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## ABC's of U. S. Missiles

(Continued from page 383)

What are MRBM characteristics?

They can be launched from mobile platforms. Two-stage solid-propellant MRBM's currently are under development and are designed to have the IRBM range. They will be deployed in Europe and the Far East. The Soviet MRBM's are operational already.

What characteristics distinguish the ALBM?

It is designed to be launched from U.S. B-52's and British Vulcan bombers. Skybolt, the U.S. ALBM, still is in the research stage and is scheduled for operational deployment in 1964. It will have a range of more than 1,000 miles. It is not known whether the Russians have any ALBM's.

What are short-range ballistic missiles?

These are solid or liquid rocket-powered missiles that operate on the ballistic principle but do not have the full range of the IRBM's. Some have a ceiling within the earth's atmosphere. Others can operate to the lower levels of the IRBM.

Honest John, Little John, Redstone and Pershing are among the larger U.S. family of shorter range ballistic missiles. All are

operational and deployed in Europe. The Pershing, which ultimately will replace the Redstone, has a range of 300 miles and can, in fact, be considered an IRBM. Honest John and Little John have a range of 12 miles and are artillery type surface-to-surface missiles usable on special mobile launchers and air transportable.

The Navy's Alfa and Zuni also are ballistic-type missiles. Both are operational. Alfa operates from surface to underwater from destroyers and cruisers. Zuni is used on aircraft.

What air-breathing missiles are in the U.S. arsenal?

Currently in use are turbojet- and ramjet-powered missiles. Expulsion of hot gases under extreme pressure through a combustion chamber gives thrust to these missiles. The turbojet is characterized by fan-type moving parts which accelerate and compress the air. The ramjet lacks these moving parts and forward speed of the engine packs or rams the air into a special duct which is the compression chamber.

The Air Force Snark, Slam, Mace and Matador Bomarc and the Navy Talos are ramjet-type missiles. All are operational and tactical weapons deployed here and overseas.

• Science News Letter, 82:383 December 15, 1962

### PUBLIC SAFETY

## Ski Injuries Estimated

➤ AN ESTIMATED 10,000 of the million or more skiers on the snowy slopes of this country are expected to be injured badly enough to require medical attention in the coming year.

Beginners and women will probably be injured in greater numbers than experienced men. The average skier's age is in the 20s and most skiers are unmarried, but the age limits go from 6 to 60.

A New England doctor who helped treat 684 injuries at the Mount Snow, Vt., ski resort last year suggested that a scientifically adequate attempt be made to investigate the causes of these accidents. As a result, the first adequately "controlled investigation of any type of recreational accident" appears in Public Health Reports, 77:975, 1962.

Every 50th person who obtained a ski ticket at the resort on the four consecutive Saturdays and Sundays from Jan. 28 through Feb. 19, 1961, was interviewed, and the injured, on arrival at the Mount Snow medical facility, were asked the same questions by either physicians or medical students. A sampling of 446 persons took part in the ski census.

Questions included self-rating as a skier, history of previous injury, height, weight, hours of sleep during each of the previous two nights, ownership of equipment in use, and place and time of the last binding adjustment. The type of binding was recorded and individual skis were measured.

Bindings were classified by inspection into release and non-release types, the investigators reported. Many persons believe that "release" bindings reduce the risk of

accidental injury. A release binding is so designed that it is supposed to become unfastened from the ski boot under forces exceeding those ordinarily encountered.

It was discovered that there were significantly fewer injuries among males using release bindings, but not among females who wore them. The researchers attributed the difference to the belief that the forces "required to disengage ski boots from these bindings tended to exceed the injury thresholds of females, but not those of males."

Release bindings, effective only on injuries to the lower extremities, should be improved so that they will give more protection to males as well as females, this study suggests.

Injuries to the head and shins might be reduced through use of protective devices.

The overall injury rate among Mount Snow skiers was 5.9 per 1,000 ski-man-days, a figure consistent with a Sun Valley (Idaho) study showing that it is likely that the overall ski-accident rate approaches one per cent per day.

Sprains, the most frequent injury, with fractures, made up 78 per cent of the total number of 684 injuries reported by Dr. Arthur E. Ellison of Williams College, Williamstown, Mass., who suggested the study and collaborated in it. Assisting in the investigation were Drs. William Haddon Jr. and Robert E. Carroll, both of the New York State Health Department, and collaborating in the clinical study, which accompanied the report of skiing injuries, was Dr. Milton Wolf of Wilmington, Vt.

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