

**CAPABILITY:** Major business areas at which COM DEV's products are aimed include Communications and Remote Sensing Satellites, Earth Terminals, Surveillance Radar, Electronic Warfare and mm-Wave Systems.

- Satellite Products – Contiguous and non-contiguous dual mode output multiplexers; group delay and amplitude equalized input multiplexers; high power waveguide and low power coax isolators; low pass harmonic reject filters; telemetry, command and preselect filters; adaptive variable power dividers and combiners; and polarization switches and beam reconfiguring subsystems. Com Dev is a participant in the Canadian DND RAF SATCOM project, Space Based Radar, Radarsat, and US Navy M-ROSS programs.

- Earth Terminal Products – High power microwave components and subsystems including filters, diplexers, combiners, isolators and terminations; low-loss and high power filters; and antenna feed networks.

- Radar Products – Specialized radar antennas, feed networks, phase shifters, high power filters and circulators and SAW enhanced pulse compression subsystems. Com Dev supplies pulse compression subsystems to Raytheon (MOT RAMP program), Mitsubishi Electronics and other radar primes. A mm-wave radiometer designed to detect arctic ice conditions is under evaluation.

- Electronic Warfare Products – Microwave and millimeter subsystems; antennas for ESM and ECM applications; microwave subsystems; millimetric receivers; unique passive/active circular phased array; mm-wave payloads for RPVs; and made to order mm-wave frequency extensions for RWR and RSM systems.

- Antenna Products – Design and manufacture of specialized antennas for spacecraft, airborne, shipborne and transportable applications. Items such as SAR, phased arrays, high power beam forming networks, and systolic arrays are available from UHF to EHF frequencies. A dual polarized SAR antenna is flying in the Arctic with the Canadian Center for Remote Sensing.

- Signal Processing and (SAW) Products – Advanced signal processing components and subassemblies for radar and satellite communications, e.g., filters, delay lines, convolvers, SAW oscillators and synthesizers, microscan (ESM) receivers, code and chirp waveform generators.

- Consulting Services – Studies undertaken on trade-offs, optimization and hardware design aspects of subsystems used in related product areas.

- Research and Development – Active and passive techniques at frequencies from DC to over 115 GHz; SAW devices as signal processing elements in digital communications and radar systems; high power ferrite technology and beam reconfiguring networks. Several EW projects funded by the Canadian DND and two by the US Army.

**AVERAGE WORK FORCE:** Technical Staff – 90  
Manufacturing, Management and Support Staff – 123

**GROSS SALES:** 1987 – \$22.0M

**PLANT SIZE:** 70,000 Sq Ft

**EQUIPMENT:** A large computer facility is used extensively for design (CAD), manufacture (CAM) and testing (CAT). There are automatic test facilities to measure product performance, thermal vacuum chambers to test performance in a simulated space environment, and shock and vibration equipment to simulate conditions from helicopters to shuttle launch. The microelectronics facility includes a recently enlarged and updated clean room, machining of items to 0.0001 inch tolerance and 6 micron finish, GaAs processing and MIC assembly. The plating facility is equipped to produce space-qualified nickel, copper and silver plating, primarily on invar and aluminum parts. The antenna facility has an indoor anechoic chamber, a 500 foot outdoor test range, precision positioners and CAT equipment.

**EXPERIENCE:** COM DEV equipment flies on three-quarters of the free world's communications satellites. Virtually every major builder of earth stations in the western world uses some COM DEV components. Customers include Hughes Aircraft, RCA, Ford Aerospace, Litton, Lockheed, SPAR Aerospace, Marconi (UK), Harris, TRW and the Canadian & US Governments.

**KEYWORDS:** Communications; Microwave Subsystems; Microelectronics; Millimeter Wave Systems; Radar; Satellite Subsystems; Space Systems; Surface Acoustic Wave Subsystems.

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## COMINCO Ltd (Electronic Materials Division)

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**HISTORY:** Cominco Ltd was incorporated in 1906 and is 91 % Canadian owned. Head Office is located at 200 Granville St, Vancouver, British Columbia. The operations of Cominco are divided into three industrial segments – Mining and Integrated Metals, Chemicals and Fertilizers, and other Operations. The Electronic Material Division is part of the latter segment.

**CAPABILITY:** Cominco is the world's largest producer of zinc and lead with significant output of many by-product metals and chemical fertilizers.

Electronic Materials Division Production:

- High Purity Metals – 17 different metals each in several degrees of high purity and shapes.

- High Purity Arsenic – 49 to 79 grade arsenic in various allotropic crystal forms and shapes. Largest plant of its kind in the world.

- Semiconductors – single crystal boules and polished wafers of gallium arsenide, indium antimonide, cadmium telluride, cadmium mercury telluride, gallium antimonide, and indium arsenide, germanium and epitaxial cadmium mercury telluride.

- High Purity Metals Fabrication – alloying, casting, rolling, extrusion, stamping, pressing and machinery operations to produce semiconductor processing and packaging materials e.g., evaporation charges, sputtering targets, solder preforms, bonding wires, and ribbons. A well equipped precision tool and die shop serves both Production and Development.

- High Purity Chemicals – As<sub>2</sub>O<sub>3</sub>, As<sub>2</sub>O<sub>5</sub>, Zn<sub>3</sub>As<sub>2</sub>, CdS, and ZnS.

Electronic Materials Division Development:

- R&D is directed toward high purity new metal, compound and semiconductor processes, product advancement, and production equipment. Cominco is currently involved in projects to produce Semiconductor Materials in Microgravity.

**AVERAGE WORK FORCE:** Electronic Materials Div

(Trail, British Columbia)  
Engineers – 17  
PhDs – 2  
Machinists – 3  
Others – 98