Errata Sheet

This Errata Sheet contains corrections or changes made after the publication of this manual.

Product Family*:*	DL205	**Date**:	October 2018
Manual Number	D2-HP-M		
Revision and Date	1st Edition, Rev. A; May, 1998		

Changes to Chapter 1. Getting Started

Pages 1-6 and 1-7. Physical Characteristics and Specifications; Connections to the CPU and Specifications

On both of these pages the part number given for the programming cable is incorrect. The correct part number is "DV-1000CBL", not "D2-DSCBL".

Page 1-6. Handheld Programmer Layout

Changes to Chapter 5. Naming and Storing Program; Saving Programs to EEPROM

Page 5-4. Types of EEPROMs (DL205 Only)

Page 5-5. Inserting a EEPROM in the Handheld Programmer

In late 2004, a design change occured that changed how the EEPROM locks into place. The drawings and text on pages 1-6, 5-4 and 5-5 show the old design, whereby the EEPROM was held into place by a small lever. To replace the EEPROM, raise the lever to loosen the EEPROM. Once the replacement EEPROM is inserted in place, press the lever down to secure it.

On re-designed models, the lever arrangement was replaced by a locking screw, as shown in the photo below. Turn the screw clockwise to loosen and counterclockwise to tighten the EEPROM.
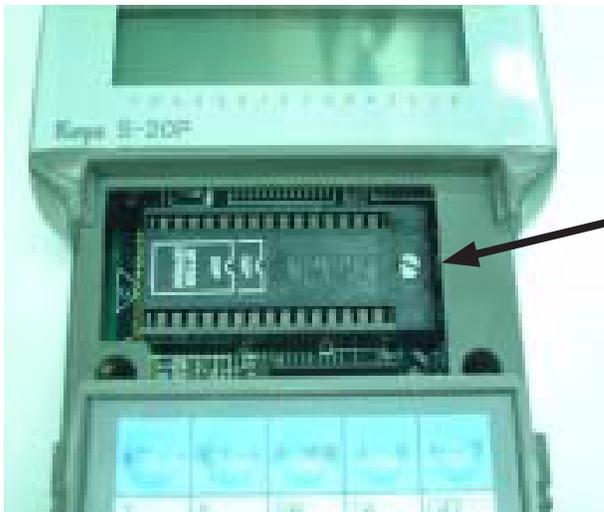
Locking screw secures EEPROM in place. Locking screw replaces lever on models manufactured after October 2004.

Getting Started

1

In This Chapter. . . .

Getting Started

Introduction

D2–HPP Handheld Programmer

The D2–HPP (Handheld Portable Programmer) is a general purpose tool for use with the DL105 or DL205 PLC products. It is well suited for performing basic PLC maintenance and troubleshooting of machine automation equipment. The Handheld programmer is *not* ideal for entering large complex PLC programs. In this case please consider using *Direct*SOFT™, our PC–based programming software.
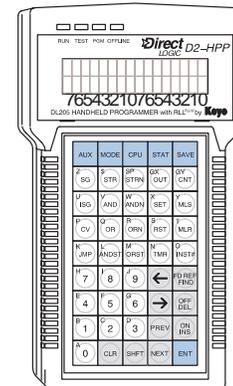
Purpose of this manual

This manual provides information on the D2–HPP capabilities and how to operate the Handheld programmer. Although this manual does *not* cover all instructions possible with the Handheld programmer, it should detail all key features and how they should be used.

Who should read this manual

This manual *is* a reference manual for the D2–HPP Handheld programmer, *not* a tutorial on the DL105/DL205 instruction set or system operations. It is intended for new user to become familiar with using the D2–HPP features and functions.

Supplemental Manuals

The DL105 and DL205 User Manuals may occasionally be referenced by this manual. As you become more efficient with the Handheld Programmer, this manual may not be absolutely necessary, but it may useful as a reference on procedures and related subjects.

Technical Support

We realize that even though we strive to be the best, we may have arranged our information in such a way you cannot find what you are looking for. First, check these resources for help in locating the information:

- **Table of Contents** – chapter and section listing of contents, in the front of this manual
- **Quick Guide to Contents** – chapter summary listing on the following page
- **Appendices** – reference material for key topics
- **Index** – alphabetical listing of key words, at the end of this manual

You can also check our online resources for the latest product support information:

- **Internet** – the address of our Web site is   http://www.plcdirect.com
- **Bulletin Board Service (BBS)** – call (770)–844–4209

If you still need assistance, please call us at 800–633–0405. Our technical support group is glad to work with you in answering your questions. They are available Monday through Friday from 9:00 A.M. to 6:00 P.M. Eastern Standard Time. If you have a comment or question about any of our products, services, or manuals, please fill out and return the 'Suggestions' card that was shipped 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 Handheld Programmer and provides general specifications.
2	**D2–HPP Setup**	provides as overview on general Handheld Programmer features and how to use them.
3	**Entering Programs**	discusses all the operations used to enter a program.
4	**Changing Programs**	shows you how to edit an existing program.
5	**Naming and Storing Programs**	discusses using program names, password protection, and how to store programs on EEPROM memory chips.
6	**System Monitoring and Troubleshooting**	provides an overview of the various features used to monitor and troubleshoot your PLC system.

Appendices Additional reference information is in the following two appendices:

A	**DL105/DL205 Memory Map**	Appendix A provides a detailed listing of the DL105/DL205 memory map for I/O, timers, counters, etc.
B	**Special Relays**	Appendix B lists the special relay contacts which are available to the ladder program to indicate system status, error conditions, instruction execution results, etc.

Getting Started

How can I use the Handheld?

As a Programming Tool

The D2–HPP handheld programming unit is convenient for on-site setup, maintenance and minor PLC program changes. With the Handheld programer, you can change almost any system setting within the PLC. These settings include I/O configuration, retentive memory range selection, clock and calender setup, and many more.

The Handheld programmer may be used to program the complete DL105 and DL205 PLC systems. The unit only allows programming the PLC with instruction mnemonics. Mnemonics are commands and operand data which will be processed by the CPU. Both on-line and off-line features will be described in detail within this manual.

The diagram to the right shows ladder logic which was programmed using the PC based **Direct**SOFT™ programming software, and the equivalent mnemonics program using the Handheld programmer. Both methods of programming have advantages and can easily be used together or independently to support your PLC application. Once again, if you are creating a *large* program, it is recommended that you use **Direct**SOFT™, which is better suited for the development environment.

Handheld Programmer

DirectSOFT RLL

Handheld Mnemonics

```
X3              Set
─┤ ├──────────( Y50 )        STR X3
X4                           OR X4
─┤ ├──                       SET Y50
```

To Monitor Machine Operations

The Handheld programmer may be used to monitor memory status of the PLC system. The memory locations such as; V-memory, I/O information, timer/counter values, and system data may be selectively examined. The monitor status functions are performed in either Test/Run and Run modes. These monitoring modes help confirm all PLC conditions. Details on how to use the Handheld programmer to monitor your PLC system are described in later chapters.
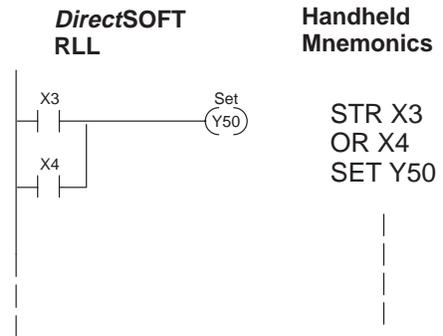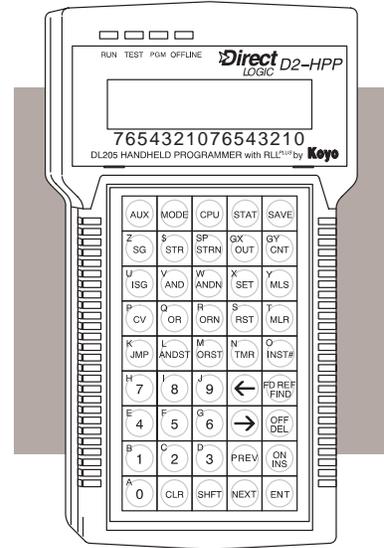
As a Debugging Tool

If your PLC automation system appears to have a problem, you may use the Handheld programmer to quickly debug both hardware and software. Auxiliary functions, when executed, provide information to help diagnose PLC problems. Here are a few examples of commonly used diagnostics available.

- **Program Diagnostics** — help locate instruction syntax errors, and potential duplicate output referencing.

- **I/O Diagnostics** — displays I/O errors and allows examination of special V-memory locations. This information may be viewed to help determine exact base and slot number having a problem.

- **Test Mode** — allows program logic to be verified without output status. While changing between Test-Program and Test-Run modes the digital output conditions are controlled.
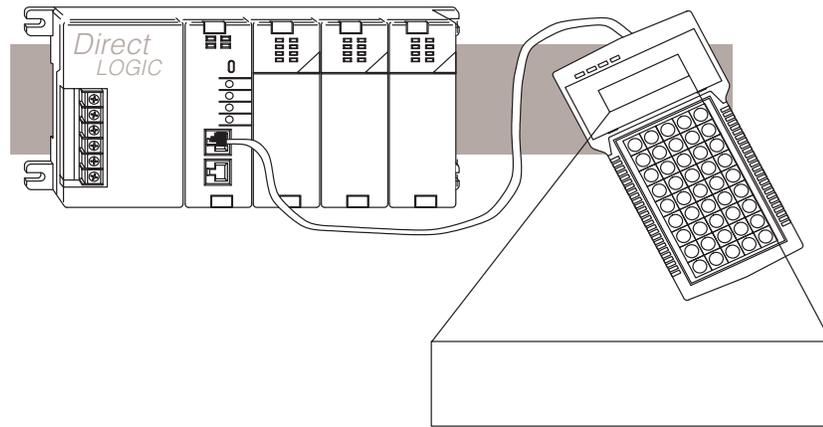
As a Low-Cost Message Log

The DL105 and DL205 CPU's allow embedded message instructions to be programmed in your control program. The Handheld programmer displays the messages saved within the CPU message log. If properly programmed, the fault messages are automatically displayed when the Handheld programmer is connected to the CPU. Please refer to the proper DL105 or DL205 User Manuals for examples on how to program these fault messages in your PLC system.

Program Initiates Message
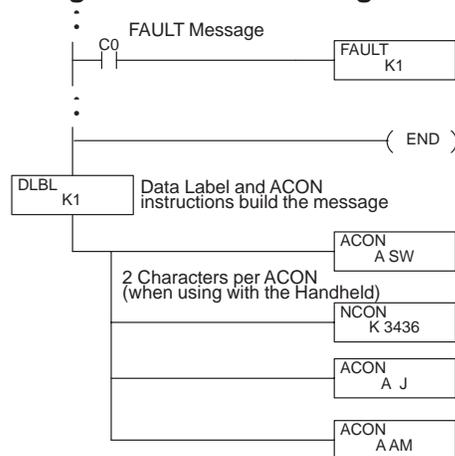
Handheld Displays Message

Getting Started
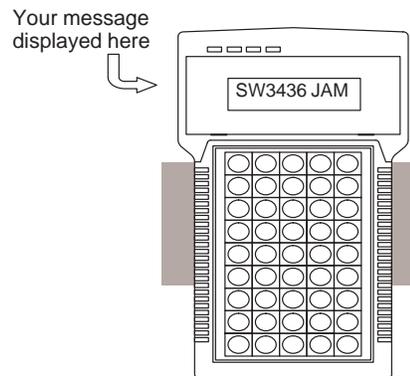
Physical Characteristics and Specifications

Handheld Programmer Layout

The Handheld programmer is designed for versatility. It provides features commonly *not* found on other handheld programmers. The figure below shows the basic physical characteristics of the Handheld programmer.

Phone Jack Style connector (RJ12) located on top of HPP

RUN TEST PGM OFFLINE

PLC Modes

3.54"
90mm

6.57"
167mm

2.99"
76mm

1.06"
27mm

0.98"
25mm

See Errata Sheet at the beginning of this file. In late 2004 the lever that secures the EEPROM was replaced by a securing screw.

RUN TEST PGM OFFLINE **Direct** LOGIC D2–HPP

7 6 5 4 3 2 1 0 7 6 5 4 3 2 1 0

DL205 HANDHELD PROGRAMMER with RLL PLUS by Koyo

2 line x 16 character backlit LCD display
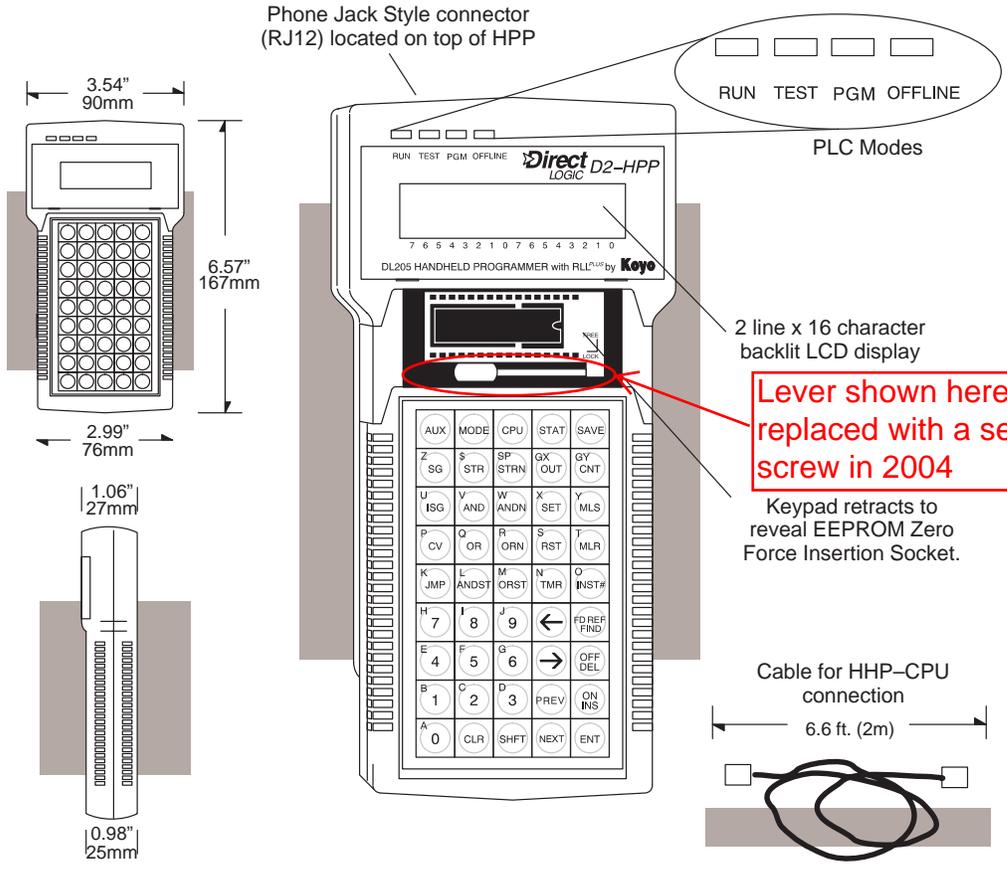
Lever shown here was replaced with a securing screw in 2004

Keypad retracts to reveal EEPROM Zero Force Insertion Socket.

Cable for HHP–CPU connection
6.6 ft. (2m)

The Handheld programmer has a two line, 16 character per line LCD display, which makes it easy to view the program, examine status and accesss other PLC data. The Handheld programmer contains a EEPROM socket which is located underneath the keypad. The EEPROM socket may be accessed by firmly holding the programmer and sliding the front keypad bezel down. The EEPROM programming feature may be used to:

- Store DL105 and DL205 CPU data to EEPROM non–volatile memory
- Compare the contents of a CPU to data stored on EEPROM
- Copy data from EEPROM to a CPU

Correct cable is part number DV-1000CBL

Connection to the CPU

The Handheld programmer is provided with a 6.6ft. (2m) programming cable (part number ~~D2–DSCBL~~). The cable is manufactured with RJ12 connectors at both ends. Connect the cable between the Handheld programmer and CPU programming port. When power is applied to the CPU, the Handheld programmer LED indicator(s) and LCD display should become active.

Specifications

The D2–HPP Handheld Programmer Specifications.

CPUs Supported	Programming Operations
DL130, DL230, DL240	Read, write, or erase programs
	Insert or delete an instruction
	Search and replace instructions
	Locate a specific address
	Read, write, or clear EEPROM
	Run time edit
	Password protection

Cables	Machine Monitoring Operations
~~D2–DSCBL~~ 6.6ft. (2m) Programmer Cable	I/O status (up to 16 simultaneously)
	On / Off status for contacts, coils, control relays, and bit locations
	Timer and counter contacts, current values, and preset values
	Displays values in either HEX, BCD, Octal or ASCII

Correct cable is part number DV-1000CBL →

Message Display	Debugging Operations
Up to 64, 23-character messages may be programmed (must be in RLL program). Maximum of 16 messages stored in each log (history and fault).	Forcing (one scan only)
	Override forcing (multiple scans)
	Run, Program Mode, and Test Mode (DL240 only)
	Program syntax check
	Duplicate reference check
	Predefined error codes

Environmental

Operating Temperature	32 to 122 F° (0 to 50 C°)
Storage Temperature	–4 to 158 F° (–20 to 70 C°)
Humidity	30 to 95% (non-condensing)
Environmental Air	No corrosive gases
Vibration	MIL STD 810C 514.2
Shock Resistance	MIL STD 810C 516.2
Noise Immunity	NEMA ICS3–304
Power	200 mA obtained through PLC port,
Dimensions	5.7" L x 4.6" H x 1.2" D 145mm W x 118mm H x 30mm D
Weight	1.7 oz. (48.2 g.)

Getting Started

Keypad Layout

Four Groups of Keys

The Handheld programmer keypad is organized into four key groups as defined below.

- **Operation keys** — used to call AUX functions, change programmer/CPU modes, monitor status and save program changes.
- **Instruction/Data type keys** — used to select the instruction and data type.
- **Numeric keys** — used to enter values in various formats (BCD, decimal, octal, HEX)
- **Editing/Monitoring keys** — used to move through the program (search, delete, etc.)
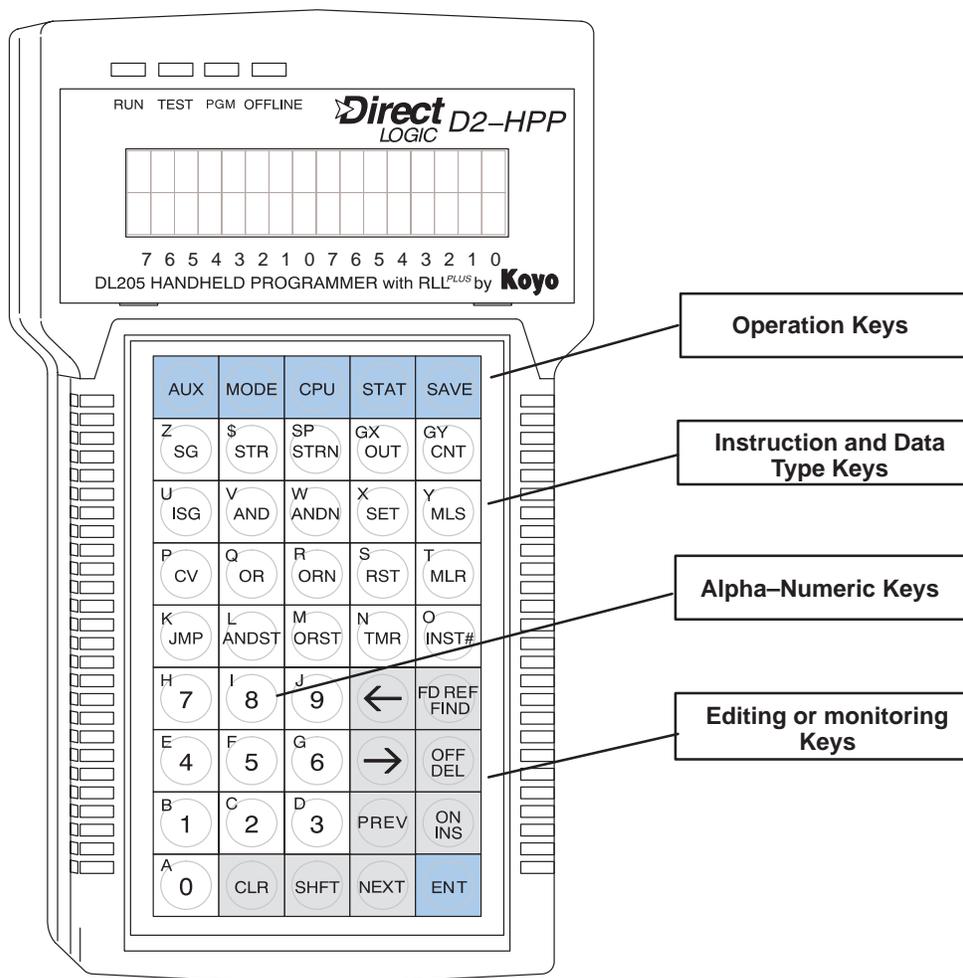
As you examine the keys, you'll notice some of the keys have more than one label. The top label describes the key when the **SHFT** (Shift) key is pressed. (These keys work just like the number keys on a computer keyboard.)

Operation Keys

These keys are used to select the following operations and perform various tasks with the Handheld programmer.

AUX	MODE	CPU	STAT	SAVE

AUX key — is used to perform various types of operations. Some of these include program management, I/O Configuration/Diagnostics, CPU configuration, EEPROM operations, and password protection.

MODE key — is used to select the different modes available with your PLC (RUN, TEST, PGM and RUNTIME EDITS).

CPU key — is used to select the Handheld programmer programming mode. You may choose on-line or off-line communications to the PLC.

STAT key — is used to select status monitoring operations.

SAVE key — is used to store offline generated programs to the Handheld programmer's EEPROM.

Instruction/Data Type Keys

These instruction keys allow you to select corresponding instructions when pressed. When closely examining the keypad, notice only some instructions have dedicated keys. All other instructions are entered by typing the instruction characters (mnemonics) using the secondary alphabet keys. The **INST#** key will allow for instruction numbers to be entered if selected.

Z SG	$ STR	SP STRN	GX OUT	GY CNT
U ISG	V AND	W ANDN	X SET	Y MLS
P CV	Q OR	R ORN	S RST	T MLR
K JMP	L ANDST	M ORST	N TMR	O INST#

Numeric Keys

The numeric keys can be used to enter instruction identifiers and numbers for or constants. Some instructions require Hexadecimal numbers by pressing the **SHFT** key to access the alphabetic characters A — F.

H 7	I 8	J 9
E 4	F 5	G 6
B 1	C 2	D 3
A 0		

Editing / Monitoring Keys

These keys are used to navigate, edit, create, and search through the PLC program and data.

The **PREV** and **NEXT** keys not only allow you to scroll through your program, they also provide scrolling list of valid mnemonics/data types while the cursor is positioned in the appropriate field location.

←	FD REF FIND
→	OFF DEL
PREV	ON INS
CLR	SHFT	NEXT	ENT

with the **INST#** key. While in status displays, **PREV** and **NEXT** can be used to show the status of adjacent memory locations.

The **CLR** key can be used to exit entry operations and clear the display. It may be necessary to press this key multiple times to clear the entire display.

The **SHFT** key will allow use of the secondary property located in the top left corner of the keys. When the shift key is activated, the ^ character is displayed in the top right corner of the display screen.

Mode Indicators

The Mode LED's are located near the top of the Handheld programmer and indicate the CPU mode. The figure below shows all possible LED status, depending on the PLC mode selected. For additional information see the section titled " Changing the CPU mode" located in Chapter 2.

❑ = ON

Mode	RUN LED	TEST LED	PGM LED	OFFLINE LED
Run	❑			
Program			❑	
Test-Run (DL240 Only)	❑	❑		
Test-Pgm (DL240 Only)		❑	❑	
Handheld in Offline				❑
Runtime Edit	Flashing ❑			
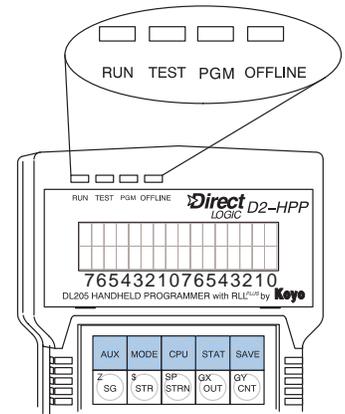
Display Panel

As mentioned, the Handheld programmer contains a two line, 16 character per line, LCD display screen. The user information and display format will change depending on the mode selected and the function being performed. The different mode display formats are discussed in later sections of this manual.

Viewing a Program
While in Run mode the Handheld programmer will display instruction and bit status. The example display on the right shows a Run Mode screen.

During the Program mode, the display screen allows viewing two instructions in your program as shown in the second example.

Some instruction, as with the Accumulative Timer (TMRA) will allow up to eight digits for a reference number. To view instructions or messages greater than 16 characters in length, press the right arrow key (→) to move viewing display. You may use the left arrow key (←) to move the display to include viewing the instruction address.

Status Displays

If the Handheld programmer is placed in Run or Test–Run modes, different memory status options are available. The Status displays will indicate if instruction or bit status is ON or OFF. The display will contain the ■ symbol which indicates ON and the S character to indicate status is OFF. The first example demonstrates Bit status of input contact (X1) which is ON.

The **STAT** key will allow viewing status of a 16 bit range. The display for a range of bits are shown to the right. Note the underscore at the C2 position, which indicates the current cursor position. The cursor may be moved left and right, by pressing the corresponding arrow keys (← ✕→). In this mode ■ indicates ON and □ indicates OFF.

The remaining example displays are Word Status for register addresses V2011 and V2010. The examples are showing the same registers in four different data formats.
The keystrokes used to switch between display formats are:

SHFT	K JMP	ENT	To select HEX
SHFT	O INST#	ENT	To select Octal
SHFT	A 0	ENT	To select ASCII
SHFT	D 3	ENT	To select Decimal

The last example display demonstrates status of Timers T20 and T17. The Timer and Counter status displays both maintain typical formats. Timer/Counter status bits are indicated with the box symbols. If the box shows solid (■), this indicates the timer/counter has attained the preset value.

Bit Status

S T R   X 1   ■

Bit Status for a Range of bits

C   1 0   C _   0

Word Status – HEX

V 2 0 1 1   V 2 0 1 0
0 0 4 1   0 0 4 2

Word Status – Octal

V 2 0 1 1   V 2 0 1 0
0 0 0 1 0 1 0   0 0 0 1 0 2 0

Word Status – ASCII

V 2 0 1 1   V 2 0 1 0
A A   B A

Word Status – Decimal

V 2 0 1 1   V 2 0 1 0
0 0 0 6 5 D   0 0 0 6 6 D

Timer/Counter Status

■ T 2 0   □ T 1 7
0 1 2 0   0 0 0 0

Getting Started

AUX Displays

The Handheld programmer allows access to various Auxiliary functions by pressing the **AUX** key. All Auxiliary function have a unique display format. The example display shown to the right is the AUX 65 Diagnostic display.

Example Auxiliary Display

A	U	X		6	*		C	F	G		H	P	P		
A	U	X		6	5		R	U	N		D	I	A	G	

TEST-RUN Display (DL205 Only)

Some CPU's, such as, the DL240 support the Test–Run mode. With the Test–Run mode various groups of information are available. The different groups of information are labeled and described below. More details concerning Test-Run mode are provided in Chapter 6.
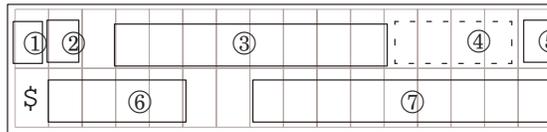
① Displays the power flow through the instruction just after the instruction is executed.
   ■ indicates power flow and **Y** indicates no power flow.

② Displays the power flow of the power rail.
   ■ indicates power flow and **M** indicates no power flow.

③ Displays the contents of the following (where applicable to the instruction):
   – the accumulator
   – the timer current value
   – the counter current value

④ If the operand is a data register, this field displays the contents of the data register.

⑤ If the operand is a bit, this field displays the bit status.
   ■ indicates ON and **S** indicates OFF

⑥ Displays the instruction address.

⑦ Displays the mnemonic instruction and reference number