ORTHOBAND® MANUAL

Suggested Applications of Orthoband Extra-Oral Appliances

We gratefully acknowledge the assistance of Dr. Robert J. Nikolai, Professor of Biomechanics in Orthodontics at the St. Louis University Medical Center, who has provided the technical information for this manual.

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Because Orthoband Company is constantly striving to improve their products, specifications on the Headgear described in this Manual are subject to change without notice.
INTRODUCTION

Dear Doctor:

We, at Orthoband Company, have prepared this manual to acquaint you with the variety of extra-oral headgear we offer where extra-oral force is needed to correct certain types of malocclusion.

There are many styles of extra-oral headgear. The typical extra-oral appliance consist of:

1. One or two traction bands composed of elastics or springs. They generate the desired force when deformed to activate the appliance.
2. A face bow or two J-hooks to deliver the force.
3. A neckpad, headcap or facemask to distribute the reciprocal force.

Traction is achieved with the use of stretchable elastic bands, springs and in some cases certain types of rubber bands.

We provide a safety release device, the Ortho-Latch® module which prevents the chance of a slingshot effect when an appliance can be elongated excessively.

You will find it of great help to consult our catalog for a full description of the various headgear components. Should you need any further information, please call, FAX or write us at our address shown on the front or back cover.

Cordially yours,

Irvin S. DeWoskin – president

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Orthoband Company manufactures and markets a wide range of extra-oral orthodontic appliances (with “break-away” features) and components thereof. On the pages of this manual to follow, in addition to illustrations of the headgear available from Orthoband Co., brief descriptions and suggested applications of the appliances with illustrations are provided. A bibliography of selected published articles and monographs, within which extra-oral procedures and devices are discussed and evaluated, appears as the final section of this manual.

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We gratefully acknowledge the assistance of Dr. Robert J. Nikolai who provided the graphs and explanations of the traction forces involved.

Dedicated to T. M. Graber, D.M.D., Ph.D., and Editor of the American Journal of Orthodontics.

Four-page catalog of Orthoband Extraoral Traction Appliances and Components will be found inside the back cover.
TRACTION FORCE DELIVERED BY
ORTHOBAND'S ELASTICS

<table>
<thead>
<tr>
<th>ELASTIC TRACTION BANDS</th>
<th>TRACTION FORCE RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-Stripe (9A)</td>
<td>8 oz. (227 gr.) – 24 oz. (680 gr.)</td>
</tr>
<tr>
<td>Two-Stripe (9D)</td>
<td>24 oz. (680 gr.) – 36 oz. (1020 gr.)</td>
</tr>
<tr>
<td>Three-Stripe (9E)</td>
<td>36 oz. (1020 gr.) – 48 oz. (1360 gr.)</td>
</tr>
</tbody>
</table>

ADJUSTABLE ELASTIC TRACTION BANDS

No. 9A-ONE STRIPE, Medium-Hard Traction. The elastic of the 9A is 3/4" wide (19mm) and is adjustable in length. Also available in 9D-TWO STRIPE, Hard Traction or 9E-THREE STRIPE for Extra-Hard Traction.

The Orthoband stainless steel adjusting buckle (shown above) is designed to hold the position of the elastic securely without damaging the fibers of the elastic.

ELASTICS WITH HOOK ATTACHMENTS TO BE USED WITH THE ORTHO-LATCH® BREAK-AWAY MODULE

No. 9AH-ONE STRIPE, Medium-Hard Traction. The elastic of the 9A is 3/4" wide (19mm) and is adjustable in length from 3 1/2" to 5 1/2". Also available in 9DH-TWO STRIPE, Hard Traction or 9EH-THREE STRIPE for Extra-Hard Traction. It is designed with hook ends for the Ortho-Latch® Module (No. 75).

No. 11AH-ONE STRIPE, Medium-Hard Traction. The elastic of the 11AH is 3/4" wide (19mm) and is 4" in length, but it extends to 7". Also available in 11DH-TWO STRIPE, Hard Traction or 11EH-THREE STRIPE for Extra-Hard Traction. It is designed with hook ends for use with the Ortho-Latch® Module (No. 75).

The non-adjustable Elastic Traction Band with hook ends is to be used with the Ortho-Latch® Break-Away Module (No. 75). Choose whichever hole in the perforated strip will achieve the desired results and the adjusting screw regulates the amount of traction necessary to break-away.
ORTHOLATCH®
SAFETY BREAK-AWAY MODULE

A simple, versatile safety device, the No. 75 module is adjustable to protect all degrees of traction force. The break-away module is both a safety device and an easy method of attaching the face bow to the cervical strap. And also an easy method for detaching the face bow by releasing the latching arrow.

A small adjusting screw on the back of the module will vary the break-away hold - turning clockwise facing the screw, tightens the grip - turning counter clockwise lessens the holding grip.

Directions for fitting Ortho-Latch® to the face bow: Assemble elastic strap, neck pad, Ortho-Latch® modules with perforated strips to the outer bow of the face bow. Use a short section of strip to allow flexibility in fitting face bow to module (see the illustration at the left). The complete device is attached or removed from the patient by separating the arrow from the module.

ORTHOLATCH®
ACCESSORIES

No. 400

The No. 400 screwdriver (above) and the No. 804 scale (to left) are both necessary in the proper use of the No. 75 module for adjustment and measuring the degree of traction.

No. 980 High-Pull headgear (above) was designed for use with the face bows or "J" Hooks. COMPLETE WITH ORTHOLATCH® MODULES (NO. 75). ORTHOLATCH® IS ADAPTABLE TO YOUR SUPPLY OF FACE BOWS. WE DO NOT MANUFACTURE FACE BOWS.

NECK AND CHEEK PADS
AVAILABLE TO CUSHION FACE FROM TRACTION DEVICES

No. 8S and 8XL – available in varying lengths

No. 7S – SATIN Polyester covered polyfill cushion

No. 46S – Flexipad

No. 6S – 3” long cheek pad

No. 17 – Disposable Neck Pad
ORTHOBAND CERVICAL-PULL HEADGEAR

The cervical-pull extraoral appliance is characterized by the distribution of the responsive force across the back of neck. Typically, this is a single, stretched, traction band transferring force to a neck pad which, in turn, transmits that force over a broad cervical region. From a sagittal perspective, the force has anteroposterior and superoinferior components, the latter somewhat smaller than the former. Orthoband Company offers a variety of neck pads; Style Nos. 6S, 7S, 8S, 8XL, 17 and 46S accommodate individual traction bands (No. 9 series) or pairs of Tract-a-Tubes® (Nos. 12 and 13), each available in three different force magnitudes. The neck pad in Style No. 866 is designed for rubber band activation in pairs. The cervical-pull, break-away appliance includes a pair of the new Ortho-Latch® subassemblies (No. 75), Style 9H traction band (with choice of force magnitude, and Style No. 8XL neck pad. The Ortho-Latch® break-away force magnitude is adjustable with a phillips screwdriver (No. 400).

The traction band, Tract-a-Tubes®, or rubber bands transfer force to a face bow or a pair of J-hooks (and, perhaps, transmit the force to sliding jigs) that, in turn, carry the force to the desired intraoral sites. The force delivered to the dentition is primarily posteriorly directed. However, a component of force exists perpendicular to the functional occlusal plane with the potential for extrusion if force delivery is to the maxillary dental arch, except when the face bow is modified by bending the arms inferiorly.

Orthoband Traction Bands eliminate guesswork and testing. Elastic webbing with colored stripes indicates the varying degrees of traction, as shown above. Rustproof adjustment buckles.

Orthoband Neckpads with satin cover fiberfill cushion and plastic ladder tape to hold Traction Band. (Nos. 8S, 8XL, catalog page 1)

No. 866 Kloehn-Type Neckpad with special reinforced band and S-hooks for use with elastic.
WITH SUGGESTED APPLICATIONS

With the cervical-pull appliance that includes a face bow, the force is transmitted to the maxillary terminal molars. An intraoral orthodontic appliance may, in turn, transfer the force elsewhere in the dental arch. If J-hooks are the force deliverers, the action may be imparted to anterior locations in either dental arch or through added sliding jigs overlaying a continuous arch-wire, to posterior sites as well.

The activated cervical-pull headgear may displace terminal molar crowns posteriorly or hold dental arch length in early treatment (Figure 1), if the intraoral mechanics alone have it undesired potential to move posterior teeth anteriorly (Figure 2), or directly retract individual teeth or dental segments in the maxillary arch (Figure 3). This appliance also may deliver force to the mandibular dental arch to support intraoral mechanics to create posteriorly directed displacements. The superimposed components of force should be smaller here, and tend to load the temporomandibular joints and must contend with the movements of the lower jaw.

**FIGURE 1. MOLAR CORRECTION**

![Diagram of molar correction](image1)

**FIGURE 2. MOLAR SUPPORT**

![Diagram of molar support](image2)

**FIGURE 3. CUSPID RETRACTION WITH CERVICAL HEADGEAR**

![Diagram of cuspid retraction](image3)
ORTHOBAND STRAIGHT-PULL HEADGEAR

The straight-pull extraoral appliance is so designated because the activating forces are directed parallel to, and ideally contained within, the functional occlusal plane. The responsive force system from the activating appliance elements is delivered to a head cap. Orthoband Company markets a preassembled, straight-pull headgear, Style No. 165L, that will accommodate pairs of rubber bands and J-hooks and, if desired, sliding jigs to activate and deliver force bilaterally to various intraoral sites in either dental arch. Alternatively, the practitioner may purchase the components with which to fabricate the head cap: e.g., No. 75 cushion, No. 62 strapping, short traction bands (No. 9H), a pair ofOrtho-Latch® break-away devices (No. 75), and the No. 25 adjustment disc.

Straight-pull headgear may deliver force to the maxillary or mandibular dental arch, to individual teeth, or to an archwire by means of hooks soldered or welded to the wire. The straight-pull appliance is easily deactivated/removed or replaced/activated by the patient. When properly adjusted, the sometimes problematic superoinferior force component inherent in the cervical-pull headgear is absent.

No. 165L preassembled Instant-Fit Straight-Pull Headgear. Foam cushion neckpads; S-hooks for elastics and tubular guides for elastics and J-hooks.

Orthoband Components: No. 7 Foam Cushion Padding to take No. 9 series Traction Bands; No. 62 strapping; No. 25 Adjustment Disc... for assembly of customized straight-pull headgear.

FIGURE 4. STRAIGHT-PULL CUSPID RETRACTION

Distal J-hook Force

FIGURE 5. STRAIGHT-PULL AGAINST BUCCAL SEGMENT

Crown Contact Forces

Jig Force

Forces against Jig

FIGURE 6. MAXILLARY BUCCAL ANCHORAGE SUPPORT

Mesial Elastic Force

Distal Force from Headgear

Extrusive Elastic Component
WITH SUGGESTED APPLICATIONS

Suggested straight-pull headgear applications include the retraction of maxillary canine teeth (Figure 4) or to distally displace posterior teeth (Figure 5) or contribute to the support of the maxillary dental arch during mandibular arch displacements through Class III mechanics (Figure 6). It can help to stabilize the mandibular dental arch and posterior anchorage there during Class II mechanics, activated to retract maxillary anterior teeth or dental segments (Figure 7). Some lingual- or labial-root torque may be applied to the incisal segment, in either dental arch, through J-hook-delivered force to hooks soldered/welded gingivally or occlusally to an engaged, rectangular archwire (Figure 8). It distributed throughout the dentition by means of a full-size, stabilizing archwire, this headgear may produce orthopedic action against the maxilla, largely a withholding of the anterior vector of maxillary growth. Perhaps, a rotation displacement may occur as viewed from a buccal perspective, toward closing an anterior open bite (Figure 9).
The high-pull appliance is characterized by a sagittal-view direction of active force having superoinferior and anteroposterior components of similar magnitudes. Force delivery may be to the outer-bow-arm ends of a face bow engaging the maxillary terminal molars with the responsive force distributed over the cranium by a head cap. Alternatively, action may be transmitted by J-hooks, perhaps with sliding jigs, to various sites in the maxillary or mandibular dental arch. The force generators may be Tract-a-Tube® subassemblies (Style Nos. 12 and 13), rubber bands, or short traction bands. An Ortho-Latch® subassembly (No. 75) may be placed in series between the force generator and force deliverer. Prefabricated high-pull headgears and head caps offered by Orthoband Company are Style Nos. 110H, 140H, 150H and 151H shown below.

The substantial superoinferior component of force on each side differentiates the high-pull headgear from the cervical and straight pull extraoral devices. The high-pull appliance assembly may be set up in the same manner and with the same force deliverers and intraoral transmission sites as the straight-pull appliance.

No. 110H preassembled High-Pull Headgear. Adjustable, with foam pad face bow guides.

**SPRING (TRACT-A-TUBE) TRACTION VALUES**

<table>
<thead>
<tr>
<th>Eyelet Type</th>
<th>Traction Value</th>
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</thead>
<tbody>
<tr>
<td>Silver Eyelet</td>
<td>4 oz. (113 gr.) - 12 oz. (340 gr.)</td>
</tr>
<tr>
<td>Gold Eyelet</td>
<td>12 oz. (340 gr.) - 28 oz. (794 gr.)</td>
</tr>
<tr>
<td>Red Eyelet</td>
<td>28 oz. (794 gr.) - 48 oz. (1360 gr.)</td>
</tr>
</tbody>
</table>

Orthoband Tract-a-Tubes® No. 12 with J-hook; No. 13 with Straight hook. Compression type traction enclosed in plastic tube with Velcro tapes for easy attachment and adjustment as treatment progresses. Three degrees of traction available: soft, medium, and hard-pull.

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No. 140H preassembled Instant-Fit adjustable Headgear, Tubular face bow guides with elastic hooks.

No. 150H preassembled Instant-Fit adjustable Headgear, with polyfill cushioned pad face bow guides.

No. 151H preassembled Instant-Fit adjustable Headgear, polyfill cushion cheek pads adapted for use with No. 12 Tract-a-Tubes®.

See 4-page Catalog, inside of back cover for complete information on all products.
WITH SUGGESTED APPLICATIONS

This appliance may be used against the maxillary arch to offset the potential of Class II elastics to extrude the anterior dental segment and to aid in retraction mechanics (Figure 10), to reduce an anterior deep bite either orthodontically or orthopedically (Figure 11), and to assist with torquing action in the maxillary incisal segment (Figure 12). With the addition of sliding jigs, the practitioner can deliver a combination of distalizing, intrusive, and second-order rotational action to the maxillary buccal segment (Figure 13), and can perform a combination of canine-retraction and reduction of the curve of Spee in the mandibular dental arch (Figure 14). Additional applications involving the high-pull headgear, e.g., to retract, tip, and extrude the mandibular incisors, are conceivable as well.

**FIGURE 10. HIGH-PULL IN MAXILLARY RETRACTION MECHANICS**

- Offseting Vertical Components
- Distal Retraction Forces from J-hook and Elastic
- High-pull Force against J-hook
- Class II Elastic Force

**FIGURE 11. CORRECTING DEEP-BITE WITH HIGH-PULL HEADGEAR**

- Superior/Posterior Displacement Potential
- J-hook Force to Arch Wire and Anterior Segment

**FIGURE 12. HIGH-PULL HEADGEAR TO INCISAL SEGMENT**

- J-hook Force to Arch Wire via Gingival Hook
- Delivered Intrusive, Lingual, and Rotational Force Components

**FIGURE 13. HIGH-PULL HEADGEAR TO BUCCAL SEGMENTS**

- Headgear Force
- Short Outer Bow
- Inner Bow
- Delivered Distal, Intrusive, and Rotational Force Components

**FIGURE 14. HIGH-PULL TO MANDIBULAR ARCH**

- Vertical Force Component to Arch Wire
- Distal Driving Component to Cuspid Bracket
- High-pull Force to J-hook against Cuspid Bracket
A head cap is marketed by Orthoband Company that includes a unique pair of "C-plates" to which force activators may be affixed, enabling the transmission of force in various directions, from a sagittal perspective with reference to the functional occlusal plane, and to a face bow and/or J-hooks. Force may be delivered on each side to one or two sites in the same dental arch or to the maxillary and mandibular arch sites simultaneously. The head cap was designed by Dr. Sebastian Interlandi, and carries Orthoband’s Style No. 170. Force is generated by stretched rubber bands or by activated Tract-a-Tubes® (Nos. 19 or 20).

This headgear may produce the actions of the cervical, straight or high pull extraoral devices previously described in this manual, or, with two force activators attached to each "C-plate", create compound actions. Force may be delivered to two intraoral sites on each side of the mid-line in either dental arch or to both arches concurrently to produce displacements or per-
DUAL-FORCE HEADGEAR

torm stabilizing functions. Orthopedic action may be delivered, for example, to the maxillary dental arch via a face bow and a pair of J-hooks. The face bow carries force to the posterior segments and the J-hooks deliver force to anterior sites, and distribution of active force throughout the entire arch would be achieved by means of a stabilizing, continuous archwire, appropriately stopped in the posterior region and ligated.

Examples of dual force action to transmit force simultaneously to both dental arches are shown in Figure 15 wherein the maintenance of or increases in dental arch lengths are illustrated in Figure 16, showing the concurrent retractions of all four canines toward and into first-premolar extraction sites, and incisal/anterior dental segment displacements posteriorly (Figure 17). The Interland® headgear is a versatile extraoral appliance with many potential applications.
Extraoral force may be delivered to the chin or to locations posterior to the chin on the mandible; a head cap supports the force generators, a pair of short traction bands, that transmit action to a chin cap. Orthoband Company offers two designs of chin cap assemblies. The action of Style No. 130H exhibits force components carried to the chin and directed posteriorly and superiorly as shown in Figure 18. The objective of this appliance is to oppose a Class III growth tendency or to provide retention subsequent to a Class III correction. With Style No. 135V the action is nearly wholly superior-inferior in direction, and force is delivered posterior to the chinpoint. The intention in this instance is to reinforce posterior occlusion or produce intrusion of posterior dental segments through upward and forward rotation of the mandible about temporomandibular joints and reduction of an anterior open bite (Figure 19).

Chin caps are integral components of the two styles of headgear mentioned above, but chin caps may be purchased separately and are available in two sizes and in “hard” or “soft” materials (Style No. 21). Orthoband Co. also offers chin cap liners to aid in force distribution and suppress any potential for skin irritation (No. 27). If desired, an Ortho-Latch®, break-away subassembly (No. 75) could be placed in series between the chin cap and the force generator on each side of the headgear.

No. 130H High-Pull Instant-Fit Headgear with molded, porous Chin Cap and adjustable elastic traction bands. Chin Cap is porous to prevent excessive perspiration and rash formation on soft tissue covering bony chin. Die cut foam cushion liners are available for more comfort.

No. 135V Vertical-Pull Headgear with molded porous Chin Cap. Same as No. 130H, except that traction is a vertical plane.
ORTHOBAND REVERSE-PULL HEADGEAR AND CHIN CAP

The reverse-pull headgear No. 220R is designed specifically for Class III maxillary deficiency cases.

It is worth mentioning that T.M. Graber, D.M.D., Ph.D. and editor-in-chief of the American Journal of Orthodontics did pioneering research on cleft palate and maxillary deficiency cases as a candidate for a Ph.D. in the 1950’s. Jean Delaire did further study using protraction in the 1970’s.

The reverse-pull headgear delivers anteriorly directed force to intraoral sites while avoiding intraoral anchorage. A wire bridge is affixed to a rigid chin cap which is supported by both a head cap and a cervical strap. Elastics are activated against the wire bridge and are attached to the intraoral delivery sites.

Force may be transmitted from the wire bridge by the stretched elastics to anterior, mid-arch, or posterior locations in either or both dental arches. Anatomic constraints necessitate that the force be directed parallel to the functional occlusal plane or nearly so. Two examples of advancement mechanics are illustrated below. Figure 20 depicts orthopedic action to advance the maxilla while maintaining the relative position of the mandible. The force delivered by the headgear is distributed throughout the maxillary arch by a properly stopped stabilizing archwire and dental units ligated into segments. Action to advance the maxillary incisors together is shown in Figure 21; the continuous archwire is free to slide through the posterior orthodontic brackets.

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**FIGURE 20. ADVANCING THE MAXILLA/HOLDING THE MANDIBLE**

Elastic Force to Arch Wire

High pull Force to Chin Cap

Wire Bridge

Force Components against Mandible

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**FIGURE 21. ADVANCEMENT OF MAXILLARY INCISAL SEGMENT**

Elastic Force to Incisal Segment

Force from Traction Band

Wire Bridge

Net Force against Chin

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No. 220R Reverse-Pull, Instant-Pull Headgear with adjustable traction bands and rigid molded chin cap fitted with adjustable wire bridge. Detail below.

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28R

Detail sketch of Chin Cap for No. 220R Headgear. See Figures 20 and 21.
BIBLIOGRAPHY: EXTRAORAL TRACTION DEVICES, METHODS, AND RESULTS

This bibliography of published papers pertaining to extraoral orthodontic mechanics has been assembled for the benefit of the readers of this manual. Additional references will be found at the conclusions of many of these articles, as well as in relevant textbooks and monographs.


**ADDENDUM 1994**


ADDENDUM 1995


