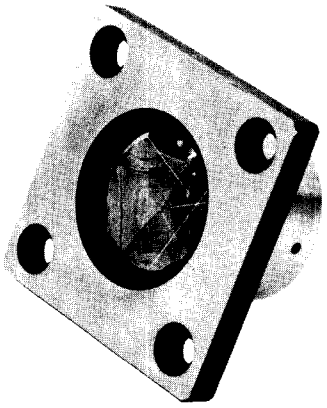
RETROREFLECTOR (CUBE CORNER)
10556A

ACCESSORY FOR 5526A
LASER MEASUREMENT SYSTEM

INSTRUCTION MANUAL

Serial Prefix: 1208A



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INTRODUCTION

The Hewlett-Packard Model 10556A Retroreflector is an accessory for the 5526A Laser Measurement System. The Retroreflector has the unique property of returning the beam parallel to its original path. Hence, the Retroreflector can be oriented in any direction, or even spun.

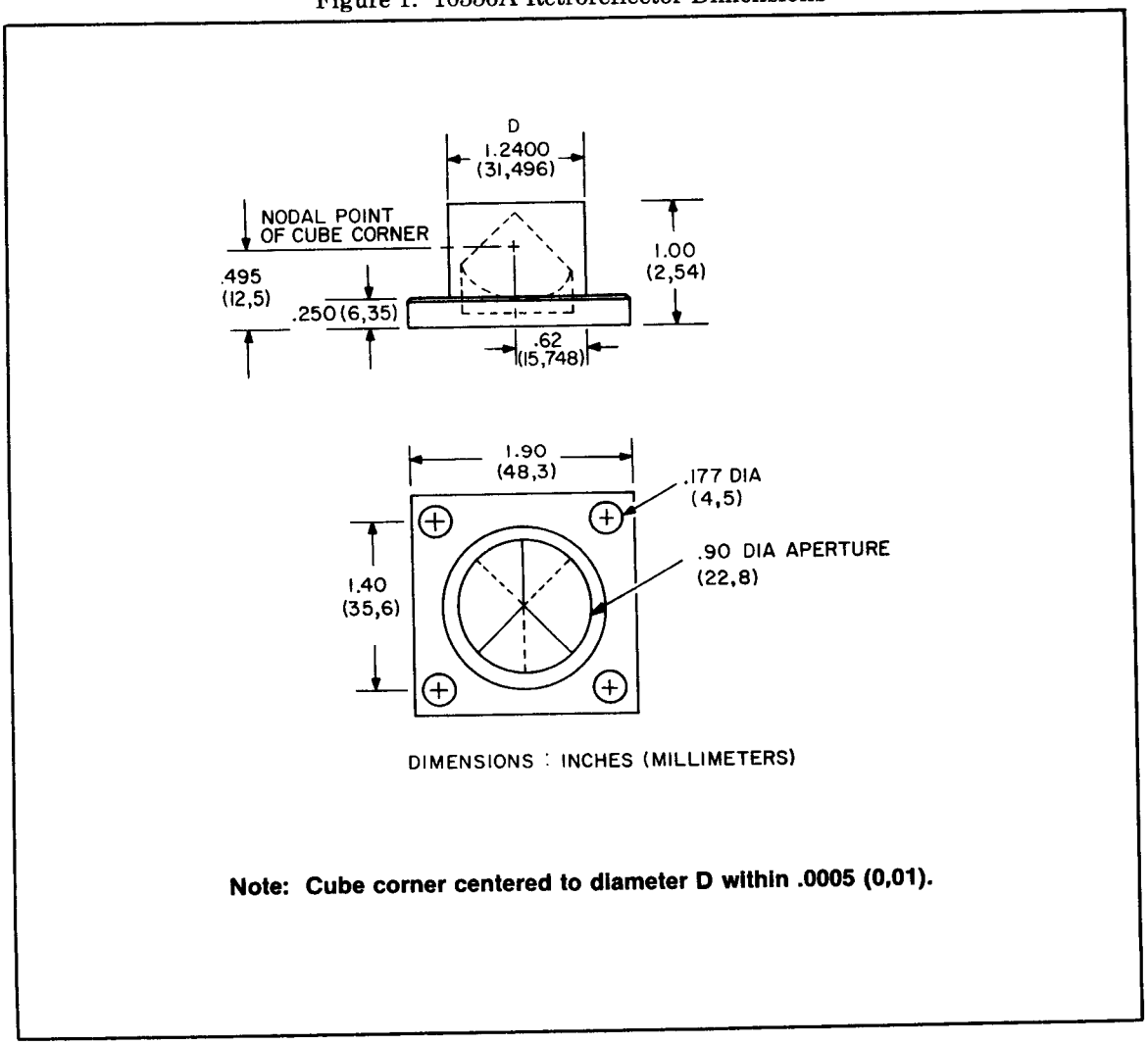
DESCRIPTION

The 10556A Retroreflector is an optically ground and polished glass trihedral prism. The three reflecting faces are mirror silvered while the front face is anti-reflection coated. The prism is mounted in a precision ground and lapped stainless steel mounting with the front face out. Refer to Figure 1 for Retroreflector dimensions.

CAUTION

The 10556A Retroreflector is supplied with a plastic cap covering the cylindrical precision ground surface. Keep this plastic cap on the ground surface at all times. Remove the plastic cap only when mounting the reflector in the 10559A Dual Reflector Mount.

Figure 1. 10556A Retroreflector Dimensions



Note: Cube corner centered to diameter D within .0005 (0,01).

5526A LASER MEASUREMENT SYSTEM AND ITS PUBLICATIONS

Each component of the 5526A system and each standard option are described in separate publications. A current listing of all publications about the 5526A Laser Measurement System is available from:

HEWLETT-PACKARD
5301 Stevens Creek Boulevard
Santa Clara, California 95050
United States of America

Attention: Laser Publications

INSTRUMENT IDENTIFICATION

Each Hewlett-Packard instrument has a ten-character serial number (e.g., 0000A00000). The four-digit serial prefix identifies a group of identical instruments, and the five-digit suffix is a serial number unique to each instrument. If the serial prefix on your instrument is not on the title page of this manual, your instrument is different from this manual. A Manual Change Sheet is included with this manual to describe the differences. If the Manual Change Shett is missing, request one from the nearest Hewlett-Packard Sales and Service office listed at the back of this manual.

PACKING AND INSPECTION

Prior to shipment, this instrument was inspected and met all specifications. Inspect the shipping container; if it is damaged, inspect the Retroreflector for damage. If the Retroreflector is damaged file a claim with the carrier and notify your Hewlett-Packard representative.

MAINTENANCE

Use a soft camel-hair lens brush to remove dust from the Retroreflector window. (A good camera lens brush with a rubber bulb blower is recommended.) Dampen a few optical lens cleaning tissues with optical grade ethyl alcohol, shake off excess alcohol and wipe across window once. Use fresh tissue dampened with alcohol for each wipe. Allow alcohol to dry naturally.

NOTE

DO use only camera or better grade lens tissue.

DO NOT use any of the various impregnated eye glass tissues.

DO NOT use harsh solvents such as acetone or MEK to clean the Retroreflector.

DO NOT use excessive amounts of alcohol.

DO NOT wipe window if there is any abrasive dust or grit on it.

STORAGE

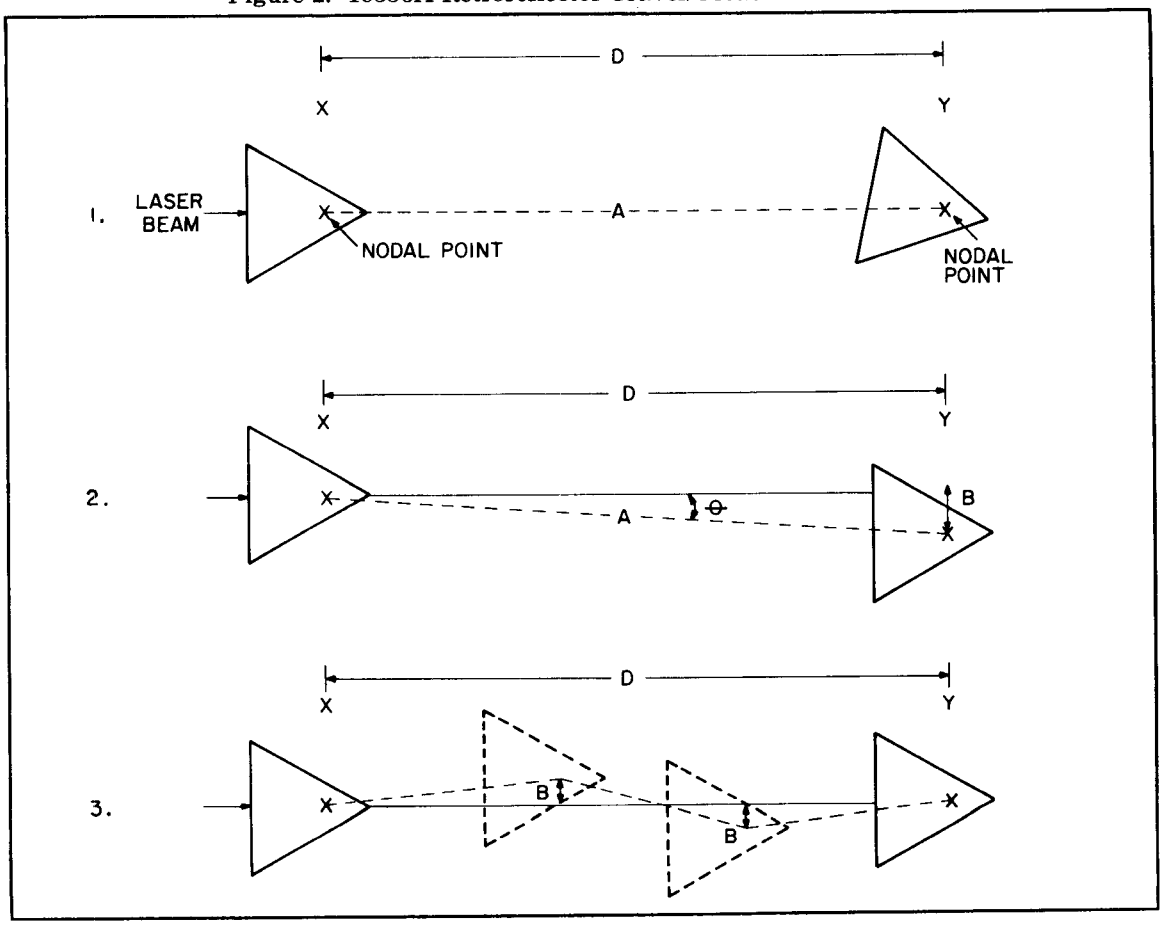
Keep the Retroreflector in its wooden storage box when it is not in use.

OPERATION

A Retroreflector (cube corner) reflects the laser beam back in a line parallel with the original beam, regardless of the orientation of the Retroreflector. The lateral displacement of the reflected beam is determined by the displacement of the corner apex from the original beam line. This property enables the Retroreflector to be tilted or rotated, through small angles, about any axis without losing beam alignment. However, to avoid any measurement errors the axis of any tilting or rotation must pass through the nodal point of the Retroreflector. The nodal point of the cube corner is defined as that point which does not result in any measurement error when the cube corner is tilted or rotated about that point. The displacement of the nodal point from the measurement axis results in measurement error because the 5526A LASER MEASUREMENT SYSTEM measures only that component of motion of the nodal point which lies along the direction of the laser beam. The location of the cube corner nodal point is shown in Figure 1.

Referring to Figure 2, the line D represents the distance measured by the 5526A LASER MEASUREMENT SYSTEM in diagrams 1, 2, and 3. The dashed line A represents the travel path of the nodal point in diagrams 1, 2, and 3. The line B represents the nodal displacement in diagrams 2 and 3. As shown in diagram 2, as the Retroreflector moves from point X to point Y, the 5526A LASER MEASUREMENT SYSTEM measures only the straight line distance traveled (line D). The nodal point path (line A) is the resultant of the straight line distance traveled and the lateral movement of the nodal point (line B). The relationship between the line D and line A is $D = A \cos \theta$. The nodal point path is not measured. Consequently, any lateral movement of the Retroreflector results in a cosine component which is not measured, cosine error. As demonstrated in diagram 2, if the laser light beam is not aligned parallel to the measurement axis of the unit under test, cosine error will degrade system accuracy. Refer to Option 010 of the 5526A LASER MEASUREMENT SYSTEM OPERATOR HANDBOOK for guide lines to minimize cosine error.

Figure 2. 10556A Retroreflector Travel/Measurement Error



In diagram 1, there is no measurement error, even though the cube corner is tilted, because the nodal point does not deviate from the measurement axis. In diagram 3, there is error introduced in the measurement during the travel of the Retroreflector from point X to point Y. However, the measurement taken at point Y is correct because the measurement axis passes through the nodal point of the cube corner.