

VERMONT
RELEASE CALIBRATER
OPERATION AND MAINTENANCE

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INTRODUCTION

NOTE: Consult the binding manufacturer's most current technical literature before beginning an equipment inspection.

The Calibrater is a fully integrated installation and inspection station that is designed to measure the release torque of Alpine ski/boot/binding systems. It can also be used to install and service bindings prior to inspection. Three components are necessary to conduct all tests: a FOOT, a LEG, and an ARM. The FOOT is a last that is inserted into the boot. The LEG is an extension of the FOOT used for forward or backward lean tests. The ARM is a torque wrench that is attached to the FOOT for twist release tests and to the LEG for forward lean release tests. The Adult FOOT is suitable for boot sole lengths 275 mm and longer. The Junior FOOT is suitable for boot sole lengths less than 275 mm. Very short boots can be accommodated by removing the boot liner.

The complete Calibrater includes LEG, Adult and Junior FOOT, Foot Collar, Universal ARM, Tilt Vise, spare parts, Instruction Manual, Video Training Tape, Torque Limiting Screwdriver with adapters, Calibration Bracket with optional Tool Hanger, Short Ski Adapter, Dead Hammer, and a foam-lined box to store components in the off-season.

The Tilt Vise can also be used to secure the ski during binding installation and repairs. The vise has a series of holes in the aluminum frame to hold it securely to your wood or metal workbench. A chip tray automatically deposits debris into a detachable plastic bag whenever the vise is tilted. Ski stops are independently adjustable and a "camber" support is available for installing bindings with camber-related performance features. Ski clamping pressure is controlled by easy-to-reach knobs under the ski platform.

WISE INSTALLATION

- 1) The Vise, Calibration Bracket, and (optional) Component Hangers can be attached to any work bench that is at least 75 cm. high with the screws and bolts provided. Leave at least 50 cm. between the Vise and the wall behind it. Leave enough room to the left and right of the Vise to accommodate the ski and extra room to the left for forward lean tests. Attach the Calibration Bracket with (optional) Component Hanger to the right and, if possible, below the Vise or to the wall behind the Vise.
- 2) Use the Vise's aluminum frame as a template to properly locate the Vise installation holes in the workbench. Do not use any holes drilled for other fixtures or earlier Tilt Vise models.
- 3) Use a 3/16th inch drill bit to create a pilot hole through each of the two slots in the face of the aluminum frame and into the edge of the workbench. The dimensions of the slot are intended to provide access to sound supporting material in the workbench. If the workbench is too thin to provide adequate support, re-enforce the underside with a "2 by 4" held in place by "Deck Screws" (not provided).
- 4) Drive a 5/16th lag bolt with washer (provided), into each pilot hole.
- 5) Use a ¼ inch drill bit to drill bolt holes through the top of the workbench using the holes in the top of the aluminum frame as a template.
- 6) Insert and tighten ¼ inch bolts with nuts and washers (provided) and retighten the lag bolts.
- 7) The Tilt Vise should be used to secure the ski for all tests. If another method of restraining the ski is to be used, test results must be compared to the Tilt Vise using the method described in Appendix I of the manual to assure that all operators obtain the same results regardless of the method used to restrain the ski.

WISE OPERATION AND MAINTENANCE

To clamp a ski in the Vise, lift the Ski Clamp handles, adjust the ski stops to a position wider than the ski, insert the ski, and depress each clamp's handle. If necessary, readjust the clamp pressure knobs on the underside of the vise. Make clamp pressure adjustments with the ski clamp open. Clamp pressure need only be sufficient to prevent movement of the ski.

Twist release tests are made with the Vise in the horizontal (up) position, with the ski clamps open, and using the FOOT and ARM of the Calibrater. Forward lean tests are made with the Vise in the inclined (down) position using the FOOT, LEG, and ARM of the Calibrater. Have the LEG in place before inclining the Vise and use it to lower the Vise into position. Insert the ARM into the LEG after the Vise is in the inclined position. To incline the Vise, release the Vise Clamp Latch at the extreme left end of the Vise.

If the ski is too short for the Tilt Vise, the Short Ski Adapter should be slipped over the tail of the ski and the box tube frame of the Vise. During forward lean tests the Adapter is clamped in place as if it were a ski. During twist tests the Adapter is secured loosely by latching the ski clamp into the nearest hole in the Adapter without readjusting ski clamp pressure.

Replace clamp bumpers when worn or cracked. Replace clamps when bent or loose. Use a wrench to replace and readjust the Vise Clamp bumper in order to eliminate looseness in the Vise when in the up position. Do not over-tighten the Vise Clamp. Thumb pressure alone should be sufficient to latch the Vise and Ski Clamp.

CLASSIFICATION AND LIMITATIONS

The Calibrater is appropriate for testing, in twist and forward lean, all releasable Alpine ski bindings in common usage at the time this document was published. However, an adapter and special instructions are required for the proper inspection and calibration of many types of releasable Mountaineering, Alpine Touring and Telemark equipment.

GENERAL INSTRUCTIONS

The Calibrater is a precision tool specifically designed to measure the release torque of Alpine ski/boot/binding systems. Although the Calibrater is manufactured to withstand the rigors of shop use, reasonable care should be taken to protect it from abuse. The Calibrater should be returned to its protective foam-lined box whenever it is not in use for long periods. The box is also an excellent place to store support materials: video instruction tapes, spare parts, manuals and calibration records--to guard against loss.

WARNING

No guarantee is expressed or implied that the use of any products or equipment described herein will prevent injury while skiing. We contract to provide reasonable care in the manufacture of all products and will replace any part that is found defective within one year of delivery. We will not replace misused equipment.

SPECIAL WARNING

Observe special care when inspecting old (more than three years) or heavily used bindings and units that have been adjusted near the top of their release indicator scale. Bindings of this type, especially older plastic models, may explode during release. Therefore, make sure no one is standing behind the heel piece when making a Forward Lean test. It is also recommended that suitable eye protective wear be worn by the Calibrater operator and all observers whenever units that meet the description above or any models with a known history of breakage are tested.

STEP-BY-STEP OPERATING PROCEDURES

The following instructions apply to a ski secured by the Tilt Vise with the tip pointing to the left of the operator.

Twist Tests

- 1) Select the correct components. Use the Adult FOOT if it fits.
- 2) Put the FOOT and Foot Collar into the boot, rotate the Foot-Collar until the Foot Shaft is vertical, and buckle the boot (normally requires only one or two buckles).
- 3) Attach the ARM to the FOOT so that the floating plastic handle points (to the right) toward the tail of the ski.
- 4) Open the two Ski Clamps.
- 5) Set the appropriate yellow Release Torque Indicator to zero. Move the other indicator to the end of the scale.
- 6) Grasp the floating plastic handle of the ARM (with your right hand--palm up) and the black plastic (HD5) grip at the driver end (with your left). Keep the Calibrator ARM level and the FOOT shaft perpendicular to the ski.
- 7) Operate the ARM with open hands and keep the handle floating by not allowing the plastic handle to touch the chrome shaft.
- 8) Perform the release with a smooth, uninterrupted motion. Complete the release in one to three seconds.
- 9) Read the appropriate release torque indicator and reset it to zero.
- 10) Repeat the test as required.
- 11) Perform 6 through 9 in the opposite direction if required.

Forward Lean Tests

- 1) Move the ski as far to the right in the Vise as practical and clamp it in place. Take care to adjust the ski clamps correctly.
- 2) Attach the LEG to the FOOT so that the alignment pin in the LEG fits into the slot in the FOOT.
- 3) Open the binding to allow the boot heel to lift. Slip the cable strap under the boot sole approximately 4 cm. from the heel. Re-latch the binding while pulling up on the strap. Move the elastic stabilizer shunt upward and then secure the cable to the cable hook.
- 4) Move the shunt as far down the cable as possible so that it takes up slack, holds the strap in place, and helps keep the LEG perpendicular to the ski.
- 5) Use the LEG to put the ski into the incline position before attaching the ARM. Attach the ARM to the inside of the socket in the LEG so that the ARM is perpendicular to the ski.
- 6) Set the appropriate release torque indicator to zero. Move the other indicator to the end of the scale.
- 7) Stand in front of the Calibrator and grasp the plastic floating handle with your left hand.
- 8) Perform the test with a smooth uninterrupted motion. Keep the handle floating and keep your forearm perpendicular to the Calibrator ARM. Complete the release in one to three seconds.
- 9) Read the release torque indicator and reset it to zero.
- 10) Repeat the test as required.

ERROR PREVENTION CHECKLIST

When performing Calibrator operations, take special care to observe the following precautions:

- 1) Don't grab or cock the floating handle during any test--support it with an open hand and keep it floating.
- 2) Don't allow your left thumb to apply pressure to the chrome-plated wand when making twist tests—rest your thumb on the plastic grip.
- 3) Don't tip the ARM up or down during twist tests--keep it level.
- 4) Don't push the ARM when making forward lean tests--always pull.
- 5) Don't let the ski flex during forward lean tests--keep the right-hand ski clamp close to the heel piece.
- 6) Don't pull up or down on the floating handle during forward lean tests--always pull with your forearm perpendicular to the handle.
- 7) Don't let the leg lean forward relative to the ski during forward lean tests--keep the strap and shunt snug.
- 8) Don't "snap" the boot out of the binding during any test--apply a smooth, uninterrupted motion.
- 9) Don't forget to reset the appropriate yellow release indicators before every test.

ROUTINE CALIBRATER AND VISE INSPECTION

Check the following prior to each use of the Calibrator. If deficiencies are noted in any of the following areas, consult the Maintenance and Repair sections of this manual:

- 1) Make sure that the yellow release torque indicators point to zero. To do this, move one indicator at a time up against the wand. Each indicator should point to within 1/4 of the smallest division of zero.
- 2) Check that the release indicators are intact and can move freely, with some resistance, but do not bind in the slot. Check also that they correctly follow the wand and do not jump or slip back when the binding releases.
- 3) Check that the wand does not drag on the scale or the protective frame. Also check that it does not touch the beam.
- 4) Check that the scale and the frame that supports it are not damaged or bent.
- 5) Check the cable strap assembly for damage or wear. Check the strap for abrasion. Check the cable for kinks or broken wires.
- 6) Check the elastic stabilizer for damage or wear. Make sure the plastic cable sleeve is lubricated with a thin film of Armorall.
- 7) Check all clamps for proper function. Check rubber bumpers and pads for tears or cracks.
- 8) Check the Vise hinge for damage or looseness.
- 9) Check that the FOOT is not bent or otherwise damaged.
- 10) Check FOOT shaft for damage or wear. Make sure that it fits the socket at the bottom of the LEG.

NOTE: *If the binding has an upward release capability at the toe, backward lean tests can be made with the Calibrator. If the Tilt Vise is used, reverse the direction of the ski. Place the strap under the sole approximately 6 cm. from the toe and release the binding as described in 2 through 9 above.*

CALIBRATER MAINTENANCE AND REPAIR

Most routine maintenance and component replacement operations can be performed in the shop. Calibrator components do not need to be returned to the factory except as noted.

1) **ARM** - Keep the yellow release torque indicators and their track clean. Replace the indicators when damaged or loose. It is a good practice to replace them every year or two. Remove the indicators, when required, by gently pulling and prying the plastic fingers from the slot. Replace the indicator by seating the pointer on the scale and then squeezing the plastic fingers together while pressing them into the slot. The bottom of each indicator is marked left (L) or right (R) and should always be replaced in pairs. When properly inserted they should point directly across the slot in the scale. Return the ARM to VSSE if damage or wear cannot be corrected by the above procedures or if proper function cannot be restored.

2) **LEG** - Keep the steel socket at the bottom of the LEG clean, smooth and lubricated with a thin film of silicone. Straighten any kinks that develop in the cable. Replace damaged or worn cables or straps. Always use clevis pins and split rings supplied by VSSE for reassembly. Keep the plastic covering of the cable lubricated with "Armorall" to allow the stabilizer to move freely. Replace the stabilizer when worn or broken. To install the stabilizer pass the looped end of the cable through the rubber O-ring, slide the rubber spacer over the O-ring, stretch the O-ring and pass the looped end of the cable back through it so that the two legs of the cable are separated by the rubber spacer.

TROUBLESHOOTING

Before consulting this section, read all technical information supplied by the manufacturer of the binding being inspected. If necessary consult the "Binding Mechanics Handbook" (distributed by VSSE).

1) **PROBLEM** - Different operators get different Measured Release Values testing the same binding.

SOLUTION:

a) Differences may be due to changes in the binding. The first few releases are usually higher than successive releases. It may take five, or more releases before a binding releases consistently. To eliminate binding factors and look only at true differences among operators, conduct the test described in Appendix I.

b) Modern bindings in good condition are least affected by operator error. Obsolete or worn out models are most affected. Operator error therefore exaggerates the difference between what is measured and what is expected when dealing with the worst release systems.

c) Techniques likely to produce error are physically more difficult for the operator than correct technique. Review the Video Training DVD provided by VSSE and follow the Error Prevention Check List above. Good technique saves time and effort.

d) Check that the Ski Clamps are open during twist release tests and the Foot Collar is in place on the Foot Shaft. These precautions should help the operator to apply two equal and opposite forces to the Calibrator ARM and help prevent the application of loads that can confuse the binding.

e) As a check on good technique during forward lean tests, operate the ARM by pulling with a short cord tied to the center of the floating handle. Alternate this method with normal technique and compare results. When proper technique is used the method of grasping the handle should have no significant effect on results.

f) When proper technique is observed operator-initiated error should not exceed plus or minus 2 1/2%. Even differences of plus or minus

5% are acceptable. However, binding manufacturers allow plus or minus 15% difference between measured and reference release values, so don't anguish over small differences between what you observed and what you thought you should have observed. The Calibrator is only a tool. Use it to find the big problems in the release system, not the small problems in the operator.

2) **PROBLEM** - Results are consistently higher in one direction than the other.

SOLUTION:

a) There may be a zero error in the ARM. Follow the Routine Inspection procedures listed in this manual (pg.8). b) The release torque indicator mechanism of the Calibrator ARM may be damaged. To check this, conduct the dead weight test described in Appendix II of this manual.

c) There may be a persistent operator-induced error. To reduce the potential for operator error, make sure the Ski Clamps are open and the Foot Collar is in place and rotated to a position on the Foot Shaft that keeps the Foot Shaft vertical not tilted to one side or the other.

d) As in (1f) above, don't lose perspective. Persistent but small differences between clockwise and counter clockwise release should not interfere with the proper inspection of the release system.

3) **PROBLEM** - Different Calibrator ARMs give different results.

SOLUTION:

a) The Calibrator is manufactured to a tolerance of plus or minus 2 1/2% and should perform, in service, to a tolerance of plus or minus 5%. The allowed difference between two devices can therefore be as great as 10%. While this may seem like a lot, it is only one third of the difference allowed by the binding manufacturers between bindings on the same pair of skis.

b) As in (1a) above, the problem may be the binding. Follow the test in Appendix I and use multiple ARMs with a single operator. Perform the test in both clockwise and counter-clockwise directions.

c) The quickest and simplest way to check the calibration of an ARM is with the dead weight test described in Appendix II of this manual.

d) If (3c) above shows the ARM to be out of calibration return it to VSSE for repairs.

4) **PROBLEM** - Calibrator ARM appears to fail Routine Inspection.

SOLUTION:

a) Conduct the dead weight test described in Appendix II of this manual.

b) If the ARM fails this test or if the problem appears to affect performance in actual use, return the ARM for repair.

5) **PROBLEM** - Measured Release Value does not agree with the binding manufacturer's Release Torque Range.

SOLUTION:

a) Make sure that you are using the correct and most current chart supplied by the binding manufacturer.

b) Consult the manufacturer's most current technical information for troubleshooting procedures.

c) Conduct a lubricated test of the system (unless the manufacturer warns against this procedure). Compare clean test results to lubed test results and make sure that the difference does not exceed the

tolerance given by the binding manufacturer. Recheck the lubricated results against the Release Torque Tolerance.

d) If this problem occurs repeatedly with a specific binding type, review the Error Prevention Checklist section of this manual and make sure that operator error is not a factor. If operator error appears to be a problem, refer to (1d) and (1e) above. Another possible source of error is the incorrect use of the stabilizer. Without the stabilizer snugly in place, some types of heel pieces may cause the Calibrator ARM to overshoot due to the binding's release action. To check for overshoot, have an observer watch the release indicator during a forward lean test. The value recorded by indicator should not be more than 5% greater than the highest value observed during the test.

Overshoot is a rare but real phenomenon. It can occur when a heel piece with an abrupt release action is set near the top of its range of adjustment. Under these conditions a shock, which can be felt by the operator, may be transmitted through the system. However, the shock load felt by the operator and the Calibrator would not necessarily be felt by the skier's leg during an actual release. Therefore, when overshoot is detected, use the peak value observed prior to release and ignore the higher value recorded by the indicator.

e) If this problem occurs repeatedly with different products, review all Calibrator training materials. If the problem persists, contact VSSE at (802) 899-4738.

f) When all other factors have been ruled out refer to the manufacturer's most recent technical information to determine allowable deviations from the Initial Release Indicator Value.

6) **PROBLEM** - Difference between clean and lubricated test results exceeds specified limits.

SOLUTION:

a) Refer to the binding manufacturer's most current troubleshooting procedures.

b) If lubricated results are less than clean results the boot may be incompatible with the binding. This usually means that the boot is too soft and/or too high in friction for the binding.

c) Check to see that the boot/binding contact areas are not damaged or contaminated.

d) If the lubricated results are higher than clean this may mean that the binding is worn out.

7) **PROBLEM** - Boot releases from binding but heel piece remains in latched (closed) position.

SOLUTION:

a) Consult the binding manufacturer's most current technical information for troubleshooting procedures with special attention to forward pressure adjustment.

b) The problem may be due to excessive counter flex of the ski. Move the heel piece as close as practical to the right ski clamp and repeat the test.

INSTRUCTIONS FOR THE SHORT SKI ADAPTER

To test short skis (less than 100 cm.) in forward lean, slide the plastic covered 'C' section of the Short Ski Adapter over the ski tail and clamp down the aluminum channel portion of the adapter as if it were a ski.

Reposition the ski clamp rubber bumper within the closest hole for twist tests. Do not readjust the clamp pressure—clamp the adapter loosely.

When not in use, hang the Short Ski Adapter from the hook on the back side of the Tool Holder.

OPERATING INSTRUCTIONS FOR THE DEAD HAMMER

Use the Dead Hammer in place of the palm of your hand to test the binding toe piece for correct anti-shock performance. Be careful not to strike buckles or other boot fixtures.

When not in use, store the Dead Hammer by placing the shaft in the large hole in the flange of the Tool Holder.

OPERATING INSTRUCTIONS FOR THE TLS

The Torque Limiting Screwdriver (TLS) is preset at the factory to approximately 4 Newton meters (Nm) torque and is marked with a red cap. The TLS allows the mechanic to apply consistent, reproducible preset torque to binding installation screws which is especially helpful during the inspection of used equipment.

If the screw is properly installed, the TLS clutch will release without breaking the adhesive seal between screw and ski. If the screw rotates at all, it should be removed, glue added to the hole, and the screw re-inserted using the proper (4 Nm) torque. If the hole is stripped, follow the ski and binding manufacturers' instructions for repair before re-inserting the screw.

The TLS can be a help in training new binding mechanics. When installing screws into properly tapped holes it should not be necessary to apply more than 4 Nm of torque. During training, if the TLS clutch releases it is an indication to the trainee that more torque has been applied than is necessary.

The Torque Limiting Screwdriver can also be used with the 1/4 inch hex adaptor (supplied with the Calibrator) to check the preset torque of power screwdrivers. To check a power driver clutch adjustment, loosen the screwdriver clutch, join the power driver and the TLS with the adaptor, position the soft plastic cap of the TLS against the workbench, push down with normal (screw insertion) force on the power driver handle, and start the power driver. The adaptor should remain stationary and the power driver clutch should release. Tighten the power driver clutch one position (one click) and repeat until the TLS allows the adaptor to rotate. Then loosen the power driver clutch one position. Return the TLS to the manufacturer for recalibration if higher (or lower) torque is required for any reason.

When not in use, store the TLS by placing the shaft in the tube protruding from the rear of the Tool Holder.

Appendix I

X1. PROCEDURES FOR DETERMINING REPRODUCIBILITY AMONG OPERATORS

X1.1 Scope

X1.1.1 This method covers procedures which may be supplied by the test device manufacturer to the user for the purpose of evaluating reproducibility among operators.

X1.2 Procedure

X1.2.1 Select a boot/binding/ski system which is typical of equipment in use and adjust the release moments to approximately the middle of the ROR for the test device.

X1.2.2 Randomly order a series of tests such that each operator performs five repetitions of the test.

X1.2.3 Pick one person to make observations. The observer should not perform any tests.

X1.2.4 Conduct all training recommended by the test device manufacturer.

X1.2.5 Conduct all tests in the order determined in X1.2.2.

X1.2.6 Do not allow the operators to observe each other or the results of any tests.

X1.2.7 Observe and record the test results to the resolutions specified by the test device manufacturer, (lines a-f).

X1.2.8 Perform tests in only one direction of release. Repeat the entire procedure for other directions, as appropriate.

X1.3 Calculations

X1.3.1 Determine the middle quantitative value for all results for each operator, (line g).

X1.3.2 Determine the range (line h - k) of operator medians, and express it as a percentage of the median for all operators, (line l).

X1.4 Evaluation

X1.4.1 Variability among operators of 10% or less may be used as a goal for a successful operator training (or routine testing) program.

X1.4.2 Variability among operators of more than 15% should prompt continued training and retesting.

X1.5 Other Uses For This Method

X1.5.1 This method may be used to evaluate multiple observers of the test device scale using a single operator.

X1.5.2 This method may also be modified to evaluate multiple observers of other scales such as the release indicator scale of the binding. These other methods may require criteria for success different than X1.4.

Name	_____	_____	_____	_____	_____	a
	_____	_____	_____	_____	_____	b
	_____	_____	_____	_____	_____	c
	_____	_____	_____	_____	_____	d
	_____	_____	_____	_____	_____	e
	_____	_____	_____	_____	_____	f
Middle Value						
b-f	_____	_____	_____	_____	_____	g

Highest line	g	_____	h
Median line	g	_____	i
Lowest line	g	_____	j

Range = line h - line j = _____ **k**

Variability = $\frac{\text{line k}}{\text{line i}} \times 100 = \text{_____}\%$ **l**

Observer's name _____ **Date** ___/___/___

Appendix II

CALIBRATION CHECK

At the beginning, and at least once during the season, the calibration of the ARM should be verified using a dead weight. (Any weight will do: even a pail of nuts and bolts can be used). Any weight used should be checked on a state or federally certified scale. Calibration checks should also be made whenever the accuracy of the Calibrator is called into question.

Calibrator ARMs are designed and manufactured to provide useful service within their specified Recommended Operating Range (ROR). However, an ARM can be used anywhere within the Full Operating Range (FOR) provided the user has verified the calibration of the ARM over the Intended Operating Range (IOR).

<u>ARM</u>	<u>FOR</u>	<u>ROR</u>
Junior	0-65	5-50
Universal	0-120	8-90
Adult	0-200	25-120

(All values in Nm)

The verification procedure described in this manual is valid only for ARMs supplied by **Vermont Ski Safety Equipment Inc.** The use of torque wrenches distributed by any other company may introduce substantial error especially in forward lean tests. ARMs with red, black, or blue scales can be updated by **VSSE**.

STEP-BY-STEP VERIFICATION PROCEDURES

- 1) Use the appropriate column of the Verification Chart to select three weights which correspond (within 10%) to the bottom, middle, and top of the Recommended Operating Range (ROR) for the ARM to be verified.
- 2) Obtain one object with a weight determined in step 1 for each of the three ranges and use them as dead weights in the following steps.
- 3) Determine the actual weight of each test weight on a scale which is accurate to within 2%.
- 4) Mount the Calibrator bracket supplied with the Calibrator in a convenient location so that the ARM, when attached, is horizontal and the scale is vertical.
- 5) Attach the nylon strap from the spare parts kit to one of the dead weights using an S-hook.
- 6) Position the nylon strap against the lip on the floating plastic handle closest to the indicator scale and suspend the dead weight.
- 7) After the ARM stops moving, push the upper yellow Release Torque Indicator against the wand and read the scale.
- 8) If the result falls within the tolerance given by the Verification Chart, the ARM passes.
- 9) Repeat steps 5-9 in clockwise and counterclockwise directions with each of the test weights.
- 10) If the ARM passes all six tests, indicate "PASS" in the Maintenance Log.
- 11) If the ARM fails any test within the ROR, review the Routine Inspection section and, if necessary, the Maintenance and Repair section of this manual.
- 12) Return the ARM to the manufacturer for repair if satisfactory results cannot be obtained within the ROR.

Note: If an ARM is to be used outside the ROR, select dead weights which correspond to the user defined IOR. If the ARM fails any test outside the ROR do not use the ARM for tests in that range without applying a calibration correction to the ARM.

If a calibration correction is used, it should be recorded on a label attached to the ARM. The correction should take the form of the amount that must be added or subtracted to the value recorded by the Release Torque Indicator to make the ARM read correctly in each direction. Corrections for both twist and forward lean scales should be given.

If calibration corrections are to be used they should also be recorded in the Extended Comments section of the Log. Corrections to actual test results should be made by the operator. Only corrected results should be recorded.

VERIFICATION CHART
(in Newton meters of torque)

TEST WGT (LBS)	ADULT*	UNIV.	JR.
2	4-9	2-7	1-6
4	8-13	5-10	4-9
6	11-16	8-13	7-12
8	15-20	11-16	9-14
10	19-24	14-19	12-17
12	23-28	17-22	15-20
14	26-31	20-25	17-22
16	30-35	23-28	20-25
18	34-39	26-31	23-28
20	37-42	30-34	25-30
22	41-46	32-37	28-33
24	45-50	35-40	30-35
26	49-54	38-43	33-38
28	52-58	41-46	36-41
30	56-61	44-49	38-43
32	59-65	47-52	41-46
34	63-69	50-55	44-49
36	66-73	53-59	46-51
38	70-77	56-62	49-54
40	73-81	59-65	51-57
42	77-85	62-68	54-60
44	80-89	64-71	56-62
46	84-93	67-74	59-65
48	87-97	70-76	61-68
50	91-101	73-81	
54	98-108	79-87	
58	105-116	84-93	
62	112-124	90-100	
66	119-132	96-106	
70	126-139	101-112	
74	133-147	107-119	
80	144-159		
90	161-178		
100	179-198		

* Also applies to the Vertronic I and Vertronic II Release Calibrater Arms.

Appendix III

RELEASE VALUE SELECTION METHOD
(For Non-Current Bindings)

The following procedures may be applicable when no Release Value Selection Table appropriate for the binding model is available.

Skier Type Determination

Skiers must classify themselves by type in order for the shop to determine the appropriate release setting. There are three classifications: I, II, and III.

Skiers who classify themselves (I) will receive lower-than-average release/retention settings. Skiers who classify themselves (III) will receive higher-than-average release/retention settings. All other skiers are classified as Type (II).

Release Value Selection Procedures

- 1) Find the Skier Code that corresponds to the skier's weight and the Skier Code that corresponds to the skier's height.
- 2) Pick the Code that is closer to the top of the table.
- 3) Use this Code for Type I skiers. For type II skiers move down the chart one Code. For type III skiers move down the chart two Skier Codes.
- 4) Move up the chart one Skier Code for skiers age 50 and older or 9 and younger.
- 5) Use the Skier Code to determine the Recommended Reference Torque. Adjust the binding to release within the range defined by the value above and below the Reference Torque.

RELEASE VALUE SELECTION TABLE

SKIER WEIGHT (LB.)	SKIER HEIGHT (FT.-IN.)	SKIER CODE	REFERENCE TORQUE	
			TWIST	FWD-LEAN
+-----+-----+-----+-----+-----+				
: 5 : 19 :				
+-----+-----+-----+-----+-----+				
: 22-29 : : A : 8 : 29 :				
+-----+-----+-----+-----+-----+				
: 30-38 : : B : 11 : 40 :				
+-----+-----+-----+-----+-----+				
: 39-47 : : C : 14 : 52 :				
+-----+-----+-----+-----+-----+				
: 48-56 : : D : 17 : 64 :				
+-----+-----+-----+-----+-----+				
: 57-66 : : E : 20 : 75 :				
+-----+-----+-----+-----+-----+				
: 67-78 : : F : 23 : 87 :				
+-----+-----+-----+-----+-----+				
: 78-91 : : G : 27 : 102 :				
+-----+-----+-----+-----+-----+				
: 92-107: 4'10" or -: H : 31 : 120 :				
+-----+-----+-----+-----+-----+				
: 108-125: 4'11"-5'1": I : 37 : 141 :				
+-----+-----+-----+-----+-----+				
: 126-147: 5'2" -5'5": J : 43 : 165 :				
+-----+-----+-----+-----+-----+				
: 148-174: 5'6"-5'10": K : 50 : 194 :				
+-----+-----+-----+-----+-----+				
: 175-209: 5'11"-6'4": L : 58 : 229 :				
+-----+-----+-----+-----+-----+				
: 210 or+: 6'5" or + : M : 67 : 271 :				
+-----+-----+-----+-----+-----+				
: : : N : 78 : 320 :				
+-----+-----+-----+-----+-----+				
: : : O : 91 : 380 :				
+-----+-----+-----+-----+-----+				
: 105 : 452 :				
+-----+-----+-----+-----+-----+				

Note: For skiers 47 lb and under, Skier Type III is not recommended. For skiers 29 lb and under, corrections for age or Skier Type are inappropriate.

RECORD KEEPING PROCEDURES

The Calibrator Maintenance Log should be kept as a permanent record by the shop. Each time that the CALIBRATION CHECK procedures of this manual are used, the status of the ARM should be recorded in the space provided on the next page. Inspection should be performed before the beginning of each season and at least once during the season.

Circle the appropriate model. The symbols (J), (U), and (A) stand for Junior, Universal, and Adult. The Junior ARM has a range of 0-65. The Universal ARM has a range of 0-120. The Adult ARM has a range of 0-200.

Record the seven-digit Serial number engraved on the back side of the chrome frame which protects the wand and the scale.

Record the date of the last factory inspection found on the last line of the label.

Indicate pass/fail, according to the STEP-BY-STEP VERIFICATION PROCEDURES by initialing the appropriate blank.

If the ARM fails, record the dead weight and test result of each range failed. Enter any appropriate comment ("Removed from service," "Returned to manufacturer," etc.).

Be sure to note the date when an ARM is taken out of service or returned to the manufacturer for any reason. If no response is required enter "NA". If the answer is not known enter "UNK". Date and sign the log upon completion of all tests.

For parts and service go to:

vermontskisafety.com

or call:

(802) 899-4738

For information regarding the inspection of specific boot/binding/ski systems, contact the equipment supplier in your country.

**VERMONT SKI SAFETY EQUIP. INC.
(mail) P.O. Box 85 / (ship) 9 Sandhill Rd.
Underhill Center, Vermont 05490**

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CALIBRATER MAINTENANCE LOG

Model (J) (U) (A)
Date unit put into service ___/___/___
Serial# _____ Date Manuf. Insp. ___/___/___
Inspector _____

Model (J) (U) (A)
Date Insp. ___/___/___ Inspector _____
Serial# _____ Date Manuf. Insp. ___/___/___
PASS ___ FAIL ___ Comment _____

Model (J) (U) (A)
Date Insp. ___/___/___ Inspector _____
Serial# _____ Date Manuf. Insp. ___/___/___
PASS ___ FAIL ___ Comment _____

Model (J) (U) (A)
Date Insp. ___/___/___ Inspector _____
Serial# _____ Date Manuf. Insp. ___/___/___
PASS ___ FAIL ___ Comment _____

Model (J) (U) (A)
Date Insp. ___/___/___ Inspector _____
Serial# _____ Date Manuf. Insp. ___/___/___
PASS ___ FAIL ___ Comment _____

Model (J) (U) (A)
Date Insp. ___/___/___ Inspector _____
Serial# _____ Date Manuf. Insp. ___/___/___
PASS ___ FAIL ___ Comment _____

Model (J) (U) (A)
Date Insp. ___/___/___ Inspector _____
Serial# _____ Date Manuf. Insp. ___/___/___
PASS ___ FAIL ___ Comment _____

EXTENDED COMMENTS:

MAINTENANCE LOG (continued)

Model (J) (U) (A)
Date unit put into service ___/___/___
Serial# _____ Date Manuf. Insp. ___/___/___
Inspector _____

Model (J) (U) (A)
Date Insp. ___/___/___ Inspector _____
Serial# _____ Date Manuf. Insp. ___/___/___
PASS ___ FAIL ___ Comment _____

Model (J) (U) (A)
Date Insp. ___/___/___ Inspector _____
Serial# _____ Date Manuf. Insp. ___/___/___
PASS ___ FAIL ___ Comment _____

Model (J) (U) (A)
Date Insp. ___/___/___ Inspector _____
Serial# _____ Date Manuf. Insp. ___/___/___
PASS ___ FAIL ___ Comment _____

Model (J) (U) (A)
Date Insp. ___/___/___ Inspector _____
Serial# _____ Date Manuf. Insp. ___/___/___
PASS ___ FAIL ___ Comment _____

Model (J) (U) (A)
Date Insp. ___/___/___ Inspector _____
Serial# _____ Date Manuf. Insp. ___/___/___
PASS ___ FAIL ___ Comment _____

Model (J) (U) (A)
Date Insp. ___/___/___ Inspector _____
Serial# _____ Date Manuf. Insp. ___/___/___
PASS ___ FAIL ___ Comment _____

EXTENDED COMMENTS:

IMPORTANT NOTICE :

1) *The instructions in this manual refer to release torque measurements in Newton meters (Nm) and are compatible with Calibrater ARMs (torque wrenches) using a "Green" scale.*

2) *Update Black, Red, Blue, or Silver scales immediately. The use of such devices may contribute to error. These scales are not compatible with the technical literature currently provided by the major binding suppliers and should be considered obsolete.*

3) *Replace yellow Release Torque Indicators each year or when damaged, worn or lose (Parts Kit #1).*

4) *Upgrade Calibrater ARMs that do not have HD5 guards and Tilt Vises that do not have modifications such as independently adjustable ski stops that accommodate wide skis.*

5) *The manual should be used in conjunction with the most current training DVD available from the Calibrater distributor. Updates to manual and DVD are ongoing.*

