

SNS104000000-SR0001-R00

Spallation Neutron Source

**System Requirements Document
For WBS 1.4 Linac Systems (LANL)**

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1.0 BACKGROUND

The overall objective of the SNS project is to provide a neutron scattering research facility that includes a pulsed-proton beam spallation neutron source, instruments and sample preparation, data collection and analysis, offices, shops, laboratories, and other research support facilities needed to support numerous short-term scientific visitors. Short-term scientific visits will run from 1 day to 2 weeks.

The neutron source shall provide:

- Initial availability greater than 90%, and predictable cold and thermal pulsed neutron beams that are generated by a proton beam with a pulse width of approximately 1 microsecond.
- a repetition rate equal to 60Hz.
- an average proton beam power in excess of 1MW striking a target system that allows optimization of the neutron beams for different scientific applications.
- both room temperature and cryogenic moderators.

The facility shall provide one target building/experiment hall and an initial complement of scattering instruments. The target building and site plan shall be designed so that it may be expanded and so that beam lines may be extended outside the building to accommodate long neutron beam lines of up to 100m. The facility site layout shall provide for the future addition of a second target building/experiment hall.

The purpose of this System Requirements Document (SRD) is to establish the system-level requirements for the WBS 1.4 linear accelerator (linac) to be built by Los Alamos, to ensure that overall SNS facility goals are met. The SRD also identifies key interfaces with other level 2 WBS elements. More detailed design criteria documents and interface control documents will be prepared for individual sub-systems (level 3 and 4 WBS elements). This SRD, as well as lower tier documents, is under formal configuration control following approval.

The linear accelerator (linac) is the principal accelerating structure, and must be capable of delivering a pulsed H⁻ beam to the accumulator ring. The linac is divided into a room-temperature linac up to 185 MeV, and a superconducting RF (SRF) linac that accelerates the beam up to approximately 970 MeV.

The linac accepts beam accelerated by the radio-frequency quadrupole (RFQ) at an energy of 2.5 MeV, and accelerates this beam to approximately 970 MeV, delivering it to the high-energy beam transport (HEBT). The goal for the linac is to operate at approximately 2-MW total power. The linac is composed of a drift tube linac (DTL), a coupled-cavity linac (CCL), and a SRF linac consisting of eleven $\beta = 0.61$ cryomodules and fifteen $\beta = 0.81$ cryomodules. The design will accommodate up to six additional cryomodules, with the potential for raising the output energy to 1.3 GeV. The design will accelerate a peak current of 52 mA with a duty factor of 6.0 %.

As specified in System Requirements Document SNS 108030000SR000, Conventional Facilities shall provide the Front End Building, the Klystron Building, and the Linac Tunnel required to house linac and klystron technical components from the ion source to the high-energy beam transport (HEBT). The conventional facilities shall include building structures; electrical power and communications; environmental control systems; mechanical and piping systems; waste systems; handling, transportation, maintenance and storage facilities; and instrumentation.

2.0 INTRODUCTION

The linac scope encompasses all technical components associated with acceleration of the beam from 2.5 MeV to approximately 970 MeV. This includes the linac accelerating structures

(normal and superconducting) and associated magnet, diagnostic, vacuum, and cooling systems; and the RF power system. Also included are the medium energy beam transport (MEBT) chopper, RFQ RF system, and HEBT cavities (both structures and RF). However, this SRD does not address work performed by Jefferson Laboratory for the superconducting cryomodules, central helium liquifier, transfer lines, and test facility.

3.0 SYSTEM DESCRIPTION

The Front-End System (WBS 1.3), delivers the 2.5 MeV H⁺ beam for injection into the linac. The ions are then accelerated to 970 MeV in the Linac Systems (WBS 1.4) for delivery to the High-Energy Beam Transport Line (HEBT).

The last element of the Front-End Systems is the MEBT line. The 2.5-MeV beam from the RFQ is transported through the MEBT for matching and injection into the DTL, which is the first element in the string of RF accelerating structures comprising the Linac Systems. The interface point is the face of the gate valve adjacent to the DTL. WBS 1.3 is responsible for the design, fabrication, and installation of the MEBT. The responsibility for design and fabrication and for testing of the traveling wave choppers to be incorporated into the MEBT, however, rests with WBS 1.4. The integration of the choppers into the MEBT line is part of WBS 1.3.

The second Linac System element is a coupled-cavity linac (CCL), and the final element is a SRF linac consisting of two different β cavities. WBS 1.5 is responsible for designing and building the HEBT. The responsibility for design and fabrication of the energy corrector spreader cavities to be incorporated into the HEBT, however, rests with WBS 1.4. The integration of these cavities into the HEBT line will be the responsibility of WBS 1.5, as is the beam dump line. WBS 1.4 will be responsible for all diagnostics in the zero-degree beam line, both before and after the first dipole magnet, including the beam-dump line, because this zero-degree line will be used to commission the Linac.

Figure 3-1 presents the overall linac layout. The MEBT chopper system is a traveling-wave structure that will produce an electric field of 2350 V/cm to provide a gap in the beam for injection into the ring. The beam-pulse structure in the linac, is given in Figure 3-2. The initial 20 μ s ramp-up in the macropulse current is accomplished by pulse-width modulation of the chopper.

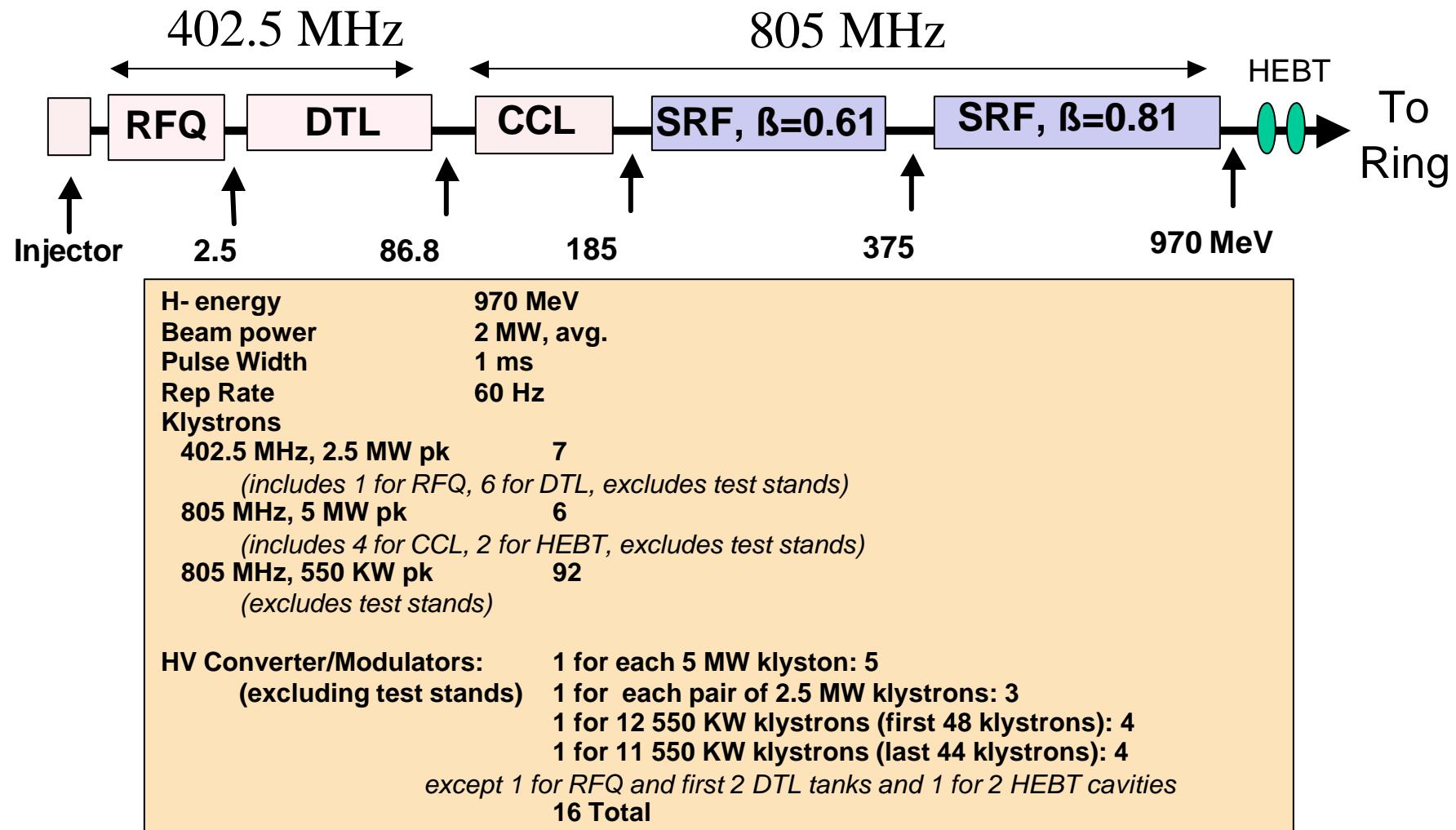


Figure 3-1, NC/SRF 2-MW Linac

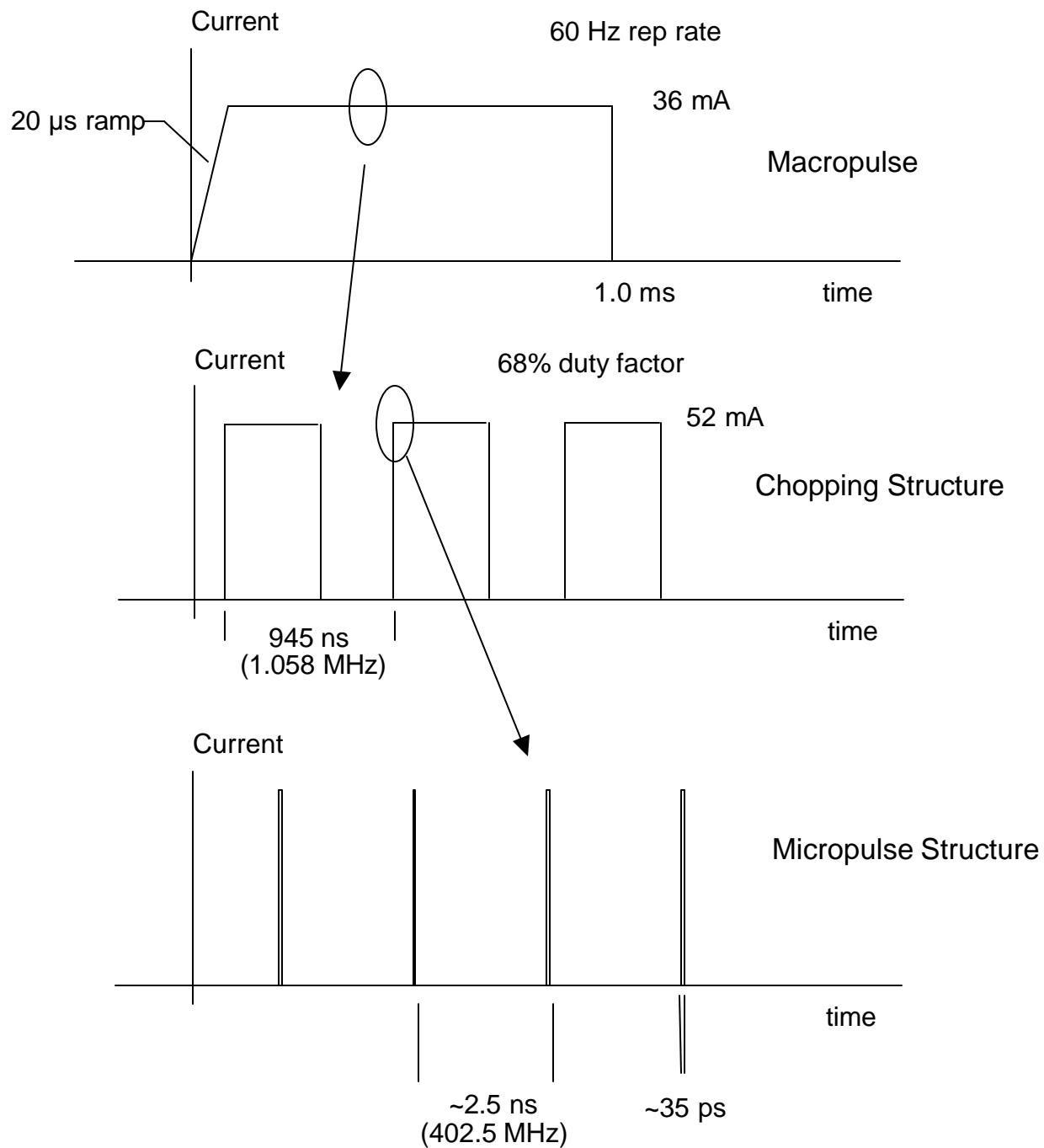


Figure 3-2, Linac Pulse Structure

4.0 REQUIREMENTS

4.1 General Requirements

Overall specifications for the linac system for the baseline (2 MW) facility are given in Table 4.1-1.

Table 4.1-1. Overall linac requirements

Input H ⁻ energy	2.5 MeV
Output H ⁻ Energy	970 MeV
Average beam current	2.08 mA
Average beam power	2.02 MW
Macropulse repetition rate	60 Hz
Macropulse beam period	1.0 msec
Beam duty factor	6.0 %
Chopper transmission	68%
Chopper period	945 ns
Peak macropulse current	52 mA
Average macropulse current	36 mA
Beam losses	<1 W/m
Energy Jitter	+/- 2.2 MeV
RMS Energy Spread	0.33 MeV
Phase Width	12.6 deg
Linac tunnel length	322 m
Linac tunnel width × height	14 × 10 ft
Beam Height	50 inches

Other requirements include:

1. Specified (SNS Parameter List) emittances from the MEBT and to the HEBT;
Use of optimum accelerating gradient to keep the total cost low; and
2. Linac design must be nearly current independent.

The beam-loss figure, 1 W/m, is based on 1 nA/m loss at full energy, on the basis of accelerator-operational experience. At this loss rate, activation is less than 10 mrem/hour, adequate for hands-on maintenance. Based on experience with existing accelerators and lessons learned thereby, such a loss rate is deemed feasible.

There are additional desires and requirements that lead to specific constraints on the linac design:

- a. the polarity of the first DTL quadrupole must be horizontally focusing, consistent with the chosen orientations of the MEBT quadrupoles; and
- b. the polarity of the last SRF quadrupole must be horizontally focusing, consistent with the orientation of the HEBT quadrupoles.

4.2 Detail Requirements

4.2.1 Seismic Requirements

The linac and associated systems must survive a PC-2 earthquake (0.08 G).

4.2.2 Structural and Architectural

The linac and associated systems must accommodate structural settlement within the tunnel and klystron gallery, as well as differential settlement between the two buildings. Settlement between 1 to 2 inches is expected.

4.2.3 Electrical Power, Communications, and Instrument and Control

Requirements are identified in the Linac/Conventional Facilities SRD. The linac must be compatible with these requirements.

4.2.4 Environmental Control

The normal-conducting linac will operate at 75° F. During operations the tunnel temperature will be maintained at 75° F.

4.2.5 Mechanical piping systems

Water systems that have the potential of becoming activated must be isolated from Conventional Facilities via a heat exchanger.

4.2.6 Waste Systems

All linac systems with the potential for activation must allow local draining and collection of waste.

4.2.7 Shielding

The chases between the klystron gallery and the linac tunnel may be filled with sand after installation to reduce radiation and thermal neutron diffusion. Klystrons and de-ionized water cartridges will be shielded to keep x-ray radiation below 0.25 mr per hour (at 30 cm).

4.2.8 Safety

The linac and associated equipment must comply with national safety codes and standards. Potentially energized systems with exposed contacts, such as magnets, must provide a clear visual indicator when energized.

4.2.9 Operational Requirements

Reliability, availability, and maintainability – SNS has an overall availability goal of 90 to 95%. In order to support this, linac availability must be between 98 and 99%.

Duty cycle requirements - In order to allow field stabilization and ramping times, the normal conducting RF structure duty factor is 6.6%, and the high-voltage duty factor is 7.2%. For the SRF linac, the high voltage duty factor is 8.4%.

4.2.10 Applicable Documents

“SNS Systems Requirements Document for Equipment, Device and Signal Naming,” SNS 102000000 SR0001-R00

“System Requirements Document for Title I Design of the Front-end Building, the Linac Tunnel and the Klystron Building,” SNS 108030000SR000

4.3 System Specific Requirements

4.3.1 RF Power Systems (WBS 1.4.1)

The RF power system consists of WBS 1.4.1.1, RF Power, which includes all linac RF subsystems, including the RF generator, RF transport, and transmitter; WBS 1.4.1.2, High Voltage Power Conditioning, comprising all components of the HV system from the substations to the RF generator; and WBS 1.4.1.3, RF Controls, which provides the feedback/feedforward control system, and RF reference and distribution. Figure 4-1 presents the overall RF System. The linac RF power system must provide the required RF fields in the accelerator cavities. Generally, these fields must be held to within $\pm 0.5\%$ in amplitude and to within $\pm 0.5^\circ$ in phase, (RF trips at $\pm 0.75\%$ in amplitude and to within $\pm 0.75^\circ$ in phase) from the design values, with a response time of 10 μs for the normal-conducting linac. This function must be performed despite variations in ambient temperature, power line fluctuations, and variable beam current. Modulators are required to modulate the klystron beam when providing power in pulsed systems. Two frequencies, 402.5 MHz for the RFQ and the DTL, and 805 MHz for the coupled cavity and SRF structures, are required. Block diagrams of the RF systems for the normal-conducting and SRF portions of the linac are presented in Figures 4-2 and 4-3 respectively.

High Voltage Power System (WBS 1.4.1.1)

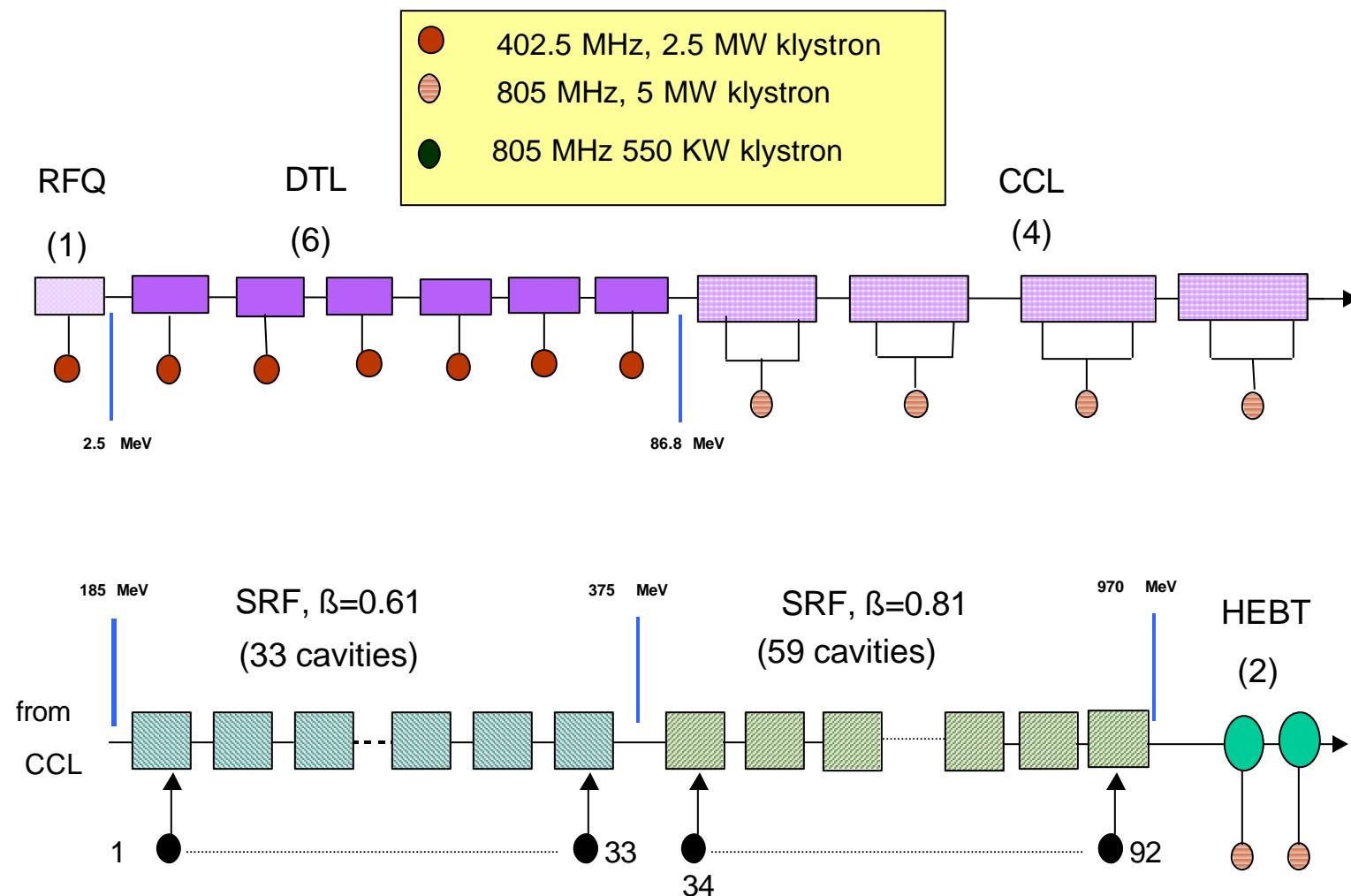
This system consists of the klystron, transmitter (electronics, diagnostics, and oil tank), circulator, waveguide, circulator load, and accelerator windows (for normal-conducting linac). The 402.5 MHz klystrons must have a peak power of 2.5-MW, and the 805 MHz must have a peak power of 550-kW (SCRF) and 5- MW (CCL). Actual operation must allow a 25% control margin for cavity variations, and waveguide and insertion losses for the room temperature cavities, and 33% for the SRF cavities.

The transmitter will have an electrical component and a cooling component. The electrical part of the transmitter will consist of two or three standard 19-in. wide, 2-m-tall racks of equipment. The major items are a PLC that can monitor and adjust any of the amplifier's variables, and provide a fault-protection unit and a status panel that monitors and displays the operating state of the transmitter.

The monitoring and status panels may be screens on the PLC controller, and a workstation computer may be used instead of a PLC. The PLC also will serve as the interface between the RF system and the facility control system.

The cooling section of the transmitter is a water and air cooling system with controls and interlocks that ensures proper cooling of the RF module. The water cooling system must cool the klystron collector, body, and solenoid, and the RF windows on the klystron and on the accelerator. Transmitter oil tanks will house one 2.5-MW, 402.5 MHz klystron, one 5-MW 805 MHz klystron, and up to six 550-kW, 805 MHz klystrons.

Figure 4-1 Linac RF System



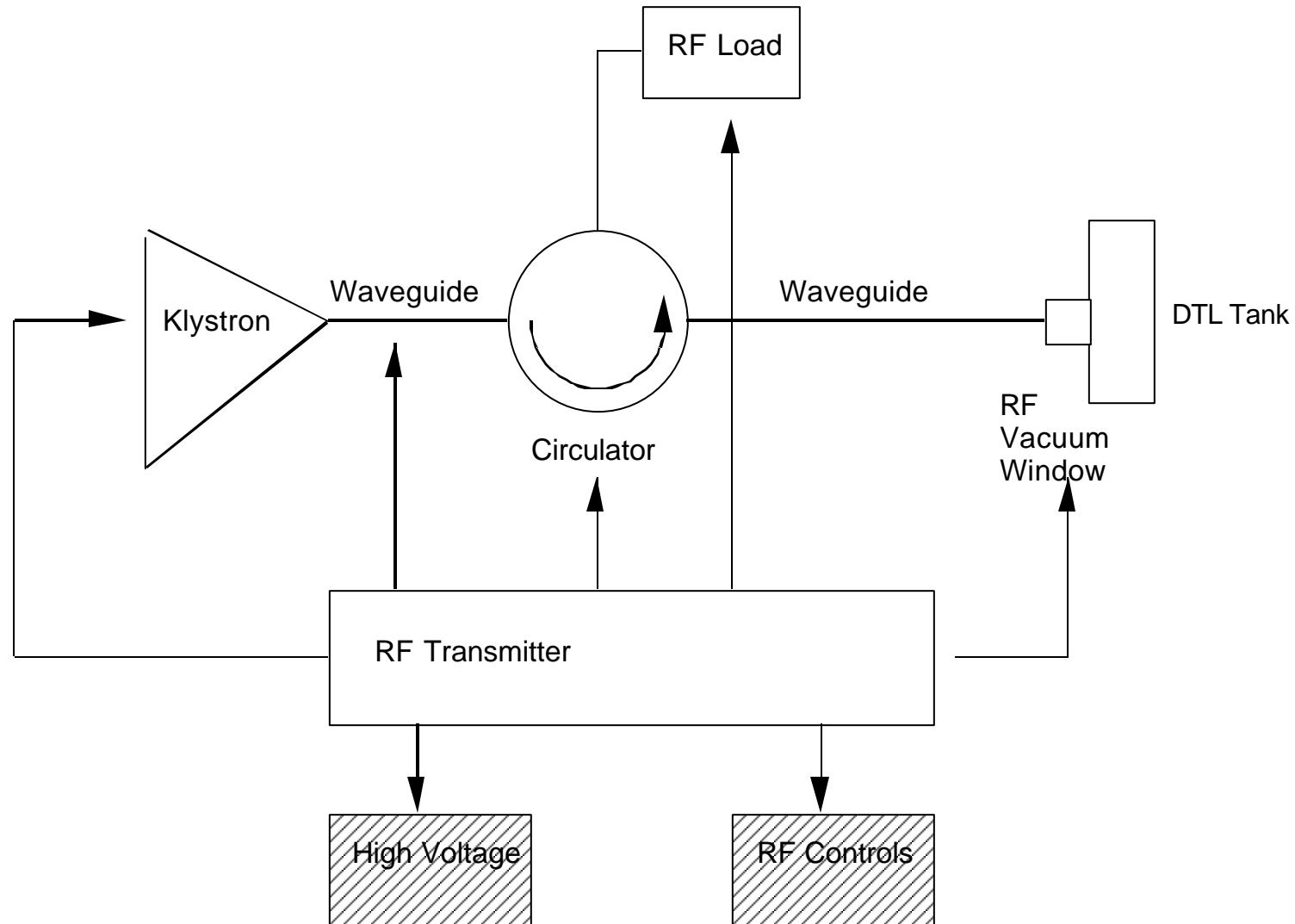


Figure 4-2, 402.5 MHz DTL RF System Block Diagram

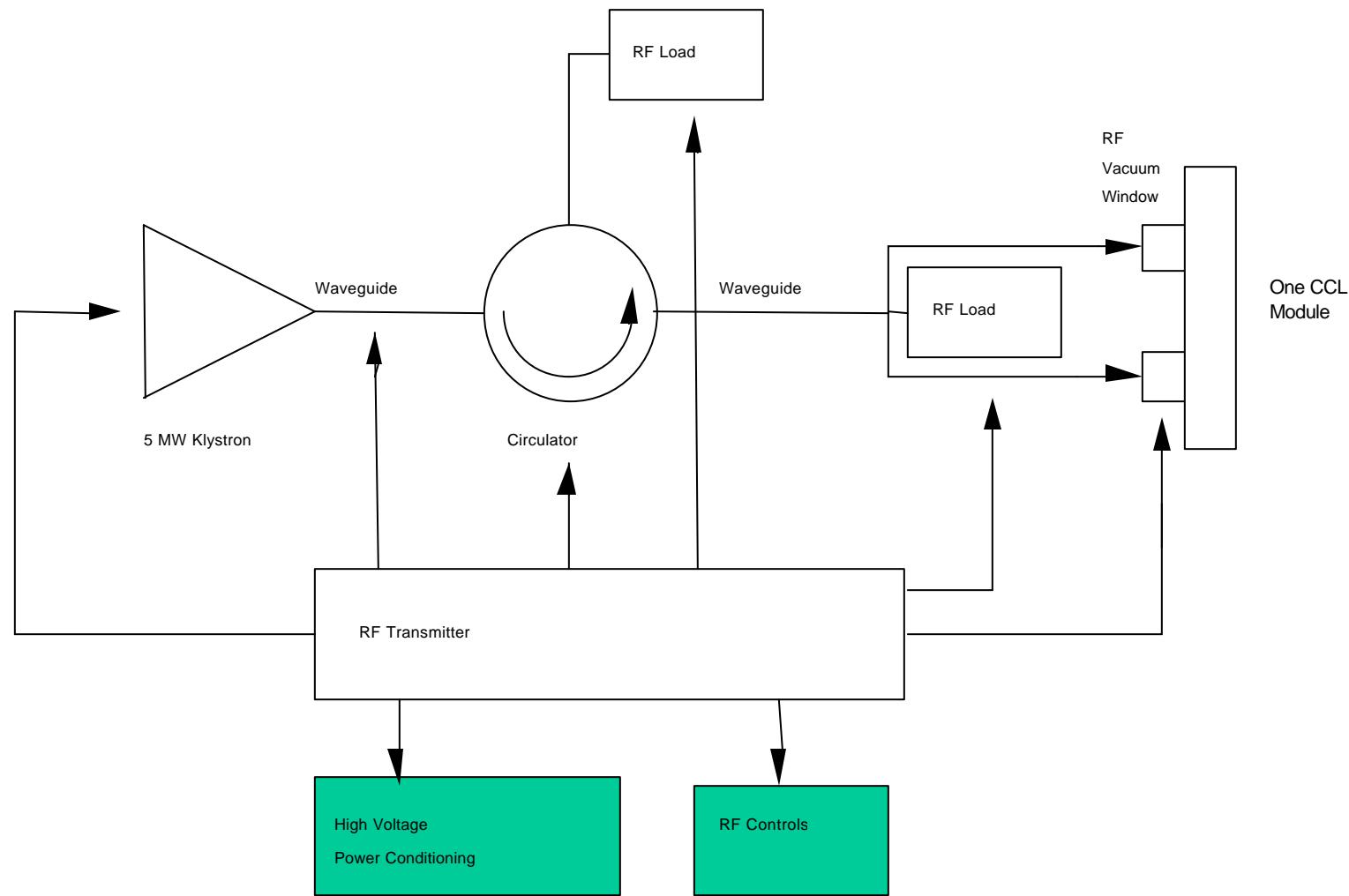


Figure 4-3, 805 MHz CCL RF System Block Diagram

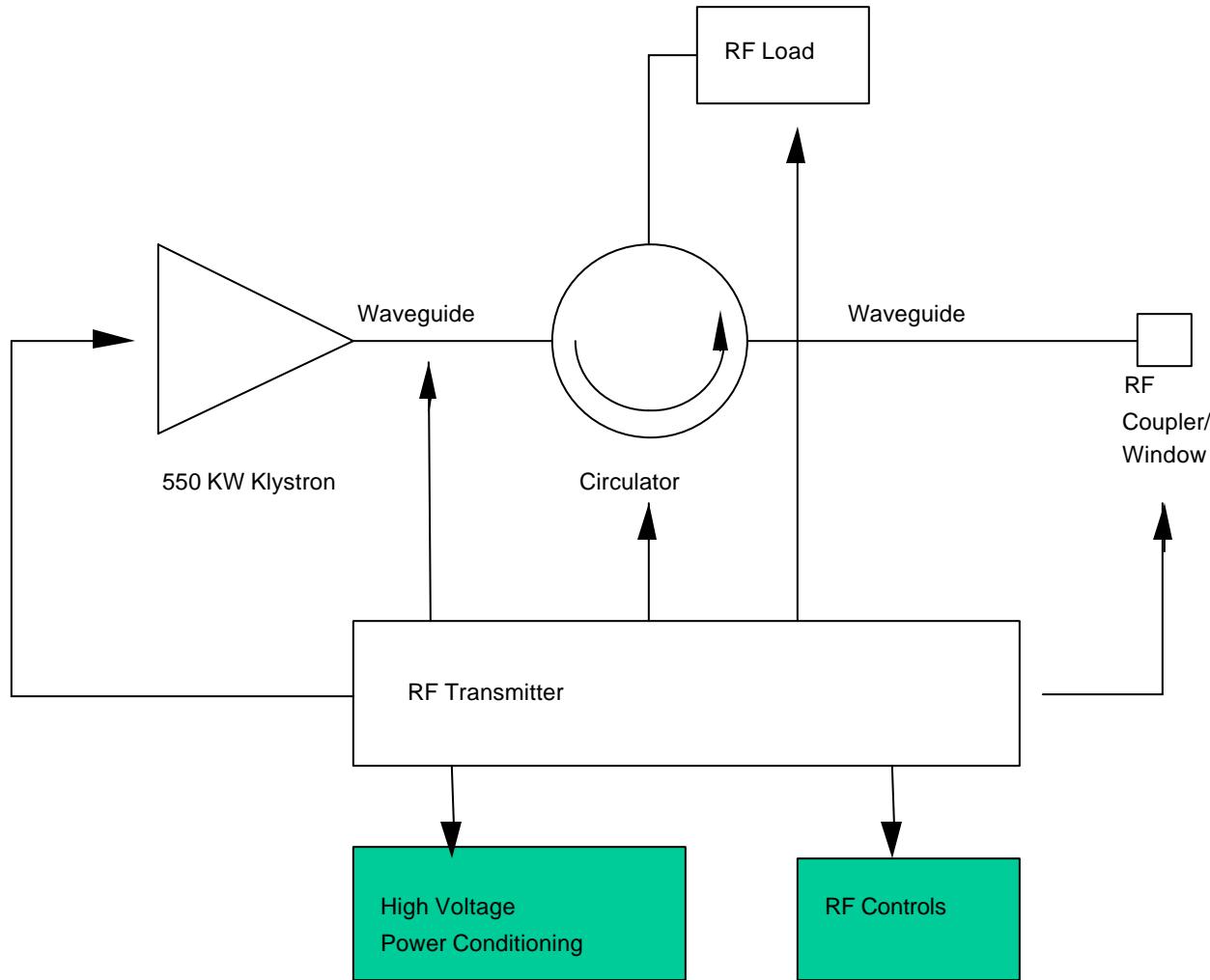


Figure 4-4, 805 MHz SC RF System Block Diagram

The klystron, window, and solenoid water systems must be monitored for flow and for maximum temperature. Whenever limits are exceeded, the systems must be shut down. In addition, drain and blow-down valves must be installed in the cooling section so that when a klystron is changed, all internal cooling passages will be dry and no water will be lost.

The klystrons and transmitter tanks will be transported in the klystron gallery with air pads. The waveguide for the RF systems is a compromise between large size, which minimizes the RF losses, and small size, which costs less and saves space in the buildings. The 402.5 MHz system will use WR-2100 waveguide, and the 805 MHz NC system will use WR-1150 waveguide. The 805 MHz SRF system will use WR-1150 waveguide, and transition to WR-975 waveguide in the klystron gallery in order to reduce the number of chases to the tunnel (since one 30" diameter chase can house two WR-975 runs). There are also vacuum windows at the accelerator end of the waveguides, one or more arc detectors protecting each RF window, and directional couplers at both ends of the waveguide to measure both the forward and reflected power.

The RF transport equipment must accommodate differential settlement between the klystron gallery and linac tunnel.

High Voltage Power Conditioning (WBS 1.4.1.2)

The SNS high-voltage power conditioning converter/modulator generates 10 MW peak power with an 8.5% duty cycle for the various linac klystrons. For the 402 MHz system, 130 kV pulse voltages are required; for the 805 MHz CCL system, 140 kV pulses are utilized. With the 805 MHz superconducting portion, 70 kV pulses are necessary. The converter/modulator powers two 402.5 MHz 2.5-MW transmitter tanks, or one 805 MHz 5-MW transmitter tank, or up to 12 805 MHz, 550kW klystrons. All components of the converter/modulator system are identical, for all systems, except for the high-voltage boost transformer. This minimizes spare inventory. All system operate from 13.8 kV, 3-phase utility grid (+1%/-3%) with harmonic rating that meet IEEE 519 standards. In addition, the converter/modulator must provide reserve power to accommodate reduced end-of-life klystron efficiency with power grid brown-outs of up to 3%. The klystron high-voltage pulse fidelity is better than 0.1% ripple and droop.

The system will provide electrical safety lock-outs to accommodate linac tunnel access safely. Personnel interlocks are hard wired with redundant computer back-up for additional protection and system notification. A programmable logic controller is used for system control and monitoring, with network tie-ins for central control room interfaces. The system footprint must be less than 8 by 16 feet by 7 feet high, and self-contained in an earthed safety enclosure. The sub assemblies are modular in design and do not require in-situ manufacture. Low voltage components are in air, high-voltage components in oil. The air-padable oil tank contains Envirotemp oil, suitable for indoor electrical use.

RF Controls System (WBS 1.4.1.3)

The RF controls system consists of the RF reference system, the accelerator cavity field control system, the cavity resonance system, and the high-power equipment protection system.

RF Controls Reference System. The function of the RF reference system is to provide a coherent reference signal to every RF module and other system that requires such a reference. At least three frequencies, 402.5 and 805 MHz plus the ring revolution frequency, are required along the linac tunnel, as well as lower frequencies to the injector, deflectors, and ring. There shall also be a timing distribution system that generates the 60-Hz repetition rate pulses, called

Tzero pulses, that drive the entire machine. In addition, the various subsystems require pulse trains in advance of or behind Tzero. For example, the RF modulators will need to be turned on well before Tzero so that the RF pulse can be in the accelerators when the beam arrives and the Tzero pulse occurs. Some time after the modulators are started, the RF pulses begin, and finally the beam may begin.

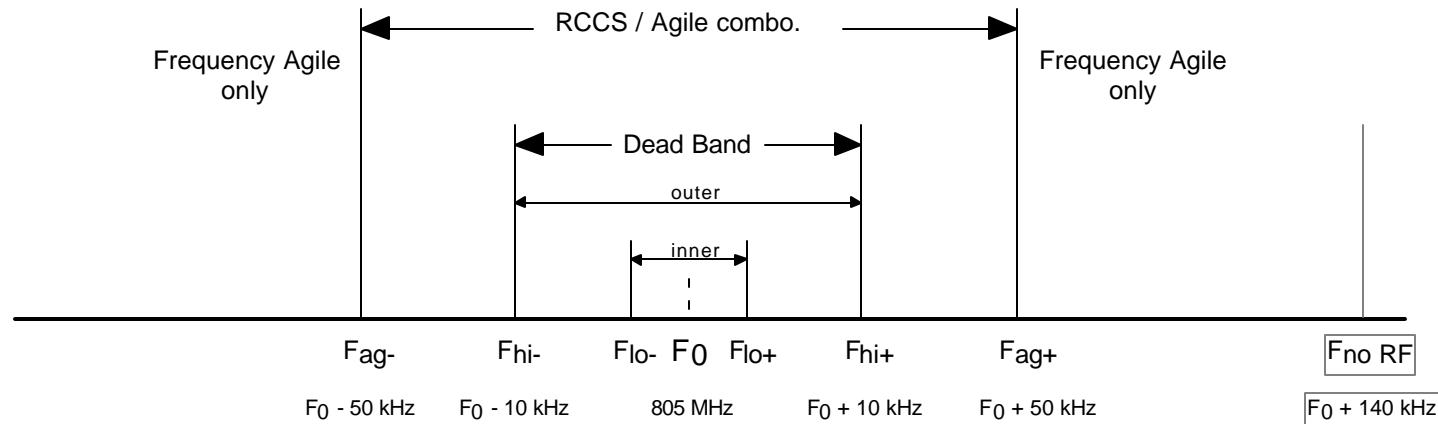
The reference system centers around a single master oscillator that has a number of phase-locked outputs, all created from a single 10-MHz crystal with extremely low phase noise. The phase-stable, coherent outputs of this master oscillator are 10 MHZ, 352.5, 402.5, 755, and 805 MHZ. The local oscillator frequencies of 352.5 and 755 will be distributed alongside the accelerator in the accelerator tunnel. This enables a downconversion from the cavity field RF frequency to an intermediate frequency of 50 MHz in the tunnel. This downconverted signal contains all of the amplitude and phase information of the RF signal but at a much lower frequency. Such a low-frequency signal can be transmitted to the RF control system in the klystron gallery without as much concern for uncontrolled phase drift, which is associated with electrical phase length changes in the transport cable due to ambient temperature changes. The local oscillator transmission lines in the tunnel will be temperature-controlled to eliminate these potential unwanted phase drifts.

Along the klystron gallery, the 10-MHz reference will be distributed to each RF control system. A number of frequency signals used by the RF control system are generated from this and are phase-locked to it: 40 MHZ ADC clock, 50 MHZ IF, as well as the LO (352.5 or 755 MHZ for upconversion). The output of each control system will be locked to this reference to ensure proper phasing of the entire accelerator. A redundant, operational spare, master oscillator is required.

Control System. The RF control system will perform various functions. Foremost is the feedback control of the accelerating fields within the cavity in order to maintain field stability within $\pm 0.5\%$ amplitude and $\pm 0.5^\circ$ phase (RF trips at 0.75% amplitude and 0.75° phase). The feedback control system requires a phase-stable RF reference subsystem signal to correctly phase each cavity. In addition, the resonance condition of the cavities is monitored and maintained. The system must maintain control during transients (i.e. beam turn-on), and respond to fault situations such as loss of beam, arcing in the accelerator cavity, and arcing in RF transport. To quickly respond to RF shutdowns, and hence rapid accelerating cavity cooldown, due to RF fault conditions, the system also will incorporate drive-frequency agility in the main feedback control subsystem.

The control system is a fast analog and digital system that measures the phase and amplitude of the electromagnetic fields in the accelerator and compares these values with desired set points. It then corrects for any deviations by modulating the drive power to the klystrons.

Resonance control of each accelerator cavity is required in order to control the shift of the cavity's resonant frequency due to RF heating, beam loading, and specific to SCRF, microphonics, Lorentz force detuning, cryogen pressure changes, and variations in klystron high voltage. A VXiBus module within the RF control system for resonance control performs two functions: it provides a resonance control signal to the cavity frequency control device, and it provides an open-loop control signal that can adjust the RF control output amplitude, phase, and frequency. During normal operation of room temperature copper structures, resonance control is performed by providing a proper drive signal to structure cooling water valves to optimize match. Figure 4-5 illustrates this control method. For the SCRF linac, the system operates the tuner control for optimum cavity resonant frequency.



Frequency Agile only: Water RCCS is inactive, holding at a set-point temperature, while the Resonance Control Module brings the drive frequency into the RCCS / Agile band.

RCCS / Agile Band: RCM and the water RCCS act to control the cavity resonant frequency and bring it into the deadband.

Dead Band: LLRF control system locks to the fundamental frequency (master oscillator) and the water RCCS takes over to control the cavity resonance within the deadband limits (as determined by the RCM).

Figure 4-5, CCL Resonance Control Implementation

The high-power equipment protection system protects the klystrons, loads, and vacuum windows from excessive power in both the forward and reverse directions, and arcs. The system contains the logic to automatically reset itself after a fault, but then shut the system down if the faults recur.

For the normal-conducting linac, a shutdown of the RF will cause the cavity to cool down dramatically because of the lost heating effects of the RF. This will cause a large shift in resonant frequency. Rather than rely on the cooling water system to bring the cavity back on resonance, we intend to employ a frequency agile system that will drive the klystron at the cavity's resonant frequency and quickly bring that drive frequency in to the nominal beam-required resonant frequency. This frequency agile function will be used only when the cavity is far from nominal resonance, not during normal operation.

4.3.2 DTL Systems (WBS 1.4.2)

The linac follows the MEBT and accelerates the H⁻ beam from an energy of 2.5 MeV to 970 MeV. Three types of RF structure perform this task. The first structure is a 402.5-MHz DTL which accelerates the beam to 86.8 MeV.

The 402.5-MHz DTL will be of conventional design. Cells are of length $\beta\lambda$ and the transverse focusing period has a length of $6\beta\lambda$ at 402.5 MHz. A focusing period spans six RF gaps and has a focusing quadrupole inside each of the first two drift tubes, followed by a drift space, followed by defocusing quadrupoles inside the next two drift tubes, and again followed by a drift space. This layout is usually called a FFODDO lattice. The drift space will be instrumented with steering dipoles and diagnostics. The DTL will have post couplers to stabilize and tune the longitudinal field distribution.

DTL Structure (WBS 1.4.2.2)

Specific DTL requirements are listed in Table 4.3-1

Appendix A provides the Geometric Drift-Tube tables. Appendix B contains lists of DTL dynamic, geometric, and beam envelope parameters that can be used for accelerator physics analysis and geometrical layouts.

DTL Drift-Tubes (WBS 1.4.2.3)

The drift tubes shield the beam from the decelerating RF field, and house magnets and diagnostic devices. The permanent magnet quadrupole system, consisting of permanent magnet quadrupoles (PMQ) located inside the drift tubes, must focus the beam transversely within the DTL. The PMQs must withstand the operational radiation environment. Twenty four steering dipoles will be used to steer the beam, and they will be located in the last four open drift tubes in each tank. Alignment tolerances for the PMQs are listed in table 4.3-2.

Vacuum System (WBS 1.4.2.4)

The function of the vacuum system is to minimize interactions between the beam and residual gases within the DTL. The vacuum requirement is 1×10^{-7} torr after initial outgassing and RF conditioning. Vacuum pumps located in the front-end system (and DTL) will be isolated from the beam line by suitable flexible bellows so as to minimize vibrations. Beam line vacuum valves will isolate the DTL from the MEBT and the CCL. Gate valves between the MEBT and the DTL and between the DTL and the CCL will be provided as part of this WBS.

Table 4.3-1. DTL Requirements

Parameters	Value
Input Energy	2.5 MeV
Structure frequency (MHz)	402.5
Output Energy (MeV)	86.8
Physical length (m)	36.5
Number of tanks	6
Total number of cells	214
Bore radius(cm)	1.0
Focusing lattice	FFODDO
Lattice period length	$6\beta\lambda$
Quadrupole Gradient (T/m)	TBD
First quadrupole for H in the horizontal plane	Focusing
Number of PMQs	149
Accelerating gradient E ₀ (MV/m)	3.6
Ave. acceleration rate (MeV/m)	2.3

Table 4.3-2, Alignment tolerances for SNS DTL Magnets

Description of Error	Tolerance
Quadrupole transverse displacement	± 0.07 mm
Quadrupole tilt	± 5.8 mrad
Quadrupole roll	± 2.5 mrad
Quadrupole-gradient error	$\pm 0.3\%$

Water System (WBS 1.4.2.5)

The cooling system must keep the DTL at an operating temperature of 75° F. Temperature control and stability must satisfy the requirements for maintaining cavity resonance control. The system interfaces with the RF control system.

Mechanical Support & Alignment System (WBS 1.4.2.6)

The mechanical support system is required to support the DTL tanks and ancillary equipment including vacuum pumps, cooling water manifolds, and electrical cables. The mating flange to the MEBT is depicted in the Front-End/Linac Interface Control Drawing.

The front edge plate of the DTL will be firmly anchored to the floor. The support stands must adjust by ± 2 inches to allow for settlement during the operational life of the facility.

The DTL tanks shall be adjustable in any direction by ± 10 mm, with respect to the stand. Positioning precision shall be ± 0.01 mm.

4.3.3 CCL Systems (WBS 1.4.4)

The CCL is an 805-MHz structure designed to accelerate the beam from 86.8 to 186 MeV.

The CCL uses a FODO transverse focusing lattice with a period of length $13\beta\lambda$ at 805 MHz. Electromagnetic quadrupole singlets and diagnostic elements occupy the spaces between segments of RF structure. Table 4.3-3 presents the structure design parameters.

The entire CCL accelerator is separated into 4 discrete, independent modules. Each module is sized to use the power output of one 5-MW klystron. Each module is separated into twelve, 8-cell segments, and the length of each segment is predicated upon a transverse-focusing periodicity of $13\beta\lambda$, including inter-segment power couplers which are 3-cell structures of length $2.5\beta\lambda$. The CCL consists of 4 resonant structures (modules) and a total of 48 segments. The entire structure will be made of oxygen free electrolytic (OFE) copper. The accelerator segment forms the basic building block, as a brazed assembly, for the accelerator.

Linac Structure (WBS 1.4.4.1)

General requirements for linac structures are described in Section 4.1.2. Specific CCL requirements are presented in Table 4.3-3.

Table 4.3-3. CCL Design parameters

Parameters	CCL
Structure frequency (MHz)	805
Energy (MeV)	186
Physical length (m)	55.1 m
Bore radius(cm)	1.50 to 2.0
Focusing lattice	FODO
Lattice period length	$13\beta\lambda$
Accelerating gradient E ₀ (MV/m)	3.06 to 3.77
Synchronous phase (deg)	-30 to -24
Ave. acceleration rate (MeV/m)	1.82
Peak structure-power loss (MW)	1.1

The expected output energy spread and transverse and longitudinal emittances are TBD.

Appendix B provides cavity and quadrupole lattice parameters for the entire linac. These parameters can be used for accelerator physics analysis and geometrical layouts.

Magnet System (WBS 1.4.4.2)

The function of the magnet system is to guide and contain the beam during acceleration. The magnet system must have positioning capabilities and appropriate fiducials for accurate alignment. Quadrupole strengths are listed in Appendix B.

Vacuum System (1.4.4.3)

In order to minimize H stripping and associated beam loss, the vacuum system is required to achieve $<5 \times 10^{-8}$ torr.

Water System (WBS 1.4.4.5)

To provide for accurate temperature control which sets the RF resonant frequency, each module will have individual and independent temperature control. Therefore, each module will have its own cooling system connected only to the chilled water header through a heat exchanger.

The water system must cool the CCL structure and the quadrupole magnets. The cooling system must maintain the CCL at an operating temperature of 75° F. The quadrupole temperature rise must be limited to 30°F. The cooling system will rely on an input water temperature of 45°F ± 1° from conventional facilities.

Mechanical Support & Alignment System (WBS 1.4.4.6)

The mechanical support system is required to support the CCL and ancillary equipment including vacuum manifolds and pumps, cooling water manifolds, and electrical cables. The support stands must adjust by ± 2 inches to allow for settlement during the operational life of the facility.

Modules will be pre-assembled and transported into the linac tunnel. Table 4.3-4 presents CCL alignment tolerances. The CCL segments shall be adjustable in any direction by ±10 mm, with respect to the stand. Positioning precision shall be ±0.01 mm.

Fiducial standards must be provided for each beamline component.

Table 4.3-4. Alignment tolerances for CCL components.

name of parameter	description of error	Tolerance
EQD	quadrupole transverse displacement	0.0127 cm (5 mil)
EQT	quadrupole tilt	5 mrad
EQR	quadrupole roll	5 mrad
EQS	quadrupole-gradient error	0.25 %
EDBC	error in distance between end gaps of adjacent segments	0.0127 cm (5 mil)
ECAVL	error in distance between adjacent gaps of a segment	0.00508 cm (2 mil)
ESD	segment transverse displacement	±0.025 cm at ends*

NOTE: a segment is the acceleration structure between focusing elements

(*) independent misalignments of the two ends, resulting in displacements and tilts

4.3.4 Superconducting RF Linac

Refer to the JLAB SRD.

SRF Linac Magnets (1.4.9.2)

The SCL magnets consists of 29 quadrupole doublets, for a total of 58 magnets, support/alignment structure, water cooling system and power supplies. The power supply is one unit per doublet with shunts for individual adjustment. Steering is accomplished through separate steering windings/power supplies. Table 4.3-5 summarizes the magnet requirements.

Table 4.3-5. SCL Magnet parameters

Parameter	Value
Steel length (cm)	35.0
Bore Radius (cm)	4
Pole Tip Field (gauss)	3500
Current (A)	545
Gradient (gauss/cm)	875
Leff (cm)	39
GL (T)	3.41
Power/Quad (KW)	5.3
Weight (lbs)	325
Quantity	58

4.3.5 Beam Diagnostics (WBS 1.4.5.2)

The linac beam diagnostics include systems to measure beam current, beam position, beam profile, beam loss, beam energy, beam phase, chopper gap width, bunch length, and cleanliness of the chopper notch.

These systems are required for

- commissioning the linac,
- verifying its proper operation and set points, and
- localizing the cause of off-normal operation.

Tables 4.3-6 and 4.3-7 provide the hardware and measurement system requirements for each of these systems. Table 4.3-6 shows how each of these measurements is distributed throughout the linac and HEBT. Table 4.5-2 discusses the specific measurement requirements for each of these beam diagnostics measurements.

Many of these systems are distributed throughout the linac and in the beamline to the ring (HEBT).

Beam Current Monitors. Beam current monitors are required in the linac to determine the peak and average macropulse current; determine transmission through the chopper, DTL, and CCL; and verify the shape of the chopper gap. The beam currents need to be measured with about 0.5% to 1% accuracy, and the chopper gap width needs to be measured to within 2.5 ns. Furthermore, the sharpness of the edges of the chopper gap needs to be observed to determine if partial micropulses are present.

Beam Position Measurement. Beam position measurements are required to determine the position of the beam centroid in the linac and to correct beam position offset errors via closed-loop control of steering dipole magnets. Beam steering errors are generally caused by misalignments of the magnetic focusing elements.

Table 4.3-6, Diagnostic devices and Distribution

Accelerator area	D-Plate	DTL	CCL	SCL	HEBT
Current toroid	1	6	2	3	-
BPM & Phase detector	2	12	16	30	2
Wire scanner (X & Y)	1	6	8	29	-
Faraday Cup	1	-	1	1	-
Harp (X & Y)	1	2	-	-	4*
Beam-in-Gap	-	-	-	-	1
Emittance	1	-	-	-	-
Vu-screen/ TV	1	-	-	-	-
Loss Monitors	-	12	24	58	-

* 2 in HEBT, 2 in RTBT

Beam Loss Measurement. Beam loss measurements are required to determine whether there is excess beam halo scraping on the linac RF structure or beam pipe, whether there are excess beam losses as a result of RF amplitude or phase errors or transverse matching errors, or whether there is an obstruction in the beam pipe, including poor vacuum. Because the BLM system is an input to the fast protect system to shut down the accelerator in case of an accelerator component failure, it must be very robust and reliable. Desirable attributes include radiation hardness, wide dynamic range, and low calibration drift. Except in a few specific locations, a wide-bandwidth (multi-MHz) response is not necessary.

Beam Energy Measurement. Beam energy measurements are required throughout the linac to carry out initial commissioning and to maintain the proper amplitude and phase settings on the RF systems. Because the RF amplitude requirement is $\pm 0.5\%$, and the nominal energy gain per klystron is 15 to 20 MeV, the energy measurement precision is typically a few percentage points of the beam energy gain. For most of the linac, the best measurement of beam energy is to measure the beam velocity by determining the time-of-flight between two identical RF beam pickups with known separation, using the difference of the 402.5-MHz beam current modulation between pickups as a measure of the flight time.

Table 4.3-7. Linac beam diagnostic requirements—type and usage

Beam parameter	Beam Device	Used for real time control?	Requires low duty factor beam?	Fast protect Input?	Operating range	Accuracy	RMS precision	Bandwidth
Current	Current toroid	No	No	Possibly	0.5–52 mA	± 0.5 mA	0.25 mA	Few kHz
	Faraday Cup	No	Yes	No	0 – 52 mA	± 0.5 mA	0.25 mA	Few kHz
Position & phase	BPM	Yes	No	Possibly	± 1.8 cm	± 0.2 mm	0.07 mm	100 kHz
Transverse profile (X,Y)	Wire scanner	No	Yes	No	± 5 sigma	250 μ m	100 μ m	Few Hz
	Harp	No	Yes	No	± 3 sigma	250 μ m	100 μ m	Few Hz
	Vu-screen	No	Yes	No	± 3 sigma	N/A	N/A	Few Hz
Beam in gap	Laser stripper	No	No	No	0.1–10 mA	0.3 mA	0.1 mA	Few MHz
Emittance	Slit & collector	No	Yes	No	± 5 sigma	250 μ m	100 μ m	Few Hz
Loss	Ionization chambers	No	No	Yes	10000:1 in loss	± 0.01 rads per pulse	± 0.001 rads per pulse	Few Hz (10s kHz)

BPM = beam position monitor

Beam Profile Measurement. Beam profile measurements are required to verify proper transverse focusing and matching of the magnetic focusing lattices throughout the linac. Profile measurements can also be used to indirectly determine the beam emittance of a matched beam in a periodic focusing lattice. Profile measurements with a $\pm 10\%$ rms width accuracy are required to verify emittances to $\pm 20\%$.

Bunch Length Measurement. Bunch length (phase width) measurement is desirable to determine the longitudinal focusing in the linac RF structure. Beam bunches typically have a bunch length of about 10° of phase (about 35 ps at 805 MHz). Bunch length measurement is especially important at 1 GeV because of the bunch rotation cavity in the linac-to-ring beam transport line (HEBT).

Beam-in-Gap Measurement. The chopper gap in the beam should be clear of H^- to about 1 part in 10,000 in order to minimize electron-induced instabilities and beam losses at extraction from the accumulator ring. Although a wide-band current monitor at the end of the linac can resolve individual H^- microbunches, and therefore measure the detailed shape of the edges of the chopper gap, it cannot determine the cleanliness of the gap at the required 1 part in 10,000 level. For this, a special diagnostic is required to laser-strip part of the beam in the 90 degree bend..

4.3.6 MEBT Chopper System (WBS 1.4.5.1)

The MEBT chopper system function is to remove the beam completely for selected time periods from the MEBT, at the beam energy of 2.5 MeV ($b=0.073$), to provide a gap in the ring filling needed for extraction. The chopper is required to rise from 2% to 98% (and fall) in less than 10 ns to accommodate the 402.5-MHz beam structure. A chopping duty factor, during the macropulse, of 32% (68% beam on) at the 1.058 MHz ring revolution frequency is also required. Both a chopper and anti-chopper are required.

The chopper and anti-chopper must fit within a space of 0.35 m in the MEBT.

Specific chopper system requirements are summarized in Table 4.3-8.

Table 4.3-8, Chopper System Requirements

Requirement	Value
Number of choppers	2
Type	Traveling wave
Gap	1.8 cm
Length	0.35 m
Deflection	18 mrad
Rise / fall time (2%–98%)	10 ns
Duty factor	32%
Total deflection voltage	± 2350 V
Post chopper off/on beam-current ratio	1.0E-4
Frequency	1.058 MHz

The chopper system consists of a traveling-wave current structure and a voltage pulse generator (modulator). Using a planar structure, with a total plate-to-plate gap of 1.8 cm and a 2350-V deflecting voltage on each plate, the chopper will provide a deflection of 18.0 mrad. A traveling-wave current structure minimizes transit-time effects. The MEBT antichopper function is to return the uncollimated portion of the chopped beam to the axis, which corrects for small errors in the timing system and small tails in the chopper pulse.

At the start of the macropulse, it is necessary to increase the beam intensity from zero to maximum in about 20 μ s to accommodate beam loading. This is done by increasing the width of the chopper deflection pulse from full to the nominal 32%.

4.3.7 HEBT Cavities (WBS 1.4.1. & 1.4.4.9)

The HEBT cavities provide the proper momentum spread of the beam prior to the beam entering the accumulator ring. Two independently controlled cavities will be used. The first will operate as an energy corrector and the second as an energy spreader, operated at \pm 100 KHz from the 805 MHz linac frequency.

The requirements for the cavities are listed in Table 4.3-9.

Table 4.3-9, HEBT Cavity Requirements

Requirement	Value
Number of cavities	2
Energy corrector RF Frequency	805 MHz
Energy corrector cavity location	77 m from linac
Energy corrector aperture diameter	4.8 cm
Energy corrector RF requirement	0.4 MW
Energy corrector peak voltage	4.0 MV
Energy corrector length	1.14 m
Energy spreader RF Frequency	805 ± 0.1 MHz
Energy spreader cavity location	79 m from linac
Energy spreader aperture diameter	4.8 cm
Energy spreader RF requirement	0.4 MW
Energy spreader peak voltage	4.0 MV
Energy spreader length	1.14 m

The HEBT cavities require individual klystrons, and will be powered by a single converter/modulator. Thermal/resonance control also must be provided. The cavities will have a common alignment and support structure.

5.0 INTERFACES

The Linac Systems (WBS 1.4) has four principal interfaces. At low energy, it interfaces with the Front-End Systems (WBS 1.3) and at high energy it interfaces with the High-Energy Beam Transport (HEBT) line, which is a sub-element of the Ring Systems (WBS 1.5). It also interfaces with the conventional facilities (WBS 1.8) and control systems (WBS 1.9). The RF power systems (WBS 1.4.1) also interface with the

RFQ subsystem of the Front-End. In addition, the linac interfaces with the chopping system and the linac beam stop.

Applicable interface documents include:

- Front-End /Linac Interface Definition Document
- Linac/Ring Interface Definition Document
- System Requirements Document for Conventional Facilities
- Interface Design Parameters (Load Tables) with Conventional Facilities
- System Requirements Document for WBS 1.9 Integrated Control Systems

Figure 5-1 depicts the general arrangement of equipment within the normal-conducting portion of the klystron gallery, and figure 5-2 depicts the equipment arrangement within the superconducting area.

6.0 TESTING REQUIREMENTS

Both vendor and on-site tests shall be performed. Sub-system operability shall be confirmed prior to beam delivery. The linac will satisfactorily pass acceptance testing after achieving a power level of 200 kW.

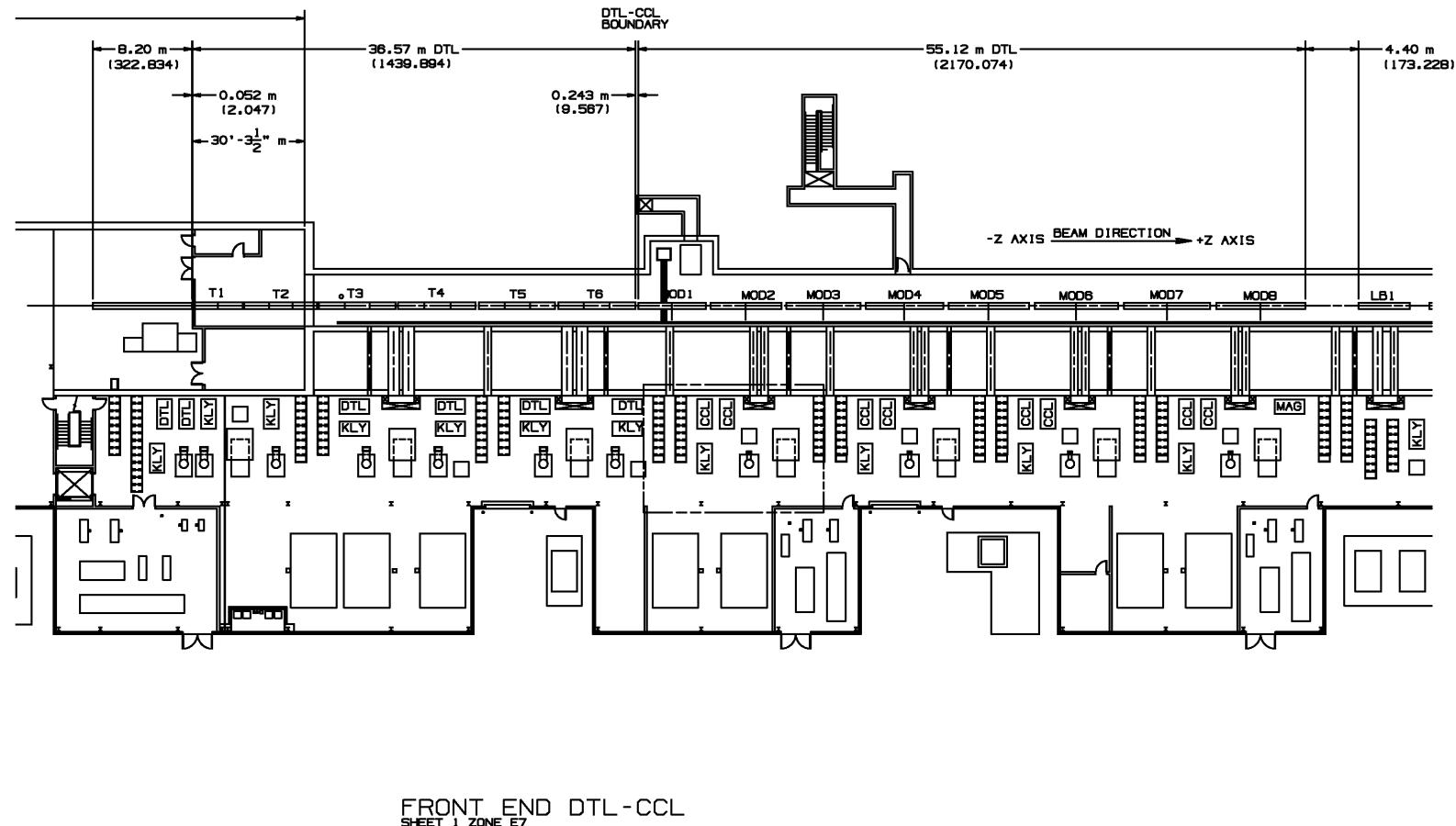


Figure 5-1, Equipment arrangement in normal-conducting portion of klystron gallery

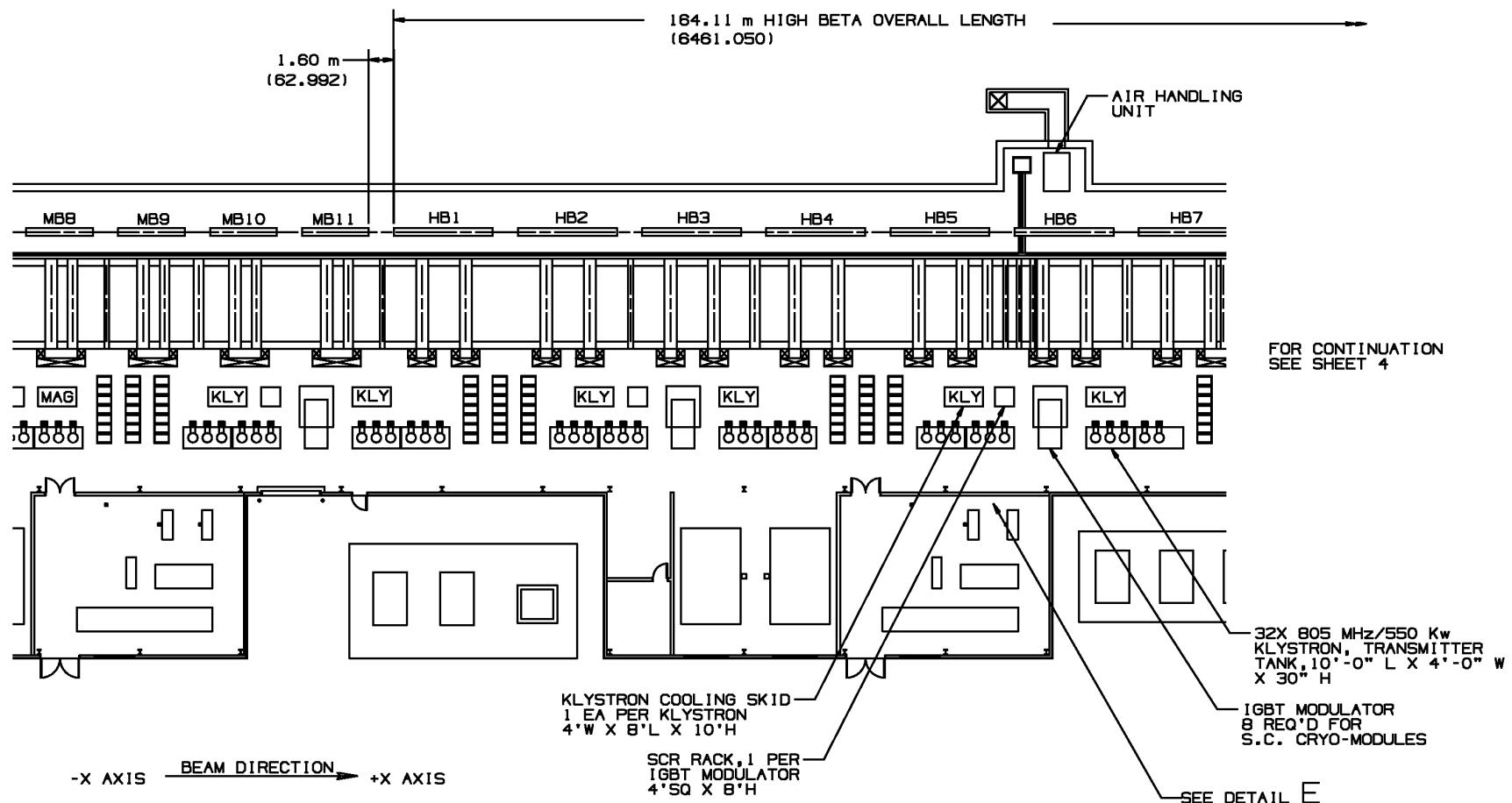


Figure 5-2, Equipment arrangement in superconducting portion of klystron gallery

7.0 UNCERTAINTIES AND ANALYSIS

Most areas of uncertainty will be addressed during the research and development phase of the project. Uncertainties in the RF area, namely 5-MW klystron development, will be addressed during construction.

8.0 ATTACHMENTS

Appendix A – Cell Geometry tables

Appendix B – Cell parameters (PARMILA output) for the linac

APPENDIX A- CELL GEOMETRY TABLES

This Appendix provides background information and geometric design tables for the DTL and CCL. Background information is extracted from the SUPERFISH codes documentation.

DTLFISH: a tuning program for drift-tube linacs

DTLFISH sets up the geometry for drift-tube linac (DTL) cells. The DTL cell is a figure of revolution about the beam axis. DTLFISH assumes a symmetric cell, and therefore sets up SUPERFISH runs for only half the cell. The symmetry plane is in the gap center between the two drift-tube noses. The control file defines up to 100 problems. DTLFISH tunes the cell by adjusting either the cavity diameter, drift-tube diameter, gap, or face angle.

DTLFISH cavity shape

Figure A-1 shows the outline of the right half of a DTL cell. Figure A-2 shows more detail near the drift-tube nose. The lower left corner is the center of the cell. The full gap is g and the full length is L . The bore radius is R_b . The full cavity diameter is D and the drift-tube diameter is d . The face angle α_f is the angle that the drift-tube face makes with the vertical. Note the difference between the face angle in Figure A-2 and the cone angle α_c (see Figure A-4) used in coupled-cavity linac problems. The cone angle is the angle that the nose makes with the horizontal. There are three circular arcs on the drift-tube profile. The corner radius R_c connects the outer end of the straight face-angle segment with the straight segment at the drift-tube diameter. The inner-nose radius R_i connects the drift-tube bore to an optional vertical flat segment of length F . The outer-nose radius R_o connects the flat segment on the nose with the face-angle segment.

Program CCLFISH uses the same parameters for the drift-tube nose shown in Figure A-2.

DTLCards, companion program for generating each PARMILA cell

Program DTLCards is a companion program for DTLFISH that creates a new input file for DTLFISH containing cell geometries interpolated from a set of representative cells. In addition, DTLCards creates two text files containing dimensions needed for construction of the drift tubes. One file lists parameters with linear dimensions in centimeters and the other uses inches.

DTLCards reads the same input file that DTLFISH reads. The code assumes that the DTL half cells have already been tuned by an appropriate DTLFISH session (all start codes should be negative). The code reads the tuned geometry from the original DTLFISH control file and then linearly interpolates geometric parameters that vary as a function of the cell length (or particle velocity βc since the cell length is $n\beta\lambda$, where n is an integer). The problems in the original file must be sequential in order of increasing cell length.

Program DTLCards uses the setting for the InitialEnergy in the DTLFISH control file, which specifies the starting energy for a DTL tank. Although DTLFISH does not use the InitialEnergy keyword, it will duplicate its setting in new control files for completed jobs.

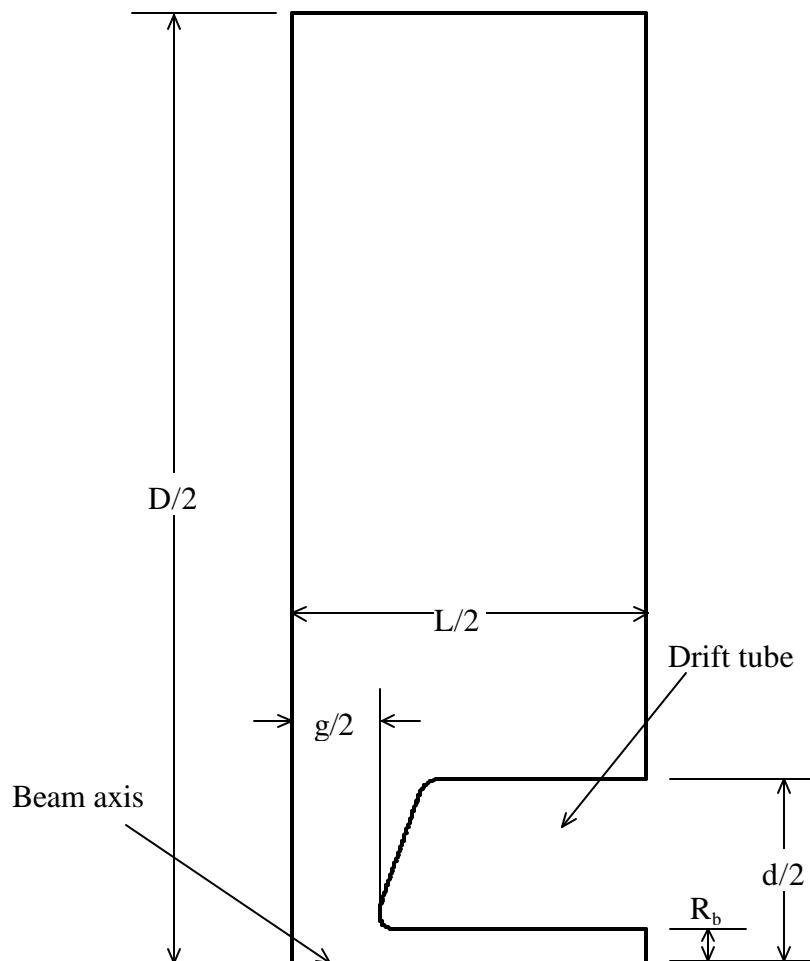


Figure A-1. The DTL half cell set up by the code DTLFISH.

The cell is a figure of revolution about the beam axis. at the bottom of the figure. The left edge is a symmetry plane. Figure A-2 show more details near the drift-tube nose.

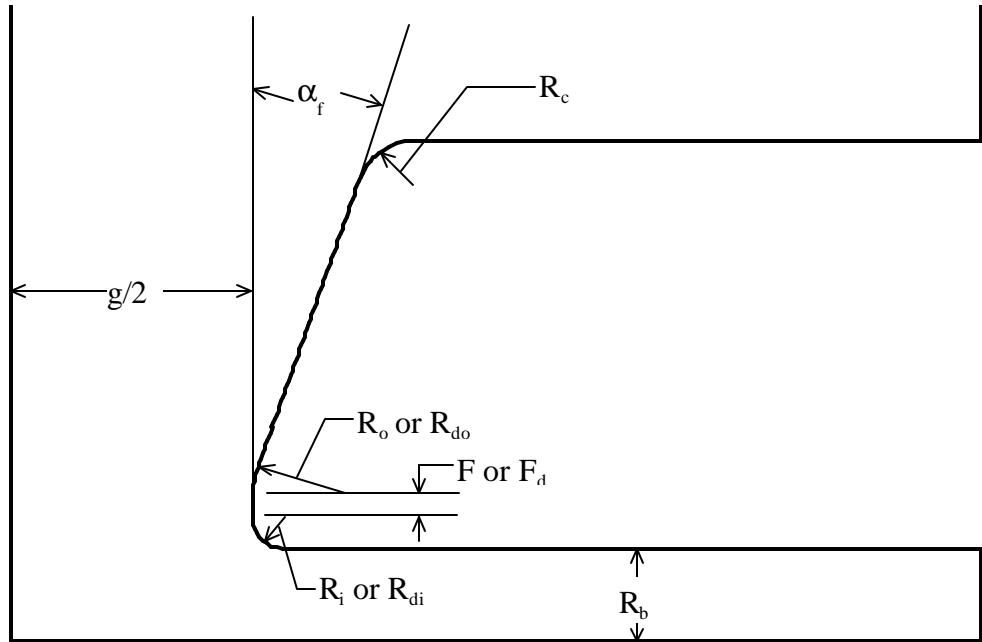


Figure A-2. Detail near the drift-tube nose.

This drift-tube nose is from the DTL cell shown in Figure A-1. Programs DTLFISH, CCLFISH, MDTFISH, and CDTFISH use similar parameters to describe the drift-tube nose.

The InitialEnergy setting refers to data in the output file PARMILA.OUT created by the PARMILA design code. The keyword indicates the starting energy of a tank on the “initial” line just before the list of geometric parameters by cell number. An “initial” line appears at the start of both commonly used tables of parameters in PARMILA.OUT. One table is titled “linout subroutine 1” and lists the dynamics parameters for the design. The other table is titled “linout subroutine 4” and lists geometric data needed for construction. The DTLCells program requires “linout subroutine 4,” the geometric data. After finding this table with the correct starting energy, the code continues reading cell lines until reaching the end of the table. An error occurs if the representative data does not span a large enough range of particle velocities to cover the range in the PARMILA.OUT table.

DTLCells counts the number of “linout subroutine 4” tables that it encounters until finding the one with the correct starting energy. The code sets the tank number parameter to this count number, and includes the tank number first on every line of output. This

feature allows you to later merge multiple files into a single file that defines the drift-tube geometry in every tank of a multi-tank DTL. The names of the output text files include the tank number. Thus, for the cm-dimension files, T1Geo_cm.TXT contains data for tank 1, T2Geo_cm.TXT for tank 2, and so on.

Table A-1. Column headings in drift-tube geometry table.

Heading	Description
Tank#	Tank number.
DT#	Drift-tube number (cell number for CellLen and GapLen columns).
CellLen	Length of the cell than includes the upstream half of this drift tube.
CellLoc	Location of the cell with respect to a fixed reference
Zstem	Longitudinal position of the drift-tube center from the upstream end wall rf surface.
FA_1	Face angle on the upstream face of the drift tube.
FA_2	Face angle on the downstream face of the drift tube.
Flat_1	Vertical flat length on the upstream face of the drift tube.
Flat_2	Vertical flat length on the downstream face of the drift tube.
Rin_1	Inner nose radius on the upstream face of the drift tube.
Rin_2	Inner nose radius on the downstream face of the drift tube.
Rout_1	Outer nose radius on the upstream face of the drift tube.
Rout_2	Outer nose radius on the downstream face of the drift tube.
DT_Len	Length of the drift tube.
Rb_1	Bore radius in the upstream half of the drift tube.
Rb_2	Bore radius in the downstream half of the drift tube.
Rc_1	Corner radius on the upstream end of the drift tube.
Rc_2	Corner radius on the downstream end of the drift tube.
Diam	Diameter of the drift tube.
GapLen	Length of the gap just upstream of this drift tube.
GL	The magnetic GL product for the quadrupole magnet in the drift tube.

A drift-tube geometry table contains 21 columns of data (see Table A-1) that completely define the shape of each drift tube in the tank, including the two half drift tubes mounted on the end walls. Drift tube 0 refers to the half drift tube on the upstream end wall, and, for a tank with N cells, drift tube N refers to the half drift tube on the downstream end wall. If M is an arbitrary cell number ranging from 1 to N, then drift tube M follows gap M, which is assumed to be contained within cell M. Drift tube stems are centered longitudinally on the drift tubes. The zero for longitudinal position is at the upstream end wall rf surface. The output file whose name ends with “_cm” will contain linear dimensions in centimeters. The file whose name ends with “_in” with contain linear dimensions in inches. In both output files, the face angles are in degrees from vertical, and the GL product is in Tesla. A zero value for the GL product means that the drift tube does not contain a quadrupole magnet. The algebraic sign of GL defines the orientation of the magnet for positively charged particles: positive GL focuses in the x (horizontal) direction and defocuses in y, negative GL focuses in the y (vertical) direction and defocuses in x.

Table A-2 presents the drift-tube geometry table for the SNS DTL.

Table A-2. DTL Geometric Design Table

DTL tank 1 geometric design data, starting energy = 2.50000 MeV

Face angles are in degrees

GL products are in Tesla

Other parameters are in cm

Drift tube N follows Cell N or Gap N

Zstem indicates centers of drift tubes

Tk	DT	CellLen	CellLoc	Zstem	FA_1	FA_2	Flat_1	Flat_2	Rin_1	Rin_2	Rout_1	Rout_2	DT_Len	Rb_1	Rb_2	Rc_1	Rc_2	Diam	GapLen	GL
1	0	N/A	363.7500	0.000	N/A	3.685	N/A	0.062	N/A	0.169	N/A	0.506	2.2551	N/A	1.250	N/A	0.500	9.000	N/A	-1.295
1	1	5.4326	369.1826	5.432	3.685	3.772	0.062	0.064	0.169	0.170	0.506	0.510	4.5349	1.250	1.250	0.500	0.500	9.000	0.9099	0.000
1	2	5.4601	374.6427	10.893	3.772	3.863	0.064	0.065	0.170	0.171	0.510	0.513	4.5603	1.250	1.250	0.500	0.500	9.000	0.9128	1.295
1	3	5.4894	380.1321	16.383	3.863	3.962	0.065	0.067	0.171	0.172	0.513	0.517	4.5875	1.250	1.250	0.500	0.500	9.000	0.9158	1.295
1	4	5.5210	385.6531	21.903	3.962	4.056	0.067	0.069	0.172	0.174	0.517	0.521	4.6152	1.250	1.250	0.500	0.500	9.000	0.9191	0.000
1	5	5.5510	391.2041	27.454	4.056	4.154	0.069	0.071	0.174	0.175	0.521	0.524	4.6426	1.250	1.250	0.500	0.500	9.000	0.9222	-1.295
1	6	5.5820	396.7862	33.036	4.154	4.253	0.071	0.072	0.175	0.176	0.524	0.528	4.6705	1.250	1.250	0.500	0.500	9.000	0.9254	-1.295
1	7	5.6139	402.4000	38.650	4.253	4.356	0.072	0.074	0.176	0.177	0.528	0.532	4.6993	1.250	1.250	0.500	0.500	9.000	0.9289	0.000
1	8	5.6467	408.0467	44.297	4.356	4.462	0.074	0.076	0.177	0.179	0.532	0.536	4.7289	1.250	1.250	0.500	0.500	9.000	0.9326	1.295
1	9	5.6804	413.7272	49.977	4.462	4.571	0.076	0.078	0.179	0.180	0.536	0.541	4.7593	1.250	1.250	0.500	0.500	9.000	0.9364	1.295
1	10	5.7152	419.4424	55.692	4.571	4.683	0.078	0.080	0.180	0.182	0.541	0.545	4.7905	1.250	1.250	0.500	0.500	9.000	0.9403	0.000
1	11	5.7509	425.1933	61.443	4.683	4.798	0.080	0.082	0.182	0.183	0.545	0.549	4.8227	1.250	1.250	0.500	0.500	9.000	0.9443	-1.295
1	12	5.7877	430.9810	67.231	4.798	4.916	0.082	0.084	0.183	0.185	0.549	0.554	4.8556	1.250	1.250	0.500	0.500	9.000	0.9485	-1.295
1	13	5.8255	436.8065	73.056	4.916	5.038	0.084	0.086	0.185	0.186	0.554	0.559	4.8892	1.250	1.250	0.500	0.500	9.000	0.9531	0.000
1	14	5.8644	442.6709	78.921	5.038	5.164	0.086	0.089	0.186	0.188	0.559	0.563	4.9240	1.250	1.250	0.500	0.500	9.000	0.9578	1.295
1	15	5.9044	448.5752	84.825	5.164	5.292	0.089	0.091	0.188	0.189	0.563	0.568	4.9596	1.250	1.250	0.500	0.500	9.000	0.9626	1.295
1	16	5.9455	454.5207	90.770	5.292	5.424	0.091	0.093	0.189	0.191	0.568	0.574	4.9962	1.250	1.250	0.500	0.500	9.000	0.9675	0.000
1	17	5.9877	460.5084	96.758	5.424	5.560	0.093	0.096	0.191	0.193	0.574	0.579	5.0336	1.250	1.250	0.500	0.500	9.000	0.9728	-1.295
1	18	6.0311	466.5395	102.789	5.560	5.700	0.096	0.098	0.193	0.195	0.579	0.584	5.0719	1.250	1.250	0.500	0.500	9.000	0.9783	-1.295
1	19	6.0757	472.6152	108.865	5.700	5.844	0.098	0.101	0.195	0.197	0.584	0.590	5.1115	1.250	1.250	0.500	0.500	9.000	0.9840	0.000
1	20	6.1215	478.7367	114.986	5.844	5.991	0.101	0.103	0.197	0.198	0.590	0.595	5.1519	1.250	1.250	0.500	0.500	9.000	0.9898	1.295
1	21	6.1686	484.9053	121.155	5.991	6.143	0.103	0.106	0.198	0.200	0.595	0.601	5.1933	1.250	1.250	0.500	0.500	9.000	0.9960	1.295
1	22	6.2170	491.1223	127.372	6.143	6.298	0.106	0.109	0.200	0.202	0.601	0.607	5.2356	1.250	1.250	0.500	0.500	9.000	1.0026	0.000
1	23	6.2666	497.3889	133.639	6.298	6.458	0.109	0.112	0.202	0.204	0.607	0.613	5.2791	1.250	1.250	0.500	0.500	9.000	1.0093	-1.295
1	24	6.3176	503.7065	139.956	6.458	6.622	0.112	0.115	0.204	0.207	0.613	0.620	5.3236	1.250	1.250	0.500	0.500	9.000	1.0161	-1.295
1	25	6.3700	510.0765	146.326	6.622	6.790	0.115	0.118	0.207	0.209	0.620	0.626	5.3692	1.250	1.250	0.500	0.500	9.000	1.0235	0.000
1	26	6.4237	516.5002	152.750	6.790	6.963	0.118	0.121	0.209	0.211	0.626	0.633	5.4160	1.250	1.250	0.500	0.500	9.000	1.0311	1.295
1	27	6.4788	522.9790	159.229	6.963	7.140	0.121	0.124	0.211	0.213	0.633	0.640	5.4639	1.250	1.250	0.500	0.500	9.000	1.0389	1.295
1	28	6.5354	529.5144	165.764	7.140	7.322	0.124	0.127	0.213	0.216	0.640	0.647	5.5127	1.250	1.250	0.500	0.500	9.000	1.0470	0.000
1	29	6.5935	536.1079	172.357	7.322	7.509	0.127	0.131	0.216	0.218	0.647	0.654	5.5627	1.250	1.250	0.500	0.500	9.000	1.0557	-1.295
1	30	6.6531	542.7610	179.010	7.509	7.700	0.131	0.134	0.218	0.220	0.654	0.661	5.6140	1.250	1.250	0.500	0.500	9.000	1.0647	-1.295
1	31	6.7142	549.4752	185.725	7.700	7.897	0.134	0.137	0.220	0.223	0.661	0.669	5.6663	1.250	1.250	0.500	0.500	9.000	1.0739	0.000
1	32	6.7769	556.2521	192.501	7.897	8.098	0.137	0.141	0.223	0.226	0.669	0.677	5.7199	1.250	1.250	0.500	0.500	9.000	1.0837	1.295
1	33	6.8412	563.0932	199.343	8.098	8.305	0.141	0.145	0.226	0.228	0.677	0.685	5.7748	1.250	1.250	0.500	0.500	9.000	1.0938	1.295

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1	34	6.9071	570.0003	206.250	8.305	8.516	0.145	0.149	0.228	0.231	0.685	0.693	5.8306	1.250	1.250	0.500	0.500	9.000	1.1043	0.000
1	35	6.9747	576.9750	213.224	8.516	8.734	0.149	0.152	0.231	0.234	0.693	0.701	5.8878	1.250	1.250	0.500	0.500	9.000	1.1154	-1.295
1	36	7.0440	584.0190	220.268	8.734	8.956	0.152	0.156	0.234	0.237	0.701	0.710	5.9464	1.250	1.250	0.500	0.500	9.000	1.1268	-1.295
1	37	7.1150	591.1340	227.383	8.956	9.184	0.156	0.160	0.237	0.240	0.710	0.719	6.0060	1.250	1.250	0.500	0.500	9.000	1.1388	0.000
1	38	7.1878	598.3218	234.571	9.184	9.418	0.160	0.165	0.240	0.243	0.719	0.728	6.0670	1.250	1.250	0.500	0.500	9.000	1.1513	1.295
1	39	7.2625	605.5843	241.833	9.418	9.657	0.165	0.169	0.243	0.246	0.728	0.737	6.1293	1.250	1.250	0.500	0.500	9.000	1.1642	1.295
1	40	7.3389	612.9233	249.172	9.657	9.903	0.169	0.173	0.246	0.249	0.737	0.746	6.1929	1.250	1.250	0.500	0.500	9.000	1.1778	0.000
1	41	7.4173	620.3405	256.590	9.903	10.286	0.173	0.180	0.249	0.251	0.746	0.753	6.2599	1.250	1.250	0.500	0.500	9.000	1.1918	-1.295
1	42	7.4975	627.8380	264.088	10.286	10.765	0.180	0.188	0.251	0.253	0.753	0.759	6.3316	1.250	1.250	0.500	0.500	9.000	1.2024	-1.295
1	43	7.5797	635.4178	271.668	10.765	11.255	0.188	0.197	0.253	0.255	0.759	0.764	6.4065	1.250	1.250	0.500	0.500	9.000	1.2107	0.000
1	44	7.6640	643.0818	279.332	11.255	11.757	0.197	0.205	0.255	0.257	0.764	0.770	6.4832	1.250	1.250	0.500	0.500	9.000	1.2191	1.295
1	45	7.7503	650.8320	287.082	11.757	12.272	0.205	0.214	0.257	0.259	0.770	0.776	6.5618	1.250	1.250	0.500	0.500	9.000	1.2277	1.295
1	46	7.8387	658.6707	294.921	12.272	12.798	0.214	0.223	0.259	0.261	0.776	0.782	6.6409	1.250	1.250	0.500	0.500	9.000	1.2368	0.000
1	47	7.9292	666.5999	302.850	12.798	13.337	0.223	0.233	0.261	0.263	0.782	0.789	6.7208	1.250	1.250	0.500	0.500	9.000	1.2484	-1.295
1	48	8.0219	674.6218	310.872	13.337	13.890	0.233	0.242	0.263	0.265	0.789	0.795	6.8028	1.250	1.250	0.500	0.500	9.000	1.2601	-1.295
1	49	8.1168	682.7386	318.988	13.890	14.454	0.242	0.252	0.265	0.267	0.795	0.801	6.8864	1.250	1.250	0.500	0.500	9.000	1.2721	0.000
1	50	8.2139	690.9525	327.202	14.454	15.033	0.252	0.262	0.267	0.269	0.801	0.808	6.9707	1.250	1.250	0.500	0.500	9.000	1.2848	1.295
1	51	8.3133	699.2658	335.515	15.033	15.624	0.262	0.272	0.269	0.272	0.808	0.815	7.0559	1.250	1.250	0.500	0.500	9.000	1.3000	1.295
1	52	8.4149	707.6806	343.930	15.624	16.228	0.272	0.283	0.272	0.274	0.815	0.822	7.1430	1.250	1.250	0.500	0.500	9.000	1.3154	0.000
1	53	8.5188	716.1995	352.448	16.228	16.847	0.283	0.294	0.274	0.276	0.822	0.829	7.2315	1.250	1.250	0.500	0.500	9.000	1.3313	-1.295
1	54	8.6252	724.8246	361.073	16.847	17.479	0.294	0.304	0.276	0.279	0.829	0.836	7.3205	1.250	1.250	0.500	0.500	9.000	1.3489	-1.295
1	55	8.7338	733.5585	369.807	17.479	18.126	0.304	0.316	0.279	0.281	0.836	0.844	7.4109	1.250	1.250	0.500	0.500	9.000	1.3681	0.000
1	56	8.8449	742.4034	378.652	18.126	18.786	0.316	0.327	0.281	0.284	0.844	0.851	7.5031	1.250	1.250	0.500	0.500	9.000	1.3878	1.295
1	57	8.9585	751.3619	387.610	18.786	19.461	0.327	0.339	0.284	0.286	0.851	0.859	7.5961	1.250	1.250	0.500	0.500	9.000	1.4084	1.295
1	58	9.0745	760.4364	396.684	19.461	20.151	0.339	0.351	0.286	0.289	0.859	0.867	7.6903	1.250	1.250	0.500	0.500	9.000	1.4312	0.000
1	59	9.1930	769.6293	405.877	20.151	20.855	0.351	0.363	0.289	0.292	0.867	0.875	7.7862	1.250	1.250	0.500	0.500	9.000	1.4546	-1.295
1	60	9.3140	778.9433	415.193	20.855	N/A	0.363	N/A	0.292	N/A	0.875	N/A	3.9444	1.250	N/A	0.500	N/A	9.000	1.4787	-1.295
2	0	N/A	788.2767	0.000	N/A	20.632	N/A	0.376	N/A	0.317	N/A	0.950	3.9143	N/A	1.250	N/A	0.500	9.000	N/A	0.000
2	1	9.4280	797.7047	9.428	20.632	21.348	0.376	0.383	0.317	0.318	0.950	0.955	7.9362	1.250	1.250	0.500	0.500	9.000	1.5451	1.295
2	2	9.5613	807.2660	18.987	21.348	22.021	0.383	0.390	0.318	0.320	0.955	0.960	8.0403	1.250	1.250	0.500	0.500	9.000	1.5711	1.295
2	3	9.6867	816.9526	28.673	22.021	22.701	0.390	0.397	0.320	0.322	0.960	0.965	8.1400	1.250	1.250	0.500	0.500	9.000	1.5957	0.000
2	4	9.8132	826.7658	38.486	22.701	23.386	0.397	0.404	0.322	0.323	0.965	0.970	8.2389	1.250	1.250	0.500	0.500	9.000	1.6236	-1.295
2	5	9.9408	836.7066	48.427	23.386	24.077	0.404	0.411	0.323	0.325	0.970	0.976	8.3385	1.250	1.250	0.500	0.500	9.000	1.6520	-1.295
2	6	10.0694	846.7760	58.495	24.077	24.746	0.411	0.417	0.325	0.327	0.976	0.981	8.4368	1.250	1.250	0.500	0.500	9.000	1.6807	0.000
2	7	10.1940	856.9700	68.689	24.746	25.427	0.417	0.424	0.327	0.329	0.981	0.986	8.5342	1.250	1.250	0.500	0.500	9.000	1.7087	1.295
2	8	10.3208	867.2908	79.010	25.427	26.132	0.424	0.431	0.329	0.330	0.986	0.991	8.6336	1.250	1.250	0.500	0.500	9.000	1.7375	1.295
2	9	10.4521	877.7429	89.462	26.132	26.841	0.431	0.438	0.330	0.332	0.991	0.996	8.7336	1.250	1.250	0.500	0.500	9.000	1.7679	0.000
2	10	10.5842	888.3271	100.046	26.841	27.553	0.438	0.446	0.332	0.334	0.996	1.002	8.8326	1.250	1.250	0.500	0.500	9.000	1.8009	-1.295
2	11	10.7168	899.0439	110.763	27.553	28.270	0.446	0.453	0.334	0.336	1.002	1.007	8.9320	1.250	1.250	0.500	0.500	9.000	1.8344	-1.295
2	12	10.8502	909.8941	121.613	28.270	28.989	0.453	0.460	0.336	0.337	1.007	1.012	9.0316	1.250	1.250	0.500	0.500	9.000	1.8683	0.000
2	13	10.9842	920.8783	132.597	28.989	29.713	0.460	0.467	0.337	0.339	1.012	1.018	9.1313	1.250	1.250	0.500	0.500	9.000	1.9027	1.295
2	14	11.1189	931.9971	143.716	29.713	30.439	0.467	0.473	0.339	0.341	1.018	1.023	9.2310	1.250	1.250	0.500	0.500	9.000	1.9375	1.295
2	15	11.2542	943.2513	154.970	30.439	31.169	0.473	0.479	0.341	0.343	1.023	1.029	9.3304	1.250	1.250	0.500	0.500	9.000	1.9733	0.000
2	16	11.3901	954.6414	166.360	31.169	31.903	0.479	0.484	0.343	0.345	1.029	1.034	9.4297	1.250	1.250	0.500	0.500	9.000	2.0100	-1.295
2	17	11.5267	966.1681	177.886	31.903	32.639	0.484	0.490	0.345	0.347	1.034	1.040	9.5291	1.250	1.250	0.500	0.500	9.000	2.0472	-1.295
2	18	11.6638	977.8319	189.550	32.639	33.379	0.490	0.495	0.347	0.348	1.040	1.045	9.6287	1.250	1.250	0.500	0.500	9.000	2.0848	0.000
2	19	11.8016	989.6336	201.352	33.379	34.122	0.495	0.500	0.348	0.350	1.045	1.050	9.7289	1.250	1.250	0.500	0.500	9.000	2.1229	1.295
2	20	11.9400	1001.5736	213.293	34.122	34.869	0.500	0.500	0.350	0.350	1.050	1.050	9.8317	1.250	1.250	0.500	0.500	9.000	2.1607	1.295
2	21	12.0790	1013.6526	225.372	34.869	35.619	0.500	0.500	0.350	0.350	1.050	1.050	9.9369	1.250	1.250	0.500	0.500	9.000	2.1946	0.000
2	22	12.2187	1025.8713	237.590	35.619	36.372	0.500	0.500	0.350	0.350	1.050	1.050	10.0424	1.250	1.250	0.500	0.500	9.000	2.2289	-1.295
2	23	12.3589	1038.2302	249.949	36.372	37.129	0.500	0.500	0.350	0.350										

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2	27	12.9262	1089.0810	300.799	39.419	40.188	0.500	0.500	0.350	0.350	1.050	1.050	10.5713	1.250	1.250	0.500	0.500	9.000	2.4077	0.000
2	28	13.0695	1102.1506	313.869	40.188	40.961	0.500	0.500	0.350	0.350	1.050	1.050	10.6771	1.250	1.250	0.500	0.500	9.000	2.4453	-1.295
2	29	13.2134	1115.3640	327.082	40.961	41.737	0.500	0.500	0.350	0.350	1.050	1.050	10.7831	1.250	1.250	0.500	0.500	9.000	2.4832	-1.295
2	30	13.3579	1128.7218	340.440	41.737	42.516	0.500	0.500	0.350	0.350	1.050	1.050	10.8891	1.250	1.250	0.500	0.500	9.000	2.5216	0.000
2	31	13.5030	1142.2248	353.943	42.516	43.298	0.500	0.500	0.350	0.350	1.050	1.050	10.9948	1.250	1.250	0.500	0.500	9.000	2.5609	1.295
2	32	13.6486	1155.8734	367.591	43.298	44.083	0.500	0.500	0.350	0.350	1.050	1.050	11.1005	1.250	1.250	0.500	0.500	9.000	2.6009	1.295
2	33	13.7948	1169.6682	381.386	44.083	44.872	0.500	0.500	0.350	0.350	1.050	1.050	11.2064	1.250	1.250	0.500	0.500	9.000	2.6413	0.000
2	34	13.9416	1183.6098	395.327	44.872	45.663	0.500	0.500	0.350	0.350	1.050	1.050	11.3124	1.250	1.250	0.500	0.500	9.000	2.6821	-1.295
2	35	14.0889	1197.6987	409.416	45.663	46.457	0.500	0.500	0.350	0.350	1.050	1.050	11.4183	1.250	1.250	0.500	0.500	9.000	2.7233	-1.295
2	36	14.2367	1211.9354	423.652	46.457	47.253	0.500	0.500	0.350	0.350	1.050	1.050	11.5239	1.250	1.250	0.500	0.500	9.000	2.7654	0.000
2	37	14.3851	1226.3205	438.037	47.253	48.053	0.500	0.500	0.350	0.350	1.050	1.050	11.6295	1.250	1.250	0.500	0.500	9.000	2.8083	1.295
2	38	14.5340	1240.8546	452.571	48.053	48.856	0.500	0.500	0.350	0.350	1.050	1.050	11.7353	1.250	1.250	0.500	0.500	9.000	2.8515	1.295
2	39	14.6835	1255.5381	467.255	48.856	49.662	0.500	0.500	0.350	0.350	1.050	1.050	11.8411	1.250	1.250	0.500	0.500	9.000	2.8953	0.000
2	40	14.8335	1270.3715	482.088	49.662	50.470	0.500	0.500	0.350	0.350	1.050	1.050	11.9467	1.250	1.250	0.500	0.500	9.000	2.9395	-1.295
2	41	14.9840	1285.3555	497.072	50.470	51.281	0.500	0.500	0.350	0.350	1.050	1.050	12.0522	1.250	1.250	0.500	0.500	9.000	2.9844	-1.295
2	42	15.1350	1300.4905	512.207	51.281	52.094	0.500	0.500	0.350	0.350	1.050	1.050	12.1575	1.250	1.250	0.500	0.500	9.000	3.0301	0.000
2	43	15.2865	1315.7771	527.493	52.094	52.911	0.500	0.500	0.350	0.350	1.050	1.050	12.2630	1.250	1.250	0.500	0.500	9.000	3.0762	1.295
2	44	15.4385	1331.2156	542.932	52.911	53.730	0.500	0.500	0.350	0.350	1.050	1.050	12.3684	1.250	1.250	0.500	0.500	9.000	3.1228	1.295
2	45	15.5911	1346.8067	558.523	53.730	54.552	0.500	0.500	0.350	0.350	1.050	1.050	12.4737	1.250	1.250	0.500	0.500	9.000	3.1698	0.000
2	46	15.7441	1362.5508	574.267	54.552	55.376	0.500	0.500	0.350	0.350	1.050	1.050	12.5788	1.250	1.250	0.500	0.500	9.000	3.2177	-1.295
2	47	15.8976	1378.4484	590.164	55.376	56.203	0.500	0.500	0.350	0.350	1.050	1.050	12.6838	1.250	1.250	0.500	0.500	9.000	3.2662	-1.295
2	48	16.0516	1394.5000	606.223	56.203	N/A	0.500	N/A	0.350	N/A	1.050	N/A	6.4021	1.250	N/A	0.500	N/A	9.000	3.3152	0.000
3	0	N/A	1410.6292	0.000	N/A	31.354	N/A	0.000	N/A	0.350	N/A	1.050	6.0113	N/A	1.250	N/A	0.500	11.000	N/A	1.295
3	1	16.2017	1426.8309	16.193	31.354	31.711	0.000	0.000	0.350	0.350	1.050	1.050	12.1338	1.250	1.250	0.500	0.500	11.000	4.1152	1.295
3	2	16.3495	1443.1805	32.543	31.711	32.068	0.000	0.000	0.350	0.350	1.050	1.050	12.2280	1.250	1.250	0.500	0.500	11.000	4.1685	0.000
3	3	16.4972	1459.6776	49.040	32.068	32.425	0.000	0.000	0.350	0.350	1.050	1.050	12.3216	1.250	1.250	0.500	0.500	11.000	4.2223	-1.295
3	4	16.6446	1476.3222	65.684	32.425	32.780	0.000	0.000	0.350	0.350	1.050	1.050	12.4147	1.250	1.250	0.500	0.500	11.000	4.2764	-1.295
3	5	16.7917	1493.1139	82.476	32.780	33.135	0.000	0.000	0.350	0.350	1.050	1.050	12.5074	1.250	1.250	0.500	0.500	11.000	4.3306	0.000
3	6	16.9387	1501.0526	99.415	33.135	33.490	0.000	0.000	0.350	0.350	1.050	1.050	12.5997	1.250	1.250	0.500	0.500	11.000	4.3851	1.295
3	7	17.0855	1527.1381	116.500	33.490	33.844	0.000	0.000	0.350	0.350	1.050	1.050	12.6915	1.250	1.250	0.500	0.500	11.000	4.4398	1.295
3	8	17.2320	1544.3701	133.732	33.844	34.198	0.000	0.000	0.350	0.350	1.050	1.050	12.7828	1.250	1.250	0.500	0.500	11.000	4.4948	0.000
3	9	17.3783	1561.7484	151.110	34.198	34.551	0.000	0.000	0.350	0.350	1.050	1.050	12.8737	1.250	1.250	0.500	0.500	11.000	4.5500	-1.295
3	10	17.5244	1579.2728	168.635	34.551	34.903	0.000	0.000	0.350	0.350	1.050	1.050	12.9640	1.250	1.250	0.500	0.500	11.000	4.6055	-1.295
3	11	17.6702	1596.9430	186.305	34.903	35.255	0.000	0.000	0.350	0.350	1.050	1.050	13.0539	1.250	1.250	0.500	0.500	11.000	4.6612	0.000
3	12	17.8157	1614.7587	204.121	35.255	35.606	0.000	0.000	0.350	0.350	1.050	1.050	13.1434	1.250	1.250	0.500	0.500	11.000	4.7170	1.295
3	13	17.9610	1632.7197	222.081	35.606	35.957	0.000	0.000	0.350	0.350	1.050	1.050	13.2322	1.250	1.250	0.500	0.500	11.000	4.7732	1.295
3	14	18.1061	1650.8258	240.188	35.957	36.306	0.000	0.000	0.350	0.350	1.050	1.050	13.3206	1.250	1.250	0.500	0.500	11.000	4.8297	0.000
3	15	18.2508	1669.0766	258.438	36.306	36.655	0.000	0.000	0.350	0.350	1.050	1.050	13.4085	1.250	1.250	0.500	0.500	11.000	4.8863	-1.295
3	16	18.3953	1687.4719	276.834	36.655	37.004	0.000	0.000	0.350	0.350	1.050	1.050	13.4959	1.250	1.250	0.500	0.500	11.000	4.9431	-1.295
3	17	18.5395	1706.0115	295.373	37.004	37.352	0.000	0.000	0.350	0.350	1.050	1.050	13.5829	1.250	1.250	0.500	0.500	11.000	5.0001	0.000
3	18	18.6834	1724.6949	314.056	37.352	37.699	0.000	0.000	0.350	0.350	1.050	1.050	13.6694	1.250	1.250	0.500	0.500	11.000	5.0573	1.295
3	19	18.8271	1743.5220	332.883	37.699	38.045	0.000	0.000	0.350	0.350	1.050	1.050	13.7553	1.250	1.250	0.500	0.500	11.000	5.1147	1.295
3	20	18.9704	1762.4924	351.854	38.045	38.391	0.000	0.000	0.350	0.350	1.050	1.050	13.8408	1.250	1.250	0.500	0.500	11.000	5.1723	0.000
3	21	19.1134	1781.6058	370.967	38.391	38.736	0.000	0.000	0.350	0.350	1.050	1.050	13.9259	1.250	1.250	0.500	0.500	11.000	5.2301	-1.295
3	22	19.2562	1800.8620	390.223	38.736	39.080	0.000	0.000	0.350	0.350	1.050	1.050	14.0104	1.250	1.250	0.500	0.500	11.000	5.2880	-1.295
3	23	19.3986	1820.2606	409.622	39.080	39.423	0.000	0.000	0.350	0.350	1.050	1.050	14.0945	1.250	1.250	0.500	0.500	11.000	5.3461	0.000
3	24	19.5407	1839.8014	429.163	39.423	39.766	0.000	0.000	0.350	0.350	1.050	1.050	14.1780	1.250	1.250	0.500	0.500	11.000	5.4045	1.295
3	25	19.6825	1859.4839	448.845	39.766	40.108	0.000	0.000	0.350	0.350	1.050	1.050	14.2610	1.250	1.250	0.500	0.500	11.000	5.4630	1.295
3	26	19.8240	1879.3079	468.669	40.108	40.449	0.000	0.000	0.350	0.350	1.050	1.050	14.3437	1.250	1.250	0.500	0.500	11.000	5.5216	0.000
3	27	19.9652	1899.2731	488.634	40.449	40.790	0.000	0.000	0.350	0.350	1.050	1.050	14.4257	1.250	1					

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3	32	20.6660	2001.2047	590.566	42.143	42.479	0.000	0.000	0.350	0.350	1.050	1.050	14.8291	1.250	1.250	0.500	0.500	11.000	5.8767	0.000
3	33	20.8051	2022.0098	611.371	42.479	42.815	0.000	0.000	0.350	0.350	1.050	1.050	14.9084	1.250	1.250	0.500	0.500	11.000	5.9364	-1.295
3	34	20.9439	2042.9537	632.325	42.815	N/A	0.000	N/A	0.350	N/A	1.050	N/A	7.5035	1.250	N/A	0.500	N/A	11.000	5.9961	-1.295
4	0	N/A	2063.9705	0.000	N/A	43.149	N/A	0.000	N/A	0.350	N/A	1.050	7.4837	N/A	1.250	N/A	0.500	11.000	N/A	0.000
4	1	21.0824	2085.0529	21.072	43.149	43.483	0.000	0.000	0.350	0.350	1.050	1.050	15.0655	1.250	1.250	0.500	0.500	11.000	6.0560	1.295
4	2	21.2205	2106.2734	42.293	43.483	43.816	0.000	0.000	0.350	0.350	1.050	1.050	15.1434	1.250	1.250	0.500	0.500	11.000	6.1160	1.295
4	3	21.3582	2127.6316	63.651	43.816	44.148	0.000	0.000	0.350	0.350	1.050	1.050	15.2209	1.250	1.250	0.500	0.500	11.000	6.1761	0.000
4	4	21.4958	2149.1275	85.147	44.148	44.479	0.000	0.000	0.350	0.350	1.050	1.050	15.2979	1.250	1.250	0.500	0.500	11.000	6.2364	-1.295
4	5	21.6328	2170.7603	106.780	44.479	44.810	0.000	0.000	0.350	0.350	1.050	1.050	15.3743	1.250	1.250	0.500	0.500	11.000	6.2967	-1.295
4	6	21.7695	2192.5298	128.549	44.810	45.139	0.000	0.000	0.350	0.350	1.050	1.050	15.4504	1.250	1.250	0.500	0.500	11.000	6.3571	0.000
4	7	21.9058	2214.4356	150.455	45.139	45.468	0.000	0.000	0.350	0.350	1.050	1.050	15.5260	1.250	1.250	0.500	0.500	11.000	6.4176	1.295
4	8	22.0418	2236.4774	172.497	45.468	45.795	0.000	0.000	0.350	0.350	1.050	1.050	15.6012	1.250	1.250	0.500	0.500	11.000	6.4782	1.295
4	9	22.1774	2258.6547	194.674	45.795	46.122	0.000	0.000	0.350	0.350	1.050	1.050	15.6758	1.250	1.250	0.500	0.500	11.000	6.5389	0.000
4	10	22.3126	2280.9673	216.987	46.122	46.448	0.000	0.000	0.350	0.350	1.050	1.050	15.7499	1.250	1.250	0.500	0.500	11.000	6.5997	-1.295
4	11	22.4474	2303.4147	239.434	46.448	46.773	0.000	0.000	0.350	0.350	1.050	1.050	15.8237	1.250	1.250	0.500	0.500	11.000	6.6605	-1.295
4	12	22.5519	2325.9966	262.016	46.773	47.097	0.000	0.000	0.350	0.350	1.050	1.050	15.8970	1.250	1.250	0.500	0.500	11.000	6.7215	0.000
4	13	22.7160	2348.7126	284.732	47.097	47.420	0.000	0.000	0.350	0.350	1.050	1.050	15.9698	1.250	1.250	0.500	0.500	11.000	6.7825	1.295
4	14	22.8497	2371.5623	307.582	47.420	47.742	0.000	0.000	0.350	0.350	1.050	1.050	16.0423	1.250	1.250	0.500	0.500	11.000	6.8436	1.295
4	15	22.9830	2394.5453	330.564	47.742	48.064	0.000	0.000	0.350	0.350	1.050	1.050	16.1137	1.250	1.250	0.500	0.500	11.000	6.9048	0.000
4	16	23.1160	2417.6613	353.679	48.064	48.384	0.000	0.004	0.350	0.350	1.050	1.050	16.1820	1.250	1.250	0.500	0.500	11.000	6.9671	-1.295
4	17	23.2486	2440.9099	376.928	48.384	48.703	0.004	0.008	0.350	0.350	1.050	1.050	16.2477	1.250	1.250	0.500	0.500	11.000	7.0337	-1.295
4	18	23.3807	2464.2907	400.309	48.703	49.022	0.008	0.011	0.350	0.350	1.050	1.050	16.3129	1.250	1.250	0.500	0.500	11.000	7.1004	0.000
4	19	23.5125	2487.8032	423.821	49.022	49.339	0.011	0.015	0.350	0.350	1.050	1.050	16.3775	1.250	1.250	0.500	0.500	11.000	7.1672	1.295
4	20	23.6438	2511.4470	447.465	49.339	49.656	0.015	0.018	0.350	0.350	1.050	1.050	16.4418	1.250	1.250	0.500	0.500	11.000	7.2341	1.295
4	21	23.7747	2535.2217	471.240	49.656	49.971	0.018	0.022	0.350	0.350	1.050	1.050	16.5054	1.250	1.250	0.500	0.500	11.000	7.3011	0.000
4	22	23.9052	2559.1269	495.145	49.971	50.285	0.022	0.025	0.350	0.350	1.050	1.050	16.5685	1.250	1.250	0.500	0.500	11.000	7.3682	-1.295
4	23	24.0353	2583.1622	519.180	50.285	50.599	0.025	0.029	0.350	0.350	1.050	1.050	16.6311	1.250	1.250	0.500	0.500	11.000	7.4355	-1.295
4	24	24.1649	2607.3271	543.345	50.599	50.911	0.029	0.032	0.350	0.350	1.050	1.050	16.6932	1.250	1.250	0.500	0.500	11.000	7.5028	0.000
4	25	24.2942	2631.6213	567.639	50.911	51.222	0.032	0.036	0.350	0.350	1.050	1.050	16.7548	1.250	1.250	0.500	0.500	11.000	7.5701	1.295
4	26	24.4230	2656.0443	592.062	51.222	51.532	0.036	0.039	0.350	0.350	1.050	1.050	16.8159	1.250	1.250	0.500	0.500	11.000	7.6376	1.295
4	27	24.5513	2680.5956	616.613	51.532	51.842	0.039	0.043	0.350	0.350	1.050	1.050	16.8766	1.250	1.250	0.500	0.500	11.000	7.7051	0.000
4	28	24.6793	2705.2749	641.304	51.842	N/A	0.043	N/A	0.350	N/A	1.050	N/A	8.4803	1.250	N/A	0.500	N/A	11.000	7.7726	-1.295
5	0	N/A	2730.0218	0.000	N/A	52.150	N/A	0.046	N/A	0.350	N/A	1.050	8.4566	N/A	1.250	N/A	0.500	11.000	N/A	-1.295
5	1	24.8068	2754.8286	24.795	52.150	52.457	0.046	0.050	0.350	0.350	1.050	1.050	16.9965	1.250	1.250	0.500	0.500	11.000	7.8401	0.000
5	2	24.9339	2779.7625	49.729	52.457	52.763	0.050	0.053	0.350	0.350	1.050	1.050	17.0558	1.250	1.250	0.500	0.500	11.000	7.9077	1.295
5	3	25.0606	2804.8232	74.790	52.763	53.068	0.053	0.056	0.350	0.350	1.050	1.050	17.1146	1.250	1.250	0.500	0.500	11.000	7.9754	1.295
5	4	25.1869	2830.0100	99.976	53.068	53.372	0.056	0.060	0.350	0.350	1.050	1.050	17.1730	1.250	1.250	0.500	0.500	11.000	8.0431	0.000
5	5	25.3127	2855.3228	125.289	53.372	53.676	0.060	0.063	0.350	0.350	1.050	1.050	17.2308	1.250	1.250	0.500	0.500	11.000	8.1108	-1.295
5	6	25.4381	2880.7609	150.727	53.676	53.978	0.063	0.066	0.350	0.350	1.050	1.050	17.2881	1.250	1.250	0.500	0.500	11.000	8.1786	-1.295
5	7	25.5631	2906.3240	176.290	53.978	54.279	0.066	0.070	0.350	0.350	1.050	1.050	17.3451	1.250	1.250	0.500	0.500	11.000	8.2465	0.000
5	8	25.6876	2932.0116	201.978	54.279	54.578	0.070	0.073	0.350	0.350	1.050	1.050	17.4015	1.250	1.250	0.500	0.500	11.000	8.3144	1.295
5	9	25.8117	2957.8233	227.790	54.578	54.877	0.073	0.076	0.350	0.350	1.050	1.050	17.4575	1.250	1.250	0.500	0.500	11.000	8.3823	1.295
5	10	25.9354	2983.7588	253.725	54.877	55.175	0.076	0.080	0.350	0.350	1.050	1.050	17.5130	1.250	1.250	0.500	0.500	11.000	8.4502	0.000
5	11	26.0587	3009.8175	279.784	55.175	55.472	0.080	0.083	0.350	0.350	1.050	1.050	17.5680	1.250	1.250	0.500	0.500	11.000	8.5182	-1.295
5	12	26.1815	3035.9990	305.965	55.472	55.768	0.083	0.086	0.350	0.350	1.050	1.050	17.6226	1.250	1.250	0.500	0.500	11.000	8.5862	-1.295
5	13	26.3039	3062.3029	332.269	55.768	56.063	0.086	0.090	0.350	0.350	1.050	1.050	17.6768	1.250	1.250	0.500	0.500	11.000	8.6542	0.000
5	14	26.4259	3088.7288	358.695	56.063	56.356	0.090	0.093	0.350	0.350	1.050	1.050	17.7304	1.250	1.250	0.500	0.500	11.000	8.7223	1.295
5	15	26.5474	3115.2763	385.242	56.356	56.649	0.093	0.096	0.350	0.350	1.050	1.050	17.7837	1.250	1.250	0.500	0.500	11.000	8.7904	1.295
5	16	26.6685	3141.9448	411.911	56.649	56.941	0.096	0.099	0.350	0.350	1.050	1.050	17.8365	1.250	1.250	0.500	0.500	11.000	8.8584	0.000
5	17	26.7892	3168.7340	438.700	56.941	57.231	0.099	0.103	0.350	0.350	1.050	1.050	17.8889	1.250	1.250	0.500	0.500	11.000	8.9265	-1.2

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5	22	27.3862	3304.4753	574.441	58.383	58.669	0.115	0.119	0.350	0.350	1.050	1.050	18.1440	1.250	1.250	0.500	0.500	11.000	9.2673	0.000
5	23	27.5043	3331.9796	601.946	58.669	58.953	0.119	0.122	0.350	0.350	1.050	1.050	18.1938	1.250	1.250	0.500	0.500	11.000	9.3354	-1.295
5	24	27.6220	3359.6015	629.580	58.953	N/A	0.122	N/A	0.350	N/A	1.050	N/A	9.1336	1.250	N/A	0.500	N/A	11.000	9.4036	-1.295
6	0	N/A	3387.2867	0.000	N/A	59.237	N/A	0.125	N/A	0.350	N/A	1.050	9.1094	N/A	1.250	N/A	0.500	11.000	N/A	0.000
6	1	27.7392	3415.0259	27.719	59.237	59.341	0.125	0.126	0.350	0.350	1.050	1.050	18.2765	1.250	1.250	0.500	0.500	11.000	9.4718	1.295
6	2	27.7824	3442.8084	55.510	59.341	59.620	0.126	0.129	0.350	0.350	1.050	1.050	18.3097	1.250	1.250	0.500	0.500	11.000	9.4970	1.295
6	3	27.8980	3470.7063	83.408	59.620	59.897	0.129	0.132	0.350	0.350	1.050	1.050	18.3572	1.250	1.250	0.500	0.500	11.000	9.5646	0.000
6	4	28.0124	3498.7187	111.420	59.897	60.170	0.132	0.135	0.350	0.350	1.050	1.050	18.4042	1.250	1.250	0.500	0.500	11.000	9.6317	-1.295
6	5	28.1256	3526.8443	139.546	60.170	60.441	0.135	0.138	0.350	0.350	1.050	1.050	18.4505	1.250	1.250	0.500	0.500	11.000	9.6984	-1.295
6	6	28.2377	3555.0820	167.784	60.441	60.709	0.138	0.141	0.350	0.350	1.050	1.050	18.4960	1.250	1.250	0.500	0.500	11.000	9.7646	0.000
6	7	28.3486	3583.4306	196.132	60.709	60.974	0.141	0.144	0.350	0.350	1.050	1.050	18.5407	1.250	1.250	0.500	0.500	11.000	9.8303	1.295
6	8	28.4583	3611.8889	224.591	60.974	61.236	0.144	0.147	0.350	0.350	1.050	1.050	18.5846	1.250	1.250	0.500	0.500	11.000	9.8957	1.295
6	9	28.5667	3640.4556	253.157	61.236	61.495	0.147	0.150	0.350	0.350	1.050	1.050	18.6279	1.250	1.250	0.500	0.500	11.000	9.9606	0.000
6	10	28.6739	3669.1295	281.831	61.495	61.751	0.150	0.153	0.350	0.350	1.050	1.050	18.6703	1.250	1.250	0.500	0.500	11.000	10.0249	-1.295
6	11	28.7797	3697.9092	310.611	61.751	62.004	0.153	0.156	0.350	0.350	1.050	1.050	18.7121	1.250	1.250	0.500	0.500	11.000	10.0886	-1.295
6	12	28.8843	3726.7934	339.496	62.004	62.253	0.156	0.158	0.350	0.350	1.050	1.050	18.7532	1.250	1.250	0.500	0.500	11.000	10.1517	0.000
6	13	28.9875	3755.7809	368.483	62.253	62.499	0.158	0.161	0.350	0.350	1.050	1.050	18.7935	1.250	1.250	0.500	0.500	11.000	10.2142	1.295
6	14	29.0893	3784.8702	397.572	62.499	62.742	0.161	0.164	0.350	0.350	1.050	1.050	18.8329	1.250	1.250	0.500	0.500	11.000	10.2762	1.295
6	15	29.1898	3814.0600	426.762	62.742	62.981	0.164	0.166	0.350	0.350	1.050	1.050	18.8715	1.250	1.250	0.500	0.500	11.000	10.3377	0.000
6	16	29.2888	3843.3488	456.051	62.981	63.217	0.166	0.169	0.350	0.350	1.050	1.050	18.9093	1.250	1.250	0.500	0.500	11.000	10.3985	-1.295
6	17	29.3864	3872.7352	485.438	63.217	63.450	0.169	0.172	0.350	0.350	1.050	1.050	18.9465	1.250	1.250	0.500	0.500	11.000	10.4586	-1.295
6	18	29.4826	3902.2178	514.920	63.450	63.679	0.172	0.174	0.350	0.350	1.050	1.050	18.9830	1.250	1.250	0.500	0.500	11.000	10.5180	0.000
6	19	29.5773	3931.7951	544.498	63.679	63.904	0.174	0.177	0.350	0.350	1.050	1.050	19.0187	1.250	1.250	0.500	0.500	11.000	10.5766	1.295
6	20	29.6705	3961.4656	574.169	63.904	64.125	0.177	0.179	0.350	0.350	1.050	1.050	19.0536	1.250	1.250	0.500	0.500	11.000	10.6345	1.295
6	21	29.7622	3991.2278	603.931	64.125	64.343	0.179	0.182	0.350	0.350	1.050	1.050	19.0877	1.250	1.250	0.500	0.500	11.000	10.6916	0.000
6	22	29.8524	4021.0801	633.793	64.343	N/A	0.182	N/A	0.350	N/A	1.050	N/A	9.5706	1.250	N/A	0.500	N/A	11.000	10.7482	0.000

CCLFISH: a tuning program for coupled-cavity linacs

CCLFISH sets up the geometry for coupled-cavity linac (CCL) cells. The CCL cell is a figure of revolution about the beam axis. CCLFISH assumes a symmetric cell, and therefore sets up SUPERFISH runs for only half the cell. The symmetry plane is in the gap center between the two noses.

For coupled-cavity cells, engineering considerations usually dictate the septum thickness. It is probably not a good idea to vary it to tune a CCL cell. You can vary the septum thickness to tune a stand-alone buncher cavity. CCLFISH does not allow a negative septum thickness because it would imply that the outer part of the cavity extends beyond the bore-tube extension in the longitudinal direction. This situation usually results in an unphysical boundary condition on the right side of the cavity. If you vary the septum thickness to tune a cell, CCLFISH will discontinue the problem if the septum thickness becomes zero or negative before the next SUPERFISH run.

Standard coupled-cavity linac cell

Figure A-3 shows the outline of the right half of a “standard” coupled-cavity linac cell. Figure A-4 shows more detail near the nose. The lower left corner is the center of the cell. The full gap is g and the full length is L . The bore radius is R_b . The full cavity diameter is D and the full septum thickness is s .

The CCLFISH program uses a control-file entry for the outer corner radius R_{co} , but not for the equator flat F_{Eq} . The code computes the value of F_{Eq} after completing a solution and it reports its value in a comment line in the control file for completed jobs. When using program CDTFISH for a full-cell calculation of a CCL end cavity (usually with a bore-tube extension), you can use the value of the equator flat supplied by CCLFISH. The CDTFISH code computes the outer corner radius from the equator flat entry.

The cone angle α_c is the angle that the nose face makes with the horizontal. There are three circular arcs on the drift-tube profile. The cavity inner corner radius R_{ci} connects the outer end of the straight cone-angle segment with the vertical segment along the septum. The inner nose radius R_i connects the bore tube to an optional vertical flat segment of length F . The outer nose radius R_o connects the flat segment on the nose with the cone-angle segment.

Table A-3 presents the cavity geometry table for the SNS CCL.

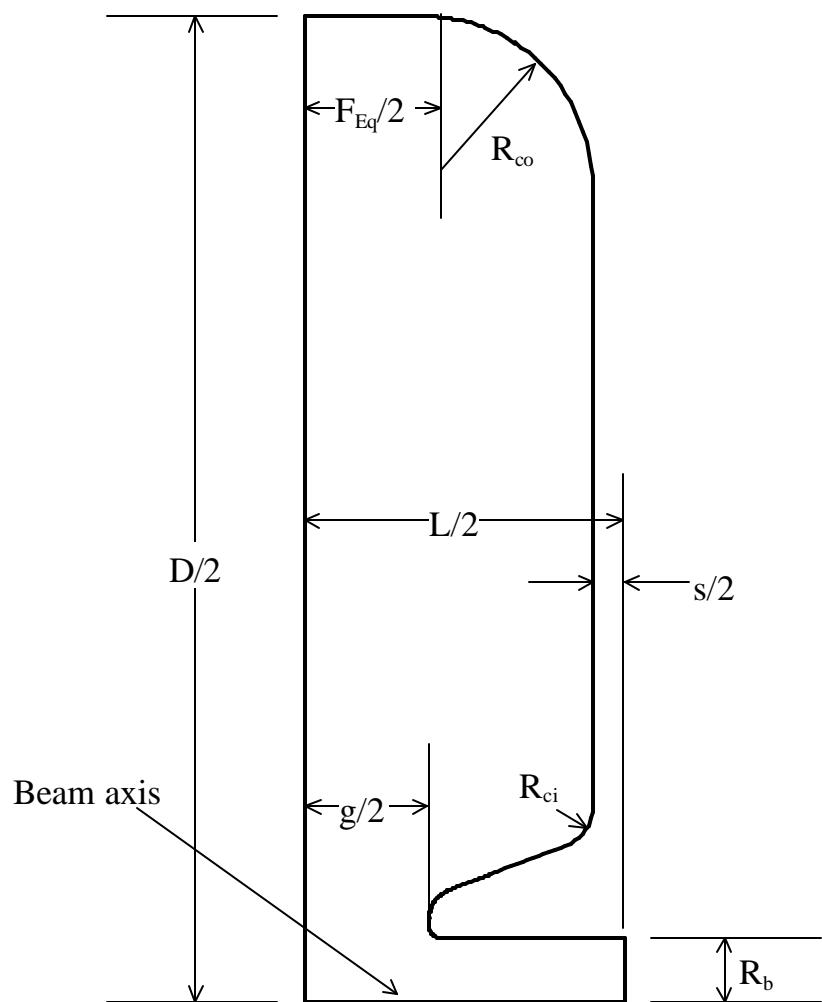


Figure A-3. The CCL half cell set up by the code CCLFISH.
The cell is a figure of revolution about the beam axis, which is at the bottom of the figure.
The left edge is a symmetry plane. Figure A-4 show more details near the nose.

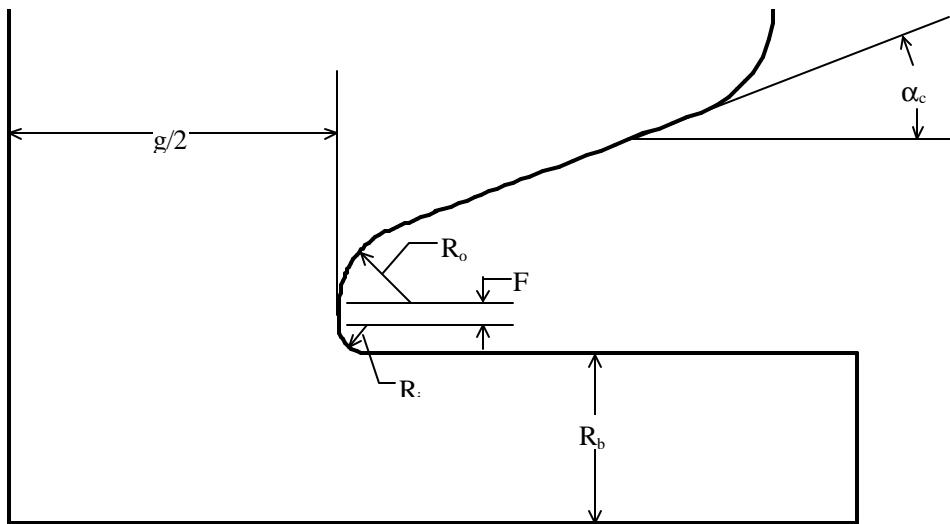


Figure A-4. Detail near the nose in a CCL cell.
This nose is from the CCL cell shown in Figure A-3. Programs DTLFISH, CCLFISH, MDTFISH, and CDTFISH all use the same parameters for the drift-tube nose.

Table A-3. CCL Geometric Design Table

Module 1, Segments 1 to 12, Internal Accelerating Cell Dimensions												
Units of cm	Segment Number											
	1	2	3	4	5	6	7	8	9	10	11	12
DIAMeter	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804
BETA	0.40397624	0.40686551	0.40982459	0.41284811	0.41594682	0.41910998	0.42234295	0.42564036	0.42900222	0.43238556	0.43575816	0.43910928
LENGTH	7.5223	7.5761	7.6312	7.6875	7.7452	7.8041	7.8643	7.9257	7.9883	8.0513	8.1141	8.1765
G_OVER_Beta_lambda	0.1274255	0.1284161	0.12943063	0.13044255	0.13147807	0.13253512	0.13360106	0.13468265	0.13578538	0.1368719	0.13794528	0.13901183
GAP_Length	1.91706568	1.94578641	1.97542211	2.0055542	2.03664787	2.06863471	2.10135767	2.13490859	2.16938871	2.20399352	2.23860365	2.27326039
E0_Normalization	3.06	3.1487	3.2375	3.3262	3.415	3.5037	3.5925	3.6812	3.77	3.772	3.772	3.772
E0T_Normalization	2.71654232	2.79645782	2.87649073	2.95650474	3.03664559	3.11673396	3.19694661	3.2770951	3.35735206	3.36034833	3.36142216	3.36249677
OUTER_CORNER_radius	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74
INNER_CORNER_radius	0.84795248	0.85373101	0.85964917	0.86569622	0.87189364	0.87821995	0.88468589	0.89128072	0.89800444	0.90477112	0.91151632	0.91821856
OUTER_NOSE_radius	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
INNER_NOSE_radius	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085
FLAT_length	0	0	0	0	0	0	0	0	0	0	0	0
CONE_angle	10	10	10	10	10	10	10	10	10	10	10	10
SEPTUM_thickness	1	1	1	1	1	1	1	1	1	1	1	1
BORE_radius	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
RING_Width	3	3	3	3	3	3	3	3	3	3	3	3
RING_Angle	20	20	20	20	20	20	20	20	20	20	20	20
RING_Effect	2.50915319	2.50244683	2.50113406	2.501806	2.502869	2.50393002	2.50319359	2.50669603	2.50457089	2.50790126	2.51274866	2.505567
RING_Thickness	0.10003805	0.10105644	0.10209942	0.10330624	0.10455197	0.10582361	0.1070116	0.10817997	0.10937118	0.11060228	0.11184292	0.11307567

Module 2, Segments 13 to 24, Internal Accelerating Cell Dimensions												
Units of cm	Segment Number											
	13	14	15	16	17	18	19	20	21	22	23	24
DIAMeter	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804
BETA	0.442449666	0.445766552	0.449071337	0.452362641	0.455617833	0.458872384	0.462099804	0.465316743	0.46851212	0.471691366	0.474854541	0.477996214
LENGTH	6.2307	6.3005	6.362	6.4231	6.4839	6.5445	6.6046	6.6645	6.724	6.7832	6.8421	6.9006
G_OVER_Beta_lambda	0.140057711	0.141090641	0.142118558	0.143131457	0.144136111	0.145137458	0.146085303	0.147031099	0.147960645	0.148882425	0.149796837	0.150705039
GAP_Length	2.307866268	2.34245739	2.376790781	2.411221148	2.44667288	2.480264015	2.514183293	2.547901911	2.581817339	2.616328225	2.649037224	2.682730545
E0_Normalization	3.772	3.772	3.772	3.772	3.772	3.772	3.772	3.772	3.772	3.772	3.772	3.772
E0T_Normalization	3.363452422	3.364423246	3.366247709	3.366086630	3.366054947	3.367536217	3.366228011	3.366566929	3.36850437	3.370014615	3.370563001	3.371023195
OUTER_CORNER_radius	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74
INNER_CORNER_radius	0.924899313	0.931537105	0.938142674	0.94		0.949399536	0.96126897	0.974048479	0.983382772	0.988709082	0.995992429	
OUTER_NOSE_radius	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
INNER_NOSE_radius	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085
FLAT_length	0	0	0	0	0	0	0	0	0	0	0	0
CONE_angle	10	10	10	10	10	10	10	10	10	10	10	10
SEPTUM_thickness	1	1	1	1	1	1	1	1	1	1	1	1
BORE_radius	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
RING_Width	3	3	3	3	3	3	3	3	3	3	3	3
RING_Angle	20	20	20	20	20	20	20	20	20	20	20	20
RING_Effect	2.508554697	2.499263607	2.508356163	2.50395072	2.505466072	2.501775462	2.505331382	2.511060701	2.504344749	2.510453102	2.505816502	2.5052904
RING_Thickness	0.114206196	0.116283969	0.116376441	0.117666689	0.118600679	0.120028735	0.121256156	0.122484573	0.123704766	0.124919761	0.126129344	0.127330723

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Module 3, Segments 25 to 36, Internal Accelerating Cell Dimensions												
Parameter	Segment Number											
	25	26	27	28	29	30	31	32	33	34	35	36
DIAMeter	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804
BETA	0.481121777	0.484231228	0.487319197	0.490391056	0.493446803	0.496486439	0.499509964	0.502522749	0.505519422	0.508505364	0.511480546	0.514439626
LENGTH	8.9588	9.0167	9.0742	9.1314	9.1883	9.2449	9.3012	9.3573	9.4131	9.4687	9.5241	9.5792
G_OVER_Beta_lambda	0.151604017	0.152490245	0.153370351	0.154242678	0.155088699	0.155930259	0.156767359	0.157585851	0.158396946	0.159205133	0.160002203	0.160786712
GAP_Length	2.716380138	2.749917592	2.783426482	2.816903188	2.85000299	2.883119311	2.916249122	2.949156173	2.982012584	3.014931295	3.047753962	3.080416143
E0_Normalization	3.772	3.772	3.772	3.772	3.772	3.772	3.772	3.772	3.772	3.772	3.772	3.772
EOT_Normalization	3.371429943	3.371796299	3.372080284	3.372402283	3.372689995	3.372912658	3.373106589	3.373248007	3.373431381	3.373542801	3.373578424	3.373673766
OUTER_CORNER_radius	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74
INNER_CORNER_radius	1.002243553	1.008462455	1.014638395	1.020782112	1.026893606	1.032972879	1.039019929	1.045045497	1.051038843	1.057010708	1.062961091	1.068879252
OUTER_NOSE_radius	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
INNER_NOSE_radius	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085
FLAT_length	0	0	0	0	0	0	0	0	0	0	0	0
CONE_angle	10	10	10	10	10	10	10	10	10	10	10	10
SEPTUM_thickness	1	1	1	1	1	1	1	1	1	1	1	1
BORE_radius	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
RING_Width	3	3	3	3	3	3	3	3	3	3	3	3
RING_Angle	20	20	20	20	20	20	20	20	20	20	20	20
RING_Effect	2.5008531	2.511043569	2.512531942	2.505069984	2.506987713	2.504372725	2.504829357	2.508357575	2.504200648	2.503760723	2.508479365	2.513156649
RING_Thickness	0.128450514	0.129430496	0.130403708	0.13140381	0.132616671	0.133823137	0.135023209	0.136110927	0.137171946	0.138229161	0.139294876	0.140367171

Module 4, Segments 37 to 48, Internal Accelerating Cell Dimensions												
Parameter	Segment Number											
	37	38	39	40	41	42	43	44	45	46	47	48
DIAMeter	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804	24.95804
BETA	0.517382595	0.520314824	0.523230941	0.526136318	0.529025583	0.531898738	0.534761151	0.537607454	0.540443015	0.543257096	0.546065805	0.548853034
LENGTH	9.634	9.6886	9.7429	9.797	9.8508	9.9043	9.9576	10.0106	10.0634	10.1158	10.1681	10.22
G_OVER_Beta_lambda	0.16156695	0.162342907	0.16310275	0.163859794	0.164612641	0.165347052	0.166071437	0.166791746	0.16750808	0.168212249	0.168915075	0.169612526
GAP_Length	3.113071986	3.145750968	3.178187562	3.210668811	3.243132407	3.275293608	3.307345892	3.339370907	3.371401616	3.403202944	3.435090754	3.466880029
E0_Normalization	3.772	3.772	3.772	3.772	3.772	3.772	3.772	3.772	3.772	3.772	3.772	3.772
EOT_Normalization	3.373656479	3.373689444	3.37367109	3.373623901	3.373541752	3.373455005	3.373362011	3.37322929	3.373078037	3.372909298	3.372704158	3.372483307
OUTER_CORNER_radius	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74
INNER_CORNER_radius	1.074765191	1.080629648	1.086461883	1.092272636	1.098051167	1.103797476	1.109522303	1.115214908	1.120886031	1.126514191	1.132131611	1.137706067
OUTER_NOSE_radius	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
INNER_NOSE_radius	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085
FLAT_length	0	0	0	0	0	0	0	0	0	0	0	0
CONE_angle	10	10	10	10	10	10	10	10	10	10	10	10
SEPTUM_thickness	1	1	1	1	1	1	1	1	1	1	1	1
BORE_radius	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
RING_Width	3	3	3	3	3	3	3	3	3	3	3	3
RING_Angle	20	20	20	20	20	20	20	20	20	20	20	20
RING_Effect	2.509231978	2.509029369	2.511254263	2.507172357	2.506161438	2.511331476	2.500120223	2.506284857	2.505866766	2.50220557	2.509233522	2.507958841
RING_Thickness	0.141433628	0.142490227	0.143491687	0.144489459	0.145481698	0.146664023	0.147941942	0.149212669	0.150430874	0.151384051	0.152335409	0.15327949

APPENDIX B – CELL PARAMETERS (PARMILA OUTPUT) FOR THE LINAC

PARMILA is an ion-linac particle-dynamics code. The name comes from the phrase, “Phase and Radial Motion in Ion Linear Accelerators.” The code generates DTL, CCDTL, and CCL accelerating cells and, using a “drift-kick” method, transforms the beam, represented by a collection of particles, through the linac. The code includes a 2-D space-charge calculation. PARMILA uses data generated by the SUPERFISH postprocessor SFO.

PARMILA is thoroughly documented in LA-UR-98-4478, original release: September 30, 1998, revision date: February 16, 2000.

This appendix presents PARMILA data. Table B-1 identifies the parameters. Table B-2 presents this data for the SNS DTL and CCL.

Table B-1. Parameters in the Output table.

Column heading	Description and comments
cell number	The sequential cell number. The space between segments (usually containing a quadrupole magnet) do not have a separate cell number. One refers to this space by the number of the previous cell.
Kinetic energy	The kinetic energy in MeV at the end of the cell.
Beta	Particle velocity βc at the end of the cell.
Cell length	Length of the cell in cm. For spaces containing magnets between segments, this column lists the total inter-segment distance from the end of one cell to the start of the next cell.
T	The transit-time factor T, involving the integral of $E_z \cos(kz)$.
Tp	First derivative of T with respect to wave number.
S	The transit-time factor S, involving the integral of $E_z \sin(kz)$.
Sp	First derivative of S with respect to wave number.
Quad length	Length of the quadrupole magnet within a DTL cell in cm. A value of zero indicates that there is no quadrupole magnet associated with the cell.
Quad gradient	The magnetic quadrupole gradient in kG/cm.
Ezero	The design value of E_0 for this cell or cavity in MV/m, where E_0 refers to the average axial electric field for the cell.
E	The computed value of E_0 for the cell in MV/m, including the ratio E/E ₀ for that cell from the SFDATA tables.
Phis phiref	Synchronous phase or phase of the design particle in degrees at the center of the gap.
End-wall position	Absolute position in cm of the nominal end of this cell. A number in parentheses refers to the absolute position of the center of a quadrupole magnet between segments. This position includes any offset indicated by a StartPosition line.
Next wall position	Absolute position in cm to the start of the next cell. This number will be the same as the previous column when cells are butted against one another in a segment.

Table B-2, PARMILA Output for the SNS DTL and CCL

Parmila InputFile name is ref608.dat

 *** ORNL June 12,2000 Design .DTL. Tank 1

linout subroutine no. 1 dynamical parameters

Transit time factors are for the synchronous or reference particles.
 tank no. 1 tank length 415.193 (cm) 60 cells power= 0.527 MW frequency= 402.50MHz
 (Cu+Beam) wavelength= 74.48260 cm

cell	kinetic	beta at	cell	t	tp	s	sp	quad	quad	Ezero	E	phis	PhiDesign	TotalLeng	TotalLeng
number	energy	end of	length					length	gradient	(MV/m)	(MV/m)	phref	(Deg)	toEndwall/	toNextBeginwall
Absolute z=0 position is at the entry to the tank. If the first quad is a full quad, it is at the center of the quad															
initial	2.5000	0.07281						3.500	-3.7000	(	0.00000)		363.75000		
1	2.5253	0.07318	5.4326	0.5835	0.0961	0.5652	0.0259	3.500	0.0000	1.1300	1.1300	-45.000	-45.000	369.18257	369.18257
2	2.5515	0.07356	5.4601	0.5861	0.0957	0.5643	0.0263	3.500	3.7000	1.1550	1.1550	-45.000	-45.000	374.64271	374.64271
3	2.5784	0.07394	5.4894	0.5886	0.0952	0.5633	0.0267	3.500	3.7000	1.1802	1.1802	-44.939	-44.939	380.13211	380.13211
4	2.6063	0.07434	5.5210	0.5910	0.0948	0.5624	0.0269	3.500	0.0000	1.2055	1.2055	-44.716	-44.716	385.65310	385.65310
5	2.6352	0.07475	5.5510	0.5938	0.0943	0.5614	0.0273	3.500	-3.7000	1.2310	1.2310	-44.489	-44.489	391.20414	391.20414
6	2.6651	0.07517	5.5820	0.5967	0.0939	0.5603	0.0277	3.500	-3.7000	1.2566	1.2566	-44.257	-44.257	396.78615	396.78615
7	2.6961	0.07560	5.6139	0.5995	0.0934	0.5593	0.0281	3.500	0.0000	1.2823	1.2823	-44.021	-44.021	402.40003	402.40003
8	2.7282	0.07605	5.6467	0.6023	0.0930	0.5582	0.0286	3.500	3.7000	1.3082	1.3082	-43.781	-43.781	408.04672	408.04672
9	2.7614	0.07651	5.6804	0.6053	0.0925	0.5571	0.0290	3.500	3.7000	1.3343	1.3343	-43.536	-43.536	413.72717	413.72717
10	2.7957	0.07698	5.7152	0.6083	0.0920	0.5559	0.0295	3.500	0.0000	1.3605	1.3605	-43.287	-43.287	419.44236	419.44236
11	2.8313	0.07747	5.7509	0.6114	0.0915	0.5548	0.0299	3.500	-3.7000	1.3869	1.3869	-43.033	-43.033	425.19329	425.19329
12	2.8681	0.07797	5.7877	0.6145	0.0910	0.5536	0.0304	3.500	-3.7000	1.4134	1.4134	-42.775	-42.775	430.98099	430.98099
13	2.9062	0.07848	5.8255	0.6176	0.0905	0.5523	0.0308	3.500	0.0000	1.4401	1.4401	-42.513	-42.513	436.80649	436.80649
14	2.9457	0.07901	5.8644	0.6208	0.0899	0.5510	0.0313	3.500	3.7000	1.4670	1.4670	-42.247	-42.247	442.67088	442.67088
15	2.9865	0.07955	5.9044	0.6241	0.0894	0.5497	0.0317	3.500	3.7000	1.4940	1.4940	-41.977	-41.977	448.57523	448.57523
16	3.0288	0.08011	5.9455	0.6275	0.0888	0.5484	0.0322	3.500	0.0000	1.5213	1.5213	-41.702	-41.702	454.52069	454.52069
17	3.0726	0.08069	5.9877	0.6308	0.0883	0.5470	0.0327	3.500	-3.7000	1.5487	1.5487	-41.424	-41.424	460.50838	460.50838
18	3.1179	0.08128	6.0311	0.6341	0.0877	0.5456	0.0331	3.500	-3.7000	1.5764	1.5764	-41.141	-41.141	466.53948	466.53948
19	3.1648	0.08188	6.0757	0.6375	0.0871	0.5441	0.0336	3.500	0.0000	1.6042	1.6042	-40.855	-40.855	472.61518	472.61518
20	3.2133	0.08250	6.1215	0.6410	0.0865	0.5427	0.0341	3.500	3.7000	1.6322	1.6322	-40.565	-40.565	478.73671	478.73671
21	3.2636	0.08314	6.1686	0.6445	0.0859	0.5412	0.0345	3.500	3.7000	1.6605	1.6605	-40.270	-40.270	484.90532	484.90532

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22	3.3156	0.08380	6.2170	0.6480	0.0853	0.5396	0.0350	3.500	0.0000	1.6890	1.6890	-39.973	-39.973	491.12228	491.12228
23	3.3695	0.08448	6.2666	0.6516	0.0847	0.5380	0.0355	3.500	-3.7000	1.7177	1.7177	-39.671	-39.671	497.38890	497.38890
24	3.4253	0.08517	6.3176	0.6552	0.0841	0.5364	0.0359	3.500	-3.7000	1.7466	1.7466	-39.366	-39.366	503.70651	503.70651
25	3.4830	0.08588	6.3700	0.6587	0.0835	0.5348	0.0364	3.500	0.0000	1.7758	1.7758	-39.058	-39.058	510.07648	510.07648
26	3.5428	0.08661	6.4237	0.6622	0.0829	0.5333	0.0368	3.500	3.7000	1.8052	1.8052	-38.746	-38.746	516.50018	516.50018
27	3.6046	0.08736	6.4788	0.6658	0.0823	0.5316	0.0373	3.500	3.7000	1.8349	1.8349	-38.431	-38.431	522.97902	522.97902
28	3.6687	0.08812	6.5354	0.6694	0.0816	0.5299	0.0378	3.500	0.0000	1.8648	1.8648	-38.113	-38.113	529.51444	529.51444
29	3.7350	0.08891	6.5935	0.6730	0.0810	0.5282	0.0382	3.500	-3.7000	1.8950	1.8950	-37.792	-37.792	536.10793	536.10793
30	3.8036	0.08972	6.6531	0.6768	0.0803	0.5264	0.0387	3.500	-3.7000	1.9255	1.9255	-37.468	-37.468	542.76099	542.76099
31	3.8747	0.09055	6.7142	0.6806	0.0796	0.5246	0.0391	3.500	0.0000	1.9562	1.9562	-37.141	-37.141	549.47517	549.47517
32	3.9484	0.09140	6.7769	0.6843	0.0789	0.5227	0.0395	3.500	3.7000	1.9872	1.9872	-36.812	-36.812	556.25205	556.25205
33	4.0246	0.09227	6.8412	0.6880	0.0782	0.5208	0.0400	3.500	3.7000	2.0185	2.0185	-36.480	-36.480	563.09321	563.09321
34	4.1035	0.09317	6.9071	0.6918	0.0775	0.5189	0.0404	3.500	0.0000	2.0501	2.0501	-36.146	-36.146	570.00031	570.00031
35	4.1853	0.09409	6.9747	0.6955	0.0768	0.5170	0.0408	3.500	-3.7000	2.0821	2.0821	-35.809	-35.809	576.97500	576.97500
36	4.2699	0.09503	7.0440	0.6993	0.0761	0.5150	0.0413	3.500	-3.7000	2.1143	2.1143	-35.470	-35.470	584.01898	584.01898
37	4.3576	0.09599	7.1150	0.7032	0.0754	0.5129	0.0417	3.500	0.0000	2.1469	2.1469	-35.129	-35.129	591.13401	591.13401
38	4.4484	0.09698	7.1878	0.7071	0.0746	0.5108	0.0421	3.500	3.7000	2.1797	2.1797	-34.786	-34.786	598.32184	598.32184
39	4.5424	0.09799	7.2625	0.7111	0.0739	0.5085	0.0425	3.500	3.7000	2.2130	2.2130	-34.441	-34.441	605.58431	605.58431
40	4.6398	0.09903	7.3389	0.7148	0.0731	0.5065	0.0428	3.500	0.0000	2.2465	2.2465	-34.095	-34.095	612.92326	612.92326
41	4.7407	0.10009	7.4173	0.7186	0.0724	0.5044	0.0432	3.500	-3.7000	2.2805	2.2805	-33.747	-33.747	620.34053	620.34053
42	4.8452	0.10118	7.4975	0.7226	0.0716	0.5020	0.0436	3.500	-3.7000	2.3148	2.3148	-33.398	-33.398	627.83805	627.83805
43	4.9534	0.10229	7.5797	0.7267	0.0708	0.4995	0.0439	3.500	0.0000	2.3494	2.3494	-33.048	-33.048	635.41778	635.41778
44	5.0656	0.10344	7.6640	0.7309	0.0699	0.4968	0.0443	3.500	3.7000	2.3845	2.3845	-32.696	-32.696	643.08175	643.08175
45	5.1819	0.10461	7.7503	0.7353	0.0691	0.4941	0.0446	3.500	3.7000	2.4199	2.4199	-32.344	-32.344	650.83202	650.83202
46	5.3024	0.10581	7.8387	0.7396	0.0682	0.4914	0.0450	3.500	0.0000	2.4558	2.4558	-31.990	-31.990	658.67071	658.67071
47	5.4273	0.10704	7.9292	0.7435	0.0674	0.4888	0.0453	3.500	-3.7000	2.4920	2.4920	-31.636	-31.636	666.59993	666.59993
48	5.5566	0.10829	8.0219	0.7475	0.0665	0.4862	0.0456	3.500	-3.7000	2.5287	2.5287	-31.281	-31.281	674.62183	674.62183
49	5.6907	0.10958	8.1168	0.7517	0.0657	0.4834	0.0459	3.500	0.0000	2.5658	2.5658	-30.925	-30.925	682.73861	682.73861
50	5.8295	0.11090	8.2139	0.7558	0.0648	0.4807	0.0462	3.500	3.7000	2.6034	2.6034	-30.570	-30.570	690.95250	690.95250
51	5.9734	0.11224	8.3133	0.7595	0.0640	0.4781	0.0465	3.500	3.7000	2.6414	2.6414	-30.214	-30.214	699.26575	699.26575
52	6.1224	0.11362	8.4149	0.7633	0.0632	0.4755	0.0467	3.500	0.0000	2.6798	2.6798	-29.859	-29.859	707.68063	707.68063
53	6.2768	0.11503	8.5188	0.7673	0.0624	0.4728	0.0470	3.500	-3.7000	2.7188	2.7188	-29.504	-29.504	716.19948	716.19948
54	6.4367	0.11647	8.6252	0.7710	0.0616	0.4701	0.0472	3.500	-3.7000	2.7582	2.7582	-29.149	-29.149	724.82464	724.82464
55	6.6023	0.11795	8.7338	0.7746	0.0608	0.4676	0.0474	3.500	0.0000	2.7981	2.7981	-28.795	-28.795	733.55849	733.55849
56	6.7738	0.11945	8.8449	0.7782	0.0600	0.4650	0.0477	3.500	3.7000	2.8385	2.8385	-28.442	-28.442	742.40343	742.40343
57	6.9515	0.12099	8.9585	0.7819	0.0592	0.4624	0.0479	3.500	3.7000	2.8795	2.8795	-28.089	-28.089	751.36191	751.36191
58	7.1354	0.12256	9.0745	0.7852	0.0585	0.4599	0.0481	3.500	0.0000	2.9209	2.9209	-27.738	-27.738	760.43639	760.43639
59	7.3258	0.12417	9.1930	0.7885	0.0578	0.4575	0.0483	3.500	-3.7000	2.9629	2.9629	-27.388	-27.388	769.62934	769.62934
60	7.5230	0.12581	9.3140	0.7920	0.0570	0.4550	0.0485	3.500	-3.7000	3.0055	3.0055	-27.040	-27.040	778.94332	778.94332

*** ORNL June 12,2000 Design BTW tank 1-2

Transport
 Bore 1 2.5
 ;quad L, Ra, outputflag, B, errorflag
 quad 1.75 0 1 -37.e2 0
 drift 5.83341 1.5 1 4
 quad 1.75 0 1 0.e2 0
 ;scheff deltaR. deltaZ, Nr, Nz, Nbunch, Nbetalambda, Remesh
 scheff .05 .05 20 40 0 0 3
 output 2 1 1 300 1
 prtbeam

*** ORNL June 12,2000 Design .DTL. Tank 2

linout subroutine no. 1 dynamical parameters

Transit time factors are for the synchronous or reference particles.

tank no. 1 tank length 606.223 (cm) 48 cells power= 1.640 MW frequency= 402.50MHz
 (Cu+Beam) wavelength= 74.48260 cm

cell	kinetic	beta at	cell	t	tp	s	sp	quad	quad	Ezero	E	phis	PhiDesign	TotalLeng	TotalLeng
number	energy	end of	length					length	gradient	(MV/m)	(MV/m)	phref	(Deg)	toEndwall/	toNextBeginwall
	(MeV)	cell	(cm)					(cm)	(kG/cm)			(Deg)	(QuadCtr)(cm)	(cm)	

Absolute z=0 position is at the entry to the tank. If the first quad is a full quad, it is at the center of the quad

initial	7.5230	0.12581						3.500	0.0000	(	0.00000)	788.27673			
1	7.7253	0.12747	9.4280	0.7917	0.0573	0.4563	0.0493	3.500	3.7000	3.0370	3.0370	-26.795	-26.795	797.70471	797.70471
2	7.9322	0.12914	9.5613	0.7947	0.0565	0.4538	0.0489	3.500	3.7000	3.0457	3.0457	-26.452	-26.452	807.26597	807.26597
3	8.1440	0.13083	9.6867	0.7982	0.0557	0.4512	0.0491	3.500	0.0000	3.0546	3.0546	-26.114	-26.114	816.95262	816.95262
4	8.3605	0.13254	9.8132	0.8009	0.0551	0.4491	0.0492	3.500	-3.7000	3.0636	3.0636	-25.781	-25.781	826.76580	826.76580
5	8.5818	0.13426	9.9408	0.8037	0.0545	0.4470	0.0493	3.500	-3.7000	3.0727	3.0727	-25.454	-25.454	836.70656	836.70656
6	8.8081	0.13599	10.0694	0.8065	0.0539	0.4448	0.0494	3.500	0.0000	3.0819	3.0819	-25.133	-25.133	846.77600	846.77600
7	9.0392	0.13774	10.1940	0.8095	0.0532	0.4425	0.0499	3.500	3.7000	3.0912	3.0912	-25.000	-25.000	856.96997	856.96997
8	9.2748	0.13950	10.3208	0.8125	0.0526	0.4403	0.0502	3.500	3.7000	3.1006	3.1006	-25.000	-25.000	867.29077	867.29077
9	9.5150	0.14127	10.4521	0.8151	0.0520	0.4382	0.0503	3.500	0.0000	3.1102	3.1102	-25.000	-25.000	877.74291	877.74291
10	9.7595	0.14304	10.5842	0.8173	0.0515	0.4365	0.0504	3.500	-3.7000	3.1199	3.1199	-25.000	-25.000	888.32707	888.32707
11	10.0086	0.14483	10.7168	0.8194	0.0510	0.4348	0.0505	3.500	-3.7000	3.1297	3.1297	-25.000	-25.000	899.04390	899.04390
12	10.2622	0.14662	10.8502	0.8215	0.0505	0.4331	0.0506	3.500	0.0000	3.1396	3.1396	-25.000	-25.000	909.89408	909.89408
13	10.5205	0.14842	10.9842	0.8237	0.0500	0.4314	0.0507	3.500	3.7000	3.1496	3.1496	-25.000	-25.000	920.87825	920.87825
14	10.7835	0.15024	11.1189	0.8258	0.0495	0.4296	0.0507	3.500	3.7000	3.1598	3.1598	-25.000	-25.000	931.99711	931.99711

15	11.0511	0.15206	11.2542	0.8277	0.0491	0.4282	0.0508	3.500	0.0000	3.1701	3.1701	-25.000	-25.000	943.25129	943.25129
16	11.3234	0.15389	11.3901	0.8294	0.0487	0.4269	0.0509	3.500	-3.7000	3.1805	3.1805	-25.000	-25.000	954.64142	954.64142
17	11.6004	0.15572	11.5267	0.8310	0.0483	0.4255	0.0509	3.500	-3.7000	3.1911	3.1911	-25.000	-25.000	966.16809	966.16809
18	11.8823	0.15757	11.6638	0.8327	0.0479	0.4242	0.0510	3.500	0.0000	3.2017	3.2017	-25.000	-25.000	977.83193	977.83193
19	12.1690	0.15942	11.8016	0.8344	0.0475	0.4229	0.0511	3.500	3.7000	3.2125	3.2125	-25.000	-25.000	989.63355	989.63355
20	12.4606	0.16129	11.9400	0.8361	0.0471	0.4215	0.0511	3.500	3.7000	3.2234	3.2234	-25.000	-25.000	1001.57356	1001.57356
21	12.7572	0.16316	12.0790	0.8377	0.0467	0.4201	0.0512	3.500	0.0000	3.2345	3.2345	-25.000	-25.000	1013.65260	1013.65260
22	13.0589	0.16503	12.2187	0.8393	0.0463	0.4187	0.0512	3.500	-3.7000	3.2457	3.2457	-25.000	-25.000	1025.87127	1025.87127
23	13.3657	0.16692	12.3589	0.8409	0.0459	0.4173	0.0512	3.500	-3.7000	3.2570	3.2570	-25.000	-25.000	1038.23020	1038.23020
24	13.6777	0.16882	12.4998	0.8426	0.0455	0.4159	0.0512	3.500	0.0000	3.2684	3.2684	-25.000	-25.000	1050.73002	1050.73002
25	13.9949	0.17072	12.6413	0.8442	0.0451	0.4144	0.0513	3.500	3.7000	3.2800	3.2800	-25.000	-25.000	1063.37137	1063.37137
26	14.3174	0.17263	12.7835	0.8456	0.0448	0.4133	0.0513	3.500	3.7000	3.2917	3.2917	-25.000	-25.000	1076.15485	1076.15485
27	14.6451	0.17455	12.9262	0.8469	0.0444	0.4122	0.0513	3.500	0.0000	3.3035	3.3035	-25.000	-25.000	1089.08104	1089.08104
28	14.9782	0.17648	13.0695	0.8482	0.0441	0.4111	0.0514	3.500	-3.7000	3.3155	3.3155	-25.000	-25.000	1102.15055	1102.15055
29	15.3167	0.17842	13.2134	0.8495	0.0438	0.4099	0.0514	3.500	-3.7000	3.3276	3.3276	-25.000	-25.000	1115.36395	1115.36395
30	15.6607	0.18036	13.3579	0.8508	0.0435	0.4088	0.0514	3.500	0.0000	3.3398	3.3398	-25.000	-25.000	1128.72185	1128.72185
31	16.0102	0.18231	13.5030	0.8519	0.0432	0.4079	0.0514	3.500	3.7000	3.3522	3.3522	-25.000	-25.000	1142.22483	1142.22483
32	16.3652	0.18427	13.6486	0.8529	0.0430	0.4071	0.0515	3.500	3.7000	3.3646	3.3646	-25.000	-25.000	1155.87344	1155.87344
33	16.7258	0.18624	13.7948	0.8539	0.0427	0.4063	0.0515	3.500	0.0000	3.3773	3.3773	-25.000	-25.000	1169.66824	1169.66824
34	17.0920	0.18821	13.9416	0.8550	0.0425	0.4055	0.0515	3.500	-3.7000	3.3900	3.3900	-25.000	-25.000	1183.60979	1183.60979
35	17.4639	0.19019	14.0889	0.8560	0.0422	0.4047	0.0516	3.500	-3.7000	3.4029	3.4029	-25.000	-25.000	1197.69866	1197.69866
36	17.8416	0.19218	14.2367	0.8568	0.0420	0.4040	0.0516	3.500	0.0000	3.4160	3.4160	-25.000	-25.000	1211.93539	1211.93539
37	18.2250	0.19418	14.3851	0.8576	0.0418	0.4035	0.0516	3.500	3.7000	3.4291	3.4291	-25.000	-25.000	1226.32051	1226.32051
38	18.6142	0.19618	14.5340	0.8584	0.0416	0.4030	0.0517	3.500	3.7000	3.4424	3.4424	-25.000	-25.000	1240.85456	1240.85456
39	19.0093	0.19819	14.6835	0.8591	0.0414	0.4024	0.0517	3.500	0.0000	3.4559	3.4559	-25.000	-25.000	1255.53805	1255.53805
40	19.4104	0.20021	14.8335	0.8599	0.0412	0.4019	0.0518	3.500	-3.7000	3.4695	3.4695	-25.000	-25.000	1270.37154	1270.37154
41	19.8174	0.20223	14.9840	0.8605	0.0411	0.4015	0.0518	3.500	-3.7000	3.4832	3.4832	-25.000	-25.000	1285.35554	1285.35554
42	20.2304	0.20426	15.1350	0.8611	0.0410	0.4013	0.0519	3.500	0.0000	3.4970	3.4970	-25.000	-25.000	1300.49054	1300.49054
43	20.6495	0.20630	15.2865	0.8616	0.0408	0.4010	0.0519	3.500	3.7000	3.5110	3.5110	-25.000	-25.000	1315.77707	1315.77707
44	21.0748	0.20834	15.4385	0.8621	0.0407	0.4008	0.0520	3.500	3.7000	3.5252	3.5252	-25.000	-25.000	1331.21562	1331.21562
45	21.5062	0.21039	15.5911	0.8627	0.0406	0.4005	0.0520	3.500	0.0000	3.5394	3.5394	-25.000	-25.000	1346.80669	1346.80669
46	21.9439	0.21245	15.7441	0.8631	0.0405	0.4004	0.0521	3.500	-3.7000	3.5539	3.5539	-25.000	-25.000	1362.55079	1362.55079
47	22.3878	0.21452	15.8976	0.8634	0.0404	0.4004	0.0522	3.500	-3.7000	3.5684	3.5684	-25.000	-25.000	1378.44838	1378.44838
48	22.8381	0.21659	16.0516	0.8638	0.0403	0.4004	0.0522	3.500	0.0000	3.5831	3.5831	-25.000	-25.000	1394.49997	1394.49997

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*** ORNL June 12,2000 Design BTW tank 2-3

Transport
Bore 1 2.5
;quad L, Ra, outputflag, B, errorflag
quad 1.75 0 1 0.e2 1
drift 12.6292 1.5 1 4
quad 1.75 0 1 37.e2 1
;scheff deltaR, deltaZ, Nr, Nz, Nbunch, Nbetalambda, Remesh
scheff .05 .05 20 40 0 0 3
output 2 1 1 300 1
prtbeam

*** ORNL June 12,2000 Design .DTL. Tank 3

linout subroutine no. 1 dynamical parameters

Transit time factors are for the synchronous or reference particles.

tank no. 1 tank length 632.325 (cm) 34 cells power= 1.932 MW frequency= 402.50MHz
(Cu+Beam) wavelength= 74.48260 cm

cell	kinetic	beta	at	cell	t	tp	s	sp	quad	quad	Ezero	E	phis	PhiDesign	TotalLeng	TotalLeng
number	energy	end of	length						length	gradient	(MV/m)	(MV/m)	phref	(Deg)	toEndwall/	toNextBeginwall
	(MeV)	cell	(cm)						(cm)	(kG/cm)	(Deg)	(QuadCtr)(cm)	(cm)			
Absolute z=0 position is at the entry to the tank. If the first quad is a full quad, it is at the center of the quad																
initial	22.8381	0.21659							3.500	3.7000	(0.00000)	1410.62917			
1	23.2745	0.21857	16.2017	0.8258	0.0510	0.4534	0.0562	3.500	3.7000	3.5990	3.5990	-25.000	-25.000	1426.83091	1426.83091	
2	23.7149	0.22056	16.3495	0.8259	0.0510	0.4537	0.0563	3.500	0.0000	3.5990	3.5990	-25.000	-25.000	1443.18045	1443.18045	
3	24.1594	0.22254	16.4972	0.8259	0.0510	0.4542	0.0564	3.500	-3.7000	3.5990	3.5990	-25.000	-25.000	1459.67760	1459.67760	
4	24.6077	0.22451	16.6446	0.8259	0.0510	0.4547	0.0565	3.500	-3.7000	3.5990	3.5990	-25.000	-25.000	1476.32216	1476.32216	
5	25.0601	0.22649	16.7917	0.8259	0.0511	0.4552	0.0566	3.500	0.0000	3.5990	3.5990	-25.000	-25.000	1493.11390	1493.11390	
6	25.5163	0.22846	16.9387	0.8258	0.0511	0.4557	0.0567	3.500	3.7000	3.5990	3.5990	-25.000	-25.000	1510.05262	1510.05262	
7	25.9765	0.23043	17.0855	0.8258	0.0511	0.4562	0.0568	3.500	3.7000	3.5990	3.5990	-25.000	-25.000	1527.13810	1527.13810	
8	26.4406	0.23240	17.2320	0.8256	0.0512	0.4568	0.0569	3.500	0.0000	3.5990	3.5990	-25.000	-25.000	1544.37012	1544.37012	
9	26.9085	0.23436	17.3783	0.8255	0.0513	0.4574	0.0570	3.500	-3.7000	3.5990	3.5990	-25.000	-25.000	1561.74844	1561.74844	
10	27.3803	0.23632	17.5244	0.8253	0.0513	0.4581	0.0571	3.500	-3.7000	3.5990	3.5990	-25.000	-25.000	1579.27280	1579.27280	
11	27.8558	0.23827	17.6702	0.8251	0.0514	0.4587	0.0572	3.500	0.0000	3.5990	3.5990	-25.000	-25.000	1596.94297	1596.94297	
12	28.3352	0.24023	17.8157	0.8249	0.0515	0.4594	0.0573	3.500	3.7000	3.5990	3.5990	-25.000	-25.000	1614.75870	1614.75870	
13	28.8183	0.24217	17.9610	0.8247	0.0516	0.4601	0.0574	3.500	3.7000	3.5990	3.5990	-25.000	-25.000	1632.71973	1632.71973	

14	29.3052	0.24412	18.1061	0.8243	0.0517	0.4609	0.0575	3.500	0.0000	3.5990	3.5990	-25.000	-25.000	1650.82580	1650.82580
15	29.7957	0.24606	18.2508	0.8240	0.0518	0.4616	0.0576	3.500	-3.7000	3.5990	3.5990	-25.000	-25.000	1669.07662	1669.07662
16	30.2899	0.24800	18.3953	0.8237	0.0519	0.4624	0.0577	3.500	-3.7000	3.5990	3.5990	-25.000	-25.000	1687.47193	1687.47193
17	30.7879	0.24993	18.5395	0.8234	0.0520	0.4632	0.0579	3.500	0.0000	3.5990	3.5990	-25.000	-25.000	1706.01145	1706.01145
18	31.2894	0.25186	18.6834	0.8230	0.0521	0.4640	0.0580	3.500	3.7000	3.5990	3.5990	-25.000	-25.000	1724.69489	1724.69489
19	31.7946	0.25379	18.8271	0.8226	0.0522	0.4649	0.0581	3.500	3.7000	3.5990	3.5990	-25.000	-25.000	1743.52197	1743.52197
20	32.3033	0.25571	18.9704	0.8222	0.0524	0.4658	0.0582	3.500	0.0000	3.5990	3.5990	-25.000	-25.000	1762.49238	1762.49238
21	32.8156	0.25763	19.1134	0.8217	0.0525	0.4667	0.0583	3.500	-3.7000	3.5990	3.5990	-25.000	-25.000	1781.60583	1781.60583
22	33.3315	0.25955	19.2562	0.8213	0.0527	0.4676	0.0584	3.500	-3.7000	3.5990	3.5990	-25.000	-25.000	1800.86201	1800.86201
23	33.8509	0.26146	19.3986	0.8209	0.0528	0.4685	0.0585	3.500	0.0000	3.5990	3.5990	-25.000	-25.000	1820.26063	1820.26063
24	34.3737	0.26336	19.5407	0.8203	0.0530	0.4695	0.0586	3.500	3.7000	3.5990	3.5990	-25.000	-25.000	1839.80136	1839.80136
25	34.9001	0.26526	19.6825	0.8198	0.0531	0.4704	0.0587	3.500	3.7000	3.5990	3.5990	-25.000	-25.000	1859.48389	1859.48389
26	35.4298	0.26716	19.8240	0.8193	0.0533	0.4714	0.0588	3.500	0.0000	3.5990	3.5990	-25.000	-25.000	1879.30790	1879.30790
27	35.9630	0.26905	19.9652	0.8187	0.0534	0.4724	0.0590	3.500	-3.7000	3.5990	3.5990	-25.000	-25.000	1899.27307	1899.27307
28	36.4996	0.27094	20.1060	0.8182	0.0536	0.4734	0.0591	3.500	-3.7000	3.5990	3.5990	-25.000	-25.000	1919.37906	1919.37906
29	37.0396	0.27283	20.2465	0.8176	0.0538	0.4744	0.0592	3.500	0.0000	3.5990	3.5990	-25.000	-25.000	1939.62556	1939.62556
30	37.5828	0.27471	20.3867	0.8170	0.0540	0.4755	0.0593	3.500	3.7000	3.5990	3.5990	-25.000	-25.000	1960.01223	1960.01223
31	38.1294	0.27658	20.5265	0.8164	0.0542	0.4765	0.0594	3.500	3.7000	3.5990	3.5990	-25.000	-25.000	1980.53872	1980.53872
32	38.6793	0.27845	20.6660	0.8158	0.0543	0.4776	0.0595	3.500	0.0000	3.5990	3.5990	-25.000	-25.000	2001.20469	2001.20469
33	39.2325	0.28032	20.8051	0.8152	0.0545	0.4786	0.0596	3.500	-3.7000	3.5990	3.5990	-25.000	-25.000	2022.00981	2022.00981
34	39.7889	0.28218	20.9439	0.8145	0.0547	0.4797	0.0597	3.500	-3.7000	3.5990	3.5990	-25.000	-25.000	2042.95374	2042.95374

 *** ORNL June 12,2000 Design BTW tank 3-4

Transport
 Bore 1 2.5
 :quad L, Ra, outputflag, B, errorflag
 quad 1.75 0 1 -37.e2 1
 drift 17.51675 1.5 1 4
 quad 1.75 0 1 0.e2 1
 :scheff deltaR, deltaZ, Nr, Nz, Nbunch, Nbetalambda, Remesh
 scheff .05 .05 20 40 0 0 3
 output 2 1 1 300 1
 prtbeam

*** ORNL June 12,2000 Design .DTL. Tank 4

linout subroutine no. 1 dynamical parameters

Transit time factors are for the synchronous or reference particles.

tank no. 1 tank length 641.304 (cm) 28 cells power= 1.929 MW frequency= 402.50MHz
 (Cu+Beam) wavelength= 74.48260 cm

cell number	kinetic energy (MeV)	beta at end of cell (cm)	cell length (cm)	tp (cm)	s (cm)	sp (cm)	quad length (cm)	quad gradient (kG/cm)	zero E (MV/m)	phi (MV/m)	PhiDesign (Deg)	TotalLeng (QuadCtr)(cm)	TotalLeng (cm)	toEndwall/ toNextBeginwall (cm)
initial	39.7889	0.28218			3.500	0.0000					(0.00000)	2063.97049		
Absolute z=0 position is at the entry to the tank. If the first quad is a full quad, it is at the center of the quad														
1	40.3487	0.28404	21.0824	0.8138	0.0549	0.4808	0.0598	3.500	3.7000	3.6000	3.6000	-25.000	-25.000	2085.05288
2	40.9117	0.28589	21.2205	0.8131	0.0551	0.4820	0.0599	3.500	3.7000	3.6000	3.6000	-25.000	-25.000	2106.27341
3	41.4778	0.28774	21.3582	0.8124	0.0553	0.4831	0.0600	3.500	0.0000	3.6000	3.6000	-25.001	-25.001	2127.63163
4	42.0471	0.28958	21.4958	0.8117	0.0555	0.4842	0.0602	3.500	-3.7000	3.6000	3.6000	-25.000	-25.000	2149.12745
5	42.6196	0.29142	21.6328	0.8110	0.0558	0.4853	0.0603	3.500	-3.7000	3.6000	3.6000	-25.000	-25.000	2170.76025
6	43.1950	0.29325	21.7695	0.8102	0.0560	0.4865	0.0604	3.500	0.0000	3.6000	3.6000	-25.000	-25.000	2192.52975
7	43.7736	0.29508	21.9058	0.8094	0.0562	0.4877	0.0605	3.500	3.7000	3.6000	3.6000	-25.000	-25.000	2214.43558
8	44.3551	0.29690	22.0418	0.8087	0.0565	0.4889	0.0606	3.500	3.7000	3.6000	3.6000	-25.000	-25.000	2236.47736
9	44.9397	0.29872	22.1774	0.8079	0.0567	0.4901	0.0607	3.500	0.0000	3.6000	3.6000	-25.000	-25.000	2258.65473
10	45.5273	0.30053	22.3126	0.8071	0.0569	0.4912	0.0608	3.500	-3.7000	3.6000	3.6000	-25.000	-25.000	2280.96730
11	46.1178	0.30234	22.4474	0.8063	0.0571	0.4924	0.0609	3.500	-3.7000	3.6000	3.6000	-25.000	-25.000	2303.41472
12	46.7113	0.30414	22.5819	0.8055	0.0574	0.4936	0.0610	3.500	0.0000	3.6000	3.6000	-25.000	-25.000	2325.99660
13	47.3078	0.30594	22.7160	0.8048	0.0576	0.4948	0.0611	3.500	3.7000	3.6000	3.6000	-25.000	-25.000	2348.71257
14	47.9071	0.30773	22.8497	0.8040	0.0578	0.4959	0.0612	3.500	3.7000	3.6000	3.6000	-25.000	-25.000	2371.56227
15	48.5095	0.30952	22.9830	0.8032	0.0580	0.4971	0.0613	3.500	0.0000	3.6000	3.6000	-25.000	-25.000	2394.54532
16	49.1146	0.31131	23.1160	0.8024	0.0583	0.4983	0.0614	3.500	-3.7000	3.6000	3.6000	-25.000	-25.000	2417.66134
17	49.7225	0.31308	23.2486	0.8013	0.0586	0.4997	0.0615	3.500	-3.7000	3.6000	3.6000	-25.000	-25.000	2440.90993
18	50.3330	0.31485	23.3807	0.8003	0.0589	0.5011	0.0616	3.500	0.0000	3.6000	3.6000	-25.000	-25.000	2464.29068
19	50.9461	0.31662	23.5125	0.7993	0.0592	0.5025	0.0617	3.500	3.7000	3.6000	3.6000	-25.000	-25.000	2487.80317
20	51.5619	0.31838	23.6438	0.7982	0.0595	0.5039	0.0618	3.500	3.7000	3.6000	3.6000	-25.000	-25.000	2511.44698
21	52.1803	0.32014	23.7747	0.7972	0.0598	0.5053	0.0619	3.500	0.0000	3.6000	3.6000	-25.000	-25.000	2535.22170
22	52.8012	0.32189	23.9052	0.7961	0.0601	0.5067	0.0620	3.500	-3.7000	3.6000	3.6000	-25.000	-25.000	2559.12691
23	53.4247	0.32363	24.0353	0.7950	0.0604	0.5082	0.0621	3.500	-3.7000	3.6000	3.6000	-25.000	-25.000	2583.16220
24	54.0507	0.32537	24.1649	0.7939	0.0607	0.5096	0.0622	3.500	0.0000	3.6000	3.6000	-25.000	-25.000	2607.32713
25	54.6791	0.32710	24.2942	0.7929	0.0610	0.5110	0.0623	3.500	3.7000	3.6000	3.6000	-25.000	-25.000	2631.62129
26	55.3101	0.32883	24.4230	0.7918	0.0613	0.5124	0.0624	3.500	3.7000	3.6000	3.6000	-25.000	-25.000	2656.04425
27	55.9434	0.33055	24.5513	0.7907	0.0616	0.5138	0.0625	3.500	0.0000	3.6000	3.6000	-25.000	-25.000	2680.59560
28	56.5792	0.33226	24.6793	0.7896	0.0619	0.5153	0.0626	3.500	-3.7000	3.6000	3.6000	-25.000	-25.000	2705.27491

*** ORNL June 12,2000 Design BTW tank 4-5

Transport

Bore 1 2.5

:quad L, Ra, outputflag, B, errorflag

quad 1.75 0 1 -37.e2 1

drift 21.24684 1.5 1 4

quad 1.75 0 1 -37.e2 1

:scheff deltaR, deltaZ, Nr, Nz, Nbunch, Nbetalambda, Remesh

scheff .05 .05 20 40 0 0 3

output 2 1 1 300 1

prtbeam

*** ORNL June 12,2000 Design .DTL. Tank 5

linout subroutine no. 1 dynamical parameters

Transit time factors are for the synchronous or reference particles.

tank no. 1 tank length 629.580 (cm) 24 cells power= 1.866 MW frequency= 402.50MHz
 (Cu+Beam) wavelength= 74.48260 cm

cell number	kinetic energy (MeV)	beta at end of cell (cm)	t (cm)	tp (cm)	s (cm)	sp (kG/cm)	quad length (cm)	quad gradient (MV/m)	Ezero (MV/m)	E (MV/m)	phis (Deg)	PhiDesign (QuadCtr)(cm)	TotalLeng (cm)	TotalLeng (cm)
initial	56.5792	0.33226					3.500	-3.7000	(	0.00000	)	2730.02175		
1	57.2174	0.33397	24.8068	0.7884	0.0623	0.5167	0.0627	3.500	0.0000	3.6000	3.6000	-25.000	-25.000	2754.82859
2	57.8579	0.33568	24.9339	0.7873	0.0626	0.5181	0.0628	3.500	3.7000	3.6000	3.6000	-25.000	-25.000	2779.76253
3	58.5007	0.33737	25.0606	0.7862	0.0629	0.5195	0.0629	3.500	3.7000	3.6000	3.6000	-25.000	-25.000	2804.82316
4	59.1458	0.33907	25.1869	0.7851	0.0632	0.5209	0.0629	3.500	0.0000	3.6000	3.6000	-25.000	-25.000	2830.01004
5	59.7933	0.34075	25.3127	0.7840	0.0635	0.5224	0.0630	3.500	-3.7000	3.6000	3.6000	-25.000	-25.000	2855.32275
6	60.4430	0.34243	25.4381	0.7828	0.0639	0.5238	0.0631	3.500	-3.7000	3.6000	3.6000	-25.000	-25.000	2880.76087
7	61.0949	0.34411	25.5631	0.7816	0.0642	0.5252	0.0632	3.500	0.0000	3.6000	3.6000	-25.000	-25.000	2906.32396
8	61.7490	0.34578	25.6876	0.7805	0.0645	0.5266	0.0633	3.500	3.7000	3.6000	3.6000	-25.000	-25.000	2932.01159
9	62.4053	0.34744	25.8117	0.7793	0.0648	0.5280	0.0634	3.500	3.7000	3.6000	3.6000	-25.000	-25.000	2957.82334
10	63.0638	0.34910	25.9354	0.7781	0.0652	0.5294	0.0634	3.500	0.0000	3.6000	3.6000	-25.000	-25.000	2983.75878
11	63.7244	0.35075	26.0587	0.7770	0.0655	0.5308	0.0635	3.500	-3.7000	3.6000	3.6000	-25.000	-25.000	3009.81747
12	64.3871	0.35240	26.1815	0.7758	0.0658	0.5323	0.0636	3.500	-3.7000	3.6000	3.6000	-25.000	-25.000	3035.99900
13	65.0519	0.35404	26.3039	0.7746	0.0662	0.5337	0.0637	3.500	0.0000	3.6000	3.6000	-25.000	-25.000	3062.30293
14	65.7187	0.35568	26.4259	0.7734	0.0665	0.5351	0.0637	3.500	3.7000	3.6000	3.6000	-25.000	-25.000	3088.72882

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15	66.3875	0.35730	26.5474	0.7722	0.0668	0.5365	0.0638	3.500	3.7000	3.6000	3.6000	-25.000	-25.000	3115.27626	3115.27626
16	67.0584	0.35893	26.6685	0.7710	0.0671	0.5379	0.0639	3.500	0.0000	3.6000	3.6000	-25.000	-25.000	3141.94480	3141.94480
17	67.7313	0.36055	26.7892	0.7698	0.0675	0.5393	0.0640	3.500	-3.7000	3.6000	3.6000	-25.000	-25.000	3168.73402	3168.73402
18	68.4061	0.36216	26.9095	0.7686	0.0678	0.5407	0.0640	3.500	-3.7000	3.6000	3.6000	-25.000	-25.000	3195.64350	3195.64350
19	69.0829	0.36376	27.0293	0.7674	0.0682	0.5421	0.0641	3.500	0.0000	3.6000	3.6000	-25.000	-25.000	3222.67279	3222.67279
20	69.7616	0.36536	27.1487	0.7662	0.0685	0.5435	0.0642	3.500	3.7000	3.6000	3.6000	-25.000	-25.000	3249.82148	3249.82148
21	70.4421	0.36696	27.2676	0.7650	0.0688	0.5449	0.0642	3.500	3.7000	3.6000	3.6000	-25.000	-25.000	3277.08912	3277.08912
22	71.1246	0.36855	27.3862	0.7638	0.0692	0.5463	0.0643	3.500	0.0000	3.6000	3.6000	-25.000	-25.000	3304.47530	3304.47530
23	71.8089	0.37013	27.5043	0.7625	0.0695	0.5476	0.0644	3.500	-3.7000	3.6000	3.6000	-25.000	-25.000	3331.97957	3331.97957
24	72.4950	0.37171	27.6220	0.7613	0.0698	0.5490	0.0644	3.500	-3.7000	3.6000	3.6000	-25.000	-25.000	3359.60152	3359.60152

*** ORNL June 12,2000 Design BTW tank 5-6

```
Transport
Bore 1 2.5
;quad L, Ra, outputflag, B, errorflag
quad 1.75 0 1 -37.e2 1
drift 24.18518 1.5 1 4
quad 1.75 0 1 0.e+2 1
;scheff deltaZ, Nr, Nz, Nbunch, Nbetalambda, Remesh
scheff .05 .05 20 40 0 0 3
output 2 1 1 300 1
prtbeam
```

*** ORNL June 12,2000 Design .DTL. Tank 6

linout subroutine no. 1 dynamical parameters

Transit time factors are for the synchronous or reference particles.

tank no. 1 tank length 633.793 (cm) 22 cells power= 1.875 MW frequency= 402.50MHz
 (Cu+Beam) wavelength= 74.48260 cm

cell number	kinetic energy (MeV)	beta at end of cell (cm)	t (tp) (cm)	s (sp) (cm)	quad length (cm)	quad gradient (kG/cm)	Ezero (MV/m)	E (MV/m)	phis (Deg)	PhiDesign (QuadCtr)(cm)	TotalLeng (cm)	toEndwall/ toNextBeginwall (cm)			
Absolute z=0 position is at the entry to the tank. If the first quad is a full quad, it is at the center of the quad															
initial	72.4950	0.37171			3.500	0.0000	(	0.00000)	3387.28670						
1	73.1829	0.37328	27.7392	0.7601	0.0702	0.5504	0.0645	3.500	3.7000	3.6000	3.6000	-25.000	-25.000	3415.02590	3415.02590
2	73.8724	0.37484	27.7824	0.7619	0.0702	0.5499	0.0654	3.500	3.7000	3.6080	3.6080	-25.952	-25.952	3442.80835	3442.80835
3	74.5595	0.37639	27.8980	0.7607	0.0705	0.5512	0.0654	3.500	0.0000	3.6160	3.6160	-26.905	-26.905	3470.70631	3470.70631

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4	75.2442	0.37793	28.0124	0.7595	0.0709	0.5526	0.0655	3.500	-3.7000	3.6241	3.6241	-27.857	-27.857	3498.71868	3498.71868
5	75.9260	0.37945	28.1256	0.7583	0.0712	0.5539	0.0655	3.500	-3.7000	3.6321	3.6321	-28.810	-28.810	3526.84430	3526.84430
6	76.6047	0.38095	28.2377	0.7571	0.0716	0.5552	0.0656	3.500	0.0000	3.6403	3.6403	-29.762	-29.762	3555.08201	3555.08201
7	77.2801	0.38244	28.3486	0.7558	0.0719	0.5565	0.0656	3.500	3.7000	3.6484	3.6484	-30.714	-30.714	3583.43062	3583.43062
8	77.9518	0.38391	28.4583	0.7546	0.0722	0.5579	0.0657	3.500	3.7000	3.6566	3.6566	-31.667	-31.667	3611.88890	3611.88890
9	78.6197	0.38536	28.5667	0.7534	0.0725	0.5592	0.0657	3.500	0.0000	3.6648	3.6648	-32.619	-32.619	3640.45560	3640.45560
10	79.2834	0.38680	28.6739	0.7522	0.0729	0.5604	0.0658	3.500	-3.7000	3.6730	3.6730	-33.571	-33.571	3669.12946	3669.12946
11	79.9427	0.38822	28.7797	0.7510	0.0732	0.5617	0.0658	3.500	-3.7000	3.6813	3.6813	-34.524	-34.524	3697.90918	3697.90918
12	80.5973	0.38962	28.8843	0.7499	0.0735	0.5629	0.0659	3.500	0.0000	3.6896	3.6896	-35.476	-35.476	3726.79343	3726.79343
13	81.2470	0.39100	28.9875	0.7487	0.0738	0.5642	0.0659	3.500	3.7000	3.6980	3.6980	-36.429	-36.429	3755.78090	3755.78090
14	81.8915	0.39237	29.0893	0.7475	0.0742	0.5654	0.0659	3.500	3.7000	3.7063	3.7063	-37.381	-37.381	3784.87020	3784.87020
15	82.5304	0.39371	29.1898	0.7464	0.0745	0.5666	0.0660	3.500	0.0000	3.7147	3.7147	-38.333	-38.333	3814.05996	3814.05996
16	83.1636	0.39504	29.2888	0.7452	0.0748	0.5678	0.0660	3.500	-3.7000	3.7231	3.7231	-39.286	-39.286	3843.34876	3843.34876
17	83.7909	0.39635	29.3864	0.7441	0.0751	0.5690	0.0660	3.500	-3.7000	3.7316	3.7316	-40.238	-40.238	3872.73518	3872.73518
18	84.4118	0.39764	29.4826	0.7429	0.0754	0.5702	0.0661	3.500	0.0000	3.7401	3.7401	-41.190	-41.190	3902.21777	3902.21777
19	85.0262	0.39890	29.5773	0.7418	0.0757	0.5713	0.0661	3.500	3.7000	3.7486	3.7486	-42.143	-42.143	3931.79506	3931.79506
20	85.6338	0.40015	29.6705	0.7407	0.0760	0.5724	0.0661	3.500	3.7000	3.7571	3.7571	-43.095	-43.095	3961.46555	3961.46555
21	86.2344	0.40138	29.7622	0.7397	0.0763	0.5736	0.0661	3.500	0.0000	3.7657	3.7657	-44.048	-44.048	3991.22776	3991.22776
22	86.8277	0.40258	29.8524	0.7386	0.0766	0.5747	0.0662	3.500	0.0000	3.7742	3.7742	-45.000	-45.000	4021.08014	4021.08014

 *** ORNL June 12,2000 Design BTW tank 6-CCL

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Transport
Bore 1 2.5
;quad L, Ra, outputflag, B, errorflag
drift 0. 1.25 1 4
drift 2.4626 1.25 1 4
drift 8.53 1.25 1 4
quad 4.0 0 1 -29.131445e2 1
quad 4.0 0 1 -29.131445e2 1
drift 5.3265 1.25 1 4
;scfeff deltaR, deltaZ, Nr, Nz, Nbunch, Nbetalambda, Remesh
scfeff .05 .05 20 40 0 0 3
output 2 1 1 3000 1
prtbeam

```

 *** ORNL June 12,2000 Design .CCL1a. ***

linout subroutine no. 1 dynamical parameters

Transit time factors are for the synchronous or reference particles.
 If you are designing symmetric linac, the phase printed is REFERENCE Particle phase at the center of the gap.

Also, the kinetic energy and beta are for the REFERENCE particle at the end of the cell.
 The geometrical beta for the cavities are printed in the WALLPWR file (with Power keyword).

E is the field for the cell(used as E*t*I*coshphi). It includes the ratio E/E0 for that cell.

tank no. 1 tank length 3312.822 (cm) 244 cells power= 10.094 MW frequency= 805.00MHz
 (Cu+Beam) wavelength= 37.24130 cm

cell number	kinetic energy (MeV)	beta at end of cell (cm)	cell length (cm)	t (sp)	tp	s	quad	quad	Ezero (kG/cm)	E (MV/m)	phis (Deg)	PhiDesign (Deg)	TotalLeng (QuadCtr)cm)	TotalLeng (cm)	toEndwall/ toNextBeginwall
Absolute z= 4045.39924 (cm) position is at the starting face of the first cavity.															
initial	86.8277	0.40258							0.000	0.0000	(0.00000)	4045.39924			
1	87.0022	0.40294	7.5224	0.8838	0.0345	0.3607	0.0477	0.000	0.0000	3.0600	3.0600	-30.915	-30.000	4052.92164	
2	87.1793	0.40330	7.5224	0.8894	0.0332	0.3570	0.0481	0.000	0.0000	3.0600	3.0600	-30.061	-30.000	4060.44403	
3	87.3570	0.40365	7.5224	0.8894	0.0332	0.3570	0.0481	0.000	0.0000	3.0600	3.0600	-29.748	-30.000	4067.96643	
4	87.5350	0.40401	7.5224	0.8894	0.0332	0.3570	0.0481	0.000	0.0000	3.0600	3.0600	-29.595	-30.000	4075.48883	
5	87.7130	0.40437	7.5224	0.8894	0.0332	0.3570	0.0481	0.000	0.0000	3.0600	3.0600	-29.603	-30.000	4083.01123	
6	87.8907	0.40473	7.5224	0.8894	0.0332	0.3570	0.0481	0.000	0.0000	3.0600	3.0600	-29.771	-30.000	4090.53363	
7	88.0679	0.40509	7.5224	0.8894	0.0332	0.3570	0.0481	0.000	0.0000	3.0600	3.0600	-30.097	-30.000	4098.05603	
8	88.2437	0.40544	7.5224	0.8838	0.0345	0.3607	0.0477	0.000	0.0000	3.0600	3.0600	-30.211	-30.000	4105.57843	
														4143.32765	
9	88.4247	0.40580	7.5762	0.8843	0.0343	0.3602	0.0477	0.000	0.0000	3.1487	3.1488	-30.913	-30.000	4150.90389	
10	88.6083	0.40617	7.5762	0.8897	0.0331	0.3566	0.0480	0.000	0.0000	3.1487	3.1488	-30.062	-30.000	4158.48014	
11	88.7925	0.40654	7.5762	0.8897	0.0331	0.3566	0.0480	0.000	0.0000	3.1487	3.1488	-29.743	-30.000	4166.05638	
12	88.9771	0.40691	7.5762	0.8897	0.0331	0.3566	0.0480	0.000	0.0000	3.1487	3.1488	-29.588	-30.000	4173.63262	
13	89.1617	0.40727	7.5762	0.8897	0.0331	0.3566	0.0480	0.000	0.0000	3.1487	3.1488	-29.596	-30.000	4181.20886	
14	89.3459	0.40764	7.5762	0.8897	0.0331	0.3566	0.0480	0.000	0.0000	3.1487	3.1488	-29.766	-30.000	4188.78510	
15	89.5296	0.40801	7.5762	0.8897	0.0331	0.3566	0.0480	0.000	0.0000	3.1487	3.1488	-30.099	-30.000	4196.36134	
16	89.7119	0.40837	7.5762	0.8843	0.0343	0.3602	0.0477	0.000	0.0000	3.1487	3.1488	-30.232	-30.000	4203.93758	
														4241.95948	
17	89.7119	0.40837	38.0219	0.0000	0.0000	0.0000	0.0000	8.000	-2.8755	0.0000	0.000	(4222.26672)	4241.95948		
18	89.8994	0.40874	7.6314	0.8849	0.0342	0.3596	0.0476	0.000	0.0000	3.2375	3.2375	-30.911	-30.000	4249.59089	
19	90.0897	0.40912	7.6314	0.8901	0.0330	0.3561	0.0480	0.000	0.0000	3.2375	3.2375	-30.063	-30.000	4257.22230	
20	90.2806	0.40949	7.6314	0.8901	0.0330	0.3561	0.0480	0.000	0.0000	3.2375	3.2375	-29.739	-30.000	4264.85371	
														4264.85371	
														4272.48512	

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21	90.6631	0.41025	7.6314	0.8901	0.0330	0.3561	0.0480	0.000	0.0000	3.2375	3.2375	-29.589	-30.000	4280.11653	4280.11653
22	90.8540	0.41062	7.6314	0.8901	0.0330	0.3561	0.0480	0.000	0.0000	3.2375	3.2375	-29.763	-30.000	4287.74794	4287.74794
23	91.0443	0.41100	7.6314	0.8901	0.0330	0.3561	0.0480	0.000	0.0000	3.2375	3.2375	-30.100	-30.000	4295.37935	4295.37935
24	91.2332	0.41137	7.6314	0.8849	0.0342	0.3596	0.0476	0.000	0.0000	3.2375	3.2375	-30.253	-30.000	4303.01076	4341.31193
	91.2332	0.41137	38.3012	0.0000	0.0000	0.0000	0.0000	8.000	2.8582	0.0000	0.000	(-4318.21740)	4341.31193		
25	91.4274	0.41175	7.6879	0.8854	0.0341	0.3592	0.0476	0.000	0.0000	3.3262	3.3263	-30.908	-30.000	4348.99982	4348.99982
26	91.6244	0.41213	7.6879	0.8904	0.0329	0.3558	0.0480	0.000	0.0000	3.3262	3.3263	-30.064	-30.000	4356.68771	4356.68771
27	91.8221	0.41252	7.6879	0.8904	0.0329	0.3558	0.0480	0.000	0.0000	3.3262	3.3263	-29.735	-30.000	4364.37560	4364.37560
28	92.0201	0.41290	7.6879	0.8904	0.0329	0.3558	0.0480	0.000	0.0000	3.3262	3.3263	-29.575	-30.000	4372.06349	4372.06349
29	92.2181	0.41329	7.6879	0.8904	0.0329	0.3558	0.0480	0.000	0.0000	3.3262	3.3263	-29.583	-30.000	4379.75138	4379.75138
30	92.4158	0.41367	7.6879	0.8904	0.0329	0.3558	0.0480	0.000	0.0000	3.3262	3.3263	-29.759	-30.000	4387.43927	4387.43927
31	92.6129	0.41406	7.6879	0.8904	0.0329	0.3558	0.0480	0.000	0.0000	3.3262	3.3263	-30.102	-30.000	4395.12716	4395.12716
32	92.8084	0.41444	7.6879	0.8854	0.0341	0.3592	0.0476	0.000	0.0000	3.3262	3.3263	-30.274	-30.000	4402.81504	4441.40198
	92.8084	0.41444	38.5869	0.0000	0.0000	0.0000	0.0000	8.000	-2.6637	0.0000	0.000	(-4416.08936)	4441.40198		
33	93.0094	0.41482	7.7457	0.8859	0.0339	0.3587	0.0476	0.000	0.0000	3.4150	3.4150	-30.906	-30.000	4449.14763	4449.14763
34	93.2133	0.41522	7.7457	0.8908	0.0328	0.3555	0.0480	0.000	0.0000	3.4150	3.4150	-30.065	-30.000	4456.89328	4456.89328
35	93.4178	0.41561	7.7457	0.8908	0.0328	0.3555	0.0480	0.000	0.0000	3.4150	3.4150	-29.731	-30.000	4464.63894	4464.63894
36	93.6228	0.41601	7.7457	0.8908	0.0328	0.3555	0.0480	0.000	0.0000	3.4150	3.4150	-29.569	-30.000	4472.38459	4472.38459
37	93.8277	0.41640	7.7457	0.8908	0.0328	0.3555	0.0480	0.000	0.0000	3.4150	3.4150	-29.577	-30.000	4480.13025	4480.13025
38	94.0323	0.41679	7.7457	0.8908	0.0328	0.3555	0.0480	0.000	0.0000	3.4150	3.4150	-29.755	-30.000	4487.87590	4487.87590
39	94.2362	0.41718	7.7457	0.8908	0.0328	0.3555	0.0480	0.000	0.0000	3.4150	3.4150	-30.103	-30.000	4495.62156	4495.62156
40	94.4386	0.41757	7.7457	0.8859	0.0339	0.3587	0.0476	0.000	0.0000	3.4150	3.4150	-30.293	-30.000	4503.36721	4542.24628
	94.4386	0.41757	38.8791	0.0000	0.0000	0.0000	0.0000	8.000	2.6377	0.0000	0.000	(-4515.89720)	4542.24628		
41	94.6464	0.41797	7.8047	0.8864	0.0338	0.3582	0.0476	0.000	0.0000	3.5037	3.5038	-30.903	-30.000	4550.05097	4550.05097
42	94.8573	0.41837	7.8047	0.8911	0.0327	0.3551	0.0480	0.000	0.0000	3.5037	3.5038	-30.066	-30.000	4557.85566	4557.85566
43	95.0688	0.41877	7.8047	0.8911	0.0327	0.3551	0.0480	0.000	0.0000	3.5037	3.5038	-29.728	-30.000	4565.66034	4565.66034
44	95.2808	0.41918	7.8047	0.8911	0.0327	0.3551	0.0480	0.000	0.0000	3.5037	3.5038	-29.563	-30.000	4573.46503	4573.46503
45	95.4927	0.41958	7.8047	0.8911	0.0327	0.3551	0.0480	0.000	0.0000	3.5037	3.5038	-29.571	-30.000	4581.26972	4581.26972
46	95.7043	0.41998	7.8047	0.8911	0.0327	0.3551	0.0480	0.000	0.0000	3.5037	3.5038	-29.752	-30.000	4589.07440	4589.07440
47	95.9152	0.42038	7.8047	0.8911	0.0327	0.3551	0.0480	0.000	0.0000	3.5037	3.5038	-30.105	-30.000	4596.87909	4596.87909
48	96.1245	0.42078	7.8047	0.8864	0.0338	0.3582	0.0476	0.000	0.0000	3.5037	3.5038	-30.313	-30.000	4604.68378	4643.86127
	96.1245	0.42078	39.1775	0.0000	0.0000	0.0000	0.0000	8.000	-2.6111	0.0000	0.000	(-4617.65542)	4643.86127		
49	96.3394	0.42118	7.8650	0.8869	0.0337	0.3578	0.0477	0.000	0.0000	3.5925	3.5925	-30.900	-30.000	4651.72623	4651.72623
50	96.5573	0.42159	7.8650	0.8915	0.0326	0.3548	0.0480	0.000	0.0000	3.5925	3.5925	-30.067	-30.000	4659.59120	4659.59120
51	96.7760	0.42200	7.8650	0.8915	0.0326	0.3548	0.0480	0.000	0.0000	3.5925	3.5925	-29.724	-30.000	4667.45616	4667.45616
52	96.9951	0.42242	7.8650	0.8915	0.0326	0.3548	0.0480	0.000	0.0000	3.5925	3.5925	-29.557	-30.000	4675.32113	4675.32113
53	97.2142	0.42283	7.8650	0.8915	0.0326	0.3548	0.0480	0.000	0.0000	3.5925	3.5925	-29.566	-30.000	4683.18609	4683.18609
54	97.4329	0.42324	7.8650	0.8915	0.0326	0.3548	0.0480	0.000	0.0000	3.5925	3.5925	-29.749	-30.000	4691.05105	4691.05105
55	97.6509	0.42364	7.8650	0.8915	0.0326	0.3548	0.0480	0.000	0.0000	3.5925	3.5925	-30.106	-30.000	4698.91602	4698.91602
56	97.8672	0.42405	7.8650	0.8869	0.0337	0.3578	0.0477	0.000	0.0000	3.5925	3.5925	-30.331	-30.000	4706.78098	4746.26307
	97.8672	0.42405	39.4821	0.0000	0.0000	0.0000	0.0000	8.000	2.5840	0.0000	0.000	(-4719.75262)	4746.26307		
57	98.0893	0.42446	7.9265	0.8873	0.0336	0.3575	0.0477	0.000	0.0000	3.6812	3.6812	-30.897	-30.000	4754.18953	4754.18953
58	98.3144	0.42488	7.9265	0.8918	0.0325	0.3545	0.0480	0.000	0.0000	3.6812	3.6812	-30.068	-30.000	4762.11599	4762.11599
59	98.5403	0.42530	7.9265	0.8918	0.0325	0.3545	0.0480	0.000	0.0000	3.6812	3.6812	-29.721	-30.000	4770.04245	4770.04245
60	98.7667	0.42572	7.9265	0.8918	0.0325	0.3545	0.0480	0.000	0.0000	3.6812	3.6812	-29.552	-30.000	4777.96892	4777.96892
61	98.9930	0.42614	7.9265	0.8918	0.0325	0.3545	0.0480	0.000	0.0000	3.6812	3.6812	-29.560	-30.000	4785.89538	4785.89538

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62	99.2190	0.42656	7.9265	0.8918	0.0325	0.3545	0.0480	0.000	0.0000	3.6812	3.6812	-29.746	-30.000	4793.82184	4793.82184
63	99.4441	0.42697	7.9265	0.8918	0.0325	0.3545	0.0480	0.000	0.0000	3.6812	3.6812	-30.108	-30.000	4801.74831	4801.74831
64	99.6676	0.42738	7.9265	0.8873	0.0336	0.3575	0.0477	0.000	0.0000	3.6812	3.6813	-30.348	-30.000	4809.67477	4849.46749
	99.6676	0.42738	39.7927	0.0000	0.0000	0.0000	0.0000	8.000	-2.5564	0.0000	0.000	(4822.64641)	4849.46749		
65	99.8970	0.42780	7.9892	0.8878	0.0334	0.3571	0.0477	0.000	0.0000	3.7700	3.7700	-30.894	-30.000	4857.45665	4857.45665
66	100.1295	0.42823	7.9892	0.8921	0.0325	0.3542	0.0480	0.000	0.0000	3.7700	3.7700	-30.069	-30.000	4865.44581	4865.44581
67	100.3628	0.42866	7.9892	0.8921	0.0325	0.3542	0.0480	0.000	0.0000	3.7700	3.7700	-29.718	-30.000	4873.43497	4873.43497
68	100.5965	0.42909	7.9892	0.8921	0.0325	0.3542	0.0480	0.000	0.0000	3.7700	3.7700	-29.547	-30.000	4881.42413	4881.42413
69	100.8302	0.42951	7.9892	0.8921	0.0325	0.3542	0.0480	0.000	0.0000	3.7700	3.7700	-29.556	-30.000	4889.41329	4889.41329
70	101.0635	0.42994	7.9892	0.8921	0.0325	0.3542	0.0480	0.000	0.0000	3.7700	3.7700	-29.743	-30.000	4897.40246	4897.40246
71	101.2960	0.43036	7.9892	0.8921	0.0325	0.3542	0.0480	0.000	0.0000	3.7700	3.7700	-30.109	-30.000	4905.39162	4905.39162
72	101.5268	0.43078	7.9892	0.8878	0.0334	0.3571	0.0477	0.000	0.0000	3.7700	3.7700	-30.365	-30.000	4913.38078	4953.49102
	101.5268	0.43078	40.1102	0.0000	0.0000	0.0000	0.0000	8.000	2.5282	0.0000	0.000	(4926.35242)	4953.49102		
73	101.7583	0.43120	8.0523	0.8882	0.0333	0.3568	0.0477	0.000	0.0000	3.7720	3.7720	-30.877	-30.000	4961.54334	4961.54334
74	101.9928	0.43163	8.0523	0.8924	0.0324	0.3540	0.0480	0.000	0.0000	3.7720	3.7720	-30.068	-30.000	4969.59567	4969.59567
75	102.2281	0.43205	8.0523	0.8924	0.0324	0.3540	0.0480	0.000	0.0000	3.7720	3.7720	-29.721	-30.000	4977.64800	4977.64800
76	102.4639	0.43248	8.0523	0.8924	0.0324	0.3540	0.0480	0.000	0.0000	3.7720	3.7720	-29.553	-30.000	4985.70032	4985.70032
77	102.6996	0.43290	8.0523	0.8924	0.0324	0.3540	0.0480	0.000	0.0000	3.7720	3.7720	-29.561	-30.000	4993.75265	4993.75265
78	102.9350	0.43333	8.0523	0.8924	0.0324	0.3540	0.0480	0.000	0.0000	3.7720	3.7720	-29.747	-30.000	5001.80497	5001.80497
79	103.1695	0.43375	8.0523	0.8924	0.0324	0.3540	0.0480	0.000	0.0000	3.7720	3.7720	-30.108	-30.000	5009.85730	5009.85730
80	103.4024	0.43417	8.0523	0.8882	0.0333	0.3568	0.0477	0.000	0.0000	3.7720	3.7720	-30.366	-30.000	5017.90962	5058.33496
	103.4024	0.43417	40.4253	0.0000	0.0000	0.0000	0.0000	8.000	-2.5002	0.0000	0.000	(5030.88126)	5058.33496		
81	103.6358	0.43458	8.1152	0.8886	0.0332	0.3565	0.0477	0.000	0.0000	3.7720	3.7720	-30.860	-30.000	5066.45015	5066.45015
82	103.8722	0.43501	8.1152	0.8926	0.0323	0.3538	0.0480	0.000	0.0000	3.7720	3.7720	-30.067	-30.000	5074.56534	5074.56534
83	104.1094	0.43543	8.1152	0.8926	0.0323	0.3538	0.0480	0.000	0.0000	3.7720	3.7720	-29.725	-30.000	5082.68052	5082.68052
84	104.3470	0.43585	8.1152	0.8926	0.0323	0.3538	0.0480	0.000	0.0000	3.7720	3.7720	-29.558	-30.000	5090.79571	5090.79571
85	104.5847	0.43628	8.1152	0.8926	0.0323	0.3538	0.0480	0.000	0.0000	3.7720	3.7720	-29.567	-30.000	5098.91090	5098.91090
86	104.8220	0.43670	8.1152	0.8926	0.0323	0.3538	0.0480	0.000	0.0000	3.7720	3.7720	-29.750	-30.000	5107.02609	5107.02609
87	105.0584	0.43712	8.1152	0.8926	0.0323	0.3538	0.0480	0.000	0.0000	3.7720	3.7720	-30.106	-30.000	5115.14128	5115.14128
88	105.2932	0.43753	8.1152	0.8886	0.0332	0.3565	0.0477	0.000	0.0000	3.7720	3.7720	-30.367	-30.000	5123.25647	5163.99527
	105.2932	0.43753	40.7388	0.0000	0.0000	0.0000	0.0000	8.000	2.4723	0.0000	0.000	(5136.22811)	5163.99527		
89	105.5285	0.43795	8.1777	0.8890	0.0331	0.3562	0.0477	0.000	0.0000	3.7720	3.7720	-30.844	-30.000	5172.17301	5172.17301
90	105.7668	0.43837	8.1777	0.8929	0.0322	0.3536	0.0480	0.000	0.0000	3.7720	3.7720	-30.066	-30.000	5180.35074	5180.35074
91	106.0059	0.43879	8.1777	0.8929	0.0322	0.3536	0.0480	0.000	0.0000	3.7720	3.7720	-29.728	-30.000	5188.52847	5188.52847
92	106.2455	0.43921	8.1777	0.8929	0.0322	0.3536	0.0480	0.000	0.0000	3.7720	3.7720	-29.564	-30.000	5196.70620	5196.70620
93	106.4850	0.43963	8.1777	0.8929	0.0322	0.3536	0.0480	0.000	0.0000	3.7720	3.7720	-29.572	-30.000	5204.88393	5204.88393
94	106.7242	0.44005	8.1777	0.8929	0.0322	0.3536	0.0480	0.000	0.0000	3.7720	3.7720	-29.753	-30.000	5213.06166	5213.06166
95	106.9625	0.44047	8.1777	0.8929	0.0322	0.3536	0.0480	0.000	0.0000	3.7720	3.7720	-30.105	-30.000	5221.23940	5221.23940
96	107.1992	0.44088	8.1777	0.8890	0.0331	0.3562	0.0477	0.000	0.0000	3.7720	3.7720	-30.368	-30.000	5229.41713	5270.46781
	107.1992	0.44088	41.0507	0.0000	0.0000	0.0000	0.0000	8.000	-2.4445	0.0000	0.000	(5242.38877)	5270.46781		
97	107.4365	0.44130	8.2400	0.8894	0.0330	0.3560	0.0477	0.000	0.0000	3.7720	3.7720	-30.828	-30.000	5278.70776	5278.70776
98	107.6767	0.44172	8.2400	0.8931	0.0322	0.3535	0.0480	0.000	0.0000	3.7720	3.7720	-30.065	-30.000	5286.94772	5286.94772
99	107.9177	0.44214	8.2400	0.8931	0.0322	0.3535	0.0480	0.000	0.0000	3.7720	3.7720	-29.732	-30.000	5295.18767	5295.18767
100	108.1591	0.44255	8.2400	0.8931	0.0322	0.3535	0.0480	0.000	0.0000	3.7720	3.7720	-29.570	-30.000	5303.42762	5303.42762
101	108.4005	0.44297	8.2400	0.8931	0.0322	0.3535	0.0480	0.000	0.0000	3.7720	3.7720	-29.578	-30.000	5311.66758	5311.66758
102	108.6415	0.44339	8.2400	0.8931	0.0322	0.3535	0.0480	0.000	0.0000	3.7720	3.7720	-29.756	-30.000	5319.90753	5319.90753

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103	108.8817	0.44381	8.2400	0.8931	0.0322	0.3535	0.0480	0.000	0.0000	3.7720	3.7720	-30.104	-30.000	5328.14748	5328.14748
104	109.1203	0.44422	8.2400	0.8894	0.0330	0.3560	0.0477	0.000	0.0000	3.7720	3.7720	-30.368	-30.000	5336.38744	5377.74838
	109.1203	0.44422	41.3609	0.0000	0.0000	0.0000	0.0000	8.000	2.4169	0.0000	0.000	(5349.35908)	5377.74838		
105	109.3595	0.44463	8.3019	0.8897	0.0330	0.3558	0.0478	0.000	0.0000	3.7720	3.7720	-30.813	-30.000	5386.05023	5386.05023
106	109.6015	0.44504	8.3019	0.8934	0.0321	0.3534	0.0480	0.000	0.0000	3.7720	3.7720	-30.065	-30.000	5394.35208	5394.35208
107	109.8444	0.44546	8.3019	0.8934	0.0321	0.3534	0.0480	0.000	0.0000	3.7720	3.7720	-29.735	-30.000	5402.65393	5402.65393
108	110.0877	0.44588	8.3019	0.8934	0.0321	0.3534	0.0480	0.000	0.0000	3.7720	3.7720	-29.575	-30.000	5410.95579	5410.95579
109	110.3310	0.44629	8.3019	0.8934	0.0321	0.3534	0.0480	0.000	0.0000	3.7720	3.7720	-29.583	-30.000	5419.25764	5419.25764
110	110.5738	0.44671	8.3019	0.8934	0.0321	0.3534	0.0480	0.000	0.0000	3.7720	3.7720	-29.759	-30.000	5427.55949	5427.55949
111	110.8159	0.44712	8.3019	0.8934	0.0321	0.3534	0.0480	0.000	0.0000	3.7720	3.7720	-30.102	-30.000	5435.86134	5435.86134
112	111.0564	0.44753	8.3019	0.8897	0.0330	0.3558	0.0478	0.000	0.0000	3.7720	3.7720	-30.367	-30.000	5444.16319	5485.83277
	111.0564	0.44753	41.6696	0.0000	0.0000	0.0000	0.0000	8.000	-2.3894	0.0000	0.000	(5457.13483)	5485.83277		
113	111.2975	0.44794	8.3634	0.8900	0.0329	0.3556	0.0478	0.000	0.0000	3.7720	3.7720	-30.798	-30.000	5494.19620	5494.19620
114	111.5414	0.44836	8.3634	0.8936	0.0321	0.3532	0.0480	0.000	0.0000	3.7720	3.7720	-30.064	-30.000	5502.55962	5502.55962
115	111.7861	0.44877	8.3634	0.8936	0.0321	0.3532	0.0480	0.000	0.0000	3.7720	3.7720	-29.739	-30.000	5510.92305	5510.92305
116	112.0312	0.44918	8.3634	0.8936	0.0321	0.3532	0.0480	0.000	0.0000	3.7720	3.7720	-29.581	-30.000	5519.28647	5519.28647
117	112.2763	0.44960	8.3634	0.8936	0.0321	0.3532	0.0480	0.000	0.0000	3.7720	3.7720	-29.589	-30.000	5527.64990	5527.64990
118	112.5211	0.45001	8.3634	0.8936	0.0321	0.3532	0.0480	0.000	0.0000	3.7720	3.7720	-29.762	-30.000	5536.01332	5536.01332
119	112.7650	0.45042	8.3634	0.8936	0.0321	0.3532	0.0480	0.000	0.0000	3.7720	3.7720	-30.101	-30.000	5544.37674	5544.37674
120	113.0073	0.45083	8.3634	0.8900	0.0329	0.3556	0.0478	0.000	0.0000	3.7720	3.7720	-30.367	-30.000	5552.74017	5594.71676
	113.0073	0.45083	41.9766	0.0000	0.0000	0.0000	0.0000	8.000	2.3621	0.0000	0.000	(5565.71181)	5594.71676		
121	113.2503	0.45124	8.4247	0.8903	0.0328	0.3555	0.0478	0.000	0.0000	3.7720	3.7720	-30.784	-30.000	5603.14143	5603.14143
122	113.4960	0.45165	8.4247	0.8938	0.0320	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-30.063	-30.000	5611.56611	5611.56611
123	113.7426	0.45206	8.4247	0.8938	0.0320	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-29.742	-30.000	5619.99078	5619.99078
124	113.9896	0.45247	8.4247	0.8938	0.0320	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-29.586	-30.000	5628.41545	5628.41545
125	114.2365	0.45289	8.4247	0.8938	0.0320	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-29.594	-30.000	5636.84012	5636.84012
126	114.4831	0.45330	8.4247	0.8938	0.0320	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-29.765	-30.000	5645.26479	5645.26479
127	114.7289	0.45370	8.4247	0.8938	0.0320	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-30.100	-30.000	5653.68946	5653.68946
128	114.9730	0.45411	8.4247	0.8903	0.0328	0.3555	0.0478	0.000	0.0000	3.7720	3.7720	-30.367	-30.000	5662.11414	5704.39611
	114.9730	0.45411	42.2820	0.0000	0.0000	0.0000	0.0000	8.000	-2.3349	0.0000	0.000	(5675.08578)	5704.39611		
129	115.2179	0.45452	8.4856	0.8906	0.0327	0.3554	0.0478	0.000	0.0000	3.7720	3.7720	-30.770	-30.000	5712.88170	5712.88170
130	115.4654	0.45492	8.4856	0.8939	0.0320	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-30.062	-30.000	5721.36729	5721.36729
131	115.7138	0.45533	8.4856	0.8939	0.0320	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-29.745	-30.000	5729.85288	5729.85288
132	115.9626	0.45575	8.4856	0.8939	0.0320	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-29.591	-30.000	5738.33847	5738.33847
133	116.2114	0.45615	8.4856	0.8939	0.0320	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-29.599	-30.000	5746.82406	5746.82406
134	116.4598	0.45656	8.4856	0.8939	0.0320	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-29.768	-30.000	5755.30965	5755.30965
135	116.7074	0.45697	8.4856	0.8939	0.0320	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-30.098	-30.000	5763.79524	5763.79524
136	116.9534	0.45737	8.4856	0.8906	0.0327	0.3554	0.0478	0.000	0.0000	3.7720	3.7720	-30.366	-30.000	5772.28083	5814.86653
	116.9534	0.45737	42.5857	0.0000	0.0000	0.0000	0.0000	8.000	2.3079	0.0000	0.000	(5785.25247)	5814.86653		
137	117.2001	0.45778	8.5462	0.8908	0.0327	0.3553	0.0479	0.000	0.0000	3.7720	3.7720	-30.756	-30.000	5823.41270	5823.41270
138	117.4494	0.45818	8.5462	0.8941	0.0319	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-30.062	-30.000	5831.95888	5831.95888
139	117.6996	0.45859	8.5462	0.8941	0.0319	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-29.749	-30.000	5840.50506	5840.50506
140	117.9502	0.45900	8.5462	0.8941	0.0319	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-29.596	-30.000	5849.05124	5849.05124
141	118.2008	0.45941	8.5462	0.8941	0.0319	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-29.604	-30.000	5857.59742	5857.59742
142	118.4510	0.45981	8.5462	0.8941	0.0319	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-29.771	-30.000	5866.14360	5866.14360
143	118.7004	0.46022	8.5462	0.8941	0.0319	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-30.097	-30.000	5874.68978	5874.68978

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144	118.9483	0.46062	8.5462	0.8908	0.0327	0.3553	0.0479	0.000	0.0000	3.7720	3.7720	-30.365	-30.000	5883.23596	5926.12374
	118.9483	0.46062	42.8878	0.0000	0.0000	0.0000	0.0000	8.000	-2.2810	0.0000	0.000	(-5896.20760)	5926.12374		
145	119.1968	0.46102	8.6064	0.8911	0.0326	0.3553	0.0479	0.000	0.0000	3.7720	3.7720	-30.743	-30.000	5934.73018	5934.73018
146	119.4480	0.46142	8.6064	0.8942	0.0319	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-30.061	-30.000	5943.33662	5943.33662
147	119.7000	0.46183	8.6064	0.8942	0.0319	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-29.752	-30.000	5951.94306	5951.94306
148	119.9524	0.46223	8.6064	0.8942	0.0319	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-29.601	-30.000	5960.54950	5960.54950
149	120.2047	0.46264	8.6064	0.8942	0.0319	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-29.609	-30.000	5969.15594	5969.15594
150	120.4567	0.46304	8.6064	0.8942	0.0319	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-29.774	-30.000	5977.76238	5977.76238
151	120.7080	0.46345	8.6064	0.8942	0.0319	0.3532	0.0481	0.000	0.0000	3.7720	3.7720	-30.096	-30.000	5986.36881	5986.36881
152	120.9576	0.46384	8.6064	0.8911	0.0326	0.3553	0.0479	0.000	0.0000	3.7720	3.7720	-30.365	-30.000	5994.97525	6038.16347
	120.9576	0.46384	43.1882	0.0000	0.0000	0.0000	0.0000	8.000	2.2543	0.0000	0.000	(-6007.94689)	6038.16347		
153	121.2080	0.46424	8.6664	0.8913	0.0326	0.3552	0.0479	0.000	0.0000	3.7720	3.7720	-30.730	-30.000	6046.82984	6046.82984
154	121.4610	0.46465	8.6664	0.8944	0.0319	0.3532	0.0482	0.000	0.0000	3.7720	3.7720	-30.060	-30.000	6055.49620	6055.49620
155	121.7147	0.46505	8.6664	0.8944	0.0319	0.3532	0.0482	0.000	0.0000	3.7720	3.7720	-29.755	-30.000	6064.16257	6064.16257
156	121.9689	0.46545	8.6664	0.8944	0.0319	0.3532	0.0482	0.000	0.0000	3.7720	3.7720	-29.606	-30.000	6072.82894	6072.82894
157	122.2231	0.46586	8.6664	0.8944	0.0319	0.3532	0.0482	0.000	0.0000	3.7720	3.7720	-29.614	-30.000	6081.49531	6081.49531
158	122.4769	0.46626	8.6664	0.8944	0.0319	0.3532	0.0482	0.000	0.0000	3.7720	3.7720	-29.777	-30.000	6090.16168	6090.16168
159	122.7299	0.46666	8.6664	0.8944	0.0319	0.3532	0.0482	0.000	0.0000	3.7720	3.7720	-30.095	-30.000	6098.82804	6098.82804
160	122.9814	0.46705	8.6664	0.8913	0.0326	0.3552	0.0479	0.000	0.0000	3.7720	3.7720	-30.364	-30.000	6107.49441	6150.98141
	122.9814	0.46705	43.4870	0.0000	0.0000	0.0000	0.0000	8.000	-2.2277	0.0000	0.000	(-6120.46605)	6150.98141		
161	123.2335	0.46745	8.7260	0.8916	0.0325	0.3552	0.0480	0.000	0.0000	3.7720	3.7720	-30.717	-30.000	6159.70737	6159.70737
162	123.4883	0.46785	8.7260	0.8945	0.0318	0.3532	0.0482	0.000	0.0000	3.7720	3.7720	-30.059	-30.000	6168.43334	6168.43334
163	123.7438	0.46825	8.7260	0.8945	0.0318	0.3532	0.0482	0.000	0.0000	3.7720	3.7720	-29.758	-30.000	6177.15930	6177.15930
164	123.9998	0.46865	8.7260	0.8945	0.0318	0.3532	0.0482	0.000	0.0000	3.7720	3.7720	-29.611	-30.000	6185.88527	6185.88527
165	124.2557	0.46905	8.7260	0.8945	0.0318	0.3532	0.0482	0.000	0.0000	3.7720	3.7720	-29.619	-30.000	6194.61124	6194.61124
166	124.5113	0.46945	8.7260	0.8945	0.0318	0.3532	0.0482	0.000	0.0000	3.7720	3.7720	-29.780	-30.000	6203.33720	6203.33720
167	124.7661	0.46985	8.7260	0.8945	0.0318	0.3532	0.0482	0.000	0.0000	3.7720	3.7720	-30.093	-30.000	6212.06317	6212.06317
168	125.0194	0.47024	8.7260	0.8916	0.0325	0.3552	0.0480	0.000	0.0000	3.7720	3.7720	-30.363	-30.000	6220.78913	6264.57325
	125.0194	0.47024	43.7841	0.0000	0.0000	0.0000	0.0000	8.000	2.2012	0.0000	0.000	(-6233.76077)	6264.57325		
169	125.2734	0.47064	8.7852	0.8918	0.0325	0.3552	0.0480	0.000	0.0000	3.7720	3.7720	-30.704	-30.000	6273.35848	6273.35848
170	125.5299	0.47104	8.7852	0.8946	0.0318	0.3532	0.0482	0.000	0.0000	3.7720	3.7720	-30.059	-30.000	6282.14372	6282.14372
171	125.7872	0.47144	8.7852	0.8946	0.0318	0.3532	0.0482	0.000	0.0000	3.7720	3.7720	-29.761	-30.000	6290.92895	6290.92895
172	126.0449	0.47184	8.7852	0.8946	0.0318	0.3532	0.0482	0.000	0.0000	3.7720	3.7720	-29.616	-30.000	6299.71418	6299.71418
173	126.3026	0.47223	8.7852	0.8946	0.0318	0.3532	0.0482	0.000	0.0000	3.7720	3.7720	-29.623	-30.000	6308.49941	6308.49941
174	126.5599	0.47263	8.7852	0.8946	0.0318	0.3532	0.0482	0.000	0.0000	3.7720	3.7720	-29.782	-30.000	6317.28465	6317.28465
175	126.8165	0.47303	8.7852	0.8946	0.0318	0.3532	0.0482	0.000	0.0000	3.7720	3.7720	-30.092	-30.000	6326.06988	6326.06988
176	127.0715	0.47342	8.7852	0.8918	0.0325	0.3552	0.0480	0.000	0.0000	3.7720	3.7720	-30.362	-30.000	6334.85511	6378.93470
	127.0715	0.47342	44.0796	0.0000	0.0000	0.0000	0.0000	8.000	-2.1749	0.0000	0.000	(-6347.82675)	6378.93470		
177	127.3273	0.47381	8.8442	0.8919	0.0324	0.3552	0.0481	0.000	0.0000	3.7720	3.7720	-30.693	-30.000	6387.77886	6387.77886
178	127.5856	0.47421	8.8442	0.8947	0.0318	0.3533	0.0482	0.000	0.0000	3.7720	3.7720	-30.058	-30.000	6396.62303	6396.62303
179	127.8446	0.47460	8.8442	0.8947	0.0318	0.3533	0.0482	0.000	0.0000	3.7720	3.7720	-29.764	-30.000	6405.46719	6405.46719
180	128.1041	0.47500	8.8442	0.8947	0.0318	0.3533	0.0482	0.000	0.0000	3.7720	3.7720	-29.621	-30.000	6414.31136	6414.31136
181	128.3635	0.47540	8.8442	0.8947	0.0318	0.3533	0.0482	0.000	0.0000	3.7720	3.7720	-29.628	-30.000	6423.15552	6423.15552
182	128.6226	0.47579	8.8442	0.8947	0.0318	0.3533	0.0482	0.000	0.0000	3.7720	3.7720	-29.785	-30.000	6431.99969	6431.99969
183	128.8809	0.47618	8.8442	0.8947	0.0318	0.3533	0.0482	0.000	0.0000	3.7720	3.7720	-30.091	-30.000	6440.84385	6440.84385
184	129.1377	0.47657	8.8442	0.8919	0.0324	0.3552	0.0481	0.000	0.0000	3.7720	3.7720	-30.360	-30.000	6449.68802	6494.06140

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	129.1377	0.47657	44.3734	0.0000	0.0000	0.0000	0.0000	8.000	2.1488	0.0000	0.000	(6462.65966)	6494.06140	
185	129.3953	0.47696	8.9028	0.8921	0.0324	0.3553	0.0481	0.000	0.0000	3.7720	3.7720	-30.682	-30.000	6502.96416	6502.96416
186	129.6553	0.47736	8.9028	0.8948	0.0317	0.3534	0.0483	0.000	0.0000	3.7720	3.7720	-30.057	-30.000	6511.86693	6511.86693
187	129.9161	0.47775	8.9028	0.8948	0.0317	0.3534	0.0483	0.000	0.0000	3.7720	3.7720	-29.767	-30.000	6520.76969	6520.76969
188	130.1772	0.47815	8.9028	0.8948	0.0317	0.3534	0.0483	0.000	0.0000	3.7720	3.7720	-29.625	-30.000	6529.67245	6529.67245
189	130.4384	0.47854	8.9028	0.8948	0.0317	0.3534	0.0483	0.000	0.0000	3.7720	3.7720	-29.633	-30.000	6538.57522	6538.57522
190	130.6992	0.47893	8.9028	0.8948	0.0317	0.3534	0.0483	0.000	0.0000	3.7720	3.7720	-29.788	-30.000	6547.47798	6547.47798
191	130.9593	0.47932	8.9028	0.8948	0.0317	0.3534	0.0483	0.000	0.0000	3.7720	3.7720	-30.090	-30.000	6556.38075	6556.38075
192	131.2178	0.47971	8.9028	0.8921	0.0324	0.3553	0.0481	0.000	0.0000	3.7720	3.7720	-30.358	-30.000	6565.28351	6609.94901
	131.2178	0.47971	44.6655	0.0000	0.0000	0.0000	0.0000	8.000	-2.1228	0.0000	0.000	(	6578.25515)	6609.94901	
193	131.4771	0.48010	8.9610	0.8922	0.0323	0.3554	0.0481	0.000	0.0000	3.7720	3.7720	-30.671	-30.000	6618.91004	6618.91004
194	131.7389	0.48049	8.9610	0.8949	0.0317	0.3536	0.0483	0.000	0.0000	3.7720	3.7720	-30.057	-30.000	6627.87107	6627.87107
195	132.0014	0.48088	8.9610	0.8949	0.0317	0.3536	0.0483	0.000	0.0000	3.7720	3.7720	-29.770	-30.000	6636.83210	6636.83210
196	132.2643	0.48128	8.9610	0.8949	0.0317	0.3536	0.0483	0.000	0.0000	3.7720	3.7720	-29.630	-30.000	6645.79312	6645.79312
197	132.5272	0.48167	8.9610	0.8949	0.0317	0.3536	0.0483	0.000	0.0000	3.7720	3.7720	-29.637	-30.000	6654.75415	6654.75415
198	132.7897	0.48206	8.9610	0.8949	0.0317	0.3536	0.0483	0.000	0.0000	3.7720	3.7720	-29.790	-30.000	6663.71518	6663.71518
199	133.0515	0.48245	8.9610	0.8949	0.0317	0.3536	0.0483	0.000	0.0000	3.7720	3.7720	-30.089	-30.000	6672.67621	6672.67621
200	133.3118	0.48283	8.9610	0.8922	0.0323	0.3554	0.0481	0.000	0.0000	3.7720	3.7720	-30.356	-30.000	6681.63724	6726.59319
	133.3118	0.48283	44.9560	0.0000	0.0000	0.0000	0.0000	8.000	2.0969	0.0000	0.000	(	6694.60888)	6726.59319	
201	133.5728	0.48322	9.0190	0.8923	0.0323	0.3555	0.0482	0.000	0.0000	3.7720	3.7720	-30.660	-30.000	6735.61215	6735.61215
202	133.8363	0.48361	9.0190	0.8949	0.0317	0.3537	0.0484	0.000	0.0000	3.7720	3.7720	-30.056	-30.000	6744.63111	6744.63111
203	134.1005	0.48400	9.0190	0.8949	0.0317	0.3537	0.0484	0.000	0.0000	3.7720	3.7720	-29.773	-30.000	6753.65006	6753.65006
204	134.3651	0.48439	9.0190	0.8949	0.0317	0.3537	0.0484	0.000	0.0000	3.7720	3.7720	-29.635	-30.000	6762.66902	6762.66902
205	134.6297	0.48478	9.0190	0.8949	0.0317	0.3537	0.0484	0.000	0.0000	3.7720	3.7720	-29.642	-30.000	6771.68798	6771.68798
206	134.8939	0.48516	9.0190	0.8949	0.0317	0.3537	0.0484	0.000	0.0000	3.7720	3.7720	-29.793	-30.000	6780.70693	6780.70693
207	135.1574	0.48555	9.0190	0.8949	0.0317	0.3537	0.0484	0.000	0.0000	3.7720	3.7720	-30.088	-30.000	6789.72589	6789.72589
208	135.4194	0.48593	9.0190	0.8923	0.0323	0.3555	0.0482	0.000	0.0000	3.7720	3.7720	-30.354	-30.000	6798.74485	6843.98957
	135.4194	0.48593	45.2447	0.0000	0.0000	0.0000	0.0000	8.000	-2.0712	0.0000	0.000	(	6811.71649)	6843.98957	
209	135.6822	0.48632	9.0766	0.8925	0.0323	0.3556	0.0482	0.000	0.0000	3.7720	3.7720	-30.650	-30.000	6853.06612	6853.06612
210	135.9474	0.48670	9.0766	0.8950	0.0317	0.3539	0.0484	0.000	0.0000	3.7720	3.7720	-30.055	-30.000	6862.14267	6862.14267
211	136.2133	0.48709	9.0766	0.8950	0.0317	0.3539	0.0484	0.000	0.0000	3.7720	3.7720	-29.775	-30.000	6871.21922	6871.21922
212	136.4796	0.48748	9.0766	0.8950	0.0317	0.3539	0.0484	0.000	0.0000	3.7720	3.7720	-29.639	-30.000	6880.29577	6880.29577
213	136.7459	0.48787	9.0766	0.8950	0.0317	0.3539	0.0484	0.000	0.0000	3.7720	3.7720	-29.646	-30.000	6889.37232	6889.37232
214	137.0118	0.48825	9.0766	0.8950	0.0317	0.3539	0.0484	0.000	0.0000	3.7720	3.7720	-29.795	-30.000	6898.44887	6898.44887
215	137.2770	0.48864	9.0766	0.8950	0.0317	0.3539	0.0484	0.000	0.0000	3.7720	3.7720	-30.087	-30.000	6907.52542	6907.52542
216	137.5407	0.48902	9.0766	0.8925	0.0323	0.3556	0.0482	0.000	0.0000	3.7720	3.7720	-30.352	-30.000	6916.60197	6962.13378
	137.5407	0.48902	45.5318	0.0000	0.0000	0.0000	0.0000	8.000	2.0457	0.0000	0.000	(	6929.57361)	6962.13378	
217	137.8052	0.48940	9.1338	0.8926	0.0323	0.3557	0.0483	0.000	0.0000	3.7720	3.7720	-30.640	-30.000	6971.26759	6971.26759
218	138.0720	0.48978	9.1338	0.8950	0.0317	0.3541	0.0484	0.000	0.0000	3.7720	3.7720	-30.055	-30.000	6980.40140	6980.40140
219	138.3396	0.49017	9.1338	0.8950	0.0317	0.3541	0.0484	0.000	0.0000	3.7720	3.7720	-29.778	-30.000	6989.53521	6989.53521
220	138.6076	0.49055	9.1338	0.8950	0.0317	0.3541	0.0484	0.000	0.0000	3.7720	3.7720	-29.643	-30.000	6998.66901	6998.66901
221	138.8756	0.49094	9.1338	0.8950	0.0317	0.3541	0.0484	0.000	0.0000	3.7720	3.7720	-29.650	-30.000	7007.80282	7007.80282
222	139.1432	0.49132	9.1338	0.8950	0.0317	0.3541	0.0484	0.000	0.0000	3.7720	3.7720	-29.798	-30.000	7016.93663	7016.93663
223	139.4100	0.49170	9.1338	0.8950	0.0317	0.3541	0.0484	0.000	0.0000	3.7720	3.7720	-30.086	-30.000	7026.07044	7026.07044
224	139.6755	0.49208	9.1338	0.8926	0.0323	0.3557	0.0483	0.000	0.0000	3.7720	3.7720	-30.350	-30.000	7035.20424	7081.02147
	139.6755	0.49208	45.8172	0.0000	0.0000	0.0000	0.0000	8.000	-2.0203	0.0000	0.000	(	7048.17588)	7081.02147	

 *** ORNL June 12,2000 Design .CCL1b.

linout subroutine no. 1 dynamical parameters

Transit time factors are for the synchronous or reference particles.
 If you are designing symmetric linac, the phase printed is REFERENCE Particle phase at the center of the gap.

Also, the kinetic energy and beta are for the REFERENCE particle at the end of the cell.
 The geometrical beta for the cavities are printed in the WALLPWR file (with Power keyword).

E is the field for the cell(used as E*t*l*cosphi). It includes the ratio E/E0 for that cell.

tank no. 1 tank length 2757.148 (cm) 174 cells power= 8.232 MW frequency= 805.00MHz
 (Cu+Beam) wavelength= 37.24130 cm

cell	kinetic	beta at	cell	t	tp	s	sp	quad	quad	Ezero	E	phis	PhiDesign	TotalLeng	TotalLeng
number	energy	end of	length											length	toNextBeginwall
	(MeV)	cell	(cm)					(cm)	(kG/cm)	(MV/m)	(MV/m)	phref	(Deg)	toEndwall/	(QuadCtr)(cm)
															(cm)

Expected Total Drift allocated for the Preceding quad is 45.81723 (cm). Preceding quad center to the First Cavity wall is : 32.84559

Quad Gradient : -2.02000 (kG/cm)

Hlf Quad Lng : 4.00000 (cm)

Absolute z= 7048.17588 (cm) position is at the center of the preceding quad.

initial	139.6755	0.49208	4.000	-2.0200	(7048.17588)	7081.02147									
1	139.9417	0.49246	9.1907	0.8926	0.0323	0.3559	0.0483	0.000	0.0000	3.7720	3.7720	-30.630	-30.000	7090.21220	7090.21220
2	140.2102	0.49285	9.1907	0.8950	0.0317	0.3543	0.0485	0.000	0.0000	3.7720	3.7720	-30.054	-30.000	7099.40293	7099.40293
3	140.4794	0.49323	9.1907	0.8950	0.0317	0.3543	0.0485	0.000	0.0000	3.7720	3.7720	-29.781	-30.000	7108.59366	7108.59366
4	140.7491	0.49361	9.1907	0.8950	0.0317	0.3543	0.0485	0.000	0.0000	3.7720	3.7720	-29.648	-30.000	7117.78439	7117.78439
5	141.0187	0.49399	9.1907	0.8950	0.0317	0.3543	0.0485	0.000	0.0000	3.7720	3.7720	-29.654	-30.000	7126.97512	7126.97512
6	141.2880	0.49437	9.1907	0.8950	0.0317	0.3543	0.0485	0.000	0.0000	3.7720	3.7720	-29.800	-30.000	7136.16584	7136.16584
7	141.5565	0.49475	9.1907	0.8950	0.0317	0.3543	0.0485	0.000	0.0000	3.7720	3.7720	-30.085	-30.000	7145.35657	7145.35657
8	141.8237	0.49513	9.1907	0.8926	0.0323	0.3559	0.0483	0.000	0.0000	3.7720	3.7720	-30.348	-30.000	7154.54730	7200.64826
	141.8237	0.49513	46.1010	0.0000	0.0000	0.0000	0.0000	8.000	1.9912	0.0000	0.000	(7167.51894)	7200.64826		
9	142.0915	0.49551	9.2473	0.8927	0.0323	0.3561	0.0484	0.000	0.0000	3.7720	3.7720	-30.620	-30.000	7209.89557	7209.89557
10	142.3617	0.49589	9.2473	0.8951	0.0317	0.3545	0.0485	0.000	0.0000	3.7720	3.7720	-30.053	-30.000	7219.14289	7219.14289
11	142.6326	0.49627	9.2473	0.8951	0.0317	0.3545	0.0485	0.000	0.0000	3.7720	3.7720	-29.784	-30.000	7228.39020	7228.39020
12	142.9039	0.49665	9.2473	0.8951	0.0317	0.3545	0.0485	0.000	0.0000	3.7720	3.7720	-29.652	-30.000	7237.63751	7237.63751
13	143.1752	0.49703	9.2473	0.8951	0.0317	0.3545	0.0485	0.000	0.0000	3.7720	3.7720	-29.659	-30.000	7246.88483	7246.88483
14	143.4461	0.49741	9.2473	0.8951	0.0317	0.3545	0.0485	0.000	0.0000	3.7720	3.7720	-29.803	-30.000	7256.13214	7256.13214
15	143.7163	0.49779	9.2473	0.8951	0.0317	0.3545	0.0485	0.000	0.0000	3.7720	3.7720	-30.084	-30.000	7265.37945	7265.37945
16	143.9851	0.49816	9.2473	0.8927	0.0323	0.3561	0.0484	0.000	0.0000	3.7720	3.7720	-30.346	-30.000	7274.62677	7321.02592
	143.9851	0.49816	46.3992	0.0000	0.0000	0.0000	0.0000	8.000	-1.9628	0.0000	0.000	(7287.59841)	7321.02592		

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17	144.2556	0.49854	9.3037	0.8928	0.0322	0.3563	0.0484	0.000	0.0000	3.7720	3.7720	-30.296	-29.684	7330.32958	7330.32958	
18	144.5282	0.49892	9.3037	0.8951	0.0317	0.3547	0.0486	0.000	0.0000	3.7720	3.7720	-29.737	-29.684	7339.63323	7339.63323	
19	144.8017	0.49930	9.3037	0.8951	0.0317	0.3547	0.0486	0.000	0.0000	3.7720	3.7720	-29.470	-29.684	7348.93689	7348.93689	
20	145.0755	0.49967	9.3037	0.8951	0.0317	0.3547	0.0486	0.000	0.0000	3.7720	3.7720	-29.339	-29.684	7358.24054	7358.24054	
21	145.3493	0.50005	9.3037	0.8951	0.0317	0.3547	0.0486	0.000	0.0000	3.7720	3.7720	-29.346	-29.684	7367.54420	7367.54420	
22	145.6227	0.50043	9.3037	0.8951	0.0317	0.3547	0.0486	0.000	0.0000	3.7720	3.7720	-29.489	-29.684	7376.84785	7376.84785	
23	145.8954	0.50081	9.3037	0.8951	0.0317	0.3547	0.0486	0.000	0.0000	3.7720	3.7720	-29.767	-29.684	7386.15151	7386.15151	
24	146.1667	0.50118	9.3037	0.8928	0.0322	0.3563	0.0484	0.000	0.0000	3.7720	3.7720	-30.029	-29.684	7395.45516	7442.12754	
	146.1667	0.50118	46.6724	0.0000	0.0000	0.0000	0.0000	8.000	1.9345	0.0000	(7408.42680)	7442.12754				
25	146.4393	0.50156	9.3598	0.8928	0.0322	0.3565	0.0485	0.000	0.0000	3.7720	3.7720	-30.130	-29.526	7451.48733	7451.48733	
26	146.7140	0.50193	9.3598	0.8951	0.0317	0.3550	0.0486	0.000	0.0000	3.7720	3.7720	-29.579	-29.526	7460.84712	7460.84712	
27	146.9895	0.50231	9.3598	0.8951	0.0317	0.3550	0.0486	0.000	0.0000	3.7720	3.7720	-29.314	-29.526	7470.20691	7470.20691	
28	147.2654	0.50269	9.3598	0.8951	0.0317	0.3550	0.0486	0.000	0.0000	3.7720	3.7720	-29.185	-29.526	7479.56670	7479.56670	
29	147.5413	0.50307	9.3598	0.8951	0.0317	0.3550	0.0486	0.000	0.0000	3.7720	3.7720	-29.191	-29.526	7488.92649	7488.92649	
30	147.8168	0.50344	9.3598	0.8951	0.0317	0.3550	0.0486	0.000	0.0000	3.7720	3.7720	-29.333	-29.526	7498.28628	7498.28628	
31	148.0916	0.50382	9.3598	0.8951	0.0317	0.3550	0.0486	0.000	0.0000	3.7720	3.7720	-29.608	-29.526	7507.64607	7507.64607	
32	148.3650	0.50419	9.3598	0.8928	0.0322	0.3565	0.0485	0.000	0.0000	3.7720	3.7720	-29.870	-29.526	7517.00586	7563.95828	
	148.3650	0.50419	46.9524	0.0000	0.0000	0.0000	0.0000	8.000	-1.9063	0.0000	0.000	(7529.97750)	7563.95828			
33	148.6396	0.50456	9.4157	0.8929	0.0322	0.3567	0.0485	0.000	0.0000	3.7720	3.7720	-29.963	-29.368	7573.37395	7573.37395	
34	148.9165	0.50494	9.4157	0.8951	0.0317	0.3552	0.0487	0.000	0.0000	3.7720	3.7720	-29.420	-29.368	7582.78963	7582.78963	
35	149.1940	0.50531	9.4157	0.8951	0.0317	0.3552	0.0487	0.000	0.0000	3.7720	3.7720	-29.159	-29.368	7592.20530	7592.20530	
36	149.4719	0.50569	9.4157	0.8951	0.0317	0.3552	0.0487	0.000	0.0000	3.7720	3.7720	-29.031	-29.368	7601.62098	7601.62098	
37	149.7499	0.50607	9.4157	0.8951	0.0317	0.3552	0.0487	0.000	0.0000	3.7720	3.7720	-29.037	-29.368	7611.03665	7611.03665	
38	150.0275	0.50644	9.4157	0.8951	0.0317	0.3552	0.0487	0.000	0.0000	3.7720	3.7720	-29.177	-29.368	7620.45232	7620.45232	
39	150.3043	0.50681	9.4157	0.8951	0.0317	0.3552	0.0487	0.000	0.0000	3.7720	3.7720	-29.449	-29.368	7629.86800	7629.86800	
40	150.5798	0.50718	9.4157	0.8929	0.0322	0.3567	0.0485	0.000	0.0000	3.7720	3.7720	-29.711	-29.368	7639.28367	7686.51487	
	150.5798	0.50718	47.2312	0.0000	0.0000	0.0000	0.0000	8.000	1.8783	0.0000	0.000	(7652.25531)	7686.51487			
41	150.8566	0.50755	9.4713	0.8930	0.0322	0.3569	0.0486	0.000	0.0000	3.7720	3.7720	-29.797	-29.211	7695.98618	7695.98618	
42	151.1355	0.50793	9.4713	0.8951	0.0317	0.3555	0.0487	0.000	0.0000	3.7720	3.7720	-29.262	-29.211	7705.45748	7705.45748	
43	151.4151	0.50830	9.4713	0.8951	0.0317	0.3555	0.0487	0.000	0.0000	3.7720	3.7720	-29.003	-29.211	7714.92878	7714.92878	
44	151.6951	0.50868	9.4713	0.8951	0.0317	0.3555	0.0487	0.000	0.0000	3.7720	3.7720	-28.877	-29.211	7724.40009	7724.40009	
45	151.9751	0.50905	9.4713	0.8951	0.0317	0.3555	0.0487	0.000	0.0000	3.7720	3.7720	-28.883	-29.211	7733.87139	7733.87139	
46	152.2547	0.50942	9.4713	0.8951	0.0317	0.3555	0.0487	0.000	0.0000	3.7720	3.7720	-29.021	-29.211	7743.34270	7743.34270	
47	152.5336	0.50979	9.4713	0.8951	0.0317	0.3555	0.0487	0.000	0.0000	3.7720	3.7720	-29.291	-29.211	7752.81400	7752.81400	
48	152.8112	0.51016	9.4713	0.8930	0.0322	0.3569	0.0486	0.000	0.0000	3.7720	3.7720	-29.552	-29.211	7762.28531	7809.79402	
	152.8112	0.51016	47.5087	0.0000	0.0000	0.0000	0.0000	8.000	-1.8504	0.0000	0.000	(7775.25695)	7809.79402			
49	153.0901	0.51053	9.5267	0.8930	0.0322	0.3572	0.0487	0.000	0.0000	3.7720	3.7720	-29.631	-29.053	7819.32070	7819.32070	
50	153.3710	0.51091	9.5267	0.8950	0.0317	0.3558	0.0488	0.000	0.0000	3.7720	3.7720	-29.104	-29.053	7828.84738	7828.84738	
51	153.6527	0.51128	9.5267	0.8950	0.0317	0.3558	0.0488	0.000	0.0000	3.7720	3.7720	-28.847	-29.053	7838.37406	7838.37406	
52	153.9347	0.51165	9.5267	0.8950	0.0317	0.3558	0.0488	0.000	0.0000	3.7720	3.7720	-28.722	-29.053	7847.90074	7847.90074	
53	154.2168	0.51202	9.5267	0.8950	0.0317	0.3558	0.0488	0.000	0.0000	3.7720	3.7720	-28.728	-29.053	7857.42741	7857.42741	
54	154.4984	0.51239	9.5267	0.8950	0.0317	0.3558	0.0488	0.000	0.0000	3.7720	3.7720	-28.865	-29.053	7866.95409	7866.95409	
55	154.7794	0.51276	9.5267	0.8950	0.0317	0.3558	0.0488	0.000	0.0000	3.7720	3.7720	-29.132	-29.053	7876.48077	7876.48077	
56	155.0591	0.51313	9.5267	0.8930	0.0322	0.3572	0.0487	0.000	0.0000	3.7720	3.7720	-29.392	-29.053	7886.00745	7933.79240	
	155.0591	0.51313	47.7849	0.0000	0.0000	0.0000	0.0000	8.000	1.8226	0.0000	0.000	(7898.97909)	7933.79240			
57	155.3400	0.51350	9.5818	0.8930	0.0322	0.3574	0.0487	0.000	0.0000	3.7720	3.7720	-29.465	-28.895	7943.37420	7943.37420	

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58	155.6230	0.51387	9.5818	0.8950	0.0317	0.3561	0.0488	0.000	0.0000	3.7720	3.7720	-28.945	-28.895	7952.95600	7952.95600
59	155.9067	0.51424	9.5818	0.8950	0.0317	0.3561	0.0488	0.000	0.0000	3.7720	3.7720	-28.692	-28.895	7962.53779	7962.53779
60	156.1908	0.51461	9.5818	0.8950	0.0317	0.3561	0.0488	0.000	0.0000	3.7720	3.7720	-28.568	-28.895	7972.11959	7972.11959
61	156.4749	0.51498	9.5818	0.8950	0.0317	0.3561	0.0488	0.000	0.0000	3.7720	3.7720	-28.574	-28.895	7981.70139	7981.70139
62	156.7586	0.51535	9.5818	0.8950	0.0317	0.3561	0.0488	0.000	0.0000	3.7720	3.7720	-28.709	-28.895	7991.28319	7991.28319
63	157.0416	0.51572	9.5818	0.8950	0.0317	0.3561	0.0488	0.000	0.0000	3.7720	3.7720	-28.973	-28.895	8000.86498	8000.86498
64	157.3234	0.51608	9.5818	0.8930	0.0322	0.3574	0.0487	0.000	0.0000	3.7720	3.7720	-29.232	-28.895	8010.44678	8058.50667
157.3234	0.51608	48.0599	0.0000	0.0000	0.0000	0.0000	0.0000	8.000	-1.7949	0.0000	0.000	(8023.41842)	8058.50667		
65	157.6064	0.51645	9.6367	0.8930	0.0322	0.3577	0.0488	0.000	0.0000	3.7720	3.7720	-29.300	-28.737	8068.14333	8068.14333
66	157.8914	0.51682	9.6367	0.8950	0.0318	0.3564	0.0489	0.000	0.0000	3.7720	3.7720	-28.787	-28.737	8077.77998	8077.77998
67	158.1772	0.51719	9.6367	0.8950	0.0318	0.3564	0.0489	0.000	0.0000	3.7720	3.7720	-28.536	-28.737	8087.41664	8087.41664
68	158.4633	0.51756	9.6367	0.8950	0.0318	0.3564	0.0489	0.000	0.0000	3.7720	3.7720	-28.413	-28.737	8097.05330	8097.05330
69	158.7494	0.51792	9.6367	0.8950	0.0318	0.3564	0.0489	0.000	0.0000	3.7720	3.7720	-28.419	-28.737	8106.68996	8106.68996
70	159.0351	0.51829	9.6367	0.8950	0.0318	0.3564	0.0489	0.000	0.0000	3.7720	3.7720	-28.553	-28.737	8116.32661	8116.32661
71	159.3202	0.51866	9.6367	0.8950	0.0318	0.3564	0.0489	0.000	0.0000	3.7720	3.7720	-28.814	-28.737	8125.96327	8125.96327
72	159.6040	0.51902	9.6367	0.8930	0.0322	0.3577	0.0488	0.000	0.0000	3.7720	3.7720	-29.073	-28.737	8135.59993	8183.93346
159.6040	0.51902	48.3335	0.0000	0.0000	0.0000	0.0000	0.0000	8.000	1.7674	0.0000	0.000	(8148.57157)	8183.93346		
73	159.8891	0.51939	9.6913	0.8930	0.0322	0.3580	0.0488	0.000	0.0000	3.7720	3.7720	-29.134	-28.579	8193.62472	8193.62472
74	160.1761	0.51975	9.6913	0.8949	0.0318	0.3567	0.0489	0.000	0.0000	3.7720	3.7720	-28.629	-28.579	8203.31597	8203.31597
75	160.4639	0.52012	9.6913	0.8949	0.0318	0.3567	0.0489	0.000	0.0000	3.7720	3.7720	-28.380	-28.579	8213.00723	8213.00723
76	160.7521	0.52049	9.6913	0.8949	0.0318	0.3567	0.0489	0.000	0.0000	3.7720	3.7720	-28.259	-28.579	8222.69849	8222.69849
77	161.0402	0.52085	9.6913	0.8949	0.0318	0.3567	0.0489	0.000	0.0000	3.7720	3.7720	-28.265	-28.579	8232.38974	8232.38974
78	161.3280	0.52122	9.6913	0.8949	0.0318	0.3567	0.0489	0.000	0.0000	3.7720	3.7720	-28.397	-28.579	8242.08100	8242.08100
79	161.6151	0.52158	9.6913	0.8949	0.0318	0.3567	0.0489	0.000	0.0000	3.7720	3.7720	-28.656	-28.579	8251.77226	8251.77226
80	161.9009	0.52195	9.6913	0.8930	0.0322	0.3580	0.0488	0.000	0.0000	3.7720	3.7720	-28.913	-28.579	8261.46351	8310.06939
161.9009	0.52195	48.6059	0.0000	0.0000	0.0000	0.0000	0.0000	8.000	-1.7400	0.0000	0.000	(8274.43515)	8310.06939		
81	162.1881	0.52231	9.7456	0.8930	0.0322	0.3583	0.0489	0.000	0.0000	3.7720	3.7720	-28.969	-28.421	8319.81499	8319.81499
82	162.4772	0.52268	9.7456	0.8949	0.0318	0.3570	0.0490	0.000	0.0000	3.7720	3.7720	-28.470	-28.421	8329.56058	8329.56058
83	162.7670	0.52304	9.7456	0.8949	0.0318	0.3570	0.0490	0.000	0.0000	3.7720	3.7720	-28.224	-28.421	8339.30617	8339.30617
84	163.0571	0.52341	9.7456	0.8949	0.0318	0.3570	0.0490	0.000	0.0000	3.7720	3.7720	-28.104	-28.421	8349.05177	8349.05177
85	163.3473	0.52377	9.7456	0.8949	0.0318	0.3570	0.0490	0.000	0.0000	3.7720	3.7720	-28.110	-28.421	8358.79736	8358.79736
86	163.6371	0.52413	9.7456	0.8949	0.0318	0.3570	0.0490	0.000	0.0000	3.7720	3.7720	-28.241	-28.421	8368.54296	8368.54296
87	163.9262	0.52450	9.7456	0.8949	0.0318	0.3570	0.0490	0.000	0.0000	3.7720	3.7720	-28.497	-28.421	8378.28855	8378.28855
88	164.2141	0.52486	9.7456	0.8930	0.0322	0.3583	0.0489	0.000	0.0000	3.7720	3.7720	-28.753	-28.421	8388.03414	8436.91105
164.2141	0.52486	48.8769	0.0000	0.0000	0.0000	0.0000	0.0000	8.000	1.7128	0.0000	0.000	(8401.00578)	8436.91105		
89	164.5032	0.52522	9.7997	0.8930	0.0322	0.3586	0.0489	0.000	0.0000	3.7720	3.7720	-28.804	-28.263	8446.71072	8446.71072
90	164.7944	0.52558	9.7997	0.8948	0.0318	0.3574	0.0491	0.000	0.0000	3.7720	3.7720	-28.312	-28.263	8456.51039	8456.51039
91	165.0862	0.52595	9.7997	0.8948	0.0318	0.3574	0.0491	0.000	0.0000	3.7720	3.7720	-28.069	-28.263	8466.31006	8466.31006
92	165.3783	0.52631	9.7997	0.8948	0.0318	0.3574	0.0491	0.000	0.0000	3.7720	3.7720	-27.950	-28.263	8476.10972	8476.10972
93	165.6705	0.52667	9.7997	0.8948	0.0318	0.3574	0.0491	0.000	0.0000	3.7720	3.7720	-27.955	-28.263	8485.90939	8485.90939
94	165.9623	0.52703	9.7997	0.8948	0.0318	0.3574	0.0491	0.000	0.0000	3.7720	3.7720	-28.085	-28.263	8495.70906	8495.70906
95	166.2535	0.52740	9.7997	0.8948	0.0318	0.3574	0.0491	0.000	0.0000	3.7720	3.7720	-28.338	-28.263	8505.50873	8505.50873
96	166.5434	0.52775	9.7997	0.8930	0.0322	0.3586	0.0489	0.000	0.0000	3.7720	3.7720	-28.593	-28.263	8515.30840	8564.45501
166.5434	0.52775	49.1466	0.0000	0.0000	0.0000	0.0000	0.0000	8.000	-1.6856	0.0000	0.000	(8528.28004)	8564.45501		
97	166.8346	0.52811	9.8535	0.8930	0.0323	0.3589	0.0490	0.000	0.0000	3.7720	3.7720	-28.639	-28.105	8574.30849	8574.30849
98	167.1277	0.52848	9.8535	0.8947	0.0319	0.3577	0.0491	0.000	0.0000	3.7720	3.7720	-28.154	-28.105	8584.16197	8584.16197

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99	167.4215	0.52884	9.8535	0.8947	0.0319	0.3577	0.0491	0.000	0.0000	3.7720	3.7720	-27.913	-28.105	8594.01545	8594.01545	
100	167.7157	0.52920	9.8535	0.8947	0.0319	0.3577	0.0491	0.000	0.0000	3.7720	3.7720	-27.795	-28.105	8603.86892	8603.86892	
101	168.0099	0.52956	9.8535	0.8947	0.0319	0.3577	0.0491	0.000	0.0000	3.7720	3.7720	-27.801	-28.105	8613.72240	8613.72240	
102	168.3037	0.52992	9.8535	0.8947	0.0319	0.3577	0.0491	0.000	0.0000	3.7720	3.7720	-27.929	-28.105	8623.57588	8623.57588	
103	168.5969	0.53028	9.8535	0.8947	0.0319	0.3577	0.0491	0.000	0.0000	3.7720	3.7720	-28.179	-28.105	8633.42936	8633.42936	
104	168.8888	0.53064	9.8535	0.8930	0.0323	0.3589	0.0490	0.000	0.0000	3.7720	3.7720	-28.433	-28.105	8643.28283	8692.69784	
	168.8888	0.53064	49.4150	0.0000	0.0000	0.0000	8.000	1.6586	0.0000	0.000	(8656.25447)	8692.69784				
105	169.1820	0.53099	9.9070	0.8929	0.0323	0.3593	0.0491	0.000	0.0000	3.7720	3.7720	-28.474	-27.947	8702.60486	8702.60486	
106	169.4772	0.53135	9.9070	0.8947	0.0319	0.3581	0.0492	0.000	0.0000	3.7720	3.7720	-27.995	-27.947	8712.51188	8712.51188	
107	169.7730	0.53171	9.9070	0.8947	0.0319	0.3581	0.0492	0.000	0.0000	3.7720	3.7720	-27.757	-27.947	8722.41890	8722.41890	
108	170.0691	0.53207	9.9070	0.8947	0.0319	0.3581	0.0492	0.000	0.0000	3.7720	3.7720	-27.640	-27.947	8732.32592	8732.32592	
109	170.3653	0.53243	9.9070	0.8947	0.0319	0.3581	0.0492	0.000	0.0000	3.7720	3.7720	-27.646	-27.947	8742.23294	8742.23294	
110	170.6611	0.53279	9.9070	0.8947	0.0319	0.3581	0.0492	0.000	0.0000	3.7720	3.7720	-27.773	-27.947	8752.13996	8752.13996	
111	170.9563	0.53315	9.9070	0.8947	0.0319	0.3581	0.0492	0.000	0.0000	3.7720	3.7720	-28.021	-27.947	8762.04699	8762.04699	
112	171.2502	0.53350	9.9070	0.8929	0.0323	0.3593	0.0491	0.000	0.0000	3.7720	3.7720	-28.273	-27.947	8771.95401	8821.63606	
	171.2502	0.53350	49.6821	0.0000	0.0000	0.0000	8.000	-1.6318	0.0000	0.000	(8784.92565)	8821.63606				
113	171.5455	0.53386	9.9603	0.8929	0.0323	0.3596	0.0491	0.000	0.0000	3.7720	3.7720	-28.310	-27.790	8831.59636	8831.59636	
114	171.8426	0.53422	9.9603	0.8946	0.0319	0.3585	0.0492	0.000	0.0000	3.7720	3.7720	-27.837	-27.790	8841.55666	8841.55666	
115	172.1404	0.53458	9.9603	0.8946	0.0319	0.3585	0.0492	0.000	0.0000	3.7720	3.7720	-27.601	-27.790	8851.51695	8851.51695	
116	172.4386	0.53494	9.9603	0.8946	0.0319	0.3585	0.0492	0.000	0.0000	3.7720	3.7720	-27.486	-27.790	8861.47725	8861.47725	
117	172.7367	0.53529	9.9603	0.8946	0.0319	0.3585	0.0492	0.000	0.0000	3.7720	3.7720	-27.491	-27.790	8871.43755	8871.43755	
118	173.0345	0.53565	9.9603	0.8946	0.0319	0.3585	0.0492	0.000	0.0000	3.7720	3.7720	-27.617	-27.790	8881.39785	8881.39785	
119	173.3317	0.53600	9.9603	0.8946	0.0319	0.3585	0.0492	0.000	0.0000	3.7720	3.7720	-27.862	-27.790	8891.35815	8891.35815	
120	173.6277	0.53636	9.9603	0.8929	0.0323	0.3596	0.0491	0.000	0.0000	3.7720	3.7720	-28.113	-27.790	8901.31845	8951.26621	
	173.6277	0.53636	49.9478	0.0000	0.0000	0.0000	8.000	1.6050	0.0000	0.000	(8914.29009)	8951.26621				
121	173.9249	0.53671	10.0133	0.8929	0.0323	0.3600	0.0492	0.000	0.0000	3.7720	3.7720	-28.145	-27.632	8961.27952	8961.27952	
122	174.2241	0.53707	10.0133	0.8945	0.0319	0.3588	0.0493	0.000	0.0000	3.7720	3.7720	-27.679	-27.632	8971.29283	8971.29283	
123	174.5238	0.53743	10.0133	0.8945	0.0319	0.3588	0.0493	0.000	0.0000	3.7720	3.7720	-27.445	-27.632	8981.30614	8981.30614	
124	174.8239	0.53778	10.0133	0.8945	0.0319	0.3588	0.0493	0.000	0.0000	3.7720	3.7720	-27.331	-27.632	8991.31944	8991.31944	
125	175.1241	0.53814	10.0133	0.8945	0.0319	0.3588	0.0493	0.000	0.0000	3.7720	3.7720	-27.336	-27.632	9001.33275	9001.33275	
126	175.4239	0.53849	10.0133	0.8945	0.0319	0.3588	0.0493	0.000	0.0000	3.7720	3.7720	-27.461	-27.632	9011.34606	9011.34606	
127	175.7230	0.53885	10.0133	0.8945	0.0319	0.3588	0.0493	0.000	0.0000	3.7720	3.7720	-27.703	-27.632	9021.35936	9021.35936	
128	176.0210	0.53920	10.0133	0.8929	0.0323	0.3600	0.0492	0.000	0.0000	3.7720	3.7720	-27.953	-27.632	9031.37267	9081.58481	
	176.0210	0.53920	50.2121	0.0000	0.0000	0.0000	8.000	-1.5785	0.0000	0.000	(9044.34431)	9081.58481				
129	176.3203	0.53955	10.0660	0.8928	0.0323	0.3603	0.0493	0.000	0.0000	3.7720	3.7720	-27.981	-27.474	9091.65086	9091.65086	
130	176.6214	0.53990	10.0660	0.8944	0.0320	0.3592	0.0494	0.000	0.0000	3.7720	3.7720	-27.520	-27.474	9101.71690	9101.71690	
131	176.9231	0.54026	10.0660	0.8944	0.0320	0.3592	0.0494	0.000	0.0000	3.7720	3.7720	-27.289	-27.474	9111.78295	9111.78295	
132	177.2252	0.54061	10.0660	0.8944	0.0320	0.3592	0.0494	0.000	0.0000	3.7720	3.7720	-27.176	-27.474	9121.84900	9121.84900	
133	177.5273	0.54097	10.0660	0.8944	0.0320	0.3592	0.0494	0.000	0.0000	3.7720	3.7720	-27.181	-27.474	9131.91505	9131.91505	
134	177.8291	0.54132	10.0660	0.8944	0.0320	0.3592	0.0494	0.000	0.0000	3.7720	3.7720	-27.304	-27.474	9141.98109	9141.98109	
135	178.1303	0.54167	10.0660	0.8944	0.0320	0.3592	0.0494	0.000	0.0000	3.7720	3.7720	-27.545	-27.474	9152.04714	9152.04714	
136	178.4302	0.54202	10.0660	0.8928	0.0323	0.3603	0.0493	0.000	0.0000	3.7720	3.7720	-27.793	-27.474	9162.11319	9212.58836	
	178.4302	0.54202	50.4752	0.0000	0.0000	0.0000	8.000	1.5520	0.0000	0.000	(9175.08483)	9212.58836				
137	178.7315	0.54237	10.1185	0.8927	0.0324	0.3607	0.0493	0.000	0.0000	3.7720	3.7720	-27.816	-27.316	9222.70687	9222.70687	
138	179.0346	0.54273	10.1185	0.8943	0.0320	0.3596	0.0494	0.000	0.0000	3.7720	3.7720	-27.362	-27.316	9232.82539	9232.82539	
139	179.3383	0.54308	10.1185	0.8943	0.0320	0.3596	0.0494	0.000	0.0000	3.7720	3.7720	-27.133	-27.316	9242.94391	9242.94391	

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140	179.6423	0.54343	10.1185	0.8943	0.0320	0.3596	0.0494	0.000	0.0000	3.7720	3.7720	-27.021	-27.316	9253.06242	9253.06242
141	179.9464	0.54378	10.1185	0.8943	0.0320	0.3596	0.0494	0.000	0.0000	3.7720	3.7720	-27.027	-27.316	9263.18094	9263.18094
142	180.2501	0.54413	10.1185	0.8943	0.0320	0.3596	0.0494	0.000	0.0000	3.7720	3.7720	-27.148	-27.316	9273.29946	9273.29946
143	180.5532	0.54448	10.1185	0.8943	0.0320	0.3596	0.0494	0.000	0.0000	3.7720	3.7720	-27.386	-27.316	9283.41798	9283.41798
144	180.8552	0.54483	10.1185	0.8927	0.0324	0.3607	0.0493	0.000	0.0000	3.7720	3.7720	-27.633	-27.316	9293.53649	9344.27333
	180.8552	0.54483	50.7368	0.0000	0.0000	0.0000	0.0000	8.000	-1.3546	0.0000	0.000	(-9306.50813)	9344.27333		
145	181.1584	0.54518	10.1707	0.8927	0.0324	0.3611	0.0494	0.000	0.0000	3.7720	3.7720	-27.652	-27.158	9354.44405	9354.44405
146	181.4635	0.54553	10.1707	0.8942	0.0320	0.3600	0.0495	0.000	0.0000	3.7720	3.7720	-27.204	-27.158	9364.61476	9364.61476
147	181.7691	0.54588	10.1707	0.8942	0.0320	0.3600	0.0495	0.000	0.0000	3.7720	3.7720	-26.977	-27.158	9374.78548	9374.78548
148	182.0751	0.54623	10.1707	0.8942	0.0320	0.3600	0.0495	0.000	0.0000	3.7720	3.7720	-26.867	-27.158	9384.95619	9384.95619
149	182.3811	0.54658	10.1707	0.8942	0.0320	0.3600	0.0495	0.000	0.0000	3.7720	3.7720	-26.872	-27.158	9395.12691	9395.12691
150	182.6869	0.54693	10.1707	0.8942	0.0320	0.3600	0.0495	0.000	0.0000	3.7720	3.7720	-26.992	-27.158	9405.29763	9405.29763
151	182.9919	0.54728	10.1707	0.8942	0.0320	0.3600	0.0495	0.000	0.0000	3.7720	3.7720	-27.227	-27.158	9415.46834	9415.46834
152	183.2958	0.54763	10.1707	0.8927	0.0324	0.3611	0.0494	0.000	0.0000	3.7720	3.7720	-27.473	-27.158	9425.63906	9476.63621
	183.2958	0.54763	50.9972	0.0000	0.0000	0.0000	0.0000	8.000	1.2116	0.0000	0.000	(-9438.61070)	9476.63621		
153	183.6011	0.54798	10.2226	0.8926	0.0324	0.3615	0.0495	0.000	0.0000	3.7720	3.7720	-27.488	-27.000	9486.85885	9486.85885
154	183.9081	0.54832	10.2226	0.8941	0.0321	0.3604	0.0496	0.000	0.0000	3.7720	3.7720	-27.046	-27.000	9497.08149	9497.08149
155	184.2157	0.54867	10.2226	0.8941	0.0321	0.3604	0.0496	0.000	0.0000	3.7720	3.7720	-26.821	-27.000	9507.30413	9507.30413
156	184.5236	0.54902	10.2226	0.8941	0.0321	0.3604	0.0496	0.000	0.0000	3.7720	3.7720	-26.712	-27.000	9517.52678	9517.52678
157	184.8316	0.54937	10.2226	0.8941	0.0321	0.3604	0.0496	0.000	0.0000	3.7720	3.7720	-26.717	-27.000	9527.74942	9527.74942
158	185.1392	0.54972	10.2226	0.8941	0.0321	0.3604	0.0496	0.000	0.0000	3.7720	3.7720	-26.836	-27.000	9537.97206	9537.97206
159	185.4463	0.55006	10.2226	0.8941	0.0321	0.3604	0.0496	0.000	0.0000	3.7720	3.7720	-27.069	-27.000	9548.19470	9548.19470
160	185.7522	0.55041	10.2226	0.8926	0.0324	0.3615	0.0495	0.000	0.0000	3.7720	3.7720	-27.313	-27.000	9558.41734	9609.67345
	185.7522	0.55041	51.2561	0.0000	0.0000	0.0000	0.0000	8.000	0.0000	0.0000	0.000	(-9571.38898)	9609.67345		

 *** ORNL June 12,2000 Design BTW CCL-SC2

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Transport
Bore 1 5.0
;quad L, Ra, outputflag, B, errorflag
drift 0. 5.0 1 4
drift 12.0284 5.0 1 8
quad 40.0 0 1 -480.9 1
drift 30. 5.0 1 8
quad 40.0 0 1 +425.6 1
drift 25. 5.0 1 8
drift 58.6976 5.0 1 8
;scheff deltaR, deltaZ, Nr, Nz, Nbunch, Nbetalambda, Remesh
scheff .05 .05 20 40 0 0 3

output 2 1 1 3000 1
prtbeam
*****
```

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*** ORNL June 12,2000 Design SC2 1a ***

linout subroutine no. 1 dynamical parameters

Transit time factors are for the synchronous or reference particles.

If you are designing symmetric linac, the phase printed is REFERENCE Particle phase at the center of the gap.

Also, the kinetic energy and beta are for the REFERENCE particle at the end of the cell.

The geometrical beta for the cavities are printed in the WALLPWR file (with Power keyword).

E is the field for the cell(used as E*t*l*cosphi). It includes the ratio E/E0 for that cell.

tank no. 1 tank length 4812.668 (cm) 152 cells power= 11.161 MW frequency= 805.00MHz
(Cu+Beam) wavelength= 37.24130 cm

This superconducting design, one/two quads locate after symmetric units.

cell number	kinetic energy (MeV)	beta	cell length (cm)	t	tp	s	sp	quad length (cm)	quad gradient (kG/cm)	Ezero (MV/m)	E (MV/m)	phis (Deg)	PhiDesign phref (Deg)	TotalLeng (QuadCtr)(cm)	TotalLeng toEndwall (cm)	rel.driver toNextBeginwall (cm)	phase (Deg)
Absolute z= 9777.11498 (cm) position is atthe starting face of the first cavity.																	
initial	185.7522	0.55041						0.000	0.0000			(0.00000)	9777.11498				
1	185.8312	0.55050	11.3586	0.5467	0.0922	0.5993	0.0244	0.000	0.0000	14.4706	16.9483	-85.692	-22.000	9788.47358	9788.47358	-51.758	
2	186.5387	0.55129	11.3586	0.7332	0.0686	0.5467	0.0523	0.000	0.0000	14.4706	13.2310	-50.055	-22.000	9799.83218	9799.83218	-51.758	
3	187.4860	0.55235	11.3586	0.7342	0.0686	0.5459	0.0524	0.000	0.0000	14.4706	13.2310	-30.845	-22.000	9811.19077	9811.19077	-51.758	
4	188.5666	0.55356	11.3586	0.7352	0.0685	0.5452	0.0526	0.000	0.0000	14.4706	13.2310	-12.035	-22.000	9822.54937	9822.54937	-51.758	
5	189.6661	0.55478	11.3586	0.7361	0.0684	0.5444	0.0527	0.000	0.0000	14.4706	13.2310	6.322	-22.000	9833.90796	9833.90796	-51.758	
6	190.4779	0.55567	11.3586	0.5529	0.0924	0.5978	0.0256	0.000	0.0000	14.4706	16.9483	40.307	-22.000	9845.26656	9896.26656	-51.758	
7	190.5453	0.55574	11.3586	0.5527	0.0924	0.5978	0.0256	0.000	0.0000	6.2062	7.2688	-81.502	-21.922	9907.62516	9907.62516	33.811	
8	190.8645	0.55610	11.3586	0.7372	0.0683	0.5436	0.0529	0.000	0.0000	6.2062	5.6746	-47.802	-21.922	9918.98375	9918.98375	33.811	
9	191.2749	0.55655	11.3586	0.7377	0.0683	0.5433	0.0529	0.000	0.0000	6.2062	5.6746	-30.337	-21.922	9930.34235	9930.34235	33.811	
10	191.7383	0.55705	11.3586	0.7381	0.0682	0.5429	0.0530	0.000	0.0000	6.2062	5.6746	-13.039	-21.922	9941.70095	9941.70095	33.811	
11	192.2131	0.55757	11.3586	0.7385	0.0682	0.5426	0.0531	0.000	0.0000	6.2062	5.6746	4.071	-21.922	9953.05954	9953.05954	33.811	
12	192.5789	0.55797	11.3586	0.5554	0.0925	0.5972	0.0261	0.000	0.0000	6.2062	7.2688	37.078	-21.922	9964.41814	10015.41814	33.811	
13	192.7755	0.55819	11.3586	0.5553	0.0925	0.5972	0.0261	0.000	0.0000	14.4706	16.9483	-79.402	-22.571	10026.77673	10026.77673	129.126	
14	193.5403	0.55902	11.3586	0.7396	0.0681	0.5417	0.0532	0.000	0.0000	14.4706	13.2310	-46.530	-22.571	10038.13533	10038.13533	129.126	
15	194.5034	0.56006	11.3586	0.7406	0.0680	0.5410	0.0534	0.000	0.0000	14.4706	13.2310	-30.075	-22.571	10049.49393	10049.49393	129.126	
16	195.5846	0.56123	11.3586	0.7415	0.0680	0.5403	0.0535	0.000	0.0000	14.4706	13.2310	-14.002	-22.571	10060.85252	10060.85252	129.126	
17	196.6999	0.56242	11.3586	0.7424	0.0679	0.5396	0.0536	0.000	0.0000	14.4706	13.2310	1.647	-22.571	10072.21112	10072.21112	129.126	
18	197.6069	0.56339	11.3586	0.5614	0.0927	0.5956	0.0272	0.000	0.0000	14.4706	16.9483	32.934	-22.571	10083.56972	10360.96492	129.126	
	197.6069	0.56339	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.4732	0.0000	0.000	(10187.26732)	10360.96492				
	197.6069	0.56339	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	0.4732	0.0000	0.000	(10257.26732)	10360.96492				
19	197.8905	0.56369	11.3586	0.5615	0.0927	0.5956	0.0272	0.000	0.0000	14.4706	16.9483	-74.787	-22.762	10372.32351	10372.32351	-40.906	
20	198.6969	0.56455	11.3586	0.7441	0.0677	0.5382	0.0539	0.000	0.0000	14.4706	13.2310	-43.855	-22.762	10383.68211	10383.68211	-40.906	

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21	199.6729	0.56558	11.3586	0.7450	0.0677	0.5375	0.0540	0.000	0.0000	14.4706	13.2310	-29.327	-22.762	10395.04070	10395.04070	-40.906
22	200.7548	0.56672	11.3586	0.7458	0.0676	0.5368	0.0542	0.000	0.0000	14.4706	13.2310	-15.168	-22.762	10406.39930	10406.39930	-40.906
23	201.8767	0.56790	11.3586	0.7467	0.0675	0.5361	0.0543	0.000	0.0000	14.4706	13.2310	-1.414	-22.762	10417.75790	10417.75790	-40.906
24	202.8411	0.56891	11.3586	0.5673	0.0929	0.5941	0.0284	0.000	0.0000	14.4706	16.9483	27.980	-22.762	10429.11649	10480.11649	-40.906
25	203.0877	0.56916	11.3586	0.5676	0.0929	0.5940	0.0284	0.000	0.0000	7.1820	8.4117	-62.958	-15.155	10491.47509	10491.47509	100.695
26	203.5506	0.56964	11.3586	0.7482	0.0674	0.5349	0.0545	0.000	0.0000	7.1820	6.5667	-33.951	-15.155	10502.83369	10502.83369	100.695
27	204.0713	0.57018	11.3586	0.7487	0.0673	0.5345	0.0546	0.000	0.0000	7.1820	6.5667	-21.185	-15.155	10514.19228	10514.19228	100.695
28	204.6238	0.57075	11.3586	0.7491	0.0673	0.5342	0.0546	0.000	0.0000	7.1820	6.5667	-8.607	-15.155	10525.55088	10525.55088	100.695
29	205.1816	0.57133	11.3586	0.7495	0.0673	0.5338	0.0547	0.000	0.0000	7.1820	6.5667	3.771	-15.155	10536.90947	10536.90947	100.695
30	205.6439	0.57180	11.3586	0.5706	0.0930	0.5932	0.0290	0.000	0.0000	7.1820	8.4117	31.999	-15.155	10548.26807	10599.26807	100.695
31	206.0572	0.57223	11.3586	0.5708	0.0930	0.5931	0.0290	0.000	0.0000	14.4706	16.9483	-67.904	-23.143	10610.62667	10610.62667	-121.348
32	206.9227	0.57312	11.3586	0.7508	0.0672	0.5328	0.0549	0.000	0.0000	14.4706	13.2310	-39.909	-23.143	10621.98526	10621.98526	-121.348
33	207.9174	0.57413	11.3586	0.7516	0.0671	0.5321	0.0550	0.000	0.0000	14.4706	13.2310	-28.292	-23.143	10633.34386	10633.34386	-121.348
34	208.9987	0.57523	11.3586	0.7524	0.0670	0.5314	0.0551	0.000	0.0000	14.4706	13.2310	-17.023	-23.143	10644.70246	10644.70246	-121.348
35	210.1242	0.57637	11.3586	0.7533	0.0669	0.5308	0.0553	0.000	0.0000	14.4706	13.2310	-6.130	-23.143	10656.06105	10656.06105	-121.348
36	211.1640	0.57741	11.3586	0.5763	0.0931	0.5915	0.0301	0.000	0.0000	14.4706	16.9483	20.401	-23.143	10667.41965	10944.81485	-121.348
	211.1640	0.57741	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.4732	0.0000	0.000	(10771.11725)	10944.81485			
	211.1640	0.57741	51.0000	0.0000	0.0000	0.0000	40.000	0.4732	0.0000	0.000	0.000	(10841.11725)	10944.81485			
37	211.6616	0.57791	11.3586	0.5768	0.0932	0.5913	0.0302	0.000	0.0000	14.4706	16.9483	-63.374	-23.333	10956.17344	10956.17344	-147.248
38	212.5645	0.57881	11.3586	0.7551	0.0668	0.5292	0.0555	0.000	0.0000	14.4706	13.2310	-37.293	-23.333	10967.53204	10967.53204	-147.248
39	213.5716	0.57981	11.3586	0.7559	0.0667	0.5286	0.0557	0.000	0.0000	14.4706	13.2310	-27.563	-23.333	10978.89064	10978.89064	-147.248
40	214.6522	0.58089	11.3586	0.7567	0.0666	0.5279	0.0558	0.000	0.0000	14.4706	13.2310	-18.170	-23.333	10990.24923	10990.24923	-147.248
41	215.7762	0.58199	11.3586	0.7575	0.0666	0.5272	0.0559	0.000	0.0000	14.4706	13.2310	-9.134	-23.333	11001.60783	11001.60783	-147.248
42	216.8559	0.58305	11.3586	0.5821	0.0933	0.5898	0.0313	0.000	0.0000	14.4706	16.9483	15.535	-23.333	11012.96643	11063.96643	-147.248
43	217.4352	0.58362	11.3586	0.5828	0.0933	0.5895	0.0314	0.000	0.0000	14.4706	16.9483	-58.912	-23.524	11075.32502	11075.32502	36.409
44	218.3732	0.58453	11.3586	0.7594	0.0664	0.5257	0.0562	0.000	0.0000	14.4706	13.2310	-34.720	-23.524	11086.68362	11086.68362	36.409
45	219.3925	0.58552	11.3586	0.7601	0.0663	0.5250	0.0563	0.000	0.0000	14.4706	13.2310	-26.849	-23.524	11098.04221	11098.04221	36.409
46	220.4717	0.58657	11.3586	0.7609	0.0663	0.5244	0.0564	0.000	0.0000	14.4706	13.2310	-19.302	-23.524	11109.40081	11109.40081	36.409
47	221.5909	0.58764	11.3586	0.7616	0.0662	0.5237	0.0565	0.000	0.0000	14.4706	13.2310	-12.096	-23.524	11120.75941	11120.75941	36.409
48	222.7029	0.58871	11.3586	0.5879	0.0934	0.5879	0.0324	0.000	0.0000	14.4706	16.9483	10.735	-23.524	11132.11800	11183.11800	36.409
49	223.3605	0.58934	11.3586	0.5887	0.0934	0.5877	0.0326	0.000	0.0000	14.4706	16.9483	-54.533	-23.714	11194.47660	11194.47660	-120.884
50	224.3315	0.59026	11.3586	0.7636	0.0660	0.5221	0.0568	0.000	0.0000	14.4706	13.2310	-32.199	-23.714	11205.83520	11205.83520	-120.884
51	225.3626	0.59123	11.3586	0.7643	0.0659	0.5215	0.0569	0.000	0.0000	14.4706	13.2310	-26.152	-23.714	11217.19379	11217.19379	-120.884
52	226.4400	0.59225	11.3586	0.7650	0.0659	0.5209	0.0570	0.000	0.0000	14.4706	13.2310	-20.417	-23.714	11228.55239	11228.55239	-120.884
53	227.5515	0.59329	11.3586	0.7657	0.0658	0.5202	0.0571	0.000	0.0000	14.4706	13.2310	-15.005	-23.714	11239.91098	11239.91098	-120.884
54	228.6880	0.59435	11.3586	0.5936	0.0935	0.5861	0.0335	0.000	0.0000	14.4706	16.9483	6.020	-23.714	11251.26958	11528.66478	-120.884
	228.6880	0.59435	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.4744	0.0000	0.000	(11354.96718)	11528.66478			
	228.6880	0.59435	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	0.4744	0.0000	0.000	(11424.96718)	11528.66478			
55	229.4197	0.59503	11.3586	0.5945	0.0935	0.5858	0.0337	0.000	0.0000	14.4706	16.9483	-50.252	-23.905	11540.02338	11540.02338	18.346
56	230.4214	0.59596	11.3586	0.7676	0.0656	0.5186	0.0574	0.000	0.0000	14.4706	13.2310	-29.739	-23.905	11551.38197	11551.38197	18.346
57	231.4637	0.59692	11.3586	0.7683	0.0656	0.5180	0.0575	0.000	0.0000	14.4706	13.2310	-25.475	-23.905	11562.74057	11562.74057	18.346
58	232.5389	0.59791	11.3586	0.7690	0.0655	0.5174	0.0576	0.000	0.0000	14.4706	13.2310	-21.511	-23.905	11574.09917	11574.09917	18.346
59	233.6399	0.59892	11.3586	0.7697	0.0654	0.5168	0.0577	0.000	0.0000	14.4706	13.2310	-17.854	-23.905	11585.45776	11585.45776	18.346
60	234.7931	0.59997	11.3586	0.5992	0.0936	0.5842	0.0347	0.000	0.0000	14.4706	16.9483	1.403	-23.905	11596.81636	11647.81636	18.346
61	235.5945	0.60070	11.3586	0.6002	0.0936	0.5839	0.0349	0.000	0.0000	14.4706	16.9483	-46.083	-24.095	11659.17495	11659.17495	-102.072
62	236.6244	0.60163	11.3586	0.7715	0.0652	0.5151	0.0580	0.000	0.0000	14.4706	13.2310	-27.347	-24.095	11670.53355	11670.53355	-102.072

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63	237.6777	0.60258	11.3586	0.7722	0.0652	0.5145	0.0581	0.000	0.0000	14.4706	13.2310	-24.820	-24.095	11681.89215	11681.89215	-102.072
64	238.7501	0.60354	11.3586	0.7728	0.0651	0.5140	0.0582	0.000	0.0000	14.4706	13.2310	-22.581	-24.095	11693.25074	11693.25074	-102.072
65	239.8380	0.60451	11.3586	0.7735	0.0650	0.5134	0.0583	0.000	0.0000	14.4706	13.2310	-20.635	-24.095	11704.60934	11704.60934	-102.072
66	241.0003	0.60554	11.3586	0.6047	0.0937	0.5823	0.0358	0.000	0.0000	14.4706	16.9483	-3.106	-24.095	11715.96794	11766.96794	-102.072
67	241.8663	0.60631	11.3586	0.6056	0.0937	0.5820	0.0360	0.000	0.0000	14.4706	16.9483	-42.033	-24.286	11778.32653	11778.32653	155.235
68	242.9221	0.60724	11.3586	0.7753	0.0649	0.5117	0.0586	0.000	0.0000	14.4706	13.2310	-25.030	-24.286	11789.68513	11789.68513	155.235
69	243.9859	0.60817	11.3586	0.7760	0.0648	0.5112	0.0587	0.000	0.0000	14.4706	13.2310	-24.189	-24.286	11801.04372	11801.04372	155.235
70	245.0551	0.60910	11.3586	0.7766	0.0647	0.5106	0.0588	0.000	0.0000	14.4706	13.2310	-23.627	-24.286	11812.40232	11812.40232	155.235
71	246.1276	0.61004	11.3586	0.7772	0.0647	0.5100	0.0589	0.000	0.0000	14.4706	13.2310	-23.342	-24.286	11823.76092	11823.76092	155.235
72	247.2919	0.61105	11.3586	0.6100	0.0937	0.5804	0.0368	0.000	0.0000	14.4706	16.9483	-7.493	-24.286	11835.11951	12112.51471	155.235
	247.2919	0.61105	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.4756	0.0000	0.000	(11938.81711)	12112.51471			
	247.2919	0.61105	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	0.4756	0.0000	0.000	(12008.81711)	12112.51471			
73	248.2174	0.61184	11.3586	0.6110	0.0937	0.5800	0.0370	0.000	0.0000	14.4706	16.9483	-38.111	-24.476	12123.87331	12123.87331	88.198
74	249.2967	0.61277	11.3586	0.7790	0.0645	0.5084	0.0591	0.000	0.0000	14.4706	13.2310	-22.789	-24.476	12135.23191	12135.23191	88.198
75	250.3705	0.61369	11.3586	0.7796	0.0644	0.5078	0.0592	0.000	0.0000	14.4706	13.2310	-23.584	-24.476	12146.59050	12146.59050	88.198
76	251.4362	0.61460	11.3586	0.7802	0.0644	0.5073	0.0593	0.000	0.0000	14.4706	13.2310	-24.646	-24.476	12157.94910	12157.94910	88.198
77	252.4911	0.61549	11.3586	0.7808	0.0643	0.5067	0.0594	0.000	0.0000	14.4706	13.2310	-25.972	-24.476	12169.30769	12169.30769	88.198
78	253.6506	0.61647	11.3586	0.6152	0.0938	0.5785	0.0379	0.000	0.0000	14.4706	16.9483	-11.756	-24.476	12180.66629	12231.66629	88.198
79	254.6302	0.61730	11.3586	0.6161	0.0938	0.5781	0.0381	0.000	0.0000	14.4706	16.9483	-34.322	-24.667	12243.02489	12243.02489	19.367
80	255.7308	0.61822	11.3586	0.7825	0.0641	0.5051	0.0596	0.000	0.0000	14.4706	13.2310	-20.629	-24.667	12254.38348	12254.38348	19.367
81	256.8141	0.61912	11.3586	0.7831	0.0641	0.5046	0.0597	0.000	0.0000	14.4706	13.2310	-23.005	-24.667	12265.74208	12265.74208	19.367
82	257.8760	0.62001	11.3586	0.7837	0.0640	0.5040	0.0598	0.000	0.0000	14.4706	13.2310	-25.638	-24.667	12277.10067	12277.10067	19.367
83	258.9116	0.62086	11.3586	0.7843	0.0639	0.5035	0.0599	0.000	0.0000	14.4706	13.2310	-28.521	-24.667	12288.45927	12288.45927	19.367
84	260.0600	0.62181	11.3586	0.6202	0.0938	0.5765	0.0389	0.000	0.0000	14.4706	16.9483	-15.885	-24.667	12299.81787	12350.81787	19.367
85	261.0885	0.62265	11.3586	0.6212	0.0938	0.5762	0.0391	0.000	0.0000	14.4706	16.9483	-30.670	-24.857	12362.17646	12362.17646	-33.370
86	262.2083	0.62357	11.3586	0.7859	0.0638	0.5019	0.0602	0.000	0.0000	14.4706	13.2310	-18.552	-24.857	12373.53506	12373.53506	-33.370
87	263.3006	0.62446	11.3586	0.7865	0.0637	0.5014	0.0602	0.000	0.0000	14.4706	13.2310	-22.452	-24.857	12384.89366	12384.89366	-33.370
88	264.3582	0.62532	11.3586	0.7870	0.0637	0.5009	0.0603	0.000	0.0000	14.4706	13.2310	-26.601	-24.857	12396.25225	12396.25225	-33.370
89	265.3729	0.62614	11.3586	0.7876	0.0636	0.5004	0.0604	0.000	0.0000	14.4706	13.2310	-30.987	-24.857	12407.61085	12407.61085	-33.370
90	266.5045	0.62705	11.3586	0.6251	0.0938	0.5746	0.0399	0.000	0.0000	14.4706	16.9483	-19.881	-24.857	12418.96944	12696.36464	-33.370
	266.5045	0.62705	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.4768	0.0000	0.000	(12522.66704)	12696.36464			
	266.5045	0.62705	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	0.4768	0.0000	0.000	(12592.66704)	12696.36464			
91	267.5767	0.62790	11.3586	0.6260	0.0938	0.5742	0.0401	0.000	0.0000	14.4706	16.9483	-27.156	-25.048	12707.72324	12707.72324	39.253
92	268.7136	0.62881	11.3586	0.7892	0.0634	0.4988	0.0606	0.000	0.0000	14.4706	13.2310	-16.557	-25.048	12719.08184	12719.08184	39.253
93	269.8146	0.62969	11.3586	0.7897	0.0634	0.4983	0.0607	0.000	0.0000	14.4706	13.2310	-21.927	-25.048	12730.44043	12730.44043	39.253
94	270.8677	0.63052	11.3586	0.7903	0.0633	0.4978	0.0608	0.000	0.0000	14.4706	13.2310	-27.536	-25.048	12741.79903	12741.79903	39.253
95	271.8602	0.63130	11.3586	0.7908	0.0632	0.4973	0.0609	0.000	0.0000	14.4706	13.2310	-33.370	-25.048	12753.15763	12753.15763	39.253
96	272.9699	0.63217	11.3586	0.6298	0.0938	0.5727	0.0409	0.000	0.0000	14.4706	16.9483	-23.739	-25.048	12764.51622	12815.51622	39.253
97	274.0809	0.63304	11.3586	0.6306	0.0938	0.5724	0.0411	0.000	0.0000	14.4706	16.9483	-23.781	-25.238	12826.87482	12826.87482	16.984
98	275.2329	0.63394	11.3586	0.7923	0.0631	0.4958	0.0611	0.000	0.0000	14.4706	13.2310	-14.646	-25.238	12838.23341	12838.23341	16.984
99	276.3420	0.63480	11.3586	0.7928	0.0630	0.4954	0.0612	0.000	0.0000	14.4706	13.2310	-21.429	-25.238	12849.59201	12849.59201	16.984
100	277.3904	0.63561	11.3586	0.7933	0.0630	0.4949	0.0613	0.000	0.0000	14.4706	13.2310	-28.442	-25.238	12860.95061	12860.95061	16.984
101	278.3595	0.63635	11.3586	0.7938	0.0629	0.4944	0.0613	0.000	0.0000	14.4706	13.2310	-35.670	-25.238	12872.30920	12872.30920	16.984
102	279.4429	0.63718	11.3586	0.6343	0.0938	0.5708	0.0418	0.000	0.0000	14.4706	16.9483	-27.461	-25.238	12883.66780	12934.66780	16.984
103	280.5878	0.63806	11.3586	0.6351	0.0938	0.5705	0.0420	0.000	0.0000	14.4706	16.9483	-20.542	-25.429	12946.02640	12946.02640	9.089
104	281.7533	0.63894	11.3586	0.7953	0.0627	0.4929	0.0616	0.000	0.0000	14.4706	13.2310	-12.817	-25.429	12957.38499	12957.38499	9.089

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105	282.8701	0.63979	11.3586	0.7958	0.0627	0.4925	0.0616	0.000	0.0000	14.4706	13.2310	-20.958	-25.429	12968.74359	12968.74359	9.089	
106	283.9135	0.64057	11.3586	0.7963	0.0626	0.4920	0.0617	0.000	0.0000	14.4706	13.2310	-29.320	-25.429	12980.10218	12980.10218	9.089	
107	284.8585	0.64128	11.3586	0.7968	0.0626	0.4915	0.0618	0.000	0.0000	14.4706	13.2310	-37.888	-25.429	12991.46078	12991.46078	9.089	
108	285.9118	0.64207	11.3586	0.6386	0.0938	0.5690	0.0427	0.000	0.0000	14.4706	16.9483	-31.047	-25.429	13002.81938	13280.21458	9.089	
	285.9118	0.64207	51.0000	0.0000	0.0000	0.0000	40.000	-0.4792	0.0000	0.000	(13106.51698)	13280.21458					
	285.9118	0.64207	51.0000	0.0000	0.0000	0.0000	40.000	0.4792	0.0000	0.000	(13176.51698)	13280.21458					
109	287.0861	0.64295	11.3586	0.6394	0.0938	0.5687	0.0429	0.000	0.0000	14.4706	16.9483	-17.439	-25.619	13291.57317	13291.57317	-153.471	
110	288.2633	0.64382	11.3586	0.7981	0.0624	0.4901	0.0620	0.000	0.0000	14.4706	13.2310	-11.068	-25.619	13302.93177	13302.93177	-153.471	
111	289.3874	0.64465	11.3586	0.7986	0.0624	0.4897	0.0621	0.000	0.0000	14.4706	13.2310	-20.513	-25.619	13314.29037	13314.29037	-153.471	
112	290.4256	0.64542	11.3586	0.7991	0.0623	0.4892	0.0621	0.000	0.0000	14.4706	13.2310	-30.171	-25.619	13325.64896	13325.64896	-153.471	
113	291.3457	0.64609	11.3586	0.7995	0.0623	0.4887	0.0622	0.000	0.0000	14.4706	13.2310	-40.024	-25.619	13337.00756	13337.00756	-153.471	
114	292.3655	0.64684	11.3586	0.6428	0.0938	0.5672	0.0436	0.000	0.0000	14.4706	16.9483	-34.500	-25.619	13348.36615	13399.36615	-153.471	
115	293.5651	0.64771	11.3586	0.6435	0.0937	0.5668	0.0438	0.000	0.0000	14.4706	16.9483	-14.468	-25.810	13410.72475	13410.72475	-134.298	
116	294.7525	0.64857	11.3586	0.8009	0.0621	0.4874	0.0624	0.000	0.0000	14.4706	13.2310	-9.398	-25.810	13422.08335	13422.08335	-134.298	
117	295.8833	0.64939	11.3586	0.8013	0.0621	0.4869	0.0625	0.000	0.0000	14.4706	13.2310	-20.093	-25.810	13433.44194	13433.44194	-134.298	
118	296.9164	0.65014	11.3586	0.8018	0.0620	0.4865	0.0625	0.000	0.0000	14.4706	13.2310	-30.994	-25.810	13444.80054	13444.80054	-134.298	
119	297.8112	0.65078	11.3586	0.8022	0.0620	0.4860	0.0626	0.000	0.0000	14.4706	13.2310	-42.082	-25.810	13456.15914	13456.15914	-134.298	
120	298.7947	0.65148	11.3586	0.6468	0.0937	0.5654	0.0444	0.000	0.0000	14.4706	16.9483	-37.821	-25.810	13467.51773	13518.51773	-134.298	
121	300.0157	0.65235	11.3586	0.6475	0.0937	0.5651	0.0446	0.000	0.0000	14.4706	16.9483	-11.625	-26.000	13529.87633	13529.87633	-102.404	
122	301.2120	0.65320	11.3586	0.8035	0.0618	0.4848	0.0628	0.000	0.0000	14.4706	13.2310	-7.805	-26.000	13541.23492	13541.23492	-102.404	
123	302.3494	0.65400	11.3586	0.8039	0.0618	0.4843	0.0629	0.000	0.0000	14.4706	13.2310	-19.699	-26.000	13552.59352	13552.59352	-102.404	
124	303.3769	0.65472	11.3586	0.8043	0.0617	0.4839	0.0629	0.000	0.0000	14.4706	13.2310	-31.792	-26.000	13563.95212	13563.95212	-102.404	
125	304.2459	0.65533	11.3586	0.8047	0.0617	0.4835	0.0630	0.000	0.0000	14.4706	13.2310	-44.063	-26.000	13575.31071	13575.31071	-102.404	
126	305.1909	0.65599	51.0000	0.0000	0.0000	0.0000	40.000	-0.4804	0.0000	0.000	(13690.36691)	13864.06451					
	305.1909	0.65599	51.0000	0.0000	0.0000	0.0000	40.000	-0.4804	0.0000	0.000	(13690.36691)	13864.06451					

 *** ORNL June 12,2000 Design BTW SC2 1a-SC2 1b

Transport
 Bore 1 5.0
 ;quad L, Ra, outputflag, B, errorflag
 drift 0. 5.0 1 4
 drift 15.0 5.0 1 8
 quad 40.0 0 1 +480.4 1
 drift 25. 5.0 1 8
 drift 58.6976 5.0 1 8
 ;scheff deltaR, deltaZ, Nr, Nz, Nbunch, Nbetalambda, Remesh
 scheff .05 .05 20 40 0 0 3
 output 2 1 1 3000 1
 prbeam

linout subroutine no. 1 dynamical parameters
 *** ORNL June 12,2000 Design SC2 1b ***

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Transit time factors are for the synchronous or reference particles.

If you are designing symmetric linac, the phase printed is REFERENCE Particle phase at the center of the gap.

Also, the kinetic energy and beta are for the REFERENCE particle at the end of the cell.

The geometrical beta for the cavities are printed in the WALLPWR file (with Power keyword).

E is the field for the cell(used as E*t*l*cosphi). It includes the ratio E/E0 for that cell.

tank no. 1 tank length 3083.836 (cm) 100 cells power= 8.106 MW frequency= 805.00MHz
(Cu+Beam) wavelength= 37.24130 cm

This superconducting design, one/two quads locate after symmetric units.

cell number	kinetic energy (MeV)	beta	cell length (cm)	t	tp	s	sp	quad length (cm)	quad gradient (kG/cm)	Ezero (MV/m)	E (MV/m)	phis (Deg)	PhiDesign phref (Deg)	TotalLeng (QuadCtr)(cm)	TotalLeng (cm)	rel.driver toEndwall/ toNextBeginwall phase (Deg)
Absolute z= 13864.06451 (cm) position is at the starting face of the first cavity.																
initial	305.1909	0.65599						0.000	0.0000		(0.00000)	13864.06451				
1	306.4302	0.65686	11.3586	0.6513	0.0937	0.5633	0.0454	0.000	0.0000	14.4706	16.9483	-8.715	-26.000	13875.42311	13875.42311	75.816
2	307.6346	0.65769	11.3586	0.8060	0.0615	0.4822	0.0632	0.000	0.0000	14.4706	13.2310	-6.094	-26.000	13886.78170	13886.78170	75.816
3	308.7795	0.65848	11.3586	0.8064	0.0615	0.4818	0.0632	0.000	0.0000	14.4706	13.2310	-19.137	-26.000	13898.14030	13898.14030	75.816
4	309.8035	0.65919	11.3586	0.8068	0.0614	0.4814	0.0633	0.000	0.0000	14.4706	13.2310	-32.373	-26.000	13909.49889	13909.49889	75.816
5	310.6496	0.65977	11.3586	0.8072	0.0614	0.4810	0.0634	0.000	0.0000	14.4706	13.2310	-45.780	-26.000	13920.85749	13920.85749	75.816
6	311.5572	0.66039	11.3586	0.6543	0.0936	0.5619	0.0460	0.000	0.0000	14.4706	16.9483	-43.901	-26.000	13932.21609	13983.21609	75.816
7	312.8113	0.66124	11.3586	0.6549	0.0936	0.5616	0.0462	0.000	0.0000	14.4706	16.9483	-5.920	-26.000	13994.57468	13994.57468	131.809
8	314.0225	0.66206	11.3586	0.8083	0.0612	0.4798	0.0635	0.000	0.0000	14.4706	13.2310	-4.451	-26.000	14005.93328	14005.93328	131.809
9	315.1744	0.66284	11.3586	0.8087	0.0612	0.4794	0.0636	0.000	0.0000	14.4706	13.2310	-18.598	-26.000	14017.29188	14017.29188	131.809
10	316.1950	0.66353	11.3586	0.8091	0.0611	0.4790	0.0637	0.000	0.0000	14.4706	13.2310	-32.931	-26.000	14028.65047	14028.65047	131.809
11	317.0181	0.66408	11.3586	0.8095	0.0611	0.4785	0.0637	0.000	0.0000	14.4706	13.2310	-47.428	-26.000	14040.00907	14040.00907	131.809
12	317.8871	0.66466	11.3586	0.6579	0.0936	0.5602	0.0468	0.000	0.0000	14.4706	16.9483	-46.671	-26.000	14051.36766	14102.36766	131.809
13	319.1526	0.66551	11.3586	0.6584	0.0935	0.5600	0.0469	0.000	0.0000	14.4706	16.9483	-3.237	-26.000	14113.72626	14113.72626	-160.955
14	320.3692	0.66631	11.3586	0.8106	0.0610	0.4774	0.0639	0.000	0.0000	14.4706	13.2310	-2.875	-26.000	14125.08486	14125.08486	-160.955
15	321.5279	0.66708	11.3586	0.8110	0.0609	0.4770	0.0639	0.000	0.0000	14.4706	13.2310	-18.081	-26.000	14136.44345	14136.44345	-160.955
16	322.5451	0.66775	11.3586	0.8114	0.0609	0.4766	0.0640	0.000	0.0000	14.4706	13.2310	-33.467	-26.000	14147.80205	14147.80205	-160.955
17	323.3453	0.66827	11.3586	0.8117	0.0608	0.4762	0.0640	0.000	0.0000	14.4706	13.2310	-49.009	-26.000	14159.16065	14159.16065	-160.955
18	324.1749	0.66882	11.3586	0.6613	0.0935	0.5586	0.0475	0.000	0.0000	14.4706	16.9483	-49.331	-26.000	14170.51924	14447.91444	-160.955
	324.1749	0.66882	51.0000	0.0000	0.0000	0.0000	40.000	-0.4804	0.0000	0.000		(14274.21684)	14447.91444			
	324.1749	0.66882	51.0000	0.0000	0.0000	0.0000	40.000	0.4804	0.0000	0.000		(14344.21684)	14447.91444			
19	325.4488	0.66965	11.3586	0.6618	0.0935	0.5584	0.0476	0.000	0.0000	14.4706	16.9483	-0.661	-26.000	14459.27304	14459.27304	-115.106
20	326.6699	0.67044	11.3586	0.8128	0.0607	0.4751	0.0642	0.000	0.0000	14.4706	13.2310	-1.363	-26.000	14470.63163	14470.63163	-115.106
21	327.8349	0.67120	11.3586	0.8132	0.0607	0.4747	0.0643	0.000	0.0000	14.4706	13.2310	-17.584	-26.000	14481.99023	14481.99023	-115.106
22	328.8487	0.67185	11.3586	0.8135	0.0606	0.4743	0.0643	0.000	0.0000	14.4706	13.2310	-33.980	-26.000	14493.34883	14493.34883	-115.106
23	329.6263	0.67235	11.3586	0.8139	0.0606	0.4739	0.0644	0.000	0.0000	14.4706	13.2310	-50.527	-26.000	14504.70742	14504.70742	-115.106
24	330.4159	0.67286	11.3586	0.6645	0.0934	0.5570	0.0482	0.000	0.0000	14.4706	16.9483	-51.885	-26.000	14516.06602	14567.06602	-115.106

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25	331.6954	0.67368	11.3586	0.6650	0.0934	0.5568	0.0483	0.000	0.0000	14.4706	16.9483	1.812	-26.000	14578.42462	14578.42462	-26.719
26	332.9200	0.67445	11.3586	0.8148	0.0604	0.4729	0.0645	0.000	0.0000	14.4706	13.2310	0.089	-26.000	14589.78321	14589.78321	-26.719
27	334.0910	0.67520	11.3586	0.8152	0.0604	0.4725	0.0646	0.000	0.0000	14.4706	13.2310	-17.108	-26.000	14601.14181	14601.14181	-26.719
28	335.1014	0.67584	11.3586	0.8156	0.0604	0.4722	0.0646	0.000	0.0000	14.4706	13.2310	-34.473	-26.000	14612.50040	14612.50040	-26.719
29	335.8566	0.67631	11.3586	0.8159	0.0603	0.4718	0.0647	0.000	0.0000	14.4706	13.2310	-51.983	-26.000	14623.85900	14623.85900	-26.719
30	336.6059	0.67678	11.3586	0.6677	0.0934	0.5554	0.0489	0.000	0.0000	14.4706	16.9483	-54.337	-26.000	14635.21760	14686.21760	-26.719
31	337.8886	0.67759	11.3586	0.6681	0.0934	0.5552	0.0490	0.000	0.0000	14.4706	16.9483	4.187	-26.000	14697.57619	14697.57619	71.613
32	339.1158	0.67835	11.3586	0.8168	0.0602	0.4708	0.0648	0.000	0.0000	14.4706	13.2310	1.482	-26.000	14708.93479	14708.93479	71.613
33	340.2924	0.67908	11.3586	0.8172	0.0602	0.4704	0.0649	0.000	0.0000	14.4706	13.2310	-16.650	-26.000	14720.29339	14720.29339	71.613
34	341.2995	0.67971	11.3586	0.8175	0.0601	0.4700	0.0649	0.000	0.0000	14.4706	13.2310	-34.946	-26.000	14731.65198	14731.65198	71.613
35	342.0327	0.68016	11.3586	0.8179	0.0601	0.4697	0.0650	0.000	0.0000	14.4706	13.2310	-53.382	-26.000	14743.01058	14743.01058	71.613
36	342.7417	0.68060	11.3586	0.6707	0.0933	0.5539	0.0495	0.000	0.0000	14.4706	16.9483	-56.692	-26.000	14754.36917	15031.76437	71.613
	342.7417	0.68060	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.4804	0.0000	0.000	(14858.06677)	15031.76437			
	342.7417	0.68060	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	0.4804	0.0000	0.000	(14928.06677)	15031.76437			
37	344.0253	0.68138	11.3586	0.6710	0.0933	0.5537	0.0496	0.000	0.0000	14.4706	16.9483	6.467	-26.000	15043.12297	15043.12297	-156.061
38	345.2543	0.68213	11.3586	0.8187	0.0600	0.4687	0.0651	0.000	0.0000	14.4706	13.2310	2.821	-26.000	15054.48157	15054.48157	-156.061
39	346.4363	0.68285	11.3586	0.8191	0.0599	0.4684	0.0652	0.000	0.0000	14.4706	13.2310	-16.210	-26.000	15065.84016	15065.84016	-156.061
40	347.4401	0.68346	11.3586	0.8194	0.0599	0.4680	0.0652	0.000	0.0000	14.4706	13.2310	-35.400	-26.000	15077.19876	15077.19876	-156.061
41	348.1515	0.68389	11.3586	0.8197	0.0598	0.4677	0.0653	0.000	0.0000	14.4706	13.2310	-54.724	-26.000	15088.55735	15088.55735	-156.061
42	348.8202	0.68430	11.3586	0.6736	0.0932	0.5524	0.0501	0.000	0.0000	14.4706	16.9483	-58.954	-26.000	15099.91595	15150.91595	-156.061
43	350.1027	0.68507	11.3586	0.6739	0.0932	0.5523	0.0502	0.000	0.0000	14.4706	16.9483	8.659	-26.000	15162.27455	15162.27455	-39.008
44	351.3327	0.68581	11.3586	0.8205	0.0597	0.4668	0.0654	0.000	0.0000	14.4706	13.2310	4.105	-26.000	15173.63314	15173.63314	-39.008
45	352.5198	0.68652	11.3586	0.8209	0.0597	0.4664	0.0654	0.000	0.0000	14.4706	13.2310	-15.788	-26.000	15184.99174	15184.99174	-39.008
46	353.5203	0.68711	11.3586	0.8212	0.0596	0.4660	0.0655	0.000	0.0000	14.4706	13.2310	-35.836	-26.000	15196.35034	15196.35034	-39.008
47	354.2105	0.68752	11.3586	0.8215	0.0596	0.4657	0.0655	0.000	0.0000	14.4706	13.2310	-56.013	-26.000	15207.70893	15207.70893	-39.008
48	354.8392	0.68789	11.3586	0.6763	0.0931	0.5510	0.0507	0.000	0.0000	14.4706	16.9483	-61.128	-26.000	15219.06753	15270.06753	-39.008
49	356.1188	0.68865	11.3586	0.6766	0.0931	0.5509	0.0508	0.000	0.0000	14.4706	16.9483	10.764	-26.000	15281.42612	15281.42612	86.857
50	357.3492	0.68937	11.3586	0.8223	0.0595	0.4648	0.0656	0.000	0.0000	14.4706	13.2310	5.340	-26.000	15292.78472	15292.78472	86.857
51	358.5412	0.69007	11.3586	0.8226	0.0595	0.4645	0.0657	0.000	0.0000	14.4706	13.2310	-15.382	-26.000	15304.14332	15304.14332	86.857
52	359.5385	0.69065	11.3586	0.8229	0.0594	0.4641	0.0657	0.000	0.0000	14.4706	13.2310	-36.254	-26.000	15315.50191	15315.50191	86.857
53	360.2078	0.69104	11.3586	0.8232	0.0594	0.4638	0.0658	0.000	0.0000	14.4706	13.2310	-57.251	-26.000	15326.86051	15326.86051	86.857
54	360.7968	0.69139	11.3586	0.6790	0.0931	0.5496	0.0513	0.000	0.0000	14.4706	16.9483	-63.216	-26.000	15338.21911	15615.61431	86.857
	360.7968	0.69139	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.4669	0.0000	0.000	(15441.91671)	15615.61431			
	360.7968	0.69139	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	0.4660	0.0000	0.000	(15511.91671)	15615.61431			
55	362.0720	0.69213	11.3586	0.6792	0.0931	0.5495	0.0514	0.000	0.0000	14.4706	16.9483	12.788	-26.000	15626.97290	15626.97290	-64.175
56	363.3022	0.69284	11.3586	0.8240	0.0593	0.4630	0.0659	0.000	0.0000	14.4706	13.2310	6.526	-26.000	15638.33150	15638.33150	-64.175
57	364.4988	0.69352	11.3586	0.8243	0.0592	0.4627	0.0659	0.000	0.0000	14.4706	13.2310	-14.992	-26.000	15649.69009	15649.69009	-64.175
58	365.4929	0.69409	11.3586	0.8246	0.0592	0.4623	0.0660	0.000	0.0000	14.4706	13.2310	-36.656	-26.000	15661.04869	15661.04869	-64.175
59	366.1417	0.69446	11.3586	0.8249	0.0592	0.4620	0.0660	0.000	0.0000	14.4706	13.2310	-58.441	-26.000	15672.40729	15672.40729	-64.175
60	366.6915	0.69478	11.3586	0.6815	0.0930	0.5482	0.0519	0.000	0.0000	14.4706	16.9483	-65.225	-26.000	15683.76588	15734.76588	-64.175
61	367.9608	0.69550	11.3586	0.6817	0.0930	0.5481	0.0519	0.000	0.0000	14.4706	16.9483	14.735	-26.000	15746.12448	15746.12448	78.300
62	369.1903	0.69620	11.3586	0.8255	0.0591	0.4612	0.0661	0.000	0.0000	14.4706	13.2310	7.667	-26.000	15757.48308	15757.48308	78.300
63	370.3913	0.69688	11.3586	0.8258	0.0590	0.4609	0.0662	0.000	0.0000	14.4706	13.2310	-14.617	-26.000	15768.84167	15768.84167	78.300
64	371.3823	0.69743	11.3586	0.8261	0.0590	0.4606	0.0662	0.000	0.0000	14.4706	13.2310	-37.043	-26.000	15780.20027	15780.20027	78.300
65	372.0111	0.69779	11.3586	0.8264	0.0590	0.4602	0.0663	0.000	0.0000	14.4706	13.2310	-59.585	-26.000	15791.55886	15791.55886	78.300
66	372.5222	0.69807	11.3586	0.6840	0.0929	0.5469	0.0524	0.000	0.0000	14.4706	16.9483	-67.157	-26.000	15802.91746	15853.91746	78.300

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67 373.7844 0.69878 11.3586 0.6842 0.0929 0.5468 0.0524 0.000 0.0000 14.4706 16.9483 16.608 -26.000 15865.27606 15865.27606 -131.394
68 375.0128 0.69946 11.3586 0.8271 0.0589 0.4595 0.0664 0.000 0.0000 14.4706 13.2310 8.764 -26.000 15876.63465 15876.63465 -131.394
69 376.2180 0.70013 11.3586 0.8274 0.0588 0.4592 0.0664 0.000 0.0000 14.4706 13.2310 -14.256 -26.000 15887.99325 15887.99325 -131.394
70 377.2059 0.70068 11.3586 0.8277 0.0588 0.4588 0.0665 0.000 0.0000 14.4706 13.2310 -37.415 -26.000 15899.35185 15899.35185 -131.394
71 377.8151 0.70101 11.3586 0.8280 0.0588 0.4585 0.0665 0.000 0.0000 14.4706 13.2310 -60.686 -26.000 15910.71044 15910.71044 -131.394
72 378.2883 0.70127 11.3586 0.6864 0.0928 0.5456 0.0529 0.000 0.0000 14.4706 16.9483 -69.015 -26.000 15922.06904 16199.46424 -131.394
378.2883 0.70127 51.0000 0.0000 0.0000 0.0000 40.000 -0.5201 0.0000 0.000 ( 16025.76664) 16199.46424
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*** ORNL June 12,2000 Design BTW Sc2 1b-SC2 2a
*****
Transport -20
Bore 1 2.5
;quad L, Ra, outputflag, B, errorflag
drift 0. 5.0 1 4
drift 15. 5.0 1 6
quad 40.0 0 1 +515.0 1 1
drift 25. 5.0 1 6
drift 58.7164 5.0 1 10
;scheff deltaR, deltaZ, Nr, Nz, Nbunch, Nbetalambda, Remesh
scheff .05 .05 20 40 0 0 3
output 2 1 1 3000 1
prtbeam
begin
```

*** ORNL June 12,2000 Design SC2 2a ***

linout subroutine no. 1 dynamical parameters

Transit time factors are for the synchronous or reference particles.

If you are designing symmetric linac, the phase printed is REFERENCE Particle phase at the center of the gap.

Also, the kinetic energy and beta are for the REFERENCE particle at the end of the cell.

The geometrical beta for the cavities are printed in the WALLPWR file (with Power keyword).

E is the field for the cell(used as E*t*I*coshphi). It includes the ratio E/E0 for that cell.

tank no. 1 tank length 12340.364 (cm) 380 cells power= 49.609 MW frequency= 805.00MHz
(Cu+Beam) wavelength= 37.24130 cm

This superconducting design, one/two quads locate after symmetric units.

cell number	kinetic energy (MeV)	beta	cell length (cm)	t	tp	s	sp	quad length (cm)	quad gradient (kG/cm)	Ezero (MV/m)	E (MV/m)	phis (Deg)	PhiDesign (QuadCtr)	TotalLeng (cm)	TotalLeng (cm)	rel.driver toEndwall/ toNextBeginwall	phase (Deg)
Absolute z= 16199.48304 (cm) position is at the starting face of the first cavity.																	
initial	378.2883	0.70127						0.000	0.0000			(-0.00000)	16199.48304				
1	377.7183	0.70096	15.0827	0.5444	0.0915	0.6113	0.0255	0.000	0.0000	18.0257	20.5005	-109.795	-26.500	16214.56576	16214.56576	-14.271	
2	378.3886	0.70133	15.0827	0.7043	0.0720	0.5698	0.0493	0.000	0.0000	18.0257	16.7922	-67.927	-26.500	16229.64849	16229.64849	-14.271	
3	379.7563	0.70208	15.0827	0.7050	0.0720	0.5694	0.0494	0.000	0.0000	18.0257	16.7922	-40.002	-26.500	16244.73122	16244.73122	-14.271	
4	381.5023	0.70303	15.0827	0.7056	0.0720	0.5690	0.0494	0.000	0.0000	18.0257	16.7922	-12.315	-26.500	16259.81394	16259.81394	-14.271	
5	383.2294	0.70397	15.0827	0.7062	0.0719	0.5685	0.0495	0.000	0.0000	18.0257	16.7922	15.072	-26.500	16274.89667	16274.89667	-14.271	
6	384.1782	0.70448	15.0827	0.5483	0.0916	0.6103	0.0262	0.000	0.0000	18.0257	20.5005	55.968	-26.500	16289.97940	16340.97940	-14.271	
7	383.6834	0.70422	15.0827	0.5474	0.0916	0.6105	0.0260	0.000	0.0000	18.0257	20.5005	-106.999	-26.117	16356.06212	16356.06212	-156.393	
8	384.4086	0.70461	15.0827	0.7067	0.0719	0.5682	0.0496	0.000	0.0000	18.0257	16.7922	-66.098	-26.117	16371.14485	16371.14485	-156.393	
9	385.7980	0.70536	15.0827	0.7073	0.0718	0.5678	0.0497	0.000	0.0000	18.0257	16.7922	-39.142	-26.117	16386.22757	16386.22757	-156.393	
10	387.5491	0.70629	15.0827	0.7079	0.0718	0.5673	0.0498	0.000	0.0000	18.0257	16.7922	-12.420	-26.117	16401.31030	16401.31030	-156.393	
11	389.2903	0.70722	15.0827	0.7086	0.0718	0.5669	0.0499	0.000	0.0000	18.0257	16.7922	14.009	-26.117	16416.39303	16416.39303	-156.393	
12	390.2934	0.70776	15.0827	0.5513	0.0917	0.6095	0.0267	0.000	0.0000	18.0257	20.5005	53.949	-26.117	16431.47575	16482.47575	-156.393	
13	389.8708	0.70753	15.0827	0.5505	0.0916	0.6097	0.0266	0.000	0.0000	18.0257	20.5005	-104.376	-25.925	16497.55848	16497.55848	70.310	
14	390.6454	0.70794	15.0827	0.7091	0.0717	0.5666	0.0500	0.000	0.0000	18.0257	16.7921	-64.451	-25.925	16512.64120	16512.64120	70.310	
15	392.0527	0.70869	15.0827	0.7097	0.0717	0.5661	0.0501	0.000	0.0000	18.0257	16.7921	-38.470	-25.925	16527.72393	16527.72393	70.310	
16	393.8076	0.70961	15.0827	0.7103	0.0716	0.5657	0.0502	0.000	0.0000	18.0257	16.7921	-12.720	-25.925	16542.80666	16542.80666	70.310	
17	395.5638	0.71053	15.0827	0.7109	0.0716	0.5653	0.0502	0.000	0.0000	18.0257	16.7921	12.745	-25.925	16557.88938	16557.88938	70.310	
18	396.6254	0.71108	15.0827	0.5542	0.0917	0.6087	0.0273	0.000	0.0000	18.0257	20.5005	51.723	-25.925	16572.97211	16623.97211	70.310	
19	396.2772	0.71090	15.0827	0.5535	0.0917	0.6089	0.0271	0.000	0.0000	18.0257	20.5005	-101.737	-25.733	16639.05483	16639.05483	-53.909	
20	397.1010	0.71133	15.0827	0.7115	0.0715	0.5649	0.0503	0.000	0.0000	18.0257	16.7921	-62.795	-25.733	16654.13756	16654.13756	-53.909	

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21	398.5261	0.71207	15.0827	0.7121	0.0715	0.5645	0.0504	0.000	0.0000	18.0257	16.7921	-37.796	-25.733	16669.22029	16669.22029	-53.909
22	400.2847	0.71298	15.0827	0.7127	0.0715	0.5640	0.0505	0.000	0.0000	18.0257	16.7921	-13.024	-25.733	16684.30301	16684.30301	-53.909
23	402.0551	0.71389	15.0827	0.7133	0.0714	0.5636	0.0506	0.000	0.0000	18.0257	16.7921	11.472	-25.733	16699.38574	16699.38574	-53.909
24	403.1745	0.71446	15.0827	0.5572	0.0918	0.6078	0.0278	0.000	0.0000	18.0257	20.5004	49.480	-25.733	16714.46847	16991.86367	-53.909
	403.1745	0.71446	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.5420	0.0000	0.000	(16818.16607)	16991.86367			
	403.1745	0.71446	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	0.5420	0.0000	0.000	(16888.16607)	16991.86367			
25	402.9027	0.71432	15.0827	0.5566	0.0918	0.6080	0.0277	0.000	0.0000	18.0257	20.5004	-99.086	-25.542	17006.94639	17006.94639	7.846
26	403.7756	0.71476	15.0827	0.7139	0.0714	0.5632	0.0507	0.000	0.0000	18.0257	16.7921	-61.133	-25.542	17022.02912	17022.02912	7.846
27	405.2184	0.71550	15.0827	0.7145	0.0713	0.5628	0.0508	0.000	0.0000	18.0257	16.7921	-37.120	-25.542	17037.11184	17037.11184	7.846
28	406.9807	0.71639	15.0827	0.7150	0.0713	0.5623	0.0509	0.000	0.0000	18.0257	16.7921	-13.330	-25.542	17052.19457	17052.19457	7.846
29	408.7645	0.71729	15.0827	0.7156	0.0712	0.5619	0.0510	0.000	0.0000	18.0257	16.7921	10.192	-25.542	17067.27730	17067.27730	7.846
30	409.9410	0.71788	15.0827	0.5603	0.0918	0.6070	0.0284	0.000	0.0000	18.0257	20.5004	47.227	-25.542	17082.36002	17133.36002	7.846
31	409.7472	0.71778	15.0827	0.5598	0.0918	0.6071	0.0283	0.000	0.0000	18.0257	20.5004	-96.428	-25.350	17148.44275	17148.44275	-98.094
32	410.6688	0.71824	15.0827	0.7163	0.0712	0.5615	0.0511	0.000	0.0000	18.0257	16.7921	-59.467	-25.350	17163.52547	17163.52547	-98.094
33	412.1294	0.71897	15.0827	0.7169	0.0711	0.5610	0.0511	0.000	0.0000	18.0257	16.7921	-36.443	-25.350	17178.60820	17178.60820	-98.094
34	413.8953	0.71984	15.0827	0.7174	0.0711	0.5606	0.0512	0.000	0.0000	18.0257	16.7921	-13.637	-25.350	17193.69093	17193.69093	-98.094
35	415.6918	0.72073	15.0827	0.7180	0.0711	0.5602	0.0513	0.000	0.0000	18.0257	16.7921	8.909	-25.350	17208.77365	17208.77365	-98.094
36	416.9241	0.72134	15.0827	0.5633	0.0919	0.6061	0.0289	0.000	0.0000	18.0257	20.5004	44.967	-25.350	17223.85638	17224.85638	-98.094
37	416.8098	0.72128	15.0827	0.5629	0.0919	0.6062	0.0289	0.000	0.0000	18.0257	20.5004	-93.767	-25.158	17289.93911	17289.93911	165.140
38	417.7798	0.72176	15.0827	0.7187	0.0710	0.5597	0.0514	0.000	0.0000	18.0257	16.7921	-57.800	-25.158	17305.02183	17305.02183	165.140
39	419.2579	0.72248	15.0827	0.7192	0.0710	0.5593	0.0515	0.000	0.0000	18.0257	16.7921	-35.766	-25.158	17320.10456	17320.10456	165.140
40	421.0272	0.72334	15.0827	0.7198	0.0709	0.5589	0.0516	0.000	0.0000	18.0257	16.7921	-13.944	-25.158	17335.18728	17335.18728	165.140
41	422.8355	0.72421	15.0827	0.7203	0.0709	0.5585	0.0517	0.000	0.0000	18.0257	16.7921	7.624	-25.158	17350.27001	17350.27001	165.140
42	424.1223	0.72483	15.0827	0.5663	0.0919	0.6052	0.0295	0.000	0.0000	18.0257	20.5004	42.703	-25.158	17365.35274	17416.35274	165.140
43	424.0886	0.72481	15.0827	0.5660	0.0919	0.6053	0.0294	0.000	0.0000	18.0257	20.5004	-91.105	-24.967	17431.43546	17431.43546	77.547
44	425.1063	0.72530	15.0827	0.7211	0.0708	0.5580	0.0518	0.000	0.0000	18.0257	16.7921	-56.135	-24.967	17446.51819	17446.51819	77.547
45	426.6018	0.72602	15.0827	0.7216	0.0708	0.5576	0.0519	0.000	0.0000	18.0257	16.7921	-35.089	-24.967	17461.60091	17461.60091	77.547
46	428.3745	0.72686	15.0827	0.7222	0.0707	0.5572	0.0519	0.000	0.0000	18.0257	16.7921	-14.252	-24.967	17476.68364	17476.68364	77.547
47	430.1938	0.72772	15.0827	0.7227	0.0707	0.5568	0.0520	0.000	0.0000	18.0257	16.7921	6.340	-24.967	17491.76637	17491.76637	77.547
48	431.5337	0.72835	15.0827	0.5694	0.0920	0.6043	0.0301	0.000	0.0000	18.0257	20.5005	40.440	-24.967	17506.84909	17784.24429	77.547
	431.5337	0.72835	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.5420	0.0000	0.000	(17610.54669)	17784.24429			
	431.5337	0.72835	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	0.5420	0.0000	0.000	(17680.54669)	17784.24429			
49	431.5813	0.72837	15.0827	0.5691	0.0920	0.6043	0.0300	0.000	0.0000	18.0257	20.5005	-88.449	-24.775	17799.32702	17799.32702	-125.603
50	432.6461	0.72887	15.0827	0.7235	0.0706	0.5562	0.0521	0.000	0.0000	18.0257	16.7921	-54.473	-24.775	17814.40975	17814.40975	-125.603
51	434.1589	0.72958	15.0827	0.7240	0.0706	0.5558	0.0522	0.000	0.0000	18.0257	16.7921	-34.413	-24.775	17829.49247	17829.49247	-125.603
52	435.9351	0.73041	15.0827	0.7246	0.0706	0.5554	0.0523	0.000	0.0000	18.0257	16.7921	-14.558	-24.775	17844.57520	17844.57520	-125.603
53	437.7643	0.73126	15.0827	0.7251	0.0705	0.5551	0.0524	0.000	0.0000	18.0257	16.7921	5.060	-24.775	17859.65792	17859.65792	-125.603
54	439.1555	0.73190	15.0827	0.5724	0.0920	0.6033	0.0306	0.000	0.0000	18.0257	20.5005	38.183	-24.775	17874.74065	17925.74065	-125.603
55	439.2851	0.73196	15.0827	0.5722	0.0920	0.6034	0.0306	0.000	0.0000	18.0257	20.5005	-85.801	-24.583	17940.82338	17940.82338	165.099
56	440.3962	0.73247	15.0827	0.7259	0.0705	0.5545	0.0525	0.000	0.0000	18.0257	16.7922	-52.816	-24.583	17955.90610	17955.90610	165.099
57	441.9260	0.73317	15.0827	0.7264	0.0704	0.5541	0.0526	0.000	0.0000	18.0257	16.7922	-33.739	-24.583	17970.98883	17970.98883	165.099
58	443.7054	0.73398	15.0827	0.7269	0.0704	0.5537	0.0526	0.000	0.0000	18.0257	16.7922	-14.862	-24.583	17986.07155	17986.07155	165.099
59	445.5436	0.73481	15.0827	0.7274	0.0703	0.5533	0.0527	0.000	0.0000	18.0257	16.7922	3.785	-24.583	18001.15428	18001.15428	165.099
60	446.9843	0.73546	15.0827	0.5754	0.0920	0.6024	0.0312	0.000	0.0000	18.0257	20.5005	35.933	-24.583	18016.23701	18067.23701	165.099
61	447.1960	0.73556	15.0827	0.5753	0.0920	0.6024	0.0312	0.000	0.0000	18.0257	20.5005	-83.166	-24.392	18082.31973	18082.31973	104.892
62	448.3525	0.73608	15.0827	0.7282	0.0703	0.5527	0.0528	0.000	0.0000	18.0257	16.7922	-51.169	-24.392	18097.40246	18097.40246	104.892

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63	449.8991	0.73677	15.0827	0.7287	0.0702	0.5523	0.0529	0.000	0.0000	18.0257	16.7922	-33.068	-24.392	18112.48519	18112.48519	104.892
64	451.6817	0.73756	15.0827	0.7292	0.0702	0.5519	0.0530	0.000	0.0000	18.0257	16.7922	-15.163	-24.392	18127.56791	18127.56791	104.892
65	453.5281	0.73838	15.0827	0.7297	0.0701	0.5516	0.0531	0.000	0.0000	18.0257	16.7922	2.519	-24.392	18142.65064	18142.65064	104.892
66	455.0162	0.73904	15.0827	0.5785	0.0921	0.6014	0.0318	0.000	0.0000	18.0257	20.5005	33.697	-24.392	18157.73336	18208.73336	104.892
67	455.3100	0.73917	15.0827	0.5784	0.0921	0.6014	0.0318	0.000	0.0000	18.0257	20.5005	-80.547	-24.200	18223.81609	18223.81609	53.721
68	456.5109	0.73969	15.0827	0.7306	0.0701	0.5509	0.0532	0.000	0.0000	18.0257	16.7922	-49.531	-24.200	18238.89882	18238.89882	53.721
69	458.0743	0.74038	15.0827	0.7311	0.0700	0.5506	0.0533	0.000	0.0000	18.0257	16.7922	-32.401	-24.200	18253.98154	18253.98154	53.721
70	459.8600	0.74116	15.0827	0.7315	0.0700	0.5502	0.0533	0.000	0.0000	18.0257	16.7922	-15.461	-24.200	18269.06427	18269.06427	53.721
71	461.7135	0.74196	15.0827	0.7320	0.0700	0.5498	0.0534	0.000	0.0000	18.0257	16.7922	1.262	-24.200	18284.14699	18284.14699	53.721
72	463.2468	0.74262	15.0827	0.5815	0.0921	0.6004	0.0323	0.000	0.0000	18.0257	20.5005	31.477	-24.200	18299.22972	18576.62492	53.721
	463.2468	0.74262	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.5420	0.0000	0.000	(18402.92732)	18576.62492			
	463.2468	0.74262	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	0.5420	0.0000	0.000	(18472.92732)	18576.62492			
73	463.6223	0.74278	15.0827	0.5815	0.0921	0.6004	0.0323	0.000	0.0000	18.0257	20.5005	-77.947	-24.008	18591.70765	18591.70765	-55.462
74	464.8666	0.74332	15.0827	0.7329	0.0699	0.5492	0.0535	0.000	0.0000	18.0257	16.7922	-47.906	-24.008	18606.79037	18606.79037	-55.462
75	466.4462	0.74399	15.0827	0.7333	0.0699	0.5488	0.0536	0.000	0.0000	18.0257	16.7922	-31.738	-24.008	18621.87310	18621.87310	-55.462
76	468.2349	0.74476	15.0827	0.7338	0.0698	0.5484	0.0537	0.000	0.0000	18.0257	16.7922	-15.755	-24.008	18636.95583	18636.95583	-55.462
77	470.0946	0.74554	15.0827	0.7343	0.0698	0.5481	0.0538	0.000	0.0000	18.0257	16.7922	0.018	-24.008	18652.03855	18652.03855	-55.462
78	471.6709	0.74621	15.0827	0.5844	0.0921	0.5994	0.0329	0.000	0.0000	18.0257	20.5005	29.277	-24.008	18667.12128	18718.12128	-55.462
79	472.1274	0.74640	15.0827	0.5845	0.0921	0.5994	0.0329	0.000	0.0000	18.0257	20.5005	-75.370	-23.817	18733.20400	18733.20400	-88.782
80	473.4139	0.74694	15.0827	0.7352	0.0697	0.5474	0.0539	0.000	0.0000	18.0257	16.7922	-46.295	-23.817	18748.28673	18748.28673	-88.782
81	475.0096	0.74761	15.0827	0.7356	0.0697	0.5470	0.0540	0.000	0.0000	18.0257	16.7922	-31.079	-23.817	18763.36946	18763.36946	-88.782
82	476.8013	0.74835	15.0827	0.7361	0.0696	0.5467	0.0540	0.000	0.0000	18.0257	16.7922	-16.044	-23.817	18778.45218	18778.45218	-88.782
83	478.6663	0.74913	15.0827	0.7365	0.0696	0.5463	0.0541	0.000	0.0000	18.0257	16.7922	-1.212	-23.817	18793.53491	18793.53491	-88.782
84	480.2832	0.74979	15.0827	0.5874	0.0921	0.5984	0.0335	0.000	0.0000	18.0257	20.5005	27.100	-23.817	18808.61763	18859.61763	-88.782
85	480.8198	0.75001	15.0827	0.5875	0.0921	0.5984	0.0335	0.000	0.0000	18.0257	20.5005	-72.819	-23.625	18874.70036	18874.70036	-113.310
86	482.1474	0.75056	15.0827	0.7375	0.0695	0.5456	0.0542	0.000	0.0000	18.0257	16.7922	-44.700	-23.625	18889.78309	18889.78309	-113.310
87	483.7589	0.75122	15.0827	0.7379	0.0695	0.5453	0.0543	0.000	0.0000	18.0257	16.7922	-30.425	-23.625	18904.86581	18904.86581	-113.310
88	485.5534	0.75194	15.0827	0.7383	0.0694	0.5450	0.0544	0.000	0.0000	18.0257	16.7922	-16.328	-23.625	18919.94854	18919.94854	-113.310
89	487.4228	0.75270	15.0827	0.7387	0.0694	0.5446	0.0544	0.000	0.0000	18.0257	16.7922	-2.425	-23.625	18935.03127	18935.03127	-113.310
90	489.0777	0.75337	15.0827	0.5903	0.0922	0.5974	0.0340	0.000	0.0000	18.0257	20.5005	24.948	-23.625	18950.11399	19001.11399	-113.310
91	489.6933	0.75361	15.0827	0.5905	0.0922	0.5973	0.0340	0.000	0.0000	18.0257	20.5005	-70.297	-23.433	19016.19672	19016.19672	-129.149
92	491.0606	0.75416	15.0827	0.7397	0.0693	0.5439	0.0546	0.000	0.0000	18.0257	16.7922	-43.123	-23.433	19031.27944	19031.27944	-129.149
93	492.6875	0.75481	15.0827	0.7401	0.0693	0.5436	0.0546	0.000	0.0000	18.0257	16.7922	-29.778	-23.433	19046.36217	19046.36217	-129.149
94	494.4848	0.75553	15.0827	0.7405	0.0693	0.5432	0.0547	0.000	0.0000	18.0257	16.7922	-16.605	-23.433	19061.44490	19061.44490	-129.149
95	496.3576	0.75627	15.0827	0.7409	0.0692	0.5429	0.0548	0.000	0.0000	18.0257	16.7922	-3.622	-23.433	19076.52762	19076.52762	-129.149
96	498.0482	0.75693	15.0827	0.5932	0.0922	0.5964	0.0346	0.000	0.0000	18.0257	20.5005	22.825	-23.433	19091.61035	19369.00555	-129.149
	498.0482	0.75693	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.5420	0.0000	0.000	(19195.30795)	19369.00555			
	498.0482	0.75693	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	0.5420	0.0000	0.000	(19265.30795)	19369.00555			
97	498.7413	0.75720	15.0827	0.5934	0.0922	0.5963	0.0346	0.000	0.0000	18.0257	20.5005	-67.806	-23.242	19384.08827	19384.08827	-147.685
98	500.1471	0.75775	15.0827	0.7419	0.0691	0.5422	0.0549	0.000	0.0000	18.0257	16.7922	-41.565	-23.242	19399.17100	19399.17100	-147.685
99	501.7892	0.75839	15.0827	0.7423	0.0691	0.5418	0.0550	0.000	0.0000	18.0257	16.7922	-29.137	-23.242	19414.25373	19414.25373	-147.685
100	503.5892	0.75909	15.0827	0.7427	0.0691	0.5415	0.0550	0.000	0.0000	18.0257	16.7921	-16.877	-23.242	19429.33645	19429.33645	-147.685
101	505.4647	0.75981	15.0827	0.7431	0.0690	0.5412	0.0551	0.000	0.0000	18.0257	16.7921	-4.799	-23.242	19444.41918	19444.41918	-147.685
102	507.1884	0.76048	15.0827	0.5961	0.0922	0.5954	0.0351	0.000	0.0000	18.0257	20.5005	20.734	-23.242	19459.50191	19510.50191	-147.685
103	507.9575	0.76077	15.0827	0.5963	0.0922	0.5953	0.0352	0.000	0.0000	18.0257	20.5005	-65.348	-23.050	19525.58463	19525.58463	-146.496
104	509.4004	0.76132	15.0827	0.7440	0.0690	0.5404	0.0552	0.000	0.0000	18.0257	16.7921	-40.028	-23.050	19540.66736	19540.66736	-146.496

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105	511.0573	0.76195	15.0827	0.7444	0.0689	0.5401	0.0553	0.000	0.0000	18.0257	16.7921	-28.503	-23.050	19555.75008	19555.75008	-146.496
106	512.8599	0.76263	15.0827	0.7448	0.0689	0.5398	0.0553	0.000	0.0000	18.0257	16.7921	-17.141	-23.050	19570.83281	19570.83281	-146.496
107	514.7371	0.76334	15.0827	0.7452	0.0688	0.5395	0.0554	0.000	0.0000	18.0257	16.7921	-5.955	-23.050	19585.91554	19585.91554	-146.496
108	516.4914	0.76400	15.0827	0.5989	0.0922	0.5943	0.0356	0.000	0.0000	18.0257	20.5005	18.675	-23.050	19600.99826	19651.99826	-146.496
109	517.3345	0.76432	15.0827	0.5991	0.0922	0.5942	0.0357	0.000	0.0000	18.0257	20.5005	-62.926	-22.858	19667.08099	19667.08099	-136.984
110	518.8132	0.76487	15.0827	0.7461	0.0688	0.5387	0.0555	0.000	0.0000	18.0257	16.7921	-38.512	-22.858	19682.16371	19682.16371	-136.984
111	520.4845	0.76549	15.0827	0.7465	0.0687	0.5384	0.0556	0.000	0.0000	18.0257	16.7921	-27.875	-22.858	19697.24644	19697.24644	-136.984
112	522.2896	0.76615	15.0827	0.7469	0.0687	0.5381	0.0557	0.000	0.0000	18.0257	16.7921	-17.398	-22.858	19712.32917	19712.32917	-136.984
113	524.1678	0.76685	15.0827	0.7473	0.0687	0.5378	0.0557	0.000	0.0000	18.0257	16.7921	-7.090	-22.858	19727.41189	19727.41189	-136.984
114	525.9501	0.76750	15.0827	0.6017	0.0922	0.5933	0.0362	0.000	0.0000	18.0257	20.5005	16.652	-22.858	19742.49462	19793.49462	-136.984
115	526.8655	0.76783	15.0827	0.6020	0.0922	0.5932	0.0362	0.000	0.0000	18.0257	20.5005	-60.542	-22.667	19808.57735	19808.57735	-119.285
116	528.3785	0.76838	15.0827	0.7482	0.0686	0.5371	0.0559	0.000	0.0000	18.0257	16.7921	-37.020	-22.667	19823.66007	19823.66007	-119.285
117	530.0640	0.76899	15.0827	0.7486	0.0685	0.5367	0.0559	0.000	0.0000	18.0257	16.7921	-27.256	-22.667	19838.74280	19838.74280	-119.285
118	531.8716	0.76965	15.0827	0.7490	0.0685	0.5364	0.0560	0.000	0.0000	18.0257	16.7921	-17.647	-22.667	19853.82552	19853.82552	-119.285
119	533.7501	0.77032	15.0827	0.7493	0.0685	0.5361	0.0560	0.000	0.0000	18.0257	16.7921	-8.203	-22.667	19868.90825	19868.90825	-119.285
120	535.5580	0.77097	15.0827	0.6044	0.0922	0.5923	0.0367	0.000	0.0000	18.0257	20.5004	14.666	-22.667	19883.99098	20161.38618	-119.285
	535.5580	0.77097	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.5420	0.0000	0.000	(19987.68858)	(19987.68858)	20161.38618		
	535.5580	0.77097	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	0.5420	0.0000	0.000	(20057.68858)	(20057.68858)	20161.38618		
121	536.5434	0.77132	15.0827	0.6047	0.0922	0.5921	0.0368	0.000	0.0000	18.0257	20.5004	-58.196	-22.475	20176.46890	20176.46890	-52.176
122	538.0894	0.77187	15.0827	0.7502	0.0684	0.5354	0.0562	0.000	0.0000	18.0257	16.7921	-35.550	-22.475	20191.55163	20191.55163	-52.176
123	539.7886	0.77247	15.0827	0.7506	0.0684	0.5351	0.0562	0.000	0.0000	18.0257	16.7921	-26.644	-22.475	20206.63435	20206.63435	-52.176
124	541.5986	0.77311	15.0827	0.7510	0.0683	0.5348	0.0563	0.000	0.0000	18.0257	16.7921	-17.888	-22.475	20221.71708	20221.71708	-52.176
125	543.4765	0.77376	15.0827	0.7513	0.0683	0.5345	0.0563	0.000	0.0000	18.0257	16.7921	-9.291	-22.475	20236.79981	20236.79981	-52.176
126	545.3076	0.77440	15.0827	0.6071	0.0922	0.5912	0.0372	0.000	0.0000	18.0257	20.5004	12.719	-22.475	20251.88253	20302.88253	-52.176
127	546.3607	0.77477	15.0827	0.6074	0.0922	0.5911	0.0373	0.000	0.0000	18.0257	20.5004	-55.891	-22.283	20317.96526	20317.96526	-18.540
128	547.9382	0.77532	15.0827	0.7522	0.0682	0.5337	0.0565	0.000	0.0000	18.0257	16.7921	-34.105	-22.283	20333.04799	20333.04799	-18.540
129	549.6508	0.77591	15.0827	0.7526	0.0682	0.5335	0.0565	0.000	0.0000	18.0257	16.7921	-26.040	-22.283	20348.13071	20348.13071	-18.540
130	551.4632	0.77653	15.0827	0.7529	0.0682	0.5332	0.0566	0.000	0.0000	18.0257	16.7921	-18.121	-22.283	20363.21344	20363.21344	-18.540
131	553.3400	0.77717	15.0827	0.7533	0.0681	0.5329	0.0566	0.000	0.0000	18.0257	16.7921	-10.356	-22.283	20378.29616	20378.29616	-18.540
132	555.1917	0.77780	15.0827	0.6097	0.0921	0.5902	0.0377	0.000	0.0000	18.0257	20.5004	10.812	-22.283	20393.37889	20444.37889	-18.540
133	556.3104	0.77818	15.0827	0.6101	0.0921	0.5901	0.0378	0.000	0.0000	18.0257	20.5004	-53.627	-22.092	20459.46162	20459.46162	22.840
134	557.9181	0.77873	15.0827	0.7542	0.0680	0.5321	0.0568	0.000	0.0000	18.0257	16.7921	-32.685	-22.092	20474.54434	20474.54434	22.840
135	559.6437	0.77931	15.0827	0.7545	0.0680	0.5318	0.0568	0.000	0.0000	18.0257	16.7921	-25.444	-22.092	20489.62707	20489.62707	22.840
136	561.4584	0.77992	15.0827	0.7549	0.0680	0.5316	0.0569	0.000	0.0000	18.0257	16.7921	-18.345	-22.092	20504.70979	20504.70979	22.840
137	563.3335	0.78054	15.0827	0.7552	0.0679	0.5313	0.0569	0.000	0.0000	18.0257	16.7921	-11.395	-22.092	20519.79252	20519.79252	22.840
138	565.2037	0.78116	15.0827	0.6123	0.0921	0.5892	0.0382	0.000	0.0000	18.0257	20.5004	8.946	-22.092	20534.87525	20585.87525	22.840
139	566.3854	0.78156	15.0827	0.6127	0.0921	0.5890	0.0383	0.000	0.0000	18.0257	20.5004	-51.405	-21.900	20600.95797	20600.95797	71.807
140	568.0219	0.78210	15.0827	0.7561	0.0679	0.5305	0.0570	0.000	0.0000	18.0257	16.7921	-31.290	-21.900	20616.04070	20616.04070	71.807
141	569.7602	0.78267	15.0827	0.7564	0.0678	0.5303	0.0571	0.000	0.0000	18.0257	16.7921	-24.856	-21.900	20631.12343	20631.12343	71.807
142	571.5771	0.78326	15.0827	0.7567	0.0678	0.5300	0.0571	0.000	0.0000	18.0257	16.7921	-18.561	-21.900	20646.20615	20646.20615	71.807
143	573.4498	0.78387	15.0827	0.7571	0.0678	0.5297	0.0572	0.000	0.0000	18.0257	16.7921	-12.409	-21.900	20661.28888	20661.28888	71.807
144	575.3361	0.78448	15.0827	0.6148	0.0921	0.5882	0.0387	0.000	0.0000	18.0257	20.5004	7.121	-21.900	20676.37160	20953.76680	71.807
	575.3361	0.78448	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.5420	0.0000	0.000	(20780.06920)	(20780.06920)	20953.76680		
	575.3361	0.78448	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	0.5420	0.0000	0.000	(20850.06920)	(20850.06920)	20953.76680		
145	576.5784	0.78489	15.0827	0.6152	0.0921	0.5880	0.0388	0.000	0.0000	18.0257	20.5004	-49.225	-21.708	20968.84953	20968.84953	-141.517
146	578.2422	0.78542	15.0827	0.7579	0.0677	0.5290	0.0573	0.000	0.0000	18.0257	16.7921	-29.921	-21.708	20983.93226	20983.93226	-141.517

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147	579.9928	0.78598	15.0827	0.7583	0.0677	0.5287	0.0574	0.000	0.0000	18.0257	16.7921	-24.277	-21.708	20999.01498	20999.01498	-141.517
148	581.8120	0.78656	15.0827	0.7586	0.0676	0.5284	0.0574	0.000	0.0000	18.0257	16.7921	-18.768	-21.708	21014.09771	21014.09771	-141.517
149	583.6817	0.78716	15.0827	0.7589	0.0676	0.5281	0.0575	0.000	0.0000	18.0257	16.7921	-13.398	-21.708	21029.18043	21029.18043	-141.517
150	585.5821	0.78776	15.0827	0.6173	0.0921	0.5872	0.0392	0.000	0.0000	18.0257	20.5004	5.339	-21.708	21044.26316	21095.26316	-141.517
151	586.8825	0.78817	15.0827	0.6177	0.0921	0.5870	0.0393	0.000	0.0000	18.0257	20.5004	-47.089	-21.517	21110.34589	21110.34589	-77.850
152	588.5723	0.78870	15.0827	0.7598	0.0675	0.5274	0.0576	0.000	0.0000	18.0257	16.7921	-28.578	-21.517	21125.42861	21125.42861	-77.850
153	590.3350	0.78925	15.0827	0.7601	0.0675	0.5271	0.0576	0.000	0.0000	18.0257	16.7921	-23.707	-21.517	21140.51134	21140.51134	-77.850
154	592.1563	0.78982	15.0827	0.7604	0.0675	0.5269	0.0577	0.000	0.0000	18.0257	16.7921	-18.966	-21.517	21155.59406	21155.59406	-77.850
155	594.0227	0.79040	15.0827	0.7607	0.0674	0.5266	0.0577	0.000	0.0000	18.0257	16.7921	-14.361	-21.517	21170.67679	21170.67679	-77.850
156	595.9352	0.79099	15.0827	0.6197	0.0921	0.5862	0.0397	0.000	0.0000	18.0257	20.5004	3.600	-21.517	21185.75952	21236.75952	-77.850
157	597.2911	0.79141	15.0827	0.6201	0.0921	0.5860	0.0397	0.000	0.0000	18.0257	20.5004	-44.996	-21.325	21251.84224	21251.84224	-7.074
158	599.0056	0.79193	15.0827	0.7615	0.0674	0.5259	0.0579	0.000	0.0000	18.0257	16.7921	-27.261	-21.325	21266.92497	21266.92497	-7.074
159	600.7799	0.79248	15.0827	0.7618	0.0673	0.5256	0.0579	0.000	0.0000	18.0257	16.7921	-23.144	-21.325	21282.00770	21282.00770	-7.074
160	602.6033	0.79303	15.0827	0.7621	0.0673	0.5254	0.0580	0.000	0.0000	18.0257	16.7921	-19.156	-21.325	21297.09042	21297.09042	-7.074
161	604.4659	0.79359	15.0827	0.7624	0.0673	0.5251	0.0580	0.000	0.0000	18.0257	16.7921	-15.297	-21.325	21312.17315	21312.17315	-7.074
162	606.3884	0.79417	15.0827	0.6221	0.0920	0.5852	0.0401	0.000	0.0000	18.0257	20.5004	1.903	-21.325	21327.25587	21378.25587	-7.074
163	607.7972	0.79460	15.0827	0.6225	0.0920	0.5850	0.0402	0.000	0.0000	18.0257	20.5004	-42.946	-21.133	21393.33860	21393.33860	70.650
164	609.5351	0.79512	15.0827	0.7633	0.0672	0.5244	0.0581	0.000	0.0000	18.0257	16.7921	-25.969	-21.133	21408.42133	21408.42133	70.650
165	611.3206	0.79565	15.0827	0.7636	0.0672	0.5242	0.0582	0.000	0.0000	18.0257	16.7921	-22.591	-21.133	21423.50405	21423.50405	70.650
166	613.1461	0.79619	15.0827	0.7638	0.0671	0.5239	0.0582	0.000	0.0000	18.0257	16.7921	-19.336	-21.133	21438.58678	21438.58678	70.650
167	615.0045	0.79674	15.0827	0.7641	0.0671	0.5237	0.0583	0.000	0.0000	18.0257	16.7921	-16.207	-21.133	21453.66950	21453.66950	70.650
168	616.9352	0.79731	15.0827	0.6244	0.0920	0.5842	0.0406	0.000	0.0000	18.0257	20.5004	0.250	-21.133	21468.75223	21746.14743	70.650
	616.9352	0.79731	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.5420	0.0000	0.000	(21572.44983)	(21572.44983)	21746.14743		
	616.9352	0.79731	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	0.5420	0.0000	0.000	(21642.44983)	(21642.44983)	21746.14743		
169	618.3945	0.79774	15.0827	0.6248	0.0920	0.5840	0.0407	0.000	0.0000	18.0257	20.5004	-40.940	-20.942	21761.23016	21761.23016	-69.690
170	620.1546	0.79825	15.0827	0.7650	0.0670	0.5229	0.0584	0.000	0.0000	18.0257	16.7921	-24.704	-20.942	21776.31288	21776.31288	-69.690
171	621.9510	0.79877	15.0827	0.7652	0.0670	0.5227	0.0584	0.000	0.0000	18.0257	16.7921	-22.046	-20.942	21791.39561	21791.39561	-69.690
172	623.7786	0.79930	15.0827	0.7655	0.0670	0.5225	0.0585	0.000	0.0000	18.0257	16.7921	-19.508	-20.942	21806.47834	21806.47834	-69.690
173	625.6325	0.79984	15.0827	0.7658	0.0669	0.5222	0.0585	0.000	0.0000	18.0257	16.7921	-17.092	-20.942	21821.56106	21821.56106	-69.690
174	627.5697	0.80039	15.0827	0.6267	0.0920	0.5832	0.0410	0.000	0.0000	18.0257	20.5004	-1.360	-20.942	21836.64379	21887.64379	-69.690
175	629.0770	0.80082	15.0827	0.6271	0.0920	0.5831	0.0411	0.000	0.0000	18.0257	20.5004	-38.977	-20.750	21902.72651	21902.72651	21.446
176	630.8580	0.80133	15.0827	0.7666	0.0669	0.5215	0.0586	0.000	0.0000	18.0257	16.7921	-23.465	-20.750	21917.80924	21917.80924	21.446
177	632.6650	0.80184	15.0827	0.7669	0.0668	0.5213	0.0587	0.000	0.0000	18.0257	16.7921	-21.509	-20.750	21932.89197	21932.89197	21.446
178	634.4946	0.80236	15.0827	0.7671	0.0668	0.5210	0.0587	0.000	0.0000	18.0257	16.7921	-19.671	-20.750	21947.97469	21947.97469	21.446
179	636.3436	0.80288	15.0827	0.7674	0.0668	0.5208	0.0588	0.000	0.0000	18.0257	16.7921	-17.950	-20.750	21963.05742	21963.05742	21.446
180	638.2856	0.80343	15.0827	0.6289	0.0920	0.5823	0.0415	0.000	0.0000	18.0257	20.5004	-2.928	-20.750	21978.14014	22029.14014	21.446
181	639.8383	0.80386	15.0827	0.6293	0.0920	0.5821	0.0415	0.000	0.0000	18.0257	20.5004	-37.057	-20.558	22044.22287	22044.22287	119.048
182	641.6390	0.80436	15.0827	0.7682	0.0667	0.5201	0.0589	0.000	0.0000	18.0257	16.7921	-22.251	-20.558	22059.30560	22059.30560	119.048
183	643.4563	0.80486	15.0827	0.7685	0.0667	0.5199	0.0589	0.000	0.0000	18.0257	16.7921	-20.981	-20.558	22074.38832	22074.38832	119.048
184	645.2878	0.80537	15.0827	0.7687	0.0667	0.5196	0.0589	0.000	0.0000	18.0257	16.7921	-19.825	-20.558	22089.47105	22089.47105	119.048
185	647.1317	0.80588	15.0827	0.7690	0.0666	0.5194	0.0590	0.000	0.0000	18.0257	16.7921	-18.784	-20.558	22104.55378	22104.55378	119.048
186	649.0770	0.80641	15.0827	0.6310	0.0919	0.5813	0.0419	0.000	0.0000	18.0257	20.5004	-4.453	-20.558	22119.63650	22170.63650	119.048
187	650.6727	0.80684	15.0827	0.6314	0.0919	0.5812	0.0419	0.000	0.0000	18.0257	20.5004	-35.179	-20.367	22185.71923	22185.71923	-137.041
188	652.4920	0.80734	15.0827	0.7697	0.0666	0.5187	0.0591	0.000	0.0000	18.0257	16.7921	-21.062	-20.367	22200.80195	22200.80195	-137.041
189	654.3192	0.80783	15.0827	0.7700	0.0665	0.5185	0.0591	0.000	0.0000	18.0257	16.7921	-20.461	-20.367	22215.88468	22215.88468	-137.041
190	656.1527	0.80833	15.0827	0.7703	0.0665	0.5183	0.0592	0.000	0.0000	18.0257	16.7921	-19.971	-20.367	22230.96741	22230.96741	-137.041

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191	657.9912	0.80882	15.0827	0.7705	0.0665	0.5180	0.0592	0.000	0.0000	18.0257	16.7921	-19.591	-20.367	22246.05013	22246.05013	-137.041
192	659.9385	0.80934	15.0827	0.6332	0.0919	0.5804	0.0423	0.000	0.0000	18.0257	20.5004	-5.936	-20.367	22261.13286	22538.52806	-137.041
	659.9385	0.80934	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.5420	0.0000	0.000	(22364.83046)	22538.52806			
	659.9385	0.80934	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	0.5420	0.0000	0.000	(22434.83046)	22538.52806			
193	661.5749	0.80977	15.0827	0.6335	0.0919	0.5803	0.0424	0.000	0.0000	18.0257	20.5004	-33.343	-20.175	22553.61078	22553.61078	148.973
194	663.4117	0.81026	15.0827	0.7713	0.0664	0.5174	0.0593	0.000	0.0000	18.0257	16.7921	-19.898	-20.175	22568.69351	22568.69351	148.973
195	665.2485	0.81075	15.0827	0.7715	0.0664	0.5172	0.0594	0.000	0.0000	18.0257	16.7921	-19.949	-20.175	22583.77624	22583.77624	148.973
196	667.0840	0.81123	15.0827	0.7718	0.0663	0.5169	0.0594	0.000	0.0000	18.0257	16.7921	-20.108	-20.175	22598.85896	22598.85896	148.973
197	668.9170	0.81171	15.0827	0.7720	0.0663	0.5167	0.0594	0.000	0.0000	18.0257	16.7921	-20.374	-20.175	22613.94169	22613.94169	148.973
198	670.8648	0.81222	15.0827	0.6352	0.0919	0.5795	0.0427	0.000	0.0000	18.0257	20.5004	-7.377	-20.175	22629.02442	22680.02442	148.973
199	672.5395	0.81265	15.0827	0.6356	0.0919	0.5793	0.0428	0.000	0.0000	18.0257	20.5004	-31.548	-19.983	22695.10714	22695.10714	-94.966
200	674.3927	0.81313	15.0827	0.7727	0.0663	0.5161	0.0596	0.000	0.0000	18.0257	16.7921	-18.759	-19.983	22710.18987	22710.18987	-94.966
201	676.2387	0.81361	15.0827	0.7730	0.0662	0.5158	0.0596	0.000	0.0000	18.0257	16.7921	-19.446	-19.983	22725.27259	22725.27259	-94.966
202	678.0761	0.81408	15.0827	0.7732	0.0662	0.5156	0.0596	0.000	0.0000	18.0257	16.7921	-20.237	-19.983	22740.35532	22740.35532	-94.966
203	679.9033	0.81454	15.0827	0.7734	0.0662	0.5154	0.0597	0.000	0.0000	18.0257	16.7921	-21.132	-19.983	22755.43805	22755.43805	-94.966
204	681.8505	0.81504	15.0827	0.6372	0.0918	0.5786	0.0431	0.000	0.0000	18.0257	20.5004	-8.778	-19.983	22770.52077	22821.52077	-94.966
205	683.5613	0.81547	15.0827	0.6376	0.0918	0.5784	0.0432	0.000	0.0000	18.0257	20.5004	-29.793	-19.792	22836.60350	22836.60350	26.941
206	685.4297	0.81595	15.0827	0.7742	0.0661	0.5148	0.0598	0.000	0.0000	18.0257	16.7921	-17.644	-19.792	22851.68622	22851.68622	26.941
207	687.2847	0.81641	15.0827	0.7744	0.0661	0.5146	0.0598	0.000	0.0000	18.0257	16.7921	-18.950	-19.792	22866.76895	22866.76895	26.941
208	689.1241	0.81687	15.0827	0.7746	0.0661	0.5143	0.0598	0.000	0.0000	18.0257	16.7921	-20.358	-19.792	22881.85168	22881.85168	26.941
209	690.9454	0.81733	15.0827	0.7749	0.0660	0.5141	0.0599	0.000	0.0000	18.0257	16.7921	-21.866	-19.792	22896.93440	22896.93440	26.941
210	692.8908	0.81781	15.0827	0.6392	0.0918	0.5777	0.0435	0.000	0.0000	18.0257	20.5004	-10.139	-19.792	22912.01713	22963.01713	26.941
211	694.6355	0.81824	15.0827	0.6395	0.0918	0.5776	0.0435	0.000	0.0000	18.0257	20.5004	-28.079	-19.600	22978.09986	22978.09986	154.547
212	696.5183	0.81871	15.0827	0.7756	0.0660	0.5135	0.0600	0.000	0.0000	18.0257	16.7921	-16.553	-19.600	22993.18258	22993.18258	154.547
213	698.3820	0.81917	15.0827	0.7758	0.0659	0.5133	0.0600	0.000	0.0000	18.0257	16.7921	-18.462	-19.600	23008.26531	23008.26531	154.547
214	700.2234	0.81962	15.0827	0.7760	0.0659	0.5131	0.0601	0.000	0.0000	18.0257	16.7921	-20.470	-19.600	23023.34803	23023.34803	154.547
215	702.0387	0.82006	15.0827	0.7762	0.0659	0.5129	0.0601	0.000	0.0000	18.0257	16.7921	-22.576	-19.600	23038.43076	23038.43076	154.547
216	703.9814	0.82053	15.0827	0.6411	0.0918	0.5768	0.0439	0.000	0.0000	18.0257	20.5004	-11.460	-19.600	23053.51349	23330.90869	154.547
	703.9814	0.82053	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.5420	0.0000	0.000	(23157.21109)	23330.90869			
	703.9814	0.82053	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	0.5420	0.0000	0.000	(23227.21109)	23330.90869			
217	705.7578	0.82096	15.0827	0.6414	0.0917	0.5767	0.0439	0.000	0.0000	18.0257	20.5004	-26.404	-19.408	23345.99141	23345.99141	140.542
218	707.6541	0.82142	15.0827	0.7769	0.0658	0.5123	0.0602	0.000	0.0000	18.0257	16.7921	-15.485	-19.408	23361.07414	23361.07414	140.542
219	709.5262	0.82187	15.0827	0.7771	0.0658	0.5121	0.0602	0.000	0.0000	18.0257	16.7921	-17.982	-19.408	23376.15686	23376.15686	140.542
220	711.3694	0.82231	15.0827	0.7774	0.0658	0.5119	0.0603	0.000	0.0000	18.0257	16.7921	-20.575	-19.408	23391.23959	23391.23959	140.542
221	713.1787	0.82274	15.0827	0.7776	0.0658	0.5117	0.0603	0.000	0.0000	18.0257	16.7921	-23.263	-19.408	23406.32232	23406.32232	140.542
222	715.1176	0.82320	15.0827	0.6429	0.0917	0.5760	0.0442	0.000	0.0000	18.0257	20.5004	-12.742	-19.408	23421.40504	23472.40504	140.542
223	716.9236	0.82363	15.0827	0.6432	0.0917	0.5758	0.0443	0.000	0.0000	18.0257	20.5004	-24.766	-19.217	23487.48777	23487.48777	-80.892
224	718.8323	0.82407	15.0827	0.7782	0.0657	0.5111	0.0604	0.000	0.0000	18.0257	16.7921	-14.439	-19.217	23502.57050	23502.57050	-80.892
225	720.7125	0.82452	15.0827	0.7784	0.0657	0.5109	0.0604	0.000	0.0000	18.0257	16.7921	-17.509	-19.217	23517.65322	23517.65322	-80.892
226	722.5576	0.82495	15.0827	0.7786	0.0656	0.5107	0.0605	0.000	0.0000	18.0257	16.7921	-20.672	-19.217	23532.73595	23532.73595	-80.892
227	724.3608	0.82537	15.0827	0.7789	0.0656	0.5105	0.0605	0.000	0.0000	18.0257	16.7921	-23.927	-19.217	23547.81867	23547.81867	-80.892
228	726.2951	0.82581	15.0827	0.6447	0.0917	0.5751	0.0446	0.000	0.0000	18.0257	20.5004	-13.987	-19.217	23562.90140	23613.90140	-80.892
229	728.1287	0.82624	15.0827	0.6450	0.0917	0.5750	0.0446	0.000	0.0000	18.0257	20.5004	-23.166	-19.025	23628.98413	23628.98413	62.942
230	730.0491	0.82668	15.0827	0.7795	0.0656	0.5099	0.0606	0.000	0.0000	18.0257	16.7921	-13.416	-19.025	23644.06685	23644.06685	62.942
231	731.9371	0.82711	15.0827	0.7797	0.0655	0.5097	0.0606	0.000	0.0000	18.0257	16.7921	-17.043	-19.025	23659.14958	23659.14958	62.942
232	733.7842	0.82753	15.0827	0.7799	0.0655	0.5095	0.0606	0.000	0.0000	18.0257	16.7921	-20.762	-19.025	23674.23230	23674.23230	62.942

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233	735.5811	0.82794	15.0827	0.7801	0.0655	0.5093	0.0607	0.000	0.0000	18.0257	16.7921	-24.568	-19.025	23689.31503	23689.31503	62.942
234	737.5102	0.82838	15.0827	0.6465	0.0916	0.5743	0.0449	0.000	0.0000	18.0257	20.5004	-15.194	-19.025	23704.39776	23755.39776	62.942
235	739.3696	0.82880	15.0827	0.6468	0.0916	0.5742	0.0450	0.000	0.0000	18.0257	20.5004	-21.603	-18.833	23770.48048	23770.48048	-148.092
236	741.3007	0.82923	15.0827	0.7808	0.0654	0.5087	0.0608	0.000	0.0000	18.0257	16.7921	-12.415	-18.833	23785.56321	23785.56321	-148.092
237	743.1964	0.82965	15.0827	0.7810	0.0654	0.5085	0.0608	0.000	0.0000	18.0257	16.7921	-16.585	-18.833	23800.64594	23800.64594	-148.092
238	745.0454	0.83007	15.0827	0.7812	0.0654	0.5084	0.0608	0.000	0.0000	18.0257	16.7921	-20.844	-18.833	23815.72866	23815.72866	-148.092
239	746.8362	0.83046	15.0827	0.7814	0.0654	0.5082	0.0609	0.000	0.0000	18.0257	16.7921	-25.188	-18.833	23830.81139	23830.81139	-148.092
240	748.7592	0.83089	15.0827	0.6482	0.0916	0.5735	0.0453	0.000	0.0000	18.0257	20.5004	-16.366	-18.833	23845.89411	24123.28931	-148.092
	748.7592	0.83089	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.5420	0.0000	0.000	(23949.59171)	(24123.28931)			
	748.7592	0.83089	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	0.5420	0.0000	0.000	(24019.59171)	(24123.28931)			
241	750.6425	0.83130	15.0827	0.6485	0.0916	0.5733	0.0453	0.000	0.0000	18.0257	20.5004	-20.075	-18.642	24138.37204	24138.37204	-108.044
242	752.5837	0.83173	15.0827	0.7820	0.0653	0.5076	0.0610	0.000	0.0000	18.0257	16.7921	-11.434	-18.642	24153.45477	24153.45477	-108.044
243	754.4867	0.83215	15.0827	0.7822	0.0653	0.5074	0.0610	0.000	0.0000	18.0257	16.7921	-16.133	-18.642	24168.53749	24168.53749	-108.044
244	756.3376	0.83255	15.0827	0.7824	0.0652	0.5072	0.0610	0.000	0.0000	18.0257	16.7921	-20.918	-18.642	24183.62022	24183.62022	-108.044
245	758.1222	0.83294	15.0827	0.7825	0.0652	0.5071	0.0610	0.000	0.0000	18.0257	16.7921	-25.787	-18.642	24198.70294	24198.70294	-108.044
246	760.0385	0.83335	15.0827	0.6498	0.0916	0.5727	0.0456	0.000	0.0000	18.0257	20.5004	-17.502	-18.642	24213.78567	24264.78567	-108.044
247	761.9439	0.83376	15.0827	0.6501	0.0915	0.5725	0.0456	0.000	0.0000	18.0257	20.5004	-18.581	-18.450	24279.86840	24279.86840	50.789
248	763.8943	0.83418	15.0827	0.7831	0.0652	0.5065	0.0611	0.000	0.0000	18.0257	16.7921	-10.475	-18.450	24294.95112	24294.95112	50.789
249	765.8043	0.83459	15.0827	0.7833	0.0651	0.5063	0.0612	0.000	0.0000	18.0257	16.7921	-15.689	-18.450	24310.03385	24310.03385	50.789
250	767.6571	0.83498	15.0827	0.7835	0.0651	0.5062	0.0612	0.000	0.0000	18.0257	16.7921	-20.986	-18.450	24325.11658	24325.11658	50.789
251	769.4355	0.83536	15.0827	0.7837	0.0651	0.5060	0.0612	0.000	0.0000	18.0257	16.7921	-26.365	-18.450	24340.19930	24340.19930	50.789
252	771.3446	0.83576	15.0827	0.6515	0.0915	0.5719	0.0459	0.000	0.0000	18.0257	20.5004	-18.604	-18.450	24355.28203	24406.28203	50.789
253	773.2705	0.83617	15.0827	0.6517	0.0915	0.5718	0.0460	0.000	0.0000	18.0257	20.5004	-17.122	-18.258	24421.36475	24421.36475	-145.637
254	775.2294	0.83658	15.0827	0.7843	0.0650	0.5054	0.0613	0.000	0.0000	18.0257	16.7921	-9.535	-18.258	24436.44748	24436.44748	-145.637
255	777.1462	0.83698	15.0827	0.7845	0.0650	0.5053	0.0613	0.000	0.0000	18.0257	16.7921	-15.250	-18.258	24451.53021	24451.53021	-145.637
256	779.0009	0.83736	15.0827	0.7846	0.0650	0.5051	0.0614	0.000	0.0000	18.0257	16.7921	-21.048	-18.258	24466.61293	24466.61293	-145.637
257	780.7732	0.83773	15.0827	0.7848	0.0650	0.5049	0.0614	0.000	0.0000	18.0257	16.7921	-26.924	-18.258	24481.69566	24481.69566	-145.637
258	782.6746	0.83812	15.0827	0.6530	0.0915	0.5711	0.0462	0.000	0.0000	18.0257	20.5004	-19.672	-18.258	24496.77838	24547.77838	-145.637
259	784.6194	0.83852	15.0827	0.6533	0.0915	0.5710	0.0463	0.000	0.0000	18.0257	20.5004	-15.696	-18.067	24562.86111	24562.86111	22.555
260	786.5861	0.83893	15.0827	0.7854	0.0649	0.5044	0.0615	0.000	0.0000	18.0257	16.7921	-8.615	-18.067	24577.94384	24577.94384	22.555
261	788.5096	0.83932	15.0827	0.7856	0.0649	0.5042	0.0615	0.000	0.0000	18.0257	16.7921	-14.819	-18.067	24593.02656	24593.02656	22.555
262	790.3662	0.83970	15.0827	0.7858	0.0649	0.5040	0.0615	0.000	0.0000	18.0257	16.7921	-21.102	-18.067	24608.10929	24608.10929	22.555
263	792.1325	0.84006	15.0827	0.7859	0.0649	0.5039	0.0616	0.000	0.0000	18.0257	16.7921	-27.462	-18.067	24623.19202	24623.19202	22.555
264	794.0258	0.84044	15.0827	0.6546	0.0914	0.5704	0.0465	0.000	0.0000	18.0257	20.5004	-20.707	-18.067	24638.27474	24915.66994	22.555
	794.0258	0.84044	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.5420	0.0000	0.000	(24741.97234)	(24915.66994)			
	794.0258	0.84044	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	0.5420	0.0000	0.000	(24811.97234)	(24915.66994)			
265	795.9879	0.84083	15.0827	0.6549	0.0914	0.5702	0.0466	0.000	0.0000	18.0257	20.5004	-14.301	-17.875	24930.75267	24930.75267	111.259
266	797.9618	0.84123	15.0827	0.7865	0.0648	0.5034	0.0616	0.000	0.0000	18.0257	16.7921	-7.714	-17.875	24945.83539	24945.83539	111.259
267	799.8916	0.84161	15.0827	0.7867	0.0648	0.5032	0.0617	0.000	0.0000	18.0257	16.7921	-14.393	-17.875	24960.91812	24960.91812	111.259
268	801.7502	0.84198	15.0827	0.7868	0.0648	0.5030	0.0617	0.000	0.0000	18.0257	16.7921	-21.150	-17.875	24976.00085	24976.00085	111.259
269	803.5104	0.84233	15.0827	0.7870	0.0647	0.5029	0.0617	0.000	0.0000	18.0257	16.7921	-27.981	-17.875	24991.08357	24991.08357	111.259
270	805.3951	0.84271	15.0827	0.6561	0.0914	0.5696	0.0468	0.000	0.0000	18.0257	20.5004	-21.711	-17.875	25006.16630	25057.16630	111.259
271	807.3730	0.84309	15.0827	0.6563	0.0914	0.5695	0.0469	0.000	0.0000	18.0257	20.5004	-12.938	-17.683	25072.24902	25072.24902	-71.670
272	809.3534	0.84348	15.0827	0.7875	0.0647	0.5024	0.0618	0.000	0.0000	18.0257	16.7921	-6.831	-17.683	25087.33175	25087.33175	-71.670
273	811.2893	0.84386	15.0827	0.7877	0.0647	0.5022	0.0618	0.000	0.0000	18.0257	16.7921	-13.974	-17.683	25102.41448	25102.41448	-71.670
274	813.1498	0.84422	15.0827	0.7879	0.0647	0.5020	0.0619	0.000	0.0000	18.0257	16.7921	-21.192	-17.683	25117.49720	25117.49720	-71.670

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275	814.9041	0.84456	15.0827	0.7880	0.0646	0.5019	0.0619	0.000	0.0000	18.0257	16.7921	-28.482	-17.683	25132.57993	25132.57993	-71.670	
276	816.7799	0.84492	15.0827	0.6575	0.0914	0.5689	0.0471	0.000	0.0000	18.0257	20.5004	-22.684	-17.683	25147.66265	25198.66265	-71.670	
277	818.7722	0.84531	15.0827	0.6578	0.0913	0.5688	0.0472	0.000	0.0000	18.0257	20.5004	-11.605	-17.492	25213.74538	25213.74538	109.670	
278	820.7586	0.84569	15.0827	0.7885	0.0646	0.5014	0.0620	0.000	0.0000	18.0257	16.7921	-5.966	-17.492	25228.82811	25228.82811	109.670	
279	822.7004	0.84606	15.0827	0.7887	0.0646	0.5012	0.0620	0.000	0.0000	18.0257	16.7921	-13.560	-17.492	25243.91083	25243.91083	109.670	
280	824.5629	0.84641	15.0827	0.7889	0.0645	0.5011	0.0620	0.000	0.0000	18.0257	16.7921	-21.227	-17.492	25258.99356	25258.99356	109.670	
281	826.3113	0.84675	15.0827	0.7890	0.0645	0.5009	0.0620	0.000	0.0000	18.0257	16.7921	-28.965	-17.492	25274.07629	25274.07629	109.670	
282	828.1780	0.84710	15.0827	0.6590	0.0913	0.5682	0.0474	0.000	0.0000	18.0257	20.5004	-23.627	-17.492	25289.15901	25340.15901	109.670	
283	830.1834	0.84748	15.0827	0.6592	0.0913	0.5681	0.0475	0.000	0.0000	18.0257	20.5004	-10.301	-17.300	25355.24174	25355.24174	-64.833	
284	832.1751	0.84785	15.0827	0.7895	0.0645	0.5004	0.0621	0.000	0.0000	18.0257	16.7921	-5.119	-17.300	25370.32446	25370.32446	-64.833	
285	834.1227	0.84821	15.0827	0.7897	0.0644	0.5003	0.0621	0.000	0.0000	18.0257	16.7921	-13.152	-17.300	25385.40719	25385.40719	-64.833	
286	835.9871	0.84856	15.0827	0.7899	0.0644	0.5001	0.0622	0.000	0.0000	18.0257	16.7921	-21.257	-17.300	25400.48992	25400.48992	-64.833	
287	837.7298	0.84888	15.0827	0.7900	0.0644	0.5000	0.0622	0.000	0.0000	18.0257	16.7921	-29.431	-17.300	25415.57264	25415.57264	-64.833	
288	839.5872	0.84923	15.0827	0.6603	0.0913	0.5675	0.0477	0.000	0.0000	18.0257	20.5004	-24.540	-17.300	25430.65537	25708.05057	-64.833	
	839.5872	0.84923	51.0000	0.0000	0.0000	0.0000	40.000	-0.5420	0.0000	0.000	(25534.35297)	25708.05057					
	839.5872	0.84923	51.0000	0.0000	0.0000	0.0000	40.000	0.5420	0.0000	0.000	(25604.35297)	25708.05057					
289	841.6044	0.84960	15.0827	0.6606	0.0913	0.5674	0.0477	0.000	0.0000	18.0257	20.5004	-9.026	-17.108	25723.13329	25723.13329	67.677	
290	843.6010	0.84997	15.0827	0.7905	0.0644	0.4995	0.0623	0.000	0.0000	18.0257	16.7921	-4.288	-17.108	25738.21602	25738.21602	67.677	
291	845.5541	0.85032	15.0827	0.7907	0.0643	0.4993	0.0623	0.000	0.0000	18.0257	16.7921	-12.750	-17.108	25753.29875	25753.29875	67.677	
292	847.4205	0.85066	15.0827	0.7908	0.0643	0.4992	0.0623	0.000	0.0000	18.0257	16.7921	-21.281	-17.108	25768.38147	25768.38147	67.677	
293	849.1576	0.85098	15.0827	0.7910	0.0643	0.4990	0.0623	0.000	0.0000	18.0257	16.7921	-29.880	-17.108	25783.46420	25783.46420	67.677	
294	851.0054	0.85131	15.0827	0.6617	0.0912	0.5668	0.0480	0.000	0.0000	18.0257	20.5004	-25.426	-17.108	25798.54693	25849.54693	67.677	
295	853.0332	0.85168	15.0827	0.6619	0.0912	0.5667	0.0480	0.000	0.0000	18.0257	20.5004	-7.778	-16.917	25864.62965	25864.62965	-98.829	
296	855.0340	0.85204	15.0827	0.7914	0.0643	0.4986	0.0624	0.000	0.0000	18.0257	16.7921	-3.474	-16.917	25879.71238	25879.71238	-98.829	
297	856.9925	0.85239	15.0827	0.7916	0.0642	0.4984	0.0624	0.000	0.0000	18.0257	16.7921	-12.353	-16.917	25894.79510	25894.79510	-98.829	
298	858.8608	0.85272	15.0827	0.7918	0.0642	0.4983	0.0624	0.000	0.0000	18.0257	16.7921	-21.300	-16.917	25909.87783	25909.87783	-98.829	
299	860.5923	0.85303	15.0827	0.7919	0.0642	0.4981	0.0625	0.000	0.0000	18.0257	16.7921	-30.312	-16.917	25924.96056	25924.96056	-98.829	
300	862.4303	0.85335	15.0827	0.6630	0.0912	0.5661	0.0482	0.000	0.0000	18.0257	20.5004	-26.284	-16.917	25940.04328	25991.04328	-98.829	
301	864.4676	0.85371	15.0827	0.6632	0.0912	0.5660	0.0483	0.000	0.0000	18.0257	20.5004	-6.557	-16.725	26006.12601	26006.12601	98.512	
302	866.4722	0.85407	15.0827	0.7924	0.0642	0.4977	0.0625	0.000	0.0000	18.0257	16.7921	-2.675	-16.725	26021.20873	26021.20873	98.512	
303	868.4358	0.85441	15.0827	0.7925	0.0641	0.4975	0.0626	0.000	0.0000	18.0257	16.7921	-11.961	-16.725	26036.29146	26036.29146	98.512	
304	870.3061	0.85474	15.0827	0.7927	0.0641	0.4974	0.0626	0.000	0.0000	18.0257	16.7921	-21.313	-16.725	26051.37419	26051.37419	98.512	
305	872.0321	0.85504	15.0827	0.7928	0.0641	0.4972	0.0626	0.000	0.0000	18.0257	16.7921	-30.728	-16.725	26066.45691	26066.45691	98.512	
306	873.8603	0.85535	15.0827	0.6643	0.0911	0.5655	0.0485	0.000	0.0000	18.0257	20.5004	-27.116	-16.725	26081.53964	26132.53964	98.512	
307	875.9059	0.85571	15.0827	0.6645	0.0911	0.5654	0.0485	0.000	0.0000	18.0257	20.5004	-5.362	-16.533	26147.62237	26147.62237	-60.398	
308	877.9139	0.85605	15.0827	0.7932	0.0641	0.4968	0.0627	0.000	0.0000	18.0257	16.7921	-1.893	-16.533	26162.70509	26162.70509	-60.398	
309	879.8825	0.85639	15.0827	0.7934	0.0640	0.4967	0.0627	0.000	0.0000	18.0257	16.7921	-11.574	-16.533	26177.78782	26177.78782	-60.398	
310	881.7547	0.85671	15.0827	0.7935	0.0640	0.4965	0.0627	0.000	0.0000	18.0257	16.7921	-21.321	-16.533	26192.87054	26192.87054	-60.398	
311	883.4755	0.85700	15.0827	0.7937	0.0640	0.4964	0.0627	0.000	0.0000	18.0257	16.7921	-31.129	-16.533	26207.95327	26207.95327	-60.398	
312	885.2937	0.85731	15.0827	0.6655	0.0911	0.5648	0.0487	0.000	0.0000	18.0257	20.5004	-27.921	-16.533	26223.03600	26500.43120	-60.398	
	885.2937	0.85731	51.0000	0.0000	0.0000	0.0000	40.000	-0.5420	0.0000	0.000	(26326.73360)	26500.43120					
	885.2937	0.85731	51.0000	0.0000	0.0000	0.0000	40.000	0.5420	0.0000	0.000	(26396.73360)	26500.43120					
313	887.3467	0.85766	15.0827	0.6657	0.0911	0.5647	0.0488	0.000	0.0000	18.0257	20.5004	-4.193	-16.342	26515.51392	26515.51392	111.604	
314	889.3575	0.85800	15.0827	0.7941	0.0640	0.4960	0.0628	0.000	0.0000	18.0257	16.7921	-1.125	-16.342	26530.59665	26530.59665	111.604	
315	891.3309	0.85833	15.0827	0.7943	0.0639	0.4958	0.0628	0.000	0.0000	18.0257	16.7921	-11.192	-16.342	26545.67937	26545.67937	111.604	
316	893.2052	0.85864	15.0827	0.7944	0.0639	0.4957	0.0628	0.000	0.0000	18.0257	16.7921	-21.324	-16.342	26560.76210	26560.76210	111.604	

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317	894.9207	0.85893	15.0827	0.7946	0.0639	0.4955	0.0629	0.000	0.0000	18.0257	16.7921	-31.515	-16.342	26575.84483	26575.84483	111.604
318	896.7290	0.85923	15.0827	0.6667	0.0911	0.5642	0.0490	0.000	0.0000	18.0257	20.5004	-28.702	-16.342	26590.92755	26641.92755	111.604
319	898.7883	0.85957	15.0827	0.6669	0.0911	0.5641	0.0490	0.000	0.0000	18.0257	20.5004	-3.048	-16.150	26657.01028	26657.01028	-40.091
320	900.8017	0.85990	15.0827	0.7950	0.0639	0.4951	0.0629	0.000	0.0000	18.0257	16.7921	-0.371	-16.150	26672.09301	26672.09301	-40.091
321	902.7797	0.86023	15.0827	0.7951	0.0638	0.4950	0.0630	0.000	0.0000	18.0257	16.7921	-10.815	-16.150	26687.17573	26687.17573	-40.091
322	904.6560	0.86053	15.0827	0.7953	0.0638	0.4949	0.0630	0.000	0.0000	18.0257	16.7921	-21.322	-16.150	26702.25846	26702.25846	-40.091
323	906.3665	0.86081	15.0827	0.7954	0.0638	0.4947	0.0630	0.000	0.0000	18.0257	16.7921	-31.886	-16.150	26717.34118	26717.34118	-40.091
324	908.1647	0.86111	15.0827	0.6679	0.0910	0.5636	0.0492	0.000	0.0000	18.0257	20.5004	-29.458	-16.150	26732.42391	26783.42391	-40.091
325	910.2294	0.86144	15.0827	0.6681	0.0910	0.5635	0.0493	0.000	0.0000	18.0257	20.5004	-1.926	-15.958	26798.50664	26798.50664	171.686
326	912.2449	0.86177	15.0827	0.7958	0.0638	0.4943	0.0631	0.000	0.0000	18.0257	16.7921	0.369	-15.958	26813.58936	26813.58936	171.686
327	914.2273	0.86208	15.0827	0.7959	0.0637	0.4942	0.0631	0.000	0.0000	18.0257	16.7921	-10.443	-15.958	26828.67209	26828.67209	171.686
328	916.1056	0.86239	15.0827	0.7961	0.0637	0.4941	0.0631	0.000	0.0000	18.0257	16.7921	-21.315	-15.958	26843.75481	26843.75481	171.686
329	917.8111	0.86266	15.0827	0.7962	0.0637	0.4939	0.0631	0.000	0.0000	18.0257	16.7921	-32.244	-15.958	26858.83754	26858.83754	171.686
330	919.5993	0.86294	15.0827	0.6691	0.0910	0.5630	0.0494	0.000	0.0000	18.0257	20.5004	-30.191	-15.958	26873.92027	26924.92027	171.686
331	921.6684	0.86327	15.0827	0.6693	0.0910	0.5629	0.0495	0.000	0.0000	18.0257	20.5004	-0.828	-15.767	26940.00299	26940.00299	26.850
332	923.6856	0.86359	15.0827	0.7966	0.0637	0.4935	0.0632	0.000	0.0000	18.0257	16.7921	1.094	-15.767	26955.08572	26955.08572	26.850
333	925.6723	0.86391	15.0827	0.7967	0.0637	0.4934	0.0632	0.000	0.0000	18.0257	16.7921	-10.075	-15.767	26970.16845	26970.16845	26.850
334	927.5526	0.86420	15.0827	0.7968	0.0636	0.4933	0.0632	0.000	0.0000	18.0257	16.7921	-21.303	-15.767	26985.25117	26985.25117	26.850
335	929.2533	0.86447	15.0827	0.7970	0.0636	0.4931	0.0632	0.000	0.0000	18.0257	16.7921	-32.587	-15.767	27000.33390	27000.33390	26.850
336	931.0314	0.86475	15.0827	0.6702	0.0909	0.5624	0.0497	0.000	0.0000	18.0257	20.5004	-30.901	-15.767	27015.41662	27292.81182	26.850
	931.0314	0.86475	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.5420	0.0000	0.000	(	27119.11422)	27292.81182		
	931.0314	0.86475	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	0.5420	0.0000	0.000	(	27189.11422)	27292.81182		
337	933.1042	0.86507	15.0827	0.6704	0.0909	0.5623	0.0497	0.000	0.0000	18.0257	20.5004	0.248	-15.575	27307.89455	27307.89455	-125.476
338	935.1227	0.86538	15.0827	0.7974	0.0636	0.4928	0.0633	0.000	0.0000	18.0257	16.7921	1.807	-15.575	27322.97728	27322.97728	-125.476
339	937.1135	0.86569	15.0827	0.7975	0.0636	0.4926	0.0633	0.000	0.0000	18.0257	16.7921	-9.711	-15.575	27338.06000	27338.06000	-125.476
340	938.9958	0.86598	15.0827	0.7976	0.0636	0.4925	0.0633	0.000	0.0000	18.0257	16.7921	-21.287	-15.575	27353.14273	27353.14273	-125.476
341	940.6919	0.86624	15.0827	0.7977	0.0635	0.4924	0.0634	0.000	0.0000	18.0257	16.7921	-32.918	-15.575	27368.22545	27368.22545	-125.476
342	942.4600	0.86651	15.0827	0.6713	0.0909	0.5618	0.0499	0.000	0.0000	18.0257	20.5004	-31.589	-15.575	27383.30818	27434.30818	-125.476
343	944.5356	0.86683	15.0827	0.6715	0.0909	0.5617	0.0499	0.000	0.0000	18.0257	20.5004	1.302	-15.383	27449.39091	27449.39091	96.212
344	946.5551	0.86713	15.0827	0.7981	0.0635	0.4920	0.0634	0.000	0.0000	18.0257	16.7921	2.507	-15.383	27464.47363	27464.47363	96.212
345	948.5500	0.86744	15.0827	0.7982	0.0635	0.4919	0.0634	0.000	0.0000	18.0257	16.7921	-9.352	-15.383	27479.55636	27479.55636	96.212
346	950.4343	0.86772	15.0827	0.7984	0.0635	0.4918	0.0634	0.000	0.0000	18.0257	16.7921	-21.267	-15.383	27494.63909	27494.63909	96.212
347	952.1259	0.86797	15.0827	0.7985	0.0634	0.4916	0.0635	0.000	0.0000	18.0257	16.7921	-33.235	-15.383	27509.72181	27509.72181	96.212
348	953.8840	0.86824	15.0827	0.6724	0.0909	0.5612	0.0501	0.000	0.0000	18.0257	20.5004	-32.255	-15.383	27524.80454	27575.80454	96.212
349	955.9618	0.86855	15.0827	0.6725	0.0909	0.5611	0.0501	0.000	0.0000	18.0257	20.5004	2.336	-15.192	27590.88726	27590.88726	-38.956
350	957.9819	0.86885	15.0827	0.7989	0.0634	0.4913	0.0635	0.000	0.0000	18.0257	16.7921	3.195	-15.192	27605.96999	27605.96999	-38.956
351	959.9806	0.86915	15.0827	0.7990	0.0634	0.4911	0.0635	0.000	0.0000	18.0257	16.7921	-8.997	-15.192	27621.05272	27621.05272	-38.956
352	961.8670	0.86942	15.0827	0.7991	0.0634	0.4910	0.0636	0.000	0.0000	18.0257	16.7921	-21.243	-15.192	27636.13544	27636.13544	-38.956
353	963.5542	0.86967	15.0827	0.7992	0.0634	0.4909	0.0636	0.000	0.0000	18.0257	16.7921	-33.541	-15.192	27651.21817	27651.21817	-38.956
354	965.3025	0.86993	15.0827	0.6734	0.0908	0.5606	0.0503	0.000	0.0000	18.0257	20.5004	-32.901	-15.192	27666.30089	27717.30089	-38.956
355	967.3816	0.87024	15.0827	0.6736	0.0908	0.5606	0.0504	0.000	0.0000	18.0257	20.5004	3.349	-15.000	27732.38362	27732.38362	-171.058
356	969.4021	0.87053	15.0827	0.7996	0.0633	0.4905	0.0636	0.000	0.0000	18.0257	16.7921	3.870	-15.000	27747.46635	27747.46635	-171.058
357	971.4046	0.87082	15.0827	0.7997	0.0633	0.4904	0.0637	0.000	0.0000	18.0257	16.7921	-8.645	-15.000	27762.54907	27762.54907	-171.058
358	973.2930	0.87110	15.0827	0.7998	0.0633	0.4903	0.0637	0.000	0.0000	18.0257	16.7921	-21.214	-15.000	27777.63180	27777.63180	-171.058
359	974.9760	0.87134	15.0827	0.7999	0.0633	0.4902	0.0637	0.000	0.0000	18.0257	16.7921	-33.834	-15.000	27792.71453	27792.71453	-171.058
360	976.7144	0.87159	15.0827	0.6744	0.0908	0.5601	0.0505	0.000	0.0000	18.0257	20.5004	-33.526	-15.000	27807.79725	28085.19245	-171.058

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976.7144 0.87159 51.0000 0.0000 0.0000 0.0000 0.0000 40.000 -0.5420 0.0000 0.000 (27911.49485) 28085.19245

*** ORNL June 12,2000 Design SC2 2b ***

linout subroutine no. 1 dynamical parameters

Transit time factors are for the synchronous or reference particles.

If you are designing symmetric linac, the phase printed is REFERENCE Particle phase at the center of the gap.

Also, the kinetic energy and beta are for the REFERENCE particle at the end of the cell.

The geometrical beta for the cavities are printed in the WALLPWR file (with Power keyword).

E is the field for the cell(used as E*t*I*cosphi). It includes the ratio E/E0 for that cell.

tank no. 1 tank length 5841.941 (cm) 175 cells power= 25.243 MW frequency= 805.00MHz
 (Cu+Beam) wavelength= 37.24130 cm

This superconducting design, one/two quads locate after symmetric units.

cell number	kinetic energy (MeV)	beta	cell length (cm)	t	tp	s	sp	quad length (cm)	quad gradient (kG/cm)	Ezero (MV/m)	E (MV/m)	phis (Deg)	PhiDesign (QuadCtr)	TotalLeng (cm)	TotalLeng (cm)	rel.driver toEndwall/ toNextBeginwall phase (Deg)
Preceding drift center between doublet to the First Cavity wall is : 138.70319																
Absolute z= 27946.49485 (cm) position is at the center of the drift between preceding quad.																
Drift 15.0000 + Quad(2) 0.5420 (kG/cm) 20.0000 (cm), + drift 83.7032 (cm)																
initial 976.7144 0.87159								4.000	-2.0200	(0.00000)	27946.49485					
1 978.7947 0.87189 15.0827 0.6746 0.0908 0.5600 0.0506 0.000 0.0000 18.0257 20.5004 4.151 -15.000 28100.27518 28100.27518 76.334																
2 980.8158 0.87218 15.0827 0.8003 0.0632 0.4898 0.0637 0.000 0.0000 18.0257 16.7921 4.343 -15.000 28115.35790 28115.35790 76.334																
3 982.8207 0.87246 15.0827 0.8004 0.0632 0.4897 0.0638 0.000 0.0000 18.0257 16.7921 -8.489 -15.000 28130.44063 28130.44063 76.334																
4 984.7088 0.87273 15.0827 0.8005 0.0632 0.4896 0.0638 0.000 0.0000 18.0257 16.7921 -21.373 -15.000 28145.52336 28145.52336 76.334																
5 986.3838 0.87297 15.0827 0.8006 0.0632 0.4895 0.0638 0.000 0.0000 18.0257 16.7921 -34.307 -15.000 28160.60608 28160.60608 76.334																
6 988.1085 0.87321 15.0827 0.6754 0.0908 0.5596 0.0507 0.000 0.0000 18.0257 20.5004 -34.324 -15.000 28175.68881 28226.68881 76.334																
7 990.1896 0.87351 15.0827 0.6756 0.0907 0.5595 0.0508 0.000 0.0000 18.0257 20.5004 4.933 -15.000 28241.77153 28241.77153 -50.047																
8 992.2111 0.87379 15.0827 0.8010 0.0632 0.4891 0.0638 0.000 0.0000 18.0257 16.7921 4.803 -15.000 28256.85426 28256.85426 -50.047																
9 994.2186 0.87407 15.0827 0.8011 0.0631 0.4890 0.0639 0.000 0.0000 18.0257 16.7921 -8.337 -15.000 28271.93699 28271.93699 -50.047																
10 996.1062 0.87433 15.0827 0.8012 0.0631 0.4889 0.0639 0.000 0.0000 18.0257 16.7921 -21.529 -15.000 28287.01971 28287.01971 -50.047																
11 997.7733 0.87457 15.0827 0.8013 0.0631 0.4888 0.0639 0.000 0.0000 18.0257 16.7921 -34.768 -15.000 28302.10244 28302.10244 -50.047																
12 999.4843 0.87480 15.0827 0.6764 0.0907 0.5590 0.0509 0.000 0.0000 18.0257 20.5004 -35.102 -15.000 28317.18517 28368.18517 -50.047																
13 1001.5658 0.87509 15.0827 0.6765 0.0907 0.5590 0.0510 0.000 0.0000 18.0257 20.5004 5.696 -15.000 28383.26789 28383.26789 -173.581																
14 1003.5876 0.87537 15.0827 0.8016 0.0631 0.4885 0.0639 0.000 0.0000 18.0257 16.7921 5.252 -15.000 28398.35062 28398.35062 -173.581																
15 1005.5975 0.87564 15.0827 0.8017 0.0631 0.4884 0.0640 0.000 0.0000 18.0257 16.7921 -8.189 -15.000 28413.43334 28413.43334 -173.581																
16 1007.4847 0.87590 15.0827 0.8019 0.0631 0.4882 0.0640 0.000 0.0000 18.0257 16.7921 -21.680 -15.000 28428.51607 28428.51607 -173.581																
17 1009.1440 0.87613 15.0827 0.8020 0.0630 0.4881 0.0640 0.000 0.0000 18.0257 16.7921 -35.219 -15.000 28443.59880 28443.59880 -173.581																
18 1010.8413 0.87636 15.0827 0.6773 0.0907 0.5585 0.0511 0.000 0.0000 18.0257 20.5004 -35.860 -15.000 28458.68152 28509.68152 -173.581																

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19	1012.9228	0.87664	15.0827	0.6775	0.0907	0.5584	0.0511	0.000	0.0000	18.0257	20.5004	6.440	-15.000	28524.76425	28524.76425	65.663	
20	1014.9447	0.87691	15.0827	0.8023	0.0630	0.4878	0.0640	0.000	0.0000	18.0257	16.7921	5.691	-15.000	28539.84697	28539.84697	65.663	
21	1016.9570	0.87719	15.0827	0.8024	0.0630	0.4877	0.0641	0.000	0.0000	18.0257	16.7921	-8.044	-15.000	28554.92970	28554.92970	65.663	
22	1018.8437	0.87744	15.0827	0.8025	0.0630	0.4876	0.0641	0.000	0.0000	18.0257	16.7921	-21.828	-15.000	28570.01243	28570.01243	65.663	
23	1020.4954	0.87766	15.0827	0.8026	0.0630	0.4875	0.0641	0.000	0.0000	18.0257	16.7921	-35.658	-15.000	28585.09515	28585.09515	65.663	
24	1022.1790	0.87788	15.0827	0.6782	0.0906	0.5580	0.0513	0.000	0.0000	18.0257	20.5004	-36.601	-15.000	28600.17788	28877.57308	65.663	
	1022.1790	0.87788	51.0000	0.0000	0.0000	0.0000	40.000	-0.5420	0.0000	0.000	(28703.87548)	28877.57308					
	1022.1790	0.87788	51.0000	0.0000	0.0000	0.0000	40.000	0.5420	0.0000	0.000	(28773.87548)	28877.57308					
25	1024.2602	0.87816	15.0827	0.6784	0.0906	0.5579	0.0513	0.000	0.0000	18.0257	20.5004	7.167	-15.000	28892.65581	28892.65581	-25.298	
26	1026.2821	0.87843	15.0827	0.8029	0.0629	0.4872	0.0641	0.000	0.0000	18.0257	16.7921	6.119	-15.000	28907.73853	28907.73853	-25.298	
27	1028.2966	0.87869	15.0827	0.8030	0.0629	0.4871	0.0642	0.000	0.0000	18.0257	16.7921	-7.903	-15.000	28922.82126	28922.82126	-25.298	
28	1030.1830	0.87894	15.0827	0.8031	0.0629	0.4869	0.0642	0.000	0.0000	18.0257	16.7921	-21.972	-15.000	28937.90398	28937.90398	-25.298	
29	1031.8270	0.87916	15.0827	0.8032	0.0629	0.4868	0.0642	0.000	0.0000	18.0257	16.7921	-36.087	-15.000	28952.98671	28952.98671	-25.298	
30	1033.4970	0.87938	15.0827	0.6791	0.0906	0.5575	0.0515	0.000	0.0000	18.0257	20.5004	-37.323	-15.000	28968.06944	29019.06944	-25.298	
31	1035.5775	0.87965	15.0827	0.6793	0.0906	0.5574	0.0515	0.000	0.0000	18.0257	20.5004	7.876	-15.000	29034.15216	29034.15216	-140.697	
32	1037.5994	0.87991	15.0827	0.8035	0.0629	0.4865	0.0642	0.000	0.0000	18.0257	16.7921	6.536	-15.000	29049.23489	29049.23489	-140.697	
33	1039.6161	0.88017	15.0827	0.8036	0.0628	0.4864	0.0643	0.000	0.0000	18.0257	16.7921	-7.765	-15.000	29064.31761	29064.31761	-140.697	
34	1041.5021	0.88042	15.0827	0.8038	0.0628	0.4863	0.0643	0.000	0.0000	18.0257	16.7921	-22.113	-15.000	29079.40034	29079.40034	-140.697	
35	1043.1386	0.88063	15.0827	0.8039	0.0628	0.4862	0.0643	0.000	0.0000	18.0257	16.7921	-36.505	-15.000	29094.48307	29094.48307	-140.697	
36	1044.7948	0.88084	15.0827	0.6800	0.0906	0.5570	0.0517	0.000	0.0000	18.0257	20.5004	-38.029	-15.000	29109.56579	29160.56579	-140.697	
37	1046.8744	0.88111	15.0827	0.6801	0.0906	0.5570	0.0517	0.000	0.0000	18.0257	20.5004	8.568	-15.000	29175.64852	29175.64852	106.488	
38	1048.8961	0.88136	15.0827	0.8041	0.0628	0.4859	0.0643	0.000	0.0000	18.0257	16.7921	6.944	-15.000	29190.73125	29190.73125	106.488	
39	1050.9149	0.88162	15.0827	0.8042	0.0628	0.4858	0.0643	0.000	0.0000	18.0257	16.7921	-7.630	-15.000	29205.81397	29205.81397	106.488	
40	1052.8004	0.88186	15.0827	0.8043	0.0628	0.4857	0.0644	0.000	0.0000	18.0257	16.7921	-22.251	-15.000	29220.89670	29220.89670	106.488	
41	1054.4294	0.88207	15.0827	0.8044	0.0627	0.4856	0.0644	0.000	0.0000	18.0257	16.7921	-36.914	-15.000	29235.97942	29235.97942	106.488	
42	1056.0720	0.88227	15.0827	0.6809	0.0905	0.5565	0.0518	0.000	0.0000	18.0257	20.5004	-38.718	-15.000	29251.06215	29302.06215	106.488	
43	1058.1503	0.88253	15.0827	0.6810	0.0905	0.5565	0.0519	0.000	0.0000	18.0257	20.5004	9.245	-15.000	29317.14488	29317.14488	-3.805	
44	1060.1717	0.88279	15.0827	0.8047	0.0627	0.4853	0.0644	0.000	0.0000	18.0257	16.7921	7.342	-15.000	29332.22760	29332.22760	-3.805	
45	1062.1927	0.88304	15.0827	0.8048	0.0627	0.4852	0.0644	0.000	0.0000	18.0257	16.7921	-7.499	-15.000	29347.31033	29347.31033	-3.805	
46	1064.0777	0.88327	15.0827	0.8049	0.0627	0.4851	0.0644	0.000	0.0000	18.0257	16.7921	-22.385	-15.000	29362.39305	29362.39305	-3.805	
47	1065.6993	0.88347	15.0827	0.8050	0.0627	0.4850	0.0645	0.000	0.0000	18.0257	16.7921	-37.312	-15.000	29377.47578	29377.47578	-3.805	
48	1067.3283	0.88368	15.0827	0.6817	0.0905	0.5561	0.0520	0.000	0.0000	18.0257	20.5004	-39.391	-15.000	29392.55851	29669.95371	-3.805	
	1067.3283	0.88368	51.0000	0.0000	0.0000	0.0000	40.000	-0.5420	0.0000	0.000	(29496.25611)	29669.95371					
	1067.3283	0.88368	51.0000	0.0000	0.0000	0.0000	40.000	0.5420	0.0000	0.000	(29566.25611)	29669.95371					
49	1069.4050	0.88393	15.0827	0.6818	0.0905	0.5560	0.0520	0.000	0.0000	18.0257	20.5004	9.905	-15.000	29685.03643	29685.03643	-68.212	
50	1071.4260	0.88418	15.0827	0.8053	0.0626	0.4847	0.0645	0.000	0.0000	18.0257	16.7921	7.731	-15.000	29700.11916	29700.11916	-68.212	
51	1073.4490	0.88443	15.0827	0.8054	0.0626	0.4846	0.0645	0.000	0.0000	18.0257	16.7921	-7.370	-15.000	29715.20188	29715.20188	-68.212	
52	1075.3336	0.88466	15.0827	0.8055	0.0626	0.4845	0.0645	0.000	0.0000	18.0257	16.7921	-22.516	-15.000	29730.28461	29730.28461	-68.212	
53	1076.9479	0.88486	15.0827	0.8056	0.0626	0.4844	0.0645	0.000	0.0000	18.0257	16.7921	-37.702	-15.000	29745.36734	29745.36734	-68.212	
54	1078.5633	0.88505	15.0827	0.6825	0.0905	0.5556	0.0522	0.000	0.0000	18.0257	20.5004	-40.048	-15.000	29760.45006	29811.45006	-68.212	
55	1080.6383	0.88530	15.0827	0.6826	0.0905	0.5556	0.0522	0.000	0.0000	18.0257	20.5004	10.551	-15.000	29826.53279	29826.53279	-173.635	
56	1082.6589	0.88555	15.0827	0.8058	0.0626	0.4842	0.0646	0.000	0.0000	18.0257	16.7921	8.111	-15.000	29841.61552	29841.61552	-173.635	
57	1084.6838	0.88579	15.0827	0.8059	0.0626	0.4841	0.0646	0.000	0.0000	18.0257	16.7921	-7.245	-15.000	29856.69824	29856.69824	-173.635	
58	1086.5679	0.88602	15.0827	0.8060	0.0626	0.4840	0.0646	0.000	0.0000	18.0257	16.7921	-22.644	-15.000	29871.78097	29871.78097	-173.635	
59	1088.1750	0.88621	15.0827	0.8061	0.0625	0.4839	0.0646	0.000	0.0000	18.0257	16.7921	-38.083	-15.000	29886.86369	29886.86369	-173.635	
60	1089.7770	0.88640	15.0827	0.6833	0.0904	0.5552	0.0523	0.000	0.0000	18.0257	20.5004	-40.690	-15.000	29901.94642	29952.94642	-173.635	

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61	1091.8500	0.88665	15.0827	0.6834	0.0904	0.5551	0.0524	0.000	0.0000	18.0257	20.5004	11.181	-15.000	29968.02915	29968.02915	83.293
62	1093.8700	0.88689	15.0827	0.8064	0.0625	0.4836	0.0647	0.000	0.0000	18.0257	16.7921	8.482	-15.000	29983.11187	29983.11187	83.293
63	1095.8969	0.88713	15.0827	0.8065	0.0625	0.4835	0.0647	0.000	0.0000	18.0257	16.7921	-7.122	-15.000	29998.19460	29998.19460	83.293
64	1097.7805	0.88735	15.0827	0.8066	0.0625	0.4834	0.0647	0.000	0.0000	18.0257	16.7921	-22.769	-15.000	30013.27732	30013.27732	83.293
65	1099.3805	0.88754	15.0827	0.8067	0.0625	0.4833	0.0647	0.000	0.0000	18.0257	16.7921	-38.455	-15.000	30028.36005	30028.36005	83.293
66	1100.9691	0.88772	15.0827	0.6841	0.0904	0.5547	0.0525	0.000	0.0000	18.0257	20.5004	-41.318	-15.000	30043.44278	30094.44278	83.293
67	1103.0400	0.88796	15.0827	0.6842	0.0904	0.5547	0.0525	0.000	0.0000	18.0257	20.5004	11.797	-15.000	30109.52550	30109.52550	-17.482
68	1105.0594	0.88820	15.0827	0.8069	0.0624	0.4830	0.0648	0.000	0.0000	18.0257	16.7921	8.845	-15.000	30124.60823	30124.60823	-17.482
69	1107.0881	0.88843	15.0827	0.8070	0.0624	0.4829	0.0648	0.000	0.0000	18.0257	16.7921	-7.002	-15.000	30139.69096	30139.69096	-17.482
70	1108.9713	0.88865	15.0827	0.8071	0.0624	0.4828	0.0648	0.000	0.0000	18.0257	16.7921	-22.891	-15.000	30154.77368	30154.77368	-17.482
71	1110.5642	0.88884	15.0827	0.8072	0.0624	0.4828	0.0648	0.000	0.0000	18.0257	16.7921	-38.818	-15.000	30169.85641	30169.85641	-17.482
72	1112.1396	0.88902	15.0827	0.6849	0.0904	0.5543	0.0526	0.000	0.0000	18.0257	20.5004	-41.931	-15.000	30184.93913	30462.33433	-17.482
	1112.1396	0.88902	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.5420	0.0000	0.000	(30288.63673)	30462.33433			
	1112.1396	0.88902	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	0.5420	0.0000	0.000	(30358.63673)	30462.33433			
73	1114.2080	0.88925	15.0827	0.6850	0.0904	0.5542	0.0527	0.000	0.0000	18.0257	20.5004	12.400	-15.000	30477.41706	30477.41706	-57.708
74	1116.2268	0.88949	15.0827	0.8075	0.0624	0.4825	0.0648	0.000	0.0000	18.0257	16.7921	9.200	-15.000	30492.49979	30492.49979	-57.708
75	1118.2573	0.88972	15.0827	0.8075	0.0624	0.4824	0.0648	0.000	0.0000	18.0257	16.7921	-6.885	-15.000	30507.58251	30507.58251	-57.708
76	1120.1401	0.88993	15.0827	0.8076	0.0624	0.4823	0.0649	0.000	0.0000	18.0257	16.7921	-23.011	-15.000	30522.66524	30522.66524	-57.708
77	1121.7260	0.89011	15.0827	0.8077	0.0623	0.4822	0.0649	0.000	0.0000	18.0257	16.7921	-39.174	-15.000	30537.74796	30537.74796	-57.708
78	1123.2882	0.89029	15.0827	0.6856	0.0903	0.5539	0.0528	0.000	0.0000	18.0257	20.5004	-42.530	-15.000	30552.83069	30603.83069	-57.708
79	1125.3541	0.89052	15.0827	0.6857	0.0903	0.5538	0.0528	0.000	0.0000	18.0257	20.5004	12.989	-15.000	30618.91342	30618.91342	-154.041
80	1127.3721	0.89075	15.0827	0.8080	0.0623	0.4820	0.0649	0.000	0.0000	18.0257	16.7921	9.547	-15.000	30633.99614	30633.99614	-154.041
81	1129.4044	0.89097	15.0827	0.8081	0.0623	0.4819	0.0649	0.000	0.0000	18.0257	16.7921	-6.771	-15.000	30649.07887	30649.07887	-154.041
82	1131.2867	0.89119	15.0827	0.8081	0.0623	0.4818	0.0649	0.000	0.0000	18.0257	16.7921	-23.128	-15.000	30664.16160	30664.16160	-154.041
83	1132.8657	0.89136	15.0827	0.8082	0.0623	0.4817	0.0649	0.000	0.0000	18.0257	16.7921	-39.521	-15.000	30679.24432	30679.24432	-154.041
84	1134.4148	0.89153	15.0827	0.6863	0.0903	0.5535	0.0529	0.000	0.0000	18.0257	20.5004	-43.117	-15.000	30694.32705	30745.32705	-154.041
85	1136.4780	0.89176	15.0827	0.6864	0.0903	0.5534	0.0530	0.000	0.0000	18.0257	20.5004	13.565	-15.000	30760.40977	30760.40977	111.772
86	1138.4952	0.89198	15.0827	0.8085	0.0623	0.4815	0.0650	0.000	0.0000	18.0257	16.7921	9.886	-15.000	30775.49250	30775.49250	111.772
87	1140.5292	0.89221	15.0827	0.8085	0.0623	0.4814	0.0650	0.000	0.0000	18.0257	16.7921	-6.659	-15.000	30790.57523	30790.57523	111.772
88	1142.4110	0.89241	15.0827	0.8086	0.0622	0.4813	0.0650	0.000	0.0000	18.0257	16.7921	-23.242	-15.000	30805.65795	30805.65795	111.772
89	1143.9832	0.89259	15.0827	0.8087	0.0622	0.4812	0.0650	0.000	0.0000	18.0257	16.7921	-39.861	-15.000	30820.74068	30820.74068	111.772
90	1145.5192	0.89275	15.0827	0.6870	0.0903	0.5531	0.0531	0.000	0.0000	18.0257	20.5004	-43.690	-15.000	30835.82340	30886.82340	111.772
91	1147.5795	0.89298	15.0827	0.6871	0.0903	0.5530	0.0531	0.000	0.0000	18.0257	20.5004	14.129	-15.000	30901.90613	30901.90613	19.686
92	1149.5958	0.89320	15.0827	0.8089	0.0622	0.4810	0.0651	0.000	0.0000	18.0257	16.7921	10.218	-15.000	30916.98886	30916.98886	19.686
93	1151.6313	0.89342	15.0827	0.8090	0.0622	0.4809	0.0651	0.000	0.0000	18.0257	16.7921	-6.549	-15.000	30932.07158	30932.07158	19.686
94	1153.5128	0.89362	15.0827	0.8091	0.0622	0.4808	0.0651	0.000	0.0000	18.0257	16.7921	-23.353	-15.000	30947.15431	30947.15431	19.686
95	1155.0783	0.89379	15.0827	0.8092	0.0622	0.4807	0.0651	0.000	0.0000	18.0257	16.7921	-40.193	-15.000	30962.23704	30962.23704	19.686
96	1156.6015	0.89395	15.0827	0.6877	0.0902	0.5527	0.0532	0.000	0.0000	18.0257	20.5004	-44.251	-15.000	30977.31976	31254.71496	19.686
	1156.6015	0.89395	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.5420	0.0000	0.000	(31081.01736)	31254.71496			
	1156.6015	0.89395	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	0.5420	0.0000	0.000	(31151.01736)	31254.71496			
97	1158.6587	0.89417	15.0827	0.6878	0.0902	0.5526	0.0532	0.000	0.0000	18.0257	20.5004	14.680	-15.000	31269.79769	31269.79769	1.547
98	1160.6741	0.89439	15.0827	0.8094	0.0621	0.4805	0.0651	0.000	0.0000	18.0257	16.7921	10.542	-15.000	31284.88041	31284.88041	1.547
99	1162.7114	0.89460	15.0827	0.8095	0.0621	0.4804	0.0651	0.000	0.0000	18.0257	16.7921	-6.442	-15.000	31299.96314	31299.96314	1.547
100	1164.5922	0.89480	15.0827	0.8096	0.0621	0.4803	0.0652	0.000	0.0000	18.0257	16.7921	-23.463	-15.000	31315.04587	31315.04587	1.547
101	1166.1511	0.89497	15.0827	0.8097	0.0621	0.4802	0.0652	0.000	0.0000	18.0257	16.7921	-40.518	-15.000	31330.12859	31330.12859	1.547
102	1167.6615	0.89513	15.0827	0.6884	0.0902	0.5523	0.0534	0.000	0.0000	18.0257	20.5004	-44.800	-15.000	31345.21132	31396.21132	1.547

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103	1169.7156	0.89534	15.0827	0.6885	0.0902	0.5522	0.0534	0.000	0.0000	18.0257	20.5004	15.220	-15.000	31411.29404	31411.29404	-86.476
104	1171.7300	0.89556	15.0827	0.8099	0.0621	0.4800	0.0652	0.000	0.0000	18.0257	16.7921	10.860	-15.000	31426.37677	31426.37677	-86.476
105	1173.7688	0.89577	15.0827	0.8099	0.0621	0.4799	0.0652	0.000	0.0000	18.0257	16.7921	-6.337	-15.000	31441.45950	31441.45950	-86.476
106	1175.6493	0.89597	15.0827	0.8100	0.0621	0.4798	0.0652	0.000	0.0000	18.0257	16.7921	-23.570	-15.000	31456.54222	31456.54222	-86.476
107	1177.2016	0.89613	15.0827	0.8101	0.0621	0.4797	0.0652	0.000	0.0000	18.0257	16.7921	-40.836	-15.000	31471.62495	31471.62495	-86.476
108	1178.6993	0.89628	15.0827	0.6891	0.0902	0.5519	0.0535	0.000	0.0000	18.0257	20.5004	-45.337	-15.000	31486.70768	31537.70768	-86.476
109	1180.7501	0.89649	15.0827	0.6891	0.0902	0.5518	0.0535	0.000	0.0000	18.0257	20.5004	15.748	-15.000	31552.79040	31552.79040	-172.533
110	1182.7635	0.89670	15.0827	0.8103	0.0620	0.4795	0.0653	0.000	0.0000	18.0257	16.7921	11.170	-15.000	31567.87313	31567.87313	-172.533
111	1184.8039	0.89691	15.0827	0.8104	0.0620	0.4794	0.0653	0.000	0.0000	18.0257	16.7921	-6.234	-15.000	31582.95585	31582.95585	-172.533
112	1186.6839	0.89710	15.0827	0.8105	0.0620	0.4793	0.0653	0.000	0.0000	18.0257	16.7921	-23.674	-15.000	31598.03858	31598.03858	-172.533
113	1188.2298	0.89726	15.0827	0.8106	0.0620	0.4792	0.0653	0.000	0.0000	18.0257	16.7921	-41.147	-15.000	31613.12131	31613.12131	-172.533
114	1189.7149	0.89741	15.0827	0.6897	0.0901	0.5515	0.0536	0.000	0.0000	18.0257	20.5004	-45.862	-15.000	31628.20403	31679.20403	-172.533
115	1191.7623	0.89762	15.0827	0.6898	0.0901	0.5515	0.0537	0.000	0.0000	18.0257	20.5004	16.264	-15.000	31694.28676	31694.28676	103.335
116	1193.7747	0.89783	15.0827	0.8108	0.0620	0.4790	0.0653	0.000	0.0000	18.0257	16.7921	11.475	-15.000	31709.36948	31709.36948	103.335
117	1195.8166	0.89803	15.0827	0.8108	0.0620	0.4789	0.0653	0.000	0.0000	18.0257	16.7921	-6.134	-15.000	31724.45221	31724.45221	103.335
118	1197.6961	0.89822	15.0827	0.8109	0.0620	0.4789	0.0654	0.000	0.0000	18.0257	16.7921	-23.777	-15.000	31739.53494	31739.53494	103.335
119	1199.2356	0.89838	15.0827	0.8110	0.0619	0.4788	0.0654	0.000	0.0000	18.0257	16.7921	-41.452	-15.000	31754.61766	31754.61766	103.335
120	1200.7083	0.89852	15.0827	0.6903	0.0901	0.5511	0.0538	0.000	0.0000	18.0257	20.5004	-46.377	-15.000	31769.70039	32047.09559	103.335
	1200.7083	0.89852	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.5420	0.0000	0.000	(31873.39799)	32047.09559			
	1200.7083	0.89852	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	0.5420	0.0000	0.000	(31943.39799)	32047.09559			
121	1202.7523	0.89873	15.0827	0.6904	0.0901	0.5511	0.0538	0.000	0.0000	18.0257	20.5004	16.770	-15.000	32062.17832	32062.17832	105.436
122	1204.7636	0.89893	15.0827	0.8112	0.0619	0.4786	0.0654	0.000	0.0000	18.0257	16.7921	11.772	-15.000	32077.26104	32077.26104	105.436
123	1206.8070	0.89913	15.0827	0.8113	0.0619	0.4785	0.0654	0.000	0.0000	18.0257	16.7921	-6.035	-15.000	32092.34377	32092.34377	105.436
124	1208.6860	0.89932	15.0827	0.8114	0.0619	0.4784	0.0654	0.000	0.0000	18.0257	16.7921	-23.877	-15.000	32107.42649	32107.42649	105.436
125	1210.2193	0.89947	15.0827	0.8114	0.0619	0.4783	0.0654	0.000	0.0000	18.0257	16.7921	-41.750	-15.000	32122.50922	32122.50922	105.436
126	1211.6796	0.89961	15.0827	0.6910	0.0901	0.5508	0.0539	0.000	0.0000	18.0257	20.5004	-46.880	-15.000	32137.59195	32188.59195	105.436
127	1213.7201	0.89982	15.0827	0.6910	0.0901	0.5507	0.0539	0.000	0.0000	18.0257	20.5004	17.266	-15.000	32203.67467	32203.67467	25.033
128	1215.7303	0.90001	15.0827	0.8116	0.0619	0.4781	0.0655	0.000	0.0000	18.0257	16.7921	12.064	-15.000	32218.75740	32218.75740	25.033
129	1217.7751	0.90021	15.0827	0.8117	0.0619	0.4780	0.0655	0.000	0.0000	18.0257	16.7921	-5.939	-15.000	32233.84012	32233.84012	25.033
130	1219.6537	0.90040	15.0827	0.8118	0.0618	0.4780	0.0655	0.000	0.0000	18.0257	16.7921	-23.975	-15.000	32248.92285	32248.92285	25.033
131	1221.1808	0.90054	15.0827	0.8119	0.0618	0.4779	0.0655	0.000	0.0000	18.0257	16.7921	-42.042	-15.000	32264.00558	32264.00558	25.033
132	1222.6289	0.90068	15.0827	0.6916	0.0901	0.5504	0.0540	0.000	0.0000	18.0257	20.5004	-47.374	-15.000	32279.08830	32330.08830	25.033
133	1224.6657	0.90088	15.0827	0.6916	0.0901	0.5504	0.0540	0.000	0.0000	18.0257	20.5004	17.751	-15.000	32345.17103	32345.17103	-53.563
134	1226.6747	0.90108	15.0827	0.8120	0.0618	0.4777	0.0655	0.000	0.0000	18.0257	16.7921	12.350	-15.000	32360.25376	32360.25376	-53.563
135	1228.7209	0.90127	15.0827	0.8121	0.0618	0.4776	0.0655	0.000	0.0000	18.0257	16.7921	-5.844	-15.000	32375.33648	32375.33648	-53.563
136	1230.5991	0.90145	15.0827	0.8122	0.0618	0.4775	0.0656	0.000	0.0000	18.0257	16.7921	-24.071	-15.000	32390.41921	32390.41921	-53.563
137	1232.1200	0.90160	15.0827	0.8123	0.0618	0.4774	0.0656	0.000	0.0000	18.0257	16.7921	-42.328	-15.000	32405.50193	32405.50193	-53.563
138	1233.5560	0.90174	15.0827	0.6922	0.0900	0.5501	0.0541	0.000	0.0000	18.0257	20.5004	-47.857	-15.000	32420.58466	32471.58466	-53.563
139	1235.5890	0.90193	15.0827	0.6922	0.0900	0.5500	0.0542	0.000	0.0000	18.0257	20.5004	18.227	-15.000	32486.66739	32486.66739	-130.390
140	1237.5969	0.90212	15.0827	0.8124	0.0618	0.4773	0.0656	0.000	0.0000	18.0257	16.7921	12.629	-15.000	32501.75011	32501.75011	-130.390
141	1239.6445	0.90231	15.0827	0.8125	0.0618	0.4772	0.0656	0.000	0.0000	18.0257	16.7921	-5.752	-15.000	32516.83284	32516.83284	-130.390
142	1241.5222	0.90249	15.0827	0.8126	0.0617	0.4771	0.0656	0.000	0.0000	18.0257	16.7921	-24.165	-15.000	32531.91556	32531.91556	-130.390
143	1243.0370	0.90263	15.0827	0.8127	0.0617	0.4770	0.0656	0.000	0.0000	18.0257	16.7921	-42.609	-15.000	32546.99829	32546.99829	-130.390
144	1244.4611	0.90277	15.0827	0.6927	0.0900	0.5497	0.0543	0.000	0.0000	18.0257	20.5004	-48.330	-15.000	32562.08102	32839.47622	-130.390
	1244.4611	0.90277	51.0000	0.0000	0.0000	0.0000	0.0000	40.000	-0.5420	0.0000	0.000	(32665.77862)	32839.47622			