SECTION 7
INTRODUCTION TO PROGRAMMING

This section provides the information necessary to create, read, delete, insert and edit networks using the Ladder Logic discussed in Section 6. It also describes how to use the reference screens and the search function.

The P190/M84 PC has two modes of editing: Element Editor and Network Editor. In Element Editor all changes are communicated to the Micro 84 as soon as they are entered into the P190 Programmer. The Network Editor is a pseudo-off-line editing mode. In Network Editor, networks displayed on the CRT screen can be created or modified but are not communicated to the Micro 84 until commanded to do so. The P190 Programmer's Memory Protect switch must be turned to the Unlock , or PROGRAM mode to EDIT or CREATE programs.

7.1. ELEMENT EDITOR

The Element Editor is the on-line editing mode. In this mode, all user-requested changes are sent directly to the Micro 84 PC, as they are entered into the P190 Programmer. The Micro 84 PC processes this change, and solves any modified logic on the next controller scan. The Element Editor screen is displayed when the PROGRAM software label key is pressed.

Press the PROGRAM software label key (on the PC Operation Menu) and then press the PROCEED software label key. A message is displayed:

PLEASE WAIT — LOADING PROGRAMMER

After the Programmer software has been read from the tape into the P190, the message "PROCESSING PC DATA" will flash for several seconds. When the "AR:" appears in the lower right of the screen, the P190 is ready to accept your inputs.

When the loading is complete the Element Editor screen, containing the following software label keys, is displayed on the CRT.

Figure 7-1 shows all the programming and editing software keys within the Element Editor. This flow chart is actually a map, illustrating the flow from one group of software labels to another.

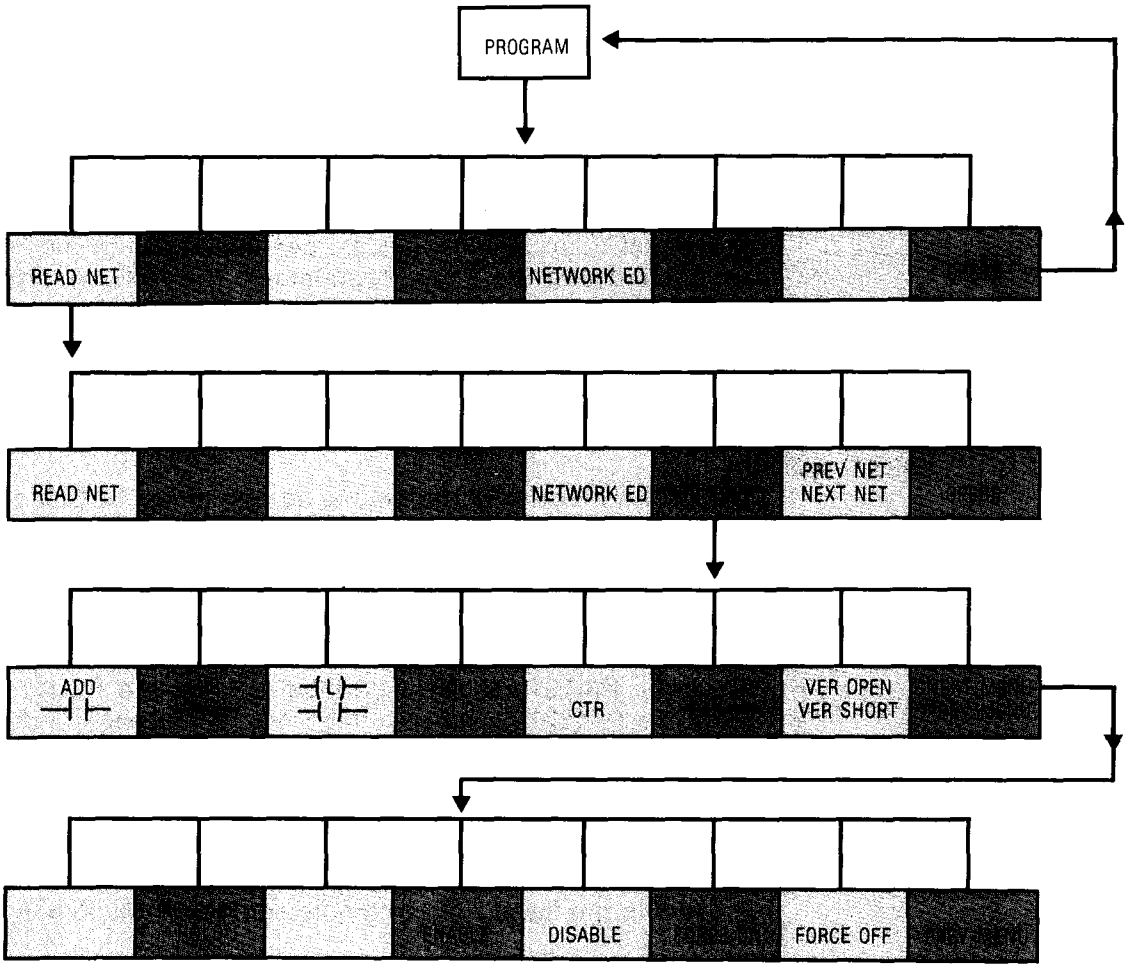


Figure 7-1. Element Editor Software Label Flow Chart

NOTE

WHEN USING J375 Revision A (PROM set 1000), the Micro 84 must be stopped to use the Element Editor.

If the Micro 84 PC is running, you can enter one element at a time and see the power flow change instantly. If the Micro 84 PC is stopped, you can enter an entire network or group of networks. As soon as the Micro 84 PC is started, the new network, or group of networks, will run at once. If the Micro 84 PC is running, the power rail is highlighted; if the Micro 84 PC is stopped, the power rail is dim.

The Element Editor uses the P190's CRT in the Logic Screen format (see Figure 7-2). In addition to the software labels and the Error/Prompt lines, the Logic Screen displays ladder logic networks in the main work area.

The left side of the main work area has a four-row power rail and a vertical label, "ELEMENT" or "NETWORK". This label identifies the editor currently in use. The seven ladder logic columns are numbered 1 to 7.

The right side of the Logic screen contains the cursor status area. This reverse video (black on white) area is labeled "cursor", and lists the row and column coordinates of the cursor. Discretes and /or register references under the ladder logic cursor are listed by reference number and their current state or contents.

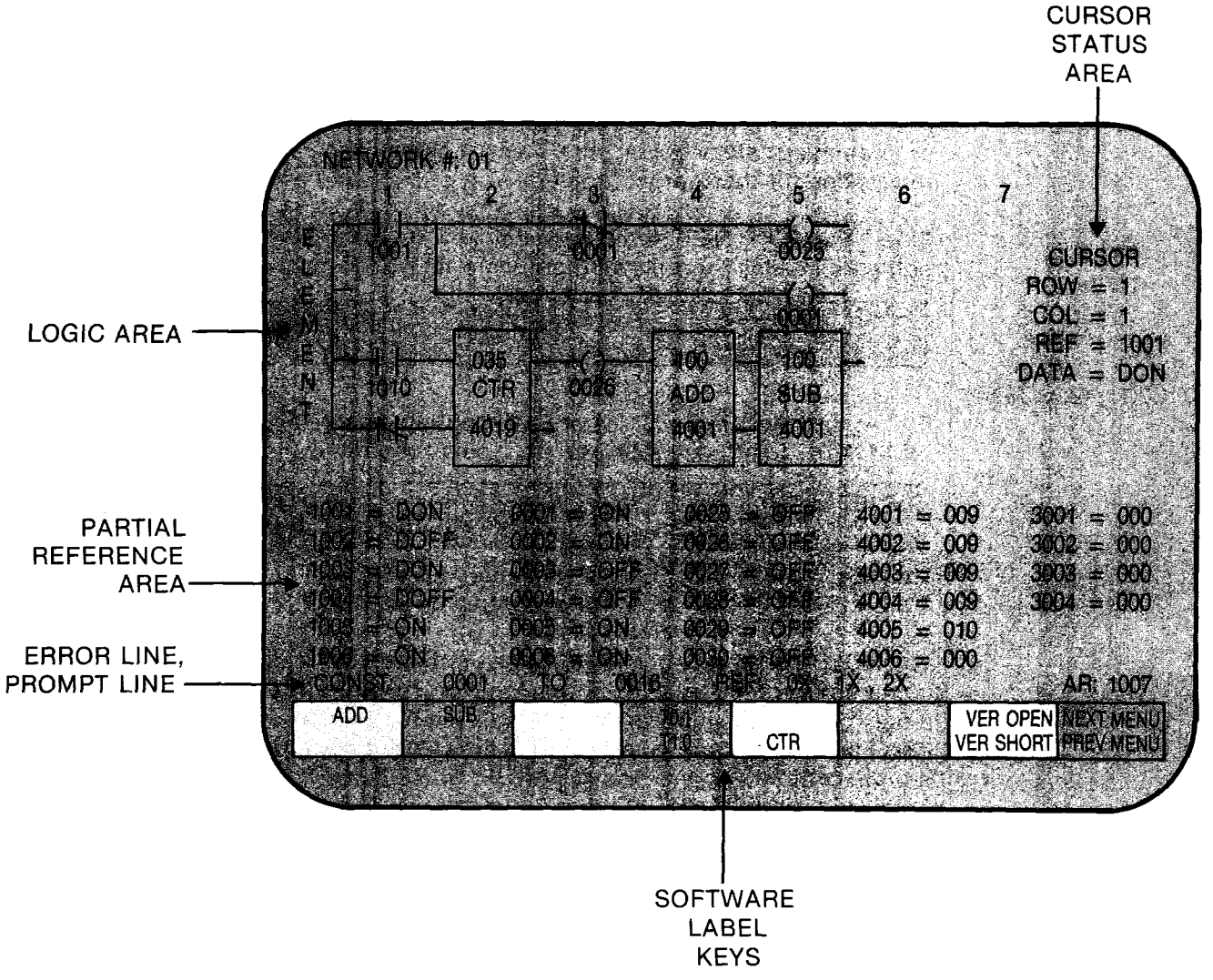


Figure 7-2. Logic Screen Format

7.1.1 Read Network (READ NET)

Press the READ NET software label key to display a designated network on the PI90's screen.

Enter the number of the network to be displayed in the AR. Press the READ NET software label key to read and display the network from the controller. The number of the network appears in the upper left-hand corner of the screen. The network power flow is displayed if the Micro 84 PC is running. Three additional software labels appear: EDIT NET, NEXT NET and PREV NET. To edit the displayed network, press the EDIT NET software label key.

Press the EDIT NET software label key to get the software label keys needed to create a network.

As the network is entered onto the P190 screen it is entered into the Micro 84 PC.

7.1.2 Edit Network (EDIT NET)

The EDIT NET software label key provides the ability to edit networks. After pressing this software label, the cursor appears on the logic screen and the Relays, Timers, and Counters screen is displayed. When the cursor is over a programming element on the logic screen, the acceptable constants and references for that particular element are displayed on the prompt line.

Press the EDIT NET software label key to reach the programming elements software labels. The following software labels are displayed:

7.1.2.1 Next Menu

The Arithmetic functions, Timers and Counter are explained in Section 6. Press the NEXT MENU software label key to display the following software labels:

The HOLD and RELEASE keys are explained here. The ENABLE, DISABLE, FORCE ON and FORCE OFF keys are described in Section 7.3.4.4 and 7.3.4.5.

The HOLD software label key allows you to stop or freeze the P190 display of the contents of a register. (The actual logic solve is not affected.) To do this, display a network and position the cursor over the register you want to check. Press the NEXT MENU software label key, then the HOLD software label key. In order to look at the contents, press the CHANGE SCREEN key on the P190 Programmer, followed by the PART REF software label key. Now key the register number into the AR and press SHIFT and GET COL. The register number(s) will be displayed without any contents. Press SHIFT and RELEASE software label key to display the register contents. Now press HOLD and the contents will NOT change. The HOLD affects only the screen display, the Micro 84's program is still running normally. When you have finished checking the register contents you can return to the LOGIC screen and RELEASE the HOLD function.

7.1.3 Previous Network/Next Network (PREV NET/NEXT NET)

This software label key allows you to move from one network in order to read an adjacent network.

Press the SHIFT key and the PREV NET software label key to display the network before the one currently displayed. For example, if network 3 is displayed and SHIFT key and the PREV NET software label key are pressed, network 2 takes the place of network 3 on the screen.

Press the NEXT NET software label key (without the SHIFT key) to move to the network after the one currently displayed.

For example, if network 5 is displayed and the NEXT NET software label key is pressed, network 6 replaces network 5 on the screen.

7.2 NETWORK EDITOR (NETWK ED)

The Network Editor allows you to make changes to the Micro 84 PC's program without immediately affecting the Micro 84 PC. Changes are sent to the Micro 84 PC in whole networks. See Figure 7-3 for the software label flow chart.

This means that you can build an entire network in the NETWORK EDITOR, and INSERT it anywhere in your existing program. You can also build a new network in the NETWORK EDITOR and REPLACE a network currently in your existing program. Troubleshooting is easier because you can make changes to an existing network, use the EXCHANGE NET function to test them, and if the changes do not work, use a FLIP NET and another EXCHANGE NET to get back the original network. These functions are explained later in this section.

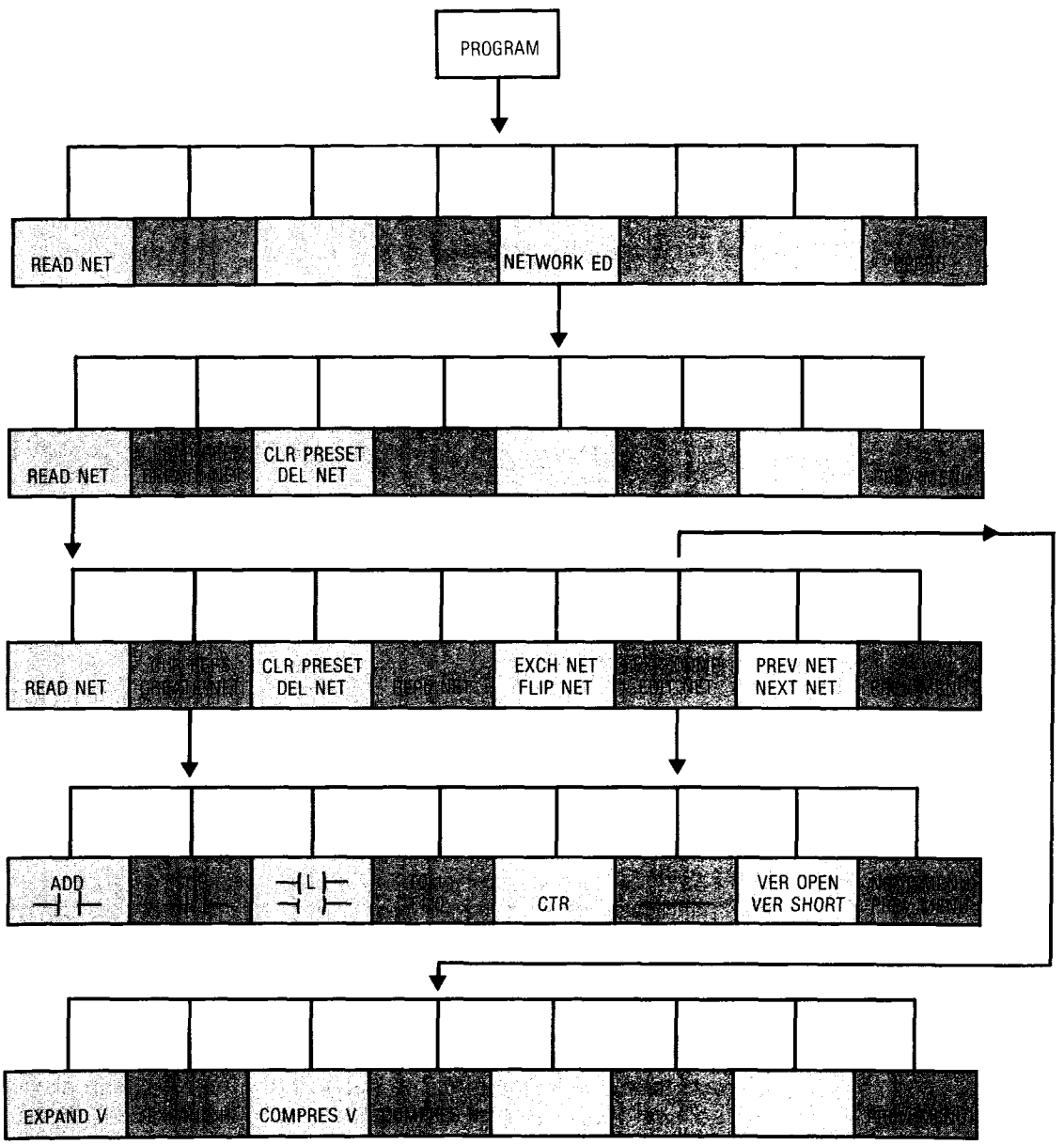
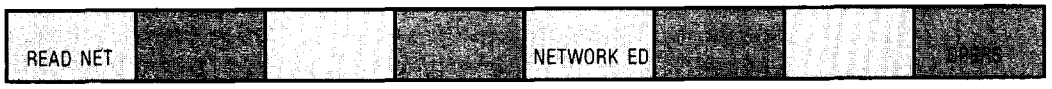


Figure 7-3. Network Editor Software Label Flow Chart

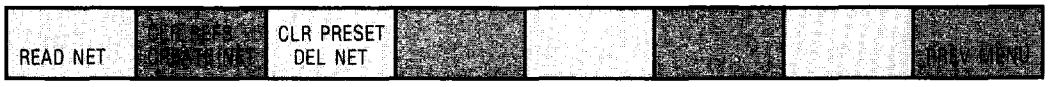
NOTE

If the PC is RUNNING, it will stop automatically while the network is being sent. It starts again as soon as the network has been sent. A STOPPED PC remains stopped during and after a network is sent.

To get to the Network Editor mode, press the PROGRAM software label key on the PC Operations Menu. The following software label keys appear:



Press the NETWORK ED software label key. Notice the change in the software label keys:



7.2.1 Read Network (READ NET)

The READ NET software label key allows you to display and read a designated network on the PI90's screen.

Enter the number of the network to be read in the AR. Press the READ NET software label key to read the network from the controller and display it on the P190 screen. The number of the network appears in the upper left-hand corner of the screen. Press the EDIT NET software label key to add to or change the network.

NOTE

The power flow within the network is highlighted until the first change is made in the network.

7.2.2 Create Network (CREATE NET)

Press the CREATE NET software label key to create a network on the PI90 screen. The network area is blank except for a power rail on the left. When you have finished creating a network, press PREV MENU and key the new network number into the AR. Then press REPL NET to send the new network to the PC.

When this software label key is pressed, the following software labels are displayed:

7.2.3 Delete Network (DEL NET)

Enter the number of the network to be deleted in the AR. Press the READ NET software label key to display the network on the P190 screen. Now press the DEL NET software label key to delete the displayed network. The DEL NET software label key allows you to delete a network from the Micro 84 PC. The deleted network is filled with horizontal opens. No renumbering of networks occurs.

NOTE

A network must be displayed before it can be deleted.

7.2.4 Replace Network (REPL NET)

The Replace Network allows you to replace (or change) elements within an existing network or to build an entirely new network. Then, by pressing the REPLACE software label key, cause that change to occur in the Micro 84 PC's memory. For example, to replace with in Network 1 you must type 1 in the AR and press READ NET. When Network 1 appears on the screen, press EDIT NET. Put the cursor over the element and make the change, (press) then press the PREV MENU software label key. Type a 1, for Network 1, in the AR and press the SHIFT key and the REPL NET software label key. The message, CHANGED PC NETWORK: 01 appears, confirming that the change has been made.

7.2.5 Exchange Network/Flip Stack (EXCH NET/FLIP STACK)

The Exchange Network function allows you to exchange the network on the screen for a network in the Micro 84 controller. With a network on the screen, enter the number of the network (in the controller) to be exchanged in the AR. Press the EXCH NET software label key and the Shift key together.

This function allows you to create a network on the screen and then EXCHANGE it for an existing network in the Micro 84 PC's memory. For example, if you have a program with ten networks in the Micro 84 PC, and have a "bug" in network 5, you can READ network 5 into the memory of the PI90. Network 5 can now be edited "off line", without disturbing the original network that is still in the Micro 84 PC's memory. Press the EXCH NET software label key to exchange the edited 5 network with the original 5 network while continuing to display the edited network. A message appears on the screen, CHANGED PC NETWORK: 05.

If you find that the new 5 network does not work, and you want the original network 5 back, press the FLIP NET software label key, then the EXCH NET software label key and the original network 5 reappears. When you press FLIP NET, "NETWORK#:05" displayed in the upper righthand corner changes to: FLIP NET#:05. This lets you know which of the two networks is on display.

The FLIP NET function can only be used in conjunction with the EXCH NET function. The P190 has two memory areas. The contents of one memory area is visible on the screen. The other memory area is used only for storage of one network, and its contents are not visible. This part is called the STACK.

The FLIP NET command moves a network shown on the screen into the memory stack and moves the stored network onto the screen. Figure 7-4 describes the five commands used in the EXCH NET/FLIP NET functions.

NOTE

If you press the EXCH NET software label key TWICE in a row without pressing FLIP NET software label key between, your original network will be lost.

1. With network A in the Micro 84 PC, press READ NET to read it into the P190.

2. Press EDIT NET and change the network to A¹. You now have A in the Micro 84 PC and A¹ on the P190 screen.

3. Press EXCH NET. The original network A is moved into the P190 STACK. The edited A¹ is now on the P190 screen and in the Micro 84 PC.

4. Press FLIP NET to get the original network A onto the P190 screen. The edited network A¹ is now in the P190 STACK and in the Micro 84 PC.

5. Press EXCH NET again and you will be back where you started. The original network A is back in the Micro 84 PC and network A¹ is saved in the stack.

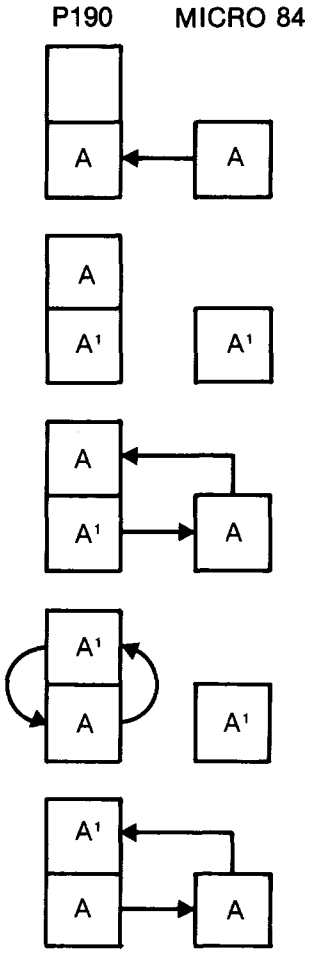


Figure 7-4. EXCH NET/FLIP NET Commands

NOTES

The Flip Net function can only be used after an Exchange Network function. Flip Net can be used again and again, (a toggle for example). The upper righthand corner of the CRT screen displays FLIP NET#: XX when the P190's stack storage network is displayed. It displays NETWORK#: XX when the PC's network is displayed.

If another function (Read Network for example) is selected after Exchange Network, the buffer is cleared and Flip Net is not allowed (STACK EMPTY error message will be displayed.)

CAUTION

If EXCH NET is pressed twice in succession, the network originally in the Micro 84 PC will be discarded.