WOODWARD

723/DSLC™
Network Binding Procedure

Revisions—Changes in this publication since the last revision are indicated by a black line alongside the text.

Contents

Warnings and Notices

Important Definitions

⚠ This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

- **DANGER**—Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **WARNING**—Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- **CAUTION**—Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- **NOTICE**—Indicates a hazard that could result in property damage only (including damage to the control).
- **IMPORTANT**—Designates an operating tip or maintenance suggestion.

⚠**WARNING** **Overspeed / Overtemperature / Overpressure**	**The engine, turbine, or other type of prime mover should be equipped with an overspeed shutdown device to protect against runaway or damage to the prime mover with possible personal injury, loss of life, or property damage.** **The overspeed shutdown device must be totally independent of the prime mover control system. An overtemperature or overpressure shutdown device may also be needed for safety, as appropriate.**

⚠**WARNING** **Personal Protective Equipment**	**The products described in this publication may present risks that could lead to personal injury, loss of life, or property damage. Always wear the appropriate personal protective equipment (PPE) for the job at hand. Equipment that should be considered includes but is not limited to:** • **Eye Protection** • **Hearing Protection** • **Hard Hat** • **Gloves** • **Safety Boots** • **Respirator** **Always read the proper Material Safety Data Sheet (MSDS) for any working fluid(s) and comply with recommended safety equipment.**

⚠**WARNING** **Start-up**	**Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.**

⚠**WARNING** **Automotive Applications**	**On- and off-highway Mobile Applications: Unless Woodward's control functions as the supervisory control, customer should install a system totally independent of the prime mover control system that monitors for supervisory control of engine (and takes appropriate action if supervisory control is lost) to protect against loss of engine control with possible personal injury, loss of life, or property damage.**

NOTICE

Battery Charging Device

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

Electrostatic Discharge Awareness

NOTICE

Electrostatic Precautions

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts:

- Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).
- Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.
- Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual *82715, Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Follow these precautions when working with or near the control.
1. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.
2. Do not remove the printed circuit board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:
   - Do not touch any part of the PCB except the edges.
   - Do not touch the electrical conductors, the connectors, or the components with conductive devices or with your hands.
   - When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control cabinet, place it in the antistatic protective bag.

723/DSLC™
Network Binding Procedure

Requirements

Computer
(for Graphics Version of LonMaker™ Software)

- IBM PC compatible with a minimum of an 80386 running at 25 MHz.
- 640 KB of conventional RAM, with at least 580 KB of this available for LonMaker™. A separate boot disk may be required to get 580 KB of memory.
- 2 MB of expanded or extended memory.
- 1.1 MB of hard disk storage for the LonMaker software.
- A serial port (RS-232) for use with the serial network interface.
- DOS version 3.2 or later.
- VGA monitor and video card.

> **IMPORTANT** **If the text version of the software is used, the computer requirements drop to a minimum of an 8088 with no expanded or extended memory, and the VGA monitor and video card are not needed.**

Software

LonMaker Software—Follow Echelon's instructions for correctly installing on your PC (Woodward part number 1796-031).

Software driver required for the Serial LonTalk™ Adapter—LDVSLTA.SYS. LonMaker database with capability of 14 DSLC™ (Digital Synchronizer and Load Control) units and 723 Digital Speed Controls, 1 LSIM (Load Sharing Interface Module), 1 MSLC (Master Synchronizer and Load Control), and 1 723 gateway. For use with the standard DSLC-compatible 723 and the standard Modbus® * gateway 723.

                                        *—Modbus is a trademark of Schneider Automation Inc.

The database and SLTA driver are supplied on a disk assembly (Woodward part number 9924-852).

Hardware

Serial LonTalk Adapter (SLTA/2) and associated cables (Woodward part number 8923-492).

IMPORTANT	**There is a Woodward "Starter Kit" that contains all the needed software and hardware (part numbers 1796-031, 9924-852, and 8923-492)—Starter Kit number 9924-863.**

Creating a Network

When an Echelon network is created, each device on the network has to know which devices it is talking to and what information it is receiving or sending. Binding is the process of installing and connecting the correct network inputs and outputs of devices in an Echelon network. For our purposes, binding is required in applications where it is desired that the DSLC information be made available on a serial network. The binding process must be performed at the initial start up (first time installation) of a system and also any time that a device on the network is replaced. The binding process is explained in detail under "Installing the Network".

In the standard power generation 723/DSLC applications, the DSLC information is transferred via the 723. The 723 functions as a gateway to convert the DSLC Echelon information into Modbus serial data.

We have considered two different network situations with the standard 723s:

1. 723/DSLC pair on each engine. The maximum capability is 14 engines on one network. The 723 is the speed control. The 723 would also be the gateway for the DSLC information to a Modbus network for monitoring.

2. One 723 connected to a maximum of 14 DSLC controls used as a gateway to a Modbus network for monitoring. In this situation, a separate control (such as a 2301A) would be used as the speed control on each engine. The 723 for this system is 8280-206 (low voltage) and 8280-207 (high voltage).

There are two separate software programs used to create an Echelon network: LonProfiler and LonMaker. LonProfiler defines each of the devices on a network and creates a parts catalog. The parts catalog contains each device and its network inputs and outputs. This parts catalog is then used by the installation software (LonMaker) to actually create the network connections and "bind" the devices.

LonMaker also defines the communication medium (twisted pair, fiber optics, etc.). All of the Woodward controls communicate over twisted pair at 1.25 MBaud. Using LonMaker, the devices can be subdivided into logical groups to organize the network installation. The LonMaker stores its information in a database on your hard drive.

Woodward has created a LonMaker database for both of the network situations above. All of the network connections are made for up to 14 engines. Also included is the possibility of an MSLC and an LSIM on the network. With the database already created, the only function that will be needed in the field is the actual binding process.

Installing the Network

The 9924-852 disk assembly contains a LonMaker database and sample autoexec.bat and config.sys files. Boot up your PC and insert this disk in your 3.5" floppy drive.

The most difficult requirement to meet for LonMaker is to make 580 KB of conventional memory available. If you are using Windows 95 as your operating system, you will probably not have any problems. If you are using DOS or Windows 3.X as your operating system and LonMaker will not execute because there is not enough memory, you will have to make some changes in your system to free up some conventional memory. If you are running Windows, exit Windows and run LonMaker from DOS. If you are still having problems, create a system disk that only loads the minimum requirements for DOS and LonMaker and boot your computer from this disk. The sample_c.sys and sample_a.bat files that are supplied on the disk assembly can be used in part or in full as the config.sys and autoexec.bat for your bootable disk.

No matter which operating system you are using (including Windows 95), the following line has to be added to your config.sys file. This system file loads the driver for the Serial LonTalk Adapter (SLTA). Be sure there is a space before and after the "**/a**":

> **devicehigh=c:\lnm\ldvslta.sys /a /p1**

If the LDVSLTA.SYS file is not already located in your C:\LNM directory, put it there. The file is supplied on the 9924-852 disk assembly.

You must also make sure that the LonMaker and LonProfiler directories (C:\LNM & C:\LNP) are in your working path. These directories can be appended to your existing path by adding the following line to your autoexec.bat file:

> **set path=%path%c:\lnm;c:\lnp;**

If you edit your config.sys or autoexec.bat files, be sure to reboot your PC so that the changes will take effect.

On the disk is a self-extracting file called database.exe. Create a directory on your root directory that will be used for your Echelon database storage (c:\echelon is common). Copy the self-extracting file from the disk to your c:\echelon directory. Execute the file, and the database will be extracted and stored within your c:\echelon directory. The self-extracting file will create a directory called 9924850. Within the 9924850 directory are two directories (called DB_TYPE and DB_INST) that contain the database files.

Create a directory that identifies the site you are working on (call the directory SITE_1 for instance) as there will be a separate database for each site. Copy the DB_TYPE and DB_INST directories and all the files contained in these directories. Place the copy of those directories in your SITE_1 directory, making an exact copy of the 9924850 directory. This will create a working directory and a backup directory in the event that you need it.
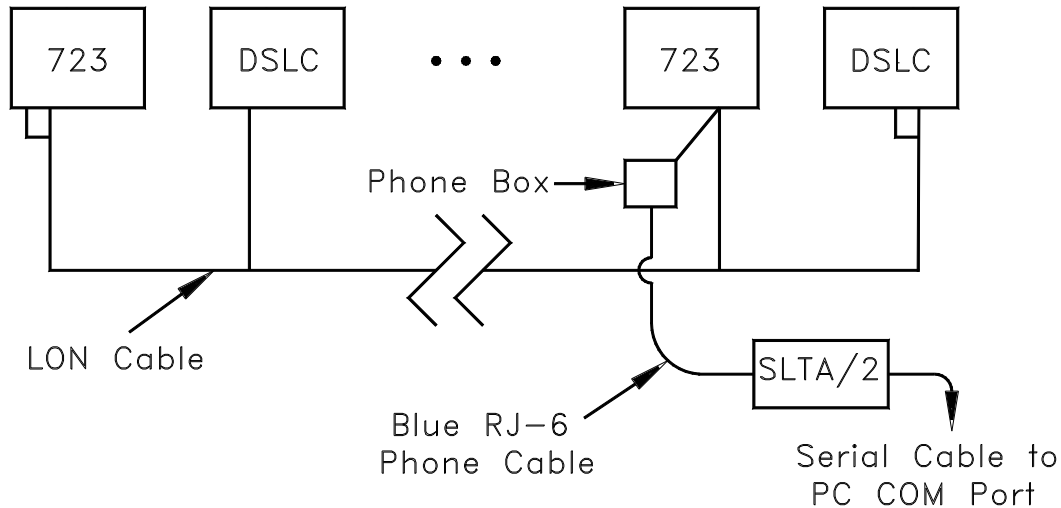
> ⚠️ **WARNING**   **Before installing any of the devices on a network, be sure that all of the engines are shut down and locked out. The load sharing between the DSLC units will be temporarily removed during the installation process.**

Connect the SLTA/2 to the serial port of your computer with the serial cable provided. The SLTA/2 is defaulted to work on serial port 1. If you need to use port 2, follow these steps:
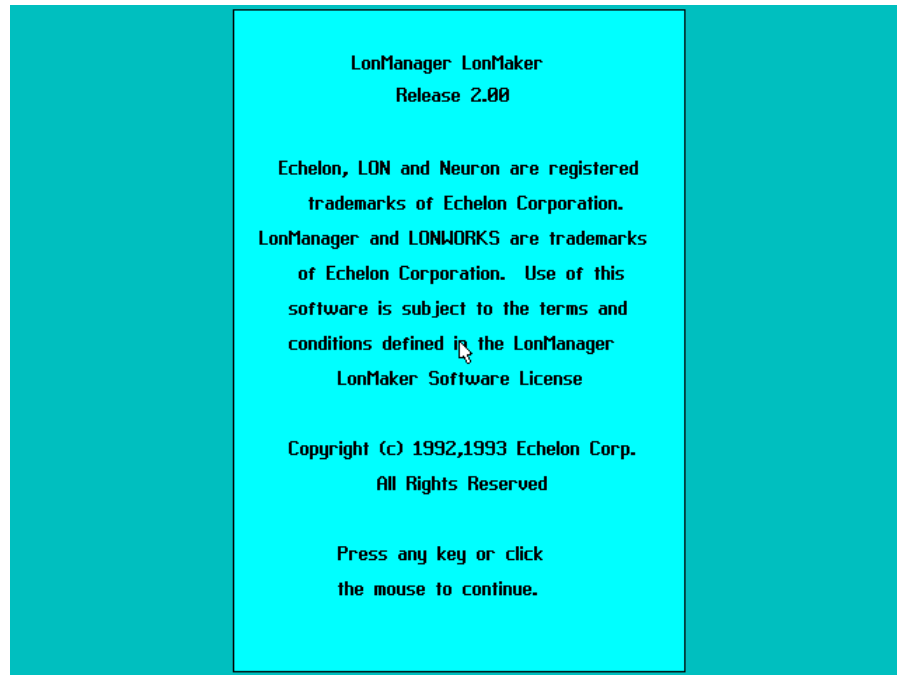
1.   Edit your config.sys file with any text editor.
2.   Change the line in the config.sys file that reads:
      "**devicehigh=c:\lnm\ldvslta.sys /A /P1**" to
      "**devicehigh=c:\lnm\ldvslta.sys /A /P2**"
3.   Save the file and reboot your PC.

Connect the SLTA/2 to any point on the network with the blue cable and phone box provided in the SLTA/2 kit P/N 8923-492. Connect the power supply and power up the SLTA/2.


```
723      DSLC      • • •      723      DSLC

                Phone Box →

LON Cable

          Blue RJ-6          SLTA/2
          Phone Cable        Serial Cable to
                             PC COM Port
```
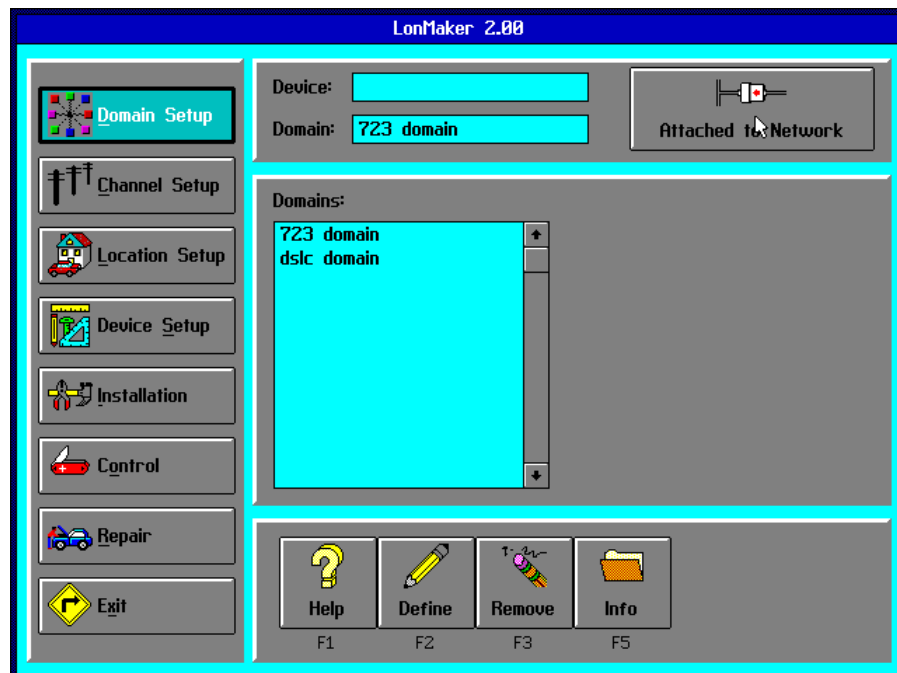
028-036
97-06-01

While residing in the project directory that you created above, from the DOS prompt type 'lnmg' (your screen at this point should read C:\ECHELON\SITE_1>lnmg) and press <ENTER>. This will launch the LonMaker program and use the database stored in the SITE_1 directory. Your screen will look as follows:

Press any key and LonMaker will start.

Be sure that you are connected to the network. The status is given at the top right hand corner of the screen.
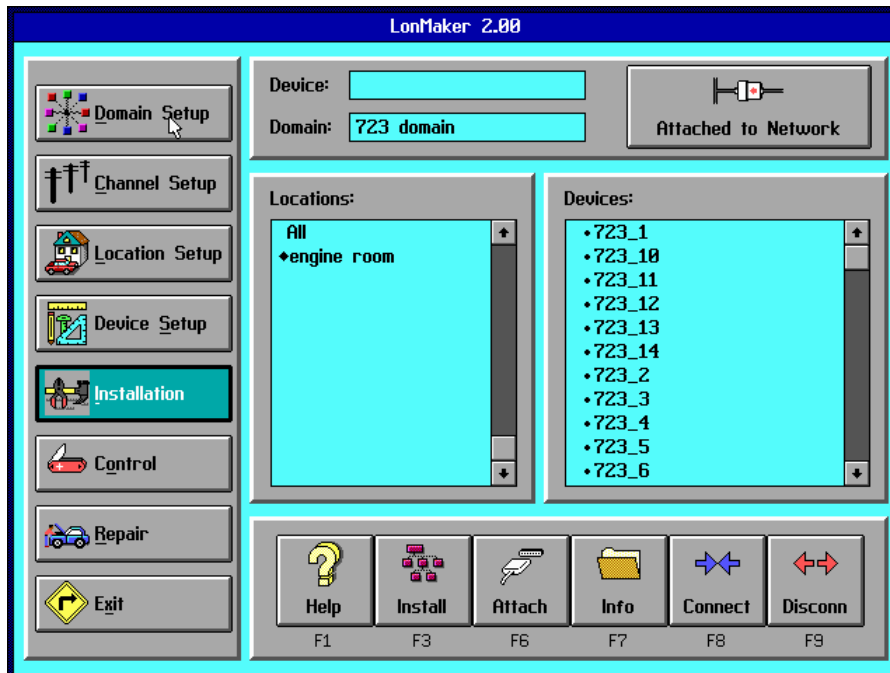
If you are not connected to the network, click on the top right hand button and you will be connected to the network through the SLTA/2. If still not connected, be sure that the SLTA/2 is powered up (1 is on, 0 is off), cycle power on the SLTA/2, and verify connection from SLTA/2 to PC.

Select the 'Domain Setup' category on the top left corner of the screen and select the Domain that you will be working in (723 or DSLC). The domain is simply a way of organizing the network. Communication between domains is not allowed. All the DSLC-to-DSLC communication is done in the DSLC domain. All the DSLC-to-723 communication is done in the 723 domain. You will find that the DSLC controls are in both domains, so when you are working with them, the domain is not important. The 723s are found only in the 723 domain. The LSIM is only in the DSLC domain because there is no communication between the 723 and the LSIM.

DSLC Domain	723 Domain
DSLC units	723s
MSLC	723 Gateway
LSIM	DSLC units
	MSLC

Select the 'Channel Setup' category and select channel 1 (there is only one channel).

Setting up locations is a way to further subdivide the network (engine room, control room, etc.). In this example, there is only one location which we called 'engine room'. Select the 'Location Setup' category and select 'All' locations. Select the 'Installation' button on the left hand side of the screen. At this point, none of the devices are installed as indicated by the • symbol next to the name of the device. Refer to the following figure.
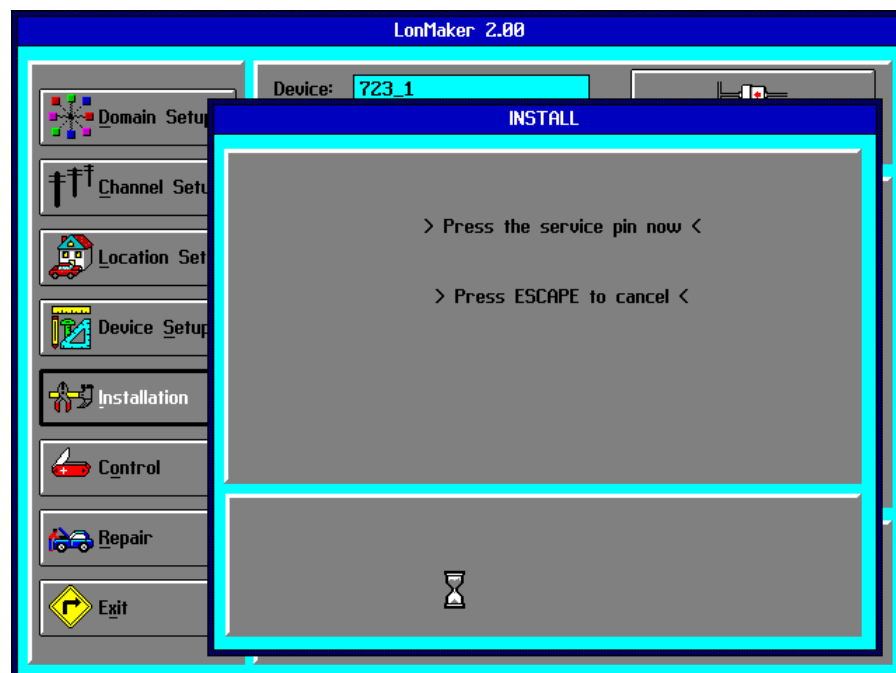
Note that 723_1 and DSLC_1 (as well as 723_2 and DSLC_2, etc) are a pair and should be installed as a pair. If the 723s and DSLC units are not physically installed as a pair, the information supplied by the 723 could be for the wrong unit. If 723_1 is installed on unit #1 and DSLC_1 is installed on unit #2, then the generator information supplied by 723_1 would actually be coming from unit #2.
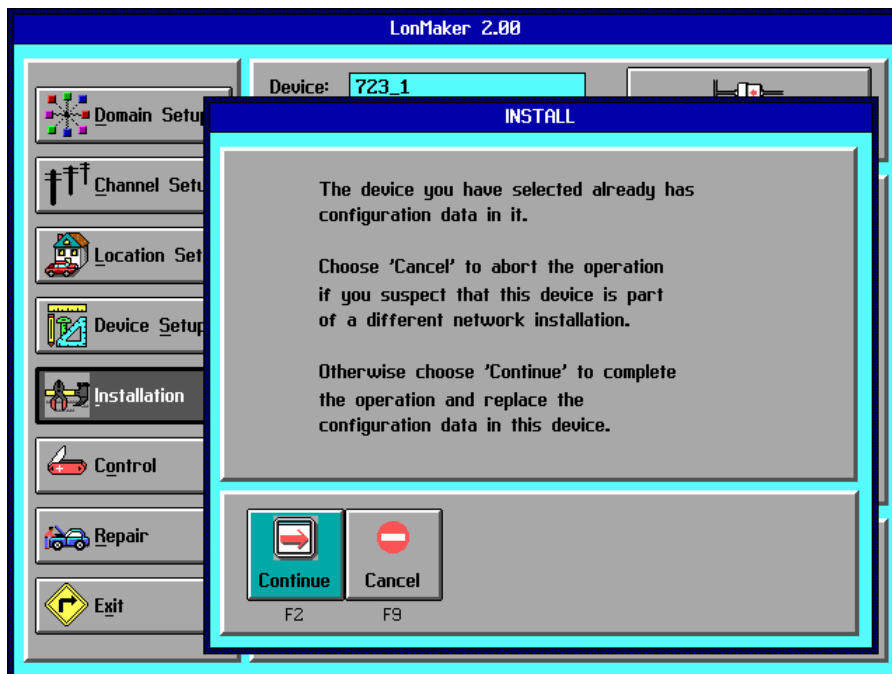

⚠ WARNING — **Whenever you are installing or replacing a device, be sure to select the correct device in LonMaker, and press the service pin on that corresponding physical device. You cannot install two devices with the same name on the same network. And you cannot install one device twice in the same network.**

Select the device that you want to install by clicking on it. Press the 'Install' button along the bottom of the screen or press F3. A screen will pop up asking you to press the service pin on the device that you are installing, as shown below.

Go to the control and select the service pin. On a 723, the service pin can be found in the service menus. Refer to the corresponding 723 manual for details on the service pin location. The 723 service pin will have to be tuned to TRUE and then back FALSE. The service pin on a DSLC control is in menu 5, and the configuration key will have to be set to 49. The LSIM has a physical service button located above terminal 11.

If the device you selected has been used in a network before, LonMaker will give you a warning as shown in the picture below. This simply means that the control has been configured in a network some time previously in its life. You will see this warning on DSLC controls because they are configured from the factory for self-binding. You may or may not see the warning when you install a 723. This is a good time to verify that you pressed the service pin on the correct device. Click on 'Continue' and LonMaker will install the device.
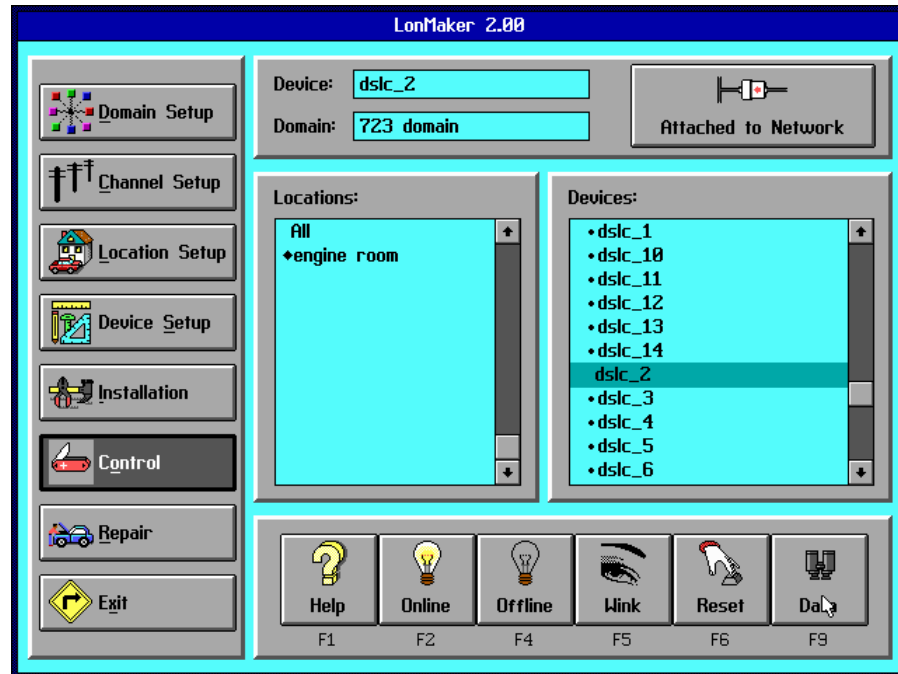

Once a DSLC unit, LSIM, or MSLC is installed with LonMaker, it will not load share with the remaining DSLC units until they are also installed with LonMaker. Follow the procedure above to install the remaining devices on the network, including the MSLC or LSIM if applicable.
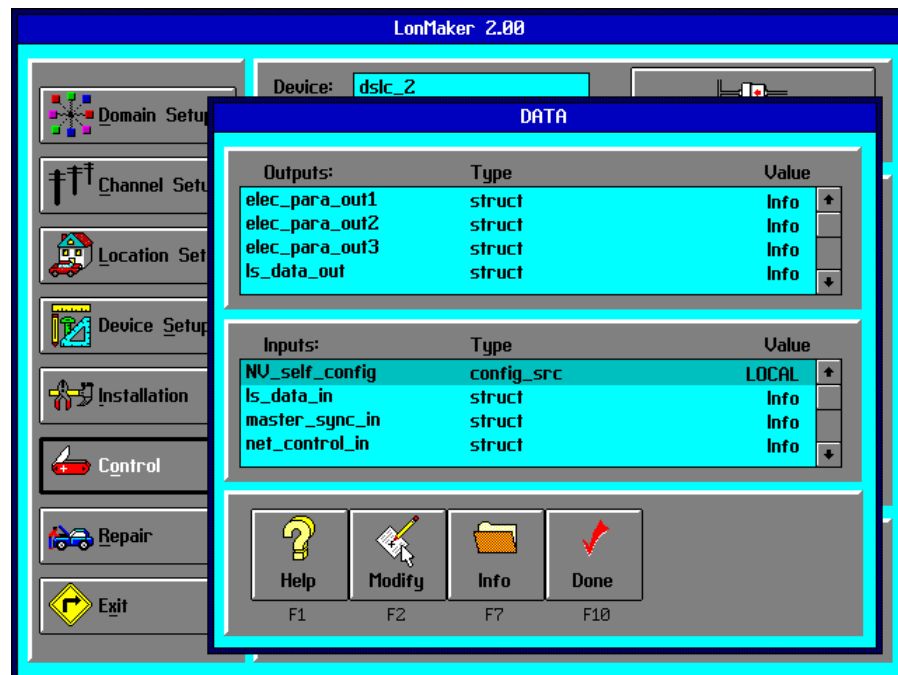
IMPORTANT **Verify that all the DSLC controls, the MSLC, and the LSIM are installed by looking at the number of "active DSLCs" in menu 0 on all of the DSLC controls and the MSLC. This number should equal the total number of all DSLC units, MSLC, and LSIM installed on the network and powered up.**

When a DSLC control, LSIM, or MSLC is installed with LonMaker, the network address (in menu 5 on a DSLC unit) is no longer valid. However, it can cause problems if the DSLC unit thinks it should be configuring itself, when in reality the LonMaker is configuring the DSLC control. To eliminate these problems, there is a variable in the DSLC control that tells it whether it is configured from an external source or locally. This variable must be set to EXTERNAL when a DSLC control has been installed using LonMaker. This variable is defaulted to LOCAL and can only be set from LonMaker as follows:

From the 'Control' category, select an installed DSLC unit and select the 'Data' button on the far bottom right.
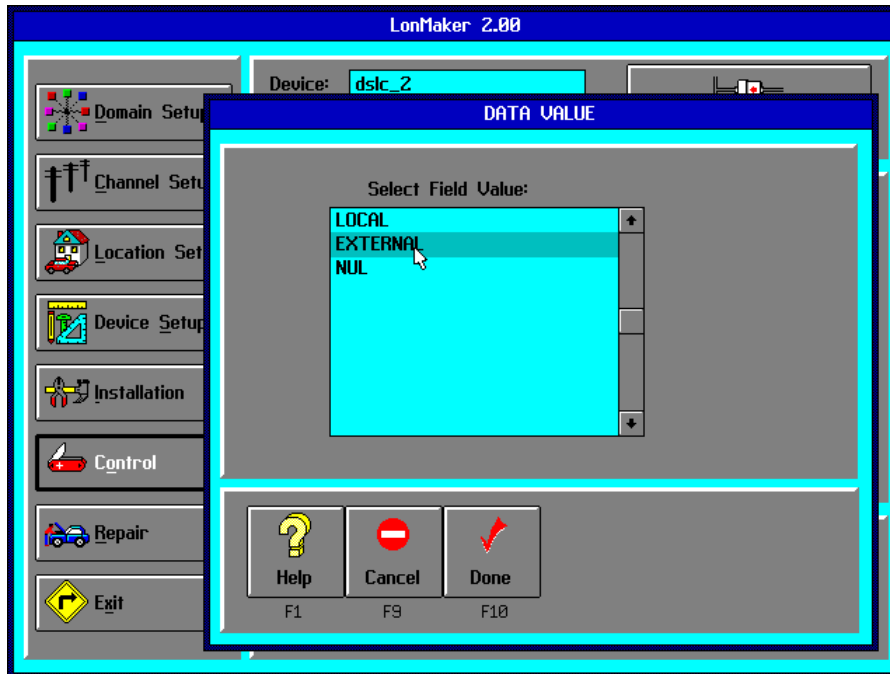

Under the 'Inputs:' window, select the variable called NV_self_config. This variable will either be set to 'LOCAL' or 'EXTERNAL'.

If the current state is 'EXTERNAL', press 'Done'. Select the next DSLC control and repeat the procedure above. Remember to check the LSIM and MSLC also.

If the current state is 'LOCAL', select the 'Modify' button along the bottom of the screen or press F2.

From the menu select 'EXTERNAL' and press DONE.

After a moment, the DATA window should reflect the change. Select 'Done'.
Repeat this procedure for all of the DSLC controls on the network as well as the LSIM and MSLC if applicable.
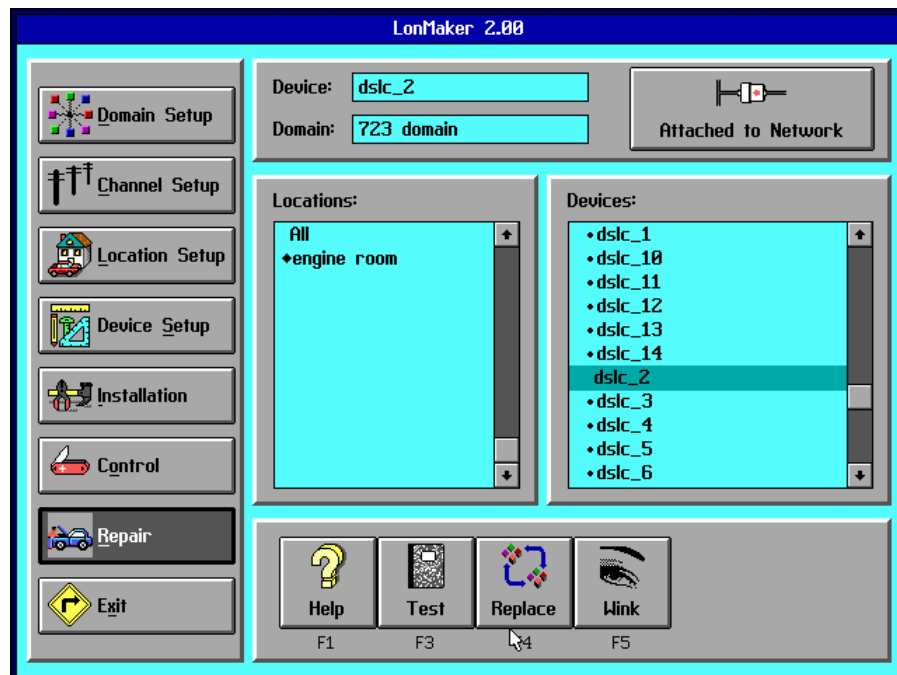
> **NOTICE**
>
> **Changing the NV_self_config value back to 'LOCAL' will NOT make the DSLC unit self-binding again, but it will cause problems in your LonMaker network. Once a DSLC unit has been installed with LonMaker, it is good only for that network and cannot be used as a self-binding control as before. It is possible to reset a DSLC and make it self-binding again, but it involves a PROM change in an electrostatic-discharge-safe environment.**

At this point all the network devices should be installed and the DSLC units, MSLC, and LSIM should be set to external configuration. You can exit LonMaker now by pressing the 'Exit' button (lower left side of the screen).

Replacing a Device

If one of the DSLC units or 723s is replaced, the LonMaker software will be required to install the new device. The software replacement can be done on a bench before physically replacing the device, or it can be done on-site after the device is installed. Remember that the device will not receive network information until the software replacement is done.

The software replacement is similar to the installation. Connect your PC to the network through the SLTA/2 and boot up your PC using the 9924-852 disk. Execute the 'lnmg' program from the directory that contains the same database that was used for installation. Verify that you are connected to the network. On the left side of the screen, select the repair category. Select the device that you want to replace.

Select the 'Replace' button from the menu along the bottom of the screen. Press the service pin on the device that you are replacing. LonMaker will download the correct information for the device that you are replacing.

IMPORTANT	**If you don't have the database that was used during the installation, you could use a fresh database and go through the installation procedure above. You will only have to install the device that you are replacing. It is a good idea to keep an up-to-date database so that you know which devices are installed in the event that you add more.**

Quick Reference Guide

Initial Installation:
1. Create Site database from 9924-852 disk assembly.
2. Execute LonMaker from your site directory.
3. Attach to the network.
4. Select the device and press install from the Installation menu.
5. Toggle the service pin for the correct device.
6. Repeat installation for all 723s, DSLC units, MSLC, and LSIM on the network.
7. Change NV_self_config variable to 'EXTERNAL' on all DSLC units, MSLC, and LSIM.
8. Once all devices are installed, verify that there are the correct number of "active DSLCs" in Menu 0 on all of the DSLC units and MSLC. The number should be equal to all of the DSLC units, MSLC, and LSIM on the network.

Replacing:
1. Execute LonMaker from your existing site directory. If you don't have the site directory, follow the initial installation steps, but only install the device(s) that is being replaced.
2. Attach to the network.
3. Select the device and press Replace from the Repair menu.
4. Toggle the service pin for the correct device.
5. Repeat replace process for all devices that are being replaced.
6. Change NV_self_config variable to 'EXTERNAL' on all DSLC units, MSLC, and LSIM that were replaced.
7. Once all devices are replaced, verify that there are the correct number of "active DSLCs" in Menu 0 on all of the DSLC units and MSLC. The number should be equal to all of the DSLC units, MSLC, and LSIM on the network.

IMPORTANT	**Remember that the network replace (or installation) can be done on a bench before the physical installation of the device. The device can be replaced (or installed) without being connected to the other devices in the network. When the device is physically connected to the other installed devices, they will start communicating.**

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

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