

# Research Instrumentation

LAL 80157



1953 Instrument Research Division Inspection Talk

You are now in the Instrument Research Laboratory. The major portion of the program at this stop will be given by the Pilotless Aircraft Research Division. However, before introducing the speaker, it appears appropriate while you are here to describe briefly the work of the Instrument group.

Because the success of the research program depends so much on the instruments and measuring techniques employed, the Instrument Research Division not only designs and builds the instruments, but also works very closely with the research people in planning and running their tests and in reducing the data to a final usable form.

The instruments developed by this Laboratory make use of electrical, mechanical, optical, and electronic techniques and vary from high-precision, jewel-like components to complete instrumentation systems. Each component is designed to obtain accurate and reliable test data with due consideration for such factors as maintenance and cost.

The Instrument Research Division is responsible for the major portion of the instrumentation used in the wind tunnels and ground facilities at Langley, the instruments used in research airplanes here and at the NACA High-Speed Flight Research Station at Edwards Air Force Base in California, and the measuring techniques and devices used in our rocket-powered model research program at Wallops Island. A few of the instruments are on display in this room.

On the extreme left there is a display of typical instruments and recorders that have been developed for flight research. Many of these instruments are electrical, but for the main parameters of the test, such as airspeed, altitude, angular velocities, and accelerations, individual mechanical-optical recorders are used because of their better accuracy and reliability. Some idea of the compactness of this type of recording may be gained from this small 24-channel pressure recorder. The reliability of this over-all airborne system is indicated by the fact that over 98 percent of the total flight records were satisfactory during the past year.

For measuring pressures on wind-tunnel models, tube-type manometers are still extensively used because of their accuracy and simplicity. We have here a display showing a few of the many hundreds of pressure pickups and associated amplifiers used for dynamic pressure measurements, and also a device that electrically integrates pressures to obtain section normal forces and pitching moments at a spanwise station of an airfoil and provides a printed record of the integrated quantities.

Optical techniques are also extensively used in wind tunnels. This 49-inch diameter mirror is to be part of the Schlieren system for the new Unitary Plan 4-Foot Supersonic Tunnel. It is one of the largest mirrors ever made for this purpose.

Force measurements in wind tunnels are generally made with electrical strain gage balances. On the right we have three sting-type wind-tunnel balances. These two are six-component balances that measure the principal forces and moments on the model, while directly below is a much smaller four-component balance. The outputs of these balances may be fed into this equipment, where they are digitized and printed, as well as punched, into IBM cards for use in subsequent data reduction.

Here is the radio telemeter system used in rocket-powered model research. On the table are some of the accelerometers, pressure pickups, gyros, and the radio transmitters that are normally installed in the models. An essential design requirement for these instruments is that they be compact enough to fit into a small space in the nose of the models, as you see overhead. To the rear is the ground telemeter receiving and recording equipment. Despite the obvious complexity of this type measurement, during the past year less than 1 percent of the data were lost.

This concludes the brief description of some of our instrumentation, and we will now turn the program over to the Pilotless Aircraft Research Division. This is Mr. Church of that division.

(Typed 4-30-53/ebb)



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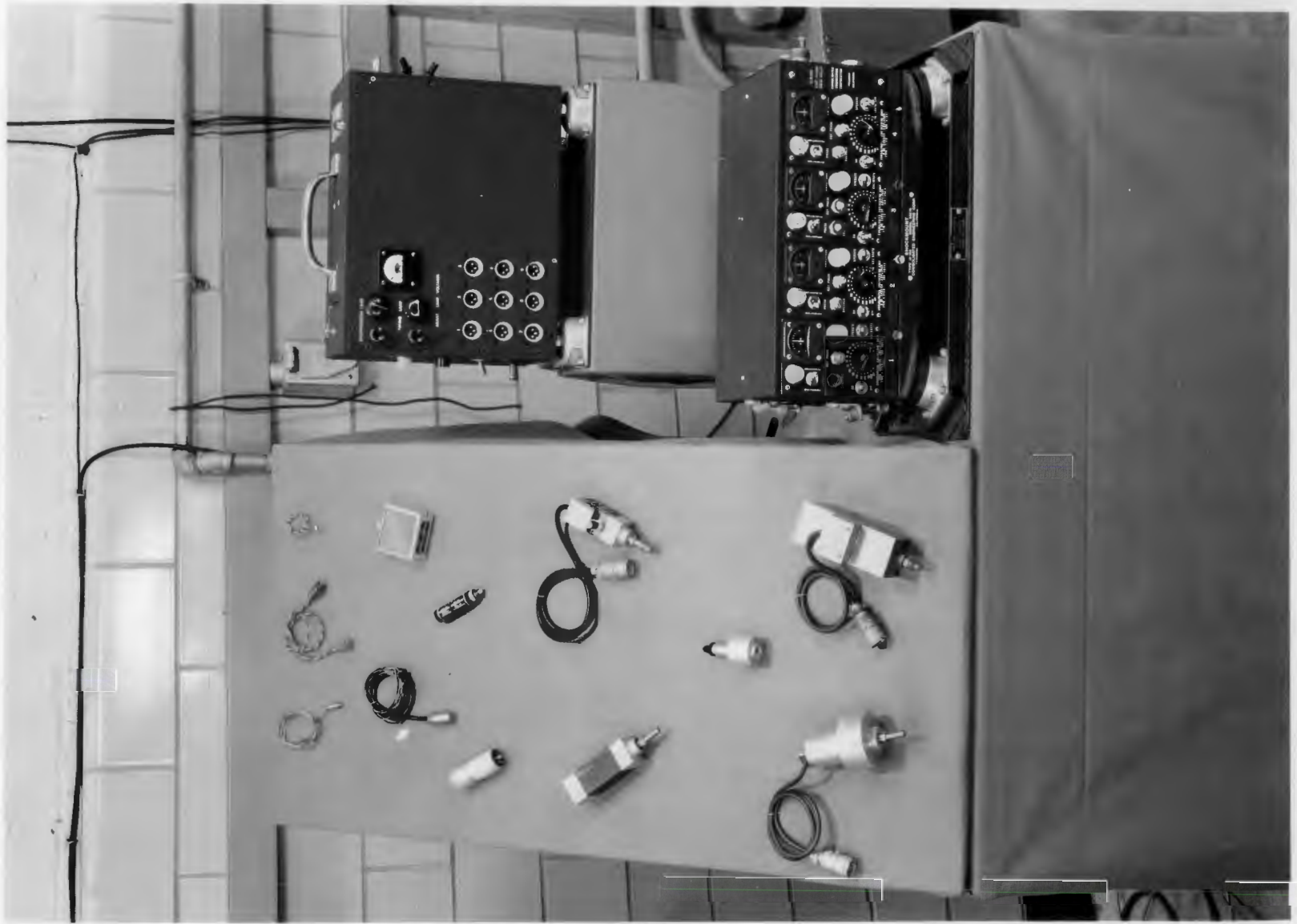
**FLIGHT RESEARCH  
INSTRUMENTATION**

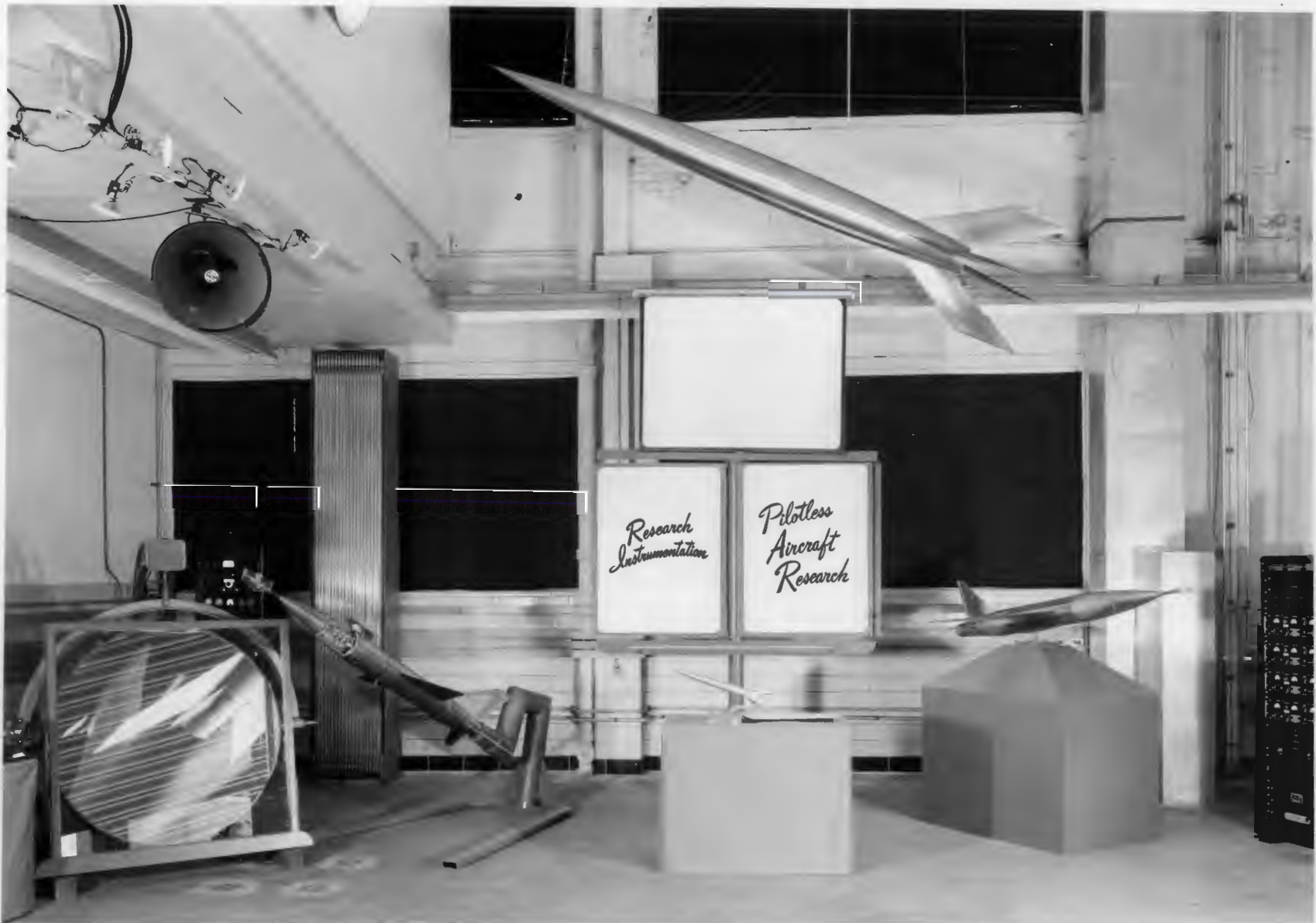




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