Norton Commando Pre-MKIII Electric Start Conversion

The CCC Electric Start conversion is for Pre-MKIII Commandos and brings instant starting* at the touch of your "stock" previously unused and unloved Lucas button. Now you don't have to throw out that bum knee and it's great for when she stalls at the short traffic light and the driver in the Escalade on their smart phone has "released horn before engaging brain."

The CCC conversion is based on the ideas and development of three people – Bob Oswald of Quiet Power Drive (the original designer), Kenny Dreer of Norton VR-880 fame (and creator of the original prototypes for the new Commando 961) and Fred Eaton of Old Britts.

*On a properly tuned bike

History: The use of a Bendix-equipped starter to engage a clutch basket mounted ring gear is not unique to this Commando conversion as it has been used for decades on Harley Sportsters as well as other makes. In the mid 70's when Norton decided they had to add electric start to their aging Commandos along with other changes (some good, some bad) they decided to follow their own path. However this wasn't Norton's first electric start system which occurred with the Norton Electra in 1963. Both designs had mixed results. Later after Norton ceased production, Triumph was given a demonstration by Bob Oswald of his QPD Bendix/Ring Gear prototype along with a primary belt drive for vintage Triumphs. They turned "Ozzie" down saying Bendix was outdated and they weren't confident of the belt's durability. This last comment came after they tried repeatedly to break it around their test track using a factory rider and were unsuccessful. Triumph like Norton followed their own electric start path and were met with similar results.

<u>The VR-880's - Bob Oswald and Kenny Dreer</u>

In the late 90's, Bob Oswald was asked by Kenny Dreer to develop a reliable electric starter system for Pre-MkIII Commandos as he needed an e-start to sell his $20K plus Super Commandos - the VR-880's. Kenny gave Bob just a few weeks to come up with a working prototype and Bob's previous conversions of Triumphs gave him a head start. For the VR-880's Kenny took Bob's design and added a belt idler to set the belt tension. Fred Eaton of Old Britts further developed it by incorporating an outrigger bearing on the transmission main-shaft. This outrigger was a "must do" for racers as otherwise with the extra hp and racing loads the AMC transmission mainshaft would significantly flex. This momentarily misaligns the gears causing eventual self-destruction. If you're going racing or ride your bike super

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aggressive then an outrigger bearing is probably a good idea. On the other hand, CCC has taken Bob's design with Kenny/Fred's idler and developed a super sturdy starter mounting bracket along with a flame-hardened and annealed ring gear to provide a happy medium – reliability, superb looks, and reasonable cost.

Other advantages:

– **Made in USA** starter and custom system components including the all important Ring Gear and Starter Mounting Bracket
– **Great looks** when installed, "very factory looking" is the comment we often get
– **Simplicity of design** with the starting mechanism. Just as on your car (most of them anyway) the mechanism is completely removed and out of the way once starting is complete
– **Top-of-the-line** American made high-torque starter from Spyke. This is a design that fits all Harley Sportsters from 1981 until the introduction of the rubber mounted engine in 2004. It was Kenny Dreer's choice for his VR-880's and for good reason. The starter is capable of cranking over even the 1200cc Sportsters, and its polished aluminum housings make it look right at home with the shiny Commando aluminum alloy primary.
– Works with many Belt Drives with UK-made Norvil as our first choice simply because we have used it for many years with good results. If you've already converted your Commando to belt drive then we can work with your existing setup as long as it uses conventional materials for the clutch housing (an alloy of aluminum) and a 30mm wide belt. There are some constraints on the diameter of the clutch basket including belt thickness (got to have room for the Bendix drive to engage the ring gear without clipping the belt) and the length and condition of your existing belt. It may require a slightly longer belt to get the wraparound we need of the belt on the drive sprocket by way of the tension idler. This keeps the high torque starter, now firmly affixed to the cradle, from ripping out the supposedly "indestructible" belt teeth on initial startup. Yes I learned this the hard way.

The "Factory" Look:

Aesthetics are very important too so CCC has designed this conversion to look like Norton produced it, not like a bolt-on item which it is of course not. Along with the Spyke polished alloy high-torque starter, the mounting bracket and Bendix cover are in polished aluminum and look "right" from both sides of the bike. The CCC conversion does NOT modify the outside of the outer primary cover and only very minor metal removal on the inside of the center mounting boss. The mods to the inner primary are for internal clearance of the ring gear and a slot for the Bendix drive and its polished alloy cover. The mounting stud for the center hold-down of the outer primary is also slightly notched to keep the ring gear from clipping it once the bike is fully warmed up and run at high speeds. As mentioned before, there is just enough room to make this conversion fit with proper clearances for metal expansion, torque loads, etc. and so we take advantage of this huge bit of luck to keep the bike looking stock. Double takes are common on those who know Commando's especially when you weep those carbs then touch that little Lucas black button and… *vrrrrroooommmm!*

What the CCC basic conversion includes:

- **All Labor** to disassemble, modify bike components and install the completed conversion. We then test the bike by riding it and starting it in different conditions as needed to ensure reliable performance.

Exchange Items (you provide from your bike or collection)…

- **Modified Engine Cradle** welded and machined to permanently fix transmission location. Then the top is milled using our own templates to provide room for the starter to nestle neatly with the transmission top section. Also included is the stainless steel top bolt w/hardware (bottom uses the stock bolt hardware). MKIII Engine Cradles do not require slugging and welding the top mounting slots as they already have a fixed top mounting bolt. Some beefing up welding is needed for the addition of the pre-MKIII primary center mounting bolt that holds the entire outer primary in place (with the large chromed nut and washer). We use the same MkIII dimensions measured from the crankshaft center to the transmission main-shaft center on the pre-MkIII cradles. There is just enough clearance in the Commando primary for all of this to work (with a little metal liposuction in places) and keep the clean original unmodified outer primary cover that was sacrificed in the MkIII design.
- **Modified Inner Primary** machined for ring gear clearance and Bendix drive/cover. The latter is done by hand with a Dremel tool and multiple fitments as the vertical location of the transmission main-shaft varies from one bike to the other. These bikes were built using very old techniques and even older machinery and if exacting clearances were not necessary then they weren't adhered to. Of course the hand-built nature of Nortons is a big part of their individual character.
- **Modified Battery Box** shortened to provide clearance for starter with gusseting for a heavier battery and optionally, a wheel spokes (2) and L-shaped battery hold-down bar, or a Triumph "belt and buckle" style battery hold-down. The basic setup includes neoprene-lined battery box interior for snug fit of Odyssey battery and high density foam block to secure in place once side cover is installed. This is a simple but reliable method for holding down these batteries unless you drive rough roads or go off-roading. Shorai lithium iron twin battery pack is another option and weighs a fraction of leaded version.

Custom Manufactured Components…

- **Starter Bracket** – CNC Machined from 6061 T6 Aluminum alloy and then hand-finished and polished
- **Ring Gear** – Plasma cut from 4130 steel then flame hardened and annealed. These ring gears are upgraded versions of the Kenny Dreer VR-880 (yes, they're interchangeable). For near perfect concentricity the ring gears are machined with a recess that mates with a matching stepped edge machined on the rear of the clutch basket. Flush mount hardened steel bolts are "loctited" in place from the inside of the basket to provide secure mounting of the gear. These ring gears have virtually no run-out and are long lasting. Additional ring gears as future spares (for your descendants) are available when we produce yearly runs (the foundry hardening process happens in scheduled batches).
- **Bendix Drive Cover** – CNC Machined from 6061 with a smoothly rounded outer edge, then hand polished to blend perfectly with the starter bracket and Norton primary. The covers are machined for a snug fit on the starter Bendix flange and held in place by the matching slot that's hand-machined in

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the inner primary cover.
- **Primary Belt Idler** – Also in 6061, this static tension belt idler incorporates three heavy duty sealed bearings and a removable slotted 1/8" spacer to provide the correct belt tension and drive sprocket wraparound. The spacer makes assembly and disassembly of the belt drive an easy process.
- **Mini Chain Guard** – As the chain does flop around on the drive sprocket during load changes, a stainless steel miniature chain guard with neoprene rubber backing keeps it from wearing grooves in the aluminum starter bracket rear mount.

New Components…
- **Spyke Super-torque Starter** in polished alloy – These starters are made to fit Harley Sportsters from 1981 through 2003 so they're readily available and made and serviced in California. Some minor mods are required (additional clearance in one area; relocation of the starter relay wire connector).
- **Odyssey Dry Cell Battery** – A no-maintenance-high-cranking-amps-super-long-shelf-life battery
- **K&N Air Filter** – Replaces original assembly which interferes with starter (see "Baby Ham Can" Option)
- **30 amp Micro Power Relay** – Keeps the amperage low across your recruited Lucas starter switch to prevent its return to the dark side; minimizes voltage drop by locating the Bendix drive relay power source close to the starter and battery.
- **Transmission Top Mounting Hardware** – Includes a ½" diameter bolt with nut, lock washer and plain washer. The transmission top mount holes are bushed down from 9/16" to ½" to allow the use of the smaller ½" diameter bolt which aids clearances.
- **Conversion Mounting Hardware** – Includes stainless steel hex bolts to mount the starter to the CNC bracket, and hardened bolts/nuts, etc. as needed for mounting the starter bracket to the cradle. Also includes stainless or hardened bolts for mounting the idler bracket and as needed for the overall conversion.
- **Electrical Components** – All wiring, terminals, sheathing, bullet connectors and harness wrap as needed for the conversion. A custom starter button is an option for fitment to custom dashes, etc.
- **Misc. gaskets, circlips, etc**. as needed for primary work (inner primary to crankcase gasket and clutch basket retaining circlip for transmission mainshaft)

Basic Electric Start Conversion, installed* **$ 3,995.00**
Plus tax if applicable*

Components Exchange Policy
The items you provide, cradle/inner primary/battery box, must be in good condition but being used some wear and tear is expected and okay. As part of the modification to the cradle, we also repair the center stand wear grooves. Inner primaries get a thorough cleaning and polishing (top face). Battery boxes are lined with rubber for a snug battery fit. The cradle and battery box are finished in gloss black 2 pack (catalyst cured and ethanol-resistant) paint. Optionally at additional cost, you can keep all or part of your original components so the bike could be returned to pre-electric start condition for a purist with young knees (then you can sleep at night and maybe later sell the parts back to me). Good used cradle, inner primary and battery box from CCC inventory, add $400

If you don't have a belt primary…

- **Norvil Primary Belt Drive** – Complete brand new belt drive system from Norvil Motorcycles in England with anodized drive pulley, 72 tooth clutch basket w/sealed bearing, and 920mm x 30mm wide HTD belt. Uses your stock clutch internals (plain/friction plates, center hub, fixings, etc.). These run about $500.00 including shipping to the continental U.S. which is a good value. There is no additional labor cost for CCC to install a new Norvil belt drive, or other approved alternative belt drive system. If you are already running one then it can be utilized for the conversion as long as it's in decent shape and meets our machining and clearance requirements. At most a slightly longer belt may be required and they generally run about $80-$100.

What the Basic CCC conversion DOES NOT include but are <u>all</u> Options:

Note: Prices quoted for parts are based on the customer purchasing them direct then shipping to CCC

- **Electronic Ignition** – Electronic ignition is a great upgrade and makes starting easier thus putting less strain on the starter system. Specifically we recommend the Tri-Spark system for Norton Commando. It has many advantages over points and even over other EI systems including a highly retarded initial startup cycle that eliminates kick backs. Kick backs on e-starts can damage the primary belt and earlier designs are prone to them especially when a bike is started warm and/or the voltage is a bit low. Damage to the e-start due to kick backs is not covered under warranty nor damage caused by hitting the starter button while the engine is already running (there's no lockout). Tri-Spark @ Colorado Norton Works - $310 plus shipping; $75 installation

- **Baby Ham Can** – This replaces the K&N Commando one-piece filter assembly included in the Basic Conversion. It has new dimensions to provide room for the electric starter and it's narrower (in thickness) to allow those dual Amal carburetor rubbers proper room to stretch their legs. You can even remove the carbs without removing the filter, imagine that. Using a Norvil UK-made front plate and perforated surround in stainless steel, and a new or good used mild-steel backing plate with ignition switch arm, the air box cover and backing plate are cut down to the new dimensions then TIG welded and metal finished. The stainless steel surround is cut to its new width and length, then (after molding to the modified plates) it's riveted back together. A single bolt through the center holds all together much, much better than the primitive side tabs with 2 bolts method. A K&N filter of perfect depth for this new ham can is cut to length, crimped back together and fitted into the surround. Easy air flow and "last forever" quality of K&N filters applies here plus it just happens to fit a Vauxhall, kind of an English Chevy. When part of an e-start conversion, the Baby Ham Can with all new front plate and perforated surround in SS, new or used backing plate in painted steel, and K&N Vauxhall filter element runs $534

- **Breather Collection Bottle and Hardware** – The breather hose that normally routes into the backing plate of the stock air breather can instead be routed into a plastic collection bottle that locates between the battery and rear fender. This keeps oil sputter from dripping out of your air filter and then moving in the air stream from there on back and even onto your rear wheel. And it's much greener and neater than a long piece of hose zip-tied to the frame. Hardware includes a white HDPE plastic bottle, nylon elbow fitting with lock nut, breather hose and hose clamps – parts & labor $45

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- **Transmission Overhaul** – A good condition transmission is an important ingredient to the conversion. Most important are the sleeve gear bushings which have a tendency to wear and add wobble to the clutch basket. In order to access the sleeve bushings the transmission must be completely disassembled. CCC provides transmission rebuilds on an "as needed" basis with customer approval. A full rebuild with all new bearings, bushings, springs, gaskets, seals, etc. runs about $550

- Rear Isolastic Replacement or Upgrade – Since the cradle is out during the conversion this is the time to replace or upgrade your rear isolastic. Andover Norton Vernier (MKIII and later versions) Isolastic Kits run about $110 plus $25 or so shipping from Norvil. Installation of the rear iso in an already removed cradle with the ISO Vernier kit provided by customer is $35

- **Needle-bearing Swing Arm Conversion** – While it's all apart this conversion replaces the oil-impregnated bronze bushings with proper needle-bearings. Grease them once and the stock "O" rings then become dust seals which they can handle. Two different lengths of high quality needle-bearings with the proper outer and inner dimensions are pressed into place in the swing arm you've provided. The old bronze bushings are then machined to become spacers and essentially reside in their original locations. Conversion includes parts (4 needle bearings/set of 4 "O" rings) & labor but not a new spindle if yours is worn beyond limit. A quality Andover Norton long spindle is highly recommended. Conversion parts & labor $220

- **Spoke & "L" Bar or Triumph-style "Belt & Buckle" Battery Hold down** – This is just an embellished way to hold that Odyssey battery in place. The Triumph-style is the easiest to use and the Spoke/"L" Bar the best looking (w/stainless or new spokes). The basic conversion has the battery box lined with neoprene and the battery held in place with a proper size high density foam block wedged between the outer cover and the battery. All three methods work fine with the "Belt & Buckle" our favorite. For either option including parts and labor (and welding if needed) add $75

- **Drive Sprocket, Chain and Rear Drum/Sprocket replacement** – The E-start will work with up to a 21 tooth drive sprocket. While the primary is disassembled, this is a great time to replace the drive sprocket and/or modify your final drive gearing. Accepted procedure is that you replace drive and rear sprocket and chain at the same time. However the Commando rear sprocket (pre-MKIII) is a singular casting with the drum so unless the teeth are noticeably hooked they can be run a bit longer. Some new drums from Taiwan had run-out problems in the past so don't turn that old one into a boat anchor yet, though it makes a good one. Prepping and installing the new sprocket(s), then fitting and shortening the new chain as required add $75 labor (parts not included)

COST ESTIMATE RECAP*

Basic E-Start Conversion	**$ 3,995.00**
Baby Ham Can	**534.00**
Tri-Spark Ignition with installation	**385.00**
Norvil Belt Drive (installation covered in Basic Conversion)	**500.00**
Needle-bearing Swing arm Conversion	**220.00**
Catch Bottle Kit	**45.00**
Good Used Set of Inner Primary, Engine Cradle & Battery Box (for mods.)	**400.00**
Rear Isolastic Upgrade (Norvil Vernier, latest), w/installation	**170.00**
Transmission Overhaul (New bearings, bushings, etc. long kit from Norvil)	**550.00**

*Parts estimates are based on prices obtained as of 6/2/2014

Basic E-Start Conversion Costs (everything you need)

Expenditures :

Items in **bold underscored** are purchased directly by customer and drop-shipped to Custom Classic Cycles per agreed upon build schedule. If CCC makes the purchase(s), then add 20% to those items for handling

- CNC machined and polished 6061 T6 Brackets (Set of 3)	$ 1,000.00
- Inner Primary machining	50.00
- Battery Box Welding	75.00
- Bushings for Transmission Top Bolt	8.00
- Bearings for Idler Assembly (3 – All Balls)	20.00
- Dremel Cut-off Wheels/Sanding Drums & Paint Supplies (Ace)	50.00
- Stainless Hardware & Neoprene Rubber for Battery Box	60.00
- **Spyke Starter (JPCycles.com - part #535-032)**	**407.00**
- Ring Gear installed on machined Clutch Basket; Cradle Mods; SS Hardware; Shipping	717.00
- Electrical Connectors/Wiring (Napa); Starter Relay (Waytek)	48.00
- **Norvil Misc.** - inner primary gasket 060711/1 x £.69, clutch basket circlip 060752/2 x £.35, brass bullet connectors 900269/10 x £.44, fem-to-fem connectors (singles/doubles) 4 sets x £1.11 – Approx. $20 shipping & fees	**40.00**
- Shipping of items for special machining (Cradle and Basket)	35.00
- K&N Commando replacement air filter assembly (Summit Racing)	65.00
- **Odyssey Dry Cell Battery** (batterymart.com)	**120.00**
Conversion Costs	$ 2,695.00
Labor	1,300.00
BASIC CONVERSION TOTAL, plus tax if applicable	**$3,995.00**