

chamber, and valves C and D are opened. Oil from the pump enters the high-pressure end of the intensifier through valve C to force the piston up and drive oil from the low pressure end of the intensifier through valve D back to the oil reservoir. The cycle is repeated as often as is necessary to build up the required pressure in the compression chamber. Since the pump is operating continuously, valves E and F are used to recycle the oil or to direct it to the point of use. The actual hydraulic pressure in the compression chamber is displayed continuously on the pressure recording gage. This gage is periodically checked against the calibration control gage to ensure its accuracy.

The next step is to prepare the instrumentation system for the ensuing test. This is accomplished primarily by turning on the heater and plate power supplies to the pressure instrumentation console; adjusting the beam intensity, gain, and sweep-rate on the oscilloscope; and opening the camera shutter. The gain and sweep-rate are adjusted in a manner such that the pressure-time curve will be displayed over a major portion of the oscilloscope screen. To gain reliability, two piezoelectric gages are used in each test. By using the chopper circuit of the plug-in preamplifier unit, pressure signals from both gages are displayed simultaneously on the oscilloscope screen.

The final step of the test is to apply either a static or a dynamic load to the knock-off tube via the loading mechanism that will cause the knock-off tube to fail at the notch and allow the pressurized fluid within the compression chamber to escape.

The pressure in the compression chamber at the time of rupture, the time constant of the pressure-time curve, and the magnitude of the static and dynamic loading weights are tabulated in Table 1. In those tests where the knock-off tubes were

**TEST SPECIFICATIONS AND EXPERIMENTAL RESULTS**

TEST SPECIFICATIONS AND EXPERIMENTAL RESULTS										
TEST NO.	TEST SPECIFICATIONS						RESULTS			
	TUBE O.D. (IN.)	TUBE I.D. (IN.)	NOTCHWALL THICKNESS (IN.)	CASE- HARDENED DEPTH (IN.)	HIGH- PRESSURE FLUID	TEMP. (°F)	STATIC LOADING WEIGHT (LB.)	DYNAMIC LOADING WEIGHT (LB.)	TIME CONSTANT θ (MSEC)	RUPTURE PRESSURE (PSIG)
1-A	0.250	0.062	-	-	SAE 10	70	-	-	13.14	46,800
2-A	0.250	0.062	-	-	SAE 10	70	-	-	13.48	42,100
3-A	0.250	0.062	-	-	SAE 10	70	-	-	13.25	36,000
4-A	0.250	0.062	-	-	SAE 10	70	-	-	12.56	30,100
5-A	0.250	0.062	-	-	SAE 10	70	-	-	12.02	24,650
6-A	0.250	0.062	-	-	SAE 10	70	-	-	11.28	20,500
7-A	0.250	0.062	-	-	SAE 10	70	-	-	10.21	14,900
8-A	0.250	0.062	-	-	SAE 10	70	-	-	8.82	9,800
9-A	0.250	0.062	-	-	SAE 10	70	-	-	5.73	4,450
1-B	0.250	0.062	-	-	SAE 20	84	-	-	13.14	44,400
2-B	0.250	0.062	-	-	SAE 20	84	-	-	13.11	41,000
3-B	0.250	0.062	-	-	SAE 20	84	-	-	12.90	35,200
4-B	0.250	0.062	-	-	SAE 20	84	-	-	12.31	30,100
5-B	0.250	0.062	-	-	SAE 20	84	-	-	11.85	25,000
6-B	0.250	0.062	-	-	SAE 20	84	-	-	12.24	19,900
7-B	0.250	0.062	-	-	SAE 20	84	-	-	9.66	12,600
8-B	0.250	0.062	-	-	SAE 20	84	-	-	8.68	10,000
9-B	0.250	0.062	-	-	SAE 20	84	-	-	7.18	4,750
8	0.562	0.187	-	-	SAE 10	65	-	-	1.44	25,000
24	0.562	0.187	0.0217	0	SAE 10	65	-	1.0	1.53	48,000
25	0.562	0.187	0.0316	0	SAE 10	-	97.4	-	-	45,500
26	0.562	0.187	0.0368	0	SAE 10	65	-	4.1	1.49	46,000
31	0.375	0.125	0.0100	0	SAE 10	-	0	-	-	48,000
35	0.375	0.125	-	-	SAE 10	65	-	-	3.20	43,350
36	0.375	0.125	0.0407	0	SAE 10	-	88.5	-	-	46,000
46	0.375	0.125	0.0302	0	SAE 10	-	73.1	-	-	0
48	0.375	0.125	0.0302	0.005	SAE 10	-	53.0	-	-	0
49	0.375	0.125	0.0307	0.005	SAE 10	-	45.1	-	-	45,000
51	0.375	0.125	0.0295	0.010	SAE 10	65	28.0	-	3.25	45,500
53	0.375	0.125	0.0300	0.010	SAE 10	-	46.1	-	-	0
56	0.375	0.125	0.0300	0	SAE 10	-	-	3.5	-	0
57	0.375	0.125	0.0302	0.005	SAE 10	-	-	0.8	-	46,500
58	0.375	0.125	-	-	SAE 10	65	-	-	2.75	25,350
59	0.375	0.125	0.0317	0.005	SAE 10	-	-	2.0	-	0
60	0.375	0.125	0.0297	0.010	SAE 10	-	-	0.5	-	46,000
61	0.375	0.125	-	-	SAE 10	65	-	-	2.50	14,350
62	0.375	0.125	0.0285	0.010	SAE 10	-	-	1.3	-	0
63	0.375	0.125	0.0230	0	SAE 10	-	16.1	-	-	46,000
65	0.375	0.125	0.0212	0	SAE 10	-	-	1.3	-	0
66	0.375	0.125	0.0207	0.005	SAE 20	84	18.1	-	2.86	44,150
68	0.375	0.125	0.0205	0.005	SAE 20	-	28.1	-	-	0
69	0.375	0.125	0.0192	0.010	SAE 20	84	5.1	-	3.05	46,000
71	0.375	0.125	0.0197	0.010	SAE 20	-	21.0	-	-	0
72	0.375	0.125	0.0212	0	SAE 10	-	-	0.7	-	48,000
74	0.375	0.125	0.0207	0	SAE 10	-	41.1	-	-	0
75	0.375	0.125	0.0210	0.005	SAE 20	84	-	0.4	3.01	46,000
76	0.375	0.125	-	-	SAE 20	84	-	-	2.74	37,000
77	0.375	0.125	0.0212	0.005	SAE 20	-	-	1.3	-	0
78	0.375	0.125	0.0190	0.010	SAE 20	84	-	0.2	3.13	45,000
79	0.375	0.125	-	-	SAE 20	84	-	-	2.49	25,000
80	0.375	0.125	0.0212	0.010	SAE 20	-	-	0.5	-	0
92	0.562	0.187	0.0315	0.005	SAE 10	65	61.1	-	1.56	45,500
93	0.562	0.187	-	-	SAE 10	65	-	-	1.15	14,900
94	0.562	0.187	0.0297	0.005	SAE 10	-	98.1	-	-	0
98	0.562	0.187	0.0300	0.005	SAE 10	65	-	1.5	1.54	43,400
100	0.562	0.187	0.0302	0.005	SAE 10	-	-	4.1	-	0
109	0.562	0.187	0.0221	0	SAE 10	-	32.1	-	-	46,000
110	0.562	0.187	0.0211	0	SAE 10	-	75.1	-	-	0
111	0.562	0.187	0.0215	0	SAE 10	-	34.1	-	-	46,000
112	0.562	0.187	0.0200	0.005	SAE 10	-	10.1	-	-	47,000
113	0.562	0.187	0.0197	0.005	SAE 10	-	12.1	-	-	45,500
114	0.562	0.187	0.0210	0.005	SAE 10	-	55.1	-	-	0
115	0.562	0.187	0.0212	0	SAE 10	-	-	1.0	-	45,500
117	0.562	0.187	0.0235	0	SAE 10	-	-	3.0	-	0
118	0.562	0.187	0.0202	0.005	SAE 10	65	-	0.5	1.56	45,500
119	0.562	0.187	-	-	SAE 10	65	-	-	1.45	25,300
120	0.562	0.187	0.0207	0.005	SAE 10	-	-	2.0	-	0
123	0.375	0.125	0.0105	0	SAE 10	-	14.6	-	-	0
124	0.375	0.125	0.0120	0.005	SAE 20	-	-	0.8	-	45,000
125	0.375	0.125	-	-	SAE 20	84	-	-	2.12	12,300
126	0.375	0.125	0.0121	0.005	SAE 20	-	13.6	-	-	0
127	0.375	0.125	0.0095	0.010	SAE 20	-	0	-	-	33,000
128	0.375	0.125	-	-	SAE 20	84	-	-	1.58	4,300
129	0.375	0.125	0.0125	0.010	SAE 20	-	10.1	-	-	0
130	0.375	0.125	0.0110	0	SAE 10	-	-	0.5	-	0
133	0.375	0.125	0.0112	0.005	SAE 20	-	-	0	-	37,500
135	0.375	0.125	0.0100	0.005	SAE 20	-	-	0.3	-	0
136	0.375	0.125	0.0115	0.010	SAE 20	-	-	0	-	38,000
138	0.375	0.125	0.0115	0.010	SAE 20	-	-	0.2	-	0
139	0.375	0.125	0.0365	0	SAE 10	-	52.1	-	-	45,000
140	0.375	0.125	0.0377	0	SAE 10	-	-	4.1	-	45,500
141	0.562	0.187	0.0108	0	SAE 10	65	0	-	1.35	31,500
142	0.375	0.125	0.0345	0.005	SAE 10	-	53.1	-	-	45,500

NOTES:

- LOADING WEIGHTS WERE APPLIED TO KNOCK-OFF TUBES AT A POINT 2.00 INCHES FROM NOTCH.
- DYNAMIC LOADING WEIGHT DROPPED FROM A HEIGHT OF 6 INCHES (IMPACT VELOCITY ≈ 68 IN/SEC).