GROWCONTROLS™

We Provide Solutions....

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Magnetron Modulators

Klystron Modulators

High Voltage DC Power Supplies

Capacitor Charging Power Supplies

Solid State RADAR TWT Power Supplies

DC-DC Convertors

LASER Power Supplies

Providing

Pulsed Power Systems

Plasma Power Supplies

Power Electronics Solutions

Since 1993

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About Us

GROWCONTROLS is a research based Power Electronics Organisation that blends technology, innovation and engineering to transform concepts into world-class products and solutions.

With a core competency in Power Electronics, ***GROWCONTROLS*** caters to Defence, Nuclear science, Space science, Research and General Industry Globally since 1993.

GROWCONTROLS is lead by a power electronics engineer with more than three decades of research experience.

GROWCONTROLS is backed by experienced and committed team of engineers, with in-depth Knowledge of technology. We have the State - Of - The - Art Infrastructure and in-house research facilities and labs.

GROWCONTROLS is actively involved in development of Power Electronic solutions for Electronic Warfare Systems, viz., Directed Energy Weapons, HPM systems, Marx generators, Pulsed Power sources, Magnetron modulators, TWT modulators, Klystron modulators, Rail gun Power supplies and LASER Power supplies.

GROWCONTROLS is committed to develop advanced technology solutions from concept to final product. We provide power supply solutions fully compliant with MIL - STD - 461F, MIL - STD - 810G, MIL - STD - 704E, MIL - STD - 1275D and also in compliance with CE Standards.

GROWCONTROLS is having successful track record of developing Pulsed Power systems, RADAR Power supplies & modulators, High Voltage Power supplies, LASER Power supplies, Solid-State High Voltage switches, High Power inverters for Defence, Nuclear science, Space science and general industry for last 30 years.

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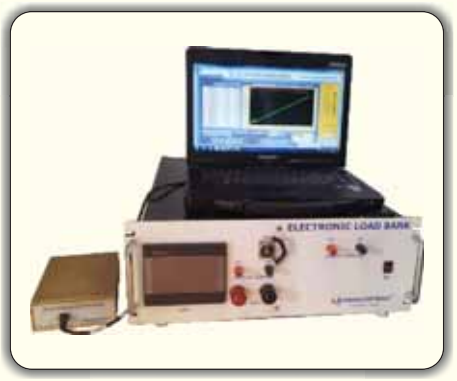
Our Expertise

Core competency in Power Electronics, Pulsed Power, Maganetics, Thermal management and allied fields.
We specialize in Technology Intensive Power Electronics Solutions for Defence, Research and Industrial applications. With Creative and Innovative ideas, we design and implement Solutions from Concept to Product level.



Services Offered

- Power Electronics Systems Designing Proto- type Development and Manufacturing
- Technology Development & Transfer
- Contract Research
- Technical Consultancy
- Indigenisation / Upgradation of existing systems
- Manufacturing Services
- Thermal Management Solutions
- Simulation Services

In House Facilities

- Electronics Systems Design and Development
- Electronics Simulation Lab
- Magnetics Design and Fabrication
- Dust Free Electronics Assembly and testing
- High-Voltage Lab
- Thermal Management Lab
- Vacuum Impregnation and Encapsulation System

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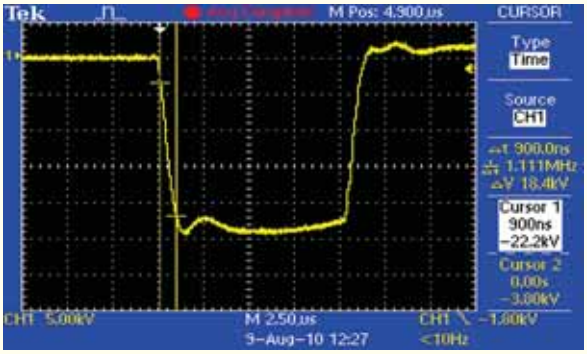
Technologies / Systems Developed

- TWT Amplifier Power Supplies
- Electronic Warfare Power Supplies
- Marx Generators
- Magnetron / Klystron Modulators
- RADAR Power Supplies / Floating Deck Modulators
- LASER Power Supplies
- PLASMA Power Supplies
- EMP Test Setup
- Pulsed Power Systems
- Capacitor Charging Power Supplies
- High Voltage Switches
- HVDC Power Supplies
- SONAR Amplifiers
- Power Supply Testing Jigs



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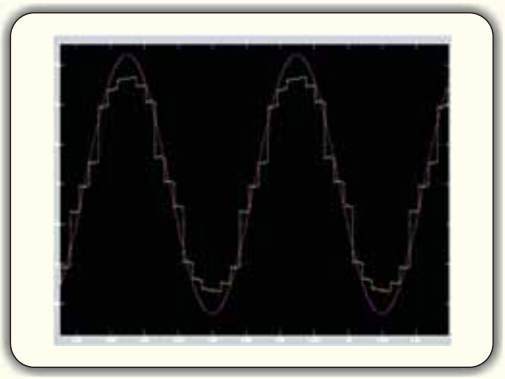
Auto Transformer Rectifier Units (ATRU)

GROWCONTROLS has indigenously developed 18 pulse Auto-Transformer AC-DC Rectifier units,for aircraft application where the fundamental requirements are high reliability, compact size and lightweight, are met by careful design and optimum selection of components. Our power supplies are rugged, light weight, efficient and reliable.

These units offer unity input power factor. These units find applications in RADAR, PULSED Power and other Electronic Warfare systems.



Features

- High Efficiency
- Unity input power factor
- Isolated / Non-Isolated output
- THD < 6%
- Forced air cooled
- Designed to handle pulsed loads
- Most suitable for Aircraft application
- Light weight
- Customised design
- Designed to meet MIL STDs

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TWT Amplifier Power Supplies

GROWCONTROLS has developed high frequency resonant converter based High Voltage High Density Power Supplies with integral Floating-Deck Modulator for TWT Amplifiers & Microwave Power Modules. These rugged power supplies are highly efficient, reliable, protected against overload and short circuits. High frequency resonant converters are very compact, have low output ripple and very low arc dump energy. Stabilized feedback loop ensures highly stable helix voltage.

Various levels of voltages are generated, rectified filtered and stabilised as required by helix and various collectors of TWT.

Typical modulator parameters are:

(i) Pulse width : 200 ns to 500 ms & CW

(ii) PRF : >300 kHz

(iii) Rise Time : 30 ns

(iv) Fall Time : 30 ns

(v) Throughput Delay : 100 ns

Our TWT power supplies finds it's applications extensively in Electronics War fare in Defence sector.

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MBK Power Supply / Modulator

TECHNICAL SPECIFICATIONS:

Cathode Voltage	: 3.5 kV to 5.0 kV Settable
Cathode Current	: 250 mA
Heater Voltage	: 2.5 V to 3.0 V DC ±5% Settable
Modulating Pulse Width	: 1.0 µs
Cathode Pulse rise / fall time	: 100 ns
Pulse Repetition Frequency (PRF)	: 100 kHz to 333 kHz
Duty Ratio	: 10% to 33%
Input Voltage	: +24 V to +40 V DC
Mechanical Dimensions	: 140 X 100 X 60 mm^3

Special Features

- Wide input voltage
- Cathode Arc protection
- RS 422 Communication
- Compact size

Applications

- Military
- Airborne
- Missile Seeker

Standards

- MIL-STD-704E
- MIL-STD-461F
- MIL-STD-810G

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DC-DC Converters

GROWCONTROLS has developed Resonant topology based DC-DC Converters for Defence and Aerospace applications. Our custom designed DC-DC Converters operate at very high frequency. These converters generate minimum EMI. High Frequency resonant operation makes the converters very compact, light weight and reliable.

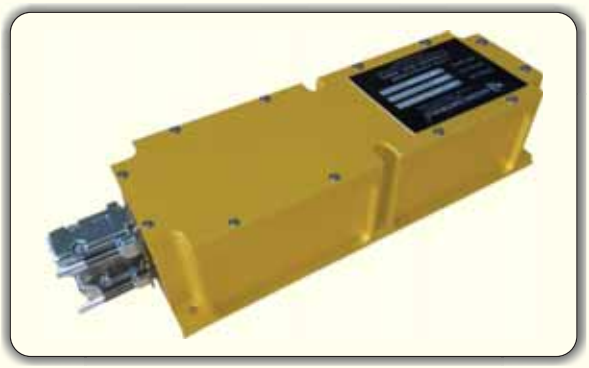
Resonate conversion eliminates switching losses, thereby generates less heat, effective thermal management facilitates the converters to operate over wide ambient temperature range.

Features

- Custom specific design
- Wide input operating range
- Resonant Conversion topology
- Very compact
- Low EMI generation
- Multiple regulated outputs possible.
- High reliability
- Wide operating temperature -45^{0} C to +80^{0} C.
- Meets MIL STDs

Applications

- Directed Energy Weapons
- RADAR Power Supplies
- Missile Sub systems
- LASER Drivers
- Electronic Warfare



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Programmable DC Power Supplies

GROWCONTROLS has indigenously designed, developed and manufactured custom built Programmable DC Power Supplies of diverse range of rugged and reliable. These power supplies are fully compliant with all military stds.

GROWCONTROLS Programmable DC Power Supplies designed and developed for precision ranging from 10W to 100's of kW delivers variable voltage and variable current, bench and Rack Mountable power supplies delivered to R&D, test and measurement, process control, power bus simulation and power conditioning applications across a wide variety of Defence applications.

Features

- High Efficiency
- Compact in Size, Rugged, Durable and Reliable
- RS232/USB / LAN / Ethernet Control
- Single / Three Phase AC input
- Single / Dual / Multi Outputs
- Wide Temperature Range -45°C to 80°C
- Zero voltage switching (soft switching)
- Advanced digital monitoring & control features

Applications

- Battery Charging
- Vacuum / Plasma Processing
- Nanotechnology applications
- Electrostatics Applications
- Electro-spinning

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High Voltage Power Supplies

Most of Defence systems require rugged, reliable and compact light weight high voltage power supplies.

GROWCONTROLS has developed High Voltage Power supplies using latest technology in Power Electronics. Resonant inverter topology, special multiple winding rectification scheme, completely encapsulated High Voltage section ensures highly reliable power supplies in demanding Defence environments.

Applications

- Directed Energy Weapon Systems
- TWT / Klystron Power Supplies
- Magnetron Power Supplies
- RADAR Power Supplies
- Electronic Warfare Systems
- Marx Generators
- Capacitor Charging Power Supplies
- LASER Power Supplies
- PLASMA Power Supplies

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High Voltage Switches

Modern Electronic Warfare Systems require Pulsed Power. Generation of High Voltage, High Current pulses in demanding environment requires highly reliable switching elements.

GROWCONTROLS has developed High power switches with Thyristors, IGBTs, MOSFETs, Thyratrons, Psuedo spark - gaps, Triggered Spark - gaps and Rail - gaps to match specific requirements. Specially designed trigger sources are developed for specific components.

Features

- Fast switching
- milliwatt to gigawatt power output
- Wide range of component selection for system specific requirement
- Customised design for specific application
- Optical fibre or current loop isolation

Applications

- Magnetron Modulators
- RADAR Power Systems
- Klystron / TWT Modulators
- LASER Power Supplies
- Electronic Warfare
- Marx Generators
- Magnetic Pulse Compression

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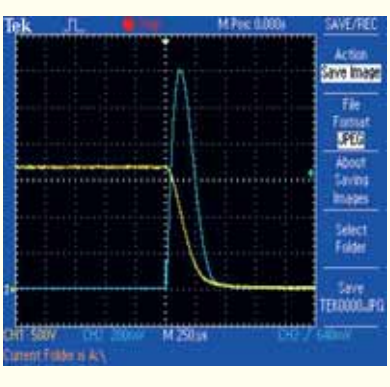
Laser Power Supplies

GROWCONTROLS has developed LASER Power Supplies for Flash Lamp / Arc Lamp based LASER systems and Diode LASERS. We have also developed Q-Switch drivers, TEC controllers and other subsystems for LASER applications.

Features

- Solid - State Design
- PFN NETWORKS for Discharge Lamps
- Diode LASER DC Power Supplies
- Q-Switch Driver
- TEC Controller
- Computer Interface & Control



Laser Power Supplies

GROWCONTROLS has developed CW laser diode drivers up to 10kW power level for military vehicle applications.

GROWCONTROLS has developed QCW laser diode drivers pulsed width from 10 ns to 100 ms with single shot to 10 MHz PRF. These laser diode drivers have inbuilt TEC controller up to 300W power and Q-switch drivers up to 3 kV voltage and rise times less than 50 ns

Features

- Solid - State Design
- PFN NETWORKS for Discharge Lamps
- Diode LASER DC Power Supplies
- Q-Switch Driver
- TEC Controller
- Computer Interface & Control

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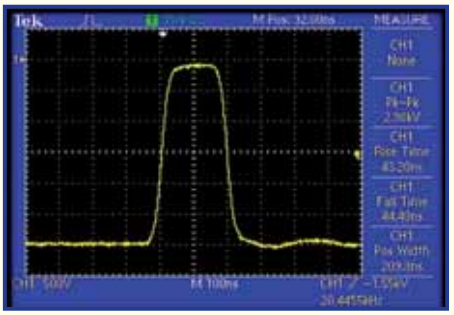
Floating Deck Modulator

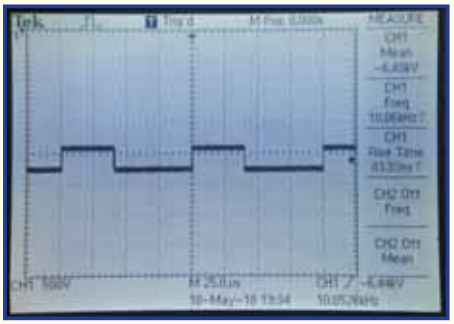
RADAR, Electronic Warfare systems require floating deck modulators, these modulators float at very high voltages. The challenge is to modulate these voltages with logic level signals from control system and the through put delay, rise and fall times of modulating voltage should be very minimum.

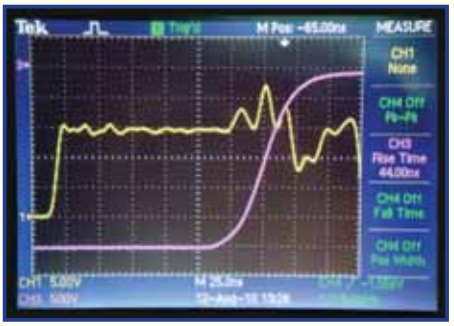
GROWCONTROLS has developed optically coupled / current loop coupled floating deck modulators with minimum through-put delay and modulating pulse frequencies > 300 kHz.



Features

- Optically / Current Loop Isolated
- Solid State Switches
- Floating Voltages > 100 kV
- Through-Put Delay < 50 ns
- Rise Time < 40 ns





Magnetics

GROWCONTROLS is equipped to develop customised special purpose magnetic components for specific applications.

We design & develop Transformers, Inductors and Magnetic Switches etc.

Expertise is in development of

- Mains Frequency Transformers
- High Frequency Transformers
- Inductors
- Pulse Forming Networks
- Magnetic Switches
- Partial Turn High Voltage Pulse Transformers
- Special Purpose Magnetic Components

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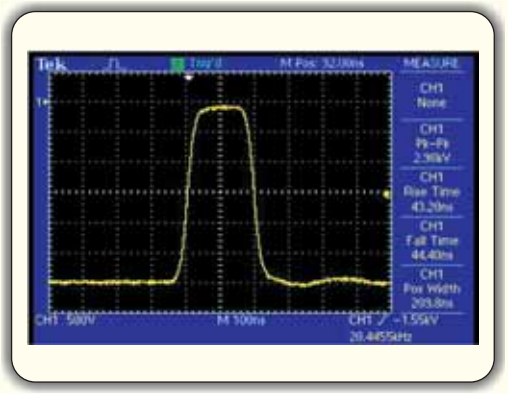
EIK Power Supply, Modulator & Control Unit

GROWCONTROLS has successfully developed high-voltage power supply, Floating Deck Modulator and Control Unit for GRID MODULATED EXTENDED INTERACTION KLYSTRON. The system is having complete operating and protection features suitable for EIK. This system consists of manual control panel as well PC interface with LAN connectivity.

Technical Specifications :

Heater Voltage	:	6.3V@1.1 A
Cathode Voltage	:	-16 kV adjustable
Collector Voltage	:	-4.9 kV
Grid bias	:	-3 kV
Grid Modulation	:	MOSFET based Floating Deck Modulator, rise and fall times < 50 ns
Pulse width	:	200 ns CW
PRF	:	Up to 40 kHz
Duty Cycle	:	5%



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Technology Development & Contract Research

GROWCONTROLS is a niche speciality research based organisation with the State-Of-The-Art Infrastructure and highly experienced & committed team of engineers to undertake outsourced Research and Developmental services for Defence and Aerospace specific requirements in the field of Power Electronics.

Our rich experience and world class infrastructure enables us to develop front end technological solutions for mission critical applications.

We have proven track record of developing innovative Power Electronics Solutions for Defence Sector for the last 20 Years.

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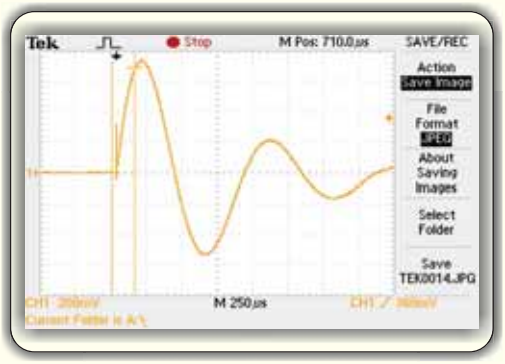
Pulsed Power Systems

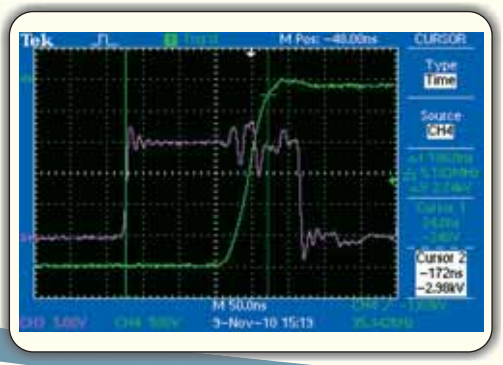
Electronic Warfare Systems, Scientific research and Industrial applications have requirements for Pulsed Power of milliwatt to gigawatt Range.

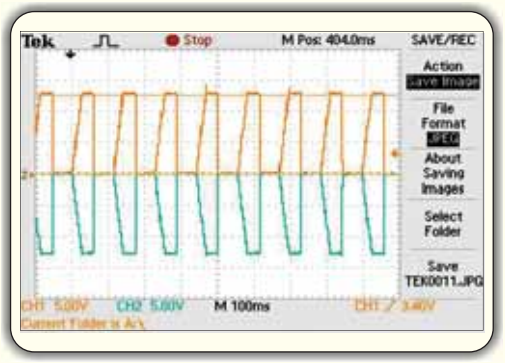
Having expertise in Power Electronics ***GROWCONTROLS*** is developing Pulsed Power Systems consisting of Capacitor Charging Power Supply, Capacitor Bank, High Voltage - High Current Switches, Trigger Units etc.



Features

- Solid State Current Sources Capacitor Charging Power Supply
- Pulse Capacitor Banks
- Rail - Gap, Spark - Gap, Thyratron, Psuedo Spark Switch, Solid State Switches are used as per System Requirement
- Customer Specific Design





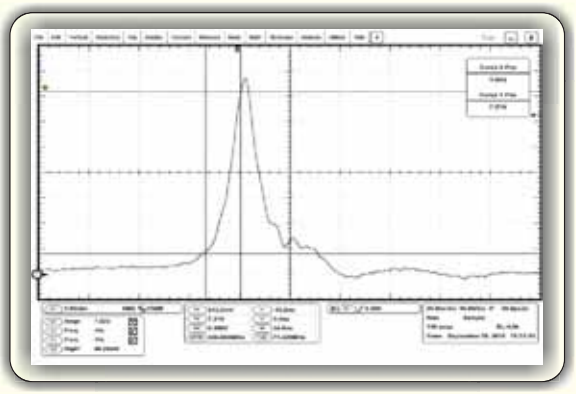
Impulse Generators

Electronics Warfare Systems require fast rising High Voltage Pulses of very High Amplitude and High Power. To meet this requirement ***GROWCONTROLS*** has developed Marx generators, using different topologies as per system requirements.

We have developed Triggered Spark - Gap based Marx - Generators Solid state switch based Marx - Generators & Induction adder Systems.

Applications

- Electro - Magnetic Pulse (EMP) Systems
- Electronic Warfare
- Plasma Applications
- Q-Switch



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Capacitor Charging Power Supplies

GROWCONTROLS has developed resonant converter based capacitor charging power supplies for LASER and EMP technology areas. These advanced technology systems will provide current source output characteristics which are fundamental requirement for any capacitor charging application.

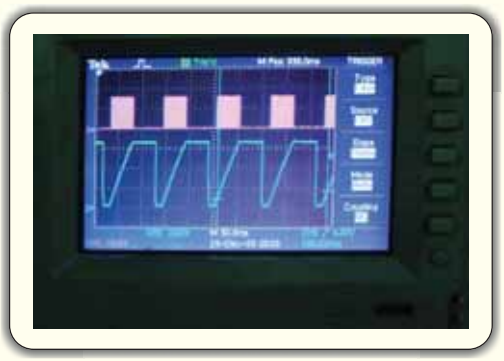
Specifications

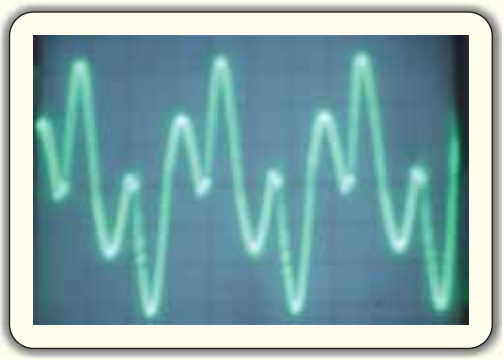
Input	:	415V, 3-Ph or 230V, 1-Ph 50 Hz AC
Output Power	:	Up to 100 kJ/s
Output Voltage	:	> 100 kV
Output Cycle Time	:	<10 ms
Duty	:	Continuous
Topology	:	IGBT based resonant converter with computer interface

Capacitor Charging Power Supplies

Pulsed Power is the basic requirement of Electronic Warfare systems.

GROWCONTROLS has developed resonant current source output power supplies suitable for capacitor charging applications.





Features

- Resonant Inverter Topology
- Constant Current Output
- Output Power can be extended to MW Range
- Capacitor Charging Voltage can be >100 kV
- Programmable Charging Current / Voltage
- Systems can be interfaced to PC/PLC
- Optical Fibre Interface

Applications

- Rail Gun System
- Electronic Warfare
- UWB
- LASER
- RADAR
- Magnetic Pulse Formimg
- PLASMA

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High Power Pulse Modulators

GROWCONTROLS has developed Solid-State High Power Modulators for Magnetrons and other High Power MICROWAVE Devices.

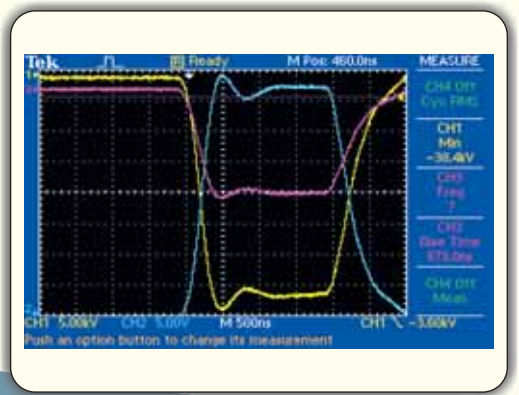
This modulator uses IGBTs and partial turn induction adder to generate High Power & High Voltage Pulses suitable for High Power Microwave devices.

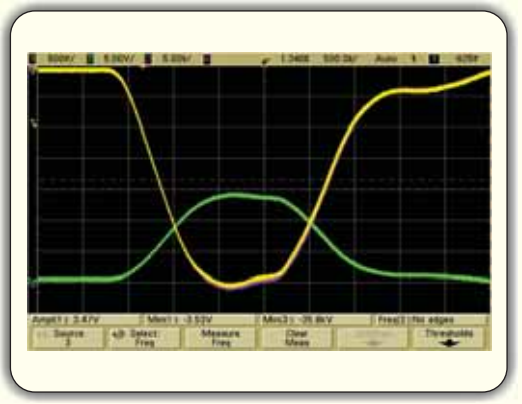
Features

- Completely Solid-State
- Latest IGBT / MOSFET Technology
- MW level Peak Power
- Faster Pulse rise time

Applications

- RADAR
- Electronic Warfare
- Defence
- Medical
- Research





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Repair services and Indigenisation of Defence Power Supplies

With core competency in Power Electronics and expertise in developing Defence power equipment over 20 years.

GROWCONTROLS is offering repair / Indigenisation services for Defence systems. We have successfully indigenized foreign RADAR Power Supplies and Modulators, TWT Power Supplies and Modulators, DC Power Supplies, Laser Drivers for Electronic Warfare, Airborne ECM Systems.

Capabilities:

- Technology Up - Gradation
- Replacement of Obsolete Components
- Indigenisation of Foreign Equipment
- Reverse Engineering
- Repairing / Refurbishing of Existing Systems

Areas of Operations

- RADAR Systems
- Fire Control
- Electronic Warfare Systems
- DC Power Supplies
- LASER Systems
- Magnetics
- Thermal Management etc.

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Load Banks

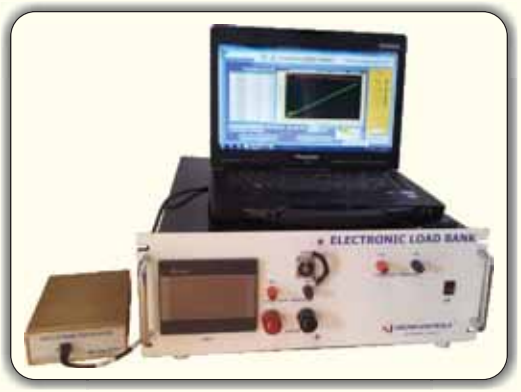
Missile batteries and Submarine batteries require frequent testing and qualifying as per specification.

GROWCONTROLS has developed specially designed load banks capable of loading batteries to given specific load conditions.

We have also developed special purpose load banks for testing Fuel Cells & batteries for mission critical applications. These computerized precision loading systems are capable of loading the batteries / power sources as per programmed profile.

Complete solid-state load bank can draw currents to the precise levels as programmed. Set load current can be realized in < milli second to test the systems for pulsed power applications.

Higher Power Versions are having grid interactive regeneration feature which enable the power to be fed back to electric utility grid instead of wasting it in load elements.



Regenerative Load Banks

GROWCONTROLS has indigenously designed & developed a unique Regenerative Load Banks for testing of 3-Phase AC, Single Phase AC and DC Power Supplies. By using these load banks the test source output will be converted into 3ϕ AC with fixed frequency and fed to the utility Grid. In passive load banks the total power will be dissipated in the form of heat energy. Where as in regenerative load banks we can feed this power to the utility Grid. These load banks can simulate leading, lagging and unity Power Factors.

Features

- Regenerative Capable More than 95% of energy is recovered
- Programmable, easily configurable to 415 V and 11 kV utility Grid using Isolation transformer
- User Defined Load Profiles
- Auto Shut – Down on Fault
- Custom Solutions
- Latest 32-bit DSP chip, advanced digital lock-in technique
- Latest generation IGBT
- Ethernet / RS 485 communication
- Fault event log
- LCD touch screen control panel

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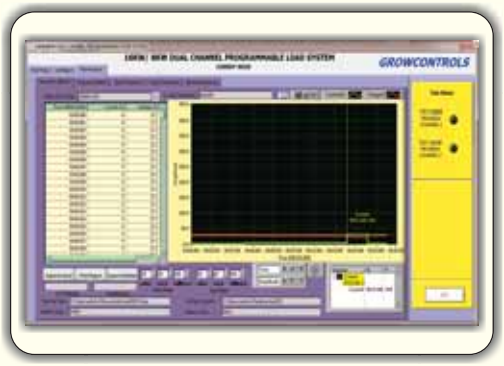
Data Acquisition and Control

In Electronic Warfare, Digital systems & Software functionality is very vital. ***GROWCONTROLS*** being involved in Electronics Warfare Systems, have developed several Data Acquisition and Control Systems, Digital Interfaces between Critical Subsystems, Lab-test Equipments for Defence organisations.

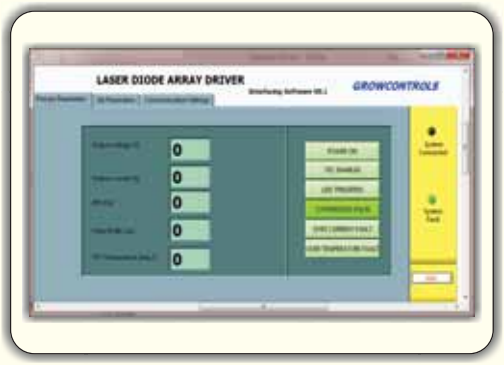
GROWCONTROLS is having expertise in digital systems. Over 20 Years of experience in data acquisition & control,we have developed customized solutions using Microcontrollers, DSP , FPGA and Computer control.

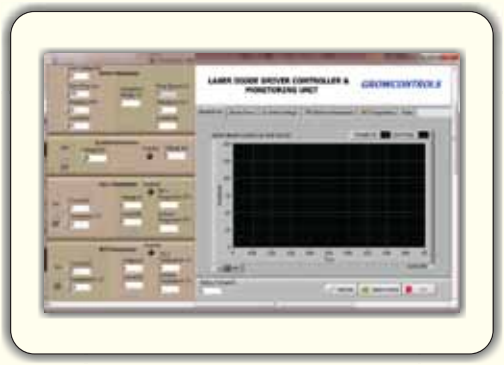
GROWCONTROLS is the best source for design and development of digital systems for better data accuracy, faster data acquisitions, dynamic response and control, data security and data-integrity for the mission critical systems.



Features

- EMI/EMC hardened design
- Highly Reliable in field conditions
- Wide temperature range Operations
- Faster response time down to nano-second levels
- Meets respective MIL STDs





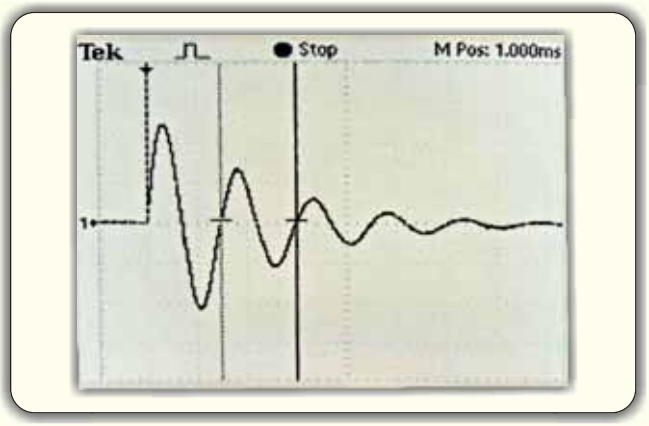
Magnetic Pulse Forming Systems

Magnetic pulse forming / welding is a cold welding process finds applications in Defence ammunition manufacturing process.

GROWCONTROLS having expertise in pulsed power field. We have developed magnetic pulse forming system for Crimping of stabilizing rings to ammunition shell bodies and other application.

Features

- Resonant inverter based capacitor Charging Power Supply
- Solid State Design
- Compact & Reliable
- Solid State High Voltage / High Current Switches
- Customised design for specific job requirement



OUR CLIENTS

AIR FORCE

INDIAN ARMY

and many more

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