ance across one arm of the strain-gage bridge.

Pressure-time curves were also obtained using a piezoelectric quartz crystal ballistic pickup and oscilloscope. The pressure-time curves obtained by both systems agreed closely.

Results

This system was designed to reproduce the pressure-time curve associated with the firing of a large-caliber weapon. Figure 2 shows the general type of pressure-time curve of concern along with a sample of the curve obtained in the laboratory. For a pressure of 35,000 psi, the rise time obtained was 3.2 millisec with a time at peak pressure of 1 millisec. There is close correlation between the experimental and actual firing curves in the rise and time-at-pressure portion. Figure 5 shows the pressure-time curve associated with a peak pressure of 44,000 psi. In this case also, the pressure-rise time was 3.2 millisec.

Figure 2 shows that there is good agreement in the initial portion of the decay curve to a pressure of approximately 75 per cent of the peak value with a wide deviation at the lower pressures owing to the reclosing of the pressure-release valve. For the testing program involved, this deviation was not considered harmful since it did not become serious until the pressure had reached a negligible level. A lower pressure system, currently being installed, will have a different type of pressure-release valve which will allow the reproduction of the complete decay portion of the pressure-time curve.

Summary

The pressure-time response associated with the firing of a large-caliber weapon has been accurately reproduced on full-scale cannon components using a hydrodynamic pressure system based on the rapid transfer of fluid from a liquid accumulator. This system, which can be used for a wide variety of high-loading-rate, thick-wall cylinder studies, can produce pressures in excess of 44,000 psi in times as low as 3.2 millisec. The elapsed time at maximum pressure can be as low as 1 millisec and varied over a wide range. The total cycle time, measured from zero pressure through the maximum to a point where the pressure has decayed to approximately 75 per cent of the maximum value, can be as low as 6 millisec. If desired, the lower portion of the pressure-time curve can also be accurately reproduced with a slight system modification.