



HEARTBEAT FITNESS REPAIR

BIOMEDICAL DIVISION • CLINICAL CALIBRATION & SAFETY PROTOCOL

Factory-trained biomedical engineering for hospital, clinical & commercial fitness equipment

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Clinical Calibration & Safety Protocol

Standard Operating Procedure for Cable-Based Rehabilitation & Resistance Equipment

DOCUMENT ID: HFR-SOP-BIO-005

REVISION: 2.1 (Clinical Grade)

EFFECTIVE DATE: August 2026

SERVICE REGION: Tampa Bay Metro

STANDARDS: Clinical PM & Audit Trail

1. CLINICAL GOVERNANCE & PATIENT SAFETY MANDATE

In physical therapy and cardiac/orthopedic rehabilitation environments, cable- and pulley-based resistance equipment delivers a prescribed, protocol-driven load rather than general fitness training. A pulley system carrying uneven friction, or a cable stack applying 8 lbs of actual resistance when the selector indicates 5 lbs, directly alters a patient's prescribed exertion beyond their clinician-set threshold. Undetected cable wear introduces acute injury risk on top of this: internal strand failure is completely invisible until catastrophic rupture under load. Heartbeat's Biomedical Division enforces mandatory tactile cable inspection and resistance-load verification (As-Found vs. As-Left) on every clinical service visit.

2. FOUR-STEP BIOMEDICAL PREVENTIVE MAINTENANCE & CALIBRATION PROTOCOL

STEP 1 Baseline Specification Mapping

Identify machine OEM factory tolerance thresholds from clinical service documentation. Benchmark target parameters including resistance-to-load ratios, pulley reduction ratios, and cable tension specifications.

STEP 2 Multi-Point Load & Travel Verification

Perform dynamic physical testing across the full resistance range: verify actual applied load against console/selector-pin indicated value at low, mid, and high stack positions; confirm uniform cable travel with no binding.

STEP 3 Tactile Cable Inspection & Mechanical Alignment

Perform full-length gloved tactile inspection of all load-bearing cables to detect internal kinks, soft spots, or core deformation invisible to the eye. Lubricate, align, or replace guide rods, pulleys, or bushings measuring friction beyond tolerance.

STEP 4 Clinical Audit Trail & Certification Sign-Off

Affix tamper-evident calibration certification tags with asset ID, technician initials, and due date. Generate a digital service report cataloging cable condition, pulley alignment, guide rod wear, and frame structural integrity.

CRITICAL CLINICAL ACCEPTANCE TOLERANCES

- **Resistance Load Accuracy:** $\pm 5\%$ of console/pin-indicated load across full stack range
- **Cable Travel:** 100% uniform resistance through full range of motion, zero binding
- **Guide Rod Alignment:** Zero measurable lateral play at full extension

SAFETY CONDEMNATION CRITERIA: Any device exhibiting frayed cable coating with visible inner core distortion, a cracked or deformed guide rod, or a weight stack that fails to fully seat must be immediately tagged CONDEMNED / OUT OF SERVICE.

- **Cable Fatigue:** Any detected internal strand separation ("bird-caging") is grounds for immediate replacement
- **Frame Structural Integrity:** Zero visible or tactile weld cracking at load-bearing points
- **Weight Stack Seating:** Full, positive stack engagement required at every selector position

● 3. STEP-BY-STEP TECHNICAL CALIBRATION SEQUENCE (SELECTORIZED CABLE STATIONS)

STEP	PROCEDURAL ACTION & CONSOLE INTERACTION	VERIFICATION PARAMETER	TECHNICAL TOLERANCES & NOTES
1	Isolate & Power Down: Disconnect power (electromagnetic units) or fully unload the weight stack (pin-selected units).	Stack rests at zero load; cable slack confirmed throughout.	Never inspect a loaded cable or stack under tension.
2	Visual Cable Path Inspection: Trace the full cable path across every pulley for visible fraying, discoloration, or misalignment.	No visible core exposure; cable rides centered on each pulley.	Visual check alone is not sufficient — proceed to tactile check.
3	Full-Length Tactile Cable Check: Run a gloved hand along the entire cable length, feeling for kinks or flat spots.	No irregularities felt; consistent diameter throughout the cable.	The only reliable method to catch internal strand failure.
4	Resistance Load Verification: Apply a calibrated load gauge at low, mid, and high stack positions.	Reading within ±5% of indicated load at all three positions.	Document As-Found value before any adjustment.
5	Pulley & Guide Rod Friction Check: Cycle the full range of motion by hand; feel for binding or grinding.	Motion is smooth and uniform through the full travel.	Binding often indicates a dry bushing, not a cable problem.
6	Adjust & Re-Verify: Lubricate, align, or replace components as needed; re-run the load verification.	As-Left reading matches target within ±5% tolerance.	Record both As-Found and As-Left readings in the compliance log.
7	Weight Stack Seating Check: Cycle the selector pin through every position; confirm full engagement.	Stack seats fully and consistently at every position.	A stack that fails to fully seat is a condemnation trigger.

● 4. CLINICAL FIELD VERIFICATION CHECKLIST & EQUIPMENT AUDIT LOG

ASSET ID / TAG	EQUIPMENT MAKE & MODEL	SERIAL NUMBER	CABLE INTEGRITY	GUIDE ROD PLAY	AS-FOUND LOAD	AS-LEFT LOAD	CLINICAL STATUS
CR-CB-01	Cybox Eagle Cable Column	SN-773510-C	✓ PASS	0.0 mm	42 lbs / 8%	45 lbs / 5%	CERTIFIED
CR-CB-02	Keiser Functional Trainer	SN-773588-C	✓ PASS	0.2 mm	18 lbs / 4%	20 lbs / 2%	CERTIFIED
PT-CB-04	Dual Adjustable Pulley	DAP-702-91	Internal fraying	N/A	—	Replaced cable	TAGGED / OK
[Blank Log]			[] PASS [] FAIL	___ mm	___ lbs / ___%	___ lbs / ___%	[] PASS [] COND

LEAD BIOMEDICAL FIELD ENGINEER

Name: _____

Certification ID: _____

Signature: _____

HOSPITAL / FACILITY CLINICAL DIRECTOR

Facility Name: _____

Authorizing Sign: _____

Inspection Date: _____

CALIBRATION AUDIT TRAIL STATUS

Compliance: Annual PM Protocol Complete

Next Due Date: _____

Emergency Dispatch: 727-512-5120

SCHEDULE CERTIFIED BIOMEDICAL SERVICE

Heartbeat Fitness Repair's Biomedical Division performs this full calibration and safety protocol on-site, with a complete clinical audit trail for facility compliance records.

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