

DNB CAMAC Timing

These notes describe the portion of the DNB control that is accomplished via CAMAC. PLC control is used for power supply monitoring and setpoints and for vacuum system control. Sequencing of the events during the beam firing cycles is controlled via CAMAC.

The timing diagram in figure 1 shows the sequencing during DNB firing. The top five actions are self explanatory. Turning the arc on and off is the result of a number of actions. These are shown in the second group and the inter-relations are emphasized with the arrows. Turning the high voltage on and off is the result of the actions in the last group. Again, the inter-relations are emphasized with the arrows.

DNB Timing Setup

These must be set

<u>Description</u>	<u>Symbol</u>	<u>MDSPlus Numeric Node</u>
beam on	t	BEAM_ON
beam duration	$t_3 < 100 \text{ ms}$	BEAM_LENGTH
prepulse duration	$t_4 < 100 \text{ ms}$	ARC_PREPULSE
gas on prepulse	t_5	GAS_PREPULSE
Arc Notch Timer	t_1	ARC_NOTCH (copied from MCL setting)
HV Pulse On Delay	t_2	HV_ON_DELAY

These are computed

<u>Description</u>	<u>Rising Edge</u>	<u>Falling Edge</u>	<u>CAMAC module</u>
Gas On	$t_3 = t - t_5$	$t_2 = t + t_3$	J221_02. Ch 7
Arc On	$t_4 = t - t_1 - t_4$	t_2	J221_03. Ch. 6
HV Pulse En Del	$t_5 = t - t_2$	$t_6 = t_5 + 10 \text{ ms}$	J221_03, Ch. 7
HV Pulse Enable	t_5	$t_7 = t + t_3$	J221_03. Ch 8
Pre Arc On	$t_8 = t_4 - 10 \text{ ms}$	$t_9 = t_4$	J221_03. Ch 4
Post Arc On	$t_{10} = t_2$	$t_{11} = t_2 + 10 \text{ ms}$	J221_03. Ch 5

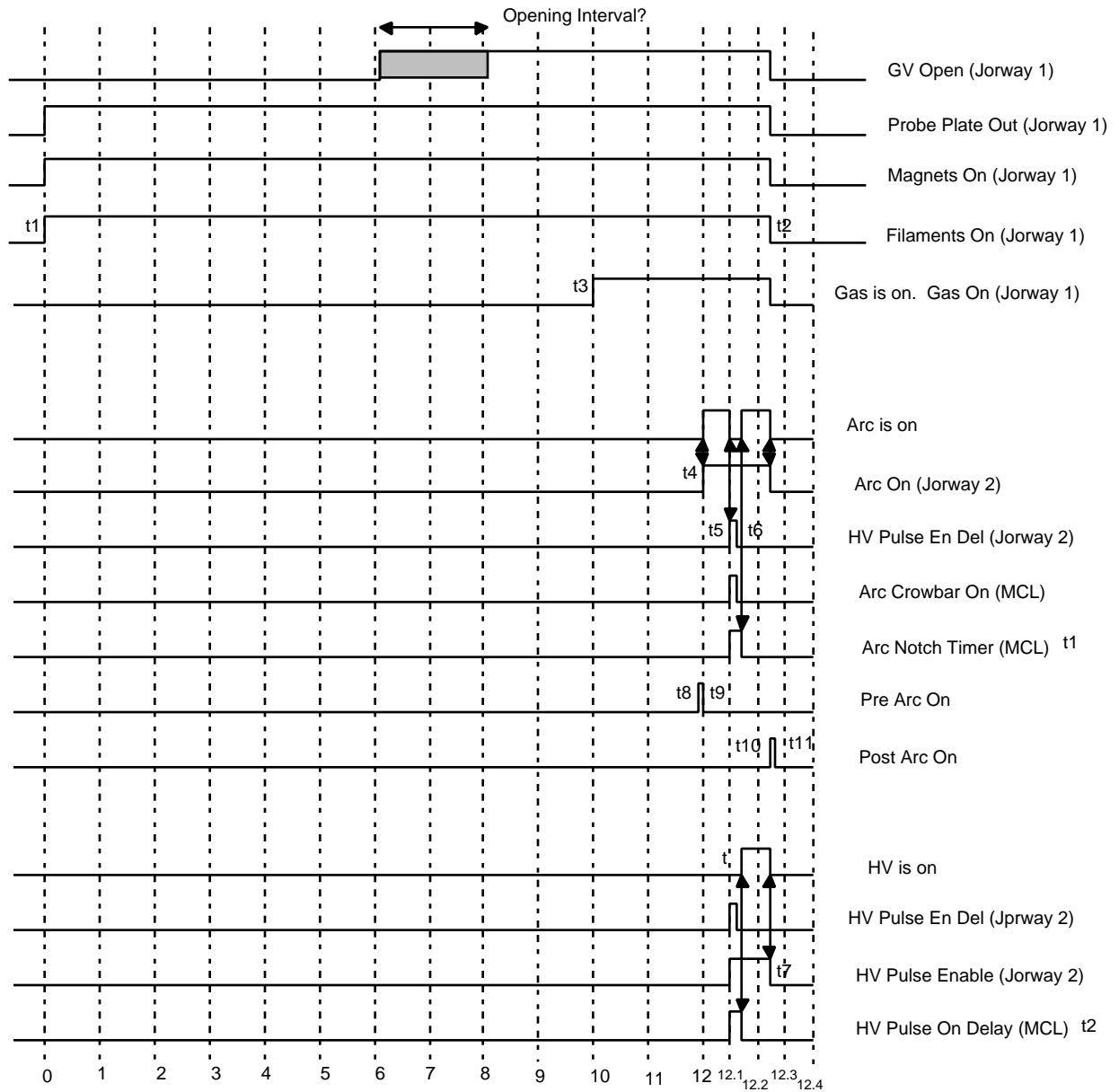
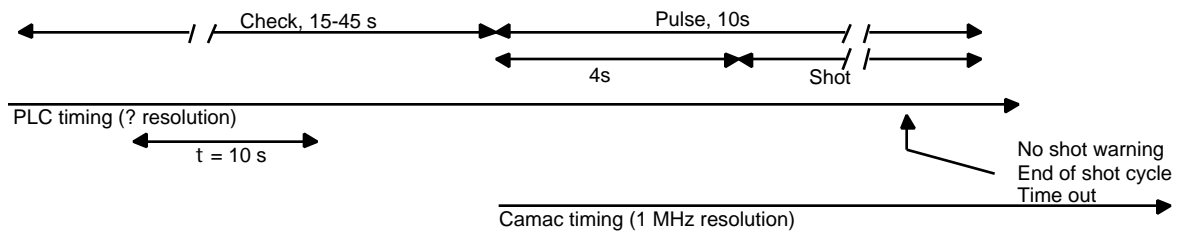


Figure 1. DNB Remote Timing Signals

DNB Engineering Crate Setup

The Numeric Nodes used to set most parameters are in \DNB::DNB_ENG and the CAMAC Nodes are in \DNB::DNB_ENG.CAMAC. The setup is as shown in the drawing "DNB REMOTE TIMING SIGNALS" with the following exceptions:

The Decoder (DECODER_02) start time is \TSTART (-4.0 sec).

Decoder outputs E2 and E3 are simple Clocks, not Gated Clocks.

J221_03:OUTPUT_10 is setup for "GAS ON" gate (as is J221_02:OUTPUT_07).

Numeric Node Use:

ARC_NOTCH	Arc Notch Timer, t ₁
ARC_PREPULSE	Prepulse Duration, t ₄
BEAM_LENGTH	Beam Duration, t ₃
BEAM_ON	Beam On, t
CHECK_TRIG	Check Cycle Event
GAS_PREPULSE	Gas On Prepulse, t ₅
HV_ON_DELAY	HV Pulse On Delay, t ₂
PULSE_TRIG	Pulse Cycle Event
TRIG_1MHZ	Trigger for TR612_01
TRIG_20KHZ	Trigger for TR16_02
TRG_5KHZ	Trigger for TR16_01

DECODER_02 Outputs:

E0	Trigger at time CHECK_TRIG	Trigger for J221_02 (slot 15)
E1	Trigger at time PULSE_TRIG	Trigger for J221_03 (slot 18)
E2	5000 Hz Clock	Clock for TR16_01 (slot 5)
E3	20000 Hz Clock	Clock for TR16_02 (slot 10)
E4	unused	
CLK	1 MHz Clock	Clock for TR612_01, J221_02, J221_03

J221_02 Outputs that are setup and On:

Ch 1	Trigger at time TRIG_5KHZ	Trigger for TR16_01 (slot 5)
Ch 7	Gate for GAS ON	Rise at BEAM_ON - GAS_PREPULSE Drop at BEAM_ON + BEAM_LENGTH

J221_03 Outputs that are setup and On:

Ch 1	Trigger at time TRIG_1MHZ	Trigger for TR612_01 (slot 11)
Ch 2	Trigger at time TRIG_20KHZ	Trigger for TR16_02 (slot 10)
Ch 3	Gate for PULSE ON	Rise at BEAM_ON - HV_ON_DELAY Drop at BEAM_ON
Ch 4	Pre Arc On	Rise at BEAM_ON - ARC_NOTCH-ARC_PREPULSE-10ms Drop at BEAM_ON - ARC_NOTCH-ARC_PREPULSE
Ch 5	Post Arc On	Rise at BEAM_ON + BEAM_LENGTH Drop at BEAM_ON + BEAM_LENGTH+10 ms
Ch 6	Gate for ARC ON (Enable)	Rise at BEAM_ON - ARCH_NOTCH - ARC_PREPULSE Drop at BEAM_ON + BEAM_LENGTH
Ch 7	Gate for HV PULSE EN DEL	Rise at BEAM_ON - HV_ON_DELAY Drop at BEAM_ON - HV_ON_DELAY + 10 ms

Ch 8 Gate for HV PULSE EN

Rise at $\text{BEAM_ON} - \text{HV_ON_DELAY}$
Drop at $\text{BEAM_ON} + \text{BEAM_LENGTH}$

Ch 10 Gate for GAS ON

Rise at $\text{BEAM_ON} - \text{GAS_PREPULSE}$
Drop at $\text{BEAM_ON} + \text{BEAM_LENGTH}$