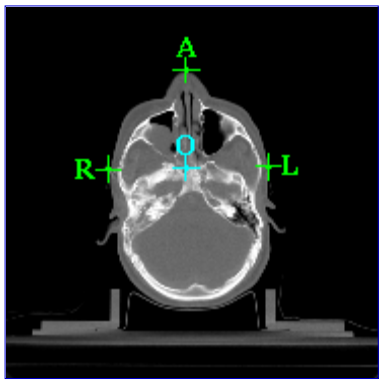
SISTEMAS DE PLANEJAMENTO

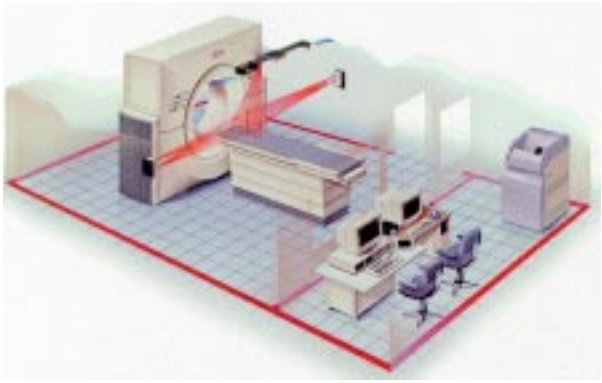
Miguel Daniliauskas

Diagnostic Imaging

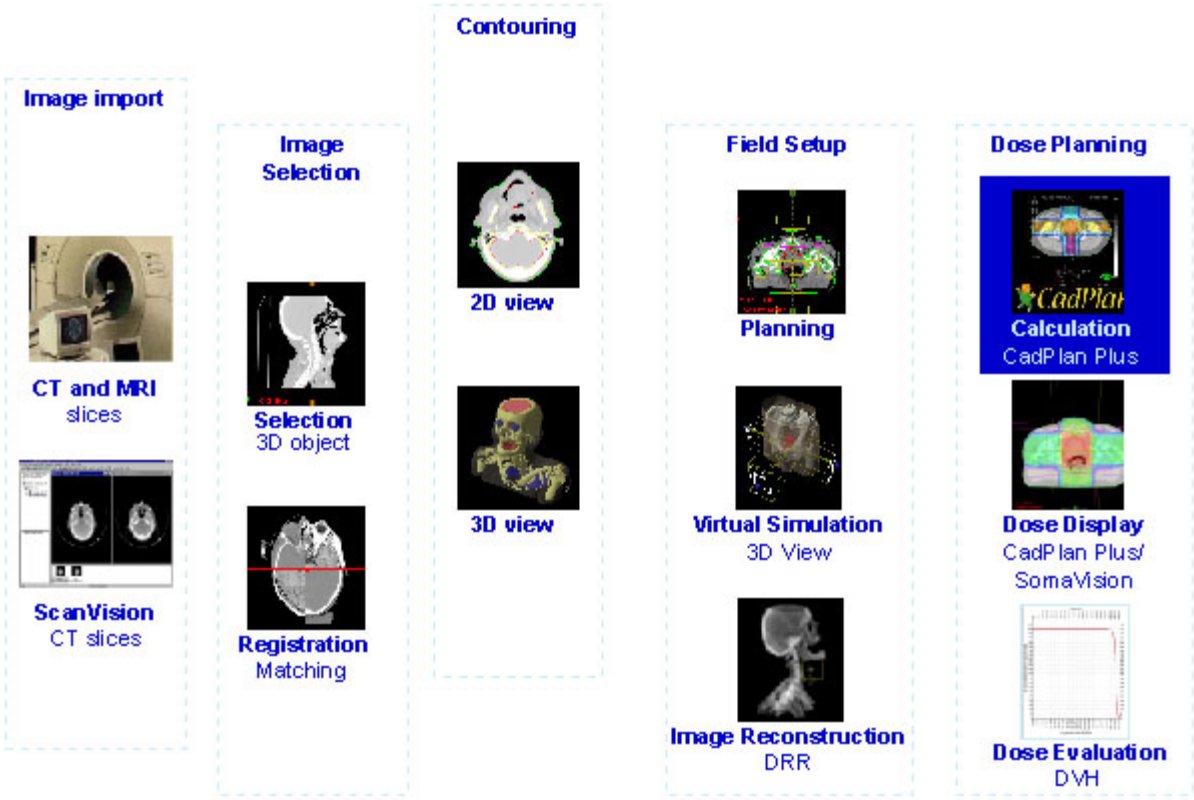
A spiral CT or MR scan of the region of interest is acquired.

- **Max. 3 mm slice thickness**
- **Large number of CT/MR slices**
- **Patient fixed in Immobilisation device**





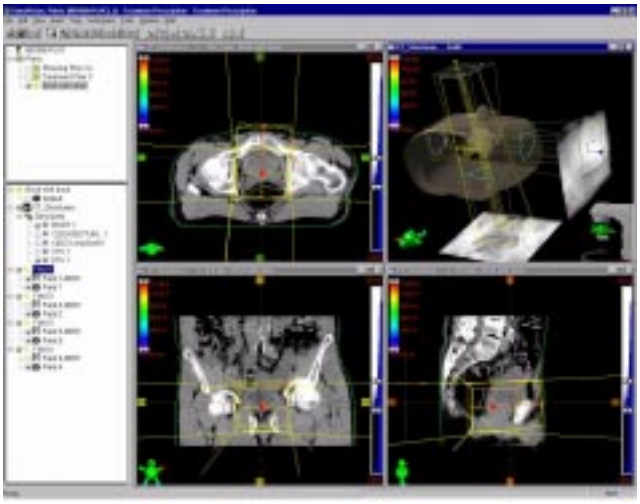
3D Planning Process - SomaVision & CadPlan Plus



Exceptional Plan Definition

SomaVision: toolset of choice

- **Import/Export**
- **Dicom RT**
- **Fast outlining**
- **Beam setting**
- **Auto MLC**
- **Supports ICRU 50**



VARIAN CadPlan

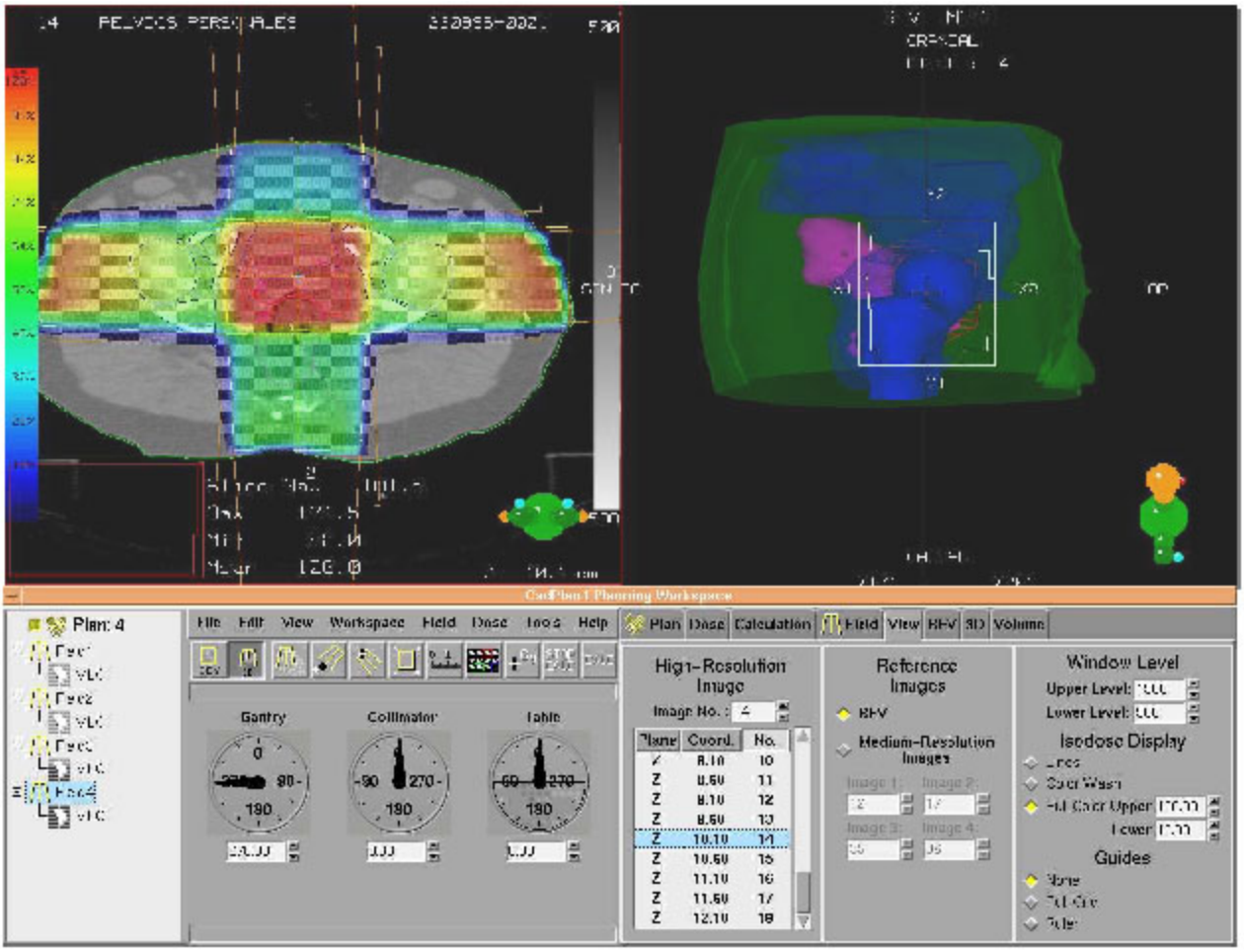
CadPlan: Características Gerais

- **HP-UX 10.20 operating system**
- **Instalado em mais de 1000 Hospitais no mundo**
- **Software provado clinicamente**
- **Inclue módulo de braquiterapia:**
  - **sementes, fios e sistemas de controle remoto**

- **Interface com o usuário:**
  - **Gráfica**
  - **Fácil de usar**
  - **Grupamento lógico dos dados**

- **Gráfico:**
  - **Gráficos de alta qualidade**
  - **Linhas, superfície e translúcido – 3D**
  - **BEV, REV**

CadPlan - Visualização Gráfica



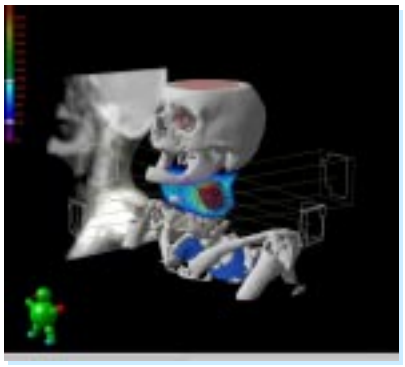
CadPlan: Configuração da Unidade de Tratamento

- **Parâmetros Geométricos**
- **Escalas (IEC, Varian IEC definida pelo usuário)**
- **Limites da Máquina**
- **Dados dosimétricos: colocação e configuração**
  - **Curvas de PDP**
  - **Profile (5 diferentes profundidades)**
  - **Tabelas de Fator Output**

⇒ **pencil beam kernels**

CadPlan: Gerenciamento do Paciente

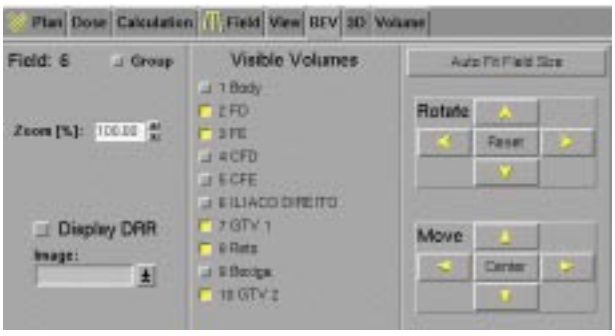
- **Imagens de CT**
  - **Network**
  - **Dicom 3.0**
- **Backups**
  - **DAT-tapes**
  - **MO-disks (using NFS mount)**
  - **Recuperação Individualizada do Paciente Gravado**

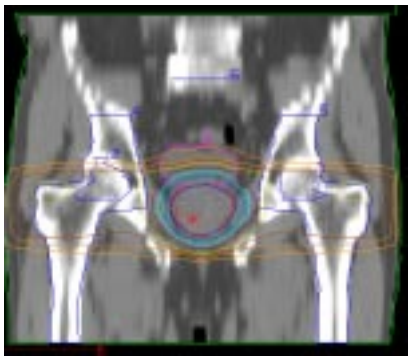


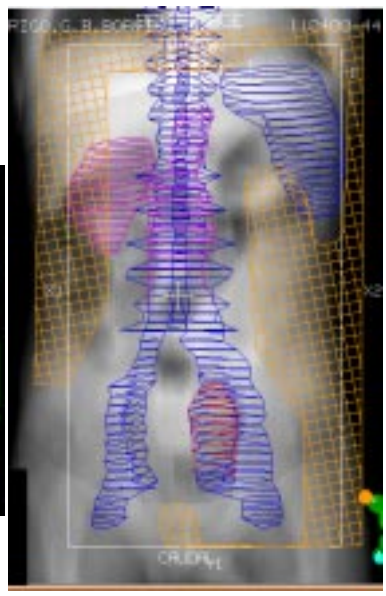
CadPlan: Contorno

- **Ferramentas de Contorno:**
  - **Contorno automático para corpo, pulmão e outros**
  - **Contorno manual**
  - **Margem 3D**
  - **Interpolação**
- **Digitalizador para entrada de contornos do paciente**
  - **Numonics**
  - **Digikon**
  - **Scanner Vidar**
- **Opção de utilizar o SomaVision**

BEV





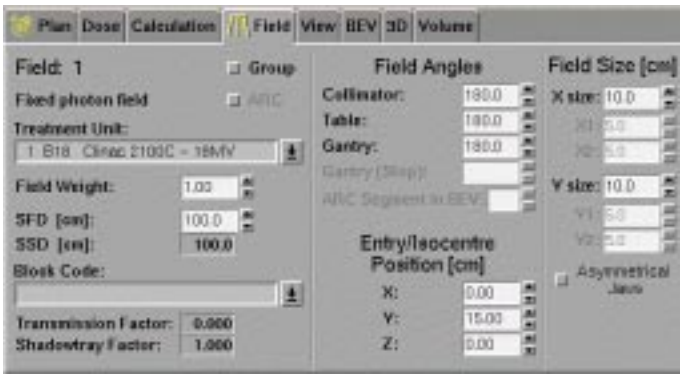


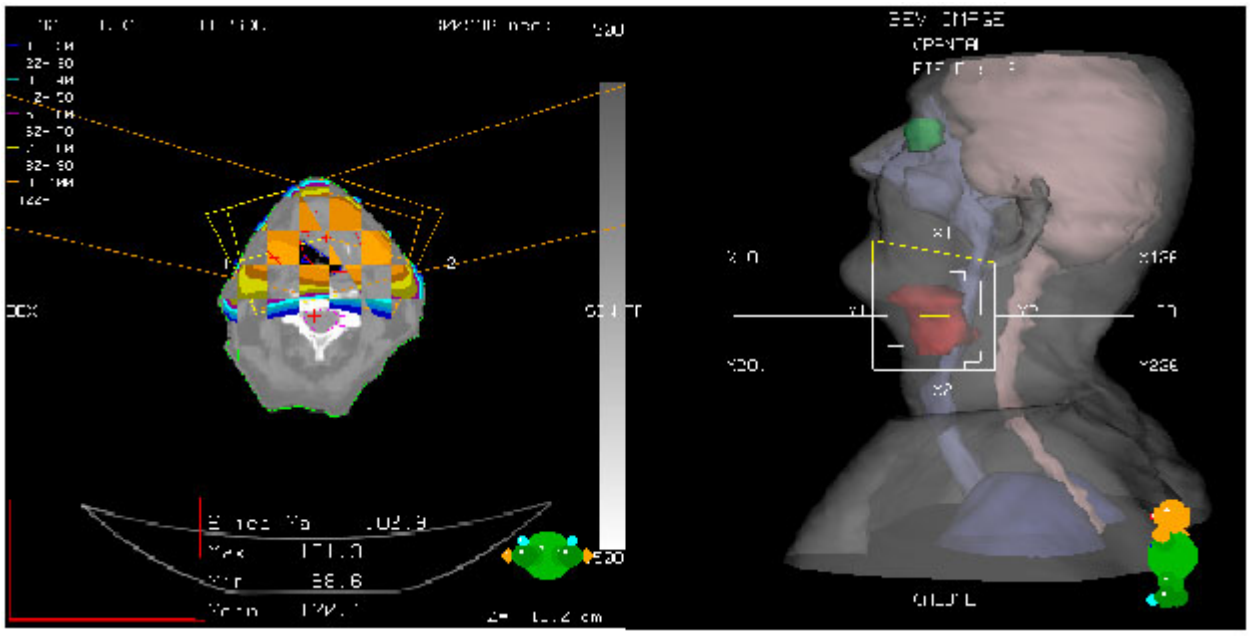
CadPlan: Field Set-up

- **Interface Gráfica com o Usuário**
  - **Browser Intuitivo**
  - **Posicionamento do campo interativamente**
    - **Visualização transversal, coronal**
    - **beam's eye-view (BEV)**
  - **Ferramentas de Posicionamento Automático**
    - **Isocentro posicionado no centro do alvo**
    - **MLC e blocos (margens assimétricas)**
- **Biblioteca de Planos**
  - **Planos clássicos (4 cpos pelve, 6 cpos próstata, etc)**

➔ **Posicionamento do Campo Preciso e Eficiente**

- **Técnicas:**
  - **Estática, Arcos**
  - **Combinação de Fótons e Elétrons**
  - **Filtro padrão e Dinâmico (EDW)**
  - **Blocos**
  - **MLC**
    - **Varian 52, 80 and 120**
      - **static, ARC dMLC, dose dMLC**
    - **BrainLab mMLC**
  - **Compensators (physical and dMLC) - IMRT**
  - **Bolus**
- **DRR – completo e volume parcial**

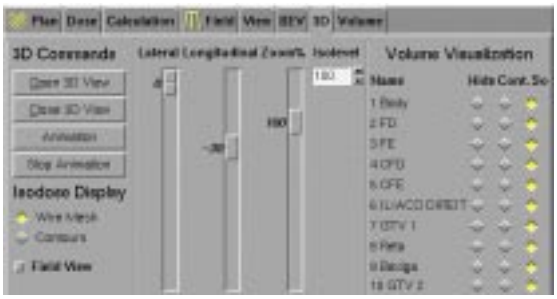




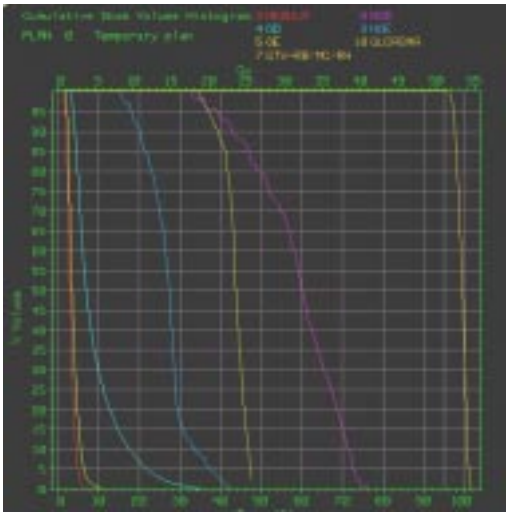
CadPlan: Cálculo da Dose

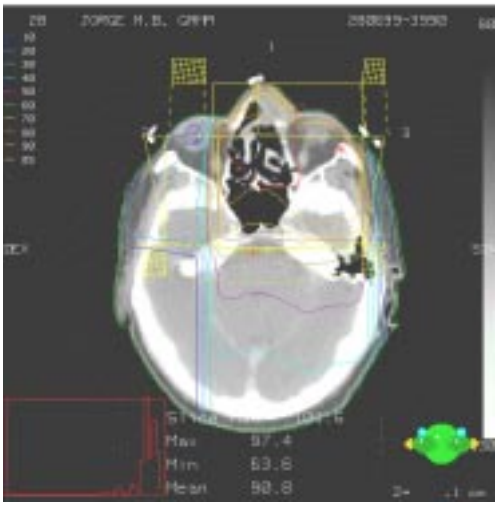
- **Modelo para Fótons: Single pencil beam convolution**
- **Modelo para Elétrons: Generalized pencil beam**
- **Cálculo da Dose em Background**

CadPlan: Avaliação do Plano



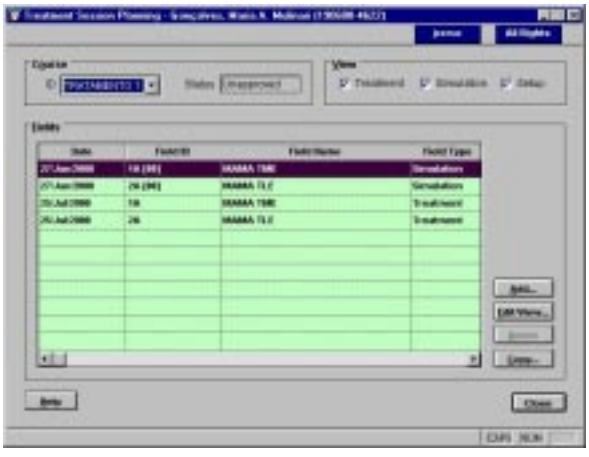
- **Visualização da Dose:**
  - **Linhas de Isodose**
  - **Isodose Color wash**
  - **Isodose em 3D**
- **Histogramas de Dose Volume**
  - **Lógica Booleana para calcular DVH para combinação de estruturas**
- **Comparação Visual "lado a lado" – DVH e imagens**
- **Diferença entre Planos**





CadPlan: Conectividade

- **Integração com SomaVision**
  - **Imagens, Estruturas e Planos**
  - **Exporta Planos e Doses**
- **Interface completa para CT**
- **Dicom RT**
  - **Imagens, estruturas e planos**
  - **Exporta Planos**
- **VARiS Link**
  - **Dados dos Campos (inclusive MLC, dMLC)**
  - **Pontos de Referência de Doses**



Infraestrutura para Instalação:

Sala para planejamento 15 metros quadrados (3x 5 m)
Bancada de 3x1 m (pg. 6.23.0 IDP)
4 tomadas para computador
Nobreak 2kva saida 120V (min. 15 min.)
Ar condicionado conforto (22 +/- 2 80% umid. max.)
Linha Telefônica Direta (modem)
Ponto de Rede do Hospital

INFORMAÇÕES NECESSÁRIAS PARA CONFIGURAÇÃO DO SOFTWARE

Caso possua CT/ MR - Modelo e Versão do Software
Indicar se possuem rede interna/Dicom para transferência
Informar maquinas de tratamento

Miguel Daniliauskas

Configuração do Equipamento a ser Fornecido pela Varian

Acelerador Clinac 2100 C

- **Energias**

  6 e 10 MV Photons

  4,6,9,12,15 MeV Eletrons

- **Colimador Multi Folhas 52 lâminas**
- **Sistema Varis -LE**

  Interligação/Interface entre o 2100C e o Sistema de Planejamento

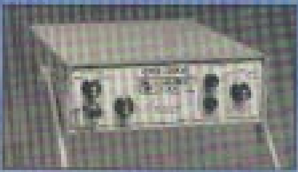
- **Acompanha Estabilizador**
- **Sistema de visualização e comunicação com o paciente**
- **Eletrometro de 4 1/2 dígitos mod. Excalibur CDX 2000 A**
- **Cabo coaxial 20 m**
- **Duas câmaras placas paralelas PTW**
- **Duas Câmaras tipo Dedal PTW**
- **Sistema de controle de qualidade dosimétrica diária, modelo Tracker Therapy Beam Evaluation System**
- **Suporte para tratamento de mama marca Med-Tec**
- **Porta Chassis marca Huestis com 36" de extensão**
- **Dois cassetes para Radiografia Portal- Radiation Products**
- **Sistema de verificação de alinhamento marca Med-Tec, mod.Iso-Align**

EXCALIBUR CDX 2000A

Charge Digitizing Electrometer

All Digital Operation

The EXCALIBUR CDX 2000A electrometer takes the charge signal from the Ion Chamber and converts it to a digital signal right at the input connector. Every 10 pC becomes one digital count. The conventional method of analog capture and analog to digital conversion is completely eliminated. Digital operation provides excellent stability, 0.02% reproducibility, and low leakage, <10 [illegible] Amps. Digital operation also contributes to these important benefits: **1. unique, user controlled timing capabilities. 2. an extensive coulomb range. 3. Five decade Amp range. 4. an attractive price.**

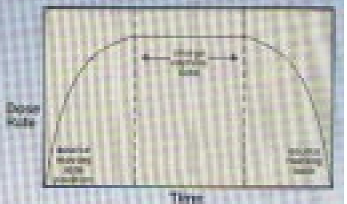


EXCALIBUR CDX 2000A. The lowest priced general purpose electrometer to include an Amp scale, a Coulomb scale and a unique timing feature.

Unique Timing Capabilities

Unique timing capability ideally suited to brachytherapy calibration. The CDX 2000A can capture charge during specific times of an exposure. Using this timing feature, the signal can be captured for a selected amount of time, ie. 30, 60, 120 seconds, thereby eliminating end effects or other variable portions of an exposure. This application is very useful during the measurement of high and low dose rate brachytherapy sources allowing you to measure charge only during the time the source is in place and the rate is constant.

The time selected is held and repeated until changed by the operator. The **two line** display shows the time counting down on one line while the charge being collected is simultaneously displayed on the other line.



The CDX timing feature allows charge capture during the constant part of an exposure.

Designed in collaboration with Paul M. DeLuca, Jr., PhD, University of Wisconsin - Madison

(ITEM 2)

TRACKER™ THERAPY BEAM EVALUATION SYSTEM MODEL 90100

TECHNICAL SPECIFICATIONS

- Dose acquisition and simultaneous display from five detectors
- Measures dose or dose rate
- Constancy, flatness, and symmetry in one measurement
- Absolute and percent-off-center display modes
- Also by 20-character Vacuum Fluorescent Display (VFD) for excellent readability in all lighting conditions
- Temperature and pressure corrections

TRACKER Therapy Beam Evaluation System, Model 90100

DESCRIPTION

The TRACKER Therapy Beam Evaluation System, Model 90100, is a quality assurance system that measures therapy radiation sources, including dose and dose rate, enabling user calculation of beam constancy, flatness, and symmetry. The system consists of the Model 35300A Detector and Model 35360A Display.

The Model 35300A TRACKER detector array incorporates four orthogonally-placed ion chambers on a 10cm radii from a fifth centrally-located ion chamber, allowing ratio-to-center dose acquisition. Each ion chamber, which is identical and vented to the atmosphere, is a circular, parallel plate configuration and is fully guarded for low leakage. An overlay indicates ion chamber locations for alignment with a therapy beam light field system. The Model 35360A TRACKER Display contains five electrometers and is characterized by a microprocessor controller, 4-line by 20-character Vacuum Fluorescent Display (VFD) that enables excellent readability of dose and dose rate measurements in virtually any lighting condition. TRACKER Communication Software enables user-modification of temperature or pressure units, random time-out duration, detector serial numbers, and optional text line for Test/Detector format/center-ing preference. The Communication Software may also be used to print a report to indicate all of the customization settings.

A five-channel electrometer enables measurement of dose or dose rate in either constancy or tolerance units. Dose measurement values may be displayed in units of R and Sv [illegible]. Dose rate measurement values may be displayed in units of R/min, rad/min, Sv/min or Gy/min.

The TRACKER System may be operated from either AC line power or from its high capacity internal battery. The batteries are charged automatically when the unit is connected to AC line power, either during use or when idle.

Consulting physicists will appreciate the TRACKER System's portability. An optional carrying case eases transport and storage. Other optional accessories include build up plates of various thicknesses and materials and a build-up retaining hardware kit.

APPLICATION

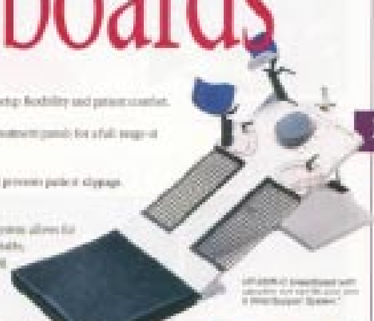
The TRACKER Therapy Beam Evaluation System performs quality assurance tests for linear accelerators, Cobalt 60, and therapeutic x-ray equipment. The system's quick setup and convenience of use make it ideal for daily checks of beam constancy, symmetry, and flatness.

KEITHLEY RADIATION MEASUREMENTS

(ITEMS 6,7,8,9,10)

Breastboards

MT-250 SERIES



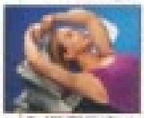
This advanced breastboard is designed for ultimate setup flexibility and patient comfort.

It features rigid, radiotranslucent carbon fiber grid treatment panels for a full range of treatment angles with minimum attenuation.

A 2" thick, vinyl-covered hip pad offers comfort and prevents patient slippage.

Optional arm positioning systems include:

- **Bilateral Arm Support System.**™ This exclusive system allows for the natural movement of the upper arm and comfortable, relaxed positioning of the lower arm. Point re-locating and a full range of arm positions — including positioning that allows the breastboard to fit into a CT scanner — make this the most accurate and versatile arm positioning system available.



[illegible]

- **Delrin hand grips.** An economical alternative that offers overhead positioning of one or both arms.

Two elevation systems are available to meet your needs:

- The **Wedge** system includes one each of 5° - 10° - 15° - 20° lightweight but sturdy PVC wedges. Custom wedges are also available.
- The elevation **Rod** system consists of a graduated aluminum rod numbered in 1cm increments up to 25° maximum.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

800.842.8688
MED-TEC
PO Box 320 . Orange City, IA 51041 . USA
U.S. fax: 712.737.8654 int'l fax: 712.737.6422 phone: 712.737.8688

Cassette holders

MT-300

hi-mobility cassette holder

This popular affordable cassette holder is lightweight and easy to maneuver. Constructed of durable, anodized aluminum and stainless steel for years of trouble-free service.

Positive-locking for any cassette size. Quick, universal adjustment for any position. *(Use extension arm for posterior port film.)* Precision-engraved angulation. Ballast holder included. Casters.

26" diameter base. 75" overall height. 27" arm length.

MT-CH3-25 or 36

standard cassette holder (ITEM 13)

Rugged, heavy duty construction. Counterbalanced cassette arm for easy vertical adjustment. Tilts the cassette 180.° Rotates cassette 360.° Locking casters.

Two arm-telescoping models available: 25" or 36."

accessory rail cassette holder clips

For quick attachment of film cassettes to treatment table rails. Precision-machined, anodized aluminum. Contact your MED-TEC account representative for details.

FDA reg. #KSR1600 Hi-mobility cassette holder

800.842.8688
MED-TEC
PO Box 320 . Orange City, IA 51041 . USA
U.S. fax: 712.737.8654 int'l fax: 712.737.6422 phone: 712.737.8688

(ITEM 15)

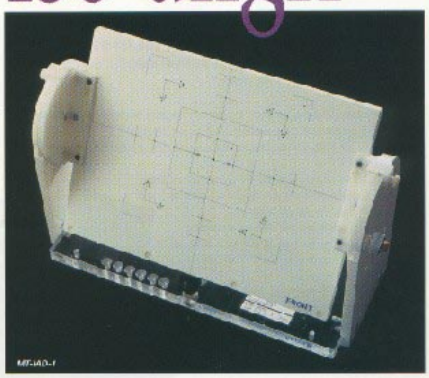
Iso-align™

radiation therapy quality control device

The Iso-align is a multi-purpose, precision alignment device for routine quality control of lasers, linear accelerators, Co-60 teletherapy machines, and simulators.

The Iso-align accurately and easily performs a multitude of precision alignment procedures without repositioning the device, including:

- *Alignment of all lasers*
- *Mechanical isocenter*
- *Gantry, collimator, table*
- *Radiation and light field coincidence.*
- *Light field alignment and jaw readout accuracy.*
- *Collimator angle readout accuracy.*
- *ODI accuracy at various distances.*
- *Port film grid alignment.*



Sturdy, precision-machined acrylic base plate has three individual adjustment feet and built-in bubble level. Two vertical supports with rotation plates and locking pins on the top plate. Angle indicator windows for quick and accurate confirmation of selected tilt. Full 360° tilt adjustment with positive locking stops every 10°. Film pack slot for 10" x 12" ready-pack film. Features Ø 1.5-mm diameter tungsten pins for accurate checking of radiation field/light field coincidence of a 15cm x 15cm field. Precision-engraved lines for quick and convenient checking of the light field at various collimator settings. Quick assembly for travel or storage. Optional storage/travel case for maximum protection.

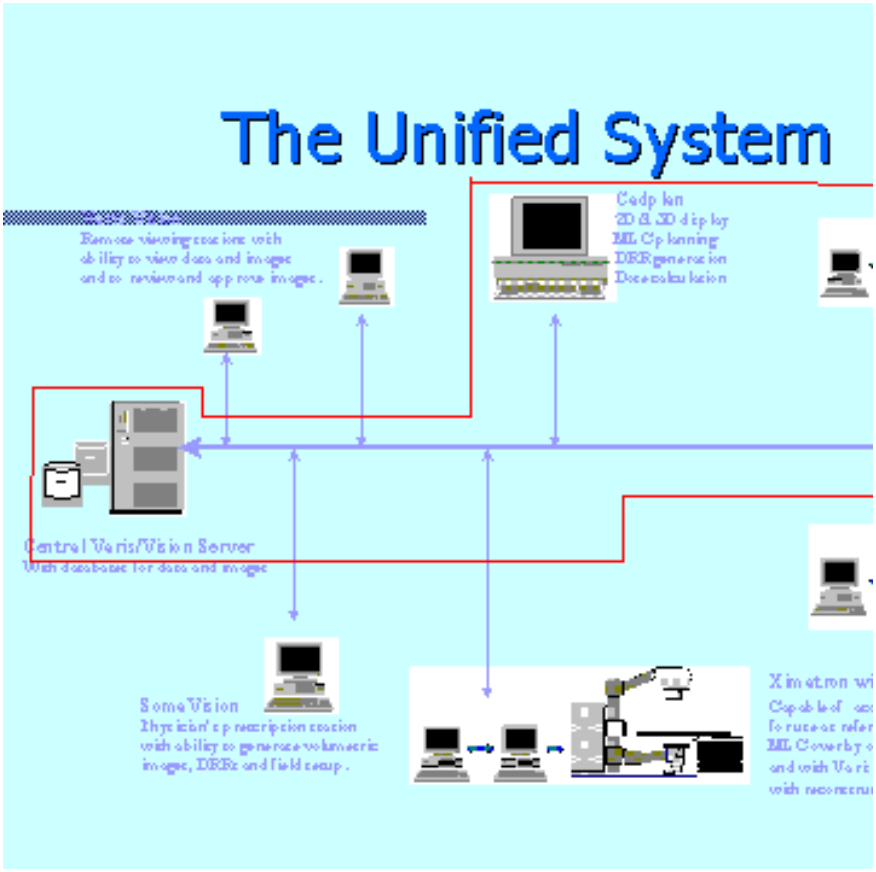
800.842.8688

MED-TEC

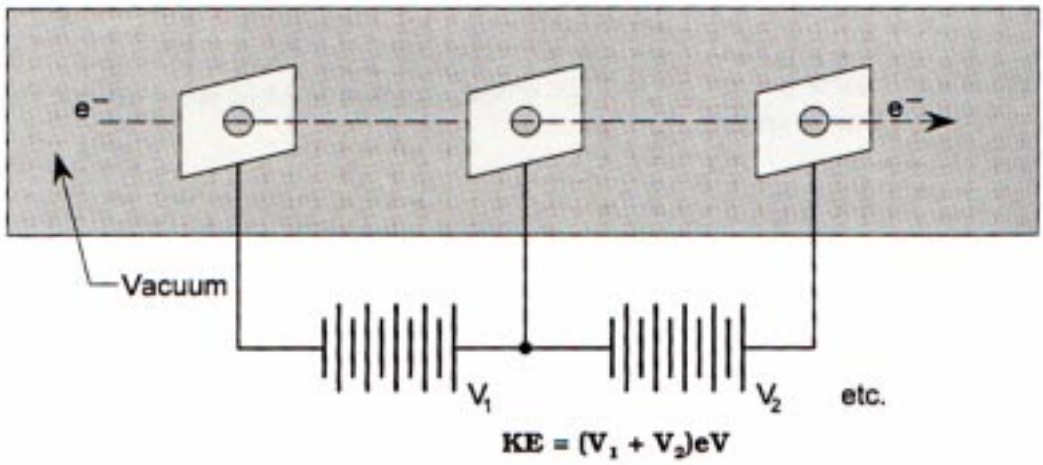
PO Box 320 . Orange City, IA 51041 . USA

U.S. fax: 712.737.8654 *Int'l fax:* 712.737.6422 *phone:* 712.737.8688

Miguel Daniliauskas

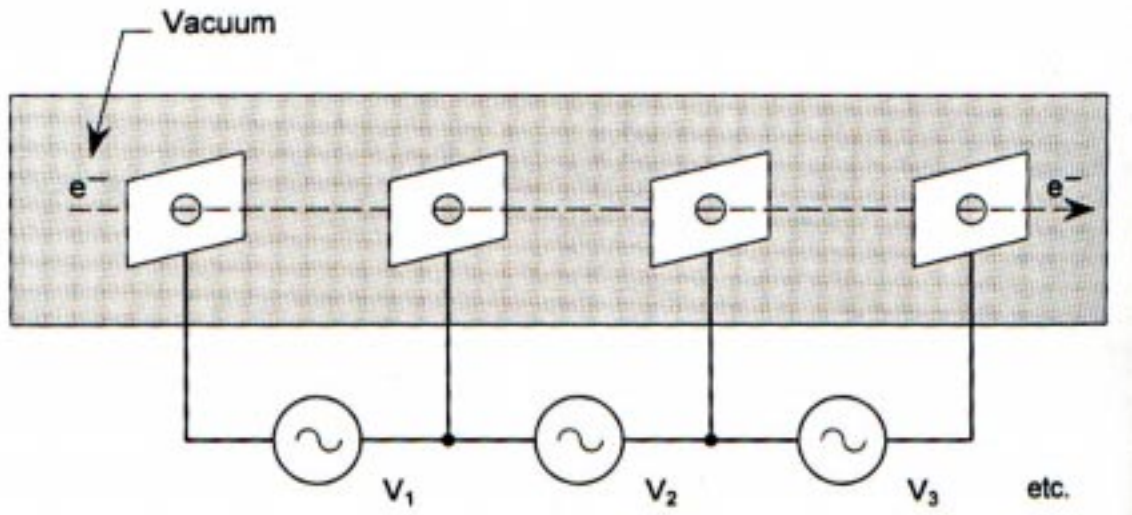


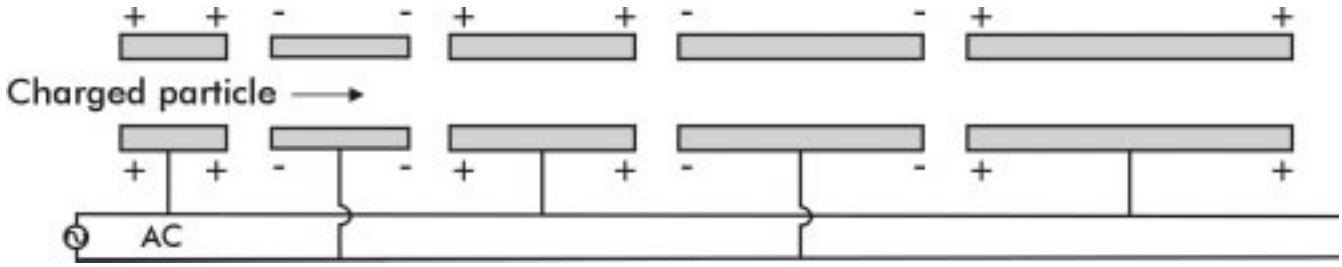
Electrostatic (DC):

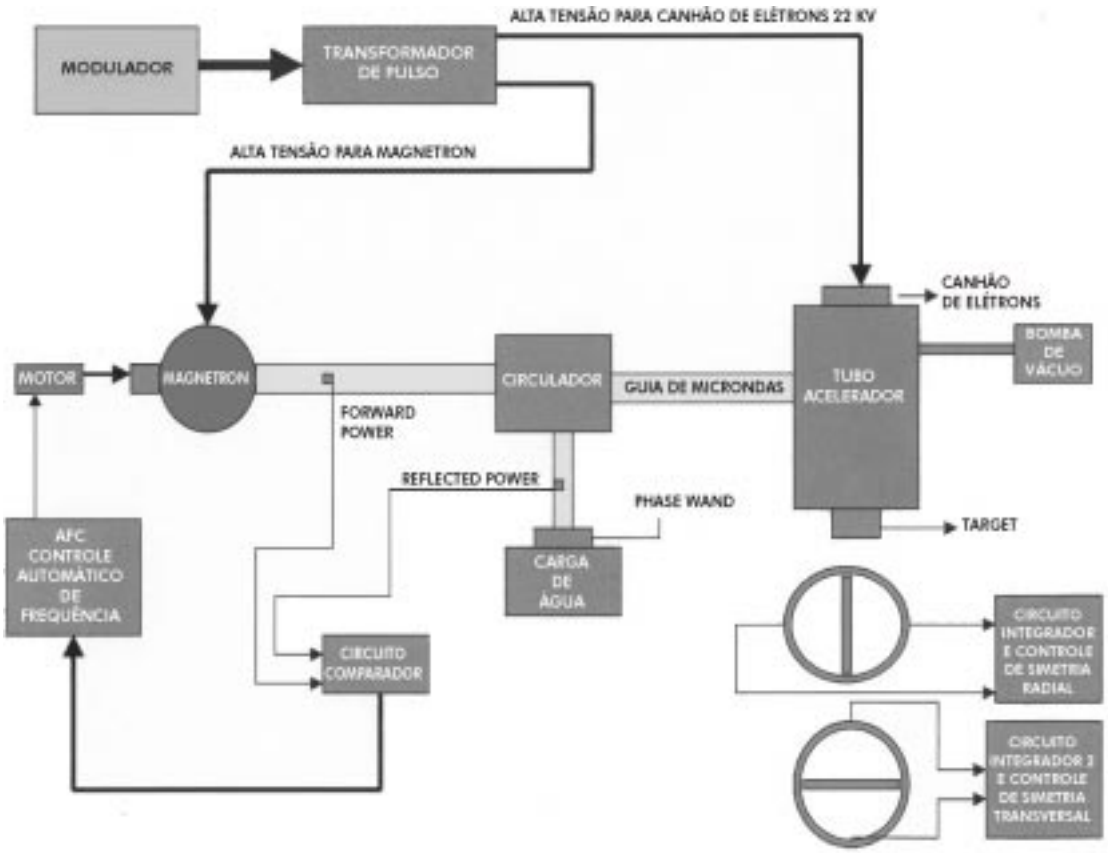


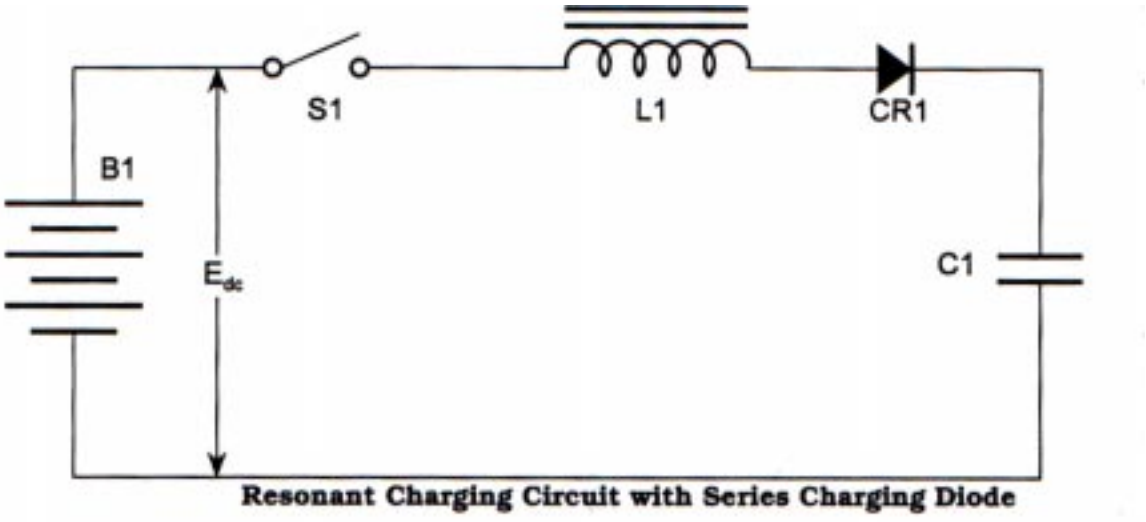
$KE = (V_1 + V_2)eV$

Alternating Current (AC):

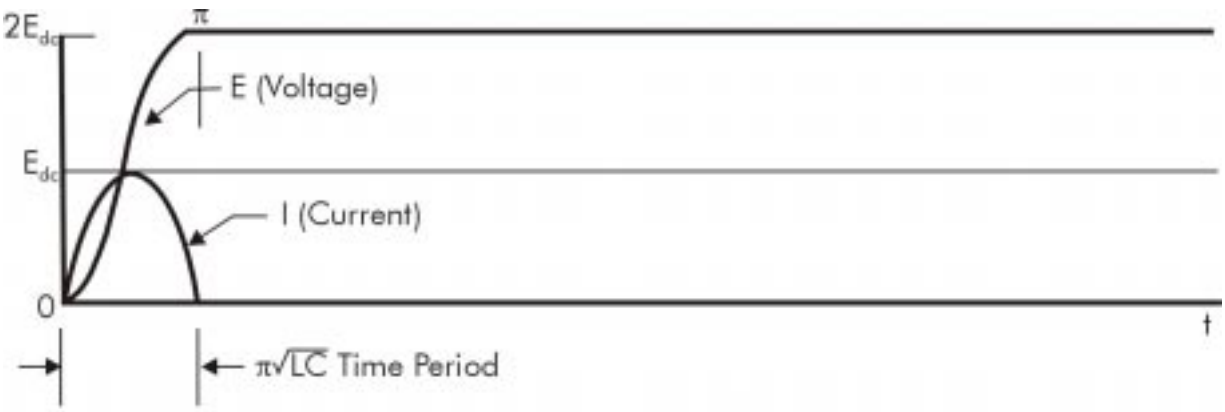




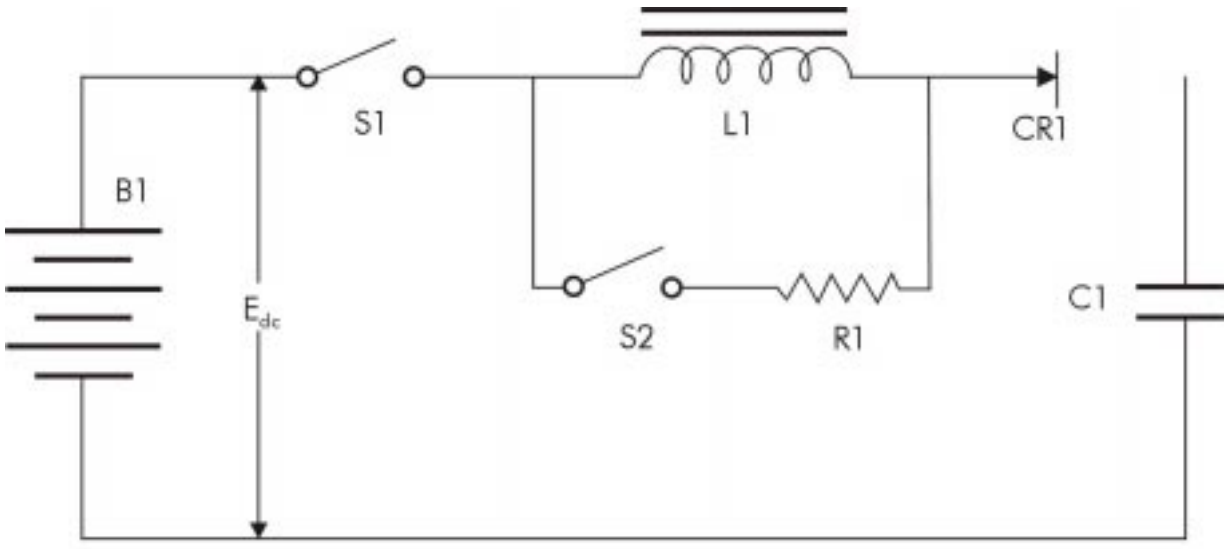




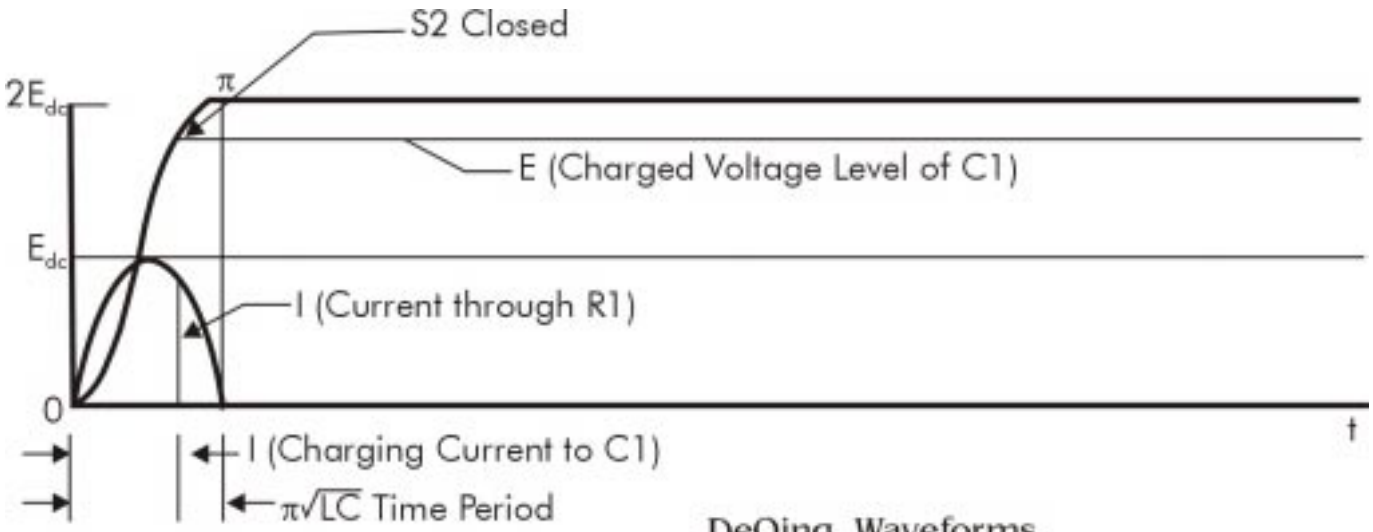
Resonant Charging Circuit with Series Charging Diode



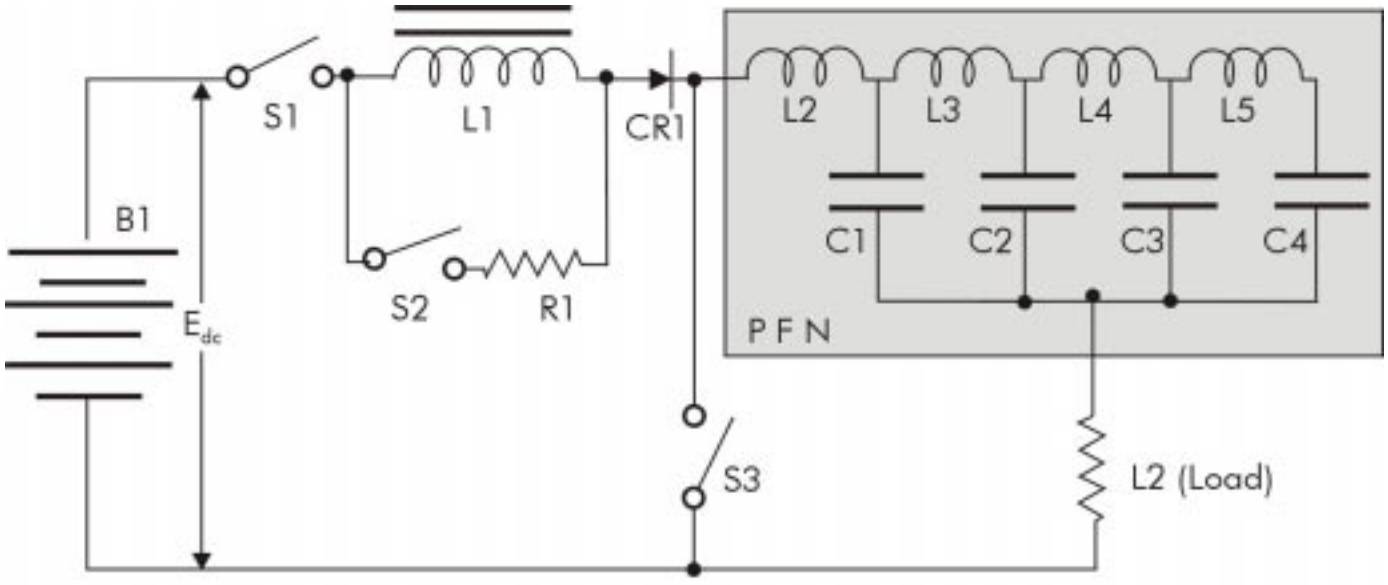
Voltage waveform on C1 with Series Charging Diode CR1



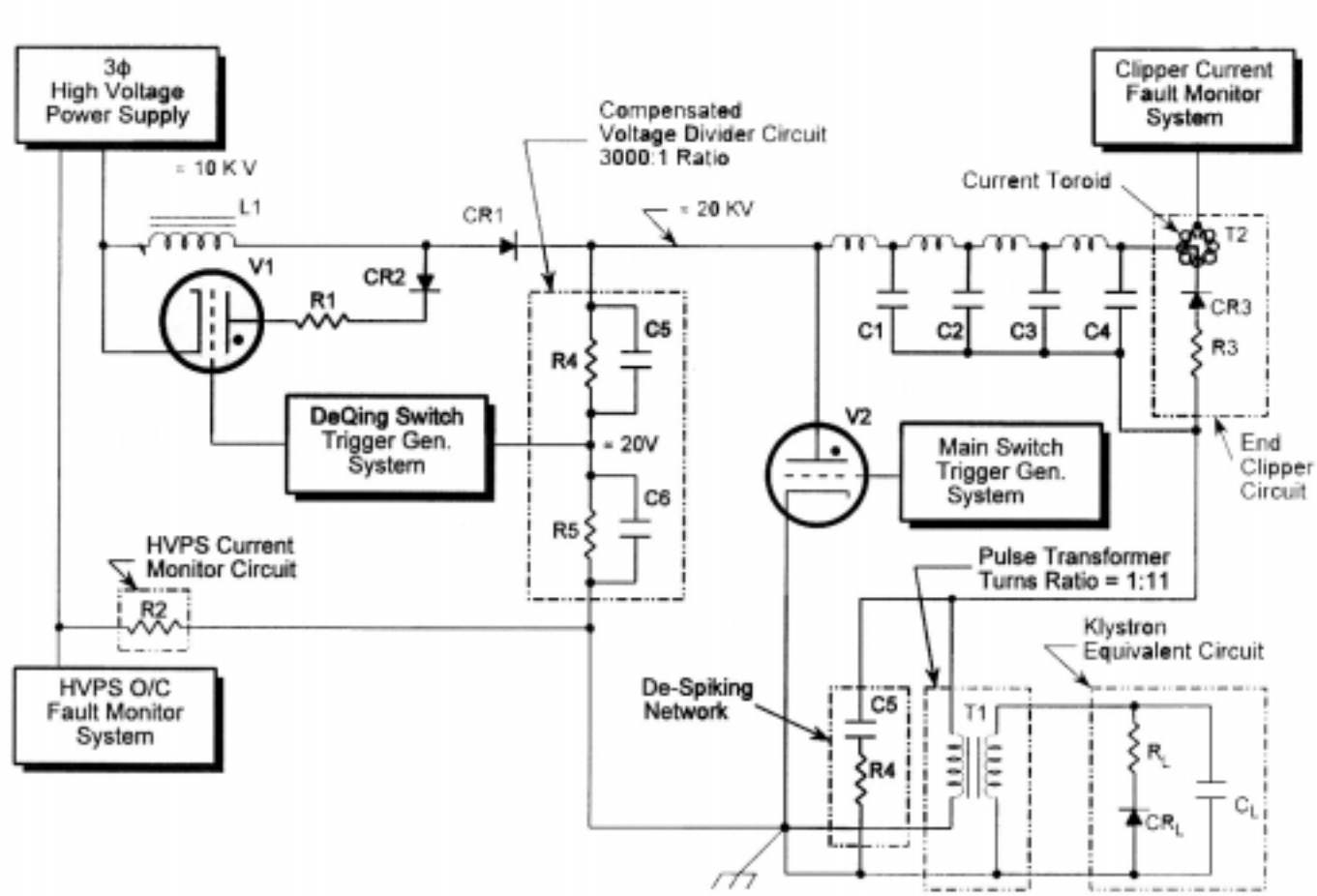
Addition of DeQing Switch Circuit



DeQing Waveforms



Basic Line Type Modulator Circuit



Continuação no arquivo aceleradores.ppt


ABIFCO

INCA

MINISTÉRIO
DA SAÚDE

GOVERNO
FEDERAL
Trabalhando em todo o Brasil