
KIN-COM[®]

CLINICAL DESK REFERENCE

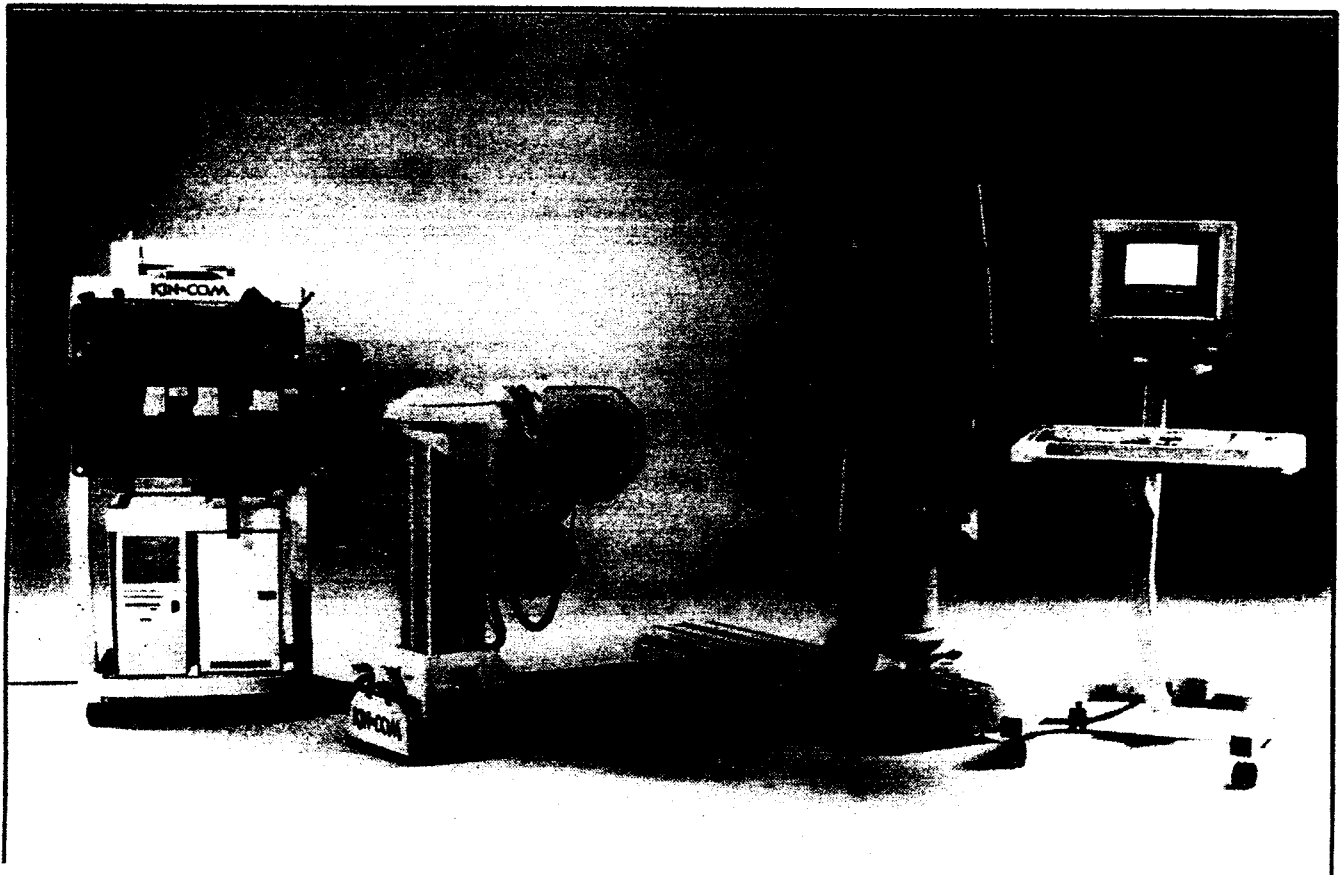


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Introduction

The purpose of this reference is to provide the user with a simple clinical guide which outlines the theory of use and clinical operation of the KIN-COM. Evaluation and exercise tools are valuable elements of a clinician's practice. The KIN-COM is designed to provide the user with the optimum in both assessment of muscle strength, as well as the tools of therapeutic exercise.

**The KIN-COM
provides the
following clinical
advantages**

- Comprehensive muscle testing capabilities in the concentric, isometric and eccentric spectrums.
- Multiple patient exercise capabilities in the following modes:
 - Isokinetic
 - Passive
 - Isometric
 - Isotonic
 - Protocol
 - Sequential.
- New unique ROM mode.
- Unparalleled ease of operation through SCREENTOUCH™ or KeyTouch™ technology. Help screens are available throughout the software.
- Engaging visual feedback for both the clinician and patient to allow for superior performance and documented progress.
- Evaluation report mode that will generate comprehensive yet simple documentation of patient progress.
- A versatile rehabilitation system with a bottom-line function to act as an extension of your clinical skills.

The KIN-COM software is designed with the clinician in mind. It is easy to use, operationally simple and patient motivating. When operating the KIN-COM, the screen clearly presents options and prompts your choice.

**Just remember the
following items
when operating the
KIN-COM**

- Your choices are contained in rectangles on the screen on how to advance within the systems' modes of exercise or evaluation.
- To select one of the options presented, touch the rectangular box containing your choice or use the corresponding keyboard function.

- Options requiring numerical input are made by touching the number option presented to you in the numerical screen pad, or use the numeric key pad on your keyboard followed by touching the enter box.
- To move forward within a program, choose **Enter** to leave a particular screen or choose **Esc**. This will usually take you back one screen.
- If you need help with any screen, press function key **F1** on the keyboard. To return to the previous screen press **Esc** on the keyboard.

Forward

This manual has been prepared for the users of the Chattanooga KIN-COM. It contains general instructions on operation, precautions, maintenance and parts. To obtain maximum life and efficiency from your KIN-COM, and to aid in its proper operation, read and understand this manual thoroughly and follow all instructions prior to operating the unit. The specifications put forth in this manual were in effect at the time of publication. However, owing to the Chattanooga Group's policy of continuous improvement, changes to these specifications may be made at any time without obligation on the part of the Chattanooga Group Inc.

The Help Screens

Throughout the KIN-COM program, a touch of the **F1** key will provide a help screen, which will define the options available on that particular screen. Use the up (↑) and down (↓) arrows and **PgUp** up and **PgDn** keys to scroll through the entire help screen. Press the **P** key if you wish to print a copy of the current help screen on the printer. Pressing **Esc** will return you to the KIN-COM screen.

SCREENTOUCH™ & KeyTouch™ Operation

The KIN-COM software is designed with simplicity in mind. To advance forward in the operational program touch either the rectangular box containing your chosen selection or the **Enter** box which is always located in the lower right portion of the screen. To escape or leave an option touch the **Esc** box which is located in the lower left portion of the screen.

Overview of Software Functions

The KIN-COM operation software is broken down into 6 primary functions: Evaluation, Exercise, Reports, ROM, Patient Positions and Utilities. The following is a brief description of these functions.

- **Evaluation:** This function allows you to perform an Isokinetic, Isometric, Isotonic or Passive based evaluation.
- **Exercise:** This function allows you to perform therapeutic exercise in any of the following modes:
 - Isokinetic
 - Isometric
 - Isotonic
 - Passive
 - Protocol
 - Sequential

All of these exercise modes may be individually customized under the protocol function. Six exercise protocols may be linked together under the sequential function.

- **Reports:** This function allows you to display your evaluation results in a variety of formats. Evaluations may also be printed in the "Report Writer" function in which a bank of evaluation comments have been stored for use in a variety of initial evaluations or comparison formats.
- **ROM:** Range of Motion is a mode of exercise that may be used to help increase or test a patients joint motion. This mode takes into consideration the patients soft tissue tension, and will only allow gains in range of motion to occur if the patients tissue tension is below a desired level.
- **Patient Positions:** This is a feature that will significantly reduce your learning curve because each of the KIN-COM's joint setups are cataloged in the systems software under Preset, Patient and Custom Positions. To access these features, choose the selected option and follow the positioning information presented to you on the screen. Automatic positions are set by following the information presented and by utilizing the automatic control panel arrow keys located to the right of the keyboard.
- **System Utilities:** This function contains three administrative choices: System Setup, Utilities, and Database Utilities which allow you to perform tasks which range from entering your clinic name to backing up data files.

The KIN-COM gives you the ability to exercise and evaluate your patients in a variety of positions and modes. In the following sections of this reference, we will discuss the simplicity of operation, and orient you to KIN-COM's fantastic options. Each screen on which you select options is organized with each choice in its respective rectangle. To select that option, touch the desired choice. All screens are designed in this manner.

Precautionary Instructions

The KIN-COM muscle testing and training system is a device that provides you with a wide variety of choices in the overall treatment of your patients. The KIN-COM is a dynamic system, and to use it most efficiently and correctly, the following precautions should be adhered to:

1. **DO NOT** operate the system until you have thoroughly read and understood the KIN-COM Clinical Desk Reference. If you have questions, please call [REDACTED] Technical Service Department at: [REDACTED] or [REDACTED].
423-344-0407 USA
2. You should take extra time to properly instruct patients who are aphasic or who have difficulty following and carrying out directions. These types of patients should be properly instructed on how the system functions and the importance of properly carrying out instructions. These patients must always be closely monitored when using the equipment.
3. Always be sure you have performed the handle jog procedure. Operation of the system when the load cell reads direction opposite than is intended is contraindicated within proper guidelines for use.
4. Mechanical hardware stops are designed for use as a protective feature, making KIN-COM unique in the marketplace. Failure to operate the system without the mechanical stops in place prior to any training or evaluation may place the patient at risk and may damage the system as well.
5. The patient interrupt switch should always be within the grasp of the patient when he / she performs any activity on the KIN-COM. The patient should be

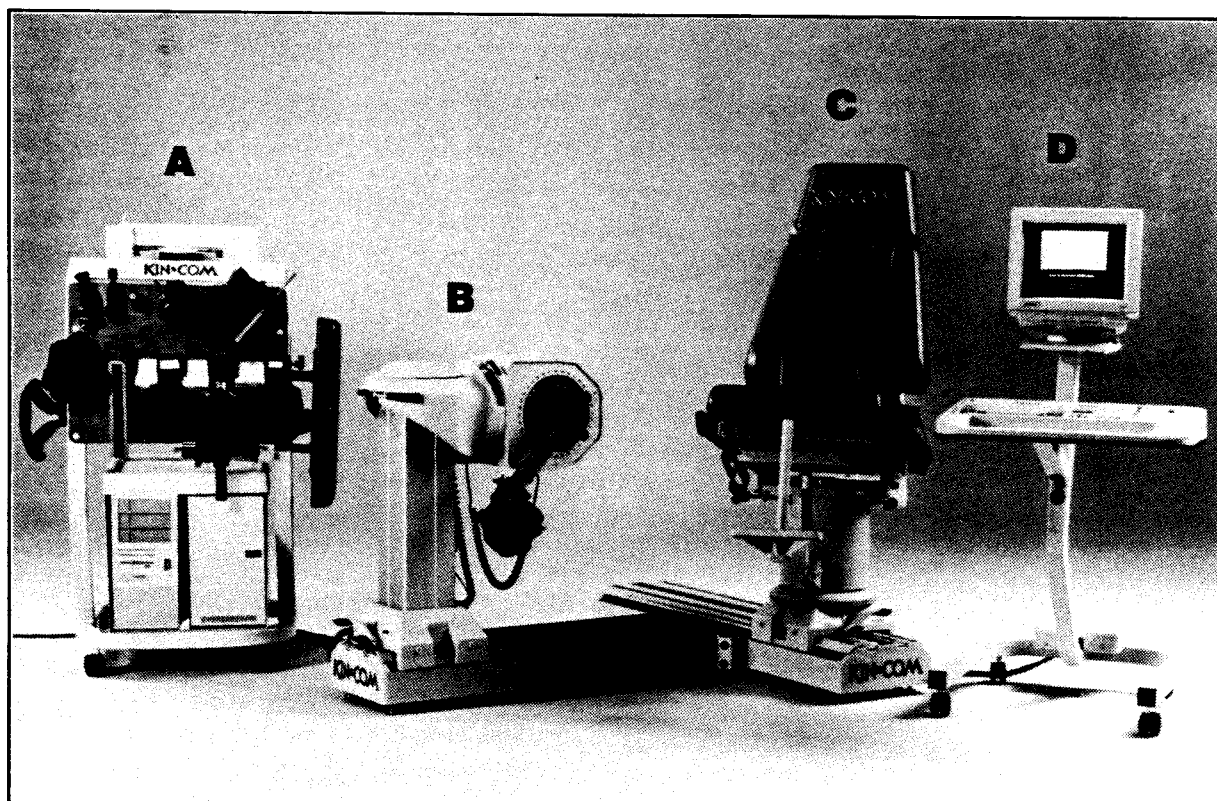
instructed as to the existence of the switch and they should have it in their hands at all times when using the system. It is used to stop the lever from moving when the patient feels that speeds or forces may have become excessive.

6. When moving the lever arm of the KIN-COM, always grasp or push on the attachment (i.e., shinpad) at the load cell. This is to ensure that the load cell will continue to read force in the same direction as the lever arm is moving.
7. The software used to operate this system is protected under copyright laws. Any use of the software other than intended with the KIN-COM muscle testing and training system is prohibited. Tampering with or altering the software in any manner constitutes unwarranted use of the KIN-COM system and immediately voids all warranties expressed or implied by the ~~XXXXXXXXXX~~ Inc. Furthermore, the ~~XXXXXXXXXX~~ Inc. assumes no liability for damaged equipment nor harm to any individual as a result of malfunction due to software which has been tampered with.
8. The KIN-COM System is designed to operate with software installed at the time of shipment. Any additional software programs added to the factory-installed program is done at user's risk and may cause service problems that would not be covered by the customer's warranty.
9. Make certain that any exercise or test has been properly stopped by touching the "Esc (ape)" prompt or keyboard "spacebar" prior to removal of a patient from the attachment or when transferring a patient on or off the KIN-COM.
10. Federal law restricts the use of this device to, or on the order of, a licensed physician or licensed practitioner.

Revised 10/1/11

Principle of Operation

System Components



- A Power / Accessory Cart
- B Dynamometer Unit
- C Seat Assembly
- D Monitor Stand Assembly

Elements of Control and Protection

The KIN-COM is an extension of your clinical skills. The KIN-COM has been designed to allow you to control your patient's exercise strategies. Even if you are not monitoring your patient one-to-one, the KIN-COM provides for patient protection and control by monitoring the patient's activity in the following ways:

Principle of Operation

- The Kinetic Communicator, (KIN-COM), is a robotic dynamometer.
- This unique mechanism of operation is responsible for elevating the KIN-COM to its position as the most valid, reliable and versatile instrument of its kind.
- The closed loop system is the foundation by which the KIN-COM operates. It can be likened to the operation of our central nervous system, which responds constantly and instantly to afferent (sensory input) information with efferent (output) activity.
- The Central Processing Unit (CPU) is the center for processing information. It is the relay center and referee for all activity occurring during exercise or evaluation.
- It has 3 primary sources for exchange of information:

1. The Load Cell

- Just like your hand during a manual muscle test, or manually resisted exercise, is the point of measurement and reference for the parameter: Force (sampling at a rate of 100 x / sec.). The CPU measures and responds to the force being produced by your patient at the load cell. The load cell is sensitive to changes in force as small as 1/4 lb. (1 Newton).
- Attachments insert into the load cell
- Torque is interchangeable in the above paragraph with force as long as you have entered a lever arm length.
- $\text{Torque} = \text{Force} \times \text{Radius}$

2. The Tachometer

- Is located in the dynamometer head and it is the point of measurement and reference for the parameter: Velocity (samples at a rate of 100 x / sec.). The CPU measures and responds to forces at the load cell with changes in velocity of the lever arm.
- If you are in a speed-based mode such as isokinetic, the tachometer maintains the speed which you have chosen, as long as your patient maintains the minimal force requirements which you have selected. If the patient cannot move, the tachometer will slow the movement of the lever arm until that force is achieved. During an Isokinetic application, if the patient does not meet the minimum force requirements established in the exercise, the lever arm will slow or possibly oscillate slightly meaning the minimal force requirement may be too high.
- The advantage of this communication between the tachometer, CPU and the load cell is:
 - The patient must comply to the exercise or test requirements.

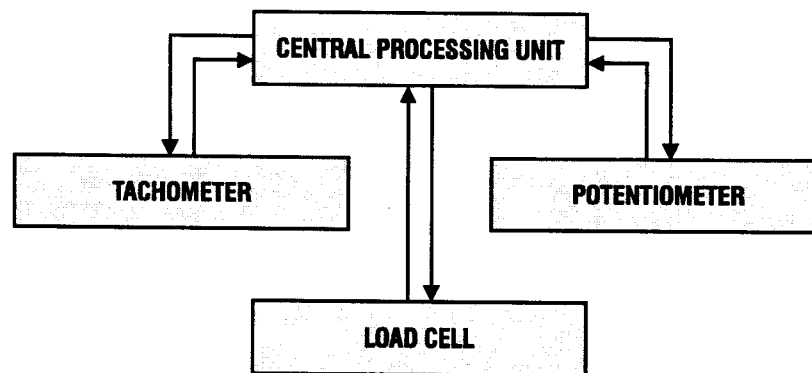
- You, the clinician, can attain instant feedback about the patient's ability to perform the program you have selected, and immediately make the changes for more appropriate parameters for the patient's individual needs.
- If you are in a force-based mode, such as isotonic, the tachometer responds to compliance with the force parameters with acceleration or deceleration of the lever arm. Once again, the closed loop communication between the tachometer and the load cell allows for specific and immediate feedback to the patient and to the clinician about the components necessary for re-education of the control of movement in both the concentric and the eccentric phases of muscle performance.

3. The Potentiometer

- Is located in the dynamometer head and it is the point of measurement and reference for the parameter: angle (sampled at a rate 100 x / sec.). Information about the location of the lever arm is being sent to the CPU, via the potentiometer, simultaneously with the information concerning force and speed, from the load cell and the tachometer.

FIGURE 2-1

Diagram: The following diagram represents a simplified version of the closed loop system.



Safety

Another advantage of KIN-COM's closed loop system of operation is overall safety in each component. You, as the clinician have the ability to modify exercise / evaluation parameters and to set maximum safety limits in terms of speed, force and range of motion.

Control of Forces and Velocities

The KIN-COM is a closed-loop system. This is a result of interaction of the KIN-COM software with the system components. The software controls the exercise parameters as force is exerted against the load cell by the patient, these parameters are selected by the clinician. The software and KIN-COM CPU know where the lever arm is at all times, sampling data from the potentiometer and tachometer every hundredth of a second. If attempts are made to exceed speed or force on the load cell, the KIN-COM CPU will adjust to accommodate for this change, or gently release the lever arm to stop the exercise.

Example

In the passive mode, you want to minimize the amount of muscle force generated by the acute or post-operative patient. If you set a maximum force limit of 22 pounds (100 Newtons) and the patient exceeds this threshold, the CPU will release the lever arm.

In addition to setting exercise parameters, you have the ability to display force markers or zones on the screen for enhanced feedback, showing the patient exactly where the maximum force threshold is.

Example The isokinetic mode, by definition, allows you to control the speed of the activity. When you select 60 degrees per second of motion, this is exactly what the KIN-COM CPU tells the KIN-COM servo amplifier to allow for. If the patient tries to exceed this speed, the system will not allow it. Adjustments are made and speed is held constant because of continual communication between the KIN-COM CPU, servo amplifier and load cell.

Control of Range of Motion

The KIN-COM CPU monitors the parameters of Force, Speed and range of motion. When you manually set the stop and start angle, you have told the KIN-COM the exact range of motion in which the patient should exercise. If attempts are made to exceed these stop and start angles, they will be denied. If these pre-set motion stops are exceeded, the KIN-COM System will shut down power to the lever arm.

Handle Jog

As discussed in the Principle of Operation, the KIN-COM lever arm has attached to it the load cell that reads force generated by the patient. The load cell reads forces in one direction, i.e. flexion, extension, concentric, eccentric, internal, external rotation, etc.

If you reposition the load cell, it will read force as if it was still the opposite side or inverted position. Whenever you reposition the load cell on the lever arm, always perform a handle jog. This procedure will reverse the direction as read by the load cell. Always make adjustments to the lever arm position, such as establishing exercise or test range of motion angles, by grasping the attachments on the load cell.

Handle Jog Procedure

The handle jog procedure will be automatically performed as you set your Stop / Start angles. Make sure you set these angles by moving the lever arm by grasping the load cell or the attachment.

NOTE: Never set stop / start angles by grasping the lever arm alone.

Repositional Mechanical Stops

These solid pegs, attached to the KIN-COM dynamometer head, act as a backup to the manually-determined software stop and start angles. The mechanical stops should be positioned just beyond (5°) the desired stop and start angles. It is not a recommendation, but rather a requirement, that mechanical stops be set prior to any exercise or evaluation routines performed on the KIN-COM! These mechanical stops are adjusted to each patient's needs for joint range of motion control.

Patient Interrupt Switch

This switch should be readily available and always in the grasp of the patient when exercise or testing on the KIN-COM. This switch will cause the power to be shut down to the KIN-COM dynamometer head when depressed.

System Operation

Patient Positioning

Choose the type of patient setup you desire to use. This provides an easy method for exercise and evaluation setup reproducibility. There are three methods for setting up your patients on the KIN-COM.

Patient Positions

➔ **Select Patient Positions and choose from one of the following:**

- Select **Preset Position** to choose a specific joint setup.
- Select **Patient Position** to choose a patient specific setup.
- Select **Custom Position** to choose a specialized setup.

Setup Suggestions

Here are some important questions you need to answer before you begin your exercise session:

- Posture
 - Is your setup encouraging good posture?
- Alignment
 - Does the mechanical axis of motion for the dynamometer match the anatomical axis of motion of the selected joint?
 - **NOTE:** Alignment is accurate when the patient's limb can be taken through the entire range of motion without causing sliding of the attachment along the patient's limb.
- Technique
 - Is your setup creating an undesirable mechanical advantage or disadvantage which may effect potential for force production.
- Mechanical Stops
 - Are the mechanical stops in place?
 - You may need to adjust their settings based on the individual needs of your patient.
- Patient Interrupt Switch
 - Does your patient have the patient interrupt switch in their hand, and do they know how to use it?

Manual Version – Preset Position

Patient Positions

➔ **Select Patient Positions from the main menu and follow these steps:**

Preset Position

➔ **Select Preset Position.**

- A library of standard positions exists to simplify setups.
- All factory preset positions are set for a 5'8" person.
- Position variables will be displayed automatically based on joint, side, and muscle group.

Joint

➔ **Select Joint (ankle, knee, shoulder, etc.).**

Muscle Group

➔ **Select Muscle Group (extensors, flexors, abd., add., etc.).**

Side

➔ **Select Side (right, left).**

Proceed

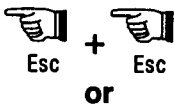
➔ **Proceed With Setup.**

Dynamometer Position

- Dynamometer Position Settings (adjust the following)
 - Dynamometer Height
 - Dynamometer Forward / Backward
 - Dynamometer Tilt (A)
 - Dynamometer Rotation (B)
 - Dynamometer Mechanical Stops (C & D)
 - Lever Arm Length

Seat Position

- Seat Position Settings (adjust the following)
 - Seat Left / Right
 - Seat Rotation (E)
 - Seat Back angle (F)
 - Seat Bottom depth (G)
 - Seat Bottom angle (H)
 - Stabilization straps



or



➔ **Select Esc 2 times to return to the main menu.**

➔ **Select F10 Accept to save positioning information.**

- Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient then select **Enter**.

Manual Version – Patient Position

Patient Position

➔ **Select Patient Positions from the main menu and follow these steps:**

Patient Position

➔ **Select Patient Position.**

- Brings up a scroll box of patient names who have had positional data stored previously.
- The previously saved positional information for the specified patient, side, joint, and muscle group is displayed.

Patient Name

➔ **Select Patient Name.**

- Scroll through list of patient names stored in the scroll box or use the keyboard to enter the patients name.

Side / Joint / Movement

➔ **Select Side / Joint / Movement.**

- Once you have identified the patient by name press enter and a second scroll box will list all side, joint, and movement setups for that individual.

Proceed

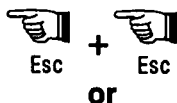
➔ **Proceed With Setup.**

Dynamometer Position

- Dynamometer Position Settings (adjust the following)
 - Dynamometer Height
 - Dynamometer Forward / Backward
 - Dynamometer Tilt (A)
 - Dynamometer Rotation (B)
 - Dynamometer Mechanical Stops (C & D)
 - Lever Arm Length

Seat Position

- Seat Position Settings(adjust the following)
 - Seat Left / Right
 - Seat Rotation (E)
 - Seat Back angle (F)
 - Seat Bottom depth (G)
 - Seat Bottom angle (H)
 - Stabilization straps



➔ **Select Esc 2 times to return to the main menu.**

➔ **Select F10 Accept to save positioning information.**

- Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient then select **Enter**.

Manual Version – Custom Position

Patient Positions

➔ **Select Patient Positions from the main menu and follow these steps:**

Custom Position

➔ **Select Custom Position.**

- Brings up a scroll box of positions listed by description.
- Includes unique positions or multi-joint positions such as leg press, shoulder diagonals, etc.

Setup Name

➔ **Select Setup Name.**

- Scroll through the list of custom setups listed by description.

Add / Delete Position

➔ **Select Add Position or Delete Position.**

- Choose one of these prompts to add a custom position setup or to remove a custom setup from the scroll box.

Proceed

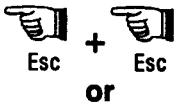
➔ **Proceed With Setup.**

Dynamometer Position

- Dynamometer Position Settings (adjust the following)
 - Dynamometer Height
 - Dynamometer Forward / Backward
 - Dynamometer Tilt (A)
 - Dynamometer Rotation (B)
 - Dynamometer Mechanical Stops (C & D)
 - Lever Arm Length

Seat Position

- Seat Position Settings(adjust the following)
 - Seat Left / Right
 - Seat Rotation (E)
 - Seat Back angle (F)
 - Seat Bottom depth (G)
 - Seat Bottom angle (H)
 - Stabilization straps



➔ **Select Esc 2 times to return to the main menu.**

➔ **Select F10 Accept to save positioning information.**

- Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient then select **Enter**.

NOTE: The following procedures for setting up Preset, Patient and Custom Positions and manual mode operations are applicable only for KIN-COMs with the automatic positioning option installed.

KIN-COM Automatic Positioning Version (option)

Patient Positions

Preset Position

Automatic Version – Preset Position

➔ **Select Patient Positions from the main menu and follow these steps:**

➔ **Select Preset Position.**

- A library of standard positions exists to simplify setups.
- All factory preset positions are set for a 5'8" person.
- Position variables will be displayed automatically based on joint, side, and muscle group.

Joint

➔ **Select Joint (ankle, knee, shoulder, etc.).**

Muscle Group

➔ **Select Muscle Group (extensors, flexors, abd., add., etc.).**

Side

➔ **Select Side (right, left).**

- Select the attachment(s) listed on screen and press any key to continue.

Proceed

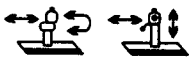
➔ **Proceed with Automatic Setup or Select Manual Mode.**



Manual Mode

➔ **Select Manual Mode.**

- To advance directly to the manual mode and by-pass all automatic functions.
- Refer to *Automatic Version – Manual Mode* on page 2-12 for detailed instructions.



Index Locations

➔ **Select Index Locations.**

- To record any changes made to the indexed locations.
- F10 to save your changes to indexed locations.

Proceed

➔ **Proceed with Automatic Setup.**

- Press lighted toggle on keypad to move dynamometer.
- The diagrams on the screen indicate dynamometer and seat position for the selected joint, side and muscle group.
- Dynamometer Position Settings (adjust the following)
 - Dynamometer Tilt (A)
 - Dynamometer Rotation (B)
 - Dynamometer Mechanical Stops (C & D)
 - Lever Arm Length
- Press lighted toggle on keypad to move seat.

Dynamometer Position

Seat Position

- Seat Position Settings(adjust the following)
 - Seat Rotation (E)
 - Seat Back angle (F)
 - Seat Bottom depth (G)
 - Seat Bottom angle (H)
 - Stabilization straps
- Automatic positioning has been completed. Press any key to advance to the manual mode.
- **NOTE:** Additional adjustments may be necessary to achieve correct alignment for different individuals. See *Automatic Version – Manual Mode* on page 2-12 for a detailed description.



Enter

- **Select Enter to save positioning information.**
 - Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient then select **Enter**.
 - If patient information changes are necessary, select **Re-do**.
 - Make changes to Patient information.
 - Select **Enter** to accept changed or previous patient information.
 - Select **YES** to overwrite previously saved positioning information with new settings and return to main menu.
 - Select **NO** to keep previously saved positioning information and return to main menu.

Automatic Version – Patient Position

Patient Position

- **Select Patient Positions from the main menu and follow these steps:**

Patient Position

- **Select Patient Position.**
 - Brings up a scroll box of patient names who have had positional data stored previously.
 - The previously saved positional information for the specified patient, side, joint, and muscle group is displayed.

Patient Name

- **Select Patient Name.**
 - Scroll through list of patient names stored in the scroll box or use the keyboard to enter the patients name.

Side / Joint / Movement

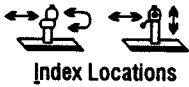
- **Select Side / Joint / Movement.**
 - Once you have identified the patient by name press enter and a second scroll box will list all side, joint, and movement setups for that individual.

Proceed



Manual Mode

- **Proceed with Automatic Setup or Select Manual Mode.**
- **Select Manual Mode.**
 - To advance directly to the manual mode and by-pass all automatic functions.
 - Refer to *Automatic Version – Manual Mode* on page 2-12 for detailed instructions.



➤ **Select Index Locations.**

- To record any changes made to the indexed locations.
- F10 to save your changes to indexed locations.

Proceed

➤ **Proceed with Automatic Setup.**

- Press lighted toggle on keypad to move dynamometer.
- The diagrams on the screen indicate dynamometer and seat position for the selected joint, side and muscle group.
- Dynamometer Position Settings (adjust the following)
 - Dynamometer Tilt (A)
 - Dynamometer Rotation (B)
 - Dynamometer Mechanical Stops (C & D)
 - Lever Arm Length
- Press lighted toggle on keypad to move seat.

Dynamometer Position

Seat Position

- Seat Position Settings(adjust the following)
 - Seat Rotation (E)
 - Seat Back angle (F)
 - Seat Bottom depth (G)
 - Seat Bottom angle (H)
 - Stabilization straps
- Automatic positioning has been completed. Press any key to advance to the manual mode.
- **NOTE:** Additional adjustments may be necessary to achieve correct alignment for different individuals. See *Automatic Version – Manual Mode* on page 2-12 for a detailed description.



➤ **Select Enter to save positioning information.**

- Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient then select **Enter**.
 - If patient information changes are necessary, select **Re-do**.
 - Make changes to Patient information.
 - Select **Enter** to accept changed or previous patient information.
 - Select **YES** to overwrite previously saved positioning information with new settings and return to main menu.
 - Select **NO** to keep previously saved positioning information and return to main menu.

Automatic Version – Custom Position

Patient Positions

➤ **Select Patient Positions from the main menu and follow these steps:**

Custom Position

➤ **Select Custom Position.**

- Brings up a scroll box of positions listed by description.
- Includes unique positions or multi-joint positions such as leg press, shoulder diagonals, etc.

Setup Name

- ➔ **Select Setup Name.**
 - Scroll through the list of custom setups listed by description.

Add / Delete Position

- ➔ **Select Add Position or Delete Position.**
 - Choose one of these prompts to add a custom position setup or to remove a custom setup from the scroll box.

Proceed



Manual Mode

- ➔ **Proceed with Automatic Setup or Select Manual Mode.**
- ➔ **Select Manual Mode.**
 - To advance directly to the manual mode and by-pass all automatic functions.
 - Refer to *Automatic Version – Manual Mode* on page 2-12 for detailed instructions.



Index Locations

- ➔ **Select Index Locations.**
 - To record any changes made to the indexed locations.
 - F10 to save your changes to indexed locations.

Proceed

- ➔ **Proceed with Automatic Setup.**
 - Press lighted toggle on keypad to move dynamometer.
 - The diagrams on the screen indicate dynamometer and seat position for the selected joint, side and muscle group.

Dynamometer Position

- Dynamometer Position Settings (adjust the following)
 - Dynamometer Tilt (A)
 - Dynamometer Rotation (B)
 - Dynamometer Mechanical Stops (C & D)
 - Lever Arm Length

Seat Position

- Press lighted toggle on keypad to move seat.
- Seat Position Settings(adjust the following)
 - Seat Rotation (E)
 - Seat Back angle (F)
 - Seat Bottom depth (G)
 - Seat Bottom angle (H)
 - Stabilization straps
- Automatic positioning has been completed. Press any key to advance to the manual mode.
- **NOTE:** Additional adjustments may be necessary to achieve correct alignment for different individuals. See *Automatic Version – Manual Mode* on page 2-12 for a detailed description.



Enter

- ➔ **Select Enter to save positioning information.**
 - Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient then select **Enter**.
 - If patient information changes are necessary, select **Re-do**.
 - Make changes to Patient information.
 - Select **Enter** to accept changed or previous patient information.

- Select **YES** to overwrite previously saved positioning information with new settings and return to main menu.
- Select **NO** to keep previously saved positioning information and return to main menu.

Automatic Version – Manual Mode

Once you select Preset, Patient or custom position you will reach a screen that will allow you to access the manual mode. Select this screen prompt to create a custom position setup and save it to a patient file.



Manual Mode

➤ Select **Manual Mode**.

- Once you are in manual mode you will be able to make seat or dynamometer adjustments and then save them to a patient file.

Dynamometer Position

➤ **Dynamometer Position (adjust the following):**

- Adjust dynamometer position.
 - Height
 - Forward / Backward
- The highlighted block on the right diagram displays the current dynamometer position numerically.
 - To move the dynamometer, push the toggle switch on the keypad toward the red light (and hold).
 - Dynamometer will automatically stop at the appropriate destination.
- Set Dynamometer Tilt (A)

Release locking lever to allow an upward or downward tilt of dynamometer, then secure the lever to hold that position.

NOTE: If switching sides requires a 180° tilt of the dynamometer, move lever arm straight up or straight down so tilt lever will not interfere with the movement.
- Set Dynamometer Rotation (B)

Release locking lever to allow left or right rotation of the dynamometer, then secure the lever to hold that position.
- Set Mechanical Stop (C)

Pull on the lever pin labeled with a green “C” and rotate to the desired destination, make sure the pin reseats itself.
- Set Mechanical Stop (D)

Pull on the lever pin labeled with a red “D” and rotate to the desired destination, make sure the pin reseats itself.

Mechanical stops are located on the face plate of the dynamometer and are 20° apart. Each should be set just outside the desired range of motion selected for training.

NOTE: Adjustments may be necessary depending on the patient’s condition.
- Lever Arm Length

All attachments plug into the load cell. To determine the lever arm length, find the number on the lever arm corresponding with the most distal end of the load cell.

Seat Position

➤ Seat Position (adjust the following):

- Adjust seat position.
 - Left / Right
- The highlighted block on the left diagram displays the current seat position numerically.
 - To move the seat, push the toggle switch on the keypad toward the red light (and hold).
 - Seat will automatically stop at the appropriate destination.
- Seat Rotation (E)

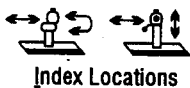
Release seat rotation lock located at both sides of the seat, move the seat to the desired position and lock it in place. The index numbers are located on the angle indicator at the base of the seat pedestal
- Back angle (F)

Release the seat back lock located behind the seat and lower to the desired angle, make sure the locking pin reseats itself properly. The index reference numbers are located on the back of the adjustable rail.
- Bottom depth (G)

Release the seat depth lock by pulling the locking lever toward you as you position your self next to the seat bottom, move the seat forward or backward and then release the locking lever. The index numbers are located on the frame below the seat.
- Bottom angle (H)

Lift up on the seat tilt adjustment locking lever to raise or lower the seat. The index numbers are located just behind the seat rotation locking lever at the side of the seat bottom.
- Stabilization straps

Use the non-elastic straps to secure the patient limb and upper torso.



Index Locations

➤ Select Index Locations.

- For accurate and consistent reproduction of patient positions from one treatment session to another, each moveable component of the KIN-COM involved in patient positioning is labeled with an index. Touching this prompt will allow you to enter new index location values. Use the arrow keys on the keyboard to make a selection and type in the appropriate index location for the following:



➤ Select F10 to save changes.



➤ Select Esc to return to the main menu.

Pictures of Setup

➤ Select F2 for Pictures of Setup (option)

- Select this prompt to display position pictures.

Stop / Start Angles

- The KIN-COM allows you to determine the exercise or evaluation range of motion with an on-line goniometer display that precisely describes the end points in the range of motion you are setting.
- During any exercise or evaluation procedure, you will be prompted to assign a stop and start angle.

Set Stop Angle

➤ Stop Angle Setting.

- **NOTE:** If you want to anatomically reference (turn on the internal goniometer) the exercise, you will need to select turn anatomical reference on before choosing the stop / start angles (See anatomical referencing).
- Grasp the load cell and move the lever arm to the angle where you want joint motion to stop during training. The KIN-COM will assign this position an automatic goniometric reference of zero degrees in the exercise unless anatomical reference has been set.
- Press **Enter** to record this stop angle and advance to the set start angle screen. Press **Esc** to terminate the setting of the stop angle and return to the previous screen. Press **Reset** if you want to select a new stop angle.
- Remember that the backward direction to the KIN-COM is from the stop angle to the start angle. This is an important point to consider when choosing parameters such as forward / backward speed, and forward / backward force.
- If you are switching sides or retesting, a red box will highlight the angle when you are within 1° of the previously chosen stop angle.
- Move the mechanical stop close to the arm but not touching (3-5° clearance) and engage the pin into the nearest hole away from the arm.



Set Start Angle

➤ Start Angle Setting.

- Grasp the load cell and move the lever arm to the angle where you want joint motion to begin during exercise. As you move the extremity to the start angle, observe the goniometric display since it describes, degree by degree, movement from the stop to the start angle.
- Press **Enter** to record this start angle and advance to the next screen. Press **Esc** to terminate the setting of the start angle and return to the choose feedback type screen.
- Remember that the Forward direction to the KIN-COM is from the Start angle to the Stop angle. This is an important point to consider when choosing parameters such as forward / backward speed, and forward / backward force.
- If you are switching sides or retesting, a red box will highlight the angle when you are within 1 degree of the previously chosen START angle.
- You have now programmed the KIN-COM CPU for the range of motion within which the patient may be allowed to exercise or evaluate.
- Move the mechanical stop close to the arm but not touching (3-5° clearance) and engage the pin into the nearest hole away from the arm.



Anatomical Referencing



Joint Position

➤ Select a Joint Position.

- Grasp the load cell and move the lever arm (with the limb attached) to an easy-to-reference anatomical position.
- It is helpful to have the person contract the muscle group to be evaluated or exercised as this will decrease the effects of soft tissue compression as you reference a joint position.
- Anatomical Zero is usually best.
- Press **Enter** to record the mechanical position of the lever arm and to advance to the next screen.



Joint Angle

➤ Actual Joint Angle.

- Enter the actual anatomical angle for the position selected.
- If a knee has a flexion contracture and cannot achieve full knee extension, it may be necessary to choose 90° of knee flexion for a joint position therefore the actual joint angle would be 90°.
- Use the number pad on the right side of the screen or the numeric keypad on the keyboard to enter numbers.
- Press **Enter**



Joint Angle Positive

➤ Move Joint Angle Positive.

- Grasp the load cell and move the lever arm from the reference position to another position that is anatomically more positive.
- Press **Enter** to record the direction as positive.
- **NOTE:** In the case of ankle (PF / DF, Inv / Ever), Shoulder (IR / ER), and wrist (Flex / Ext, R / U Deviation) motions you should select any motion toward the midline of the body as your angle more positive. This will be important in evaluation if you want to overlay two test recorded for separate motions (ex. if you want to overlay results from a shoulder internal rotation and external rotation test together).



Review

➤ Anatomical Reference Review.

- Press **Enter** to advance to the next screen.
- Press **Re-do** if an error was made and you wish to re-setup the anatomical reference.

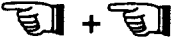

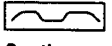






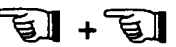


SECTION


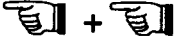








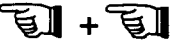
3

Quick Start


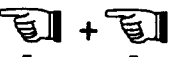

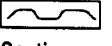






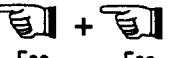
EXERCISE – Setting Up A Passive Exercise

SELECT	TO DO THIS
KIN-COM®	Access the main menu.
Patient Positions	Setup a preset, patient or custom position.
 Esc + Esc or	Return to the main menu after positioning your patient.
	Save positioning information to a patient file. Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient, then select Enter .
Exercise	Select the mode of exercise.
Passive	Select constant speed with no minimal forces required.
 Continuous	Select desired feedback type.
Stop/Start Angle	Identify the desired range of motion.
Modify Speeds	The box in the upper right corner displays the current speed. Touch the box or use the arrow keys to modify speeds.
 Change	Modify exercise parameters.
 Start Exercise	Begin the exercise session.
 Stop Exercise	End the exercise session.
 View Results	View data recorded during exercise.
 Save	Save exercise data to a patient file.
 Esc Finish Exercise	Return to the choose feedback screen.
 Esc + Esc	Return to the main menu.


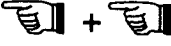

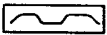






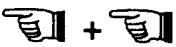
EXERCISE – Setting Up An Isometric Exercise

SELECT	TO DO THIS
	<p>Access the main menu.</p>
<p>Patient Positions</p>	<p>Setup a preset, patient or custom position.</p>
 Esc or Esc	<p>Return to the main menu after positioning your patient.</p>
 F10 Accept	<p>Save positioning information to a patient file. Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient, then select Enter.</p>
<p>Exercise</p>	<p>Select the mode of exercise.</p>
<p>Isometric</p>	<p>Select constant position, variable force exercise.</p>
 Turn Store ON	<p>If you desire to record data during exercise.</p>
 Feedback: Bar	<p>Select feedback type.</p>
<p>Stop Angle</p>	<p>Identify the end of the range of motion.</p>
<p>Isometric Holds</p>	<p>Identify the additional isometric hold angles.</p>
<p>Start Angle</p>	<p>Identify the starting point.</p>
<p>Min. Isometric Forces</p>	<p>Set the minimal requirements for recording data.</p>
 Enter	<p>After you input the minimal force requirements.</p>
 Change	<p>Modify exercise parameters.</p>
 Start Exercise	<p>Begin the exercise session.</p>
 Stop Exercise	<p>End the exercise session.</p>
 Esc Finish Exercise	<p>Return to the choose feedback screen.</p>
 Esc Esc	<p>Return to the main menu.</p>

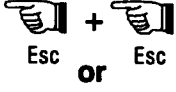





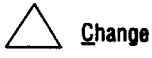

EXERCISE – Setting Up An Isokinetic Exercise (Continuous)

SELECT	TO DO THIS
	<p>Access the main menu.</p>
<p>Patient Positions</p>	<p>Setup a preset, patient or custom position.</p>
 Esc + Esc or	<p>Return to the main menu after positioning your patient.</p>
 F10 Accept	<p>Save positioning information to a patient file. Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient, then select Enter.</p>
<p>Exercise</p>	<p>Select the mode of exercise.</p>
<p>Isokinetic</p>	<p>Select constant speed, variable force exercise.</p>
 Continuous	<p>Select desired feedback type.</p>
<p>Stop/Start Angle</p>	<p>Identify the desired range of motion.</p>
<p>Modify Speeds</p>	<p>The box in the upper right corner displays the current speed. Touch the box or use the arrow keys to modify speeds.</p>
 Change	<p>Modify exercise parameters.</p>
 Start Exercise	<p>Begin the exercise session.</p>
 Stop Exercise	<p>End the exercise session.</p>
 View Results	<p>View data recorded during exercise.</p>
 Save	<p>Save exercise data to a patient file.</p>
 Esc Finish Exercise	<p>Return to the choose feedback screen.</p>
 Esc + Esc	<p>Return to the main menu.</p>




















EXERCISE – Setting Up An Isotonic Exercise (Continuous)

SELECT	TO DO THIS
	<p>Access the main menu.</p>
<p>Patient Positions</p>	<p>Setup a preset, patient or custom position.</p>
 Esc + Esc or	<p>Return to the main menu after positioning your patient.</p>
 F10 Accept	<p>Save positioning information to a patient file. Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient, then select Enter.</p>
<p>Exercise</p>	<p>Select the mode of exercise.</p>
<p>Isotonic</p>	<p>Select speed variable exercise.</p>
 Continuous	<p>Select desired feedback type.</p>
<p>Stop/Start Angle</p>	<p>Identify the desired range of motion.</p>
<p>Modify Force Limits</p>	<p>The box in the upper right corner shows current force limits. Touch the box or use the arrow keys on the keyboard to modify force limits.</p>
 Change	<p>Modify exercise parameters</p>
 Start Exercise	<p>Begin the exercise session.</p>
 Stop Exercise	<p>End the exercise session.</p>
 View Results	<p>View data recorded during exercise.</p>
 Save	<p>Save exercise data to a patient file.</p>
 Esc Finish Exercise	<p>Return to the choose feedback screen.</p>
 Esc + Esc	<p>Return to the main menu.</p>

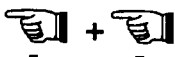





EVALUATION – Setting Up An Isokinetic Overlay Test (New Patient, Con / Ecc)

SELECT	TO DO THIS
KIN-COM®	Access the main menu.
Patient Positions	Setup a preset, patient or custom position.
	Return to the main menu after positioning your patient.
	Save positioning information to a patient file. Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient, then select Enter .
Evaluation	Access the evaluation program.
	Enter all relevant patient information.
	If information is correct, choose Enter if not press Re-do .
Joint Specification	Enter joint, muscle group and side first information.
	Re-do to change joint specification information.
Gravity Compensation	Turn ON Gravity Compensation (optional) and follow the steps if you want to compensate for gravity.
Isokinetic	Select isokinetic as the mode of testing.
	Select desired feedback type.
Lever Arm Length	Set the distance from the axis of rotation to the load cell.
Anatomical Reference	Select Re-do if the anatomical reference is not correct.
Stop/Start Angle	Identify the desired range of motion.
	Modify evaluation parameters.
	Allow individual to become familiar with testing parameters.





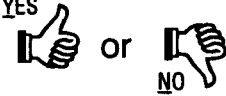






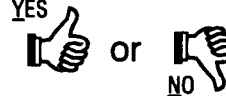


EVALUATION – Setting Up An Isokinetic Overlay Test (New Patient, Con / Ecc) – cont.

SELECT	TO DO THIS
 Stop Exercise	Exit the warm-up session.
 Start Measure	Start measure, begin recording data.
YES  or  NO	Accept or reject the latest effort.
YES  or  NO	Accept or reject the previous effort(s).
 Save	Once you have 3 consistent concentric and eccentric efforts.
 Esc	After you select save, choose Esc to set up the other side.
Side Right/Left	Remember to change side being testing.
 Setup Test	Repeat steps for: lever arm length, anatomical reference, stop / start angles.
 Warm-Up	Allow individual to become familiar with testing parameters.
 Stop Warm-up	Exit the warm-up session.
 Start Measure	Start measure, begin recording data.
YES  or  NO	Accept or reject the latest effort.
YES  or  NO	Accept or reject the previous effort(s).
 Save	Once you have 3 consistent concentric and eccentric efforts.
 Esc	Return to the setup test screen.
 End Test	Follow this by Esc to return to the main menu.










EVALUATION – Setting Up An Isometric Test (New Patient)

SELECT	TO DO THIS
KIN-COM®	Access the main menu.
Patient Positions	Setup a preset, patient or custom position.
 Esc + Esc or	Return to the main menu after positioning your patient.
 F10 Accept	Save positioning information to a patient file. Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient, then select Enter .
Evaluation	Access the evaluation program.
 New Patient	Enter all relevant patient information.
 Enter	If information is correct, choose Enter if not press Re-do .
Joint Specification	Enter joint, muscle group and side first information.
 Enter	Re-do to change joint specification information.
Gravity Compensation	Turn ON Gravity Compensation (optional) and follow the steps if you want to compensate for gravity.
Isokinetic	Select isometric as the mode of testing.
Lever Arm Length	Set the distance from the axis of rotation to the load cell.
Anatomical Reference	Select Re-do if the anatomical reference is not correct.
Stop Angle	Identify the end of the range of motion.
Isometric Holds	Identify the additional isometric hold angles.
Start Angle	Identify the starting point.
Min. Isometric Forces	Set the minimal requirements for recording data.
 Change	Modify evaluation parameters.



EVALUATION – Setting Up An Isometric Test (New Patient) – cont.

SELECT	TO DO THIS
 Warm-Up	Allow patient to become familiar with testing parameters.
 Stop Warm-up	Exit the warm-up session.
 Start Test	Start measure, begin recording data.
 Stop Test	Once 3 efforts have been performed at each angle.
 YES or NO	Save data to a patient file or exit without saving.
 Finish Side	After you select save, choose Esc to set up the other side.
Side Right/Left	Select this prompt to change side being tested.
 Setup Test	Repeat steps for: lever arm length, anatomical reference, stop / start angles.
 Warm-Up	Allow individual to become familiar with testing parameters.
 Stop Warm-up	Exit the warm-up session.
 Start Test	Start measure, begin recording data.
 Stop Test	Once you have 3 consistent concentric and eccentric efforts.
 YES or NO	Save data to a patient file or to exit without saving.
 Finish Side	After choosing save, select finish side to setup the next test.
 End Test	Follow this by Esc to return to the main menu.

Setting Up the Range of Motion Mode

SELECT	TO DO THIS
KIN-COM®	Access the main menu.
Patient Positions	Setup a preset, patient or custom position.
 Esc Esc or	Return to the main menu after positioning your patient.
 F10 Accept	Save positioning information to a patient file. Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient, then select Enter .
ROM	Access the range of motion mode.
Protocol	Choose the ROM protocol you want to use.
 Enter	After you select one of the ROM protocols choose enter.
Anatomical Reference	Select Re-do if the anatomical reference is not correct.
Stop/Start Angles	Identify the desired range of motion.
Return Force	Set the force at which the lever will reverse direction.
	Make any changes in maximum force limit.
	Make any changes in return force limit.
 Enter	Accept the parameters as entered.
Expanded ROM	This will allow motion past the set stop angle.
 Change	Modify ROM parameters:
 Start Exercise	Begin ROM exercise.
 Stop Exercise	End ROM exercise.

Setting Up the Range of Motion Mode – cont.

SELECT	TO DO THIS
 Esc Finish Exercise  Esc	Return to ROM protocol screen. Return to the main menu.

Exercise

Exercise Options

A clinical advantage the KIN-COM provides is multiple exercising strategies to choose from. You are not limited to the isokinetic exercise alone, but can utilize passive, isometric and isotonic forms of exercise as well. The first 4 options are pre-programmed examples of each type of exercise. These examples were selected because they can be used for a majority of patients.

NOTE: No single exercise is appropriate for all patients all of the time; therefore, the protocol option exists to allow a clinician to change each parameter of the exercise as appropriate for an individual patient's needs.

Exercise ➤ **Select Exercise from the main menu and you will see the following choices:**

Isokinetic	Passive
Isometric	Isotonic
Protocol	Sequential

Speed Constant Exercises

The following modes of training are described as Speed Constant exercises:

- **Passive**
 - Velocity is constant and either minimal or no voluntary force by the patient is required for lever arm movement to occur.
 - The KIN-COM will act as a continuous passive motion device.
 - Through the use of visual feedback markers or zones on the screen, the patient is able to monitor their own effort in an active / assistive manner.
- **Isometric**
 - Isometric muscle contractions occur at various Isometric hold angles in the range of motion, as preset by the clinician.
 - Visual feedback of force produced by the patient and pre-established exercise parameters of minimal effort and time of contraction will motivate the patient to optimum performance.

- **Isokinetic**

- The velocity of joint motion is constant, excluding acceleration to and deceleration from the designated speed.
- Force is dependent upon how hard the individual pushes against the load cell.

Speed Variable Exercise

The following mode of training is described Speed Variable exercise.

- **Isotonic**

- The tension the muscle generates in response to a window of force limits in both the concentric and eccentric directions.
- The amount of force generated also varies depending upon the position of the limb and its range of motion.
- During isotonic exercise, the speed at which a weight is moved is variable dependent upon patient effort and is displayed as a velocity trace on the KIN-COM monitor screen.
- Through the use of a velocity trace and positional markers or zones, you are training, not only gains in strength, but progressively training neuromuscular motor control.

Other Exercise Options

The other two prompts are for protocol and sequential

- **Protocol**

- Allows design and storage of an individual exercise of any type.
- The exercise can then be named by patient or description for easy recall from the protocol scroll box.
- The mode of exercise and specific parameters should be chosen by the clinician as appropriate to individual patient needs.

- **Sequential**

- Allows for design and linking together of up to six different exercises of any type.
- The sequence can be named by patient or description, and stored for easy recall from the sequential scroll box.

NOTE: In this section we will look at each of the four modes of exercise in detail. Protocol and sequential will be covered in another section. Methods for modifying each mode of exercise will be covered in modifying exercise.

The Passive Mode

- **Applications**

- CPM (Controlled passive)
- Soft tissue stretch
- End range oscillations
- Early motor control
 - Familiarization

- Active Assistive
- Resistive
 - Submaximal
 - Maximal
- Reciprocal
- Combination
- Testing
 - Weak
 - Malingerers
 - Neuro
- **Advantages**
 - Early loading of muscle or joint
 - Re-education of motor control

Setting Up a Passive Exercise

- **Select KIN-COM to access the main menu.**
 - To setup a preset, patient or custom position
 - To select the mode of training

Patient Positioning

Choose the type of patient setup you desire to use. This provides an easy method for exercise and evaluation setup reproducibility. There are three methods for setting up your patients on the KIN-COM.

Patient Position

- **Select Patient Positions and choose one of the following:**
 - **Preset Position** to choose a specific joint setup.
 - **Patient Position** to choose a patient specific setup.
 - **Custom Position** to choose a specialized setup.

Proceed

- **Proceed With Setup.**
 - Seat and Dynamometer Position
 - The diagrams on the screen indicate seat and dynamometer position for the selected joint, side, and muscle group.
 - **NOTE:** Additional adjustments may be necessary to achieve correct alignment for different individuals.

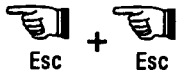
Dynamometer Position

- Dynamometer Position Settings (adjust the following)
 - Dynamometer Up / Down
 - Dynamometer Forward / Backward
 - Dynamometer Tilt (A)
 - Dynamometer Rotation (B)
 - Dynamometer Mechanical Stops (C & D)
 - Lever Arm Length

Seat Position

- Seat Position Settings (adjust the following)
 - Seat Left / Right
 - Seat Rotation (E)
 - Seat Back angle (F)

- Seat Bottom depth (G)
- Seat Bottom angle (H)
- Stabilization straps



or



➤ **Select Esc 2 times to return to the main menu.**

➤ **Select F10 Accept to save positioning information.**

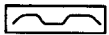
- Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient then select **Enter**.

Exercise

➤ **Select Exercise as the mode of training.**

Passive

➤ **Select Passive constant speed (no minimal forces required).**



Continuous

➤ **Select Continuous as the desired visual feedback option.**

- Display is time based.
- A trace moves continuously across the screen.
- Each sweep occurs over a 5 second interval.

Stop / Start Angles

➤ **Identify the desired range of motion.**

Suggestion: You may want to anatomically reference this exercise for accurate choice of angles, see principles of operation.

Stop Angle

➤ **Set stop angle.**

- Move the attachment into the direction of the first contraction type, and stop the attachment at the desired end point, pause momentarily.
- Pressing **Enter** records this angle as the stop angle and prompts the next angle to be selected.
- **Reset** allows you to reselect the stop angle.
- For a more detailed explanation of stop / start angles refer to principles of operation.



Enter

Start Angle

➤ **Set start angle.**

- Move the attachment to the desired starting point, and stop the attachment at the desired starting point, pause momentarily.
- **Enter** records this angle as the start angle and prompts the next angle to be selected
- For a more detailed explanation of stop / start angles refer to principles of operation.



Enter

Orientation to Screen Display



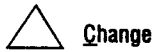
Screen Display

- The upper right corner denotes the exercise / evaluation speeds.
 - If both the forward speed and the backward speed are equal, then the upper right corner will have a button with the current speed.
 - Press the left side of this button (↓ arrow key) to decrease the forward and backward speeds or press the right side of this button (↑ arrow key) to increase the forward and backward speeds.
- If this is the first time at this screen, a blue box in the middle of the screen will display the current exercise / evaluation parameters.

- Select **Change** to make modifications to the program parameters without leaving the program.
- The upper middle records the current sets and reps.
- The force is exhibited continuously by the trace, and numerically to the right of the baseline.
- The time scale is exhibited (in seconds), across the bottom of the screen. Cues will appear at the bottom right to acknowledge each 10 seconds of recorded data.

Be sure the mechanical blocks are set.

Be sure the patient has the interrupt switch.



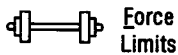
➤ **Select Change to modify exercise parameters.**

- To modify the exercise program parameters without leaving the exercise program press the change button.



➤ **Select Speed Limits to modify the following:**

- Speed forward
- Speed backward
- Type of contraction
 - Concentric / Eccentric
 - Concentric / Concentric
 - Eccentric / Eccentric
 - Eccentric / Concentric



➤ **Select Force Limits to modify the following:**

- Start forward force
- Start backward force
- Minimum force
- Maximum force
- Isometric settings



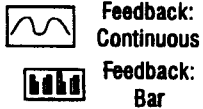
➤ **Select Screen Display to modify the following:**

- Traces
- Scale
- Markers
- Baseline
- Marker lines (or) marker zones filled
- Target on (or) off

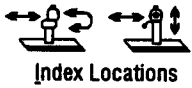
Sets, Reps & Turns

➤ **Select Sets, Reps & Turns to modify the following:**

- Repetitions per set
- Number of sets
- Recovery time
- Turning points
 - Acceleration
 - Deceleration



➤ Select **Feedback: Continuous (or) Feedback: Bar**.

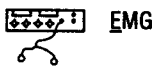


➤ Select **Index Locations to record modifications to positioning.**

- **Index:** Each moveable component of the KIN-COM involved in patient positioning has been labeled with an appropriate index.
- Each category on this screen exhibits the appropriate index number for the selected side, joint, and muscle group.



➤ Select **Save to save new parameters as a custom protocol.**



➤ Select **EMG to calibrate or setup EMG unit.**



➤ Select **Esc to return to the exercise screen.**



➤ Select **Start Exercise to begin the exercise session.**



➤ Select **Stop Exercise to end the exercise session.**



➤ Select **View Results to view exercise report.**

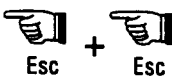
- This screen displays a summary of the peak forces and speeds and the power and work exerted for the previous exercise.
- **NOTE:** A lever length must be entered for the power and work values to be valid. This can be accomplished by typing in the lever length via the numeric keys on the keyboard.
- To print these results, press the print button. You must enter the patient's information in order to get a printout. The program will prompt you for the needed information when select print.



➤ Select **Save to save exercise data to a patient file.**



➤ Select **Esc Finish Exercise to return to the choose feedback screen.**



➤ Select **Esc 2 times to return to the main menu.**

The Isometric Mode

- **Applications**

- Stabilization
- Beginning Motor control
- Strengthening at specific point of ROM
- Eliminates muscle stretch
- Contract / relax
- Hold / relax
- Testing

- **Advantages**

- Motor control easier to regulate
- Eliminates muscle stretch

Setting Up An Isometric Exercise

Patient Positioning

- **Select KIN-COM to access the main menu.**

- To setup a preset, patient or custom position
- To select the mode of exercise

Choose the type of patient setup you desire to use. This provides an easy method for exercise and evaluation setup reproducibility. There are three methods for setting up your patients on the KIN-COM.

Patient Position

- **Select Patient Position and choose one of the following:**

- **Preset Position** to choose a specific joint setup.
- **Patient Position** to choose a patient specific setup.
- **Custom Position** to choose a specialized setup.

Proceed

- **Proceed With Setup.**

- Seat and Dynamometer Position
 - The diagrams on the screen indicate seat and dynamometer position for the selected joint, side, and muscle group.
 - **NOTE:** Additional adjustments may be necessary to achieve correct alignment for different individuals.

Dynamometer Position

- Dynamometer Position Settings (adjust the following)

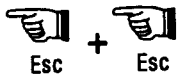
- Dynamometer Up / Down
- Dynamometer Forward / Backward
- Dynamometer Tilt (A)
- Dynamometer Rotation (B)
- Dynamometer Mechanical Stops (C & D)
- Lever Arm Length

Seat Position

- Seat Position Settings (adjust the following)

- Seat Left / Right
- Seat Rotation (E)
- Seat Back angle (F)

- Seat Bottom depth (G)
- Seat Bottom angle (H)
- Stabilization straps



or



➤ Press Esc 2 times to return to the main menu.

➤ Select F10 Accept to save positioning information.

- Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient then select **Enter**.

Exercise
Isometric

➤ Select **Exercise** as the mode of training.

➤ Select **Isometric Constant angle, variable force exercise**.



➤ Select **Turn Store On**.

- This option will allow the data to be stored during the exercise.
- If this option is turned ON, then you will be limited to collecting a maximum of 3 sets.
- To record exercise data during exercise you must select turn store on prior to setting the start / stop angles.
- Once you finish the exercise you will be prompted to save the data to a patient file, choose **Yes** to access a patient file or create a new patient file or **NO** to return to the exercise screen.
- Access the data you saved to a patient file by selecting reports at the main menu.



➤ Select desired visual feedback option.

- During isometric exercise effort will be displayed in a bar graph format as the limb is passively moved from one hold angle to the next.

Stop / Start Angles

➤ Identify the desired range of motion.

Suggestion: You may want to anatomically reference this exercise for accurate choice of isometric angles, see principles of operation.

Stop Angle

➤ **Stop Angle Setting.**

- Grasp the load cell and move the lever arm to the final angle of the isometric exercise. To enhance session to session reliability, notice to the left a reminder of the previous angle set.
- **Enter** records this angle as the stop angle and prompts the next angle to be selected. Set additional isometric holds, the stop / start angles will also function as isometric holds



Isometric Hold Angle

➤ **Isometric Hold Angle Settings.**

- Grasp the load cell and move the lever arm to the next angle to be selected for the isometric exercise.
- **Enter** records this angle, and the prompt for the next angle appears. Then move the lever arm to the next angle and press enter. If you choose store exercise, each angle must be at least 5 degrees apart.



Start Angle



Enter

- Touch the set start angle button when ready to set the first isometric angle. Including start and stop angles, a total of 9 angles are available for isometric measurements.
- **Re-do** allows you to reset all of the angles without having to reset anatomical reference.

➤ Set start angle.

- Move the attachment to the desired starting point
- Stop the attachment at the desired starting point, pause momentarily
- Choose **Enter**

Isometric Settings

➤ Isometric Settings.

- Angles to be evaluated have been selected and are exhibited in white on left side of screen.
- The minimal forces which were previously set for the corresponding angles appear, displayed in blue. Enter records these minimal forces as shown.
- Current Min. Force is the minimal amount of force that must be applied against the load cell in order for the clock to count down the contraction time, at the corresponding angle. If the force produced by the patient drops below the minimal force requirement, then the clock will stop counting down.

Set Min. Force

➤ Select Set Min. Force.

- To change the minimal force requirements choose set min. forces. Press enter to keep the forces as displayed.
- Each angle allows for a separate minimum isometric force requirement, so that the effects of biomechanical advantage and / or passive insufficiency may be considered.
- In parenthesis appears a reminder of the Min. Force previously chosen for this angle.
- The minimum isometric force must be set below the maximum force.

Orientation to Screen Display



Screen Display

- Either the Time Clock or Time Bar in the upper left corner denotes contraction time. The clock counts down only when patient meets or exceeds the minimum isometric force.
- Number of contractions and sets are counted in upper right corner. One set includes the total contractions from start to stop angles.
- The blue markers represent an 11 lb. window as a target. This target automatically adjusts so that the bottom of the blue represents the minimum isometric force required at that angle.
- Angle and minimum isometric force are denoted numerically under each bar graph.
- If this is the first time at this screen, a blue box in the middle of the screen will display the current test parameters.



Change

➤ Select Change to modify exercise parameters.

- To modify the exercise program parameters without leaving the exercise program press the change button.



Speed Limits

➤ **Select Speed Limits to modify the following.**

- Speed forward
- Speed backward
- Type of contraction
 - Concentric / Eccentric
 - Concentric / Concentric
 - Eccentric / Eccentric
 - Eccentric / Concentric



Force Limits

➤ **Select Force Limits to modify the following.**

- Start forward force
- Start backward force
- Minimum force
- Maximum force
- Isometric settings
 - Minimum isometric forces
 - Contraction time
 - Relax after contraction yes, no
 - Time bar on, off



Screen Display

➤ **Select Screen Display to modify the following.**

- Traces
- Scale
- Markers
- Baseline
- Marker lines (or) marker zones filled
- Target on (or) off

Sets, Reps & Turns

➤ **Select Sets, Reps & Turns to modify the following.**

- Number of sets
- Recovery time
- Turning points
 - Acceleration
 - Deceleration

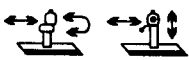


Feedback: Continuous

➤ **Select Feedback: Continuous (or) Feedback: Bar.**



Feedback: Bar



Index Locations

➤ **Select Index Locations to record modifications to positioning.**

- **Index:** Each moveable component of the KIN-COM involved in patient positioning has been labeled with an appropriate index.
- Each category on this screen exhibits the appropriate index number for the selected side, joint, and muscle group.



Save

➤ **Select Save to save new parameters as a custom protocol.**



EMG

➔ Select **EMG** to calibrate or setup EMG unit.



Esc

➔ Select **Esc** to return to the exercise screen.



Start
Exercise

➔ Select **Start Exercise** to begin the exercise session.



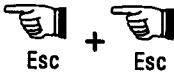
Stop
Exercise

➔ Select **Stop Exercise** to end the exercise session.



Esc
Finish Exercise

➔ Select **Esc Finish Exercise** to return to the feedback screen.



Esc + Esc

➔ Select **Esc 2 times** to return to the main menu.

The Isokinetic Mode

- **Applications**

- Strengthening
 - Submaximal
 - Maximal
- Endurance Training
- Motor Control
- Testing

- **Types of Feedback**

- Continuous
- Overlay

- **Advantages**

- Allows maximal loading of the muscle through the range of motion.
- Accommodating force at a fixed speed.

Setting Up An Isokinetic Exercise (Continuous)

Select **KIN-COM** to access the main menu

- To setup a preset, patient or custom position
- To select the mode of exercise

Patient Positioning

Choose the type of patient setup you desire to use. This provides an easy method for exercise and evaluation setup reproducibility. There are three methods for setting up your patients on the KIN-COM.

Patient Positions

➔ Select **Patient Positions** and choose one of the following:

- Preset Position to choose a specific joint setup.
- Patient Position to choose a patient specific setup.
- Custom Position to choose a specialized setup.

Proceed ➤ **Proceed With Setup.**

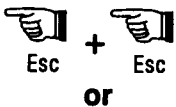
- Seat and Dynamometer Position
 - The diagrams on the screen indicate seat and dynamometer position for the selected joint, side, and muscle group.
 - **NOTE:** Additional adjustments may be necessary to achieve correct alignment for different individuals.

Dynamometer Position

- Dynamometer Position Settings (adjust the following)
 - Dynamometer Up / Down
 - Dynamometer Forward / Backward
 - Dynamometer Tilt (A)
 - Dynamometer Rotation (B)
 - Dynamometer Mechanical Stops (C & D)
 - Lever Arm Length

Seat Position

- Seat Position Settings(adjust the following)
 - Seat Left / Right
 - Seat Rotation (E)
 - Seat Back angle (F)
 - Seat Bottom depth (G)
 - Seat Bottom angle (H)
 - Stabilization straps



➤ **Press Esc 2 times to return to the main menu.**



➤ **Select F10 Accept to save positioning information.**

- Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient then select **Enter**.

Exercise ➤ **Select Exercise as the mode of training.**

Isokinetic ➤ **Select Isokinetic constant speed, variable force exercise.**



➤ **Select Continuous as the desired visual feedback option.**

- Display is time based.
- A Trace moves continuously across the screen.
- Each sweep occurs over a 5 second interval.

Stop / Start Angles ➤ **Identify the desired range of motion.**

Suggestion: You may want to anatomically reference this exercise for accurate choice of angles, see principles of operation.

Stop Angle



➤ Set stop angle.

- Move the attachment into the direction of the first contraction type, and stop the attachment at the desired end point, pause momentarily.
- **Enter** records this angle as the stop angle and prompts the next angle to be selected.
- **Reset** allows you to reselect the stop angle.
- For a more detailed explanation of stop / start angles refer to principles of operation.

Start Angel



➤ Set start angle.

- Move the attachment to the desired starting point, and stop the attachment at the desired starting point, pause momentarily.
- **Enter** records this angle as the start angle and prompts the next angle to be selected
- For a more detailed explanation of stop / start angles refer to principles of operation.

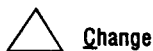
Orientation to Screen Display



- The upper right corner denotes the test speeds.
 - If both the forward speed and the backward speed are equal, then the upper right corner will have a button with the current speed.
 - Press the left side of this button (↓ arrow key) to decrease the forward and backward speeds or press the right side of this button (↑ arrow key) to increase the forward and backward speeds.
- If this is the first time at this screen, a blue box in the middle of the screen will display the current test parameters.
- Select **Change** to make modifications to the program parameters without leaving the program.
- The upper middle records the current sets and reps.
- The force exerted against the load cell is displayed continuously by the trace, and numerically to the right of the baseline.
- The time scale is exhibited (in seconds), across the bottom of the screen. Cues will appear at the bottom right to acknowledge each 10 seconds of recorded data.

Be sure the mechanical blocks are set.

Be sure the patient has the interrupt switch.



➤ Select **Change** to modify exercise parameters.

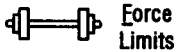
- To modify the exercise program parameters without leaving the exercise program press the change button.



➤ Select **Speed Limits** to modify the following.

- Speed forward
- Speed backward
- Type of contraction
 - Concentric / Eccentric
 - Concentric / Concentric

- Eccentric / Eccentric
- Eccentric / Concentric



➤ **Select Force Limits to modify the following.**

- Start forward force
- Start backward force
- Minimum force
- Maximum force
- Isometric settings



➤ **Select Screen Display to modify the following.**

- Traces
- Scale
- Markers
- Baseline
- Marker lines (or) marker zones filled
- Target on (or) off

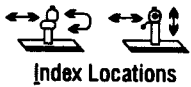
Sets, Reps & Turns

➤ **Select Sets, Reps & Turns to modify the following.**

- Repetitions per set
- Number of sets
- Recovery time
- Turning points
 - Acceleration
 - Deceleration



➤ **Select Feedback: Continuous (or) Feedback: Bar.**

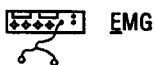


➤ **Select Index Locations to record modifications to positioning.**

- **Index:** Each moveable component of the KIN-COM involved in patient positioning has been labeled with an appropriate index.
- Each category on this screen exhibits the appropriate index number for the selected side, joint, and muscle group.



➤ **Select Save to save new parameters as a custom protocol.**



➤ **Select EMG to calibrate or setup EMG unit.**



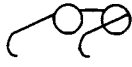
➤ **Select Esc to return to the exercise screen.**



➤ **Select Start Exercise to begin the exercise session.**



➔ **Select Stop Exercise to end the exercise session.**



View Results

➔ **Select View Results to view exercise report.**

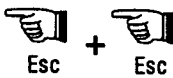
- This screen displays a summary of the peak forces and speeds and the power and work exerted for the previous exercise.
- **NOTE:** A lever arm length must be entered for the power and work values to be valid. This can be accomplished by typing in the lever arm length via the numeric keys on the keyboard.
- To print these results, press the print button. You must enter the patient's information in order to get a printout. The program will prompt you for the needed information when the PRINT button is pressed.



➔ **Select Save to save exercise data to a patient file.**



➔ **Select Esc Finish Exercise to return to the choose feedback screen.**



➔ **Select Esc 2 times to return to the main menu.**

Setting Up An Isokinetic Exercise (Overlay)

➔ **Select KIN-COM to access the main menu.**

- To setup a preset, patient or custom position
- To select the mode of exercise

Patient Positioning

Choose the type of patient setup you desire to use. This provides an easy method for exercise and evaluation setup reproducibility. There are three methods for setting up your patients on the KIN-COM.

Patient Positions

➔ **Select Patient Positions and choose one of the following:**

- **Preset Position** to choose a specific joint setup.
- **Patient Position** to choose a patient specific setup.
- **Custom Position** to choose a specialized setup.

Proceed

➔ **Proceed With Setup.**

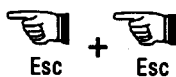
- **Seat and Dynamometer Position**
 - The diagrams on the screen indicate seat and dynamometer position for the selected joint, side, and muscle group.
 - **NOTE:** Additional adjustments may be necessary to achieve correct alignment for different individuals.

Dynamometer Position

- **Dynamometer Position Settings (adjust the following)**
 - Dynamometer Up / Down
 - Dynamometer Forward / Backward
 - Dynamometer Tilt (A)

Seat Position

- Dynamometer Rotation (B)
- Dynamometer Mechanical Stops (C & D)
- Lever Arm Length
- Seat Position Settings(adjust the following)
 - Seat Left / Right
 - Seat Rotation (E)
 - Seat Back angle (F)
 - Seat Bottom depth (G)
 - Seat Bottom angle (H)
 - Stabilization straps



or



➔ **Press Esc 2 times To return to the main menu.**

➔ **Select F10 Accept to save positioning information.**

- Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient then select **Enter**.

Exercise

Isokinetic

➔ **Select Exercise as the mode of training.**

➔ **Select Isokinetic constant speed, variable force exercise.**



Overlay

➔ **Select Overlay as the desired visual feedback option.**

- Display is angle based.
- Note that the angle scale is below the baseline.
- A trace displays data in the forward direction (i.e. Concentric) separately from data in the backward direction (i.e. Eccentric).
- Each curve remains on the screen, and can be used as targets for either maximal or submaximal training.

Stop / Start Angles

➔ **To identify the desired range of motion.**

Suggestion: You may want to anatomically reference this exercise for accurate choice of angles, see principles of operation.

Stop Angle

➔ **Set stop angle.**

- Move the attachment into the direction of the first contraction type, and stop the attachment at the desired end point, pause momentarily.
- **Enter** records this angle as the stop angle and prompts the next angle to be selected.
- **Reset** allows you to reselect the stop angle.
- For a more detailed explanation of stop / start angles refer to principles of operation.



Start Angle

➔ **Set start angle.**

- Move the attachment to the desired starting point, and stop the attachment at the desired starting point, pause momentarily.



Enter

- **Enter** records this angle as the start angle and prompts the next angle to be selected
- For a more detailed explanation of stop / start angles refer to principles of operation.

Orientation to Screen Display



Screen Display

- The upper right corner denotes the test speeds.
 - If both the forward speed and the backward speed are equal, then the upper right corner will have a button with the current speed.
 - Press the left side of this button (↓ arrow key) to decrease the forward and backward speeds or press the right side of this button (↑ arrow key) to increase the forward and backward speeds.
- If this is the first time at this screen, a blue box in the middle of the screen will display the current test parameters.
- The upper middle records the current sets and reps.
- The Force traces are recorded on separate graphs.
- The left graph is the forward direction force curve.
- The right graph is the backward direction force curve.
- The scale defining the size of the force trace is to the left of the baseline.
- The numeric force currently applied against the loadcell is displayed to the right of the baseline.
- Range of motion and direction of movement are denoted on the angle scale below the baseline.
- Select **Change** to change any of the test parameters without resetting the range of motion.
- Select **First Target** to allow the acquisition of the 1st overlay target boundary.



First Target



Second Target

- Select **Second Target** to allow the acquisition of the 2nd overlay target boundary.



Start Exercise

- Select **New Target** to allow the acquisition of the 1st overlay target boundary.
- Select **Start Exercise** to start the exercise.

Be sure the mechanical blocks are set.

Be sure the patient has the interrupt switch.



Change

- **Select Change to modify exercise parameters.**

- To modify the exercise program parameters without leaving the exercise program press the change button.

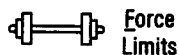


Speed Limits

- **Select Speed Limits to modify the following.**

- Speed forward
- Speed backward
- Type of contraction

- Concentric / Eccentric
- Concentric / Concentric
- Eccentric / Eccentric
- Eccentric / Concentric



Force
Limits

➔ **Select Force Limits to modify the following.**

- Start forward force
- Start backward force
- Minimum force
- Maximum force
- Isometric settings



Screen
Display

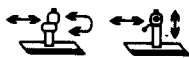
➔ **Select Screen Display to modify the following.**

- Traces
- Scale
- Markers
- Baseline
- Marker lines (or) marker zones filled
- Target on (or) off

Set, Reps & Turns

➔ **Select Set, Reps & Turns to modify the following.**

- Repetitions per set
- Number of sets
- Recovery time
- Turning points
 - Acceleration
 - Deceleration



Index Locations

➔ **Select Index Locations to record modifications to positioning.**

- Index: Each moveable component of the KIN-COM involved in patient positioning has been labeled with an appropriate index.
- Each category on this screen exhibits the appropriate index number for the selected side, joint, and muscle group.



Save

➔ **Select Save to save new parameters as a custom protocol.**



EMG

➔ **Select EMG to calibrate or setup EMG unit.**



First
Target

➔ **Select First Target to allow the acquisition of the 1st overlay target boundary.**



Second
Target

➔ **Select Second Target to allow the acquisition of the 2nd overlay target boundary.**



New Target

➔ Select **New Target** to reset the exercise target boundaries.



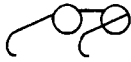
Start Exercise

➔ Select **Start Exercise** to begin the exercise session.



Stop Exercise

➔ Select **Stop Exercise** to end the exercise session.



View Results

➔ Select **View Results** view exercise report.

- This screen displays a summary of the peak forces and speeds and the power and work exerted for the previous exercise.
- Note: A lever length must be entered for the power and work values to be valid. This can be accomplished by typing in the lever length via the numeric keys on the keyboard.
- To print these results, press the print button. You must enter the patient's information in order to get a printout. The program will prompt you for the needed information when the PRINT button is pressed.



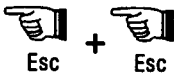
Save

➔ Select **Save** to save exercise data to a patient file.



Esc
Finish Exercise

➔ Select **Esc Finish Exercise** to return to the choose feedback screen.



Esc + Esc

➔ Select **Esc 2 times** to return to the main menu.

The Isotonic Mode

● Applications

- Motor Control
- Strengthening
- Impulse Loading
- Testing

● Types of Feedback

- Continuous
- Overlay

● Advantages

- Controlled loading through the use of:
 - High speed deceleration exercise
 - Plyometrics
 - Impulse loading
 - Positional deceleration
- **Sport specific training and conditioning.**

Setting Up An Isotonic Exercise (Continuous)

Patient Positioning

- **Select KIN-COM to access the main menu.**
 - To setup a preset, patient or custom position
 - To select the mode of training

Choose the type of patient setup you desire to use. This provides an easy method for exercise and evaluation setup reproducibility. There are three methods for setting up your patients on the KIN-COM.

Patient Positions

- **Select Patient Positions and choose one of the following:**
 - **Preset Position** to choose a specific joint setup.
 - **Patient Position** to choose a patient specific setup.
 - **Custom Position** to choose a specialized setup.

Proceed

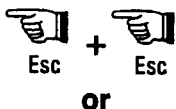
- **Proceed With Setup.**
 - **Seat and Dynamometer Position**
 - The diagrams on the screen indicate seat and dynamometer position for the selected joint, side, and muscle group.
 - **NOTE:** Additional adjustments may be necessary to achieve correct alignment for different individuals.

Dynamometer Position

- **Dynamometer Position Settings (adjust the following)**
 - Dynamometer Up / Down
 - Dynamometer Forward / Backward
 - Dynamometer Tilt (A)
 - Dynamometer Rotation (B)
 - Dynamometer Mechanical Stops (C & D)
 - Lever Arm Length

Seat Position

- **Seat Position Settings (adjust the following)**
 - Seat Left / Right
 - Seat Rotation (E)
 - Seat Back angle (F)
 - Seat Bottom depth (G)
 - Seat Bottom angle (H)
 - Stabilization straps



or



- **To Esc to 2 times to return to the main menu.**

- **Select F10 Accept to save positioning information.**

- Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient then select **Enter**.

Exercise

- **Select Exercise as the mode of training.**

Isotonic

- **Select Isotonic variable speed, variable force exercise.**



➤ To **Continuous** select as the desired visual feedback option.

- Display is time based.
- A Trace moves continuously across the screen.
- Each sweep occurs over a 5 second interval.

Stop / Start Angles

➤ To identify the desired range of motion.

Suggestion: You may want to anatomically reference this exercise for accurate choice of angles, see principles of operation.

Stop Angle

➤ Set stop angle.

- Move the attachment into the direction of the first contraction type, and stop the attachment at the desired end point, pause momentarily.
- **Enter** records this angle as the stop angle and prompts the next angle to be selected.
- **Reset** allows you to reselect the stop angle.
- For a more detailed explanation of stop / start angles refer to principles of operation.



Start Angle

➤ Set start angle.

- Move the attachment to the desired starting point, and stop the attachment at the desired starting point, pause momentarily.
- **Enter** records this angle as the start angle and prompts the next angle to be selected
- For a more detailed explanation of stop / start angles refer to principles of operation.



Orientation to Screen Display



- The upper right corner denotes the test speeds.
 - If both the forward speed and the backward speed are equal, then the upper right corner will have a button with the current speed.
 - Press the left side of this button (or the down arrow key) to decrease the forward and backward speeds or press the right side of this button (or the up arrow key) to increase the forward and backward speeds.
- If this is the first time at this screen, a blue box in the middle of the screen will display the current test parameters.
- If you desire to make modifications to the exercise program parameters without leaving the exercise program press the button.
- The upper middle records the current sets and reps.
- The force exerted against the load cell is displayed continuously by the trace, and numerically to the right of the baseline.
- The time scale is exhibited (in seconds), across the bottom of the screen. Cues will appear at the bottom right to acknowledge each 10 seconds of recorded data.

Be sure the mechanical blocks are set.

Be sure the patient has the interrupt switch.



Change

➤ **Select Change to modify exercise parameters.**

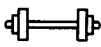
- To modify the exercise program parameters without leaving the exercise program press the change button.



Speed Limits

➤ **Select Speed Limits to modify the following.**

- Speed forward
- Speed backward
- Type of contraction
 - Concentric / Eccentric
 - Concentric / Concentric
 - Eccentric / Eccentric
 - Eccentric / Concentric



Force Limits

➤ **Select Force Limits to modify the following.**

- Start forward force (do not modify these in passive)
- Start backward force (do not modify these in passive)
- Minimum force
- Maximum force
- Isometric settings (do not modify these in passive)



Screen Display

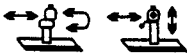
➤ **Select Screen Display to modify the following.**

- Traces
- Scale
- Markers
- Baseline
- Marker lines (or) marker zones filled
- Target on (or) off

Time, Reps & Turns

➤ **Select Time, Reps & Turns to modify the following.**

- Non-completed repetitions YES
 - Exercise time (seconds)
- Non-completed repetitions NO
 - Repetitions per set
 - Number of sets
 - Recovery time
- Turning points
 - Acceleration
 - Deceleration



Index Locations

➤ **Select Index Locations to record modifications to positioning.**

- Index: Each moveable component of the KIN-COM involved in patient positioning has been labeled with an appropriate index.
- Each category on this screen exhibits the appropriate index number for the selected side, joint, and muscle group.



Save

➔ Select **S**ave to save new parameters as a custom protocol.



EMG

➔ Select **E**MG to calibrate or setup EMG unit.



Esc

➔ Select **E**sc to return to the exercise session.



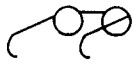
Start
Exercise

➔ Select **S**tart Exercise to begin the exercise session.



Stop
Exercise

➔ Select **S**top Exercise to end the exercise session.



View
Results

➔ Select **V**iew Results to view exercise report.

- This screen displays a summary of the peak forces and speeds and the power and work exerted for the previous exercise.
- **NOTE:** A lever arm length must be entered for the power and work values to be valid. This can be accomplished by typing in the lever arm length via the numeric keys on the keyboard.
- To print these results, press the print button. You must enter the patient's information in order to get a printout. The program will prompt you for the needed information when the PRINT button is pressed.



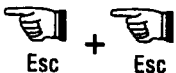
Save

➔ Select **S**ave to save exercise data to a patient file.



Esc
Finish Exercise

➔ Select **E**sc Finish Exercise to return to the choose feedback screen.



Esc + Esc

➔ Select **E**sc 2 times to return to the main menu.

Setting Up An Isotonic Exercise (Overlay)

➔ Select **K**IN-COM to access the main menu.

- To setup a preset, patient or custom position
- To select the mode of training

Patient Positioning

Choose the type of patient setup you desire to use. This provides an easy method for exercise and evaluation setup reproducibility. There are three methods for setting up your patients on the KIN-COM.

Patient Positions

➔ Select **P**atient Positions and choose one of the following:

- **P**reset Position to choose a specific joint setup.
- **P**atient Position to choose a patient specific setup.

- **Custom Position** to choose a specialized setup.

Proceed ➔ **Proceed With Setup.**

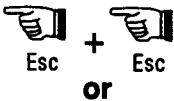
- Seat and Dynamometer Position
- The diagrams on the screen indicate seat and dynamometer position for the selected joint, side, and muscle group.
- **NOTE:** Additional adjustments may be necessary to achieve correct alignment for different individuals.

Seat Position

- Seat Position Settings (adjust the following)
 - Seat Left / Right
 - Seat Rotation (E)
 - Seat Back angle (F)
 - Seat Bottom depth (G)
 - Seat Bottom angle (H)
 - Stabilization straps

Dynamometer Position

- Dynamometer Position Settings (adjust the following)
 - Dynamometer Up / Down
 - Dynamometer Forward / Backward
 - Dynamometer Tilt (A)
 - Dynamometer Rotation (B)
 - Dynamometer Mechanical Stops (C & D)
 - Lever Arm Length



- ➔ **Press Esc 2 times to return to the main.**



- ➔ **Select F10 Accept to save positioning information.**

- Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient then select **Enter**.

Exercise

- ➔ **Select Exercise as the mode of training.**

Isotonic

- ➔ **Select Isotonic variable speed, variable force exercise.**



Overlay

- ➔ **Select Overlay as the desired visual feedback option.**

- Display is ANGLE based.
- Note that the angle scale is below the Baseline.
- A Trace displays data in the forward direction (i.e. Concentric) separately from data in the backward direction (i.e. Eccentric).
- Each curve remains on the screen, and can be used as targets for either maximal or Submaximal training.

Stop / Start Angles

- ➔ **To identify the desired range of motion.**

Suggestion: You may want to anatomically reference this exercise for accurate choice of angles, see principles of operation.

Stop Angle



Enter

➔ Set stop angle.

- Move the attachment into the direction of the first contraction type, and stop the attachment at the desired end point, pause momentarily.
- **Enter** records this angle as the stop angle and prompts the next angle to be selected.
- **Reset** allows you to reselect the stop angle.
- For a more detailed explanation of stop / start angles refer to principles of operation.

Start Angle



Enter

➔ Set start angle.

- Move the attachment to the desired starting point, and stop the attachment at the desired starting point, pause momentarily.
- **Enter** records this angle as the start angle and prompts the next angle to be selected
- For a more detailed explanation of stop / start angles refer to principles of operation.

Orientation to Screen Display



Screen Display

- The upper right corner denotes the test speeds.
 - If both the forward speed and the backward speed are equal, then the upper right corner will have a button with the current speed.
 - Press the left side of this button (↓ down arrow key) to decrease the forward and backward speeds or press the right side of this button (↑ up arrow key) to increase the forward and backward speeds.
- If this is the first time at this screen, a blue box in the middle of the screen will display the current test parameters.
- The upper middle records the current sets and reps.
- The velocity traces are recorded on separate graphs.
- The left graph is the forward direction force curve.
- The right graph is the backward direction force curve.
- The scale defining the size of the force trace is to the left of the baseline.
- The numeric velocity currently applied against the loadcell is displayed to the right of the baseline.
- Range of motion and direction of movement are denoted on the angle scale below the baseline.
- Select **Change** to change any of the test parameters without resetting the ROM.
- Select **First Target** to allow the acquisition of the 1st overlay target boundary.
- Select **Second Target** to allow the acquisition of the 2nd overlay target boundary.
- Select **New Target** to allow the acquisition of the 1st overlay target boundary.
- Select **Start Exercise** to start the exercise.



First Target



Second Target

Be sure the mechanical blocks are set.

Be sure the patient has the interrupt switch.



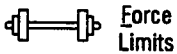
➤ Select Change to modify exercise parameters.

- To modify the exercise program parameters without leaving the exercise program press the change button.



➤ Select Speed Limits to modify the following.

- Speed forward
- Speed backward
- Type of contraction
 - Concentric / Eccentric
 - Concentric / Concentric
 - Eccentric / Eccentric
 - Eccentric / Concentric



➤ Select Force Limits to modify the following.

- Start forward force (do not modify these in passive)
- Start backward force (do not modify these in passive)
- Minimum force
- Maximum force
- Isometric settings (do not modify these in passive)



➤ Select Screen Display to modify the following.

- Traces
- Scale
- Markers
- Baseline
- Marker lines (or) marker zones filled
- Target on (or) off

Time, Reps & Turns

➤ Select Time, Reps & Turns to modify the following.

- Non-completed repetitions YES
 - Exercise time (seconds)
- Non-completed repetitions NO
 - Repetitions per set
 - Number of sets
 - Recovery time
- Turning points
 - Acceleration
 - Deceleration



➤ Select Index Locations to record modifications to positioning.

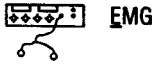
- Index: Each moveable component of the KIN-COM involved in patient positioning has been labeled with an appropriate index.

- Each category on this screen exhibits the appropriate index number for the selected side, joint, and muscle group.



Save

- Select **S**ave to save new parameters as a custom protocol.



EMG

- Select **E**MG to calibrate or setup EMG unit.



Esc

- Select **E**sc to return to the exercise screen.



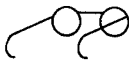
Start
Exercise

- Select **S**tart Exercise to begin the exercise session.



Stop
Exercise

- Select **S**top Exercise to end the exercise session.



View
Results

- Select **V**iew Results to view exercise report.

- This screen displays a summary of the peak forces and speeds and the power and work exerted for the previous exercise.
- **NOTE:** A lever arm length must be entered for the power and work values to be valid. This can be accomplished by typing in the lever arm length via the numeric keys on the keyboard.
- To print these results, press the print button. You must enter the patient's information in order to get a printout. The program will prompt you for the needed information when the PRINT button is pressed.



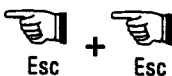
Save

- Select **S**ave to save exercise data to a patient file.



Esc
Finish Exercise

- Select **E**sc Finish Exercise to return to the select feedback screen.



Esc + Esc

- Select **E**sc 2 times to return to the main menu.

Exercise Feedback Options

Continuous

• Continuous Feedback:

- Time based feedback is represented as a continuous trace (or line) displaying patient effort in terms of force production as seen in the isokinetic mode or velocity of motion found in the isotonic mode.
- The continuous sweep is over a five second interval.

Overlay ● **Overlay Feedback:**

- Angle based feedback which allows you or the patient to create a force or velocity curve which will remain on the during the exercise.
- The patient can use this curve to act as a "goal" to either train at maximal or sub-maximal levels in the isokinetic mode, or at various speeds in the isotonic mode.

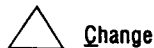
Bar Graph ● **Bar Graph Feedback:**

- Continuous peak display of the patient's efforts over time is the special feature of bar graph feedback.
- This type of feedback provides continuous updating for each repetition in dynamic or isometric exercise for motivational feedback.

Modify Exercises

Modifying a Passive Exercise

Change Settings



The following section describes each of the options available for changing passive evaluation / exercise settings. The options on each screen allow access to making changes in exercise parameters. Select the category for the parameter to be changed.

Speed Limits



● Speed Forward

- The speed of the lever arm from start angle to stop angle.
- Motion begins when the patient meets the start forward force.
- Motion continues only as long as the patient's force remains above the minimal force requirement and below the maximal force limit.

● Speed Backward

- The speed of the lever arm from stop angle to start angle.
- Motion begins when the patient meets the start backward force.
- Motion continues only as long as the patient's force remains above the minimal force requirement and below the maximal force limit.

➡ To modify speeds:

- Select the speed prompt you want to change.
- Touch number pad on the right of the screen or use the numeric keypad on the keyboard to make changes.
- Select Enter when you are finished.

Note: According to the force / velocity curve.

- As concentric speed increases, force decreases.
- As eccentric speed increases, force increases.

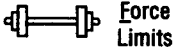
- **Types of Contraction**

- Concentric / Eccentric
- Concentric / Concentric
- Eccentric / Concentric
- Eccentric / Eccentric

- ➔ **To modify contraction type:**

- Select the prompt to choose the contraction type.

Force Limits



- **Start Forward Force (Preload Force)**

- This represents the minimal force required to initiate movement of the lever arm in the forward direction.

- **Start Backward Force**

- This represents the minimal force required to initiate movement of the lever arm in the backward direction.

- **Minimum Force**

- This represents the minimal force required to continue motion in either direction.
- **NOTE:** Start forward, start backward, and minimum force limits should be set at zero (0) in the passive mode.

- **Maximal Force**

- Maximal force allowed for this system is 2000 Newtons (450 pounds). Maximal force parameters can be used to create "high end force limits" you do not want the patient to exceed.
- This represents the maximal force allowed at any point in the range of motion. If exceeded, the software will release the lever arm.
- Maximum force limits should be set to protect the individual from undesirable forces.
- **NOTE:** Make sure your mechanical blocks are in place.

- **Isometric Settings**

- Disregard this option when performing a passive exercise, unless you want to include isometric holds in your exercise program.

Screen Display



- **Traces**

- Dynamic screen traces for angle, velocity, force, or EMG signals can be turned on or off to enhance visual feedback.
- One or more traces can be on at any time and the trace line can be thick or thin.
- **NOTE:** Be selective concerning which additional traces will enhance feedback, too many traces may be confusing.

- **Scale**

- Select scale to adjust size (amplification) of each trace currently displayed on the screen.
- Choose the type of scale you wish to adjust.

- Use the up arrow on the keyboard to increase the scale, which decreases the dispersion of the trace, making the picture smaller. Up will decrease the size of the graph by 50%.
- Use the down key on the keyboard to decrease the scale, which increases the dispersion of the trace, making the picture larger. Down will increase the size of the graph by 100%.

- **Markers**

- Markers may be selected to coordinate with force, velocity, and / or angle traces.
- Select the trace (angle, force, velocity) make modifications by using the keyboard to enter numbers or arrow keys to change settings.
- Use these marker lines to on the screen for biofeedback.
 - Markers may be used to create a window for the patient to train within. When changing "high end maximal force" change marker number 1 to correspond to the same maximal force parameters, or slightly higher, to allow failure to control high end forces.
 - Markers can be used to display maximal forces as in the passive protocol, or minimum forces as in the isometric protocols.

- **Baseline**

- Once a trace has been turned on, it can be moved to any position up and down the screen.
- Choose which baseline you wish to move.
- Use the arrows on the keyboard to move the baseline up or down.

- **Marker Lines or Marker Zones Filled**

- This option alternates between marker lines or the space between the markers will be shaded blue for enhanced patient feedback.

- **Target On / Off**

- This is a blinking ball that leads the trace across the screen.

- **Number of Sets**

- The number of sets you want the patient to complete in each exercise session.
- Choose the desired number of sets and press Enter.
- If this number is set to zero, then the exercise will continue until the operator stops the exercise.
- If this number is not zero, then the KIN-COM will automatically stop the exercise at the end of the specified number of sets.

- **Repetitions Per Set**

- The number of repetitions you wish the patient to complete in each set (ex. 3 sets of 10 repetitions).
- Enter the desired number of repetitions and press Enter.

- **Recovery Time**

- This is the amount of rest time (in seconds) between each set.

Sets, Reps and Turns

Sets, Reps & Turns

- **Turning Points**

- Acceleration
- Deceleration
 - This is the adjustment for the rate at which the lever arm accelerates to or decelerates from the chosen speed when the direction of the lever arm changes.
 - In the passive mode, this built-in acceleration / deceleration occurs only at the beginning and at the end of the range of motion; and eliminates the need for any sort of anti-shear device. This may also be described as a ramping to and from the selected speed...
 - Gentlest turning points occur with Con / Ecc patterns of movement with low acceleration / deceleration at low speed.
 - Sharpest turning points occur with Con / Ecc patterns of movement with high acceleration / deceleration at high speed.

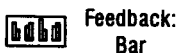
- **Parameters allowed are:**

- Xlow – for extra slow acceleration / deceleration (trunk only)
- Low – for slow acceleration / deceleration
- Medium – for moderate acceleration / deceleration
- High – for fast acceleration / deceleration

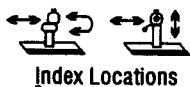
Feedback Type



- Continuous
- Bar



Index Locations



- To modify seat and dynamometer position.

Save



- To save any modifications to a custom protocol.

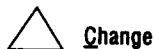
EMG



- To setup and calibrate the EMG unit.

Modify An Isometric Exercise

Change Settings



Speed Limits



The following section describes each of the options available for changing isometric evaluation / exercise settings. The options on each screen allow access to making changes in exercise parameters. Select the category for the parameter to be changed.

● Speed Forward

- This is the speed with which the lever arm will move from the start to the stop angle between isometric hold angles.
- It is recommended that this should be a passive motion.

● Speed Backward

- This is the speed with which the lever arm will move from the stop angle back to the start angle.

➡ To modify speeds:

- Select the speed parameter you want to change.
- Touch number pad on the right of the screen or use the numeric keypad on the keyboard to make changes.
- Select Enter when selection is complete.

NOTE: According to the force / velocity curve.

- As concentric speed increases, force decreases.
- As eccentric speed increases, force increases.

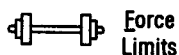
● Types of Contractions

- Concentric / Eccentric
- Concentric / Concentric
- Eccentric / Concentric
- Eccentric / Eccentric

➡ To modify contraction type:

- Select the prompt to choose the contraction type.

Force Limits



● Start Forward Force

- This represents the minimal force required to initiate movement of the lever arm in the forward direction between isometric holds.

● Start Backward Force

- This represents the minimal force required to initiate movement of the lever arm in the backward direction.

● Minimal Force

- This represents the minimal force required to continue motion in either direction.

NOTE: It is recommended that the start forward, backward and minimal forces be set at zero (0). Any value other than zero requires the individual to actively move the limb to the next hold position.

Isometric Settings

- **Maximal Force**
 - Maximal force allowed for this system is 2000 Newtons (450 pounds). Maximal force parameters can be used to create "high end force limits" you do not want the patient to exceed.
 - This represents the maximal force allowed at any point in the range of motion. If exceeded, the software will release the lever arm.
 - Maximum force limits should be set to protect the individual from undesirable forces.
 - **NOTE:** Make sure your mechanical blocks are in place.
- **Minimum Isometric Tension**
 - This represents the minimum amount of force that must be applied against the load cell during each isometric hold to make the clock count down.
 - It can be varied at each angle, to allow for consideration of bio-mechanical disadvantage and / or passive insufficiency.
- **Contraction Time**
 - This represents the amount of time (in seconds) the individual must maintain the minimum isometric tension.
 - The clock will count down only when the load cell perceives the minimal force requirements or greater.
- **Relax After Contraction**
 - Yes
 - After the clock has counted down, the lever arm waits for force to be removed from the load cell before it allows movement of the lever arm.
 - No
 - After the clock has counted down, the lever arm does not wait for force to be removed from the load cell before it allows the lever arm to move.
 - If using the contraction time as a "hold" time for tissue stretching, select NO, so that the patient will not be required to move limb away from the load cell.
- **Time Bar**
 - ON
 - Graphic display bar graph fills in as clock counts down.
 - Indicates the elapsed time of each contraction graphically as a horizontal bar in the upper left-hand corner of the screen.
 - OFF
 - Indicates that the elapsed time of each contraction will be shown in large numbers in the upper left-hand corner of the screen.

Screen Display



Screen
Display

- **Traces**
 - Dynamic screen traces for angle, velocity, force, or EMG signals can be turned on or off to enhance visual feedback.
 - One or more traces can be on at any time and the trace line can be thick or thin.

- **NOTE:** Be selective concerning which additional traces will enhance feedback, too many traces may be confusing.
- **Scale**
 - Select scale to adjust size (amplification) of each trace currently displayed on the screen.
 - Choose the type of scale you wish to adjust.
 - Use the up arrow on the keyboard to increase the scale, which decreases the dispersion of the trace, making the picture smaller. Up will decrease the size of the graph by 50%.
 - Use the down arrow on the keyboard to decrease the scale, which increases the dispersion of the trace, making the picture larger, down will increase the size of the graph by 100%.
- **Markers**
 - Markers may be selected to coordinate with force, velocity, and / or angle traces.
 - Select the trace (angle, force, velocity) make modifications by using the keyboard to enter numbers or arrow keys to change settings.
 - Use these marker lines to on the screen for bio-feedback.
 - Markers may be used to create a window for the patient to train within. When changing "high end maximal force" change marker number 1 to correspond to the same maximal force parameters, or slightly higher, to allow failure to control high end forces.
 - Markers can be used to display maximal forces as in the passive protocol, or minimum forces as in the isometric protocols.
- **Baseline**
 - Once a trace has been turned on, it can be moved to any position up and down the screen.
 - Choose which baseline you wish to move.
 - Touch the arrows on the screen or keyboard to move the baseline.
- **Marker Lines or Marker Zones filled**
 - This option alternates between marker lines or the space between the markers will be shaded blue for enhanced patient feedback.
- **Target On / Off**
 - This is a blinking ball that leads the trace across the screen.
- **Number of Sets**
 - Use this option to set the desired number of sets.
 - If this number is set to zero, then the exercise will continue until the operator stops the exercise.
 - If this number is not zero, then the KIN-COM will automatically stop the exercise at the end of the specified number of sets.
 - When in evaluation or the turn store option has been turned on, the maximum number of sets allowed is three (3).

Sets, Reps and Turns

Sets, Reps & Turns

- **Repetitions Per Set**

- You do not have the option of modifying this number in the isometric mode. Each isometric position as well as the stop and start angles represent the exercise repetitions.

- **Recovery Time**

- This is the amount of time the patient is allowed to rest or recover after completing each isometric hold.

- **Turning Points**

- Acceleration
- Deceleration
 - This is the adjustment for the rate at which the lever arm accelerates to or decelerates from the chosen speed when the direction of the lever arm changes.
 - In this case between isometric holds.

Feedback



Feedback:
Continuous

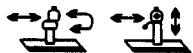
- Continuous



Feedback:
Bar

- Bar

Index Locations



Index Locations

- To modify seat and dynamometer position.

Save



Save

- To save any modifications to a custom protocol.

EMG



EMG

- To setup and calibrate the EMG unit.

Modify An Isokinetic Exercise

Change Settings



Change

The following section describes each of the options available for changing isokinetic evaluation / exercise settings. The options on each screen allow access to making changes in exercise parameters. Touch the category for the parameter to be changed.

Speed Limits



● Speed Forward

- The speed of the lever arm from start angle to stop angle.
- Motion begins when the patient meets the start forward force.
- Motion continues only as long as the patient's force remains above the minimal force requirement and below the maximal force limit.

● Speed Backward

- The speed of the lever arm from stop angle to start angle.
- Motion begins when the patient meets the start backward force.
- Motion continues only as long as the patient's force remains above the minimal force requirement.

➤ To modify speeds:

- Select the speed prompt you want to change.
- Touch number pad on the right of the screen or use the numeric keypad on the keyboard to make changes.
- Select Enter when selection is complete.

NOTE: According to the force / velocity curve.

- As concentric speed increases, force decreases.
- As eccentric speed increases, force increases.

● Types of Contractions

- Concentric / Eccentric
- Concentric / Concentric
- Eccentric / Concentric
- Eccentric / Eccentric

➤ To modify contraction type:

- Touch the prompt to choose the contraction type.

Force Limits



● Start Forward Force (Preload Force)

- This represents the minimal force required to initiate movement of the lever arm in the forward direction.

● Start Backward Force

- This represents the minimal force required to initiate movement of the lever arm in the backward direction.

● Minimum Force

- This represents the minimal force required to continue motion in either direction.

● Maximal Force

- Maximal force allowed for this system is 2000 Newtons (450 pounds). Maximal force parameters can be used to create "high end force limits" you do not want the patient to exceed.
- This represents the maximal force allowed at any point in the range of motion. If exceeded, the software will release the lever arm.

- Maximum force limits should be set to protect the individual from undesirable forces.
- **NOTE:** Make sure your mechanical blocks are in place.

- **Isometric Settings**

- Disregard this option when performing an isokinetic exercise, unless you want to include isometric holds in your exercise program.

Screen Display



Screen
Display

- **Traces**

- Dynamic screen traces for angle, velocity, force, or EMG signals can be turned on or off to enhance visual feedback.
- One or more traces can be on at any time and the trace line can be thick or thin.
- **NOTE:** Be selective concerning which additional traces will enhance feedback, too many traces may be confusing.

- **Scale**

- Select scale to adjust size (amplification) of each trace currently displayed on the screen.
- Choose the type of scale you wish to adjust.
- Use the up arrow on the keyboard to increase the scale, which decreases the dispersion of the trace, making the picture smaller. Up will decrease the size of the graph by 50%.
- Use the down arrow on the keyboard to decrease the scale, which increases the dispersion of the trace, making the picture larger. Down will increase the size of the graph by 100%.

- **Markers**

- Markers may be selected to coordinate with force, velocity, and / or angle traces.
- Select the trace (angle, force, velocity) make modifications by using the keyboard to enter numbers or arrow keys to change settings.
- Use these marker lines to on the screen for bio-feedback.
 - Markers may be used to create a window for the patient to train within. When changing "high end maximal force" change marker number 1 to correspond to the same maximal force parameters, or slightly higher, to allow failure to control high end forces.
 - Markers can be used to display maximal forces as in the passive protocol, or minimum forces as in the isometric protocols.

- **Baseline**

- Once a trace has been turned on, it can be moved to any position up and down the screen.
- Choose which baseline you wish to move.
- Touch the arrows on the screen or keyboard to move the baseline.

- **Marker Lines or Marker Zones Filled**

- This option alternates between marker lines or the space between the markers will be shaded blue for enhanced patient feedback.

Sets, Reps and Turns

Sets, Reps & Turns

- **Target On / Off**
 - This is a blinking ball that leads the trace across the screen.
- **Number of Sets**
 - The number of sets you want the patient to complete in each exercise session, choose the desired number of sets and press Enter.
 - If this number is set to zero, then the exercise will continue until the operator stops the exercise.
 - If this number is not zero, then the KIN-COM will automatically stop the exercise at the end of the specified number of sets.
- **Repetitions Per Set**
 - The number of repetitions you wish the patient to complete in each set (ex. 3 sets of 10 repetitions).
 - Enter the desired number of repetitions and press Enter.
- **Recovery Time**
 - This is the amount of rest time (in seconds) between each set.
- **Turning Points**
 - Acceleration
 - Deceleration
 - This is the adjustment for the rate at which the lever arm accelerates to or decelerates from the chosen speed when the direction of the lever arm changes.
 - In the isokinetic mode, this built-in acceleration / deceleration occurs only at the beginning and at the end of the range of motion; and eliminates the need for any sort of anti-shear device. This may also be described as a ramping to and from the selected speed.
 - Gentlest turning points occur with Con / Ecc patterns of movement with low acceleration / deceleration at low speed.
 - Sharpest turning points occur with Con / Ecc patterns of movement with high acceleration / deceleration at high speed.
- **Parameters allowed are:**
 - Xlow -- for extra slow acceleration / deceleration (trunk only)
 - Low -- for slow acceleration / deceleration
 - Medium -- for moderate acceleration / deceleration
 - High -- for fast acceleration / deceleration

Feedback



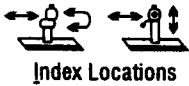
Feedback:
Continuous



Feedback:
Bar

- Continuous
- Bar

Index Locations



- To modify seat and dynamometer position.

Save



- To save any modifications to a custom protocol.

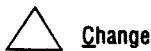
EMG



- To setup and calibrate the EMG unit.

Modify An Isotonic Exercise

Changing Settings



The following section describes each of the options available for changing isotonic evaluation / exercise settings. The options on each screen allow access to making changes in exercise parameters. Select the category for the parameter to be changed.

Speed Limits



● Speed Forward

- The speed chosen is the maximum velocity that the lever arm will achieve during the forward motion, from start to stop angle.
- **NOTE:** Throughout the range of motion the lever arm will be either accelerating, decelerating, or not moving, depending upon the patient's compliance with the parameters designed by the clinician (i.e. Completed vs. non-completed reps and forces).

● Speed Backward

- The speed chosen is the maximum velocity that the lever arm will achieve during the backward motion, from stop to start angle.

➤ To modify speeds:

- Select the speed prompt you want to change.
- Touch number pad on the right of the screen or use the numeric keypad on the keyboard to make changes.
- Select Enter when selection is complete.

NOTE: According to the force / velocity curve.

- As concentric speed increases, force decreases.
- As eccentric speed increases, force increases.

- **Types of Contractions**

- Concentric / Eccentric
- Concentric / Concentric
- Eccentric / Concentric
- Eccentric / Eccentric

- **To modify contraction type:**

- Touch the prompt to choose the contraction type.

Force Limits



- **Forward Force**

- This parameter is the minimum amount of force necessary to raise the limb from the start to stop angle.
- This is the minimal amount of force required to maintain movement of the limb through the available range of motion.

- **Backward Force**

- This parameter is the maximal amount of force allowed to lower the limb from the stop to the start angle.
- Backward force simulates the lowering of a weight; the individual must push less than the amount of the weight in order to lower it.

- **Minimum Force**

- This is the minimum amount of force required to maintain movement of the lever arm in the backward direction during the exercise.
- If the patient's applied force against the loadcell drops below this amount, then the lever arm will stop.

- **Maximum Force**

- This is the maximum amount of force allowed in order to continue movement of the limb in the forward direction.
- Exceeding this force does not result in a lever arm release such as occurs in speed controlled modes, instead the lever arm will stop, removing until the applied force is decreased.

Screen Display



- **Traces**

- Dynamic screen traces for angle, velocity, force, or EMG signals can be turned on or off to enhance visual feedback.
- One or more traces can be on at any time and the trace line can be thick or thin.
- **NOTE:** Be selective concerning which additional traces will enhance feedback, too many traces may be confusing.

- **Scale**

- Select scale to adjust size (amplification) of each trace currently displayed on the screen.
- Choose the type of scale you wish to adjust.
- Use the up arrow on the keyboard to increase the scale, which decreases the dispersion of the trace, making the picture smaller. Up will decrease the size of the graph by 50%.

- Use the down key on the keyboard to decrease the scale, which increases the dispersion of the trace, making the picture larger. Down will increase the size of the graph by 100%.

- **Markers**

- Markers may be selected to coordinate with force, velocity, and / or angle traces.
- Select the trace (angle, force, velocity) make modifications by using the keyboard to enter numbers or arrow keys to change settings.
- Use these marker lines to on the screen for bio-feedback.
 - Markers may be used to create a window for the patient to train within, prompting them to control velocity as they lower the limb to the starting point.

- **Baseline**

- Once a trace has been turned on, it can be moved to any position up and down the screen.
- Choose which baseline you wish to move.
- Use the arrows on the screen or keyboard to move the baseline.

- **Marker Lines or Marker Zones Filled**

- This option alternates between marker lines or the space between the markers will be shaded blue for enhanced patient feedback.

- **Target On / Off**

- This is a blinking ball that leads the trace across the screen.

Sets and Reps

Sets, Reps & Turns

- **Non-Completed Repetitions – Yes**

- The individual is not required to move the limb from the start to the stop angle to be allowed to then return to the start angle.
- When the force applied against the load cell drops below the forward force limit the lever arm will reverse direction until force is built up again. (Simulates an attempt to lift a heavy weight.)
- Exercise Time
 - You select the specified number of seconds that the exercise should be performed.
 - No sets or repetitions are counted.

- **Non-Completed Repetitions – No**

- Patient is required to complete the set range of motion from the start to the stop angle before being allowed to return to the start angle.
- **Example:** If force drops below the forward force, or is above the backward force limit, the lever arm will not move.

- **Repetitions Per Set**

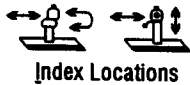
- Use this option to set the desired number of repetitions per set.

- **Number of Sets**

- Use this option to choose the desired number of sets.

- If this number is set to zero, then the exercise will continue until the operator stops the exercise.
- If this number is not zero, then the KIN-COM will automatically stop the exercise at the end of the specified number of sets.
- **Recovery Time**
 - This is the amount of rest time between sets.
- **Turning Points**
 - Acceleration
 - The rate at which the lever arm moves forward in response to the force perceived at the load cell. Occurs throughout the range of motion, until maximum velocity is reached.
 - Deceleration
 - The rate at which the lever arm moves backward in response to the force perceived at the load cell. Occurs throughout the range of motion, until maximum velocity is reached.
 - **NOTE:** In the isotonic mode, velocity is variable!

Index Locations



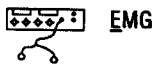
- To modify seat and dynamometer position.

Save



- To save any modifications to a custom protocol.

EMG



- To setup and calibrate the EMG unit.


Managing Protocols

Introduction

The protocol mode allows you to select, modify and store a custom exercise. Each protocol is built from one of the standard default exercises (Isokinetic, Passive, Isometric, Isotonic) or from a previously stored protocol. Many KIN-COM users make individual modifications to the standard default exercise options and store them in the protocol scroll box using the exercise name.

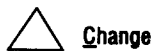
Example: You just created a custom isokinetic exercise and saved it as; Isokinetic 30/30 C/E to denote the speeds and type of contraction, in addition you modified sets, repetitions, and recovery time as well as force limits for a total of 8 changes. Now you want to create a second custom protocol just like the previous with the exception of choosing a different speed, so rather than making all 8 modifications a second time you could select "Isokinetic 30/30 C/E" from the protocol scroll box, change the speed of exercise to 60°/sec. and save as Isokinetic 60/60 C/E.

To Create a Custom Exercise Protocol

- | | |
|--|---|
| Exercise | ➔ Select Exercise to access the protocol prompt. |
| Protocol | ➔ Select Protocol to access protocol scroll box. |
| Protocol Scroll Box | ➔ Select Exercise Mode. |
| | <ul style="list-style-type: none"> • Protocols are stored in the Protocol scroll box and can be reviewed by using the up and down arrows on the screen, the arrow keys on the key board, or by typing the name of the protocol (this is known as the alpha sort function). • When you type in the letter "P" for passive the scroll box will advance to the first protocol starting with the letter "P". • Choose the exercise mode or previously stored custom protocol you wish to utilize to build your new protocol. |
| 
Enter | ➔ Select Enter to accept the training mode you will use to build your custom protocol. |

Feedback Type ➤ **Select Type of Feedback from the options available to you.**

Start / Stop Angles ➤ **Set Start / Stop Angles to identify the desired range of motion.**



➤ **Select Change to modify one of the following parameters:**

- You have many choices available to you as you build your custom protocol. Which changes you will make will depend on which mode of training you are utilizing.
- Changes made in Isotonic will be different than those in passive, isometric or isokinetic in terms of what you are asking the individual to perform.
- **NOTE:** Refer to the modify exercise section in this manual for more information.

Speed Limits



• **Speed Forward**

• **Speed Backward**

- For more information on speed limits as they relate to speed controlled, or speed variable modes of evaluation / exercise refer to modifying exercise.

➤ **To modify speeds:**

- Select the speed parameter you want to change.
- Touch number pad on the right of the screen or use the numeric keypad on the keyboard to make changes.
- Select Enter when selection is complete.
- **NOTE:** According to the force / velocity curve.
 - As concentric speed increases, force decreases.
 - As eccentric speed increases, force increases.

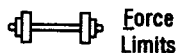
• **Types of Contractions**

- Concentric / Eccentric
- Concentric / Concentric
- Eccentric / Concentric
- Eccentric / Eccentric

➤ **To modify contraction type:**

- Touch the prompt to choose the contraction type.

Force Limits



• **Start Forward Force**

• **Start Backward Force**

• **Minimum Force**

• **Maximal Force**

• **Isometric Settings**

- For more information on force limits as they relate to speed controlled, or speed variable modes of evaluation / exercise refer to modifying exercise.

Screen Display



Screen
Display

● Traces

- Dynamic screen traces for angle, velocity, force, or EMG signals can be turned on or off to enhance visual feedback.
- One or more traces can be on at any time and the trace line can be thick or thin.
- **NOTE:** Be selective concerning which additional traces will enhance feedback, too many traces may be confusing.

● Scale

- Select scale to adjust size (amplification) of each trace currently displayed on the screen.
- Choose the type of scale you wish to adjust.
- Use the up arrow on the keyboard to increase the scale, which decreases the dispersion of the trace, making the picture smaller. Up will decrease the size of the graph by 50%.
- Use the down arrow on the keyboard to decrease the scale, which increases the dispersion of the trace, making the picture larger. Down will increase the size of the graph by 100%.

● Markers

- Markers may be selected to coordinate with force, velocity, and / or angle traces.
- Select the trace (angle, force, velocity) make modifications by using the keyboard to enter numbers or arrow keys to change settings.
- Use these marker lines to on the screen for bio-feedback.
 - Markers may be used to create a window for the patient to train within. When changing "high end maximal force" change marker number 1 to correspond to the same maximal force parameters, or slightly higher, to allow failure to control high end forces.
 - Markers can be used to display maximal forces as in the passive protocol, or minimum forces as in the isometric protocols.

● Baseline

- Once a trace has been turned on, it can be moved to any position up and down the screen.
- Choose which baseline you wish to move.
- Use the arrows on the screen or keyboard to move the baseline.

● Marker Lines or Marker Zones Filled

- This option alternates between marker lines or the space between the markers will be shaded blue for enhanced patient feedback.

● Target On / Off

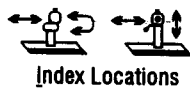
- This is a blinking ball that leads the trace across the screen.

Sets, Reps and Turns





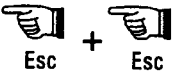
Sets, Reps & Turns

- **Number of Sets**
 - The number of sets you want the patient to complete in each exercise session.
 - Choose the desired number of sets and press Enter.
 - If this number is set to zero, then the exercise will continue until the operator stops the exercise.
 - If this number is not zero, then the KIN-COM will automatically stop the exercise at the end of the specified number of sets.
- **Repetitions Per Set**
 - The number of repetitions you wish the patient to complete in each set (ex. 3 sets of 10 repetitions).
 - Enter the desired number of repetitions and press Enter.
- **Recovery Time**
 - This is the amount of rest time (in seconds) between each set.
- **Turning Points**
 - Acceleration
 - Deceleration
 - This is the adjustment for the rate at which the lever arm accelerates to or decelerates from the chosen speed when the direction of the lever arm changes.
 - In the passive mode, this built-in acceleration / deceleration occurs only at the beginning and at the end of the range of motion; and eliminates the need for any sort of anti-shear device. This may also be described as a ramping to and from the selected speed.
 - Gentlest turning points occur with Con / Ecc patterns of movement with low acceleration / deceleration at low speed.
 - Sharpest turning points occur with Con / Ecc patterns of movement with high acceleration/deceleration at high speed.
- **Parameters allowed are:**
 - Xlow - for extra slow acceleration / deceleration (trunk only)
 - Low - for slow acceleration / deceleration
 - Medium - for moderate acceleration / deceleration
 - High - for fast acceleration / deceleration




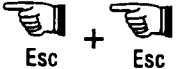
Feedback Type






- ➔ **Select Feedback Type from the options available to you.**
- ➔ **Select Index Locations to modify seat and dynamometer position.**
- ➔ **Select Save to name your new custom protocol.**
 - Name the protocol in a way that describes what it is, for example, use the name Isokinetic 60/60 C/E to represent speed of exercise and type of contraction.

-  **EMG** ➔ **Select EMG to setup and calibrate the EMG unit.**
-  **Esc** ➔ **Select Esc to return to the exercise screen.**
-  **Start Exercise** ➔ **Select Start Exercise.**
-  **Esc Finish Exercise** ➔ **Select Esc Finish Exercise to return to the choose feedback screen.**
-  **Esc + Esc** ➔ **Select Esc 2 times to return to the main menu.**

To Access a Stored Protocol

- Exercise** ➔ **Select Exercise to access the protocol prompt.**
- Protocol** ➔ **Select Protocol to access protocol scroll box.**
- Protocol Scroll Box**
 - ➔ **Select the custom protocol from the scroll box.**
 - Protocols are stored in the Protocol scroll box and can be reviewed by using the up and down arrows on the screen, the arrow keys on the key board, or by typing the name of the protocol (this is known as the alpha sort function).
 - When you type in the letter "P" for passive the scroll box will advance to the first protocol starting with the letter "P".
-  **Enter** ➔ **Select Enter to accept custom protocol of choice.**
- Feedback Type** ➔ **Select Type of Feedback from the options available to you.**
- Start / Stop Angles** ➔ **Set Start / Stop Angles to identify the desired range of motion.**
-  **Start Exercise** ➔ **Select Start Exercise.**
-  **Esc Finish Exercise** ➔ **Select Esc Finish Exercise to return to the choose feedback screen.**
-  **Esc + Esc** ➔ **Select Esc 2 times to return to the main menu.**

To Modify a Stored Protocol

- Exercise** ➤ **Select Exercise to access the protocol prompt.**
- Protocol** ➤ **Select Protocol to access protocol scroll box.**
- Protocol Scroll Box** ➤ **Select the custom protocol from the scroll box.**
- Protocols are stored in the Protocol scroll box and can be reviewed by using the up and down arrows on the screen, the arrow keys on the key board, or by typing the name of the protocol (this is known as the alpha sort function).
 - When you type in the letter "P" for passive the scroll box will advance to the first protocol starting with the letter "P".
-  **Enter** ➤ **Select Enter to accept custom protocol of choice.**
- Feedback Type** ➤ **Select Type of Feedback from the options available to you.**
- Start / Stop Angles** ➤ **Set Start / Stop Angles to identify the desired range of motion.**
-  **Change** ➤ **Select Change to modify one of the following parameters:**
- Speed of Exercise
 - Force Limits
 - Screen Display
 - Sets, Reps & Turns
 - Feedback
 - EMG
-  **Save** ➤ **Select Save to add the modified protocol.**
- Name It** ➤ **Name the modified protocol with the existing name if you want to replace the previous one, or with a different name.**
- If you give the protocol the same name you will be reminded that the exercise protocol name already exist, do you want to replace it enter "Y" for yes and "N" for no.

To Delete a Stored Protocol

- Exercise** ➤ **Select Exercise to access the protocol prompt.**
- Protocol** ➤ **Select Protocol to access protocol scroll box.**
- Protocol Scroll Box** ➤ **Select the custom protocol from the scroll box.**
- Protocols are stored in the Protocol scroll box and can be reviewed by using the up and down arrows on the screen, the arrow keys on the key board, or by typing the name of the protocol (this is known as the alpha sort function).
 - When you type in the letter "P" for passive the scroll box will advance to the first protocol starting with the letter "P".



➤ **Select Delete to remove the protocol from the scroll box.**

- Or use the delete key on the keyboard.



➤ **Select Enter to delete the protocol or to return to the protocol scroll box.**

Custom Sequence

To Create a Custom Sequence

- Exercise Sequential**
- ➔ Select **Exercise** to access the sequential prompt.
 - ➔ Select **Sequential** to build your exercise sequence.



Create Sequence

- ➔ Select **Create Sequence** to build an exercise sequence.
 - Touching this prompt will bring up a scroll box of protocols from which a new sequence can be built.
 - Choose the exercise(s) for the new sequence from the list of protocols contained in this scroll box.

- 1st Exercise**
- ➔ Select the first mode of exercise from the protocol scroll box.



Enter



Edit

or



Enter

- ➔ Select **Enter** to accept the protocol for your exercise sequence.
 - Select **Edit** to modify protocol parameters (see modify exercise).
 - Select **Enter** to accept the protocol as it is without modifying.

- 2nd Exercise**
- ➔ Select the second mode of exercise from the protocol scroll box.



Enter



Edit

or



Enter

- ➔ Select **Enter** to accept the protocol for your exercise sequence.
 - Select **Edit** to modify protocol parameters (see modify exercise).
 - Select **Enter** to accept the protocol as it is without modifying.

- Complete Your Sequence**
- ➔ Continue until you have made all of your exercise selections.
 - You can build an sequence of up to 6 different protocols.



Save

➤ **Select Save to name your new sequence.**

- Name the exercise sequence using the patients name.
- This will help you to quickly call up the sequence next time.



Esc

➤ **You may also select Esc to end the building of the sequence, and you will be prompted to name the new sequence.**

Note

➤ **NOTE: If you build a sequence of 6 exercises you will be automatically prompted to name the sequence after the sixth selection.**



Enter

➤ **Select Enter to access the new sequence.**



Begin Sequence

➤ **Select Begin Sequence.**

Stop / Start Angles

➤ **Set Stop / Start Angles.**



Start Exercise

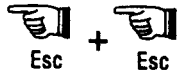
➤ **Select Start exercise.**

- Each exercise of the selected sequence will be displayed in a blue review box at the top of the screen. Touching this prompt will start the first exercise for this sequence.



➤ **If you want to skip an exercise, then perform the following:**

- Prior to selecting Begin Exercise use **Down** arrow on the screen or keyboard to move to a desired exercise selection. This is useful if you wish to skip one of the exercises without having to take the time to modify the sequence.



Esc

+

Esc

➤ **Select Esc 2 times to end the exercise sequence and return to the main menu.**

To Modify a Custom Sequence

Exercise

➤ **Select to access the sequential prompt.**

Sequential

➤ **Select to build your exercise sequence.**

Scroll Box

➤ **Select a custom sequence from the scroll box.**

- Scroll box displays names of sequences already created and sorted. Sequences can be named by patient or by description.



Enter

➤ **Select Enter.**

- Touching this prompt will display the list of protocols contained in the highlighted sequence and allows editing.
- This sequence summary screen exhibits all exercises and rest periods contained in the sequence.



Print

➤ **Select Print if you want to get a printed copy of the sequence.**

- Touching this prompt will print the exercises for this sequence.



Edit

➤ **Select Edit to modify the current exercise sequence.**

- Touching this prompt will allow the user to edit the exercises or rest periods as well as add or delete an exercise for this sequence.



Edit Exercise

➤ **Select Edit Exercise to modify exercise parameters.**

- Touching this prompt will allow the user to edit any exercise for this sequence. Modify parameters as you did when creating a custom protocol.
- These choices include: Speed limits, Force Limits, Screen Display, Sets, Reps and Turns, Index Locations, EMG
- Refer to modifying a custom protocol for more information.



Edit Rest

➤ **Select Rest to modify the rest between each exercise.**

- This screen is prompting you to press the rest period that you would like to edit. If you do not wish to edit any rest period, touch Esc.
- Static Rest: Enter the time (in seconds) allowed for a rest between exercises.
- Dynamic rest: Allows the user to enter the number of passive repetitions allowed for a rest between exercises.
- Dynamic speed: Allows the user to enter the speed for the passive repetitions for a rest between exercises.

1 + 1 = 2
Add

➤ **Select 1 + 1 = 2 Add to add an additional exercise to the sequence.**

- Touching this prompt will allow the user to add an exercise to the sequence, if there are less than 6 exercises currently in the sequence.



Delete

➤ **Select Delete to remove an exercise from the sequence.**

- Touching this prompt will allow the user to delete an exercise from the sequence.



Esc

➤ **Select Esc to exit the edit portion of the program.**



Save

➤ **Select Save to make your modifications permanent.**

- Choosing this prompt will give you the option of saving your changes as a new sequence name by typing the new name.
- You may select enter to replace the previous sequence and then select enter a second time to complete the process.



Esc

➤ **Select Esc to cancel the replace option, and the specified sequence will remain unchanged.**








Begin
Sequence




➤ **Select Begin Sequence to setup the exercise session.**

- You will be prompted to set start / stop angles.
- Next you will be prompted to begin exercise.
- The exercise sequence will include your modifications, these changes will be temporary if you did not choose save.
- Each exercise of the sequence is displayed in the review box.
- Select the down arrow to skip exercises as desired

To Access a Custom Sequence

- Exercise** ➤ **Select Exercise to access the sequential prompt.**
- Sequential** ➤ **Select Sequential to build your exercise sequence.**
- Scroll Box** ➤ **Select a custom sequence from the scroll box.**
- Scroll box displays names of sequences already created and sorted. Sequences can be named by patient or by description.
-  **Enter** ➤ **Select Enter.**
- Touching this prompt will display the list of protocols contained in the highlighted sequence.
-  **Print** ➤ **Select Print if you want to get a printed copy of the sequence.**
-  **Begin Sequence** ➤ **Begin Sequence.**
- Stop / Start Angles** ➤ **Set Stop / Start Angles.**
-  **Start Exercise** ➤ **Begin Exercise.**
- Each exercise of the selected sequence is displayed in the review box. If you want to skip the first exercise use the down arrow to move to the desired exercise.
 - Touching this prompt will start the exercise sequence.
-  **Esc** ➤ **Select Esc.**
- Touching this prompt will end sequence.

To Delete a Custom Sequence

- Exercise** ➤ **Select Exercise to access the sequential prompt.**
- Sequential** ➤ **Select Sequential to build your exercise sequence.**
- Scroll Box** ➤ **Select a custom sequence from the scroll box.**
- Scroll box displays names of sequences already created and sorted. Sequences can be named by patient or by description.
-  **Delete** ➤ **Select Delete to remove a sequence from the scroll box.**
- Touching this prompt will delete the highlighted sequence.
-  **Esc** ➤ **Select Esc to abort the deletion process and return to the sequence scroll box.**
-  **Enter** ➤ **Select Enter to finish deleting a sequence.**

Evaluation

Overlay (Interrupted Stroke) Test

KIN-COM® ➤ Select **KIN-COM** to access the main menu.

Patient Positions ➤ Select **Patient Positions** to setup a preset, patient or custom position.

- Select **Esc** 2 times to return to the main menu. – OR
- Select **F10 Accept** to save positioning information.
 - Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient then select enter. Refer to principles of operation

Evaluation ➤ Select **Evaluation** to access the evaluation program.

- The KIN-COM evaluation mode gives you a variety of options to evaluate a patient's force / torque production, motor control, spasticity or joint range of motion.
- The KIN-COM provides a variety of evaluation options taking into consideration the diversity of patients and patients' problems.



New Patient

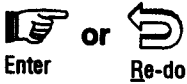
➤ Select **New Patient** or a patient name from the scroll box.

- The scroll box lists all patient names currently in the system.
- To scroll through the list, touch the up or down buttons on the keyboard or use the "Alpha Sort" feature by typing in the first letter(s) of the desired name using the keyboard.
- If retesting a patient, highlight the patient's name on the scroll box and press **Enter**. This recalls the patient's file and eliminates the need to repeat input of patient information.
- Select **New Patient** to create a new patient file.

Patient Information ➤ Enter all relevant patient information.

- Fill in any or all of the fields for this patient. All patient data must be entered for a complete report. Three lines are available for description of patient complaints.

- Enter the following patient information
 - Name; Last, First, M
 - Weight, Birthdate, Sex
 - Diagnosis, Physician, Clinician
 - Involved Side
 - Chief Complaint



➔ **Select Enter if information is correct, if not press Re-do.**

Joint Specification

➔ **Enter Joint Specification Information.**

- Enter the joint being evaluated.
- Choose the muscle group appropriate for the muscle being evaluated as in the following example:
 - Extensors = Con / Ecc or Ecc / Con
 - Flexors = Con / Ecc or Ecc / Con
 - Ext / Flex = Con / Con or Ecc / Ecc
- Choose the side you wish to evaluate first, usually this is the uninvolved side. None refers to a trunk test or a special test.

➔ **If you are evaluating an existing patient you will see a review screen.**

- Joint specifications of the previous evaluation will be displayed.
- **Re-do** allows new entry of joint specifications.
- **Enter** stores the joint specifications displayed and advances to the next screen.



➔ **Select Turn ON Gravity Compensation (optional).**

- Gravity compensation is recommended to enhance return force accuracy. (Important if you are doing research).
- Perform the following steps:
 - Grasp the load cell and move the lever arm (with the patient's limb attached) to a position that is as close to parallel to the floor as possible.
 - The system records the location of the lever arm at the horizontal position (when the lever arm is directly parallel to the floor) accuracy is important!
 - Press **Enter** when the lever arm is at the horizontal position. This registers the lever arm reading into the computer and advances to the next screen.
 - Remove your hand from the load cell and ask the patient to relax. When the limb weight appears to be consistent, press the **Enter** button to record the weight of the limb.
- **NOTE:** You may want to move one of the mechanical stops to hold the position of the lever arm at the horizontal position while the limb is being weighed.

Select Evaluation Mode

➔ **Select Evaluation Mode.**

Choose one of the following options for evaluating your patient:

- **Isokinetic**
 - Speed controlled, variable force evaluation. Appropriate for measuring maximal voluntary force capacity.
- **Passive**
 - Speed controlled evaluation, no minimal force required.
 - Appropriate for measuring Below Fair Muscle or Spasticity characteristics.
- **Isotonic**
 - Force controlled, variable speed evaluation.
 - Appropriate for evaluating endurance by measuring work and power. As the muscle fatigues, it slows down and produces less force.
- **Protocol**
 - This allows design and storage of an individual evaluation of any type. Evaluations may be named by patient or description for easy recall from the scroll box.
- **Muscle Performance**
 - A comprehensive evaluation which incorporates the evaluation of a muscle's maximal voluntary capacity, measured isokinetically as force, and collected from overlay data; endurance measured as work, acceleration / deceleration capacity measured as power, are collected isotonicly from continuous data. Choose from one of the following:
- **NOTE:** If you are evaluating an existing patient:
 - A scroll box will list and describe all evaluations previously stored in this patient's file. To bring the same evaluation parameters as a previously stored test, highlight the test you wish to repeat, and then press **Enter**.
 - Press **New Test** to create a different type of evaluation.

New Test



Overlay

➤ Select Overlay to select desired feedback option.

- Overlay is the most effective way to measure a maximum voluntary contraction which assists with the graphic determination of Eccentric vs. Concentric Deficits.

Lever Arm Length

➤ Set Lever Arm Length.

- The distance from the axis of rotation to the load cell.
- Lever Arm length. All attachments plug into the load cell. To determine the lever arm length, find the number on the lever arm corresponding with the most distal end of the load cell.
- This value is important for accurate evaluation reproduction and is necessary for proper torque calculation.

Anatomical Reference

➤ Set Anatomical Reference.

- This procedure will allow you to anatomically reference the patient's joint angle so that actual goniometric angles will be displayed on the screen during the evaluation.
- Select a Joint Position
 - Grasp the loadcell and move the lever arm (with the limb attached) to an easy-to-reference anatomical position.



- It is helpful to have the person contract the muscle group to be evaluated or exercised as this will decrease the effects of soft tissue compression as you reference a joint position.
- Anatomical Zero is usually best.
- Press **Enter** to record the mechanical position of the lever arm and advance to the next screen.



- Actual Joint Angle
 - Enter the actual anatomical angle for the position selected.
 - If a knee has a flexion contracture and cannot achieve full knee extension, it may be necessary to choose 90° of knee flexion for a joint position therefor the actual joint angle would be 90°.
 - Use the number pad on the right side of the screen or the numeric keypad on the keyboard to enter numbers.
 - Press **Enter**.



- Move Joint Angle Positive
 - Grasp the loadcell and move the lever arm from the reference position to a position that is anatomically more positive.
 - Press **Enter** to record the direction as positive.
 - **NOTE:** In the case of ankle (Inv / Ever), shoulder (IR / ER), and wrist (Flex / Ext) select any motion toward the midline of the body as your positive angle. This will be important in evaluation if you want to overlay two test recorded for separate motions (ex. if you want to overlay results from a shoulder internal rotation and external rotation test together).



- Anatomical Reference Review
 - Press **Enter** to advance to the next screen.
 - Press **Re-do** if an error was made and you wish to re-set the anatomical reference.

Stop Angle

➤ Set Stop Angle.



- Grasp the load cell and move the lever arm to the angle where you want joint motion to stop.
- Press **Enter** to record this stop angle and advance to the set start angle screen. Press **Esc** to terminate the setting of the stop angle and return you to the previous screen. Press **Reset** if you want to select a new stop angle.
- Remember that the backward direction to the KIN-COM is from the stop angle to the start angle. This is an important point to consider when choosing parameters such as forward / backward speed, and forward / backward force.
- If you are switching sides or retesting, a red box will highlight the angle when you are within 1° of the previously chosen stop angle.
- Move the mechanical stop close to the arm but not touching (3-5° clearance) and engage the pin into the nearest hole away from the arm.

Start Angle

➤ Start Angle Setting.

- Grasp the load cell and move the lever arm to the angle where you want joint motion to begin during the evaluation. As you move the extremity to the



Enter

start angle, observe the goniometric display since it describes, degree by degree, movement from the stop to the start angle.

- Press **Enter** to record this start angle and advance to the next screen. Press **Esc** to terminate the setting of the start angle and return you to the choose feedback type screen.
- Remember that the forward direction to the KIN-COM is from the start angle to the stop angle. This is an important point to consider when choosing parameters such as forward / backward speed, and forward / backward force.
- If you are switching sides or retesting, a red box will highlight the angle when you are within 1° of the previously chosen start angle.
- You have now programmed the KIN-COM for the range of motion within which the patient will be evaluated.
- Move the mechanical stop close to the arm but not touching (3-5° clearance) and engage the pin into the nearest hole away from the arm.

Data Collection

➤ Data Collection.

- Force data is collected by an "Interrupted Stroke" method.
- Concentric force curves are collected separately from eccentric force curves. This eliminates any influence of the stretch shortening cycle upon force production.
- Each subsequent curve is "overlaid" upon the previous curve, and is accepted or rejected based upon the reproducibility of a maximal voluntary effort.
- Curves that are accepted are averaged.
- Display is angle based with the angle scale below the baseline.
- This evaluation method is appropriate for assessing the maximal force capacity of a muscle.

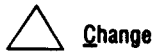
Orientation to Screen

➤ Orientation to Screen.

NOTE: When using the isotonic mode the values displayed in the box in the upper right corner of the screen refer to force limits. The trace displayed on the screen represents velocity not force.

- The upper right corner denotes the lever arm speeds.
 - If both the forward and backward speeds are equal, then the upper right corner will have a button with the current speed.
 - Press the left side of this button (or the down arrow on the keyboard) to decrease the forward and backward speeds or press the right side of this button (or the up arrow on the keyboard) to increase the forward and backward speeds.
- If this is the first time at this screen, a blue box in the middle of the screen will display the current evaluation parameters. To change any of these, press the **Change** button.
- The upper middle records the number of currently accepted concentric reps and number of eccentric reps.
- The force traces are recorded on separate graphs. The left graph is the forward direction force curve. The right graph is the backward direction force curve.

- To the left of the baseline is the scale which defines the size of the force trace on the screen. To the right of the baseline is the numeric force currently on the loadcell.
- Range of motion and direction of movement are denoted on the angle scale below the baseline.



➔ **Select Change to make changes to any of the following:**

- Speed Limits, Contraction Type
- Force Limits
- Screen Display
- Sets, Reps and Turns
- Or Save as a Custom Protocol.

NOTE: For more information refer to modifying exercise



Warm-Up

➔ **Select Warm-Up.**

- A warm-up function is provided to allow the patient to adjust to the parameters and prepare the muscle group for testing.
- Touching this prompt will allow you to practice without recording data.
- Suggestions for warm-up progression, this is an example only!
 1. Exercise Bike X 5 minutes
 2. KIN-COM Specifics
 - 25% effort x 2 reps, 30 second rest
 - 50% effort x 2 reps, 30 second rest
 - 75% effort x 2 reps, 30 second rest
 - 100% effort x 2 reps, 30 second rest
 3. Stretch off Machine



Stop Warm-up

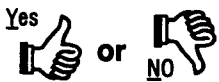
➔ **Select Stop Warm-Up to exit the warm-up session.**



Start Measure

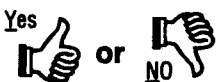
➔ **Select Start Measure to begin recording data.**

- The individual must meet the force requirements for the lever arm to move at the chosen speed.
- Instruct the patient to push as hard and as fast as they can. Tell them to try not to anticipate the stopping point, but to continue to push all the way until the machine stops.
- Use consistent verbal commands to instruct the patient during the evaluation (i.e. "When I say go, push as hard as you can into the pad until I say relax").



➔ **Select YES or NO to accept or reject the latest effort.**

- If the latest effort matches or exceeded the previous effort, then touch the **YES** prompt. If the latest effort did not match or exceed the previous effort, then touch the **NO** prompt.



➔ **Select YES or NO to accept or reject the previous effort(s).**

- If the previous curve is significantly less than the latest effort, then touch the **NO** button. This will eliminate the curve from the averaging process. - If the previous was consistent with the latest, touch the **YES** button.
- This is "on-line editing" of the patient's efforts.
- Making careful selections concerning which force curves you will accept and which ones you will reject will greatly effect your coefficient of variation.



Save

➔ **Select Save.**

- Once you have 3 consistent concentric and eccentric efforts touch **Save**. After you have stored your evaluation data regarding this particular joint, you may touch **Esc**.
- The number in parenthesis indicates the number of tests stored for the session. The maximum number of tests allowed per session is 12. If an * appears on the store button, it indicates that you have already pressed the store button and the data has already been saved.
- To evaluate the opposite side, press **Esc** once.



Esc

➔ **Select Esc to set up the other side.**

- A screen of options will be presented representing settings for the other limb to be evaluated, another muscle group or motion pattern to be evaluated.
- The setup evaluation screen allows for physical changes to be made between sides, without exiting the patient's file. Touch the buttons on the left to denote the appropriate changes in reports and report writer.
- The rectangle summary shows previous side, muscle group, and the number of tests stored for previous evaluations stored in this evaluation session.
- **NOTE:** Make sure you touch the side right / left prompt to change from left to right, or right to left.
- At this point choose **Setup Test** to advance to the anatomical reference procedure for the next evaluation, or choose **End Test** to end the evaluation.



Setup Test

➔ **Select Setup Test to perform steps for:**

- Lever Arm Length
- Anatomical Reference
- Stop / Start Angles.
- Repeat the following steps as you did when evaluating the other side.



Warm-Up

➔ **Select Warm-Up.**

- To allow individual to become familiar with evaluation parameters.



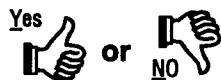
Stop Warm-up

➔ **Select Stop Warm-Up to exit the warm-up session.**

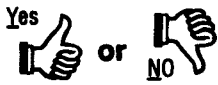


Start Measure

➔ **Select Start Measure to begin recording data.**



➔ **Select YES or NO to accept or reject the latest effort.**



➔ Select **YES** or **NO** to accept or reject the previous effort(s).



➔ Select **Save**.

- Once you have 3 consistent concentric and eccentric efforts.



➔ Select **Esc** 3 times to return to the main menu.

- When you finish your evaluation, choose **Esc** three times to return to the main menu and view reports.

Reports

➔ Select **Reports**.

- To view results choose overlay reports and follow prompts.
- For more information see reports section.

Continuous Repetition Test

KIN-COM®

➔ Select **KIN-COM** to access the main menu.

Patient Positions

➔ Select **Patient Positions** to setup a preset, patient or custom position.

- Select **Esc** 2 times to return to the main menu. – OR
- Select **F10 Accept** to save positioning information.
 - Choose **New Patient** to create a new patient file or use the up and down arrows to highlight an existing patient then select enter. Refer to principles of operation

Evaluation

➔ Select **Evaluation** to access the evaluation program.

- The KIN-COM evaluation mode gives you a variety of options to evaluate a patient's force / torque production, motor control, spasticity or joint range of motion.
- The KIN-COM provides a variety of testing options taking into consideration the diversity of patients and patients' problems.



➔ Select **New Patient** or a patient name from the scroll box.

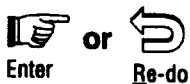
- The scroll box lists all patient names currently in the system.
- To scroll through the list, touch the up or down buttons on the keyboard or use the "Alpha Sort" feature by typing in the first letter(s) of the desired name using the keyboard.
- If retesting a patient, highlight the patient's name on the scroll box and press **Enter**. This recalls the patient's file and eliminates the need to repeat input of patient information.
- Select **New Patient** to create a new patient file.

Patient Information

➔ Enter all relevant patient information.

- Fill in any or all of the fields for this patient. All patient data must be entered for a complete report. Three lines are available for description of patient complaints.

- Enter the following patient information
 - Name; Last, First, M
 - Weight, Birthdate, Sex
 - Diagnosis, Physician, Clinician
 - Involved Side
 - Chief Complaint



➤ **Select Enter if information is correct, if not press Re-do.**

Joint Specification

➤ **Enter Joint Specification Information.**

- Enter the joint being evaluated.
- Choose the muscle group appropriate for the muscle being evaluated as in the following example:
 - Extensors = Con / Ecc or Ecc / Con
 - Flexors = Con / Ecc or Ecc / Con
 - Ext / Flex = Con / Con or Ecc / Ecc
- Choose the side you wish to evaluate first, usually this is the uninvolved side. None refers to a trunk test or a special test.

➤ **If you are evaluating an existing patient you will see a review screen.**

- Joint specifications of the previous test will be displayed.
- **Re-do** allows new entry of joint specifications.
- **Enter** stores the joint specifications displayed and advances to the next screen.



➤ **Select Turn ON Gravity Compensation (optional).**

- Gravity compensation is recommended to enhance return force accuracy. (Important if you are doing research).
- Perform the following steps:
 - Grasp the load cell and move the lever arm (with the patient's limb attached) to a position that is as close to parallel to the floor as possible.
 - The system records the location of the lever arm at the horizontal position (when the lever arm is directly parallel to the floor) accuracy is important!
 - Press **Enter** when the lever arm is at the horizontal position. This registers the lever arm reading into the computer and advances to the next screen.
 - Remove your hand from the load cell and ask the patient to relax. When the limb weight appears to be consistent, press the **Enter** button to record the weight of the limb.
 - **NOTE:** You may want to move one of the mechanical stops to hold the position of the lever arm at the horizontal position while the limb is being weighed.



Evaluation Mode

➤ **Select Evaluation Mode.**

Choose one of the following options for evaluating your patient.

- **Isokinetic**
 - Speed controlled, variable force evaluation. Appropriate for measuring maximal voluntary force capacity.
- **Passive**
 - Speed controlled evaluation, no minimal force required.
 - Appropriate for measuring below fair muscle or spasticity characteristics.
- **Isometric**
 - Constant angle, variable force evaluation.
 - Appropriate for measuring force when the joint is not ready for isokinetics.
- **Isotonic**
 - Force controlled, variable speed evaluation.
 - Appropriate for testing endurance by measuring work and power. As the muscle fatigues, it slows down and produces less force.
- **Protocol**
 - This allows design and storage of an individual evaluation of any type. Tests may be named by patient or description for easy recall from the scroll box.
- **Muscle Performance**
 - A comprehensive evaluation which incorporates the evaluation of a muscle's maximal voluntary capacity, measured isokinetically as force, and collected from overlay data; endurance measured as work, acceleration / deceleration capacity measured as power, are collected isotonically from continuous data.
- **NOTE:** If you are evaluating an existing patient
 - A scroll box will list and describe all evaluations previously stored in this patient's file. To bring the same parameters as a previously stored evaluation, highlight the test you wish to repeat, and then press **Enter**.
 - Press **New Test** to create a different type of evaluation.

New Test



Continuous

➔ **Select Continuous to select desired feedback option.**

- Time-based data allows for visualization of the patients effort over time, especially valuable when comparing to velocity, force, angle and integrated EMG data.

Lever Arm Length

➔ **Set Lever Arm Length.**

- The distance from the axis of rotation to the load cell.
- Lever Arm length. All attachments plug into the load cell. To determine the lever arm length, find the number on the lever arm corresponding with the most distal end of the load cell.
- This value is important for accurate test reproduction and is necessary for proper torque calculation.

Anatomical Reference

➔ **Set Anatomical Reference.**

- This procedure will allow you to anatomically reference the patient's joint angle so that actual goniometric angles will be displayed on the screen during the evaluation.

- Select a Joint Position
 - Grasp the loadcell and move the lever arm (with the limb attached) to an easy-to-reference anatomical position.
 - It is helpful to have the person contract the muscle group to be evaluated or exercised as this will decrease the effects of soft tissue compression as you reference a joint position.
 - Anatomical zero is usually best.
 - Press **Enter** to record the mechanical position of the lever arm and advance to the next screen.
- Actual Joint Angle
 - Enter the actual anatomical angle for the position selected.
 - If a knee has a flexion contracture and cannot achieve full knee extension, it may be necessary to choose 90° of knee flexion for a joint position therefor the actual joint angle would be 90°.
 - Use the number pad on the right side of the screen or the numeric keypad on the keyboard to enter numbers.
 - Press **Enter**.
- Move Joint Angle Positive
 - Grasp the loadcell and move the lever arm from the reference position to a position that is anatomically more positive.
 - Press **Enter** to record the direction as positive.
 - **NOTE:** In the case of ankle (Inv / Ever), shoulder (IR / ER), and wrist (Flex / Ext) select any motion toward the midline of the body as your positive angle. This will be important in evaluation if you want to overlay two test recorded for separate motions (ex. if you want to overlay results from a shoulder internal rotation and external rotation test together).
- Anatomical Reference Review
 - Press **Enter** to advance to the next screen.
 - Press **Re-do** if an error was made and you wish to re-set the anatomical reference.



Stop Angle



- **Set Stop Angle.**
 - Grasp the load cell and move the lever arm to the angle where you want joint motion to stop.
 - Press **Enter** to record this stop angle and advance to the set start angle screen. Press **Esc** to terminate the setting of the stop angle and return you to the previous screen. Press **Reset** if you want to select a new stop angle.
 - Remember that the backward direction to the KIN-COM is from the stop angle to the start angle. This is an important point to consider when choosing parameters such as forward / backward speed, and forward / backward force.
 - If you are switching sides or retesting, a red box will highlight the angle when you are within 1° of the previously chosen stop angle.
 - Move the mechanical stop close to the arm but not touching (3-5° clearance) and engage the pin into the nearest hole away from the arm.

Start Angle



➔ Start Angle Setting.

- Grasp the load cell and move the lever arm to the angle where you want joint motion to begin during the evaluation. As you move the extremity to the start angle, observe the goniometric display since it describes, degree by degree, movement from the stop to the start angle.
- Press **Enter** to record this start angle and advance to the next screen. Press **Esc** to terminate the setting of the start angle and return you to the choose feedback type screen.
- Remember that the forward direction to the KIN-COM is from the start angle to the stop angle. This is an important point to consider when choosing parameters such as forward / backward speed, and forward / backward force.
- If you are switching sides or retesting, a red box will highlight the angle when you are within 1° of the previously chosen start angle.
- You have now programmed the KIN-COM for the range of motion within which the patient will be evaluated.
- Move the mechanical stop close to the arm but not touching (3-5° clearance) and engage the pin into the nearest hole away from the arm.

Data Collection

➔ Data Collection.

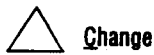
- Force data is collected continuously.
- Display is time based.
- Data from any trace that is turned on will be displayed continuously across the screen.
- Each sweep occurs over a 5 second interval
- This evaluation method is appropriate for assessing the endurance capacity of a muscle.

Orientation to Screen

➔ Orientation to Screen.

NOTE: When using the isotonic mode the values displayed in the box in the upper right corner of the screen refer to force limits. The trace displayed on the screen represents velocity not force.

- The upper right corner denotes the lever arm speeds.
 - If both the forward and backward speeds are equal, then the upper right corner will have a button with the current speed.
 - Press the left side of this button (or the down arrow on the keyboard) to decrease the forward and backward speeds or press the right side of this button (or the up arrow on the keyboard) to increase the forward and backward speeds.
- If this is the first time at this screen, a blue box in the middle of the screen will display the current evaluation parameters. To change any of these, press the **Change** button.
- The upper middle records current sets and repetitions
- Force is exhibited continuously by the trace, and numerically to the right of the baseline.
- A time scale is displayed (in seconds), across bottom of screen.
- Cues will appear at bottom right, to acknowledge each 10 seconds of recorded data.



➔ **Select Change to make changes to any of the following:**

- Speed Limits, Contraction Type
- Force Limits
- Screen Display
- Sets, Reps and Turns
- Or Save as a Custom Protocol.

NOTE: For more information refer to modifying exercise



➔ **Select Warm-Up.**

- A warm-up function is provided to allow the patient to adjust to the evaluation procedure and prepare the muscle group for testing. Selecting this prompt will allow you to practice without recording data.
- Suggestions for warm-up progression, this is an example only!
 1. Exercise Bike X 5 minutes
 2. KIN-COM Specifics
 - 25% effort x 2 reps, 30 second rest
 - 50% effort x 2 reps, 30 second rest
 - 75% effort x 2 reps, 30 second rest
 - 100% effort x 2 reps, 30 second rest
 3. Stretch off Machine



➔ **Select Stop Warm-Up to exit the warm-up session.**



➔ **Select Start Test to begin recording data.**

- The individual must meet the force requirements for the lever arm to move within the current evaluation parameters.
- Use consistent verbal commands to instruct the patient prior to starting the evaluation (i.e. "When I say go, push as hard as you can into the pad until I say relax").



➔ **Select Stop Test to end a evaluation.**

- Tell the patient to stop pushing, and then press stop test.
- You will have the option to store that data to the patient's file or to repeat the evaluation.



➔ **Select NO to return to the evaluation screen and select Start Test to record new evaluation data.**



➔ **Select YES to save data to a patient file, followed by Finish Side to setup the next test.**

- A screen of options will be presented representing settings for the other limb to be evaluated, another muscle group or motion pattern to be evaluated.
- The setup test screen allows for physical changes to be made between sides, without exiting the patient's file. Touch the buttons on the left to denote the appropriate changes in reports and report writer.

- The rectangle summary shows previous side, muscle group, and the number of tests stored for previous evaluation session.
- **NOTE:** Make sure you touch the side right / left prompt to change from left to right, or right to left.



Setup Test

- ➔ **Select Setup Test to advance to the anatomical reference procedure for the next test, or choose End Test to end the evaluation.**



End Test



Setup Test

- ➔ **Select Setup Test to perform steps for:**

- Lever Arm Length
- Anatomical Reference
- Stop / Start Angles.
- Repeat the following steps as you did when evaluating the other side.

- ➔ **Select Warm-Up.**



Warm-Up

- ➔ **Select Stop Warm-Up to exit the warm-up session.**



Stop Warm-up

- ➔ **Select Start Test to begin recording data.**



Start Test

- ➔ **Select Stop Test to end a test.**



Stop Test

- ➔ **Select YES to save data to a patient file.**



- ➔ **Select NO to return to the evaluation screen.**



- ➔ **Select Finish Side to return to the setup test screen.**



Finish Side

- ➔ **Select End Test followed by choosing Esc to return to the main menu and view reports.**



End Test



Esc

Reports

- ➔ **Select Reports.**

- To view results choose continuous reports and follow prompts.
- For more information see reports section.

Performing a 2 Speed Isokinetic Test (Overlay, Continuous)

Orientation to Screen

➔ Orientation to screen.

- The upper right corner denotes the lever arm speeds.
 - If both the forward and backward speeds are equal, then the upper right corner will have a button with the current speed.
 - Press the left side of this button (or the down arrow on the keyboard) to decrease the forward and backward speeds or press the right side of this button (or the up arrow on the keyboard) to increase the forward and backward speeds.

Perform First Evaluation

➔ Perform the first evaluation at a selected speed.

- Once you finish collecting data at the first speed save the data.
- Then change the speed limits by touching the prompt in the upper right corner of the screen (or use the arrows on the keyboard) to increase or decrease the forward and backward speed.

Change Speeds

➔ If the evaluation speeds are different for the forward and backward directions then select **Change** to modify speeds.



➔ Select **Speed Limits** and change the following:

- Speed Forward
- Speed Backward



➔ Select **Warm-Up**.

- Allow the individual to become accustomed to the new speed.



➔ Select **Stop Warm-Up** to exit the warm-up session.



➔ Select **Start Measure** to begin recording data.



➔ Select **YES** to accept the latest effort.

- Record the first effort at the new speed.



➔ Select **NO** to reject the previous effort(s).

- You do not want to average values from 2 different speeds.

Continue with Evaluation

➔ Continue with the rest of the evaluation as you did before.

Isometric Test

KIN-COM®

- ➔ Select **KIN-COM** to access the main menu.

Patient Positions

- ➔ Select **Patient Positions** to setup a preset, patient or custom position.
 - Select **Esc** 2 times to return to the main menu.
 - Select **F10 Accept** to save positioning information.
 - Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient then select enter. Refer to principles of operation

Evaluation

- ➔ Select **Evaluation** to access the evaluation program.
 - The KIN-COM evaluation mode gives you a variety of options to evaluate a patient's force / torque production, motor control, spasticity or joint range of motion.
 - The KIN-COM provides a variety of evaluation options taking into consideration the diversity of patients and patients' problems.

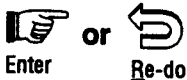


New Patient

- ➔ Select **New Patient** or a patient name from the scroll box.
 - The scroll box lists all patient names currently in the system.
 - To scroll through the list, touch the up or down buttons on the keyboard or use the "Alpha Sort" feature by typing in the first letter(s) of the desired name using the keyboard.
 - If retesting a patient, highlight the patient's name on the scroll box and press **Enter**. This recalls the patient's file and eliminates the need to repeat input of patient information.
 - Select **New Patient** to create a new patient file.

Patient Information

- ➔ Enter all relevant patient information.
 - Fill in any or all of the fields for this patient. All patient data must be entered for a complete report. Three lines are available for description of patient complaints.
 - Enter the following patient information
 - Name; Last, First, M
 - Weight, Birthdate, Sex
 - Diagnosis, Physician, Clinician
 - Involved Side
 - Chief Complaint



or



- ➔ Select **Enter** if information is correct, if not press **Re-do**.

Joint Specification

- ➔ Enter **Joint Specification** Information.
 - Enter the joint being evaluated.
 - Choose the muscle group appropriate for the muscle being evaluated as in the following example:

- Extensors = Con / Ecc or Ecc / Con
- Flexors = Con / Ecc or Ecc / Con
- Ext / Flex = Con / Con or Ecc / Ecc
- Choose the side you wish to evaluate first. Usually this is the uninvolved side. None refers to a trunk test or a special test.

➤ **If you are testing an existing patient you will see a review screen.**

- Joint specifications of the previous evaluation will be displayed.
- **Re-do** allows new entry of joint specifications.
- **Enter** stores the joint specifications displayed and advances to the next screen.



➤ **Select Turn ON Gravity Compensation (optional).**

- Gravity compensation is recommended to enhance return force accuracy. (Important if you are doing research).
- Perform the following steps:
 - Grasp the load cell and move the lever arm (with the patient's limb attached) to a position that is as close to parallel to the floor as possible.
 - The system records the location of the lever arm at the horizontal position (when the lever arm is directly parallel to the floor) accuracy is important!
 - Press **Enter** when the lever arm is at the horizontal position. This registers the lever arm reading into the computer and advances to the next screen.
 - Remove your hand from the load cell and ask the patient to relax. When the limb weight appears to be consistent, press the **Enter** button to record the weight of the limb.
 - **NOTE:** You may want to move one of the mechanical stops to hold the position of the lever arm at the horizontal position while the limb is being weighed.



Evaluation Mode

➤ **Select Evaluation Mode.**

Choose one of the following options for evaluating your patient.

- **Isometric**
 - Constant angle, variable force evaluation.
 - Appropriate for measuring force when the joint is not ready for isokinetics.
- **Protocol**
 - This allows design and storage of an individual evaluation of any type. Tests may be named by patient or description for easy recall from the scroll box.
- **If you are evaluating an existing patient**
 - A scroll box will list and describe all evaluations previously stored in this patient's file. To bring the same parameters as a previously stored test, highlight the evaluation you wish to repeat, and then press **Enter**.
 - Press **New Test** to create a different type of evaluation.

New Test

Lever Arm Length

➤ Set Lever Arm Length.

- The distance from the axis of rotation to the load cell.
- Lever Arm length. All attachments plug into the load cell. To determine the lever arm length, find the number on the lever arm corresponding with the most distal end of the load cell.
- This value is important for accurate evaluation reproduction and is necessary for proper torque calculation.

Anatomical Reference

➤ Set Anatomical Reference.

- This procedure will allow you to anatomically reference the patient's joint angle so that actual goniometric angles will be displayed on the screen during the evaluation.

Joint Position

• Select a Joint Position

- Grasp the loadcell and move the lever arm (with the limb attached) to an easy-to-reference anatomical position.
 - It is helpful to have the person contract the muscle group to be evaluated or exercised as this will decrease the effects of soft tissue compression as you reference a joint position.
 - Anatomical Zero is usually best.
 - Press **Enter** to record the mechanical position of the lever arm and advance to the next screen.



Enter

Joint Angle

• Actual Joint Angle.

- Enter the actual anatomical angle for the position selected.
 - If a knee has a flexion contracture and cannot achieve full knee extension, it may be necessary to choose 90° of knee flexion for a joint position therefore the actual joint angle would be 90°.
 - Use the number pad on the right side of the screen or the numeric keypad on the keyboard to enter numbers.
 - Press **Enter**.

Joint Angle Positive

• Move Joint Angle Positive.

- Grasp the loadcell and move the lever arm from the reference position to a position that is anatomically more positive.
 - Press **Enter** to record the direction as positive.
 - **NOTE:** In the case of ankle (Inv / Ever), shoulder (IR / ER), and wrist (Flex / Ext) select any motion toward the midline of the body as your positive angle. This will be important in evaluation if you want to overlay two test recorded for separate motions (ex. if you want to overlay results from a shoulder internal rotation and external rotation test together).



Enter

• Anatomical Reference Review

- Press **Enter** to advance to the next screen.
- Press **Re-do** if an error was made and you wish to re-set the anatomical reference.



Enter

Stop Angle

➤ Stop Angle Setting.

- Grasp the load cell and move the lever arm to the final angle of the isometric exercise. To enhance session to session reliability, notice to the left is a reminder of the previous angle set.



- **Enter** records this angle as the stop angle and prompts the next angle to be selected. Set additional isometric holds, the stop / start angles will also function as isometric holds

Isometric Hold Angle Settings



➤ Isometric Hold Angle Settings.

- Grasp the load cell and move the lever arm to the next angle to be selected for the isometric exercise.
- **Enter** records this angle, and the prompt for the next angle appears. Then move the lever arm to the next angle and press enter. If you choose store exercise, each angle must be at least 5 degrees apart.
- Touch the set start angle prompt when you are ready to set the first isometric angle. Including start and stop angles, a total of 9 angles are available for isometric measurements.
- **Re-do** allows you to reset all of the angles without having to reset anatomical reference.

Start Angle



➤ Set Start Angle.

- Move the attachment to the desired starting point
- Stop the attachment at the desired starting point, pause momentarily
- Choose **Enter**.

Isometric Force Settings

➤ Isometric Force Settings.

- Angles to be evaluated have been selected and are exhibited in white on left side of screen.
- The minimal forces which were previously set for the corresponding angles appear, displayed in blue. Enter records these minimal forces as shown.
- Current Min. Force is the minimal amount of force that must be applied against the load cell in order for the clock to count down the contraction time, at the corresponding angle. If the force produced by the patient drops below the minimal force requirement, then the clock will stop counting down.

Min. Isometric Forces

➤ Select Min. Isometric Forces.

- To change the minimal force requirements choose minimal isometric forces. Press enter to accept the forces as displayed.
- Each angle allows for a separate minimum isometric force requirement, so that the effects of biomechanical advantage and / or passive insufficiency may be considered.
- In parenthesis appears a reminder of the min. force previously chosen for this angle.
- The minimum isometric force must be set below the maximum force.

Screen Display

➤ Orientation To Screen Display.

- Either the Time Clock or Time Bar in the upper left corner denotes contraction time. The clock counts down only when patient meets or exceeds the minimum isometric force.
- Number of contractions and sets are counted in upper right corner. One set includes the total contractions from start to stop angles.

- The blue markers represent an 11 lb. window as a target. This target automatically adjusts so that the bottom of the blue represents the minimum isometric force required at that angle.
- Angle and minimum isometric force are denoted numerically under each bar graph.
- If this is the first time at this screen, a blue box in the middle of the screen will display the current evaluation parameters.



➔ **Select Change to modify exercise parameters.**

- To modify the exercise program parameters without leaving the exercise program press the change button.
 - Speed Limits, Contraction Type
 - Force Limits
 - Screen Display
 - Sets, Reps and Turns
 - Or Save as a Custom Protocol.

NOTE: For more information refer to modifying exercise



➔ **Select Warm-Up.**

- A warm-up function is provided to allow the patient to adjust to the procedure and prepare the muscle group for testing.
- Touching this prompt will allow you to practice without recording data.



➔ **Select Stop Warm-Up to exit the warm-up session.**



➔ **Select Start Test to begin recording data.**

- The individual must meet the minimal force requirements for the clock to count down. Once the clock counts down to zero the lever arm will move to the next hold position.
- Use consistent verbal commands to instruct the patient prior to starting the evaluation (i.e. "When I say Go, Push as hard as you can into the pad until I say Relax").



➔ **Select Stop Test to end a test.**

- After the individual performs three (3) contractions at each isometric hold position instruct the patient to stop pushing, and then press stop test.
- You will have the option to store that data to the patient's file or to repeat the evaluation.



➔ **Select NO to return to the evaluation screen and select Start Test to record new evaluation data.**



➔ **Select YES to save data to a patient file, followed by Finish Side to setup the next evaluation.**


- A screen of options will be presented representing settings for the other limb to be evaluated, another muscle group or motion pattern to be evaluated.

- The setup test screen allows for physical changes to be made between sides, without exiting the patient's file. Touch the buttons on the left to denote the appropriate changes in reports and report writer.
- The rectangle summary shows previous side, muscle group, and the number of tests stored for a previous evaluation session.
- **NOTE:** Make sure you touch the side prompt to change from left to right, or right to left.

 Setup Test

➔ **Select Setup Test to advance to the anatomical reference procedure for the next test, or choose End Test to end the test.**

 End Test

 Setup Test

➔ **Select Setup Test to perform steps for:**

- Lever Arm Length
- Anatomical Reference
- Stop / Start Angles.
- Repeat the following steps as you did when evaluating the other side.

 Warm-Up

➔ **Select Warm-Up.**

 Stop Warm-up

➔ **Select Stop Warm-Up to exit the warm-up session.**

 Start Test

➔ **Select Start Test to begin recording data.**

 Stop Test

➔ **Select Stop Test to end a test.**

Yes 

➔ **Select NO to return to the evaluation screen.**

 NO

➔ **Select YES to save data to a patient file.**

 Finish Side

➔ **Select Finish Side to return to the setup screen.**

 End Test  Esc  Esc

➔ **Select End Test followed by choosing Esc 2 times to return to the main menu and view reports.**

Reports

➔ **Select Reports.**

- To view results choose continuous reports and follow prompts.
- For more information see reports section.

Muscle Performance Test

- This is an automatic comprehensive evaluation which incorporates the evaluation of a muscle's maximal voluntary capacity, this is achieved by:
 - Measuring force isokinetically, collected from overlay data.
 - Endurance measured as work, as well as acceleration / deceleration capacity, measured as power, are collected isotonicly from continuous data.
- The Muscle Performance evaluation must be performed bilaterally and the uninvolved side must be tested first.
- Description of endurance portion of muscle performance evaluation.
 - The isotonic mode with continuous data collection, using Con / Ecc contractions is the mode of choice.
 - As the muscle fatigues, it slows down producing less force; thus work and power measurements are more meaningful.
$$\text{Work} = \text{Force} \times \text{Distance}$$
$$\text{Power} = \text{Work} / \text{Time}$$
 - The submaximal load chosen is equivalent to 70% of the force produced isokinetically at the weakest angle (minus 5 degrees at each end of the range of motion), of the uninvolved side during the overlay portion of the evaluation.
 - Break point is defined as the point at which the patient fails to produce movement of the lever arm for 2 seconds. The evaluation ends automatically when the break point is reached.

Below Fair Muscle Test / Spasticity Assessment

- This evaluation will measure the amount and direction of force produced during an isolated movement at a given speed, accurate to 1/4 lb. (1 Newton).
- The baseline should be in the middle of the screen to allow the force trace to be visualized when patient's force is less than the weight of the limb; or when unintentional force is produced (i.e. spasticity).
- The range of motion scale appears on the bottom of the screen, so location of force changes can be noted.
- Curve 1
 - The individual is instructed to relax as the limb is passively taken through the range of motion in both concentric and eccentric directions.
 - Each curve represents the weight of the limb plus any resistance to passive movement.
 - Store these curves as Test 1.
- Curve 2
 - The individual is instructed to make an effort to move with the lever arm during the concentric phase of movement; and then to resist during the eccentric phase.
 - Store these curves as Test 2.

- The difference between the two tests represents the patient's ability to produce force.
- For further explanation, see the spasticity report in the report writer program.

Reports

Introduction

Results of evaluations are stored for display and / or printing in a variety of formats to meet every need and to address all phases of progress in the patient's rehabilitation.

The choices are as follows:

- **Overlay Reports:**

- The most effective way to measure a maximum voluntary contraction which assists with the graphic determination of concentric vs. eccentric deficits.
- Enhances ability to assess deficits in force production within a specific range of motion, so treatment plans can be better focused.
- Data collected by overlay method can be exhibited in 3 different angle-based formats. Each presents data for assessment of maximal voluntary capacity to produce force at each angle throughout the range of motion.
- Types of Overlay Reports:
 - Standard
 - Compare
 - Numeric

- **Continuous Reports**

- Time-based data allows for visualization of the patients effort over time, especially when comparing to velocity, force, angle and integrated EMG data.

- **Muscle Performance Reports**

- Graphically and numerically display all elements of the effort in terms of peaks, average power, work and endurance ratios for fatigue measures, utilizing either isokinetic (speed controlled) or isotonic (speed variable) approaches.

- **Isometric Reports**

- Vividly display the patient's efforts in bargraph and curve formats as all the preceding reports do. Compare maximum efforts or progress in those early phases of rehabilitation.

- Date to date comparisons provide objective documentation of progress or regression for individuals who cannot tolerate isokinetic testing.
- **ROM Reports**
 - Data collected during ROM protocols can be stored and retrieved in a format that exhibits the angle reached for each repetition.

Overlay Reports

Overlay Standard Report

This type of report is utilized most frequently by clinicians as they report results to the physician. It permits the ability to compare results from two tests, either from the same date or from two different dates.

KIN-COM®

➤ **Select KIN-COM**

Reports

➤ **Select Reports from the main menu.**

Overlay

➤ **Select Overlay to identify the test format.**

Standard Report

➤ **Select Standard Report to identify the type of report desired.**

Patient Name

➤ **Patient Name**

- The patient scroll box lists all patient names that have previously collected and stored an evaluation of this type.
- To scroll through the list, touch the up or down arrows on the screen or keyboard. You may also use the "Alpha Sort" feature by typing in the first letter(s) of the desired name using the keyboard.
- To select a patient, highlight that patient's name and press **Enter**.



Enter

➤ **Date Tested**

- If the patient has multiple test dates, use the up or down arrows on the keyboard to scroll to the desired date.
- Select the date you wish to view from the scroll box by choosing **Enter**.



Enter



Stats

➤ **Select Stats**

- Patient information and all parameters for a particular test are displayed, including Start and stop angles.
- **NOTE:** You do not have to select this option to display a report. It is intended to provide a checklist to assist with test to test reproducibility.



**ASCII
Data**

➤ **Select ASCII Data**

- As with stats you do not need to select this option to display a report. This option allows you to view or download ASCII data for a selected report.
- **Screen:** To display ASCII data on the screen.
- **File:** This option will write the test information to a file. This option is useful if you wish to import test information into a spreadsheet or another program for analysis.



Enter

➤ Select Uninvolved Side

- All test for the patient and date selected will be displayed in a test scroll box. Use the up or down arrows on the keyboard to highlight the desired test.
- Select **Enter** to accept the highlighted test as report #1.



Enter

➤ Select Involved Side

- After you select the uninvolved side from the test scroll box, use the up or down arrows on the keyboard to highlight and select the involved side.
- Select **Enter** to accept the highlighted test as report #2.
- **NOTE:** Choose **Select Patient** or **Select Date** to access a report from a different date or patient file. This is useful when comparing one patient to another or when creating a progress report.

Summary Screen

Summary Screen

- Information is displayed related to the tests you have selected to view including:
 - Test number
 - Patient name, test date
 - Test mode, contraction type
 - Test speeds, side and joint tested
- This screen also displays four options available to you:



Esc

- Select **Esc** to return to the choose type of overlay test screen.



Re-do

- Select **Re-do** to change one or both of the test you selected.



View

- Select **View** to display test parameters for the reports selected.



Display

- Select **Display** to display reports on the screen.

Orientation To Screen

- The upper middle corner denotes the test speed.
- Each test is color-coded to its curve and numeric data.
- CV: Coefficient of variation.

This represents the difference between the curves accepted during the evaluation to produce the average curve.

NOTE: This only appears if at least 3 curves were accepted. Formula:
 $CV = (\text{standard deviation} / \text{mean}) * 100\%$

- Left Graph = Concentric effort.
- Right Graph = Eccentric effort (unless contraction type was changed).
- Scale at left of baseline defines the size of the curve.

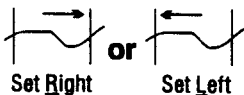
- Range of motion and direction of movement are denoted on the angle scale below the baseline.
- The angles exhibited in the middle of the screen denote, numerically, the positions of the markers.
- Each curve displayed on the screen represents an average of the curves accepted during the evaluation.
- Numeric force for each curve is displayed below the graphs.
- Average markers are automatically positioned at the start and stop angles for evaluation #1. If the range of motion was the same for evaluation #2, touch markers to adjust.
- If average markers are displayed, then the number reflects the average force of the curve between the markers.
- If value marker is displayed, then the number reflects the force of the curve at the marker.
- The percent difference is calculated as follows:

$$\% \text{ diff.} = [(\text{test 2} / \text{test 1}) - 1] * 100\%$$

Two suggestions for progress reports.

- When comparing one test date to another test date, choose the earlier date as Test 1, thus a positive % difference reflects progress while a negative % difference reflects regression.
- When comparing uninvolved to involved sides, choose the uninvolved side as Test 1, thus a negative % difference will reflect the deficit.

When displaying a report you have the following options:



➤ **Select Scale**

- To adjust the amplification of the force curve using the numeric keyboard. The number in the pink box denotes present scale.
- A higher scale value will reduce the size of the curve.
- A lower scale value will increase the size of the curve.

➤ **Selecting Markers will display the following:**

- Peaks
- Set Right
- Set Value
- Left and Right Arrows
- Esc

➤ **Select Peaks**

- Touching this prompt will display the peak force for each curve, exhibited graphically and numerically. The angle where the peak occurred is also exhibited.

➤ **Select Set Right or Set Left**

- Selecting this prompt will specify which marker to move.

Left Marker Time

- The time from the beginning of the first contraction to where the left marker is currently located.

Right Marker Time

- The time from the beginning of the first contraction to where the right marker is currently located.



Select Set Value

- Touching this prompt will display one marker which reflects force for that one angle only.
- The value marker may be moved to the left or right.

Value Markers

- Isokinetic data, the marker represents force values.
- Isotonic data, the marker represents velocity values.

Angle

- The angle value at the marker.



Select Set Average

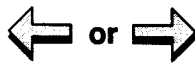
- Touching this prompt will display two markers which reflects the average effort for each angle between them.

Average Markers

- Isokinetic data, average force is displayed between the markers.
- Isotonic data, average velocity is displayed between the markers.

Average Angle

- The average angle value between the markers.



Select Left Arrow or Right Arrow

- This allows you to move a marker to the left or right.
- Once you have moved the markers to the desired location select **Esc** to return to the previous screen.



Select Print to print the report as displayed on the screen.



Select Esc to return to the summary screen.

Overlay Compare Report

An expanded version of the standard report and is utilized most frequently by clinicians when they desire more in-depth information from an evaluation. Permits the ability to compare results from two tests, either from the same date or from different dates.

KIN-COM®

Select KIN-COM

Reports

Select Reports from the main menu.

Overlay

Select Overlay to identify the test format.

Compare Report

Select Compare Report to identify the type of report desired.

Patient Name

➤ Patient Name

- The patient scroll box lists all patient names that have previously collected and stored an evaluation of this type.
- To scroll through the list, touch the up or down arrows on the screen or keyboard. You may also use the "Alpha Sort" feature by typing in the first letter(s) of the desired name using the keyboard.
- To select a patient, highlight that patient's name and press **Enter**.



Date Tested

➤ Date Tested

- If the patient has multiple test dates, use the up or down arrows on the keyboard to scroll to the desired date.
- Select the date you wish to view from the scroll box by choosing **Enter**.



Stats

➤ Select Stats

- Patient information and all parameters for a particular test are displayed, including Start and stop angles.
- **NOTE:** You do not have to select this option to display a report. It is intended to provide a checklist to assist with test to test reproducibility.



ASCII
Data

➤ Select ASCII Date

- As with stats you do not need to select this option to display a report. This option allows you to view or download ASCII data for a selected report.
- **Screen:** To display ASCII data on the screen.
- **File:** This option will write the test information to a file. This option is useful if you wish to import test information into a spreadsheet or another program for analysis.

Uninvolved Side

➤ Select Uninvolved Side

- All test for the patient and date selected will be displayed in a test scroll box. Use the up or down arrows on the keyboard to highlight the desired test.
- Select **Enter** to accept the highlighted test as report #1.



Involved Side

➤ Select Involved Side

- After you select the uninvolved side from the test scroll box, use the up or down arrows on the keyboard to highlight and select the involved side.
- Select **Enter** to accept the highlighted test as report #2.
- **NOTE:** Choose **Select Patient** or **Select Date** to access a report from a different date or patient file. This is useful when comparing one patient to another or when creating a progress report.



Summary Screen

Summary Screen

- Information is displayed related to the tests you have selected to view including:
 - Test number
 - Patient name, test date

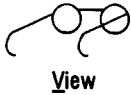
- Test mode, contraction type
- Test speeds, side and joint tested
- This screen also displays four options available to you:



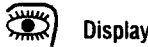
➤ **Select Esc to return to the choose type of overlay test screen.**



➤ **Select Re-do to change one or both of the test you selected.**



➤ **Select View to display test parameters for the reports selected.**



➤ **Select Display to display reports on the screen.**

Orientation To Screen

- Each test is color coded to its curve and numeric data.
- Left Graph = Concentric effort.
- Right Graph = Eccentric effort (unless types of contraction has been changed).
- Scale at left of baseline defines the size of the curve on the screen
- Range of motion and direction of movement are denoted on the angle scale below the baseline.
- Marker angles are numerically defined to the right of the angle scale.
- The darkened trace represents the average of the efforts recorded during the evaluation. The highest and the lowest efforts are also displayed.
- Consistency of efforts is exhibited numerically by the coefficient of variation value. $CV = (\text{standard deviation} / \text{mean}) * 100\%$
- Markers are automatically set at the start and stop angles for Test 1. If the range of motion was the same for Test 2, select markers to adjust.
- If average markers are displayed, then the number reflects the average of the curve between the markers.
- If value marker is displayed, then the number reflects patient effort at the marker.

Two suggestions for progress reports.

- When comparing one test date to another test date, choose the earlier date as Test 1, thus a positive % difference reflects progress while a negative % difference reflects regression.
- When comparing uninvolved to involved sides, choose the uninvolved side as Test 1, thus a negative % difference will reflect the deficit.

When displaying a report you have the following options:



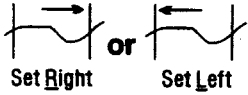
➤ **Select Scale.**

- To adjust the amplification of the force curve using the numeric keyboard. The number in the pink box denotes present scale.
- A higher scale value will reduce the size of the curve.
- A lower scale value will increase the size of the curve.



➤ **Selecting Markers will display the following:**

- Set Right
- Set Value
- Left and Right Arrows
- Esc



➤ **Select Set Right or Set Left**

- Selecting this prompt will specify which marker to move.

Left Marker Time

- The time from the beginning of the first contraction to where the left marker is currently located.

Right Marker Time

- The time from the beginning of the first contraction to where the right marker is currently located.



➤ **Select Set Value**

- Touching this prompt will display one marker which reflects force for that one angle only.
- The value marker may be moved to the left or right.

Value Markers

- Isokinetic data, the marker represents force values.
- Isotonic data, the marker represents velocity values.

Angle

- The angle value at the marker.



➤ **Select Set Average**

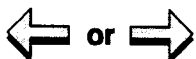
- Touching this prompt will display two markers which reflects the average effort for each angle between them.

Average Markers

- Isokinetic data, average force is displayed between the markers.
- Isotonic data, average velocity is displayed between the markers.

Average Angle

- The average angle value between the markers.



➤ **Select Left Arrow or Right Arrow**

- This allows you to move a marker to the left or right.
- Once you have moved the markers to the desired location select **Esc** to return to the previous screen.



➤ **Select Print to print the report displayed on the screen.**



➤ **Select Esc to return to the summary screen.**

Overlay Numeric Report

Allows you to display each torque or force curve superimposed (overlaid) within the range of motion tested. The curves may all be concentric, all eccentric, or a mixture of both. Each must be selected separately.

KIN-COM®

Reports
Overlay
Numeric Report
Patient Name

➤ **Select KIN-COM.**

➤ **Select Reports from the main menu.**

➤ **Select Overlay to identify the test format.**

➤ **Select Numeric Report to identify the type of report desired.**

➤ **Patient Name.**

- The patient scroll box lists all patient names that have previously collected and stored an evaluation of this type.
- To scroll through the list, touch the up or down arrows on the screen or keyboard. You may also use the "Alpha Sort" feature by typing in the first letter(s) of the desired name using the keyboard.
- To select a patient, highlight that patient's name and press **Enter**.



➤ **Date Tested.**

- If the patient has multiple test dates, use the up or down arrows on the keyboard to scroll to the desired date.
- Select the date you wish to view from the scroll box by choosing **Enter**.



Stats

➤ **Select Stats.**

- Patient information and all parameters for a particular test are displayed, including Start and stop angles.
- **NOTE:** You do not have to select this option to display a report. It is intended to provide a checklist to assist with test to test reproducibility.



**ASCII
Data**

➤ **ASCII Data.**

- As with stats you do not need to select this option to display a report. This option allows you to view or download ASCII data for a selected report.
- **Screen:** To display ASCII data on the screen.
- **File:** This option will write the test information to a file. This option is useful if you wish to import test information into a spreadsheet or another program for analysis.

Uninvolved Side

➤ **Select Uninvolved Side.**

- All test for the patient and date selected will be displayed in a test scroll box. Use the up or down arrows on the keyboard to highlight the desired test.
- Select **Enter** to accept the highlighted test as report #1.



➤ **Select which contraction you desire to view.**

- Concentric
- Eccentric

Summary Screen

Summary Screen

- This screen displays information related to the test you have selected including: test number, patient name, and evaluation date
- This screen also displays options available to you including:



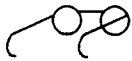
Esc

- ➔ **Select Esc to return to the choose type of overlay test screen.**



Re-do

- ➔ **Select Re-do if you chose the wrong file or date.**



View

- ➔ **Select View to display test parameters for the reports selected.**

1 + 1 = 2
Add

- ➔ **Select Add to add up to eight test to the display.**

- After you select the uninvolved side from the test scroll box, use the up or down arrows on the keyboard to highlight and select the involved side.
- Select **Enter** to accept the highlighted test as report #2.
- **NOTE:** Choose **Select Patient** or **Select Date** to access a report from a different date or patient file. This is useful when comparing one patient to another or when creating a progress report.



Enter

- ➔ **Select which contraction you desire to view.**

- Concentric
- Eccentric

1 Remove
-2 Test
1

- ➔ **Select Remove Test to remove a test from the display.**



Display

- ➔ **Select Display to display reports on the screen.**

Orientation To Screen

- Each test is color coded to its curve and numeric data.
- All curves are overlaid onto one angle-based graph.
- Scale at left of baseline defines the size of the curve on the screen
- Range of motion and direction of movement are denoted on the angle scale below the baseline.
- Curve number, contraction type, side, number of curves accepted, numeric values, and CV of force are displayed on right side of the screen.
- Note: The CV of force is only displayed if the Force trace was On when the data was collected and if at least three curves were accepted into the average during the evaluation.
- If average markers are displayed, then the number reflects the average force of the curve between the markers.
- If value marker is displayed, then the number reflects the force of the curve at the marker.
- Marker angles are numerically displayed, right of the angle scale.

- Each curve represents the average of the curves accepted during the evaluation.
- Markers are automatically set at the start and stop angles for Test 1. If the range of motion was the same for Test 2, select markers to adjust.
- If some curves displayed are too short, any angle between the end of the curve and the marker will result in a zero being averaged in for that curve. Markers may be adjusted.

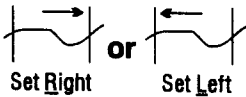
When displaying a report you have the following options:



Scale



Markers



Set Right

Set Left



Set Value



Set Average

➤ **Select**

- To adjust the amplification of the force curve using the numeric keyboard. The number in the pink box denotes present scale.
- A higher scale value will reduce the size of the curve.
- A lower scale value will increase the size of the curve.

➤ **Selecting Markers will display the following:**

- Set Right
- Set Value
- Left and Right Arrows
- Esc

➤ **Select Set Right or Set Left**

- Selecting this prompt will specify which marker to move.

Left Marker Time

- The time from the beginning of the first contraction to where the left marker is currently located.

Right Marker Time

- The time from the beginning of the first contraction to where the right marker is currently located.

➤ **Select Set Value**

- Touching this prompt will display one marker which reflects force for that one angle only.
- The value marker may be moved to the left or right.

Value Markers

- Isokinetic data, the marker represents force values.
- Isotonic data, the marker represents velocity values.

Angle

- The angle value at the marker.

➤ **Select Set Average**

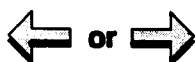
- Touching this prompt will display two markers which reflects the average effort for each angle between them.

Average Markers

- Isokinetic data, average force is displayed between the markers.
- Isotonic data, average velocity is displayed between the markers.

Average Angle

- The average angle value between the markers.



➤ Select Left Arrow or Right Arrow

- This allows you to move a marker to the left or right.
- Once you have moved the markers to the desired location select **Esc** to return to the previous screen.



Print

➤ Select **Print** to print the report displayed on the screen.



Esc

➤ Select **Esc** to return to the summary screen.

Progress Reports

➤ Progress Reports

- Select the desired patient from the patient scroll box.
- Select the earlier date as Test 1. Select the first test report you desire to display. Touch the select date prompt.
- Choose the second evaluation date you wish to compare to the earlier test. Select the second test report you desire to display.
- Choosing the earlier date as test 1, will present a positive % difference as progress while a negative % difference reflects regression.
- Select display, modify display as before.
- Select print.

Change Force To Torque

Change Force to Torque

- This option will change the "force units" from force to torque.
- In the standard report, if torque is the unit of force and average markers are displayed, then the numeric data exhibits the average work between the markers. If value marker is displayed, then the numeric data exhibits the torque value of the marker.
- If you desire the report to display torque (Nm. or Ft. Lbs.) values, or if you want to display work as joules the select **Change Force to Torque**.

Continuous Reports

Continuous 1 Test Report

Data collected by continuous method is exhibited in a time based format. Data is presented for assessment of the ability to produce force over time. Numeric and graphic specifics can be obtained.

KIN-COM®

➤ Select **KIN-COM**

Reports

➤ Select **Reports** from the main menu.

Continuous ➤ **Select Continuous to identify the test format.**

Patient Name ➤ **Patient Name.**

- The patient scroll box lists all patient names that have previously collected and stored an evaluation of this type.
- To scroll through the list, touch the up or down arrows on the screen or keyboard. You may also use the "Alpha Sort" feature by typing in the first letter(s) of the desired name using the keyboard.
- To select a patient, highlight that patient's name and press **Enter**.



Enter

Date Tested ➤ **Date Tested.**

- If the patient has multiple test dates, use the up or down arrows on the keyboard to scroll to the desired date.
- Select the date you wish to view from the scroll box by choosing **Enter**.



Enter



Stats

➤ **Select Stats.**

- Patient information and all parameters for a particular test are displayed, including start and stop angles.
- **NOTE:** You do not have to select this option to display a report. It is intended to provide a checklist to assist with test to test reproducibility.



ASCII
Data

➤ **Select ASCII Date.**

- As with stats you do not need to select this option to display a report. This option allows you to view or download ASCII data for a selected report.
- **Screen:** To display ASCII data on the screen.
- **File:** This option will write the test information to a file. This option is useful if you wish to import test information into a spreadsheet or another program for analysis.

➤ **Select an evaluation report to display.**

- All test for the patient and date selected will be displayed in a test scroll box. Use the up or down arrows on the keyboard to highlight the desired test.
- Select **Enter** to accept the highlighted test as report #1.



Enter

Summary Screen

Summary Screen

- This screen displays information related to the test you have selected including: test number, patient name, and evaluation date
- This screen also displays options available to you including:



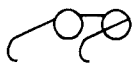
Esc

➤ **Select Esc to return to the choose type of overlay test screen.**



Re-do

➤ **Select Re-Do if you choose the wrong file or date.**



View

- ➔ Select **V**iew to display test parameters for the reports selected.



Display

- ➔ Select **D**isplay to view reports on the screen.

- Patient name along with side, joint and motion tested appear in the upper left corner of the screen.
- Percentage of time plotted and test speeds appear in the upper right corner of the screen.
- Force, angle and velocity traces are displayed.
- Screen prompts appear along the bottom of the screen listing the many display options available when viewing one report including: Esc., Print, Zoom, Traces, Numeric: On, Pwr / Wrk.



Esc

- ➔ Select **E**sc to return to the summary screen.



Print

- ➔ Select **P**rint to print the report as displayed on the screen.



Zoom

- ➔ Select **Z**oom to highlight a portion of the data displayed.

- Choose **E**sc to return to the previous screen.
- Use the **L**eft or **R**ight arrows to move markers or an area highlighted during the zoom option.
- Choose **I**nc. **W**idth to increase the zoom width.
- Choose **D**ec. **W**idth to decrease the zoom width.
- Choose **E**nter to display the highlighted area.
- Select **U**nzoom to reset to plot all of the data. This button only appears if you have previously “zoomed in” on the data.



Traces

- ➔ Select **T**rac~~e~~s to turn on / off data traces.

- Allows selection of which traces to plot on the graph including: **A**ngle, **F**orce, **V**elocity, **E**MG1 and **E**MG2.
- Choose **E**sc to return to the previous screen.
- Choose **E**nter to display the traces you have selected.



Numeric: OFF

- ➔ The numeric option is turned off when you see **N**umeric: OFF, select this prompt to turn **N**umeric: ON and display force and angle traces along with the following numeric data:



Numeric: ON

- Isokinetic: Peak Force / Torque
- Isotonic: Peak Velocity
- Time to peak
- Repetition number where the peak occurred.
- If the test is isokinetic it plots the force and angle traces.
- If the test is isotonic it plots the velocity and angle traces.
- Choose **E**sc to return to the previous screen.
- Choose **P**rint to print the report as displayed on the screen.

- Choose **Zoom** to highlight a portion of the data displayed.
- Choose **Numeric: ON** to return to the **Numeric: OFF** screen and remove the numeric data from the screen.
- Choose **Markers** to display the following options:
 - Choose **Esc** to return to the previous screen.
 - Choose **Print** to print the report as displayed on the screen.
 - Choose **Left** or **Right** arrows to move a marker to the left or right.
 - Choose **Set Right** to move the right marker line.
 - Choose **Set Value** to display a single marker representing effort at a single point in the evaluation range of motion.



Pwr/Wrk



Time Graph

➤ **Select Pwr / Wrk to display average power and total work graphs.**

- Choose **Esc** to return to the previous screen.
- Choose **Print** to print the report as displayed on the screen.
- Choose **Time Graph** to view an endurance time graph.

Endurance Time Graph – Isokinetic Test

- **Peak Torque:** the peak torque produced during the test.
- **Fatigue Index:** ratio of the beginning torque to the ending torque. Calculated by computing the "least-squares best fit" (LSBF) through each of the contraction's peak torque values. The formula is as follows:
 Begin_torque = torque value where the LSBF line intersects at time zero.
 End_torque = torque value where the LSBF line intersects at the end of the test. Fatigue index = (Begin_torque / end_torque) * 100
- **Mean Peak Force:** average of each contraction's peak force values.
- **CV Peak Force:** Coefficient of variation of the peak forces.
 $CV = [(STD \text{ of Pk Forces}) / (\text{mean of Pk Forces})] * 100$
- **Total Work:** [SUM(-angle * force)] * (lever length in meters)
- **Power:** (total work) / (number of seconds)

Endurance Time Graph – Isotonic Test

- **Peak Velocity:** The peak velocity reached during the test.
- **Mean Peak Velocity:** Average of each contraction's peak velocity values.
- **CV Peak Velocity:** Coefficient of variation of the peak velocities.
 $CV = [(STD \text{ of Pk Velocities}) / (\text{mean of Pk Velocities})] * 100$
- **Fatigue Index:** Ratio of the beginning velocity to the ending velocity. Calculated by computing the "least-squares best fit" (LSBF) through each of the contraction's peak velocity values. The formula is as follows:
 Begin_Velocity = torque value where the LSBF line intersects at time zero.
 End_Velocity = torque value where the LSBF line intersects at the end of the test.
- **Fatigue Index:** (Begin_Velocity / End_Velocity) * 100
- **Total Work:** [SUM(-angle * force)] * (lever length in meters)
- **Power:** (total work) / (number of seconds)

Continuous 2 Test Report

Data collected by continuous method is exhibited in a time based format. Data is presented for assessment of the ability to produce force over time. Numeric and graphic specifics can be obtained.

KIN-COM®

Reports

➤ Select KIN-COM

➤ Select Reports from the main menu.

➤ Select Continuous to identify the test format.

➤ Patient Name

- The patient scroll box lists all patient names that have previously collected and stored an evaluation of this type.
- To scroll through the list, touch the up or down arrows on the screen or keyboard. You may also use the "Alpha Sort" feature by typing in the first letter(s) of the desired name using the keyboard.
- To select a patient, highlight that patient's name and press **Enter**.



Enter

Date Tested

➤ Date Tested

- If the patient has multiple test dates, use the up or down arrows on the keyboard to scroll to the desired date.
- Select the date you wish to view from the scroll box by choosing **Enter**.



Enter



Stats

➤ Select Stats

- Patient information and all parameters for a particular test are displayed, including Start and stop angles.
- **NOTE:** You do not have to select this option to display a report. It is intended to provide a checklist to assist with test to test reproducibility.



ASCII
Data

➤ Select ASCII Date

- As with stats you do not need to select this option to display a report. This option allows you to view or download ASCII data for a selected report.
- **Screen:** To display ASCII data on the screen.
- **File:** This option will write the test information to a file. This option is useful if you wish to import test information into a spreadsheet or another program for analysis.

Select a report

➤ Select an evaluation report to display.

- All test for the patient and date selected will be displayed in a test scroll box. Use the up or down arrows on the keyboard to highlight the desired test.
- Select **Enter** to accept the highlighted test as report #1.



Enter

Summary Screen

Summary Screen

- This screen displays information related to the test you have selected including: test number, patient name, and evaluation date.
- This screen also displays the following options available to you:



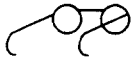
Esc

➤ Select **Esc** to return to the choose type of overlay test screen.



Re-do

➤ Select **Re-do** if you choose the wrong file or date.



View

➤ Select **View** to display test parameters for the reports selected.

1 + 1 = 2
Add

➤ Select **Add** to add a second test to the display.

- After you select the uninvolved side from the test scroll box, use the up or down arrows on the keyboard to highlight and select the involved side.



Enter

- Select **Enter** to accept the highlighted test as report #2.

- **NOTE:** Choose **Select Patient** or **Select Date** to access a report from a different date or patient file. This is useful when comparing one patient to another or when creating a progress report.

1
-2
1 Remove
Test

➤ Select **Remove Test** to remove a test from the display.



Display

➤ Select **Display** to view reports on the screen.

- Patient name along with side, joint and motion tested appear in the upper left corner of the screen.
- Percentage of time plotted and test speeds appear in the upper right corner of the screen.
- Force, angle and velocity traces are displayed.
- Screen prompts appear along the bottom of the screen listing the many display options available when viewing one report including: Esc., Print, Zoom, Traces, Numeric: On, Pwr/Wrk.

Endurance Time Graph – Isokinetic Test

- **Peak Torque:** the peak torque produced during the test.
- **Fatigue Index:** ratio of the beginning torque to the ending torque. Calculated by computing the “least-squares best fit” (LSBF) through each of the contraction’s peak torque values. The formula is as follows:

Begin_torque = torque value where the LSBF line intersects at time zero.

End_torque = torque value where the LSBF line intersects at the end of the test. Fatigue index = (Begin_torque / end_torque) * 100

- **Mean Peak Force:** average of each contraction’s peak force values.
- **CV Peak Force:** Coefficient of variation of the peak forces.
 $CV = [(STD \text{ of Pk Forces}) / (\text{mean of Pk Forces})] * 100$
- **Total Work:** [SUM(-angle * force)] * (lever length in meters)
- **Power:** (total work) / (number of seconds)

Endurance Time Graph – Isotonic Test

- **Peak Velocity:** The peak velocity reached during the test.
- **Mean Peak Velocity:** Average of each contraction’s peak velocity values.

- **CV Peak Velocity:** Coefficient of variation of the peak velocities.
 $CV = [(STD \text{ of Pk Velocities}) / (\text{mean of Pk Velocities})] * 100$
- **Fatigue Index:** Ratio of the beginning velocity to the ending velocity. Calculated by computing the "least-squares best fit" (LSBF) through each of the contraction's peak velocity values. The formula is as follows:
 Begin_Velocity = torque value where the LSBF line intersects at time zero.
 End_Velocity = torque value where the LSBF line intersects at the end of the test.
- **Fatigue Index:** $(\text{Begin_Velocity} / \text{End_Velocity}) * 100$
- **Total Work:** $[\text{SUM}(-\text{angle} * \text{force})] * (\text{lever length in meters})$
- **Power:** $(\text{total work}) / (\text{number of seconds})$



- **Select Esc to return to the summary screen.**



- **Select Print to print the report as displayed on the screen.**



- **Select Overlay to display all curves recorded during an evaluation.**

Orientation to screen

- Test #1 is displayed on the left and test #2 on the right.
- Concentric curves are displayed on top.
- Eccentric curves are displayed on the bottom (unless the contraction type was changed).
- Peak torque to body weight values are displayed with the corresponding concentric or eccentric curves.

Isometric Reports

Isometric 1 Test Report

Data collected at various angles is presented in either bar graph, curves, or time graph formats. Date to date comparisons provide objective documentation of progress or regression for patients who cannot tolerate isokinetic testing.

KIN-COM®

- **Select KIN-COM**

Reports

- **Select Reports from the main menu.**

Isometric

- **Select Isometric to identify the test format.**

Patient Name

- **Patient Name**

- The patient scroll box lists all patient names that have previously collected and stored an evaluation of this type.
- To scroll through the list, touch the up or down arrows on the screen or keyboard. You may also use the "Alpha Sort" feature by typing in the first letter(s) of the desired name using the keyboard.



Enter

Date Tested

- To select a patient, highlight that patient's name and press **Enter**.

➤ Date Tested

- If the patient has multiple test dates, use the up or down arrows on the keyboard to scroll to the desired date.
- Select the date you wish to view from the scroll box by choosing **Enter**.



Enter



Stats

➤ Select Stats

- Patient information and all parameters for a particular test are displayed, including Start and-stop angles.
- **NOTE:** You do not have to select this option to display a report. It is intended to provide a checklist to assist with test to test reproducibility.



ASCII Data

➤ Select ASCII Data

- As with stats you do not need to select this option to display a report. This option allows you to view or down load ASCII data for a selected report.
- **Screen:** To display ASCII data on the screen.
- **File:** This option will write the test information to a file. This option is useful if you wish to import test information into a spreadsheet or another program for analysis.

Select a report

➤ Select an evaluation report to display.

- All test for the patient and date selected will be displayed in a test scroll box. Use the up or down arrows on the keyboard to highlight the desired test.
- Select **Enter** to accept the highlighted test as report #1.



Enter

Summary Screen

Summary Screen

- This screen displays information related to the test you have selected including: test number, patient name, and evaluation date.
- This screen also displays the following options available to you:



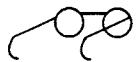
Esc

➤ Select Esc to return to the choose type of report screen.



Re-do

➤ Select Re-do if you choose the wrong file or date.



View

➤ Select View to display test parameters for the reports selected.



Display

➤ Select Display to view reports on the screen.

Bar Graph

- Choosing display defaults to bar graph format, select curves or time graph to view data in a different format.
- This screen displays each of the average forces measured for each contraction.

- The contractions are grouped together according to the angle value at which the contraction occurred, beginning with the start angle at the left hand side of the graph.
- If 3 contractions were collected at any given angle, then the coefficient variation of the 3 contraction values is printed.
- If the minimum isometric force was less than or equal to zero, then no CV value is displayed for that angle.



Esc

- **Select Esc to return to the summary screen.**



Print

- **Choose Print to print the report as displayed on the screen.**



Time Graph

- **Select Time Graph to view a time based display of the data. You may choose any of the following options:**

- Choose **Esc** to return to the previous screen.
- Choose **Print** to print the report as displayed on the screen.
- Choose **Traces** to turn on / off data traces.
 - Allows selection of which traces to plot on the graph including: **Angle, Force, Velocity, EMG1** and **EMG2**.
 - Choose **Esc** to return to the previous screen.
 - Choose **Enter** to display the traces you have selected.
- Choose **Bar Graph** to return to the default screen.
- Choose **Curves** to display each angle individually
- Select **Zoom** to highlight a portion of the data displayed.
 - Choose **Esc** to return to the previous screen.
 - Use the **Left** or **Right** arrows to move a highlighted area to the left or right.
 - Choose **Inc. Width** to increase the zoom width.
 - Choose **Dec. Width** to decrease the zoom width.
 - Choose **Enter** to display the highlighted area.



Traces



Curves

- **Select Curves**
 - This will display the time-based force curves for each of the isometric contractions from the evaluation.
 - Only those data points with a force value above the specified minimal isometric tension value are displayed.
 - Choose **Esc** to return to the previous screen
 - Choose **Print** to print the report as displayed on the screen.
 - Select **Time Graph** to view a time based display of the data.
 - Choose **Bar Graph** to return to the default screen.
 - Choose **Zoom**
 - A "box" is around one of the curves. You can move the "box" to the different curves by either touching the desired curve, or by using the arrows on the screen or keyboard.

- If the "box" is sitting around an unselected curve, then the prompt to select this curve will say **Select**. Choose this option if you desire to choose this curve.
- If the "box" is sitting around a previously selected curve, then the prompt to de-select this curve will say **Deselect**. Choose this option if you do not desire to choose this curve.
- Once the desired curve(s) are selected, choose **Display** to view only those curves which have been selected.
- You may select up to 3 different curves to display.

Zoom Display

- This is a display of all the isometric force curves for the previously selected curves. It also displays the peak force value for each curve and the time to reach this peak.
- If there are 3 curves at any isometric angle, then the coefficient of variation (CV) of these 2 numbers is also displayed.
- **NOTE:** If the minimum isometric force for this curve was less than or equal to zero, then no CV value is displayed.

Isometric 2 Test Report

Data collected at various angles is presented in either bar graph, curves, or time graph formats. Date to date comparisons provide objective documentation of progress or regression for patients who cannot tolerate isokinetic testing.

KIN-COM®

➤ **Select KIN-COM.**

Reports
Isometric
Patient Name

➤ **Select Reports from the main menu.**

➤ **Select Isometric to identify the test format.**

➤ **Patient Name.**

- The patient scroll box lists all patient names that have previously collected and stored an evaluation of this type.
- To scroll through the list, touch the up or down arrows on the screen or keyboard. You may also use the "Alpha Sort" feature by typing in the first letter(s) of the desired name using the keyboard.
- To select a patient, highlight that patient's name and press **Enter**.



Enter

Date Tested

➤ **Date Tested.**

- If the patient has multiple test dates, use the up or down arrows on the keyboard to scroll to the desired date.
- Select the date you wish to view from the scroll box by choosing **Enter**.



Enter



Stats

➤ **Select Stats.**

- Patient information and all parameters for a particular test are displayed, including start and stop angles.
- **NOTE:** You do not have to select this option to display a report. It is intended to provide a checklist to assist with test to test reproducibility.



ASCII
Data

➤ Select ASCII Data

- As with stats you do not need to select this option to display a report. This option allows you to view or down load ASCII data for a selected report.
- **Screen:** To display ASCII data on the screen.
- **File:** This option will write the test information to a file. This option is useful if you wish to import test information into a spreadsheet or another program for analysis.

Select a Report



Enter

➤ Select an evaluation report to display.

- All test for the patient and date selected will be displayed in a test scroll box. Use the up or down arrows on the keyboard to highlight the desired test.
- Select **Enter** to accept the highlighted test as report #1.

Summary Screen

Summary Screen

- This screen displays information related to the test you have selected including: test number, patient name, and evaluation date.
- This screen also displays the following options available to you:



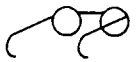
Esc

➤ Select Esc to return to the choose type of report screen.



Re-do

➤ Select Re-do if you choose the wrong file or date.



View

➤ Select View to display test parameters for the reports selected.

1 + 1 = 2
Add

➤ Select Add to add a second test to the display.

- After you select the uninvolved side from the test scroll box, use the up or down arrows on the keyboard to highlight and select the involved side.
- Select **Enter** to accept the highlighted test as report #2.
- **NOTE:** Choose **Select Patient** or **Select Date** to access a report from a different date or patient file. This is useful when comparing one patient to another or when creating a progress report.



Enter

➤ Select Remove Test to remove a test from the display.

$\frac{1}{-2}$ Remove
Test



Display

➤ Select Display to view reports on the screen.

Bar Graph

- Choosing display defaults to bar graph format, to view data in a different format select or .
- Average forces measured for each contraction are displayed.
- The contractions are displayed with the angle value at which the contraction occurred, beginning with the start angle at the left hand side of the graph.
- The first evaluation's average force values for each isometric angle is compared to these of the second evaluation's.

- Each bar graph is the average of the average force reading during each contraction at the given isometric angle.
- The percent difference (% diff.) is calculated between the average values from Test 1 and Test 2: % diff. = $[(\text{Test 2} / \text{Test 1}) - 1] * 100\%$
- If 3 contractions were collected at any given angle, then the coefficient variation of the 3 contraction values is printed.
- If the minimum isometric force was less than or equal to zero, then no CV value is displayed for that angle.



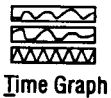
Esc

- **Select Esc to return to the summary screen.**



Print

- **Choose Print to print the report as displayed on the screen.**



Time Graph

- **Select Time Graph to view a time based display of the data. You may choose any of the following options:**

- Choose **Esc** to return to the previous screen.
- Choose **Print** to print the report as displayed on the screen.
- Choose **Traces** to turn on / off data traces.
 - Allows selection of which traces to view including: **Angle, Force, Velocity, EMG1 and EMG2.**
 - Choose **Esc** to return to the previous screen.
 - Choose **Enter** to display the traces you have selected.
- Choose **Bar Graph** to return to the default screen.
- Choose **Curves** to display each angle individually
- Select **Zoom** to highlight a specific area of the time graph.
 - Choose **Esc** to return to the previous screen.
 - Use the **Left** or **Right** arrows to move a highlighted area to the left or right.
 - Choose **Inc. Width** to increase the zoom width.
 - Choose **Dec. Width** to decrease the zoom width.
 - Choose **Enter** to display the highlighted area.



Traces

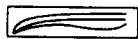


Curves

- **Select Curves**

- Displays the time-based force curves for each of the isometric angles from the evaluation.
- Only those data points with a force value above the specified minimal isometric tension value are displayed.
- Choose **Esc** to return to the previous screen
- Choose **Print** to print the report as displayed on the screen.
- Select **Time Graph** to view a time based display of the data.
- Choose **Bar Graph** to return to the default screen.
- Choose **Zoom**
 - A "box" is around one of the curves. You can move the "box" to the different curves by either touching the desired curve, or by using the arrows on the screen or keyboard.

- If the "box" is sitting around an unselected curve, then the prompt to select this curve will say **Select** choose this option if you desire to choose this curve.
- If the "box" is sitting around a previously selected curve, then the prompt to de-select this curve will say **Deselect** choose this option if you do not desire to choose this curve.
- Once the desired curve(s) are selected, choose **Display** to view only those curves which have been selected.
- You may select up to 2 different curves to display.
- Zoom Display
 - This is a display of all the isometric force curves for the previously selected curves. It also displays the peak force value for each curve and the time to reach this peak.
 - If there are 3 curves at any isometric angle, then the coefficient of variation (CV) of these 2 numbers is also displayed.
 - **NOTE:** If the minimum isometric force for this curve was less than or equal to zero, then no CV value is displayed.
 - If 2 curves were selected, then the **Overlay: ON** prompt will appear. Choose this option to "overlay" the 2 sets of curves on top of each other.
 - Choose **Overlay: OFF** to redisplay the 2 sets of curves separately.



Overlay: ON



Overlay: OFF

Muscle Performance

Data collected by both force production and endurance capacity. For test description see associated help screens under muscle performance.

KIN-COM®

➤ **Select KIN-COM**

Reports

➤ **Select Reports from the main menu.**

Muscle Performance

➤ **Select Muscle Performance to identify the test format.**

Patient Name

➤ **Patient Name**

- The patient scroll box lists all patient names that have previously collected and stored an evaluation of this type.
- To scroll through the list, touch the up or down arrows on the screen or keyboard. You may also use the "Alpha Sort" feature by typing in the first letter(s) of the desired name using the keyboard.
- To select a patient, highlight that patient's name and press **Enter**.



Enter

Date Tested

➤ **Date Tested**

- If the patient has multiple test dates, use the up or down arrows on the keyboard to scroll to the desired date.



Enter

- Select the date you wish to view from the scroll box by choosing **Enter**.



Stats

➤ **Select Stats.**

- Patient information and all parameters for a particular test are displayed, including start and stop angles.
- **NOTE:** You do not have to select this option to display a report. It is intended to provide a checklist to assist with test to test reproducibility.



ASCII Data

➤ **Select ASCII Data.**

- As with stats you do not need to select this option to display a report. This option allows you to view or down load ASCII data for a selected report.
- **Screen:** To display ASCII data on the screen.
- **File:** This option will write the test information to a file. This option is useful if you wish to import test information into a spreadsheet or another program for analysis.

Select a report

➤ **Select an evaluation report to display.**

- All test for the patient and date selected will be displayed in a test scroll box. Use the up or down arrows on the keyboard to highlight the desired test.
- Select **Enter** to accept the highlighted test as report #1.



Enter

Summary Screen

Summary Screen

- This screen displays information related to the test you have selected including: test number, patient name, and evaluation date.
- This screen also displays the following options available to you:



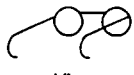
Esc

➤ **Select Esc to return to the choose type of report screen.**



Re-do

➤ **Select Re-do if you choose the wrong file or date.**



View

➤ **Select View to display test parameters for the reports selected.**

1 + 1 = 2
Add

➤ **Select Add to add a second test to the display.**

- After you select the uninvolved side from the test scroll box, use the up or down arrows on the keyboard to highlight and select the involved side.
- Select **Enter** to accept the highlighted test as report #2.
- **NOTE:** Choose **Select Patient** or **Select Date** to access a report from a different date or patient file. This is useful when comparing one patient to another or when creating a progress report.



Enter

➤ **Select Remove Test to remove a test from the display.**

1
-2
1 Remove Test



Display

➤ **Select Display to view reports on the screen.**

Average Power And Total Work Graphs - 1 Test

- This is a bar graph of the average power and a bar graph of the total work.
- It also indicates the number of repetitions that were used to calculate these parameters.

Endurance Time Graph - Isokinetic Test Peak Torque

- The peak torque produced during the test.

Fatigue Index

- Ratio of the Beginning Torque to the Ending Torque.
- Calculated by computing the "least-squares best fit" (LSBF) through each of the contraction's peak torque values. The formula is as follows:
 - Begin Torque = torque value where the LSBF line intersects at time zero.
 - End_Torque = torque value where the LSBF line intersects at the end of the test.
 - Fatigue Index = (Begin_Torque / End_Torque) * 100

Mean Peak Force

- Average of each contraction's peak force values.

CV Peak Force

- Coefficient of variation of the peak forces.
- $CV = [(STD \text{ of Pk Forces}) / (\text{mean of Pk Forces})] * 100$

Total Work

- $[SUM(-angle * force)] * (\text{lever length in meters})$

Power

- (total work) / (number of seconds)

Average Power And Total Work Graphs - 2 Tests

- These are the bar graphs of the average power and the total work along with the number of repetitions that were used in these calculations.
- The percent difference is also displayed between the 2 tests:
 - $\% \text{ Diff.} = [(Test 2 / Test 1) - 1] * 100\%$

ROM – Range of Motion

Data collected during ROM protocols can be displayed in a format that exhibits the angle reached for each repetition.

KIN-COM®

➤ **Select KIN-COM**

Reports

➤ **Select Reports from the main menu.**

RQM

➤ **Select RQM to identify the test format.**

Patient Name

➤ **Patient Name**

- The patient scroll box lists all patient names that have previously collected and stored an evaluation of this type.



Enter

Date Tested

➤ Date Tested

- To scroll through the list, touch the up or down arrows on the screen or keyboard. You may also use the "Alpha Sort" feature by typing in the first letter(s) of the desired name using the keyboard.
- To select a patient, highlight that patient's name and press **Enter**.



Enter



Stats

➤ Select Stats

- Patient information and all parameters for a particular test are displayed, including Start and stop angles.
- Note: You do not have to select this option to display a report. It is intended to provide a checklist to assist with test to test reproducibility.



ASCII
Data

➤ Select ASCII Data

- As with stats you do not need to select this option to display a report. This option allows you to view or down load ASCII data for a selected report.
- **Screen:** To display ASCII data on the screen.
- **File:** This option will write the test information to a file. This option is useful if you wish to import test information into a spreadsheet or another program for analysis.

Select a report

➤ Select an evaluation report to display.

- All test for the patient and date selected will be displayed in a test scroll box. Use the up or down arrows on the keyboard to highlight the desired test.
- Select **Enter** to accept the highlighted test as report #1.



Enter

Summary Screen

Summary Screen

- This screen displays information related to the test you have selected including: test number, patient name, and evaluation date.
- This screen also displays the following options available to you:



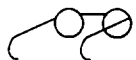
Esc

➤ Select Esc to return to the choose type of report screen.



Re-do

➤ Select Re-do if you choose the wrong file or date.



View

➤ Select View to display test parameters for the reports selected.

1 + 1 = 2
Add

➤ Select Add to add a second test to the display.

- After you select the uninvolved side from the test scroll box, use the up or down arrows on the keyboard to highlight and select the involved side.



Enter

- Select **Enter** to accept the highlighted test as report #2.
- **NOTE:** Choose **Select Patient** or **Select Date** to access a report from a different date or patient file. This is useful when comparing one patient to another or when creating a progress report.



Remove Test

- ➔ Select **Remove Test** to remove a test from the display.



Display

- ➔ Select **Display** to view reports on the screen.

Orientation To Screen

- ROM results for one or two sessions are overlaid for comparison.
- Patient information and test description are recorded above the graph.
- The return force for each repetition is exhibited if there are less than 11 total repetitions for both tests.
- The curve represents the progress of the session.
- The green line represents the expanded ROM setting for Test #1.
- The blue line represents the expanded ROM setting for Test #2.



Bar Graph

- ➔ Select **Bar Graph** to display the data in a bar graph format.



Line Graph

- ➔ Select **Line Graph** to return to the linear display.



Print

- ➔ Select **Print** to print the report as displayed on the screen.

Print Manager

This screen displays a scroll box of all the previously saved reports. Select all of the reports you wish to print and the number of copies to print.



Print Reports

- Select this button to print all of the selected reports to the printer.



Number Copies

- Select this button to change the number of copies of each report to print.



Delete

- Select this button to delete a report from the scroll box.



Untag

- Select this button to unmark the currently highlighted report. Any report that is unmarked will not be printed when you select the **Print Reports** prompt.

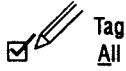


Tag

- Select this button to mark the currently highlighted report. Any report that is Marked will be printed when you select the **Print Reports** button.



- Select this button to unmark all of the reports in the scroll box. Any report that is Unmarked will not be printed when you select the **Print Reports** button.
NOTE: This prompt and the mark all prompt are only displayed if there are at least 10 reports in the scroll box.



- Select this button to mark all of the reports in the scroll box. Any report that is marked will be printed when you select the **Print Reports** button. Note that this button and the unmark all prompt are only displayed if there are at least 10 reports in the scroll box.



- Select this prompt to exit print manager and return to the main reports screen.

Interpretation of Reports

The following is an article review for the purpose of offering some helpful suggestions to you the clinician as you interpret the reports obtained from evaluating your patients on the KIN-COM. If you are interested in additional information I would recommend obtaining a copy of the complete article.

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Current Concepts Review

Title: Muscle Performance Evaluation in Orthopedic Practice

Author: Alexander A. Sapega, M.D., Philadelphia, Pennsylvania

Reviewed by: Keith M. Nikitin, M. Ed., ATC, CSCS

- The particular testing mode by which performance is measured in a given situation provides us with a secondary view of the type of test performed. If you perform an isometric test, then you are assessing the ability of a muscle or group of muscles to function within the specific parameters of that test.
- Questions concerning a patients ability make one specific type of test more appropriate than another. You need to consider when you would use an isometric test over an isokinetic test?
- Muscular work is described as "Force x Distance" (i.e. externally applied force multiplied by the distance through which it is applied. If force changes throughout the range of motion of a joint , then work is described as "Average force x Distance."
- In order for test results to be reliable specific items must be considered including:
 - Attention to detail
 - Standardization of techniques
 - Trunk position and stabilization

- Limb position and stabilization
 - The origin must be sufficiently stabilized to allow the muscle to contract maximally against the insertion.
- Position of the joint proximal to the joint being tested
 - Are you testing a one or a two joint muscle, this may influence the position of the proximal joint during the evaluation.
 - Example: Soleus test, the knee should be in flexion.
- When testing the upper body steps should be taken to limit the effects of the hand grip. The point of application should be just proximal to the wrist or elbow joint.
- Inadequate stabilization may lead to:
 - The forces that a given muscle or group may apply to move the distal segment may be limited, and therefore the true performance is underestimated.
 - Proximal muscles may be able to substitute and compensate by acting synergistically with weaker distal muscles, therefore the results are overestimated.
- Data on quantitative testing of muscular performance may be affected by:
 - Variations in velocity of test movements
 - Gravitational forces
 - Instruction and coaching
 - Familiarization with the test
 - Time of day
 - Subject induced or ambient noise
- Indications and contraindications of testing
 - Isometric testing may be contraindicated in situations where significant joint or soft tissue forces are undesirable.
- Testing speeds
 - Testing velocities between 30 and 60° / sec have been found to be equally or more effective in revealing deficits in muscular function than speeds of 120 to 300° / sec. A speed of 60° / sec is recommended.
 - A rule of thumb may be to use, "one degree of motion per degree of motion tested."
 - Higher speeds may be indicated for:
 - Research purposes
 - When limiting maximal muscle force is desired.
 - Testing patients who are sensitive to patellofemoral compression.
- When interpreting results careful consideration should be given to:
 - Clinical judgments based on small (15%) changes in performance
 - Clinical judgments based solely upon muscle testing involving the primary movers. Muscle groups distant from the site of injury may contribute to the dysfunction.

- Muscular strength in one point in the range of motion does not accurately reflect the ability of the muscle to perform throughout other portions of the range of motion.
- A real difference does not necessarily mean an abnormal difference.
- Symmetry is the norm for assessment of muscular performance in the muscles of the lower extremities, this is not always true in the upper body.
- Be sure to consider the strength present in all of the supporting muscle groups.
- When presumably normal individuals are evaluated, here are some general guidelines to consider related to interpretation of results:
 - Related to imbalances found in force production.
 - Differences of less than 10% can be considered normal.
 - Differences of 10 - 20% are possibly abnormal.
 - Differences of greater than 20% are probably abnormal.
 - When one extremity is clearly expected to be weaker:
 - Differences of 10 - 20% can be considered probably abnormal.
 - Differences of more than 20 % are almost certainly abnormal.
 - Return to activity criteria:
 - The commonly used 80 - 90% of the measured capacity of the uninvolved extremity is useful as a minimum standard.
 - There is no harm in striving for side to side symmetry
 - Agonist to antagonist ratios:
 - Here you are assessing the balance of opposing muscle groups
 - A knee flexor-extensor output ratio of more than 15% of the involved compared to the uninvolved has been shown to effect functional outcome.
 - Side to side balance is the most important factor to consider here.
 - Normative data
 - It is difficult to collect normative data because of variables found in population, testing mode, technique, stabilization, as well as familiarization, age, sex, lean body mass, activity level etc.
 - Side to side symmetry appears to be the best goal of rehabilitation as long as the individual is not bilaterally involved.
 - Shape of the force curve
 - You may notice a consistent drop in force production at a particular point in the range of motion, however this should not be considered a diagnostic tool.
 - Comparing maximal efforts
 - These can only be considered valid if the subject provides a full maximum voluntary effort.
 - The start forward, backward and minimal force settings will help to improve consistent effort, however the level of effort is still specific to your patient.

- Safety Considerations
 - Evaluate the ability of your patient to exert effort (submaximal or maximal) in order to perform a particular test. Be sure to consider the following:
 - Age
 - Past activity level
 - Type of injury
 - Post operative
 - Osteoarthritis
 - Make your patients aware of all safety procedures
 - Be sure to set your mechanical blocks
 - Be sure to give the patient the interrupt switch

“When testing of extremities is ordered, it is often more productive to evaluate the essential elements of performance in a large number of muscle groups than to assess every possible parameter in one or two selected muscle groups.”

— Alexander Sapega, MD

Report Writer

Data collected during an evaluation is transferred into a report in letter form, using a S.O.A.P. format. Goal and treatment plans are selected from a scroll box or created to complete the necessary information.

Range of Motion

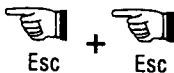
Setting Up

KIN-COM®

- ➔ Select **KIN-COM** to access the main menu.

Patient Positions

- ➔ Select **Patient Positions** to setup a preset, patient or custom position.



- ➔ Select **Esc** 2 times to return to the main menu.



- ➔ Select **F10 Accept** to save positioning information.

- Choose New Patient to create a new patient file or use the up and down arrows to highlight an existing patient then select enter.

RQM

- ➔ Select **RQM** to access the range of motion mode.

ROM Protocol

- ➔ Select the **Range of Motion protocol** you want to use.

- ROM protocols operate uniquely through a mode that responds to the resistive forces from passive tissue stretch, as measured by the load cell during movement.
- Each ROM protocol listed in this scroll box utilizes the return force to determine the return angle, similar to the clinician who utilizes capsular end feel for objective feedback.
- **NOTE:** ROM protocols listed in this scroll box can and should be modified as appropriate for each individual patient.



- ➔ Select **Enter** to accept the selected ROM protocol.



- ➔ Select **Turn ON Gravity Compensation (optional)**.

- The position of the patient and selected range of motion may result in the weight of the limb causing the return force to be exceeded earlier than

desired. You may want to compensate for gravity to diminish the influence of limb weight.

- Selecting this prompt will automatically anatomically reference the joint angle.

Anatomical Reference

➔ Set Anatomical Reference.

- If you decide not to compensate for gravity you will need to follow the steps to anatomically reference a joint angle.
- Select **Re-do** if the anatomical reference is not correct.

Stop / Start Angles

➔ Set Stop / Start angles to identify the desired range of motion.

ROM Return Force

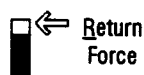
➔ Set ROM Return Force.

- Set the amount of force at which the lever will reverse direction
- Once start and stop angles have been set, a push on the load cell cues the lever arm to move back to the stop angle.
- Here, the force exhibited should reflect the force from passive resistance of tight tissue.
- Enter records this force to be used as the default return force.
- Maximum force will automatically be set to:
 - 3 times return force if the return force is less than 10 lbs. or
 - 2 times return force if the return force is greater than 10 lbs.
- If at any point during the exercise the maximum force is exceeded, then the lever arm will release and the program will end.



➔ Select **Max Force** to change the maximum force limit.

- Maximum force is the force limit for this program. If the load cell perceives equal or greater forces that the maximum force, lever arm will release and the program will end.
- **REMEMBER:** Forces you choose in the ROM protocols are forces from resistance to passive tissue stretch, not forces from active muscle contraction.
- **NOTE:** Always remember to give the patient the interrupt switch this way a patient can voluntarily exit the program if necessary.



➔ Select **Return Force** to change the return force limit.

- **REMEMBER:** Forces you choose in the ROM protocols are forces from resistance to passive stretch, not forces from active muscle contractions.
- When a more aggressive stretch is indicated, the return force may be increased.
- For an especially gentle stretch, return force may be lowered.
- Any change in return force automatically changes the maximum force, so note that change or adjust as appropriate.
- If you have not compensated for gravity, the position of the patient and range of motion may result in the weight of the limb causing the return force to be exceeded earlier than desired. To adjust: either compensate for gravity, decrease ROM or increase the return force.
- Return force must be between 1 lb. and maximum force.



➔ **Select Enter to accept the parameters as entered.**

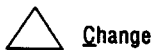
Expanded ROM

➔ **Set Expanded ROM.**

- This will allow motion past the set stop angle as long as the maximum force limit has not been reached.
- Start angle and stop angle are set for a range of motion within the patient's comfort level. This builds patient's confidence and ability to relax during the movement.
- After several repetitions, as patient begins to relax and trust the movement, less "guarding" may occur.
- As soft tissue begins to stretch, resistance to the movement may decrease, thus the return force is not exceeded until a point further into the range.
- The expanded stop angle automatically allows 10 degrees beyond the set stop angle. This number can be decreased to zero or increased to a maximum of 20 degrees beyond the set stop angle, or 100% of the set ROM, whichever is smaller.



➔ **Select Enter to advance to the ROM training screen.**



➔ **Select Change.**

- You have the option to modify one or all of the following:
 - **Speed limits (speed forward, speed backward)**
Should be slow and depends on the range of motion selected.
 - **Force Settings (return force, maximum force)**
For the movement to be passive, start forward, start backward, and minimum forces should all be zero.
 - **Sets, ROM & Turns**
The ROM cannot be expanded more than 20 degrees from the stop angle or more than 100% of the set range of motion (whichever is smaller). Turning points should be set to low.
 - **Feedback Type (anglebar or continuous)**
NOTE: If you select continuous feedback you will have the option to make other modifications to the screen display by selecting the screen display prompt.
- Other change options include EMG, index locations or save as a custom protocol.

Orientation to Screen

● Angle Bar Feedback

- The large graph will plot maximum range per repetition.
- On the far left, note that the Y axis denotes range in degrees of movement.
- As the lever arm moves through the range of motion, toward the stop angle, a force exerted against the load cell exceeding the set return force, will cause the lever arm to reverse movement back toward the start angle.

- The angles at which this occurs are plotted along the graph and are exhibited numerically along the X axis.
- Repetitions are counted and labeled across the bottom of the graph.
- On the far right of the screen, the vertical graph exhibits current amount and direction of force during the exercise.

● **Continuous Feedback**

- The upper right corner denotes the test speed.
- The upper middle records the time remaining.
- The force is exhibited continuously by the trace, and numerically to the right of the baseline.
- The time scale is exhibited (in seconds), across the bottom of the screen.
- As the lever arm moves through the range of motion, toward the stop angle, a force exerted against the load cell exceeding the set return force, will cause the lever arm to reverse movement back toward the start angle.
- Touch the start exercise button to start the exercise.
- If you want to make changes to the protocol, touch the change setup button.



➔ **Select Start Exercise to begin ROM training.**



➔ **Select Stop Exercise to end ROM training.**



➔ **Select Esc Finish Exercise to return to protocol selection box.**



➔ **Select Esc to return to the main menu.**

● **ROM Force Review**

- Review the forces you have accepted.
- If the load cell ever perceives resistance equal to or above the maximum force, as the lever arm moves in either direction, then the lever arm will immediately release and the program will end.



➔ **Select Max Force to change this value.**

- As the lever arm moves forward from the start angle toward the stop angle, whenever the load cell perceives resistance equal to or above the return force, then the lever arm will reverse direction, return to the start angle, and begin another repetition.



➔ **Select Return Force to change this value.**

● **Review ROM Setup options**

- The purpose of the ROM mode is to increase a patient's range of motion. At this point, the clinician has made the following choices for setting up a patient's program.

- Start and stop angles are set for a range of motion within the patient's comfort level.
- Set max. force: When the patient exceeds this force, the lever arm releases, and the program ends.
- Set return force: When the patient exceeds this force, the lever arm reverses direction and returns to the start angle to begin another repetition.
- Change range of motion brought up a screen which allowed expansion of the stop angle.

Remember to set your mechanical blocks.

Remember to give the patient the interrupt switch.

Patient Positioning and Attachments

Basic Patient Positioning Setups

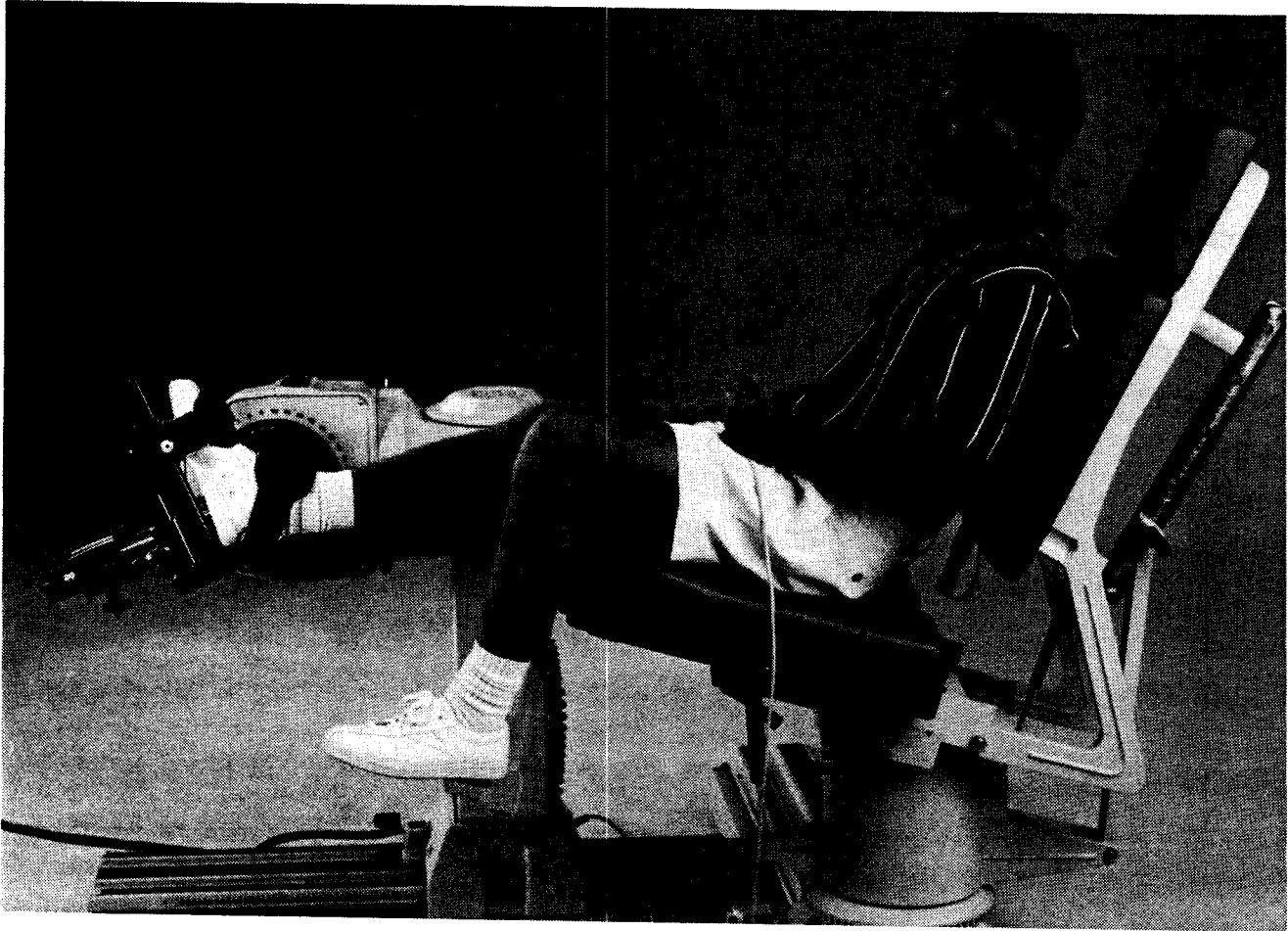
Introduction

- The purpose of this section is to get you acquainted with the KIN-COM attachments and provide an overview as to how they are utilized in the various positioning setups.
- Each attachment has a variety of uses which are described with a pictorial example.
- **NOTE:** The positions are examples of one protocol only. Alternate positioning will depend upon the patients status in their clinical progression. The examples given are the more commonly utilized positions. Your patient needs will dictate whether a patient is positioned seated, supine, semi-supine, prone, standing, etc.

Basic Philosophy of Positioning:

- Alignment of the patient's axis of rotation must correspond to the KIN-COM axis.
- Pad placement is determined according to:
 - Appropriate biomechanical positioning for resistance, with consideration to the joint and varying muscle lengths.
 - Comfort.
 - Function of the extremity.
 - Whether the purpose is to test specifically or exercise more functionally.
- Lever Arm length is determined by attachment placement.

Positioning Setup for Ankle: Plantar Flexion / Dorsiflexion



Muscle Groups

- Plantar flexors:**
- Gastrocnemius-plantar flexes the foot; flexes the knee.
 - Soleus-plantar flexes the foot; steadies the leg on the foot.
 - Plantaris-assists with plantar flexion of the foot and flexion of the knee.
- Dorsiflexors:**
- Tibialis anterior-dorsiflexes and inverts the foot.
 - Peroneus tertius-dorsiflexes the foot and aids in eversion of the foot.

Positioning Setup for Ankle: Plantar Flexion / Dorsiflexion – (continued)

Right Ankle

Dynamometer Settings

Height : 0 cm
Forward/Backward : 5 cm
Tilt (A): 180°
Rotation (B): 180°
Mechanical Stop (C): 30
Mechanical Stop (D): 5
Lever Arm Length : 22 cm

Seat Settings

Left/ Right : 95 cm
Rotation (E): 0°
Seat Back Angle (F): 45°
Seat Bottom Depth (G): 3 cm
Seat Bottom Angle (H): 15°

Left Ankle

Dynamometer Settings

Height : 0 cm
Forward/Backward : 5 cm
Tilt (A): 0°
Rotation (B): 180°
Mechanical Stop (C): 33
Mechanical Stop (D): 8
Lever Arm Length : 22 cm

Seat Settings

Left/ Right : 3 cm
Rotation (E): 0°
Seat Back Angle (F): 45°
Seat Bottom Depth (G): 3 cm
Seat Bottom Angle (H): 15°

Positioning Setup for Ankle: Inversion / Eversion



Muscle Groups

-
- Invertors:**
- Tibialis posterior-inverts and plantar flexes the foot.
- Evertors:**
- Peroneus longus-everts and plantar flexes the foot.
 - Peroneus brevis-everts and plantar flexes the foot.

Positioning Setup for Ankle: Inversion / Eversion – (continued)

Right Ankle

Dynamometer Settings

Height : 0 cm
Forward/Backward : 60 cm
Tilt (A): 55°
Rotation (B): 70°
Mechanical Stop (C): 23
Mechanical Stop (D): 33
Lever Arm Length : 12 cm

Seat Settings

Left/ Right : 67 cm
Rotation (E): 340°
Seat Back Angle (F): 45°
Seat Bottom Depth (G): 18 cm
Seat Bottom Angle (H): 15°

Left Ankle

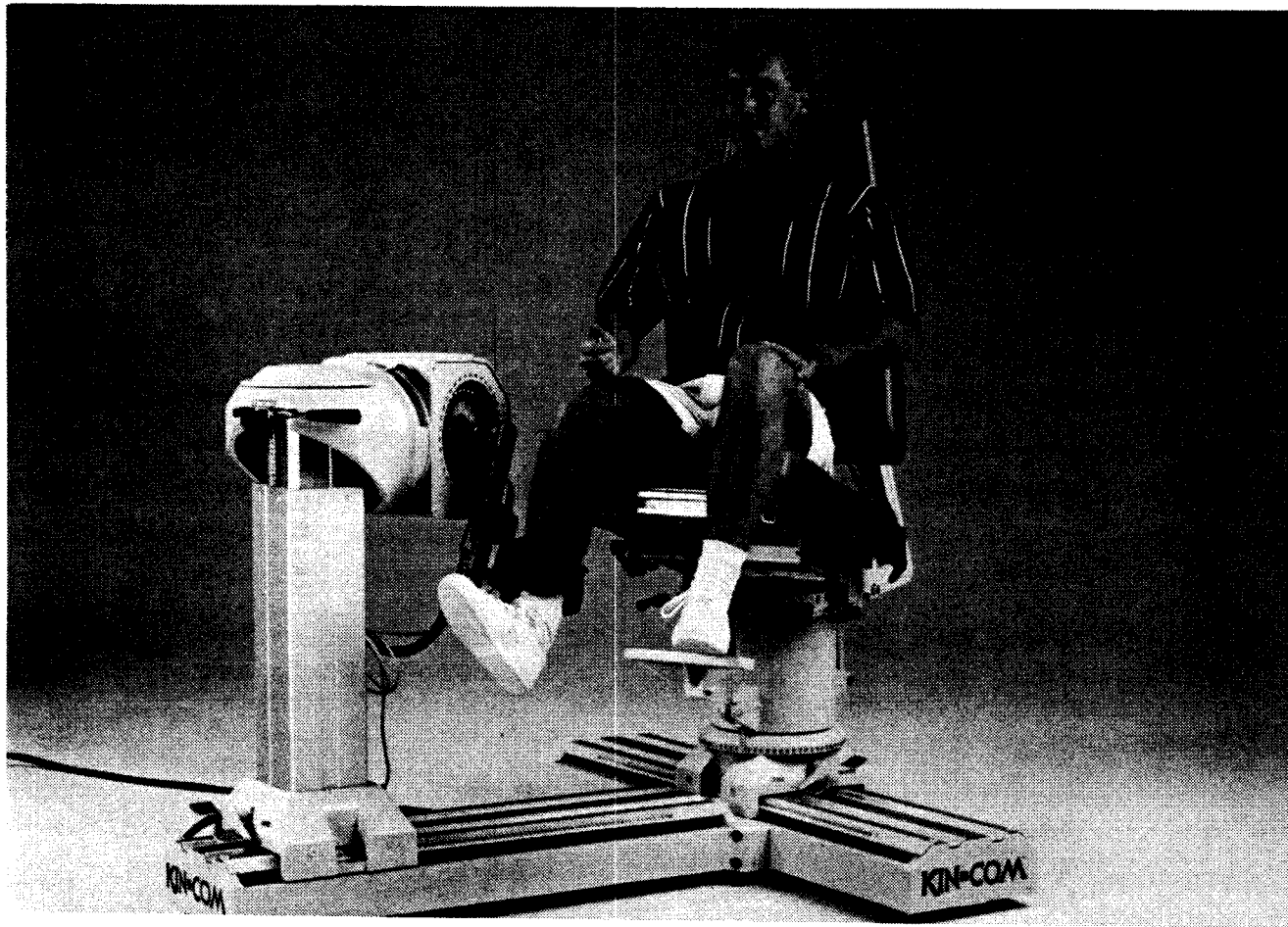
Dynamometer Settings

Height : 0 cm
Forward/Backward : 65 cm
Tilt (A): 125°
Rotation (B): 290°
Mechanical Stop (C): 5
Mechanical Stop (D): 15
Lever Arm Length : 12 cm

Seat Settings

Left/ Right : 29 cm
Rotation (E): 20°
Seat Back Angle (F): 45°
Seat Bottom Depth (G): 3 cm
Seat Bottom Angle (H): 15°

Positioning Setup for Knee: Extension / Flexion



Muscle Groups

- Extensors:**
- Quadriceps femoris: Rectus femoris-extends the leg and flexes the thigh.
 - Vastus lateralis-extends the leg.
 - Vastus intermedius-extends the leg.
 - Vastus medialis-extends the leg.
- Flexors:**
- Semimembranosus-flexes leg and extends the thigh.
 - Semitendinosus-flexes leg and extends the thigh.
 - Biceps femoris-flexes leg and extends the thigh.

Positioning Setup for Knee: Extension / Flexion – (continued)

Right Knee

Dynamometer Settings

Height	:	11 cm
Forward/Backward	:	69 cm
Tilt	(A):	0°
Rotation	(B):	30°
Mechanical Stop	(C):	8
Mechanical Stop	(D):	23
Lever Arm Length	:	28 cm

Seat Settings

Left/ Right	:	48 cm
Rotation	(E):	30°
Seat Back Angle	(F):	78°
Seat Bottom Depth	(G):	8 cm
Seat Bottom Angle	(H):	15°

Left Knee

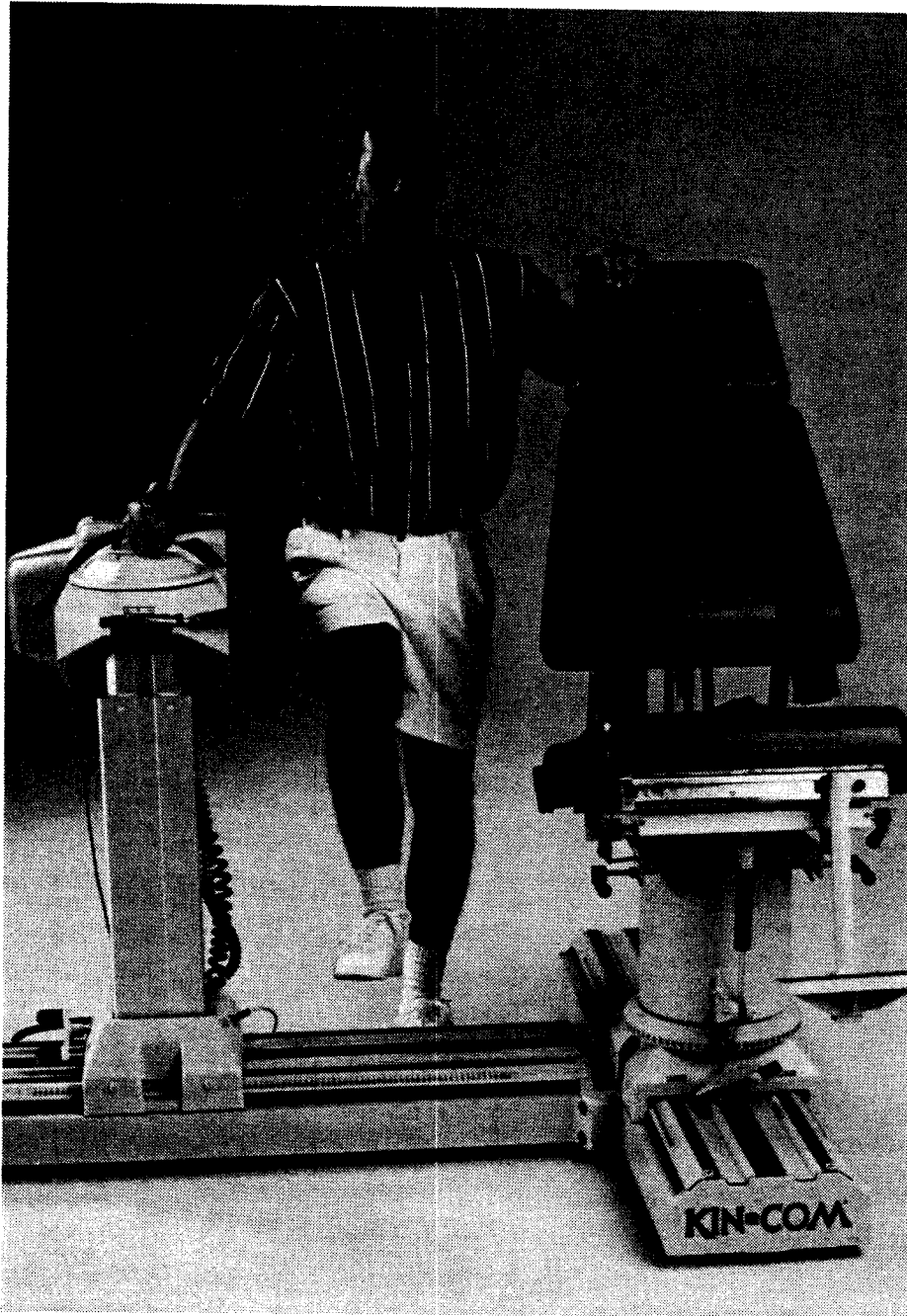
Dynamometer Settings

Height	:	11 cm
Forward/Backward	:	69 cm
Tilt	(A):	180°
Rotation	(B):	330°
Mechanical Stop	(C):	15
Mechanical Stop	(D):	30
Lever Arm Length	:	28 cm

Seat Settings

Left/ Right	:	48 cm
Rotation	(E):	330°
Seat Back Angle	(F):	78°
Seat Bottom Depth	(G):	18 cm
Seat Bottom Angle	(H):	15°

Positioning Setup for Hip: Flexion / Extension



Muscle Groups

Flexors

- Iliopsoas-flexes the thigh.
- Iliacus-flexes the thigh.
- Rectus femoris-secondary flexor of the thigh.

Extensors

- Gluteus maximus-extends the thigh.

Positioning Setup for Hip: Flexion / Extension – (continued)

Right Hip

Dynamometer Settings

Height	:	13 cm
Forward/Backward	:	66 cm
Tilt	(A):	0°
Rotation	(B):	90°
Mechanical Stop	(C):	5
Mechanical Stop	(D):	21
Lever Arm Length	:	34 cm

Seat Settings

Left/ Right	:	75 cm
Rotation	(E):	270°
Seat Back Angle	(F):	60°
Seat Bottom Depth	(G):	18 cm
Seat Bottom Angle	(H):	15°

Left Hip

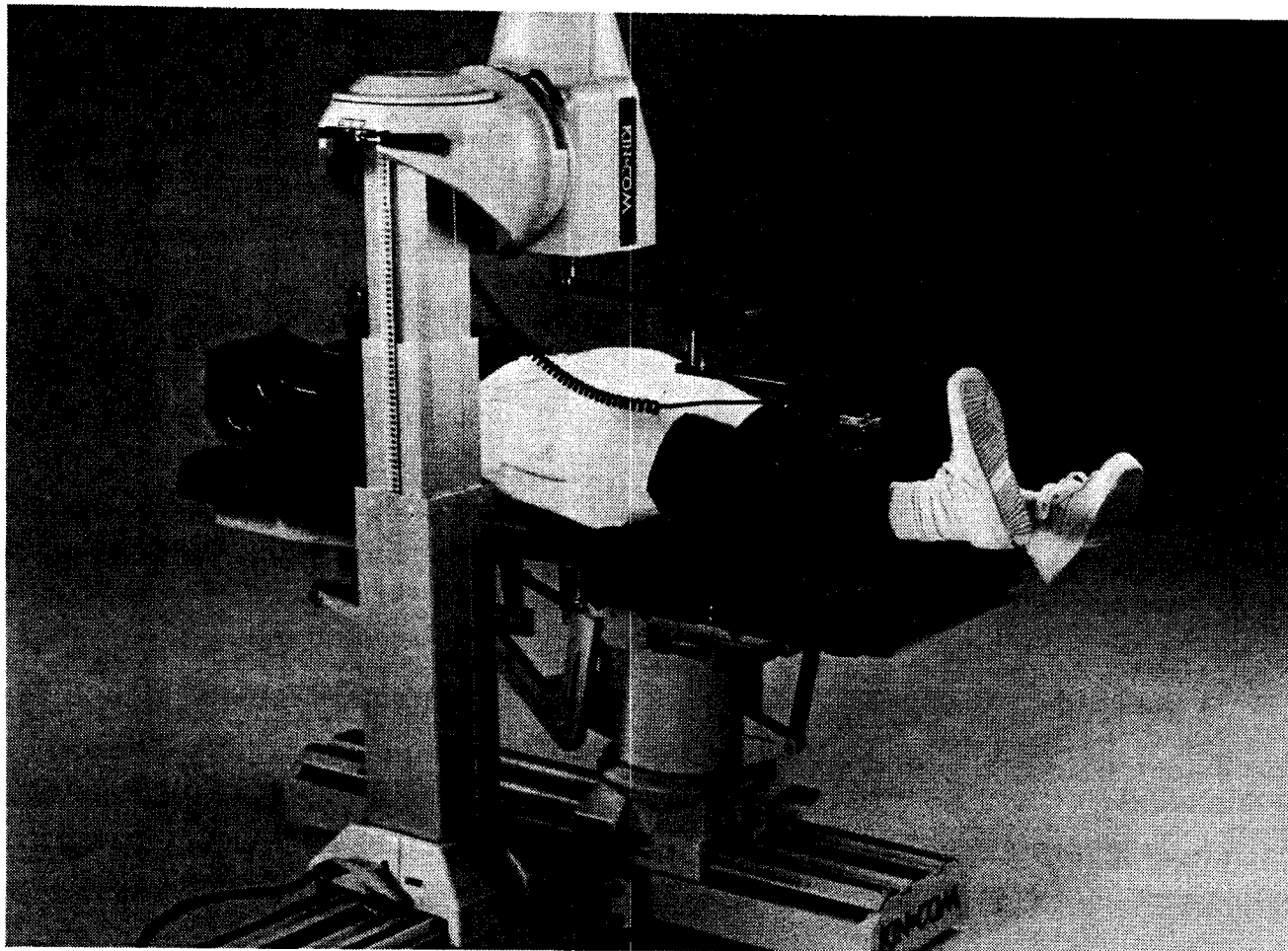
Dynamometer Settings

Height	:	13 cm
Forward/Backward	:	66 cm
Tilt	(A):	180°
Rotation	(B):	270°
Mechanical Stop	(C):	17
Mechanical Stop	(D):	35
Lever Arm Length	:	34 cm

Seat Settings

Left/ Right	:	21 cm
Rotation	(E):	90°
Seat Back Angle	(F):	60°
Seat Bottom Depth	(G):	18 cm
Seat Bottom Angle	(H):	15°

Positioning Setup for Hip: Abduction / Adduction



Muscle Groups

Abductors:

- Gluteus medius-abducts and medially rotates the thigh.
- Gluteus minimus-abducts and medially rotates the thigh.

Adductors:

- Pectineus-adducts and flexes the thigh.
- Gracilis-adducts and flexes the thigh.
- Adductor longus-adducts and flexes the thigh.
- Adductor brevis-adducts thigh; minimal flexor of thigh.
- Adductor magnus-adducts and extends the thigh.

Positioning Setup for Hip: Abduction / Adduction – (continued)

Right Hip

Dynamometer Settings

Height : 53 cm
Forward/Backward : 10 cm
Tilt (A): 270°
Rotation (B): 0°
Mechanical Stop (C): 22
Mechanical Stop (D): 30
Lever Arm Length : 54 cm

Seat Settings

Left/ Right : 66 cm
Rotation (E): 90°
Seat Back Angle (F): 0°
Seat Bottom Depth (G): 18 cm
Seat Bottom Angle (H): 0°

Left Hip

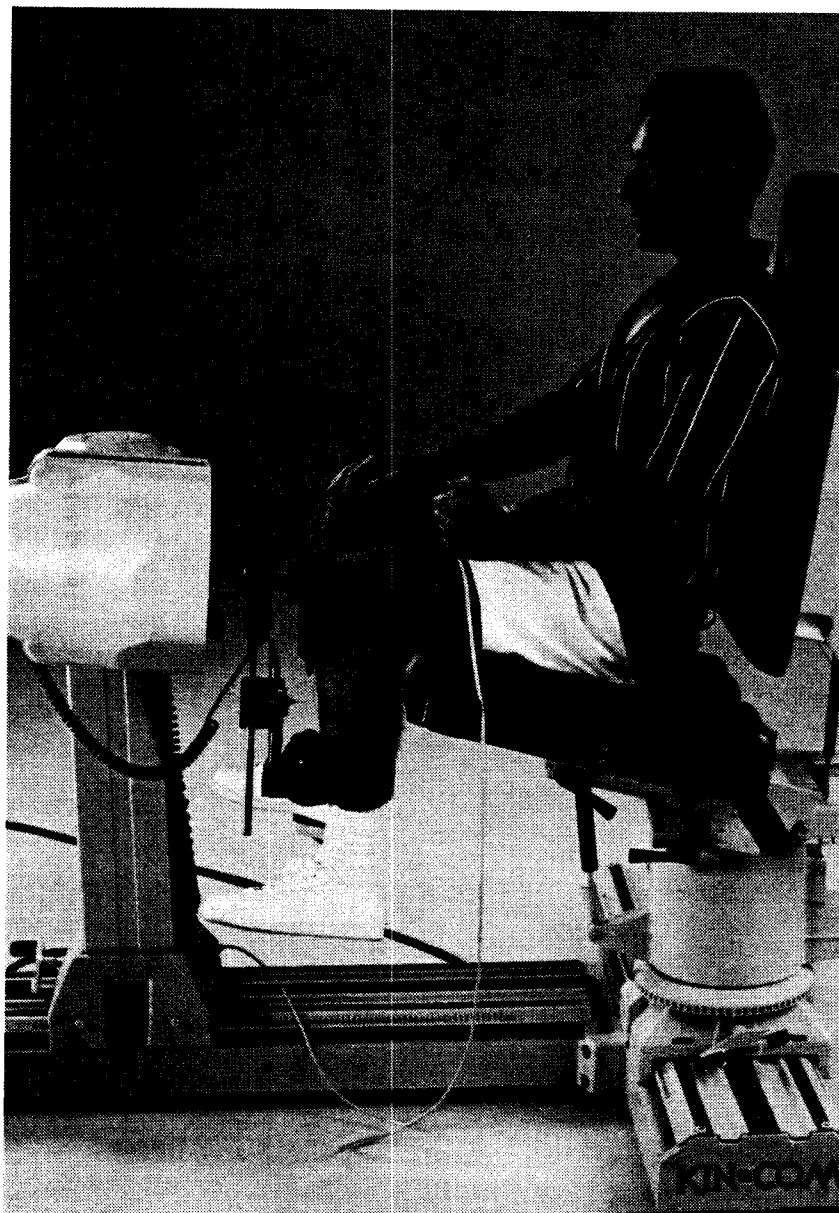
Dynamometer Settings

Height : 53 cm
Forward/Backward : 10 cm
Tilt (A): 270°
Rotation (B): 0°
Mechanical Stop (C): 8
Mechanical Stop (D): 16
Lever Arm Length : 54 cm

Seat Settings

Left/ Right : 30 cm
Rotation (E): 270°
Seat Back Angle (F): 0°
Seat Bottom Depth (G): 18 cm
Seat Bottom Angle (H): 0°

Positioning Setup for Hip: Internal / External Rotation



Muscle Groups

Abductors:

- Tensor fascia latae-medially rotates the thigh at the hip.
- Gluteus medius-medially rotates the thigh at the hip.
- Gluteus minimus-medially rotates the thigh at the hip.

Adductors:

- Obturator internus-laterally rotates the thigh at the hip.
- Obturator externus-laterally rotates the thigh at the hip.
- Gemelli-laterally rotates the thigh at the hip.
- Quadratus femoris-laterally rotates the thigh at the hip.
- Piriformis-assists with lateral rotation.
- Gluteus maximus-assists with lateral rotation.
- Sartorius-assists with lateral rotation.

Positioning Setup for Hip: Internal / External Rotation – (continued)

Right Hip

Dynamometer Settings

Height : 21 cm
Forward/Backward : 57 cm
Tilt (A): 355°
Rotation (B): 90°
Mechanical Stop (C): 6
Mechanical Stop (D): 14
Lever Arm Length : 32 cm

Seat Settings

Left/ Right : 27 cm
Rotation (E): 0°
Seat Back Angle (F): 78°
Seat Bottom Depth (G): 18 cm
Seat Bottom Angle (H): 15°

Left Hip

Dynamometer Settings

Height : 21 cm
Forward/Backward : 57 cm
Tilt (A): 185°
Rotation (B): 270°
Mechanical Stop (C): 25
Mechanical Stop (D): 32
Lever Arm Length : 32 cm

Seat Settings

Left/ Right : 69 cm
Rotation (E): 0°
Seat Back Angle (F): 78°
Seat Bottom Depth (G): 18 cm
Seat Bottom Angle (H): 15°

Positioning Setup for Shoulder: Extension / Flexion



Muscle Groups

Extensors:

- Latissimus dorsi-extends, adducts and medially rotates humerus.
- Posterior deltoid-extends and laterally rotates the humerus.
- Teres major-aids in extension from a flexed position.
- Posterior Deltoid-extends and laterally rotates the humerus.

Flexors:

- Coracobrachialis-flexes and adducts humerus.
- Anterior Deltoid-flexes and medially rotates the humerus.

Positioning Setup for Shoulder: Extension / Flexion – (continued)

Right Shoulder

Dynamometer Settings

Height	:	48 cm
Forward/Backward	:	32 cm
Tilt	(A):	5°
Rotation	(B):	85°
Mechanical Stop	(C):	12
Mechanical Stop	(D):	32
Lever Arm Length	:	25 cm

Seat Settings

Left/ Right	:	32 cm
Rotation	(E):	90°
Seat Back Angle	(F):	60°
Seat Bottom Depth	(G):	9 cm
Seat Bottom Angle	(H):	15°

Left Shoulder

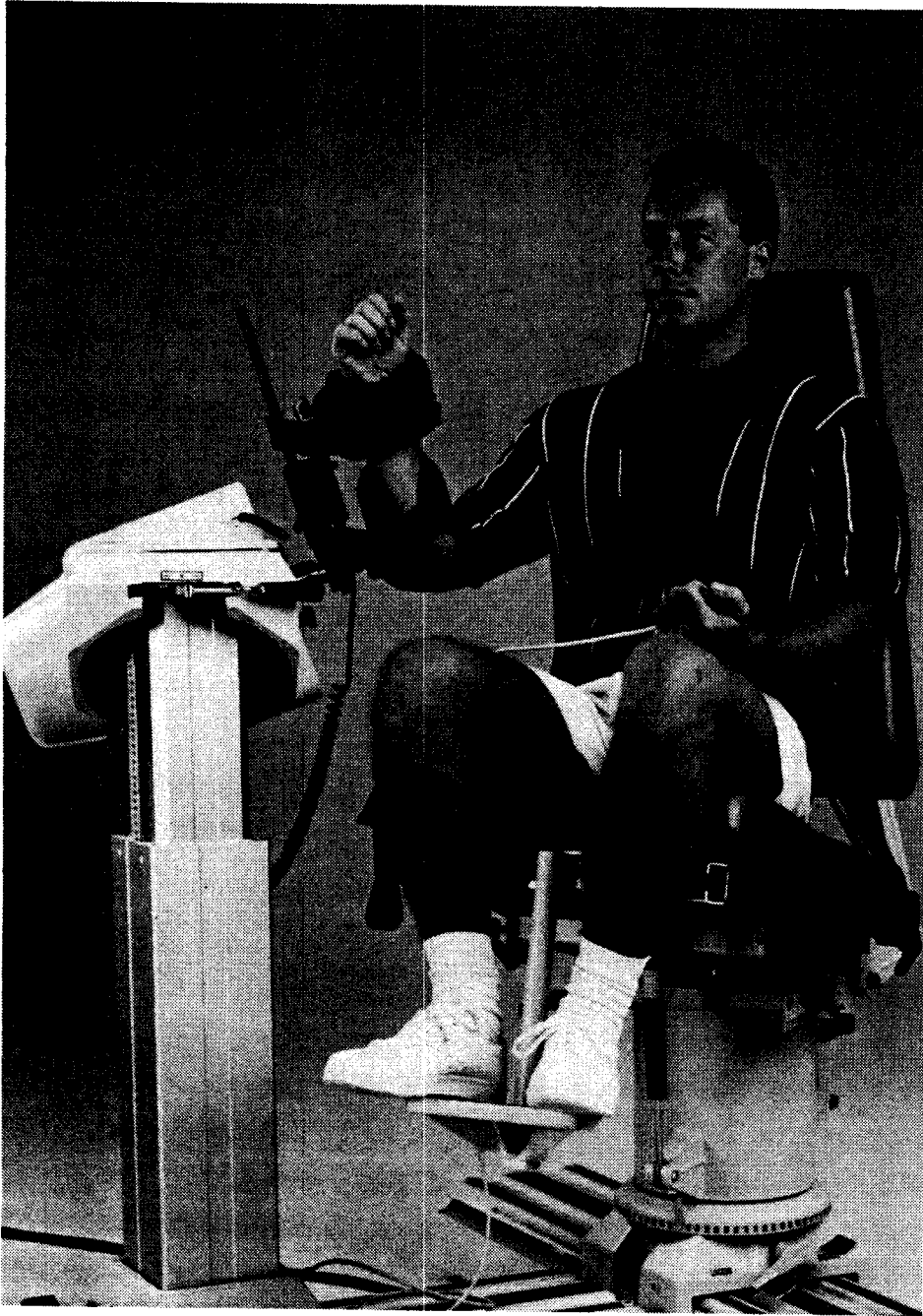
Dynamometer Settings

Height	:	48 cm
Forward/Backward	:	32 cm
Tilt	(A):	175°
Rotation	(B):	275°
Mechanical Stop	(C):	7
Mechanical Stop	(D):	27
Lever Arm Length	:	25 cm

Seat Settings

Left/ Right	:	64 cm
Rotation	(E):	270°
Seat Back Angle	(F):	60°
Seat Bottom Depth	(G):	9 cm
Seat Bottom Angle	(H):	15°

Positioning Setup for Shoulder: Internal / External Rotation



Muscle Groups

-
- Internal Rotators:**
- Subscapularis-medially rotates the humerus.
 - Pectoralis major-secondary medial rotator of the humerus.
 - Teres major-secondary medial rotator of the humerus.
- External Rotators:**
- Infraspinatus-laterally rotates the humerus.
 - Teres minor-laterally rotates the humerus.
 - Posterior Deltoid-laterally rotates the humerus.

Positioning Setup for Shoulder: Internal / External Rotation – (continued)

Right Shoulder

Dynamometer Settings

Height : 27 cm
Forward/Backward : 41 cm
Tilt (A): 25°
Rotation (B): 70°
Mechanical Stop (C): 16
Mechanical Stop (D): 34
Lever Arm Length : 22 cm

Seat Settings

Left/ Right : 48 cm
Rotation (E): 35°
Seat Back Angle (F): 78°
Seat Bottom Depth (G): 18 cm
Seat Bottom Angle (H): 15°

Left Shoulder

Dynamometer Settings

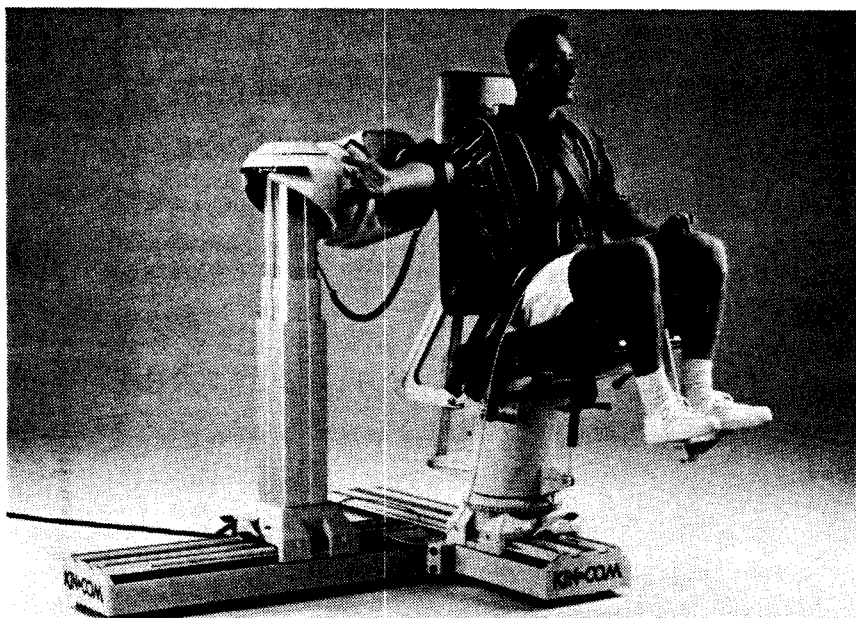
Height : 27 cm
Forward/Backward : 41 cm
Tilt (A): 155°
Rotation (B): 290°
Mechanical Stop (C): 4
Mechanical Stop (D): 22
Lever Arm Length : 22 cm

Seat Settings

Left/ Right : 48 cm
Rotation (E): 325°
Seat Back Angle (F): 78°
Seat Bottom Depth (G): 18 cm
Seat Bottom Angle (H): 15°

Positioning Setup for Shoulder: Abduction / Adduction

Overview



Detailed



Muscle Groups

Abductors

- Middle Deltoid-abducts the humerus.
- Supraspinatus-abducts the humerus.

Adductors:

- Teres major-adducts and medially rotates the humerus.
- Pectoralis major-adducts and medially rotates the humerus.
- Coracobrachialis-secondary adductor of the humerus.

Positioning Setup for Shoulder: Abduction / Adduction – (continued)

Right Shoulder

Dynamometer Settings

Height : 46 cm
Forward/Backward : 26 cm
Tilt (A): 15°
Rotation (B): 15°
Mechanical Stop (C): 12
Mechanical Stop (D): 27
Lever Arm Length : 25 cm

Seat Settings

Left/ Right : 82 cm
Rotation (E): 100°
Seat Back Angle (F): 78°
Seat Bottom Depth (G): 18 cm
Seat Bottom Angle (H): 15°

Left Shoulder

Dynamometer Settings

Height : 46 cm
Forward/Backward : 26 cm
Tilt (A): 165°
Rotation (B): 345°
Mechanical Stop (C): 11
Mechanical Stop (D): 26
Lever Arm Length : 25 cm

Seat Settings

Left/ Right : 14 cm
Rotation (E): 260°
Seat Back Angle (F): 78°
Seat Bottom Depth (G): 18 cm
Seat Bottom Angle (H): 15°

Positioning Setup for Shoulder: Diagonal



Muscle Groups

Combination

- Shoulder girdle musculature.

Positioning Setup for Shoulder: Diagonal – (continued)

Right Shoulder

Dynamometer Settings

Height	:	58 cm
Forward/Backward	:	19 cm
Tilt	(A):	325°
Rotation	(B):	50°
Mechanical Stop	(C):	16
Mechanical Stop	(D):	32
Lever Arm Length	:	45 cm

Seat Settings

Left/ Right	:	91 cm
Rotation	(E):	60°
Seat Back Angle	(F):	30°
Seat Bottom Depth	(G):	9 cm
Seat Bottom Angle	(H):	15°

Left Shoulder

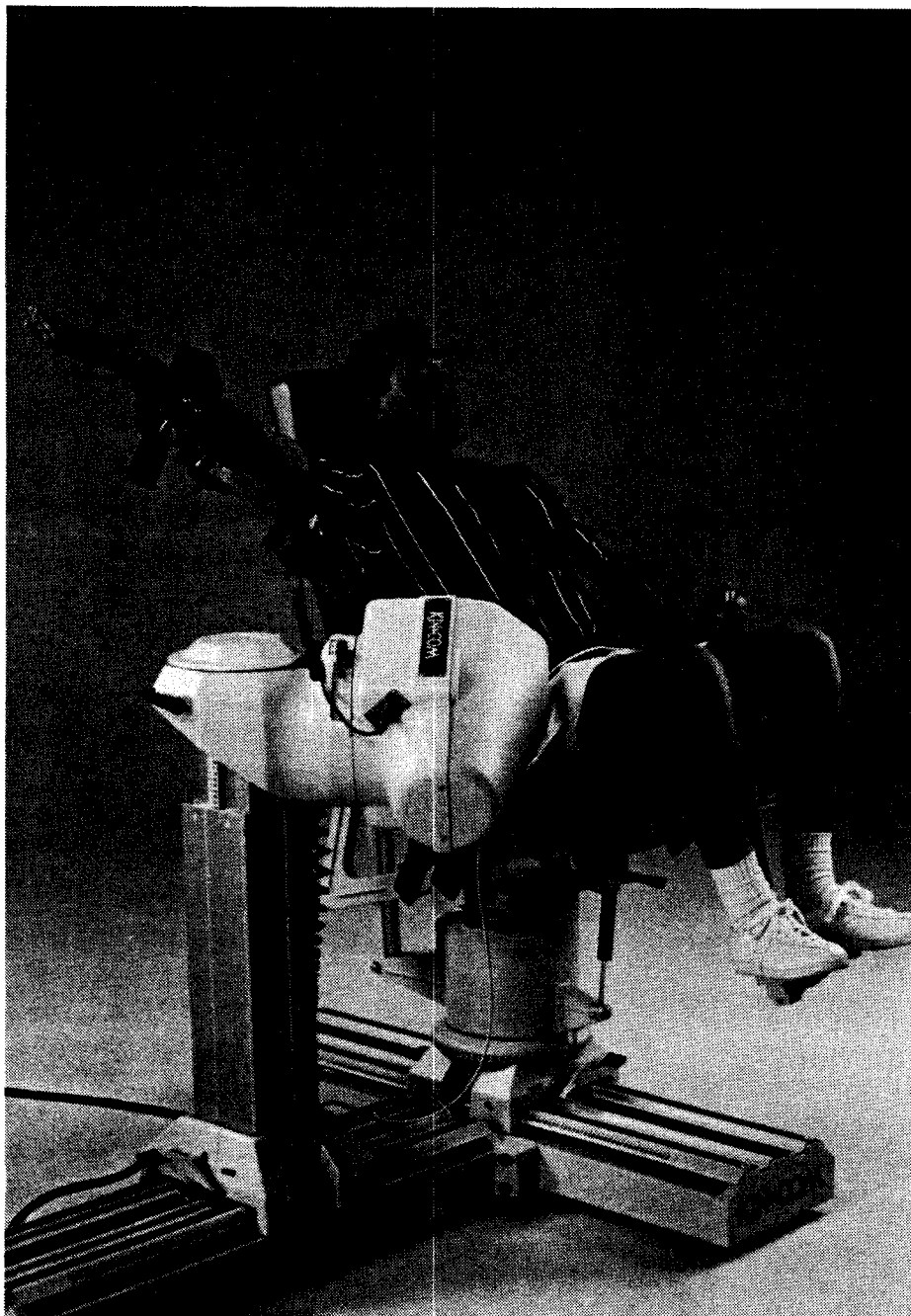
Dynamometer Settings

Height	:	58 cm
Forward/Backward	:	19 cm
Tilt	(A):	215°
Rotation	(B):	310°
Mechanical Stop	(C):	6
Mechanical Stop	(D):	22
Lever Arm Length	:	45 cm

Seat Settings

Left/ Right	:	5 cm
Rotation	(E):	300°
Seat Back Angle	(F):	30°
Seat Bottom Depth	(G):	9 cm
Seat Bottom Angle	(H):	15°

Positioning Setup for Shoulder: Custom



Muscle Groups

-
- Combination** • Shoulder girdle musculature.

Positioning Setup for Shoulder: Custom – (continued)

Right Shoulder

Dynamometer Settings

Height : 18 cm
Forward/Backward : 31 cm
Tilt (A): 150°
Rotation (B): 325°
Mechanical Stop (C): 36
Mechanical Stop (D): 19
Lever Arm Length : 47 cm

Seat Settings

Left/ Right : 54 cm
Rotation (E): 90°
Seat Back Angle (F): 45°
Seat Bottom Depth (G): 0 cm
Seat Bottom Angle (H): 15°

Left Shoulder

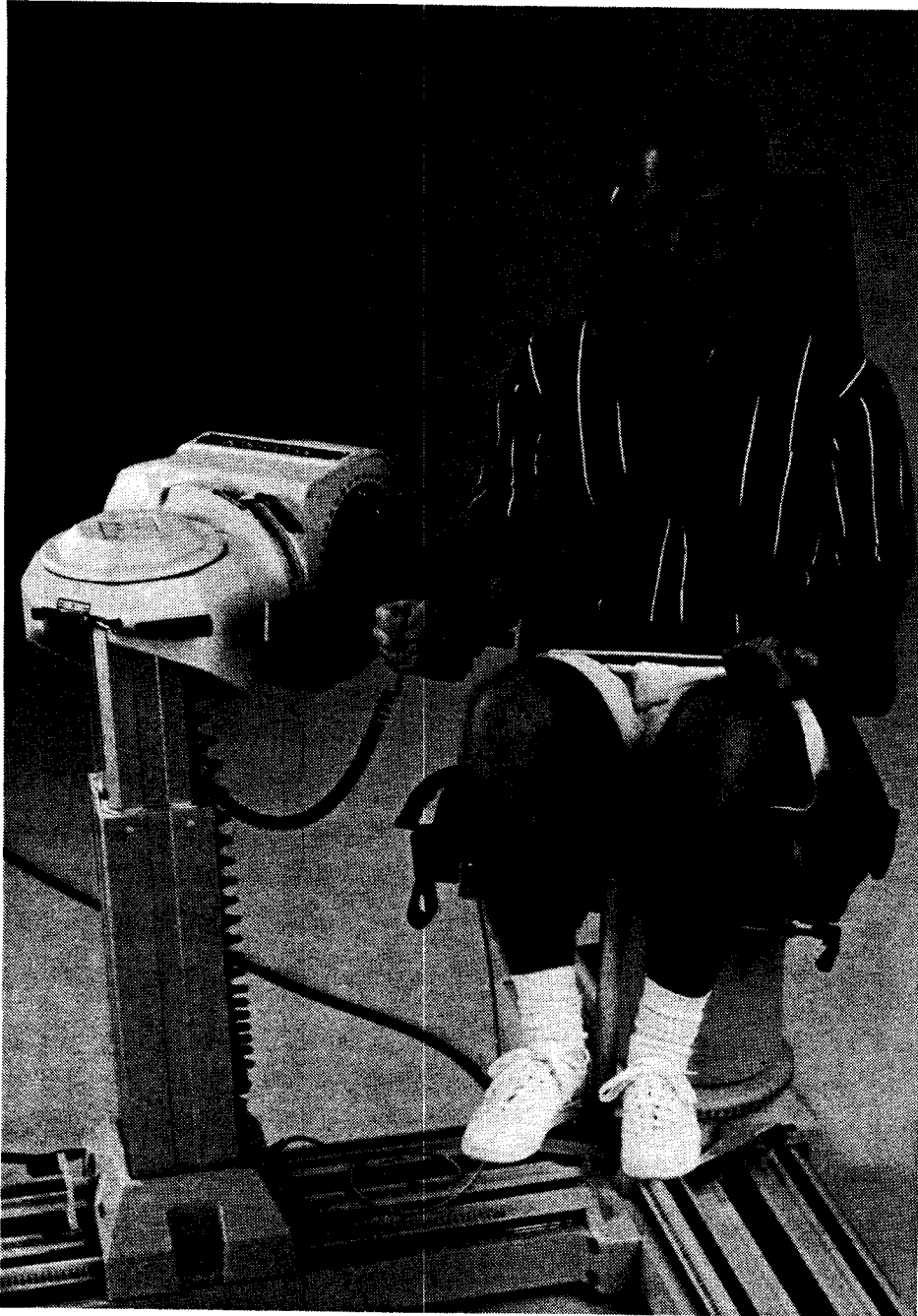
Dynamometer Settings

Height : 18 cm
Forward/Backward : 31 cm
Tilt (A): 30°
Rotation (B): 35°
Mechanical Stop (C): 19
Mechanical Stop (D): 1
Lever Arm Length : 47 cm

Seat Settings

Left/ Right : 42 cm
Rotation (E): 270°
Seat Back Angle (F): 45°
Seat Bottom Depth (G): 9 cm
Seat Bottom Angle (H): 15°

Positioning Setup for Elbow: Extension / Flexion



Muscle Groups

Extensors:

- Triceps brachii-extends forearm.
- Anconeus-extends forearm.

Flexors:

- Biceps brachii-flexes the forearm and supinates hand.
- Brachialis-flexes the forearm.
- Brachioradialis-flexes the forearm.
- Pronator teres-secondary flexor of elbow.

Positioning Setup for Elbow: Extension / Flexion – (continued)

Right Elbow

Dynamometer Settings

Height : 32 cm
Forward/Backward : 48 cm
Tilt (A): 0°
Rotation (B): 50°
Mechanical Stop (C): 13
Mechanical Stop (D): 27
Lever Arm Length : 22 cm

Seat Settings

Left/ Right : 42 cm
Rotation (E): 60°
Seat Back Angle (F): 78°
Seat Bottom Depth (G): 18 cm
Seat Bottom Angle (H): 15°

Left Elbow

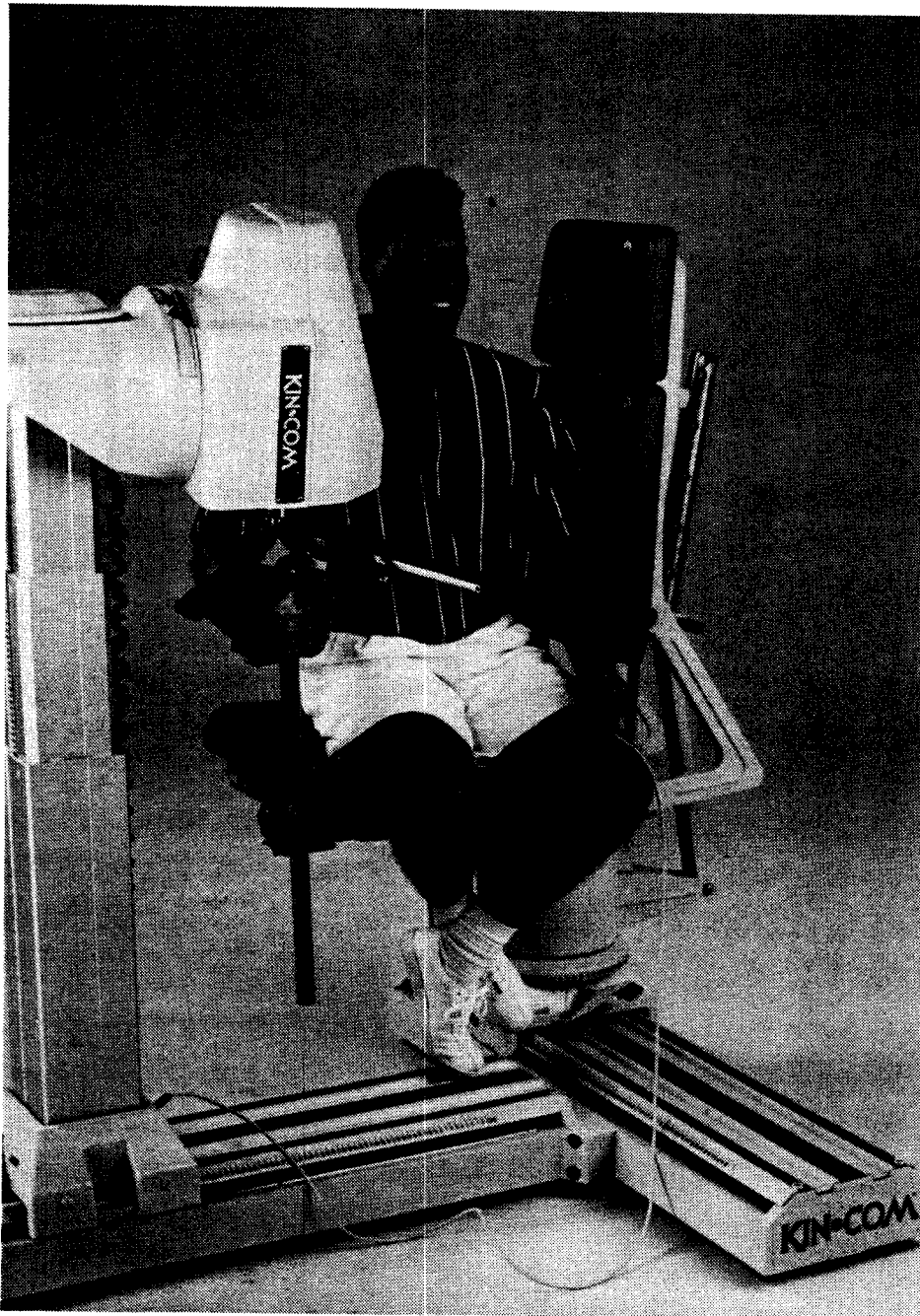
Dynamometer Settings

Height : 32 cm
Forward/Backward : 48 cm
Tilt (A): 180°
Rotation (B): 310°
Mechanical Stop (C): 11
Mechanical Stop (D): 25
Lever Arm Length : 22 cm

Seat Settings

Left/ Right : 54 cm
Rotation (E): 300°
Seat Back Angle (F): 78°
Seat Bottom Depth (G): 18 cm
Seat Bottom Angle (H): 15°

Positioning Setup for Wrist: Extension / Flexion



Muscle Groups

Extensors:

- Extensor carpi radialis longus-extends wrist and abducts the hand.
- Extensor carpi radialis brevis-extends wrist and abducts the hand
- Extensor carpi ulnaris-extends wrist and adducts the hand.
- Extensor digitorum communis-extends wrist and fingers.

Flexors:

- Flexor carpi ulnaris-flexes wrist and adducts the hand.
- Flexor carpi radialis-flexes wrist and abducts the hand.
- Palmaris longus-flexes the wrist.

Positioning Setup for Wrist: Extension / Flexion – (continued)

Right Wrist

Dynamometer Settings

Height : 59 cm
Forward/Backward : 56 cm
Tilt (A): 270°
Rotation (B): 355°
Mechanical Stop (C): 20
Mechanical Stop (D): 35
Lever Arm Length : 8 cm

Seat Settings

Left/ Right : 38 cm
Rotation (E): 0°
Seat Back Angle (F): 60°
Seat Bottom Depth (G): 18 cm
Seat Bottom Angle (H): 15°

Left Wrist

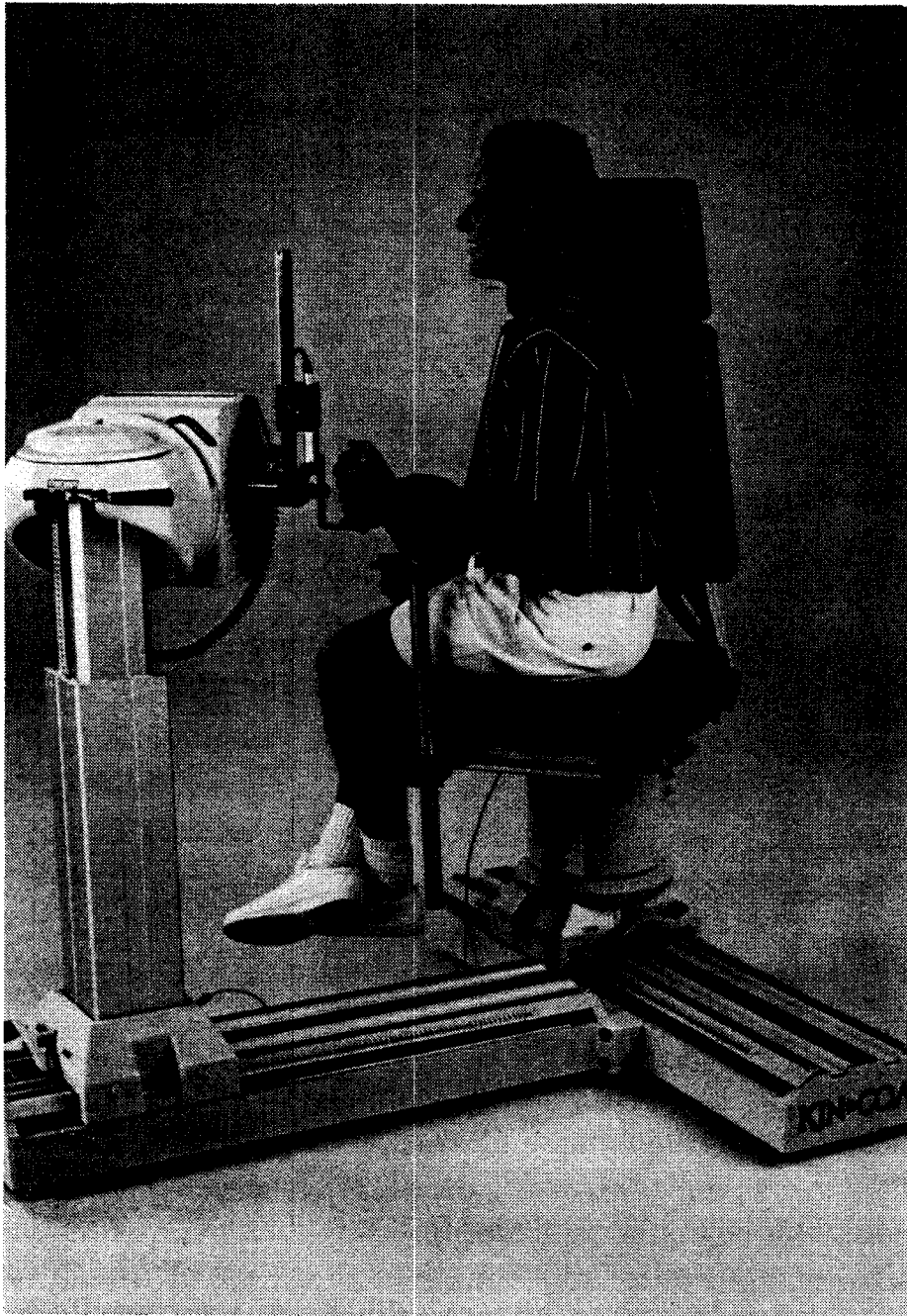
Dynamometer Settings

Height : 59 cm
Forward/Backward : 56 cm
Tilt (A): 270°
Rotation (B): 5°
Mechanical Stop (C): 36
Mechanical Stop (D): 16
Lever Arm Length : 8 cm

Seat Settings

Left/ Right : 58 cm
Rotation (E): 0°
Seat Back Angle (F): 60°
Seat Bottom Depth (G): 18 cm
Seat Bottom Angle (H): 15°

Positioning Setup for Wrist: Pronation / Supination



Muscle Groups

Pronators:

- Pronator teres-pronates forearm and flexes elbow.
- Pronator quadratus-pronates forearm.

Supinators:

- Supinator-supinates the forearm.
- Biceps brachii-assists in supination when elbow is flexed.
- Positioning Setup
- Wrist
- Pronation / Supination

Positioning Setup for Wrist: Pronation / Supination – (continued)

Right Wrist

Dynamometer Settings

Height : 23 cm
Forward/Backward : 71 cm
Tilt (A): 180°
Rotation (B): 310°
Mechanical Stop (C): 35
Mechanical Stop (D): 21
Lever Arm Length : 1 cm

Seat Settings

Left/ Right : 72 cm
Rotation (E): 320°
Seat Back Angle (F): 60°
Seat Bottom Depth (G): 18 cm
Seat Bottom Angle (H): 0°

Left Wrist

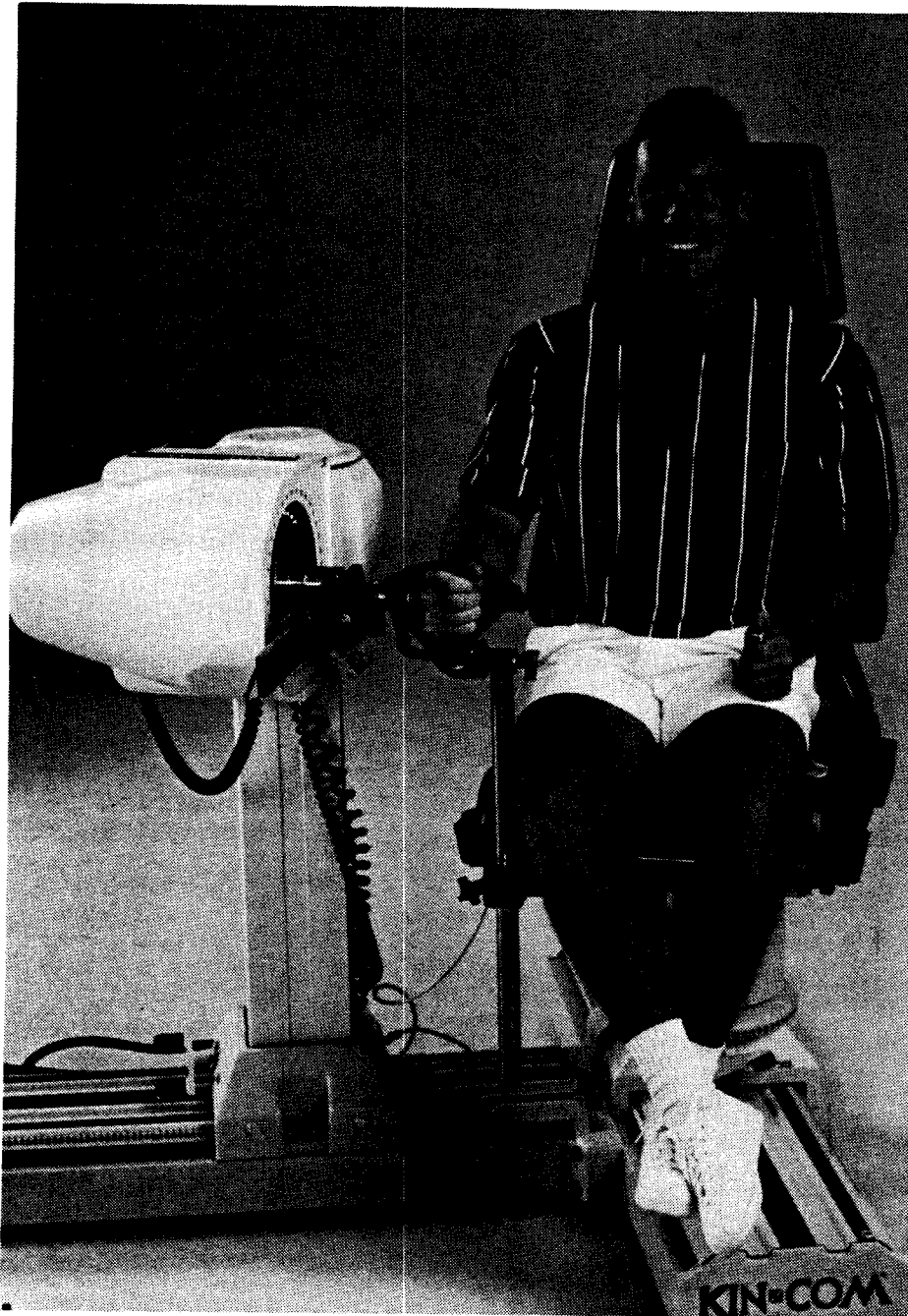
Dynamometer Settings

Height : 23 cm
Forward/Backward : 71 cm
Tilt (A): 0°
Rotation (B): 50°
Mechanical Stop (C): 17
Mechanical Stop (D): 3
Lever Arm Length : 1 cm

Seat Settings

Left/ Right : 24 cm
Rotation (E): 40°
Seat Back Angle (F): 60°
Seat Bottom Depth (G): 18 cm
Seat Bottom Angle (H): 0°

Positioning Setup for Wrist: Ulnar / Radial / Deviation



Muscle groups:

Ulnar (medial) deviators:

- Flexor carpi ulnaris-adducts hand from the anatomical position.
- Extensor carpi ulnaris-adducts hand from the anatomical position.

Radial (lateral) deviators:

- Flexor carpi radialis-abducts hand from the anatomical position.
- Extensor carpi radialis longus-abducts hand from the anatomical position.
- Extensor carpi radialis brevis-abducts hand from the anatomical position.

Positioning Setup for Wrist: Ulnar / Radial / Deviation – (continued)

Right Wrist

Dynamometer Settings

Height : 23 cm
Forward/Backward : 56 cm
Tilt (A): 180°
Rotation (B): 265°
Mechanical Stop (C): 31
Mechanical Stop (D): 6
Lever Arm Length : 6 cm

Seat Settings

Left/ Right : 58 cm
Rotation (E): 0°
Seat Back Angle (F): 60°
Seat Bottom Depth (G): 18 cm
Seat Bottom Angle (H): 0°

Left Wrist

Dynamometer Settings

Height : 23 cm
Forward/Backward : 56 cm
Tilt (A): 0°
Rotation (B): 85°
Mechanical Stop (C): 32
Mechanical Stop (D): 7
Lever Arm Length : 6 cm

Seat Settings

Left/ Right : 38 cm
Rotation (E): 0°
Seat Back Angle (F): 60°
Seat Bottom Depth (G): 18 cm
Seat Bottom Angle (H): 0°

Leg Press: Custom



Muscle groups:

Combination: • Hip, knee and ankle musculature.

Leg Press: Custom – (continued)

Right Leg

Dynamometer Settings

Height : 0 cm
Forward/Backward : 54 cm
Tilt (A): 15°
Rotation (B): 0°
Mechanical Stop (C): 19
Mechanical Stop (D): 30
Lever Arm Length : 38 cm

Seat Settings

Left/ Right : 95 cm
Rotation (E): 0°
Seat Back Angle (F): 45°
Seat Bottom Depth (G): 8 cm
Seat Bottom Angle (H): 15°

Left Leg

Dynamometer Settings

Height : 0 cm
Forward/Backward : 54 cm
Tilt (A): 165°
Rotation (B): 0°
Mechanical Stop (C): 8
Mechanical Stop (D): 19
Lever Arm Length : 38 cm

Seat Settings

Left/ Right : 3 cm
Rotation (E): 0°
Seat Back Angle (F): 45°
Seat Bottom Depth (G): 8 cm
Seat Bottom Angle (H): 15°

Attachments

Lever Arm Extension PART No. 54707

NOTE: Used to increase lever arm length. Also provides an extension away from the axis of rotation which enhances alignment during gravity eliminated positions.

Foot Rest Lift and twist to convert from a bilateral to a unilateral foot rest. (Don't forget to move it over when performing seated knee flexion.)

Single Pad Attachment Part No. 54702

Double Pad Attachment Part No. 54712

Ankle Plantar/Dorsi Attachment Part No. 54708

Ankle Inversion/Eversion Attachment Part No. 54705

Hip Pad Accessory Part No. 54704

Shoulder Support Part No. 54713

Elbow Flexion/Extension Elbow Support Part No. 54703

Wrist Pronation / Supination Part No. 54709

Hand Grip Attachment Part No. 54717

Utilities and Disk Operations

System Setup

Choose this option to change any of the following:

Facility Information

- This is the address information that will be printed on each report.

Printer Type

- Use this option to change the default printer type.
 - Set the printer type to the printer you have connected to your KIN-COM computer.

Units of Force

- This determines the units the system will use to display force and torque values.
- Metric: Force is in Newtons (N.) Torque is displayed in Newton-Meters (Nm)
- Non-Metric: Force is in Pounds (lb) Torque is displayed in Foot-Pounds (Ft-lb)

Units of Display

- This affects the default units for Overlay Reports.

Protocol Lock

- This should normally be set to On, meaning that all of the "standard" (see below) protocols cannot be overwritten by the user.
- If set to Off, then the user can overwrite these "standard" protocols.
- The following are the KIN-COM "standard" protocols affected by this Protocol Lock function:
 - Isokinetic, Passive, Isometric, Isotonic
 - Isokinetic Trunk Ext / Flex
 - Passive Cervical (if the Cervical Option is installed)
 - Active Assistive Cervical (if the Cervical Option is installed)
 - Cervical Stretching (if the Cervical Option is installed)
 - Cervical Isometric (if the Cervical Option is installed)

Screen Options

- 0: – All of the protocols on the Protocol scroll box will be displayed.
- 1: – Allows you to "filter" the Protocol scroll box protocols that are displayed in the scroll box.

- Protocols can be filtered by the type of exercise (i.e. Speed Constant (isokinetic and passive), Force Constant (isotonic), Angle Constant (isometric), or no filter (all)).

Date Format

- This allows you to setup the default preferred method of displaying a date.
- One of the following date formats may be selected:
 - USA: mm/dd/yy Ex: 03/06/92
 - European: dd.mm.yy Ex: 06.03.92
 - Japanese: yy/mm/dd Ex: 92/03/06

Calibrate Screentouch

- This option is only available if you have screentouch installed in your KIN-COM computer.
- Allows you to recalibrate the screentouch zones on the screen.

Audio Option

- Allows you to turn the audio function ON / OFF.

AP Setup Voice

- Allows you to turn the audio function ON / OFF during patient positioning setup.

System Utilities

Choose this option to access one of the following:

Files Manager

- Allows the backup and restoring of data files to and from diskette or tape.
- Allows the backup and restoring of protocols to and from diskette.

Backup Data Files

- Backup To Diskettes
 - Will backup KIN-COM data files to diskette.
 - If there is no tape software detected you will be prompted to backup all patient data files from the hard drive (C:) to diskette (A:)
 - The system will display the number of bytes that will be backed up.
 - You should know the type of diskettes that you will be backing up on so that you can determine the number of formatted diskettes that will be required.
 - **NOTE:** If you are using low density diskettes, each will hold approximately 720K bytes.
 - If you are using high density diskettes, each will hold approximately 1.44 Megabytes (twice that of low density diskettes).
- Backup To Tape
 - If there is tape software detected you will have the option to backup to diskette or tape
 - The purpose of the tape drive is to provide the user with a alternative method to backup KIN-COM data files. This method is generally faster and less confusing for the user.

- When you answer "Yes", you will copy all the data files onto the tape. Any data on that tape will be erased and overwritten! You may not select individual files.

Restore Data Files

- Restore From Diskettes
 - To restore KIN-COM data files that have been backed up on diskette.
 - If there is no tape software detected you will be prompted to copy previously backed up data files from a floppy diskette (A:) to the hard drive (C:).
- Restore From Tape
 - To restore KIN-COM data files that have been backed up on to tape.
 - If there is tape software detected you will have the option to copy previously backed up data files from a floppy diskette (A:) or tape

Backup Protocols

- Back up all protocols and sequences stored on the hard drive (C:) onto a diskette (A:).

Restore Protocols

- Copy backed up protocols and sequences from a floppy diskette (A:) to the hard drive (C:).

Copy Data Files

- This option allows you to copy specific individual patient files to or from a floppy diskette.
- After selection of a source drive, a directory listing of all KIN-COM patient files on that drive will be displayed. You are then prompted to select the file(s) you wish to copy. Follow the prompts to complete the copying process.
- Allows the copying of individual files to and from diskettes.

Copy A Data File From (C:)

- Highlight the patient data file that you would like to copy from the hard drive to the floppy diskette and press enter.

Copy A Data File From (A:)

- Highlight the patient data file that you would like to copy from the diskette to the hard drive and press enter.

Display Directory

- This option allows you to view the listing of all patient data files located on either the hard drive (C:) or a floppy diskette (A:).

Erase Data Files

- This option provides the means to erase an unwanted data file from the hard drive (C:).
- Highlight the data files that you wish to erase, press enter to select (or deselect) them, and then press erase selected files to erase all of the files you have selected.
- **NOTE:** Each entry in the scroll box indicates a patient's name and date. By selecting an entry, all data files that were collected for the specified patient for the specified date will be erased.

- Format Diskette** ● Allows the formatting of a floppy diskette.
- Printer Test** ● Allows for the testing of the operation of the line printer.
- Set Date & Time** ● Allows the user to verify/set the system date and time.
- Audio Module** ● If the Audio Module is turned ON, then this option will appear.
● Allows for the testing of the Audio Module.
- Exit To DOS** ● To exit to the operating system.
- Esc** ● To return to the utilities menu.

Database Utilities

Choose this option to modify one of the following:

- Rebuild Databases** ● This function should be run whenever any type of database error has occurred in the KIN-COM software.
● This will not erase or alter any of the data files.
- Patient File Statistics** ● Reveals a "viewbox" of all patient files in the database.
● The next prompt offers selection of type of test.
● Exhibits the number and type of tests performed on a particular patient.
● Allows selection of the type of test to be viewed.
- Patient File Listing** ● This option allows you to view all of the patient data files currently on the hard drive.
● Display of all patient data files in the database on the screen or print a hard copy.
● Answer 'Y' to the prompt if you want to print the listing on your printer.
● Answer 'N' to the prompt if you want to just view the listing on the screen. While the listing is scrolling on the screen, you may pause the scrolling by hitting any key select enter to continue scrolling.
- Protocol Convert / Import / Export** ● Provides options to transfer individually selected protocols to and from you system.
● Convert Old Protocols To New Format
 - Used if you have protocols that were backed up using an old version of the KIN-COM software (prior to Version 4.00).
 - This will convert them to the new KIN-COM software format and add them to the KIN-COM database.
- Export Protocols To Drive (A:)**
 - Copies selected protocols from the hard drive (C:) to a floppy diskette in drive (A:).

- Useful if you need to copy protocols from one KIN-COM machine to another.

Import Protocols From Drive (A:)

- Copies selected protocols from a floppy drive (A:) to the hard drive (C:).
- Useful if you need to copy protocols from one KIN-COM machine to another.

Change Source/Destination Drives From (A:) TO (C:)

- This will change the drive identification letter in the export protocols or import protocols listed above to (C:)

Positioning Pictures (optional)

- Allows the user to view a picture of any of the KIN-COM AP preset positions.

Delete Patient Positions

- Allows the user to delete a specified patient position from the hard drive (C:).
- You may select a patient so their patient position may be deleted.
- You may select a joint, side, or muscle group for a particular patient so their patient position may be deleted.

Esc

- To return to the utilities menu.

Basic Science Review

"Deceleration of the body involving resisted muscle lengthening is a common experience of earth-bound residents and the resultant muscle injuries are quite normal occurrences throughout life, especially during running and jumping activities". — *Bill Stauber, Ph. D.*

Components of a Muscle

Contractile Tissue

- Myofibril - contains two basic protein filaments
 - A thicker one called myosin
 - A thinner one called actin
- Sarcomere - the smallest functional unit of a myofibril
 - Defined as the distance between Z lines
 - Contracts when stimulated

Non - Contractile Tissue

- Proprioceptors - sense organs that convey information regarding movement and joint position.
 - Muscle Spindle
 - Golgi Tendon
- Connective Tissue
 - Endomysium - connective tissue surrounding individual muscle fibers
 - Perimysium - connective tissue surrounding a muscle bundle
 - Epimysium - connective tissue surrounding an entire muscle

Nerves

- Sensory - convey information from the periphery to the central nervous system
 - Group II Afferent Nerve
 - Group IA Afferent Nerve
- Motor - convey information from the central nervous system to the muscles
 - Alpha Efferent Nerve
 - Gamma Efferent Nerves

Vascular

- Arteries - transports oxygenated blood from the heart and lungs to the rest of the body

- Veins - transports deoxygenated blood from the body to the heart and lungs
- Capillaries - where cellular respiration occurs, exchanging oxygen for carbon-dioxide

Definition of a Muscle Contraction

Komi has supplied us with a good definition of muscle contractions. He tells us that a contraction: Is a state of muscle when tension is generated across a number of actin and myosin filaments.

Types of Muscle Contractions

The three ways in which a muscle can contract include:

- Concentric – causes motion
- Isometric – maintains position
- Eccentric – controls motion

What becomes confusing in the literature, the function in which the muscle performs may be used instead of the contraction type. Do not mistake muscle function for contraction type.

Concentric Contraction

- Definition of Concentric Contraction
 - Concentric contractions occur when the applied resistance causes a contraction-coupling to occur and there is a shortening of a sarcomere.
 - As a result there is a decrease in the length of the whole muscle and the limb segment will move in the same direction of the muscle tension.
- Characteristics of Concentric Contractions
 - Causes motion
 - The muscle shortens as tension is developed
 - The limb moves in the same direction of the muscle contraction
 - The work is performed by the muscle
 - Positive work ($W = F [+ D]$)
- Example:
 - Lifting a weight
 - Ascending stairs

Isometric Contraction

- Definition of Isometric Contraction
 - Isometric contractions occur when the applied resistance produces a shortening of the sarcomere as with the concentric contraction.
 - Slack will be removed from the muscle or connective tissue, but there will be no observable change in the length of the whole muscle and the limb segment also will not move.
- Characteristics of Isometric Contractions
 - Maintains position
 - The muscle contracts:
 - With no change in the length of the muscle
 - With no change in the position of the joint

Eccentric Contraction

- Example:
 - Posture
 - Grip
- Definition of Eccentric Contraction
 - Eccentric contractions occur when the applied resistance causes a contraction-coupling to occur producing a lengthening of the sarcomere and, therefor an increase in the length of the whole muscle.
 - The limb segment will move in the opposite direction of the muscle tension.
- Characteristics of Eccentric Contractions
 - Controls motion
 - The muscle lengthens as tension is developed
 - The limb moves in the opposite direction of the muscle contraction
 - The work is performed on the muscle
 - Negative work ($W = F [- D]$)
 - An eccentric contraction is impossible to perform without the presence of a load or resistance
- Example:
 - Lowering a weight
 - Descending stairs

Concentric Verses Eccentric

- Differences between eccentric and concentric contractions
 - Eccentric contractions have the ability to produce greater force than concentric contractions.
 - Eccentric exercise has a higher mechanical efficiency than concentric does.
 - At comparable work loads, the metabolic energy cost of eccentric exercise is less than with concentric.
 - Eccentric exercise produces greater loading of the elastic components of the muscle
 - Post exercise soreness is associated more with eccentric exercise than with concentric.
- The need to understand eccentrics
 - Many activities of daily living involve both concentric and eccentric contractions, therefor training should also include multiple types of exercise.
 - When organizing an exercise program you should choose a mode of training that is specific to the activity or functional needs of that person.
 - It is also important to include all 3 types of muscle contractions in the individual program.
- Eccentric muscle function
 - High tensions are produced for the same amount of motor activity with quick eccentric contractions, therefor the series elastic component is placed under greater stress than with concentric.
 - For this reason alone it is advisable to allow for a period of eccentric training to allow the muscles to adapt.

- Therapeutic implications of negative work
 - Negative work may be performed with less strength and endurance compared to positive work, therefore it may allow individuals with limited cardiorespiratory reserves to function at a higher level.
 - This is because individuals with low cardiorespiratory reserves typically use their reserves maximally during light activity and as a result are unable to make significant improvements in their exercise capacity.

Muscle Action That Produces Joint Motion

Prime Movers

Joint Stabilizers

- One force acts along the long axis of the bone leading to compression or stabilization of the joint. In order for a segment of the body to move properly it must possess the right amount of stability.

Secondary Movers

- The other force acts perpendicular to the long axis and leads to rotation, or motion of the limb segment. The prime mover is one whose chief function is to cause a particular motion.
- A secondary mover will assist in movement of a specific body segment. For example the rectus femoris in the anterior thigh is primarily responsible for knee extension and assist in hip flexion

Type of Muscle Function

Types of Muscles	Function	External Mechanical Work
Concentric	Acceleration (motor)	Positive ($W = Fx[+D]$)
Isometric	Fixation (Fixator)	Zero (no change in length)
Eccentric	Deceleration (Shock Absorber)	Negative ($W = Fx[-D]$)

Muscle Performance

Strength

- The maximal pulling force of a muscle or muscle group
- The ability to exert an external force or to lift an object
- The heavier the object the greater the strength required

Power

- The measure of work per unit of time
- The ability of a muscle or muscle group to produce force quickly
- The faster the requirement the greater the power required

Endurance

- The ability of a muscle or muscle group to perform repeated contractions against a resistance or load for an extended period of time.
- The longer the time requirement the greater the endurance required.

Muscle Tension

The velocity of a muscle contraction is one of the factors responsible for tension development, tension is the signal for hypertrophy to take place. In per unit of contractile tissue the amount of tension that can be generated differs depending on the type of muscle contraction performed.

Eccentric → Isometric → Concentric

The Stretch – Shortening Cycle

Komi has described the working interrelationship of muscle contraction in his work on the stretch shortening cycle.

He reports in the book, Human Muscle Power, "The types of contractions listed in Table 1 very seldom occur alone in normal human muscle movement because the body segments are periodically subjected to impact forces, as in running and jumping or because some external forces such as gravity lengthens the muscle. In these phases the muscles are usually contracting eccentrically and concentric follows. Thus, the combination of eccentric and concentric contractions form a natural type of muscle function called the Stretch-Shortening Cycle.

This behavior allows a the final action (Concentric Contraction) to take place with greater force or power output than a movement initiated by concentric contraction alone. An eccentric contraction immediately followed by a concentric contraction will greatly increase the force generated concentrically. This is a critical point to understand when attempting to understand the specific needs and requirements of high speed movements. This eccentric - concentric coupling forms the basis for plyometric training.

The Force Velocity Curve

The maximum force decreases (concentric) or increases (eccentric) as a function of the stretch shortening velocities, respectively. According to the force velocity curve, the maximal force decreases (Concentric) or increases (Eccentric) as a result of the shortening or stretching velocities, respectively.

Muscular Strengthening

Strength is a common term used to describe muscle performance, however a more appropriate term might be force, since this is what is actually being measured by the testing devices presently being used in Physical Therapy clinics.

Since motorneurons undergo orderly recruitment, based on their size, some muscle fibers, by virtue of being innervated by motorneurons with small cell bodies, will be recruited most often. With a trained athlete, the type of activity influences how much muscle develops. The powerlifter/sprinter does high speed, high power types of activity that demand recruitment of all fiber types since his force generations are high. Their recruitment of all fibers types leads to greater force generation = increase tension = Muscular Hypertrophy. The cellular changes that occur enhance the ability to develop power.

The marathon runner on the other hand does low speed, low power types of activity that generates a greater demand of the type one fibers predominately. They do not have a need for the same muscular hypertrophy. On a cellular level the muscle develops a greater capacity for endurance. (Figure 4).

Strengthening is a result of cellular hypertrophy. Strengthening is specific to the type of work required of the muscle tissue.

Muscular Strengthening Continuum

Strength can be thought of as a continuum and it is adopted from the pattern of use theory.

Single
Maximum
Contraction

Clean & Jerk Football 100 Meters 800 Meters 1500 Meters Cross Country Triathlon

Repetitive
Sub-Maximum
Contraction

S.A.I.D. Principle (Specific Adaptation to Imposed Demands)

Tells us that the training program must attempt to adapt the individual to the demands that may be made upon them during performance.

Basic Formulas

Force = Mass x Acceleration

General Principles

- Final Momentum - most important factor in producing striking force
- Final Velocity - most important factor in jumping and throwing
- Average Velocity - most important factor in locomotive activities

We as humans are able to produce self generated force in the form of a muscle contraction. Environmental forces such as gravity can often be used effectively in conjunction with voluntary muscle contractions.

The following principles must be considered to gain maximum results:

- Correct muscle selection
- Stability and loss of effective force
- Effect of angle and force application
- Initial muscle tension

Work = Force x Distance

Concentric contractions can be measured in terms of work because force acts over a distance.

Eccentric contractions occur as the load is placed on the limb rather than the result of muscle action. The muscle contraction is in direct opposition to the direction of the limb segment being moved. As a result the mechanical work is performed on the limb, A. V. Hill, therefor coined the term, "negative work" to describe the work performed during an eccentric contraction.

Power = Work / Time

Most sport activities require tremendous energy production in the shortest period of time. Quite often a 40 yard dash time, or vertical jump is used as a measure of anaerobic power.

Basic Principles of Exercise

Muscle Hypertrophy

Muscle Mutability

Mutability refers to the ability to change and muscle is considered to be in a state of constant change. Muscle mutability may be broken down into 2 categories hypertrophy and atrophy.

Improvements in muscle performance are usually by an increase in muscle size and metabolic capacity. This is the result of an increased diameter of existing muscle fibers, due to an increase in the number of myofibrils per fiber. An increase in total protein, and hypertrophy of the connective tissue, tendons, and ligaments also occurs. There is little scientific proof to support an increase in the number of muscle fibers through longitudinal splitting of existing fibers called hyperplasia as a result of exercise.

Muscle Atrophy

Muscle atrophy may also discussed in terms of size and metabolic capacity. The wasting away or reduction of muscle size as a result of decreased use or immobilization of a joint.

Overload Principle

To exercise a muscle or muscle group against a resistance greater than that which is normally encountered. the resistance or load may be maximal or sub-maximal.

Principle of Specificity

To exercise in a way that is consistent with the specific needs of your sport or activity. the performance needs of a football player are different than the needs of a basketball player, or a wrestler, therefor the training programs should be different.

It should also be noted that increases in strength, power, or endurance will be specific to the mode of training performed

Arrangement of Exercise

As you set up an exercise program you should work the larger muscle, or muscle groups first and work toward the smaller ones.

To reduce the effects of local muscle fatigue (that could limit the effectiveness of your cardiovascular program) you should perform aerobic type exercise prior to weight training or other anaerobic exercise.

Exercise Prescription

What are your goals?

Frequency	(How Often)
Intensity	(How Hard)
Duration	(How Long)
Progression	(When To Increase)
Mode	(What Choice of Exercise)

Adaptation to Strength Training

Muscular Response

Komi and Buskirk [1972] reported that negative work resulted in a greater % increase in muscle tension generated than with positive work for all 3 types of contractions. These studies demonstrated that negative training resulted in muscular adaptations that probably minimized soreness and ultimately increased the efficiency of performing negative work.

Cardiorespiratory Response

During aerobic exercise utilizing negative work such as retro walking against a % grade or eccentric cycling there was an associated decreased energy cost in terms of VO₂ as compared to positive work.

Knuttgen [1971] examined the cardiorespiratory responses of two male subjects performing both positive and negative work. Power ranged from 0 to 130 watts and a speed of 20 to 100 rpm. During negative work, for a given intensity VO₂ was about 30% of that for positive work.

Thompson [1971] showed cardiac output, and heart rate to be higher, and blood lactate concentrations slightly reduced in negative vs. positive work. O₂ uptake and heart rate were linearly related: however for a given level heart rate was somewhat higher and VO₂ presumably less in negative vs. positive work.

Thermoregulatory Response

Neilson [1972] showed that heat production was almost triple in negative work as opposed to positive work. Work is performed by the muscle during positive work and on the muscle during negative work. The greater heat production was observed to increase cutaneous blood flow. It was also observed that core temperature was lower during steady state negative training as compared with positive.

Neuromuscular Adaptation

Most rapid increase in strength occurs within the first three weeks of training. Increases in voluntary strength are associated mainly with neuro adaptation involving improvements of coordination, skill learning, and activation of prime movers.

Muscle Biology

Muscle can be broken down into two broad categories for fiber typing. They are:

- Type I (Slow Twitch Fiber)
 - The type 1 fiber concerned mainly with Oxidative and Aerobic Metabolism, (i.e.: The ability to use oxygen for prolonged periods to synthesize and use ATP). They are most resistive to fatigue and are the first recruited.
- Type II (Fast Twitch Fiber)
 - The type II fibers are used for explosive type of activity. They generate a tremendous force over a short period of time. If immobilized, isometric contractions may prevent atrophy
- Type II fibers can be broken down into:
 - Type II A
 - Type II A B
 - Type II B
 - They differ mainly in terms of endurance.

Motor Unit Recruitment (Orderly)

The size and nature of the motor neuron determines the threshold and frequency of firing of the muscle fibers in its motor unit. Since slow twitch fibers are innervated by smaller neurons that fire at a lower force generation the recruitment of motor units occurs from:

(ST) to (FTA) to (FTAB) to (FTB) as requirements of force increase.

Selective motor unit firing does not occur.

Fast speeds do not necessarily recruit fast twitch fibers.

ATP Usage

Metabolic Standpoint: Per unit of tension developed in a muscle the amount of ATP used by a muscle differs. Eccentric contractions are the most efficient and concentric are the least efficient.

Eccentric → Isometric → Concentric

Energy Systems

- Anaerobic(strength, power)
 - ATP-PC system - the immediate usable form of chemical energy for muscular activity. It is anaerobic with limited ATP production also referred to as the phosphagen system.
 - Lactic Acid system - also known as anaerobic glycolysis, which means the breakdown of sugar in the absence of Oxygen. This system has limited ATP production with a by product called Lactic Acid which produces muscle fatigue.
- Aerobic (endurance)
 - Oxygen system - is aerobic in nature as it utilizes oxygen to produce energy. It possesses the ability for unlimited ATP production with no fatiguing by products and is used during endurance activities

Work Rest Ratios

In order to exercise focusing to a greater extent on one of the 3 energy systems use one of the following work rest ratios:

- ATP - PC 1 : 3 - to allow more time to restore utilized ATP
- Lactic Acid 1 : 2 - to increase the ability to tolerate elevated levels of lactic acid
- Aerobic 1: 1 or 2:1- to allow for replenishment of ATP and oxygen in the myoglobin

Recovery From Exercise

- Restoration of ATP - PC
2 - 3 minutes
- Replenishment of myoglobin with oxygen
1 - 5 minutes
- Replenishment of muscle glycogen
10 - 46 hours (prolonged exercise)
5 - 24 hours (intermittent exercise)
- Removal of lactic acid
30 - 60 minutes with exercise
1 - 2 hours with no exercise
- Repayment of alactacid oxygen debt
3 - 5 minutes
- Repayment of lactacid oxygen debt
30 - 60 minutes

Causes of Delayed Onset Muscle Soreness

- Lactic acid accumulation
- Small muscle tears
- Local muscle spasms
- Overstretching of connective tissue
- Local muscle fatigue
- Electrolyte depletion

Delayed Onset Muscle Soreness

Eccentric exercise usually leads to delayed onset muscle soreness more than concentric exercise and somewhat more than isometrics. At rest myosin exist in a preenergized form and tropomyosin rest on the binding sites of actin, preventing cross bridges from forming.

When the motor unit becomes excited the binding of myosin and actin take place because the inhibition of tropomyosin is removed by the interaction of calcium with troponin. If after the binding reaction occurs the cross bridges are forcibly pulled backward, then the actin-myosin bond would break before transduction of energy could occur.

Repetition of these attachment - separation reactions produce a measurable tension in the muscle but with no apparent energy consumption because the cross bridge has not had time to recycle.

Muscle Injuries

We classify injuries into 2 categories, Macrotrauma and Microtrauma. Microtrauma seems to be the most common cause of injury and soreness following eccentric exercise. Following this repeated trauma there is a period of perceived pain which varies both in quality and duration. Eccentric exercise induced soreness should not be confused with exertional pain, or post fatigue soreness which has a metabolic origin.

Mechanism of Injury

Knowing the type of contraction that takes place during the mechanism of injury, may help us determine what mode of muscle rehabilitation the patient needs to emphasize.

Mechanical forces of stretch may be involved in tearing of muscle tissue as a result of repeated eccentric action. When an active muscular contraction occurs the following components could break under tension; (1) connective tissue linking adjacent myofibers could break, (2) the basal lamina could be peeled off of the fiber, exposing the plasma membrane, (3) the plasma membrane could rupture, (4) a sarcomere could be pulled apart, and (5) a myofiber could break apart without disrupting the basal lamina.

Deceleration Injuries

The importance of eccentric muscle actions in deceleration of the body during walking and running is well recognized and accepted. Too often training programs involve concentric exercise and neglect to properly utilize the eccentric component.

Many muscle injuries occur during deceleration, or shock absorption when the muscle is contracting eccentrically. A good example is an acute hamstring strain sustained during a 60 or 100 meter sprint race. The hamstring becomes injured when it attempts to counteract the contraction of the quadriceps musculature. In

other words, as the quadriceps contracts concentrically to extend the knee the hamstrings contract eccentrically to decelerate as the knee reaches full extension. Many people think that the hamstring is injured during the concentric contraction of the propulsion phase, actually the lesion occurs during the deceleration portion of the swing phase just before heel strike when the hamstring muscles are contracting eccentrically.

Adaptation

After looking at how muscle injury can result from eccentric muscle contractions, you may wonder why it is considered to be so valuable in influencing optimal muscle performance. Just as skin and bone are able to adapt to mechanical strain to resist further insult, muscle and connective tissue will repair and adapt in a similar way. It is also possible that the central nervous system adjusts to prevent the recurrence of pain.

Concerning myofiber repair, regeneration will take place in exercise damaged musculature. If the basal lamina, vascular, or nerve supply is damaged then repair will take longer and may not be complete, this incomplete repair may also include scar tissue formation. Normally myofiber damage or rupture associated with eccentric exercise is not accompanied by bleeding or nerve injury, and in most cases the basal lamina remains intact.

Connective Tissue Injury and Adaptation

It appears that the endomysium and the perimysium swell following muscle injury and this is where the pain receptors are located. The endomysium and the basal lamina are so intimately related physically that they could be considered a single structure.

One purpose of connective tissue may be to increase shock absorption capability and spare the myofibers from excessive loads. Scarring usually did not occur after a single exercise bout, but with time the musculature was able to adapt to these new stresses.

“Many injuries occur because of the lack of ability within a muscle fiber to produce enough tension in the elongated state”. (Tendonitis: Etiology and Treatment, Standish)

Clinical Applications

Rehabilitation

Muscle rehabilitation relies on several phases that must be identified and brought forth in the training programs. The five basic phases stressed with great importance are:

- Strength (force production)
- Flexibility
- Proprioception / Balance
- Motor Control
- Sport Specific Training

Attempt to incorporate the four phases of rehabilitation into early training.

- **Phase 1**
 - Early ROM: re-establish length of muscle tissue and flexibility.
 - Submaximal isometrics: stability of the joint.
- **Phase 2**
 - Joint stabilization within a pain free range of motion.
 - Gentle strength training submaximal isokinetics.
 - Isotonic exercises to facilitate control.
 - Begin gentle balance activities.
- **Phase 3**
 - Increase strength throughout painfree range of motion.
 - Develop flexibility into end range of motion.
 - Stabilization into final degrees of motion.
 - Proprioceptive exercises and balance function range.
- **Phase 4**
 - Full painfree ROM with normal strength.
 - Begin sport skill retraining.
 - High speed deceleration, plyometric, impulse loading and positional.
 - Deceleration training to stress controlled loading.
- **Phase 5**
 - Sport specific training and conditioning.

Appendix

Manual Protective Systems

The KIN-COM is equipped with two manual protective devices. These devices are the Patient Abort Switch and Emergency Stop Pins.

The Patient Abort Switch is a device activated by the patient when the patient believes an unanticipated event is occurring. This device will turn "OFF" the watchdog circuit. The watchdog circuit will then turn "OFF" the motor and power circuits. This creates an error detected by the software and is displayed on the monitor.

The Emergency Stop Pins are physical (mechanical) stops used as backup to the Automatic Protective System. The correct application of these stops are the responsibility of the operator.

Automatic Protective Systems

The KIN-COM utilizes several analog and digital signals to track the protective systems on the KIN-COM. All of the signals are sampled 100 times a second. The analog and digital signals are constantly checked and cross checked against each other for accuracy and reliability.

The analog signals undergo a conversion to digital signals that the computer can understand. These signals are the angle (potentiometer), speed (tachometer), and the force (load cell) signals. The digital signals include the power supply control, power supply sense, amplifier control, amplifier sense, and other signals that determine the condition of the machine.

The watchdog circuitry is designed to watch the computer for lock-up. The digital lines to the watchdogs from the computer must toggle at a constant 50Hz rate. If this rate varies the watchdogs will interrupt the operation of the unit. If any other error occurs, the watchdogs are turned off, along with the power supply and amplifier signals, by the software.

Listed below are the error code numbers, a brief description of the error, and some helpful hints as to possible causes. The errors are listed numerically for easy reference.

Error Code Descriptions

Various errors can result if the machine is not set up properly, connections are intermittent, or amplifier circuitry drifts due to age or excessive temperature. Following is a list of errors.

Angle Error

These are the codes and explanations for the errors that can occur if a problem arises from angle discrepancy:

- 11** This error will only occur when the amplifier is on which will be during exercise or test, not during setup. During setup the higher angle is determined when the most positive position is selected as a stop point. If for any reason the arm travels beyond this point, (i.e. outside the upper range of motion) error 11 will occur. Possible causes of this error are: amplifier current output insufficient to control stopping power, mechanical linkage is inconsistent (i.e. loose drive belt), electrical components are drifting due to age or temperature, A/D converter is erratic.
- 12** This error will only occur when the amplifier is on which will be during exercise or test, not during setup. During setup the lower angle is determined when the most negative position is selected as a stop point. If for any reason the arm travels beyond this point, (i.e. outside the lower range of motion) error 12 will occur. Possible causes of this error are: amplifier current output insufficient to control stopping power, mechanical linkage is inconsistent (i.e. loose drive belt), electrical components are drifting due to age or temperature, A/D converter is erratic.
- 13** This error occurs when there is a sudden shift in the arm position. It can happen when the amplifier is inhibited or when its not. If the amplifier is on, a correction occurs to get the predicted shift. If the predicted shift is within the allowable range, no error will occur.
- 14** This error occurs when there is a difference between the calculated velocity (determined by angle displacement / time) is greater than the actual velocity as read by the tachometer.
- 17** This error occurs when the voltage input from the potentiometer exceeds the maximum limit that the 12 bit converter can handle. At present, this voltage is 110V. The control code will produce this error when a digital reading exceeding 2040 is reached.
- 19** This error occurs when the amplifier is on and the arm deviates from it's normal fixation point. This error may show up if high forces are placed on the arm during fixation. To prevent this, ensure that switch two of the amplifier is always set to the "ON" position.

Velocity Error

These are the codes and explanations for the errors that can occur if a problem arises from a velocity discrepancy:

- 23** This error occurs when there is a sudden shift in velocity. If the amplifier is inhibited we allow twice the value for velocity shifts. If the amplifier is on, the shift is compared to the last shift to which a calculated value is added that depends on the programmed speed.
- 24** This error occurs when the amplifier is on and there is a difference between the measured velocity and the programmed velocity set by the user. More velocity deviation is allowed in isotonic mode due to the nature of the exercise even when a low speed upper limit is programmed.

- 27 This error occurs when the voltage input from the tachometer exceeds the maximum limit that the 12 bit converter can handle. At present, this voltage is 110V. The control code will produce this error when a digital reading exceeding 2040 is reached.
- 29 This error check scans for high, medium, and low velocity drifts from fixation (velocity zero). Errors have to be in sequence or the counter will reset to zero, therefore if three deviations from fixation occur under heavy loading or poor offset adjustment, an error will occur.
- 38 This error occurs when the actual velocity is continuously lagging the programmed velocity for more than .5 seconds. When the software detects a lagging velocity greater than .5% of the programmed velocity, it will make adjustments to accelerate the arm to the proper speed. If the correction is unsuccessful after .5 seconds, the software will shut the unit down. This error can occur under very heavy loads or under heavy loading combined with a low line voltage.

Force Error

These are the codes and explanations for the errors that can occur if a problem arises from a loadcell or force discrepancy:

- 1 This error occurs when the programmed force limits have been exceeded during an exercise or test in isokinetic mode.
- 33 This error occurs when the change in force is quicker than 600 newtons per sample period (10ms.). This error detects upsets to the loadcell that may be detrimental to the equipment.
- 37 This error occurs when the voltage input from the loadcell exceeds the maximum limit that the 12 bit converter can handle. At present, this voltage is 110V. The control code will produce this error when a digital reading exceeding 2040 is reached.

Other Errors

- 41 This error occurs when software does not read a feedback signal that represents the true value of the power supply. If the software turns the power supply to the amplifier on, then the feedback signal should indicate that the power supply is actually on. If the software has not turned the power supply to the amplifier on, then the feedback signal should indicate that it's off. Any other condition will produce this error.
- 41 This error occurs when software does not read a feedback signal that represents the true value of the amplifier enable. If the software turns the amplifier on, then the feedback signal should indicate that the amplifier is actually on. If the software has not turned the amplifier on, then the feedback signal should indicate that it's off. Any other condition will produce this error.
- 80 This error occurs when the software detects an open circuit in the patient abort switch and in the case of the Manual KIN-COM, the head locking device is also not completely engaged. These two devices will cause an immediate shutdown of the motor circuitry if depressed.

12 Month Warranty

Rehab WREN

██████████ ("Company") Warrants that the KIN-COM, ("Product") is free of defects in material and workmanship.

This Warranty shall remain in effect for one (1) year from the date of the consumer purchase of the Product and extends to any owner of the Product during the Warranty period.

If this Product fails to function because of a defect in material or workmanship, the Company or Authorized Service Group will respond within a 48 hour period of notification.

After analyzing the technical problem; the Company, or Authorized Service Group will replace or repair this Product without charge. Analyzing the problem and/or defective component(s) is necessary and requires the assistance of the user and/or owner.

What This Warranty Covers

1. All hardware and components attached to the KIN-COM base.
2. Computing system to include the monitor and printer.
3. Force sensing hardware.
4. All PC. boards within the main KIN-COM system.
5. Software updates or replacements (a nominal charge will be applied for shipping and handling).

What This Warranty Does Not Cover

1. Replacement parts or labor furnished by anyone other than the Company, the Dealer or an Approved Company Service Agent.
2. Defects or damage caused by labor furnished by someone other than the Company, the Dealer or an approved Company Service Agent.
3. Any malfunction or failure of the Product while it is in the possession of the owner during the Warranty period if the malfunction or failure is caused by unreasonable use, including the failure to provide reasonable and necessary maintenance.
4. Replacement of parts that are considered "normal wear" items (i.e., upholstery, foam pads, printer ribbons, paper, etc.).
5. Repairs of damages or service required due to disaster, accident, or physical abuse to the KIN-COM machine.

Company Shall Not Be Liable for Incidental or Consequential Damages to Property or Business.

Some states do not allow the exclusion of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

Chattanooga Group, Inc. warranties do not supersede the original manufacturers' warranties. This warranty may become void if the owner fails to return the software agreement. This warranty gives you specific legal rights and you may also have rights which vary from state to state.

The Company does not authorize any person or representative to create for it any other obligation or liability in connection with the sale of this Product. Any representation or agreement not contained in this warranty shall be void and of no agreement.

Glossary

Basic Terminology

- Contraction - Concentric** The concentric muscle contraction is a dynamic action in which the ends of the muscle move together. The muscle shortens while producing tension. Positive work is performed.
-
- Contraction - Eccentric** In eccentric contraction, the muscle is forcibly lengthened. The ends of the muscle are moved further apart by an external force. Negative work is performed.
-
- EMG - Electromyography** A technique in which the electrical activity generated by an active muscle is recorded. EMG activity tells us that a particular muscle is firing but does not tell how much force the muscle is generating.
-
- Gravity Correction** The Gravity Correction option on the KIN-COM allows the you to correct for the subject's limb weight during a test. By identifying the subject's limb weight at a specific unrestricted joint angle and identifying the true horizontal position of the KIN-COM Lever Arm, the gravitational effects of the subject's limb will be accounted for throughout the testing range by way of a cosine mathematical formula which is:
- $$\text{Gravity Correction} = (\text{Force}[\text{sampled}]) - ([\text{Weight of Limb}] \times \cosine \varnothing)$$
- where: \varnothing = the angle in degrees of the Lever Arm away from horizontal
 Force = actual Force [sampled] produced during an evaluation as sampled every 1/100th of a second.
-
- Hypertrophy** An increase in the cross-sectional size of a muscle fiber or cell.
-
- Isokinetic Exercise** A muscular contraction where tension develops and the velocity of joint motion is held constant by an external mechanism. The force is variable and accommodating.
-
- Isometric Contraction** An isometric contraction is one where tension develops however the muscle does not shorten or lengthen. Such a contraction can be either maximal or submaximal. The force is controlled by the patient.

Isotonic Contraction	The type of exercise where tension develops against a constant mass (e.g. 10 lbs.) the force is variable dependent upon the velocity of joint motion as controlled by the individual.
Lever Arm	The metal arm which extends from the mechanical axis, and to which the load cell is attached.
Load Cell	Located at the point where each attachment is inserted. It communicates to the CPU (at a rate of 100x / sec.), the amount and direction of force being applied by the patient. The Load Cell can accurately measure from one (1) Newton to 2000 Newtons of force(1 pound = 4.45 Newtons).
Maximal Voluntary Contraction	Refers to the condition in which a person attempts to recruit as many fibers in a muscle as possible for the purpose of developing force.
Muscular Endurance	The ability of the muscle to perform repeated contractions over a pro-longed period of time.
Newton	The KIN-COM software program accurately measures in Newtons, the metric force measurement (4.45 Newton = 1.0 pound). When the screen displays a non-metric equivalent, that display is rounded to the closest pound.
One Repetition Max.	The maximum amount of weight that can be lifted through the weakest point in the ROM, one time.
Passive Motion	Movement within the unrestricted range of motion where the movement is produced entirely by an external force. There is no voluntary muscle contraction.
Potentiometer	Measures the exact angular position of the lever arm at any time during exercise or evaluation.
Power	Where Power is the Rate of doing work. $\text{Power} = \frac{\text{Force} \times \text{Distance}}{\text{Time}} \quad \text{or:} \quad \frac{\text{Force} \times \text{Velocity}}{\text{Time}}$
Progressive Resistance Exercise (PRE)	An approach to exercise where the load or resistance of the muscle is applied by some mechanical means and is quantitatively and progressively increased over time.
Tachometer	Measures and controls the rotational speed of the lever arm during the activity, from zero to 250 degrees per second.
Torque	Torque (Newton meter or foot pound) = Force x Radius Where: Force is the force measured by the load cell and Radius is the length of the lever arm
Work	Work = Force x Distance Where Distance is the angular distance traveled as measured by the potentiometer.

Screen Prompts

Angle	When you select the change setup option and choose screen display followed by scale, markers or baseline; choose this prompt to modify the angle settings.
Angle: OFF	When you select the change setup option and choose screen display followed by traces, touching this prompt will turn off the angle trace.
Angle: ON	When you select the change setup option and choose screen display followed by traces, touching this prompt will turn on the angle trace.
Ankle	Select this prompt to choose the ankle during the joint specification procedure.
Audio Module Test	When the audio module is turned on, this will give you the opportunity to test the audio module installed in your KIN-COM computer.
Baseline	When you select the change setup option and choose screen display, touching this prompt will allow you to select a specific trace and move it up or down on the screen.
Backup Data Files	Used to backup all patient data files from the hard disk drive (C:) to diskette (A:). You should backup your data files regularly by copying them to tape or a floppy disk drive.
Backup Protocols	Backup all protocols and sequences stored on the hard disk drive (C:) onto a diskette (A:). You should backup your protocols regularly by copying them to tape or a floppy disk.
Change Source / Destination Drive From A: to C:	This will identify the disk drive you desire to copy your information to, this identifies the hard disk drive (C:) as the destination drive.
Change Source / Destination Drive From C: to A:	This will identify the disk drive you desire to copy your information to, this identifies the floppy disk drive (A:) as the destination drive..
Change Force to Torque	Choose this prompt if you want the numerical values in your evaluation reports displayed in Ft. Lbs. Average torque will be represented in joules.
Change Force	In the ROM mode of training you have the option to select change to modify ROM parameters, if you select return to exercise from the change force limits or time, ROM & turns you will have the opportunity to verify force values.
Change ROM	In the ROM mode of training you have the option to select change to modify ROM parameters, if you select return to exercise from the change force limits or time, ROM & turns you will have the opportunity to verify expanded range of motion values.

Change Source Drive From A: to C:	This will identify the disk drive you desire to copy your information from, this identifies the hard disk drive (C:).
Change Source Drive From C: to A:	This will identify the disk drive you desire to copy your information from, this identifies the floppy disk drive (A:).
Change Torque to Force	If you want to the numerical values in your evaluation reports displayed in lbs. of force.
Compare Report	This is an expanded version of the standard report and will provide more in-depth information from an evaluation.
CON / CON	This identifies the type of contraction to be performed during the exercise, in this case a concentric contraction followed by a concentric contraction of the opposing muscle group.
CQN / ECC	This identifies the type of contraction to be performed during the exercise, in this case a concentric contraction followed by an eccentric contraction of the same muscle group.
Continuous	This refers to the feedback option desired, here the traces are displayed in a time based format resembling an EKG.
Convert Ver 2.3x or 3.x Protocols on Drive A: to New Format	To convert protocols created in an earlier version of software and stored on a floppy disk drive (A:) to the latest format.
Convert Ver 2.3x or 3.x Protocols on Drive C to New Format	To convert protocols created in an earlier version of software and stored on the hard disk drive (C:) to the latest format.
Convert Old Protocols to New Format	To upgrade protocols from a previous version of software to the latest version.
Copy Data Files	To copy selected patient files from the hard disk drive (C:) to a floppy disk drive (A:) or from a floppy disk to the hard disk. Multiple files may be copied from (C:) to (A:) only.
Copy Files from Drive A: to C:	Choose this option when you desire to copy patient files from the floppy disk drive (A:) to the hard disk drive (C:).
Copy Files from Drive C: to A:	Choose this option when you desire to copy patient files from the hard disk drive (C:) to the floppy disk drive (A:).
Copy Selected Files	This allows you the opportunity to choose at one time the patient files you want to copy to a floppy disk drive (A:).
Custom Position	Displays a scroll box of positions listed by position, including unique positions or multi-joint positions such as the leg press, shoulder diagonals, etc.

Custom	After you select escape or finish side during evaluation, you will have the option of changing patient positioning without exiting the evaluation program.
Database Utilities	Choose this option to rebuild your data base, view patient file statistics, list patient files, import / export protocols, convert old protocols to a current version, view positioning pictures, delete patient positions.
Delete Patient Positions	Select this prompt if you want to remove a patient position that was created and saved previously. This is recommended when a patient is no longer being treated in your facility.
Directory of Drive A:	This will allow you to view patient files saved on the floppy disk located in floppy disk drive (A:).
Directory of Drive C:	This will allow you to view patient files saved on the floppy disk located in hard disk drive (C:).
Display Directory	Allows a listing of all patient data files located on either the hard disk drive (C:) or a floppy disk drive (A:).
ECC / CON	This identifies the type of contraction to be performed during the exercise, in this case an eccentric contraction followed by a concentric contraction of the same muscle group.
ECC / CON	This identifies the type of contraction to be performed during the exercise, in this case an eccentric contraction followed by an eccentric contraction of the opposing muscle group.
Elbow	Select this prompt to choose the elbow during the joint specification procedure.
EMG1	When you select the change setup option and choose screen display followed by traces, touching this prompt will turn off the EMG1 trace.
EMG1: OFF	When you select the change setup option and choose screen display followed by traces, touching this prompt will turn off the EMG1 trace.
EMG1: ON	When you select the change setup option and choose screen display followed by traces, touching this prompt will turn on the EMG1 trace.
EMG2	When you select the change setup option and choose screen display followed by scale, markers or baseline; choose this prompt to modify the EMG2 settings.
EMG2: OFF	When you select the change setup option and choose screen display followed by traces, touching this prompt will turn off the EMG2 trace.
EMG2: ON	When you select the change setup option and choose screen display followed by traces, touching this prompt will turn on the EMG2 trace.
Erase Data Files	This allows you to erase an unwanted patient data file from the hard disk drive (C:).

Erase Selected Files	When you want to erase multiple files from the hard disk drive (C:) this option will allow you to delete the files you select.
Evaluation	Select this prompt when you want to use of the evaluation modes. These include Isokinetic, Passive, Isometric, Isotonic, Protocol, and Muscle Performance test.
Exercise	Select this prompt when you want to use one of the exercise modes. These include Passive, Isometric, Isokinetic or Isotonic exercise.
Export Protocol(s) to Drive A:	Use this option to copy selected protocols from the hard disk drive (C:) to a floppy disk drive (A:). This is useful if you need to copy protocols from one KIN-COM to another.
Export Protocol(s) to Drive C:	Use this option to copy selected protocols from a floppy disk drive (A:) to the hard disk drive (C:). This is useful if you need to copy protocols from one KIN-COM to another.
File	When accessing the ASCII data in reports you have the option of viewing the information on the screen or sending it to a file.
Files Manager	Allows you to backup or restore patient files and / or protocols to and from floppy disk drive (A:) or tape.
High Density (1.44 MB) (or) Double Density (720 KB)	When you desire to format a floppy diskette (A:) you will be asked to identify the type of diskette. High Density (1.44 MB) or Double Density (720 KB) describes the capacity of the diskette.
Format Diskette	Before data can be written to the Floppy Diskette it must be formatted, you will need to format your diskettes before you can transfer information to them. It is possible to purchase diskettes that are already formatted for DOS.
Force	When you select the change setup option and choose screen display followed by scale, markers or baseline; choose this prompt to modify the force settings.
Force: OFF	When you select the change setup option and choose screen display followed by traces, touching this prompt will turn off the Force trace.
Force: ON	When you select the change setup option and choose screen display followed by traces, touching this prompt will turn on the Force trace.
Home Exercise Program	Select this prompt to access the home exercise program files.
Hip	Select this prompt to choose the hip during the joint specification procedure.
Import Protocol(s) From Drive A:	Use this option to copy selected protocols from the floppy disk drive (A:) to the hard disk drive (C:). This is useful if you need to copy protocols from one KIN-COM to another.
Import Protocol(s) From Drive C:	Use this option to copy selected protocols from the hard disk drive (C:) to a floppy disk drive (A:).

Isokinetic	This mode of exercise / evaluation is speed constant with force dependent upon patient effort. This allows for maximal loading of a muscle group through a set range of motion, Start forward, start backward and minimal forces are adjustable.
Isometric	This mode of exercise / evaluation is constant angle with force dependent upon patient effort, minimal force and contraction time is adjustable. This allows for sub-maximal or maximal loading when working through an available range of motion.
Isometric Settings	Selecting this prompt will allow you to modify minimal isometric forces, contraction time, relax after contraction, and time bar settings.
Isotonic	This mode of exercise / evaluation is speed variable dependent upon patient effort, it is also force variable based on acceleration and deceleration effort against adjustable force limits.
KIN-COM	A registered trademark of the Chattanooga Group, Inc.
Marker Lines (or) Marker Zones Filled	When you select the change setup option and choose screen display you will see either marker lines or marker zones filled. You may alternate between marker lines only or a shaded blue zone between the marker lines.
Muscle Performance	One method for evaluating your patients, first an isokinetic test is performed followed by an isotonic endurance test with the isotonic value based upon a percentage of the average force produced during the isokinetic test.
Markers	When you select the change setup option and choose screen display followed by markers, you can setup markers to coordinate with force, velocity, or angle traces. Use the keyboard to enter numbers or use the arrows to move the markers up or down the screen. Markers are useful to enhance patient feedback, however they have no effect on how the KIN-COM functions.
New Test	When performing a patient evaluation you have the option to perform an isokinetic, passive, isometric, isotonic, or muscle performance test, select new test if you want to set up a test not listed in the test scroll box. You may also modify the type of evaluation performed (except muscle performance) by choosing protocol.
Numeric Report	This allows you to display each torque or force curve superimposed (overlaid) along with the corresponding force values, the curves may be concentric only, eccentric only or a combination. This is a useful way to display improvement over a period of time.
Overlay	This feedback option is angle based, a trace displays data in the forward direction separate from the backward direction. Each curve remains on the screen and can be used as a target for training maximally or sub-maximally.
Passive	This mode of training / evaluation is speed constant with no minimal force effort required for motion to occur.
Patient	After you select escape or finish side during evaluation, you will have the option of changing patient positioning without exiting the evaluation program.

Patient File Listing	This option allows you to view all of the patient data files currently on the hard disk drive (C:). These files may be displayed on the screen or sent to the printer.
Patient Files Listing of A:	This option allows you to view all of the patient data files currently on the floppy diskette in drive (A:).
Patient File Listing of C:	This option allows you to view all of the patient data files currently on the hard disk drive (C:).
Patient Positions	Here you have the option of selecting preset, patient, or custom positions for the purpose of setting up your patient on the KIN-COM. You can save the indexed locations by a patient name to be retrieved at a later date.
Patient Position	This option displays all patients stored on a scroll box and allows you to setup your patient exactly the same way as before. If you train more than one joint or joint motion you may want to include some relevant information in the way you name the patient position.
Patient File Statistics	This displays the number and type of test performed on a particular patient, select which test you desire to view.
Positioning Pictures	The scroll box displays a list for selection of standard preset position pictures to help you as you set up your patient.
Positioning Pictures (optional)	The scroll box displays a list for selection of standard preset position pictures to help you as you set up your patient.
Preset Position	Choosing this option will allow you to set up a patient for evaluation or exercise by specifying the joint, muscle group and side right / left.
Preset	After you select escape or finish side during evaluation, you will have the option of changing patient positioning without exiting the evaluation program.
Printer Test	This prompt will allow you to make sure your printer is functioning properly
Protocol	This allows you to make changes to an existing passive, isokinetic, isometric, or isotonic program and store as an individual exercise or evaluation protocol to be retrieved in the future without having to make the same changes each time.
Protocol Convert / Import / Export	Provides options to allow you to transfer individually selected protocols to and from your system.
Rebuild Databases	This option should be run when any type of database error has occurred in your KIN-COM software. If this does not solve the problem you may need to reformat your hard disk drive (C:) and reinstall your KIN-COM software. This is why it is a good idea to backup your data files and protocols on a regular basis.
Reports	Selecting the reports prompt will allow you to access evaluation data stored during isokinetic, passive, isometric, and isotonic testing. Reports options include Overlay, Continuous, Isometric, Muscle Performance and ROM.

RQM	This program is designed to improve joint motion utilizing the ability of the load to measure force throughout the patients available range of motion. You select the force limits as well as the expanded range of motion settings.
Restore Data Files	This procedure is followed to restore previously backed up patient data files from a floppy disk drive (A:) to the hard disk drive (C:) on your KIN-COM. It will be necessary to do this if it becomes necessary to reformat your hard disk drive (C:) to reinstall your software.
Restore Protocols	This procedure is followed to restore previously backed up patient protocol files from floppy disk drive (A:) to the hard disk drive (C:) on your KIN-COM. It will be necessary to do this if it becomes necessary to reformat your hard disk drive (C:) to reinstall your software.
Scale	When you select the change setup option and choose screen display followed by scale, you will have the option to increase or decrease the display scale which effects the size of the effort displayed on the screen.
Screen	When accessing the ASCII data in reports you have the option of viewing the information on the screen or sending it to a file.
Sequential	Allows for design and linking together of up to six different exercise protocols of any type. The sequence can be stored by patient name or by sequence description for future recall from the sequence scroll box.
Set Date & Time	This allows you to verify / set the system date and time.
Standard Report	This is one method for viewing an isokinetic test and is utilized most frequently by clinicians as they report results to the referring physician. You have the option of viewing two test from the same date or two different dates.
System Setup	Choose this option to change any of the following KIN-COM options: facility information, printer type, units of force, units of display, protocol parameter lock, research option, screen options, data format, sound board, positional lock, or to calibrate screentouch.
System Utilities	Choose this option to backup or restore data or protocols, copy or erase data files, format floppy diskettes, change the system date and time, test the printer or test the sound board.
Target OFF (or) Target-ON	This feedback option either turns on / off a blinking ball that leads the trace across the screen.
Traces	When you select the change setup option and choose screen display followed by traces, you will have the option to turn the Angle, Velocity, Force, EMG1 or EMG2 traces on or off.
Traces: THICK (or) Traces: THIN	When you select the change setup option and choose screen display followed by traces, you will have the option to select between having the traces displayed as a thick line or a thin line.

-
- Trunk** Select this prompt to choose the trunk during the joint specification procedure.
-
- Velocity** When you select the change setup option and choose screen display followed by scale, markers or baseline; choose this prompt to modify the velocity settings.
-
- Velocity: OFF** When you select the change setup option and choose screen display followed by traces, touching this prompt will turn off the velocity trace.
-
- Velocity: ON** When you select the change setup option and choose screen display followed by traces, touching this prompt will turn on the Velocity trace.
-
- Wrist** Select this prompt to choose the wrist during the joint specification procedure.
-

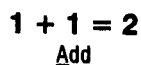
Screen Icons



Select this prompt to save the positioning information to a patient file.

Add Position

Select this prompt to add a custom position to the select setup scroll box.



Select this prompt to add an additional evaluation report to be displayed with the first test. Select this prompt to add an additional exercise protocol to your sequence.



Select this prompt to turn on the internal goniometer to reference a joint position.



Select this prompt to turn on the internal goniometer to reference a joint position.



This option allows you to obtain ASCII data recording for a chosen test. The data can be displayed on the screen sent to the printer, or stored in a file.



Select this prompt to copy your data files or protocols to a floppy disk (A).



Select this prompt to copy your data files to tape.

Backward Force

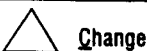
Select this prompt to modify the backward force limit in the isotonic mode.



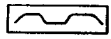
Select this prompt to display report data in a bar graph format.



Select this prompt to begin a sequential exercise program.



Select this prompt to modify training / evaluation parameters.



Continuous

Select this prompt to display exercise / evaluation feedback as a continuous trace.

CON/CON

Select this prompt to choose concentric / concentric as your contraction type.

CON/ECC

Select this prompt to choose concentric / eccentric as your contraction type.

**Contraction
Time:**

Select this prompt to modify the length of the contraction time in the isometric mode.



Create Sequence

Select this prompt to create a new patient sequence from your list of protocols.



Curves

In isometric report, this displays effort at each isometric hold angle. You then have the option to zoom in on up to 3 different angles, when viewing one evaluation and up to 2 different angles when view a comparison report to two different evaluation.



Dec
Width

Select this prompt to decrease the area you wish to zoom in on within an isometric report.



Delete

Select this prompt to erase a selected file, protocol, sequence, or position setup.

Delete Position

Select this prompt to delete a custom position from the select setup scroll box.



Deselect

Select this prompt to deselect or un-flag a patient file to be copied or deleted.



Display

Select this prompt to display the reports you have chosen on the screen.



Select this prompt to decrease the size of a selected item or move a selected item down the screen.

Dynamic Rest Select this prompt to modify the dynamic rest period in the sequential mode. Dynamic rest is a passive motion.


Dynamic Rest Reps Select this prompt to modify the number of repetitions in the dynamic rest period in the sequential mode. Dynamic rest is a passive motion.


Dynamic Rest Speed Select this prompt to modify the speed the lever arm will move during the dynamic rest period in the sequential mode. Dynamic rest is a passive motion.

ECC/CON Select this prompt to choose eccentric / concentric as your contraction type.


ECC/CON Select this prompt to choose eccentric / eccentric as your contraction type.


 **Edit** Select this prompt to make changes to your sequential exercise program.


 **Edit Exercise** Select this prompt to make changes to the exercise portion of the sequential program.

 **Edit Rest** Select this prompt to make changes to the rest portion of the sequential program.

 **EMG** Select this prompt to set up and calibrate your EMG unit.

 **End Test** Select this prompt when you have completed an evaluation, be sure to select save first.

 **Enter** Select this prompt to accept the information as entered and progress to the next step.

 **Esc** Select this prompt to return to the previous screen.



Exit
to DOS

Select this prompt to exit the program and return to the computer operating system.



Feedback:
Anglebar

Select this prompt to display data on the screen in an anglebar format when using the ROM mode.



Feedback:
Bar

Select this prompt to display data on the screen in a bar format during exercise (except isotonic).



Feedback:
Continuous

Select this prompt to display data on the screen in a continuous format during exercise.



Feedback:
Overlay

Select this prompt to display data on the screen in an overlay format during exercise.

**Exercise Time
Seconds**

Select this prompt to modify the exercise time in Isotonic or ROM.



Esc
Finish Exercise

Select this prompt to exit the exercise screen.



Finish Side

Select this prompt when you finish collecting evaluation data and are ready to test the other side.



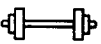
Finish Test

Select this prompt when you finish your evaluation and are ready to view the reports.



First
Target

Select this prompt to create a feedback marker in the isokinetic overlay training mode.



Force
Limits

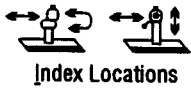
Select this prompt to modify forward, backward, minimal, maximal and isometric forces.

**Forward
Force:**

Select this prompt to modify the forward force limit in the isotonic mode.



Select this prompt to increase the area you wish to zoom in on within an isometric report.



Select this prompt to record information related patient positioning.

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Select this prompt to turn off the label repetitions option when displaying a report.



Select this prompt to turn on the label repetitions option when displaying a report.



Select this prompt to move markers to the left.
Select this prompt to move an area highlighted in a continuous or isometric report to the left.



Select this prompt to identify the side you wish to exercise / evaluate during the joint specification procedure.



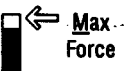
Select this prompt to display a line graph in a continuous or isometric report.



Select this prompt to move the dynamometer up or down and seat right or left.



Select this prompt to modify the marker positions when viewing a report.



Select this prompt to modify the maximum force setting during the ROM program.

Maximum Force:

Select this prompt to modify the maximum force setting during a training program.

Minimum Force:

Select this prompt to modify the minimum force setting during a training program.

Min. Isometric Forces

Select this prompt to modify the minimum force setting during an isometric program.



Select this prompt to add a new patient to the select patient scroll box.



Select this prompt to set up new target lines (get first, get second) in the isotonic mode.



If you select view during reports (this is an option just before selecting display), then use the page down key to display the next page of information. Select page up to return to the previous page of information.



Select this prompt if you do not want to store data to a patient file.

Non-Completed Reps: NO

Select this prompt to require the individual to move the lever arm the entire range of motion during the isotonic mode. This will allow you to count sets and repetitions as well as input a recovery time.

Non-Completed Reps: YES

Select this prompt to require the individual to move the lever arm as they would a free weight, they are required to reach the stop angle before they are allowed to change direction.



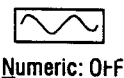
Select this prompt to identify none as the side you wish to exercise / evaluate during the joint specification procedure (this is used for cervical or trunk).



Select this prompt to choose one or more copies of a report when printing.

Number of Sets:

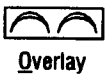
Select this prompt to modify the number of sets you will require during the exercise.



Select this prompt to turn off the numeric data displayed in a continuous or isometric report.



Select this prompt to display numeric data in a continuous or isometric report.



Select this prompt to display exercise / evaluation feedback as an overlay trace.



Select this prompt to toggle between viewing the isometric curves you previously zoomed in on either separately or superimposed upon one another.



Select this prompt to toggle between viewing the isometric curves you previously zoomed in on either separately or superimposed upon one another.



Select this prompt to display peak force efforts when viewing reports.



Select this prompt to display a picture of the desired patient setup.



If you select view during reports (this is an option just before selecting display), then use the page down key to display the rest of the information. Select page up to return to previous page.



Select this prompt to print screen information or an evaluation report.



This screen displays a scroll box of all the previously saved reports. From this screen select all of the reports you wish to print and the number of copies to print.



Select this prompt to print a report of data compiled during exercise.



Select this prompt to print a report of data compiled during exercise.



Selecting this prompt will display the average power and the total work bar graphs, you may also look at the endurance values from the data. The percent difference is also displayed between the 2 test: $\% \text{ Diff} = [(\text{Test 2} / \text{Test 1}) - 1] \times 100$.

Range of Motion Expansion:

Select this prompt to modify the amount of additional joint motion you want to allow during ROM training. Remember the amount of joint motion is dependent upon force limits you set for return force and maximal force

Recovery Time:

Select this prompt to modify the amount of rest you want to allow between sets.



Re-do

Select this prompt to repeat the previous step.



Select this prompt to remove one of the test to be displayed when viewing reports.



Report Writer

Report writer automatically places evaluation data in a letter format to send to physicians.

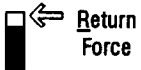
Reps per Set

Select this prompt to modify the number of repetitions required per set.



Reset

Select this prompt to reset the stop angle.



Return Force

Select this prompt to modify the return force setting during the ROM program.



Return to Exercise

Select this prompt to return to exercise from the change setup menu.



Return to Test

Select this prompt to return to evaluation from the change setup menu.



Select this prompt to move markers to the right.
Select this prompt to move a highlighted area in a continuous or isometric report to the right.

Relax After Contraction: ON

Select this prompt so the patient will not have to remove force from the load cell after an isometric contraction.

**Relax After
Contraction: YES**

Select this prompt so the patient will be required to remove force from the load cell after an isometric contraction.



Restore From
Diskette

Select this prompt to copy patient files from a floppy diskette (A) to your system.



Restore From
Tape

Select this prompt to copy patient files from the tape drive to your system.

**Return
Force:**

Select this prompt to modify the return force setting during the ROM program.



Select this prompt to identify the side you wish to exercise / evaluate during the joint specification procedure.



Select this prompt to save your new protocol, sequence or data recorded during training / evaluation.



Select this prompt to modify the size of the trace displayed on the screen.



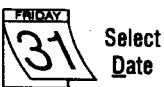
Select this prompt to modify items such as traces, scale, markers, baseline, and marker lines.



Select this prompt to create a second feedback marker in the isokinetic overlay training mode.



Select this prompt to accept the isometric curves at a particular angle when you choose the zoom option in curves.



Select this prompt to add an evaluation report from a separate date to be displayed or printed.

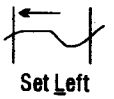


Select this prompt to add an evaluation report from a separate patient to be displayed or printed.

Select this prompt to modify the markers that represent average force.



Select this prompt to modify the markers that represent average force.



Select this prompt to move the left marker that represents average force.



Select this prompt to move the right marker that represents average force.



Select this prompt to modify the marker that represent peak force.

**Sets, Reps
& Turns**

Select this prompt to modify sets, repetitions, recovery time and turning points.



Select this prompt to setup the uninvolved limb after testing the involved side.

**Speed
Backward**

Select this prompt to modify the speed the limb will move from the stop to the start angle.

**Speed
Forward**

Select this prompt to modify the speed the limb will move from the start to the stop angle.



Select this prompt to modify the speed forward, speed backward and contraction type.



Select this prompt to begin your exercise program.



Select this prompt to begin recording data during an evaluation.




Select this prompt to begin recording data during an isometric evaluation.


Start Backward Force: Select this prompt to modify the force required to move the limb to the start angle.


Start Forward Force: Select this prompt to modify the force required to move the limb to the stop angle.


Static Rest Select this prompt to modify the rest time (in sec.) between exercises in sequential.


 **Stats** Select this prompt to display the evaluation parameters and statistics in reports.

 **Stop Exercise** Select this prompt to stop the exercise program.

 **Stop Test** Select this prompt to stop recording data during an isometric evaluation.

 **Stop Warm-up** Select this prompt to stop the warm-up session.

 **Tag** Select this prompt to flag one or more files to copy.
Select this button to mark the currently highlighted report. Any report that is Marked will be printed when you select print reports.

 **Tag All** Select this prompt to flag all files to copy.
Select this button to mark all of the reports in the scroll box. Any report that is Marked will be printed when you select print reports.

Test Time Seconds Select this prompt to modify the amount of time data will be recorded during the evaluation.

Time Bar: OFF Select this prompt to turn off the time bar during isometric exercise / evaluation.

Time Bar: ON Select this prompt to turn on the time bar during isometric exercise / evaluation.



Displays information in a time graph or time based format.

Time Graph

Time, Reps & Turns

Select this prompt to modify exercise time, repetitions, and turning points in the isotonic mode.

Time, ROM & Turns

Select this prompt to modify exercise time, range of motion expansion and turning points in the ROM mode.



Traces

Select this prompt to turn on or off force, velocity, range of motion or EMG traces.



Select this prompt to turn off gravity compensation during evaluation.



Select this prompt to turn on gravity compensation during evaluation.



Select this prompt to turn off the store exercise option in the isometric mode.



Select this prompt to turn on the store exercise option in the isometric mode.

Turning Points

Select this prompt to modify the acceleration / deceleration type during exercise or evaluation. This is similar to ramp time on our electrical stim. Your choices are: Xlow, Low, Med and High.



Select this prompt to remove one or more files from the list to copy. This will not delete any files. Select this prompt to unmark the currently highlighted report. Any report that is Unmarked will not be printed when you select print reports.



Select this prompt to remove all files from the list to copy, this will not delete files. Select this button to unmark all of the reports in the scroll box. Any report that is Unmarked will not be printed when you select print reports.



Unzoom

After you select the zoom option to concentrate on a specific area you can exit this option.



Select this prompt to access the utilities menu to modify system setup, system utilities, and database utilities.



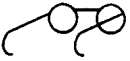
Utilities

Select this prompt to view data prior to the display option in reports.



View

Select this prompt to display data recorded during an exercise session.



View
Results

Select this prompt to allow your patient to experience the test parameters prior to testing.



Warm-Up

Select this prompt to display data in terms of work during a continuous evaluation.



Work Graph

Select this prompt if you want to store data to a patient file.



Yes

Select this prompt to zoom in on a specific area within an isometric report.



Zoom

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