Frantangelo, Barbara K

From: Mattson, Erik R
Sent: Tuesday, February 19, 2002 2:33 PM
To: 'raymond.degiorgio[redacted]
Cc: Allen, Larry; Homer, Steven N; Hollenbeck, Arnold H; Wojtecki, Ronald J
Subject: RE: Increased detent force

Follow Up Flag: Follow up
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Ray,
You are correct, it is N-cm; not N-mm.

Where in the CTS is there an exact requirement of these forces? All I see is a general curve that is marked "This is a TARGET curve only, actual curve to be furnished by supplier after GM Engineering approval." I'm not saying it is impossible to change the detent forces, but it does have an impact on timing and our suppliers will not do it for free. It is not expensive, but it does take some time, especially if we do not have a local source for the detent plunger.

The Talc samples were 9.6 N-cm. The new production intent version of the switch has 9.5 N-cm. We feel this is a match of the TALC switch. We can revise this again but we all need to be aware of the impacts in timing, cost, and possible other issues that might be created when we are this close to PPAP.

If we are trying to improve the "feel" of the switch through the column, please remember that we have no control over how the lock cylinder and related parts impact the "feel" of the switch. We will be happy to make any changes you need in order to improve the system as a whole given cost and timing.

Erik R. Mattson
Product Engineer
Delphi Mechatronic Systems
[redacted]

-----Original Message-----
From: raymond.degiorgio[redacted]
Sent: Tuesday, February 19, 2002 11:39 AM
To: Mattson, Erik R
Cc: Allen, Larry; Homer, Steven N; Hollenbeck, Arnold H; Wojtecki, Ronald J
Subject: Re: Increased detent force

Erik,
If increasing the detent ACCRY force by 5N will destroy this switch than do nothing ..... maintain present course.
Under no circumstances do we want to compromise the electrical performance of this switch nor PPAP status.

a.) DV Epsilon ACC detent force peak is at 14.0 N-mm +/- 1N-mm (Follow GMX 380 CTS requirements; let me know if this is an issue.)(Are you sure its 14 Nmm not

14 Ncm?)

b.) PV Delta Acc detent was at 7.0 N-mm +/- 1.5N-mm. (Are you sure of the Nmm vs N cm?) Delta Talc
#1 was 7.6 N-mm,
#2 was 9.6 N-mm
Delta (New) Acc detent now at9.5 N-mm (not enough data for tolerance) - (Much improved over GMX 320 but, still too soft of a detent. Does not meet CTS
requirements.)

c.) Previously you had directed us to match the Talc samples for detent feel on Delta. (Where the tools cut to reflect the TACL sample feel. At our PDT you indicated that the production samples would infact feel softer than the Tacl
sample.)

Note:
1.) Switch design will require detent modifications for the GMX 001 Program.
(along with any other rotor / PCB design mods necessary to meet the CTS
requirements.)
2.) Standardization of GMX 320/357 switch designs not probable unless above requirements are met.
3.) Ultimately, if the TALC Group does not buy - off on the feel of the switch than changes to the design will be required.

Ray (tired of the switch from hell) DeGiorgio

"Mattson, Erik R" [redacted] on 02/18/2002 04:11:08 PM

To: Raymond DeGiorgio/US/GM/GMC [redacted]
cc: "Allen, Larry" [redacted], "Homer, Steven N"
[redacted] "Hollenbeck, Arnold H"
[redacted] "Wojtecki, Ronald J"
[redacted]
Subject: Increased detent force

Ray, per our discussion at the PDT:

DV Epsilon Acc detent force peak is at 14.0 N-mm +/- 1N-mm PV Delta Acc detent was at 7.0 N-mm +/- 1.5N-mm Delta Talc Samples Acc detent was at
#1 was 7.6 N-mm,
#2 was 9.6 N-mm
Delta (New) Acc detent now at9.5 N-mm (not enough data for tolerance)

Previously you had directed us to match the Talc samples for detent feel on Delta. During the PDT 2-13-02 you directed us to be 15 N-mm +/- 2 N-mm. The Epsilon is currently meeting that requirement. Delta can be increased to this new requirement, but there are several things we all need to be prepared for.

1. Possible damage (cracking) during durability to rotors due to increased forces at the driver tip required to rotate through the detent positions.
2. Possible premature (less than 3x life) wear-out of the detent with an extremely heavy feel resulting.
3. Possible impact on electrical functions (PCB wearout) as the spring loads are substantially larger than those previously tested. These loads act along the same axis as the contact forces.

Timing to make a change to the detent is around 7 weeks for PPAP switches; the parts come from Germany. Cost is nominal, around $2000 to do the engineering and get parts. If we can find a supplier that is a cost savings more locally, I believe we can improve the timing. Also, we had planned on starting the 3x life portion of the new PV plan (since Mohammed's departure) by 3-15-02. This will be delayed significantly if we follow this path.

Regards,

Erik R. Mattson
Product Engineer
Delphi Mechatronic Systems
[redacted]