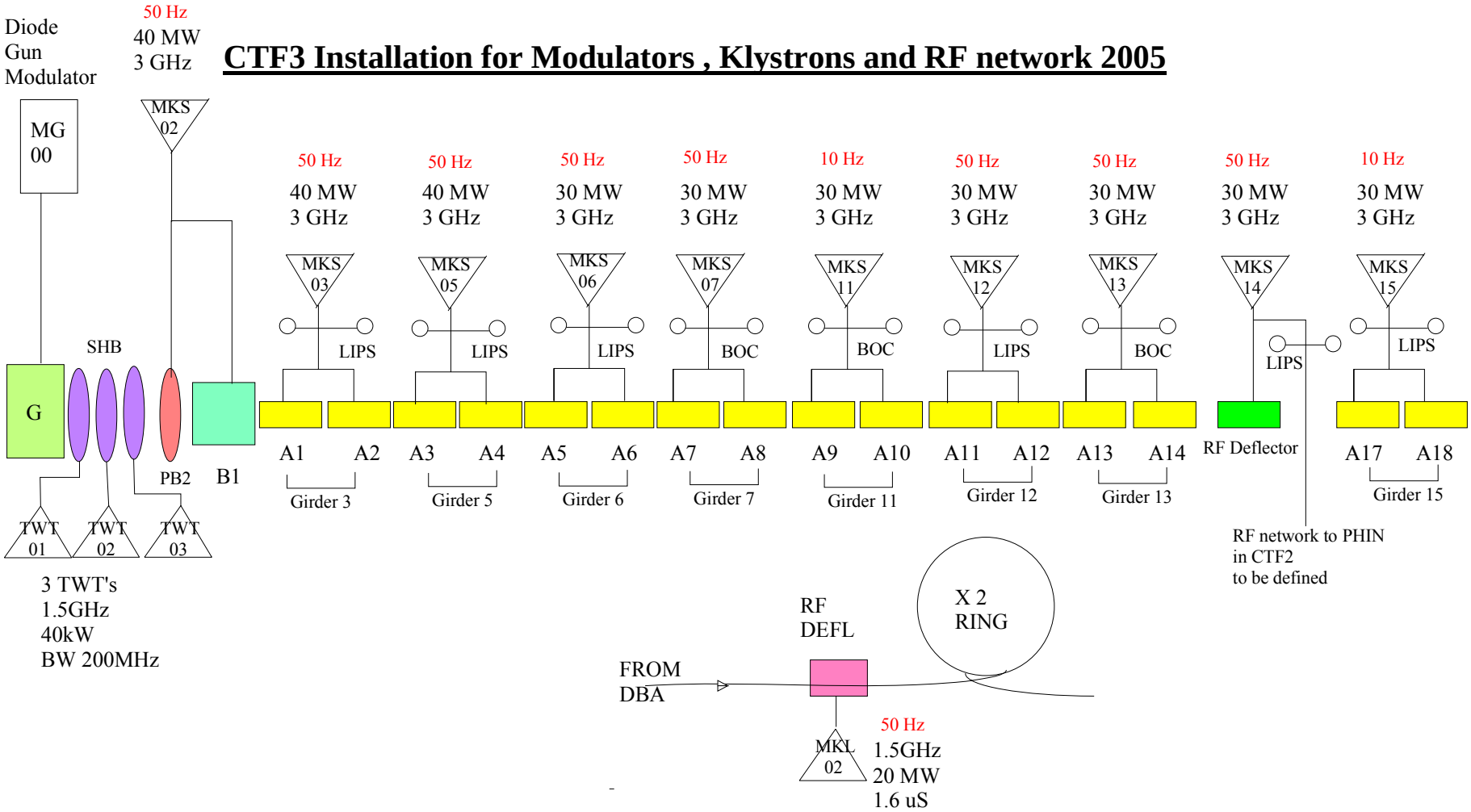
# Situation of RF Power Systems for CTF3 November 2005

S-Band 3 GHz systems
New Water Station Configurations
L-Band RF Deflector
Sub Harmonic Buncher
Other work

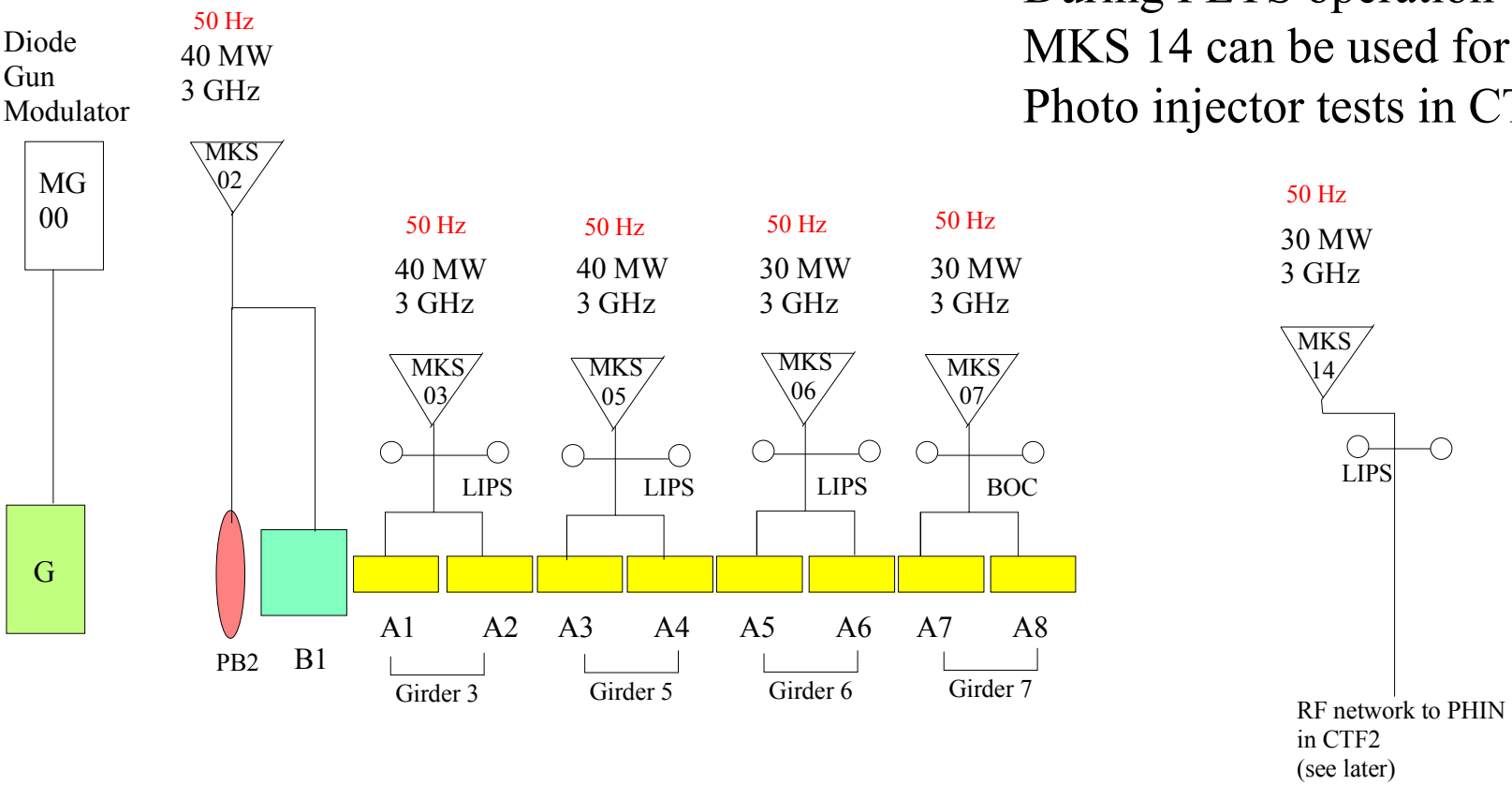
G.McMonagle, 29th November 2005

# CTF3 Installation for Modulators , Klystrons and RF network 2005

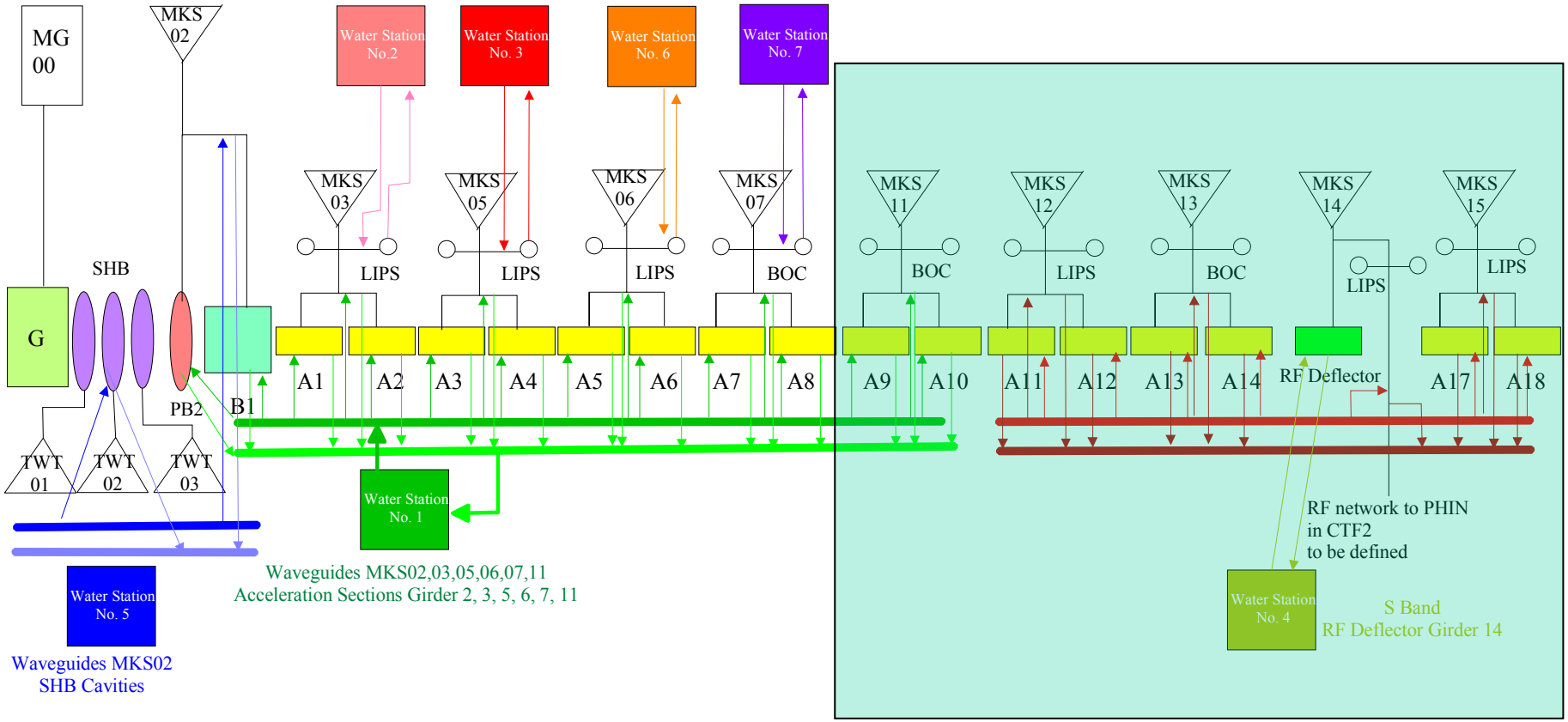


# CTF3 Installation for Modulators , Klystrons and RF network 2005 for PETS operation

During PETS operation
MKS 14 can be used for
Photo injector tests in CTF2



# RF NETWORK WATER STATION DISTRIBUTION 2004/2005



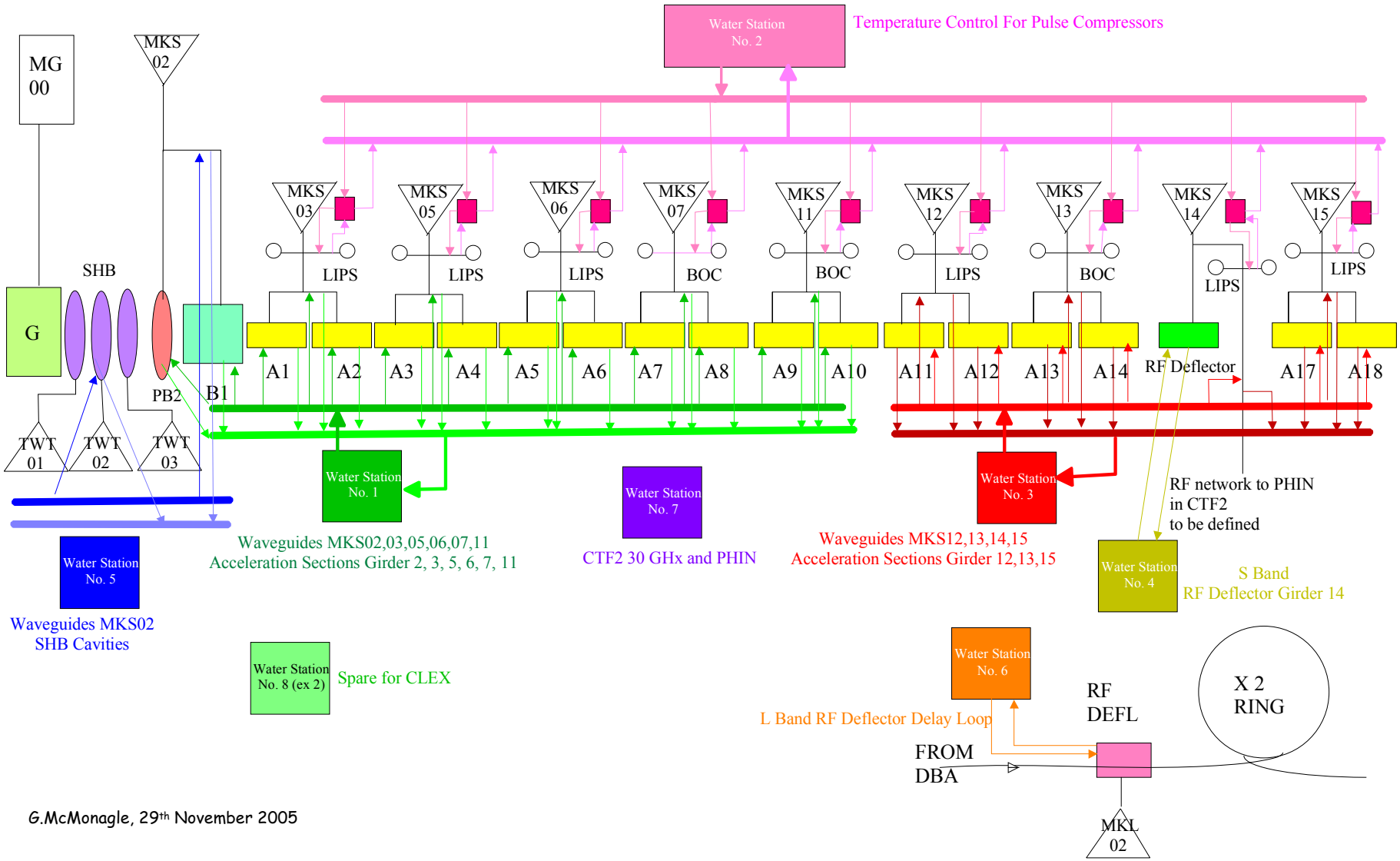

NOT USED

- This configuration was sufficient for initial start up for PETS run

- Not enough water stations to continue like this for complete linac operation

- The response time of the water regulation was too slow (at least an hour to reach stable temperature after step change of power in pulse compressor).
- The water stations were designed to keep waveguides and accelerating sections at a temperature of 30 deg C +/- 0.1 in steady state

# RF NETWORK WATER STATION DISTRIBUTION




G.McMonagle, 29th November 2005

# OPERATION OF NEW WATER STATION FOR PULSE COMPRESSORS




Working temperature Range 24 deg C to 35 deg C
average temperature stability Tout -Tin +/- 0.01 deg

Repeated 9 times
(possibility to add extra 3 pulse compressors)

Maximum power consumption 180 kW



Thanks to our colleagues in TS/CV
for their help in the technical specification
price enquiry and installation

# Summary of Performance since new water station installed

- Overall stability of the RF is now very good
- Even starting from cold machine is stable within 15 minutes
- Improved klystron reliability, when turning on or increasing klystron output power the quick response of the temperature stability (i.e. cavity tuning) means less reflected power
- Frees up the other existing water stations for the rest of the linac and we now have enough reserve for the combiner ring Rf deflectors and the CLEX building

# TWT Situation (Ordered from Poland)

- 4 TWT's were ordered and 4 were delivered to TWTA manufacturer in UK.
- Initial problems with arcing in 1st Tube, resolved by manufacturer (heater voltage calibration).
- 3rd Tube failed after arrival at TMD due to vacuum problem, being repaired under guarantee by manufacturer , delivery scheduled for 20th December 2005
- 4th Tube damaged in transport, not usable or repairable according to Polish company, new tube being manufactured (insurance claim) delivery next year

# TWTA Situation (ordered from UK)

- Late (Very Late)
- April 2005 looked on schedule. BUT…
- First Factory acceptance test. TWTA was not complete and did not perform as required in technical specification (mainly voltage stability and voltage droop during the pulse i.e. phase stability out of tube).. DID NOT ACCEPT UNIT
- After some modifications by manufacturer to achieve stability, the power supply failed and they blamed the free issue TWT because it was arcing and refused to continue doing any more work unless CERN paid compensation for time lost on testing of the "faulty" tube. CERN's argument was TWTA should be self protecting against tube arc and also protect the tube (as mentioned in technical spec)
- After long negotiations between CERN (AB/RF, purchasing and legal services) and manufacturer they agreed to continue the work in July 2005.

# TWTA Situation (cont)

- In September 2005 the supplier seemed to have a working TWTA. Not quite achieving specification requirements! We requested < 1 degree phase change over the 3 μs pulse and they could only achieve 1.6 degrees over 3 μs within a 4.5 μs pulse. We agreed to accept this performance in order to progress

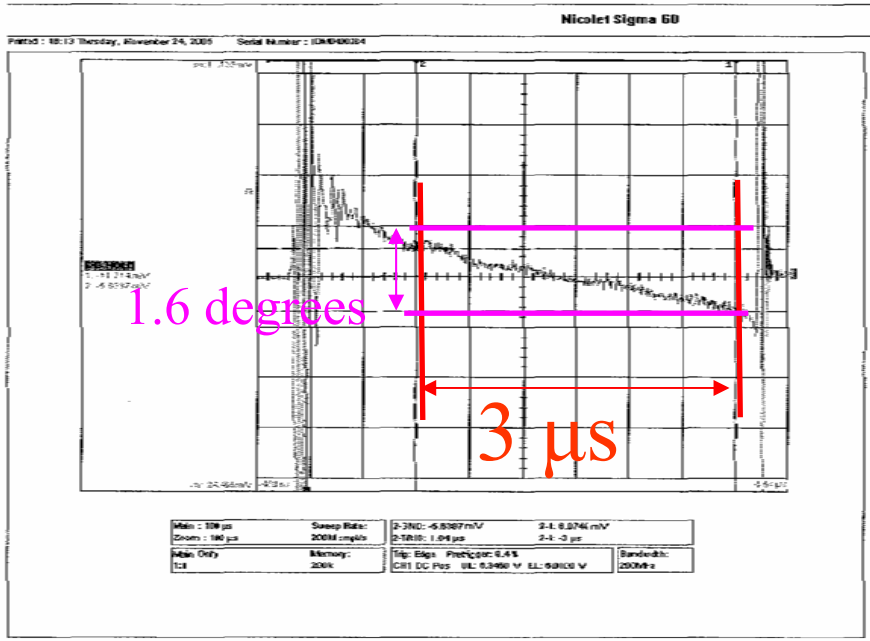
- On the evening before the factory acceptance test (29th September 2005) the TWTA failed again (grid modulator blew up)

- Over last 2 months the manufacturer has endeavoured to resolve the problem and the reliability of the TWTA,

- Finally the first TWTA is ready , it has been running since last Friday without any failure and will continue to run until the factory acceptance test on 1st December

# TWTA Situation (cont)






215,15mV × II/180 = 3,75mV

6,07/3,75 = 1,61°

PW = 4,5µS
I.P.P. = 20mS
Retrigger = 20µS

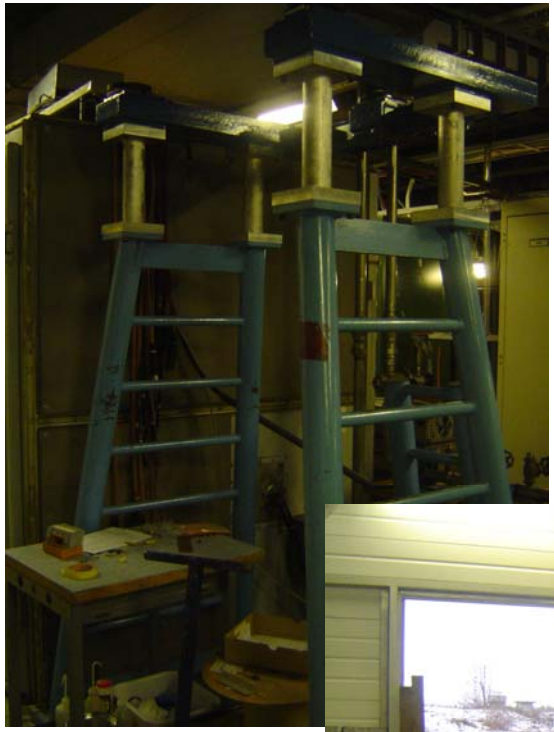
5 mV/div 500ns/div

# TWTA Situation (cont)

- Need to get guarantees about repair time in case of failure as we still have reservations about the unit reliability
- If all goes well this Thursday, will push manufacturer to deliver the unit for the beginning of next week so that we can try and get some RF on 1st SHB cavity before end of the year.
- Lesson learned is when possible don't split up orders with different companies where performance of one component relies on the other and vice versa.

# L Band Klystron and RF deflector Installation

- In this months shutdown the RF deflector was installed by INFN
- This allowed CERN to complete the waveguide installation from deflector to klystron gallery.
- Modulator operational (was tested with an S Band klystron)
- Some small mechanical conflicts for L band installation, resolved yesterday
- Waiting for delivery of 1 capacitor for HT tank before klystron can be installed
- Cabling for new focussing magnet power supplies being completed
- Should be ready to put HT on klystron in a few days
- RF conditioning to follow and hopefully deflecting beam before end of run, maybe next week



# OTHER ONGOING WORK

- Waveguide network for Photo Injector tests in CTF2. Not ideal solution approx 80 metres of waveguide necessary to get power from MKS14, plus 2 circulators to be installed since cavity is standing wave.
- Ordering some waveguide components, bends level changes etc. (used reserve to interchange modulators MKS06 and MKS11 to allow 50 Hz operation for PETS)
- Need final drawing of cavity as there has to be a 180 degree phase shift between the two inputs
- Waveguide network for S band RF deflectors in combiner ring being studied, again from MKS14 unless another modulator is found, specification is 10 MW per deflector.
- New End of Line Diode assembly should be ready for a prototype test during winter shutdown
- New PLC development for MKS15, new configuration will then be installed in MKS11 as well.
- PLC controller for TWTA's to be started
- CLEX modulators and RF network?
- E2V have managed to get permission from Phillips to give CERN Valvo klystron drawings (at a cost) now to sort out small print before finding someone to repair them