

R-319

1959 ROAD TEST ON 1,000 GALLONS OF  
3M CENTERLITE PREBEADED WHITE TRAFFIC PAINT

Traffic Paint Subcommittee  
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Research Laboratory Division  
Office of Testing and Research  
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Michigan State Highway Department  
John C. Mackie, Commissioner  
Lansing, December 1959

1959 ROAD TEST ON 1,000 GALLONS OF  
3M CENTERLITE PREBEADED WHITE TRAFFIC PAINT

The Traffic Control Devices Committee at its meeting of April 17, 1959, voted to approve a road test to determine the erosion effect on highway striping equipment resulting from spraying 1,000 gal of prebeaded 3M traffic paint as skip centerline. Unbeaded white traffic paint purchased for 1959 roadway striping was used for control and comparative purposes.

The road test approved by the Committee followed a plan drawn up by the Traffic Paint Subcommittee at its meeting of April 6, 1959. The essential details of the plan were: (1) that 1,000-gal amounts of the beaded test paint and the unbeaded control paint be used in standard 20-30-ft skip centerline, (2) that a new spray gun be used in spraying 1,000 gal of each paint, (3) that the Grand Rapids paint crew apply all beaded test paint when the equipment used could be examined and the spray gun changed before applying the control paint, and (4) that the Office of Maintenance and the Office of Testing and Research each provide an observer for the tests.

## ROAD TESTS

Because of bad weather during the application period, when striping could not be applied, and because the paint crew had to paint disjointed areas from day to day, neither the Office of Maintenance nor the Office of Testing and Research could provide an observer every day. Therefore some information on the progress of the test was obtained from the crew foreman.

### Prebeaded Paint

The 1,000 gal of prebeaded paint was applied by the Grand Rapids paint crew, mostly on US 16, as skip centerline between May 14 and June 3. Application and physical characteristics are given in an Appendix.

After all the beaded paint had been sprayed, the spray gun, which required no parts changes, was removed for observation, while the spraying equipment, brand new at the start of the tests, was examined to note the extent of erosion at points most susceptible to wear by use of the coarse-particled prebeaded traffic paint.

Wear which was observed on the spraying equipment included:

1. Packing and stem of valve underneath paint tank was scoured and needed replacement.
2. Stirrer shaft guide bearing on the lower interior of the tank showed wear.

3. Gear pump used to transfer paint from drum to equipment tanks showed increased roughening on surfaces of interior moving parts, but shortening of pump service life during test could not be easily determined (F. Ballew stated that a wornout pump cannot be repaired and must be replaced with a new pump costing about \$100).

#### Control Paint

A new spray gun was attached to the equipment and 1,000 gal of unbeaded MSHD specification paint was then sprayed out, to determine comparative rates of wear on gun parts spraying equal amounts of beaded and unbeaded traffic paint.

### SPRAY GUN WEAR RESULTS

Fig. 1 shows an assembled spray gun, standard on roadway striping equipment and also the type used in the tests, and Fig. 2, the gun interior parts subject to wear and replacement.

Fig. 3 provides a comparison of spray gun air nozzles when new, after spraying 1,000 gal of unbeaded specification paint, and after spraying 1,000 gal of beaded test paint. The nozzle used to spray the unbeaded paint shows no evidence of wear on the round center channel, and a 2-percent lengthening of fanned orifice. The nozzle used for spraying an equal amount of beaded test paint shows some wear on the round center channel

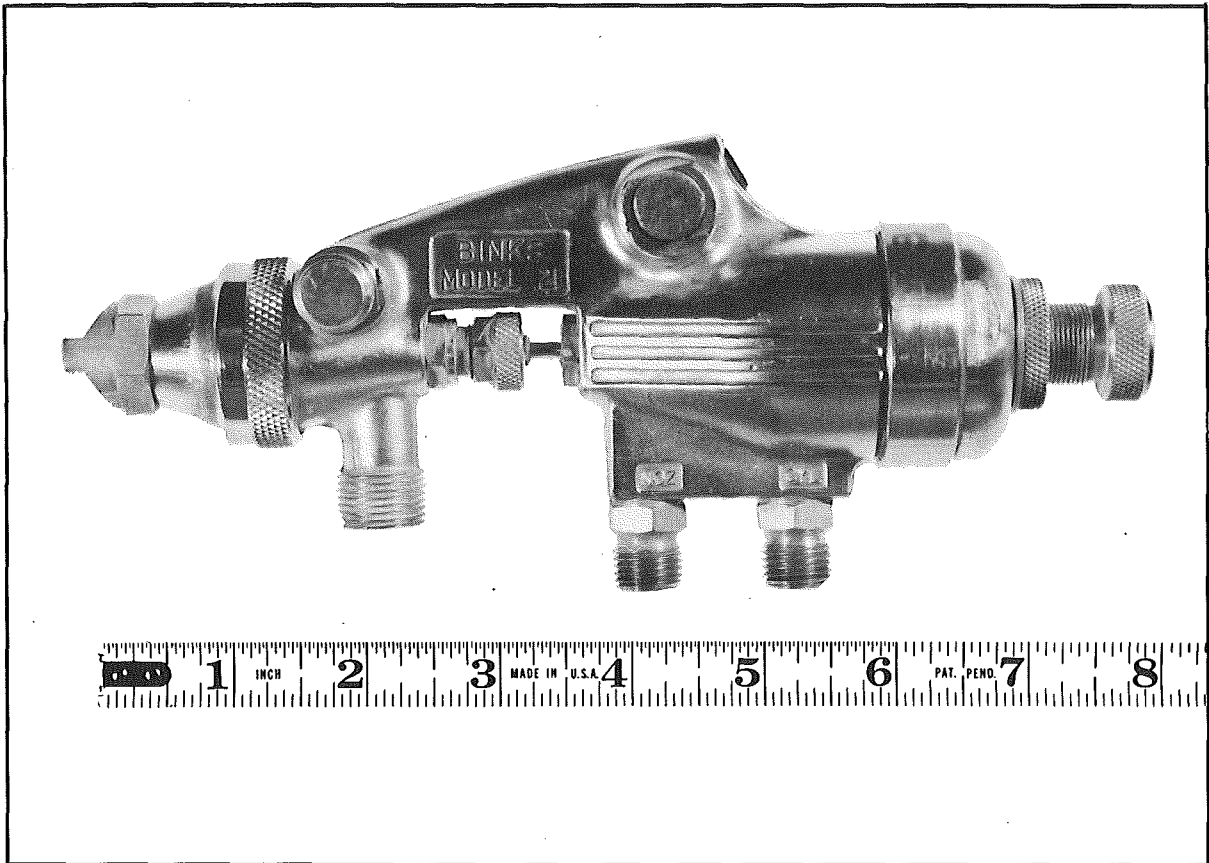


Figure 1. Assembled standard spray gun.

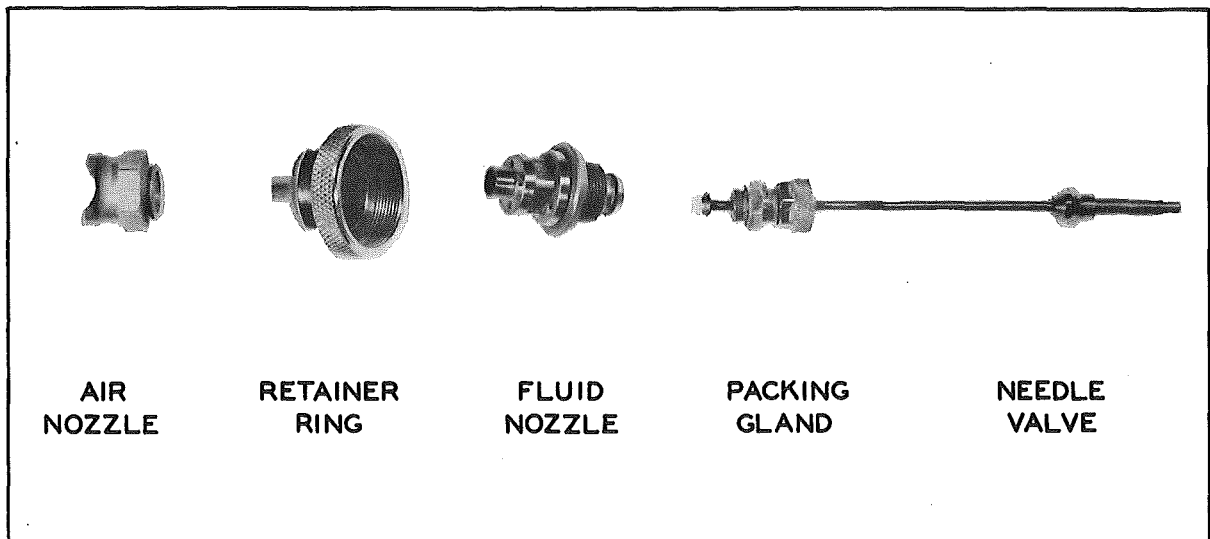


Figure 2. Gun parts subject to wear and replacement.

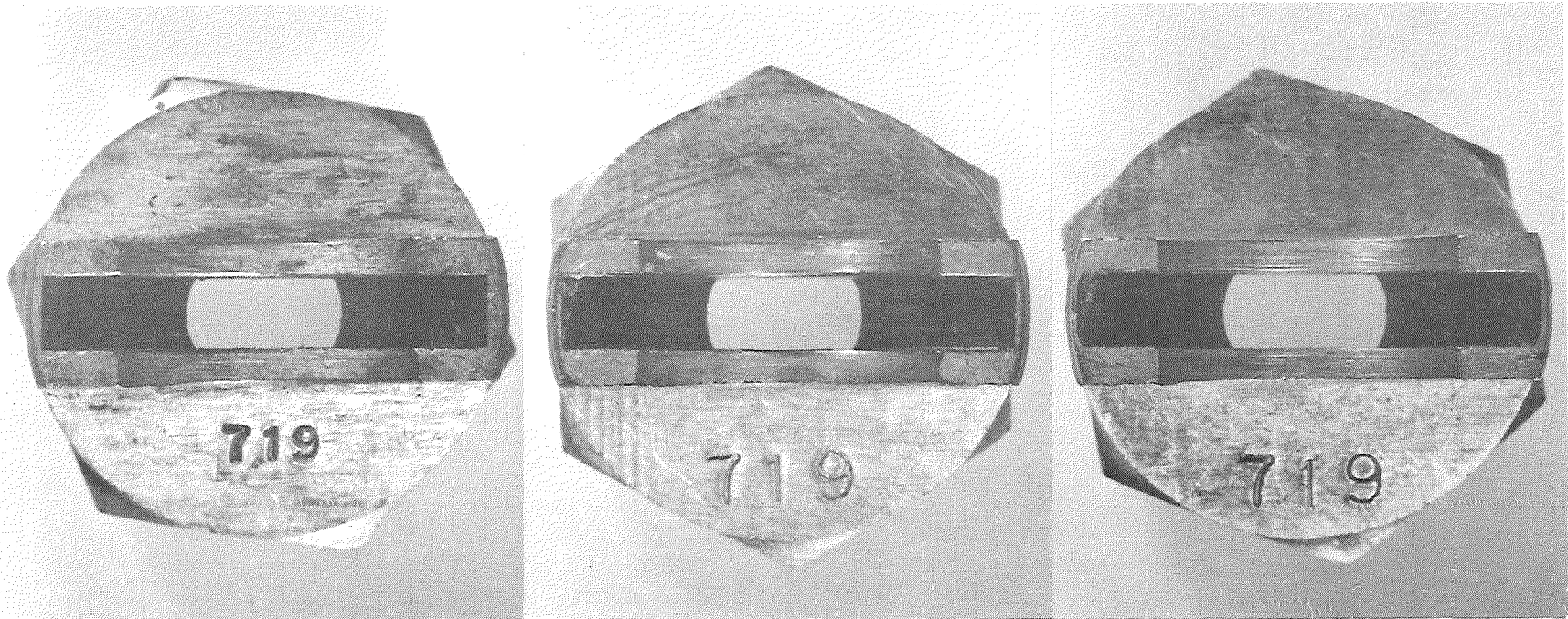
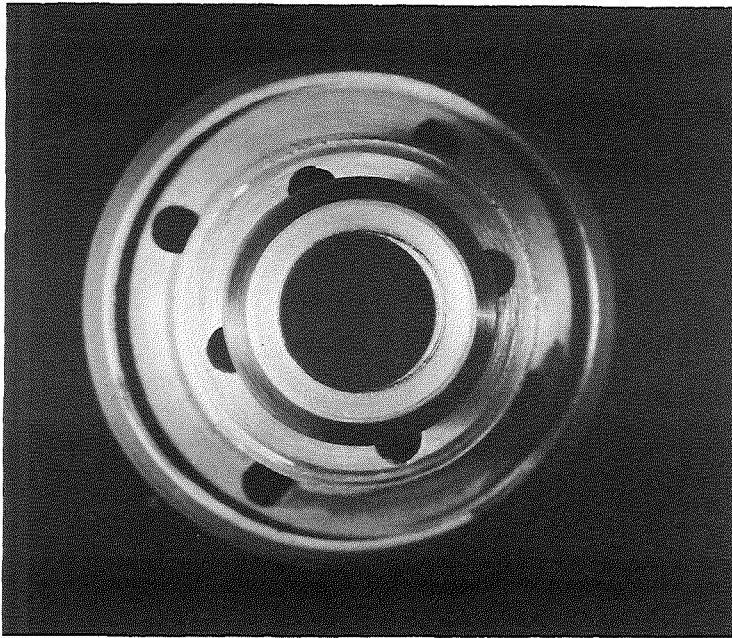


Figure 3. Spray gun air nozzles when new (left), after spraying 1,000 gal of unbeaded control paint (center), and after spraying 1,000 gal of beaded test paint (right).

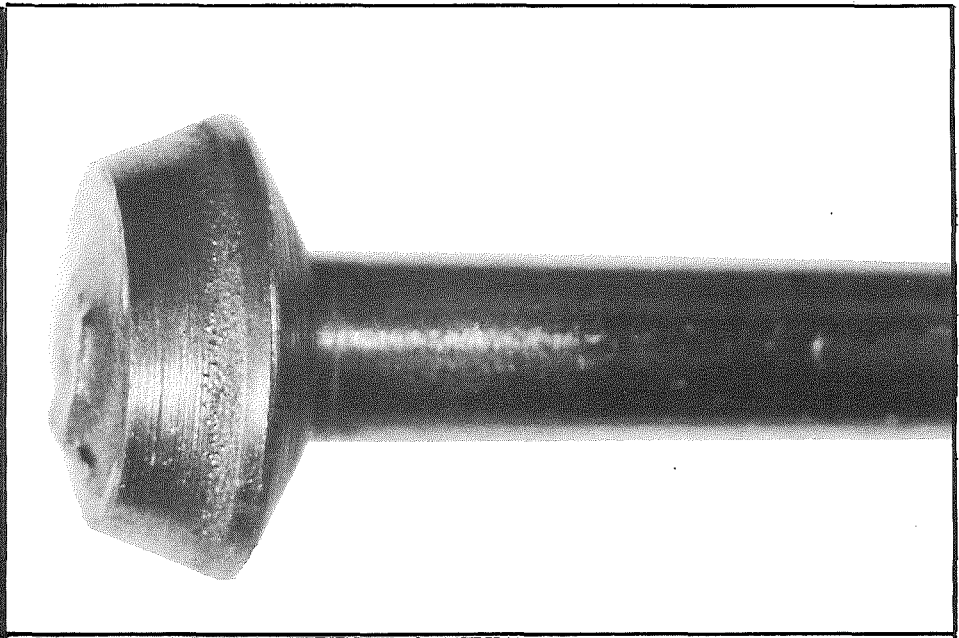
(14percent enlargement of area by measurement), and a 5-percent lengthening of fanned orifice.

Fig. 4 shows the fluid nozzle after spraying 1,000 gal of the unbeaded control paint as standard skip centerline. The center round channel (paint channel) shows no significant wear at the shoulder, or valve seat, which contacts the needle valve when closing off the paint flow. The fluid nozzle used for beaded test paint was in similar condition, indicating that service life of a fluid nozzle is considerably greater than 1,000 gal of paint of either type.

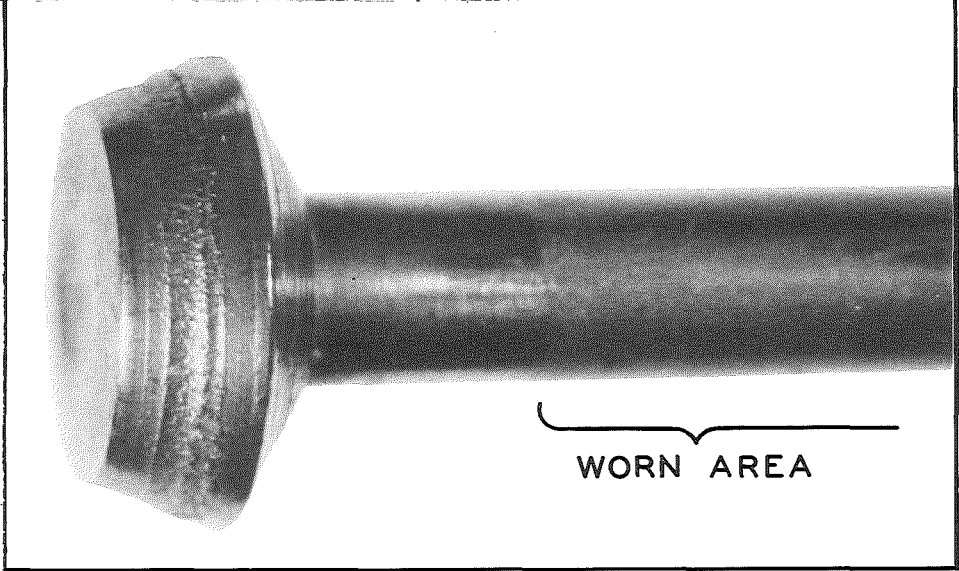
Fig. 5 shows the test gun needle valves after spraying 1,000 gal of each paint. Both valve tips show wear by pitting where valves made contact with the fluid nozzle during paint shutoff. Comparison indicates that the pitting is deeper and covers a larger area on the valve handling the prebeaded paint. In neither valve was the wear sufficient to allow dripping, and therefore need replacement during the 1,000-gal tests. A polished area may be noted on the stem of the needle valve used for beaded test paint, beginning about 1/2-in. above the tip; this area represents the portion passing through the packing gland which the 3M Co. in its report "Highway Spray Gun Wear Tests" admitted was the only area where wear was appreciably greater when spraying its prebeaded paint. However, in the Department's tests, the striping crew did not report having any trouble making adjustments on the packing gland surrounding the polished area of the stem.



▲ Figure 4. Spray gun fluid nozzle showing paint channel (center) with shoulders serving as valve seat, after spraying 1,000 gal of unbeaded control paint.



▶ Figure 5. Needle valves after spraying control paint (top) and test paint (bottom), showing stem wear caused by the prebeaded test paint.





## CONCLUSIONS

A field test was conducted to investigate the comparative erosion rate on roadway striping equipment spraying unbeaded specification paint and 3M prebeaded paint. The test showed that:

1. The 3M prebeaded test paint increased the erosion rate on some spray gun components, but the spray gun used regularly on Department equipment needed no replacement parts while spraying 1,000 gal of either paint as standard 20-30-ft skip centerline.

2. The prebeaded test paint, containing glass beads that are relatively coarse compared to pigments normally used in traffic paints, will increase the erosion rate on equipment parts subject to sliding contact, such as packing glands on valves, paint-tank stirrer bearings, and the gear pump used in transferring paint from drum to tank.

3. From the test results, the Subcommittee estimates that the following additional equipment maintenance costs would be borne by the Department when applying the prebeaded 3M test paint or its equivalent, instead of the current unbeaded specification paint:

(a) Annual cost per machine

\$ 100	for (1) pump replacement
15	for (1) complete replacement of gun parts
15	for replacement of valve components, etc.
<u>120</u>	for down time (\$15 per hr x 8 hr)
\$250	

(b) Annual cost for all machines

\$2250 (or \$250 x 9 machines)

## APPENDIX

### Application Characteristics

1. The 3M prebeaded paint was supplied for these tests in standard 30-gal drums having poor hoop closures. As a result, about half the containers had varying amounts of oxidized skin and gelled vehicle, which complicated transfer of paint from drums and altered its viscosity, and in turn complicated adjusting application rate. The 3M paint was unusual in that it skinned over when left in equipment tanks for periods of about a day, requiring removal and straining, yet it dried slowly as striping.

2. The field drying time of 3M paint varied from 50 to 90 min (specifications allow a maximum of 45 min).

3. In accordance with instructions from the Maintenance Services Division, the 3M prebeaded paint was applied without overlay beads.

### Prebeaded Test Paint Characteristics

1. Pigment + beads: 67.2 percent by weight  
Vehicle non-volatile: 45.2 percent by weight  
Weight per gal: 13.66 lb  
Viscosity: 92 K. U.

2. The glass beads in the paint were in the ratio of about 6 lb per gal of unbeaded paint and the bead grading conformed approximately to MSHD Type IIA Specifications for Glass Beads.

3. The paint submitted for the test appeared about the same as submitted for 1956 performance tests.