Megawin

8051 ISP-ICP Programmer

User Manual

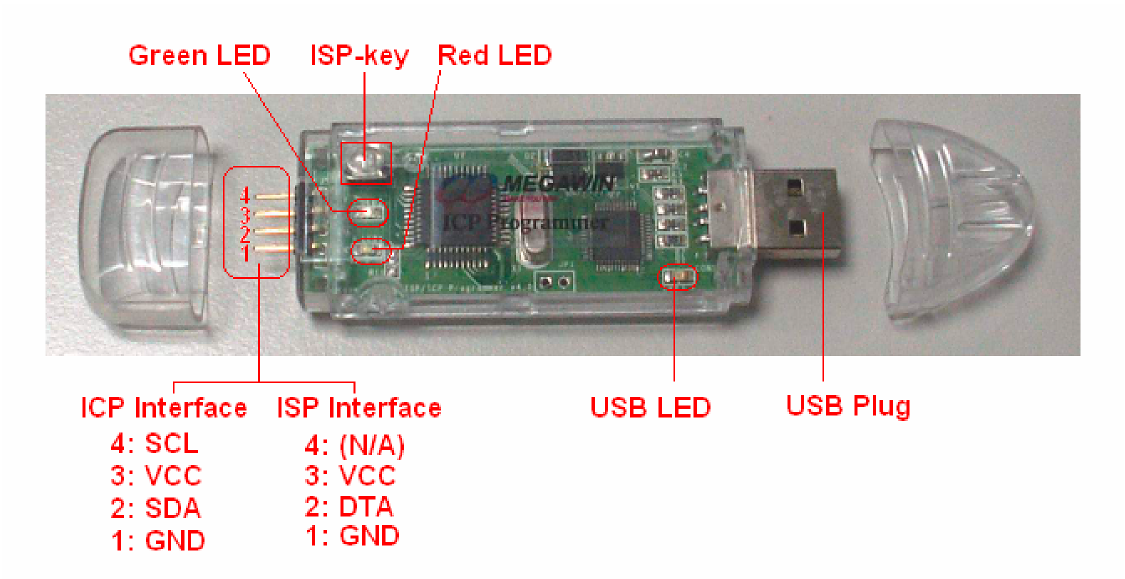
By Vincent Y. C. Yu

Contents

1 Introduction

ISP is the acronym of **I**n-**S**ystem **P**rogramming, and **ICP** is the acronym of **I**n-**C**ircuit **P**rogramming. Both these two programming methods make it possible that the user can update the application code under the software control without removing the mounted MCU chip from the actual end product. The tool "Megawin 8051 ISP-ICP Programmer", see the following picture, integrates these two functions into a USB stick. That is it can function as an ISP Programmer and an ICP Programmer. In addition, because the programming data to be programmed to the target can be saved in the programmer's non-volatile storage, this programmer is able to work stand-alone without host (PC) intervention. This feature is especially useful in the field without a PC.

Picture of the ISP-ICP Programmer



1.1 Two-in-One Functions

ISP Programmer

When acting as an ISP Programmer**,** it functions like a bridge between the host, which provides the new programming data, and the target MCU, which has the loader program running inside. The loader program is the so-called "ISP-code" and should be pre-programmed in the ISP-memory of the target. When powered on, the target boots from the ISP-memory and executes the ISP-code to check if the ISP operation is requested. If the ISP is requested, the target receives the programming data from the Programmer and programs into the AP-memory by in-system programming method. After ISP processing is completed, the target will re-boot from the AP-memory to run the new application code when the Programmer is plugged out of the target; If the ISP is not requested, the target will directly re-boot from the AP-memory for normal running of the application code.

ICP Programmer

When acting as an ICP Programmer, it actually functions fully like a universal programmer except it adopts a serial interface with only four pins used for programming. So, there is no need to have a loader program embedded inside. It provides all the programming functions which a universal programmer can support, such as:

(1) erase the device,

(2) program the device,

(3) verify the device, and

(4) program all the device H/W options, including the security bits.

1.2 Comparison between ISP and ICP

The following table shows the comparison between ISP and ICP and the parts that support them.

Compared Items	**ISP**	**ICP**
Parts that support ISP or ICP	MPC89L(E)51/52/53 MPC89L(E)54/58/515 MPC82L(E)52 MPC82L(E)54 MPC82G516 *Note1* MG84FL54 MG84FL516 *Note1*	MPC82G516 *Note1* MG84FL516 *Note1*
Erase, Program and Verify	Yes	Yes
Update target's H/W option	Partial or None	Yes
Interface	GND/DTA/VCC *Note2*	GND/SDA/VCC/SCL *Note2*
Chip configuration before using ISP or ICP	ISP-code pre-programmed & HWBS enabled	Not Need

Note:

1. *So far, only the MPC82G516 and MG84FL516 support both ISP and ICP.*
2. *ISP interface always uses P3.1 as DTA pin while ICP interface uses dedicated SDA and SCL pins.*

2 Chip Configuration for ISP

To use the ISP function, the user should configure the target MCU by the following two steps:

Step1:

Use a universal programmer or "Megawin 8051 Writer" to configure ***ISP-memory*** with 1K bytes (or 1.5K bytes for MPC82L(E)54) and make ***HWBS*** (or ***HWBS2***) option enabled.

Step2:

Program the Megawin-provided standard ISP code in the **[(3) Target ISP-code]** folder into the ISP-memory. Note "***ISP_Code_v5.00.bin***" is for MPC89/82-series MCU, and "***ISP_Code_v5.00_MG84.bin***" is for MG84-series MCU.

Note:

To let users easily use the ISP function, the Megawin 8051 products will have the following factory setting:

(1) ISP-memory is configured with 1K (or 1.5K) bytes and "HWBS" option is enabled.

(2) The Megawin-provided standard ISP-code is pre-programmed.

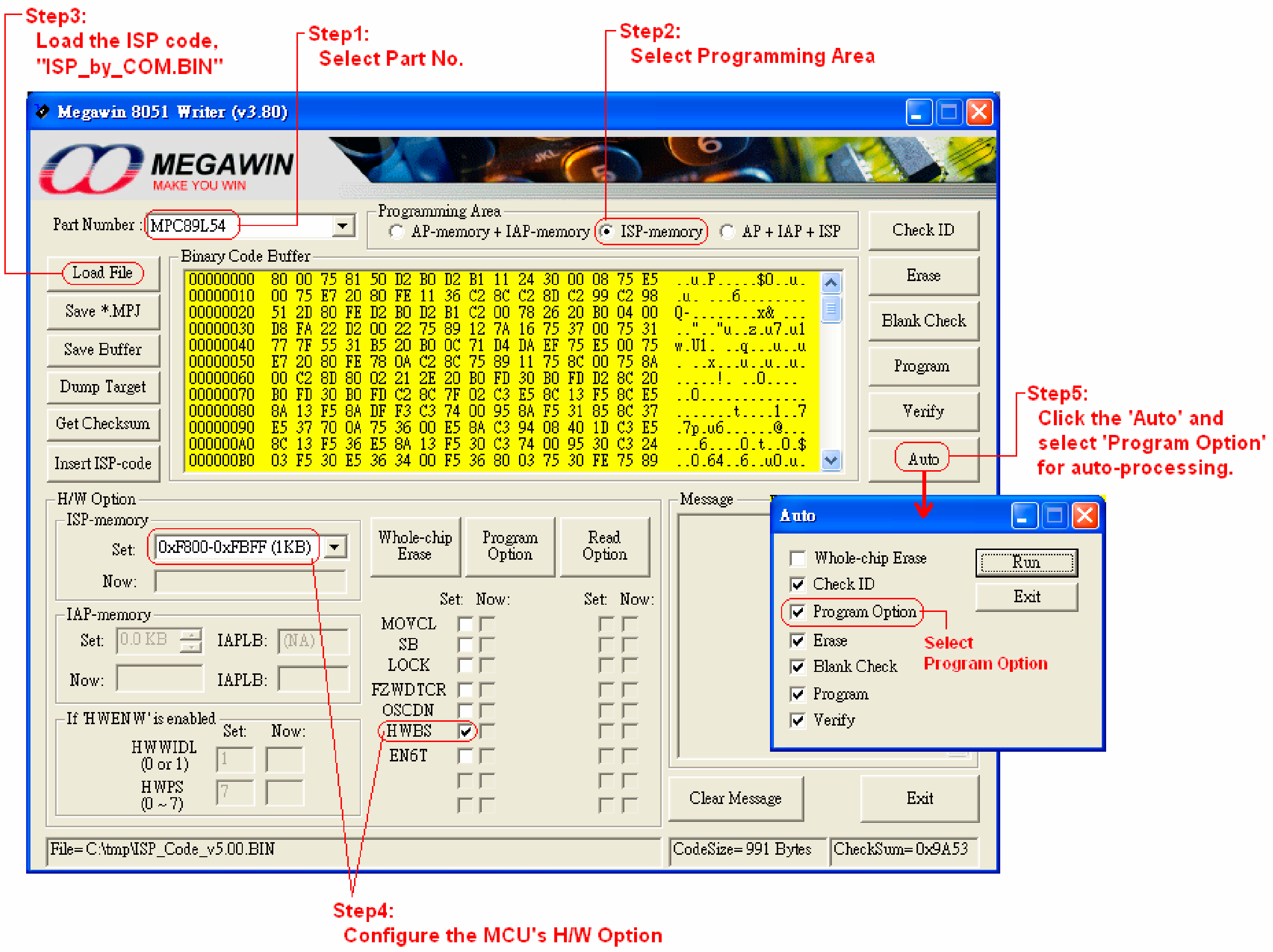
So, the user has no need to do the chip configuration before using the ISP function.

**** Contact Megawin for detailed product information.*

2.1 Using the “Megawin 8051 Writer” for Chip Configuration

Please follow the steps (also shown in the following picture):

Step1: Select the Part No.
Step2: Select the Programming Area: *ISP-memory*.
Step3: Load the ISP code to the Writer’s buffer.
Step4: Configure the MCU’s H/W Option: select 1KB (or 1.5KB for MPC82L(E)54) for ISP-memory and enable HWBS or HWBS2.
Step5: Click “Auto” and select “Program Option”, then click “Run” for auto programming.



Step3:
Load the ISP code,
"ISP_by_COM.BIN"

Step1:
Select Part No.

Step2:
Select Programming Area

Part Number : MPC89L54

Programming Area: ○ AP-memory + IAP-memory ● ISP-memory ○ AP + IAP + ISP

```
00000000  80 00 75 81 50 D2 B0 D2 B1 11 24 30 00 08 75 E5   ..u.P.....$0..u.
00000010  00 75 E7 20 80 FE 11 36 C2 8C C2 8D C2 99 C2 98   .u. ...6........
00000020  51 2D 80 FE D2 B0 D2 B1 C2 00 78 26 20 B0 04 00   Q-........x& ...
00000030  D8 FA 22 D2 00 22 75 89 12 7A 16 75 37 00 75 31   .."..."u..z.u7.u1
00000040  77 7F 55 31 B5 20 B0 0C 71 D4 DA EF 75 E5 00 75   w.U1. ..q...u..u
00000050  E7 20 80 FE 78 0A C2 8C 75 89 11 75 8C 00 75 8A   . ..x...u..u...u.
00000060  00 C2 8D 80 02 21 2E 20 B0 FD 30 B0 FD D2 8C 20   .....!. ..0....
00000070  B0 FD 30 B0 FD C2 8C 7F 02 C3 E5 8C 13 F5 8C E5   ..0.............
00000080  8A 13 F5 8A DF F3 C3 74 00 95 8A F5 31 85 8C 37   .......t....1..7
00000090  E5 37 70 0A 75 36 00 E5 8A C3 94 08 40 1D C3 E5   .7p.u6......@...
000000A0  8C 13 F5 36 E5 8A 13 F5 30 C3 74 00 95 30 C3 24   ...6....0.t..0.$
000000B0  03 F5 30 E5 36 34 00 F5 36 80 03 75 30 FE 75 89   ..0.64..6..u0.u.
```

Step5:
Click the 'Auto' and
select 'Program Option'
for auto-processing.

H/W Option

ISP-memory
Set: 0xF800-0xFBFF (1KB)
Now:

IAP-memory
Set: 0.0 KB IAPLB: (NA)
Now: IAPLB:

If 'HWENW' is enabled Set: Now:
HWWIDL (0 or 1) 1
HWPS (0 ~ 7) 7

	Set:	Now:	Set:	Now:
MOVCL	□	□	□	□
SB	□	□	□	□
LOCK	□	□	□	□
FZWDTCR	□	□	□	□
OSCDN	□	□	□	□
HWBS	☑	□	□	□
EN6T	□	□	□	□
	□	□	□	□
	□	□	□	□

Auto
□ Whole-chip Erase
☑ Check ID
☑ Program Option
☑ Erase
☑ Blank Check
☑ Program
☑ Verify

Select
Program Option

File=C:\tmp\ISP_Code_v5.00.BIN | CodeSize=991 Bytes | CheckSum=0x9A53

Step4:
Configure the MCU's H/W Option

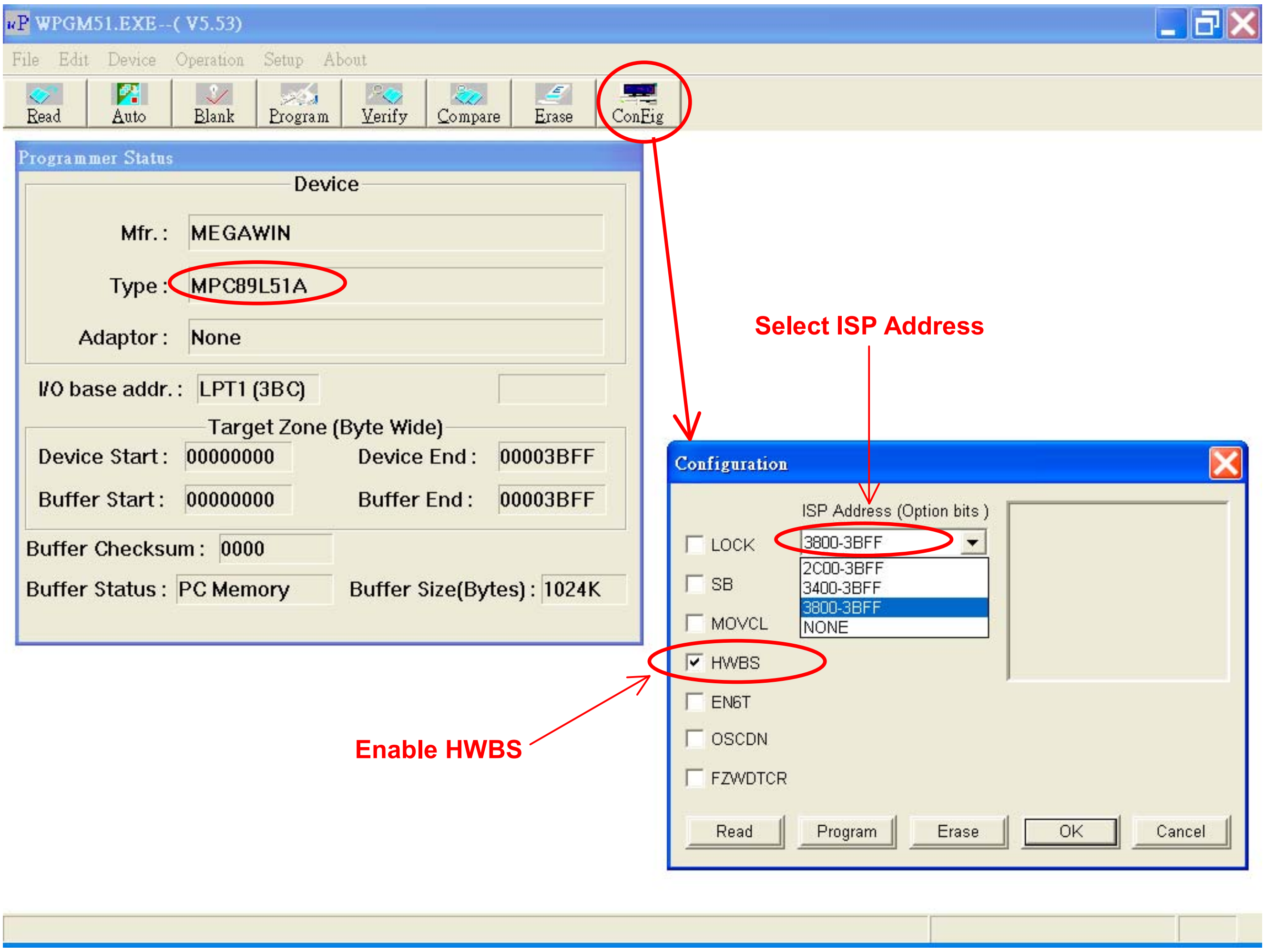
2.2 Using the "Hi-Lo ALL-11 Programmer" for Chip Configuration

Step 1. Configure the H/W option: Enable HWBS and select ISP Address

(1) For MPC89L(E)51/52/53: select **0x3800-0x3BFF** (1K bytes for Megawin-provided ISP code)
(2) For MPC89L(E)54/58/515: select **0xF800-0xFBFF** (1K bytes for Megawin-provided ISP code)
(3) For MPC82L(E)52: select **0x1C00-0x1FFF** (1K bytes for Megawin-provided ISP code)
(4) For MPC82L(E)54: select **0x3800-0x3DFF** (1.5K bytes for Megawin-provided ISP code)
(5) For MPC82G516: select **0xFC00-0xFFFF** (1K bytes for Megawin-provided ISP code)
(6) For MG84FL54: select **0x3C00-0x3FFF** (1K bytes for Megawin-provided ISP code)
(7) For MG84FL516: select **0xFC00-0xFFFF** (1K bytes for Megawin-provided ISP code)

See the following example:

For MPC89L(E)51/52/53:


WPGM51.EXE--(V5.53)
File Edit Device Operation Setup About
Read Auto Blank Program Verify Compare Erase ConFig
Programmer Status
Configuration
Read Program Erase OK Cancel

Device
Mfr. : MEGAWIN
Type : MPC89L51A
Adaptor : None
I/O base addr. : LPT1 (3BC)

Target Zone (Byte Wide)
Device Start : 00000000 Device End : 00003BFF
Buffer Start : 00000000 Buffer End : 00003BFF
Buffer Checksum : 0000
Buffer Status : PC Memory Buffer Size(Bytes) : 1024K

Select ISP Address

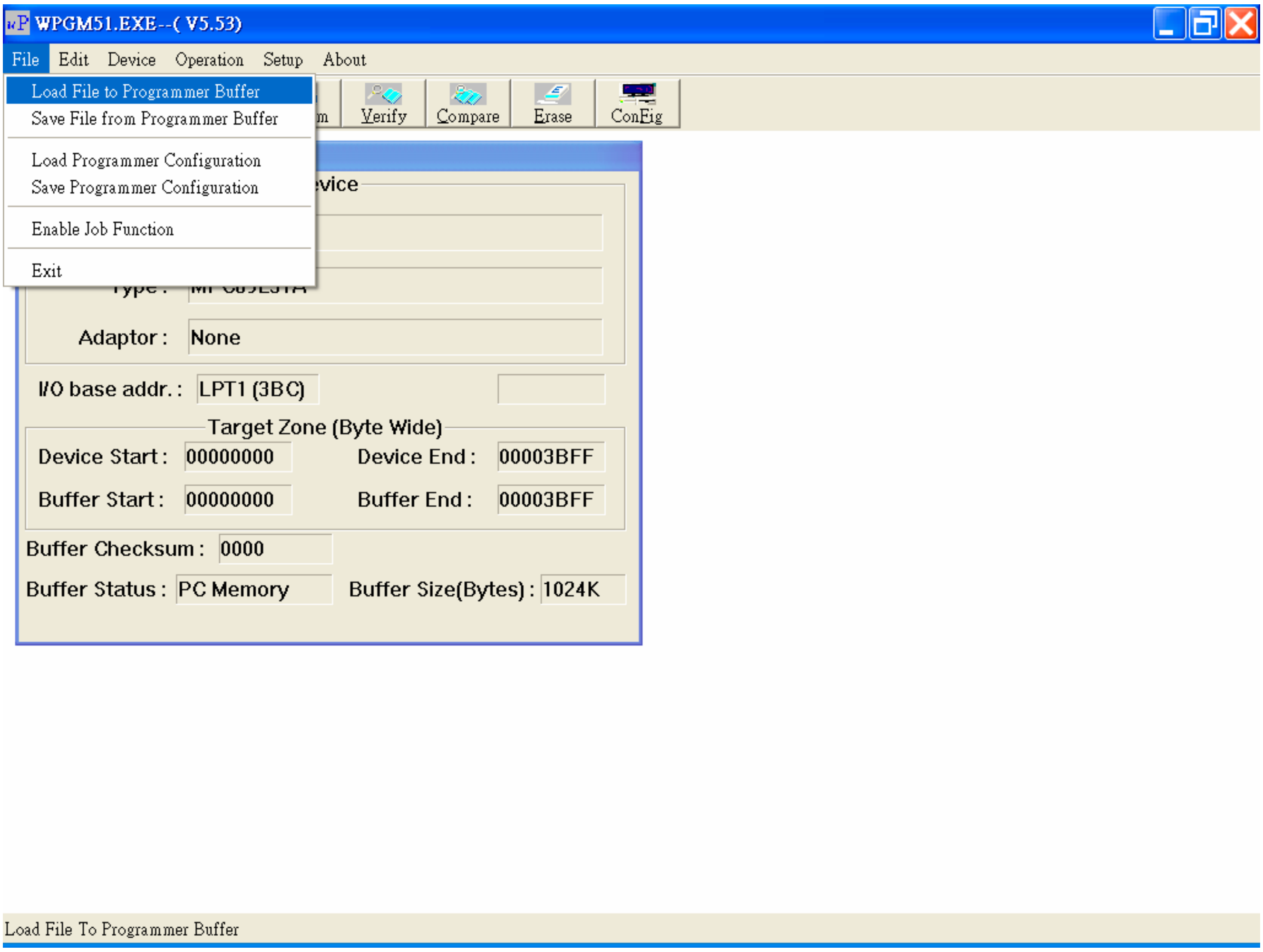
ISP Address (Option bits): 3800-3BFF
2C00-3BFF
3400-3BFF
3800-3BFF
NONE

□ LOCK
□ SB
□ MOVCL
☑ HWBS
□ EN6T
□ OSCDN
□ FZWDTCR

Enable HWBS

Step 2. Load the "ISP code" to the Programmer's buffer

As the following figure, select "Load File to Programmer Buffer" to load the ISP code into the Programmer's buffer.


WPGM51.EXE--(V5.53)
File
Edit
Device
Operation
Setup
About
Load File to Programmer Buffer
Save File from Programmer Buffer
Load Programmer Configuration
Save Programmer Configuration
Enable Job Function
Exit
Verify
Compare
Erase
ConFig
Load File To Programmer Buffer

Adaptor : None

I/O base addr. : LPT1 (3BC)

Target Zone (Byte Wide)

Device Start : 00000000 Device End : 00003BFF

Buffer Start : 00000000 Buffer End : 00003BFF

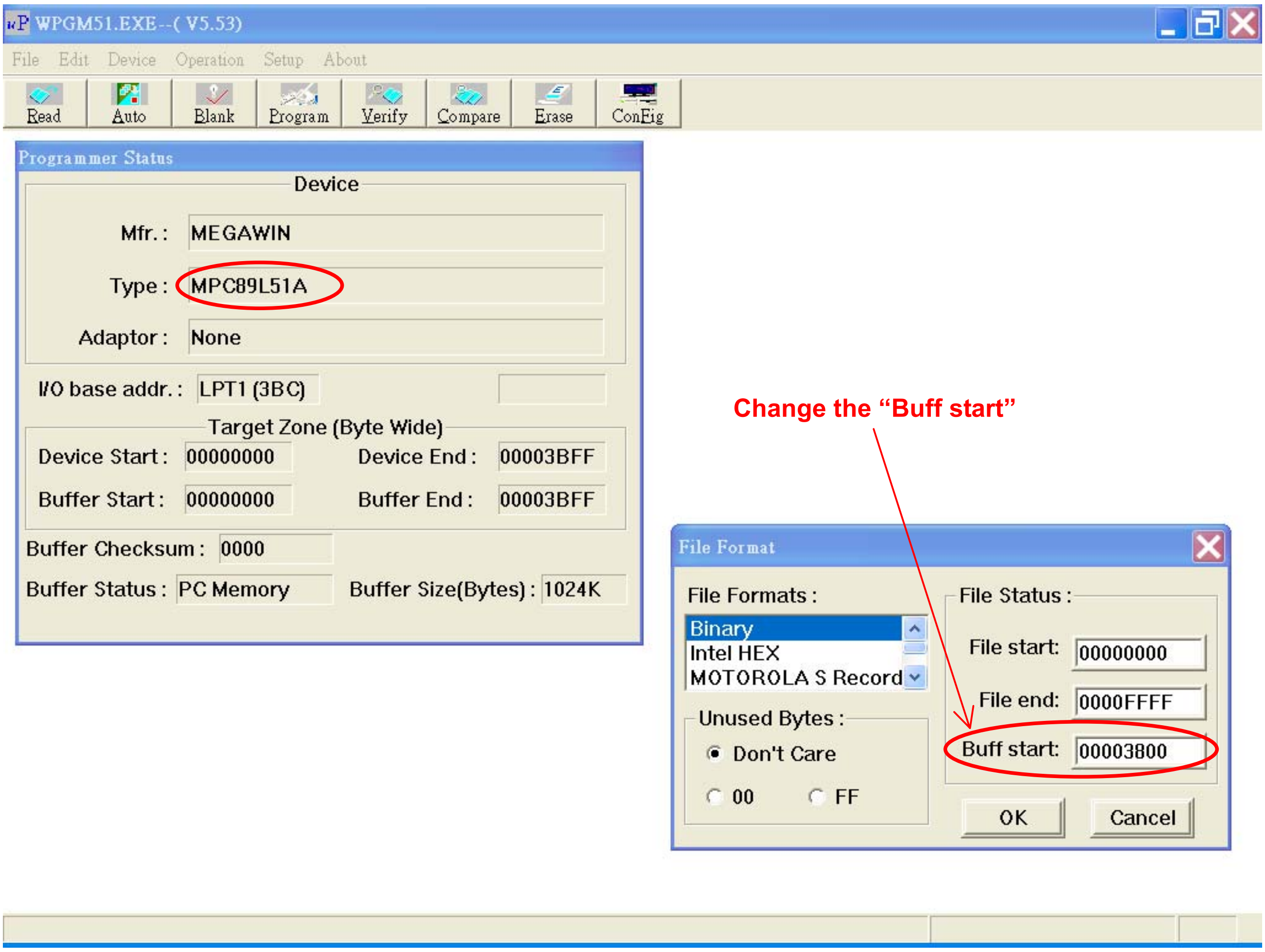
Buffer Checksum : 0000

Buffer Status : PC Memory Buffer Size(Bytes) : 1024K

Step 3. Change the "Buff start" to the ISP start address

(1) For MPC89L(E)51/52/53: change to **0x3800**
(2) For MPC89L(E)54/58/515: change to **0xF800**
(3) For MPC82L(E)52: change to **0x1C00**
(4) For MPC82L(E)54: change to **0x3800**
(5) For MPC82G516: change to **0xFC00**
(6) For MG84FL54: change to **0x3C00**
(7) For MG84FL516: change to **0xFC00**

Note: Hi-Lo will support MPC82G516, MG84FL54 and MG84FL516 in the future.

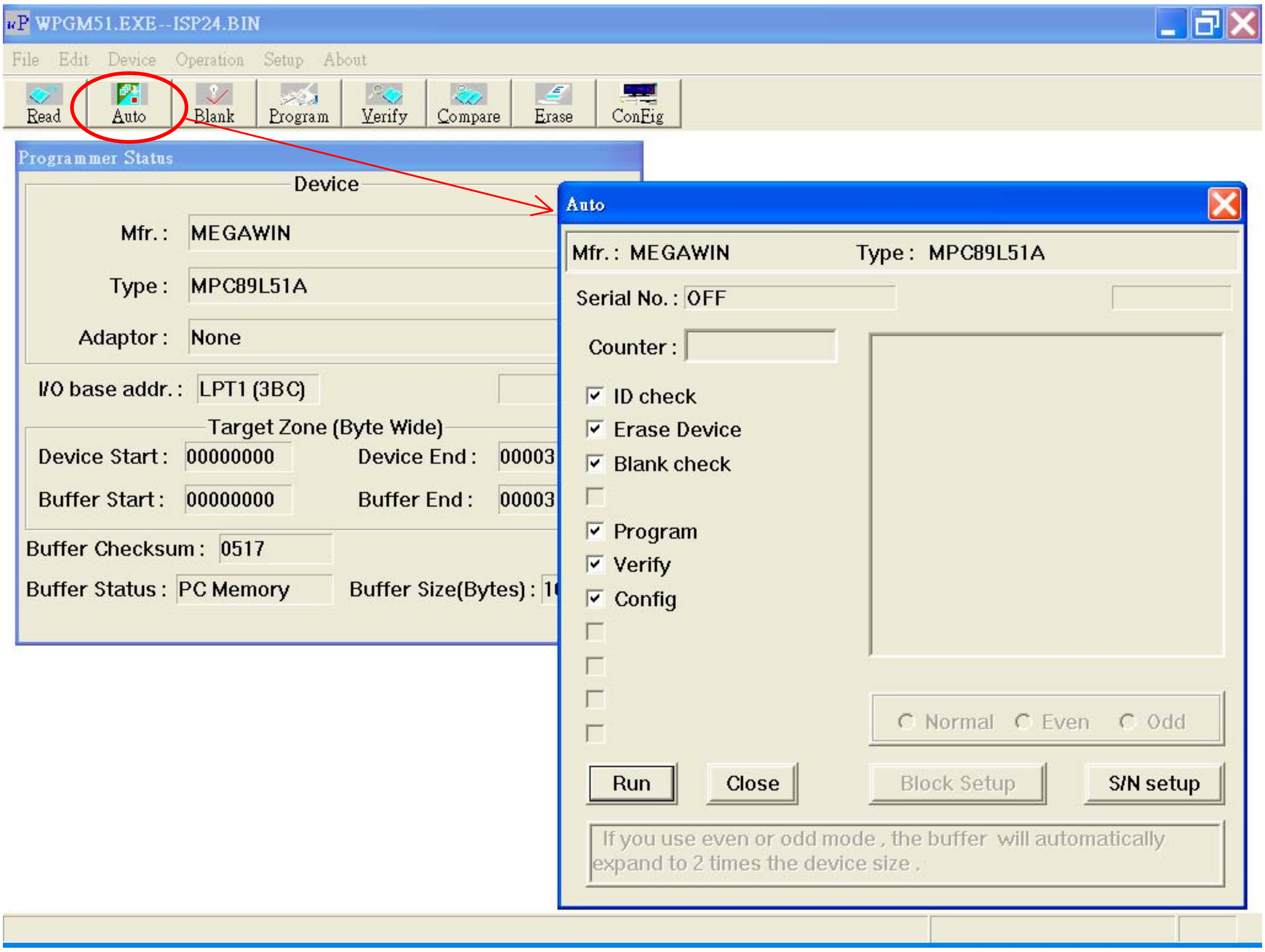


Mfr. : MEGAWIN
Type : MPC89L51A
Adaptor : None
I/O base addr. : LPT1 (3BC)
Target Zone (Byte Wide)
Device Start : 00000000 Device End : 00003BFF
Buffer Start : 00000000 Buffer End : 00003BFF
Buffer Checksum : 0000
Buffer Status : PC Memory Buffer Size(Bytes) : 1024K

File start: 00000000
File end: 0000FFFF
Buff start: 00003800

Change the "Buff start"

Step 4. Click the “Auto” button to program the ISP code and H/W option into 8051



Programmer Status

Device

Mfr. : MEGAWIN

Type : MPC89L51A

Adaptor : None

I/O base addr. : LPT1 (3BC)

Target Zone (Byte Wide)

Device Start : 00000000 Device End : 00003

Buffer Start : 00000000 Buffer End : 00003

Buffer Checksum : 0517

Buffer Status : PC Memory Buffer Size(Bytes) : 1

Auto

Mfr. : MEGAWIN Type : MPC89L51A

Serial No. : OFF

Counter :

☑ ID check
☑ Erase Device
☑ Blank check
□
☑ Program
☑ Verify
☑ Config
□
□
□
□

○ Normal ○ Even ○ Odd

If you use even or odd mode , the buffer will automatically expand to 2 times the device size .

3 Install the ISP-ICP Programmer

3-1 Install the Driver

Plug the ISP-ICP Programmer into the PC's USB port, and do as follows when the monitor shows a prompt about new hardware found.

1) Select **No, not this time**, click **Next**.
2) Select **Install from a list or specific location**, click **Next**.
3) Select **Search for the best driver in these locations** and **Include this location in the search**, click **Browse**.
4) Locate the driver folder [(2) PC-site Driver], click **OK**.
5) Click **Next**. The driver installation starts.
6) Click **Finish** when the installation completes.

To check if the Programmer was correctly installed, follow the listed steps:

1) Open the **My Computer** folder.
2) Open the **Control Panel** folder.
3) Open the **System**.
4) Click on the **Hardware** tab at the top of the dialog box, then click on the **Device Manager**.
5) Click on the plus sign in front of the **Universal Serial Bus Controllers** to check the device listing.

If the installation was completed successfully, you may find an entry, ***Megawin 8051 ISP-ICP Programmer***, in the listing.

3-2 Install the AP

Run ***"Setup.exe"*** (in the [(1) PC-site AP] folder) to install the application program for the ISP-ICP Programmer on your PC. Using its default installing setting, you will find the item ***"Megawin Utilities \ Megawin 8051 ISP-ICP Programmer (v?.??)"*** appearing in the Windows START-menu.

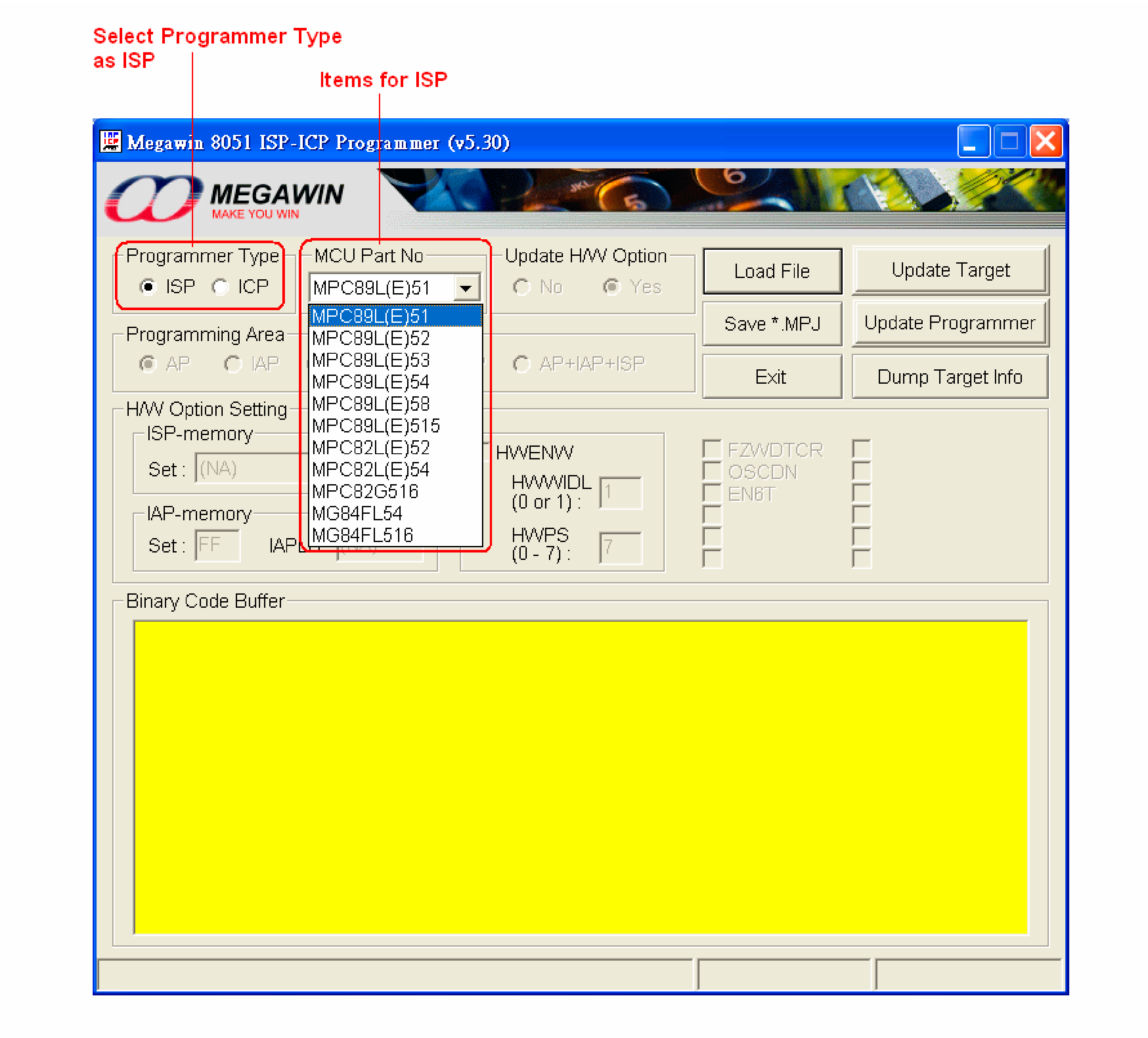
*(Note: the **v?.??** means the current version and may be upgraded in the future.)*

3-3 Introduction to GUI of the PC-site AP

GUI means "Graphic User Interface" of the Application Program running in the Windows.

The PC-site software AP (Application Program) integrates both functions of the ISP Programmer and the ICP Programmer. The first thing the user needs to do is to select the "Programmer Type" when the AP is opened. See the following figures for these two programmer types.

ISP Programmer Type



Select Programmer Type as ISP

Items for ISP

Megawin 8051 ISP-ICP Programmer (v5.30)

Programmer Type: ● ISP ○ ICP

MCU Part No: MPC89L(E)51

Update H/W Option: ○ No ● Yes

Programming Area: ● AP ○ IAP ○ AP+IAP+ISP

H/W Option Setting

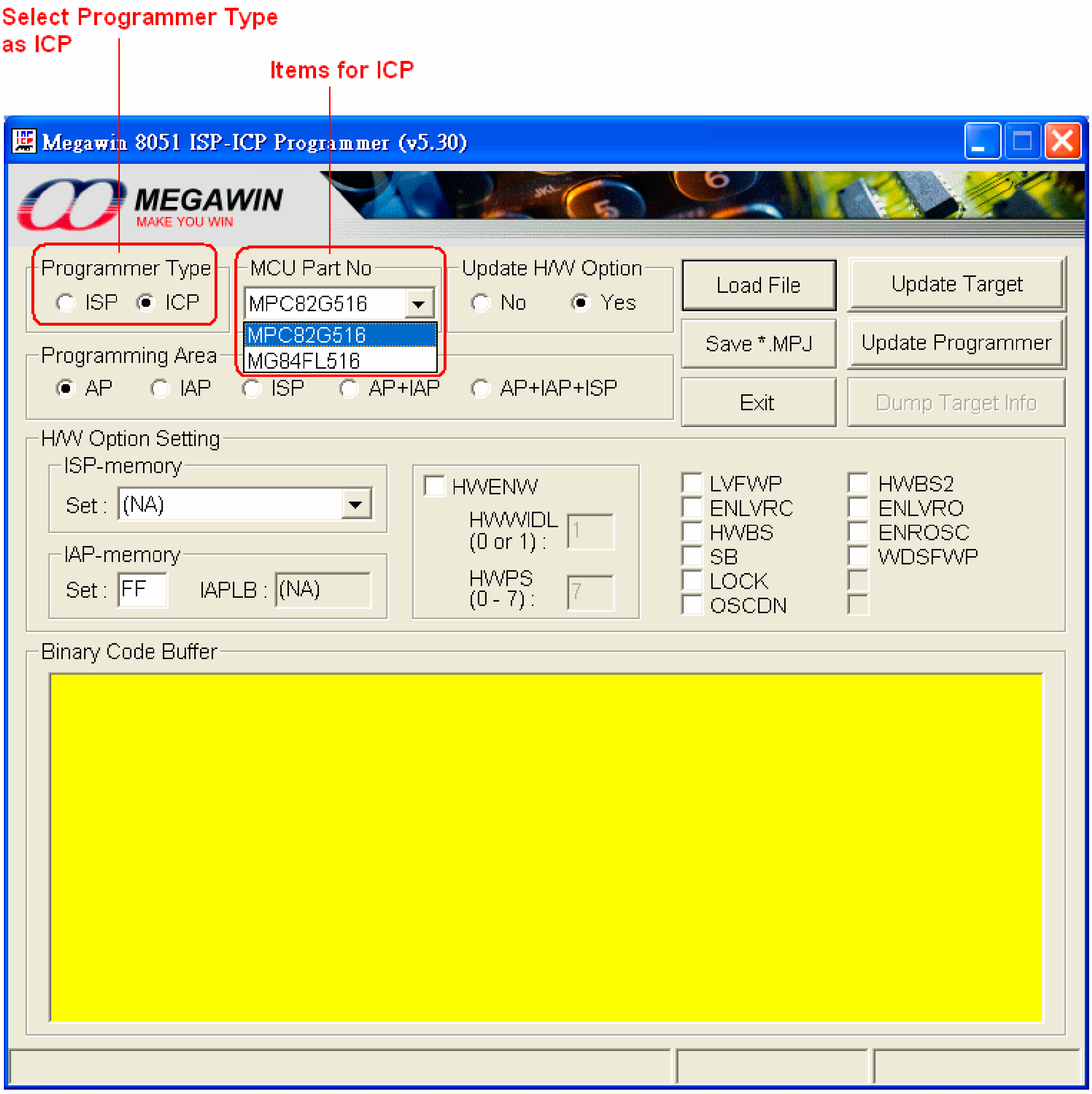
ISP-memory Set : (NA)

IAP-memory Set : FF

HWWIDL (0 or 1) : 1

HWPS (0 - 7) : 7

ICP Programmer Type



Select Programmer Type as ICP

Items for ICP

Megawin 8051 ISP-ICP Programmer (v5.30)

Programmer Type: ○ ISP ● ICP

MCU Part No: MPC82G516
MPC82G516
MG84FL516

Update H/W Option: ○ No ● Yes

Programming Area: ● AP ○ IAP ○ ISP ○ AP+IAP ○ AP+IAP+ISP

H/W Option Setting

ISP-memory Set : (NA)

IAP-memory Set : FF IAPLB : (NA)

□ HWENW

HWWDL (0 or 1) : 1

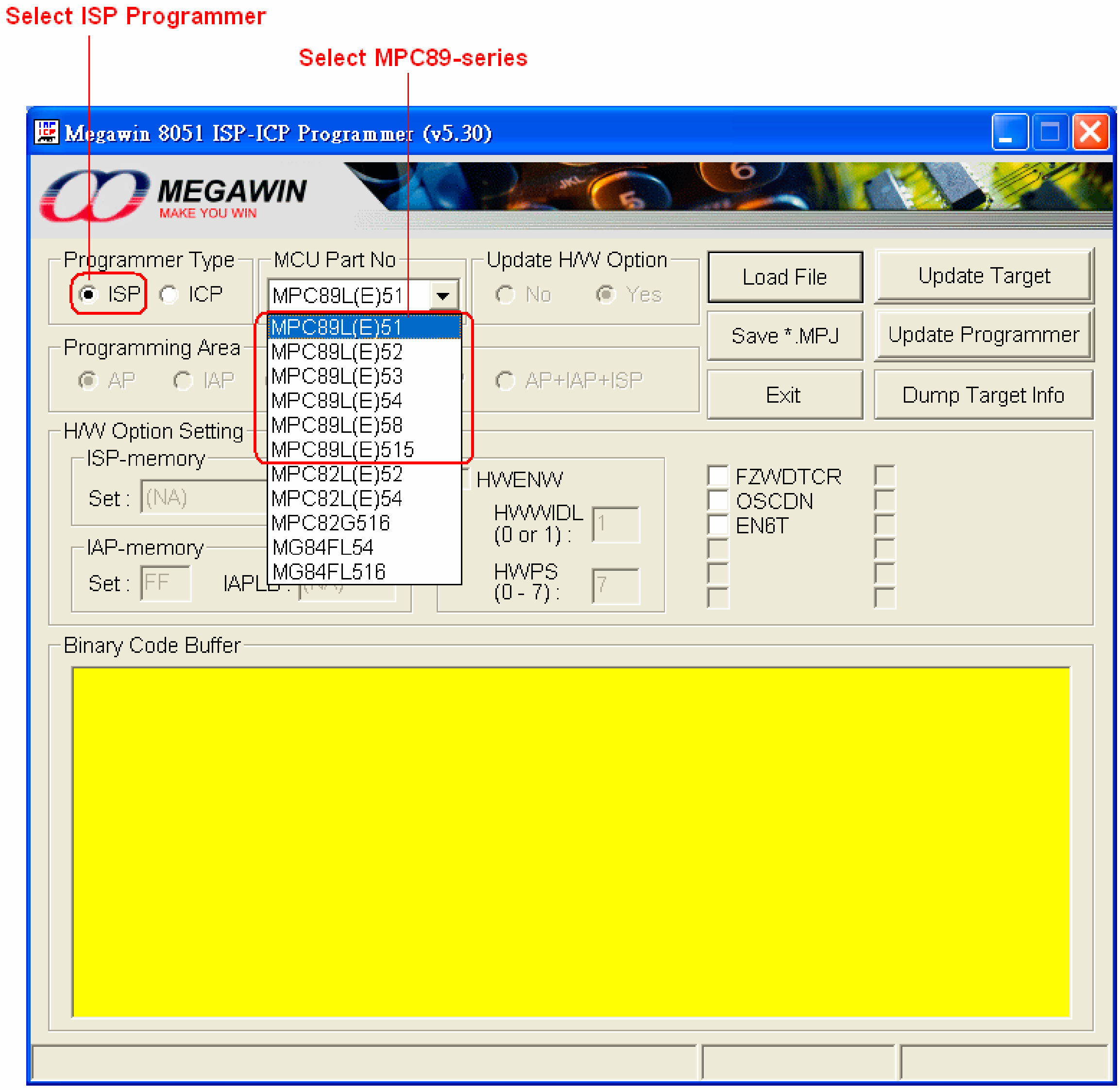
HWPS (0 - 7) : 7

□ LVFWP
□ ENLVRC
□ HWBS
□ SB
□ LOCK
□ OSCDN

□ HWBS2
□ ENLVRO
□ ENROSC
□ WDSFWP

Binary Code Buffer

3-3-1 ISP Programmer GUI for MPC89-series



Select ISP Programmer

Select MPC89-series

Megawin 8051 ISP-ICP Programmer (v5.30)

Programmer Type: ● ISP ○ ICP

MCU Part No: MPC89L(E)51

About the H/W Option Setting

The user should always configure proper H/W Option before clicking "Update Target" or "Update Programmer".

FZWDTCR:

[enabled]: The WDTCR register will be initialized to its reset value (0x00) *only by power-on reset*.
(*For example, if WDTCR=0x2D, it still keeps at 0x2D rather than 0x00 after RST-pin, S/W or WDT reset.*)

[disabled]: The WDTCR register will be initialized to its reset value (0x00) by all reset (including power-on, RST-pin, S/W and WDT reset).

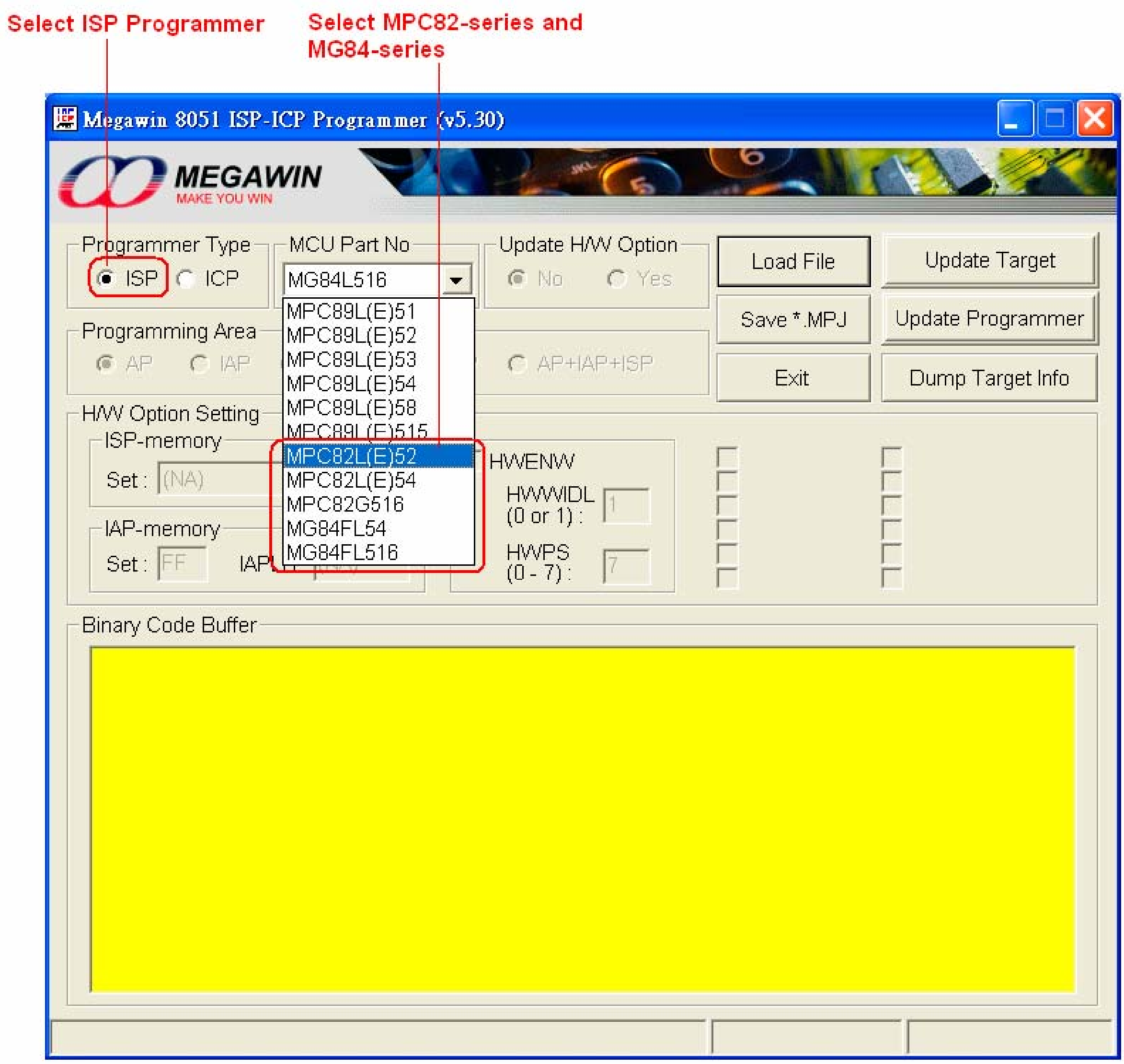
OSCDN:

[enabled]: If the XTAL frequency is less than 25MHz, this option can be enabled to reduce the internal oscillating gain for lower EMI.
[disabled]: Normal oscillating gain.

EN6T:

[enabled]: MCU runs at 6T mode (6 clocks per machine-cycle, double speed compared to a traditional 8051)
[disabled]: MCU runs at 12T mode (12 clocks per machine-cycle, like a traditional 8051)

3-3-2 ISP Programmer GUI for MPC82-series and MG84-series



Select ISP Programmer

Select MPC82-series and MG84-series

Megawin 8051 ISP-ICP Programmer (v5.30)

Programmer Type: ● ISP ○ ICP

MCU Part No: MG84L516

MPC89L(E)51
MPC89L(E)52
MPC89L(E)53
MPC89L(E)54
MPC89L(E)58
MPC89L(E)515
MPC82L(E)52
MPC82L(E)54
MPC82G516
MG84FL54
MG84FL516

Update H/W Option: ● No ○ Yes

Programming Area: ● AP ○ IAP ○ AP+IAP+ISP

H/W Option Setting

ISP-memory Set : (NA)

IAP-memory Set : FF

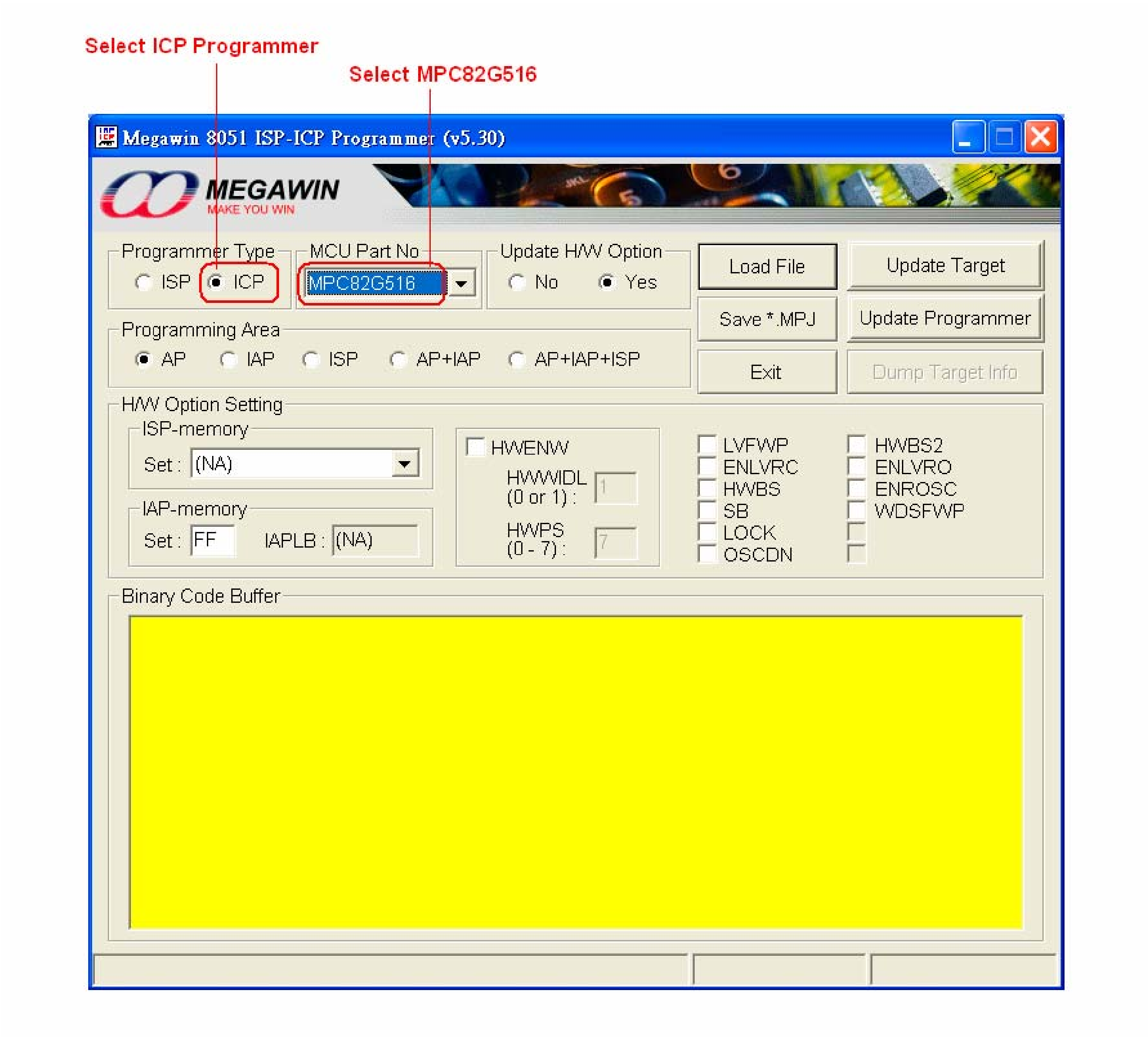
HWWIDL (0 or 1) : 1

HWPS (0 - 7) : 7

About the H/W Option Setting

For these two series, the user can not update the H/W Option by ISP.

3-3-3 ICP Programmer GUI for MPC82G516



Select ICP Programmer

Select MPC82G516

Megawin 8051 ISP-ICP Programmer (v5.30)

Programmer Type: ○ ISP ● ICP

MCU Part No: MPC82G516

Update H/W Option: ○ No ● Yes

Programming Area: ● AP ○ IAP ○ ISP ○ AP+IAP ○ AP+IAP+ISP

H/W Option Setting

ISP-memory Set: (NA)

IAP-memory Set: FF IAPLB: (NA)

□ HWENW

HWWIDL (0 or 1): 1

HWPS (0 - 7): 7

□ LVFWP
□ ENLVRC
□ HWBS
□ SB
□ LOCK
□ OSCDN

□ HWBS2
□ ENLVRO
□ ENROSC
□ WDSFWP
□
□

About the H/W Option Setting

The user should always configure proper H/W Option before clicking “Update Target” or “Update Programmer”.

ISP-memory:
Select the size you want.

IAP-memory:
Select the lower boundary address you want. For example, if 0x5A00 is wanted, then just key in “5A”, and the IAP-memory lower boundary address will automatically displayed in the IAPLB box.

LVFWP:
[enabled]: Enable LVFWP (Low-Voltage Flash Write Protection) while IAP or ISP programming.
[disabled]: Disable LVFWP.

ENLVRC:
[enabled]: Enable hardware to generate low voltage reset when V30-pin voltage drops below 2.4V.
[disabled]: Disable low voltage reset.

HWBS:
[enabled]: When power-on, MCU will boot from ISP-memory if ISP-memory is configured.
[disabled]: MCU always boots from AP-memory.

SB:
[enabled]: Code dumped on a universal Writer or Programmer is scrambled for security, but Device ID can be read normally. *It is strongly recommended that the LOCK should also be enabled when SB is enabled.*
[disabled]: Not scrambled.

LOCK:
[enabled]: Code dumped & Device ID read on a universal Writer or Programmer is locked to 0xFF for security.
[disabled]: Not locked.

OSCDN:
[enabled]: Oscillating gain is reduced down for EMI reduction.
[disabled]: Normal gain.

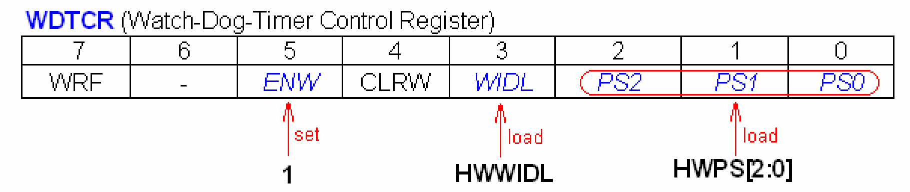
HWBS2:
[enabled]: Like HWBS, the reset from RST-pin can also cause MCU to boot from ISP-memory.
[disabled]: Where MCU boots from is determined by **HWBS**.

ENLVRO:
[enabled]: Enable MCU to generate low voltage reset when VDD-pin voltage drops below 3.7V.
[disabled]: No low voltage reset.

ENROSC:
[enabled]: Enable built-in RC oscillator.
[disabled]: Disable built-in RC oscillator.

WDSFWP:
[enabled]: The special function register WDTCR will be write-protected except the bit CLRW.
[disabled]: The special function register WDTCR is free to be written by software.

HWENW (accompanied with arguments **HWWIDL** and **HWPS[2:0]**):
[enabled]: Automatically enable Watch-dog Timer by the hardware when the MCU is powered up.
It means that:
In the WDTCR register, the hardware will automatically:
(1) set *ENW* bit,
(2) load **HWWIDL** into *WIDL* bit, and
(3) load **HWPS[2:0]** into *PS[2:0]* bits.
For example:
If **HWWIDL** and **HWPS[2:0]** are programmed to be 1 and 5, respectively, then **WDTCR** will be initialized to be 0x2D when MCU is powered up, as shown below.

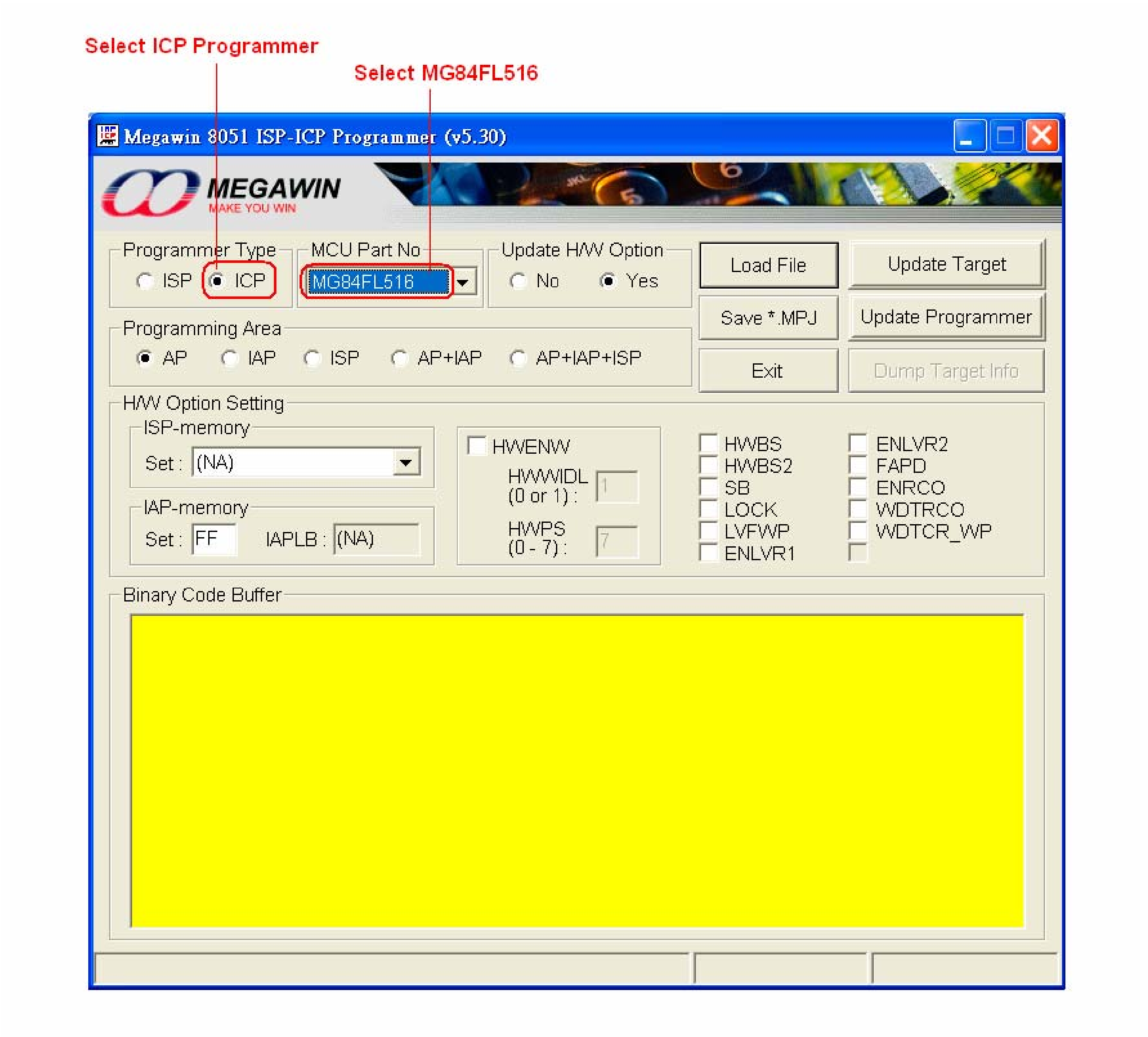


WDTCR (Watch-Dog-Timer Control Register)

7	6	5	4	3	2	1	0
WRF	-	*ENW*	CLRW	*WIDL*	*PS2*	*PS1*	*PS0*

[disabled]: No action on Watch-dog Timer when the MCU is powered up.

3-3-4 ICP Programmer GUI for MG84FL516



Select ICP Programmer

Select MG84FL516

Megawin 8051 ISP-ICP Programmer (v5.30)

Programmer Type: ○ ISP ● ICP

MCU Part No: MG84FL516

Update H/W Option: ○ No ● Yes

Programming Area: ● AP ○ IAP ○ ISP ○ AP+IAP ○ AP+IAP+ISP

H/W Option Setting

ISP-memory: Set : (NA)

IAP-memory: Set : FF IAPLB : (NA)

□ HWENW

HWWIDL (0 or 1) : 1

HWPS (0 - 7) : 7

□ HWBS
□ HWBS2
□ SB
□ LOCK
□ LVFWP
□ ENLVR1

□ ENLVR2
□ FAPD
□ ENRCO
□ WDTRCO
□ WDTCR_WP
□

Binary Code Buffer

About the H/W Option Setting

The user should always configure proper H/W Option before clicking "Update Target" or "Update Programmer".

ISP-memory:
Select the size you want.

IAP-memory:
Select the lower boundary address you want. For example, if 0x5A00 is wanted, then just key in "5A". The IAP-memory lower boundary address will automatically displayed in the IAPLB box.

HWBS:
[enabled]: When power-on, MCU will boot from ISP-memory if ISP-memory is configured.
[disabled]: MCU always boots from AP-memory.

HWBS2:
[enabled]: In addition to power-on-reset, the reset from RST-pin will also force MCU to boot from ISP-memory if ISP-memory is configured.
[disabled]: Where MCU boots from is determined by **HWBS**.

SB:

[enabled]: Code dumped on a universal Writer or Programmer is scrambled for security, but Device ID can be read normally. *It is strongly recommended that the LOCK should also be enabled when SB is enabled.*
[disabled]: Not scrambled.

LOCK:

[enabled]: Code dumped & Device ID read on a universal Writer or Programmer is locked to 0xFF for security.
[disabled]: Not locked.

LVFWP:

[enabled]: Enable LVFWP (Low-Voltage Flash-Write Protection) while IAP or ISP programming.
[disabled]: Disable LVFWP.

ENLVR1:

[enabled]: MCU to generate low voltage reset when VDD-pin voltage drops below LVD1.
[disabled]: No low voltage reset.

ENLVR2:

[enabled]: MCU to generate low voltage reset when VDD-pin voltage drops below LVD2.
[disabled]: No low voltage reset.

FAPD:

[enabled]: Enable Flash-Auto-Power-Down to save power while normal operating.
[disabled]: Disable Flash-Auto-Power-Down.

ENROSC:

[enabled]: Enable built-in RC oscillator (6MHz).
[disabled]: Disable built-in RC oscillator.

WDTRCO:

[enabled]: Enable the RC oscillator, and select RCosc as OSCin.
[disabled]: Disable the RC oscillator, and select XTALosc as OSCin.

WDTCR_WP:

[enabled]:

If CPU runs in AP-memory, the register WDTCR will be software-write-protected except the bit CLRW.
If CPU runs in ISP-memory, the register WDTCR will be software-write-protected except the bits CLRW, PS2, PS1 and PS0.

[disabled]: The register WDTCR can be freely written by software.

HWENW (accompanied with arguments **HWWIDL** and **HWPS[2:0]**):

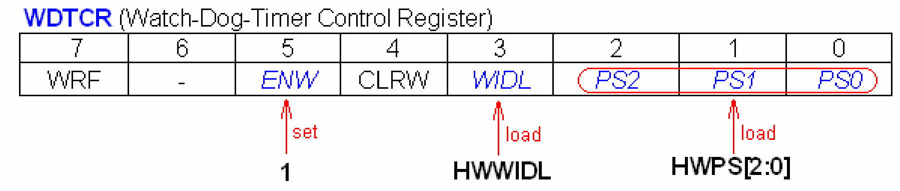
[enabled]: Automatically enable Watch-dog Timer by the hardware when the MCU is powered up.

It means that:

In the WDTCR register, the hardware will automatically:
(1) set *ENW* bit,
(2) load **HWWIDL** into *WIDL* bit, and
(3) load **HWPS[2:0]** into *PS[2:0]* bits.

For example:

If **HWWIDL** and **HWPS[2:0]** are programmed to be 1 and 5, respectively, then **WDTCR** will be initialized to be 0x2D when MCU is powered up, as shown below.



WDTCR (Watch-Dog-Timer Control Register)

7	6	5	4	3	2	1	0
WRF	-	*ENW*	CLRW	*WIDL*	*PS2*	*PS1*	*PS0*

[disabled]: No action on Watch-dog Timer when the MCU is powered up.

4 Use the ISP-ICP Programmer

4-1 Operation Modes

There are three operation modes for the ISP-ICP Programmer based on its connection conditions.

4.1.1 Mode-1: Connected between host and target system

In this condition, the ISP-ICP Programmer works with the PC-site AP being executed. Three main buttons can be clicked: (1) The "**Update Programmer**" button, which is used to download the programming data (including Part No., user's application code and H/W option) into the non-volatile storage of the Programmer. (2) The "**Update Target**" button, which further programs the new application code and H/W option into the Target MCU in addition to those the "Update Programmer" button does. (3) The "**Dump Target Info**" button, which dumps the Target Information Data described in *Section 5*.

The user should select correct "**Part No.**", then click "**Load File**" to load the new application code, and configure the H/W options (if have) before clicking the "Update Programmer" or "Update Target" button. The ISP-key can also be used to start the ISP or ICP processing after the "Update Programmer" is completed. Of course, the user may load the *MPJ* file (described in *Section 4.4*) to restore all the programming data to the GUI of the AP.

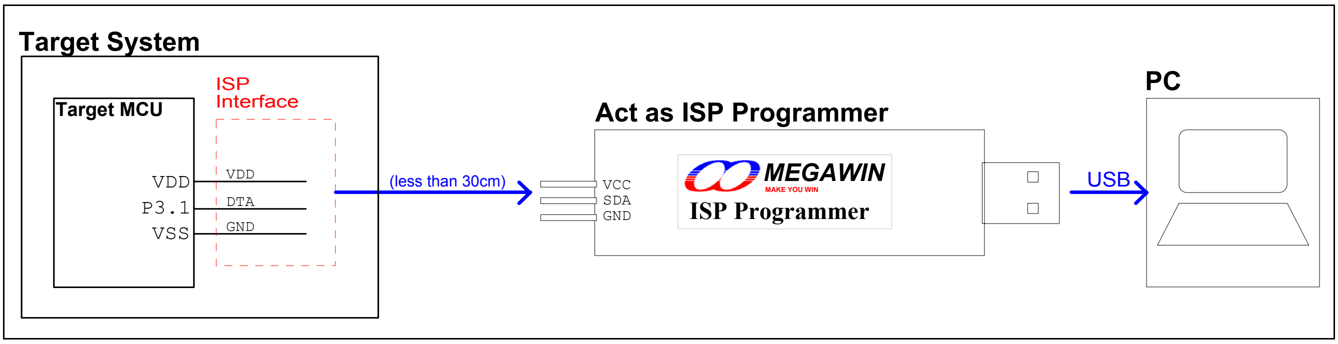
The following figures show the connection diagram:

(1) When the Programmer acts as an ISP Programmer, *don't power on the target system before connecting ok*. After connecting ok, then the user's system can be powered on. At this time, the target MCU keeps running in the ISP-memory for ISP processing. When ISP is finished, disconnect this Programmer from the target system to let the target MCU run the new application code.

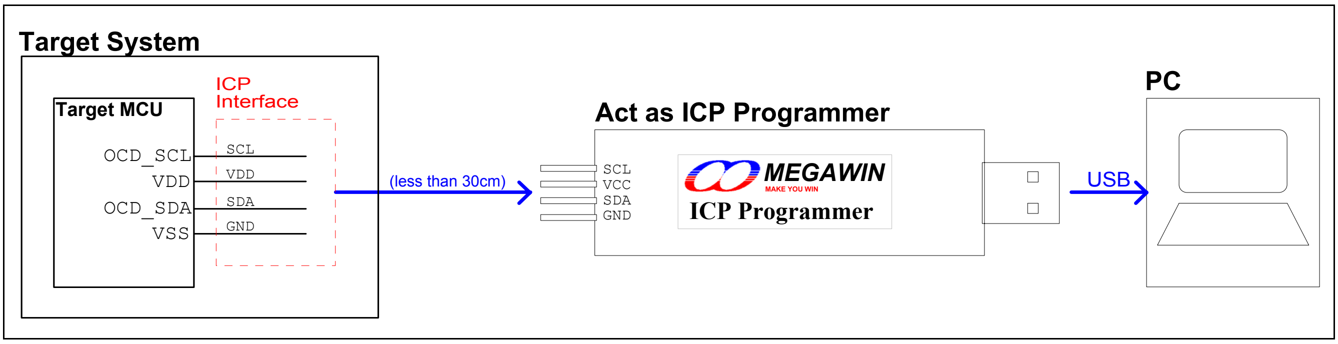
(2) When the Programmer acts as an ICP Programmer, the target system can be powered on *before* or *after* the connecting. And the target MCU will automatically run the new application code without need of disconnecting from the target system after ICP is finished.

The LEDs show the processing result. If ISP/ICP processing succeeds, the green LED will turn on, otherwise the red LED will turn on.

When the Programmer acts as an ISP Programmer:

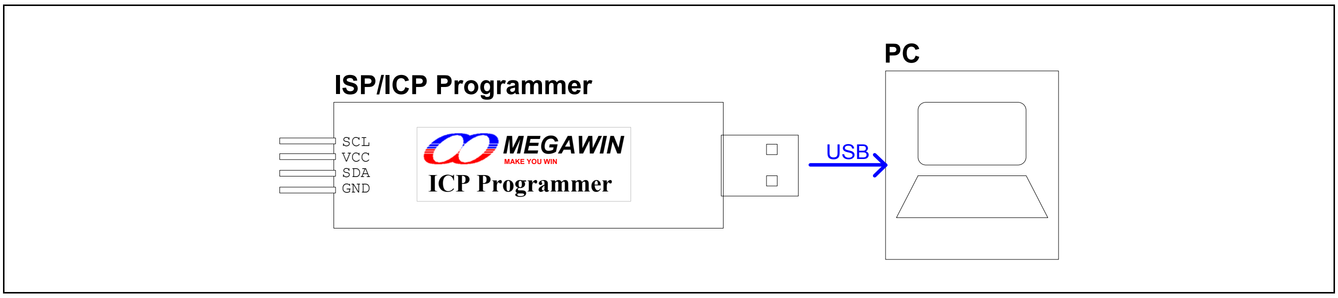


When the Programmer acts as an ICP Programmer:



4.1.2 Mode-2: Connected to host only

In this condition, the ISP-ICP Programmer works with the PC-site AP being executed and only the “**Update Programmer**” button can be clicked. User can download the programming data into the non-volatile storage in the Programmer for later stand-alone operation.



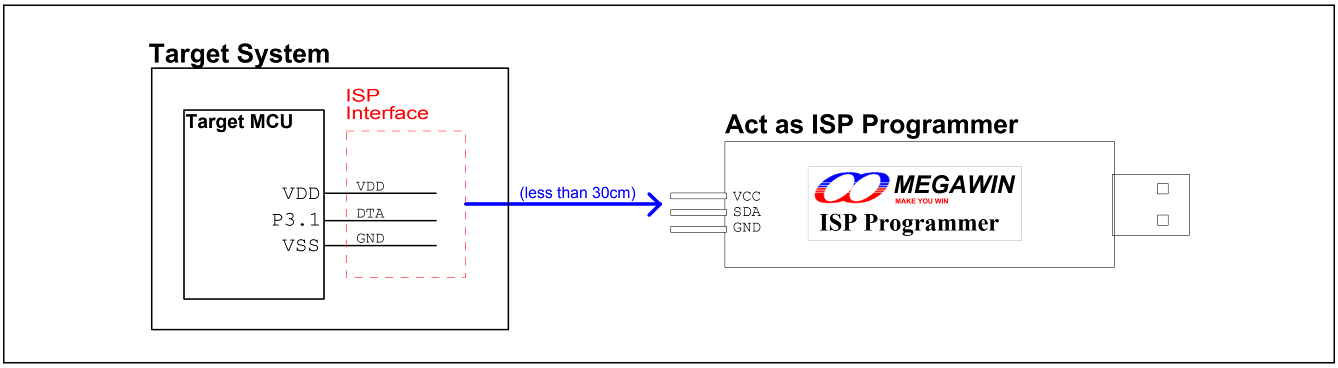
4.1.3 Mode-3: Connected to target system only

In this condition, the Programmer works stand-alone without the AP’s intervention.

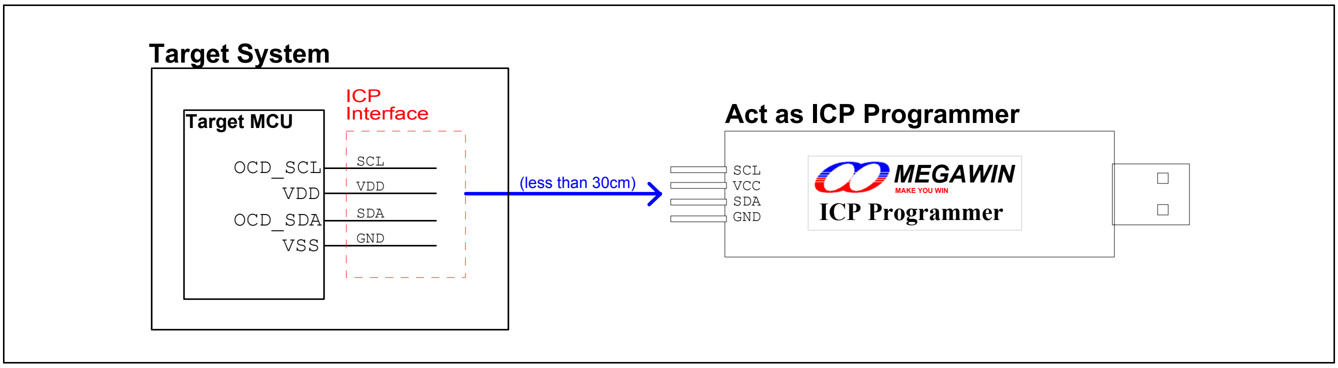
(1) When acting as an ISP Programmer, connect the Programmer to the target system before the system is powered up. Then, power on the system, and press the **ISP-key** to start ISP processing. The green and red LEDs show the processing result. Now, the user can disconnect the Programmer to let the system start running the new application code.

(2) When acting as an ICP Programmer, connect the Programmer to the target system at any time regardless of the system’s power state. Then press the **ISP-key** to start ICP processing while the system is powered on. The green and red LEDs show the processing result. And once the processing is finished, the system will automatically run the new application code.

When the Programmer acts as an ISP Programmer:



When the Programmer acts as an ICP Programmer:



4-2 Act as an ISP Programmer

4.2.1 Download Programming Data to the ISP Programmer

How to download new programming data (including application code & H/W options) into the Programmer?

Step 1: Select “Programmer Type” as *ISP Programmer*, and select the wanted “MCU Part No”.

Step 2: Click “Load File”, both HEX format and BIN format are acceptable, and the code size is based on its binary format.

For **MPC89L(E)51/52/53**, the maximum code size is 15K-1K=**14K** bytes, which includes IAP data.

For **MPC89L(E)54/58/515**, the maximum code size is 63K-1K=**62K** bytes, which includes IAP data.

For **MPC82L(E)52**, the maximum code size is 8K-1K=**7K** bytes, which includes IAP data.

For **MPC82L(E)54**, the maximum code size is 15.5K-1.5K=**14K** bytes, which includes IAP data.

For **MPC82G516**, the maximum code size is 64K-1K=**63K** bytes, which includes IAP data.

For **MG84FL54**, the maximum code size is 16K-1K=**15K** bytes, which includes IAP data.

For **MG84FL516**, the maximum code size is 64K-1K=**63K** bytes, which includes IAP data.

Where, “minus 1K” (or 1.5K for MPC82L(E)54) means subtracting the space of ISP-memory.

Step 3: Configure the wanted H/W Option. (Only available for MPC89-series.)

Step 4: Click “Update Programmer”.

Note: In Step 2, you can load an MPJ file (refer to Section 4.4), then Step 3 is not necessary.

4.2.2 Update the Target

How to update the target?

Step 1~3: The same as previous Step1~3..

Step 4: Click “Update Target”.

4.2.3 Dump the Contents in the Information Zone

How to dump the 256 bytes of target “Information Data”? (Please refer to *Section 5*)

Step 1: Select “Programmer Type” as an *ISP Programmer*.

Step 2: Click “Dump Target Info”.

4-3 Act as an ICP Programmer

4.3.1 Download Programming Data to the ICP Programmer

How to download new programming data (including application code & H/W options) into the Programmer?

Step 1: Select "Programmer Type" as *ICP Programmer*, and select the wanted "MCU Part No".

Step 2: Click "Load File", both HEX format and BIN format are acceptable, and the code size is based on its binary format.

Step 3: Configure the wanted H/W Option.

Step 4: Click "Update Programmer".

Note: In Step 2, you can load an MPJ file (refer to Section 4.4), then Step 3 is not necessary.

4.3.2 Update the Target

How to update the target?

Step 1~3: The same as previous Step1~3..

Step 4: Click "Update Target".

4-4 The Megawin Project File (MPJ File)

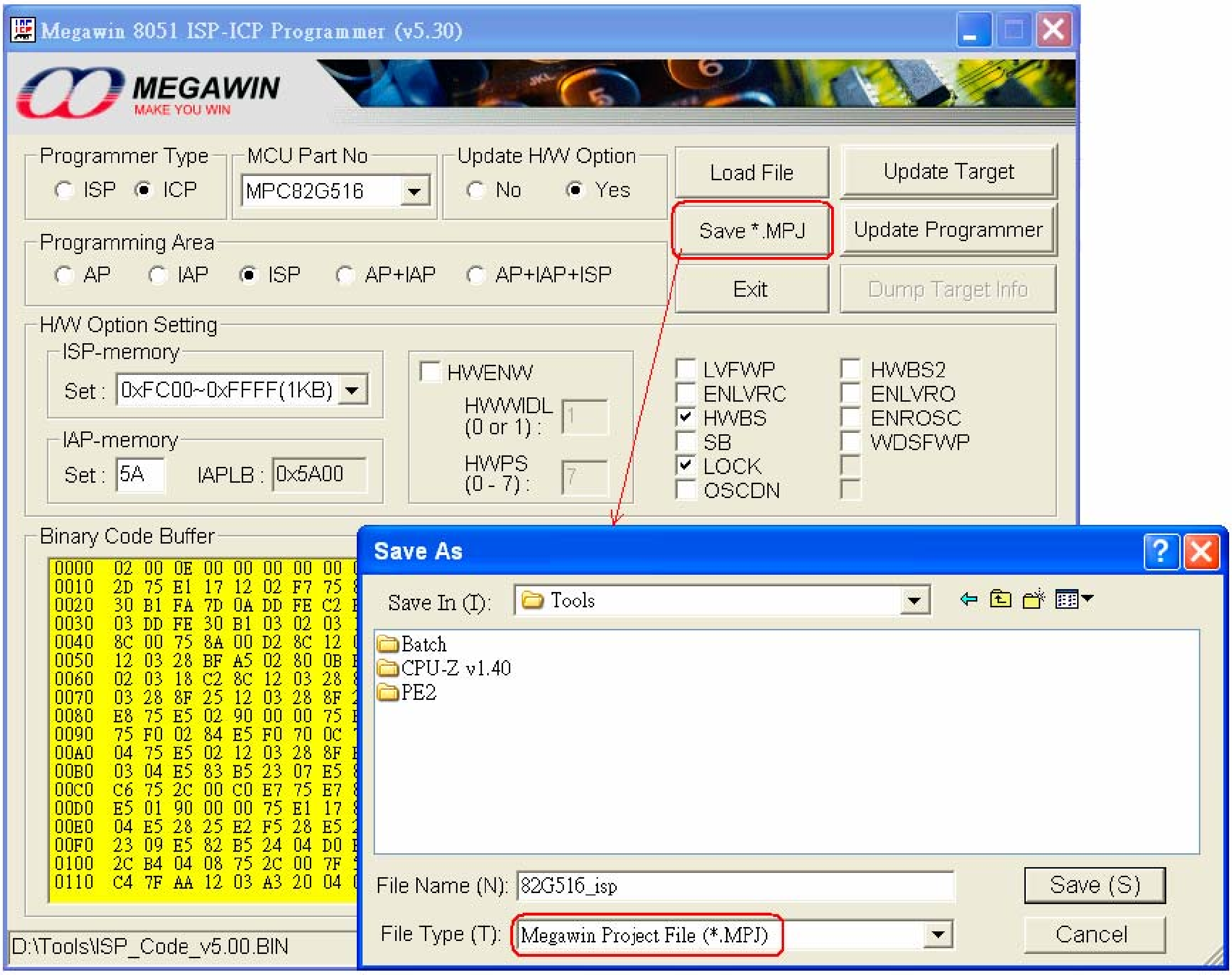
In addition to the application code, the Programmer may program the H/W options to the target MCU at each time the “Update Target” button (on the PC-site AP) is clicked or the ISP-key (on the Programmer) is pressed. And, maybe the operating of application code depends on the H/W options (for example, EN6T), so the one who takes the programming task must set the correct H/W options in addition to loading the correct application code. To prevent from any mistake (for example, forget to set the correct H/W options), all the relevant programming information should be saved together in one file, which we called the ***MPJ*** file.

4.4.1 Save to an MPJ File

The MPJ file includes all the relevant programming information appearing on the GUI, they are:

(1) Programmer Type,
(2) MCU Part No,
(3) Control of Update H/W Option,
(4) Programming Area,
(5) H/W Option Setting, and
(6) Binary Code Buffer.

Click the button “**Save *.MPJ**” to save all the programming information in an MPJ file, as shown below.



Megawin 8051 ISP-ICP Programmer (v5.30)

Programmer Type: ○ ISP ● ICP
MCU Part No: MPC82G516
Update H/W Option: ○ No ● Yes
Programming Area: ○ AP ○ IAP ● ISP ○ AP+IAP ○ AP+IAP+ISP

H/W Option Setting
ISP-memory Set : 0xFC00~0xFFFF(1KB)
IAP-memory Set : 5A IAPLB : 0x5A00
□ HWENW
HWWIDL (0 or 1) : 1
HWPS (0 - 7) : 7
□ LVFWP
□ ENLVRC
☑ HWBS
□ SB
☑ LOCK
□ OSCDN
□ HWBS2
□ ENLVRO
□ ENROSC
□ WDSFWP
□
□

Binary Code Buffer

```
0000  02 00 0E 00 00 00 00 00
0010  2D 75 E1 17 12 02 F7 75
0020  30 B1 FA 7D 0A DD FE C2
0030  03 DD FE 30 B1 03 02 03
0040  8C 00 75 8A 00 D2 8C 12
0050  12 03 28 BF A5 02 80 0B
0060  02 03 18 C2 8C 12 03 28
0070  03 28 8F 25 12 03 28 8F
0080  E8 75 E5 02 90 00 00 75
0090  75 F0 02 84 E5 F0 70 0C
00A0  04 75 E5 02 12 03 28 8F
00B0  03 04 E5 83 B5 23 07 E5
00C0  C6 75 2C 00 C0 E7 75 E7
00D0  E5 01 90 00 00 75 E1 17
00E0  04 E5 28 25 E2 F5 28 E5
00F0  23 09 E5 82 B5 24 04 D0
0100  2C B4 04 08 75 2C 00 7F
0110  C4 7F AA 12 03 A3 20 04
```

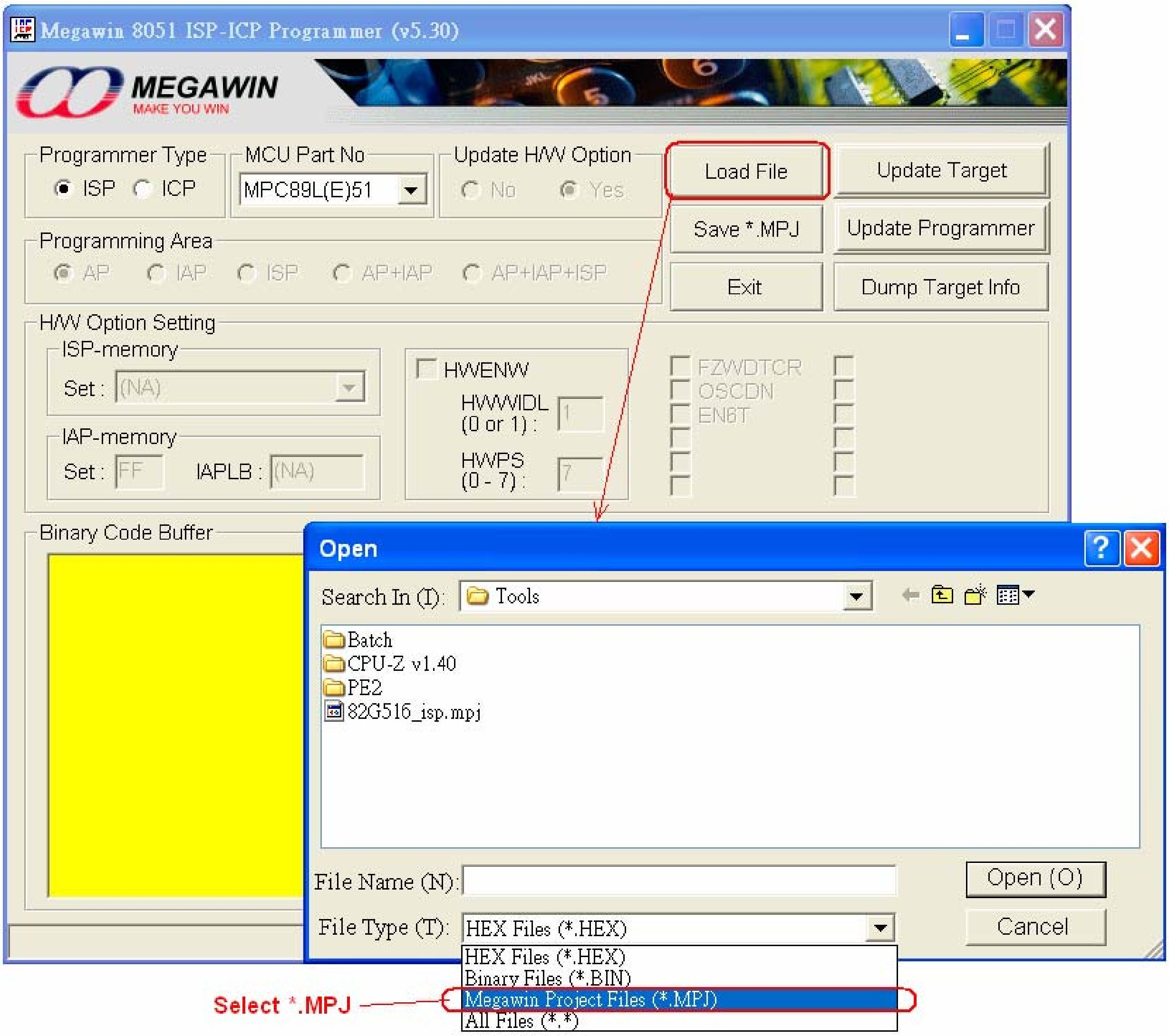
D:\Tools\ISP_Code_v5.00.BIN

Save As

Save In (I): Tools
Batch
CPU-Z v1.40
PE2
File Name (N): 82G516_isp
File Type (T): Megawin Project File (*.MPJ)

4.4.2 Load an MPJ File

Click “Load File” and select **Megawin Project Files (*.MPJ)** to select the MPJ file you want. When the MPJ file is opened, all the relevant programming information will be retrieved and restored to the GUI of the AP. The following figure shows how to open an MPJ file.



5 Information Zone

When the H/W option *LOCK* or *SB* is enabled for code security, there is no way to read out the contents of the target by neither a universal programmer nor the ISP Programmer. For the purpose of user's product failure analysis in the future, a special Flash area called ***Information Zone*** is defined to be readable by only the ISP Programmer even the target is locked or scrambled. The user may put some useful product information there for future failure analysis, such as Product version, F/W version, manufacturing date code, .. and etc.

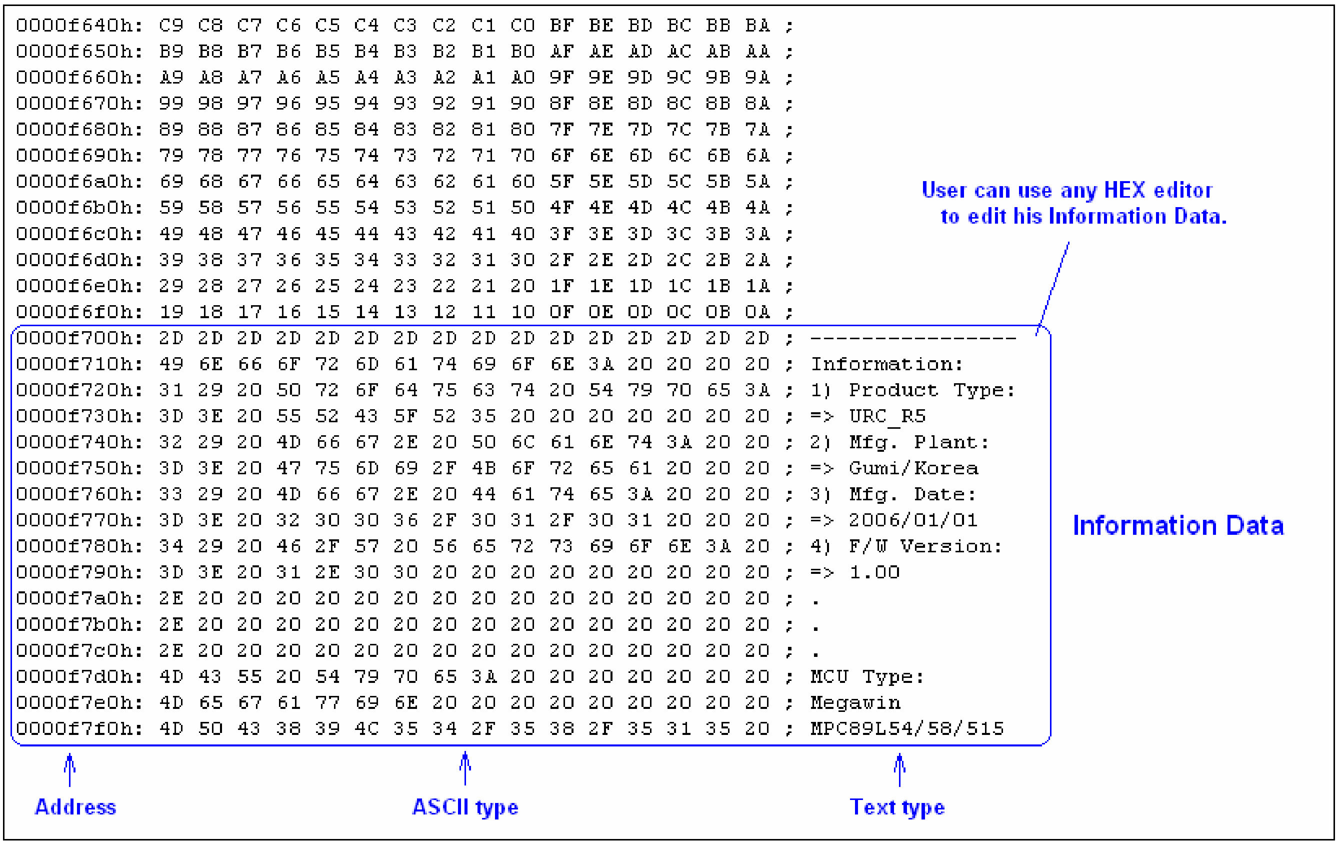
Note:
The Information Zone is just the name of the range where the ISP Programmer can read out data even the target is locked or scrambled.

5.1 Definition of the Information Zone

The ***Information zone*** is defined in the 256 bytes just prior to the ISP-memory, as listed below.

For MPC89L(E)51/52/53, it is located at *0x3700~0x37FF*.
For MPC89L(E)54/58/515, it is located at *0xF700~0xF7FF*.
For MPC82L(E)52, it is located at *0x1B00~0x1BFF*.
For MPC82L(E)54, it is located at *0x3700~0x37FF*.
For MPC82G516, it is located at *0xFB00~0xFBFF*.
For MG84FL54, it is located at *0x3B00~0x3BFF*.
For MG84FL516, it is located at *0xFB00~0xFBFF*.

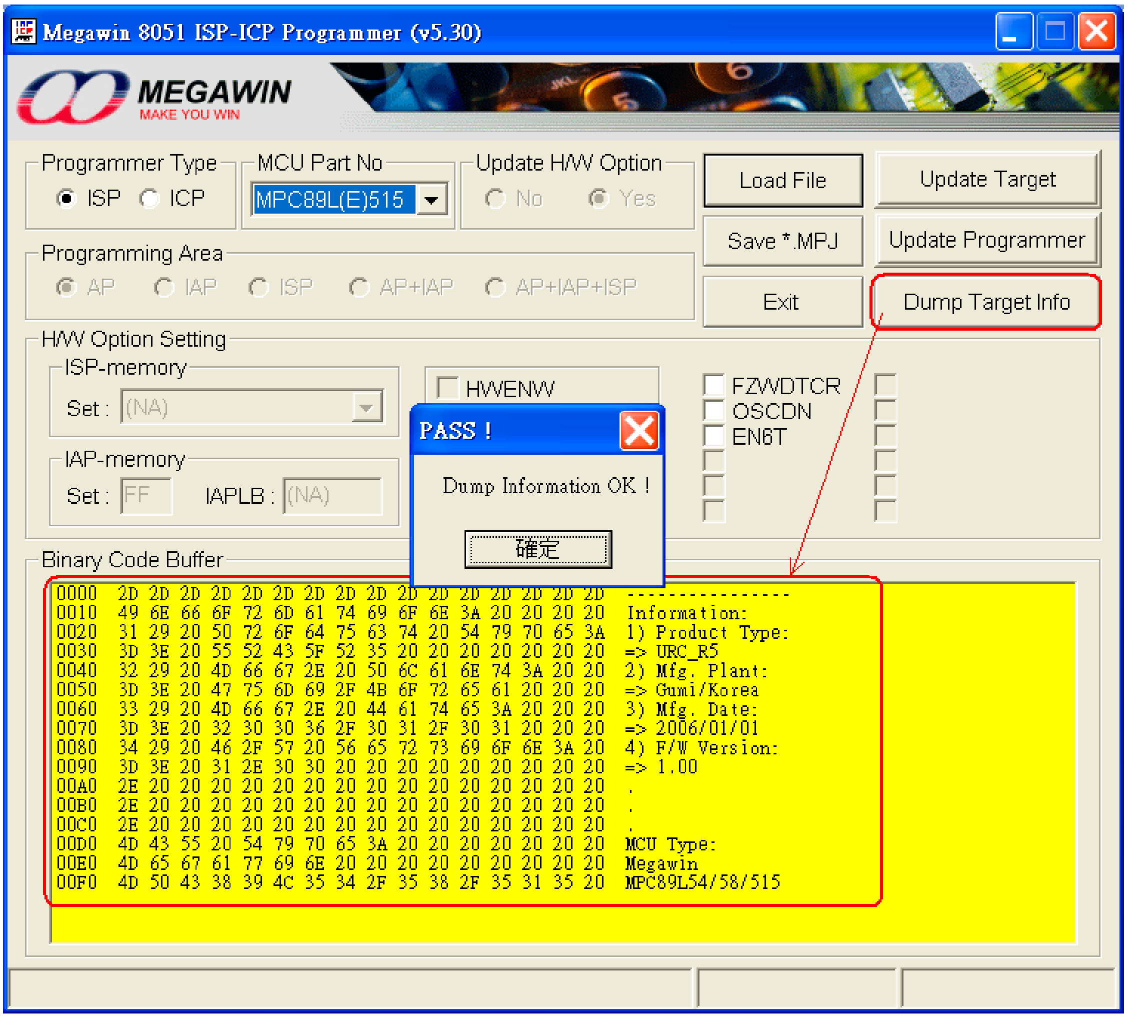
An example of the ***Information zone*** of MPC89L(E)54/58/515:



```
0000f640h: C9 C8 C7 C6 C5 C4 C3 C2 C1 C0 BF BE BD BC BB BA ;
0000f650h: B9 B8 B7 B6 B5 B4 B3 B2 B1 B0 AF AE AD AC AB AA ;
0000f660h: A9 A8 A7 A6 A5 A4 A3 A2 A1 A0 9F 9E 9D 9C 9B 9A ;
0000f670h: 99 98 97 96 95 94 93 92 91 90 8F 8E 8D 8C 8B 8A ;
0000f680h: 89 88 87 86 85 84 83 82 81 80 7F 7E 7D 7C 7B 7A ;
0000f690h: 79 78 77 76 75 74 73 72 71 70 6F 6E 6D 6C 6B 6A ;
0000f6a0h: 69 68 67 66 65 64 63 62 61 60 5F 5E 5D 5C 5B 5A ;
0000f6b0h: 59 58 57 56 55 54 53 52 51 50 4F 4E 4D 4C 4B 4A ;
0000f6c0h: 49 48 47 46 45 44 43 42 41 40 3F 3E 3D 3C 3B 3A ;
0000f6d0h: 39 38 37 36 35 34 33 32 31 30 2F 2E 2D 2C 2B 2A ;
0000f6e0h: 29 28 27 26 25 24 23 22 21 20 1F 1E 1D 1C 1B 1A ;
0000f6f0h: 19 18 17 16 15 14 13 12 11 10 0F 0E 0D 0C 0B 0A ;
0000f700h: 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D ; ----------------
0000f710h: 49 6E 66 6F 72 6D 61 74 69 6F 6E 3A 20 20 20 20 ; Information:
0000f720h: 31 29 20 50 72 6F 64 75 63 74 20 54 79 70 65 3A ; 1) Product Type:
0000f730h: 3D 3E 20 55 52 43 5F 52 35 20 20 20 20 20 20 20 ; => URC_R5
0000f740h: 32 29 20 4D 66 67 2E 20 50 6C 61 6E 74 3A 20 20 ; 2) Mfg. Plant:
0000f750h: 3D 3E 20 47 75 6D 69 2F 4B 6F 72 65 61 20 20 20 ; => Gumi/Korea
0000f760h: 33 29 20 4D 66 67 2E 20 44 61 74 65 3A 20 20 20 ; 3) Mfg. Date:
0000f770h: 3D 3E 20 32 30 30 36 2F 30 31 2F 30 31 20 20 20 ; => 2006/01/01
0000f780h: 34 29 20 46 2F 57 20 56 65 72 73 69 6F 6E 3A 20 ; 4) F/W Version:
0000f790h: 3D 3E 20 31 2E 30 30 20 20 20 20 20 20 20 20 20 ; => 1.00
0000f7a0h: 2E 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 ; .
0000f7b0h: 2E 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 ; .
0000f7c0h: 2E 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 ; .
0000f7d0h: 4D 43 55 20 54 79 70 65 3A 20 20 20 20 20 20 20 ; MCU Type:
0000f7e0h: 4D 65 67 61 77 69 6E 20 20 20 20 20 20 20 20 20 ; Megawin
0000f7f0h: 4D 50 43 38 39 4C 35 34 2F 35 38 2F 35 31 35 20 ; MPC89L54/58/515
```

5.2 Dump the Information Data

To view the Information Data in the Information Zone, click “**Dump Target Info**”. Now, the Information Data read by the ISP Programmer will be displayed on the Binary Code Buffer, as shown below.



Programmer Type: ● ISP ○ ICP

MCU Part No: MPC89L(E)515

Update H/W Option: ○ No ● Yes

Programming Area: ● AP ○ IAP ○ ISP ○ AP+IAP ○ AP+IAP+ISP

H/W Option Setting

ISP-memory Set : (NA)

IAP-memory Set : FF IAPLB : (NA)

□ HWENW □ FZWDTCR □ OSCDN □ EN6T

PASS !

Dump Information OK !

Binary Code Buffer

```
0000  2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D 2D  ----------------
0010  49 6E 66 6F 72 6D 61 74 69 6F 6E 3A 20 20 20 20  Information:
0020  31 29 20 50 72 6F 64 75 63 74 20 54 79 70 65 3A  1) Product Type:
0030  3D 3E 20 55 52 43 5F 52 35 20 20 20 20 20 20 20  => URC_R5
0040  32 29 20 4D 66 67 2E 20 50 6C 61 6E 74 3A 20 20  2) Mfg. Plant:
0050  3D 3E 20 47 75 6D 69 2F 4B 6F 72 65 61 20 20 20  => Gumi/Korea
0060  33 29 20 4D 66 67 2E 20 44 61 74 65 3A 20 20 20  3) Mfg. Date:
0070  3D 3E 20 32 30 30 36 2F 30 31 2F 30 31 20 20 20  => 2006/01/01
0080  34 29 20 46 2F 57 20 56 65 72 73 69 6F 6E 3A 20  4) F/W Version:
0090  3D 3E 20 31 2E 30 30 20 20 20 20 20 20 20 20 20  => 1.00
00A0  2E 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20  .
00B0  2E 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20  .
00C0  2E 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20  .
00D0  4D 43 55 20 54 79 70 65 3A 20 20 20 20 20 20 20  MCU Type:
00E0  4D 65 67 61 77 69 6E 20 20 20 20 20 20 20 20 20  Megawin
00F0  4D 50 43 38 39 4C 35 34 2F 35 38 2F 35 31 35 20  MPC89L54/58/515
```

6 Special Notes for ISP

For the ISP operation, the Target MCU's **P3.1** pin is used as the **DTA** pin. The best case is that P3.1 dedicates itself to the ISP operation. However, P3.1 can has its normal function while not in ISP operation as long as the user follow the rule:

When the ISP Programmer is not connected, the state on P3.1 must be logic-1 when the MCU is just powered on.

It is because when the MCU is powered on and boots from ISP-memory, the MCU will check P3.1's state to determine which action will be taken: (1) keep running the ISP code, or (2) re-boot to run user's application code. If logic-0 is read, it means ISP operation is requested by the user, and the MCU will take action (1) for further ISP processing. If logic-1 is read, the MCU will take action (2). During ISP processing, P3.1 functions for bi-directional data transfer. It may output logic-1 or logic-0, and also, the ISP Programmer may send it logic-1 or logic-0. So, the user should check if it is harmful to the device/component which is connected to P3.1.

The following figures show the restriction on typical applications of P3.1 if P3.1 also functions for DTA-pin of ISP.

Figure 1:
P3.1 is used to drive an NPN transistor.

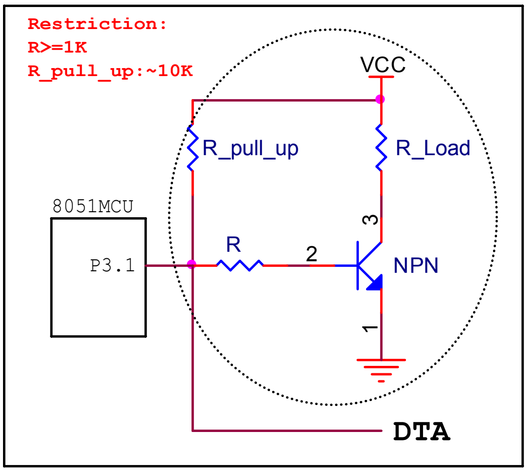


Figure 2:
P3.1 is used to drive a PNP transistor.

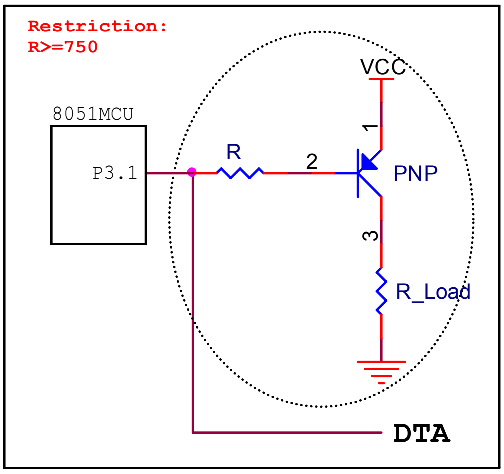


Figure 3:
P3.1 is used to drive an LED.

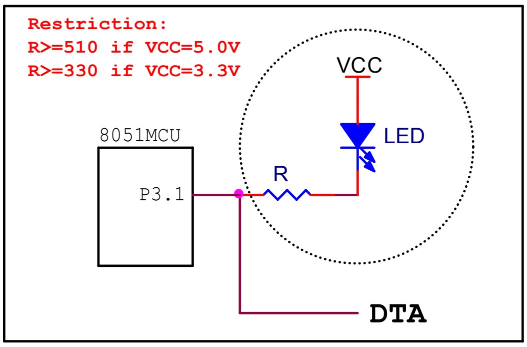


Figure 4:
P3.1 is used as it original TXD function.

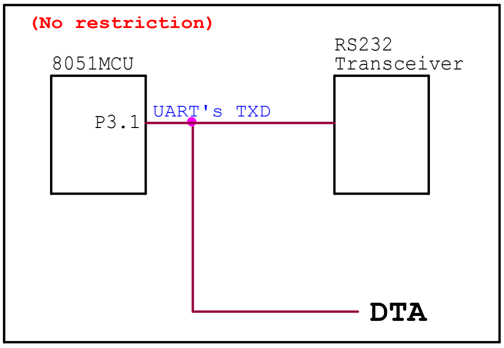


Figure 5:
P3.1 is pulled low.

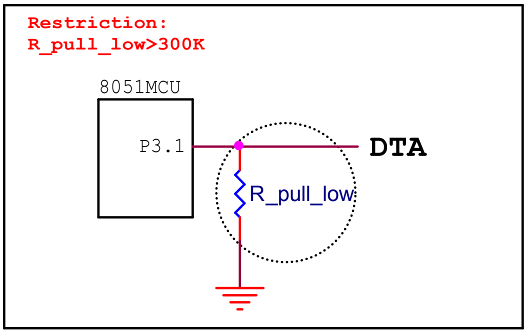
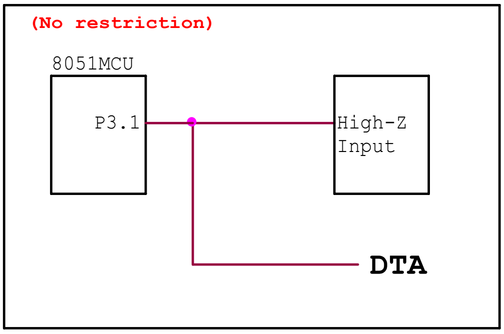


Figure 6:
P3.1 is used to drive a high-impedance input.



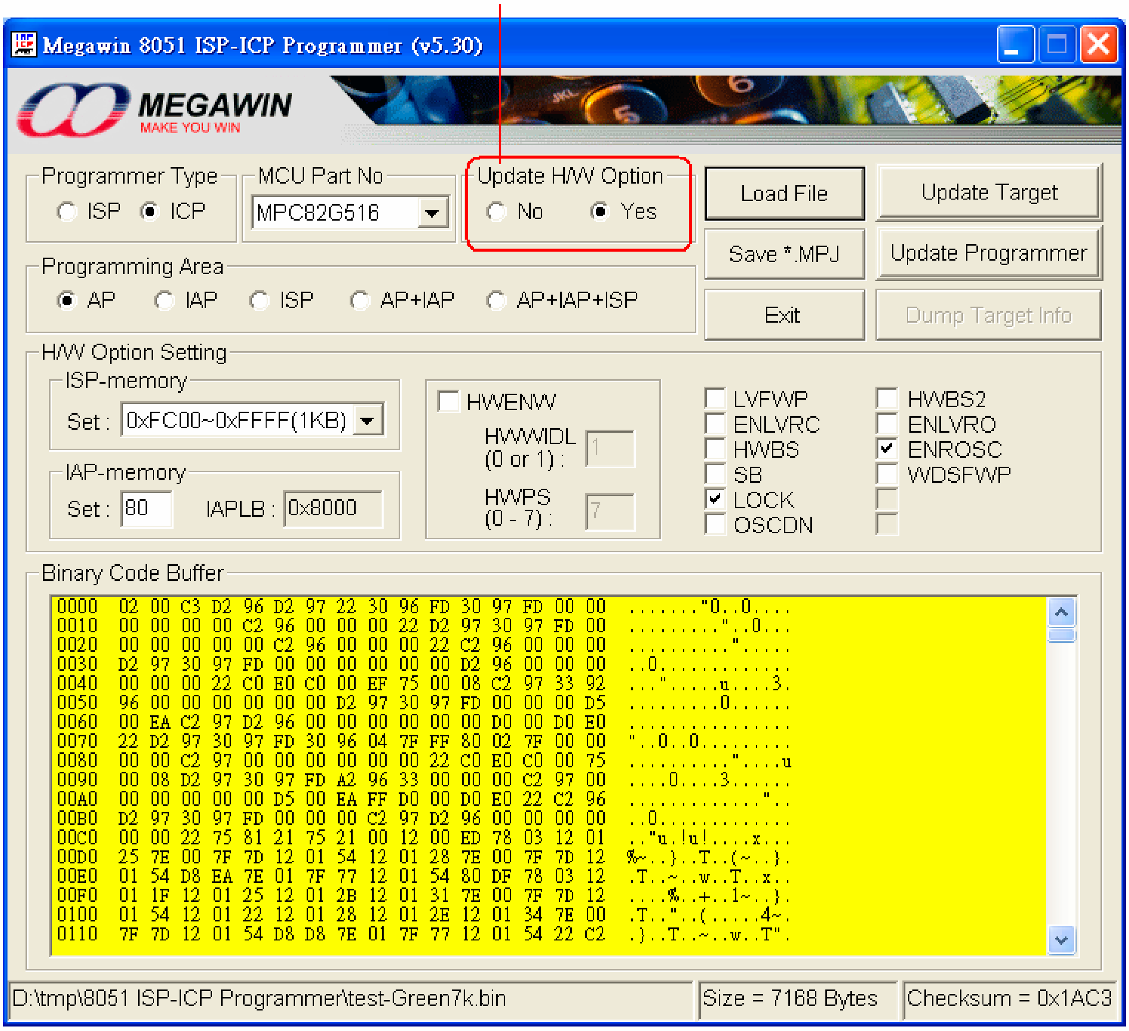
7 Special Notes for ICP

When the Programmer is used as an ICP Programmer, the user can select any of the Target Programming Area. This feature, however, is not available if acting as an ISP Programmer. In addition, if IAP-memory or ISP-memory is included in the programming area, the corresponding memory space should be configured by properly setting the H/W option regarding the IAP space and ISP space.

When chip was not locked previously, the user can individually re-program any area he wants. ***However, when the chip had been locked previously, any re-programming will be inhibited.*** This is for security consideration. It prevents from any re-programming of a code with the malicious purpose. So, re-programming must be inhibited when chip has been locked.

Once the chip was locked, the only valid operation is to program a new code with **Yes** of "**Update H/W Option**" is selected. Of course, you can also enable the LOCK bit again. See the following figure.

Select Yes to un-lock previous locked state



Programmer Type: ○ ISP ● ICP

MCU Part No: MPC82G516

Update H/W Option: ○ No ● Yes

Programming Area: ● AP ○ IAP ○ ISP ○ AP+IAP ○ AP+IAP+ISP

H/W Option Setting

ISP-memory Set : 0xFC00~0xFFFF(1KB)

IAP-memory Set : 80 IAPLB : 0x8000

□ HWENW
HWWIDL (0 or 1) : 1
HWPS (0 - 7) : 7

□ LVFWP
□ ENLVRC
□ HWBS
□ SB
☑ LOCK
□ OSCDN

□ HWBS2
□ ENLVRO
☑ ENROSC
□ WDSFWP
□
□

Binary Code Buffer

```
0000  02 00 C3 D2 96 D2 97 22 30 96 FD 30 97 FD 00 00   ......."0..0....
0010  00 00 00 00 C2 96 00 00 00 22 D2 97 30 97 FD 00   ........."..0...
0020  00 00 00 00 00 C2 96 00 00 00 22 C2 96 00 00 00   ..........".....
0030  D2 97 30 97 FD 00 00 00 00 00 00 D2 96 00 00 00   ..0.............
0040  00 00 00 22 C0 E0 C0 00 EF 75 00 08 C2 97 33 92   ..."....u....3.
0050  96 00 00 00 00 00 00 D2 97 30 97 FD 00 00 00 D5   .........0......
0060  00 EA C2 97 D2 96 00 00 00 00 00 00 D0 00 D0 E0   ................
0070  22 D2 97 30 97 FD 30 96 04 7F FF 80 02 7F 00 00   "..0..0.........
0080  00 00 C2 97 00 00 00 00 00 00 22 C0 E0 C0 00 75   .........."....u
0090  00 08 D2 97 30 97 FD A2 96 33 00 00 00 C2 97 00   ....0...3.......
00A0  00 00 00 00 00 D5 00 EA FF D0 00 D0 E0 22 C2 96   .............."..
00B0  D2 97 30 97 FD 00 00 00 C2 97 D2 96 00 00 00 00   ..0.............
00C0  00 00 22 75 81 21 75 21 00 12 00 ED 78 03 12 01   .."u.!u!....x...
00D0  25 7E 00 7F 7D 12 01 54 12 01 28 7E 00 7F 7D 12   %~..}..T..(~..}.
00E0  01 54 D8 EA 7E 01 7F 77 12 01 54 80 DF 78 03 12   .T..~..w..T..x..
00F0  01 1F 12 01 25 12 01 2B 12 01 31 7E 00 7F 7D 12   ....%..+..1~..}.
0100  01 54 12 01 22 12 01 28 12 01 2E 12 01 34 7E 00   .T.."..(.....4~.
0110  7F 7D 12 01 54 D8 D8 7E 01 7F 77 12 01 54 22 C2   .}..T..~..w..T".
```

D:\tmp\8051 ISP-ICP Programmer\test-Green7k.bin | Size = 7168 Bytes | Checksum = 0x1AC3

Revision History

Revision	Description	Date
v5.10	Add auto-upgrade function for the firmware of the Programmer's MCU.	2007/06/23
v5.20	(1) Update the included standard ISP-code: "ISP_Code_v5.00.BIN": for MPC89-series & MPC82-series "ISP_Code_v5.00_MG84.BIN": for MG84-series (2) Update the driver to "0E6A030D_8051ISPICP_v3.00.inf" for Vista OS.	2007/07/17
v5.30	(1) Fix the AP bug: Firmware upgrade will fail if host uses OHCI chip set. (2) For ICP Programmer, the user can select whether to update the hardware option or not.	2007/10/05
v5.30a	(1) Fix the AP bug: Wrong display in the H/W Option area when “MPC89E58.MPJ” is loaded. (2) Modify description for HWENW. (Section 3-3-3 & 3-3-4) (3) Correct description for ENLVRO, from 3.8V to 3.7V. (Section 3-3-3) (4) Update Section 2.1.	2008/01/24