MHSMP-72-28 GG

109

THE DETONATION ELECTRIC EFFECT AS APPLIED TO THE MC-2453 DRIVER SUBASSEMBLY

J. K. Boettner

DEVELOPMENT DIVISION

OCTOBER - DECEMBER 1971

Normal Process Development
Endeavor No. 232

Mason & Hanger-Silas Mason Co., Inc.
Pantex Plant
P. O. BOX 647
AMARILLO, TEXAS 79105
806-335-1581

operated for the
ATOMIC ENERGY COMMISSION
under
U. S. GOVERNMENT Contract DA-11-173-AMC-487 (A)

The Detonation Electric Effect
As
Applied to the MC-2453 Driver Subassembly

J. K. Boettner

DEVELOPMENT DIVISION

Use of shock-generated signals to measure events in HE systems.

October - December 1971
Endeavor No. 232
Acct. No. 22-2-44-01-232

Section GG

THE DETONATION ELECTRIC EFFECT
AS
APPLIED TO THE MC-2453 DRIVER SUBASSEMBLY

ABSTRACT

The detonation electric effect has been used to measure transit times of the MC-2453 driver subassemblies at 185 F, 212 F and room temperature after the units were subjected to a temperature of 232 F. The test procedure and the results are included in this report.

DISCUSSION

Six MC-2453 driver subassemblies (Fig. 1) were fired to determine the transit time at three temperature conditions. The temperatures of interest were 185 F, 212 F, and ambient temperature after the units had been subjected to a temperature of 232 F. The test fire assembly (Fig. 2) was essentially the same as that described in a previous report(*1*). The differences were that Lexan replaced the Plexiglas for the shot assembly fixtures due to the high temperature involved, and a copper-constantan thermocouple was placed at the Lexan/tetryl interface for the purpose of monitoring temperature with an X-Y recorder.

Prior to each firing, the cartons containing the test fire assembly were filled with L-45 silicone fluid(*2*) and heated to temperature with a 115 VAC "knife-blade" immersion heater placed in the fluid. A record of the heating cycles is shown in Figs. 3 through 8. The two units that were heated to 232 F (Figs. 7 and 8) were allowed to cool normally, i.e., no special cooling procedure was applied to the unit after temperature had been reached.

Results of the test-firing are tabulated in Table I. For the purpose of comparison, these results have been plotted with data previously reported(*1*) and are shown in Fig. 9.

COMMENTS; CONCLUSIONS; FUTURE WORK

The new test fire data of the MC 2453 driver subassembly, plotted in Fig. 9, indicates transit times at the highest temperatures longer than predicted from earlier tests. Furthermore, the spread in transit time of the units fired at ambient temperature (70 F) after exposure to 238 F was greater than the spread in transit time of the units fired without prior exposure to a higher temperature. Although the data is limited, it does suggest that pre-exposure of the units to a high temperature affects their performance at ambient temperatures. Further testing would be required to determine the effect more precisely.

---

(1) Detonation Electrical Effects/2453 Driver Subassembly (July-September 1971).

(2) A dimenthylpolysiloxane marketed by Union Carbide.

Table I. Transit Time vs. Temperature

Unit No.	Firing Temperature (F)	Transit Time (µs)	Average Temp. (F)	Average Transit Time (µs)
MBZ 1235	196	2.17	192.5	2.16
MBZ 1274	189	2.14		
MBZ 1112	215	2.15	214.5	2.16
MBZ 1282	214	2.16		
MBZ 1291	70 (238)*	2.07	70 (238)	2.10
MBZ 1122	70 (238)*	2.12		
MBZ 1061	85	2.11	85	2.10
MBZ 1060	83	2.10		
MBZ 1044	86	2.11		
MBZ 1021	84	2.09		

**The numbers in parenthesis indicate temperatures the units were exposed to prior to being allowed to cool to ambient temperature.*

NOTE: As reported in "The Detonation Electric Effect as Applied to the MC-2453 Driver Subassembly", July-September, 1971.

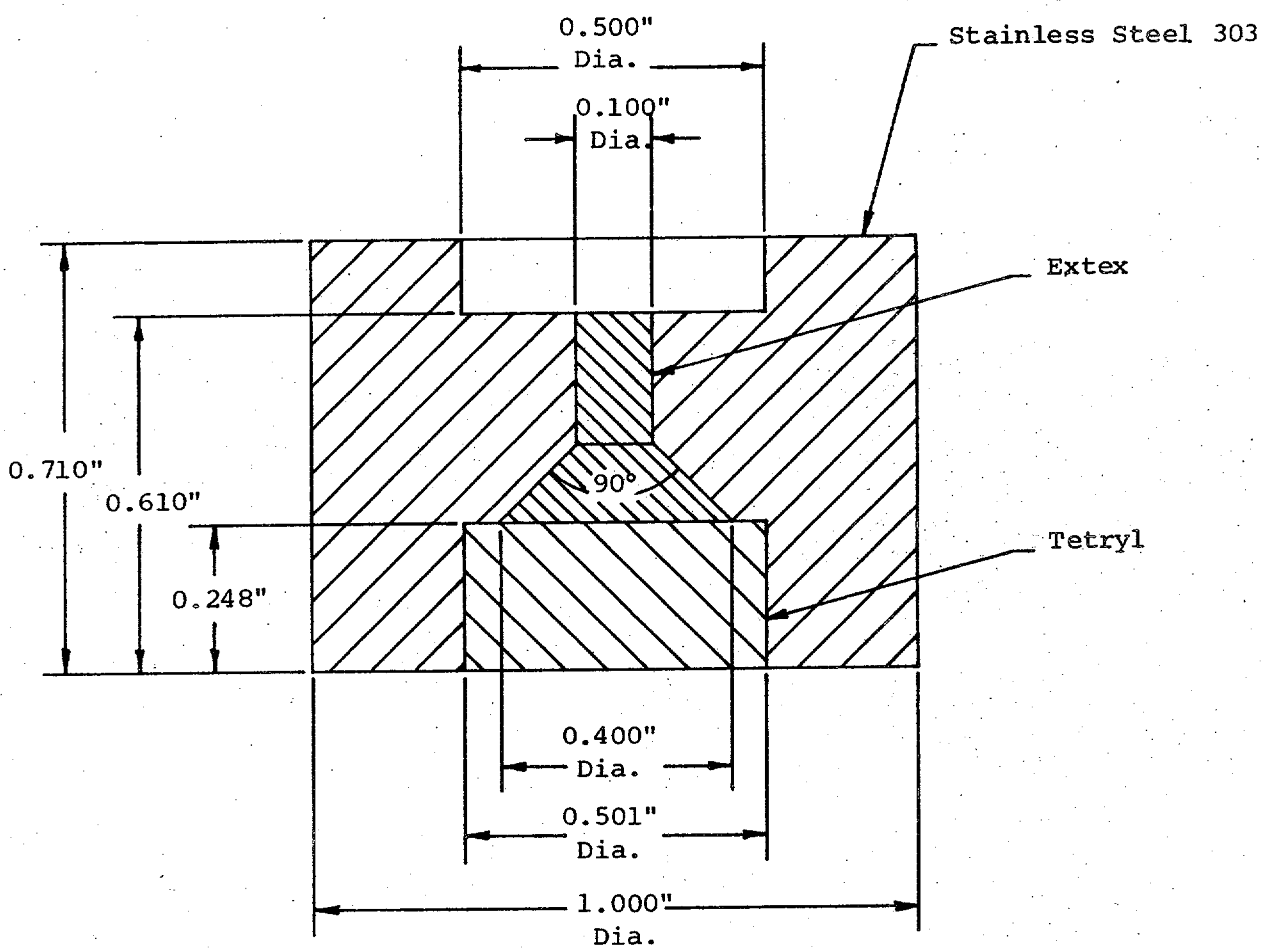

Fig. 1. An MC-2453 Driver Subassembly

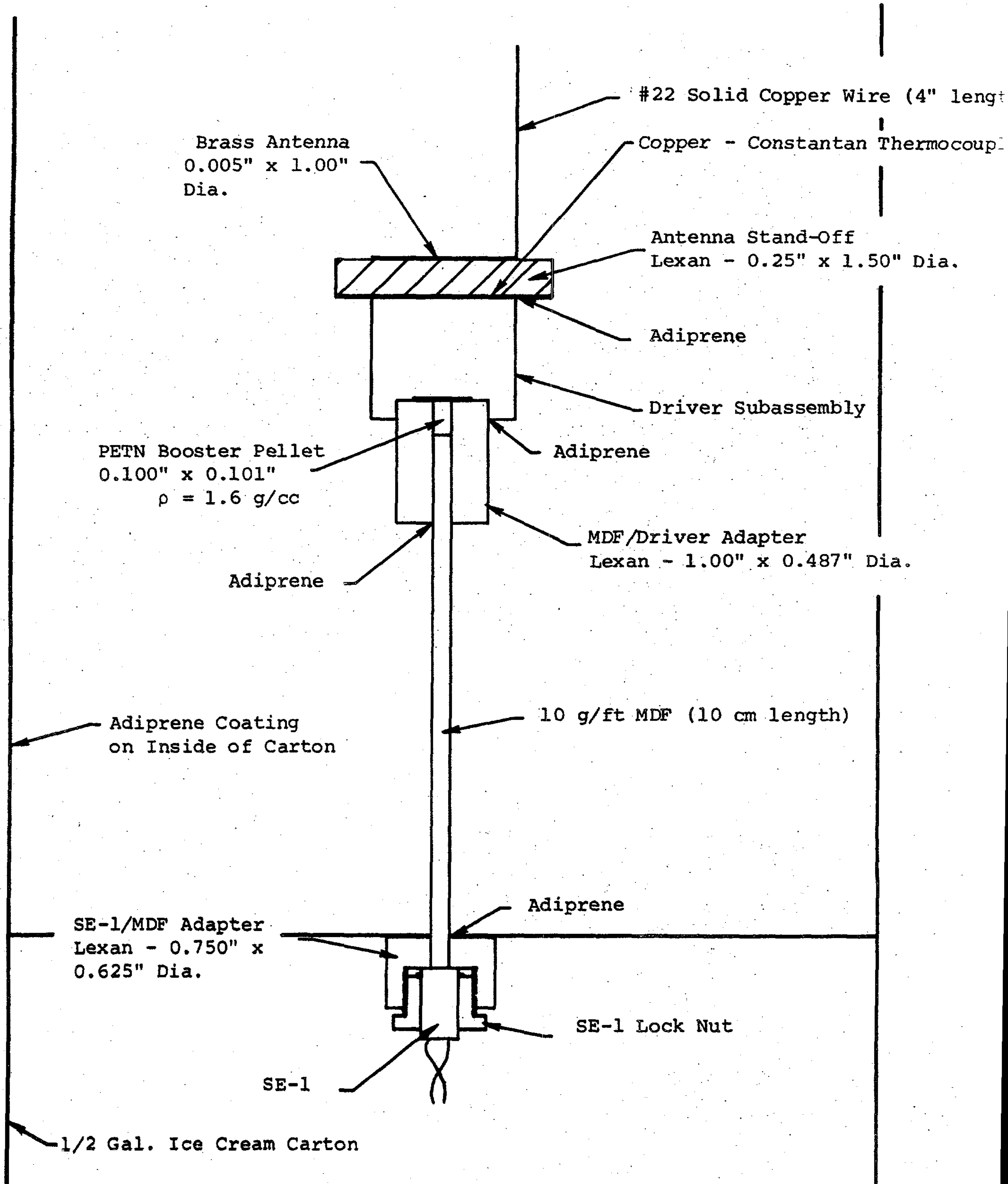

Fig. 2. Test Fire Assembly

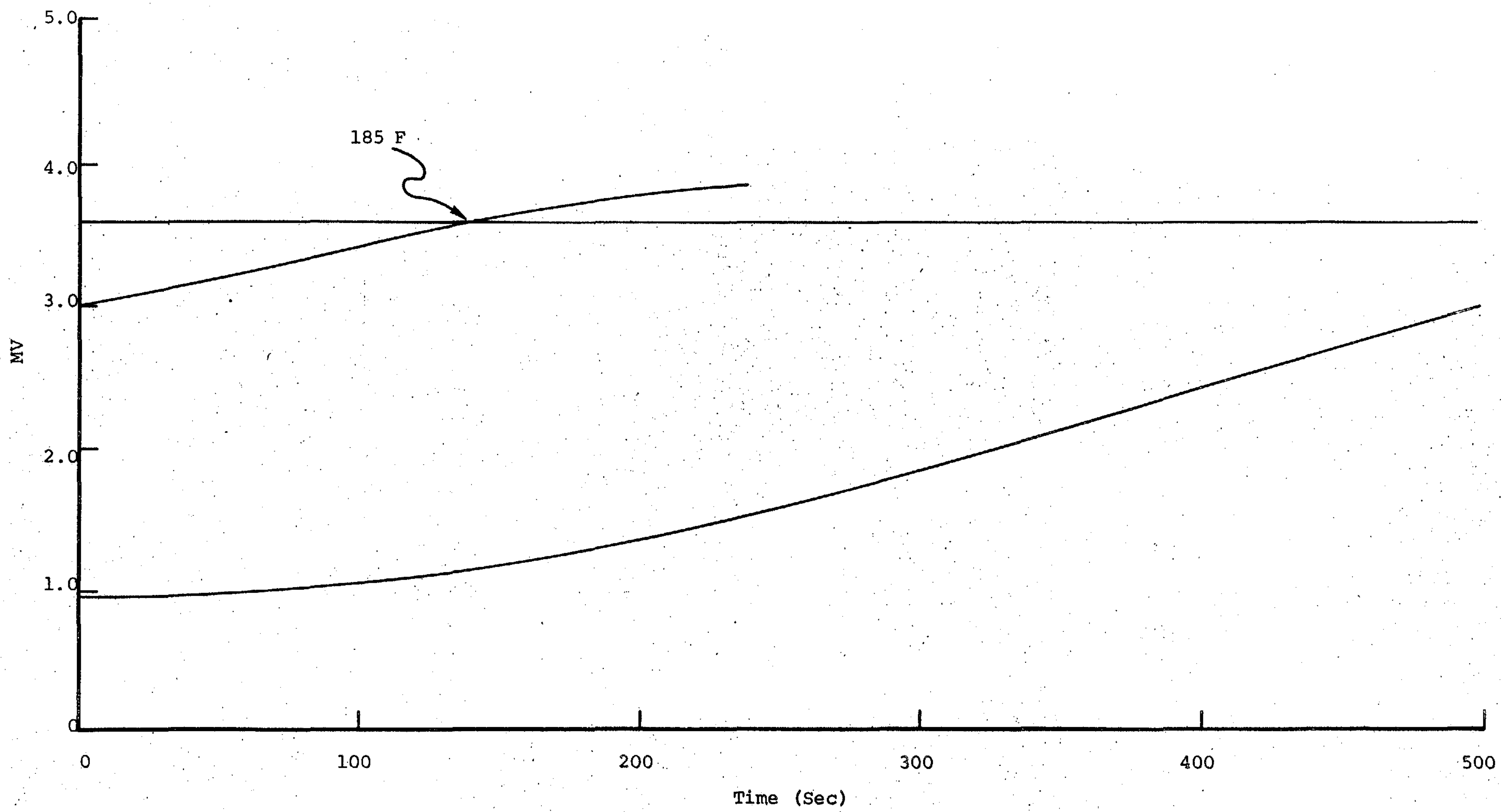

Fig. 3. Copper-Constantan
ZBZ-1235

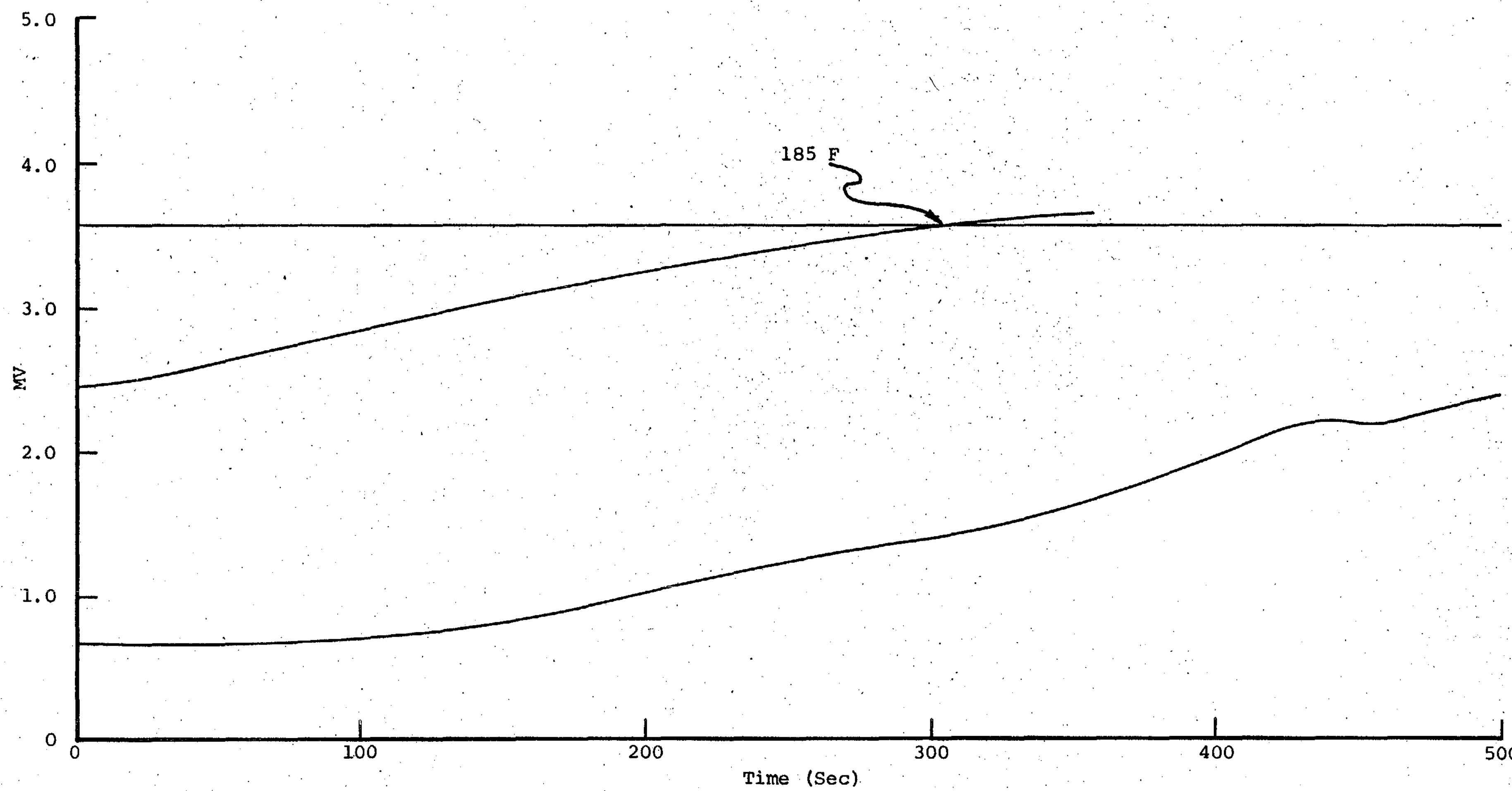

Fig. 4. Copper-Constantan
MBZ-1274

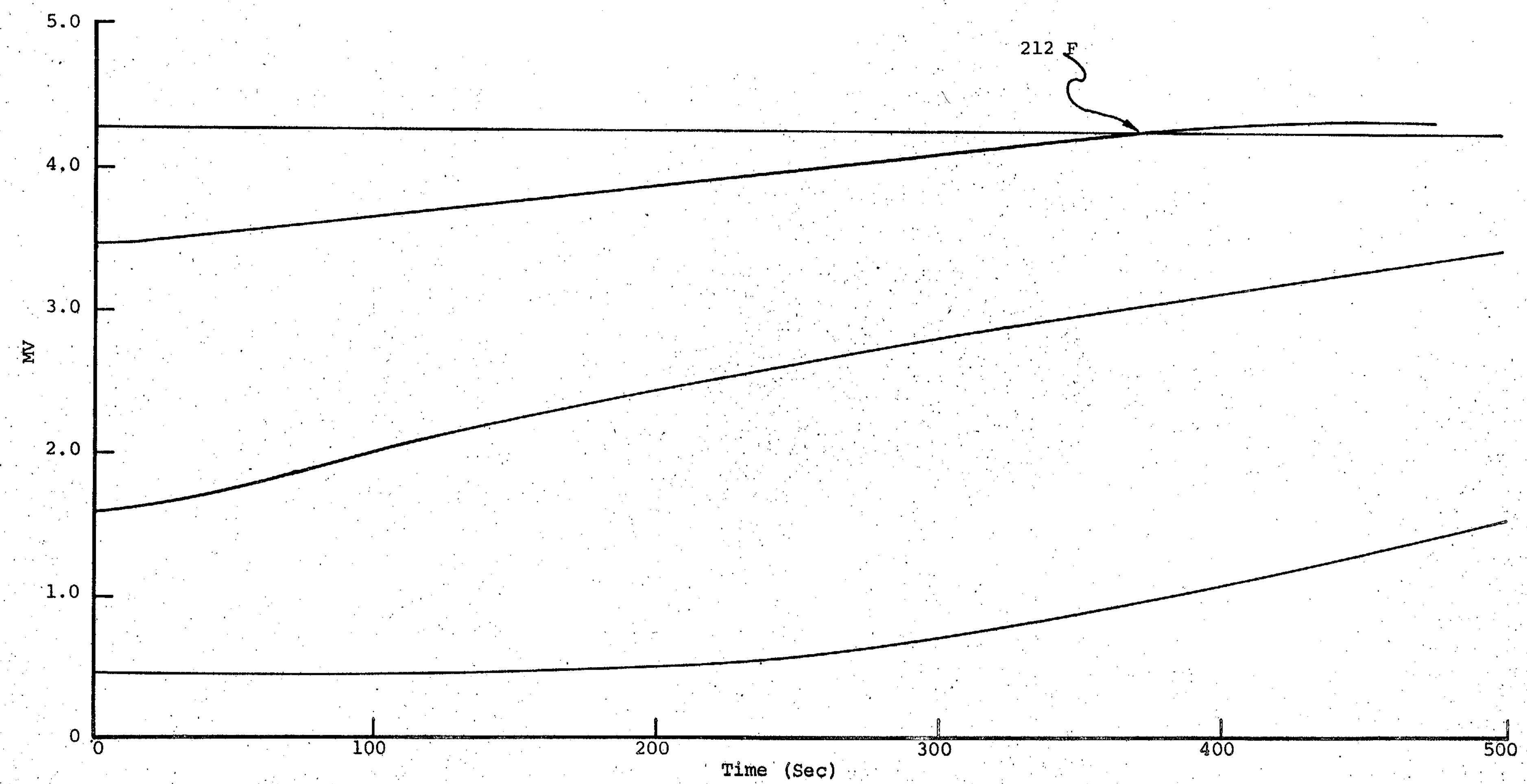

Fig. 5. Copper-Constantan
MBZ-1112

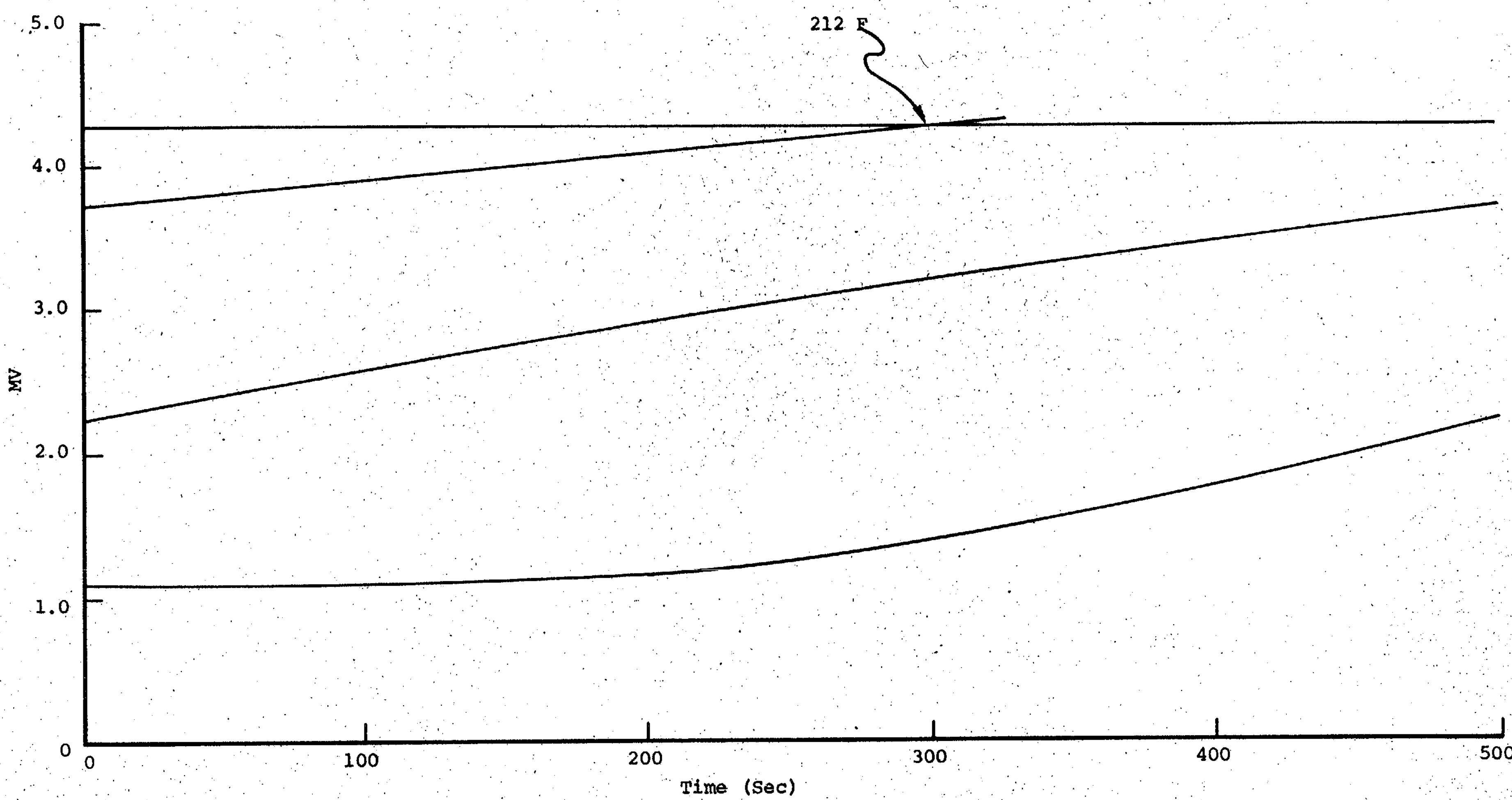

Fig. 6. Copper-Constantan
MBZ-1282

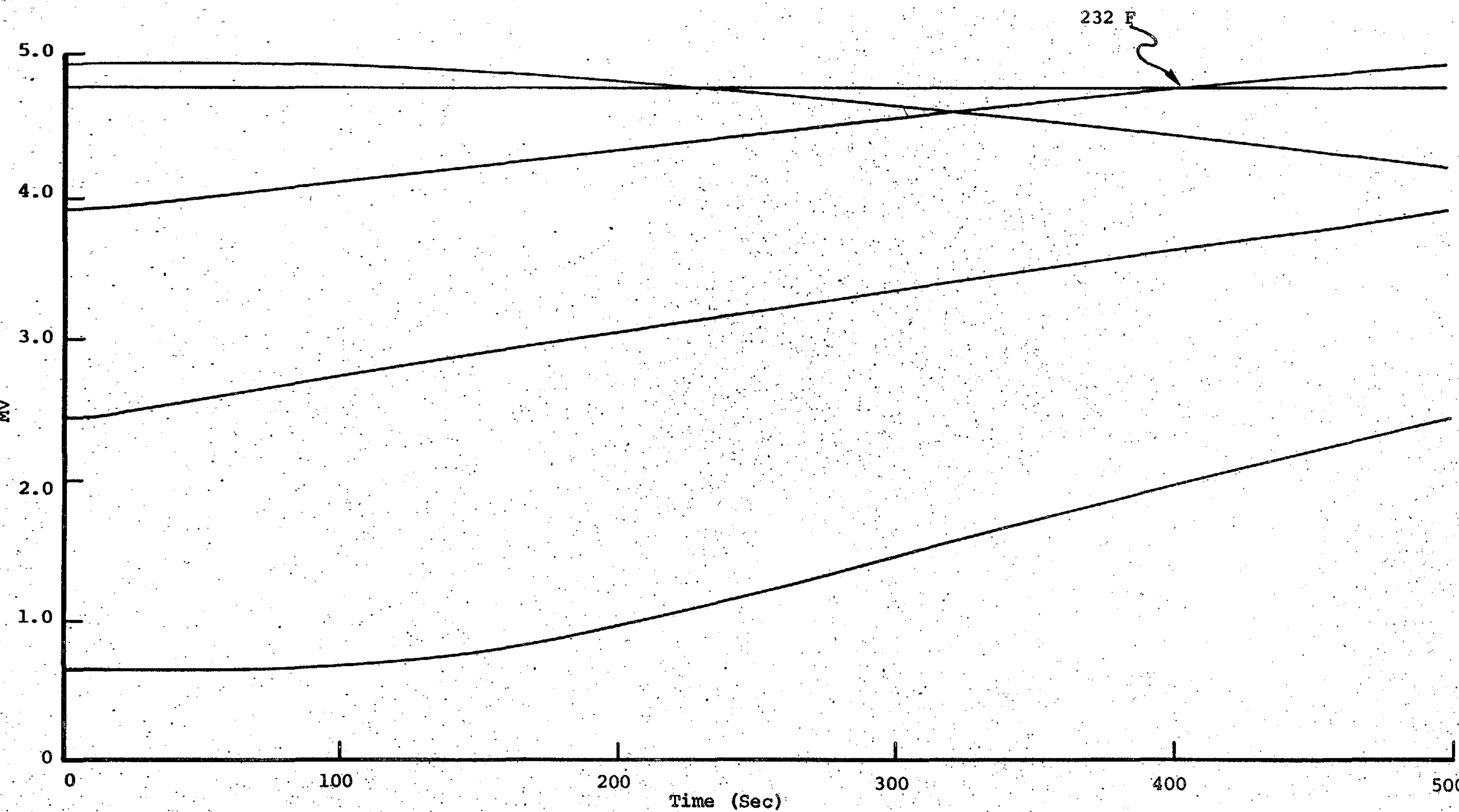

Fig. 7. Copper-Constantan
MBZ-1291

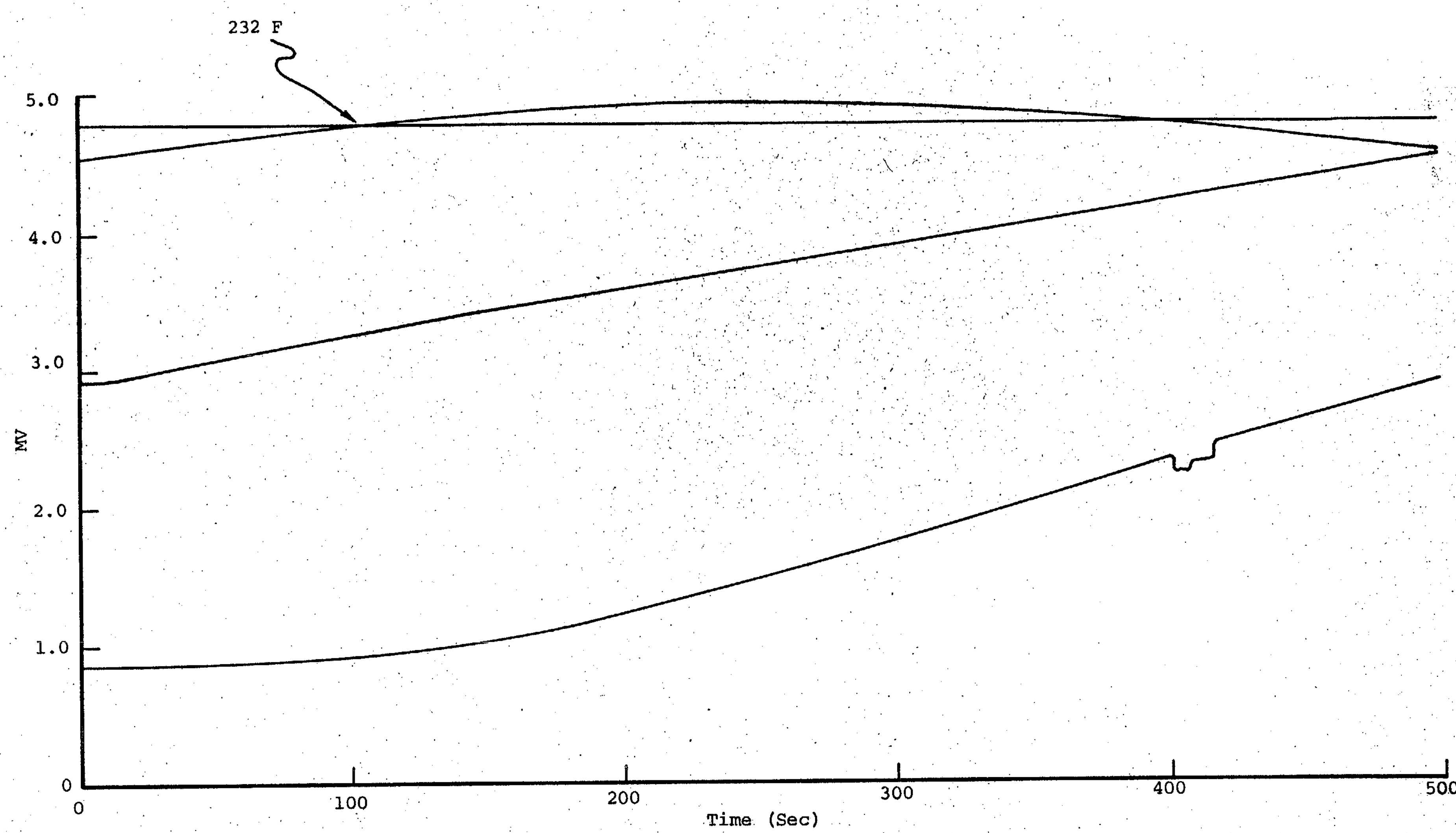

Fig. 8. Copper-Constantan
MBZ-1122

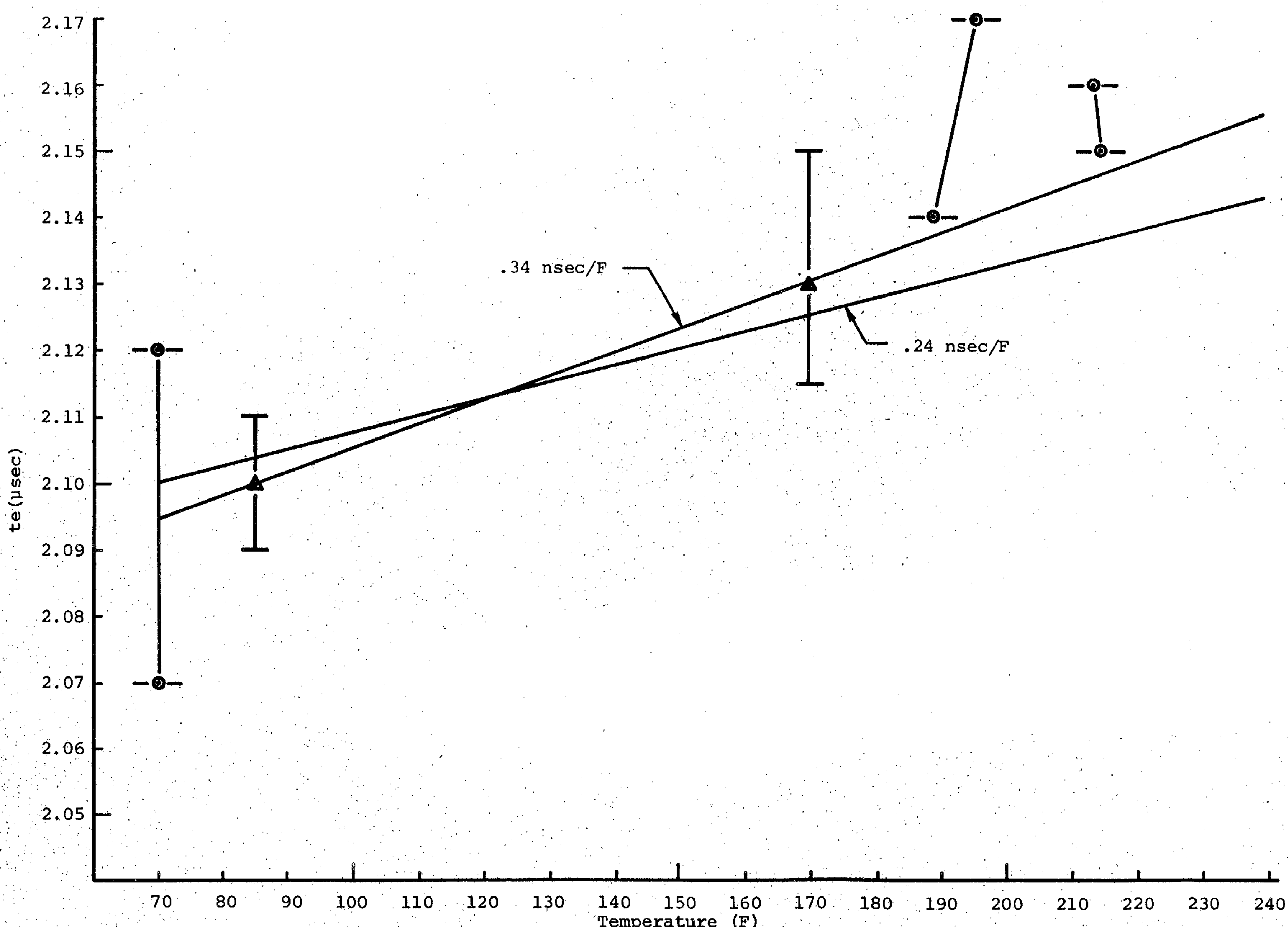

Fig. 9. MC-2453 Driver Subassembly
Transit Time vs. Temperature