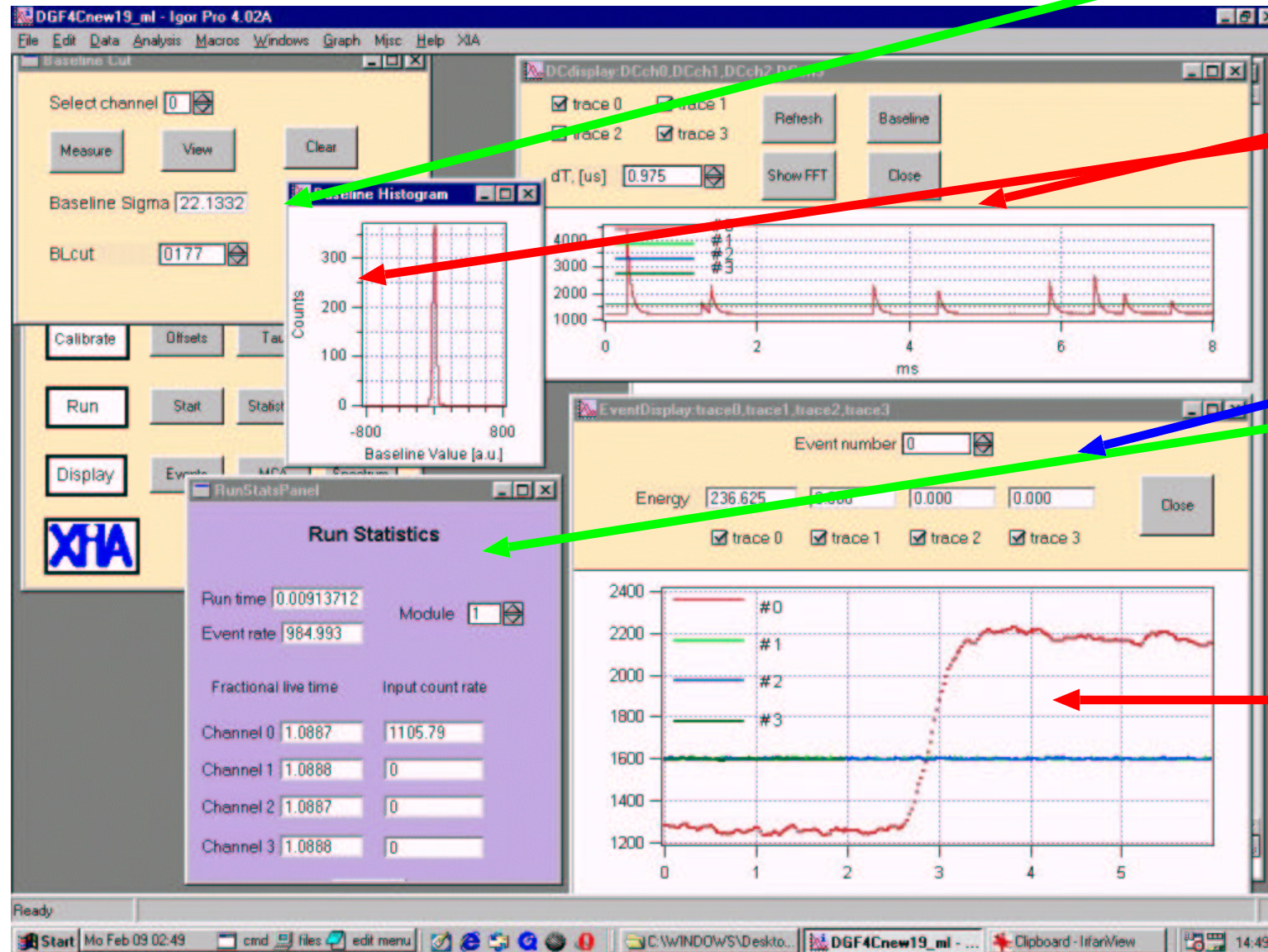


Development Environment: XIA Software Release 2.7/2.8

- XIA uses IGOR Pro software from Wavemetrics: DGF setup + DAQ + Data Analysis
- AND: System Diagnostics !!!
- more info: www.xia.com and www.wavemetrics.com



Baseline Cut

Untriggered waveform with variable time scale

Run Statistics:
triggers/events
Live & Run time

DGF List
Mode Buffer:
• Energy
• Trace

Development Environment: Interfacing with the XIA code

- precompiled XIA code
- Template file: User.dsp
 - Assembler
 - Various subroutines called at different stages of the XIA code
 - 2048 Instructions and 1000 Data Words
- Interface with XIA code: Global Variables/Data Arrays
- PSA results: 6 Parameters (Uretval Array)
 - XIA code puts User PSA results into list mode buffer
- Makefile: compilation of User.dsp and linking with XIA modules
- more information: - www.xia.com
 - **Appendix A** of DGF Programmer's Manual
- XIA software release 3.0 much faster than 2.7 → C code library

Analog Devices ADSP-2181/2183

- fixed point Digital Signal Processor
- 16 bit, 40 Mhz
- Harvard Architecture: Data & Program Memory
- simple Assembler expressions:

```
i0 = dm(ATstart); /* load pointer to beginning of waveform buffer */
```

```
ax0 = dm(i0,m1); /* load first data word of trace into register */
```

```
ar = ax0 - ay0; /* subtract offset (stored in ay0) from waveform */
```

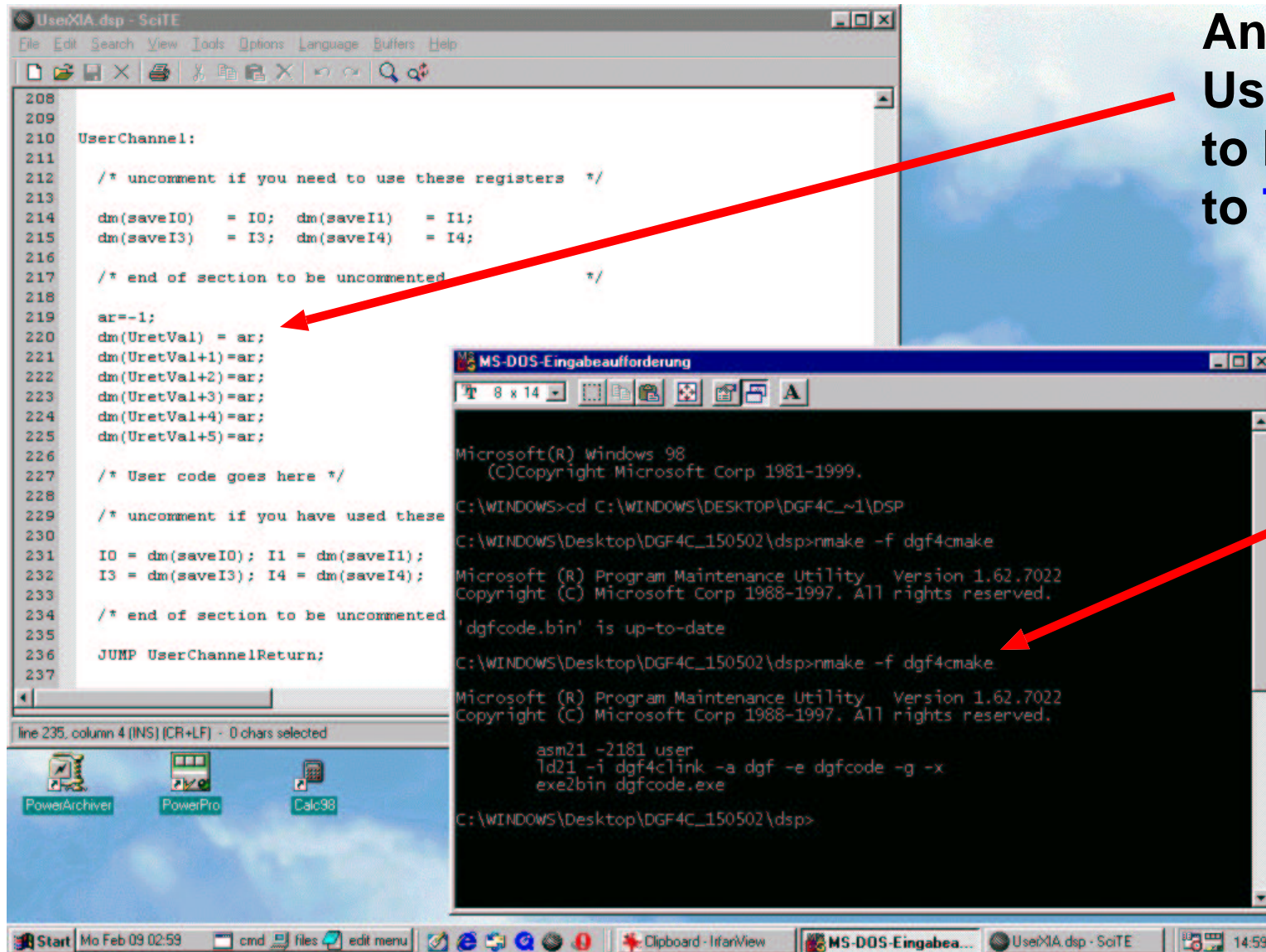
```
/* Multiply ACcumulate Operation with data read */
```

```
/* Multi Function: ALU/MAC + DATA & PROGRAM Memory Read */
```

```
mr = mr + mx0*my0 (uu), mx0=dm(i0,m1);
```

Development Environment: DSP software

- Analog Devices Assembler Version 6.1 (VisualDSP++ free trial software (90 days))
- more information: www.analog.com/processors/processors/ADSP/index.html



The image shows a Windows 98 desktop environment. The main window is a text editor titled "UseXIA.dsp - SciTE" containing assembly code for a DSP. The code includes register definitions, a section for user code, and a jump instruction. A second window, titled "MS-DOS-Eingabeaufforderung", shows the execution of the 'make' command in a directory path, resulting in the creation of a binary file 'dgfcode.exe'. A red arrow points from the text editor to the command prompt, and another red arrow points from the command prompt to the text 'NEXT STEP: download new code to DGF-4C'.

```
208
209
210 UserChannel:
211
212 /* uncomment if you need to use these registers */
213
214 dm(saveI0) = I0; dm(saveI1) = I1;
215 dm(saveI3) = I3; dm(saveI4) = I4;
216
217 /* end of section to be uncommented */
218
219 ar=-1;
220 dm(UretVal) = ar;
221 dm(UretVal+1)=ar;
222 dm(UretVal+2)=ar;
223 dm(UretVal+3)=ar;
224 dm(UretVal+4)=ar;
225 dm(UretVal+5)=ar;
226
227 /* User code goes here */
228
229 /* uncomment if you have used these
230
231 I0 = dm(saveI0); I1 = dm(saveI1);
232 I3 = dm(saveI3); I4 = dm(saveI4);
233
234 /* end of section to be uncommented
235
236 JUMP UserChannelReturn;
237
```

```
Microsoft(R) Windows 98
(C)Copyright Microsoft Corp 1981-1999.
C:\WINDOWS>cd C:\WINDOWS\DESKTOP\DGF4C_~1\DSP
C:\WINDOWS\Desktop\DGF4C_150502\dsp>nmake -f dgf4cmake
Microsoft (R) Program Maintenance Utility Version 1.62.7022
Copyright (C) Microsoft Corp 1988-1997. All rights reserved.
'dgfcode.bin' is up-to-date
C:\WINDOWS\Desktop\DGF4C_150502\dsp>nmake -f dgf4cmake
Microsoft (R) Program Maintenance Utility Version 1.62.7022
Copyright (C) Microsoft Corp 1988-1997. All rights reserved.
asm21 -2181 user
ld21 -i dgf4clink -a dgf -e dgfcode -g -x
exe2bin dgfcode.exe
C:\WINDOWS\Desktop\DGF4C_150502\dsp>
```

Any Text Editor
User code
to be added
to **TEMPLATE**

MAKEFILE
included !
User Code
linked with
precompiled
XIA code
NEXT STEP:
download
new code
to DGF-4C

Development Environment: Configuration

- 2 data arrays with 16 global parameters: USERIN + USEROUT
- Possibility to define new arrays in the User Code !
- Global Variables: tracelength, energy, start address of trace, channel number

The screenshot shows the Igor Pro 4.02A interface. The main window is titled 'DSPview: DSPnames.DSPvalues' and contains a table with the following data:

Point	DSPnames	DSPvalues
47	XDATLENGTH	0
48	USERIN	3
49		3
50		2
51		2
52		2
53		2
54		59023
55		59023
56		59023
57		59023
58		10
59		10
60		0
61		0
62		12345
63		54321
64	CHANC SRAD	2749
65	CHANC SRBD	3
66	GAINDACO	16903
67	TRACKDACO	33480
68	UNUSEDAD	65535
69		0
70		0
71		0
72	SLOWLENGTH0	8
73	SLOWGAP0	3
74	FASTLENGTH0	4
75	FASTGAP0	2

The 'dsppanel' window is titled 'Edit DSP parameters' and contains a 'Select Module' dropdown menu set to '1'. It has 'Get' and 'Put' buttons for two data sources: 'data from/to database only' and 'data from/to database and module'. There are also 'Apply' and 'Close' buttons. A blue arrow points from the 'Put' button for 'data from/to database and module' to the 'USERIN' row in the DSPview table.

USERIN array:
16 global
parameters
for all channels

MINIBALL:
selection of
the algorithms

samples used
for the baseline

with or without
interpolation
($\Delta t < 25$ ns)

samples used
for PSA

