



## INSTALLATION AND TUNING GUIDE

### KWI ULTRASHIFT CAN AM X3 V4 PRIMARY CLUTCH

**PART NUMBER(s):** ULTRASHIFT X3 V4

#### TOOLS NEEDED

- 1/2" Drive Impact Gun
- 22mm - 1/2" Drive Impact Socket
- 11/16 12 point - 1/2" Drive Impact Socket
- 1/2" Torque Wrench (140Ft/Lbs)
- 5mm Allen Wrench
- 6mm Allen Wrench
- 3/16 Allen Wrench
- T30 Torx
- KWI Can Am UltraShift primary clutch puller
- Belt removal tool
- ARP Fastener lube
- Anti Seize
- Vorhees Vise primary holding tool (or equivalent)
- Long 3/8" or 1/4" drive extension



#### ESTIMATED INSTALL TIME

60 MINUTES

**We are not responsible for any damage caused during installation. Follow these steps carefully to prevent damaging your clutch.**

#### **IMPORTANT NOTES- PLEASE READ TO PREVENT DAMAGE!!!**

- 1. The UltraShift X3 uses a GATES REDLINE 49R4313 belt. The OEM belts for the CanAm X3 are too short and will not fit with the UltraShift Installed.***
- 2. The UltraShift is larger than your OEM clutch so the NEW style 420212508 clutch housing cover from the turbo RR and 420450405 white sealing gasket must be used or the clutch may rub the cover.***
- 3. The UltraShift V4 uses matched cam arms and rollers- YOU CANNOT USE ANY OTHER CAM ARMS IN THIS CLUTCH EXCEPT THE KWI SIDEWINDERS OR DAMAGE WILL OCCURR!!!***
- 4. Your ULTRASHIFT is a balanced assembly when you receive it. All parts are individually balanced. The inner sheave assy balancing is done with the balance screws on the back of the primary fixed sheave. DO NOT REMOVE THE BALANCE SCREWS FOR ANY REASON.***
- 5. Your ULTRASHIFT comes with a pre-Installed baseline calibration determined by your car info that you provided in your order. You are responsible for verifying that the cam arms and spring is configured properly for your application determined by your final testing and adjustment for proper RPM.***
- 6. Your ULTRASHIFT X3 uses a different puller to remove it. The Ultrashift X3 puller is available thru our website.***

## **Remove OEM primary clutch:**

### **1. Remove Belt Cover:**

- Use a T30 Torx driver to remove the screws securing the belt box cover. Lift the cover off and set it aside.

### **2. Remove CVT Belt:**

- Use a Belt Removal Tool to safely remove the CVT belt from the clutches, you will not re-use the OEM length belt with the CanAm X3 UltraShift as it uses a longer GATES REDLINE 49R4313 belt.

### **3. Unbolt the Primary Clutch:**

- For the OEM clutch use a 22mm - 1/2" Drive Impact Socket to remove the primary clutch bolt. This bolt isn't used on the ULTRASHIFT X3.
- For the ULTRASHIFT use a 11/16 12 point socket and 3/16 allen key to remove the attach stud.

### **4. Detach and Remove Primary Clutch:**

- Lubricate the Puller threads with anti seize and hand-thread the OEM Clutch Puller (for removing the OEM clutch) or the KWI Ultrashift X3 primary clutch puller (for removing the Ultrashift X3 clutch) a few turns into the clutch. Then, tighten it with a strong 1/2" impact gun until the clutch disengages from the shaft.
- If it won't come off easily then remove the puller and insert 1/2 slice of rolled up bread (yes...bread) into the hole, reinstall the puller and try again- this works 100% of the time for stuck clutches.

## **Critical Steps: Failure to follow these may result in damage.**

### **6. Clean Crankshaft Bolt Hole:**

- Use the supplied wire brush and brake cleaner to remove any debris, oil, or rust from the hole. You can use the OEM clutch bolt to chase the threads if needed. Make sure the threads are clean and the ARP stud can thread in fully by hand easily.

### **7. Clean Crankshaft and Clutch Taper:**

- Wipe down the engine crankshaft and the taper inside your new UltraShift clutch with brake cleaner or acetone to remove all oils, dust residues.

### **8. Prepare ARP Stud:**

- Clean all threads with brake cleaner. Lightly apply the supplied ARP lubricant ONLY to the stud threads labeled GREASE at the Allen key end, as well as to the nut and washer. DO not apply any grease to the crankshaft threads! Screw the washer and nut onto the greased end of the stud for just two turns.

### **9. Install New Primary Clutch:**

- Place the ULTRASHIFT clutch onto the crankshaft taper. Using a 3/16 Allen Wrench, screw in the ARP stud until it lightly bottoms out, then back it out by 1/2 turn.

### **10. Torque Down:**

- Hold the ULTRASHIFT from turning with the Vorhees Vise clutch holding tool or equivalent. Use a 1/2" Torque Wrench set to 140 ft/lbs to tighten the nut. Re-check torque on the nut after the first 5 minutes of riding.

## **Final Steps:**

### **12. Adjust Belt Shimming:**

- If you have a KWI Float Mod, refer to its specific instructions for proper belt centering.

### **13. Re-Install Belt and Cover:**

- Put the new correct length CVT belt on (refer to **SETUP CHART** below) and reattach the belt box cover.

### **14. Test Drive:**

- Drive the vehicle and check and adjust for proper RPM at 100% throttle between 20 and 70 MPH according to the adjustment instructions on page 3 and tuning chart on page 4.

## Cam Arm removal steps:

### 1. Remove CVT Belt:

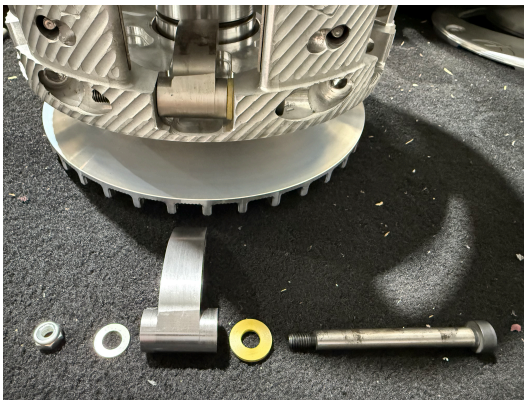
- Use a Clutch Belt Removal Tool to safely remove the CVT belt from the clutches.

### 2. Remove the primary clutch cover:

- Remove cover using a 5mm Allen key to remove all the cover bolts BY HAND. Do not use power tools or you may strip the screws. The standard primary spring that comes with the UltraShift has a mild amount of spring tension and can be removed by hand. (A cover compression tool is available from KWI separately to compress the cover with high engagement springs that have higher pressures)

### 3. Remove the cam arms **\*\*No need to remove the primary clutch from the crankshaft\*\***:

- Slide the sheave all the way in toward the motor which will allow the cam arms to swing free.
- **Important- there is a thrust washer on one side and there may be an OPTIONAL shim washer on the other side of each cam arm, it is CRITICAL these are reinstalled in the same positions or damage to your clutch may occur.**
- Using a Allen wrench and a long socket, remove the pins holding the primary cam arms in place. The pins fit may tightly in the outer half and may need to be tapped lightly to remove them - being careful to not damage the threads) Remove the 6 weight pins and nuts to remove the cam arms.



## RPM ADJUSTMENT- Refer to tuning chart on page 4

- The weight of the added screws affects RPM. The more screws that are installed the lower the RPMs will be. 1 screw in each cam arm will change Full Throttle RPM approx 100 RPM
- Depending on your HP level your UltraShift may have 2, 3, 4 or 6 cam arms installed. **BALANCE IS CRITICAL!**
  - 2 cam arms installed-- ALL cam arms MUST have identical screw configurations
  - 3 cam arms installed-- ALL cam arms MUST have identical screw configurations
  - 4 cam arms installed-- ANY 2 OPPOSING cam arms MUST have identical screw configurations
  - 6 cam arms installed-- ANY 2 OPPOSING cam arms MUST have identical screw configurations

***To add or remove screws from the 2 holes closest to the cam arm pin you must remove the cam arms from the clutch. (SEE "Primary clutch disassembly and reassembly" ABOVE)***

***All other holes can be accessed without removing the cam arms from the clutch.***

- There are 6 holes in the arms to place screws- you can place screws in holes as required.
  - Screws in the 2 holes closest to the cam arm pin will affect RPM's from 0-20 MPH.
  - Screws in the center holes will affect RPM's from 20-50 MPH.
  - Screws in the 2 holes closest to the tip will affect RPM's at 50+ MPH.

### 1. Reinstall cam arms and cover:

- Install the steel shim washer, cam arm and yellow thrust washer in the appropriate slot
- Slide the weight pin thru the clutch, shim washer, cam arm and yellow thrust washer. Make sure all pins are installed the same direction for balance purposes and torque weight pin nuts to 20 in-lb (2 Nm).
- Install spring with both steel shims on bottom.
- Install cover with screws and blue loctite.
- Torque screws to 10 ft/lbs.

ULTRASHIFT V4 X3 SETUP CHART						
The chart below is a guideline with very close start points with 32" tires riding at Sea Level elevation. (choose the Crankshaft horsepower/Wheel horsepower that best matches your X3) (Identical cars may have HP differences of up to 10 HP due to engine manufacturing tolerances so clutch kit calibration adjustments are necessary in most cases)						
For High Altitudes- subtract 15% from the Published HP range of your tune to get actual effective HP. Example - 200 CHP (at sea level) x .85 = 170CHP (use the 175CHP line in the chart below as your baseline setting)						
For sand dunes or large tires (35"+)- subtract 8% from the Published HP range of your tune to get actual effective HP. Example - 200 CHP x .92 = 184CHP (use the 175CHP line in the chart below as your baseline setting)						
For tires 28" and smaller- Add 8% from the Published HP range of your tune to get actual effective HP. Example - 200 CHP x .1.08 = 216CHP (use the 215CHP line in the chart below as your baseline setting)						
For Launch Control - Install the KWI HIGH ENGAGEMENT primary spring with the correct engagement for your application. (SOLD SEPARATELY AND LISTED BELOW)						
Crankshaft horsepower (CHP) /Wheel horsepower (WHP)	# of Cam Arms	Screw Configuration	Primary spring	Secondary spring / Helix / hole	Belt Recommendation	Full throttle RPM at 55mph
152CHP/130WHP	2	PIN- 1,0,0,0,0,0 -TIP	7045112 IS STANDARD LOW ENGAGEMENT SPRING  KWI SILVER PURPLE IS 2900 RPM HIGH ENGAGEMENT SPRING  KWI SILVER IS 3500 RPM HIGH ENGAGEMENT SPRING  (HIGH ENGAGEMENT SPRINGS RAISE SHIFT RPM AND NEED ADDITIONAL SCREWS INSTALLED IN THE CAM ARMS TO COMPENSATE FOR THE INCREASE IN SPRING PRESSURE)	OEM TURBO RR HELIX- OEM TURBO RR Black/Green secondary spring in hole #3 (60 degrees wrap)	CANAM X3 USES A LONGER BELT THAT IS COMMERCIALY AVAILABLE FROM MANY MANUFACTURERS- SEE RECOMMENDATIONS BELOW  GATES – 49R4313 - FIRST CHOICE AND MOST DURABLE BELT BY FAR, THE ONLY CHOICE FOR AGGRESSIVE RIDING AND RACING, EASILY WITHSTANDS 260 DEGREE BELT TEMPS.  ULTIMAX - USX804 – THIS IS THE GOTO BELT FOR DRAG RACING WITH YOUR ULTRASHIFT!  DAYCO – XTX5041 – A GOOD ALTERNATIVE IF THE ABOVE ARE NOT AVAILABLE	7950 RPM +/- 100 RPM (ALL OEM TURBOS)
175CHP/165WHP	2	PIN- 1,1,0,1,0,0 -TIP		KWI DR3 GROOVIX - OEM TURBO RR		
195CHP/175WHP	2	PIN- 1,1,0,0,1,1 -TIP		OEM TURBO RR HELIX- OEM TURBO RR Black/Green secondary spring in hole #4 (30 degrees wrap)		
215CHP/185WHP	2	PIN- 1,1,1,1,1,1 -TIP		FOR KWI DR3 GROOVIX- OEM TURBO RR Black/Green secondary spring in hole #2 (35 degrees wrap)		
225CHP/195WHP	3	PIN- 1,0,0,0,0,0 -TIP		WITH #4 GROOVIX- KWI Dark Blue Pink secondary spring in hole #2 (35 degrees wrap)		
255CHP/225WHP	3	PIN- 1,1,0,1,0,0 -TIP				
290CHP/250WHP	3	PIN- 1,1,0,0,1,1 -TIP				
330CHP/275WHP	3	PIN- 1,1,1,0,1,1 -TIP				
360CHP/310WHP	3	PIN- 1,1,1,1,1,1 -TIP				
400CHP/350WHP	4	PIN- 1,0,0,0,1,1 -TIP				
500CHP/450WHP	4	PIN- 1,1,1,1,1,1 -TIP			8350 RPM +/- 100 RPM (AFTERMARKET TURBO)	
600CHP/550WHP	6	PIN- 0,0,1,0,1,1 -TIP	KWI MAROON IS STANDARD LOW ENGAGEMENT SPRING KWI SILVER PURPLE IS 2900 RPM HIGH ENGAGEMENT SPRING KWI SILVER IS 3500 RPM HIGH ENGAGEMENT SPRING (HIGH ENGAGEMENT SPRINGS RAISE SHIFT RPM AND NEED ADDITIONAL SCREWS INSTALLED IN THE CAM ARMS TO COMPENSATE FOR THE INCREASE IN SPRING PRESSURE)			8750 RPM +/- 100 RPM (AFTERMARKET TURBO)

**PRIMARY SPRING ENGAGEMENT RPMS**  
(RPM MAY VARY DUE TO SPRING MANUFACTURE TOLRANCES, SPRING AGE OR VEHICLE SPECIFIC CAM ARM CONFIGURATION)

STANDARD SPRING	1800-2200
KWI SILVER PURPLE	2700-3100
KWI SILVER	3200-3800

**PARTS INCLUDED**

	PART DESCRIPTION	QTY	OEM PART #	OUR PART #
	ULTRASHIFT V4 PRIMARY CLUTCH	1	—	ULTRASHIFTX3PRI
	ARP STUD, NUT, WASHER AND LUBE	1	—	-
	(INCL IN CLUTCH) STD SPRING	1	—	-
	(INCL IN CLUTCH) SIDEWINDER WEIGHTS	AR	—	-
	RPM ADJUST SCREW PACK	AR	—	-
	SWAG	1	—	-
	WIRE BRUSH	1	—	-

**LIABILITY STATEMENT**

As defined by the Magnuson-Moss warranty Act. Do not install any performance parts or services unless you have the technical ability to properly set-up the entire machine to compensate for the installation of those parts. The necessary work and expertise needed to install different product varies. Instructions, where provided, are given to assist in installation only; they are not a substitute for mechanical experience in setting up racing vehicles. References to performance gains, reliability, ease of installation, etc. are based on our and outside customer's experiences. This is not a guarantee of similar performance in every installation. While we sell proven products, in the end it's up to the individual to make the most of the product. Kris Werth Inc. d.b.a. KWI Clutching or its associated corporations are not responsible for any personal or property damages caused by this product. Kris Werth Inc. d.b.a. KWI Clutching or its associated corporations assumes no responsibility for damage or injury of any kind because of misuse, improper installation or improper application of any parts in anyway, by any person. Contact your local dealer to schedule installation of this kit if you are not a qualified ATV or UTV mechanic. USE OF PRODUCTS. BUYER SHALL USE, AND REQUIRE ITS EMPLOYEES, CONTRACTORS, AND AGENTS TO USE, ALL AVAILABLE SAFETY PRECAUTIONS, IN ADDITION TO ANY SPECIFICALLY SET FORTH IN ANY MANUALS, MATERIAL SAFETY DATA SHEETS, TECHNICAL DATA SHEETS, INSTRUCTION SHEETS, IF ANY, FURNISHED BY SELLER (OR AVAILABLE FROM RAW MATERIAL SUPPLIERS) RELATING TO SELLER'S PRODUCTS. IF BUYER DOES NOT RECEIVE ANY REQUIRED MATERIAL SAFETY DATA SHEETS FOR ANY PRODUCT FROM SELLER, BUYER WILL REQUEST THEM FROM SELLER. IF BUYER FAILS TO STRICTLY OBSERVE EACH AND EVERY ONE OF THE OBLIGATIONS SET FORTH IN THIS SECTION 22 OR IF BUYER'S USE OF ANY OF SELLER'S PRODUCTS IS IN VIOLATION OF ANY STANDARD OR RULE OF THE AMERICAN NATIONAL STANDARDS INSTITUTE OR OCCUPATIONAL HEALTH AND SAFETY ACT, OR OTHER APPLICABLE WORKPLACE LAW, REGULATION, OR STANDARD, BUYER WILL INDEMNIFY, DEFEND, AND HOLD HARMLESS SELLER AND SELLER AND ITS EMPLOYEES, OFFICERS, DIRECTORS, AGENTS, AFFILIATES, SUCCESSORS AND ASSIGNS FROM AND AGAINST ANY AND ALL CLAIMS, DEMANDS, DAMAGES, ACTIONS, AND CAUSES OF ACTION, AS WELL AS ANY AND ALL LIABILITY, LOSS, OR EXPENSE OF ANY KIND, INCLUDING REASONABLE ATTORNEYS' FEES ARISING FROM, CONNECTED WITH OR IN ANY WAY PERTAINING TO ANY SUCH FAILURE BY BUYER. NOTIFICATION. BUYER SHALL NOTIFY SELLER PROMPTLY, AND IN ANY EVENT WITHIN 30 DAYS, AFTER ANY ACCIDENT OR FAILURE INVOLVING SELLER'S PRODUCTS THAT RESULTS IN PERSONAL INJURY OR DAMAGE TO PROPERTY AND SHALL COOPERATE FULLY WITH SELLER IN INVESTIGATING AND DETERMINING CAUSES OF SUCH ACCIDENT OR FAILURE. ATTORNEYS' FEES AND COSTS. BUYER WILL PAY SELLER'S REASONABLE ATTORNEYS' FEES AND OTHER COSTS AND EXPENSES FOR ANY LEGAL OR EQUITABLE ACTION UNDERTAKEN BY SELLER TO ENFORCE THESE TERMS OR THE PROVISIONS OF ANY SUPPLY AGREEMENT.