DEFENCE

CONCRETE DIBBER CONCEIVED IN FRANCE

Israel's war-winning bomb: its genesis detailed

BY ROBERT R. RODWELL

ISRAEL'S "CONCRETE DIBBER," the penetration bomb used with decisive effect against Arab runways on June 5 during the opening hours of the six-day Middle East war, was based upon a French Engins Matra design study completed three years ago. The existence and use of the concrete dibber, exclusively revealed in *Flight* on June 22, has been denied by the Israelis. We are now able to reveal, however, salient details of the design study which was made at Israeli request (the project was known at Matra as "the Israeli Bomb") and was the subject of discussions between the company and the Israeli authorities, and of several detailed presentations in Israel, in early 1965. Since that time, it appears, development of the weapon has continued solely in Israel. At the time the study was made it was foreseen that development would take place in France, with trials based at Cazaux, using IAF aircraft and crews.

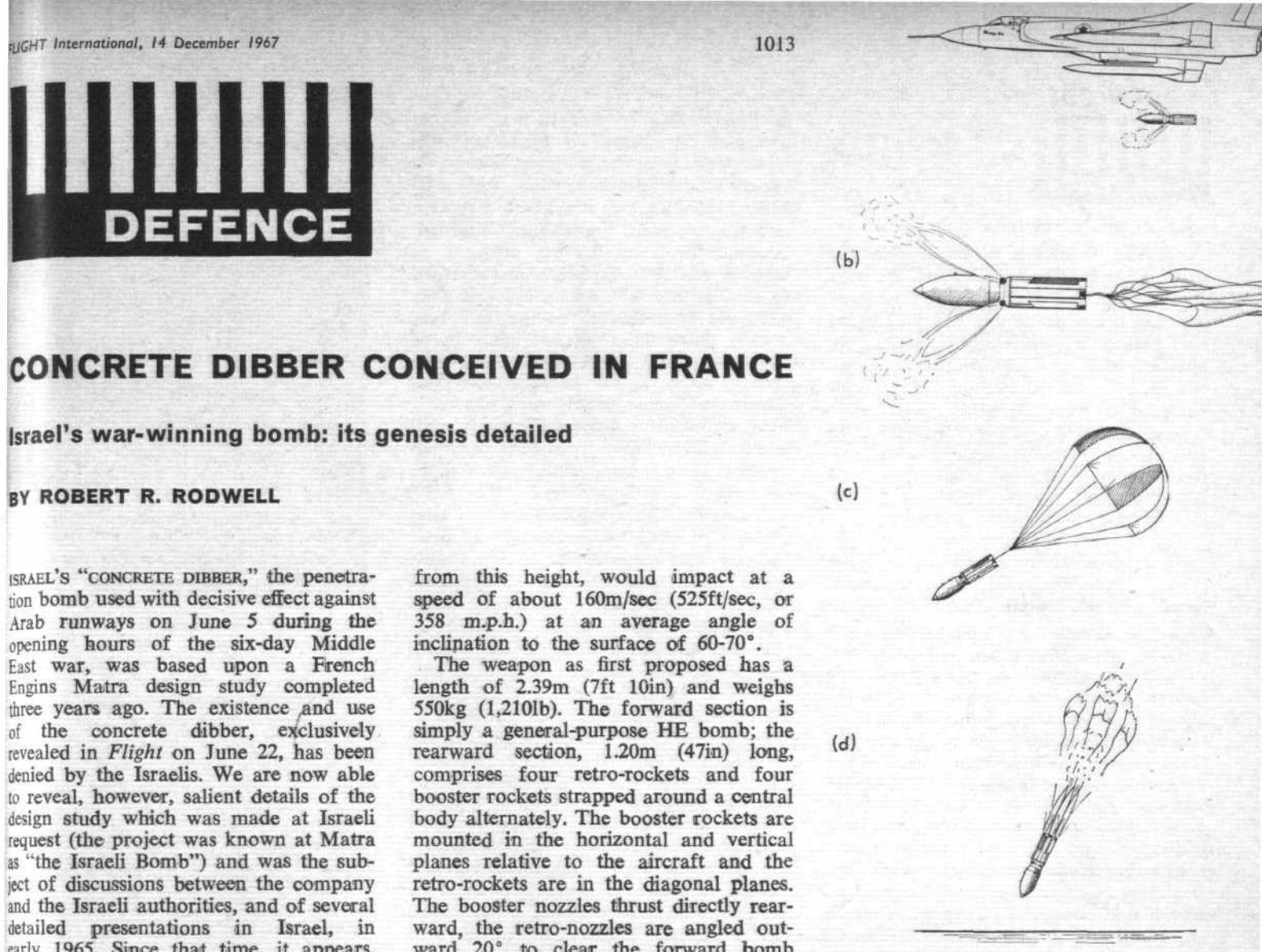
The IAF asked for a bomb to be dropped from Vautour and Mirage 3CJ aircraft in high-speed, very low and level flight. This imposed certain dimensions within which the project team considered a bomb could be developed for delivery at speeds between 300kt and 500kt and heights of about 100m (330ft) and which, from this height, would impact at a speed of about 160m/sec (525ft/sec, or 358 m.p.h.) at an average angle of inclination to the surface of 60-70°.

The weapon as first proposed has a length of 2.39m (7ft 10in) and weighs 550kg (1,210lb). The forward section is simply a general-purpose HE bomb; the rearward section, 1.20m (47in) long, comprises four retro-rockets and four booster rockets strapped around a central body alternately. The booster rockets are mounted in the horizontal and vertical planes relative to the aircraft and the retro-rockets are in the diagonal planes. The booster nozzles thrust directly rearward, the retro-nozzles are angled outward 20° to clear the forward bomb casing. The eight rocket tubes are mounted around a central parachute container, which houses a cruciform-pattern drogue of 25m² (269 sq ft) in area. Deceleration is a two-stage affair: first the retro-rockets, then the drogue.

Both retro and accelerator rockets contain blocks of TT-25 Propergol propellant, identical in structure to those of a Hotchkiss-Brandt artillery rocket but cut down in length. Each retro-rocket block is 0.95cm (37in) long and, together, they have an effective rearward thrust, allowing for the inclination of nozzles, of 7,250kg (15,985lb). Burning time is 0.9sec.

The two booster blocks in the horizontal plane are 1.0m (39in) long and weigh 8.7kg (19lb) each. Those in the vertical plane are 15cm (6in) shorter, weighing 7.4kg (16.3lb), thus leaving space between the forward ends of the rocket tubes and the bomb backplate for auxiliaries. In the topmost space are mounted the sequential triggering device and safety fuse. In the lower is the battery for the rocket igniters. Together the four boosters give 7,500kg (16,535lb) thrust for a burning time of 0.9sec.

Sequence of operation is as follows: release is followed by the firing, 0.3sec later and at 0.5m separation from the aircraft, of the retro-rockets, which burn for 0.9sec and produce a deceleration of 13g. At 0.9sec after release, when the retros are two-thirds spent, the parachute begins to deploy, taking 0.3-0.5sec to develop. During the three seconds or so that this is developed, it rotates the bomb sufficiently to assure a penetration angle relative to the surface of between 60° and 80°, thereby obviating the great



After release from an aircraft flying at only 330ft (a) the retro-rockets fire, with a time delay of 0.3sec. While they are still burning, the drogue starts deploying at 0.9sec after release. Suspended by the drogue, the bomb rotates (c) at about 20°/sec to assume its penetration angle. Then, at 4.7sec, the boosters fire and the drogue tears and burns (d)

The concrete dibber as proposed by Matra in 1964, drawn here by a "Flight" artist. (1) Warhead: STA Type 200 bomb; (2) two-point mounting; (3) rocket mounting ring; (4) retro-rockets; (5) retro-nozzles; (6) parachute drogue in central container; (7) booster rockets; (8) booster nozzles; (9) stabilising fins; (10) sequential triggering mechanism; (11) igniter batteries