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A C Q U I S I T I O N   S Y S T E M  
F O R   T R A N S I E N T   S I G N A L S  
U S I N G   S I M I K   B O X   D I G I T I Z E R S

User's Manual

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Apendices

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## 1. Introduction

This system is designed as a digital 16-trace storage oscilloscope, but only 10 traces can be simultaneously displayed on the screen. The fast acquisition of transients is done by the Simik box which is controlled, via RS/232C, by a mini-computer PRO 380 (DEC, PDP-11 family). The maximum sampling frequency is 250KHz.

The software (program SACQUI) running on the PRO 380 is easy to use and no prior knowledge of the computer is necessary. It allows the User to setup the instrument to meet his needs, and to modify the display interactively. The options are selected from three menus: 'main menu', 'modify setup menu' and 'modify display menu'.

A hard copy of the screen can be produced on the printer. The transient signals are stored in disc files with all relevant information for further analysis: date, time, setup, scaling and User's comments.

Update - Version 2      April 87

The slow ADC box is also supported. However the maximum sampling time allowed is 32 ms.

Update - Version 3      August 87

Printout on laser printer (option 6).  
Display setup is saved on disk.





Each active channel on the fast (slow) Simik box increases the sampling time by 4  $\mu$ s (100  $\mu$ s). (Must be set manually using the front-panel switches.)

Example:

Channels actived:	Minimum sampling time	
	Fast ADC box	Slow ADC box
1	4 $\mu$ s	100 $\mu$ s
2	8 $\mu$ s	200 $\mu$ s
3	12 $\mu$ s	300 $\mu$ s
.	.	
.	.	
16	64 $\mu$ s	1600 $\mu$ s

If an error occurs, LED diodes light on the front-panel of the Simik box.

In the version described here the program SACQUI handles 511 samples per trace.

### 3. The program SACQUI (Version 3)

#### 3.0 System deadstart

- \* Turn the power ON (PRO 380 and Simik box)

After 30 s the 'DIGITAL logo' appears on the screen, then the P/OS menu.

- \* Select P/OS Tool kit (press the 'down arrow' once, and press DO.

When the initialization is complete, the PRO 380 can be used like a PDP 11 under RSX11M.

- \* Select the working directory

Type SET DEF [SGYRO] (gyrotron shots)  
or SET DEF [OPHELIA] (quench analyser)

- \* Type RUN SACQUI

The main menu is displayed and the system is ready.

#### Main menu

- 0 Display this menu
- 1 Display the CURRENT setup
- 2 Modify the setup
- 3 Acquire new data from the box
- 4 Modify plot/print displays
- 5 Plot data on screen
- 6 Plot data on laser printer
- 7 Read an existing data file
- 8 Exits from this program

Your choice ?

Some of the options are documented in the next sections.



## Remarks:

- 1) The front-panel settings of the Simik box are read in each time this display is called. If you modify the settings while this display is active, you must reselect it in order to see the change. If it doesn't work, reset the box.
- 2) The information which cannot be entered via the front-panel switches can be modified by using option 2 (section 3.2).  
Ex.: The A & B constants, the slot unit etc.

3.2 Modify the setup (option 2)

The following sub-menu is displayed:

Modify setup menu

- 0 Display this menu
- 1 Define trace parameters
- 2 Enter comments
- 3 Display setup
- 4 Save setup on disc
- 5 Return to main menu

Your choice ?

Typing 1: allows you to change all the parameters listed in section 3.1, except the parameters which have to be set manually on the Simik box. All User's inputs are checked for plausibility.

Typing 2: allows you to change only the comments (3 lines of 32 characters).

Typing 3: produces the same display as the one shown in 3.1.

Typing 4: saves the current setup in a disc file (ASCII) named SSETUP.ACQ. The file can be displayed or printed using the standard DCL commands TYPE or COPY (one must first exit from SACQUI).  
Saving the setup dispenses the User to redefine all the trace parameters the next time he runs SACQUI. This file is read in automatically during the initialisation of the program.

Typing 5: Returns to the main menu.



### 3.3 Acquire new data from Simik box (option 3)

All selected traces are read in sequentially and stored in a disc file named Snnnnn.SHT, where nnnnn is the shot number. In the present version, each trace has 511 points. To conserve disc space, the data is stored in binary form. The file length is  $2*(nt+1)$  blocks of 512 bytes, nt being the number of traces. (The hard disc size is 65000 blocks.)

The shot files are written in the working directory (eg. [SGYRO]). The files can be listed, copied, deleted by using the DCL commands.

The shot number is automatically incremented and saved into an auxiliary file, so the User does't have to remember it. Writing twice the same file is thus not possible.

Reading all the Simik box ( ~ 8176 acquisitions ) takes about 25 sec. at 9600 baud.

### 3.4 Modify plot/print displays (option 4)

A table similar to this one is displayed on the screen:

Trace	Selec	Displ	time t0	Time/div	Physical Y-values	
			[ $\mu$ s]	[ $\mu$ s]	Min.	Max.
1	1	1	0.000E-01	100.000	-5.00	5.00
2	1	1	0.000E-01	100.000	-5.00	5.00
3	1	0	0.000E-01	100.000	-5.00	5.00
4	1	0	0.000E-01	100.000	-5.00	5.00
5	1	0	0.000E-01	100.000	-5.00	5.00
6	1	0	0.000E-01	100.000	-5.00	5.00
7	1	0	0.000E-01	100.000	-5.00	5.00
8	1	0	0.000E-01	100.000	-5.00	5.00
9	1	0	0.000E-01	100.000	-5.00	5.00
10	1	0	0.000E-01	100.000	-5.00	5.00
11	1	0	0.000E-01	100.000	-5.00	5.00
12	1	0	0.000E-01	100.000	-5.00	5.00
13	1	0	0.000E-01	100.000	-5.00	5.00
14	1	0	0.000E-01	100.000	-5.00	5.00
15	1	0	0.000E-01	100.000	-5.00	5.00
16	1	0	0.000E-01	100.000	-5.00	5.00

Display mode: Raw data

#### Modify display menu

- 1 Modify values in the above table
- 2 Modify Time/div for all traces in one go
- 3 Plot data
- 4 Return to the main menu

Your choice ?

Typing 1 allows you to change the following parameters.

Select: Trace selector    1: trace is present (see 3.1)  
                               0: trace is absent

Displ: Display selector    1: trace will be displayed  
                               0: trace will not be displayed

Time t0 [ $\mu$ s]: Time before the first sample shown on the screen.

Time/div. : The time axis has 10 divisions, so the time axis length is 10 times the value printed in this column.

Physical Y-values : Lower and upper bounds for the display. The default values are the physical range of the trace (constants A & B section 3.1).

Two displays can be selected:

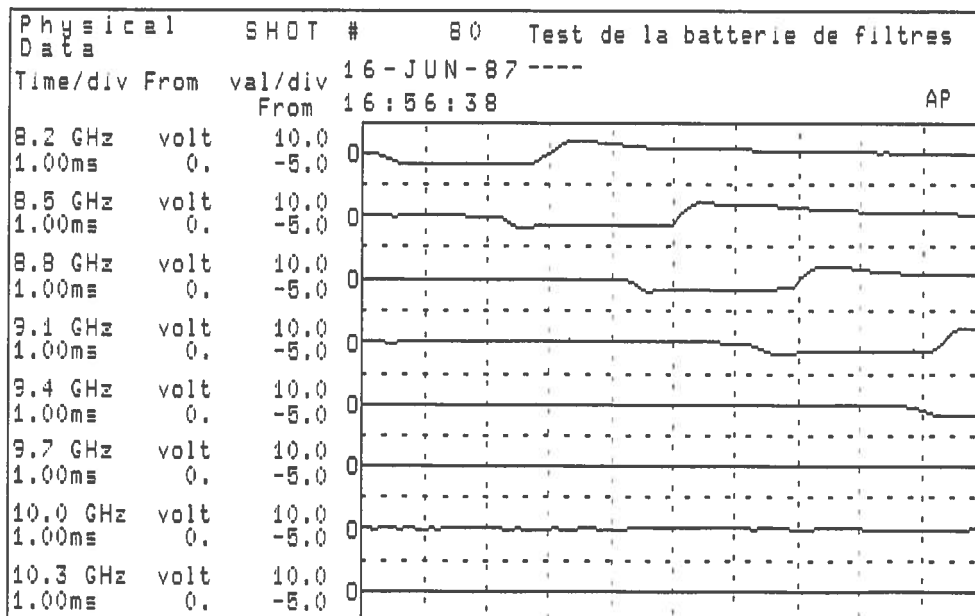
- Raw data: Values are shown from -2048 to 2047 as stored in the Simik box.
- Physical data: Values are scaled to the physical range.

Typing 2 allows you to change the time scale of all the traces by entering only one input.

Typing 3 plots the data (and return to the main menu)

### 3.5 Plot data on the screen (option 5)

Produces displays on the screen. Use the key Print screen to get a hard copy. (You can put 3 screens per A4 sheet.) Use Page eject to get the paper out.



### 3.6 Plot data on the laser printer (option 6)

Plots the shot on a A4 page.

### 3.7 Read an existing data file (option 7)

The User is prompted to enter the shot number. Since the traces have been stored with the corresponding setup information, the data can immediately be displayed.

## Appendix A List of source files - directory [SIMIK]

### SACQUI Version 3

File	Routines
SACQUI.FTN	Main program, blockdata
SRSETUP.FTN	srsetup
SMSETUP.FTN	smsetup
SERINI.FTN	serini
SERSWI.FTN	serswi
RSERIAL.FTN	rserial, srshot, writ1k, read1k
RD1BLK.ftn	rd1blk
SMODPLO.FTN	smodplo, sdisset
SPLTDAT.FTN	spltdat, sgrid
STITLE.FTN	stitle, sscases
SDSPTRA.FTN	sdsptra, zeropt
LPLTDAT.FTN	lpltdat
LGRID.FTN	lgrid
LTITLE.FTN	ltitle, lscases
LDSPTRA.FTN	ldsptra, zzeropt
SACQUI.CMD	Command file containing everything to task-build the program
UTIL.FTN	Conversation subroutines (UTIL.OLB) in directory [LIB]

To compile: FOR file/SOURCE/NOMAP/NOWAR

To task-build: @SACQUI

Auxiliary files in the working directory (eg [SGYRO]) :

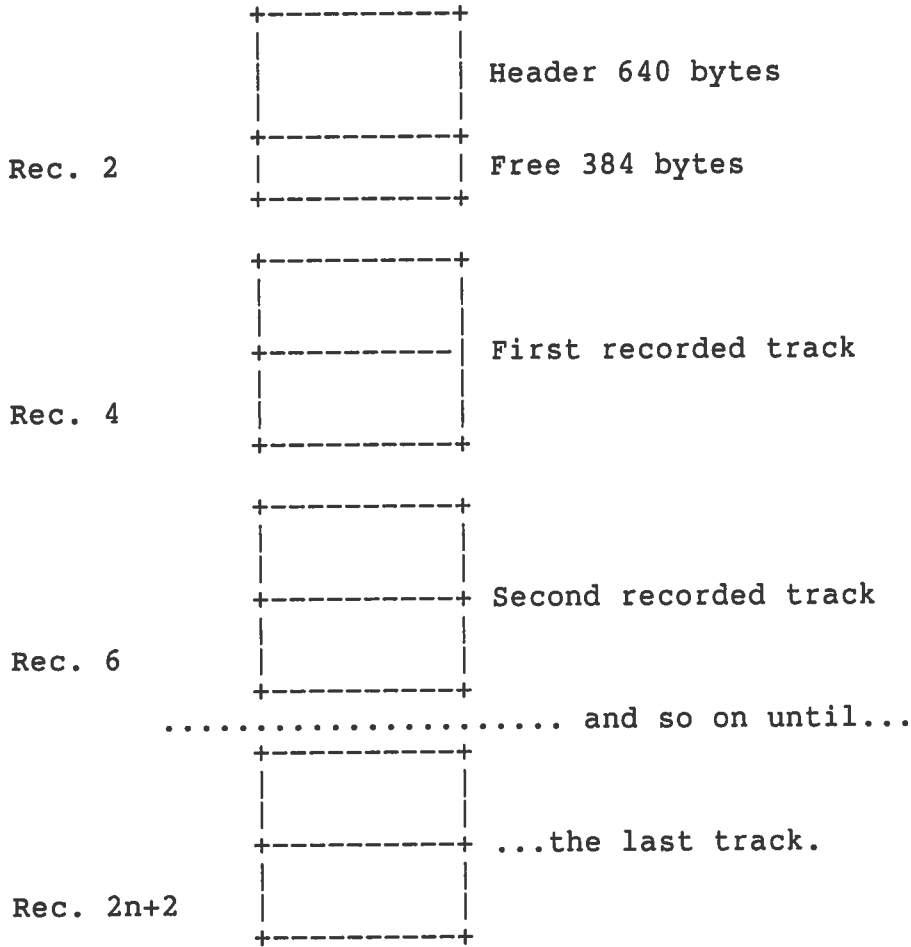
SSETUP.ACQ	present setup
SNSHOT.ACQ	last shot number
DSSETP.ACQ	display setup

The user-ready task SACQUI.TSK resides in directory [SGYRO].

Further versions of SACQUI should be developed in directory [SIMIK] and transferred to the working directory only when they are tested and documented.

Appendix B      Structure of the file [SGYRO]Snnnnn.SHT

Records of 512 bytes = 256 words = 1 block



To access the file, the parameters of Call OPEN are:

ACCESS='direct', FORM='unformatted',  
 RECL=128, BLOCKSIZE=512

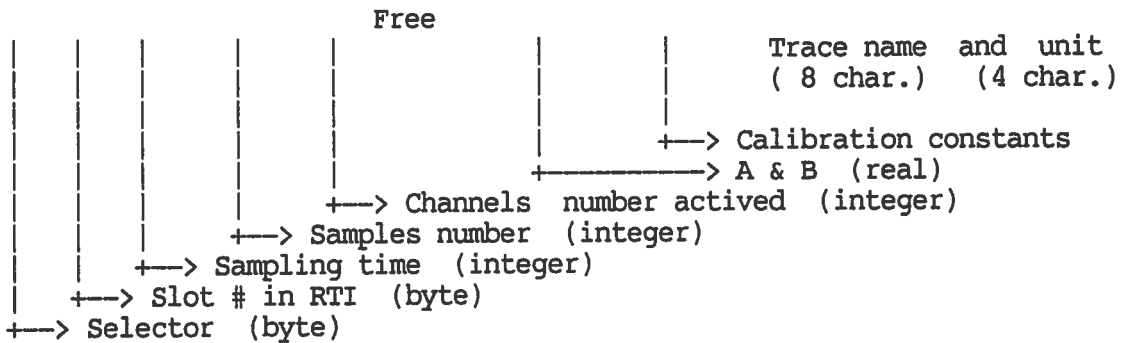
Note:      Only the traces selected in the Setup are  
 stored in the file Snnnnn.SHT

Structure of the header block

Integer array IHEAD(16,20)

IHEAD(i,j) i→

j	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16																
1	Shot#	2	5	-	O	C	T	-	8	5		1	7	:	2	5	:	2	6													
2	1	s	t		L	i	n	e		o	f		c	o	m	m	e	n	t	s												
3	2	n	d		L	i	n	e		o	f		c	o	m	m	e	n	t	s												
4	3	r	d		L	i	n	e		o	f		c	o	m	m	e	n	t	s												
5	1	1		100		511		16				A	(	min)		B	(	max)		P	o	w	e	r		P	g	W	a	i	t	t
6	1											A	(	min)		B	(	max)		U	c	o	l	l	e	c	t		k	V		
7	1											A	(	min)		B	(	max)		N	a	m	e		U	n	i	t				
8	1											A	(	min)		B	(	max)		N	a	m	e		U	n	i	t				
9	1											A	(	min)		B	(	max)		N	a	m	e		U	n	i	t				
10	1											A	(	min)		B	(	max)		N	a	m	e		U	n	i	t				
11	1											A	(	min)		B	(	max)		N	a	m	e		U	n	i	t				
12	1											A	(	min)		B	(	max)		N	a	m	e		U	n	i	t				
13	1											A	(	min)		B	(	max)		N	a	m	e		U	n	i	t				
14	1											A	(	min)		B	(	max)		N	a	m	e		U	n	i	t				
15	1											A	(	min)		B	(	max)		N	a	m	e		U	n	i	t				
16	1											A	(	min)		B	(	max)		N	a	m	e		U	n	i	t				
17	1											A	(	min)		B	(	max)		N	a	m	e		U	n	i	t				
18	1											A	(	min)		B	(	max)		N	a	m	e		U	n	i	t				
19	1											A	(	min)		B	(	max)		N	a	m	e		U	n	i	t				
20	1											A	(	min)		B	(	max)		N	a	m	e		U	n	i	t				



Appendix C Error messages and trouble-shooting

Error	Possible action
Cannot read front panel switches of the acquisition box	Power up the Simik box. Check RS/232C cable connection. Reset the Simik box. Correct the switches of the box. Correct the slot unit number of the RTI. Test program [simik]RDSIM to localize the fault.

## Useful phone numbers for further help:

021 47 34 90	A.Perrenoud	Responsible of this system CRPP
021 47 34 79	A.Simik	Responsible of the acquisition box
021 47 45 87	J.Virchaux	Responsable SIG pour les mini-ordinateurs. A contacter avant d'appeler DEC. No. du système: WF51418494
021 47 41 47	Pittori	Contrats de maintenance DEC
021 27 45 61	P.Howald	Ingénieur de vente chez UNICS Av. de Cour 26 1007 Lausanne
01 829 92 22		DEC Zürich
022 43 59 40	Pralong Agassiz	Ing. field service PC Ing. field service PC DEC Genève

PHYSICAL  
DATA

SHOT # 80  
16-JUN-87

Test de la batterie de filtres  
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16:56:38

AP

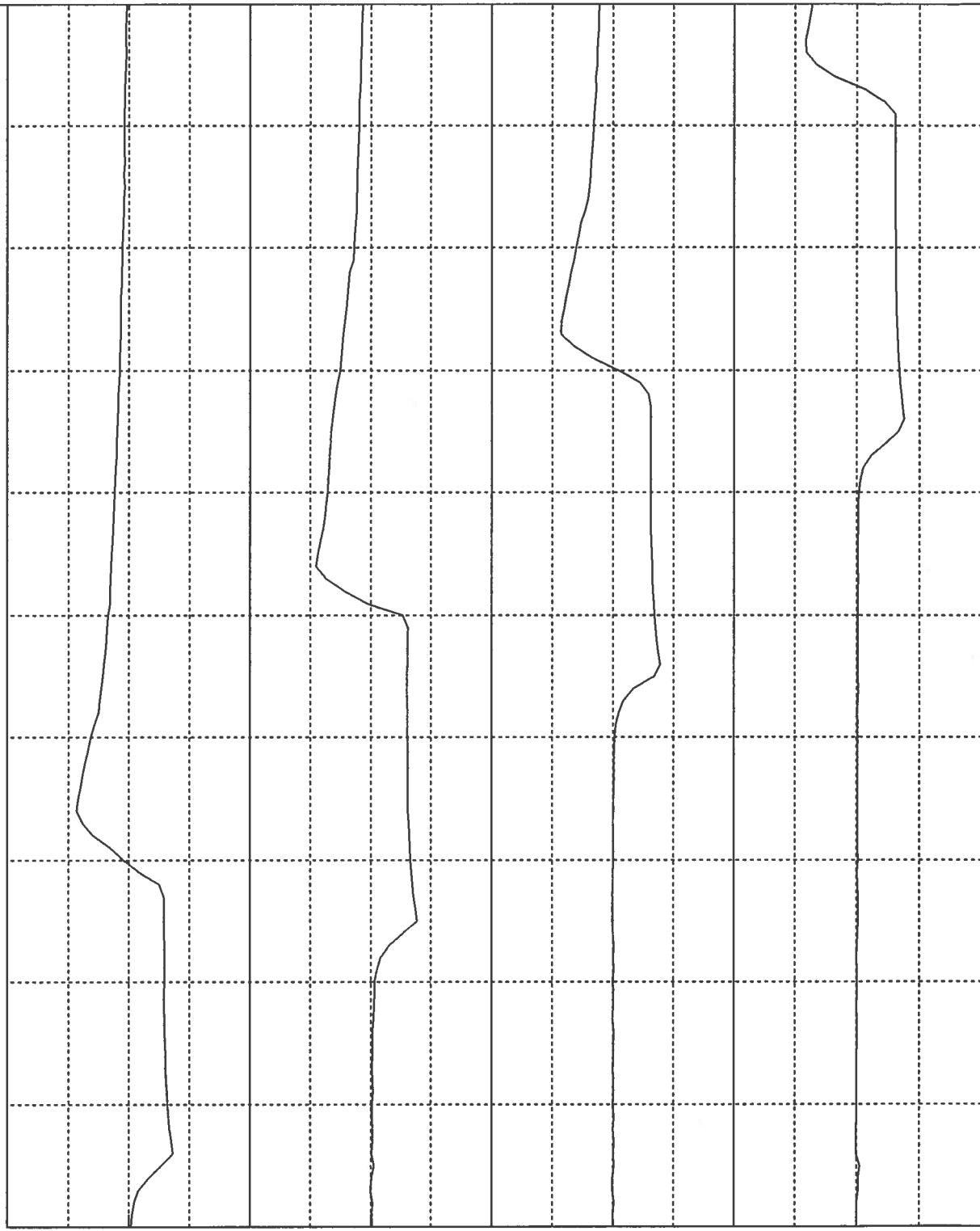
TIME/DIV FROM  
VAL/DIV

8.2 GHz volt  
1.ms 0.  
2.5 -5.0

8.5 GHz volt  
1.ms 0.  
2.5 -5.0

8.8 GHz volt  
1.ms 0.  
2.5 -5.0

9.1 GHz volt  
1.ms 0.  
2.5 -5.0



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PROGRAMME D'ACQUISITION POUR BOÎTES "SIMIK" (16 traces)

Q U E N C H   A N A L Y S E R

31.07.87

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Software

Le principe est le même que pour le programme ACQUI. Documentation générale: INT 119/85.

Lorsqu'on enclenche le PRO 380, on arrive dans le directory [GYRO] qui contient les fichiers relatifs au gyrotron 8 GHz. Entrer la commande SET DEF [OPHELIA] pour accéder au directory réservé aux bobines SMIT. Ensuite: RUN SACQUI et répondre aux questions.

Une option a été rajoutée pour dessiner les traces sur l'imprimante laser, mais ça prend 4 minutes (!). Pour des dessins plus rapides, utiliser le "print screen", puis presser le "page eject" sur l'imprimante (bouton | > ). On peut mettre 3 "print screen" par page A4.

Hardware

Une nouvelle variante de boîte "SIMIK" (Slow ADC3) avec échantillons après trigger a été construite spécialement pour enregistrer les signaux provenant des bobines SMIT lors d'un quench.

La communication avec le PRO 380 se fait par fibre optique: switch I/O sur "OPTO". La boîte contient toujours 511 échantillons par traces. Entrées:  $\pm 5V$ , digitaliseurs 12 bits. Un compteur indique la nombre d'échantillons pris après le trigger.

Signal de trigger: flanc descendant d'une impulsion TTL. Utiliser le diviseur par 3 (sucobox) pour l'adaptation avec le trigger SMIT (15 V).

Bouton rouge: ACQUIS = Acquisition normale  
SCOPE = Display possible des traces sur oscilloscope  
compteur "NB OF CHANNELS" = N° de la trace

Toutes les prises BNC non utilisées doivent être "bouchées" par des court-circuits.

Pour démarrer l'acquisition: RESET : la lampe "BUSY" s'allume.

Après un trigger, quand la lampe "END OF SAMPLING" s'allume la lecture de la boîte est possible (on peut lire les données autant de fois qu'on veut). Attention de ne pas presser le RESET intempestivement !

En cas de problèmes...

Si le PRO 380 n'arrive pas à lire l'ADC3:

- Vérifier la liaison par fibre optique. Convertisseur enclenché ?
- Vérifier le setup
- Essayer de lire avec le scope

En dernier ressort: utiliser le système CAMAC et RUN ACQUI.