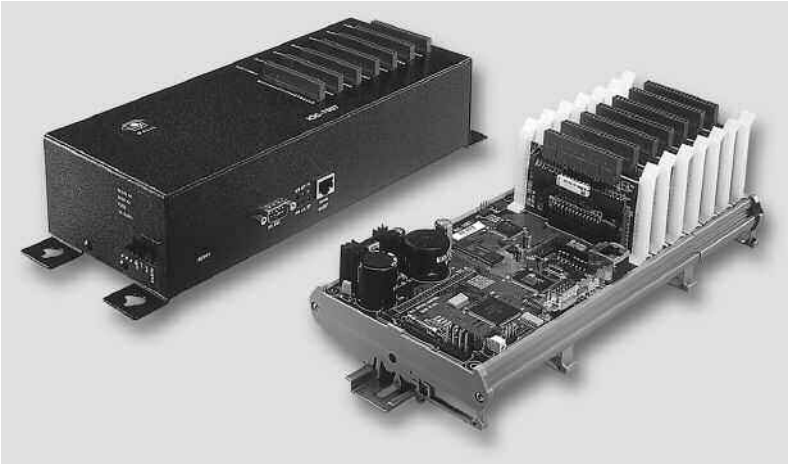
Ethernet I/O Controller

IOC-7007

Product Description

The IOC-7007 I/O logic controller provides an intelligent solution for handling inputs and outputs. The IOC-7007 controller base accepts up to seven Galil I/O IOM modules. IOM modules are available with TTL inputs, optoisolated inputs, optoisolated outputs, high power outputs, dry contact relays, analog inputs and analog outputs.

Galil's IOC-7007 has a 10/100 Base-T auto-negotiable Ethernet port allowing it to communicate with multiple devices in an Ethernet network. This allows easy integration of Galil's Ethernet motion controllers with I/O and eliminates the need for an external PLC.



IOC-7007

The IOC-7007 is programmable and includes 500 lines of non-volatile program memory, variables, arrays and multitasking for concurrent execution of up to eight different programs. The controller also includes 1 PLC thread with deterministic timing. The programming language is similar to Galil's motion controller language allowing seamless integration of motion and I/O.

The IOC-7007 is available as a packaged unit, as a DIN rail mount unit, or as a card-level unit. The box-level version accepts 90–260 VAC or 20–60 VDC. The DIN rail and card-level unit accept 20–60 VDC.

Features

- *Intelligent Input/Output Controller IOC includes 32-bit microcomputer with memory and multitasking for programming I/O events.*
- *Install up to seven plug-in IOM modules to handle many input and output functions.*
- *"Mix and Match" I/O modules to meet specific requirements. I/O modules for:*
  - *16 TTL Inputs*
  - *8 optoisolated inputs*
  - *8 optoisolated outputs*
  - *8 high power outputs*
  - *4 dry contact relays*
  - *4 or 8 analog outputs*
  - *8 analog inputs*
- *Interfaces with other Galil Ethernet motion controllers or Ethernet I/O devices*
- *Ethernet 10/100 Base-T with auto-negotiate function for communicating with 100 Base-T or 10 Base-T devices; One RS232 port up to 19.2 kbaud*
- *Supports Modbus TCP in both master and slave mode for interface to other Modbus devices.*
- *I/O commands and programming are similar to Galil motion controller programming. Additional commands for I/O processing and PLC functions are included. Easy integration of Galil Ethernet motion controller with IOC-7007*
- *8 multitasking threads for simultaneous execution of multiple I/O programs. One additional thread for PLC mode*
- *PLC mode for fast I/O scans with deterministic timing*
- *Fast command processing time—less than 100 microseconds*
- *Non-volatile memory includes 500 line x 80 characters program space; 126 symbolic variables; 2000 elements in up to 14 arrays*
- *Accepts 90-260 VAC 50/60 Hz or 20–60 VDC*
- *Packaging options include: metal enclosure, DIN rail mount, or card-level*
- *20-pin Molex connectors for easy interface to I/O modules*

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Application Programming

The IOC-7007 command language is similar to the command language of Galil motion controllers, but the motion-specific commands are removed and additional I/O and logic commands added. The language is comprised of intuitive, two-letter English-like ASCII commands designed to make programming as quick and easy as possible. For example, the command "SB1" sets output bit 1 and "CB1" clears output bit 1. The complete set of commands is described in the Command Table.

Like all Galil motion controllers, the IOC-7007 has the ability to store and execute complex application programs designed by the user. Such application programs can be downloaded directly to the controller and executed without host intervention. Special commands are available for application programming including event triggers, conditional jumps, IF/THEN/ELSE statements, subroutines, symbolic variables and arrays.

The IOC-7007 permits multitasking, which allows up to eight application programs to execute simultaneously. An additional task can be executed in a special PLC mode which is described in the next section.

Example

INSTRUCTION	INTERPRETATION
#TASK1	*Task1 label*
XQ #TASK2,1	*Execute Task2 in thread 1*
WT20000	*Wait for 20 seconds*
HX1	*Stop thread 1*
MG"DONE"	*Print Message*
EN	*End of Program*
#TASK2	*Task2 label*
AT0	*Initialize reference time*
CB1	*Clear Output 1*
#LOOP	*Loop label*
AT 10	*Wait 10 msec from reference time*
SB1	*Set Output 1*
AT -40	*Wait 40 msec from reference time, then initialize reference*
CB1	*Clear Output 1*
JP #LOOP	*Repeat Loop*
EN	*End task*

PLC Mode

The PLC Mode (Programmable Logic Controller) is a special mode of operation that allows fast execution of an application program. The program is compiled into optimized code for faster execution with deterministic timing. This feature provides quick and accurate I/O scans.

The special PLC application program is designated with the label #PLCSCAN. All commands following the #PLCSCAN label are part of the program. A subset of Galil commands that are available for use in the PLC mode are designated in bold in the command list. Variables and arrays are also available in the PLC mode. The CP command compiles the PLC program and the PLC program is executed with the XP command. Precisely the same number of PLC commands are executed per update period which allows for deterministic timing.

Example

INSTRUCTION	INTERPRETATION
#PLCSCAN	*PLC special label*
IF (@IN[5]=1)	*If Input 5 equals one*
CB1	*Clear Output 1*
ELSE	*If Input 5 equals 0*
SB1	*Set Output 1*
ENDIF	*Terminate IF statement*
EN	*End PLC program*

Specifications

System Processor

- Motorola 32-bit microcomputer

Communications Interface

- Ethernet 10/100BASE-T and RS232 port up to 19.2 kbaud

Memory

- Program — 500 lines × 80 characters
- Variables — 126
- Array — 2000 array elements in up to 14 arrays

Power Requirements

- AC option (BOX version only): 90 – 260 VAC 50/60 Hz
- DC option (BOX, DIN, CARD): 20 – 60 VDC input

Mechanical

- IOC-7007 board: 10.75" × 4.25"
- IOC-7007-box: 10.8" × 4.5" × 2.6"
- IOC-7007-DIN: fits standard DIN mount
- IOM modules: 1.8" × 3.2"

IOM Electrical Specifications

- IOM-70016: 16 buffered inputs, 2.2 K ohm pull-up
- IOM-70108: 8 optoisolated inputs, 2.2 K pull-up for 5 V in, 10k for 24 V in
- IOM-70208: 8 optoisolated outputs, 24 V @ 25 mA each
- IOM-70308: 8 low-side, high-power outputs, 24 V @ 100 mA each
- IOM-70404: 4 dry contact relays, 150 V @ 250 mA each
- IOM-70508: 8 high-side, high-power outputs, 30 V @ 500 mA each
- IOM-70808: 8 analog inputs*, 12-bits standard, 16-bit option
- IOM-70904: 4 analog outputs, 12-bits standard, 16-bit option
- IOM-70908: 8 analog outputs, 12-bits standard, 16-bit option

**Analog inputs (± 10 V, 0 – 10 V, ± 5 V, 0 – 5 V)*

Ethernet I/O Controller

IOC-7007

Instruction Set

Ethernet

IA	Set IP address
IH	Internet handle
MB	ModBus
MW	ModBus wait

I/O

AO	**Analog output voltage**
CB	**Clear bit**
II	Input interrupt
OB	**Define output bit**
OQ	**Output port**
SB	**Set bit**
@AO[x]	**State of analog output x**
@IN[x]	**State of digital input x**
@OUT[x]	**State of digital output x**
@AN[x]	**Value of analog input x**

Interrogation

LA	List arrays
LL	List labels
LR	Launch slave record
LS	List program
LV	List variables
MG	Message command
QR	Data record
QZ	Return data record information
^R^V	Revision
TB	Tell status
TC	Tell error code
TH	Tell Ethernet handle
TI	Tell input
TIME	**Time operand, internal clock**
TQ	Tell thread execution
TR	Trace program
TZ	Tell I/O configuration
WH	Ethernet Handle

Math Functions

@SIN[x]	Sine of x
@COS[x]	Cosine of x
@COM[x]	1's compliment of x
@ASIN[x]	Arc sine of x
@ACOS[x]	Arc cosine of x
@ATAN[x]	Arc tangent of x
@ABS[x]	Absolute value of x
@FRAC[x]	Fraction portion of x
@INT[x]	Integer portion of x
@RND[x]	Round of x
@SQR[x]	Square root of x
+,-,*,/	**Arithmetic commands**
>,<,=,>=,<=,<>	**Logical operators**
&	**Logical AND**
|	**Logical OR**

Programming

AB	Abort program
DA	Deallocate variables/arrays
DL	Download program
DM	Dimension arrays
ED	Edit program
ELSE	**Conditional statement**
EN	**End program**
ENDIF	**End of conditional statement**
HX	**Halt execution**
IF	**If statement**
IN	Input variable
JP	**Jump**
JS	Jump to subroutine
NO	**No-operation — for remarks**
RA	Record array, automatic data capture
RC	Record interval for RA
RD	Record data for RA
RE	Return from Error
RI	Return from interrupt routine
SA	Send command
UL	Upload program
XQ	**Execute program**
ZC	User variable
ZD	User variable
ZS	Zero stack

System Configuration

BN	Burn parameters
BP	Burn program
BV	Burn variables and arrays
CF	Configure default port
CW	Data adjustment bit
EO	Echo off
HS	Handle Assignment
IK	Ethernet port blocking
LZ	Leading zeros format
QD	Download array
QU	Upload array
RS	Reset
^R^S	Master reset
VF	Variable format

Trippoint

AA	After analog input
AI	After input
AT	At time
WT	Wait for time

PLC Mode

CP	**Compile PLC thread**
HP	**Halt PLC thread**
TX	**Tell PLC execution time**
XP	**Execute PLC thread**

Note: **Commands in bold designate commands available for the PLC mode**

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Connectors

20-pin molex for each IOM module

IOM-70016 16-TTL input module

1	5 VDC supply output (50 mA max)
2	Ground reference for TTL inputs
3	TTL Input 1
4	TTL Input 2
5	TTL Input 3
6	TTL Input 4
7	TTL Input 5
8	TTL Input 6
9	TTL Input 7
10	TTL Input 8
11	TTL Input 9
12	TTL Input 10
13	TTL Input 11
14	TTL Input 12
15	TTL Input 13
16	TTL Input 14
17	TTL Input 15
18	TTL Input 16
19	NC
20	NC

IOM-70208 8 Opto-isolated output module

1	NC
2	NC
3	Opto Output 1 (Collector)
4	Opto Output 1 (Emitter)
5	Opto Output 2 (Collector)
6	Opto Output 2 (Emitter)
7	Opto Output 3 (Collector)
8	Opto Output 3 (Emitter)
9	Opto Output 4 (Collector)
10	Opto Output 4 (Emitter)
11	Opto Output 5 (Collector)
12	Opto Output 5 (Emitter)
13	Opto Output 6 (Collector)
14	Opto Output 6 (Emitter)
15	Opto Output 7 (Collector)
16	Opto Output 7 (Emitter)
17	Opto Output 8 (Collector)
18	Opto Output 8 (Emitter)
19	NC
20	NC

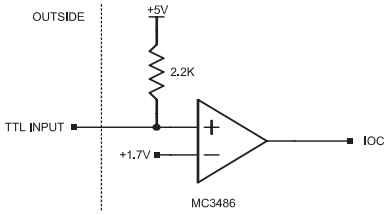
IOM-70108 8 Opto-isolated input module

1	NC
2	NC
3	Opto Input 1 (Anode)
4	Opto Input 1 (Cathode)
5	Opto Input 2 (Anode)
6	Opto Input 2 (Cathode)
7	Opto Input 3 (Anode)
8	Opto Input 3 (Cathode)
9	Opto Input 4 (Anode)
10	Opto Input 4 (Cathode)
11	Opto Input 5 (Anode)
12	Opto Input 5 (Cathode)
13	Opto Input 6 (Anode)
14	Opto Input 6 (Cathode)
15	Opto Input 7 (Anode)
16	Opto Input 7 (Cathode)
17	Opto Input 8 (Anode)
18	Opto Input 8 (Cathode)
19	NC
20	NC

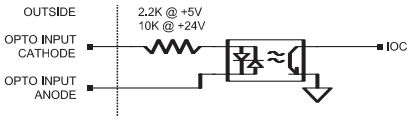
IOM-70308 8 Opto-isolated high power output module

1	NC
2	NC
3	Power Output 1
4	Power Output 2
5	Power Output 3
6	Power Output 4
7	Power Output 5
8	Power Output 6
9	Power Output 7
10	Power Output 8
11	NC
12	NC
13	NC
14	NC
15	NC
16	NC
17	NC
18	NC
19	VIN_ISO, Input for Power supply (+)
20	Ground_ISO, Input for Return supply (-)

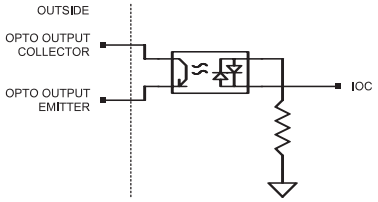
IOM-70016
16 TTL Input Module for IOC-7007



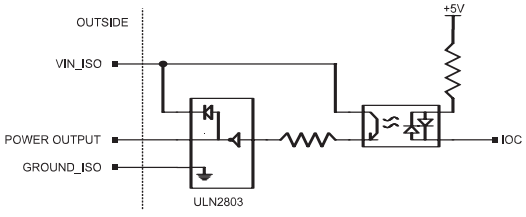
IOM-70108
8 Opto-isolated Inputs



IOM-70208
8 Opto-isolated Outputs



IOM-70308
8 Opto-isolated High Power Outputs



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Ethernet I/O Controller

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Connectors

20-pin molex for each IOM module

IOM-70508 8 Opto-isolated high power output module

1	NC
2	NC
3	Power Output 1 (+)
4	Power Output 2 (+)
5	Power Output 3 (+)
6	Power Output 4 (+)
7	Power Output 5 (+)
8	Power Output 6 (+)
9	Power Output 7 (+)
10	Power Output 8 (+)
11	NC
12	NC
13	NC
14	NC
15	VIN_ISO, Input for Power supply (+)
16	VIN_ISO, Input for Power supply (+)
17	VIN_ISO, Input for Power supply (+)
18	VIN_ISO, Input for Power supply (+)
19	VIN_ISO, Input for Power supply (+)
20	Ground_ISO, Input for Return supply (-)

IOM-70404 4 Dry contact relay output module

1	NC
2	NC
3	Relay Output Common 1
4	Relay Output Normally Open 1
5	Relay Output Normally Close 1
6	Relay Output Common 2
7	Relay Output Normally Open 2
8	Relay Output Normally Close 2
9	Relay Output Common 3
10	Relay Output Normally Open 3
11	Relay Output Normally Close 3
12	Relay Output Common 4
13	Relay Output Normally Open 4
14	Relay Output Normally Close 4
15	NC
16	NC
17	NC
18	NC
19	NC
20	NC

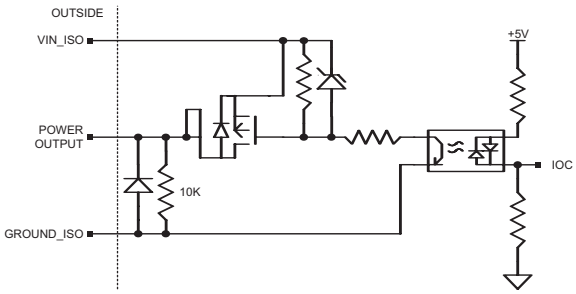
IOM-70808 8 Analog input module

1	+5 V
2	Ground
3	Analog Input 1
4	Analog Ground
5	Analog Input 2
6	Analog Ground
7	Analog Input 3
8	Analog Ground
9	Analog Input 4
10	Analog Ground
11	Analog Input 5
12	Analog Ground
13	Analog Input 6
14	Analog Ground
15	Analog Input 7
16	Analog Ground
17	Analog Input 8
18	Analog Ground
19	NC
20	NC

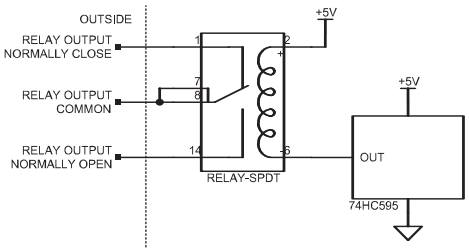
IOM-70908 8 Analog output module

1	+5 V
2	Ground
3	Analog Output 1
4	Analog Ground
5	Analog Output 2
6	Analog Ground
7	Analog Output 3
8	Analog Ground
9	Analog Output 4
10	Analog Ground
11	Analog Output 5
12	Analog Ground
13	Analog Output 6
14	Analog Ground
15	Analog Output 7
16	Analog Ground
17	Analog Output 8
18	Analog Ground
19	NC
20	NC

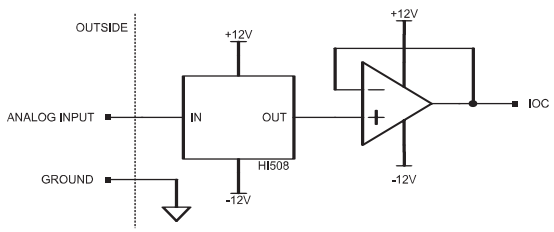
IOM-70508
8 Opto-isolated High Power Outputs



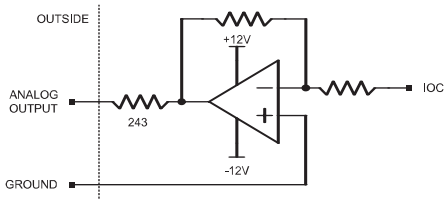
IOM-70404
4 Dry Contact Relay Outputs



IOM-70808-12 8 Analog Inputs



IOM-70908 8 Analog Outputs



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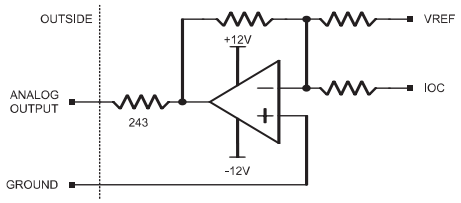
Connectors

20-pin molex for each IOM module

IOM-70904 4 Analog output module

1	+5 V	11	NC
2	Ground	12	NC
3	Analog Output 1	13	NC
4	Analog Ground	14	NC
5	Analog Output 2	15	NC
6	Analog Ground	16	NC
7	Analog Output 3	17	NC
8	Analog Ground	18	NC
9	Analog Output 4	19	NC
10	Analog Ground	20	NC

IOM-70904 4 Analog Outputs



Ordering Information

PART NUMBER	DESCRIPTION	QUANTITY 1	QUANTITY 100
IOC-7007-BOX-AC	I/O Controller Base; BOX; 90 – 260 AC	$ 595	$ 495
IOC-7007-BOX-DC	I/O Controller Base; BOX; 20 – 60 VDC	$ 595	$ 495
IOC-7007-DIN-DC	I/O Controller Base; DIN; 20 – 60 VDC	$ 595	$ 495
IOC-7007-CARD-DC	I/O Controller Base; CARD; 20 – 60 VDC	$ 545	$ 445
IOC-7007-CARD-NS	I/O Controller Base; CARD; no supply (requires +5 V, ±12 V inputs)	$ 495	$ 395
IOM-70016	I/O Module — 16 TTL inputs	$ 30	$ 20
IOM-70108	I/O Module — 8 optoisolated inputs	$ 30	$ 20
IOM-70208	I/O Module — 8 optoisolated outputs (24 V @ 25 mA)	$ 30	$ 20
IOM-70308	I/O Module — 8 low-side, high-power outputs (24 V @ 100 mA)	$ 30	$ 20
IOM-70404	I/O Module — 4 dry contact relays (150 V @ 250 mA)	$ 55	$ 40
IOM-70508	I/O Module — 8 high-side, high-power outputs (30 V @ 500 mA)	$ 45	$ 30
IOM-70808	I/O Module — 8 analog inputs (12-bits)	$ 60	$ 45
IOM-70904	I/O Module — 4 analog outputs (12-bits)	$ 30	$ 20
IOM-70908	I/O Module — 8 analog outputs (12-bits)	$ 60	$ 45

Note: One IOC-7007 controller base accepts up to seven (7) IOM modules

Galil offers additional quantity discounts for purchases between 1 and 100. Consult Galil for a quotation.

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