

# Transforce Lingual Appliances for Arch Development

WILLIAM J. CLARK, BDS, DDO

**T**ransforce\* lingual appliances are a new series of preadjusted fixed-removable devices designed to develop archform in patients with contracted dental arches (Fig. 1). They are readily integrated with conventional fixed appliances, offering new possibilities for interceptive treatment that can reduce the length of the fixed-appliance phase by as much as 50%. These esthetic appliances may also be combined with lingual brackets or Invisalign\*\* appliances to complete treatment, and they do not cover the palate or interfere with speech, making them especially acceptable to adult patients.

Transforce appliances are inserted into horizontal lingual sheaths on the molar bands. They are preactivated by a new expansion module, which incorporates a nickel titanium coil spring enclosed in a tube to deliver a gentle, continuous force with a long range of action. Light, continuous forces are more comfortable and may prove to be less traumatic and more physiological than the heavy forces applied in rapid maxillary expansion. The Transforce module is calibrated to a level of 100-200g, according to the requirements for sagittal or transverse arch development, and no further activation is required after the appliance is fitted.

\*Registered trademark of Ortho Organizers, 1619 S. Rancho Santa Fe Road, San Marcos, CA 92078.

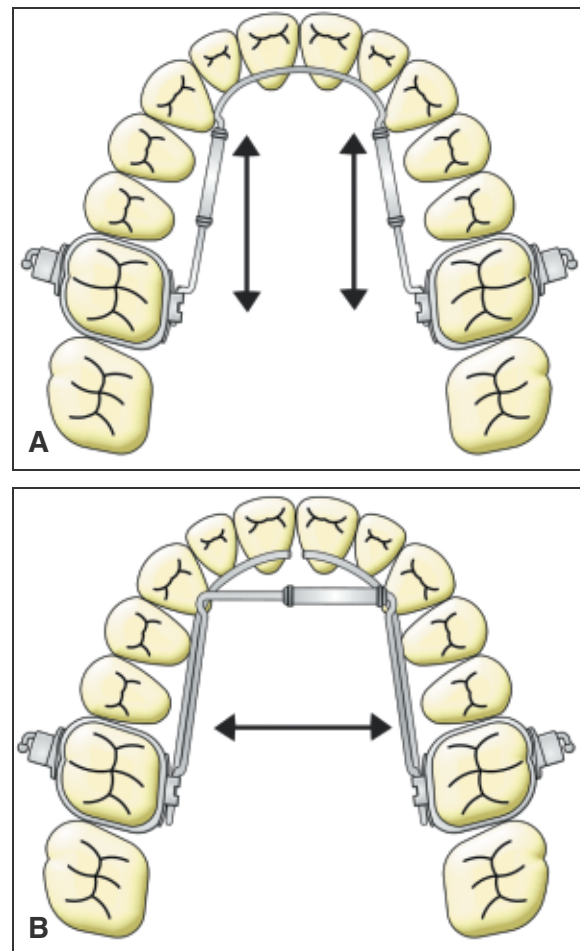
\*\*Align Technology, Inc., 881 Martin Ave., Santa Clara, CA 95050.



Dr. Clark is in the private practice of orthodontics at Lundin Lea, 41 Leven Road, Lundin Links, Fife, KY8 6AJ Scotland; e-mail: twinblocks@mac.com. He is the inventor of the Transforce appliances.

## Appliance Selection and Fitting

Transforce appliances may be selected and prepared for fitting either directly at the chair or on the patient's pretreatment casts. Scale models of the appliances in both compressed and fully extended forms are provided on clear templates



**Fig. 1 A. Transforce\* Sagittal Arch Development Appliance. B. Transforce Transverse Arch Development Appliance.**

## Transforce Lingual Appliances for Arch Development

for appliance sizing (Fig. 2).

Separators should be placed no more than three days before the appliance fitting. At that appointment, the appropriate size molar bands are selected and tried in the mouth, and the appliance is assembled and tried in the mouth prior to cementing. The spring modules must be compressed to fit the lingual wires within the dental arch.

It is easier to attach the molar bands to the lingual wire and fit the appliance in one piece, rather than cementing the bands first and then inserting the appliance into the lingual sheaths. Minor intraoral adjustments with a triple-beak or concavo-convex plier may be required to adapt

the appliance for each individual patient, especially if the lingual wires are activated for expansion or to align irregular incisors.

### Maintenance and Removal

The patient should be seen at six-to-eight-week intervals to check progress, but appliance maintenance should be minimal. At any stage in treatment, the Transforce device can be made passive by crimping the tubes to compress the wires and prevent further activation. The appliance is normally left in place as a passive retainer after activation is complete.

If bonded appliances are used for detailed

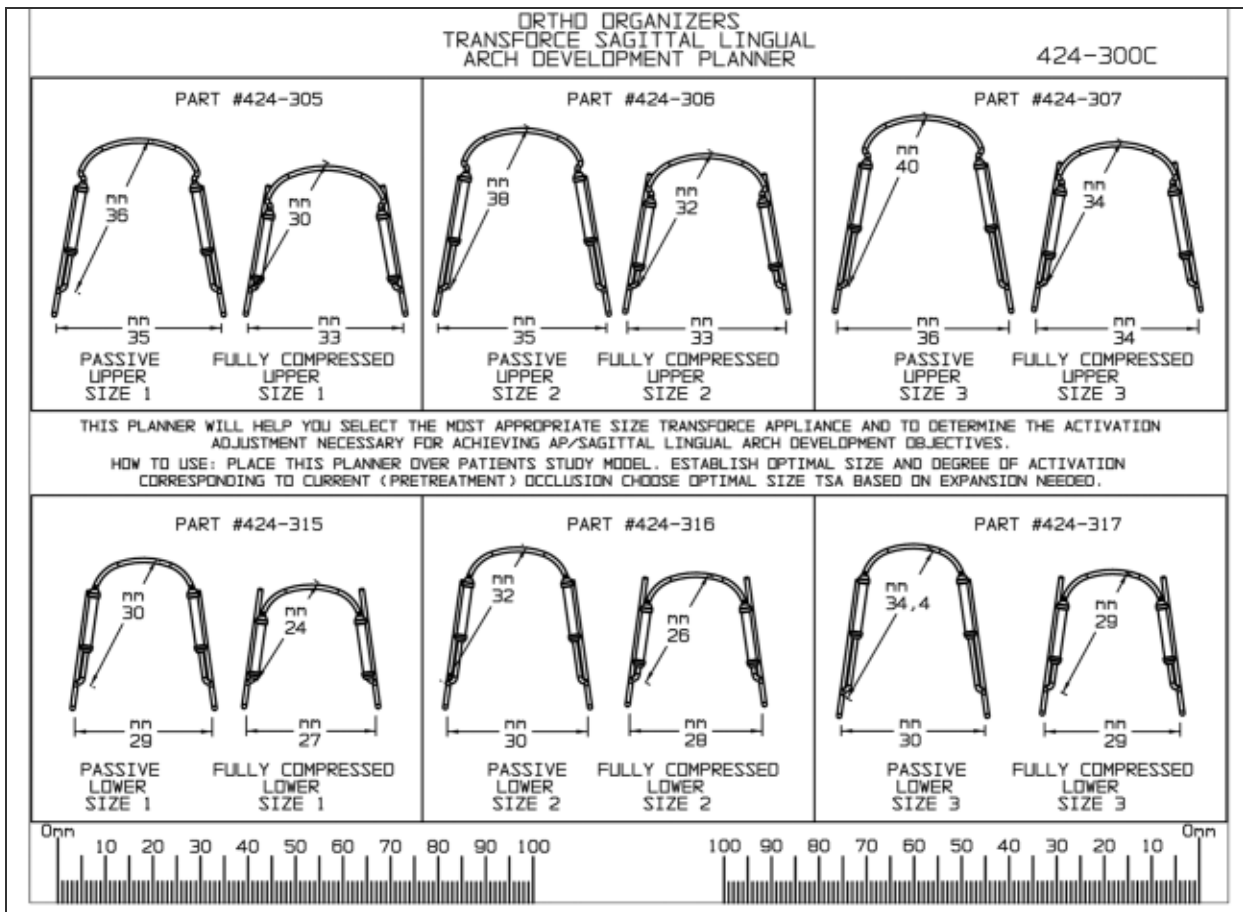


Fig. 2 Template for size selection of Transforce Sagittal Arch Development Appliance (not to scale).

finishing, the lingual appliance may be integrated with the fixed appliances, or it can be removed by compressing the coil springs to remove the wire tags from the molar sheaths.

### **Sagittal Arch Development**

Sagittal arch development is indicated in cases where the archform is constricted by retroclined upper or lower incisors, as are commonly found in Class II, division 2 malocclusions and Class I malocclusions with bimaxillary retrusion. These patients generally present with deep overbites and reduced lower facial height. Whenever possible, they should be treated without extractions to maintain the vertical dimension. Sagittal arch development helps resolve anterior crowding, and proclination of the incisors reduces the overbite.

Labial movement of the anterior teeth may be combined with transverse development of the buccal segments where indicated. When a lateral incisor is severely displaced lingual to a central incisor, it is advisable to expand the arch transversely before advancing the lateral incisor, to avoid moving the central incisor labially out of the alveolar trough.

The arch-length discrepancy is divided by two to determine the space required on each side. Every millimeter advancement of the incisors is equivalent to a 2mm gain in arch length, or 1mm on each side. Because reciprocal forces are delivered against the incisors and the molars, the incisor movement will be accompanied by a slight distal movement and distolingual rotation of the molars. Therefore, it must be assumed that any increase in arch length is achieved mainly by incisor proclination.

It is essential to confirm that adequate bony support is available before significantly proclining incisors, and it is especially important not to procline incisors that are already procumbent or correctly related to the mandibular base. An essential objective in treatment planning is to place the lower incisors in a stable position over basal bone—ideally, 1-3mm ahead of the APo line at the end of treatment. Labial movement of

the lower incisors is indicated only if they are retroclined, with their tips positioned significantly lingual to the APo line. This is a common feature in bimaxillary retrusion cases, where incisor proclination is often required in both arches. Similarly, in Class II, division 2 malocclusions, the upper incisors should be proclined to free the mandible.

Dental Class III patients with retroclined upper incisors will often benefit from sagittal arch development in the mixed dentition (Fig. 3). To distinguish a dental from a true skeletal Class III pattern, the patient should be able to hold the incisors edge-to-edge before posturing forward to entrap the upper incisors in a lingual occlusion.

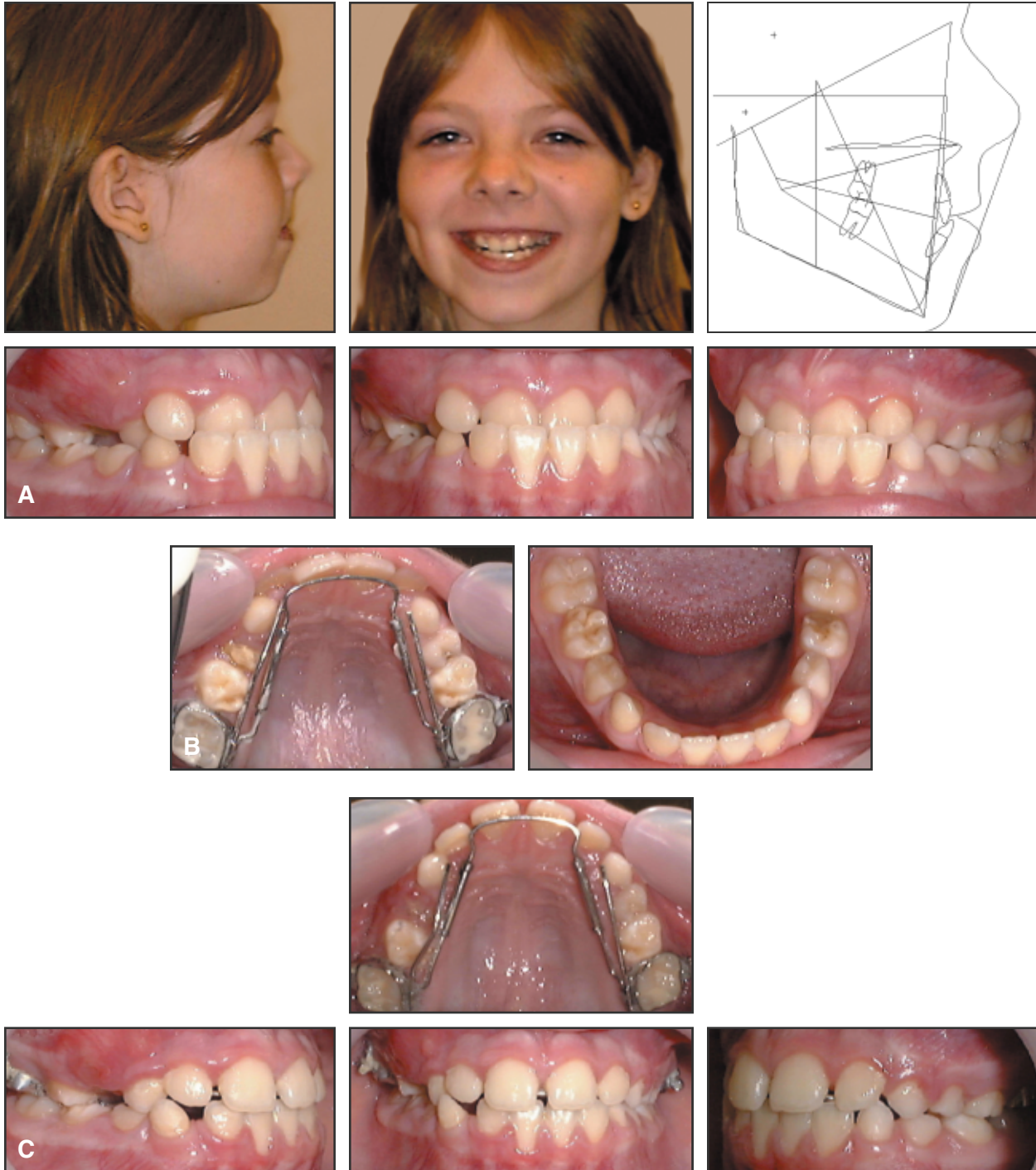
### **Appliance Selection**

The Transforce Sagittal Arch Development Appliance is specifically designed for anteroposterior arch development, either unilaterally or bilaterally, in either or both arches. The appliance operates on the slide principle, with each expansion module extending mesially from the lingual molar sheath at the gingival level to engage the anterior segment. The expansion module is preactivated to lengthen the arch by placing reciprocal forces on the molars and incisors while also increasing the intermolar width.

The sagittal appliance is available in three sizes for the upper arch and three sizes for the lower arch, with the mesiodistal length varying in 2mm increments. The size selection should take into account the number of millimeters of crowding and the labiolingual position of the incisors. The template is placed over the occlusal surface of the patient's cast to select the appropriate arch length (from the mesial end of the lingual molar sheath to the mid-incisal gingival papilla) and intermolar width (at the gingival margins). The compressed outline of the appliance should fit inside the patient's pretreatment lingual archform, while the extended outline shows the amount of arch development that can be achieved.

Alternatively, the millimeter scale on the template can be used to measure the arch length

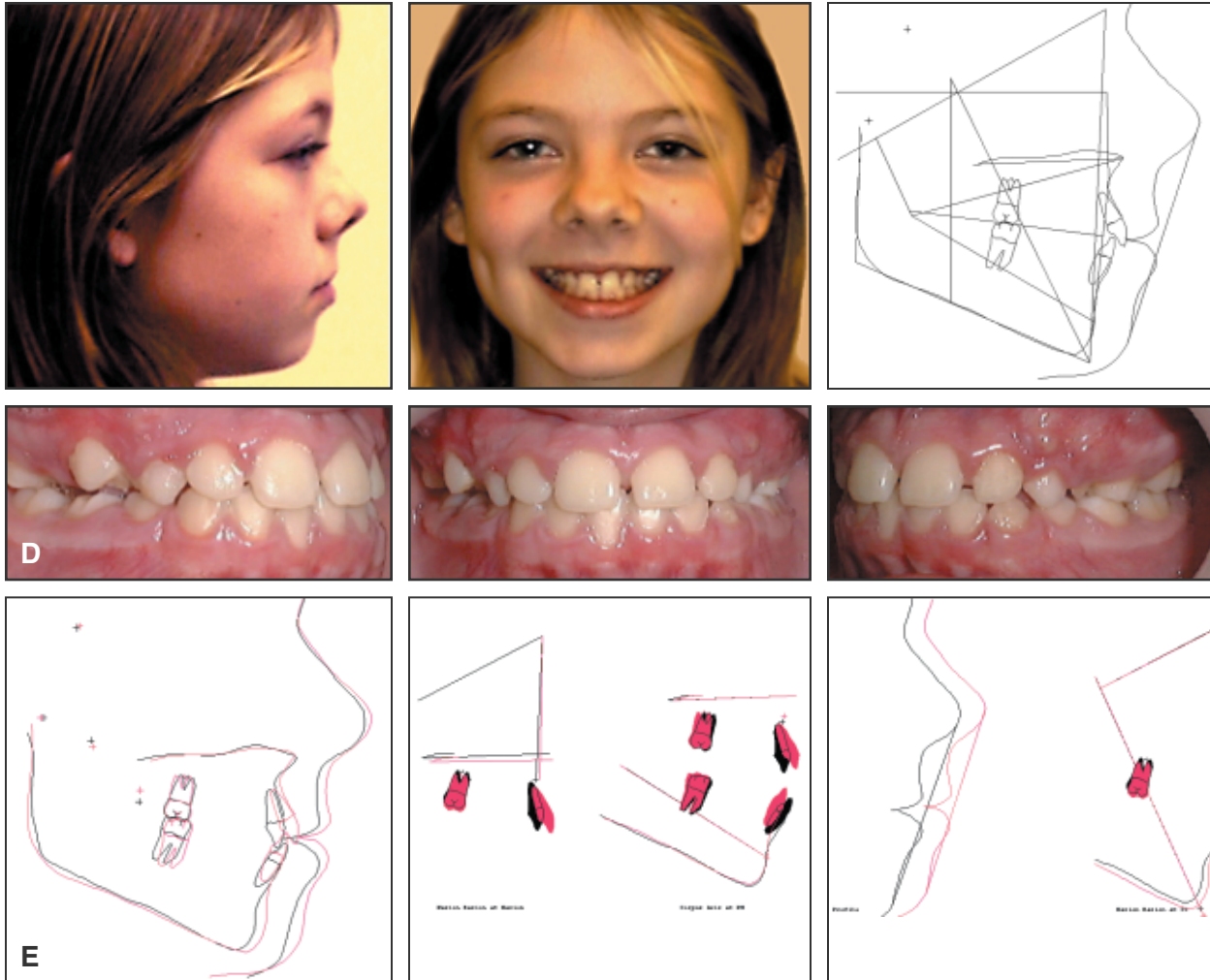
## Transforce Lingual Appliances for Arch Development



**Fig. 3** A. 9-year-old female Class III patient in mixed dentition, showing lingual occlusion of upper incisors and posterior crossbite. B. Placement of upper Transforce Sagittal Arch Development Appliance. Lingual occlusion was corrected in six weeks. C. Patient after three months of arch development (continued on next page).

on each side of the cast, from the molar point (at the mesiolingual gingival contour of the molar, level with the mesiolingual cusp) to the incisal point (the midpoint of the gingival papilla be-

tween the central incisors). This distance is then compared with the compressed length of the sagittal appliance, measured from the mesial contact point of the wire with the lingual sheath



**Fig. 3 (cont.) D.** Patient after appliance removal, following 13 months of passive retention. **E.** Superimposition of cephalometric tracings before treatment and after appliance removal. Patient is currently under observation awaiting premolar eruption.

to the midpoint of the anterior section.

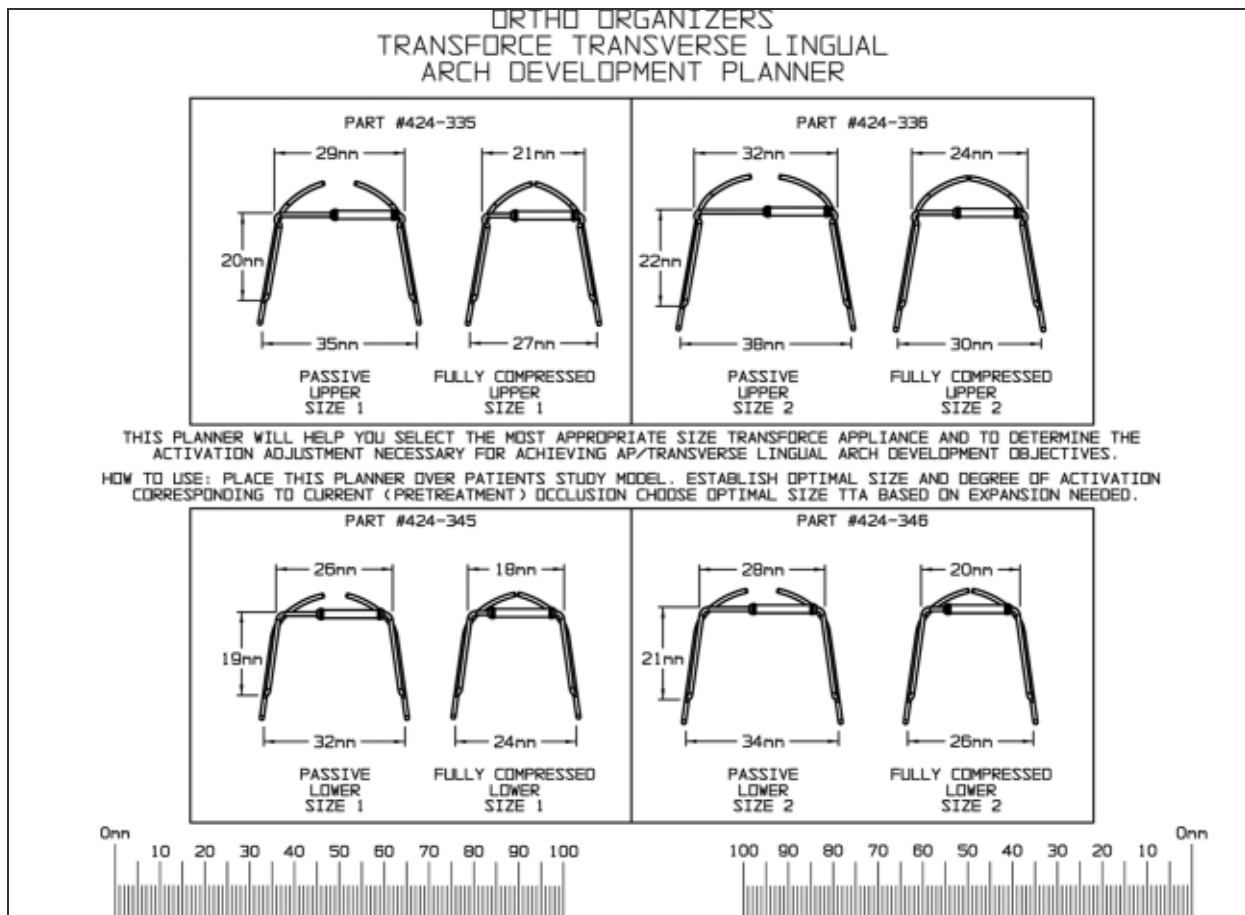
The gingival steps mesial to the molar segments of the appliance are inclined lingually to clear the gingivae, and torque is included for insertion in the molar tubes. To avoid fitting the appliance upside down, it is important to make sure that these gingival steps incline lingually.

To increase arch width in the premolar or canine region, the recurved wire extending mesially from the molar tube can be activated. For distal molar movement, the anterior wire can be cut at the midline, and the ends bent palatally for incorporation in a Nance button. Anterior anchorage can be reinforced during fixed appliance therapy by adding a figure-8 ligature under the archwire as the molar-distalizing force is increased.

### Transverse Arch Development

Constricted arch width occurs in all classes of malocclusions, and ideally should be treated as early as possible to promote normal function and proper tongue positioning. A low tongue position is associated with a narrow palate and often related to mouth breathing. Maxillary constriction may predispose the patient to a distal occlusion and may restrict mandibular development in the sagittal or transverse dimensions. A narrow maxilla is also a common cause of upper anterior crowding, which can be responsible for secondary crowding in the lower arch.

It is advisable to treat incisor crowding in the mixed dentition, at the stage of development when the incisors are erupting and the dental



**Fig. 4** Template for size selection of Transforce Transverse Arch Development Appliance (not to scale).

arches are most amenable to transverse development. Parents frequently request treatment when they observe the permanent incisors erupting in crowded positions.

When light forces are applied for maxillary expansion, palatal radiographs do not show the splitting of the midline that is typically observed with rapid palatal expansion. The rate of expansion is slower, typically 2mm per month; the maxillary suture may be slightly wider in the anterior region, and the space between the roots of the incisors appears to increase.

### **Appliance Selection**

The Transforce Transverse Arch Development Appliance may be used in either arch to correct anterior crowding or constricted arch width. The Transforce module is preactivated to achieve the required amount of intercanine expansion. An ideal replacement for upper or lower Schwarz plates, this device achieves a similar effect without relying on patient compliance.

The transverse appliance is available in two sizes for the upper arch and two sizes for the

lower arch, with the intermolar width, intercanine width, and mesiodistal length increasing in 2mm increments. Using the millimeter scale on the template (Fig. 4), the pretreatment intermolar width is measured on the patient's cast between the gingival margins of the molars, and the intercanine width between the gingival margins of the canines. These distances are compared with the compressed and extended widths of the transverse appliance to determine the correct size and range of activation.

The upper appliance incorporates gingival steps mesial to the molars and inset bends distal to the canines to engage both the canines and the first premolars. The inset bends are not required on the lower appliance.

The recurved wires extending mesially from the molar tubes may be used to align irregular anterior teeth from the lingual. This is particularly useful when lingually displaced teeth have insufficient space for bracket placement. It is essential, however, to expand the intercanine width before activating the appliance to advance lingually displaced incisors. □