

NOTICE:
 This manual applies to the following hardware and firmware release:
B-RAD Select Brushless Rev. B
V06-10-13
 Use with any other firmware version may produce unexpected results.

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MANUAL REVISION HISTORY

V2014.07.03:

- Initial Manual Release

V2014.12.17:

- Updated Hardware – Handle

V2015.11.03:

- B-RAD Select Upgrade

V2016.02.12:

- Firmware Release 2.07.02

V2016.02.25:

- Firmware Release 2.08.01
- Added 3000-2/4000-2 Tool Model

V2016.06.29:

- Firmware Release 2.08.07
- Updated Torque Ranges and Tool Models Table
- Updated Cycle of Operation

V2017.02.02:

- Updated Manual Layout

V2017.03.28:

- Updated General Power Tool Safety Warnings
- Section 1.2.1: Added Tool System Weight and Vibration Specifications

V2017.10.05:

- Controller Hardware Revision E
- Firmware Release v4.10.08: New User Interface, Voltage Detect, and Vibration Sensor
- Updated Calibration Procedure
- Updated images

V2018.03.08:

- Firmware Release v5.10.10
- Brushless handle and new buttons

V2018.05.02:

- Firmware Release v06-10-12
- Updated controller hardware images
- Updated interface operation: Main and Calibration

V2018.06.22:

- Firmware Release v06-10-13

B-RAD Select Tool System – Original Instructions

GENERAL POWER TOOL SAFETY WARNINGS



WARNING!

READ ALL SAFETY WARNINGS, INSTRUCTIONS, ILLUSTRATIONS, AND SPECIFICATIONS PROVIDED WITH THIS POWER TOOL. FAILURE TO FOLLOW ALL INSTRUCTIONS LISTED BELOW MAY RESULT IN ELECTRIC SHOCK, FIRE AND/OR SERIOUS INJURY.

SAVE ALL WARNINGS AND INSTRUCTIONS FOR FUTURE REFERENCE.

The term "power tool" in the warnings refers to your battery-operated (cordless) power tool.

1. Work Area Safety

- a. **Keep work area clean and well lit.** Cluttered and dark areas invite accidents.
- b. **Do not operate power tools in explosive atmospheres, such as in the presence of flammable liquids, gases, or dust.** Power tools create sparks which may ignite the dust or fumes.
- c. **Keep children and bystanders away while operating the power tool.** Distractions can cause you to lose control.

2. Electrical Safety

- a. **Power tool plugs must match the outlet. Never modify the plug in any way. Do not use any adapter plugs with earthed (grounded) power tools.** Unmodified plugs and matching outlets will reduce the risk of electric shock.
- b. **Avoid body contact with earthed (grounded) surfaces such as pipes, radiators, ranges, or refrigerators.** There is an increased risk of electric shock if your body is earthed (grounded).
- c. **Do not expose power tools to rain or wet conditions.** Water entering a power tool will increase the risk of electric shock.
- d. **Do not abuse the cord. Never use the cord to carry, pull, or unplug the power tool. Keep cord away from heat, oil, sharp edges, and moving parts.** Damaged or entangled cords increase the risk of electric shock.
- e. **When operating a power tool outdoors, use an extension cord suitable for outdoor use.** Use of a cord suitable for outdoor use reduces the risk of electric shock.
- f. **If operating a power tool in a damp location is unavoidable, use a Ground Fault Circuit Interrupter (GFCI) protected supply.** Use of a GFCI reduces the risk of electric shock.

3. Personal Safety

- a. **Stay alert, watch what you are doing, and use common sense when operating a power tool. Do not use a power tool while you are tired or under the influence of drugs, alcohol, or medication.** A moment of inattention while operating power tools may result in serious personal injury.
- b. **Use personal protective equipment and always wear eye protection.** Protective equipment such as a dust mask, non-skid safety shoes, hard hat, and hearing protection used in appropriate conditions will reduce personal injuries.
- c. **Prevent unintentional starting.** Ensure the switch is in the off position before connecting to a power source and/or battery pack, picking up, or carrying the tool. Carrying power tools with your finger on the switch or energizing power tools that have the switch on invites accidents.
- d. **Remove any adjusting key or wrench before turning the power tool on.** A wrench or a key left attached to a rotating part of the power tool may result in personal injury.
- e. **Do not overreach. Keep proper footing and balance at all times.** This enables better control of the power tool in unexpected situations.
- f. **Dress properly. Do not wear loose clothing or jewellery.** Keep your hair, clothing, and gloves away from moving parts.

- g. **If devices are provided for the connection of dust extraction and collection facilities, ensure these are connected and properly used.** Use of dust collection can reduce dust-related hazards.
- h. **Do not let familiarity gained from frequent use of tools allow you to become complacent and ignore tool safety principles.** A careless action can cause severe injury within a fraction of a second.

4. Power Tool Use and Care

- a. **Do not force the power tool.** Use the correct power tool for your application.
- b. **Do not use the power tool if the switch does not turn it on and off.** A power tool that cannot be controlled with the switch is dangerous and must be repaired.
- c. **Disconnect the power source and/or the battery pack from the power tool before making any adjustments, changing accessories or storing power tools.** Such preventive measures reduce the risk of starting the power tool accidentally.
- d. **Store idle power tools out of the reach of children and do not allow persons unfamiliar with the power tool or these instructions to operate the power tool.** Power tools are dangerous in the hands of untrained users.
- e. **Power tools must be properly maintained.** Check for misalignment or binding of moving parts, breakage of parts, and any other condition that may affect the power tool's operation. If damaged, have the power tool repaired before use. Many accidents are caused by poorly maintained power tools.
- f. **Use the power tool and accessories in accordance with these instructions, taking into account the working conditions and the work to be performed.** Use of the power tool for operations different from those intended could result in a hazardous situation.
- g. **Keep handles and grasping surfaces dry, clean and free from oil and grease.** Slippery handles and grasping surfaces do not allow for safe handling and control of the tool in unexpected situations.

5. Battery tool use and care

- a. **Recharge only with the charger specified by the manufacturer.** A charger that is suitable for one type of battery pack may create a risk of fire when used with another battery pack.
- b. **Use power tools only with specifically designated battery packs.** Use of any other battery packs may create a risk of injury and fire.
- c. **When battery pack is not in use, keep it away from other metal objects,** like paper clips, coins, keys, nails, screws or other small metal objects that can make a connection from one terminal to another. Shorting the battery terminals together may cause burns or a fire.
- d. **Under abusive conditions, liquid may be ejected from the battery; avoid contact. If contact accidentally occurs, flush with water. If liquid contacts eyes, additionally seek medical help.** Liquid ejected from the battery may cause irritation or burns.
- e. **Do not use a battery pack or tool that is damaged or modified.** Damaged or modified batteries may exhibit unpredictable behaviour resulting in fire, explosion or risk of injury.
- f. **Do not expose a battery pack or tool to fire or excessive temperature.** Exposure to fire or temperature above 130 °C (265 °F) may cause explosion.
- g. **Follow all charging instructions and do not charge the battery pack or tool outside the temperature range specified in the instructions.** Charging improperly or at temperatures outside the specified range may damage the battery and increase the risk of fire.

6. Service

- a. **Have your power tool serviced by a qualified repair person using only identical replacement parts.** This will ensure that the safety of the power tool is maintained.
- b. **Never service damaged battery packs.** Service of battery packs should only be performed by the manufacturer or authorized service providers.

Battery Pack Safety Warnings

Only use the RAD Li-Ion Battery Pack with the B-RAD Tool System. The use of other batteries with the B-RAD Tool System will cause damage to the tool.

The RAD Li-Ion Battery Pack should only be charged on the RAD Battery Charger. If an incompatible charger is used, damage to the RAD Battery will occur.

Keep the RAD Li-Ion Battery Pack away from any metal objects. If the battery terminals are connected by a metal object, the battery will short and will cause damage to the battery and injury to the operator.

Do not expose the RAD Li-Ion Battery Pack to wet conditions. This will cause damage to the RAD Battery and increase the risk of electric shock.

Do not use faulty or deformed RAD Batteries. Do not attempt to open the RAD Battery. Do not short circuit the RAD Battery. Failure to comply will cause damage to the RAD Battery and injury to the operator.

If liquid is ejected from the RAD Battery, avoid contact. If contact with skin occurs, immediately flush with water. If contact with eyes occurs, immediately flush with water and seek medical aid. Liquid from the RAD Battery may cause irritation and/or burns.

RAD Li-Ion Battery Packs cannot be disposed of with regular waste. Return RAD Batteries to your RAD Distributor.

1. GENERAL INFORMATION

1.1 System Components

The B-RAD Select Tool System is shipped in a storage case with the following parts:

- B-RAD Select Tool (Figure 1.1-1)
- Two RAD Li-Ion Battery Packs (Figure 1.1-2)
- RAD Battery Charger (Figure 1.1-3)
- Standard Reaction Arm and Snap Ring (Figure 1.1-4)
- Calibration Certificate
- User Manual



Figure 1.1-1: B-RAD Select



Figure 1.1-2: RAD Li-Ion Battery Pack



Figure 1.1-3: RAD Battery Charger

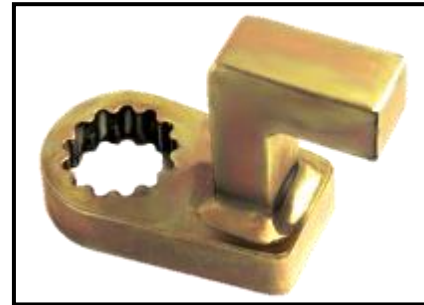


Figure 1.1-4: Standard Reaction Arm

1.2 Specifications

1.2.1 Tool Model Specifications

The following tables outline the torque ranges, weight, and vibration of the available B-RAD Select models:

Tool Model	Torque Range (Imperial)	Torque Range (Metric)	Weight (includes battery)
B-RAD Select 200 / 270-M	40-200 ft·lb	50-270 N·m	7.2 lb / 3.4 kg
B-RAD Select 350 / 470-M	70-350 ft·lb	100-470 N·m	7.5 lb / 3.4 kg
B-RAD Select 500 / 700-M	120-500 ft·lb	170-700 N·m	7.6 lb / 3.4 kg
B-RAD Select 500-2 / 700-2-M			9.2 lb / 4.2 kg
B-RAD Select 1000 / 1400-M	200-1000 ft·lb	300-1400 N·m	8.2 lb / 3.7 kg
B-RAD Select 1000-2/1400-2-M			10.0 lb / 4.5 kg
B-RAD Select 1500 / 2000-M	300-1500 ft·lb	400-2000 N·m	8.9 lb / 4.0 kg
B-RAD Select 1500-2/2000-2-M			10.7 lb / 4.9 kg
B-RAD Select 3000 / 4000-M	600-3000 ft·lb	800-4000 N·m	13.0 lb / 5.9 kg
B-RAD Select 3000-2/4000-2-M			16.2 lb / 7.3 kg
B-RAD Select 5000 / 6800-M	1000-5000 ft·lb	1350-6800 N·m	19.0 lb / 8.6 kg

Table 1.2.1-1: Tool Model Torque Ranges and Weights

Vibration (all tool models)	Does not exceed 2.5 m/s ²
Noise Level (all tool models)	90 ± 2 dB

Table 1.2.1-2: Tool Operation Specifications

1.2.2 Battery Specifications

Ensure that all Battery Specifications are followed when using the B-RAD Tool System.

Battery Output	
Voltage	18 VDC
Current	30 A
Charge Time	60 minutes
Charger Voltage	
Input	115 or 230 VAC
Output	12 – 18 VDC
Charger Output Current	2.5 A

Table 1.2.2: Battery Specifications

1.2.3 Environmental Specifications



CAUTION!

Only operate the B-RAD Tool System if the following storage and operation conditions have been met.

Temperature Ranges	°C	°F
Operating Temperature	0 – 35	32 – 95
Charging Temperature	0 – 50	32 – 122
Storage Temperature	-25 – 70	-13 – 158
Humidity	10% to 90% non-condensing	
Shock	10G according to DIN IEC 68-2-6/29	
Vibration	1G, 10-150Hz according to DIN IEC 68-2-6/29	
Required Operating Conditions	Non explosive atmosphere Dry location	

Table 1.2.3: Environmental Specifications

1.2.4 Cycle of Operation

A Cycle of Operation or a Tool Cycle as used in this manual is defined as:

- 5 seconds forward
- 10 seconds rest

Or:

- 5 seconds reverse
- 10 seconds rest

Note: An actual Torque Cycle may vary from the general definition above.

2. TOOL SYSTEM

The following sections introduce the operation of the Tool Handle, LED Display Interface, RAD Li-Ion Battery Pack, and RAD Battery Charger.

2.1 Tool Handle

The B-RAD Select (Figure 2.1-1) is activated with a Trigger Switch. The Forward/Reverse Switch controls the direction of rotation. Torque values and tool information are displayed on the 4-digit LED display. Two buttons are used to enter the desired torque setting and view the menus. The RAD Li-Ion Battery Pack is attached to the bottom of the Tool Handle.

1. Trigger Switch – tool activation
2. Forward/Reverse Switch – controls direction of rotation: fully to the left is Forward; fully to the right is Reverse
3. LED Display and **+**/**-** Button Module
4. RAD Li-Ion Battery Pack – refer to Section 2.3 – RAD Li-Ion Battery Pack
5. Battery Release Button – refer to Section 2.3.1 – Insert/Remove the RAD Li-Ion Battery Pack



Figure 2.1-1: B-RAD Select and LED Display

2.1.1 Trigger Lock

The Trigger Lock is useful while transporting or storing the B-RAD. The Trigger Lock disables the use of the On/Off Trigger, therefore disabling the tool. It is suggested that while the B-RAD is not in use, the Trigger Lock should be enabled.

To enable the Trigger Lock:

- Slide the Forward/Reverse Switch to the Centre Position (neither fully to the right nor fully to the left).

Note: The On/Off Trigger cannot be pressed.

To disable the Trigger Lock:

- Slide the Forward/Reverse Switch to the Forward Position or the Reverse Position.

Note: The On/Off Trigger can be pressed.

2.2 LED Display Module

The LED Display and the Buttons are the interface for the B-RAD Select (See Figure 2.2-1). The LED Display has 4 digits that display torque values and menu options. The **+** (plus, increase) and **-** (minus, decrease) buttons are used to modify numbers and navigate the various menus in the module. The interface is described in detail in Section 3 – Interface and Settings.

To turn on the LED Display, attach the RAD Li-Ion Battery to the B-RAD Select handle and press the Trigger Switch momentarily. The Display will light a small LED indicator near each button when a button is being pushed or held down.

The Display will dim after 15 seconds of inactivity. Lightly pull the trigger or press a button to brighten the display. The display will turn off after 30 seconds. To turn it back on, lightly pull the trigger.

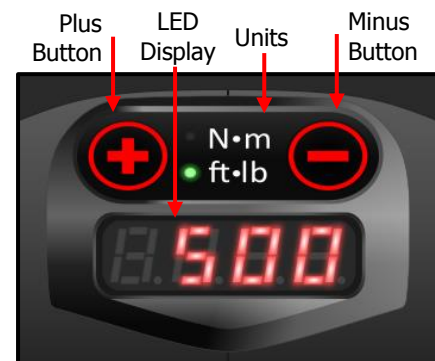


Figure 2.2-1: LED Display



CAUTION!

The LED Display Module may be damaged by mechanical shock, electrostatic discharge, excessive force, moisture, or extreme temperatures. Avoid such conditions and gently wipe clean or let dry before use.

2.3 RAD Li-Ion Battery Pack



CAUTION!

Only use the RAD Li-Ion Battery Pack with the B-RAD Tool System. Using third-party batteries may damage the B-RAD Tool System.

Keep the RAD Li-Ion Battery Pack away from any metal objects. If the battery terminals are connected by a metal object, the battery will short and cause damage to the battery and injury to the operator.

The RAD Li-Ion Battery Pack supplies power to the tool; for the B-RAD to perform best, ensure the RAD Battery is fully charged and in good condition before use. In optimal conditions, the RAD Battery should be capable of approximately 100 Torque Cycles at 50% of the Maximum Torque.

Note: The application torque, joint hardness, battery condition, age, and operating temperature will affect the actual number of Torque Cycles per charge.

2.3.1 Insert/Remove the RAD Li-Ion Battery Pack

To insert the RAD Battery:

1. Ensure the On/Off Trigger is in the Off Position (not depressed).
2. Align the RAD Battery with the bottom of the Tool Handle.
3. Slide the RAD Battery into place until it is fully seated.

Note: A click will confirm that the RAD Battery is locked in place.

4. Check that the RAD Battery is locked in place by trying to slide it out of place.

To remove the RAD Battery:

1. Press and hold the Battery Release Button.
2. Slide the RAD Battery away from the Tool Handle.

2.3.2 Check RAD Battery Charge

To check the RAD Battery Charge:

- Press the "Charge" button on the RAD Battery (Figure 2.3.2-1). The green bars will light up. If all the bars are illuminated, the Battery is fully charged. If only one of the bars is illuminated, the RAD Battery is discharged and needs charging (refer to Section 2.4.1 – Charging the RAD Li-Ion Battery Pack).
- View the battery voltage on the B-RAD Select LED Display from the Information menu. See Section 3.2.2 – View the Battery Voltage.
- When the battery charge gets too low, the LED Display will flash a "Lo-b" message on the display.

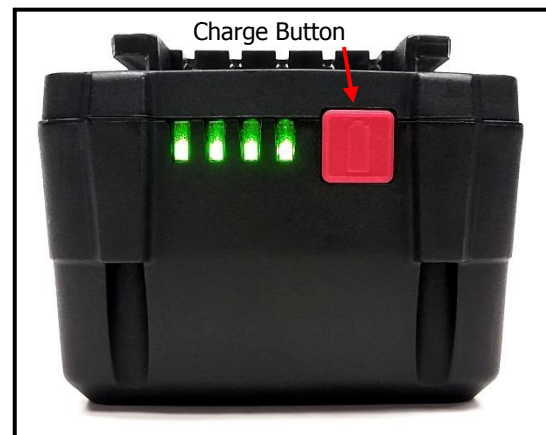


Figure 2.3.2-1: RAD Li-Ion Battery Pack

2.4 RAD Battery Charger



CAUTION!

The RAD Li-Ion Battery Pack should only be charged on the RAD Battery Charger. If an incompatible charger is used, damage to the RAD Battery will occur.

The Charging Status Display (Figure 2.4-1) indicates when the RAD Battery is charging, when the charge is complete, and if there is an error.

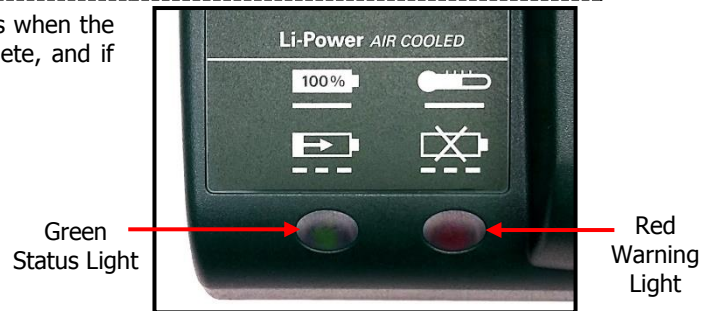


Figure 2.4-1: Charging Status Display

2.4.1 Charging the RAD Li-Ion Battery Pack

Note: The temperature range for charging is 0°C to 50°C (32°F to 122°F).

To charge the RAD Battery:

1. Plug the RAD Battery Charger into the wall outlet. The Red Warning Light will turn on for one second and then the Green Status Light will turn on for one second.
2. Align the RAD Battery with the RAD Battery Charger.
3. Slide the RAD Battery into place. The Green Status Light will flash while the RAD Battery is charging.

When the RAD Battery has been fully charged, the Green Status Light will stop flashing and stay illuminated. Until the RAD Battery is removed from the RAD Charger, the Charger will maintain the battery charge at maximum capacity.

To remove the RAD Battery:

1. Slide the RAD Battery away from the RAD Charger.
2. Check that the RAD Battery is fully charged (refer to Section 2.3.2 – Check RAD Battery Charge).

2.4.2 Charging Errors

The Red Warning Light is on:

The RAD Battery is not charging because its temperature is not within the required temperature range for charging. When the RAD Battery's temperature changes to within the required range, the Red Warning Light will turn off and charging will commence.

The Red Warning Light is flashing:

The RAD Battery may be placed incorrectly on the RAD Battery Charger. Remove the RAD Battery and replace it correctly on the RAD Battery Charger. If the Red Warning Light continues to flash, the RAD Battery is defective; remove the RAD Battery immediately.

If these problems continue, contact New World Technologies Inc. Technical Support (refer to Section 7.0 – Contact Us) or your RAD Distributor.

3. INTERFACE AND SETTINGS

3.1 Changing Torque



CAUTION!

The B-RAD Select must be calibrated before use. If the LED Display shows anything other than the Torque Select screen, the Information Menu, or the Calibration Menu, contact New World Technologies Inc. Technical Support (refer to Section 7 – Contact Us) or your RAD Distributor.

When the B-RAD Select is powered on, the LED Display will start in Torque Select Mode (Figure 3.1-1).

Note: If the tool has just been calibrated, the LED Display will show the tool's rated minimum torque.

When N·m (metric) units are used, the "N·m" indicator will light on the keypad. When ft·lb (imperial) units are used, the "ft·lb" indicator will light. (Refer to Section 3.2.1 – Change the Torque Units)



Figure 3.1-1: Torque Mode Display

To change the torque value:

1. Press and hold a button until a digit starts blinking. The **-** (minus) button starts the left-most digit blinking. If you press and hold the **-** button again, the selected digit moves to the right. The opposite happens with the **+** (plus) button.
2. Press the **+** or **-** button quickly to change the digits by one unit at a time. Other digits may be selected (see Step 1) to fine-tune the torque setting.
3. The selected torque value will be saved and ready after 5 seconds. Alternatively, press and hold a button until the digit stops flashing. The display will blink, indicating that the value is saved. The torque value will be saved even when the battery is removed.

Table Mode:

The torque may be set in discrete levels from 1 to 50 over the calibrated range instead of using torque units (see Section 3.4 – Unlock Levels for the feature code). Setting 1 is the minimum calibrated torque, setting 50 is the maximum calibrated torque, and the points in between are evenly spaced over the tool's range. When Table Mode is entered, the previous calibrated torque value is converted into the corresponding Table value.

3.2 Information Menu

The Information Menu allows you to change torque units, view the battery voltage, change LED brightness, enter an unlock code, and view the program version. The menu items are described below.

To enter the Information Menu:

- While in Torque Select mode, hold the **+** button and momentarily press the **-** button.
- To move to the next item, hold the **+** button and press the **-** button. To go to a previous menu item, hold the **-** button and press the **+** button.
- To exit the menu, hold both buttons until the Torque Value is displayed. If an unlock code was entered, the locked or unlock mode will be displayed on the LEDs before the menu exits (see Section 3.4 – Unlock Levels for a list of codes).

3.2.1 Change the Torque Units

- Press a button to toggle between **f** (foot-pounds) and **n** (newton-metres) as shown in Figures 3.2.1-1 and 3.2.1-2.
- To exit the Unit Select menu, press and hold both buttons.



Figure 3.2.1-1: Units – ft·lb



Figure 3.2.1-2: Units – N·m

- The N·m indicator lights when N·m units are used (Figure 3.1.2-3), and the ft·lb indicator lights when ft·lb units are used (Figure 3.1.2-4).

Note: When the units are changed, the torque setting will be converted into the new units.



Figure 3.2.1-3: N·m Display



Figure 3.2.1-4: ft·lb Display

3.2.2 View the Battery Voltage

- Move to the next menu item: "batt." The battery voltage is shown (Figures 3.2.2-1 and 2).
- When the battery voltage gets too low, the message "Lo-b" will flash on any screen to warn you that the battery needs charging.



Figure 3.2.2-1: Battery Menu



Figure 3.2.2-2: Actual Voltage

3.2.3 Change the LED Brightness

- Move to the next menu item: "Lite." The number of lines shown depict how bright the LED Display is (Figures 3.2.3-1 and 2). Use the + and - buttons to change the display brightness.



Figure 3.2.3-1: Lite Menu



Figure 3.2.3-2: LED Brightness

3.2.4 Enter a Lock or Unlock Code

- Move to the next menu item: "Lock." The flashing line indicators on the screen keep track of the number of button presses used to enter a code (Figures 3.2.4-1 and 2).
- Enter a code using the + and - buttons. The desired code will depend on which features are needed. See Section 3.4 – Unlock Levels for more information.
- Navigate forward or press and hold both buttons to accept the code and close the menu. The new Unlock level will scroll across the screen.



Figure 3.2.4-1: Lock Menu



Figure 3.2.4-2: Code Entry – Button Presses

3.2.5 View Program Version

Move to the next menu item, labelled "Prog." The program version number will scroll across the screen.









Figure 3.2.5-1: Program Menu

3.3 Tool Menu

The Tool Menu displays tool model information and is the menu used to calibrate the tool. When in Locked or Basic levels, you may only view tool information. When in Calibration mode, the Cal Points may be modified. The menu items are described in more detail in Section 5 – Calibration.

To enter the Tool Menu:

- While in Torque Select mode, hold the  button and momentarily press the  button.
- To move to the next item, hold the  button and press the  button. To go to a previous menu item, hold the  button and press the  button.
- To exit the menu, hold both buttons until the display flashes and the Torque Value is displayed. Any changes made in Calibration will be saved.

To view tool information:

- The first menu item is "Tool." This displays the gearbox number and model in the calibrated units.
- Move to the next menu item. The tool serial number is displayed.
- The next two items display the minimum and maximum torque values.
- If in Calibration mode, the next options define the minimum and maximum Calibration limits and the Calibration Points. Changing these values will affect the output torque. See Section 5 – Calibration.

3.4 Unlock Levels

The B-RAD Select has several access levels which change the operation of the tool and the interface. The access levels are described below. The codes may be entered using the Lock Code menu (see Section 3.2.4 – Enter a Lock or Unlock Code). After the code is entered and the menu is closed, the level is displayed on the LED display. If the wrong code is entered, no message will be displayed after exiting.


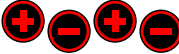

Access Level	Description	Code
Locked/Basic	<p>Locked mode freezes the output torque value. Basic menu options are available as below.</p> <p>Basic mode enables selecting torque values and switching between Torque and Table modes.</p> <p>Information Menu: Unit Select, Battery level, LED brightness, Code entry, and Program version.</p> <p>Tool Menu: displays model, serial number, and torque minimum and maximum.</p>	
Table Mode	Change from Torque Mode to Table Mode. Choose from 50 torque levels over the calibrated range. The tool is in Basic.	
Torque Mode	Change from Table Mode to Torque Mode. Display torque in physical units (ft·lb or N·m) as calibrated. This is the default setting. Note: Can only be entered while in Table Mode.	
Calibrate	Change calibration values. See Section 5 – Calibration.	Contact Us or your RAD distributor

Table 3.4: Unlock Levels, Features, and Codes

4. GENERAL OPERATING INSTRUCTIONS



CAUTION!

Only qualified personnel with training in the safe operation of torque tooling and the B-RAD Tool System should operate this tool. Refer to the Important Safety Notice for more information.

The B-RAD operates in Torque Cycles. The Torque Cycle passes when the Actual Torque reaches the Target Torque, and the Cycle fails if it is interrupted before the Actual Torque reaches the Target Torque.

This section instructs the operator in the use of the Reaction Arm needed for B-RAD operation and how to conduct a Torque Cycle.

4.1 Reaction Arm



Warning!

Always keep body parts clear of the Reaction Arm when the B-RAD Tool System is in use. Serious injury could occur.

CAUTION!

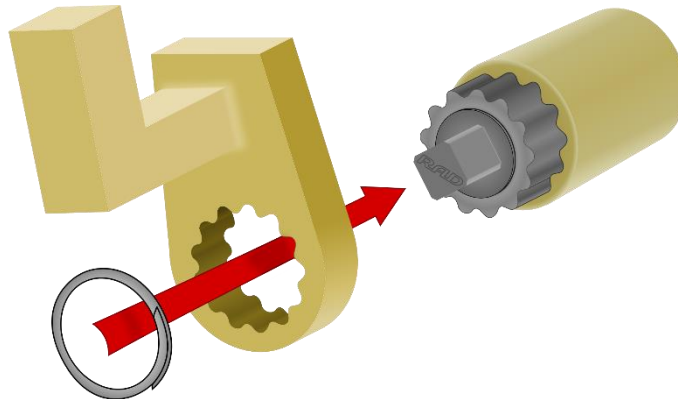
Ensure that the Reaction Arm has a solid contact point before operating the B-RAD Tool System.

Improper reaction will void warranty and can cause premature tool failure.

Please contact New World Technologies Inc. or your local RAD Authorized Distributor for information on custom Reaction Arms.

Installing the Reaction Arm

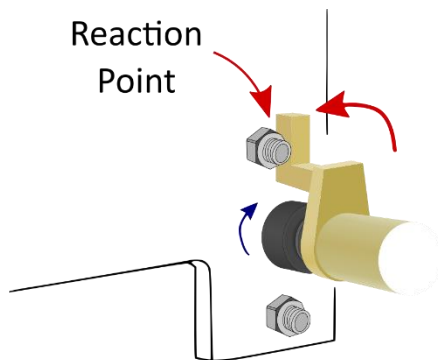
Slide the Reaction Arm onto the spline or serpentine fitting and secure the Snap Ring to hold the Reaction Arm in place.



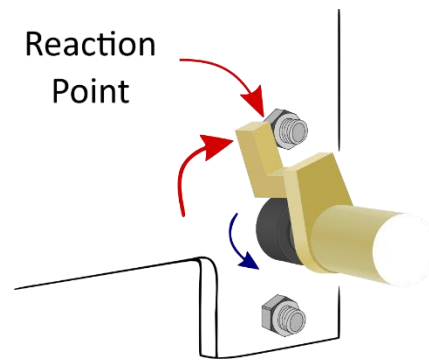
Reaction Points

Make sure that the Reaction Arm is in contact with a solid Reaction Point before you operate the tool.

When the tool is in operation, the Reaction Arm rotates in the opposite direction to the Output Square Drive and must be allowed to rest squarely against a solid object or surface adjacent to the bolt to be tightened.




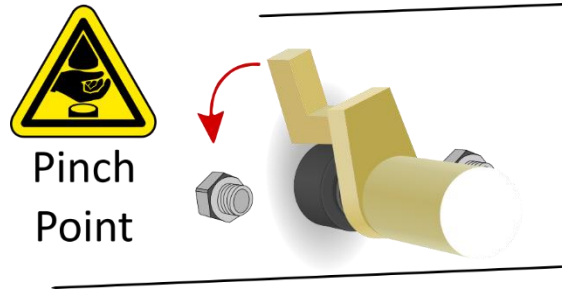
Clockwise Operation



Counter-Clockwise Operation

Personal Safety

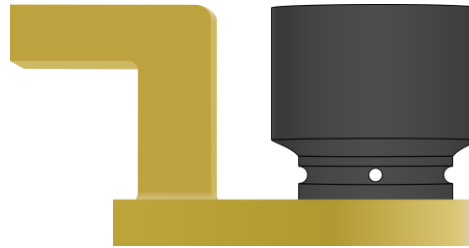
 **CAUTION!**
Keep your hands clear of the Reaction Arm and joint when the tool is in operation.



Reaction Arm Height

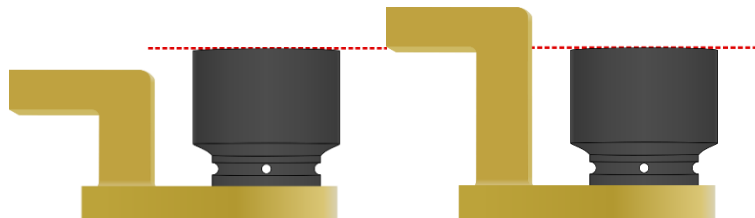
Ensure that the height of the socket is even with the height of the Reaction Arm.

CORRECT: The Reaction Arm and socket are even.



The height of the socket cannot be shorter or longer than the height of the Reaction Arm.

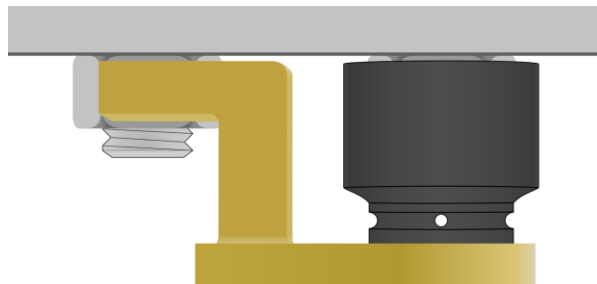
INCORRECT: The leg of the Reaction Arm is too short in the left image and too long in the right image.



Reaction Arm Foot

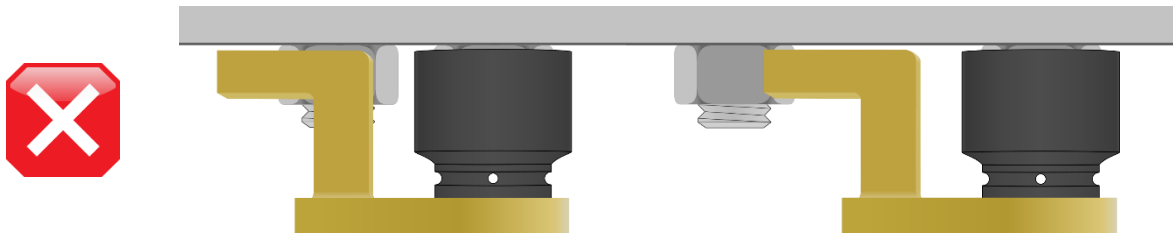
Ensure that the foot of the Reaction Arm aligns with the reaction point.

CORRECT: The foot of the Reaction Arm aligns with the reaction point.



The length of the foot cannot be shorter or longer than the reaction point.

INCORRECT: The reaction point is too close in the left image and too far in the right image. Do not react against the heel of the reaction arm.



4.2 Torque Operation

To operate the tool in a Torque Cycle:

1. Ensure the tool is in Torque Select mode (example in Figure 4.2-1. Also see Section 3.1 – Changing Torque).
2. Ensure the LED Display is showing the correct units (see Section 3.2.1 – Change the Torque Units).
3. Change the torque value as desired (see Section 3.1 – Changing Torque). Allow the display to flash after changing the torque, indicating that the torque value is saved and set.
4. The B-RAD Select is ready to torque at the displayed setting. Place the B-RAD on the joint system.
5. Ensure the Forward/Reverse Switch is in the Forward position.
6. Press and hold the On/Off Trigger.

Note: To stop the Torque Cycle at any time, release the On/Off Trigger.

7. When the B-RAD reaches the selected Torque, the tool will stop turning. Release the On/Off Trigger.



Figure 4.2-1: Torque Select Mode

5. CALIBRATION



CAUTION!

Only qualified personnel with training in the safe operation of torque tooling and the B-RAD Select Tool System should operate this tool. Improper use of the calibration function will result in tool damage.

Do not calibrate at Target Torques that result in exceeding the B-RAD Select Tool System's Torque Range. Severe tool damage will occur.

This function allows the operator to access the calibration values for the B-RAD. These values should only be modified by a Qualified Calibration Technician and using a Calibration Stand.

5.1 Calibration Menu Navigation

The functions available in Calibration depend on which Unlock level the B-RAD Select is in. See Section 3.4 – Unlock Levels for details.

To enter the Calibration menu:

- While in Torque Select mode, hold the **-** button and press the **+** button. Make sure to release the **+** button first. The "Tool" menu will appear (Figure 5.1-1).



Figure 5.1-1: Tool (Calibration) Menu

To change numeric values within each menu:

- Press and hold either the **+** or the **-** button until a digit flashes. Repeat until the desired digit is flashing, then use the **+** or **-** button to change the number.
- To exit the edit mode, press and hold either button. The value will be saved and the cursor will stop flashing.

To advance the menu items:

- Hold the **+** button and press the **-** button to advance to the next menu item (illustrated in Figure 5.1-2).
- Hold the **-** button and press the **+** button to return to the previous menu item.
- To view the title of a menu item, press either button for 3 seconds. The title is displayed for as long as the button is held. Note that showing the menu title will also reset the menu value to the previously saved value if the value was changed.
- Any changed values will be saved when the menu is advanced. A modified value is indicated by the two dots on the LED display blinking quickly. When the value is saved, the LED dots blink more slowly.

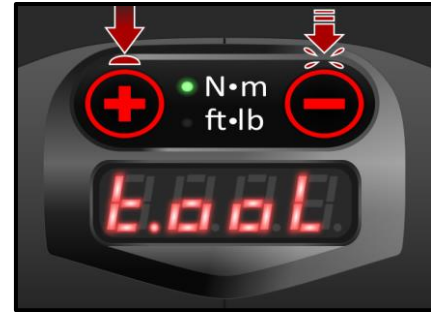


Figure 5.1-2: Menu Advance Function

5.2 Table of Calibration Menus

The order and function of the menus in Calibration Mode are outlined in Table 5.2 below.

Note: Only CPhi, CPLo, and the CAL points are available after the first cycle through the menu. The first 4 options become available when the calibration menu is opened again.

Menu Title	Description of Function
Tool	Gearbox Model – View the current tool model. The models are shown in Table 5.2.2 below.
Ser	Tool Serial Number
Lo	Minimum Torque Limit – Set up to 100% higher than default. Can only be changed by factory.
Hi	Maximum Torque Limit – Set down to 50% lower than rated maximum. Can only be changed by factory.
CPhi	Calibration Point High – Sets the maximum tool output for Calibration. The value may range between 10 and 990.
CPLo	Calibration Point Low – Sets the minimum tool output for Calibration. The value may range between 10 and 990.
CAL1, CAL2, ... CAL6	Tool Calibration Points – Calibrates output torque at 3, 20, 40, 60, 80, and 99% of tool output.

Table 5.2: Calibration Menu Titles and Functions

5.3 Table of Tool Models



The first Menu in Calibration Mode is the Gearbox Select Menu. Table 5.3 shows which Gearbox setting in the Menu corresponds to the desired tool model.

Gearbox Designator	Tool Model
G00	<i>Default/Test: 10 – 990</i>
G01	40 – 200 ft·lb
G02	50 – 270 N·m
G03	70 – 350 ft·lb
G04	100 – 470 N·m
G05	120 – 500 ft·lb
G06	170 – 700 N·m
G07	400 – 700 ft·lb
G08	500 – 950 N·m
G09	200 – 1000 ft·lb
G10	300 – 1400 N·m
G11	300 – 1500 ft·lb
G12	400 – 2000 N·m
G13	600 – 3000 ft·lb
G14	800 – 4000 N·m
G15	1000 – 5000 ft·lb
G16	1400 – 6800 N·m

Table 5.3: Calibration Mode Gearbox Values

5.4 Calibration Procedure

To Calibrate the B-RAD Select:

1. See Section 3.4 – Unlock Levels to ensure the correct access level is enabled. Some settings in Calibration are restricted to higher levels.
2. Install a fresh battery into the B-RAD Select.
3. Enter Calibration Mode by holding the  button then pressing the  button.
4. Select the correct Tool Model using Table 5.3 above. If the tool has previously been calibrated, this value cannot be changed. Note that the units of the tool model are indicated by the green LED.
5. Navigate to the next Calibration menu labelled "SER." The serial number is displayed.
6. The next two menu items show the lower and upper torque limits of the tool's torque range.
7. Before any calibration points are set, it is recommended that the tool is warmed up near the tool's maximum setting. Navigate forward to "CPhi."
8. Set the level to a value lower than 800 (the default is 750). Take a pull on the calibration stand.
9. If the output torque is lower than the rated maximum of the tool, gradually increase the tool percentage until the torque readings nearly match the maximum torque of the tool. Adjust the value to achieve approximately 50 units above maximum torque.



CAUTION!

DO NOT operate the B-RAD Select Tool System beyond 50 units above the rated maximum torque. Overtorquing the tool will cause severe tool damage.

10. Do approximately 10 pulls around the maximum torque to warm up the tool.
11. Advance to the "CPLo" menu.
12. Take a pull at the default setting.
13. Gradually increase or decrease the percentage setting until the tool pulls approximately 50 units below the tool's minimum torque. For example, a 1000 ft·lb tool has a minimum of 200 ft·lb, so the torque to be reached would be 150 ft·lb. See Table 5.3 for a full list of B-RAD Tool ranges.
14. Navigate to the next menu in Calibration Mode. The display will show "CAL 1."
15. Take one pull at "CAL 1" and record the measured torque value.
16. Enter the torque value (See Section 5.1 – Calibration Menu Navigation).
17. Navigate to the next Calibration menu "CAL 2." Take a pull and record the measured value, as before.
18. Enter the torque value.
19. Repeat Steps 17-18 for the remaining CAL points.
20. Finally, exit Calibration Mode by pressing and holding both buttons until the display flashes and Torque Mode is displayed. All Calibration data will be saved.

If the units are changed using the Information Menu (see Section 3.2.1 – Change the Torque Units), the calibration values will be converted in the calibration menu.

6. TROUBLESHOOTING



Important!

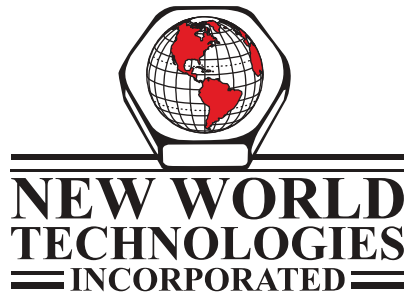
Disassembling or attempting repair will void warranty.

If breakdown, malfunction, or error occurs, contact New World Technologies Inc. Technical Support (refer to Section 7 – Contact Us).

The LED Display may exhibit abnormal behaviour depending on operating conditions, frequency of use, or excessive wear on the Display Module.

The Display Module is designed to withstand normal use over the lifetime of the B-RAD Select Tool System; however, as a sensitive electronic device it is susceptible to damage caused by shock, moisture, or excessive force.

7. CONTACT US



Toll Free: 1-800-983-0044

Fax: 604-852-0269

Web: www.radtorque.com

Email: info@radtorque.com

Technical Support:

Phone: 1-800-983-0044 (EXT. 227)

Email: eradsupport@radtorque.com

New World Technologies Inc.

30580 Progressive Way

Abbotsford, BC

V2T 6Z2

Canada

