Minutes of PS Technical Meeting N° 99
held on 25th February 1998

The AD and its controls

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1   S. Maury presented the status of the AD project, approximately 6 months ahead of the start-up. His transparencies are shown in annex. Whilst there are some worrying items (notably the delivery schedule of certain power supplies and RF equipment), the AD project is on target for the initial tests, as from September 1998. For the experimental areas it is essential to mount as much of the beamline elements as possible, as well as the experimental areas in order to give sufficient time to the physicists for their preparations for the start of physics after the 1999 shutdown.

2.   C. Serre then showed the architecture of the AD controls which closely resembles the rest of the PS control system. See transparencies in annex.

3.   B. Frammery explained how timing will be done for AD using the standard MTG and TG8 modules, but adopting a new method to cope with the very special timing needs of AD. This involves adding an additional MTG to the 3 already in use, which implies large changes to the software. The transparencies are given in annex.

4.   There was no presentation on application software and a question was raised about using Java. The feeling of CO group is that it is too early to contemplate providing a suite of application programs in Java because the associated tools are not yet sufficiently developed. Although it means some programs may later have to be re-written in Java, for the moment this language is not a realistic option in the present time-frame.

B.W. Allardyce

AD STATUS

Controls	:	• Specifications • Commissioning foreseen for June 1998
Power Converters	:	• Specifications done • Preparation for installation in bldgs 195 & 366
Magnetic Measurements	:	QDN, QDW, BHN, sextupole
RF	:	LEAR cavity is used for h=1
Vacuum	:	• Specifications / Calculations done • Studies started in laboratory (stochastic cooling tanks, RF cavities) • Installation pumps starts 1st November
Stochastic Cooling	:	Studies of increase aperture
Electron Cooling	:	• LEIR stops the 17th November • Studies of mechanical modification • Installation started in bldg 193
Infrastructure	:	• Water cooling installed at 90% • Cabling path installed • Re-cabling starts 18th November • Racks • Brinolage

Experimental Area	:	• 4 areas
		• New lines: - 2 ATRAP lines
		    - more compact
		    - same matching
		• Studies: - huts installation
		    - safety

AD PROJECT

ID	Task Name	Start	End
1	**Infrastructures**	27.10	30.6
2	**AC/AD Ring upgrade**	27.10	28.8
3	*Control*		
4	Control - Studies, Layout, Specif.	27.10	15.5
5	Control -Commissioning	1.6	30.11
6	Power Converter	27.10	15.9
7	*Magnet corrector LEP,PSB*		
8	Magnet corrector-Studies,Layout	27.10	29.5
9	Magnet corrector - Installation	1.6	31.7
10	Magnet dipole	27.10	30.6
11	QDN Reserve	27.10	5.5
12	Magnet quadrupole	12.1	1.5
13	Magnet Sextupole	1.4	30.4
14	RF	27.10	15.6
15	Vacuum	27.10	10.9
16	Source - Target Zone	27.10	30.4
17	SC/BI studies/modific.	27.4	28.8
18	SC/BI Installation/cabling	2.3 / 29.6	30.3 / 28.8
21	*ECOOL*		
22	Installation	27.10	29.5
23	Commissioning	1.6	15.7
24	*Experimental Zones*		
25	Experimental Zones Studies	27.10	30.1
26	Installation transfert ligne	2.3	29.5
27	Installation Experience	4.5	28.8
28	Move ligne	2.2	4.5
29	Instrumentation	27.10	28.8
30	Machine Start-Up	2.9	30.11
31	Shut-Down	◆ 1.12	

My worries

1. 1st of September
   (Power Supplies, rf , controls, PU's

2. Stability at low energy

3. Installation of the experimental area

4. Controlled access for the experimental area

5. Personnel

AD : Controls Infrastructure

Generalities + Solutions

Studied Interfaces

Organization & responsibilities

Planning

TGLM AD Status; 25.02.98

Generalities & Solutions

▮ General structure of the AD Control System

▮ PPC in DSC; Evaluation of JAVA for workstation Applics

▮ Adaptation to the AD Cycle

  ▮ particular solution for the long cycle

  ▮ One "active" Break Point per AD cycle

  ▮ Predefined number of "Multiple Injection"

  ▮ PS & PSB synchronization

▮ Solution defined by the CO group after long discussions

  ▮ Complexity of the control of the cycle managed at the level of a particular MTG for AD (new ADE PLS telegram)

  ▮ at the DSC level : standard EM and specific RT tasks

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Layout & Control Interfaces (1)

- **Instrumentation (BD) : 4 DSC**
  - Transfo DC, Pick up (===> GPIB module foreseen; no specs)
  - Screens, Scrapers, Fast Transfos
  - Coherent oscillations (BD in charge)
  - Q measurement, MWPC ==> to be discussed
- **Electron Cooling : 1 DSC**
  - control of specific PC interface from standard VME modules
- **Kickers (standard KSU) : 2 DSC**
- **Power Supplies (128 1553/RTI, 37 CAMAC) : 3 DSC**
- **Vacuum [LHC/VA, standard EMs improved] : 1 DSC**

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Layout & Control Interfaces (2)

- **Stochastic Cooling : 2 DSC**
  - Control of amplifiers, delays and attenuators
  - Kickers and PUs movements (VME modules to specific proc.)
- **RF (interface for 2 cavities + cavity H=1) : 1 DSC**
  - NMR and BTrain calibration (PC based specific controls)
- **Timing (TG8 and TSM with modified Software) : 1 DSC**
- **Sampling measurements (adapted to AD cycle)**
- **nAos : 2 VXI crates foreseen**
  - Solution not yet defined for very slow signals.
- **WEB Documentation : "http://srv1ps.cern.ch/ad/"**

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Organization & Responsibilities.

∎ Operation Team (HM, TE) in charge of :
  ∎ Users & Operation Requirements
  ∎ Definition of Equipment to be controlled (OBnames)
  ∎ Specification and realization of workstation Applications
∎ Controls Team in charge of VME controls interfaces and Software in the DSC (EM, RT, Drivers)
  ∎ E.Roux : layout and its implementation + Hardware Tests + Documentation on WEB.
  ∎ GH. Hemelsoet : technical responsible of the AD Control System development (+ realization of DSC Software)
  ∎ Ch.Serre : General coordination and planning

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Planning

∎ Requests specified for end of January 98.
∎ February/March : Detailed specifications for EM & RT
∎ DSC Software done for June
  ∎ tests of layout (DSC, Timings, Basic Software) from ACR
  ∎ tests of the specific control interface for the equipment
∎ Commissioning in September 98 (from ACR Workstations & Console Manager)
  ∎ tests of the Control System itself (with possible perturbations on CPS machine operations)
  ∎ Participation to the starting up of the AD machine
∎ For April 99
  ∎ integration of modifications identified during the commissioning
  ∎ operational starting up from MCR

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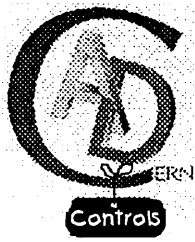
Recalls

PS timing generation
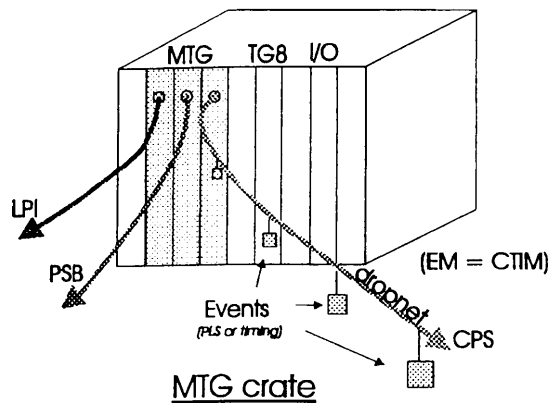
The "strong coupling" principle

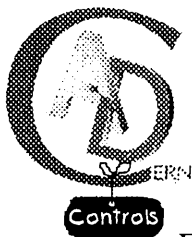## Recall on PS timing generation
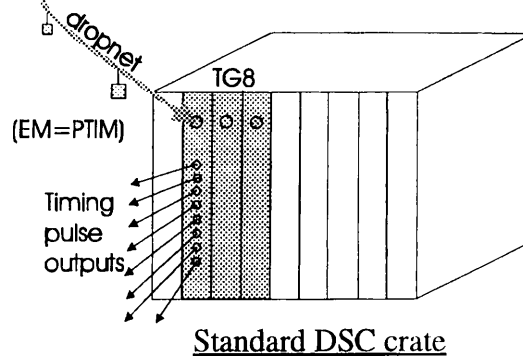
"Event" production in the Main Timing Generator

MTG crate

Recall on PS Timing generation (2)

From "events" to timing pulses in the TG8 modules

(EM=PTIM)
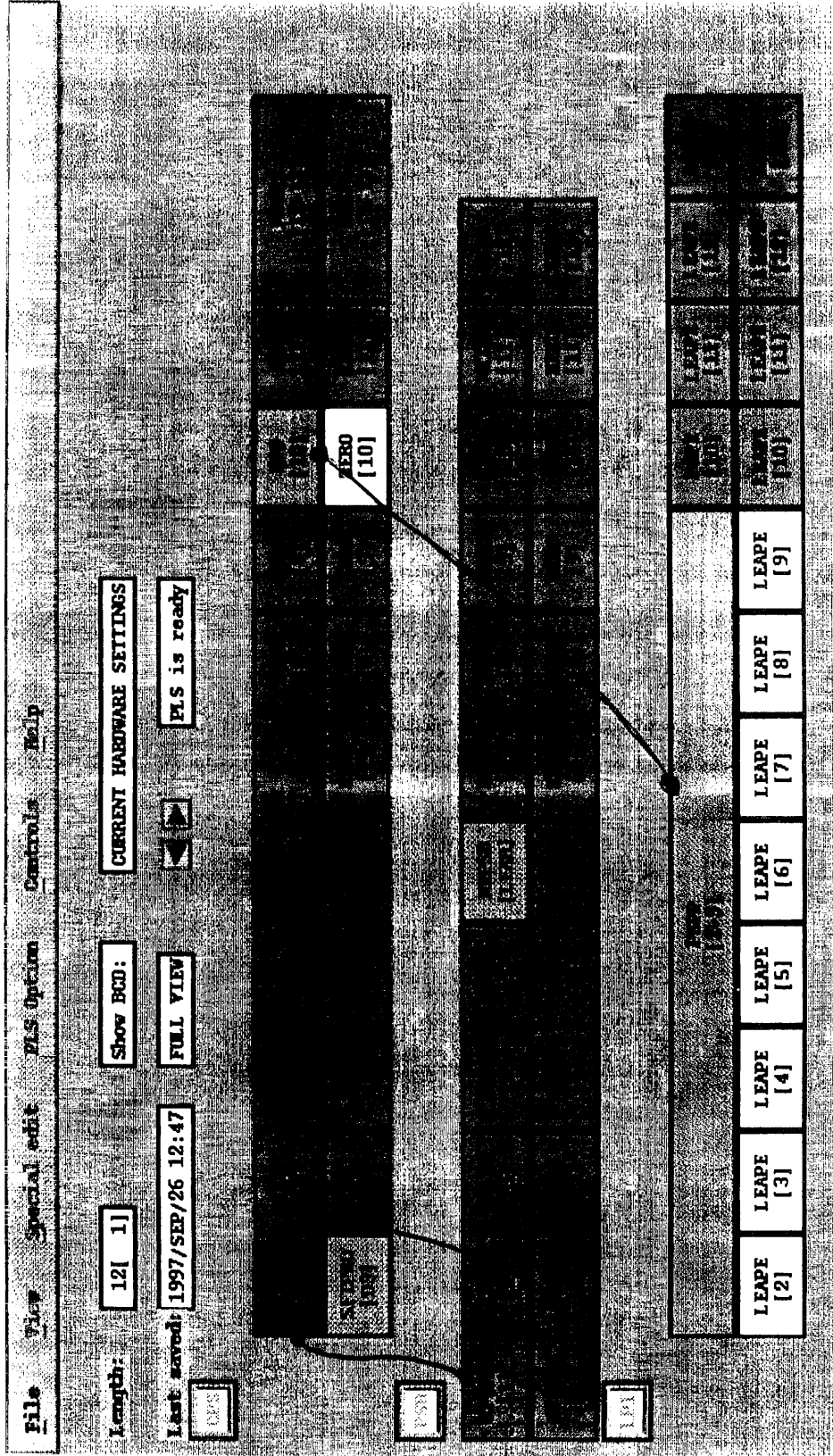
TG8

Timing
pulse
outputs

Standard DSC crate

Minimalist approach

A) no dedicated dropnet

B) standard PPM on "segments"

=> drawbacks

A)   coupling at the PLS Editor level

       difficulty of AD cycles with "strong coupling"

B)   1.2 s resolution

       non-independent USERs

       uncertain mapping process/USER

       high potential number of USERs

       difficulty to hide PPM at the console

       no more resource for extension

"The strong coupling": beams & predefined cycle lengths.

Length: 12[1]
Last saved: 1997/SEP/26 12:47

Show BCD: CURRENT HARDWARE SETTINGS

FULL VIEW   PLS is ready

ZERO
[10]

LEAPE
[2]   LEAPE
[3]   LEAPE
[4]   LEAPE
[5]   LEAPE
[6]   LEAPE
[7]   LEAPE
[8]   LEAPE
[9]

Early approach.

AD Cycle Overview

main bending magnet

quadrupple magnet

RF voltage C2

RF freq. corr. C2

RF harm. change & phase offset

EC cathode & grid HT

EC solenoid

Segment 1: RMP-50/3500
Segment 2: FT-3500
Segment 3: RMP-3500/2000
Segment 4: FT-2000
Segment 5: RMP-2000/300
Segment 6: 1stFT-300
Segment 7: bumpin-300
Segment 8: 2ndFT-300
Segment 9: bumpout-300
Segment 10: 3rdFT-300
Segment 11: RMP-300/100
Segment 12: 1stFT-100
Segment 13: bumpin-100
Segment 14: 2ndFT-100
Segment 15: bumpout-100
Segment 16: 3rdFT-100
Segment 17: RMP-100/50

O   start GFA   ⊣ internal stop GFA   —— GFA running
⊙   event start GFA   — end of GFA function   ---- GFA suspended

Segments considered as "USERs" and the AD cycle
considered as Supercycle.

"Final" approach

A) Dedicated dropnet for AD

- an additional MTG & telegram
- a new "loose coupling" principle (in the MTG):
    - ☞ *the downstream machine waits for the beam*
    - ☞ *the upstream machine checks for client readyness*
- a dedicated PLS editor for AD

B) A dedicated PPM for timing "events"

- AD basically non-PPM
- timing-driven "inflatable" GFAs for compact cycle
- use of PPM on "events":
    - ☞ *stopping the cycle*
    - ☞ *multi-injection cycle*
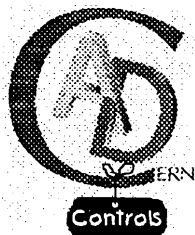
Consequences

A) Changes made

to enable the introduction of additional MTGs
- libraries, GM & R-T tasks
- Oracle & DBRT table

B) Changes to be made

after development & tests achieved on a Test MTG
- C-train extension
- additional MTG
- new associated software ("loose coupling")
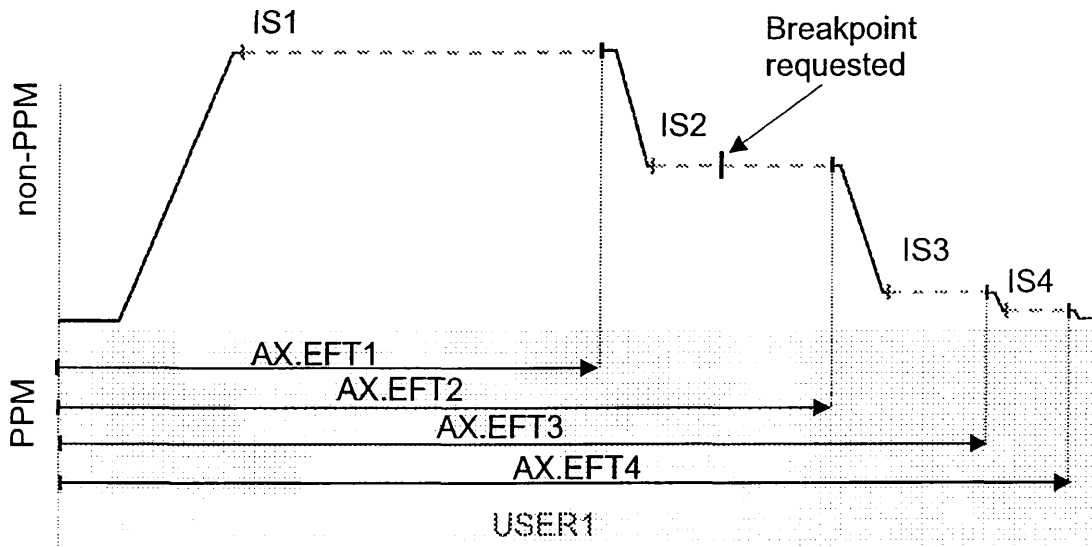
=> some perturbations expected
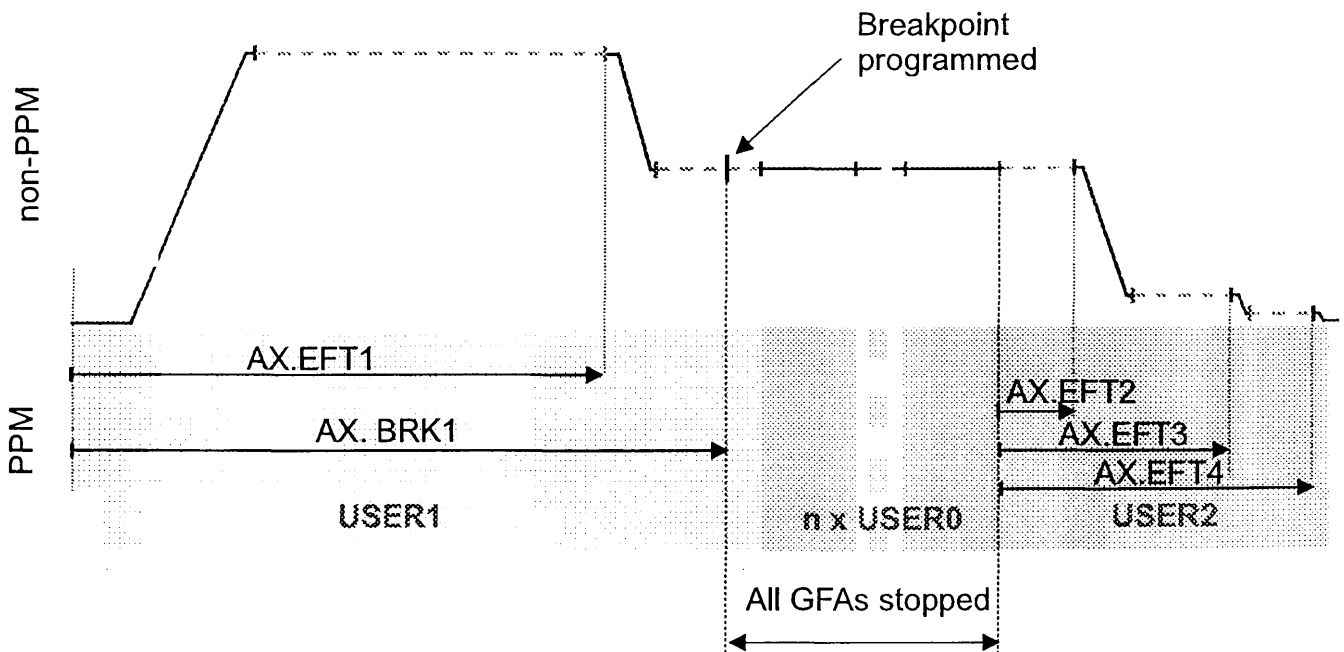
Handling GFAs

GFAs as edited

GFAs as produced

bf/24/02/98
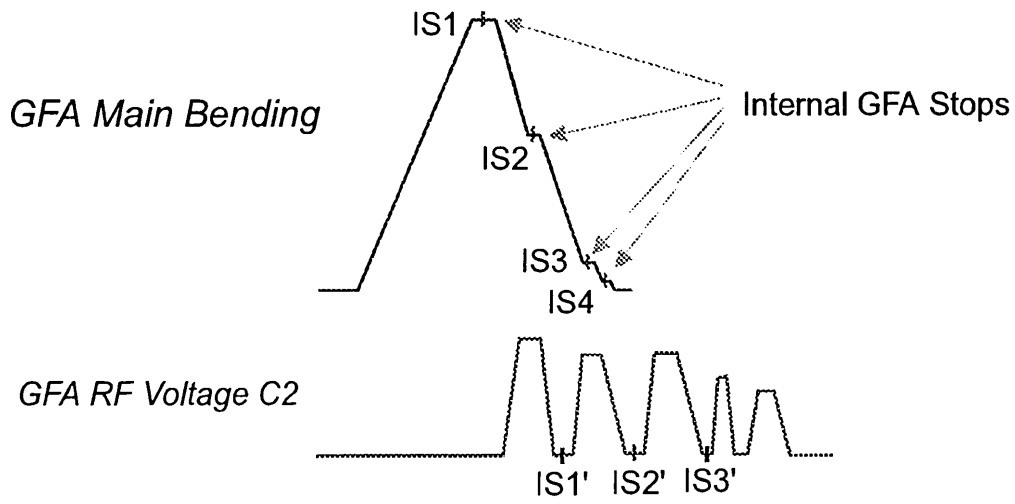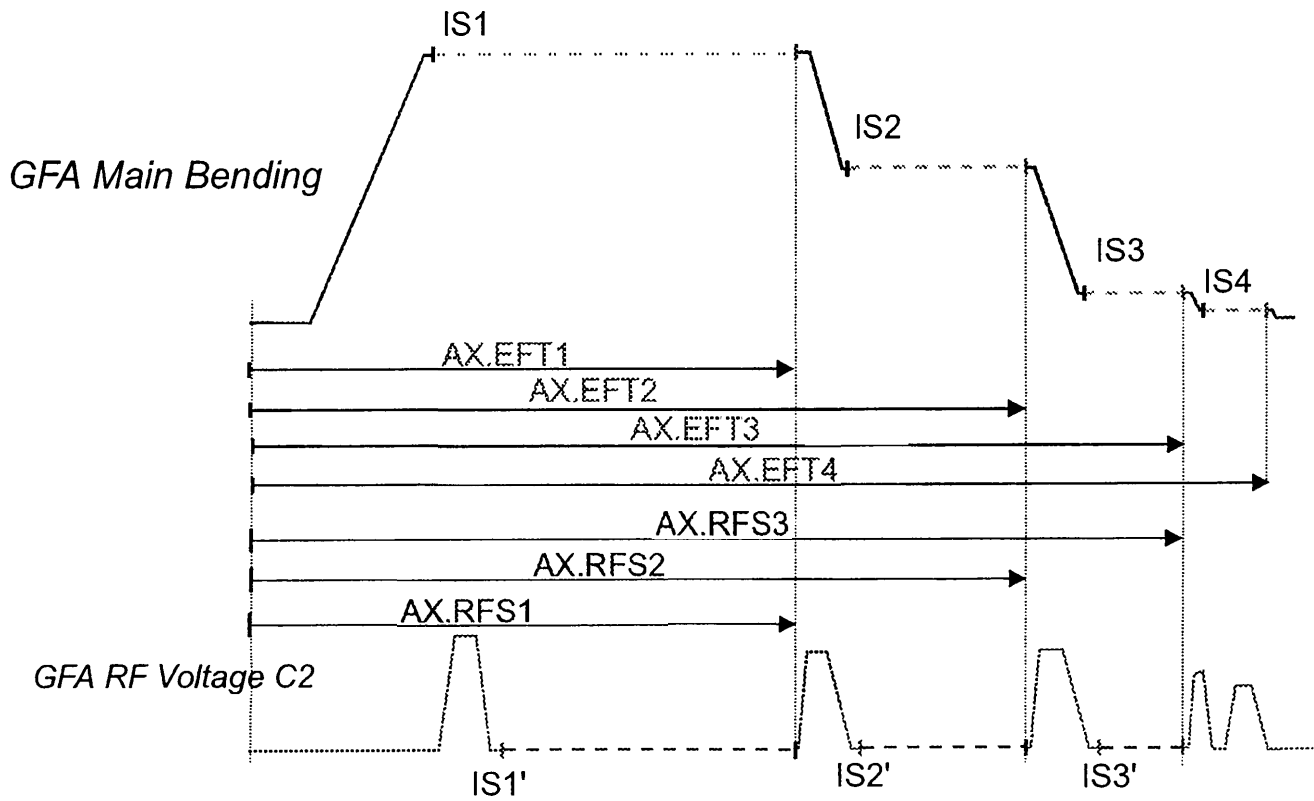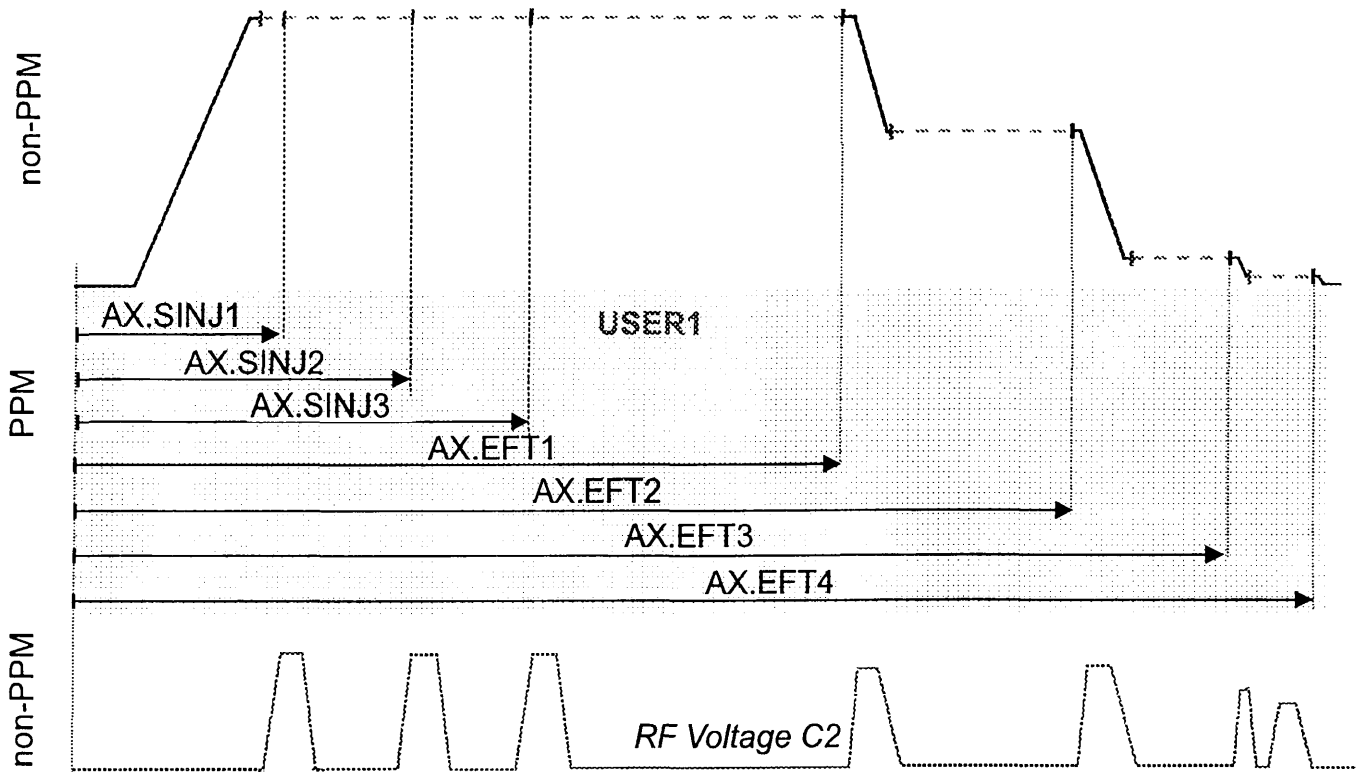
Handling Breakpoints

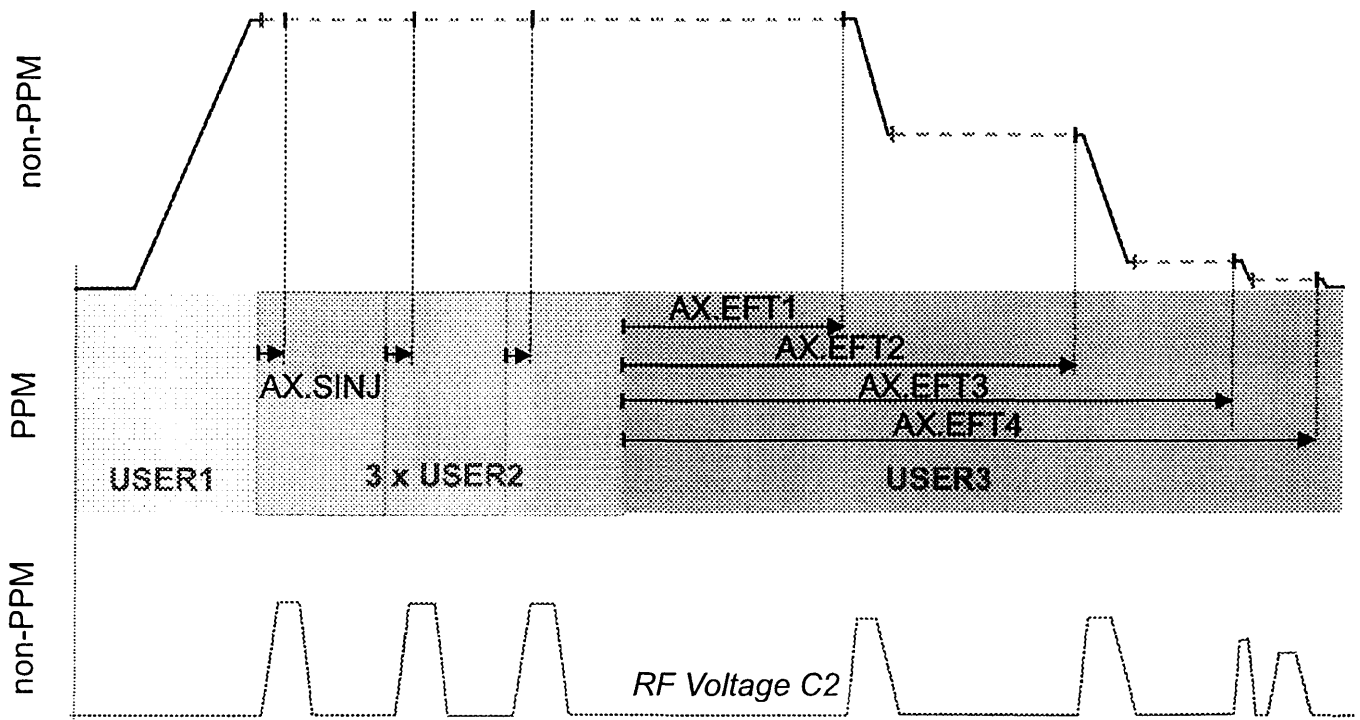*GFA main bending AD*

AD cycle with one breakpoint

The USERS are 1.2 s long or a multiple of 1.2 s

Handling multiple (predefined) injection

AD cycle with triple injection

Using the "Repeat" facility