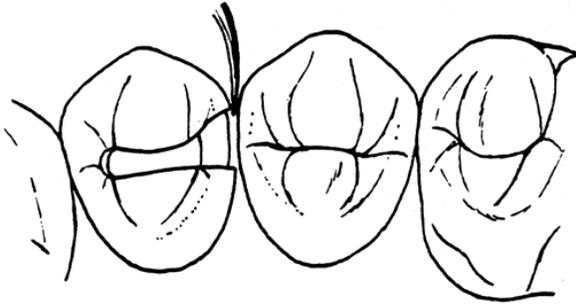


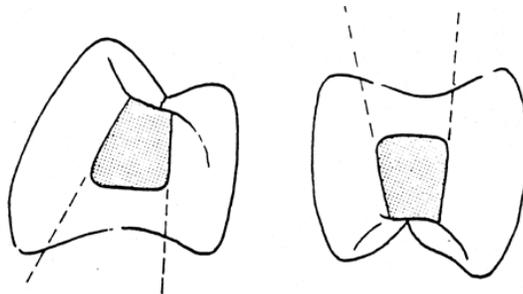
## THE CLASS II AMALGAM PREPARATION

Up to this point, cavity preparations have involved only directly accessible surfaces of the tooth. Now you are being introduced to a multiple surface preparation that will include the occlusal and proximal surfaces. Caries in the proximal surface of a tooth begins just gingival to the contact point and may be minimal or extensive. We are considering the minimal or ideal situation in the laboratory preparation. There are some differences in design that need to be pointed out prior to proceeding:

1. Conservatism is still a prime consideration but all margins must be accessible for proper condensation and finishing of the restoration. Keeping the margins "hidden" may seem to be the most esthetic and conservative approach, but not being able to assess if the margins are well sealed is a poor compromise. If the tip of an explorer can be passed between a cavity preparation margin and an adjacent tooth, adequate access has been developed. This is true of facial, lingual and gingival margins.

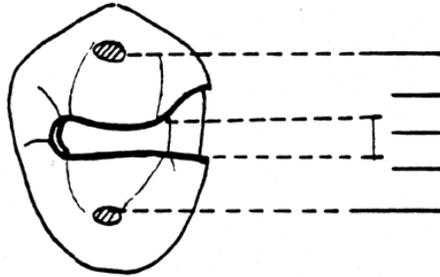


2. The proximal portion of the cavity preparation should converge somewhat from gingival to occlusal. \*A general rule dictates that the lingual wall of mandibular posteriors and the facial wall of maxillary posteriors should be parallel with the long axis of the tooth. (The other wall will then converge toward the occlusal). The angles formed by the junction of the facial and lingual walls of the box and the gingival wall of the box are slightly rounded - not sharp.

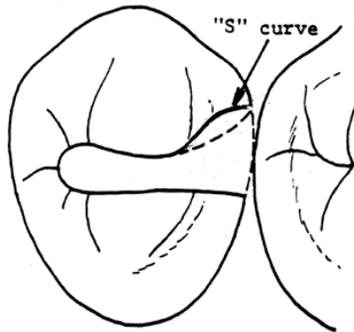


3. The **occlusal portion** should include primary grooves and be properly undercut for retention, but it is flared at uninvolved marginal ridges to prevent them from being undermined. The **narrowest (buccolingually) portion or isthmus should be kept to a minimum width to avoid weakening cusps.** A good guideline for this width is 1/4 the distance between buccal and lingual cusp tips.

4. If contacts occurred equidistant from facial and lingual directions, those walls would be cut in the same angle. However, contact areas are generally located somewhat facially to the faciolingual midpoint of the tooth. Extending the proximal box from the central groove area to the facial, would normally create a very acute angle of amalgam or destroy an excessive amount of tooth structure in the proximal box. To avoid this, a **reverse** or **"S" curve** is incorporated into the preparation, after it is shaped initially. This allows the operator to develop a



solid 90° junction of alloy and tooth, without sacrificing an undue amount of solid tooth structure. The **reverse curve** is used wherever indicated in proximal boxes to create a butt joint margin without destroying excessive tooth structure. However, they are generally necessary on the buccal portion of the proximal box. In some cases, they are not necessary at all.

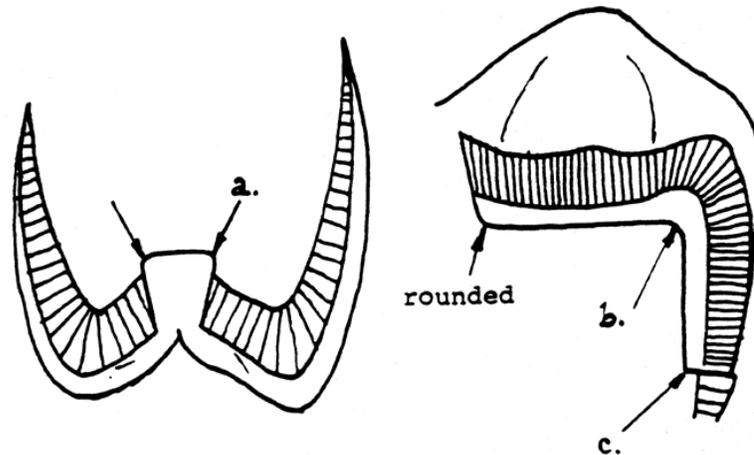


5. Internal line angles are definite, but "softened" or rounded, except for the axio-gingival.

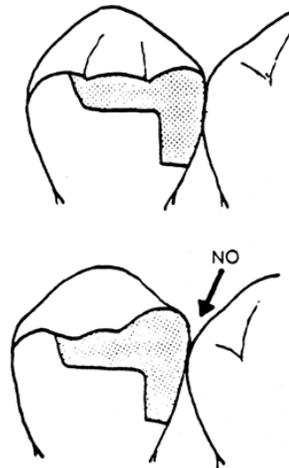
a. Line angles directed at the facial or lingual direction are rounded to prevent developing stress or wedge areas that would tend to split a tooth apart.

b. The axio-pulpal line angle is rounded or beveled to add bulk in a weak area of amalgam, and to prevent fracture of the amalgam isthmus over a "wedge of tooth".

c. However, the axio-gingival line angle is made sharp and definite for positive condensation of amalgam, as well as stability of the restoration under stress.

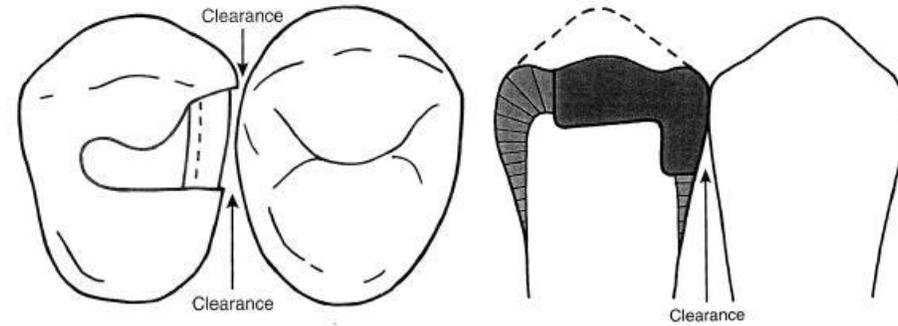


6. Retention form of the proximal portion is made independently of the occlusal. Each portion (the occlusal and the proximal portion) is retentive in itself, without relying on the retention of the other portion. The occlusal is slightly undercut bucco-lingually. The proximal is designed with some degree of convergence toward the occlusal, but in addition, retentive grooves, placed in the facial and lingual walls, prevent lateral (proximal) displacement of the restoration.

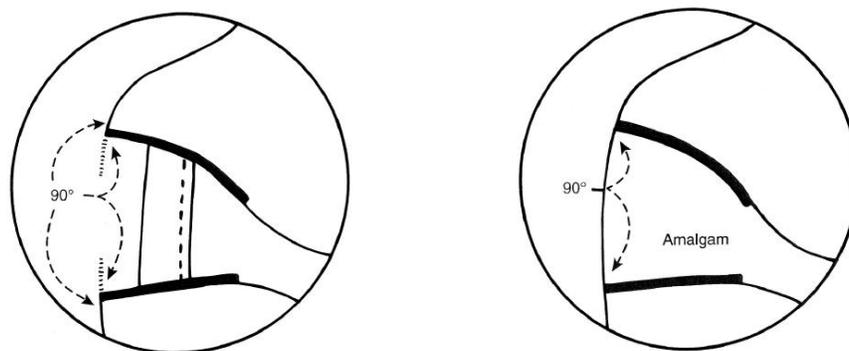


7. It is extremely important to have adjacent marginal ridge heights equal and proximal contacts re-established in the finished restorations. If there is a

discrepancy from one ridge to the next, or an “open” contact, a food impaction area will develop, creating a very unhealthy situation for supporting tissues (gingiva and bone). It is necessary to plan the carved restoration with this in mind.



**Diagrams with adequate proximal box opening: buccal, lingual, & gingival**



**Diagrams illustrating proper “S” curve or 90 ° tooth-amalgam junction**  
AMALGAM PREPARATION - CLASS II - MESIO-OCCLUSAL - #29

Caries occurring in the proximal surface of a posterior tooth does not always, but usually entails involvement of at least some portion of the occlusal surface. In a tooth with well defined primary grooves, this demands that the proximal preparation extend to a less susceptible area of the occlusal surface. If the occlusal surface is not involved or not likely to become carious, a “slot” preparation may be done that includes only the interproximal surface and a minimal portion of the marginal ridge above the lesion.

However, in many cases, a relatively large portion of the tooth needs to be removed in order to extend the restoration so that it can be properly finished, and maintained by the patient, yet staying as conservative as possible. Thus, even though the lesion may appear small and just at or below the contact area, the proximal portion needs to be extended gingivally, facially and lingually for adequate access.

After the cavity preparation is completed, a matrix or form needs to be placed, to condense the amalgam against and develop the contour of the lost tooth structure. (This will be covered in more detail later in this section).

## ARMAMENTARIUM

1. Mirror and explorer
2. High speed contra-angle
3. Low speed contra-angle
4. #329 and 330 FG burs
5. #169L FG bur
6. #1/4 round bur
7. Gingival margin trimmer - GF 12
8. Enamel hatchet GF 16

## PREPARATION

1. Initially, a standard occlusal preparation is cut into this tooth. It can be prepared almost to completion before proceeding to the proximal portion of the preparation. The anatomy of the tooth will dictate the shape of the occlusal portion, with the inclusion of primary or deep grooves. There may be a slight variation in morphology between the dentoforn and stone models.

2. The proximal portion appears as an open box form, slightly converging from gingival to occlusal. It has a gingival floor, an axial wall, and facial and lingual walls.

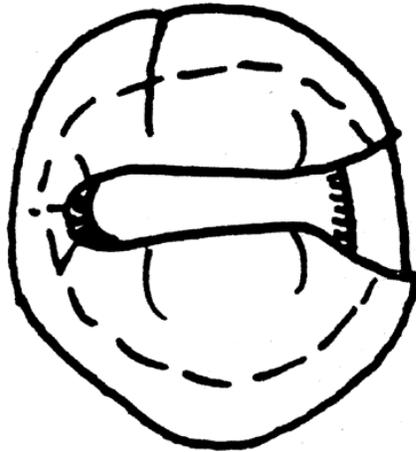
3. Note that the contact point occurs a bit facial to the central groove, so in order to conserve tooth structure and create bulk in the restoration, a **reverse** or **'S' curve** is included in the preparation.

4. Retention is gained independently for occlusal and proximal portions, so it is **not** necessary to develop a **"dovetail"** effect in the distal fossa to "lock" the amalgam in place.

5. Occlusal depth should be 1.5 mm in the mesial and distal fossa (shallowest) areas.

6. The pulpal floor is smooth, flat and perpendicular to the long axis of the tooth.

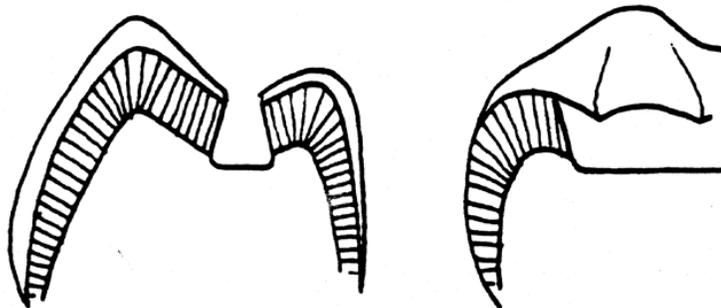
7. The proximal box should be just clear of contact facially and lingually. The gap will be slightly wider gingivally.



8. All internal line angles are rounded (including the axio-pulpal), except the axiogingival.

9. Gingivo-facial and gingivo-lingual line angles are rounded.

10. Margins should be smooth and continuous, and all cavo-surface angles should be as close to 90° as possible for maximum strength of tooth and



amalgam.

11. The mouth mirror should be used to provide illumination and visualization for this preparation.

### PROCEDURE

1. Place the patient in a somewhat upright position with the mandible parallel to the floor. (Operator might best work from a 7 o'clock position).
2. The preparation outline should be drawn with a # 2 pencil on the tooth prior to beginning the preparation. Have this checked by your bench instructor prior to beginning the preparation.

3. Entry is gained into the occlusal portion with the #329 bur at high speed, angled first and then uprighted parallel with the long axis of the tooth. The shallowest areas, the fossae, will be 1.5 mm or about 3/4 of the length of the bur head.

4. Maintaining a flat and level pulpal floor, extend the outline almost to the proposed occlusal limits.

5. With the #330 bur, slightly enlarge the occlusal, maintaining the isthmus between cusps no wider than the width of this bur. At the distal extension, tip the handpiece distally, drawing the bur occlusally as it is cutting. This will aid in developing the correct taper to protect the marginal ridge.



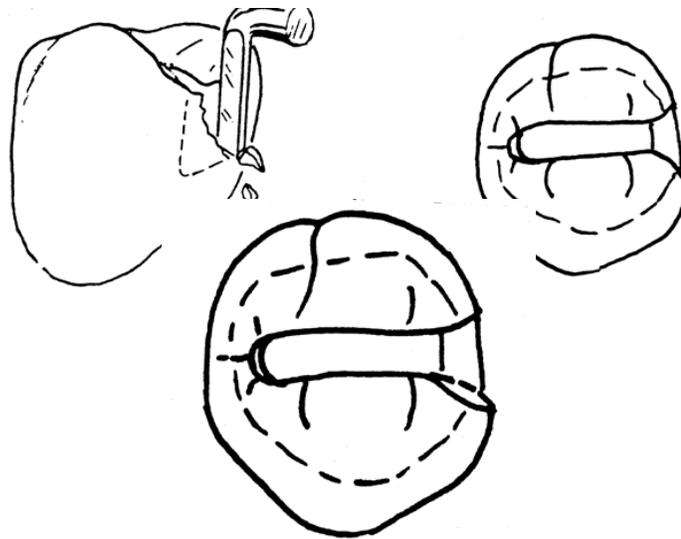
6. Extend the mesial portion of the preparation until a very thin area of proximal "enamel" remains.



7. With the #169L bur at high speed, using the thin enamel as a guard to prevent abrading the adjacent tooth, move the bur in a very slight facial and lingual direction as it cuts gingivally. It must be extended gingivally far enough to clear gingival contact. This can be determined by placing the bur in the facial embrasure (without the bur turning!!!) to measure how far the bur must penetrate, prior to entering the marginal ridge with the bur. A metal matrix band and wedge placed interproximally may also help to protect the adjacent tooth during this procedure.

8. With a sharp GF 12 margin trimmer, the proximal opening can be accomplished. Place the tip of the blade so as to provide a minimal

(explorer tip) opening to the facial and lingual. Press gingivally to cleave the enamel and plane these margins. This procedure generally results in producing an acute angle to the facial wall of the box and a 90° angle to the lingual wall. The gingival margin should be scraped and planed with this instrument to develop a smooth flat gingival margin with rounded corners at the facial and lingual.



9. With the #169L bur, define the internal box form. The gingival seat width should be 1 mm from axial wall to external surface. The axial wall should be parallel with the long axis of the tooth, and conform to the shape of the external surface bucco-lingually. The reverse curve is now placed to develop a 90° angle at the facial without destroying the buccal cusp and transverse ridge. **It should not open the facial margin any further.**

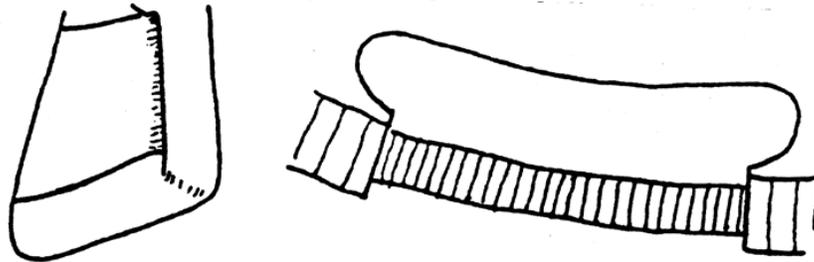


10. The gingival seat is now scraped or planed to join facial and lingual walls in a rounded angle, using the GF 16 enamel hatchet (blade is 1.0 mm)

wide - use it as a width guide here). The side of the blade is useful in shaping and smoothing the axial wall. A gap of 0.5-1.0 mm should be apparent between the gingival margin and tooth #28.



11. Using the #1/4 round bur, retentive grooves are placed in the facial and lingual walls at their junction with the axial. (Grooves are not to be directed axially). They should extend from the gingival seat to the axio-pulpal line angle. They should be the depth of the tip of the bur at the gingival and taper out (to nothing) at the pulpal level.



12. Angle the #169L bur from the distal, or use the GF 12 margin trimmer in a scraping motion to bevel or round the axio-pulpal line angle.



\*\*13. If preparation is smooth and properly extended, show it to your instructor for a grade.

### MATRIX FORMATION AND PLACEMENT

When restoring a tooth with amalgam where replacement of a wall or part of a wall is required, it is generally necessary to provide a form of some sort to

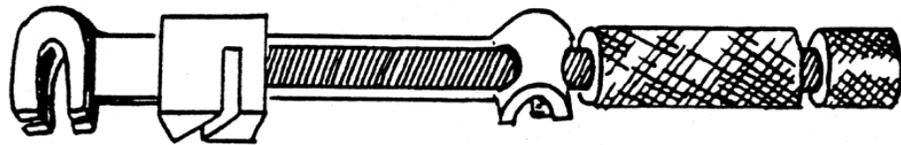
condense the against. One such form which is routinely used is a metal (steel) **matrix band** that has adequate strength, and yet is thin enough to provide properly contacting restorations.

Matrix bands are manufactured in various shapes and thicknesses. The one we will use serves very well for most required applications. It is designated a #1 or universal band and is 0.0015" thick. Other bands are useful for unusual situations or excessive gingival depth of the preparation.



Note the shape of the band. It will be placed with the **"concave"** side toward the gingival tissue since the tooth is somewhat bell shaped, and the cervical area is narrower than the occlusal.

The band is held in place by means of a matrix retainer, which grips it firmly and allows length adjustment for various sizes. The particular style that you were issued is called a **Tofflemeier** retainer.

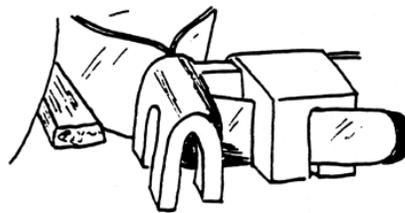


When assembling the retainer, the band should be looped with the two "tails" side by side. Note that a funnel shape results. Place the tails into the head of the retainer and engage the slot in the sliding body. Keep the open side of the head of the retainer directed the same as the narrow part of the funnel - toward the gingival. With the loop projecting out one side of the head, and the tails of the band just protruding out the diagonal slot of the sliding body, turn the short knurled knob (clockwise) to lock the band in place.

Using the handle of the mirror (or other instrument), shape the loop to a smooth circular form. Enlarge or reduce the size of the loop as necessary by turning the long knurled knob on the retainer.

Place the matrix band down over the tooth, with the narrow side of the funnel directed toward the gingiva. The band should be worked gently down with finger pressure through contact areas to a position at least 1.0 mm beyond the gingival seat (gingival to the gingival margin of the preparation). The occlusal portion of the band should extend approximately 1 mm above the marginal ridge of the adjacent tooth. (If teeth in the dentoforn are too close to pass the contact, slightly loosen the next tooth).

Turn the long knob to snug the band against the tooth and under the gingival tissue. Tighten the band firmly. Place a moistened wooden wedge into the interproximal space to hold the band tightly against the gingival seat. (The base of the wedge must extend below the gingival margin to avoid ledge formation).



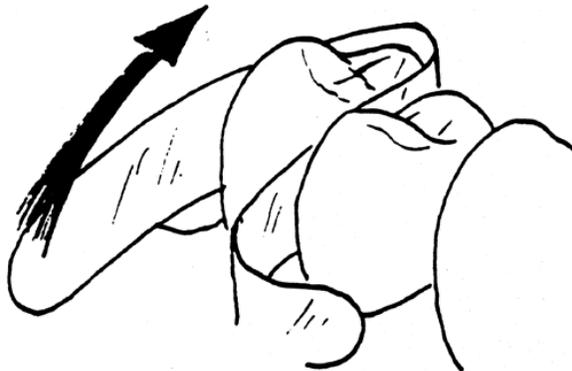
Slightly loosen the band (1/4 turn), using the long knob, to allow proper condensation and contour.





When removing the band - first, loosen the long knob. Next, loosen the short knob to release the band. Then, tighten the long knob - this will pull the sliding body away from the band. Now, lift the retainer off of the band. **(If the open end of the head was positioned improperly, the retainer won't lift off, but will be forcing against the gingival tissues).**

Tip the portion of the band in contact with intact tooth surfaces to the lingual first and pull it through. Then bend the band away from the amalgam, cut off the excess length of band with the curved crown and bridge scissors, tip it lingually and slide it out (lingually). Do not attempt to pull the band straight out occlusally, as the marginal ridge may be dislodged.



## PLACEMENT OF AMALGAM

### ARMAMENTARIUM

1. Amalgam condensers #0 and #1-2
2. Burnisher #26-30
3. Carver Tharp #1
4. Carver IPC
5. Burnisher Dilley #1

### PROCEDURE

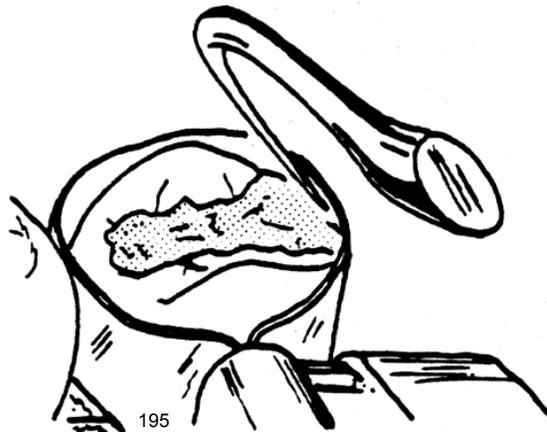
1. Place a stable, properly wedged matrix band over the tooth.
2. This preparation can be filled using a blue capsule of Dispersalloy.
3. Condense a partial carrier load well down into the gingival area of the proximal box using the #0 condenser. Don't load the entire preparation and expect to be able to condense it well. Condense laterally as well as vertically.
4. Add a small increment to the occlusal portion, and another to the proximal. Condense thoroughly.



5. As the restoration is built up to the cavo-surface margin, use the #1-2 condenser and work in line with the inclines to overfill slightly.
6. Burnish firmly with the round end of the #26-30 burnisher.



7. Use the explorer tip to clear the marginal ridge excess away from the matrix band and create an occlusal embrasure. Don't lower the marginal



ridge in the process.

8. Withdraw the wedge, remove the retainer, and carefully re-move the matrix as described earlier.

9. With the IPC carver, roll and shape the marginal ridge, maintaining a height consistent with the distal ridge of #28. This same instrument works very well to remove excess alloy from facial, lingual and gingival margins. Do not develop "steps" in the surface of the alloy.



10. Refine the anatomy of the inclines, grooves and marginal ridges with the Sharp carver.

11. When carving is complete, lightly rub with the Dilly burnisher (pointed end).

13. Flick off margin and groove excesses with the IPC carver.

\*\*14. Wipe gently with a cotton roll - see your instructor for a grade.

## DIRECTIONS FOR PLACING A MATRIX BAND AND TOFFLEMEIER RETAINER FOR CLASS II RESTORATIONS

### 1. Matrix band

- a. Used with Class II restorations
- b. May be clear: typically used with composites OR may be stainless steel: typically used with amalgams
- c. Functions:
  - replace a proximal wall
  - provide a surface to place restorative material against
  - various shapes and sizes

### 2. Tofflemeier retainer

- a. Holds matrix band in place
- b. Large knob adjusts the size of the band
- c. Small knob secures the band into retainer



3. Matrix band placed with concave side toward the gingiva
4. Retainer is placed with open slot toward the gingiva
  - a. Facilitates removal of retainer complex
  - b. Generally place retainer on buccal side, may vary with situation
  - c. Matrix band should cover 1.0 mm. cervical to the gingival margin of the prep and 1.0 mm above the proposed marginal ridge area. This will allow adequate support of the restorative material when it is placed.



## AMALGAM PREPARATION - CLASS II - MO and DOL - #14

In the maxillary molars, as well as other posterior teeth, caries is often found to occur simultaneously on both proximal surfaces, and also involves the occlusal fossae and lingual groove.

If the occlusal oblique ridge is deeply fissured or undermined by caries, it should be cut through for access, and to avoid future breakdown. If the caries has not progressed, it is best not to violate this ridge, as it serves to tie facial and lingual portions together.

This Class II preparation follows the same guidelines as the previous preparation, but on a larger scale. The contact areas are broader, the reverse curve may be less obvious, and in fact, not even required in the distal preparation. Extension of proximal and gingival margins to allow access is of prime importance.

### ARMAMENTARIUM

1. Mirror and explorer
2. High speed contra angle
3. Low speed contra angle
4. #329 and 330 FG burs
5. #169L and #1/4 FG burs
6. Gingival margin trimmers - GF 11 and GF 12
7. Enamel hatchet GF 16

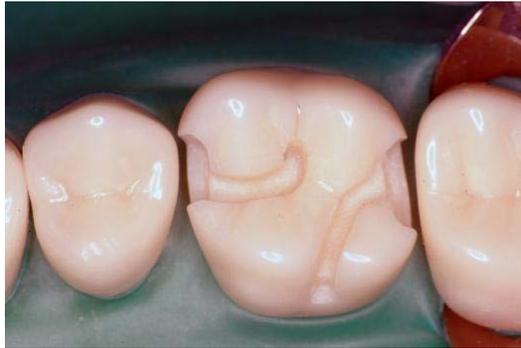
### PREPARATION

1. To begin this preparation, first cut the outline form and depth as was done in, the occluso-lingual preparation on tooth #3. The only difference will be lack of concern of undermining the marginal ridges since these will be subsequently removed in this preparation.

2. The proximal boxes will be somewhat wider bucco-lingually because the contact areas are broader on this tooth than they were in tooth # 29. Furthermore, the labial wall is more parallel to the long axis of the tooth, while the lingual converges toward the occlusal. This is in contrast to the preparation on tooth # 29.

3. Occlusal depth is established in the fossae areas at 1.5 mm.

4. The pulpal floor is flat and smooth and internal line angles are rounded, except for the axio-gingival.
5. The marginal outline is smooth and continuous with 90° junctions wherever enamel meets amalgam.
6. The oblique ridge is not undermined.
7. Working with the mirror, and maintaining the correct axial inclination of the bur are the major points to be mastered. Avoid damage to neighboring teeth.



#### PROCEDURE

1. Position the patient with the maxilla perpendicular to the floor, head cocked slightly left. (An 11 o'clock operator position is suggested, but it may be necessary to relocate operator and patient during the operation).
2. With a sharp pencil, draw the proposed outline on the tooth and have your table instructor check this prior to beginning the preparation.
3. Open into the central fossa with a #329 bur at high speed and, at the proper depth, extend the occlusal portion. Keep the pulpal floor flat and do not undermine the facial groove or oblique ridge.
4. Follow the same routine for the distal fossa. Establish the lingual groove and step.
5. Return to refine, smooth and extend at the marginal ridges with the #330 bur. Use it to develop the facial and oblique ridge area tapers. Thin out the mesial and distal "enamel".

6. Drop the proximal boxes with the #169 bur, being careful not to overextend them facially or lingually. Maintain the correct axial inclination. The gingival depth of the box is established in the same manner as in tooth # 29.



7. Using the margin trimmers, break through and plane and shape the facial and lingual walls of the box. Scrape the gingival margin smooth. Use the GF 12 on the mesial and the GF 11 on the distal to accomplish this. Ensure a space of 0.5-1.0 mm between gingival margins and adjacent teeth.

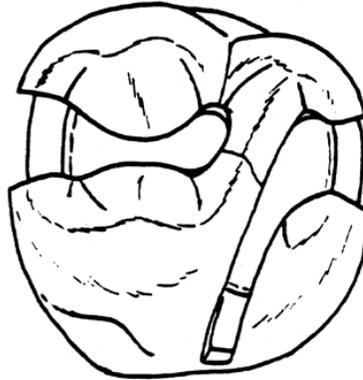


8. The #169L bur can be used to refine the entire preparation and bevel the axio-pulpal line angle.

9. Using the GF 16 enamel hatchet, define the axio-gingival line angle, creating a gingival seat width of 1.0 mm, and smooth and shape the axial wall with the side of the blade of the instrument.

10. Place definite retentive grooves in both proximal boxes with the 1/4 round bur as described in the preparation in #29. In the area of the lingual step, place retentive grooves with the #1/4 bur directed at the mesial and distal walls of the step. The deepest portion of the groove is toward the gingival wall and it tapers out to nothing toward the axio-pulpal line angle.

\*\*11. When preparation is finished, present it to your instructor for grading.



## PLACEMENT OF AMALGAM

### ARMAMENTARIUM

1. Amalgam condensers #0 and #1-2
2. Burnisher #26-30
3. Carver Tharp #1
4. Carver IPC
5. Burnisher Dilley #1

### PROCEDURE

1. Position a matrix band over the tooth with the retainer on the facial, equidistant from mesial and distal. Wedge it properly at both proximal areas, placing the wedges from the lingual. Be sure they are firmly placed against the gingival margin.



2. One to two blue capsules of amalgam should suffice unless excessive spillage occurs.
3. Start in the proximal boxes and condense well with the #0 condenser. Make sure you condense well towards the gingival line angles.
4. Place a small increment in the lingual step and condense parallel with the long axis.



5. Gradually increase the bulk after covering axial and pulpal floors. Use the #1-2 condenser as contour begins to develop, condensing perpendicular to the tooth surface.
6. When slightly overfilled, burnish heavily with the ball end of the #26-30 burnisher, especially on the marginal ridge area.
7. With the explorer tip, clear the excess amalgam from the band at the marginal ridges and the margin of the lingual step. Maintain the marginal ridge height.
8. Remove the wedges and matrix retainer. Bend the tails of the band away from the tooth, cut off the excess with crown and bridge scissors and ease the band out to the lingual.

9. Shape the marginal ridges using the IPC carver and remove any excess from facial, lingual and gingival.



10. Roughly carve the occlusal and onto the lingual groove with the Tharp carver. Carve "from outside-in" to avoid breaking the marginal ridge or lingual.

11. Refine the anatomy with the Tharp carver.

12. Lightly burnish all the accessible surfaces with the Dilley burnisher.

13. Assure crisp margins and clean out grooves with the IPC carver.

\*\*14. Wipe lightly with a cotton roll - see your instructor for a grade.

