

# CLINICAL Impressions®

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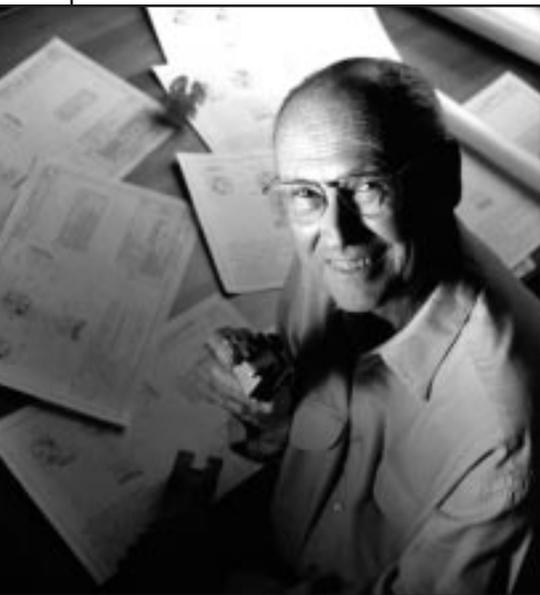
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# The Wildman Twin

## Revolutionary Self-Locking Design Provides True Twin Versatility and Speedier Treatment

by A. J. Wildman, D.D.S., M.S.D.  
Eugene, Oregon



Dr. A. J. (Jim) Wildman received his orthodontic training at Northwestern University. Throughout his professional life, Dr. Wildman has pursued the goal of improving orthodontic hardware. He developed the EdgeLok® ligatureless bracket and holds a number of patents concerning lingual orthodontics and ligatureless bracket design. Dr. Wildman has conducted his private practice of orthodontics in Eugene, Oregon, since 1955.

### Introduction

The Wildman TwinLock™\* System is the happy merging of three components: my locking mechanism, Ormco's twin-bracket design requirements and Dr. Charles Burstone's variable modulus concept. We have developed a true twin ligatureless bracket with no encumbering "pseudotwin" features (Figures 1-2). The lock is strong and easy to open and close with no special tools necessary (Figures 3-4). We feel that the Wildman TwinLock, when used with the new space-age wires in the variable modulus technique, has earned the right to be called a revolutionary improvement.

### History

**Setting Our Goals** – In May 1990, I approached Ormco Corporation with a ligatureless bracket design that I felt would be a proper replacement for my EdgeLok® bracket. I had been developing an improved bracket lock to replace EdgeLok for a number of years and was

pleased with the new design. I called this bracket "MiniLine" because it was very small incisogingivally (Figure 5). I hoped that the MiniLine would be thin enough and esthetic enough to be a good compromise between clear brackets and a bulky bracket like EdgeLok.

Ormco's market research, however, showed that I was probably on the wrong track. Ormco challenged me to adapt my MiniLine locking mechanism to produce a ligatureless Mini Diamond® bracket, so that the operator would not in any way need to change techniques. This bracket was to be an authentic Mini Diamond bracket, with the additional feature of a strong, trouble-free lock that would not require special opening or closing tools. Design constraints called for a lock that would not encroach on the tie areas of the Mini Diamond wings, so that Power O's and Chains could be used at the doctor's discretion (Figure 6). We found that the compact MiniLine locking mechanism fit

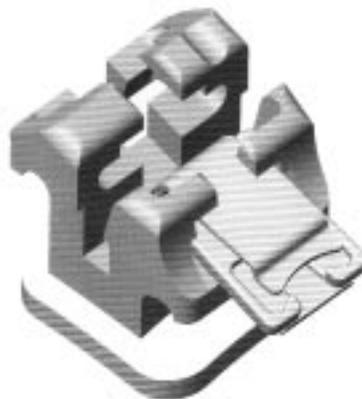


Figure 1. Wildman TwinLock bracket – open position.



Figure 2. Wildman TwinLock bracket – closed position.

# Lock Bracket

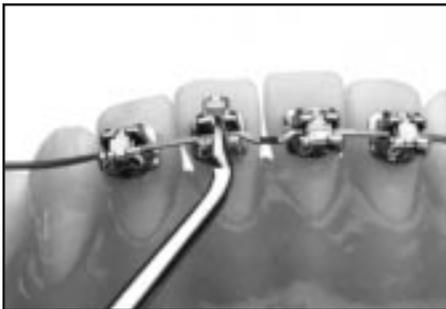


Figure 3. Open position.



Figure 4. Closing with cleoid scaler - no special tools required.

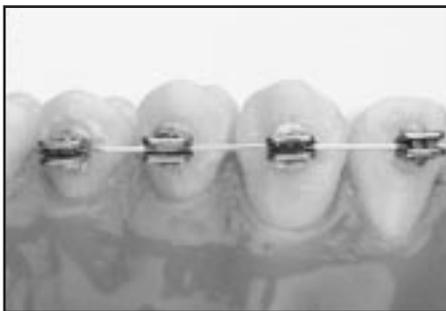


Figure 5. The MiniLine design focused on esthetics.

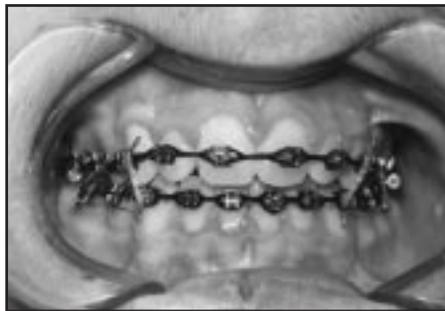


Figure 6. Wildman TwinLock is a Mini Diamond® twin bracket design, accommodating Power Chain (as shown) and providing all the working capabilities of a true twin bracket.



Figure 7. Early 1900s heavy archwires were bent to conform with the malocclusion and then gradually straightened as the case unraveled.

perfectly inside the Mini Diamond wings, making a ligatureless, uncompromised twin bracket possible.

**The Variable Modulus Concept** – By 1990, it was becoming apparent that the use of the remarkable new titanium alloy archwires of constant cross section and variable stiffness might replace the variable cross-section approach. Dr. Burstone called this the variable modulus concept. You may recall that in the early 1900s, orthodontic tooth movement was accomplished with heavy, stiff, full-sized archwires bent to conform to the malocclusion and then gradually straightened as the case unraveled (Figure 7).

This was replaced by the variable cross-section concept. Very light, ideal arch-

wires were placed to begin tooth movement. A progression of heavier and heavier archwires was placed to complete the case (Figure 8). We now begin with a nearly-full- or full-sized, very flexible archwire and proceed to archwires of increased stiffness. Since the new wires can work out over long periods of time, the weak link turned out to be the ties. Power O's decayed too rapidly and could not seat the new wires fully in the slot. With the variable modulus technique, steel ties bring their own set of problems. As they are cinched tight, they bind and produce a high degree of force. This creates a double whammy: a slowing of treatment progress and a tendency to peel the bonds off the teeth. The use of steel ties has played a larger role in bond failure

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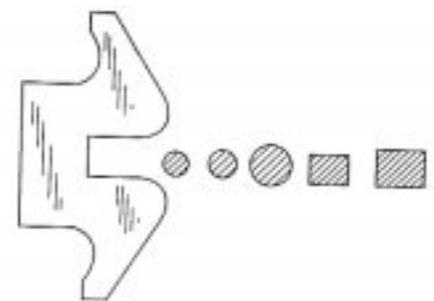


Figure 8. The variable cross-section approach to archwire mechanics.

# Dr. Wildman

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than most clinicians realize. To solve this problem, a strong, easy-to-use, ligatureless bracket system seemed to be the logical choice to complete the variable modulus system. With this system, archwires would not need to be changed for perhaps six months. If this could be accomplished, we felt we could call this new system a revolutionary step forward in efficiency. *In 1990, we could see that the superefficient archwires deserved a new, superefficient bracket.*

**Perfecting the Locking System** – During the eight-year development period, Wildman TwinLock went through several design changes. The original locking mechanism was a trip spring (Figure 9).\* It was adapted directly from the early wingless MiniLine design. The lock was very strong and positive, and the results of extensive clinical tests were extremely encouraging. However, some clinicians found the lock a bit difficult to unlock. It seemed that a special opening tool might be necessary. One of our goals was a lock that was easy to open and close, with no special tools needed, so we began to modify our lock to make it easier to open.

The next design was a compression-spring locking modification (Figure 10). The lock functioned beautifully – strong, positive and easy to open and close with a silky smooth action. However, it had one fatal flaw that was detected during the

typodont torture tests. The “oil can” spring fatigued after a number of opening and closing cycles. We discovered this problem during the typodont tests, so we did not clinic this design.

In our next attempt, we went back to the original design, but with a modification that allowed the lock to open and close smoothly and easily. Extensive clinical testing created no fatigue after repeated opening and closing cycling, so we knew we had a winner. Our test doctors gave us rave reviews. The design breakthrough was the replacement of the trip spring with a smooth shoulder spring that moved into a pocket to prevent fatigue during multiple cycling. After eight years of developing and testing, we feel that we have met the rigorous goals set forth in 1990 (Figure 11).

**Establishing the Design High Ground** – While we recognize that a number of talented teams are offering interesting and innovative designs to the profession, we feel that our team has distinct advantages. I had been working on ligatureless bracket designs for 35 years and had used my patented laminated prototype manufacturing technique to create many prototype designs, testing them on typodonts and in the mouth (Figure 12). This allowed us to identify and patent early on what we considered to be the best designs – to stake out the design high ground.

I want to thank Ormco design team members and co-patent holders Jim Reher and Larry Phaneuf for their major contributions to the project.

## The Wildman TwinLock Today *A True Rigid-Walled Convertible Tube* –

A distinct advantage is the in-front-of-the-archwire locking mechanism. To understand the design of ligatureless brackets, it helps to think of a bracket as a tube (Figure 13A), but with the labial wall removed as shown in Figure 13B. This wall must be replaced by a locking element, which must have some sort of shear relation to contain the archwire. We placed a locking slider in a channel in front of the archwire, creating an incisal and gingival shear area there. The slider consists of a filler that provides strength and a spring with a locking shoulder that engages a labioincisal shoulder during the locking cycle and is compressed into a pocket in the filler during the unlocking cycle (Figure 14). Since the archwire must be constrained from moving labially, labial shear areas just make sense. We have patented this design feature of the double shear in front of the archwire (Figure 15). If the locking element is in shear behind the archwire, there is an inherent tendency for the device to rock, producing sloppy dimensional control. Brackets with shear behind the archwire must be considered “pseudoconvertible” tubes.

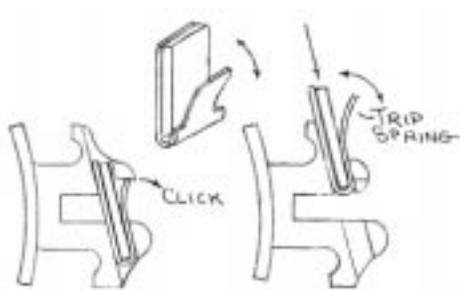


Figure 9. Trip spring locking mechanism of the first true twin bracket design was occasionally too positive and, consequently, difficult to unlock.

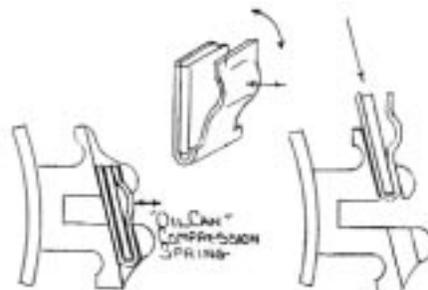


Figure 10. The second design with an “oil can” compression spring locking mechanism fatigued after a number of opening and closing cycles.



Figure 11. The third version replaced the trip spring with a smooth shoulder spring that moved into a pocket to prevent fatigue – the Wildman TwinLock, a true twin bracket with a superior locking device.

\*This illustration and following illustrations (except Figure 13) are original engineering drawings of Dr. Wildman's.

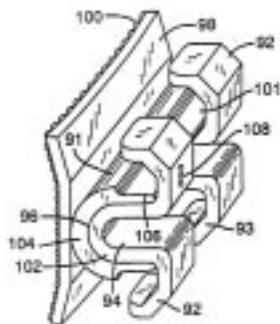


Figure 12. The laminated prototype manufacturing technique allowed the testing of many design concepts.

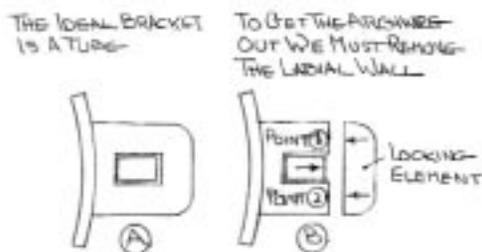


Figure 13. (A) The ideal attachment is a tube. (B) To remove the archwire, we must remove the labial wall. The Wildman TwinLock provides rigid metal-to-metal locking areas in front of the archwire (Points 1 and 2).

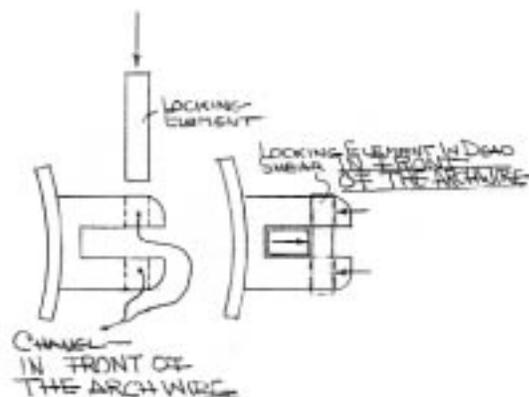


Figure 14. The Wildman TwinLock places a locking slider in a channel in front of the archwire, with the incisal and gingival shear areas providing a rigid labial wall.

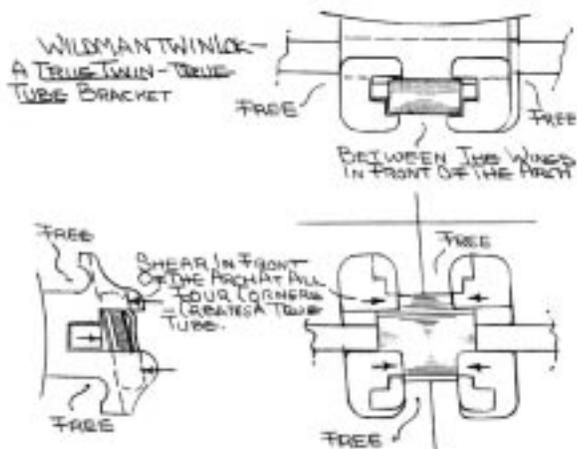


Figure 15. The locking design with a shear in front of the archwire creates a rigid-walled tube. A locking element in shear behind the archwire will be prone to rocking, reducing dimensional control.

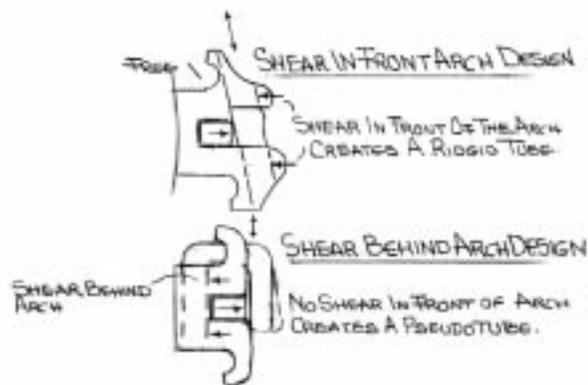


Figure 16. The position of the locking element in front of the archwire and between the wings frees all tie areas from locking element encumbrances.

### A True Mini Diamond Twin

(Modified Roth Rx - .018 or .022 slot) -

The slider assembly nestled between the wings does not encroach on the tie areas, making Wildman TwinLock a self-locking true twin Mini Diamond design. A locking element wrapped around the archwire both labially and lingually produces a pseudotwin, since it must occupy the same area as the tie wings (Figure 16).

There is one more interesting feature of the design. The recess in front of the slider is a perfect receptacle for the archwire to be tied to during the first appointment in the case of an extreme rotation that cannot be immediately engaged. My partner, Dr. Gary Chapman, has called this the

“doorstep.” He says that for these situations, he ties the wire in the doorstep at the first appointment, then invites the wire inside at the second appointment. Power O’s and ties can be used with Wildman TwinLock, just as with Mini Diamond. We try to get full engagement at the first appointment, but this is not always possible.

### Clinical Advantages

As a case begins, bonding Wildman TwinLock is easy, because we retain the unique diamond shape that helps the operator to visually reference the bracket to the incisal edge and the long axis of the tooth. Opening the diamond lock to receive the first archwire requires no

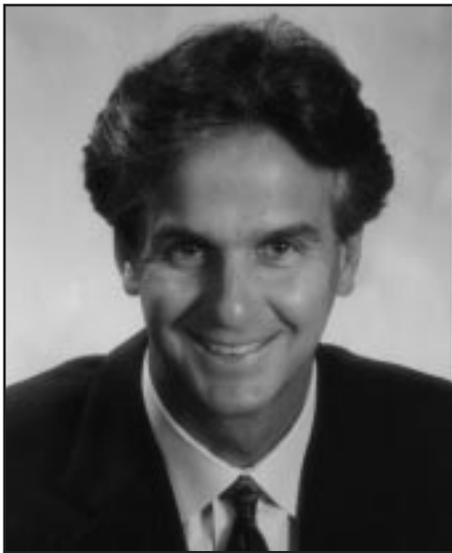
special instrument. Incisal pressure on the slider with a common cleoid scaler easily activates the unlocking action. Locking is equally easy. We found that most operators use a cleoid and an occasional fingernail to lock the archwire. This sounds unsophisticated, but our test doctors found that it works. Even though the lock was easy to open and close, our test doctors reported that patient tampering was not a problem.

The Wildman TwinLock works well when full-sized, shape memory or superelastic wires are used for the first arch in the variable modulus technique. To obtain

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# Matching the Herbst to the Malocclusion

## Three Types of Stainless Steel Crown Herbsts



by John R. (Bob) Smith, D.D.S., M.S.D.  
Winter Springs, Florida

The development of noncompliant orthodontic appliances, like the Herbst\* and Pendex, has simplified the correction of our most challenging cases. Additionally, the introduction of superelastic wires and sophisticated straight wire appliances has catapulted our profession to what Dr. Jim Hilgers has termed the "era of hyperefficient orthodontics!". Since integrating hyperefficient tools to our office in 1989, we have seen a profound improvement in the quality of care delivered to our patients and a steady easing of stress.

### Hyperefficiency and the Herbst Appliance

Sharing some of my personal experiences will help me illustrate the profound impact these hyperefficient modalities have had on my practice. During the mid '80s, I began my quest to eliminate one of the biggest headaches in the practice of orthodontics – noncompliance. At that time, the Herbst appliance was becoming more user-friendly, due to the work of such pioneers as Drs. Terry Dischinger, Joe Mayes, Dwight Damon, Bob Fry and

Bob Chastant. The stainless steel crown design emerged as the most consistent and durable form of Herbst appliance. Learning how to integrate this appliance into my practice was both challenging and exciting. I soon learned that the Herbst appliance and appropriately-timed treatment were the keys to consistent practice improvement.

Let's take a look at some of my office statistics from 1989 to 1997:

- Patients Seen Per Year 8% decrease
- Days Worked Per Year 15% decrease (157 days in 1997)
- Size of Staff 16% decrease
- Gross Collections 11% increase
- Profit 14% increase

Using all the components of hyperefficient and properly-timed treatment allowed us to increase the intervals between appointments; as a result, our daily patient load was reduced. Because we were seeing fewer patients, as we experienced the normal loss of staff members over the years, we were able to comfortably handle the patient care with a smaller staff. Because staff expenses constitute the greatest portion of our overhead, practice profitability dramati-

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Dr. John R. (Bob) Smith received his D.D.S. from Emory University in 1975 and his M.S.D. from the University of Washington in 1977. He received the Milo Hellman Research Award for his graduate thesis. An original member of the "Lingual Task Force," Dr. Smith has lectured and published extensively on lingual orthodontics as well as practice management, diagnosis and treatment planning, and early intervention. He maintains a full-time practice in Winter Springs, Florida.

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**Figure 1.** An open coil spring between the tubes on the cantilever arms increases arch length. Note the occlusal rests on the primary molars.

cally increased. Other benefits included reduced supply costs, increased appointment availability and reduced workdays. Our capacity for growth was enhanced, facilitating a 21 percent increase in new patient contracts over the last five years. Best of all, I went from three offices to one highly sophisticated and comfortable location. Focusing my energies on one office has proven to be less stressful and much more rewarding.

The Herbst appliance was the greatest contributor to these hyperefficient treatment improvements. Herbst therapy has evolved into a multifaceted discipline, the most efficient and consistent means for Class II skeletal and dental corrections. The purpose of this article is to explain my application of stainless steel crown-supported Herbst appliances.

All of us have experienced the time-consuming and frustrating experience of trying to generate better compliance with headgears, elastics or other removable appliances. I learned very early that *you don't get anywhere with criticism*. It is always better to avoid confrontation with patients and parents when there are materials and methods available to reduce the compliance issues.

While the Herbst has proven to be an

invaluable tool for the correction of Class II malocclusions, I still use headgear and elastics. During the new patient exam, it is usually possible to determine which patients will more likely cooperate with headgear. Occasionally, a particular case will need headgear traction to achieve an optimal result, such as a Class II malocclusion with procumbent lower incisors. Although a Herbst appliance will work in such cases, it places a mesial component of force on the mandibular teeth that can further procline the incisors. The key to using any orthodontic appliance is to understand its strengths and weaknesses. The clinician can then select the approach that best suits the needs of the patient. My goal has always been to select the course of treatment that requires the fewest appointments, has the lowest material costs, demands the least doctor time, allows maximum use of staff and, most important, consistently produces the best clinical results with the least patient discomfort.

Before I discuss the different types of Herbst appliances, it is essential to cover the most common clinical decisions that complicate and reduce their efficiency. The most common is to initiate Herbst treatment in the early mixed dentition. Due to the bulk of the appliance and the diminutive size of the patient,

numerous soft-tissue problems are typically encountered when the patient is young (ages 7-9). Because of the close proximity of the molar axles to the coronoid processes of the mandible, irritations of the buccal cheek tissues and parotid duct can occur. Additionally, using the cantilever Herbst design on patients this young can cause irritations at the corners of the mouth. At this early age, using the Herbst appliance for A-P correction is often unsuccessful, long-term. Ordinarily, the Herbst does an excellent job of altering the dentoalveolar and skeletal components throughout early childhood and adolescence. However, many patients experience varying degrees of relapse due to the continued expression of the original genetic growth pattern. Through evaluating numerous completed cases, Dr. Hans Pancherz determined that it is best to initiate Herbst therapy in the late mixed dentition. His studies suggest that good dental intercuspation at the end of Herbst therapy enhances the stability of the correction<sup>2</sup>. My clinical experience supports these findings.

## The Three Herbst Designs

I commonly use three types of Herbst appliance designs, each with its inherent strengths and weaknesses. Because I use stainless steel crowns to secure the Herbst to the dentition, understanding how the crowns influence the action of the Herbst appliance is essential in selecting which type to use for optimal results. No one design can be expected to effectively treat every Class II malocclusion.

### Type I Herbst

I use the Type I or cantilever design for early Herbst therapy (ages 9-11) prior to the eruption of the mandibular first bicuspid. There are four instances where I use the Type I Herbst: first, for the young patient who has an emotionally debilitating Class II malocclusion that demands correction to enhance the patient's self-esteem; second, the Class II openbite case; third, the Class II case with a significant arch-length deficiency and deviation of the dental midlines; and finally, the extraction case.

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## Dr. Smith

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Figure 2. The archwire tubes should be occlusal to the cantilever arms.

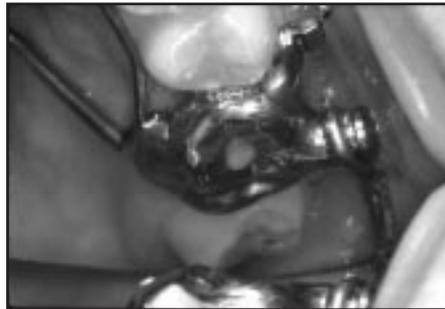


Figure 3. A tube on a short cantilever arm mesial to the maxillary crowns simplifies archwire management.

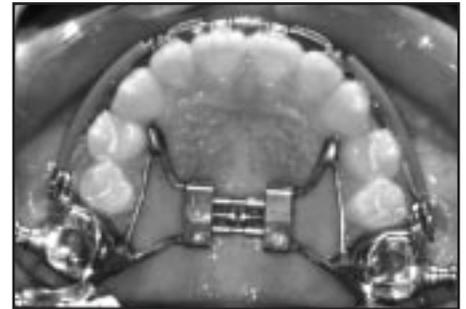


Figure 4. The RPE is soldered only to the first molar crowns.



Figure 6. The type II Herbst design.



Figure 7. The crown and band are soldered to an .045 stainless steel wire.



Figure 8. A tube can be placed under the crown axle to facilitate archwire placement.

Let's look at the unique components of this Herbst design. Cantilever arms extend mesially to the contact points of the first molars and primary canines. Care must be taken not to extend the arm too far forward in order to avoid irritation of the cheek tissues and bulges at the corner of the mouth when the patient smiles. An .045" stainless steel lingual wire connected to both lower molars, with occlusal rests on the primary second molars, gives rigidity to the lower portion (Figure 1). These rests are usually placed through the lingual grooves of the mandibular primary second molars and rest on the occlusal surfaces. Their purpose is to stabilize the entire lower Herbst unit by minimizing the rotational moment generated by the action and direction of the rods. To facilitate placement of lower archwires for lower incisor alignment, an .022" x .028" tube can be placed occlusal to the cantilever arm.

This tube should always be placed occlusally to simplify distal archwire management (Figure 2). I have

found no clinical advantages in placing the tube gingivally.

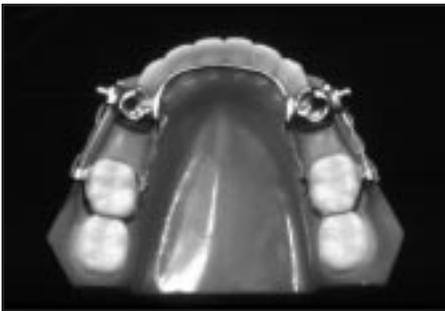
Maxillary components include crowns on first molars. These crowns can have mesially extended archwire tubes that enable the placement of utility archwires to manage the alignment and torque of the incisors (Figure 3). Most Class II cases need maxillary expansion to properly align the mandible to the maxilla; I usually incorporate it with most Class II therapy, irrespective of the orthopedic appliance used to correct the antero-posterior discrepancy. A rapid palatal expander (RPE) is attached to the first molars with .045" stainless steel wires extending mesially to the primary first molars (Figure 4). The stainless steel crowns, due to their occlusogingival height and infringement on the freeway space, help prevent extrusion of the maxillary first molars during expansion. In young patients, it may be necessary to move the axle to the mesial aspect of the maxillary crowns to prevent impingement

of the tissue over the coronoid processes during excursive movements of the mandible. Placing the axle in the middle of the buccal surface of the crown or to the area over the mesiobuccal cusp can make screw insertion and tightening easier. Many Herbst designs position the axle on the distal aspect of the crown or even on a short cantilever extending the axle more distally. Although these designs usually work on older patients, the young patient needs careful evaluation prior to Herbst fabrication to determine where to place the maxillary axles. As the axle is moved mesially on the crown, the overall rod length is shortened, which may cause frequent rod disengagement on opening. Axle position and rod length need to be carefully balanced to ensure comfort and success with the Herbst appliance.

All crowns should have a 3 mm hole over the mesiobuccal cusp to facilitate crown removal with the AEZ Chastant Crown Removing Plier (Ormco #803-0610). Removal of the upper and lower units



**Figure 5.** The vertical cut should be placed where it is easily accessible with a plier or bur.



**Figure 9.** Type II Herbst design using power chains to close bicuspid spaces.

during the fitting and trying process is difficult without the aid of the occlusal holes and plier. Microetch the interiors of all crowns to enhance cement adhesion. Failure to microetch their interior can present difficulties with cement removal, particularly with the dual-cured glass ionomer cements. Most of the cement will remain on the teeth rather than the crowns, creating a cleanup nightmare. A 2 mm vertical cut at the buccal or mesiobuccal line angle at the gingival margin of the crown facilitates removal following Herbst therapy (Figure 5). When removing the crowns, use a #556 high-speed bur to connect the vertical gingival cut with the occlusal hole; then extend the cuts to the distal marginal ridge of the crowns. Use the crown removal plier to pop the crowns loose. Another effective plier is the AEZ Crown Slitting Plier (#803-0430); use the sharpened point to split the crown from the gingival vertical cut to the occlusal surface of the crown. Use the Chastant Crown Removing Plier to remove the lower

Herbst unit. After splitting the crowns with a bur or plier, place the plunger of the plier on the occlusal surface of the erupting first bicuspid, with the carbide tip under the cantilever arm. Apply a gentle fulcrum force to this area to remove the crown with little patient discomfort.

### Type II Herbst

I use the Type II Herbst most often in my practice. This design is extremely esthetic and comfortable. The major design difference between Type I and Type II is in the mandibular portion. With the Type II design, crowns are placed on the first bicuspid rather than first molars. Bands are placed on the mandibular first molars (Figure 6). Solder the crowns and bands to an .045" stainless steel lingual wire to consolidate the lower portion into an anchorage unit (Figure 7). To allow archwire placement for aligning the lower anteriors, place an .022" x .028" tube under the axle screw on the bicuspid crowns (Figure 8). This is also helpful if the .045" stainless steel lingual wire breaks between the bicuspid. If this occurs, brackets can be placed on the incisors and cuspids to gain stability and anchorage in the lower arch. Also, if the lingual wire breaks between the bicuspid and molars, a buccal .022" x .025" stainless steel segmental wire can be placed to accomplish the same objectives.

I have found Type II to be the most durable and hygienic design. Since it is attached to the lower first bicuspid, it forces the clinician to wait for the patient to develop further before starting treatment. The Herbst has been found to be more successful in patients between 10 and 14, when they are approaching maximum pubertal growth. I have also found the A-P corrections to be more attainable and stable when treatment is initiated in that age range. The intraoral environment is more conducive to Herbst therapy in larger patients. The maxillary portion of Type II is the same as Type I.

The key to successful Type II treatment is to time treatment so that after the 12

months of Herbst therapy, the bicuspid and canines are in their final eruptive phase. I feel that once these teeth have erupted into a solid Class I occlusion, the overall A-P correction will be more stable.

### Type III Herbst

The Type III Herbst design is the same as Type II except for not including rigid connections between the mandibular bicuspid crowns and molar bands. It is used in cases where mandibular first molar or second bicuspid spaces are to be closed, especially in maintaining lower anterior anchorage as the posterior teeth are moved mesially. Use closing loop archwires or sliding mechanics for space closure (Figure 9). I have found this particular design to be very helpful in the treatment of Class I or Class II patients with congenitally missing mandibular second bicuspid. It is possible to move the molars mesially and still maintain a Class I cuspid relationship. The resultant occlusion in either case is a Class III molar and Class I canine relationship, assuming no maxillary bicuspid are extracted. Again, the maxillary portion of this type of Herbst is the same as the previous designs.

## Type I Herbst Therapy for Nonextraction Cases

Now that we have a general understanding of the various Herbst types, let's look at the specific details of the Type I design for nonextraction cases:

- Case Selection
- Fabrication
- Placement
- Typical Treatment Protocol
- Case Examples
- Retention

### Case Selection

Prior to fabricating any Herbst appliance, a careful intraoral evaluation should be made to recognize any potential problems that might modify either the timing of treatment or the design of the appli-

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ance. Because the Type I Herbst is attached to the permanent first molars, they must be fully erupted and accessible prior to attempting placement. A common error using the Type I design is to attempt placement when there is still tissue over the distal marginal ridge of these teeth. This produces significant patient discomfort and is a common emergency associated with Herbst therapy. At this visit, a determination is made as to where to position the maxillary axles for ease of

screw placement. The cheek should be retracted as far as possible to ensure there is adequate access for the screw and wrench. At what stage of dental development is it appropriate to use the Type I Herbst? The answer to this question can have a tremendous impact on the outcome of Herbst therapy and the level of discomfort. Type I Herbst therapy should be initiated when the patient's mandibular primary first molars are in the final stage of exfoliation. At this time, the patient's

oral environment can usually accommodate the Herbst appliance. Occasionally, the permanent mandibular canines will precede the eruption of the bicuspid. Treatment should be initiated before severe canine displacement occurs. An advantage of using the Type I Herbst at this stage of dental development is that it provides the ability to gain arch length. We often encounter cases where the dental midlines are incongruent with the facial midline due to an arch-length

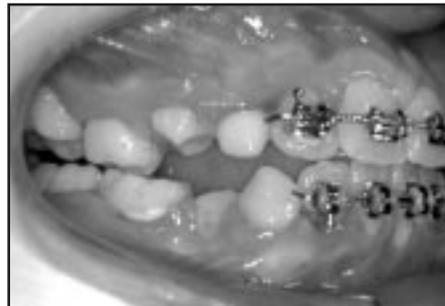
# Case Illustration – Type I Herbst Therapy



This 9-year-old patient exhibits a dolicofacial pattern with hypermentalalis muscle behavior.



Note pretreatment Class II anterior openbite malocclusion.



Occlusion immediately after Type I Herbst removal. Note openbite between first molars.

deficiency in one or both dental arches. The Type I Herbst is excellent for modifying the transverse and A-P relationships of teeth in both arches. Expanding the lower lingual wire prior to cementation increases mandibular arch length. Using an RPE increases the maxillary transverse dimension. Additionally, because upper and lower archwires can be placed between the tubes on the upper molars and cantilever arms, open-coil springs can be used to move the incisors to the

desired position (Figure 1). In cases with mandibular skeletal asymmetry, the mandible can be incrementally moved using different shim lengths. It is possible to make mandibular positional adjustments to align the skeletal structures with the facial midline.

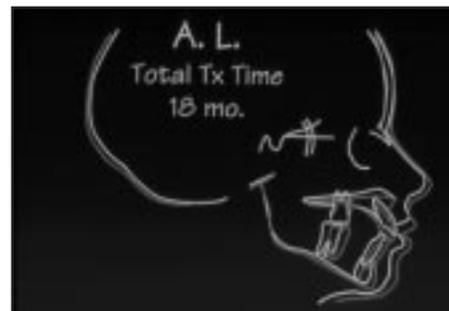
Many orthodontists begin expansion therapy when lower incisors erupt into inadequate space for proper alignment. Because the Type I Herbst is so effective at

resolving arch-length deficiencies and Class II malocclusions, it is tempting to start Herbst therapy at that time. But a decision to start Herbst therapy at such a young age will predispose both the patient and orthodontist to many problems. Tissues around the first molar and cheek areas are affected by the bulk of the appliance. It is best to remove primary canines to allow autonomous alignment of the incisors. Patients can be seen every 6 to

continued on following page



Occlusion after primary second molar occlusal reduction. Maintaining the maxillary incisors in their original position or placing them slightly forward and intruded would have allowed additional autorotation of the mandible (see Figures 11-13).



Posttreatment result with associated superimpositions. Patient has an improved smile with normal mentalis muscle function. She will need a free gingival graft facial to the lower incisors.

## Dr. Smith

continued from preceding page

12 months until they are more mature and the mandibular primary first molars are exfoliating. Overall treatment efficiency will be enhanced when combined with a prudent approach to patient management.<sup>3,4</sup>

### Fabrication

The Type I Herbst can be fabricated directly in the mouth or indirectly on the models. I prefer the indirect approach because the appliance can be fabricated in its entirety on models. This reduces chairtime dramatically compared to the direct approach where crowns are fitted and the appliance is fabricated while the patient waits. Also, it reduces the time and discomfort the patient endures during the fitting of the crowns.

Specific laboratory instructions are necessary to ensure the proper advancement of the mandible. Simply take upper and lower impressions. I typically do not send a bite registration to the laboratory. I ask them to advance the mandible to an end-to-end incisor relationship, but no more than 8 mm. During the course of Herbst treatment, our office will make any additional advancements. Every doctor should have a shim kit that allows incremental advancement of the mandible. In cases with overjets of 12 mm or greater, it is necessary to change the entire rod mechanism to enable adequate mandibular projection without constant disengagement of the rods. Learning the range of activation and timing of rod replacement comes through experience and careful questioning of the patient. I typically advance the mandible in 1 or 2 mm increments. The maximum forward projection of the mandible should not exceed an end-to-end incisor relationship. It is not necessary or desirable to place the patient in an anterior crossbite; not only is it uncomfortable, but it invariably requires explanation to the parents and patients. One of the common errors in rod length adjustment is to make the male portion of the rod mechanism too long. If the male portion extends more than 2 mm beyond the distal aspect of the female tube, impingement of the buc-

**“My goal has always been to select the course of treatment that requires the fewest appointments, has the lowest material costs, demands the least doctor time, allows maximum use of staff and, most important, consistently produces the best clinical results with the least patient discomfort.”**

cal tissues can occur. Prior to sending any cases to the laboratory, it is best to request their forms and ask what materials and information are needed for proper fabrication of the appliance. The quality of the Herbst appliance is a by-product of the understanding and communication between the laboratory technician and orthodontist.

In the indirect technique, the laboratory will trim the molars on the plaster models to facilitate sizing of the crowns. Once the crowns are trimmed and sized, they will solder occlusal rests and the RPE to the lingual wire. If you would like to use .032" hinge cap attachments on the first molar crowns, it is a simple process for the laboratory to weld them in place after sizing. The hinge cap brackets require laboratory fabrication of the RPE with .032" x .032" stainless steel lingual wires. The beauty of using the hinge cap brackets is in simplifying removal of the lingual wire and RPE. Their major weakness is the nonrigid connection of the RPE to the stainless steel crowns. Since the .032" x .032" wire does not fully engage the bracket slot, there is a tendency to lose molar torque as the appliance screw is activated. Because the RPE and crowns are cemented as one unit, third-order bends can be placed in the wire prior to cementation to enhance buccal root torque to the maxillary first molars.

### Placement

Once the Herbst appliance returns from the laboratory, it is a simple process to try

in the appliance and crimp the gingival margins of the crowns with the AEZ Crown Forming Plier (not yet available for purchase). To enhance retention, I use glass ionomer cement on all portions of the Herbst. The maxillary arch must be expanded prior to cementing the lower unit due to the buccolingual dimension of the cantilever arms. This is necessary to prevent the axle arms of the female portion, which are attached to the maxillary first molar crowns, from hitting the cantilever arms extending from the lower first molars. This premature contact could place the maxillary first molars in hyperocclusion and prevent the patient from completely closing. I will typically expand the RPE 28 to 34 turns, depending on the pretreatment maxillary width. I usually see the patient in three weeks to allow time for expansion and appliance accommodation. A semirigid light-cure material, Barricaid™ (visible light-cure periodontal surgical dressing – Calk/Dentsply), is applied over the axles to smooth the contours of the appliance. I give written instructions explaining the expansion process to the parent and patient. With careful and complete education, we have experienced very few problems during the early stages of Herbst therapy.

I schedule the patient for cementation of the lower unit three weeks after the initial placement of the Herbst. If bonding of brackets is necessary to align the incisors, do it at this appointment. After the lower unit is tried in, crimp and contour the crowns and bands to ensure proper

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# Cookbook Bonding, Indirectly



by **William M. Odom, D.D.S.**  
**San Mateo, California**

Composite technology has had a dramatic impact on orthodontics. The ability to bond directly or indirectly to natural and artificial tooth surfaces has changed the diagnosis and treatment planning of orthodontic cases as well as the day-to-day delivery of care. Bonding indirectly to the tooth surface has been an enticing protocol from the days of the Sugar Daddy and Elmer's glue to the breakthrough in heat-cured resin technology that we have today.

The promise of bonding indirectly is that it will result in more accurate bracket placement. It offers the ability to:

- view the tooth from all perspectives.
- take into consideration any special circumstances, such as incisal and cuspal wear and the need for additional rotation, tip or torque.
- see unusual tooth form, etc.

Bonding indirectly allows the clinician to use his or her experience and skill to place the bracket in the most advantageous position in a clear, unobstructed field, without concern for patient comfort, field isolation or fiddling with the bracket during the gel stage.

Today we can bond from second molar to second molar on virtually any tooth sur-

face, natural or artificial, and we can do it indirectly with a minimum of doctor time or patient discomfort.

Why, we might ask, if indirect bonding is so great, do only 7-10 percent of the orthodontists routinely bond indirectly?

A great many more have tried it, with little success.

What went wrong?

Well, actually some or most of the brackets fell off.

And why is that?

It is really the challenge of technique and training. All bonding has some technique sensitivity, even with the new hydrophilic resins. Bonding indirectly is a bit more sensitive because there are some additional steps. The preparation of the tooth surface is the same. How the field is isolated may be different and the preparatory work in the lab is different.

After diagnosis and treatment planning, arguably, the most important single doctor procedure is getting the brackets on the teeth in the most ideal position. The most valuable time in the office is the

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Dr. Bill Odom received his D.D.S. from the University of the Pacific in 1964 and a certificate in orthodontics from the University of Oregon in 1969. He has published some and lectured a bit on the paperless office, imaging in orthodontics and bonding. Dr. Odom is a member of the orthodontic faculty at UOP and maintains private practices in San Mateo and Half Moon Bay, California.

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doctor's chairtime. Bonding indirectly saves the most valuable time in the office and allows the single most important procedure to be done more accurately.

The following protocol works! Do we have bond failures? Yes! Do we ever need to reposition brackets? Yes! Do we have more problems when a new staff member is being trained? Yes! However, the ease, accuracy and savings in doctor time outweighs the additional time spent by the laboratory team.

The procedure to be described uses a single silicone tray. For those of you who previously heard me speak about bonding indirectly, you may remember that we utilized a two-tray, piggyback system when simultaneously bonding upper and lower arches from second molar to second molar. That is the neatest procedure imaginable. It is, unfortunately, a very laboratory intensive procedure. For my practice, I did not feel that the savings in doctor time warranted the additional lab time and costs. However, it is really slick. If you are interested in the protocol, call my office at (650) 342-4171 and we will send you an outline.

The recipe that follows has evolved over the last couple of decades while I was trying to find an easier and better way to put brackets on teeth. It is the most user-friendly recipe to date. It works! It is simple, accurate, predictable and cost effective. It requires the least additional investment in materials and equipment.

The composite breakthroughs are Therma-Cure™, the heat-cured resin that forms the custom base between the model and the bracket, and Custom I.Q.™, the two-part, unfilled resin that forms the interface between the custom base and the tooth surface. The appliance breakthrough is Orthos™\* Ormco's recent improvement in the field of preadjusted orthodontic appliances. The improved accuracy of bonding indirectly, combined with an appliance that has solved most of the problems associated

## "Bonding indirectly saves the most valuable time in the office and allows the single most important procedure to be done more accurately."

with the original preadjusted designs, gets us one big step closer to meeting the biggest challenge: making the teeth fit together well at the end of treatment.

The great news about Therma-Cure is that brackets can be placed by the assistants and repositioned by the doctor without concern for the material setting until heated. All flash can be seen and removed. The custom base closely approximates the tooth surface, making the bracket-resin, resin-tooth interface as thin as possible. (If days elapse between placing and repositioning the brackets, the material will dry out and you will need to place fresh resin on those brackets that need to be moved.) The end result will be brackets on the model with no flash and a thin tooth-bracket interface.

The great news about Custom I.Q. two-part, liquid unfilled resin is that it adds virtually no thickness to the tooth-bracket interface. The clinical effect of the preadjusted appliance will be expressed more accurately, the strength of the bond is enhanced and posttreatment cleanup is simplified. The biggest challenge to mastering bonding is the "Yeah, but..." reflex. If you are inclined to give this recipe a try, I have a strong recommendation: *suspend disbelief!* This really is "cookbook." Before you start changing the recipe, master this way first. Then you can change the ingredients, one thing at a time.

### Tips, Secrets and FAQ's

- Start by bonding indirectly from second bicuspid to second bicuspid. Wait until that is mastered before you try second molar to second molar.
- No, you don't need to use a silicone

impression material instead of alginate to get an accurate model. You do need to use a quality alginate, to mix properly and to pour immediately. We use Basis™ (Ormco) alginate and wrap in a wet paper towel until poured. A good working model is the first critical step.

- The model really does need to be dry. If not, the brackets will not bond well to the model when it is cured and will come loose when you make your tray.
- Yes, put three thin coats of liquid foil on the model, allowing it to dry between coats. We put a hash mark on the base of the model each time a coat is placed to keep track of the number of coats. If not, the plaster may adhere to the custom base, making it harder to microetch. Only the liquid foil residue should remain on the base when the tray is removed from the model. No plaster.
- The human eye finds the center of an object most accurately. That's why sella is the reference point with the least potential for error. It is easier for the assistants to place the bracket in the center of the clinical crown than to train them to consider the anomalies of tooth position and form to draw reference lines. Yes, the doctor can draw the lines and assistants can learn to draw them, but why?
- If the position of the tooth does not allow the bracket to be properly placed, first position the bracket to level the tooth. Once the tooth is level, the bracket can be repositioned to align it.
- The thermostat on the toaster oven is not accurate. Use a thermometer. What do you expect for \$40?
- No, you do not need to use both light-bodied and heavy-bodied silicone impression materials. The heavy body alone is fine, but the tray needs to be trimmed as described.
- Honestly, the assistants will make a

better tray if they are trained to place small pinches of the silicone over the brackets instead of making a long roll and laying it over the brackets. It will have fewer voids and an adequate bulk of material over the brackets to resist deformation when you place and hold it in the mouth.

- Adding a handle to the tray will keep your fat little fingers away from the teeth and allow an unobstructed view of the arch when placing the tray. Always mark the midline on both the tray and the handle.
- Making the tray the day that it is to be delivered assures that the silicone will not dry out and will remain supple, making removal easier.
- If you don't soak the tray long enough for the tray to separate easily, plaster may adhere to the custom bracket base.
- Look carefully at the picture of the trimmed tray. Exposing the wings of the brackets and making small cuts between each wing and facially make removing the tray a less threatening event. A bulky, under-trimmed, rigid tray may cause the

brackets to be removed when the tray is removed.

- If trimmed as suggested, the tray does not need to be cut or sectioned with a blade to remove it.
- If the field is isolated properly, the entire arch can be bonded from second molar to second molar at one time without sectioning the tray and doing one side at a time.
- No, you don't have to pumice the teeth; a rubber cup is sufficient. If the teeth are really dirty, put the patient on a hygiene program before bonding.
- I recommend etching from 15-30 seconds.
- Failure to rinse and dry thoroughly reduces bond strength.
- We dry with warm air and don't use air/water spray because of the high probability of having moisture (or oil) in the air supply. Yes, we do have a top-of-the-line dental compressor with an air dryer.
- Thin coats of Custom I.Q. are applied to the tooth surface and to the bracket base only. Do not coat the entire inside of the tray with the resin – only the bracket itself. Polymerization will occur under

the bracket base. The conditioned but unsealed enamel will begin remineralizing as soon as it is exposed to the saliva.

- When bonding to gold, amalgam or stainless steel, microetch for two to four seconds with 50-micron aluminum oxide from Danville Engineering and apply an intermediate resin. We use Enhance™ by Reliance.
- When bonding to porcelain, microetch two to four seconds with 50-micron aluminum oxide. Condition for one minute with 37 percent phosphoric acid; do not rinse. Apply two coats of Ormco's Porcelain Primer (silane), rinse thoroughly, dry thoroughly and continue with indirect technique.

If you would like to have a separate copy of the step-by-step pages with illustrations to use for training or to put up in the lab, call Ormco at (800) 854-1741, Ext. 7573, or (714) 516-7573 and they will send an extra copy of *Clinical Impressions*.

Remember, the hardest part of the cookbook is following the recipe.

# Dr. Odom's Indirect Bonding Recipe

## The Ingredients

### Lab Procedure

- Accurate Stone Models
- Liquid Foil and Brush
- Disinfectant
- Mixing Pad and Scaler
- Flat Toothpicks
- Bracket Holder
- Brackets (Ormco)
- Therma-Cure™ (Reliance)
- Toaster Oven w/Thermometer
- Timer
- Silicone Impression Material: Citricron® – Heavy Body Base and Accelerator (Kerr)
- Bowl and Hot Water
- Bard-Parker Blade
- Microetcher w/50 Micron Aluminum Oxide (Danville Engineering)

### Clinical Procedure

- Basis™ Alginate (Ormco)
- Glasses and Bib
- Cheek Retractors (Nola™)
- Rubber Cup (Denticator™)
- Water Syringe and Saliva Ejector
- Dappen Dish, Cotton Pliers, Pledgets
- Mixing Pad and Brushes
- 37% Phosphoric Acid
- Custom I.Q.™ (Reliance)
- Enhance™ (Reliance)
- Porcelain Conditioner (Ormco)
- Dri-Angles® (Dental Health Products)
- Warm-Air Dryer
- Plastic Conditioner (Reliance)
- Silicone Tray w/Brackets
- Timer



### The Impression

- Polish teeth w/Denticator. Rinse with mouthwash.
- Mechanically spatulate a good quality alginate.
- Take an accurate impression that shows alveolar anatomy.
- Spray with disinfectant and pour immediately.

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# Dr. Odom

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## The Model

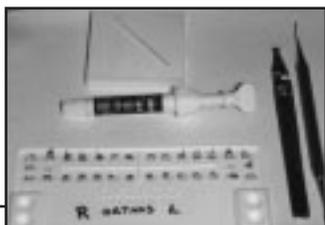
- Pour w/stone – not plaster.
- Mix under vacuum to avoid bubbles and voids.
- Trim back of model parallel to occlusal plane to make bracket placement easier to visualize.



- Thoroughly dry model! Bench drying overnight is best, or you can place under lamp or in oven for a short time. Do not completely desiccate the plaster.
- Remove any air bubbles at gingival margin that might interfere with bracket placement.
- Coat three times w/liquid foil; dry between coats. Put hash marks on back of model to track number of coats.

## Materials for Lab Procedure

- Therma-Cure by Reliance.
- Brackets – Orthos™\* byOrmco.
- Bracket holder.
- Flat toothpicks.
- Pad and scaler.

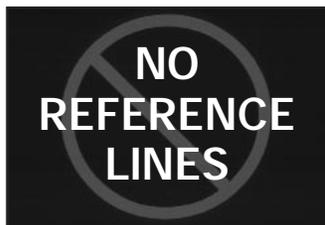


## Therma-Cure

- Heat-cured resin allows assistant to place brackets and leave until convenient for doctor to adjust position.
- Brackets remain adjustable until heat cured. Eventually, the resin will dry out.
- If working model sits for several days, add new Therma-Cure if major repositioning of any brackets is needed.

## Model Preparation

- Already coated with three coats of liquid foil.



- Do not draw reference lines. It is easier to train staff to place bracket in the middle of the tooth than it is to draw appropriate reference lines.
- The doctor can use a gauge, if desired, when deciding precisely where this bracket should be on this patient.

## Bracket Preparation

- Microetch bracket base where appropriate.



- Apply Therma-Cure to base.
- Be certain to thoroughly fill mesh with resin.

## Bracket Placement

- Assistant places bracket on tooth as doctor prescribes.
- The human eye is very adept at finding the center of things.



- Assistant places bracket in the center of the tooth.
- Press firmly and remove all the flash.
- Set model aside for doctor to reposition as needed.

## Doctor Repositions Brackets as Needed

- The bracket is in the center of the tooth, all cleaned up, without any flash.



- You can now reposition the bracket with all those special considerations that each patient brings.

## The Cure

- Preheat toaster oven to 325°-350°.
- If curing a number of models at the same time, increase the temperature.
- Cure for 20 minutes at 325°; this causes the resin to cure.
- Open the door of the toaster



oven, turn off the heat and allow to cool.

## Custom Silicone Tray

- Use Citricon.
- Heavy Body Citricon is the only material needed if the tray is made and trimmed properly.



- Mix putty with accelerator using fingers (will stick to gloves).
- If the mix is setting too quickly, stop, make another mix and add on (next time use less accelerator).

## Fabricating the Tray

- Place small pinches of Citricon around each bracket to prevent voids.
- Build a wedge-shaped bulk over the brackets.
- Cover the occlusals and linguals of the teeth.



- Extend tray one tooth distal to the last tooth to be bonded unless bonding 7-7; this stop assists in seating the tray accurately.

### Add a Handle

- After covering the teeth, use a sectioned tongue blade to fabricate a handle.



- If the material is set, the handle can still be added.
- The handle keeps your fingers away from the tray and the teeth while seating the tray, thus avoiding possible contamination; it also makes it easier to see the arch.

### Removing the Tray From the Working Model

- Soak in hot water for 10-15



- minutes or until tray comes off model easily.
- Separate tray from the model.

### Trimming the Tray

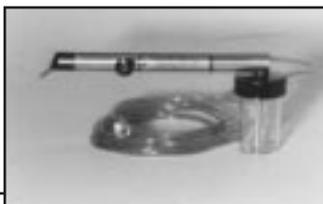
- Use Bard-Parker blade to trim material from base.
- Carefully expose each bracket wing and hook.
- Trim lingual of tray material above the tissue margin.



- Remove interproximal interferences that might interfere with seating of tray, e.g., severely rotated or displaced teeth.
- Make a small cut between the wings and to the facial of each bracket.

### Finishing the Tray

- Microetch the custom base to remove the liquid foil only.



- Do not remove the Thermo-Cure base!
- Mark the centerline of the tray to help orientation when seating.

### Clinical Setup for IDB

- IDB tray
- I.Q. Sealant A & B by Reliance (very short gel time and specifically for indirect bonding).
- Glasses, cotton pliers, pledgets, Dri-Angles, bonding brushes, plastic primer and Denticator.



- Tooth conditioner, 37% phosphoric acid.
- Warm-air dryer, cheek retractors and water syringe.

### Clinical Procedure

- Place glasses.



- Place cheek retractors (preferably from Nola – they are easier to remove after the doctor places the tray).
- Place Dri-Angles.

### Preconditioning Preparation

- Prophylax teeth with Denticator or rubber cup and water only.



- Rinse thoroughly, 10-15 seconds/tooth. You do not need to use pumice or polyacrylic acid unless the teeth are covered with plaque.

### Conditioning the Teeth

- Condition each tooth for 15 seconds, no more than 30 seconds.



- Dab the surface with conditioner; don't wipe it.
- You need to move very quickly to get from 7-7 and start rinsing within the 30-second limit.
- Conditioning longer does not increase bond strength.

### Rinsing the Teeth

- Rinse the surfaces of all teeth very quickly from side to side.
- Then go back and rinse each tooth for another 10-15 seconds.

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# Dr. Odom

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- Thoroughly! Thoroughly! Thoroughly! Rinse each tooth!
- Leaving conditioner on the tooth surface will decrease bond strength.



## Warm-Air Dry

- Thoroughly! Thoroughly! Thoroughly! Dry each tooth with a warm-air dryer!
- Moisture contamination is the primary culprit in bond failures, both direct and indirect.
- Compressed air from your air syringe may have water vapor or oil vapor as a contaminant.

## Tooth Preparation

- Paint a thin coat of I.Q. Sealant A on the face of each tooth.



## Tray Preparation

- When you hear the warm-air dryer, it's time to move toward the chair.
- Each custom base has been previously primed with plastic conditioner and



- allowed to air dry for at least 60 seconds.
- The doctor paints a thin coat of I.Q. Sealant B onto the custom base while the assistant is painting the surfaces of the teeth.
- Do not cover the silicone tray with sealant or allow the sealant to pool in the tray.

## Tray Placement

- As the doctor paints the sealant, the assistant gives the patient instructions about what is to happen so they don't open their mouth before the doctor is ready to place the tray.



- The assistant controls the lips by pushing up when seating an upper tray and pulling down for a lower tray.
- The saliva ejector is removed. To avoid contamination, remove over the upper teeth when placing a lower tray and over the lower teeth when placing an upper tray.
- The doctor places the tray.

## After Tray Placement

- The cheek retractors are removed by squeezing them



- together as the doctor holds the tray in place.
- Pressure is applied to the tray from the facial and occlusal as far back as there are bonds being placed.
- The doctor holds the tray for one minute and the assistant waits another three minutes before removing the tray.

## Tray Removal

- Remove the Dri-Angles.
- Starting at the second molar, the tray is teased down with a scaler around the arch perimeter.



- If the interproximal and facial cuts have been made properly, the tray will come off easily and the brackets won't.

## Ready to Place the Archwire

(We start with a 35° Copper Ni-Ti™.)



maximum performance from the new wires, it is important to get full engagement as soon as possible. Steel ties are to be used with discretion. As they are cinched, they bind the system, creating a force that tends to pull the bracket off the tooth. We call this "cinch and shock." The Wildman TwinLock allows the operator to seat the wire in the slot without binding and, at the same time, to lock the slider in place. The seating force can then be gently released. We call this "seat and lock," as opposed to "cinch and shock." The archwires are then free to work out to their full potential (Figures 17-18). Early, full engagement requires a strong locking mechanism. During the design phase, we tested for strength by locking in a full-sized superelastic wire that would logically be used as a starting wire, and then we bent it at a right angle (Figure 19). We

continued on following page



Figure 17. Patient K.B.: Initial bonding on June 19, 1997. Wildman TwinLock design allows full engagement of a 40° .019 x .025 Copper Ni-Ti archwire (.022 slot). Reproximation of lower anteriors was done at this visit.

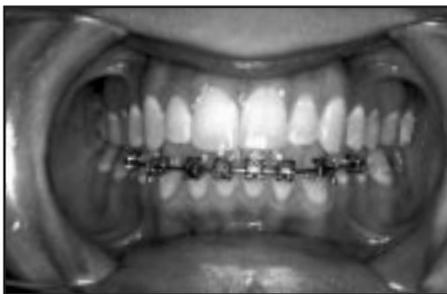


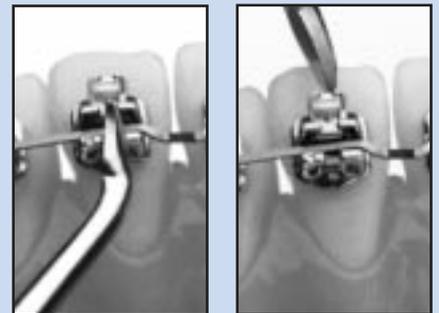
Figure 18. Patient K.B.: Second appointment on July 31, 1997. Reduced friction of the ligature-free Wildman TwinLock provides more efficient tooth movement compared to traditional twin brackets.

## The Wildman TwinLock Bracket- Revolutionary Design Speeds Treatment While Reducing Chairtime & Bond Failure

**Quicker Treatment:** Wildman TwinLock's superior, patented mechanism locks in the archwire, reducing friction 40 to 50 percent by eliminating steel ligature ties. An additional advantage is that, unlike elastomeric ties, it doesn't deform, allow the archwire to protrude outside the slot and produce even higher friction. Wildman TwinLock's labial slider creates a solid wall that does not intrude into the slot, permitting archwires to work out to their full potential. Ideally suited for the application of variable modulus mechanics, the Wildman TwinLock™ provides a solid channel free of tie wire and elastomeric binding. Easy engagement of shape memory and superelastic wires permits the early use of larger rectangular wires and allows for extended intervals between visits.

**Reduced Chairtime:** As well as eliminating unnecessary office visits, the Wildman TwinLock greatly reduces the time required for each visit. Independent university studies confirm that archwire changes are three to four times faster than conventional ligation. The slide mechanism is easy to open and close, requiring no special instrumentation.

**Fewer Emergencies:** "Seat and lock" archwire placement avoids the "cinch and shock" effect of steel ligature ties and the resulting tendency to pull the bracket off the tooth. The slider locks securely in place, unlike previous self-locking brackets subject to frequent accidental archwire disengagement. The Wildman TwinLock bracket also provides the latest, most technically



advanced bonding base in orthodontics. OptimeshXRT™ is an improved version of Optimesh, a proven performer since 1992 in reducing bond failures and emergency office visits by providing an additional 35 percent bond strength to mesh bases.

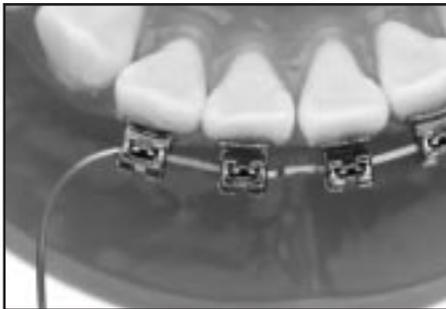
### The Mini Diamond® Twin

**Advantage:** Unlike other self-locking brackets, the Wildman TwinLock requires no sacrifices. You get the patented Mini Diamond rhomboidal shape that facilitates bracket placement. It's a true twin design that provides twin bracket rotational control and accommodates power chain. And when the occasion arises, you have the ability to use elastomeric or steel ties.

Additional benefits include improved hygiene and patient comfort – a smooth, clean labial surface and no requirements for plaque-accumulating elastomeric ties or gingiva-irritating steel ligatures. Wildman TwinLock is available in the Level Arch Modern Prescription (Modified Roth) in .018 and .022. See this major advancement in orthodontic treatment in Dallas! Order information is provided on page H of the Center Section.

## Dr. Wildman

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**Figure 19.** Strength testing included locking in full-sized superelastic wires and subjecting lock to stress of 90° bends.

insisted, as a design constraint, that the lock meet the archwire in this severe test. After years of designing, testing, redesigning and retesting, our lock meets the strength goal which we laid down at the beginning of the project.

As treatment progresses, when full-sized archwires are locked down completely in the variable modulus technique, they are free to work out over long periods of time; but they are also not encumbered by ties. Wildman TwinLock becomes a tube, so they can work out without the inherent friction produced by ties. A study by Dr. John Voudouris at the University of Toronto showed that treatment time is significantly reduced in this situation.

### The Wildman TwinLock – Variable Modulus Revolution

When we compare the efficiency of the old, standard variable cross-section approach with the new Wildman TwinLock-variable modulus technique, we have to conclude that we are experiencing a true efficiency revolution. In the new technique, we often place a full-size, shape memory wire, such as 35°C Copper Ni-Ti™. Dr. Chapman reports he is routinely into full-sized steel or TMA® archwires after six months. The frequent archwire changes in the old leveling process are a thing of the past. Archwire changes are reduced dramatically. Treatment time is reduced dramatically. This is certainly the profile of a revolution in productivity, and I'm proud to participate by offering the Wildman TwinLock System to the specialty.

## Dr. Smith

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retention. The cantilever arms may need minor adjustment, using a large three-prong headgear plier (AEZ/Ormco #803-0450). A common emergency is impingement of gingival tissues under the forward cantilever axle area. Placing occlusal rests on the primary second molars and properly adjusting the cantilever arm will help prevent this.

After the lower portion is cemented, place and secure the rods with screws. To ensure screw retention, apply Ceka Bond® (Preat Company 800-232-7732) to the screw threads prior to insertion and tightening. Again, Barricaid is applied over the cantilever axle for patient comfort.

### Treatment Protocol

Other than the extraction case, the treatment protocol for the Type I Herbst is the same for most cases. The usual duration of Herbst therapy is 12 to 16 months. I rarely remove the Herbst prior to 12 months. I feel the appliance must exert its influence for a sufficient duration to sustain the A-P correction. Additional prospective randomized studies evaluating treatment outcomes and efficiency are needed to answer the questions of timing and duration of Herbst treatment.

The following is a typical treatment protocol with the Type I Herbst. The time allocated for each appointment includes:

- Seating of the patient
- Performing the procedures
- Scheduling
- Treatment progress review with responsible party
- Cleanup and sterilization

#### Appointment #1 – 90 minutes

- Records
- Consultation contract signed
- Take upper and lower full arch impressions for indirect fabrication of the Type I Herbst
- Place separators mesial to maxillary first molars

#### Appointment #2 (after 3 weeks) – 60 minutes

- Deliver upper portion of Herbst with RPE
- Give instructions on RPE and number of turns
- Place separators mesial to the mandibular first molars
- Oral hygiene instructions, toothbrush kit, fluoride Rx and office T-shirt

#### Appointment #3 (after 3 weeks) – 90 minutes

- Deliver lower portion of Herbst
- Add Herbst rods
- Bond brackets to maxillary and mandibular central and lateral incisors
- Place either .016 Ni-Ti™ or .016 x .022 35°C Copper Ni-Ti™ archwires
- Review oral hygiene

#### Appointment #4 (after 12 weeks) – 15 to 30 minutes

- Check Herbst and resecure archwires

#### Appointment #5 (after 12 weeks) – 45 minutes

- Add 2 mm shims as needed to advance mandible and align midlines
- Remove RPE
- Place .019 x .025 35°C Copper Ni-Ti or TMA® archwires

#### Appointment #6 (after 10 weeks) – 30 minutes

- Add shims as needed
- Resecure archwires

#### Appointment #7 (after 12 weeks) – 45 minutes

- Place .021 x .025 TMA archwires
- Add shims as needed

#### Appointment #8 (after 8 weeks) – 60 minutes

- Remove Type I Herbst
- Fit bands for lingual holding arches if necessary
- Take full arch impressions for indirect fabrication of lingual arches

#### Appointment #9 (after 1 week) – 45 minutes

- Cement lingual holding arches
- Consult with patient and parents to



Figure 10. Typical openbite between first molars following Type I Herbst therapy.

intrusion is due to stalling of the normal vertical eruption of the first molars relative to the continued development of the adjacent teeth and bone. I have noticed few instances where the mandibular plane angle (relative to S-N) was increased. Therefore, if the Type I Herbst is used in the late mixed dentition and is removed near or at the time the primary second molars are lost, the openbite can be closed substantially. If lower primary second molars are still present or loose at the end of Herbst therapy, they should be removed or vertically reduced to allow closure of the bite. With vertical closure, the mandible autorotates, reducing the A-P discrepancy (see openbite case on pages 10-11).

To take full advantage of the autorotation of the mandible, it is essential to understand how the Herbst appliance influences the position of upper incisors if they are connected by an archwire to the crowns on the first molars. Due to the posterior vertical directional force exerted by the Herbst rods, the maxillary first molars are moved distally. A clockwise rotational moment is directed to the first molars that exerts a lingual and extrusive force to the maxillary incisors. This change in the maxillary incisor positions reduces the autorotation of the mandible after Herbst removal. To ensure maximum autorotation of the mandible, specific mechanics should be directed to the maxillary incisors to counteract the lingual extrusive movement. It is usually necessary to intrude and move the incisors labially

continued on following page

review treatment objectives and explain the rest period and need for final phase of corrective treatment

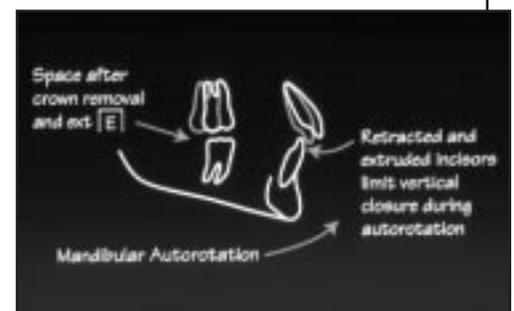
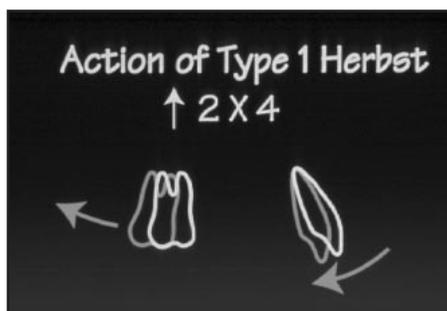
- See the patient on a six-month recall basis after lingual holding arches are placed – typical duration of the rest period is 6 to 18 months, depending on the developmental stage of the patient

### Case Example

One of the most difficult malocclusions to treat is the Class II openbite case. Over the years, I have used numerous appliances, including headgear, elastics, bite blocks and removable functional appliances, to treat openbites. The success of each appliance was invariably linked to patient cooperation and compliance. Therefore, I found openbite cases to be the most

frustrating and time consuming to treat. Initiating the Type I Herbst therapy at the appropriate time has been the most positive addition to my armamentarium for treating these cases.

Why is the Type I Herbst such an effective openbite corrector? Because of their occlusal height, the stainless steel crowns infringe on the freeway space, altering the vertical dental and skeletal development. Additionally, the posterior-superior forces generated by the appliance are of considerable assistance in closing the bite. When the Herbst appliance is removed, invariably there is an openbite between the permanent first molars (Figure 10). After tracing many lateral head radiographs following Type I therapy, I have found the



Figures 11-13. Maximizing the effectiveness of the Type I Herbst in openbite cases.



**Figures 14-15. Brackets and continuous archwires impede the distal drift of the bicuspid and canines during Herbst treatment.**

(Figures 11-13). In many Class II openbite cases, due to excessive gingival exposure, the maxillary incisors need intrusion to improve the patient's smile.

There has been a great deal of confusion concerning the placement of vertical stops on second molars and bicuspid. Due to the ability of the Type I Herbst to alter first molar eruption, all openbite cases should have occlusal rests on the second molars to impede eruption. If it is desirable to stall the eruption of either the first or second bicuspid, stops can be placed on one or both teeth. I have found the Type I Herbst to be best suited for doliofacial openbite malocclusions and that Types II and III work best on mesiofacial and brachyfacial patterns. If there is a normal or excessive overbite, occlusal rests should not be used on second molars or bicuspid. Some proponents of Herbst therapy bond wires on the occlusal surfaces of bicuspid and molars. In my opinion, these wires are unnecessary, time consuming to place and remove, and complicate the Herbst design. One of the most desirable sequelae of the distal movement of the molars is the autonomous distal drift of the bicuspid and canines. Placing brackets, bonded occlusal wires or acrylic impedes the distal drift of these teeth (Figures 14-15).

The objective is to use the fewest bonded attachments during Herbst therapy. Bonded attachments are primarily

used on the maxillary incisors to establish proper torque and A-P position. Once the incisors are in the desired position, remove the brackets and continue the Herbst therapy. Fewer bonded attachments mean less potential for emergencies and decalcification, and the therapeutic affect of the Herbst is optimized. The simplicity of the designs I am presenting is why Herbst therapy is efficient and not labor intensive.

### Retention

If Herbst therapy is timed properly, the rest period from the time the appliance is removed until full-banded and bonded therapy begins should be 6 to 12 months. Occasionally, the bicuspid and canines erupt during Herbst therapy and create the desired Class I occlusion. In these cases retention is not necessary. However, if the bicuspid and canines are in the eruptive phase, some form of retention is necessary to maintain the molar relationship and arch length. The most common form of retention in my office is the fixed

lingual arch. I typically do not use the Nance appliance due to the tissue irritation commonly found with this form of retainer. A lingual arch made from .045" stainless steel soldered to the first molar bands provides the most dependable and durable retention. I do not use removable retainers because of the potential for relapse in case of noncompliance. In the maxillary arch, the lingual wire is bowed inward toward the palatal midline to allow space for the erupting bicuspid and canines. Maintaining arch length during the eruptive phase is essential to allow the distal drift of the bicuspid and canines<sup>3</sup>. During the rest period, the patient is seen every six months. Usually, I will wait for the eruption of all permanent second molars prior to initiating the final phase of treatment. If I have accomplished my treatment goals with the Herbst therapy, the second phase of treatment should take 8 to 12 months.

Have you ever seen a second molar erupt into a poor position after you have done a beautiful job aligning the other teeth? To align the second molars requires additional appointments and materials. The greatest cost is the disappointment experienced by the patient due to the extended treatment time. Not a practice-building experience! Efficiency is based on properly-timed treatment<sup>3,4</sup>

Placing full braces immediately after Herbst therapy prior to the full eruption of the bicuspid and canines can result in significant loss of A-P correction. The maxillary molars tend to drift mesially if there is insufficient dental

**"...Dr. Hans Pancherz determined that it is best to initiate Herbst therapy in the late mixed dentition. His studies suggest that good dental intercuspation at the end of Herbst therapy enhances the stability of the correction. My clinical experience supports these findings."**

intercuspatation in the buccal segments. This is particularly true if retraction of the bicuspids and cuspids is initiated. If retraction is necessary, it should be done while the Herbst is in place to provide molar anchorage. The only time I use Herbst-supported retraction mechanics is in extraction cases and adult treatment.

In future articles I will discuss the use of the Type I Herbst in extraction cases.

Also, I will cover the utilization of the Type II and III Herbsts. Hopefully, the information provided in this article will increase the usefulness of Herbst therapy in your practice.

### References

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- bite jumping on the dentofacial complex: A follow-up study after Herbst appliance treatment of Class II malocclusions, *Eur. J. Orthod.* 3: 49-60, 1981.
3. Smith, J.: How to improve practice efficiency and profitability, *Clinical Impressions*, Vol. 4, No. 4: 6-21, 1995.
  4. Smith, J.: A treatment philosophy...that really works, *Clinical Impressions*, Vol. 5, No. 1: 2-25, 1996.

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## Lecture/Course Schedule at a Glance – Through October 1998

Date	Lecturer	Location	Sponsor, Contact and Subject
6/1-2	Joe Mayes	Paris, France	AOSM; Josiane 331 4859 1617; STM & CBJ Typodont Course*
6/3	Jim Hilgers	San Francisco, CA	PCSO; Lecture—“The Era of Hyperefficient Orthodontics”
6/5-6	Joe Mayes	Lisbon, Portugal	AOSM; Josiane 331 4859 1617; STM & CBJ Typodont Course*
6/6-7	Kyoto Takemoto	Tokyo, Japan	Dr. Takemoto; R. Kishi 81 3 3945 0065; In-Office Lingual Typodont Course*
6/12-13	Barbara Brunner	Orange, CA	Ormco; Katie (800) 854-1741, Ext. 7573; Seminar—“Executive Presentations”
6/18-20	ESLO	Rome, Italy	Eur. Soc. of Ling. Ortho.; Dr. Scuzzo 39 6 5685852; Third Eur. Ling. Ortho. Conf.
6/19	Jerry Clark	Montreal, Canada	Ormco; Katie (800) 854-1741, Ext. 7573; Seminar—“Marketing: Strategies & Tactics”
6/26-27	Terry Dischinger	Lake Oswego, OR	Dr. Dischinger; Kelly (503) 557-3509; “In-Office Comprehensive Hands-On Herbst Training”*
6/28-30	Wick Alexander	Tokyo, Japan	Ormco Japan; R. Kishi 81 3 3945 0065; Alexander Discipline Comprehensive*
6/29-7/1	Didier Fillion	Paris, France	Dr. Fillion (Fax) 33 1 47551833; In-Office Lingual Ortho.: Typodonts, Lab & Clinic*
7/1-2	Wick Alexander	Kamakura, Japan	Ormco Japan; R. Kishi 81 3 3945 0065; Alexander Discipline Advanced
7/1-5	Luis Batres	Panama City, Panama	Dr. Batres (507) 264-3920; Alexander Discipline Comprehensive*
7/2-3	Wick Alexander	Kamakura, Japan	Ormco Japan; R. Kishi 81 3 3945 0065; ADSCJ Annual Meeting
7/6-8	Didier Fillion	Paris, France	Dr. Fillion (Fax) 33 1 47551833; In-Office Lingual Ortho.: Typodonts, Lab & Clinic*
7/17-18	Duane Grummons	Spokane, WA	Dr. Grummons; Kaci (310) 822-8711; “Nonextraction Orthodontic Innovations”
7/23-25	Stanley Braun	Milwaukee, WI	Marquette Univ.; Dr. Ferguson (414) 288-7473; Comprehensive Biomechanics
7/24	J. Piankoff/B. Brunner	Seattle, WA	Ormco; Katie (800) 854-1741, Ext. 7573; Seminar—“Round Peg..Round Hole”
8/27	Michael Swartz	Wellington, NZ	NZAO Annual Conf.; Dr. Taylor 64 4 385 7213; Ortho. Bonding—Achieving a 97% Success Rate
8/28	Michael Swartz	Wellington, NZ	NZAO Annual Conf.; Dr. Taylor 64 4 385 7213; Optimal Use of Titanium Archwires
8/28	K. Black/B. Brunner	White Plains, NY	Ormco; Katie (800) 854-1741, Ext. 7573; Seminar—“Just Say It!”
8/29	Michael Swartz	Wellington, NZ	NZAO Annual Conf.; Dr. Taylor 64 4 385 7213; “Fact or Friction.” “Taking Quality Photographs”
8/31	Michael Swartz	Sydney, Australia	Ormco Pty; J. Doon 612-9870-7344; Use of Titanium Archwires
9/2	Michael Swartz	Brisbane, Australia	Ormco Pty; J. Doon 612-9870-7344; Use of Titanium Archwires
9/4-5	Joe Mayes	Gainesville, FL	U. of FL Orthodontic Alumni Mtg.; Barbara Jones (352) 392-4355; Lecture—STM & CBJ
9/13-15	Wick Alexander	F Dei Marmi, Italy	Ormco Biaggini; Roberta 0039 187 509575; Alexander Discipline Comprehensive*
9/16-17	Wick Alexander	F Dei Marmi, Italy	Ormco Biaggini; Roberta 0039 187 509575; Alexander Discipline Advanced
9/18	Wick Alexander	F Dei Marmi, Italy	Ormco Biaggini; Roberta 0039 187 509575; Alexander Study Club
9/18	Rebecca Poling	Orange, CA	Ormco; Katie (800) 854-1741, Ext. 7573; Staff Seminar—Quality Records*
9/19	Rebecca Poling	Orange, CA	Ormco; Katie (800) 854-1741, Ext. 7573; Staff Seminar—Quality Bonding & Banding Procedures*
9/23	Joan Garbo	Indianapolis, IN	Ormco; Katie (800) 854-1741, Ext. 7573; Seminar—“More Than Hired Hands”
9/24-26	Wick Alexander	Arlington, TX	Dr. Alexander; Brenda (817) 275-3233; Alexander Discipline Comprehensive*
9/25	Jim Hilgers	San Francisco, CA	Ormco; Katie (800) 854-1741, Ext. 7573; Seminar—“The Era of Hyperefficient Orthodontics”
10/2	Joan Garbo	New Orleans, LA	Ormco; Katie (800) 854-1741, Ext. 7573; Seminar—“More Than Hired Hands”
10/3	Terry Dischinger	Washington, DC	MD Ortho Society; Duane (301) 236-0600; “Edgewise Herbst Appliance”
10/8-10	Mario Paz	Beverly Hills, CA	Dr. Paz; Shelly (310) 278-1681; Hands-On Lingual Ortho. with Typodonts & Patients*
10/9	David Sarver	Washington, DC	Ormco; Katie (800) 854-1741, Ext. 7573; Seminar—Maximizing Appliance Systems for Efficiency
10/9	Jim Hilgers	Sao Paulo, Brazil	Paulista Society of Ortho.; “The Essence of Practical Orthodontics”
10/16	J. Piankoff/B. Brunner	Houston, TX	Ormco; Katie (800) 854-1741, Ext. 7573; Seminar—“Round Peg..Round Hole”
10/16-17	Terry Dischinger	Lake Oswego, OR	Dr. Dischinger; Kelly (503) 557-3509; “In-Office Comprehensive Hands-On Herbst Training”*
10/19	Wick Alexander	Asheville, NC	South. Ortho. Society; Sharon Hunt (800) 261-5528; Lecture—Alexander Discipline Advanced
10/24-25	K. Takemoto/G. Scuzzo	Munich, Germany	Ormco Europe; 41 1 3065111 (Fax 41 1 3065151); Lingual Orthodontics
10/27-28	K. Takemoto/G. Scuzzo	Vigevano, Italy	Biaggini Ormco Italia; 39 187 509575 (Fax 39 187 599076); Lingual Orthodontics
10/30-31	K. Takemoto/G. Scuzzo	Madrid, Spain	Kalma SA; 34 1 3802383 (Fax 34 1 7784864); Lingual Orthodontics

\*Typodonts and/or Participation

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