Preface

Thank you for purchasing the Pro-face GLC DeviceNet master module.

This back-pack module allows connection to the DeviceNet Fieldbus to access many sensors, actuators, and other peripherals which communicate through DeviceNet networks.

This manual includes installation information plus usage and specifications for the GLC DeviceNet Master Module.

NOTE

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Table of Contents

⚠ WARNINGS

Installation

- Do not modify the GLC DeviceNet Master Module. Doing so may cause a fire or an electric shock.

Wiring

- To prevent electric shock or equipment damage, prior to installing or wiring GLC DeviceNet Master Module, be sure that the GLC unit's power cord is unplugged from the power supply.

⚠ CAUTIONS

Wiring Layout

- Be sure that all input/output signal lines are isolated from all power wiring or power cables, via a separate wiring duct. This is to prevent excessive noise, which can cause a unit malfunction.

Installation

- Be sure the data cable attached to the GLC DeviceNet Master Module is securely connected. If all connector pins do not make complete contact, incorrect input or output signals can result.

- Be sure that metal filings or wiring remnants do not fall inside the GLC DeviceNet Master Module, since they can cause a fire, accident, or malfunction.

Operation and Maintenance

- Be sure to read the GLC unit's manual, this manual, and online help information carefully before performing program changes, forced output, or utilizing the RUN, STOP, or PAUSE commands while the GLC is in operation. Mistakes concerning the use of these items can cause an accident or equipment or damage.

Package Contents

The package for the GLC DeviceNet master module contains:

- the GLC DeviceNet Master Module
- a DeviceNet Connector
- DeviceNet Master Resource CD-ROM

The contents of this package were checked for quality at the factory. However, should anything be amiss, please contact your local Pro-face distributor for prompt service.

UL/CSA/CE Listings

UL/cUL (CSA) NOTES

The GLC DeviceNet Master, model CA2-DNMALL-41, is a UL/cUL recognized component.

(UL file: E180970)

This unit conforms as a component to the following standards:

- UL1604: Electrical Equipment for Use in Class I and II Division 2 and Class III Hazardous (Classified) Locations
- CAN/CSA-C22.2, No. 213-M1987: Non-incendive Electrical Equipment for Use in Class I Division 2 Hazardous Locations

To meet the above standards, installation and usage must adhere to the cautions and instructions included in this manual.

CA2-DNMALL-41

<Cautions>

- If the GLC, with the DeviceNet Master Module attached, is installed so as to cool itself naturally, be sure to install it in a vertical panel. Also, be sure that it is mounted at least 100mm away from adjacent structures and other equipment, otherwise, the heat generated by the unit's internal components may exceed that allowed by UL standard requirements.

UL1604 HANDLING CAUTIONS

1. Power, input and output (I/O) wiring must all be in accordance with Class I, Division 2 wiring methods, Article 501-4 (b) of the National Electrical Code, NFPA 70, or as specified in Section 18-152 of the Canadian Electrical Code for units installed within Canada, and in accordance with the authority having jurisdiction.

2. Suitable for use in Class I, Division 2, Groups A, B, C, and D; and Class II, Division 2, Groups F and G hazardous locations, or nonhazardous locations only.

3. WARNING: Explosion hazard - substitution of components may impair suitability for Class I, Division 2, and Class II, Division 2.

4. WARNING: Explosion hazard - do not disconnect equipment unless power has been switched OFF or the area is known to be nonhazardous.

5. WARNING: Explosion hazard - when in hazardous locations, turn OFF power before replacing or wiring modules.

CE MARKING NOTES

The GLC DeviceNet Master Module, model CA2-DNMALL-41, is a CE marked EMC compliant product that conforms to the EMC Directive 89/336/EEC and amending directives. For detailed CE marking information, contact your local Pro-face distributor.

FCC NOTES

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

System Design

DeviceNet Network System Design

The GLC DeviceNet Master Module allows connection to a DeviceNet Network as a master. With this connection, the GLC, with the DeviceNet Master Module, can control and monitor up to 63 slave nodes on the single channel.
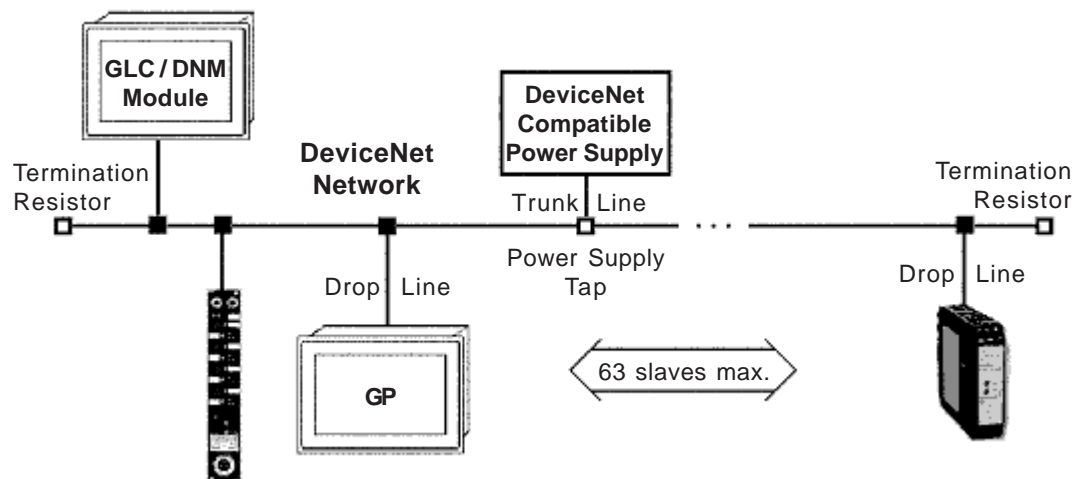
Note:
- The GLC DeviceNet Master Module connects only to DeviceNet. GLC2000 Series units can also connect to serial ports. However, the Flex Network Driver cannot be loaded at the same time as the DeviceNet Master Driver.
- The GLC DeviceNet Master connects only as a master to the DeviceNet Network.

The Master Baud Rate and MAC ID settings for the GLC unit can be made in the Pro-Control Editor of C-Package 02.

▽**Reference**△ *For details, refer to the* Pro-Control Editor Manual Supplement.

Supported Devices

The GLC with the GLC DeviceNet Master Module will communicate with any DeviceNet slave that conforms to standard physical and logical protocol specifications of DeviceNet. Supported modes of communication are:

- Polled
- Bit Strobed
- Cyclic
- Change of State (COS)

Up to 48 I/O Points (Word and/or Discrete) are supported for each slave device. This total includes both inputs and outputs.

Additional Accessories

SOFTWARE

Product Name	Model Number	Description
GP-PRO/PBIII C-Package02	GPPRO-CNT01W-P02	HMI and Ladder Logic Editor software (on CD)
DeviceNet Master Resource CD-ROM	142151 (XYCOM)	Add-on software plus manuals for C-Package to work with DeviceNet (on CD)

*   C-Package 01 or later.

DEVICENET ACCESSORIES

Product Name	Model Number	Description
DeviceNet Connector Plug	142055 (XYCOM)	Plug connects to the GLC DeviceNet Master module. Allows wiring in the field with a screw clamp on each pin.

Specifications

General Specifications

The GLC DeviceNet Master Module is designed to attach only to a GLC2000 Series unit. The general specifications for the DeviceNet Master module, including Temperature and Humidity, are for the module itself, and will not exceed the specifications for the main unit it attaches to.

Ambient Operating Temp.	0°C to 50°C
Ambient Humidity	10%RH to 85%RH (no condensation)
Atmospheric Pressure	800hPa to 1114hPa (2000 meters max.)
Atmosphere	Pollution Degree 2

Interface Specifications

BUS CONNECTOR

The bus connector on the underside of the module is for attaching data and power signals to the GLC main unit.

DEVICENET CONNECTOR

The following table lists overall specifications for the DeviceNet Connection features.

Communication Topology	Trunk with Drop Lines
Connection Mode	1:N – i.e., 1 GLC; multiple slave devices (Multiple Masters)
Transfer Distance	125kbaud: 500m max. 500kbaud: 100m max.
Transfer Speed*	125kbaud, 250kbaud, 500kbaud
Number of Stations	64 nodes max., including GLC
Number of I/O Points	1008 total – 48 I/O Terminals max., per node (inputs and outputs) Inputs can be all Words or all Discretes. Outputs can be all Words or all Discretes.

* *All devices on the network must operate at the same baud rate.*

▼Reference▲ *For further information, refer to the* DeviceNet Specification.

GENERAL DEVICENET INFORMATION

Below are some important points regarding DeviceNet data for the GLC DeviceNet Master:

- DeviceNet Versions: Volume I version 2.0, Volume II version 2.0 May 31, 2000
- Digital's Vendor ID: 96 decimal
- Device Profile: Communication Adapter 0x12
- DeviceNet Power Consumed: 45 mA max.
- Baud Rate: Software settable
- MAC ID: Software settable
- Connector type: Open style

Part Names and Functions

DEVICENET CONNECTOR

The DeviceNet Connector connects the GLC DeviceNet Master Module to a DeviceNet Network. When connecting in the orientation shown, V- is the top signal.

DEVICENET LEDS

The DeviceNet LEDs show the status of the DeviceNet Master module and the DeviceNet Connection.

On startup, if the I/O is enabled and the Ladder Logic engine is running, GLC DeviceNet Master Module performs a self-test.

When the self-test is successful:

1. The MNS (Module Network Status) LED turns Red, then Green, then OFF.
2. The ACT (Activity) LED turns Green, then Red, then OFF.
3. The ACT LED turns Red for a few seconds, then turns steady Green.
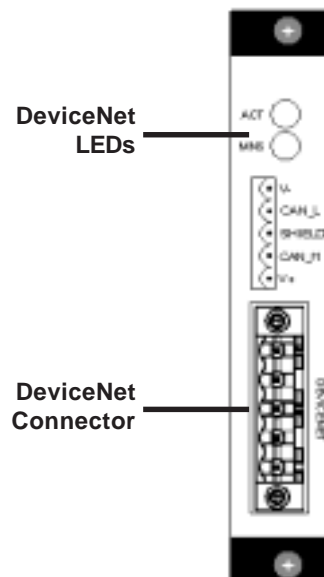
After completion of the self-test, the LEDs indicate the GLC DeviceNet Master Module's status, as described in the following table.

LED	State	Description
MNS (Module/Network Status)	OFF	Not powered, or not online
	Green	Powered, online, and connected
	Red	Critical communication fault
	Flashing Green	Online, operating, but not connected
	Flashing Red	Minor communication fault, or connection timed-out
	Flashing Green / Red	Communication faulted; "Identify Comm Fault Request" has been received
ACT (Activity)	OFF	Initialization not started yet, or internal failure
	Green	Initialization succeeded
	Red	Initialization in process or failed
	Flashing Green	NA Reserved
	Flashing Red	NA Reserved

▼**Reference**◣ *For details about the MNS (Module Network Status) LED, refer to the* DeviceNet Specification.

Dimensions

The GLC DeviceNet Master Module extends 20mm beyond the back face of a GLC2000 Series unit
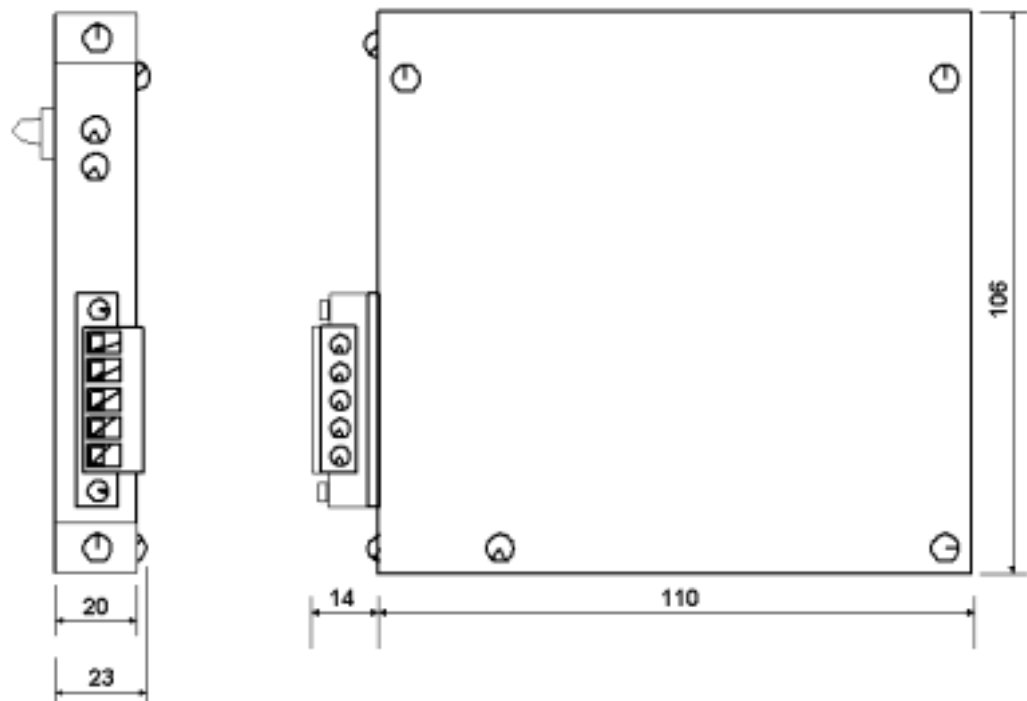
Installation and Wiring

⚠ CAUTIONS

- Always ensure that the power is off on the GLC unit before installing the backpack module.
- Use caution when handling the GLC DeviceNet Master Module, in order not to damage it due to Electrostatic Discharge. Do not touch the bus connector, or any of the exposed circuitry on the module.

Installation

Instructions for installing on the back of a GLC2000 unit

You may have to remove the bus connector cover from the GLC unit.

1. Match the posts of the Bus Connector with the insert holes on the unit's connector. This connector is labeled EXT1.
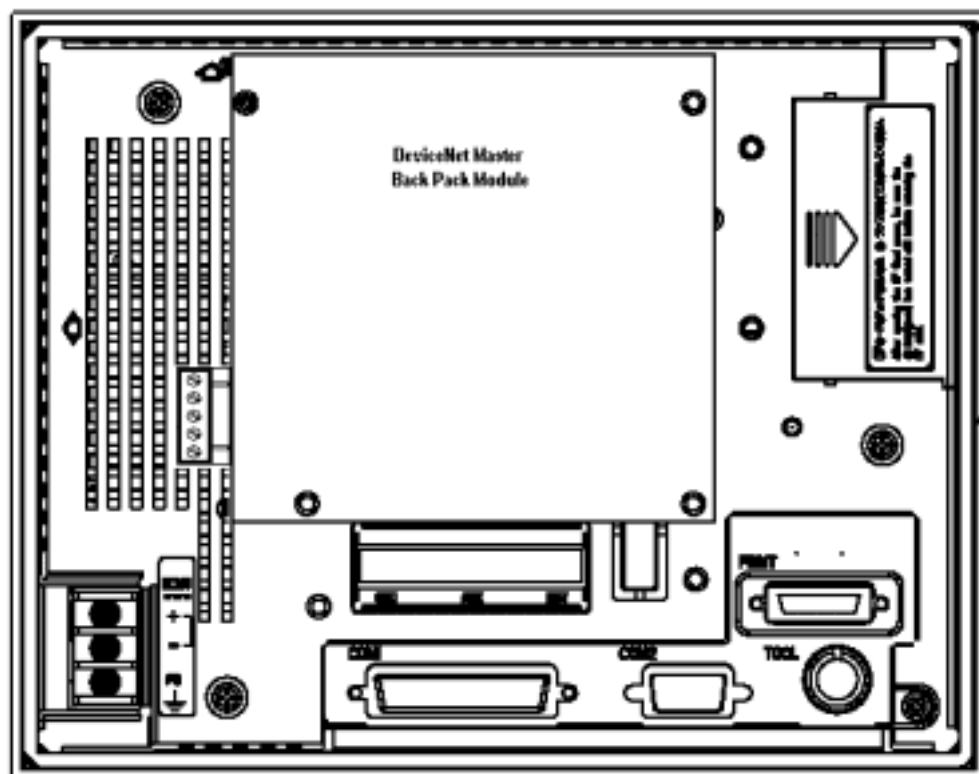
2. Press in until the casing meets the back face of the GLC unit.
3. Fasten the four screws to firmly hold the module in place.

Wiring

The following shows how the DeviceNet Connector plugs into the DeviceNet Master module.

To comply with UL 1604, use a connector with the mounting screw ears on either end.

▼Reference◄ *See the* ■ *Additional Accessories section for a suitable connector.*

For recommended connectors and cables, refer to the Open DeviceNet Vendor Association (ODVA) Web site, at http://www.odva.org.

The cable wires are normally coded as follows.

Signal	Wire Color	Pin No.
V-	Black	1
CAN_L	Blue	2
Shield	Bare Wire	3
CAN_H	White	4
V +	Red	5
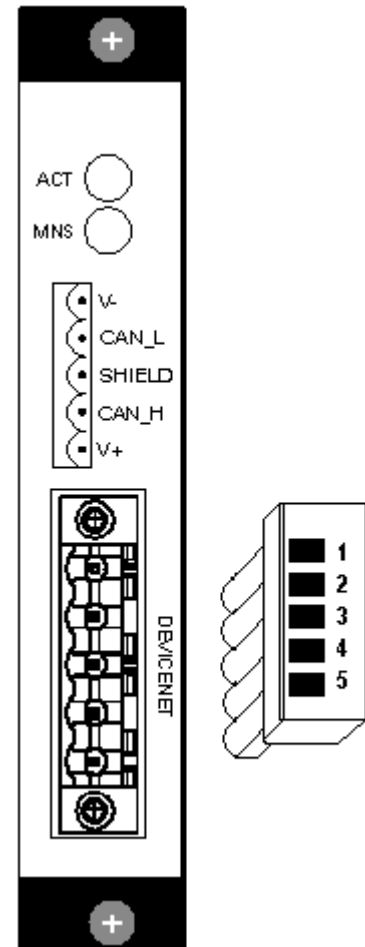
The transceivers of the GLC DeviceNet Master Module are powered from the DeviceNet Network. These transceivers are isolated from the internal signals.

Termination resistors are required for DeviceNet to operate correctly. If the GLC is at the end of the Trunk Line, then a 121 ohm resistor will be needed between the CAN_L and CAN_H pins.

▼Reference◄ *For details, refer to* Chapter 9 – DeviceNet Specification.

DEVICENET POWER CONSIDERATIONS

• The GLC DeviceNet Master Module uses up to 45mA of bus current.

In addition, the module accepts a separate power source from the GLC unit it is mounted on.

Data Download

The GLC DeviceNet Master accepts DeviceNet Master configuration data during download of the Logic Program.

Offline Menus

With the download of the DeviceNet Master Driver, special Offline menu screens are also loaded into the GLC.

These Offline menu screens are entered in the same way as all other GLC units.

▼Reference▲ *For details, refer to your* GLC User Manual.

The following sections describe specific settings and Offline menus associated with configuration of the DeviceNet Master Driver.

Entering the DeviceNet Offline Menus

To enter the special DeviceNet Master Driver's Offline menu* screens:

1. From the INITIALIZE menu, press PLC to open that setup menu.

2. From the PLC SETUP menu (see right), press CTRL SETTING to open the CONTROLLER MENU.

3. From the CTRL MENU, press DeviceNet Driver to open the DeviceNet Menu.

4. From the DeviceNet Menu (see right), DeviceNet-related functions can be selected.

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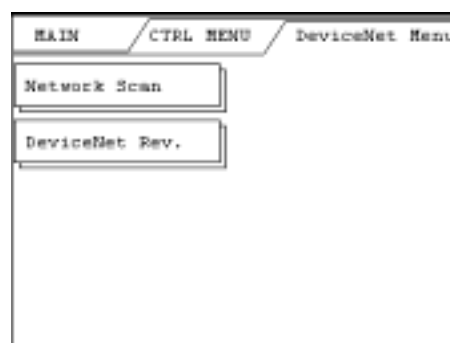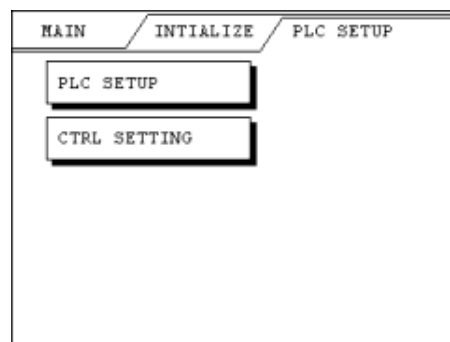
* *Shown in this section are the GLC 2300 unit menus. The GLC 2400 and the GLC 2600 unit menus will be slightly different.*

DEVICENET REV.

Pressing this button will display the DeviceNet Firmware Revision.

NETWORK SCAN

The Network Scan collects information over the DeviceNet network about all connected slaves. As a Master, the GLC uses Explicit Messaging for the following configurations.

Scan Preparation

In the following screen, set the baud rate you wish to scan at.

Note: Settings made here will not affect the downloaded project.

```
Network Scan:   Prepare                ESC

Baud Rate                    125Kb

Master MAC ID                  0


                  START
```

Scan Results

The MAC ID for each slave connected at that rate will display in reverse video.

```
Network Scan                      SET   RET

Total Connected I/O units       1
Connected S-No.s are reverse color.

 0    1    2    3    4    5    6    7
 8    9   10   11   12   13   14   15
16   17   18   19   20   21   22   23
24   25   26   27   28   29   30   31
32   33   34   35   36   37   38   39
40   41   42   43   44   45   46   47
48   49   50   51   52   53   54   55
56   57   58   59   60   61   62   63
```

A number of error codes may also appear in this screen, as listed in the following table. If an error code not listed here appears, it may indicate an internal failure in the hardware or software. Please report this information to your local Pro-face support office.

Error Code	Description
1	Duplicate MAC ID.
32	Duplicate MAC ID check failed. No devices at selected baud rate.
33	Error retrieving network scan data.
34	Error writing network scan packet.
-1	Error reading slave details.

SLAVE DETAILS

When a MAC ID appearing in reverse video is pressed, the details of that slave device can be viewed on the Slave Details screen, as follows.

```
  Slave Details:                    ┌─────┐
                                    │ ESC │
Name:                               └─────┘
  TSX MODICON Momentum
MAC ID:        63                   ┌─────┐
                                    │ MAC │
Baud Rate:     125Kb                └─────┘
Vendor ID:     243    Expl:   Yes   ┌─────┐
                                    │Baud │
Device Type:   0      Polled: Yes   └─────┘
Product Code:  2065   Bit Str:Yes   ┌─────┐
Major Revision:1      Cyclic:       │ Set │
                                    └─────┘
Minor Revision:10     COS:
Input Bytes:   2      UCMM:         ┌─────┐
                                    │ Get │
Output Bytes:  2      Error:        └─────┘
```

Press ESC to return to the Network Scan screen.

Press the MAC, Baud, Set, or Get buttons to open the screens described in the following sections.

In this screen, it is important that all the following data match with the configuration downloaded from the Editor:

Item	Comment
Mac ID	Device's Station Number
Baud Rate	Baud Rate for the device. This needs to be the same for all slaves on the same network.
Vendor ID	Unique number controlled by ODVA
Device Type	Identifies the specific functionality of the device
Product Code	Vendor's own number to uniquely identify the product.
Major Revision	Minor revision is not used for keying
Input Bytes	These must also match, or the Master will not communicate with the device.
Output Bytes	"

The Connection Types shown in the Slave Details screen are as follows:

Expl	Explicit Connection
Polled	Polled
Bit Str	Bit Strobed
Cyclic	Cyclic
COS	Change of State

Any one of the slave device's Connection Type displays that indicate "Yes" can be selected in the Editor. If UCMM indicates "Yes," select UCMM and determine the group it will communicate on to allow communication between the master and the device. If you are uncertain about which UCMM Group the device supports, select Group 3.

The Error field provides an error code should there be a failure in communicating with the Device to get detail information. Error code 64 means internal blocking has disallowed the sending of the request.

▼**Reference**◄ *All other error codes can be cross referenced in Appendix H of the DeviceNet Specification Volume I.*

Configuring Slaves in Offline Mode

CHANGE MAC ID

A slave's MAC ID can be changed from the Offline Menus on the GLC. Use the Change MAC ID screen to make this change.

1. Press the rectangle next to New MAC ID.

```
Change MAC ID:              ┌──────┐ ┌─────┐
                            │ Chng │ │ ESC │
                            └──────┘ └─────┘

Old MAC ID                  ┌──────────┐
                            │    63    │
                            └──────────┘

New MAC ID                  ┌──────────┐
                            │    45    │
                            └──────────┘

Error Code                  ┌──────────┐
                            │    0     │
                            └──────────┘
```

2. When the keypad pops up, enter the new MAC ID.

Note: For this and the following screens, an error code of 0 means the slave successfully processed the request. All other error codes are described in the ODVA's *DeviceNet Specification.*

CHANGE BAUD RATE

The baud rate of a slave can also be configured. Normally, connect the slave in a one-to-one network with the GLC.

1. Perform a Network Scan to find the slave.

2. Press the reverse-displayed MAC ID to view the slave's details.

3. Press Baud to open the Change Baud Rate screen.

4. Press the rectangle to toggle through until the desired rate appears, then press Chng.

5. Reconnect the slave and GLC to the overall network, then exit the offline menus.

```
 ┌──────────────────────────────────────────────────┐
 │  Change Baud Rate:              ┌────┐┌────┐       │
 │  ──────────────────────         │Chng││ESC │       │
 │                                 └────┘└────┘       │
 │                                                    │
 │   New Baud Rate            ┌──────────┐            │
 │                            │  125Kb   │            │
 │                            └──────────┘            │
 │                                                    │
 │   Old Baud Rate            ┌──────────┐            │
 │                            │  250Kb   │            │
 │                            └──────────┘            │
 │                                                    │
 │   Error Code               ┌──────────┐            │
 │                            │          │            │
 │                            └──────────┘            │
 │                                                    │
 └──────────────────────────────────────────────────┘
```

Note: Normally, slaves require a power cycle before any changes will be recognized.

The master's baud rate can only be set in the Editor, and then downloaded to the panel. This resets the functionality of the Master and thus implements the new baud rate immediately. It is advised to set the baud rate for all slaves on the network, then download to the master and finally, cycle power to bring the whole network to the new baud rate.

GET AND SET ATTRIBUTES

General attributes can be configured for the selected slave using the offline menu's Set Attributes screen:

```
 ┌──────────────────────────────────────────────────┐
 │  Set DeviceNet Attribute        ┌────┐┌────┐       │
 │  ──────────────────────         │SET ││ESC │       │
 │                                 └────┘└────┘       │
 │                                                    │
 │   Class                    ┌──────────┐            │
 │                            │   15     │            │
 │                            └──────────┘            │
 │                                                    │
 │   Instance                 ┌──────────┐            │
 │                            │   1      │            │
 │                            └──────────┘            │
 │                                                    │
 │   Attribute                ┌──────────┐            │
 │                            │   1      │            │
 │                            └──────────┘            │
 │                                                    │
 │   Data                     ┌──────────┐            │
 │                            │   15     │            │
 │                            └──────────┘            │
 │                                                    │
 │   Error Code               ┌──────────┐            │
 │                            │          │            │
 │                            └──────────┘            │
 └──────────────────────────────────────────────────┘
```

Note: A similar screen (Get Attributes) is for reading back from the slave device.

Values for Class, Instance, and Data can be 16-bit numbers (0–65535). The Attribute is an 8-bit number (0–255). All values on the SET screen are in decimal. The GET screen takes input in decimal and displays the return value in Hex.

Runtime and Error Codes

▼Reference▲ *For error messages and troubleshooting information, refer to the* GLC DeviceNet Master Editor Operation Manual Supplement *and your* GLC User Manual.