4.6.2. CO_2 Laser Tube Replacement

4.6.2.1. General

- Effective from Serial No. 20 for the 20C, No. 40 for the 30C, and 30 for the 40C, the method of securing the CO2 laser tube has been changed. The securing brackets have been improved, as well as the method of bracing the tube to the securing brackets by way of plastic support rings.

- If you are servicing a 20C/30C/40C, and its serial number is higher than those indicated, you are working with a "new" tube; remove the tube by following instructions in Section 4.6.2.4. If the Serial number for the unit you are servicing is lower than those indicated, or you are servicing a SHARPLAN 1030 unit or Suricenter 40 unit, you are working with an "old" tube; remove the tube by following instructions in Section 4.6.2.3. Note also that if you are removing an old tube, you must order a kit with the new tube. Cat No. AS2451000 for 20C, AS2383500 for 30C, or AS2355000 for 40C.

- Perform the following procedure only after removing the optical bench from the unit (see 4.6.1). Place the optical bench on a clean 1.5x0.5m (60" x 20") table with the He-Ne laser tube facing upwards.

- Do not touch the front mirror. Do not apply pressure to the rear mirror housing or on the laser tube protrusions. Hold the laser tube by its widest diameter only.

4.6.2.2. Special Materials Required

1. Petroleum Jelly
2. Tie-wraps 140mm (5.5") (X10) (P/N EW1068700)
3. Tie-wraps 368mm (14.5") (X2) (P/N EW1068500)
4. Laser tube support.

4.6.2.3. CO_2 Laser Tube Removal - Old Design

1. Tie a 180° loop in the upper (outlet) coolant tube (to avoid coolant leakage), and disconnect the coolant tube from the power detector.

2. Remove the antistatic foam from the CO_2 laser tube by releasing its tie-wrap.

3. Remove the eight CO_2 laser rear securing screws and the three CO_2 laser rear locking screws (with their discs). Loosen the three CO_2 laser front locking screws (see Figure 4-22A).

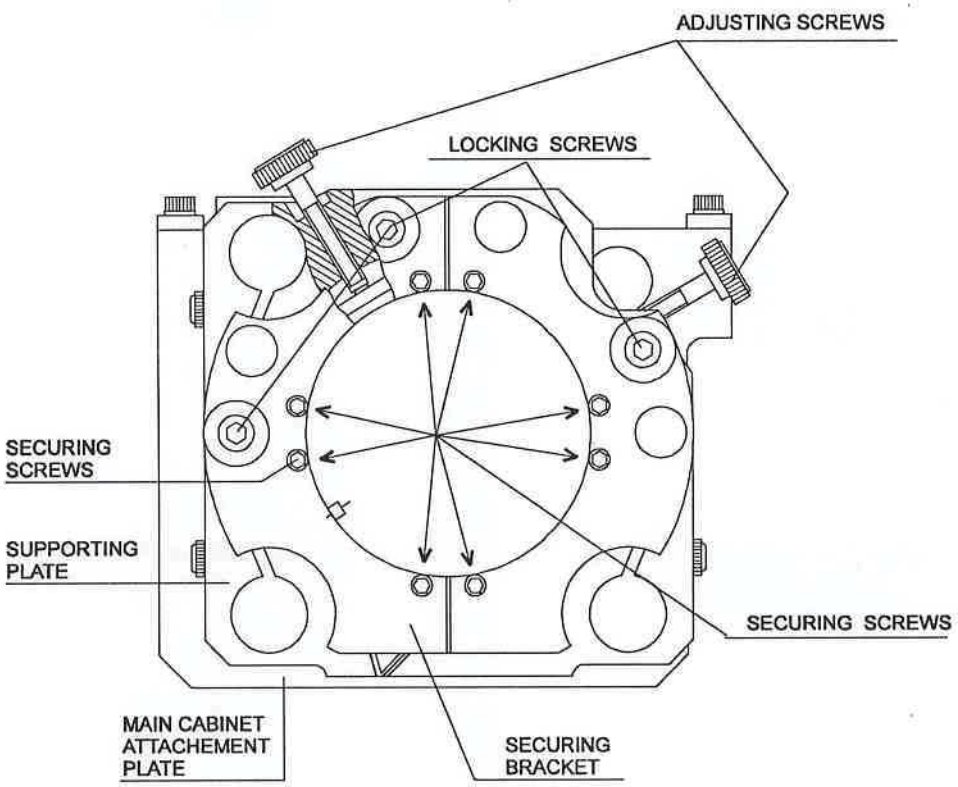

FIGURE 4-22A. CO_2 LASER TUBE SUPPORTING PLATE - OLD DESIGN

4. Remove the two rear securing brackets, and set them aside; they will not be used in installing the new tube. Return them to SHARPLAN.

5. Fully open both CO_2 laser rear and front adjusting screws.

6. Slide the CO_2 laser tube towards the rear section of the bench, while simultaneously pulling the high voltage lead

and upper coolant tube. The rear bearing housing should come out with the tube, but the front bearing housing should remain in place (see Figure 4-23).

7. Carefully place the old CO_2 laser tube on the laser tube support, setting it aside for shipment back to SHARPLAN. Tie the electrical wires and the coolant tubing to the laser tube.

8. Remove the eight CO2 laser front securing screws and the three CO2 laser front locking screw (with their discs). See Figure 4-22A.

9. Remove the two front securing brackets, and set them aside; they will not be used in installing the new tube. Return them to SHARPLAN with the other brackets and the old laser tube.

4.6.2.4. CO_2 Laser Tube Removal - New Design

1. Tie a 180° loop in the upper (outlet) coolant tube (to avoid coolant leakage), and disconnect the coolant tube from the power detector.

2. Remove the antistatic foam from the CO_2 laser tube by releasing its tie-wrap.

3. Remove the eight CO_2 laser rear securing screws and the three CO_2 laser rear locking screws (with their discs). Loosen the three CO_2 laser front locking screws (see Figure 4-22B).

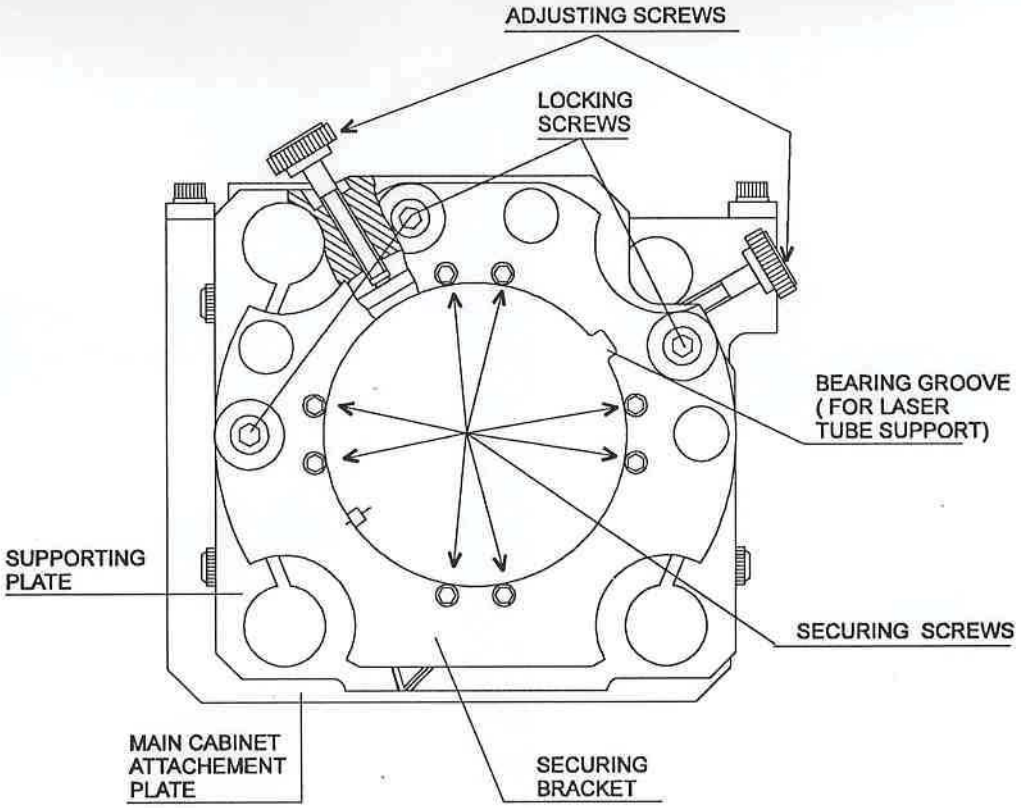

FIGURE 4-22B. CO_2 LASER TUBE SUPPORTING PLATE - NEW DESIGN

4. Remove the rear securing bracket.

5. Fully open both CO_2 laser rear and front adjusting screws.

6. Slide the CO_2 laser tube towards the rear section of the bench, while simultaneously pulling the high voltage lead and upper coolant tube. The rear bearing housing should come out with the tube, but the front bearing housing should remain in place (see Figure 4-23).

7. While removing the tube from the bench, try not to let the fixing pins of the supporting rings fall out, as they are difficult to replace (see Figure 4-22C).

8. Carefully place the CO_2 laser tube on the laser tube support. Tie the electrical wires and the coolant tubing to the laser tube.

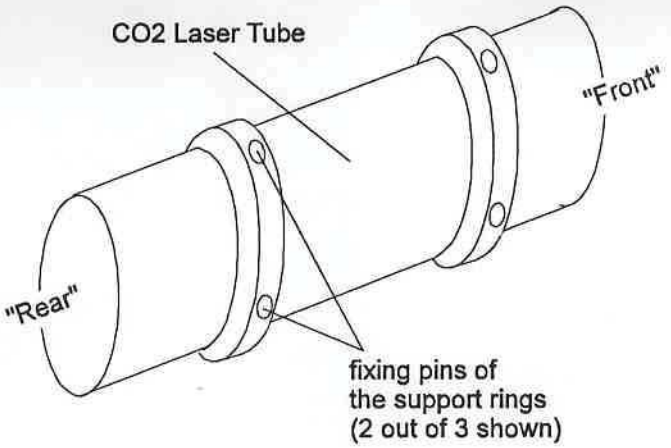

FIGURE 4-22C. LASER TUBE, WITH FIXING PINS

4.6.2.5. Laser Tube Replacement - New Design

Note: Do not replace a tube of the old design. Use the new design only.

1. Insert the front securing bracket (one-piece). Insert and tighten the eight CO_2 laser front securing screws. Insert the three front locking screws (with their discs), but leave all locking screws loose in order to perform the tube alignment. See Figure 4-22B.

2. Apply a thin layer of petroleum jelly to the alignment shoes.

3. Apply a thin layer of petroleum jelly to the alignment spring of the CO_2 laser supporting plate and on the bearing housing (see Figure 4-23) of the front CO_2 laser supporting plate.

4. Place the CO_2 front and rear laser adjusting screws at the midpoint of their range.

5. Insert the high voltage lead and upper coolant tube into the bench, and carefully insert the tube into the bench until the bearings almost reach the supporting plates.

6. While inserting the tube into the bench, do not allow the fixing pins of the supporting rings to fall out. These pins are the contact points between the laser tube and the securing brackets, and one of them (for each ring) contains a rubber O-ring (see Figure 4-22C).

7. Remove the protective cover from the front mirror, and

insert the mirror into the protective dust sleeve (see Figure 4-24).

8. Gently push the tube forwards. Verify that the front bearing housing pin enters the front bearing groove.

9. Insert the rear securing bracket (one-piece). Insert and tighten the eight CO_2 laser rear securing screws. Insert the three rear locking screws (with their discs), but leave all locking screws loose in order to perform the tube alignment.

10. Using the Allen screws, screw in the laser tube support for the rear securing bracket.

11. Connect the upper (outlet) coolant tube to the power detector and release the 180° tie-wrap. Manually tighten the fitting by a final 1/4 turn with a wrench. Verify that the tube is not in the path of the He-Ne beam.

12. Replace the antistatic foam and secure with a 368mm tie-wrap. Verify that the foam touches the front supporting plate.

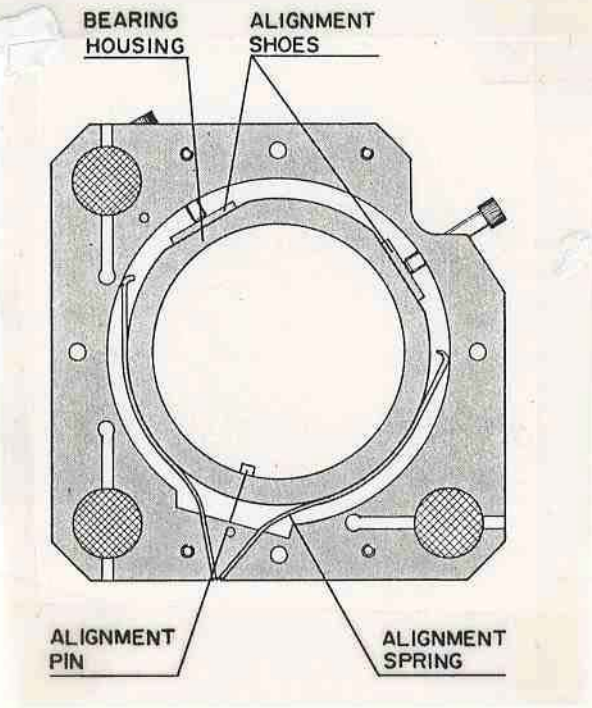

FIGURE 4-23. CO_2 LASER TUBE FRONT SUPPORTING PLATE WITH SECURING BRACKETS REMOVED

4.6.3. Beam Combiner Assembly Replacement

The beam combiner assembly is secured to the front supporting plate by screw A (see Figure 4-24). The assembly fits over the two pins protruding from the supporting plate, which prevent the assembly from moving. A protective dust sleeve connects the beam combiner assembly, the CO2 laser tube front mirror and the power detector, and protects these components from dust particles.

Whenever replacing the beam combiner assembly, the beam combiner or the folding mirror, ensure that all surfaces are perfectly clean, and that all components are in place. Even the smallest dust particle can cause power output or mode structure (spot shape) deterioration, and damage to the optical components.

To remove the beam combiner assembly, carefully remove the dust sleeve from the CO2 laser tube. Take care not to scratch the laser tube front mirror. Release screw A, and remove the assembly.

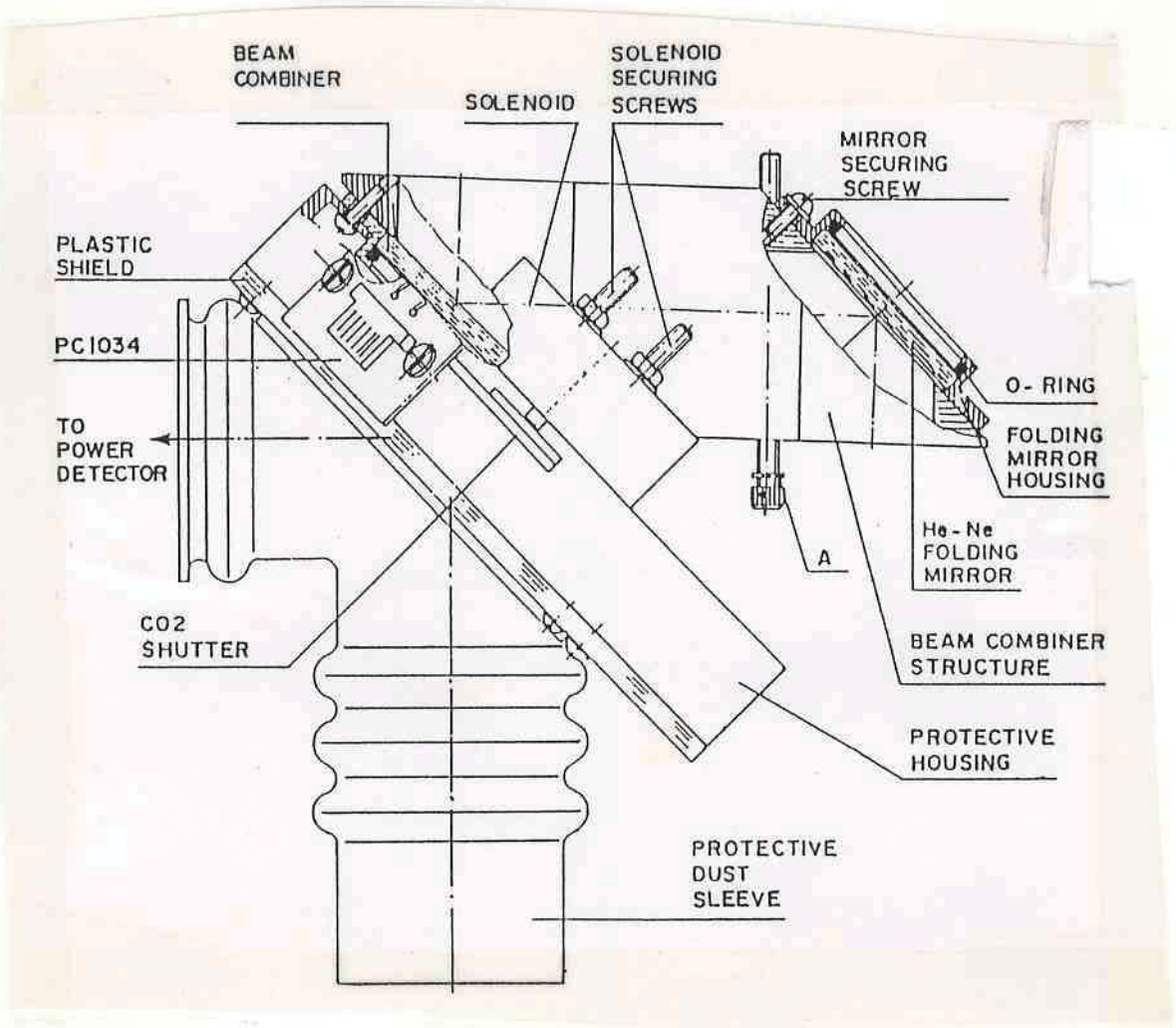

FIGURE 4-24. BEAM COMBINER ASSEMBLY

When replacing the beam combiner, take care that the yellow-tinted surface, which reflects the He-Ne beam, faces towards the He-Ne folding mirror. After replacement, perform He-Ne and CO2 laser tube alignment checks/procedures.