from punched cards. A total of 24,000 digits a minute can be recorded in printed form, 16,000 digits a minute can be noted as punched holes on cards.

The computing speeds of the latest IBM mechanical brain are as follows: It can add or subtract each second 3,500 numbers of 19 digits each; it can multiply each second 50 numbers of 14 digits each or divide 20 numbers of 14 digits.

The machine contains 12,500 electronic tubes, 21,400 relays and 40,000 pluggable connections.

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NUCLEAR PHYSICS

Is Test C To Be Secret?

➤ WILL "Test Charlie" be made a part of the top-secret atom-bomb experiments scheduled for the new mid-Pacific proving ground centered on Eniwetok atoll?

If this deep-water explosion, scheduled as part of the tests at Bikini but "postponed indefinitely," is restored to the program, it is highly improbable that the world will be told about it, as it was about tests A and B ("Able" and "Baker") in July of 1946. As a matter of permanent policy, all press and radio observers are excluded from the Eniwetok area.

It is possible, however, to form a reasonable conjecture of what such a test might be like, based partly on past experience, partly on present conditions and future possibilities.

Deep Water Test

Test C (or "Charlie") was originally planned to be held in deep water off Bikini, using such ships as were left after the first two tests, which were held within the lagoon. It was intended primarily to get a picture of the crushing effect on ships' hulls of an atom-bomb explosion in really deep water—a mile or more down. Since water is incompressible it was expected that this shock would be effective for a considerable distance; but existing physical and engineering tables do not suffice for a safe prediction of just what distance.

"Baker" test at Bikini was a submerged explosion, but a shallow one, for the depth of the lagoon at the center of the target array was only about 300 feet. All atoll lagoons are shallow, so if "Charlie" test is held in the Eniwetok area it will have to take place well out at sea—30 or 40 miles from the nearest island. If surface craft are tested, they will probably be held together with chains or cables. A practicable way to insure correct placing and depth of the bomb would be to suspend it on a mile or so of cable secured to one of the ships.

Value of a test against surface craft, however, would seem questionable at present. The only surface navy of any size, outside of our own, is the British; and Britain, her great Continental rival gone and her overseas commitments much reduced, is now content to let supremacy rest with the U. S. Navy. In view of that fact, and of the additional fact that the survivor-ships at Bikini have all been taken either to Pearl Harbor or to the mainland Pacific coast, the expense and labor of setting up a target array of surface ships hardly seems worth while.

Naval tacticians might, however, want to try the weapon at depth against recent-type submarines. At the close of the war, Germany had developed a new U-boat design, said to be proof alike against radar detection and even the heaviest depth charges. It is rumored that the USSR has up to 300 of these craft, either taken over in the capture of German naval bases or completed since the war with the assistance of German technicians. Obviously, if the present "cold war" between the USA and the USSR should reach the shooting stage, these submarines would be the principal menace to our surface fleets and our merchant marine.

German Submarines Handy

We have a number of the late-type German submarines, as well as quantities of German plans and blueprints. A crushing test against such subs, with an atom-bomb as a super-depth-charge, might seem to be in order.

It would not be easy to arrange submerged U-boats for the test, but it probably could be managed. One of the biggest difficulties would be the salvaging of data from them if they were sunk in the test. A stove-in submarine would be highly interesting from a technical point of view, but on the bottom a couple of miles straight down would be rather inconvenient to board. It seems likely, therefore, that means would have to be devised to hold the damaged craft near the surface — possibly suspended from unsinkable floats — and perhaps haul them up and put them into floating drydocks after the explosion.

A test of this kind could probably be conducted in as nearly complete secrecy as is possible in this leaky world of ours. If surface ships of the Bikini target array should one day be missing from their berths, interested eyes might readily note their absence. But submarines are normally invisible and silent; they could proceed to the designated target spot under their own power and there be abandoned by their crews.

It is unlikely, too, that a mile-deep atom-bomb explosion would give news of its own occurrence. Probably no great amount of radioactive debris would reach the surface, and what the surrounding water would absorb would soon be so diffused in the vastness of the ocean that it would leave no trace.

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PHYSICS

Calculate Various Levels Of Temperature Above Earth

➤ IT'S 50 degrees hotter than boiling water 100 miles over your head. At 45 miles above the earth the temperature is 150 degrees Fahrenheit below zero. And it is the comfortable temperature of 70 degrees at 35 miles altitude, while in the atmospheric layer eight to 20 miles above the earth the average temperature is 75 degrees below zero.

One of the largest explosions in history, the destruction of Germany's Helgoland naval base with 5,000 tons of TNT on April 18 of last year, allowed Dr. Everett F. Cox of the Naval Ordnance Laboratory, Washington, to determine these temperatures. He announced them to the joint meeting of the American Physical Society and the Institute of Aeronautical Sciences, New York.

Noise from a great explosion does not reach distances of several hundred miles away until later than times calculated, assuming the sound travelled directly along the earth's surface. Around an explosion there are alternate zones of noise and silence.

Dr.. Cox said that the best explanation of these skip-distances is that the sound waves travel upward until they hit a hotter layer of air high above the earth, where they are bent sufficiently to be reflected back to earth to form a noise ring. This sound is reflected by the earth and then goes up and down again to form another noise ring.

Using the observations of a special U. S. Navy expedition that observed the Helgoland blast at various points,

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