

These transmitter systems operate in discrete frequency bands ranging from 30 to 220 GHz for pulsed and cw applications and can be designed to meet customer requirements to commercial or MIL specifications.

Power Supplies: The basis of this product line is a complete series of power supplies which complement VCMD's electron tubes. However, in addition, specialized, complex power supplies have been developed and manufactured by the Division to both MIL and commercial specifications, requiring capabilities such as – high and low voltage outputs; DC or AC inputs; multiple outputs; stringent noise and regulation requirements; and unique shapes and sizes. Power levels up to 30 kW and voltages up to 50 kV have been achieved.

Satellite Communications Power Amplifiers: A series of high power commercial amplifiers of VCMD design is available for satellite communications in frequencies ranging from 2 to 14 GHz with power levels up to 3 kW. These amplifiers consist of the power klystron, power supplies, cabinetry, waveguide/RF circuits, and control circuitry. A specialized military high power (10 kW) amplifier for satellite communications has also been designed and manufactured in Canada. The amplifier forms a complete subsystem incorporating an X-band klystron, power supplies, control circuitry, waveguide runs, and liquid cooling equipment consisting of a water-to-air heat exchanger and a purification loop.

VCMD is able to qualify and test to MIL and commercial specifications. Customized products are a specialty of the Division. Organizational and administrative systems are in place to ensure the smooth execution of commercial and military contracts requiring exceptional attention to detail. These include fully computerized and on-line Manufacturing Resources Planning and a complete Quality Assurance system appropriate for MIL requirements.

Average Work Force: Total – 300

Gross Sales: \$30.0M

Plant Size: 100,000 sq ft (2 Facilities)

Equipment/Facilities: VCMD has, in-house, all of the extensive facilities and capabilities needed for the manufacture of high quality electron tubes and electronic equipment. A few of the facilities which support such precise and delicate design and manufacturing activities are: "Watchmaker accuracy" machine shop; in-house manufacturing of high voltage transformers; test facilities for microwave tubes, subsystems and power supplies; clean rooms; vacuum sealing facilities; electric discharge machining; environmental test facilities; hydrogen and vacuum furnaces; and laser welding.

Experience: VCMD has in excess of twenty-five years of experience working with original equipment manufacturers of microwave and satellite telecommunications equipment. The Division has also been involved in various development programs for power supplies and other electronic subsystems to customers' specifications for many years.

Military programs have been a successful part of VCMD's operation. The largest single program lasted three and one-half years and was valued at approximately \$6.0M. In 1979, the company produced a space qualified instrument which was successfully flown on a NASA satellite designed to measure the earth's magnetic field. As well as private industry throughout North America, Europe and the Far East, the clientele also includes the Canadian, US and several European Governments, plus various agencies, laboratories and research institutions associated with these governments.

Keywords: 7 = Electronics; 18 = Space Systems; Solid State Devices = 7; Travelling Wave Tubes = 7; Klystrons = 7; Reflex Klystrons = 7; Power Klystrons = 7; Extended Interaction Klystrons = 7; Power Supplies = 7; Power Amplifiers = 7; Satellite Communications Power

Amplifiers = 7, 18; Pulsers = 7; Millimeter Wave Subsystems = 7, 18; Waveguides = 7; Amplifiers = 7; Amplifier Subsystems = 7, 18; Control Circuitry = 7; Cabinets = 7.

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History: Incorporated in 1975 (100% Canadian owned).

Capability: Approximately 80% of their R&D and manufacturing is for the Canadian Department of National Defense. Typical engineering projects include:

- Technical investigations and engineering services to DND on marine weapon systems drives and controls.
- Engineering services to industry on control systems for machinery and large winches.
- Engineering services to industry on sound and vibration problems in gear systems.
- Design and prototype fabrication of 20 kW vertical axis windmill.
- Designed and developed 1.2 m plastic parabolic antenna for 11.6 GHz satellite receiving.
- Developed production techniques for fabrication of outdoor unit to house LNA of satellite receiving antenna.
- Investigated dielectric feed horn problems and developed modifications.
- Engineering services on avionics flight surfaces control systems.

Small manufacturing capability include the following items:

- Amplifiers, reactors, special transformers, & RF coils
- Fiberglass microwave dish antennas
- Small gears and gear reducer assemblies
- Extrusion and molding of miscellaneous plastic and rubber parts
- Aircraft smoke signal markers pyrotechnics
- Cable assemblies
- Marine projectile line throwing devices
- Inflatable mast antennas
- Marine weapon system drive and controls

Victrix also has an R&O capability for radar duplexers, precision electronic components and power supplies.

Average Work Force: 1 Senior Scientist (Electronics)
1 Mechanical Engineer
1 Telecommunications Engineer
2 Technologists
2 Technicians
3 Machinists
10-30 Production People
1 Quality Control Manager