LNC-TC1 Torque Cut Module

With RPM Limiter Function

Installation Instructions

PN: L460135297

Rev. 1.3

Release date: 22 November 2016

Parts List

#	Part number	Description
1	LNC-TC1	LPE Launch Controller with Torque Cut
1	XX03975-0003	72" trigger wire harness
1	522660311	3 PIN PLUG SPLASH PROOF, MINI, MOLEX
1	522130311	3 PIN RECEPTACLE SPLASH PROOF, MINI, MOLEX
3	501488100	22-20 GA TERMINAL FEMALE, MOLEX SPLASH PROOF
3	501478100	22-20 GA TERMINAL MALE, MOLEX SPLASH PROOF
7	06483	Hook and loop tape, per inch
4	AV16037	Self tapping screws
1	L450080000	Transient voltage suppression (TVS) diode kit
1	L950050000	LPE technician's screwdriver
2	L920180000	LPE bumper sticker & sponsor decal
1		Instructions

Optional Items

Description	Part Number
• Load cell shift knob	L350170000
• Intermediate load cell shifter interface (special order)	L350180000
• Transient voltage suppression (TVS) diode kit	L450080000
• STOV-002 MPH activated switch	L460050000
• LED for indicator light	
• Red 12 vdc LED with 30 cm leads	L450030000
• Green 12 vdc LED with 30 cm leads	L450040000
• Sealed 40 amp heavy duty relay kit	L450100000
• Red LED lighted paddle toggle switch, 20 amp	DC-7600500
• Connector, AMP Mate-N-Lock, Female 1-pos	571-14803490
• Connector, AMP Mate-N-Lock, Male 1-pos	571-14803510
• Connector, AMP Mate-N-Lock Pin, 24-18 AWG	571-606181
• Connector, AMP Mate-N-Lock Socket, 24-18 AWG	571-606171

Note: The LNC-TC1 receives power and ground from the coil pack connectors. The +12V and ground activation wires are not power and ground for the controller.

LNC-TC1 Specifications:

- Custom molded high temperature glass filled Nylon 6 enclosure with direct access to the controller settings without requiring removal of a cover or access panel.

- 40 MHz 16-bit automotive qualified processor with eight channel Enhanced Time Module.

- Each coil drive circuit has a dedicated timer to keep the timing accurate over the full RPM range.

- Independent coil drive provides Sequential Ignition Kill when RPM limiting is active.

- Reverse battery protection.

- Both of the activation inputs have active clamps and optical isolation to suppress electrical noise from external solenoids (such as trans brake and line lock).

- Digital filter provided in software to further isolate electrical noise on the activation inputs.

- Separate RPM x100 and RPM x1000 switches for easy setting adjustments.

- RPM limiter activation point can be adjusted from 1500 to 9,900 RPM in 100 RPM increments.

- Both **Ground Activation** and **+12 Volt Activation** inputs are provided for RPM limit activation.

- Load cell inputs allow for adjustable torque cut based on load cell voltage.

- Torque cut time ranging from 25ms to 95ms.

- Alternate setting to allow for manual control of torque cut with momentary switch, seperate controller, etc.

- Analog voltage output wire for sending torque cut signal to data acquisition systems (EFILive, HPTuners, DashDAQ, Racepak, AEM, AIM, etc.).

- True plug-and-play coil pack connection design for ease of installation and removal.

- Fully encapsulated (potted) construction for added durability.

- One year warranty (from date of purchase).

LNC-TC1 description:

The LNC-TC1, or Torque Cut Module, is designed to provide a momentary torque cut on GM LS based engines using the OEM style ignition systems. This momentary torque cut is usually needed when using dog-engagement or other clutchless shift type transmissions.

The LNC-TC1 also has an RPM limiter feature that can be used to provide a reliable and fast acting spark based individual cylinder RPM limiter. This RPM limiter can function as a traditional engine RPM limiter or it can function as a 2-step or launch controller in order to provide consistent launch RPM off the line in drag racing and other standing start racing applications.

WARNINGS:

The RPM limiter and the torque cut functions of the LNC-TC1 act by disabling spark to individual cylinders so the torque cut and 2-Step/Launch Control functions are not meant for use on the street or for use on cars equipped with catalytic converters. The torque cut and 2-Step/ Launch Control functions of the LNC-TC1 are only for use at the race track on race vehicles not equipped with catalysts. Failure to follow these precautions can result in premature catalyst failure.

DO NOT operate the engine with the LNC-TC1 RPM limit active for extended periods of time. Due to the raw fuel in the exhaust when the RPM limit is active, a risk of backfiring exists if you do so.

DO NOT place in direct exposure to exhaust manifolds, turbocharger turbine housings or other underhood items that are high temperature heat sources (radiated heat sources). The warranty does not cover damage due to melted enclosures or wiring due to improper installation.

Do NOT submerge Controller in liquid or directly wash unit with liquid of any type! The switches on the LNC-TC1 are sealed but are NOT rated for high pressure wash, use caution if power washing near the LNC-TC1 controller

Important Information regarding spark plug wires and spark plugs:
You must use noise suppression ignition wires AND resistor type spark plugs with this Controller. The LNC-2000 Controller contains High Frequency Digital Electronics and will NOT function correctly without Noise Suppression Wires or resistor type spark plugs!

Switches and indicator lights:

Red (Power) LED:

- Comes on solid on start-up (power on)
- When active RPM is reached, red LED will blink (even if activation wire is not triggered)

Green (Activation) LED:

- slow blink rate (4 Hz) for Launch Activation only
- medium blink rate (8 Hz) for torque cut (kill) Activation only
- fast blink rate (16 Hz) for both launch and torque cut inputs on

Torque cut settings:

- Controlled by two (2) 16 position switches: **Kill Enable Offset Voltage** and **Kill Time**
  - o Torque cut (kill) enable voltage
  - o Torque cut (kill) duration in milliseconds

Launch control settings:

- Controlled by two (2) ten position switches (**RPM**)
  - o One ten position switches for selecting hundreds of **RPM (x100)**
  - o One ten position switches for selecting thousands of **RPM (x1000)**

Notes:

- The LNC-TC1 RPM limiter function will not trigger at RPM levels below 1500 RPM
- **Changes to the switch point settings (RPM, Cut voltage, Cut duration) must be done with the ignition off**
  - o The switch positions are **ONLY** read on start up

Example settings:

- 1900 RPM activation point for launch control
  - o Upper (x100) RPM switch on position 9
  - o Lower (x1000) RPM switch on position 1

RPM Programming Switches

100's Switch (x100 RPM)

1000's Switch (x1000 RPM)

- 6900 RPM activation point for RPM limiter
  - o Upper (x100) RPM switch on position 9
  - o Lower (x1000) RPM switch on position 6

RPM Programming Switches

100's Switch (x100 RPM)

1000's Switch (x1000 RPM)

- 0.4 Voltage activation point with 80 ms torque cut
  - o Kill enable offset voltage in position 2
  - o Kill time in position B
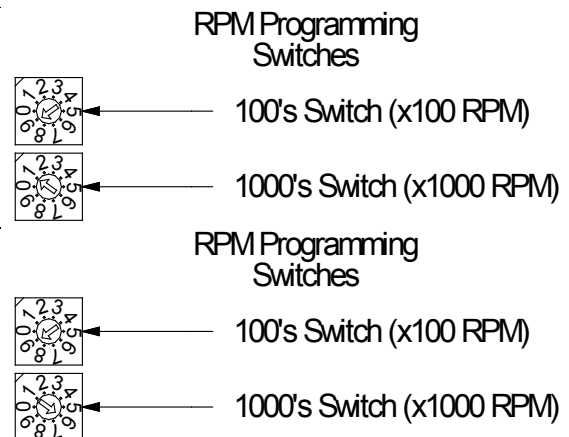
Installation:

- Make sure the ignition is off before beginning installation.
- You can mount the LNC-TC1 using the supplied hook and loop tape or the supplied self tapping screws.
- Do NOT mount the LNC-TC1 directly on top of the engine or near the exhaust manifolds due to heat concerns.
- Do NOT mount the LNC-TC1 in the line of site of high temperature objects such as exhaust manifolds, turbine housings etc. If needed, put a heat shield in between the heat source and the module to protect the plastic case.
- Do NOT install within 6" of nitrous solenoids or other devices with strong magnetic fields.
- If you have relocated coil packs, do not run the high voltage spark plug wires alongside the low voltage coil pack wires. Keep the wires as far apart as possible and, if they do have to intersect, have them intersect at right angles.
- Disconnect the pack connectors on each side of the engine and then plug the LNC-TC1 wiring harnesses in between on each side. It does not matter which bank of cylinders each side of the LNC-TC1 harness connects to.

Launch Control Installation:

- The wiring that is required is for the trigger wire(s) for both the launch control activation and the load cell input. Depending on how you want to enable the launch control, 12V + or ground activation may be used. Check some of the GM, LS1, Corvette, GTO and other forums for discussions on other wiring methods. The possible launch control trigger/activation connection methods are:
    - Ground activation wire (green) - connect this wire to a source that supplies a ground path when you want the LNC-TC1 to become active
    - +12 volt activation wire (yellow) - connect this wire to a source that supplies +12 volts when you want the LNC-TC1 to become active (i.e. brake light switch, line-lock solenoid)
    - Switch connected in between the ground activation wire and the +12 volt activation wire (green wire connected to yellow wire through a switch, usually a momentary switch)
    - Ground activation wire connected to +12 volt activation wire (green connected to yellow) for standard RPM limiter operation (LNC-TC1 always active)
- Set the desired RPM switch activation point using the two ten position rotary switches for the 1000 RPM increment (x1000) and the 100 RPM increment (x100). See Page 4 for example settings.

LNC-TC1 operation

When in Shift Kill mode the LNC-TC1 cuts all engine torque by disabling the ignition to all cylinders. The LNC-TC1 does this based on input to the orange Shift Kill Enable/Activation wire and to the purple Shift Load Signal wire. When using a load cell type input, the LNC-TC1 will cut torque when the desired input voltage on the purple wire is reached (as set on the **Kill Enable Offset Voltage** rotary dial) and for the length of time set with the **Kill Time** rotary switch. The torque cut length is adjustable from 25ms-95ms. When using an external device to activate the torque cut, the length of time for the torque cut can either be controlled by the Kill Time setting (0 to E settings) or by the external device (setting F).

Load cell shift knob or lever input configuration:

The LNC-TC1 is designed to work with a 5 volt powered load cell with a 2.5V centering voltage and +/-2.0V span. The load cell can be directional or non-directional. The LPE load cells provide directional output. LPE offers two different versions of this type of load cell. One is a shift knob (L350170000) and the other is an intermediate adapter that installs in between your shifter mechanism or lever and the shift knob (L350180000). See page 14 for images of the LPE load cell input devices. Other companies also offer load cell shift knobs and some companies will install a load cell into your existing shifter lever or knob. Just be sure to specify the above mentioned voltage configuration.

In order to reduce ground offset related problems, it is recommended that the LNC-TC1 supply the power and ground for the load cell via the provided +5 volt and ground wires.

> **Load cell shift knob operation:**
> A load cell shift knob or lever has a strain gauge installed inside of it that provides a signal that is caused by a change in length of a resistor that is attached to the knob or lever. The change in length of the resistor element in the load cell causes a change in output voltage across the load cell. At zero strain the voltage across the load cell should be 2.5 V. When load (strain) is applied to the shifter, the voltage will then become 2.5V +/- 2.0V. The maximum and minimum voltage across the load cell is therefore 4.5V and 0.5V in tension and compression, respectively.

Because the load cell output is 2.5 volts with no load, you can NOT just disconnect the load cell or put a switch in the harness to disable the torque cut feature. Doing so will result in a 0 volt signal to the LNC-TC1 which would be seen as a maximum load condition in one direction.

If you want to be able to disable the LNC-TC1 torque cut function, set both the "Kill Enable Offset Voltage" and the "Kill Time" to the "F" positions and then make sure nothing is connected to the orange wire (unplug the wire or put a switch in the wire).

LNC-TC1 load cell input modes (also see Table A on page 14):

The LNC-TC1 has two modes of operation for the load cell input. One uses the directional load information (**Voltage Mode**) and one ignores the directional information (**Time Based Mode**).

Voltage Mode and **Time Based Mode** are controlled by the orange **Input On** wire, the rotary **Kill Enable Offset Voltage** switch and the rotary **Kill Time** switch. If 12 volts is applied to the orange Input On wire and the Kill Enable Offset Voltage switch and the Kill Time switch are both set to positions 0-E, then you will be in **Voltage Mode**.

If nothing is connected to the orange Input On wire and the Kill Enable Offset Voltage switch and the Kill Time switch are both set to positions 0-E, then you will be in **Time Based Mode**.

Voltage Mode:

When in **Voltage Mode**, the LNC-TC1 uses the directional load information to prevent multiple torque cuts when the shifter is pulled in the same direction. When in this mode and connected to a directional output type load cell type shifter, once a torque cut occurs in one direction, the LNC-TC1 will not cut torque again until it sees the shift lever cross back to zero load (2.5V) and then go the other direction in load. So if you pull back on the lever and apply a load that goes below 2.5 volts, the LNC-TC1 will not perform another torque cut until the lever is pushed forward and the load cell output goes above 2.5 volts.

Time Based Mode:

When in **Time Based Mode** the LNC-TC1 ignores the directional nature of the load cell input signal (if you are using a directional load cell). To reduce false or redundant torque cuts, the LNC-TC1 waits 0.050 seconds (50 msec) after a torque cut occurs before it will allow another torque cut to occur. Anything above or below the 2.5 volt centering voltage (0 load) that meets the Kill Enable Offset Voltage setting will trigger a torque cut. This mode may be needed in road racing conditions where you may not change gears in order. This mode is also needed when using the LNC-TC1 with a sequential type transmission where all upshifts involve pushing up or pulling back on the shift lever. This mode must be used when non-directional type load cells are used.

Momentary switch or toggle-switch type shift knob operation:

When using a momentary switch on your shifter or a toggle-switch type shift knob (on-off type spring loaded switch) then the momentary switch should be wired such that when the switch is depressed, +12 volts are applied to the orange Input On wire. The Kill Enable Offset Voltage switch should be set to the F position (ALT). The length of the torque cut can be controlled two ways when in this mode. If the Kill Time switch is set to positions 0-E then the LNC-TC1 will cut the engine for the length of time specified by the switch position (0.025 to 0.095 seconds). If the Kill Time switch is set to position F (OFF) then the LNC-TC1 will cut the torque for as long as the momentary switch is held (for as long as 12 volts is applied to the orange Input On wire).

External module control operation (also see Table A on page 14):

If you have an external device (shifter controller, transmission controller etc.) that you want to have control the torque cut, this can be done in two primary ways.

The first method would be if your external device can provide a 0-5 volt variable voltage output and you still want the LNC-TC1 to control the duration of the torque cut. In this case you could send the control signal to the purple wire, much like the load cell input signal. You would connect nothing to the orange Input On wire and you would set the Kill Enable Offset Voltage to what ever voltage change your external device could generate. Keep in mind the external device would have to supply 2.5 volts for a no torque cut condition and then go above or below 2.5 volts to command a torque cut. In this configuration you would be in Time Based Mode so the LNC-TC1 would ignore any torque cut request that occurred within 0.050 seconds of a previous request.

If you want the external device to control when and for how long a torque cut occurs, then you would connect the signal output from your device to the orange Input On wire and set the Kill Enable Offset Voltage to position F (ALT) and the Kill Time to position F (OFF). In this mode when ever your device provided a 12 volt signal to the orange wire, the LNC-TC1 would be in torque cut operation. The length of the torque cut would be controlled by how ever long the voltage signal is applied to the orange wire.

Torque Cut Wiring for the LNC-TC1

The orange wire is a 12 volt input signal wire. It is used for controlling the operating modes and in some modes to control the length of the torque cut.

The gray wire is a 5V output wire. This wire is used for data logging.

The red (5V) wire should be connected to the positive (+) voltage wire on the load cell.

The black (ground) wire on the LNC-TC1 must be connected to the negative (-) voltage wire on the load cell.

The purple (signal) wire on the LNC-TC1 should be connected to the signal wire on the load cell.

RPM Limiting & 2-step/Launch Control Operation

The independent coil drive of the LNC-TC1 provides sequential ignition kill when RPM limiting is active. The desired RPM limiting is set as shown on page 4 using the x1000 and x100 RPM increment rotary dials. The activation for the Launch Control/2-Step function is controlled by the ground (green) or +12 volt (yellow) activation wires.

If you are triggering off of the clutch switch, the 2-step will trigger each time you depress the clutch pedal. If you do not want the 2-step to trigger when you engage the clutch pedal once you are moving then you will need to install a momentary switch or use the Lingenfelter MPH activated switch. With the MPH activated switch you can set at what MPH you want the 2-Step activation to be disabled.

Setting the torque cut:

- **Kill Enable Offset Voltage**
  Required change in load cell voltage 0 – E: Change in voltage the LNC-TC1 needs to see before activating torque kill.

Position	Voltage Change
0	0.2 V
1	0.3 V
2	0.4 V
3	0.5 V
4	0.6 V
5	0.7 V
6	0.8 V
7	0.9 V
8	1.0 V
9	1.1 V
A	1.2 V
B	1.3 V
C	1.4 V
D	1.5 V
E	1.6 V
F	ALT[1]

[1]Position F for the Kill Enable Offset Voltage is used for manually cutting torque either with a momentary switch or some other external device. The alternate setting must receive 5-12 volt DC to cut torque.

- **Kill Time**
  Torque kill time settings 0-E: Sets the time that the torque kill is activated during shifts in milliseconds (0.001 seconds).

Position	Kill Time
0	25 ms
1	30 ms
2	35 ms
3	40 ms
4	45 ms
5	50 ms
6	55 ms
7	60 ms
8	65 ms
9	70 ms
A	75 ms
B	80 ms
C	85 ms
D	90 ms
E	95 ms
F	OFF[2]

[2]Position F for the Kill Time setting is used to cut the torque for as long as the signal meets the required setting for the load cell range. This is the normal setting for external torque cut control. If the load cell voltage is met on the torque cut module for a given time, the torque cut will happen over the entire time the load is applied.

Vehicle applications:

The LNC-TC1 is designed for use on all known GM LS series engine applications (LS1, LS6, LS2, LS7, LS3, LQ4, L76, L92 and other Gen III and IV GM V8 applications along with other GM V8 engines using the same ignition coil system) including the following vehicles:

- 1997-2004 C5 Corvette
- 2005-2013 C6 Corvette (including Z06)
- 1998-2002 LS1 V8 equipped Camaro and Firebird
- 2004-2006 Pontiac GTO
- 2008-2009 Pontiac G8 with the L76 or the LS3 engine
- 2004-2007 Cadillac CTS-V
- 1999-2013 GM CK trucks (Tahoe, Yukon, Escalade, H2, Sierra, Silverado, Avalanche) with the 4.8, 5.3, 6.0 and 6.2L Gen III and IV V8 engines (will not work on 305 & 350 Vortec engines)
- 2003-2006 Chevrolet SSR
- 2006-2009 Trailblazer SS and other S/T body trucks with the 4.8, 5.3 and 6.0L Gen III & IV GM V8 engines
- CK trucks with 8.1L V8 engines (L19) with individual coil ignitions
- Front wheel drive 5.3L LS4 Gen IV V8 equipped cars (Impala SS, Grand Prix & Monte Carlo)

The LNC-TC1 should also function with these products but has not yet been tested with them:

- Aftermarket coils for the LS series engines (such as the MSD coils) used with GM ECM/PCM.
- Aftermarket engine management systems and ignition systems (Accel, BigStuff3, FAST, Holley, MEFI, Motec, MSD, etc.) that run the production GM coils.

The LNC-TC1 can be used on the 2009-2013 ZR1 Corvette (LS9 engine), the 2009-2014 Cadillac CTS-V (LSA engine) and the 2012-2014 ZL1 Camaro (LSA engine) but you will need to change the connectors because the LS9 and the LSA use a different combined coil and fuel injector harness. Contact LPE for these connectors (part #s 15336037, 15422562, 15326939, 15336034). If you would prefer not to do this yourself, contact LPE and we can have a custom unit made with the correct connectors.

The LNC-TC1 will NOT work with other individual coil ignition systems like those found on the GM Northstar or Ecotec engines or on the Ford modular V8 and the Chrylser Hemi V8.

Additional Notes

Important Information regarding spark plug wires and spark plugs:
You must use noise suppression ignition wires AND resistor type spark plugs with this Controller. The LNC-TC1 controller contains High Frequency Digital Electronics and will NOT function correctly without Noise Suppression Wires or resistor type spark plugs!

Nitrous, line-lock, trans-brake and other solenoid usage warning:
LPE has found that these solenoids can cause fly-back voltage levels at times in excess of 600 volts. These voltage levels have the potential to damage sensitive electronics including the LNC-TC1, the PCM/ECM and other modules in the vehicle. LPE has developed a transient voltage suppression (TVS) diode kit (PN L450080000) for use with line-lock solenoids, trans-brake solenoids and other aftermarket automotive solenoids of this type. The TVS diode is a special kind of diode used to suppress voltage spikes. LPE recommends the use of our TVS diode on all vehicles that have a line lock or trans-brake. This kit comes with three TVS diodes, enough for most common installations. If you have a vehicle with multiple solenoids we recommend obtaining additional TVS diodes for those solenoids.

Install the TVS diode across the solenoid wires as close to the solenoid as possible. Polarity does not matter (Red and Black wires can go to either solenoid wire). If there is no accessible ground terminal to connect the diode to, such as the case with a trans-brake solenoid, the diode should be connected to the nearest ground source. In the case of the diode for the trans-brake solenoid, the diode should be connected to the transmission case as it will provide a ground path.
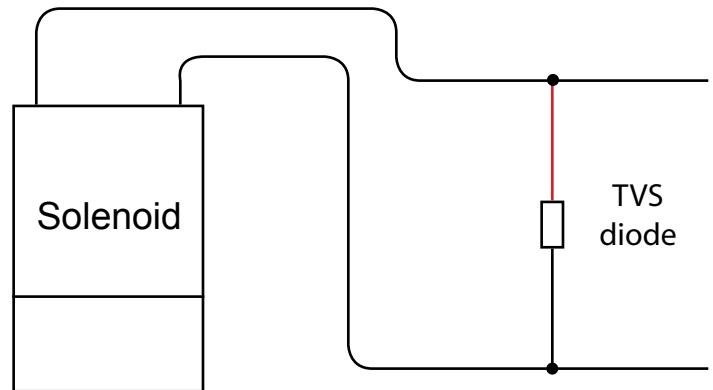
LPE recommends using TVS diodes on:
• Nitrous solenoids
• Nitrous purge solenoids
• Fuel solenoids
• Line-lock solenoids
• Trans-brake solenoids

Troubleshooting:

- Intermittent misfire or other erratic vehicle operation.
  - Have someone monitor the LED's on the LNC and note what they are doing when the problem occurs. Try changing the RPM settings on the LNC. Does the problem still occur and, if so, at the same RPM?
  - Disconnect the RPM limit activation input and retest (leaving the LNC connected to the coil packs and the load cell/external input)
    - Does the problem still occur?
      - If no, the problem is likely coming from the RPM limit activation input.
        - Check for an erratic activation signal or electrical noise on the activation input. Are you using a microswitch or momentary switch? Bypass this device to confirm that it isn't giving you erratic activation signals. Are you using a mechanical relay in a high vibration/acceleration environment? If so, try switching to a solid state relay.
      - If yes, disconnect the load cell/external input from the LNC and retest
        - If the problem goes away with the load cell/external input disconnection, check to make sure vibration or other forces aren't causing unexpected torque cut activation. Change the Kill Time and see if the condition changes.
        - If it changes, your Kill Enable setting is likely too sensitive (increase the Kill Enable Offset Voltage)
        - If the problem doesn't appear to be caused by shifter vibration/movement, check for noise coming from the load cell/external input side of the circuit
    - If the problem still occurs, disconnect the LNC from the vehicle completely (activation, load cell and coils) and test again.
      - If the problem still occurs, it is not related to the LNC.
      - If the problem goes away, re-install the LNC and test the following:
        - Re-route the LNC wiring harness away from the spark plug wires and/or ignition coils.
        - Make sure the wires are not run in parallel with electrical wiring including fuel injector harness wires or nitrous solenoid wires.
        - Mount the LNC in a different location.
        - If you are using aftermarket spark plug wires, try changing back to the stock spark plug wires or a different brand of spark plug wires. Make sure you are using noise suppression spark plug wires.
        - If you are using aftermarket/non OEM spark plugs, confirm that they are really a resistor type plug.
- No power LED on LNC/no vehicle start up
  - Try disconnecting everything and plugging it all back in - you may have corroded or loose connections. Inspect all connectors and wires for damage and wear.

Troubleshooting (continued):

- LNC RPM limit is active all of the time
    - Have someone check the LED's to see what they do when the LNC activates.
    - Make sure that the LNC ground activation wire is not connected to an "always on" ground. This connection is not a module ground but an activation ground.
    - Make sure you don't have the yellow and green activation wires connected to each other - this will cause the LNC to always be active.
- Torque cut always active or torque cut not working
    - Check what the LED's on the LNC are doing when the torque cut should become active
    - Check what the voltage levels are at red, black and purple wires
    - Check what the Torque Cut output signal using a volt meter on the gray analog out wire.

LPE load cell shift knob with nylon outer cover
PN L350170000

LPE intermediate load cell adapter
PN L350180000

Table A (LNC-TC1 Torque Cut Input Modes)					
Mode	**Orange input wire**	**Kill Enable Offset Voltage switch setting**	**Kill Time switch setting**	**Expects switched directional input**	**Load cell / 0-5V input**
Voltage Mode	12 volts	Positions 0-E	Positions 0-E	Yes	Yes
Time Based Mode	Not connected	Positions 0-E	Positions 0-E	No	Yes
Momentary switch, LNC controls cut time	Momentary on 12 volts	F (Alt)	O-E or F	No	No
Momentary switch, switch controls cut time	Momentary on 12 volts	F (Alt)	F (OFF)	No	No
External device activation, LNC controls cut time	Not connected	Positions 0-E	Positions 0-E	No	From device
External device control where external device controls cut time	12 volts from device	F (Alt)	F (OFF)	No	No
Torque Cut Function OFF	Not connected (open)	F (Alt)	F (OFF)	NA	NA

Photo by SDW Photography

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