

Decision #30 - Maintenance Unit Length

Options:

- 1) Half the distance between refrigerators ~3km sector
- 2) ~0.5km units using “double turn-a-round box” with 6 U-tubes at each location, figure #1, 2, & 5
- 3) ~0.5km units using “double turn-a-round box” with 24 valves at each location, figure #1, 3, 4, & 5

BCD: ~3Km sector

Pro:

- 1) Minimizes the component count
- 2) Minimizes the heat load. (Note: Option #3 adds twice the load of #2.)
- 3) Minimizes the linac length; each “double turn-a-round box” adds 1.5m slot length.

Con (500m units provide):

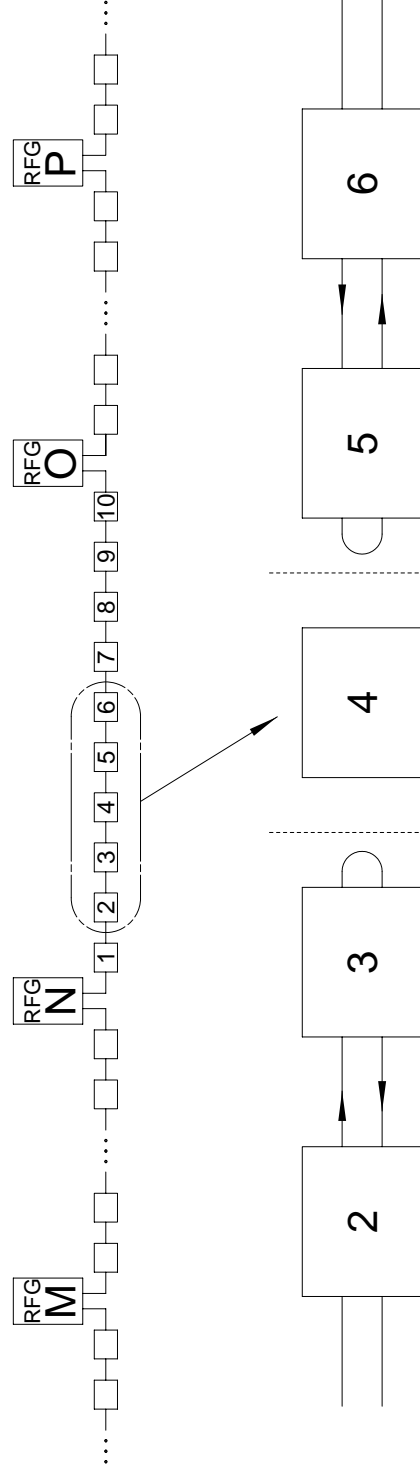
- 1) Reduced thermal cycles on CM's. (factor ~5)
- 2) Reduced warm up times (factor >2)
- 3) Reduced cooldown times (factor ~10)
- 4) Reduced He storage (factor ~5)
- 5) Refrigeration load sharing. (Note: Can also be achieved by adding double turn-a-round boxes at 3 km spacing.)
- 6) Modular commissioning elements: as each 500m unit is installed, it can be cooled down and commissioned.
- 7) Modular “upgrade” elements: the Linac energy can be upgraded in 500m units during maintenance periods.

ACD: If the component reliability can not be reached; change design to 500m maintenance units.

ACD R&D: 300mm cold valve design

This valve requires a cold actuator in order to minimize the heat load, and it must be “slow opening”, where this is defined as not causing either a pressure or temperature transient that trip off the Cold Compressors. This is required for option #3 and is also useful for option #2.

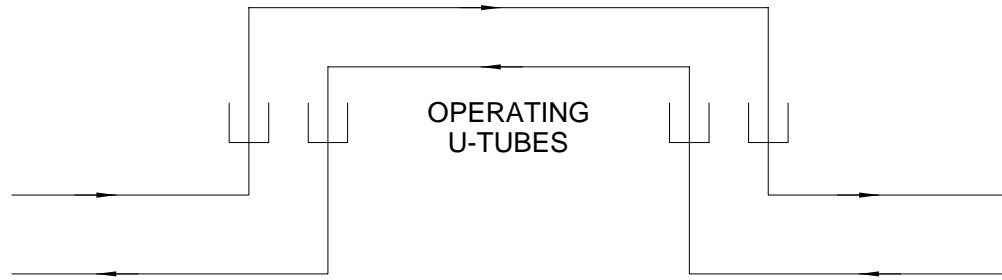
FIGURE #1
500 m MAINTENANCE UNIT



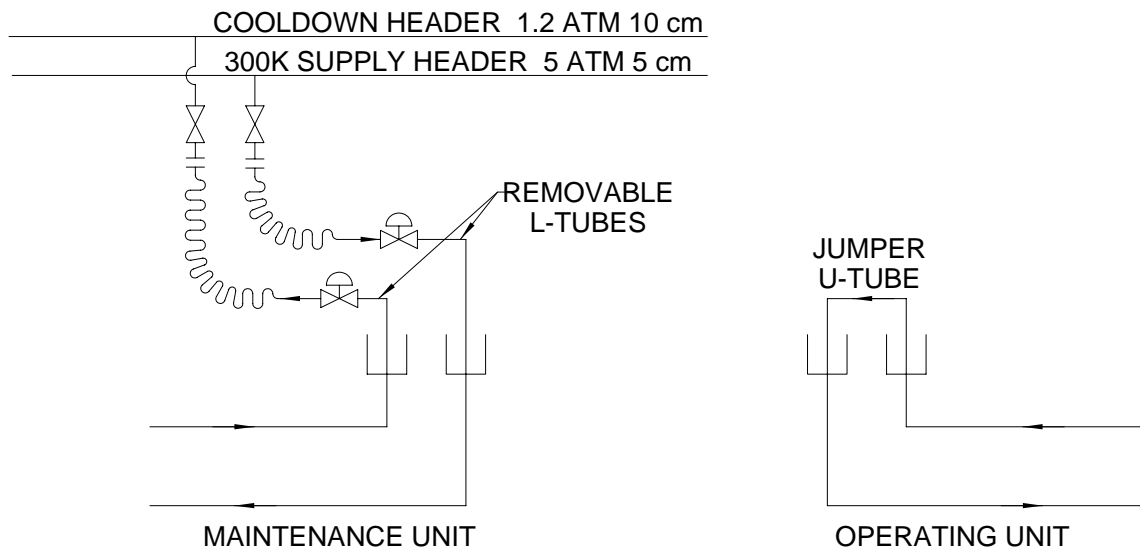
MODES

WARM UP:	OPERATING ON REFRIGERATOR N	WARMED UP BY RERG M & N	OPERATING ON REFRIGERATOR O & P
REPAIR:	OPERATING ON REFRIGERATOR N	—	OPERATING ON REFRIGERATOR O & P
COOLDOWN:	OPERATING ON REFRIGERATOR N & M	COOLDOWN BY RERG M, N, O, & P	OPERATING ON REFRIGERATOR O & P

FIGURE #2
U-TUBE OPTION - 50K, 5K, LOOPS & 2K



NORMAL OPERATION



MAINTENANCE MODE

FIGURE #3
VALVE OPTION - 50K & 5K LOOPS

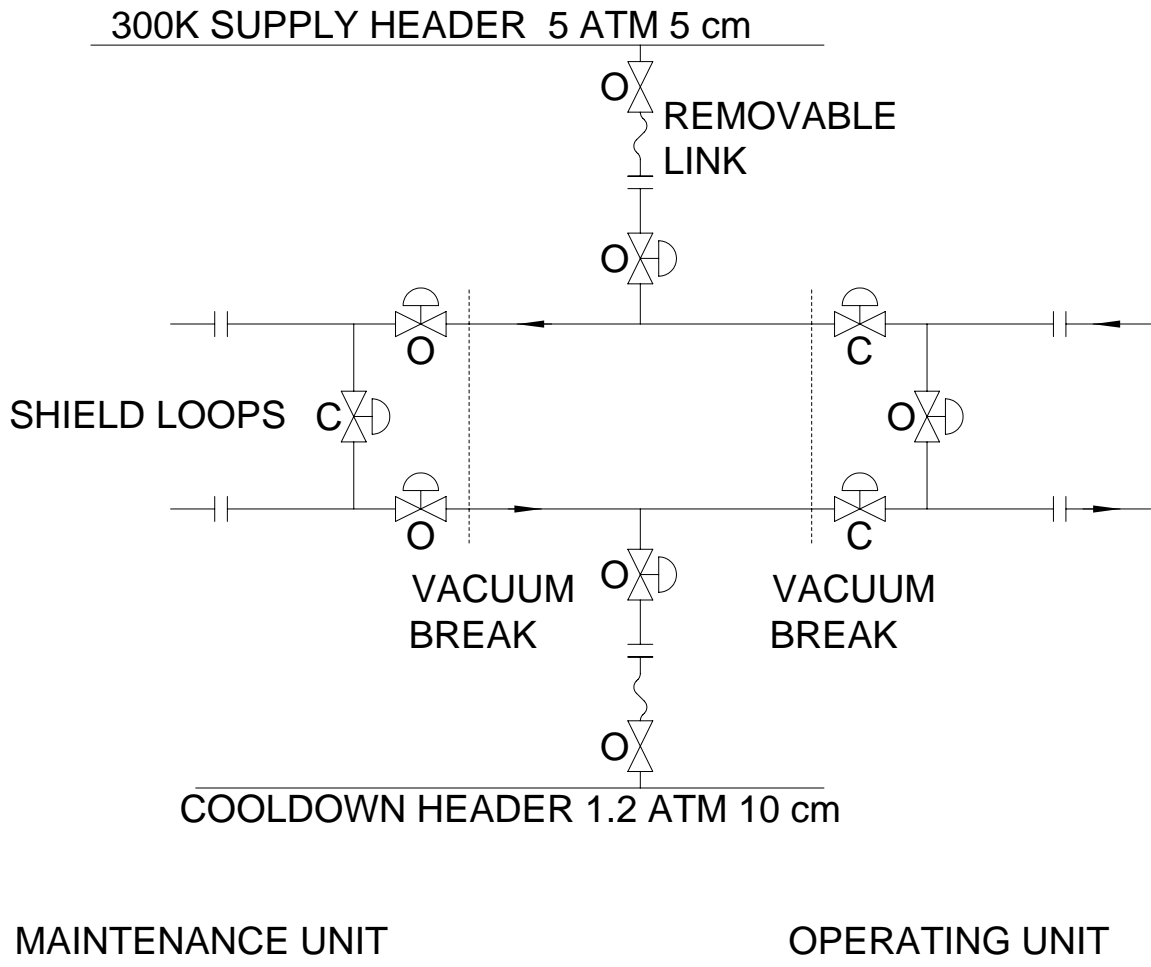


FIGURE #4
VALVE OPTION - 2K LOOP

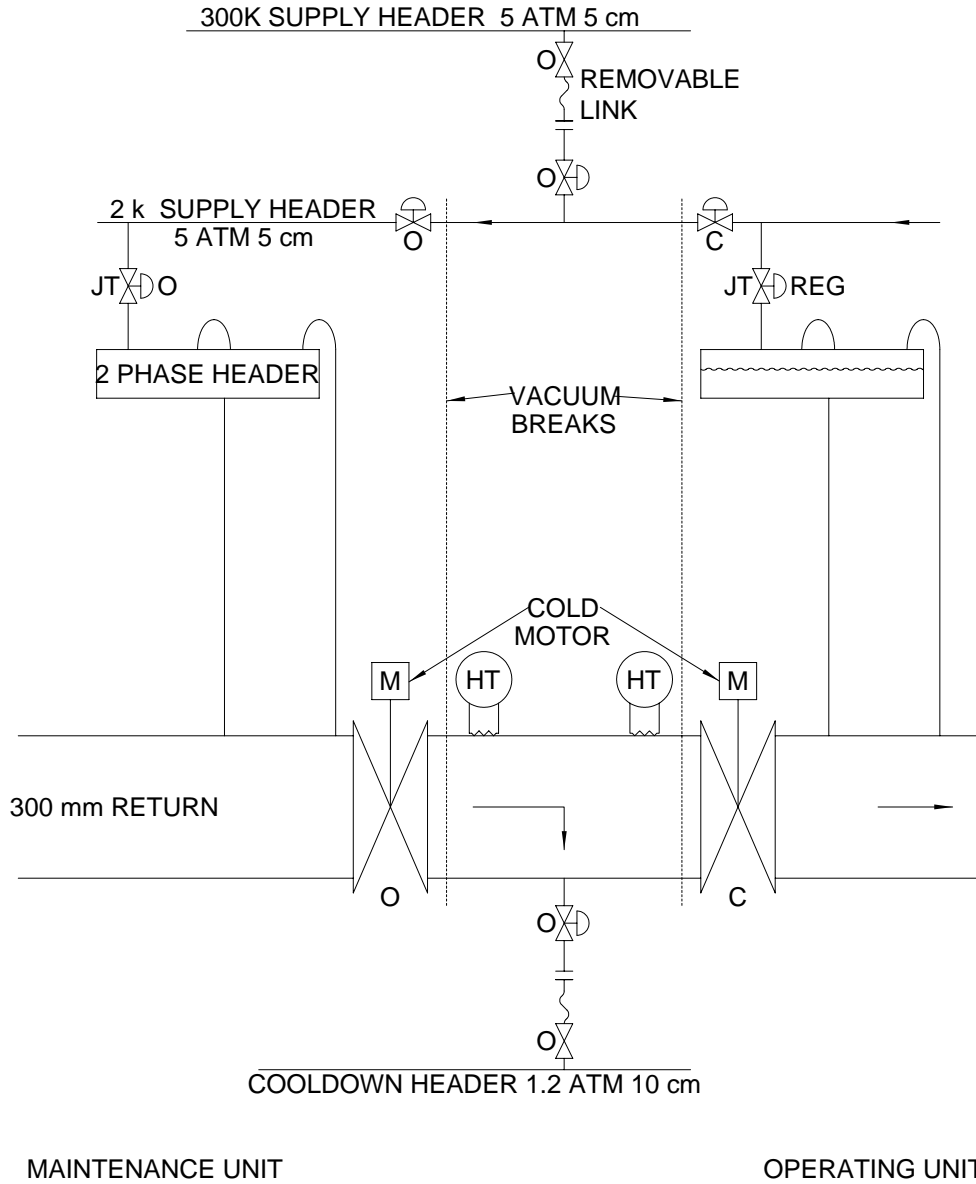
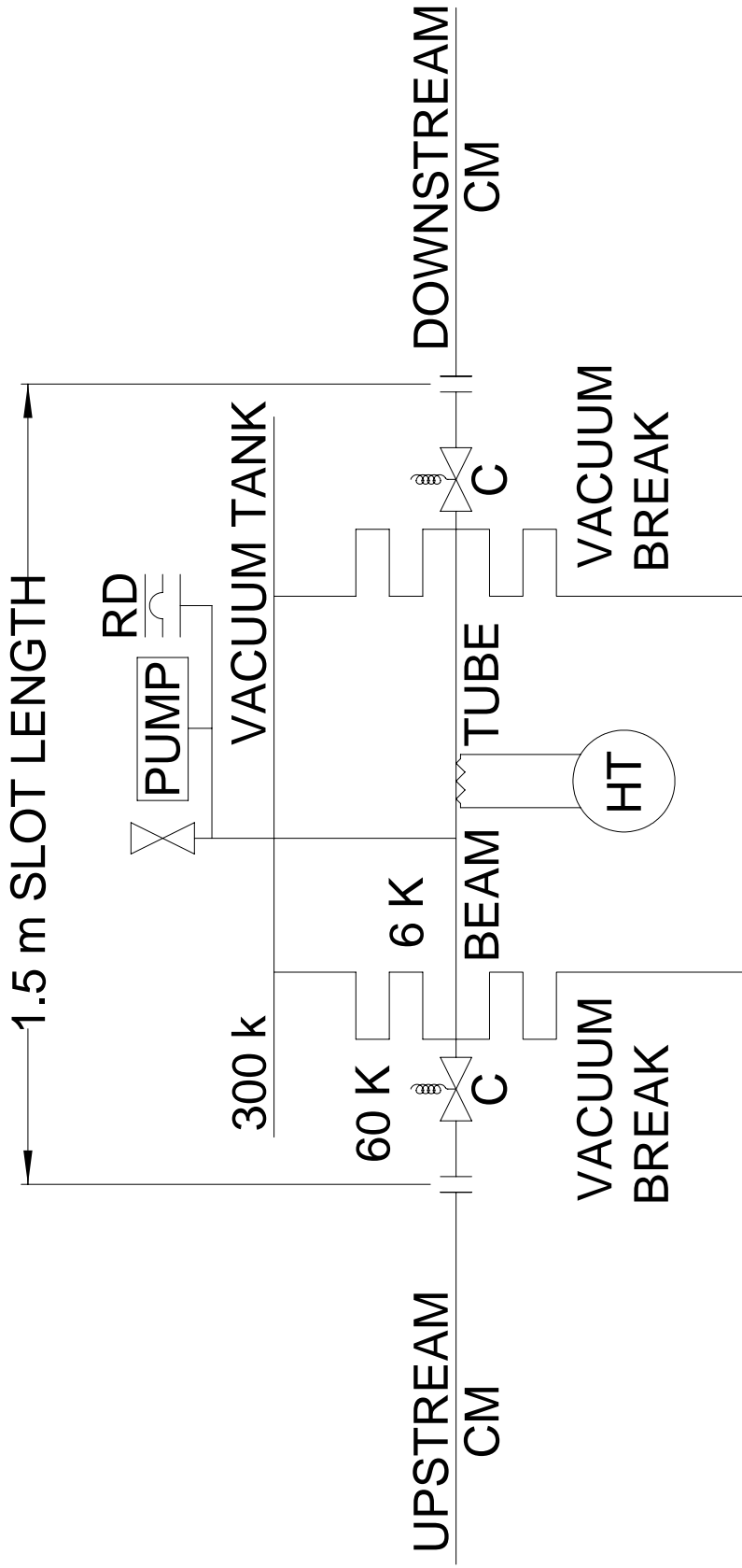


FIGURE #5
BEAM TUBE



MAINTENANCE UNIT

OPERATING UNIT