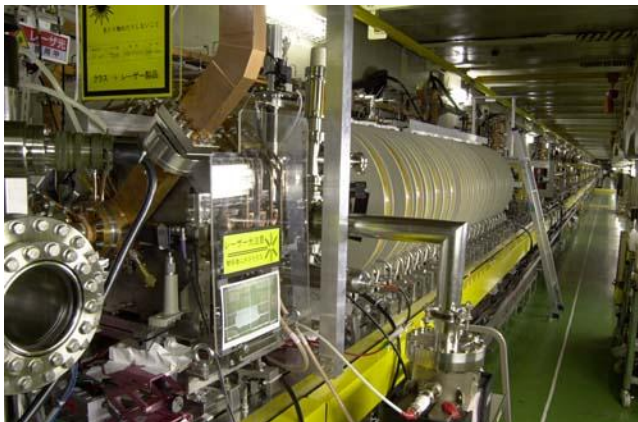
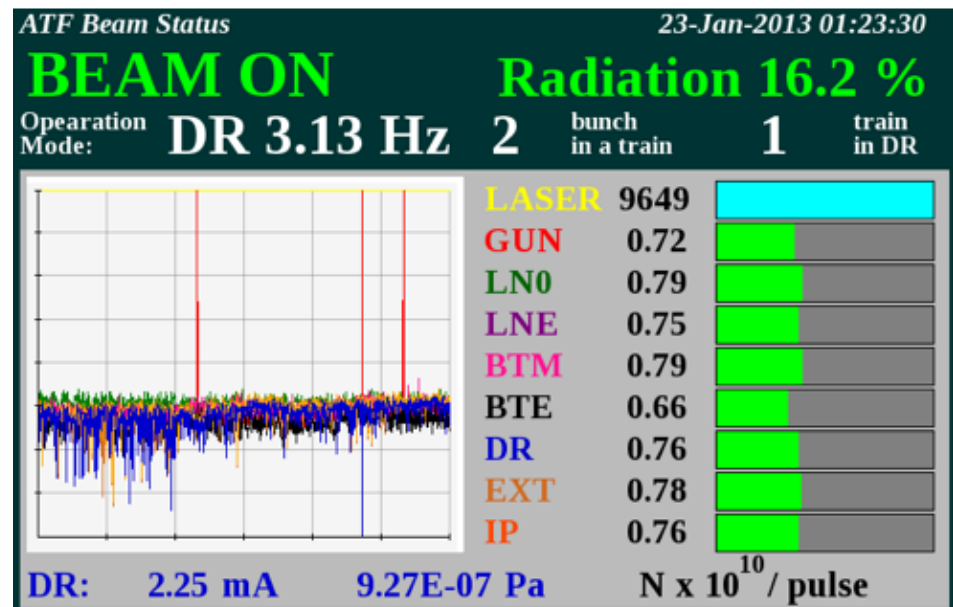


ATF Linac status and future plan

15th ATF project meeting
2013/01/23 T.Naito

Contents

1. System configuration
2. Trouble at #2 klystron power supply
3. Renewal schedule
 1. Pulse power supplies
 2. Cooling water system



$E=1.28\text{GeV}$

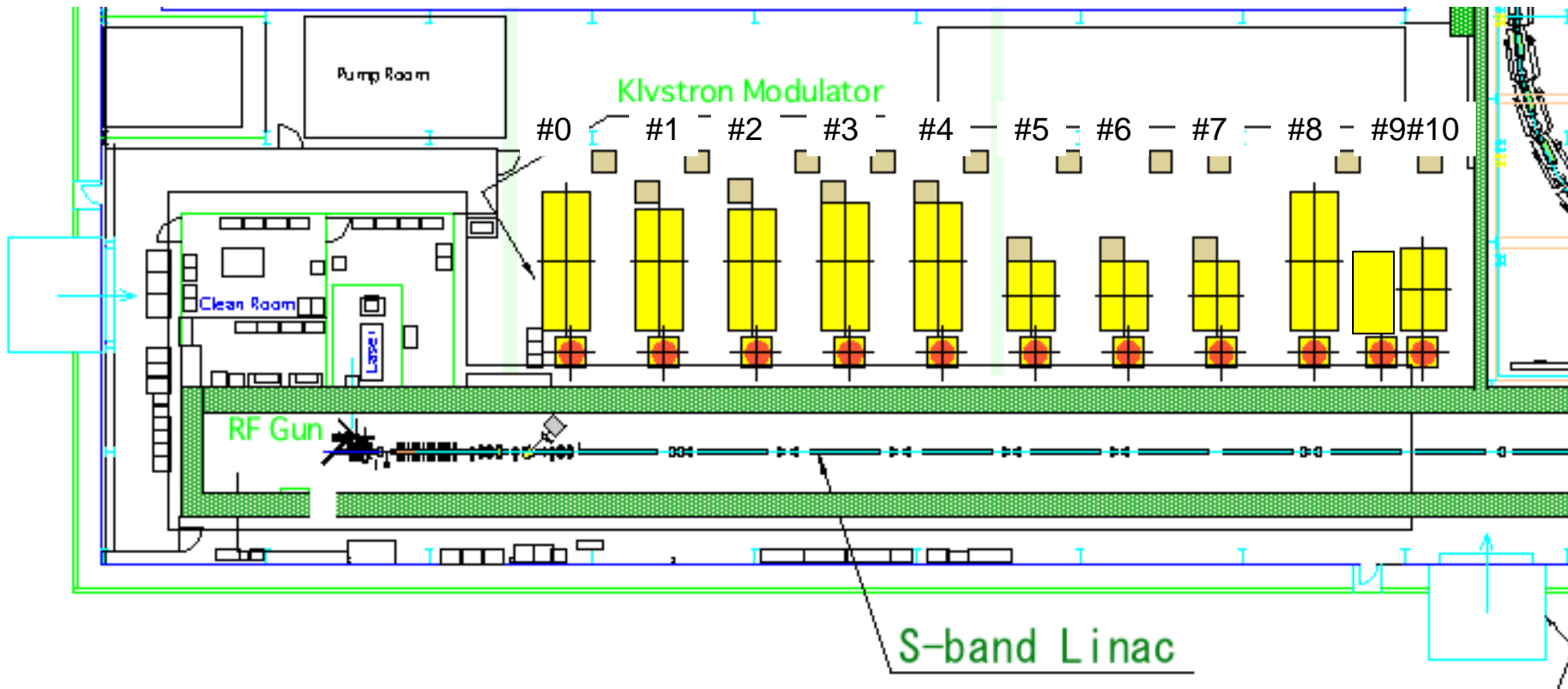
$Ne=2 \times 10^{10} \text{ e}^-/\text{bunch}$

Bunch#/shot 1 ~ 20 bunches(2.8ns spacing)

Bunch#/shot 1 ~ 10 bunches(5.6ns spacing)

Rep rate = ~12.5Hz

Normalize Emittance = $3E-5 \text{ radm}$



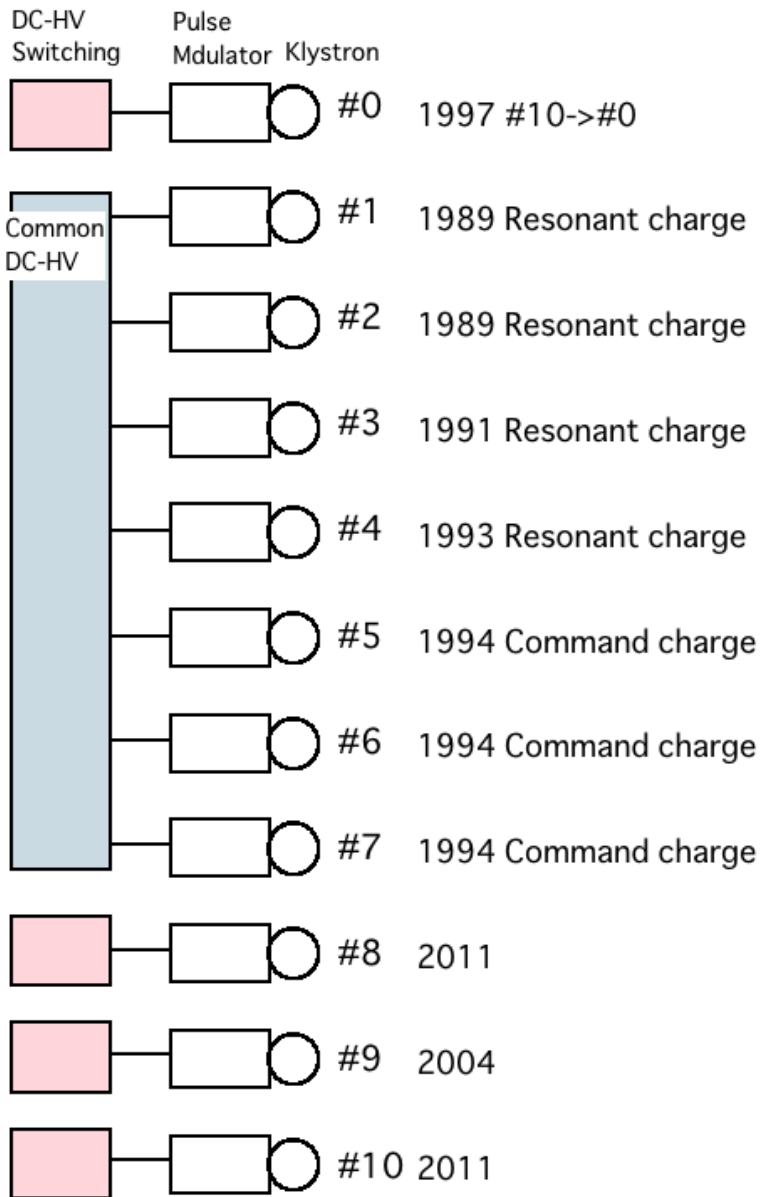
The high power pulse RF is produced by 11 klystrons.

#0 RF gun + 1st Accelerator structure

#1~#8 Two Accelerator structures using SLED

#9, #10 Single Accelerator structure for the Energy compensation of multi-bunch beam acceleration

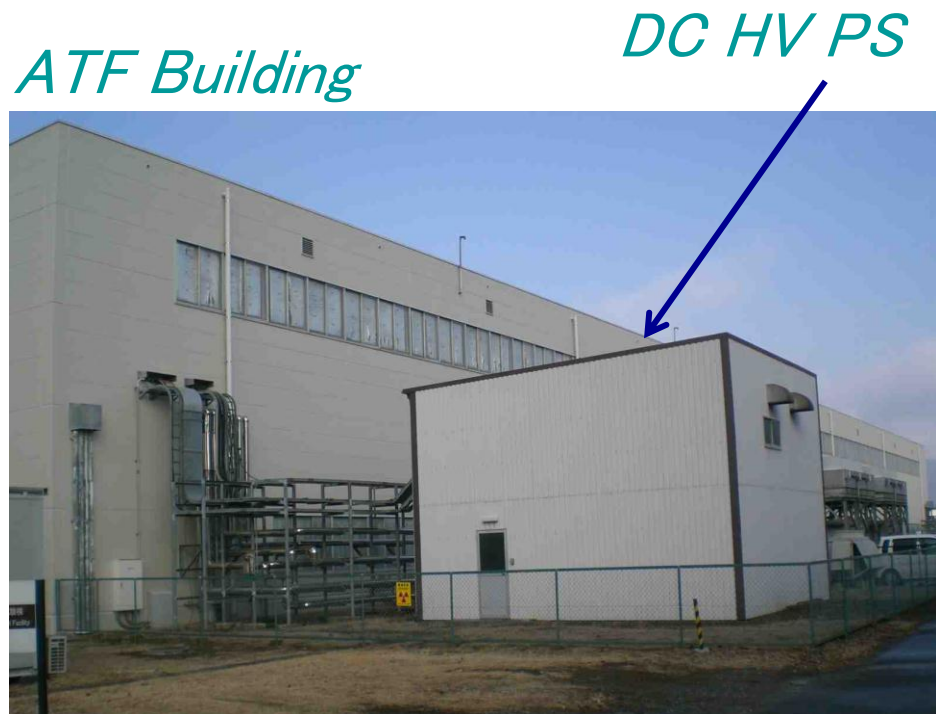
#9, #10 are not used for the single bunch acceleration.



Each klystron power supply has different history and has different hardware.

Especially, the common DC High Voltage power supply (common DC HV PS) is located outside of the building, which happens many troubles.

The replacement of the power supplies from the common DC HV PS to the switching HV PS is scheduled.

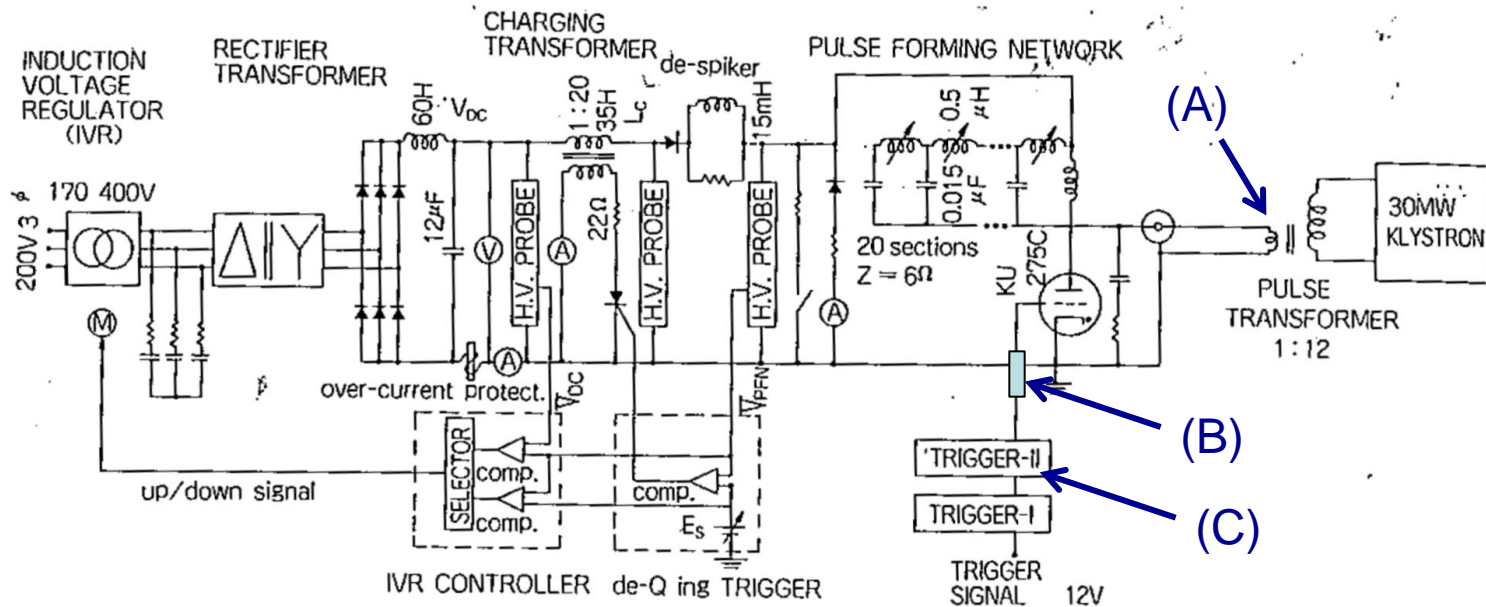


ATF Building

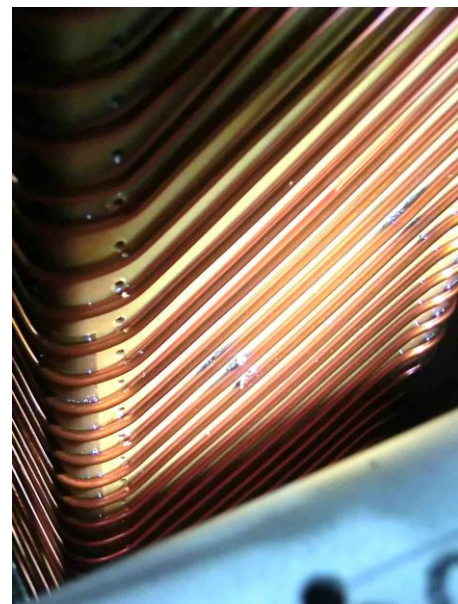
DC HV PS

Trouble at #2 klystron pulse modulator

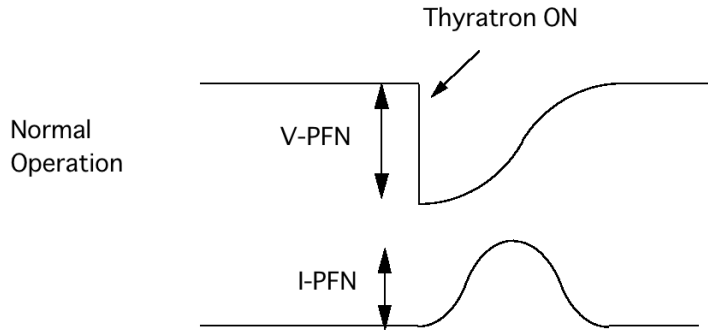
Very serious trouble happened 12/Nov/2012



- (A) Discharge at the insulator of the pulse trans
- (B) Burn out of the trigger resistor
- (C) Broken the trigger pulser



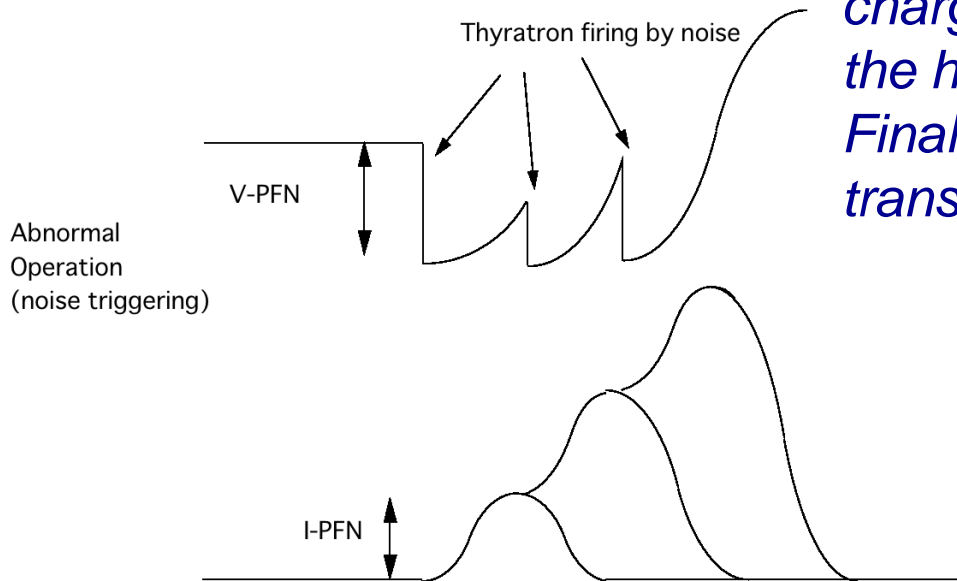
Noise triggering the thyatron and the break down phenomena



The burn out of the trigger resistor of the thyatron changed the input impedance to high, which was caused by the noise triggering of the thyatron.

The noise triggering at the timing of the charging made the pile up situation of the high voltage.

Finally, the break down of the pulse trans was happened.



To avoid same trouble



Before



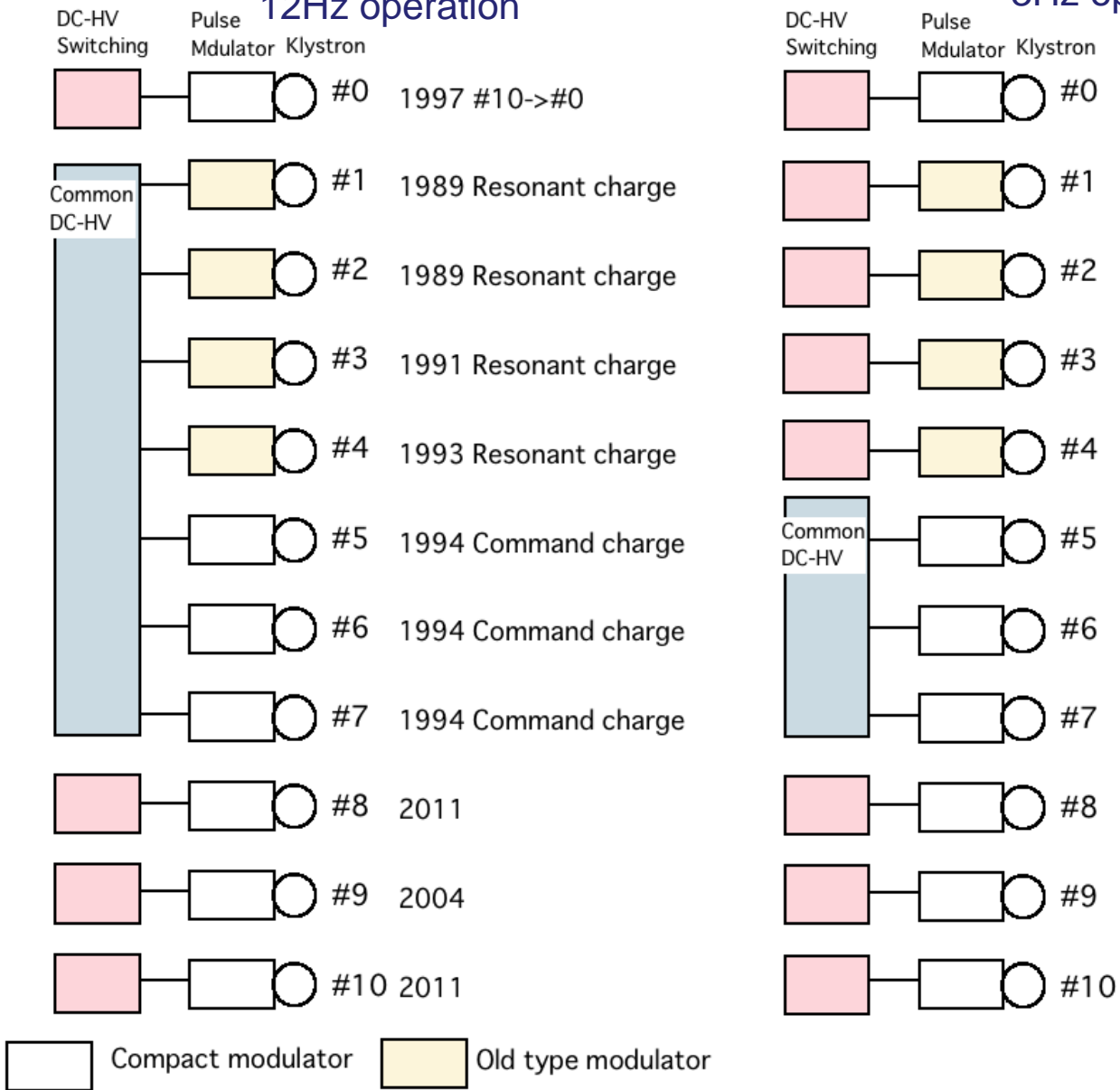
Present

1. The burn out resistor was replaced to high voltage resistors.
2. The over current limit set to low.
3. Replacing to switching high voltage power supply.

Renewal schedule(klystron modulators) 1/2

Jan/2012
12Hz operation

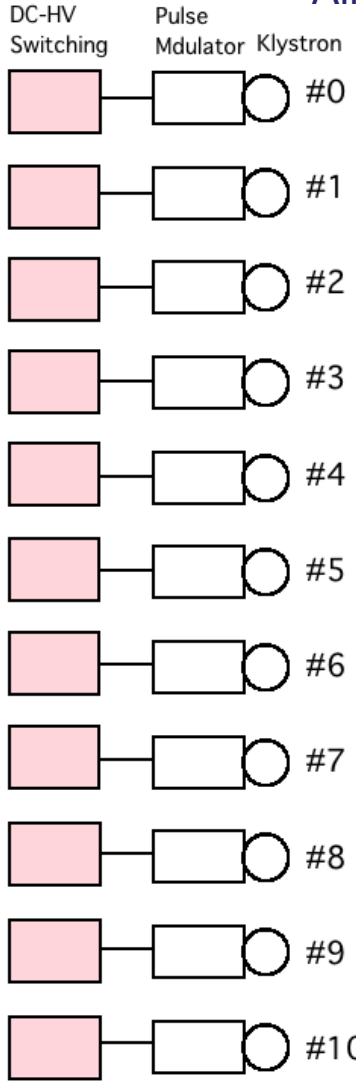
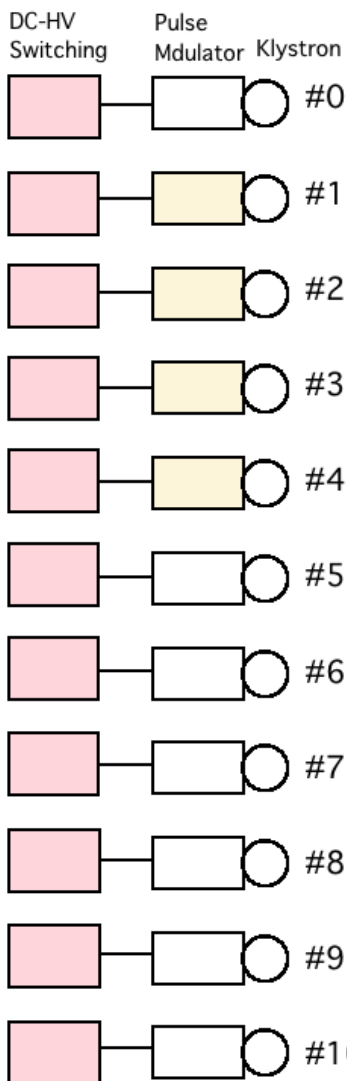
Jan/2013
3Hz operation



Renewal schedule(klystron modulators) 1/2

Apr/2013
All switching PS

Oct/2013
All compact modulator



Compact modulator
 Old type modulator



2008/10/11

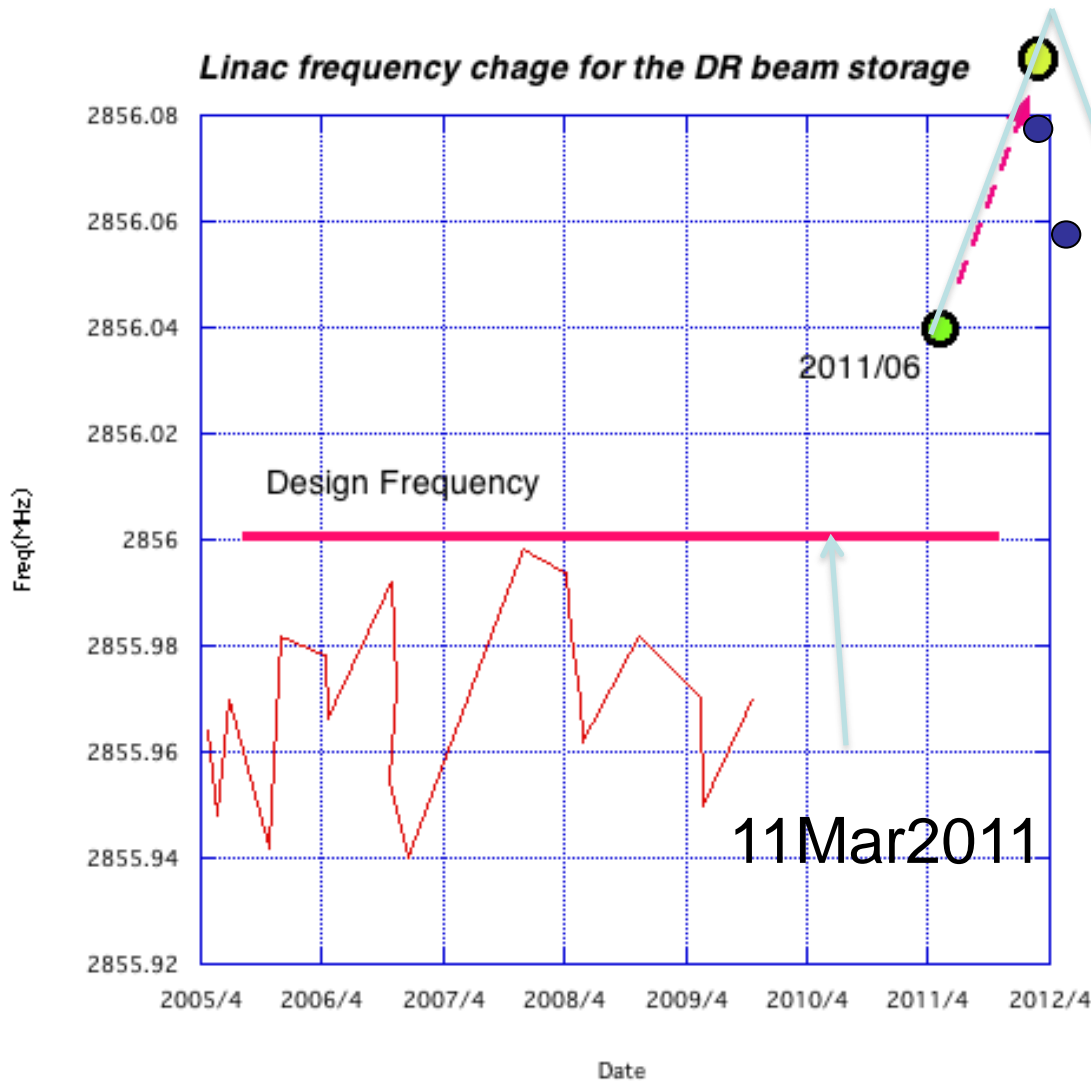
Renewal schedule (Cooling water system)



The linac cooling water system was fabricated in 1990, which supplies the cooling water for the accelerator structures. It is very old and the cooling power reduced year by year. At the every spring run, especially high temperature day time, the system was down for the over heating. Some times difficult to keep 0.1 degreeC stability. The low repetition rate operation of the linac is effective to avoid the system down.

The replacement to new one is scheduled this summer shutdown.

Trend of the ATF frequency change



The temperature of the cooling water have to change from 28.0~31.0 degreeC when the linac frequency is changed.



Summary

To supply the stable beam to ATF2, the linac renewal is in progress.

1. Jan/2013 #1~#4 modulator HV PS change to switching HV PS. 3Hz operation can be done.
2. Apr/2013 All modulators change to switching HV PS.
3. Oct/2013 Renewal #1~#4 modulator to compact modulator.
4. Oct/2013 Renewal Cooling water system – The energy drift will be reduced.



Backup



ライナック冷却水システム

JLC-PWP-1系統 (No.1系統)

冷却水システムは、1600L/minのメインに400L/minのサブを足すという設計で安定性から見るといい設計ではない。

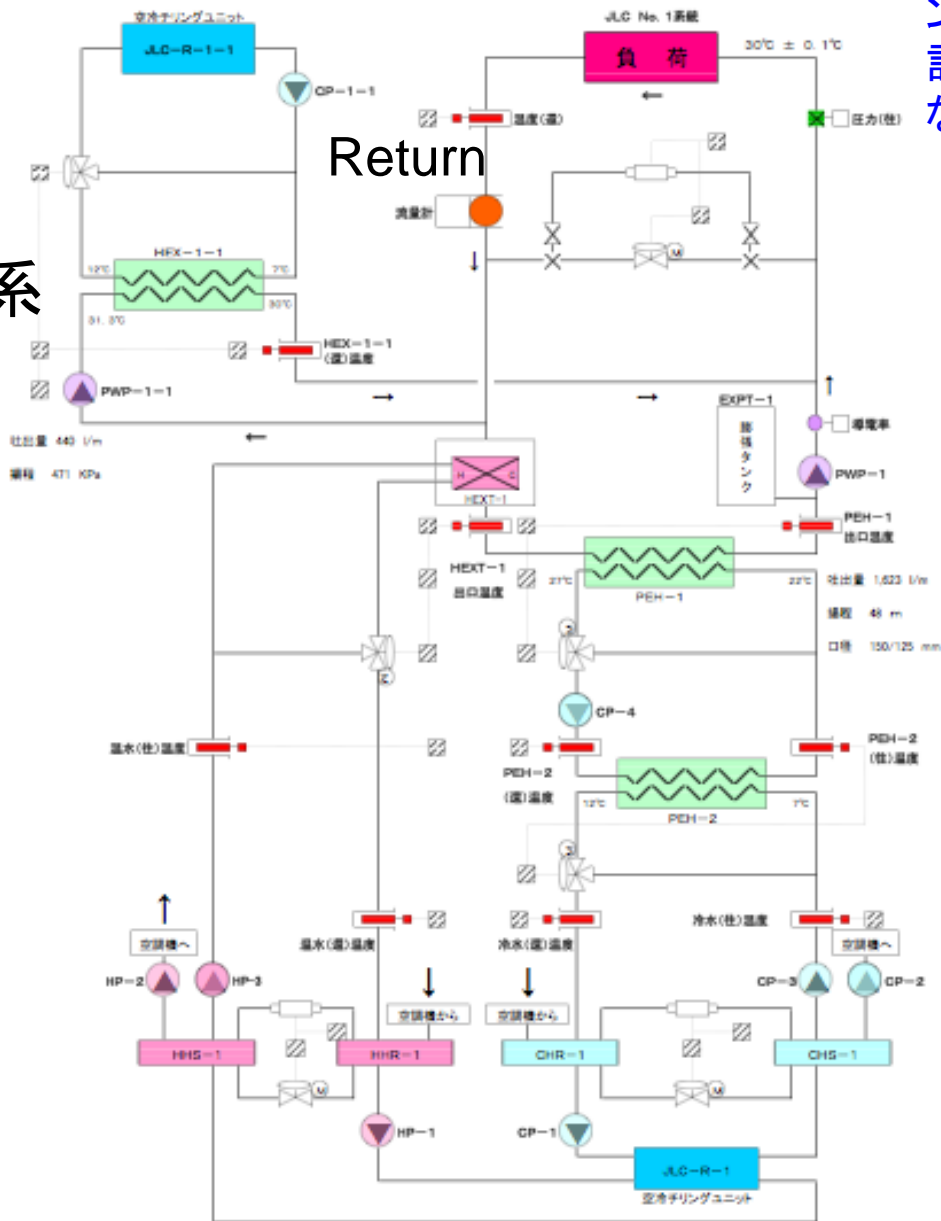
Sub
(4)30°C系

Main

(3)30°C系

(2)22°C系

(1)7°C系





SLED

The Q-value, 10^5 , is very high, so the tuning frequency is very sensitive with the temperature.

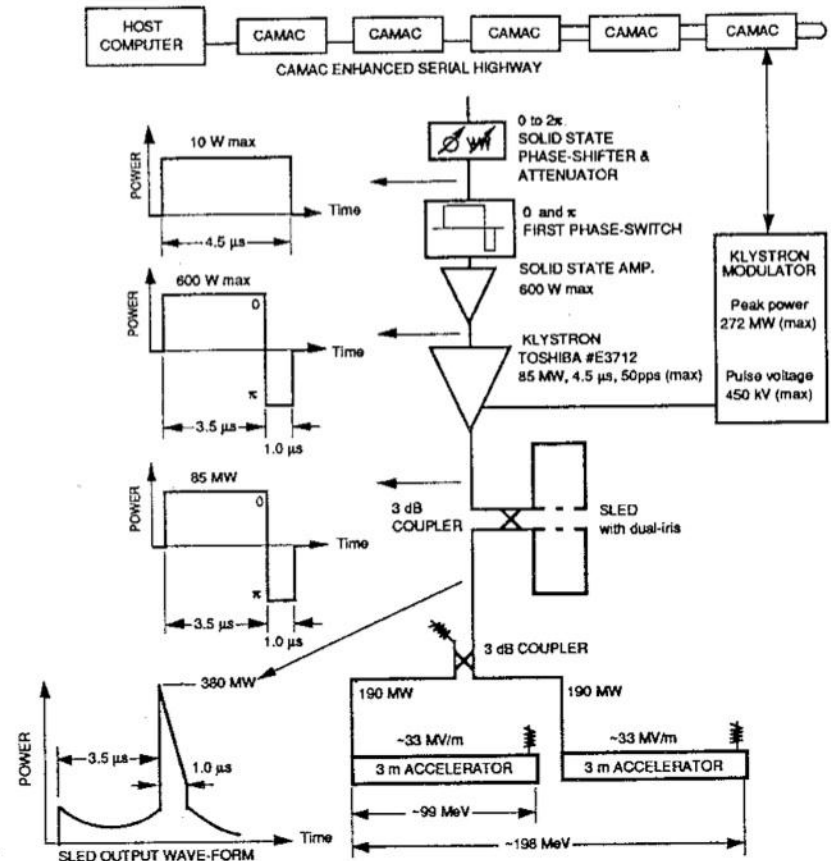


Fig. 1 A schematic diagram of an accelerating unit of the ATF injector linac.

#8 SLED tuning(20091008)

SLED
波形



Tuning 前

片側のみtuning

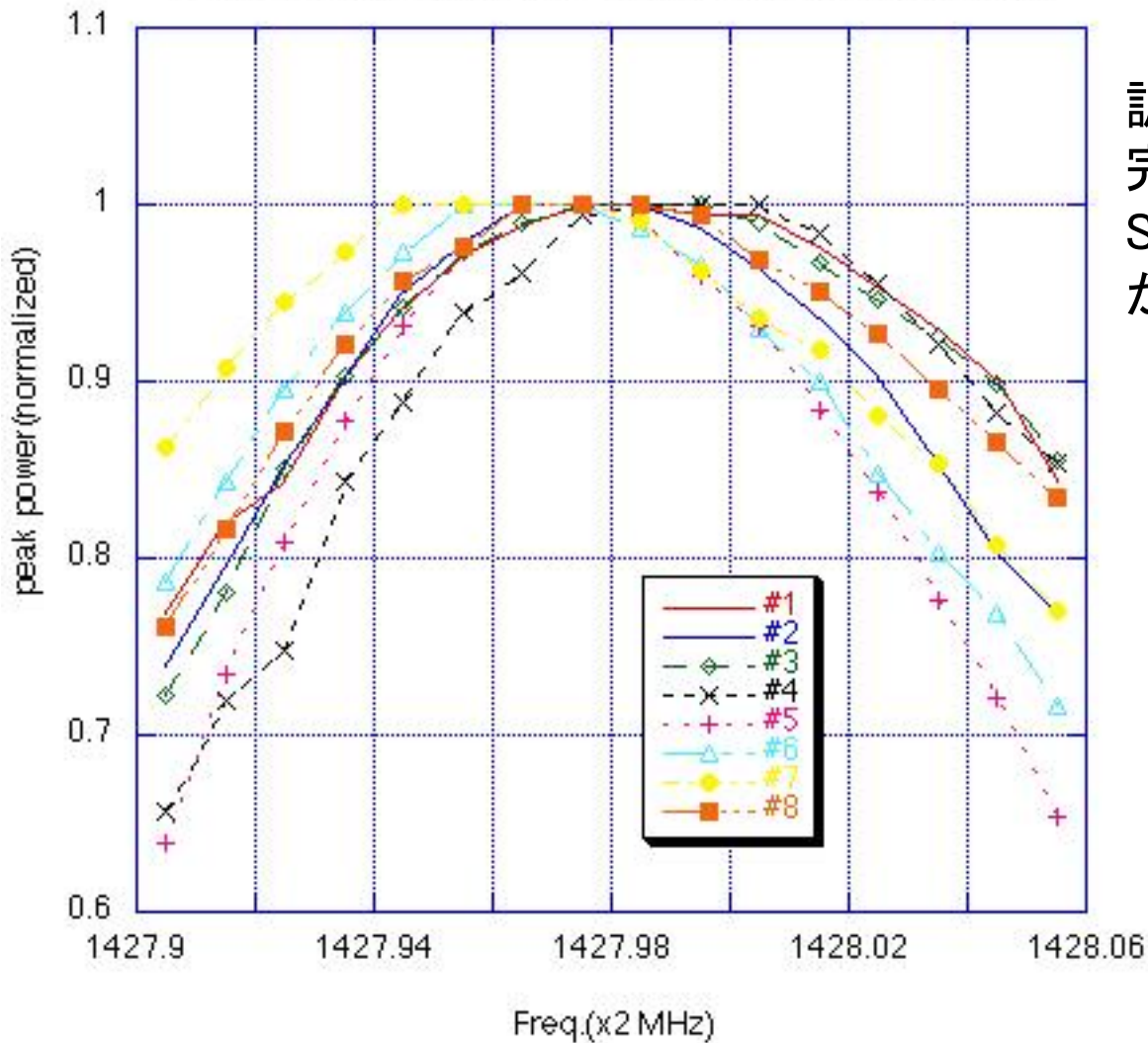


De-tunerを入れる。

Tuning 後



SLED Frequency Response(20091021)



調整後、
完全にではないが8台全ての
SLEDに対して周波数の調整
が出来た。