

Around the Laboratories

KEK B factory

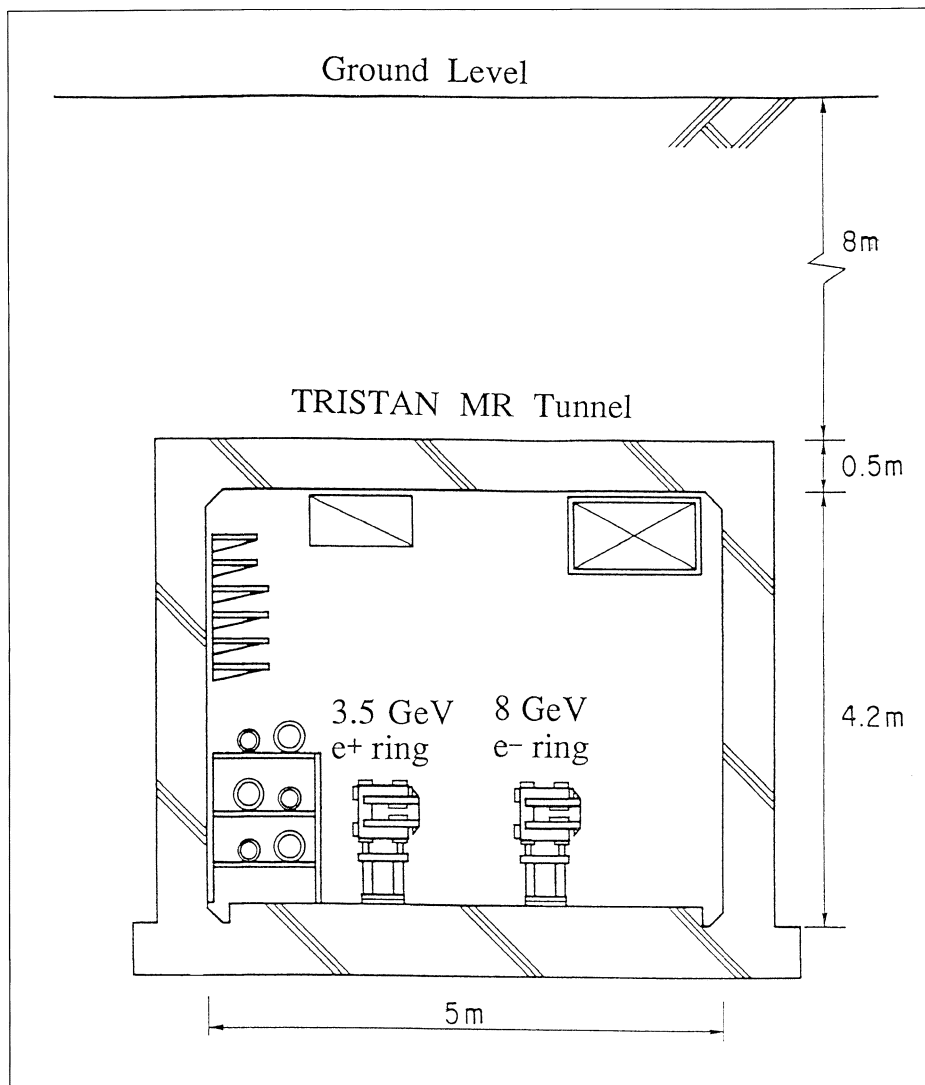
After more than three years of intensive evaluation, the Japanese government has approved the conversion of the TRISTAN electron-positron collider at the national KEK Laboratory to a two-ring asymmetric B-meson factory. The project will take about five years to complete. Initial construction will proceed while TRISTAN experiments continue data-taking, expected to continue until summer 1995.

When it becomes operational in 1998, the new facility (TRISTAN II) will be capable of producing more than ten million B meson pairs each year. Detailed studies of their decay properties are expected to reveal answers to the long-standing puzzle of the violation of CP symmetry - combined left-right reversal and particle-antiparticle substitution.

According to the conventional (Kobayashi-Maskawa) picture of CP violation, certain rare decays of B mesons will give much larger CP violating effects than those seen so far (in neutral kaon decays). The theory predicts a well defined pattern of CP violating effects in several different decay modes.

TRISTAN has been operating since 1986 in the collision energy region between 50 and 64 GeV. During its initial stages of operation, when it was the world's highest energy electron-positron collider, TRISTAN experiments searched for new particles such as the top quark and Higgs bosons, establishing new limits.

After LEP at CERN and SLC at Stanford (SLAC) extended the energy frontier in 1989, TRISTAN



For the new B-factory, the single ring in the present TRISTAN electron-positron collider at the Japanese KEK Laboratory will be replaced by two new rings.

experiments concentrated on precision studies of electroweak, quark-gluon, and two-photon processes.

The energy of TRISTAN II will be reduced to 10.5 GeV - the mass of the $\Upsilon(4S)$ resonance.

TRISTAN's single ring will be replaced by two new rings - a 3.5 GeV positron and an 8 GeV electron ring. The asymmetric collision energies will facilitate observation of the time-dependent asymmetries in B meson decays that would signal CP violation.

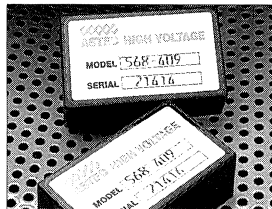
The energy of KEK's existing 2.5

GeV injection linac will be upgraded to 8 GeV to permit direct filling of the 8 GeV electron ring without the need for intermediate acceleration.

The production target for positrons will be located at the 4.5 GeV energy point of the linac, significantly higher than the 200 MeV point currently used for TRISTAN.

The linac upgrade has already begun. The increase to 8 GeV energy will be accomplished by increasing accelerating gradients from 8 to 20 MV/m. This will be done by increasing the number of accel-

Low-cost tracking converters feature extended output to 6kV



With a power rating of 3W, Brandenburg's 568 DC converters are low-cost, fully isolated modules providing outputs to 6kV. Being tracking converters, these modules are adjustable between 30 and 100% of full output simply by altering the

supply between 4 and 15V.

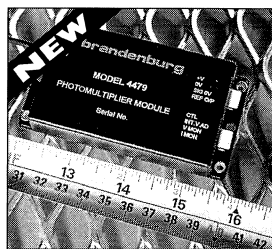
Nine models cover full range outputs from 300V to 6kV. A feature of this tracking design is that output is floating and easily tied for negative or positive polarity. Combined with an input-to-output isolation of 3.5kV, this makes the 568 suitable for a very wide range of applications from photomultipliers, Penning gauges, radiation counters etc.

Output ripple is low, at 0.01% to 0.5%, and load regulation varies from +10% no load to -10% at full load. Dimensions and weight are 64 by 38 by 22 and 87g respectively.

High performance photomultiplier supplies are world's smallest

Compact design and ultra-low ripple are key features of the new 4479 series of photomultiplier supplies. Available with fixed or variable outputs to 2kV, with 4mV pk-pk ripple, these 2W modules have a footprint of 95 by 49 by 15mm high. Tempco is typically 25ppm/°C and voltage and current monitoring are standard, as is fixed and variable reference output.

There are 48 versions, with PCB and flying-lead options. Input voltages are 12 or 24V while outputs range from 0 - 300V to 0 - 2kV. Line regulation is 50ppm/V and load regulation is 50ppm from no load to full load.



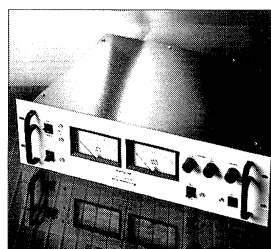
HV lab source now offers RS232

Intended primarily for precision research and development work, Brandenburg Alpha III bench power supplies provide up to 30kV at 1.5mA with very low ripple and a drift figure of less than 20ppm over 15 minutes.

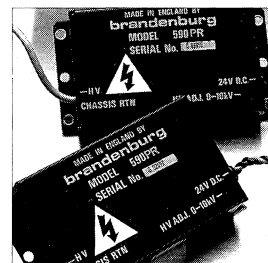
Three models in the range - all now available ex-stock - are the 3507 supplying 0 to 5kV at 10mA, the 3707 for 0 to 15kV at 3mA and the 3807 for 0 to 30kV output. Maximum ripple figures for the three are 0.5V, 1.5V and 3V respectively. Load regulation is 0.002% or less while line regulation is less than 0.001%.

Positive or negative outputs are selectable, as are two operating modes providing either constant voltage or constant current. An optional interface allows computer control via an RS232 interface.

An over current trip is provided in voltage mode. Local/or remote switch control is provided via a 0-10V analogue signal. A remote on/off TTL signal is available.



Compact 5W converters supply up to 10kV



Both 12 and 24V versions of Brandenburg's 590 series low-profile DC-to-DC converters provide up to 10kV at 5W yet measure only 19mm high. Fully regulated, these modules feature a ripple figure of less than 4V pk-pk and incorporate flashover and short-circuit protection.

Normally, output voltage is set by an internal potentiometer but is optionally programmable between 0 and 10kV via a 0 to 10V analogue signal. Both positive and negative output versions feature a temperature coefficient of typically 150ppm/°C.

Compact, efficient and feedback regulated, 590 series modules have a 95 by 49 by 19mm footprint - including RFI screening. Weight is just 150g and having flying leads, they are suitable for PCB or chassis mounting.

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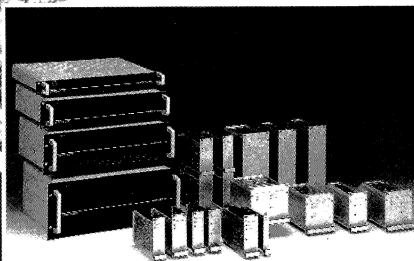
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For information on the products above or for a copy of the catalogue, please circle the number on the enquiry card.



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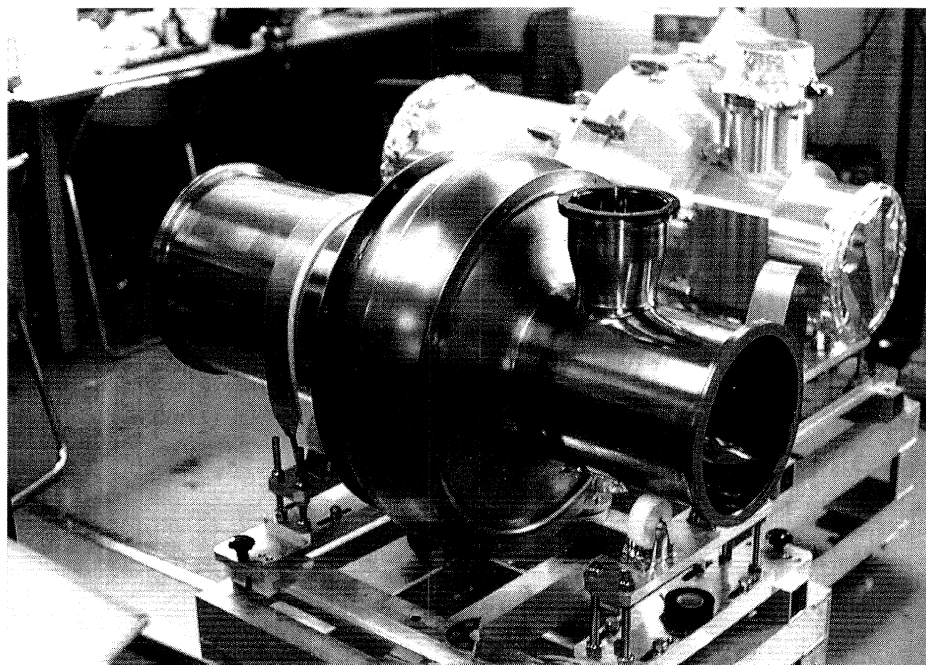
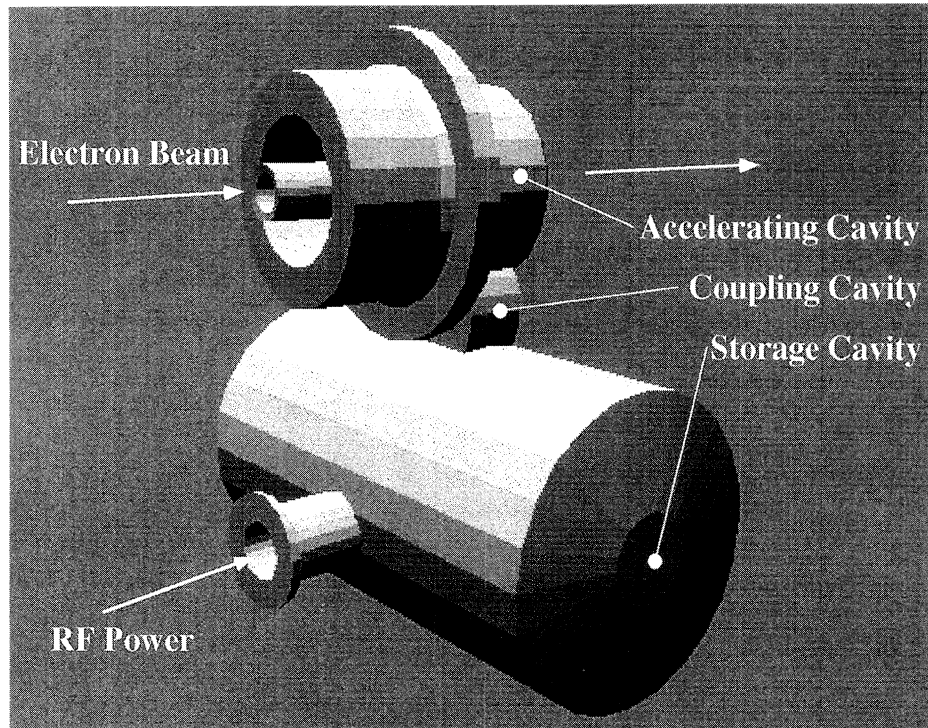


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At KEK, research and development work for the new B-factory is underway. Prototypes of radiofrequency cavities are under performance tests for their ability to handle coupled-bunch instabilities. Above - normal conducting cavity resonantly coupled with an energy storage cavity. Below - superconducting cavity.



eration structures and by doubling the radiofrequency power.

The high luminosity needed to produce the large number of B mesons will be achieved by both

reducing the size of the beam at the collision point and increasing the total circulating beam currents.

The TRISTAN II design emphasizes smaller beam sizes with modest

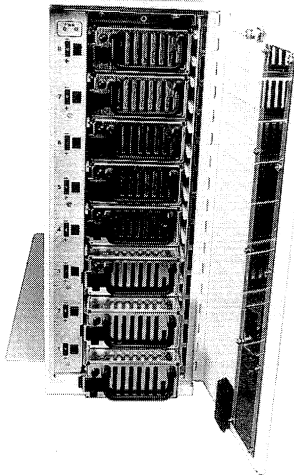
beam currents. Even so, the total stored beam currents will eventually reach 2.6 A for the positron and 1.1 A for the electron ring. With such large beam currents stored in many bunches, strong coupled-bunch beam instabilities are excited. A radiofrequency cavity that minimizes the excitation of higher-order-mode fields by the passing beam must be used. KEK is developing both normal and superconducting versions of these cavities.

Eventually, the performance of the machine will be limited by the coupled-bunch instability caused by the accelerating mode itself. It has been known that a superconducting cavity can mitigate this problem because of its large accelerating field and large stored energy. Here, the past five year's operating experience with superconducting cavities at TRISTAN should prove useful. A normal cavity with an energy storage cell can potentially work as well as the superconducting type. Cavities of this type will soon be tested in the existing 8 GeV TRISTAN Accumulation Ring.

The design of the machine lattice is progressing. Since beam injection is expected to occur every half hour or so, the design looks for a horizontal dynamic aperture sufficiently large so as to avoid having to change the beam optics between injection and experimental data-taking. Such a scheme was tested in the TRISTAN Main Ring last year, and more tests will follow. Various devices for beam-monitoring are being tested at the 2.5 GeV Photon Factory Ring that routinely provides a multi-bunch 0.35 A positron beam.

Last summer, KEK hosted a meeting to inform potential worldwide users about the new facility. The Laboratory has stated that there will be one interaction region and the users were encouraged to form a

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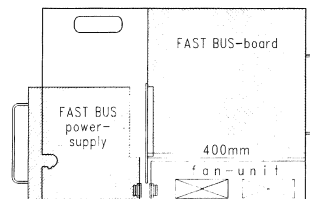
Power Supply Spec.:

Input voltage: 3-phase, 400 V - 50 Hz / 200 V - 60 Hz
Neutral line-load < 2A.

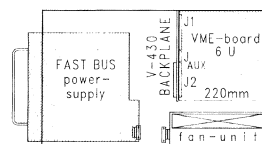
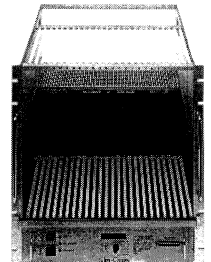
Output power: Up to 3.500 W.

Output modules: -2 V - 50/100/150 A. +5V/-5.2 V - 75/150/200/300 A. +12 V/-12 V - 10/25/40 A. +15/-15 V - 10 A/25 A/35 A.

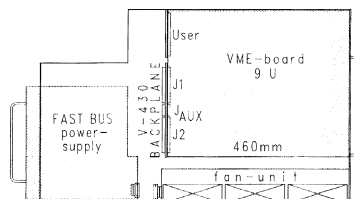
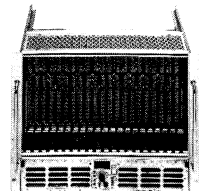
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Output protection: Global Trip-Off of all voltage within 5msec. at any bad status, overload, overvoltage, overheat, line error and switch-off mains. (Outputs discharged with crowbars).



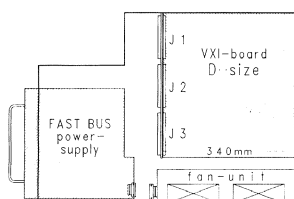
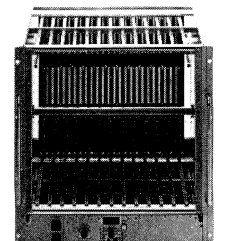
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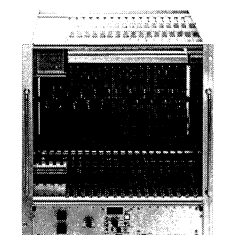
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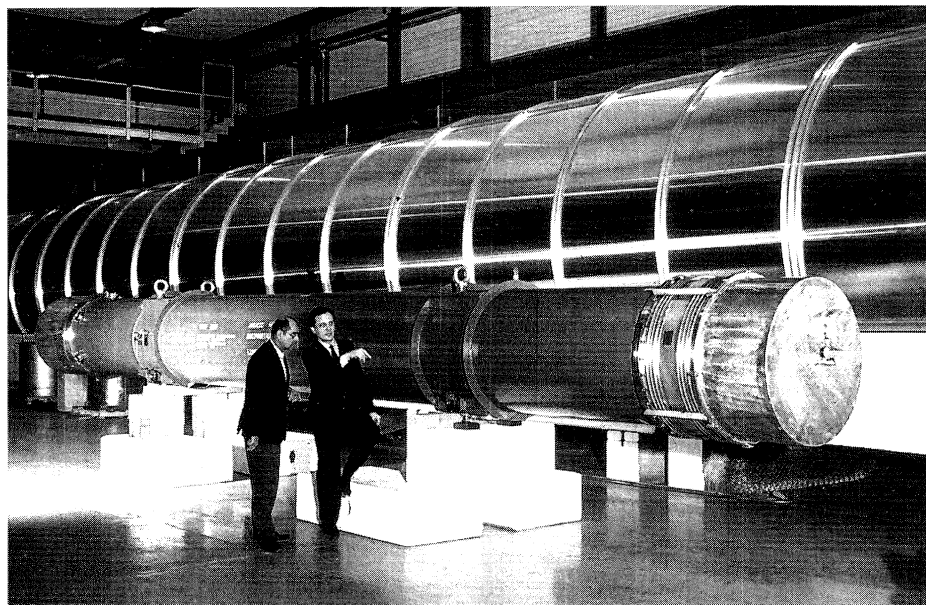
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The first 10-metre twin-aperture prototype dipole for CERN's LHC proton collider was recently delivered to CERN for testing.



single collaboration. In response, a consortium of more than 36 institutions from six countries prepared a Letter of Intent for the March meeting of the TRISTAN Program Advisory Committee. Both the laboratory and the collaboration welcome experimentalists to join this effort.

CERN First LHC prototype dipole

The first 10-metre twin-aperture prototype dipole for CERN's LHC proton collider was delivered on 1 February for testing. It is the first of two prototypes supplied by the Italian INFN (Istituto Nazionale di Fisica Nucleare) in the framework of a collaboration with CERN on applied superconductivity.

The project is being managed by the Milan Section of INFN at its Laboratory for Applied Superconductivity

(LASA) which worked mainly with Italian companies. The technical follow-up is being carried out by a CERN-INFN team.

The active part and cold mass of the magnet were manufactured by Ansaldo (Genoa); the cryostat was produced by Zanon (Schio). A significant contribution was also made by LMI-Europa Metalli (Florence) in developing high current density superconducting cables with the requisite fine filaments.

The second INFN-CERN prototype is not far behind. Five more 10-metre-long prototypes from other collaborations are scheduled for delivery later this year.

CANADA TRIUMF support

Citing insufficient levels of foreign contributions, on 22 February Canadian Industry Minister John Manley

announced the Federal Government's decision not to support further the KAON accelerator project for the TRIUMF Laboratory in Vancouver.

KAON was intended as a five-ring particle 'factory' using KAON's existing 500 MeV cyclotron as injector, producing a variety of beams a hundred times more intense than currently available sources. The mood had been optimistic in the late 1980s when development money came through both from the regional British Columbia administration and from Ottawa.

The previous Federal Government had made a commitment to contribute a third of KAON's construction and operating costs, equivalent to \$608 million over ten years, provided sufficient support came through from overseas. Another third of the construction cost had been offered by British Columbia. Although contributions had been lined up from France, Germany and Italy (Canada had been one of the first to contribute to the German HERA electron-proton collider at DESY, Hamburg), the US and Japan remained aloof.

With the federal government preoccupied with cutting the budget deficit, KAON was an obvious target. However this does not spell the end for TRIUMF. Far from it. 'We will be asking TRIUMF management to develop options for its future role that will enable it to continue being a focal point for Canada's research in particle physics, and act as Canada's gateway to leading foreign facilities', said Minister Manley. Ottawa support for TRIUMF in the 1994-5 financial year is being boosted by \$4 million to \$33.25 million, offsetting recent cuts. Managed as a joint venture by a consortium of Canadian universities, TRIUMF is mainly funded through the Canadian National Research Council.