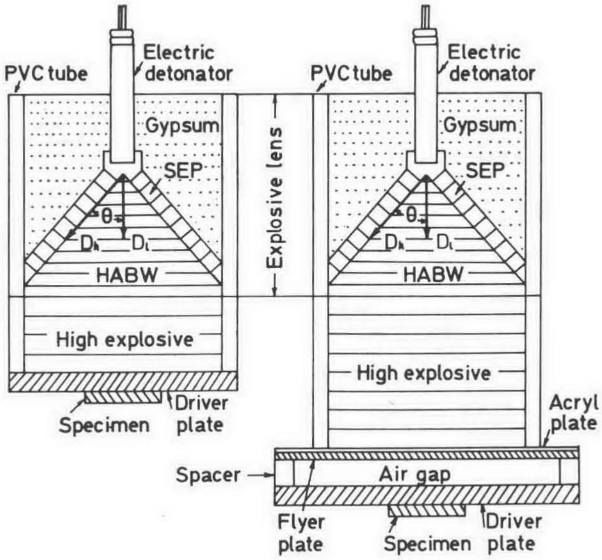

Fig. 2(a) Fig. 2(b)

Fig. 2. Devices for production of plane shock wave
(a) In-contact method (b) Flyer method

Two clay-like plastic explosives, SEP and HABW, containing a high explosive substance PETN (pentaerythritol-tetranitrate), manufactured by Asahi Chemical Industry Co., Ltd., are used for the higher and lower velocity explosives, respectively. Approximate compositions are as follows: SEP (65% PETN, 35% binder); HABW (30% PETN, 50% Pb_3O_4, 20% binder). By means of the so-called ion gap method the detonation velocities of SEP and HABW are determined to be 6.67 mm/μs and 5.05 mm/μs, respectively. Thus the angle θ is chosen to be 40°51′. The diameter of the explosive lens used in the present study is 40 mm, 51 mm or 78 mm, being much smaller than a usual one. It is to be emphasized that the smallest explosive lens weighs only 40 g.

Using a brass mold shown in Fig. 3, the plastic explosive SEP is shaped into a conical shell in a gypsum cast in a PVC (polyvinyl-chloride) cylinder. Then, a cone of HABW which is also shaped using a similar brass mold is inserted to fit the conical shell of SEP. During the molding process, a care is taken so as to introduce no void in the clay-like explosives.

The plane shock wave produced by the explosive lens is transmitted to a specimen mounted on a driver plate in contact with a high explosive pad, which is inserted between the explosive lens and the driver plate for the purpose of intensifying the shock pressure. This method, called the in-contact method, is shown in Fig. 2(a). The high explosive pad, 20 mm or 30 mm thick, is composed of Octol, Composition B, Pentolite, Baratol, or SEP in order to produce various values of the shock pressure. Various in-contact plane wave generator systems and values of pressure produced in the driver plate are listed in Table 1. The shock pressure produced in the specimen is determined by the characteristic of high explosive and the shock impedances ($\rho_0 U$) of both the specimen and the driver material. Generally the value of pressure in the specimen is not equal to that in the driver plate. The highest pressure obtained by the in-contact method is about 400 kbar.

Higher shock pressures can be realized by the impact of an explosive-driven flyer plate upon the driver plate(15), as shown in Fig. 2(b). An acrylite plate about

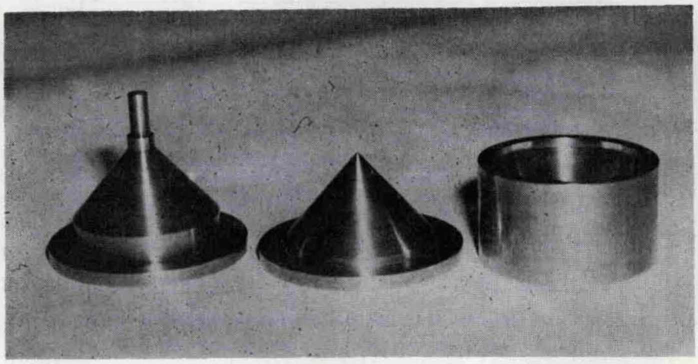

Fig. 3. Brass molds for making the explosive plane wave lens

Table 1. In-contact plane wave generator systems

Explosive lens diameter	High explosive pad (thickness)	Driver plate (thickness)	Shock pressure in driver plate
40 mm	SEP (20 mm)	Brass (3.5 mm)	160 kbar
	Pentolite (20 mm)	Brass (3.5 mm)	300 kbar
	Octol (20 mm)	Brass (3.5 mm)	300 kbar
51 mm	SEP (20 mm)	2024Al (5 mm)	120 kbar
		Brass (5 mm)	160 kbar
	Pentolite (20 mm)	2024Al (5 mm)	230 kbar
		Brass (5 mm)	300 kbar
	Comp. B (30 mm)	2024Al (5 mm)	290 kbar
		Brass (5 mm)	340 kbar
	Octol (30 mm)	2023Al (5 mm)	310 kbar
		Brass (5 mm)	410 kbar
78 mm	SEP (30 mm)	2024Al (5 mm)	120 kbar
		Brass (5 mm)	160 kbar
	Baratol (30 mm)	2024Al (5 mm)	140 kbar
		Brass (5 mm)	190 kbar
	Pentolite (30 mm)	2024Al (5 mm)	230 kbar
		Brass (5 mm)	300 kbar
	Comp. B (30 mm)	2024Al (5 mm)	290 kbar
		Brass (5 mm)	340 kbar
	Octol (30 mm)	2024Al (5 mm)	310 kbar
		Brass (5 mm)	410 kbar

(15) R.G. McQueen and S.P. Marsh, J. appl. Phys., **31** (1960), 1253.