Naval Air Systems Command

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Approved for Public Release

M-197 Dispersion Test

Conducted 30-31 May 2001

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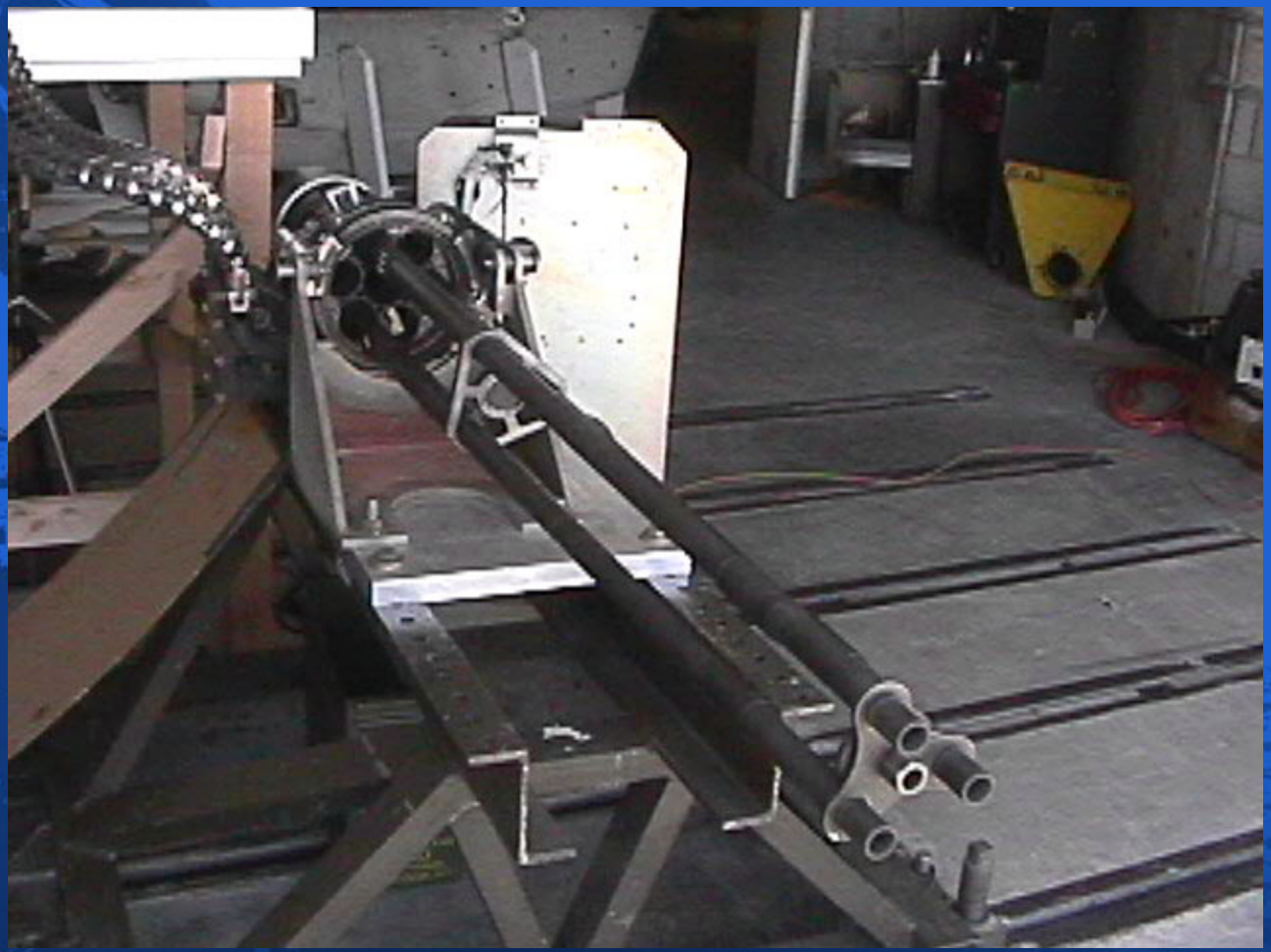
Purpose

- To quantify any dispersion reduction resulting from the adaptation of the M61A1 muzzle clamp to a Fleet representative M-197 Gatling gun.
  - Follow-on testing with adaptation of M61A1 mid-barrel clamp.
- To determine what configuration(s) would be viable and/or beneficial for in-flight and subsequent Fleet employment.

Scope

- (2) Fleet issued M-197's w/ no special modifications.
- 1170 total rounds fired of PGU-27B.
- (6) bursts per gun per configuration.
  - (2) bursts of 30 rounds
  - (2) bursts of 40 rounds
  - (2) bursts of 50 rounds
  - different burst lengths required to provide statistical data on the interdependency of the dispersion to burst length.
- (3) bursts per gun with both M61A1 clamps.
  - (3) bursts of 30 rounds
- Total of 570 rounds per gun, plus (1) 30 round burst for instrumentation checkout
- All testing conducted at the NAWCWD Ballistics Test Lab.

M-197 Current Configuration



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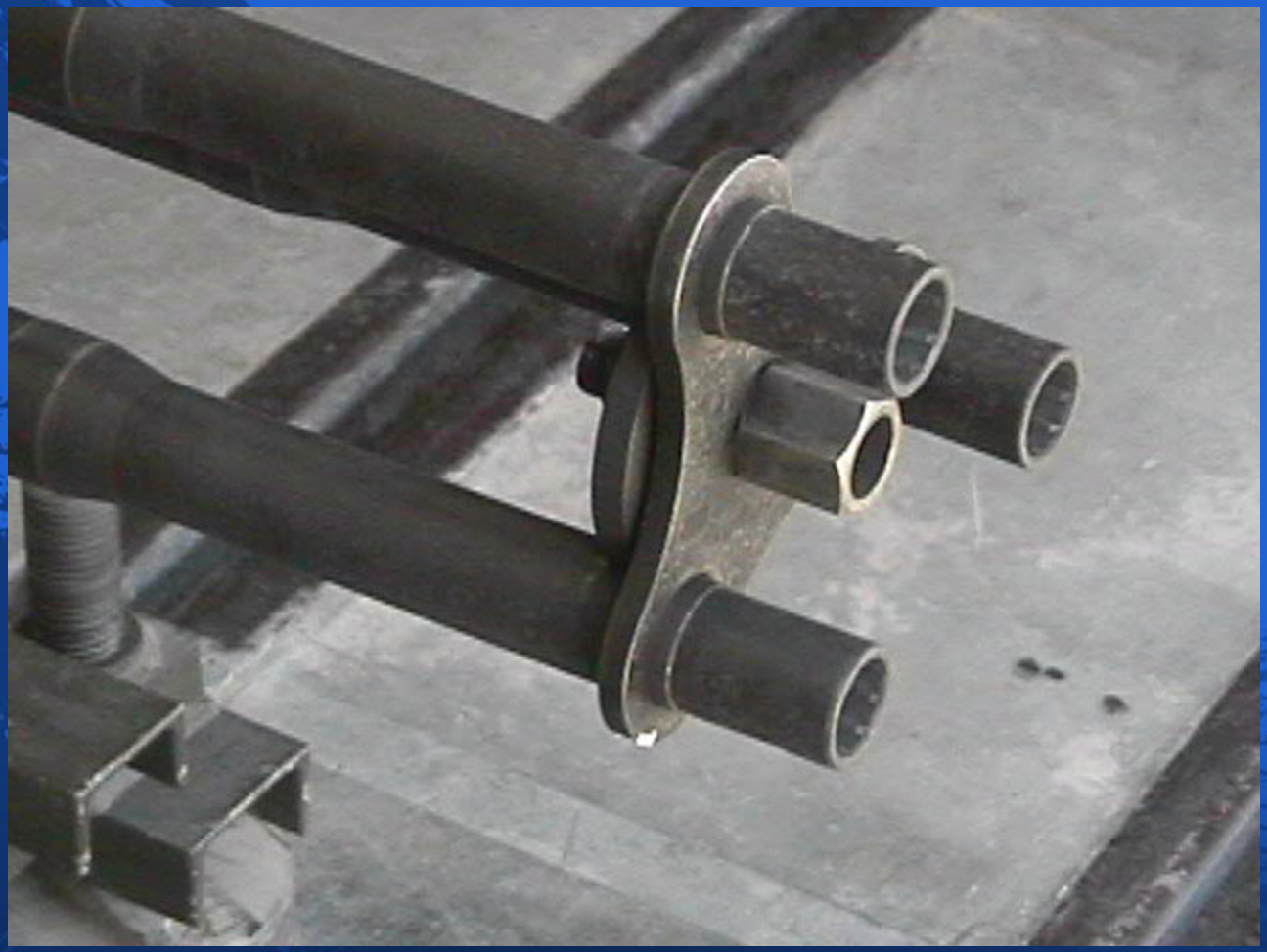
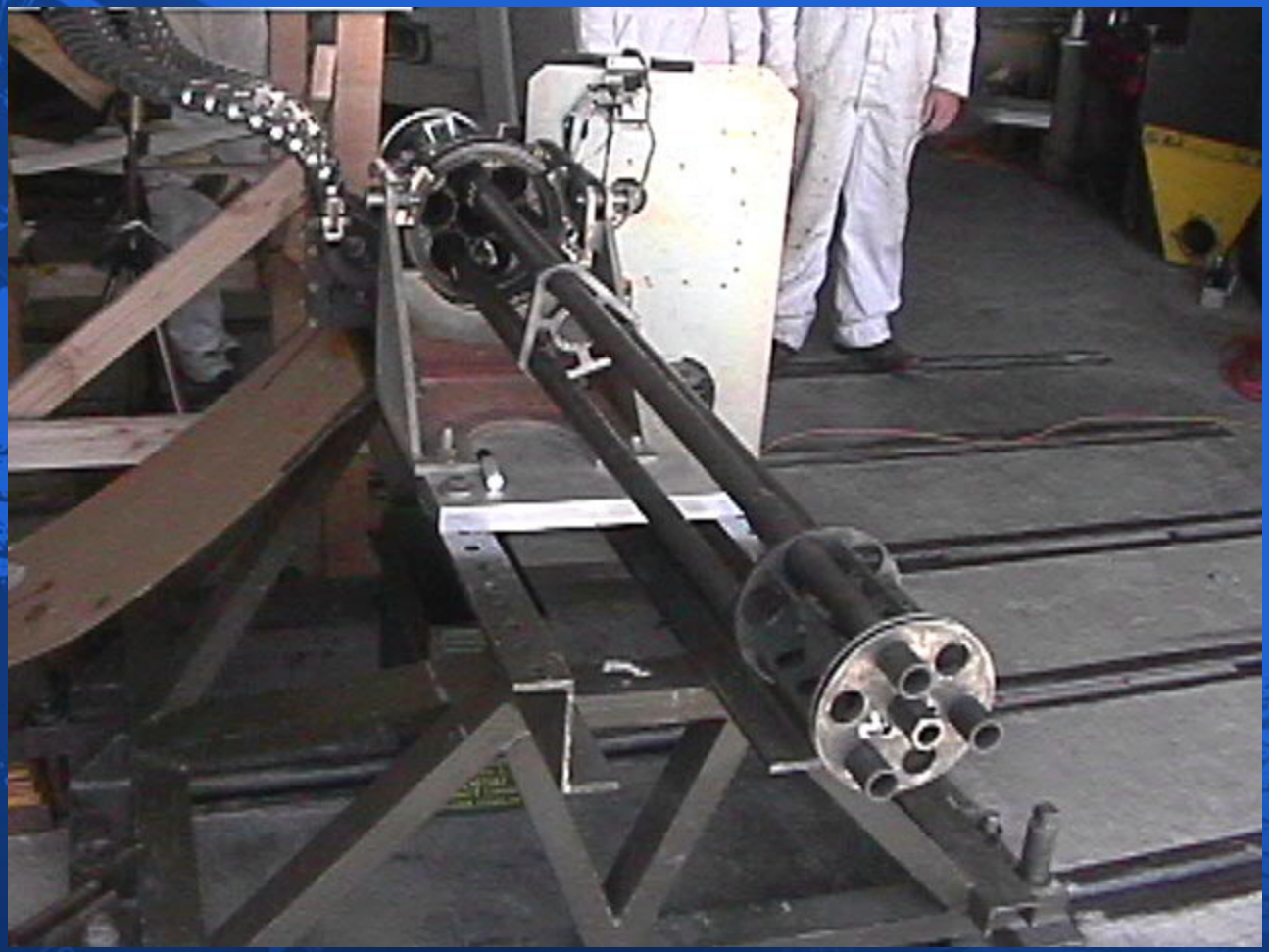
Current Muzzle Clamp



M-197 with M61A1 Muzzle Clamp



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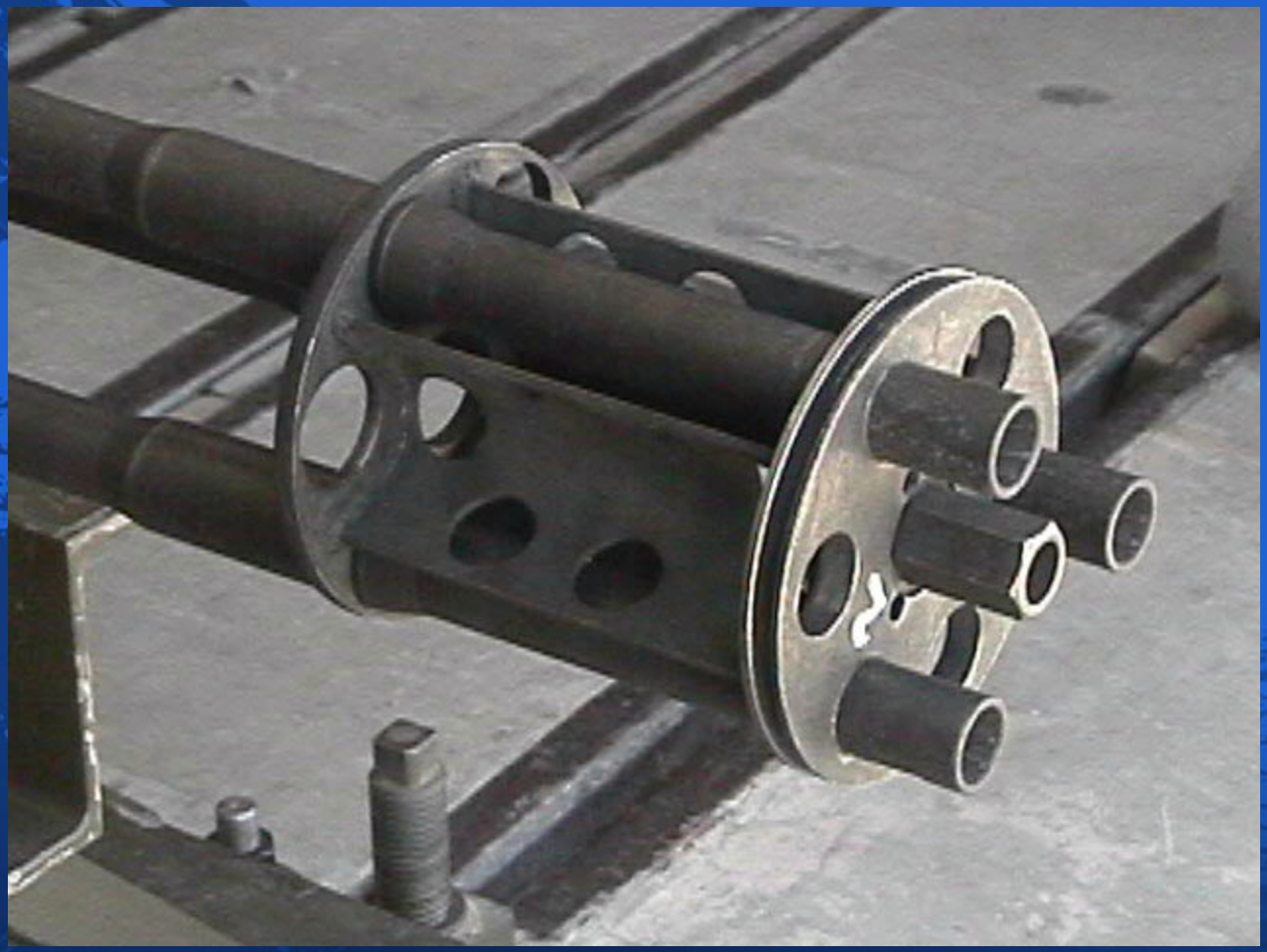
M61A1 Muzzle Clamp Configuration



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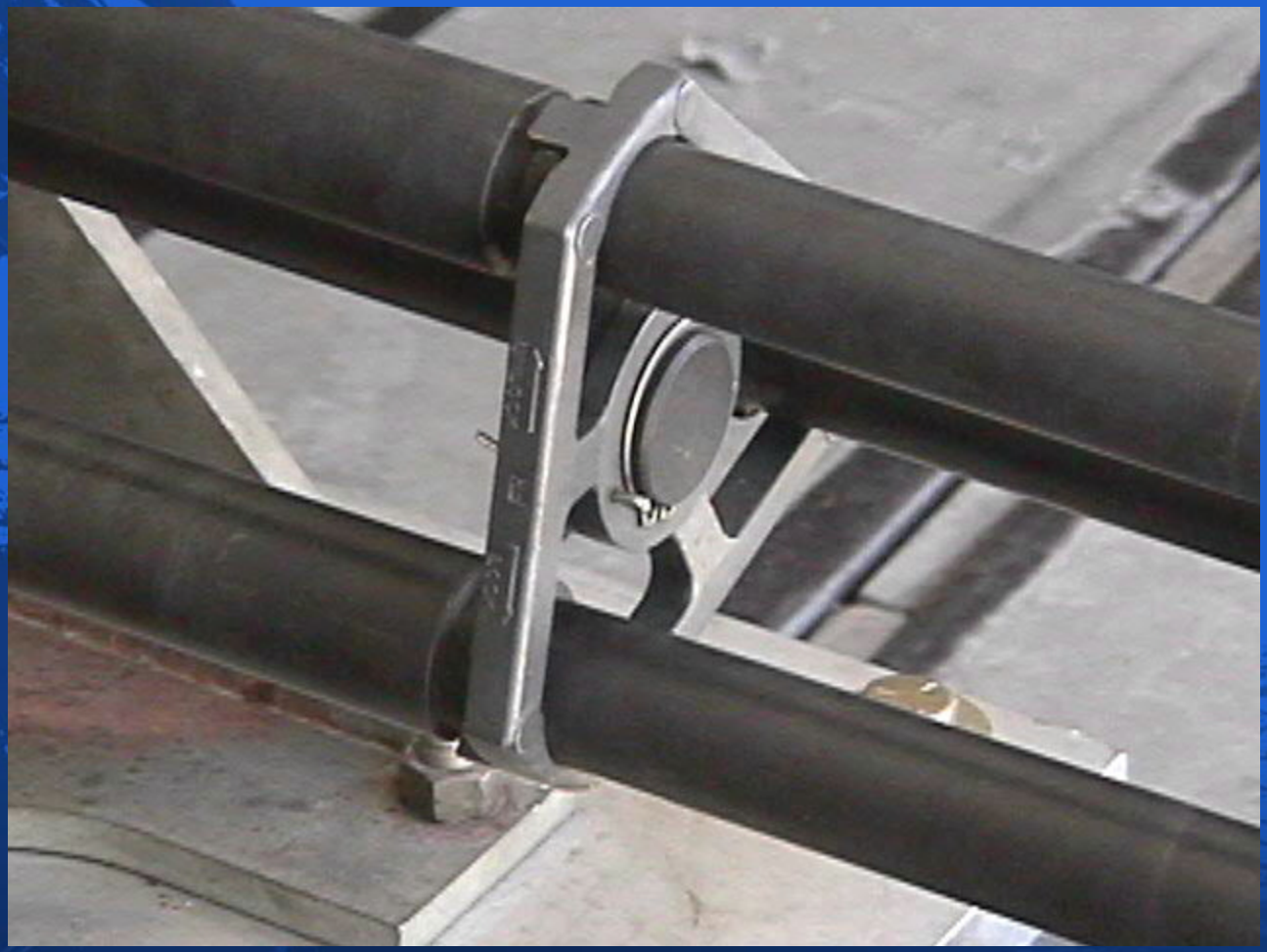
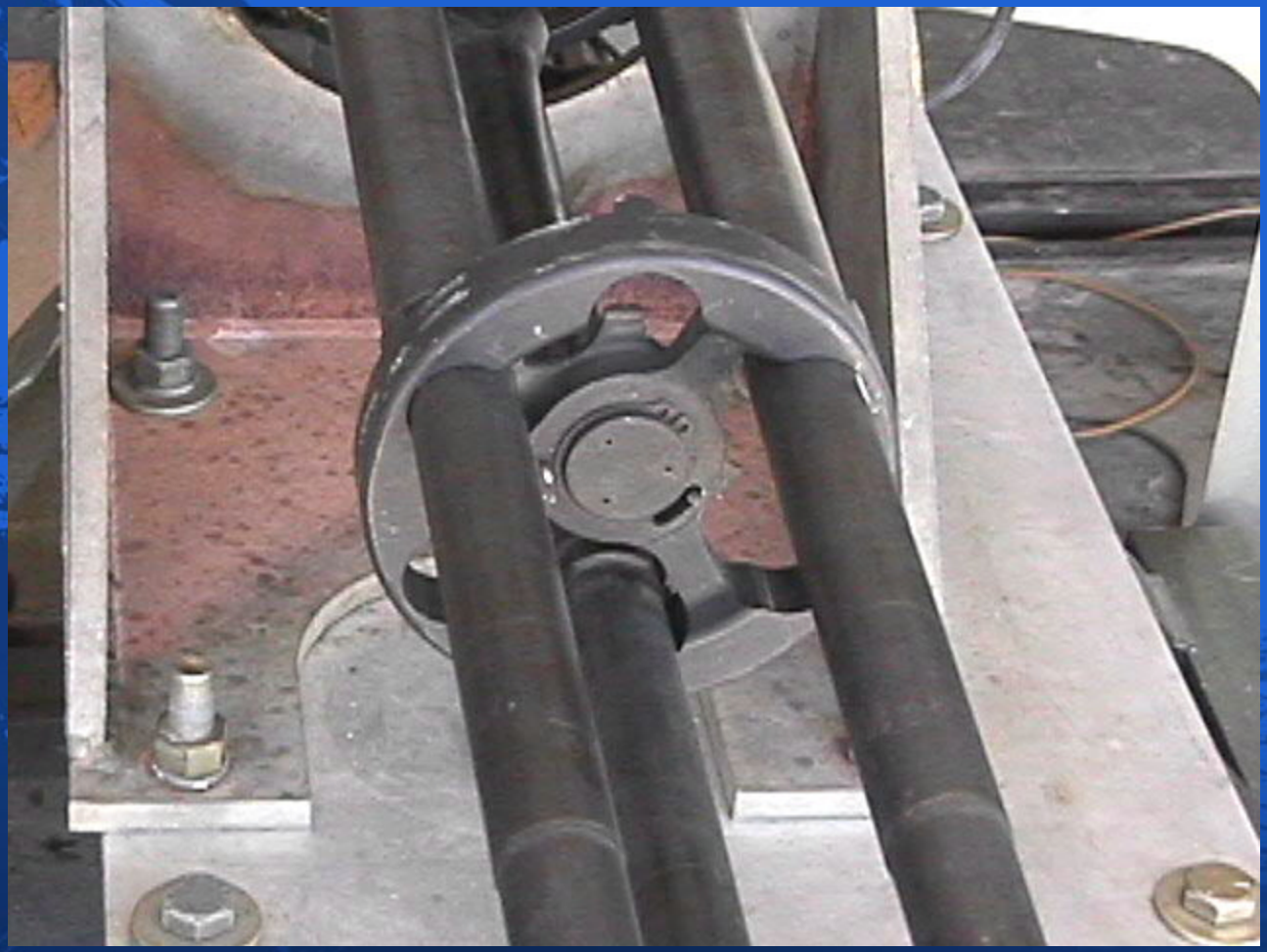
Current Mid-Barrel Clamp



M61A1 Mid-Barrel Clamp



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Data

- Arbitrarily centered Cartesian point coordinates as recorded by an Oehler acoustic target.

Analysis

- Oehler coordinate data was entered into a spreadsheet.
- The center of the dispersion pattern of each burst was calculated.
- Each Oehler-centered point was median-centered.

Analysis

- The median distance from the center of the dispersion pattern of each burst was calculated.
  - This value is the empirical circular error probable (CEP).
  - This is the measure of dispersion used for each burst.
- An analysis of variance was performed on the CEP values.

Results

- Usable Data: 92.75%
- CEP value used as measure of dispersion.
- All values are dispersion diameters.
- Baseline Data
  - Gun 1: 7.58 mil
  - Gun 2: 6.40 mil
- With M61A1 Muzzle Clamp
  - Gun 1: 9.74 mil (28% increase)
  - Gun 2: 5.44 mil (15% decrease)
- With M61A1 Muzzle and Mid-Barrel Clamp
  - Gun 1: 7.14 mil (6% decrease)
  - Gun 2: 4.22 mil (34% decrease)
- Average Both Guns
  - Baseline: 7.16 mil
  - With M61A1 Muzzle Clamp: 7.58 mil (6% increase)
  - With Both Clamps: 5.68 mil (21% decrease)

Conclusions

- There is a statistically significant difference in CEP between guns
- Adaptation of the M61A1 muzzle clamp only had little to no effect on dispersion reduction. An average increase in dispersion of 6% was noted.
- Adaptation of both the M61A1 muzzle and mid-barrel clamp reduced dispersion by 21% but not enough to warrant in-flight testing.
  - Layman's terms: Dispersion was reduced by 1.5 mils or 1.5 meters at 1000 meters.