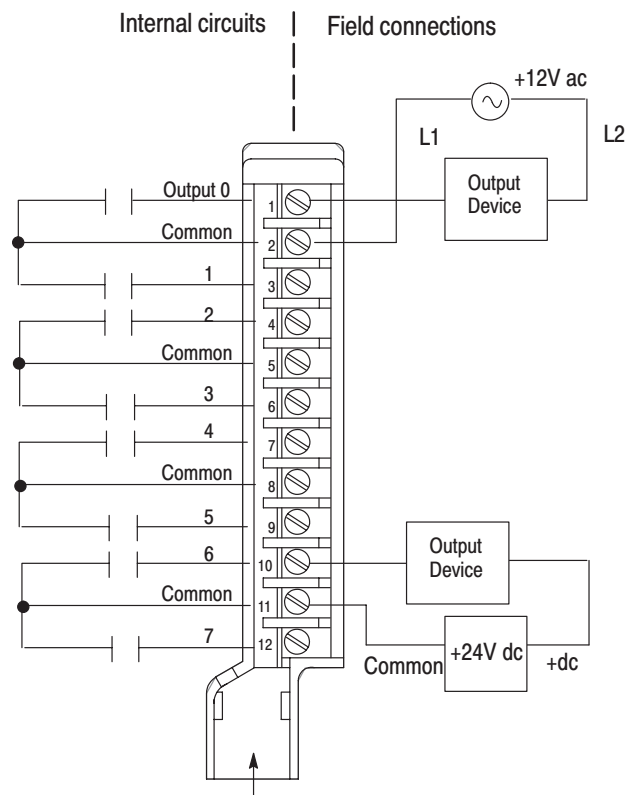
(Actual wiring runs in this direction.)

10524–I

Specifications (Cat. No. 1771-OZL)

Outputs per Module	8 (4 groups of 2)
Module Location	1771 I/O chassis
Contact Configuration	8 Form A (N.O.)
Voltage Rating	0–24V ac rms 0–24V dc
Current Rating[1]	100mA per output (maximum)
Surge Current	100mA maximum per output[2] (at rated power)
Power Rating	dc: 2.4W per output (resistive) ac (suppressed)[2]: 2.4W per output (resistive)
Minimum Contact Load	dc: 1mA @ 0–24V ac: 1mA @ 0–24V
Operate/Release Time	1ms maximum
Bounce Time	1ms maximum
Switching Frequency	10Hz maximum
Power Dissipation	2.2 Watts (max.), 2 Watts (min.)
Thermal Dissipation	7.6 BTU/hr (max.), 6.9 BTU/hr (min.)
Backplane Current	420mA maximum
Isolation Voltage	1000V between open contacts 1500V between coil and contact
Conductors Wire Size Category	14 gauge (2mm^2) stranded maximum 3/64 inch (1.2mm) insulation maximum 1[3]

Environmental Conditions
     Operating Temperature
     Storage Temperature
     Relative Humidity
	0 to 60°C (32 to 140°F)
	–40 to 85°C (–40 to 185°F)
	5 to 95% (without condensation)

Keying	Between 6 and 8 Between 16 and 18
Field Wiring Arm	1771-WD
Wiring Arm Screw Torque	7-9 inch-pounds
Agency Certification (when product or packaging is marked)	• CSA certified • CSA Class I, Division 2, Groups A, B, C, D certified • UL listed • CE marked for all applicable directives
Installation Data	1771-2.129

[1] Spikes, peaks, and surges must be within the power rating. Resistive loads only.
ac or dc power = 2.4W max
[2] Surge limiting circuitry is not provided in the module. For reliable operation, the user must ensure that surges do not exceed either the voltage or current rating of the module.
[3] You use this conductor category information for planning conductor routing as described in the system level installation manual.

Sample Connection Diagram for the 1771-OZL Module Driving an ac Input Module
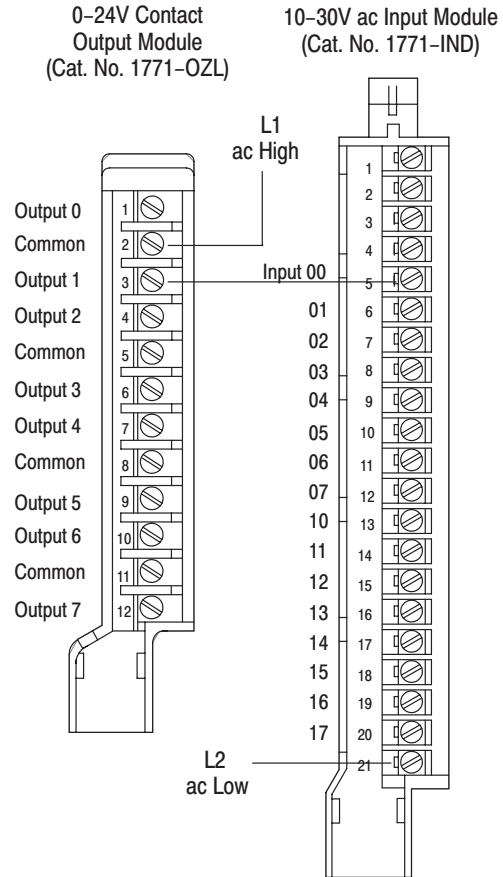
10525–I

Related Publications

You can refer to the following publications for more information about Allen-Bradley relay contact modules and other Allen-Bradley discrete I/O modules:

For information about	Refer to this publication	Publication Number
1771–OW module	Selectable Contact Output Module (cat. no. 1771–OW) Installation Data	1771–2.110
1771–OW16 module	Selectable Contact Output Module (cat. no. 1771–OW16) Installation Data	1771–2.206
1771–OWN module	Contact Output Module (cat. no. 1771–OWN) Installation Data	1771–5.37
1771–OWNA module	Contact Output Module (cat. no. 1771–OWNA) Installation Data	1771–5.38
1771–OX module	Power Contact Output Module (cat. no. 1771–OX) Installation Data	1771–2.43
1771–OYL module	0–24V Contact Output Module (cat. no. 1771–OYL) Installation Data	1771–2.134
1771–OZL module	0–24V Contact Output Module (cat. no. 1771–OZL) Installation Data	1771–2.129
all Allen-Bradley 1771 digital I/O modules	1771 Universal Discrete I/O Modules Selection Guide	1771–1.25
Allen-Bradley dc solid state digital I/O modules	1771 Digital dc Solid State I/O Modules Product Data	1771–2.180
Allen-Bradley ac solid state digital I/O modules	1771 Digital ac Solid State I/O Modules Product Data	1771–2.182
Allen-Bradley analog I/O modules	1771 Analog I/O Modules Product Data	1771–2.183

Notes

Support Services

At Allen-Bradley, customer service means experienced representatives at Customer Support Centers in key cities throughout the world for sales service and support. Our value-added services include:

Technical Support

- SupportPlus programs
- telephone support and 24-hour emergency hotline
- software and documentation updates
- technical subscription services

Engineering and Field Services

- application engineering assistance
- integration and start-up assistance
- field service
- maintenance support

Technical Training

- lecture and lab courses
- self-paced computer and video-based training
- job aids and workstations
- training needs analysis

Repair and Exchange Services

- your only "authorized" source
- current revisions and enhancements
- worldwide exchange inventory
- local support

Rockwell Automation

Allen-Bradley

Allen-Bradley, a Rockwell Automation Business, has been helping its customers improve productivity and quality for more than 90 years. We design, manufacture and support a broad range of automation products worldwide. They include logic processors, power and motion control devices, operator interfaces, sensors and a variety of software. Rockwell is one of the world's leading technology companies.

Worldwide representation.

Argentina • Australia • Austria • Bahrain • Belgium • Brazil • Bulgaria • Canada • Chile • China, PRC • Colombia • Costa Rica • Croatia • Cyprus • Czech Republic • Denmark • Ecuador • Egypt • El Salvador • Finland • France • Germany • Greece • Guatemala • Honduras • Hong Kong • Hungary • Iceland • India • Indonesia • Ireland • Israel • Italy • Jamaica • Japan • Jordan • Korea • Kuwait • Lebanon • Malaysia • Mexico • Netherlands • New Zealand • Norway • Pakistan • Peru • Philippines • Poland • Portugal • Puerto Rico • Qatar • Romania • Russia–CIS • Saudi Arabia • Singapore • Slovakia • Slovenia • South Africa, Republic • Spain • Sweden • Switzerland • Taiwan • Thailand • Turkey • United Arab Emirates • United Kingdom • United States • Uruguay • Venezuela • Yugoslavia

Allen-Bradley Headquarters, 1201 South Second Street, Milwaukee, WI 53204 USA, Tel: (1) 414 382-2000 Fax: (1) 414 382-4444