

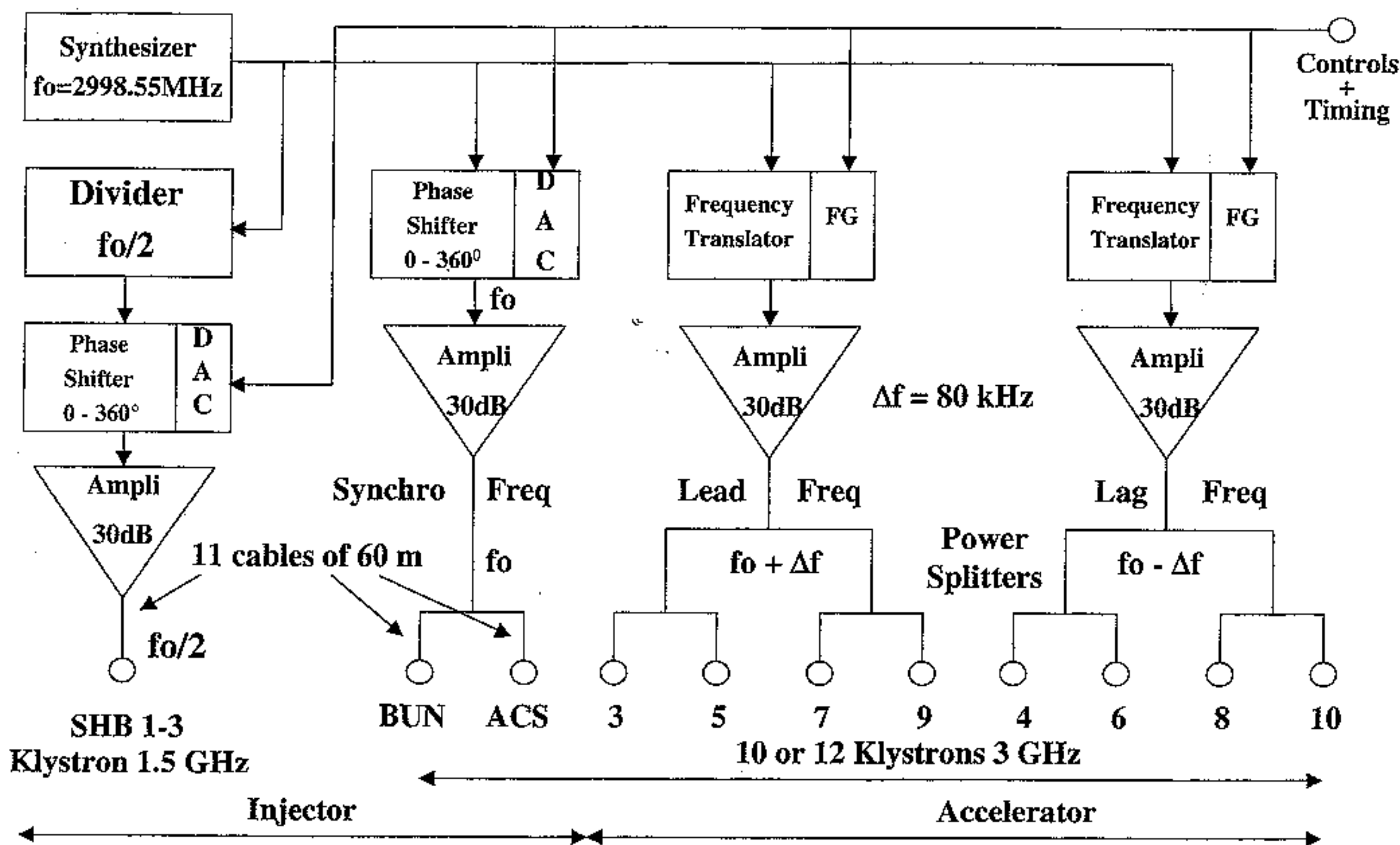
The followings points
will be treated:

- Synchronization
- The RF Distribution System
- Phase Control
- The Data Acquisition System
- Voltage Control
- Energy Control

The CTF3 Low Power RF System

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Synchronization of RF Pilot Frequencies for CTF3



Synchronization

- The RF master generator will be a synthesizer working at 2998.55 MHz.
- With a divider the frequency for the subharmonic buncher is derived.
- With other dividers the timing signals are generated.

Synchronization

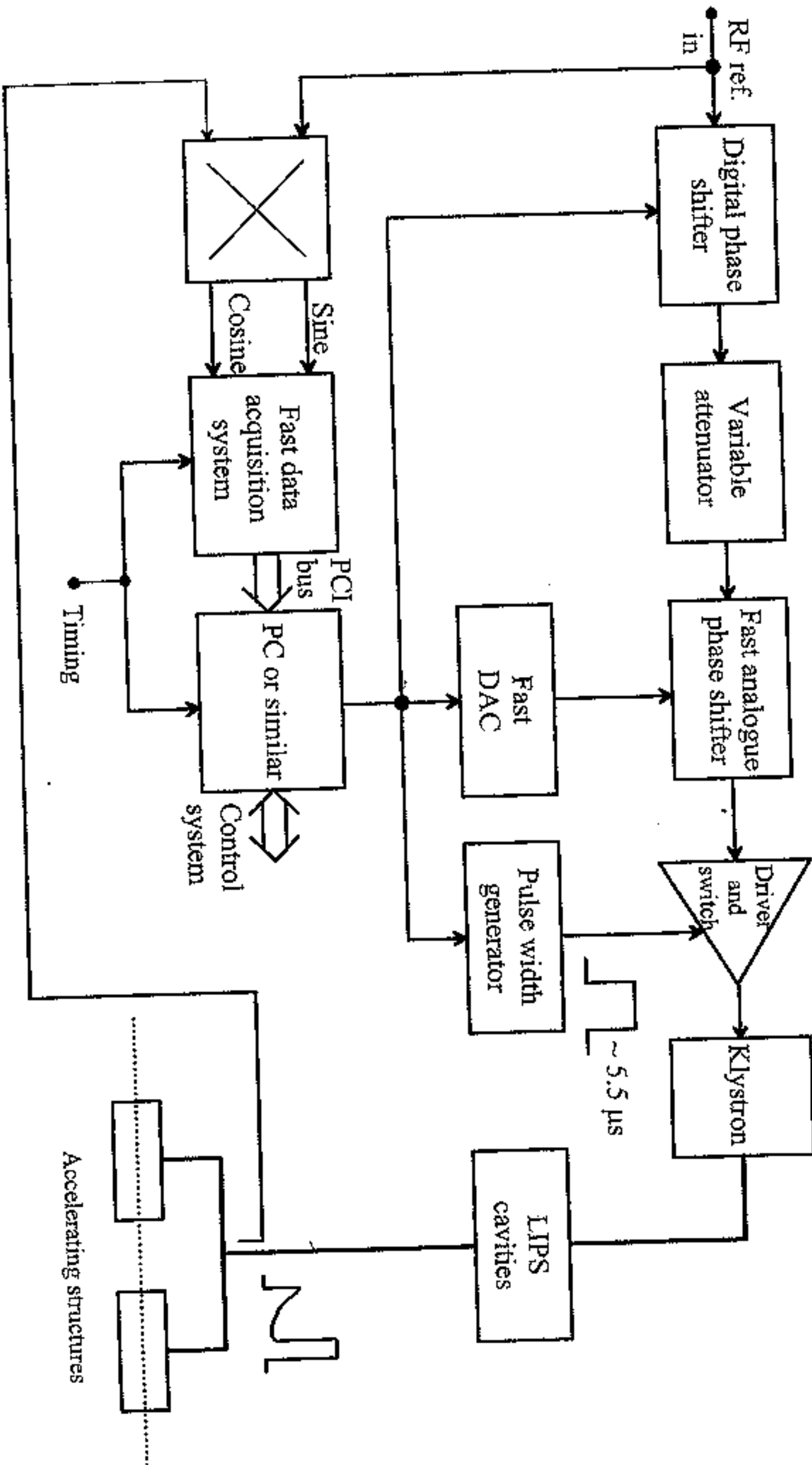
- Two more frequencies are generated centrally:
- A leading for the odd numbered klystrons with pulse compression.
- A lagging for the even numbered klystrons.

The Distribution system

- The signals to the 11 klystron are sent through equal length coaxial cables.
- Phase stabilized coaxial cables will be used (3 to 6 ppm/deg.)
- Over 60 m the phase drift will be less than 1.4 deg. RF at 3 GHz if the temperature varies 1 deg. between the cables.

Phase Control

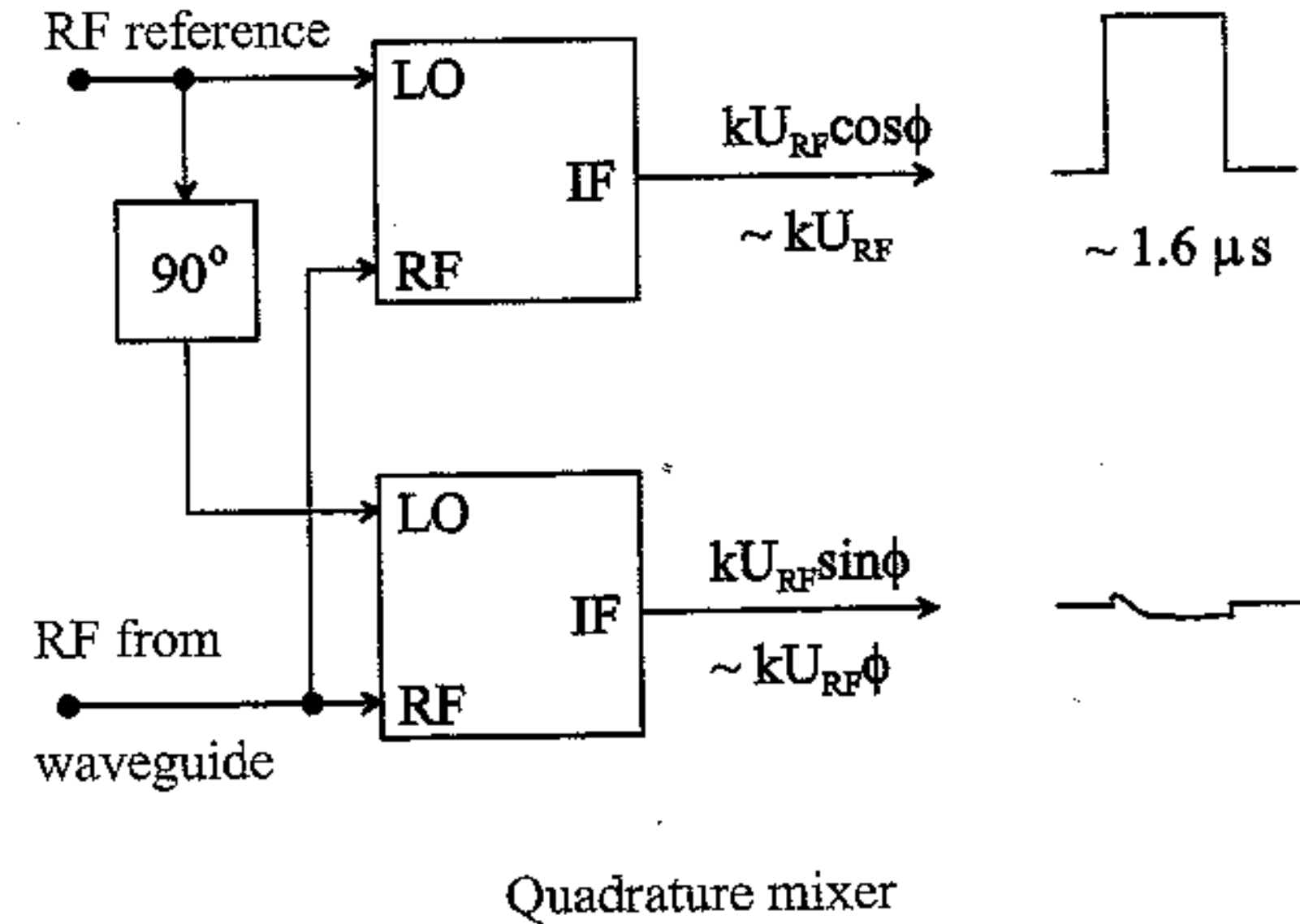
- At the input of each amplifier chain a 10 bit 360 degree phase shifter is used to set the phase with respect to the beam and the other accelerating sections.
- The fast analogue phase shifter is used for the phase programme for the pulse compression.



Block diagram of the phase control for one klystron with pulse compression

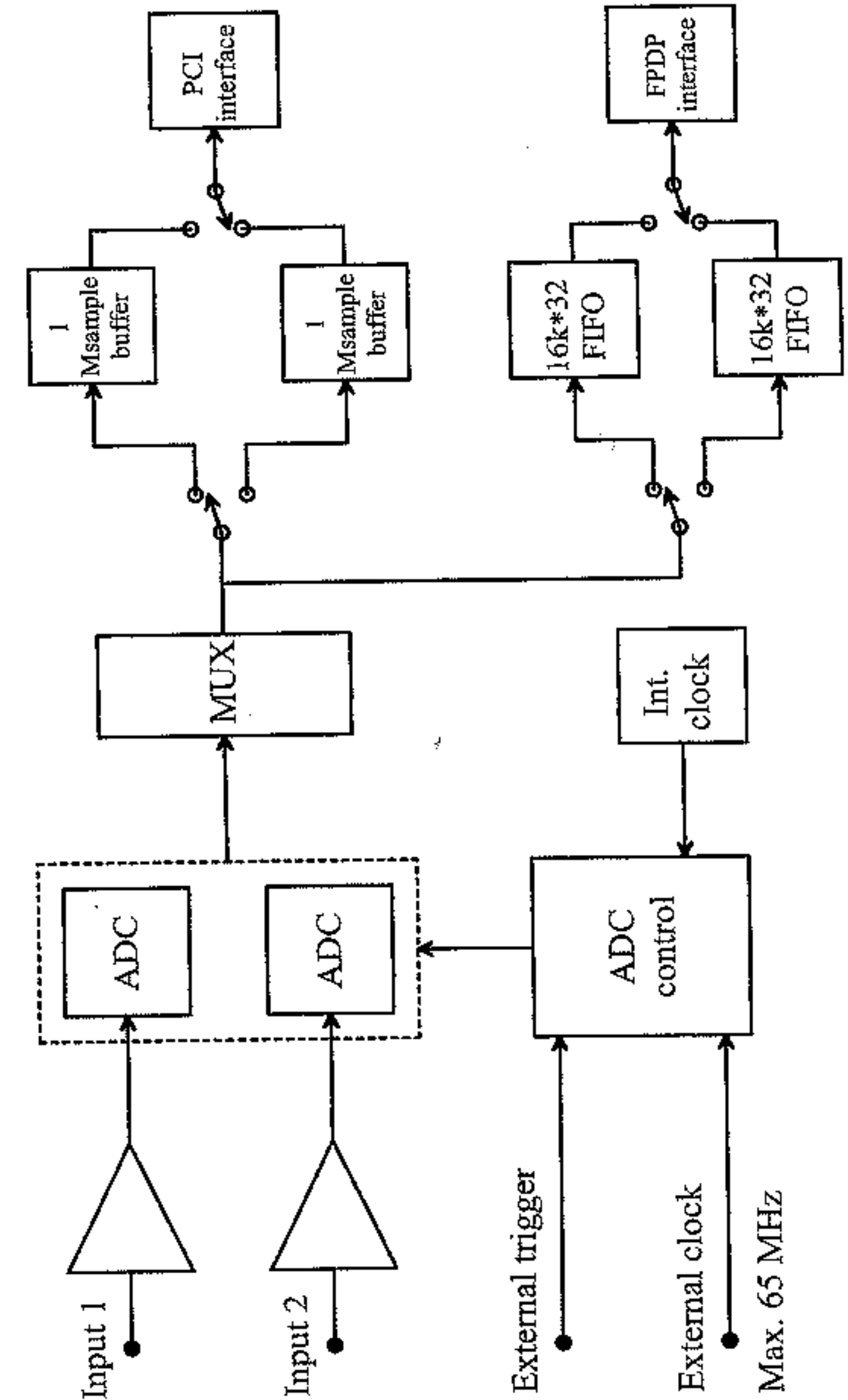
Phase Control

- Uncontrollable phase variations are compensated with a feed forward loop. The phase between the reference and a directional coupler in the waveguide is measured with a quadrature coupler.
- The average phase during the beam pulse is calculated and a correction applied to the digital phase shifter before the next pulse.



Data Acquisition System.

- About 20 measurements are required during the duration of the beam pulse (1.4 ms).
- A fast system is therefore needed.
- ADC boards with sample rates up to 65 MHz and 12 bits and a PCI bus exist.
- The acquisition can be completely synchronized to the beam pulse.



Beam Energy Control

- The power gain of the compressor can be adjusted with high resolution by changing the duration of the RF power production.
- Eventually by measuring the beam position at the end of the linac a feed forward loop could be implemented.
- Was successfully used in LIL.

Voltage Control

- At nominal beam current the accelerating cavities are fully loaded.
- With the same klystron power at low current the average field would then be twice as high.
- The klystron output power can be varied between 17 and 35 MW by changing the modulator voltage.
- Another factor two by changing the gain of the pulse compression.