



**LOWERING THE BOOM** — A Boeing B-47 Stratojet medium bomber moves into position to receive fuel through the boom from a Boeing KC-97 Stratofreighter tanker.

## For jet range:

# Gas pump on a cloud

In this age of fast, high-flying jet airplanes, aerial refueling is an accepted operational procedure, thanks to the development of some remarkable refueling equipment.

Just how important aerial refueling has become is evident in some facts revealed by Robert P. Person, group engineer, aerial refueling, of the Boeing Airplane Company, Seattle, at the diamond jubilee spring meeting of the American Society of Mechanical Engineers.

► **Flying Boom.** Describing aerial refueling by means of the Boeing flying boom, Mr. Person said that aircraft operated by the Strategic Air Command made 142,000 aerial refueling contacts in 1954. This is the equivalent of one contact every 3½ minutes, day and night, in all weather conditions, for every day of the year.

SAC considers aerial refueling operations as important as takeoffs and landings. The value of an aerial refueling system, Mr. Person said, can be condensed into one word—range.

One of the most serious problems in aerial refueling consists of maintaining the proper tanker-receiver "forming" position.

Considerable pilot skill and judgment are needed to prevent the receiver from pulling away from the refueling tanker.

► **Refuel Instruments.** To assist the receiver pilot in maintaining refueling position, some interesting devices have been developed. The primary device, described by Mr. Person, is a battery of five signal lights mounted on the tanker's belly and operated by the refueling boom.

When the two aircraft are in the optimum elevation-telescoping boom position, the green centre light comes on. If the two craft depart from this nominal position in the vertical plane, an "up," "down," "fore" or "aft" signal is activated telling the receiver pilot in which direction to move to regain the nominal position.

Mr. Person also discussed the method for co-ordinating receiver-

tanker operations. The boom nozzle has a signal coil coupled inductively to a matched coil in the receiver's receptacle.

Through this system a low-voltage signal is transmitted between tanker and receiver. This low energy signal is then amplified in both airplanes to activate relays which control the various boom systems.

► **SAC 24 Hours.** SAC's jet-powered bombers and fighters today are refueled by Boeing KC-97 Stratofreighters utilizing the unique Boeing Flying Boom system of aerial refueling. Using this system SAC's current operations involve an average of 2,880 contacts per week, or one aerial refueling every three and one half minutes around the clock. One SAC refueling squadron alone has transferred more than 6,000,000 gallons in its operations.

Aerial refueling of jet bombers with compatible jet tanker aircraft will vastly increase the already great range, flexibility and capability of the USAF. Toward that end the USAF has ordered into production a "limited quantity" of an advanced tanker-transport version of the new Boeing "707" jet prototype, to be known as the KC-135.

The Strategic Air Command's table of organization calls for each 45-plane wing of Boeing B-47 Stratojets to be complemented with a 20-plane tanker squadron of KC-97 Stratofreighters. The current production models of the Stratofreighter, designated KC-97G, serve not only as tankers, but also see daily duty as personnel and cargo transports.

► **Lower The Boom.** The boom itself consists of four concentric aluminum tubes, one of which telescopes giving the boom an extended length of 48 feet. The boom is flown into place in the receiver airplane by the operator from his station in the pod. Lying on his stomach, he watches the receiver's approach, talking him into a position where he can direct the boom into the receiving receptacle.

When contact is made the operator signals the flight engineer, who controls the pumping operation, and the fuel transfer commences. Should either airplane get out of normal formation during refueling, a spring-loaded steel poppet inside the nozzle closes off the fuel supply and the boom automatically disconnects and retracts. The boom is activated by a hydraulic motor and also can be extended and retracted manually if necessary. Contact may be broken by either the boom operator or the receiver pilot at any time during the operation.