

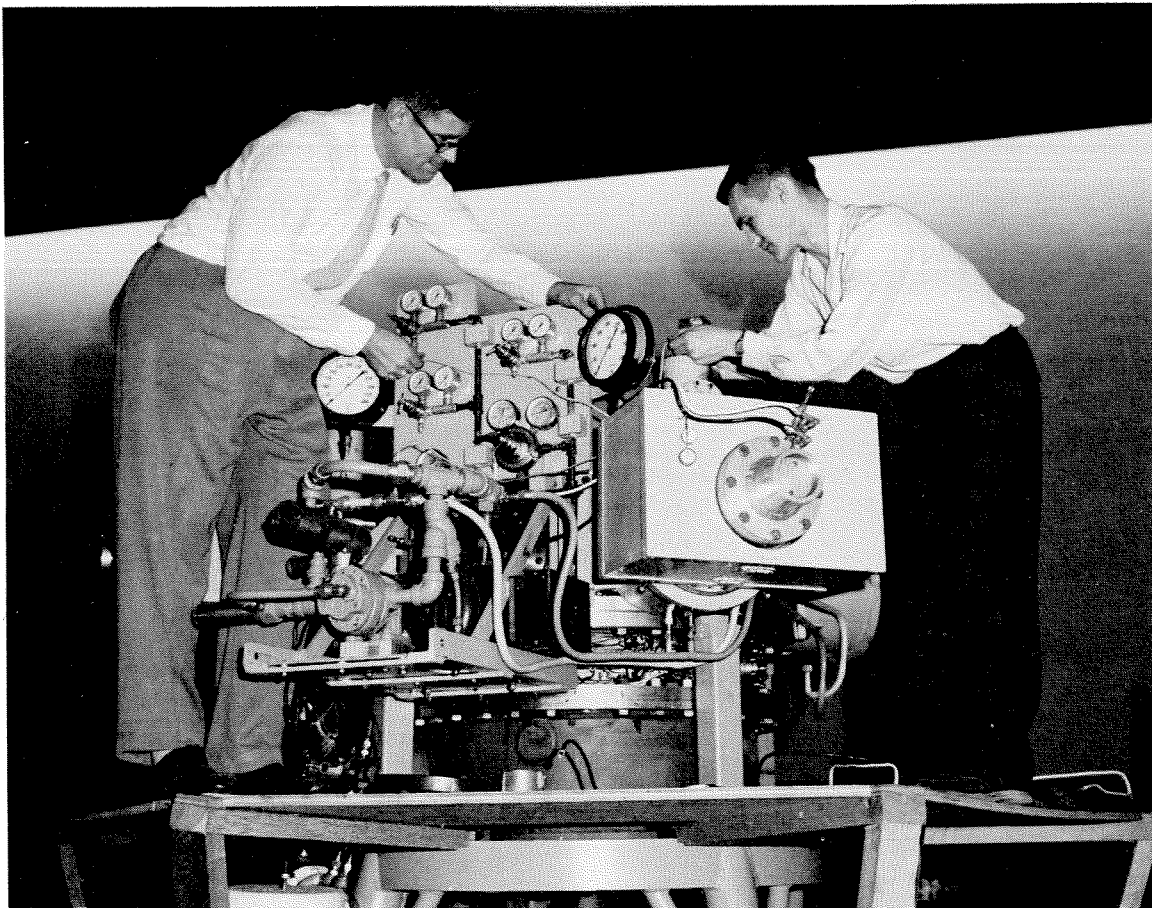
Caltech's new high temperature x-ray spectrometer analyzes the atomic structure of space-age metals. Pol Duwez, professor of mechanical engineering (left), and graduate student Ronald Willens, designed it. CES built it.

Big Business on Campus

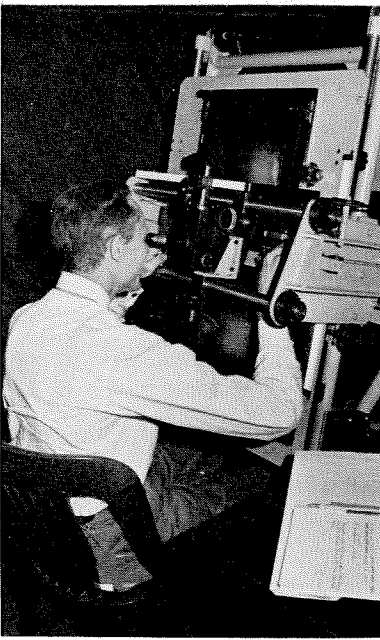


Scientific research calls for a steady flow of original and intricate equipment — most of which must be newly created. In fact, Caltech has had to create a separate unit to keep the Institute's countless research projects supplied with this necessary equipment. This unique organization, Central Engineering Services, was originally formed to design and build Palomar's 200-inch telescope in the early thirties. Today, it has grown into a \$175,000-a-year business. Some of the equipment it makes is so effective that other universities and research institutes ask for duplicates. On these pages, a sampling of some of the original instruments designed and built in Central Engineering Services.

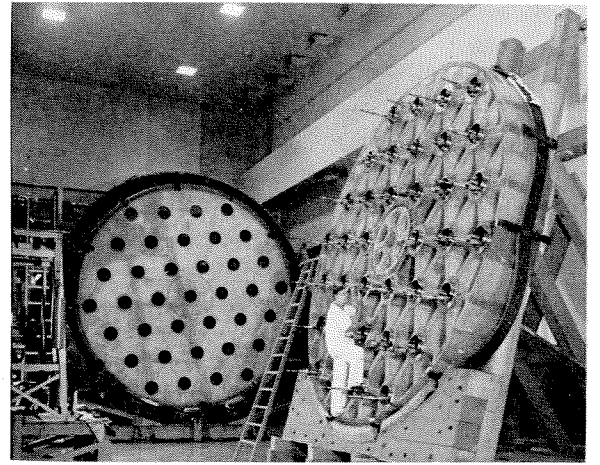
Bruce Rule (center), director of Central Engineering Services, and co-workers gingerly handle a block of fragile crystal. This will eventually be a part of a Cerenkov counter which detects high energy particles.



John Teem, senior research fellow in physics, and research assistant Joe Mullins operate a new bubble chamber which receives x-ray pulses from the Caltech synchrotron and photographs the tracks of pi and k mesons.



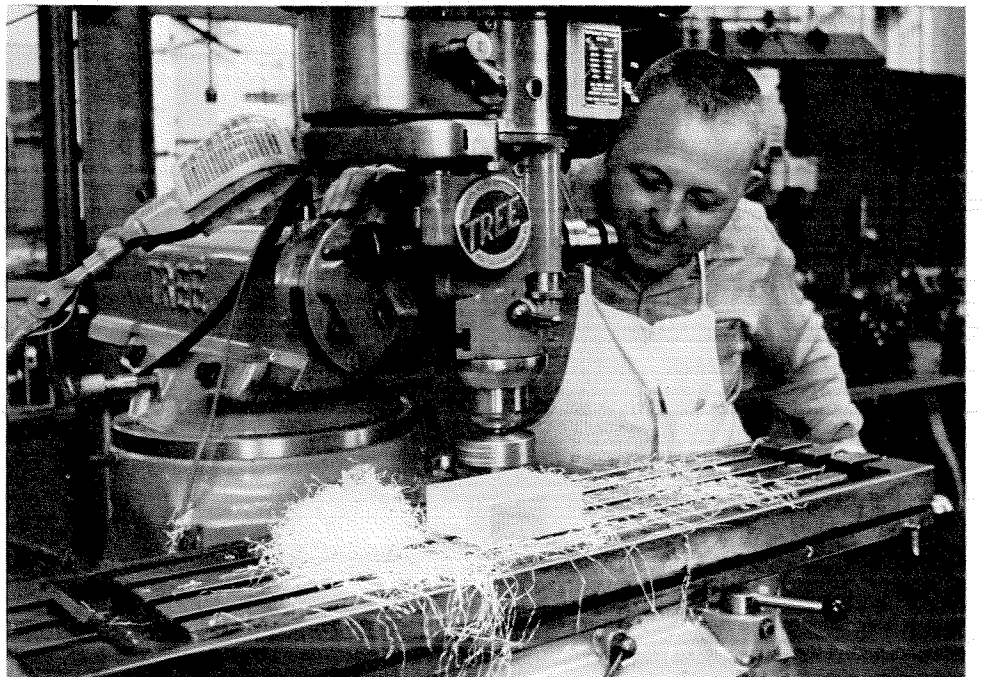
An astronomer uses the blink comparator, a viewing device which allows comparison of an old and a new picture of one astronomical field. This is how supernovae and other astronomical phenomena are found.



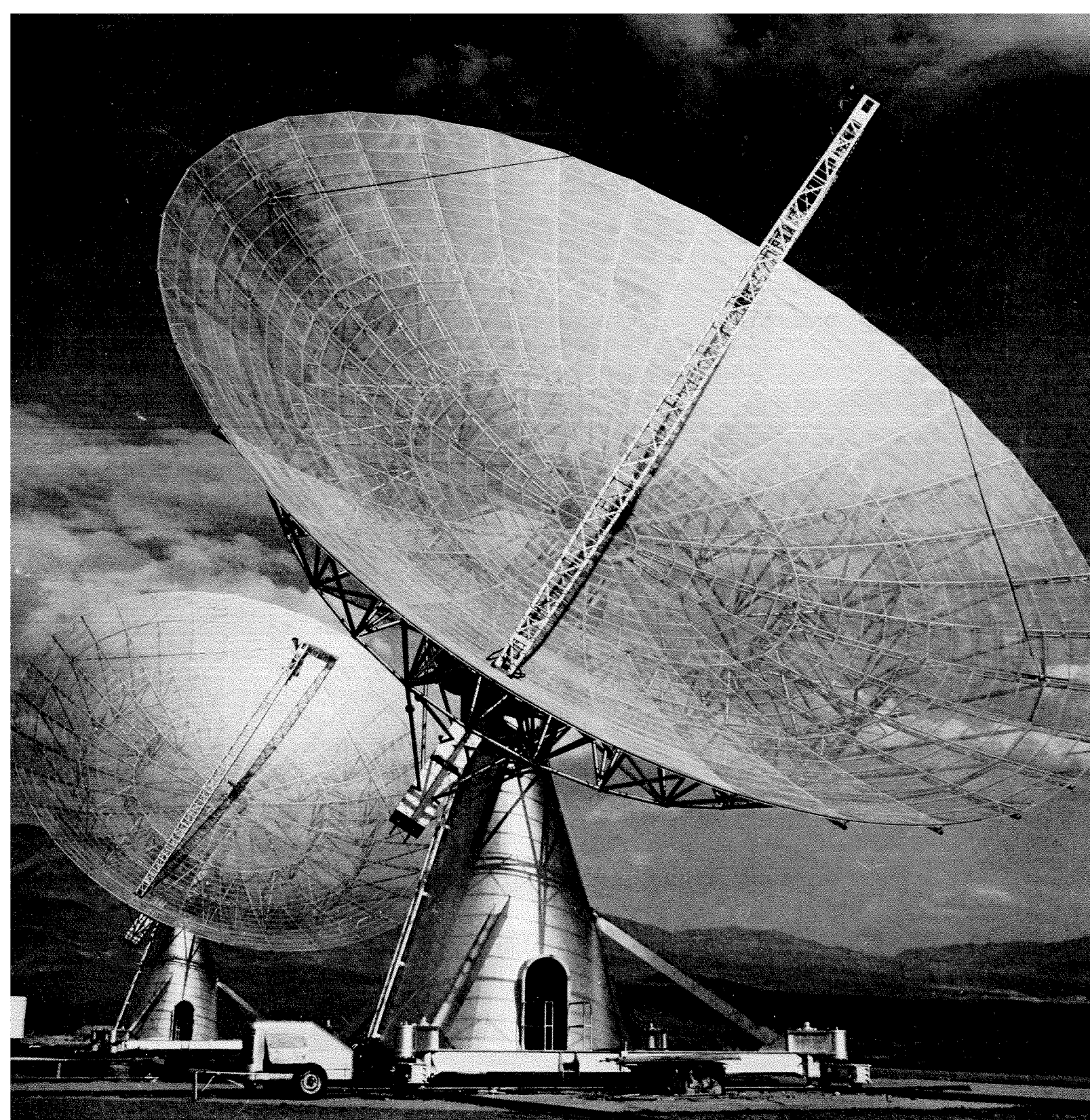
CES's first job — designing and building the 200-inch Palomar telescope.



Fred Birri, superintendent; Frank Tennant, precision machinist; and Robert Harrington, engineer-designer, examine a new CES instrument. This is a dual viscometer, which measures the viscosity of liquids used in basic studies of hydrodynamics.



Thomas Shortridge, precision machinist, shapes a piece of lucite for use as an x-ray beam catcher for the synchrotron.



At Caltech's new radio astronomy installation in Bishop, California, giant reflectors receive radio signals from space. All control apparatus, tracking equipment, timing mechanisms and differential drives for the project were built by Central Engineering Services. Original specifications were set up by John G. Bolton, professor of radio astronomy; and Bruce Rule, chief engineer of the radio astronomy project.