

## iron curtain parts for ti scientists

**A**FTER AN INSIDE view of Russian research and production, two TIers agree that Russia lags behind the United States somewhat in semiconductor technology and no longer leads this country in thermoelectric work. The TIers came to these conclusions after visiting some of Russia's top physics laboratories and the largest semiconductor plant in the U.S.S.R.

Dr. Richard Petritz of Central Research Laboratories and Dr. Raj Misra, consultant in Semiconductor-Components division, believe they saw more of Russian basic research efforts in these areas than any other Americans have been allowed to observe in recent times. Although both entered Russia as tourists, they were sponsored by the Soviet Academy of Sciences which controls admission to that country's leading research facilities.

In mid-September, Dick and Raj, with TIers Bill Savage, Alan Beattie and Murray Bullis, attended the International Conference on Semiconductor Physics in Prague, Czechoslovakia. There, they became acquainted with a number of Russian scientists. The Soviets, already familiar with the international reputation of TI's scientists and with TI itself, invited Dick and Raj to visit some of the Academy laboratories and the University of Moscow. Dick gave lectures at four of the five laboratories he visited. Raj, who was touring separately, was guest lecturer at the Svetlana semiconductor and vacuum tube plant. En route to Moscow, Dick, accompanied by his wife and daughter, also visited research facilities in Warsaw, Poland.

"Much of the advanced research in Russia is carried on in the laboratories of the Academy," Dick reported, "with a smaller percentage in university and industrial laboratories. In comparison, U.S. research is more heavily concentrated in industry and universities than in government facilities. Technical effort at TI is typical of our strong industrial research program."

Raj and Dick concur that lack of an electronics instrument manufacturing industry in Russia handicaps Soviet research. There, tools with which laboratories are equipped must be specially made. "In fact," Dick says, "each laboratory is almost self-sufficient, growing its own crystals and designing its own equipment."

In spite of this handicap, semiconductor technology in Russia is not far behind that in the United States. Dr. Misra observed basic work on device geometry high-frequency techniques which have the potential of becoming high calibre. He also found cold welding techniques, for final incapsulation of transistors, more



Passports of Raj Misra, top, and Dick Petritz, below, are stamped with Russian visas following the TIers' recent visit in the U.S.S.R. Red Square is shown in insert.

advanced than any others he has seen. Raj, who heads germanium reliability research and development in S-C, currently is experimenting with these very methods. Meanwhile, other S-C TIers are studying Russian-made high-power transistors given to Raj in exchange for standard TI devices which he carried to the U.S.S.R.

Dick, who heads CRL Device department and is acting head of the Data Systems & Earth Sciences department, found an advanced semiconductor research program underway at the Physical Technical Institute in Leningrad. There, work is in progress on solar cells, gallium arsenide and indium antimonide. The latter, he noted, was purified to a greater extent than any he had seen previously.

In thermoelectricity—a field currently of great interest to TI—the Soviets were acknowledged world leaders just three years ago, Dr. Petritz said. A vigorous program was begun in the United States, and, from all indications, Dick believes this country probably is now about even, and possibly ahead in some areas.

Raj, alone, had an opportunity to observe semiconductor device production when he was guest lecturer

at Svetlana, Russia's largest semiconductor and vacuum tube plant in Leningrad.

"Without doubt," he says, "the Russian vacuum tubes appear to be the most advanced I've seen. But the general quality of transistors and other semiconductor devices is inferior."

Svetlana was a light bulb factory 45 years ago. It now has modern equipment and maintains a scrupulously clean atmosphere, Raj says. Girls scrub the floors continually. He found mechanization equipment for washing and cleaning devices, but, in general, mechanization was sparse.

At the entrance to the plant, Raj saw morale-boosting posters depicting proposed production figures for all Soviet industries based on the next five-year plan.

"Soviets believe that they will surpass the U.S. gross national product in 1966," Raj said he learned. "However," he adds, "the recent, strong U.S. program in thermoelectrics proves that this country is not standing still."

As an incentive for increased production at Svetlana, Raj was told that a 20% bonus would be given to all employees if the quota is met; if it is exceeded, everyone gets 1% increase in wages for each percentage point achieved above the quota.

But Raj concluded that Soviet production quotas may not provide for product reliability. "Many of the semiconductor products appear to have poor surface treatment, although they are well packaged. I saw

no evidence of a quality assurance operation," he said.

Raj was impressed most by the plant engineers' knowledge of theoretical science. "The engineers—including many women—are given time to study technical literature and obviously are well-versed in their fields," he observed.

For its employees, Svetlana offers many services more frequently provided by an American municipality. These services include a day nursery, clinic and recreation facilities. The Svetlana equivalent of TI's "coffee break" upholds the American impression of athletic Russians. Twice each shift, employees do physical exercises to music broadcast by the factory radio center.

In all dealings with the Russian people, both Raj and Dick were treated hospitably. They believe that little was hidden from them during their laboratory tours. Dick judged this to be true by the nature of the questions asked him following his lectures, and also because he was free to talk directly to scientists and observe first-hand their scientific apparatus.

The Russians, in turn, seem eager to visit TI.

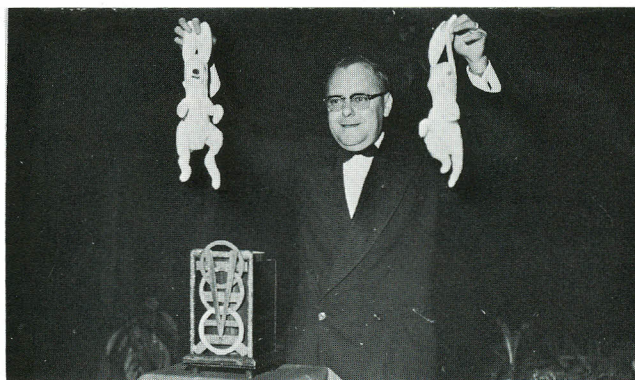
Both Dick and Raj want to maintain contact with Soviet technology in the areas of interest to TI because, in Raj's words, "With Russia turning out annually almost three times as many engineers as the United States, Soviet technology will continue to improve fast. There is much we will be able to learn from them in the future."

## ti instrument repairman has tricks up his sleeve

WHEN a little magic is needed for the repair and maintenance of instruments, Troy McVay has a few tricks up his sleeve. Besides having dexterity in putting complex equipment in working order, the Tler of the Apparatus repair & maintenance group is capable of some genuine slight of hand.

Once, Troy borrowed another Tler's necktie and apparently cut it into pieces, raising the owner's wrath. But quicker than you can say "abracadabra," Troy "put it back together," thus probably avoiding the victim role in another kind of "necktie party."

Troy is a home-grown Houdini with a repertoire of tricks developed over 15 years. Today he is a professional magician in demand nearly every week to entertain at banquets, parties and church gatherings.



*Presto, rabbits appear from nowhere as a result of slight-of-hand magic performed by Apparatus Tler Troy McVay.*

For church groups—particularly for youngsters—Troy has adapted many of the standard magician's tricks to illustrate the scriptures. During this holiday season, he will give numerous benefit performances at orphanages, hospitals and institutions. But first he will practice his new tricks on fellow Tlers.