Mobil-Aider™
Joint Mobility Measurement Device

Shoulder Kit User Guide

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Version 1.1
US Patent # 11,123,007
FDA Cleared as Class 1 Exempt

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The Mobil-Aider™ – innovative orthopedic technology

Indications for Use

The Mobil-Aider™ is an orthopedic device used to **measure the linear translation** of two joint surfaces. It enables the clinician to quantify (in millimeters) the linear translation.

Introduction

At this time, the only method of obtaining joint mobility feedback is subjective. The clinician relies on the "feeling" of the joint motion, the "sense" of tissue tension, and the "quality" of the resistance to motion.[1,2]

The shoulder is a ball-and-socket joint that requires both mobility and stability. For this reason, a device to quantify the magnitude of mobility/laxity can be very valuable. The Mobil-Aider Shoulder Kit (**Figure 1)** includes custom contoured attachments capable of accessing and treating anterior, posterior, and inferior glenohumeral translation.

Figure 1. Mobil-Aider Shoulder Kit

The Mobil-Aider™ is a simple, portable (weighs less than 13 ounces), and economical device to interface between the hands of the clinician and the joint of the patient to measure the linear displacement of the shoulder. The Mobil-Aider™ device will help the practitioner stay in the proper plane of motion parallel to the joint surface (avoiding angular or sheer motions), position the joint in the optimal range, and quantify the amount of linear translation (in millimeters).

The concurrent validity and reliability of the Mobil-Aider™ has been successfully tested in the laboratory. Bench testing revealed very high reliability (Cronbach alpha = 0.992 - 0.997) as well as concurrent validity (ICC & Pearson correlations = 0.986 - 0.998).

Figure 2. Identification of Mobil-Aider™ Attachments

The Shoulder Mobil-Aider Kit includes one (1) of each of the following components.

Base Unit: H-A Screen H-1 Non-Screen side			**H-D Blue**
H-E Green		**H-3 Black**	

Table 1. Mobil-Aider™ Attachments for Clinical Use

Attachment Identification	Attachment Use	Technique
H-3	Standard mobilization component	All shoulder mobilizations/tests
H-E Green	Sternoclavicular posterior glide	Shoulder horizontal abduction
H-D Blue	Shoulder posterior glide (supine)	Shoulder rotation
H-E Green	Shoulder anterior glide (prone)	Shoulder rotation
H-E Green	Shoulder inferior glide	Shoulder elevation

Table 2 and 3 provide the Absolute Contraindications and Relative Precautions, respectively, for joint mobilizations.

Table 2. Absolute Contraindications

• Cancer in treatment area	• Joint swelling
• Spinal cord injury	• Joint arthritis
• Acute inflammation	• Nerve injury
• Fracture in treatment area	• Surgery in the treatment area
• Stroke or heart problems	• Blood clotting disorder
• Joint laxity	• Circulation problems

Table 3. Relative Precautions

• Suspected cancer in treatment area	• Skin rash/wound in treatment area
• Joint replacements	• Connective tissue disorder
• Pregnancy	• Bone disease
• Blood clotting therapy	• Long-term use of corticosteroids

Mobil-Aider™ Instructions

Overview

The Mobil-Aider™ is designed to be used for a variety of manual techniques. Through the interlocking dove-tail design, the attachments can be interchanged to accommodate numerous joint contours. Each of the colorful attachments is identified with a letter embossed on it. The table below provides a recommended attachment for the corresponding joint mobilization technique.

However, since every individual has a unique shape, the clinician may find another attachment to be a better "contour" for some individuals. Regardless of the attachment selected, H-B and H-C will only match the dovetail on the "screen side" (**Figure 3**) and H-2 and H-3 will only match the dovetail on the "non-screen side"(**Figure 4**).

Figure 3. Screen side

Figure 4. Non-screen side

General instructions for device use

Key points:

1. Individuals using the Mobil-Aider™ should be properly trained in manual techniques prior to use.
2. It is recommended to assess the uninvolved joint first to obtain a baseline value and allow the patient to be comfortable with the technique(s).

Technique:

1. Select the appropriate components for the technique.
2. Slide each component into the appropriate slot until the spring plunger snaps into place. Failure to engage a component completely into the slot can pinch the patient's skin with use.
3. Position the patient and explain the technique.
4. Power the Mobil-Aider™ device on by moving the switch to the **ON** position.
5. The fuel gauge (image of a battery) will indicate the status of the battery (in %)
6. Select the **"A" or "B" mode** by moving the mode switch to "A" or "B"
    a. **A Mode** = holds the maximal reading on the screen for 3 seconds prior to resetting to zero; recommended for joint testing and initial joint measurements of mobility.
    b. **B Mode** = real-time readings allow the clinician to see a reading on the display for the position of the joint at any point in time; recommended for joint mobilizations.
7. Align the axis (space between the screen-side and non-screen-side) of the Mobil-Aider™ with the joint line.
8. Stabilize the proximal component of the Mobil-Aider™ against the patient with one hand of the clinician.
9. Secure the distal component of the Mobil-Aider™ against the patient with the clinician's other hand.
10. Good contact between the device/patient will enhance the comfort of the technique and reduce likelihood of error.
11. Assure the patient is relaxed.
12. Translate the distal segment anterior on the stabilized proximal segment.
13. View the screen for the value of the translation (displayed in millimeters of motion).
14. The clinician may also be able to appreciate the qualitative aspect of the technique, i.e. the endfeel.
15. If the technique is to be repeated, simply relax the grip on the device to allow the device to return to the zero position (screen should read "0"). If in the A mode this will occur is 3 seconds. If in the B mode it will occur instantaneously.

Key to graphics:

X = point of stabilization ➡ = direction of applied force

Specific Instructions for Shoulder Techniques

It is recommended to perform all techniques on the uninvolved shoulder first to obtain a baseline value and allow the patient to understand the technique.

Sternoclavicular Posterior Glide (Figure 5)

Purpose: To improve horizontal abduction

Components: Green (H-E) attached to screen side to stabilize and Black (H-3) attached to non-screen/moving side

Position: Patient in supine with clinician at the head facing the feet.

Stabilization: Clinician aligns the axis of the Mobil-Aider™ with the sternoclavicular joint line. The device is stabilized on the sternum with the clinician's medial hand.

Figure 5. S-C Posterior Glide

Mobilization: The moveable component of the device is placed in contact with the medial clavicle. The clinician's lateral hand is placed on the moveable component of the device to perform a posterior glide.

Glenohumeral Inferior Glide (Figure 6)

Figure 6. G-H Inferior Glide

Purpose: To improve elevation of the humerus
Components: Green (H-E) attached on screen side to stabilize and Black (H-3) attached on non-screen/moving side
Position: Patient in supine with clinician at the head facing the feet.
Stabilization: Clinician aligns the axis of the Mobil-Aider™ with the glenohumeral joint line. The device is stabilized proximally with the clinician's medial hand.
Mobilization: The moveable component of the device is placed in contact with the superior humeral head. The clinician's lateral hand is placed on the moveable component of the device to perform an inferior glide.

Figure 7. G-H Posterior Glide

Glenohumeral Posterior Glide (Figure 7)
Purpose: To improve rotation of the humerus
Components: Blue (H-D) attached on screen side to stabilize and Black (H-3) attached on non-screen/moving side
Position: Patient in supine with clinician alongside the patient.
Stabilization: Clinician aligns the axis of the Mobil-Aider™ with the glenohumeral joint line. The device is stabilized proximally on the anterior chest with the medial hand.
Mobilization: The moveable component of the device is placed in contact with the anterior humeral head. The clinician's lateral hand is placed on the moveable component of the device and glided posterior/lateral.

Figure 8. G-H Anterior Glide

Glenohumeral Anterior Glide (Figure 8)
Purpose: To improve rotation of the humerus
Components: Green (H-E) attached on screen side to stabilize and Black (H-3) attached on non-screen/moving side
Position: Patient in prone with clinician alongside the patient.
Stabilization: Clinician aligns the axis of the Mobil-Aider™ with the glenohumeral joint line. The device is stabilized proximally on the posterior shoulder/scapula with the medial hand.
Mobilization: The moveable component of the device is placed in contact with the posterior humeral head. The clinician's lateral hand is placed on the moveable component of the device and glided anterior/medial.

References:

1. Chang J, Chang Chien C, Chang G, Chung K, Has A. Adaptability of learning on joint mobilization skill with augmented feedback by using a joint translation simulator. Physiotherapy. 2007;93(s1):S75.
2. Gorgos KS, Wasylyk NT, Van Lunen BL, Hoch MC. Inter-clinician and intra-clinician reliability of force application during joint mobilization: a systematic review. Manual therapy. 2014;19(2):90-6. doi:10.1016/j.math.2013.12.003. PubMed PMID: 24405786.
3. Gulick DT, iOrtho+ mobile app, iOS, Android, and web versions, 2021.
4. Gulick DT. Ortho Notes: A Rehabilitation Specialist's Pocket Guide. Philadelphia, PA: Davis Publishing; 2018.

Charging Port (Figure 9)

The Mobil-Aider™ shoulder kit comes with a charging port. The Mobil-Aider™ device is rechargeable. When first obtaining the device, please charge completely via the charging port.

Figure 9. Docking Station with Charging Port

- To charge the Mobil-Aider™, all attachments must be removed.
- Slide the device screen-side first onto the charging/docking station
- Plug the android end of the recharging cord into the back of the charging port
- Attach the USB end into the AC adapter
- Plug the AC adapter into the wall outlet
- The red light pipe under the device will indicate it is charging
- The fuel gauge will indicate the status of the battery
- Duration of the charge will be influenced by usage

Possible Error Sources

1. Failure to align the axis of the device with the joint axis will influence the quantity of motion
2. Failure to achieve muscle relaxation could decrease translation
3. Failure to keep the device tight against the patient's skin may result in an erroneous reading (interface error)

General Maintenance

Cleaning: The Mobil-Aider may be cleaned with anti-microbial wipes. After wiping off the device, allow the surface to air-dry. Liquids of any kind should never be applied to the device. It should never be submerged in any liquid at any time.

Calibration Check (optional component)

Figure 10. Calibration Block

- The device is calibrated prior to shipping.
- An optional calibration block is available for purchase (**figure 10).** This calibration block will allow the owner to periodically assess the consistency of the Mobil-Aider™. To use the calibration block:
  - First remove all attachments from the base device
  - Slide screen-side of the device onto the dovetail of the challenge block in the direction of the arrow.
  - Place the calibration pin in the 2, 5, 10, or 14 slot.
  - With the power "on" and the device in the "A" mode, translate the non-screen side of the device down to the challenge block pin & hold for 2 seconds for a reading to be displayed.
  - The screen value should be within 5% of the selected pin, i.e. 2 mm pin = 2.0 ± 0.2 or from 1.8 – 2.2 mm
  - Testing can be repeated in the "B" mode. Translate the non-screen side of the device down to the challenge block pin & hold for 2 seconds for a reading to be displayed.
  - If the value is not within this range, the device should be returned for calibration.
  - Package the device with sufficient padding and enclose the completed "Repair Form."
- If a calibration block is not purchased, there is always the option to complete a "Repair Form" to be return the device for calibration. Please call first for pricing.

Trouble-shooting

If any electrical component fails, the mechanical aspects of the device will still work but the screen will simply not display a read -out. This does not pose any risk to the user or the patient.

Table 4

Problem	Potential Concern	Action
User tries to put the attachment into the device incorrectly	Dovetail components will not permit the attachments to be inserted into the wrong side, i.e. large dovetail will not fit & small dovetail will fall out	Dovetail connection will only allow the components to attach as designed
User does not slide the attachment completely into the dovetail connection	Patient could have a skin pinch	User needs to push the attachment into the dovetail slot until the spring plunger engages
Spring plunger fails	Attachment will fail to lock into place; user should not use the device	Inspect integrity of spring plunger; user can return for repair or replacement
Uneven finish/burrs on the device	May scratch the skin	Return device for repair or replacement
No reading on the screen	Unit is not powered “on” or device is not charged	Turn device “on” and/or recharge device
Battery not charging	Battery, charging port, or charging wire failure	Try a different charging wire; Return device for repair or replacement
Crack in the screen	Read-out is not present or unable to be read	Return device for repair or replacement
Incorrect reading with challenge block	Inaccurate measure	Return device for recalibration
Device is dropped and/or there is a rattling noise inside device	Inaccurate measure	Assess with challenge device

Limited Warranty

Mobil-Aider™ is designed to perform in accordance with specifications provided by Therapeutic Articulations, LLC. The purchaser should consult the specifications prior to use.

The Mobil-Aider™ is warranted by Therapeutic Articulations, LLC to the original purchaser for a period of one (1) year from the date of purchase. The Mobil-Aider™ is warranted to be free from defects in materials and workmanship. The purchaser should contact Therapeutic Articulations, LLC by mail or email as follows to obtain a return authorization number:

Therapeutic Articulations, LLC
64 Bethel Church Road, Spring City, PA 19475 USA
dawn@mobil-aider.com
610.570.7153

Upon receipt of the Mobil-Aider™, Therapeutic Articulations, LLC will examine the device. If Therapeutic Articulations, LLC finds the device to be defective as a result of materials and/or workmanship, repairs or replacement of the device will be at the expense of Therapeutic Articulations, LLC.

Please note, misuse, abuse, or unauthorized repairs/alternations of the device will void this warranty. Therapeutic Articulations, LLC will not be liable for commitments or agreements made by any of its employees, agents, or dealers not in compliance with the above stated warranty.

Therapeutic Articulations, LLC reserves the right to design or modify the device without incurring any liability whatsoever to any prior purchaser.

QUALITY MANAGEMENT SYSTEMS FORM

Return Authorization

Request for Return of Therapeutic Articulations Product

Requestor (Section 1)

NAME

ADDRESS

CITY	STATE
COUNTRY	ZIPCODE

PHONE

SHIPPED VIA	SHIPPER TRACKING NO.
EXPECTED DATE OF PICKUP	EXPECTED DATE OF DELIVERY

Reason for request

☐ Malfunction Feedback Report # _____
☐ Ordered Wrong Part
☐ Other_____
☐ Provide Shipping Container For Returned Product

COMMENTS

Therapeutic Articulations Part Number	Returned Product Description	Serial / Lot Number	Replacement Needed
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No

RETURN REQUESTED BY	DATE	RA# ISSUED BY	DATE

Route to Receiving when Complete

Contract Manufacturer/Receiving (Section 2)

NAME & ADDRESS RECEIVED FROM (*IF DIFFERENT THAN ABOVE)*

RECEIVED BY	DATE

☐ Packing Slip Verified

Route to Therapeutic Articulations QA/RA when Complete