

# Getting Started

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## In This Chapter. . . .

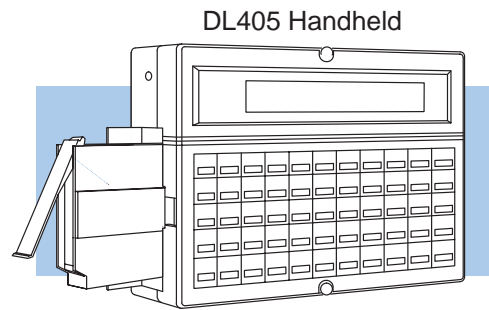
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## Introduction

### DL405 Handheld Programmer

The DL405 Handheld Programmer is a general purpose programming tool for use with the DL405 family of automation products.

The Handheld is well suited for entering small programs or for troubleshooting machine operations. It is not the ideal choice for entering larger, more complex programs. For these types of programs, you should consider using **DirectSOFT**, our PC-based programming software.



### Purpose of this manual

This manual will teach you the basic keystrokes used with the Handheld. It does not provide an example of every instruction. Once you understand the basic keystroke techniques, you should use the DL405 User Manual to determine the keystrokes required for the individual instructions.

Since we constantly try to improve our product line, we occasionally issue addenda that document new features and changes to the products. If there are addenda included with this manual, please read through them to see which areas of the manual or product have changed.

### Who should read this manual

If you understand the DL405 instruction set and system setup requirements, this manual will provide all the information you need to get a basic understanding of the Handheld. This manual *is not* intended to be a tutorial on the DL405 instruction set or system operation, but rather a user reference manual for the Handheld Programmer.

### Supplemental Manuals

There is another manual that may occasionally be referenced by this manual. This manual is not absolutely necessary to use the Handheld, but it does provide additional details on several related subjects.

- DL405 User Manual (D4-USER-M)

Now, you have the material necessary to quickly understand the DL405 Handheld Programmer. So, let's get started!

### Technical Assistance

After completely reading this manual, if you are not successful with implementing the OP-1500 or OP-1510, you may call **PLCDirect** at (800) 633-0405, Monday through Friday from 9:00 A.M. to 6:00 P.M. Eastern Standard Time. Our technical support group will work with you in answering your application questions. If you have a comment or question about our products, services, or manuals which we provide, please fill out and return the suggestions card included with this manual.

**Chapters**

The main contents of this manual are organized into the following six chapters.

**1****Getting Started**

provides an overview of the various uses for the Handheld Programmer and provides general specifications.

**2****System Setup**

shows you how to use the basic features of the Handheld Programmer. Also provides an overview of the various AUX functions and how they are used to setup the PLC system prior to entering programs.

**3****Entering Programs**

discusses all the operations used to enter a program.

**4****Changing Programs**

shows you how to quickly edit an existing program.

**5****Naming and Storing Programs**

shows you how to use program names and password protection. This chapter also shows you how to store programs on memory cartridges and cassette tapes.

**6****System Monitoring and Troubleshooting**

provides an overview of the various features used to monitor and troubleshoot the system.

**Appendices**

Additional examples and reference information are in the following appendix:

**A****DL405 Memory Map**

provides a detailed listing of the DL405 memory map for I/O, timers, counters, etc.

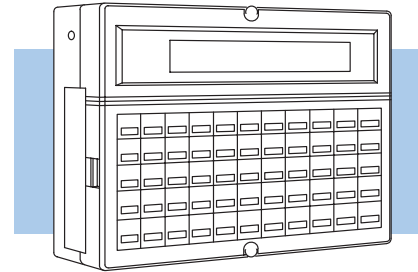
# How can I use the Handheld?

## As a Programming Tool

The DL405 Handheld Programmer is ideally suited for entering or changing small programs with instruction mnemonics. You can enter programs up to the limits of the CPU you are using, but larger programs are much easier to design and enter with **DirectSOFT** Programming Software.

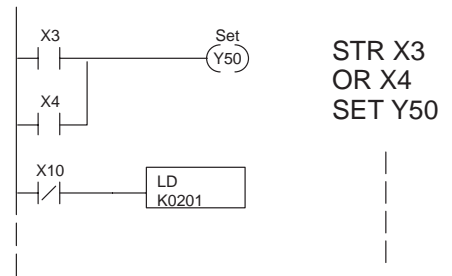
In addition to entering programs, the Handheld is ideal for making on-site program or system changes. You can change almost any system setting, including I/O configuration, retentive memory settings, etc.

Since the Handheld has a built-in memory cartridge port, you can also move programs between memory cartridges and the CPU.



DirectSOFT

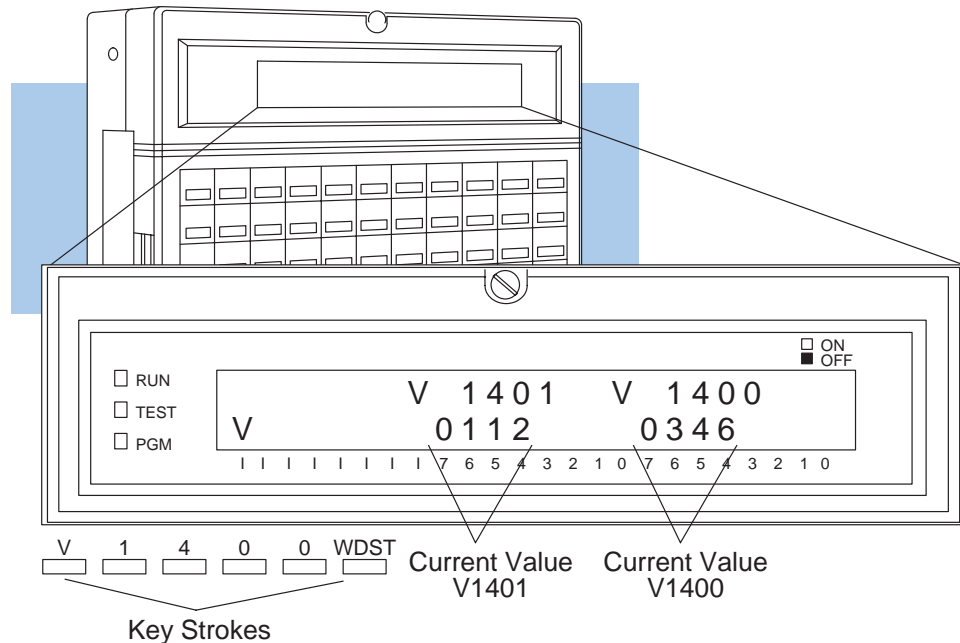
Handheld



## To Monitor Machine Operations

The Handheld is especially useful if you need to quickly look at the status of an I/O point, timer/counter value, or V-memory location.

Since all DL405 data memory is mapped into V-memory, you only have to learn a few simple keystrokes to access virtually any type of system information.

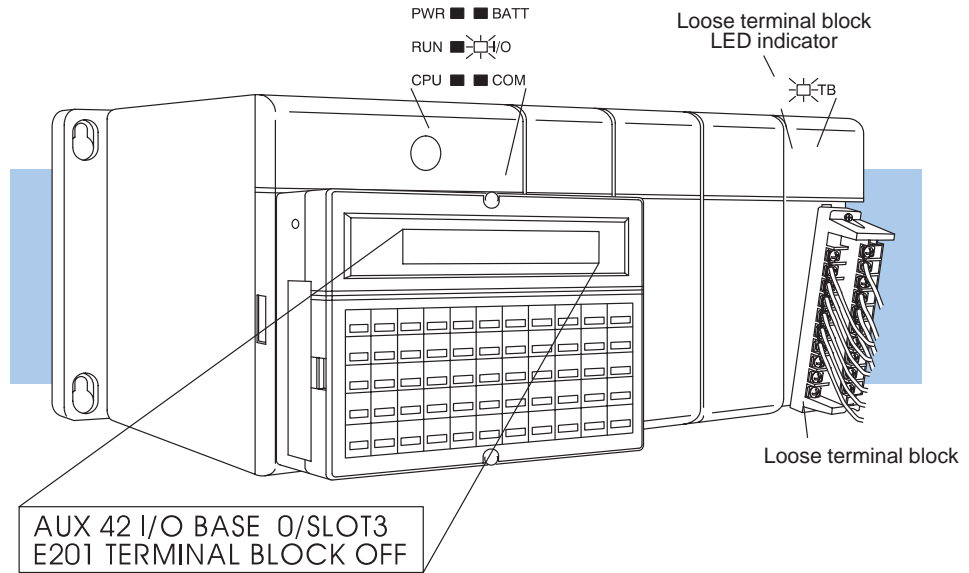


Getting Started

**As a Debugging Tool**

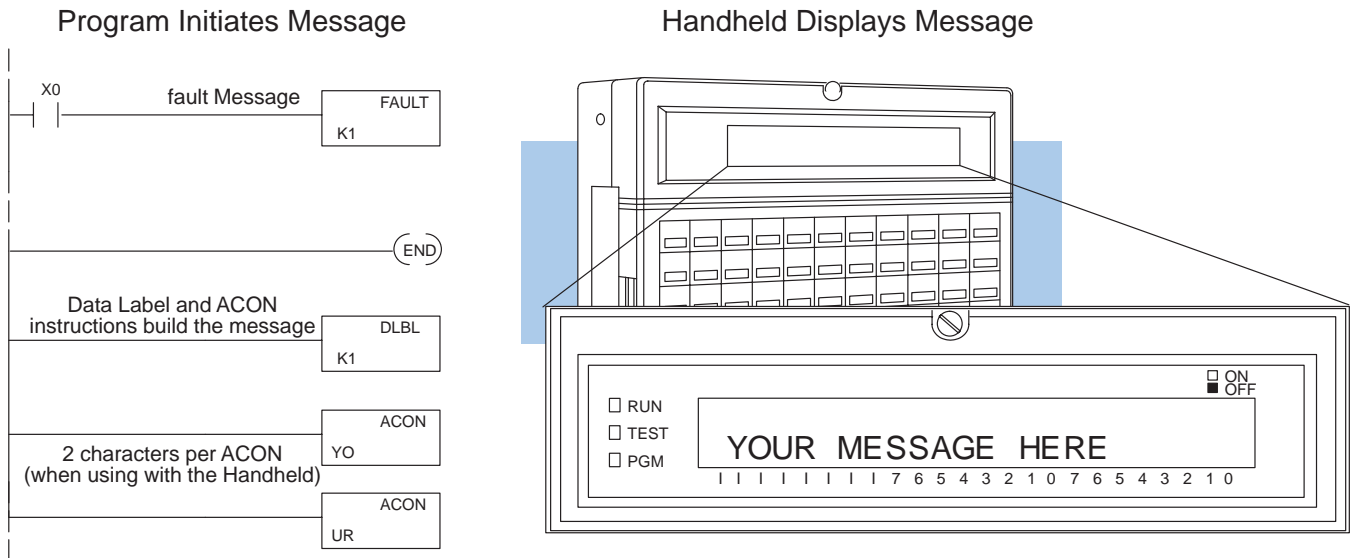
Unfortunately, problems can occur with any automation system. The DL405 Handheld makes it easier to find problems and perform system maintenance operations in several areas. Auxiliary (AUX) Functions make these tasks easier.

- Program — syntax check, duplicate reference check
- I/O — AUX 42 I/O Diagnostics shows the exact base and slot location for the problem. This System Auxiliary Function will also indicate the nature of the problem such as a loose connector, blown fuse, etc.
- Test Modes — you can also use the Handheld in several Test modes. Test Mode allows you to run a fixed number of scans, which can be very helpful in isolating machine problems.



**As a Low-Cost Message Display**

If you're using a DL440 PLC, there are instructions that allow you to embed messages in the RLL program. These messages can easily be displayed on the Handheld and can be used to provide operator instructions, error messages, and even corrective actions.



## Physical Characteristics and Specifications

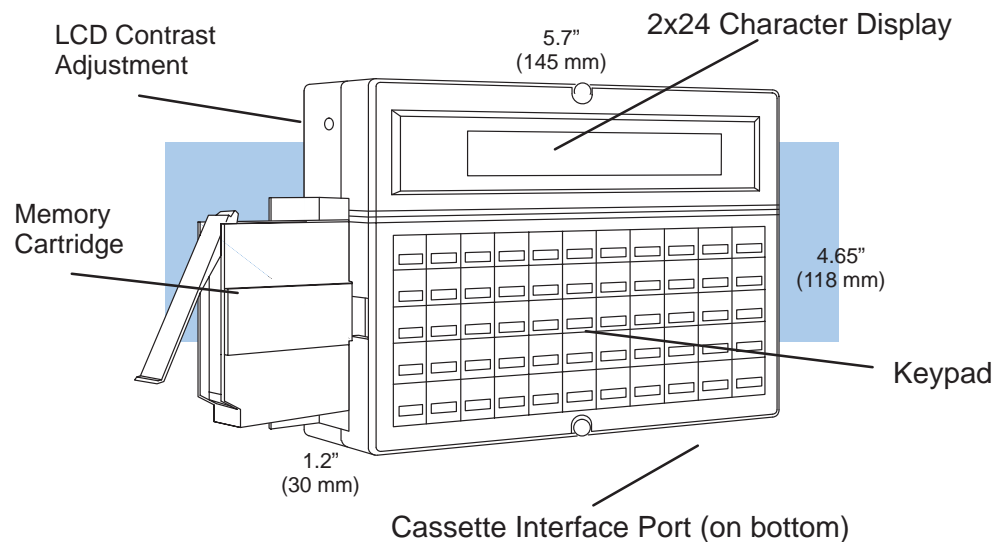
### Handheld Layout

The Handheld was designed to be much more than a simple program entry tool and provides features not found on many handheld programmers. The 2x24 character backlit LCD display provides clear, easy-to-read characters and can be adjusted for brightness. (You can also turn off the backlighting.)

A memory cartridge slot is located on the side of the unit. You can use any of the DL405 memory cartridges to:

- copy CPU memory to a CMOS RAM, UV PROM, or EEPROM cartridge.
- compare the contents of CPU memory to data contained on a memory cartridge.
- copy data from the memory cartridge to the CPU.

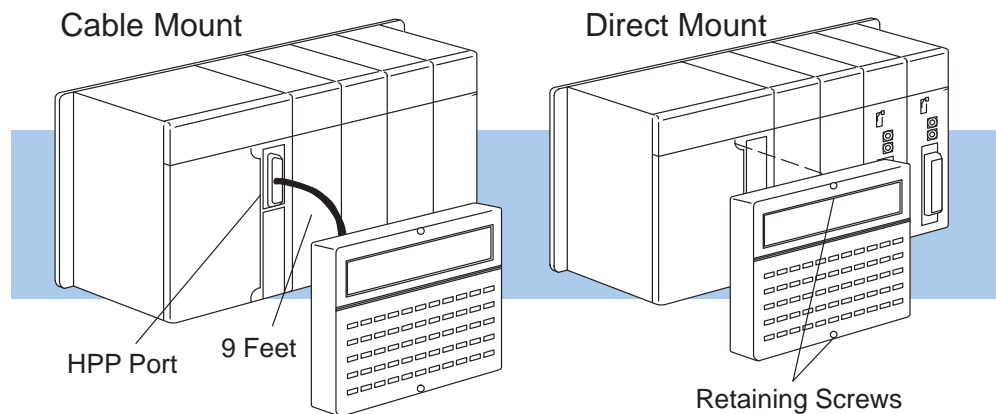
If you prefer, you can use common cassette tapes for program storage. (There's a cassette interface port located on the bottom of the unit.)



### Connection Options

You can mount the Handheld directly to the CPU, or you can use a cable. The cable, part number D4-HPCBL-1, is approximately 9 feet (3m) in length and provides much more flexibility.

A cassette interface cable, part number D4-CASCBL, is required to connect a cassette recorder.



**Specifications**

The following table provides specifications for the DL405 Handheld Programmer.

<p><b>Environmental</b></p> <p>Operating Temperature ..... 32 to 140 F° (0 to 60 C°)</p> <p>Storage Temperature ..... 14 to 149 F° (-10 to 65 C°)</p> <p>Humidity ..... 20 to 90% (non-condensing)</p> <p>Environmental Air ..... No corrosive gases</p> <p>Vibration ..... MIL STD 810C 514.2</p> <p>Shock Resistance ..... MIL STD 810C 516.2</p> <p>Noise Immunity ..... NEMA ICS3-304</p> <p>Power ..... obtained through PLC port, 200 mA without backlight LCD 320 mA with backlight LCD</p> <p>Dimensions ..... 5.7" L x 4.6" H x 1.2" D 145mm W x 118mm H x 30mm D</p> <p>Weight ..... 13.4 oz. (380 g.)</p>	
<p><b>CPUs Supported</b></p> <p>DL430, DL440</p> <p>Simatic® TI425™, TI435™</p> <p>Texas Instruments® TI425™, TI435™</p>	<p><b>Programming Operations</b></p> <p>Read, Write, or erase programs</p> <p>Insert or delete an instruction</p> <p>Search and replace instructions</p> <p>Locate a specific address</p> <p>Read, write, or clear Memory Cartridges</p> <p>Read or write to cassette tapes</p>
<p><b>Cables</b></p> <p>D4-CASCBL, Cassette Interface</p> <p>D4-HPCBL-1, 1.5m Programmer Cable</p> <p>D4-HPCBL-2, 3.0m Programmer Cable</p>	<p><b>Machine Monitoring Operations</b></p> <p>I/O status (up to 16 simultaneously)</p> <p>On / Off status for contacts, coils, control relays, and bit locations</p> <p>Timer and counter contacts, current values, and preset values</p>
	<p><b>Debugging Operations</b></p> <p>Forcing (one scan only)</p> <p>Run, Test, and Program Mode display</p> <p>Program syntax check</p> <p>Duplicate reference check</p> <p>Predefined error codes</p>
	<p><b>Message Display</b></p> <p>Up to 64, 23-character messages (must be in RLL program)</p>

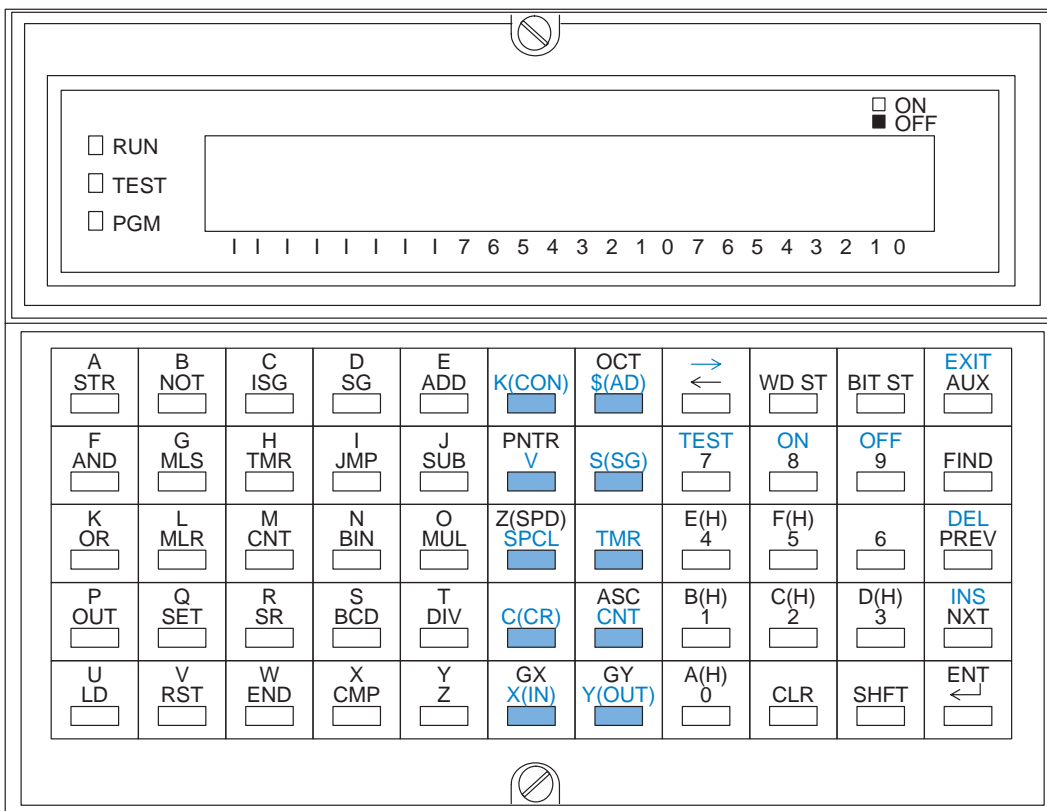
# Keypad Layout

## Four Groups of Keys

When you enter a program, you need to be able to select the instruction, enter any parameters for that instruction, and move to the next task. The Handheld keypad is organized into key groups that make this task easier. The groups are:

- Instruction keys — used to select the instruction
- Instruction identifier keys — used to assign a number to the instruction. For example each timer must have a unique identifier, TMR 0, TMR 1, etc.
- Numeric keys — used to enter values in various formats (BCD, decimal, octal, HEX, etc.)
- Editing / Monitoring keys — used to move through the program (Find, Delete, etc.)

As you examine the keys, you'll notice some of the keys have more than one label. The top label describes the key when the Shift (SHFT) key is pressed. (These keys work just like the number keys on a computer keyboard.)





**Instruction Keys**

The instruction keys are used to select from the various instructions. As you examine the keypad you'll notice only the basic instructions have dedicated keys. The remaining instructions are entered by typing the instruction mnemonic with the alphabet keys.

For example, to enter a OUTF instruction you would press the SHFT key followed by the O, U, T, and F keys.

A STR □	B NOT □	C ISG □	D SG □	E ADD □
F AND □	G MLS □	H TMR □	I JMP □	J SUB □
K OR □	L MLR □	M CNT □	N BIN □	O MUL □
P OUT □	Q SET □	R SR □	S BCD □	T DIV □
U LD □	V RST □	W END □	X CMP □	Y Z □

**Instruction Identifier Keys**

The identifier keys are used to specify the exact instruction reference. For example, if you want to store a contact, you have to specify which contact you want to use.

Some DL405 instructions require you enter some of the instruction parameters in ASCII or octal. You can do this by using the SHFT key. Press SHFT followed by ASC to enter ASCII characters. Press SHFT followed by OCT and you can enter an octal number.

K(CON) □	OCT \$(AD) □
PNTR V □	S(SG) □
Z(SPD) SPCL □	TMR □
C(CR) □	ASC CNT □
GX X(IN) □	GY Y(OUT) □

**Numeric Keys**

These keys are primarily used to enter numbers such as the instruction identifiers or constants. For hexadecimal numbers, you must use the SHFT key to access A – F.

The top three keys also have SHFT functions and are used for:

- TEST — initiates Test functions within Test Mode (more on this later)
- ON — forces an element to on
- OFF — forces an element to off

TEST 7 □	ON 8 □	OFF 9 □
E(H) 4 □	F(H) 5 □	6 □
B(H) 1 □	C(H) 2 □	D(H) 3 □
A(H) 0 □		

**Editing / Monitoring Keys**

These keys are primarily used to help you edit the program, monitor specific locations, or access system AUX functions.

You can use the AUX functions to perform various types of operations. Some of these include I/O Diagnostics, CPU mode control, Memory Cartridge operations, etc.

→ ← □	WD ST □	BIT ST □	EXIT AUX □
			FIND □
			DEL PREV □
			INS NXT □
CLR □	SHFT □		ENT ← □