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From: james.redman@continental-corporation.com
Sent: Thursday, April 10, 2014 11:53 AM
To: Ruiz, Jesica (.); Fred.Schwendenmann@hitachi-automotive.us
Cc: ralph.wagers@hitachi-automotive.us; Yusuke.Shigeta@hitachi-automotive.us; Hirokazu.Sano@hitachi-automotive.us; Rodger.Carter@hitachi-automotive.us; Stauffer, Eric (E.L.); Williams, Dan (DW.); Aynessazian, Kam (K.); Kosztowny, Brian (B.P.); Smith, Warren (W.A.); Dunham, James (J.A.); DeBono, John (J.E.); Lawson, Manny (M.R.); Bonde, Swapnil (S.); Eigsti, Sam (S.)
Subject: NVH analysis of P415 Zipper noise complaint
Attachments: Ford P415 zipper noise NVH analysis 10Apr14.pdf; latest mc complete.wav; latest mc with BP 630Hz.wav; latest mc with BP 4000Hz.wav; prev-old mc complete.wav; prev-old mc with BP 950Hz.wav; prev-old mc with BP 4000Hz.wav; pic05692.gif

Hello Zipper Noise Team,

Here is the NVH summary from the week's testing.

(See attached file: Ford P415 zipper noise NVH analysis 10Apr14.pdf)

I have also include some sound files showing the difference between the two master cylinders tested.

Sound files from latest master cylinder: complete sound, sound at 630Hz, sound at 4000Hz (See attached file: latest mc complete.wav)(See attached file: latest mc with BP 630Hz.wav)(See attached file: latest mc with BP 4000Hz.wav)

Sound files from previous/old mc: complete sound, sound at 950Hz, sound at 4000Hz (See attached file: prev-old mc complete.wav)(See attached file: prev-old mc with BP 950Hz.wav)(See attached file: prev-old mc with BP 4000Hz.wav)

Regards,

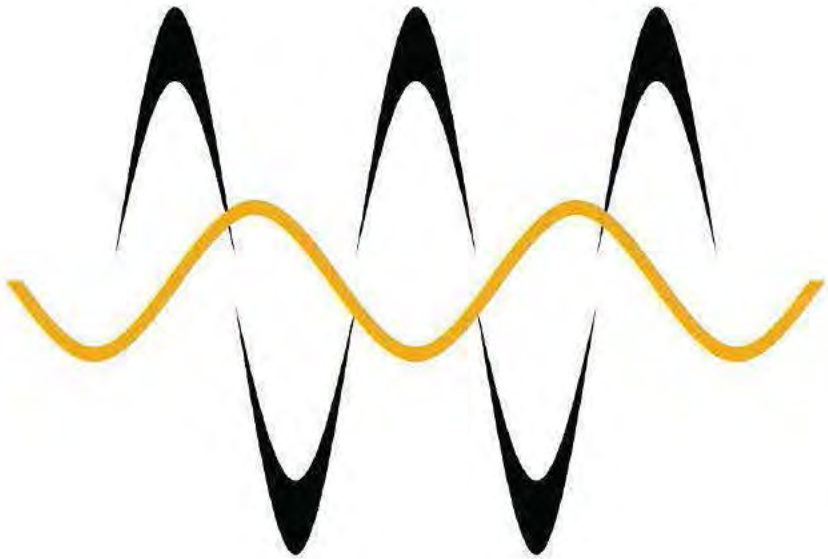
James Redman

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(Embedded image moved to file: pic05692.gif) Continental Automotive Systems, Inc.
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CONTINENTAL ENGINEERING SERVICES



NVH
noise • vibration • harshness
Engineering

Ford P415 Zipper Noise

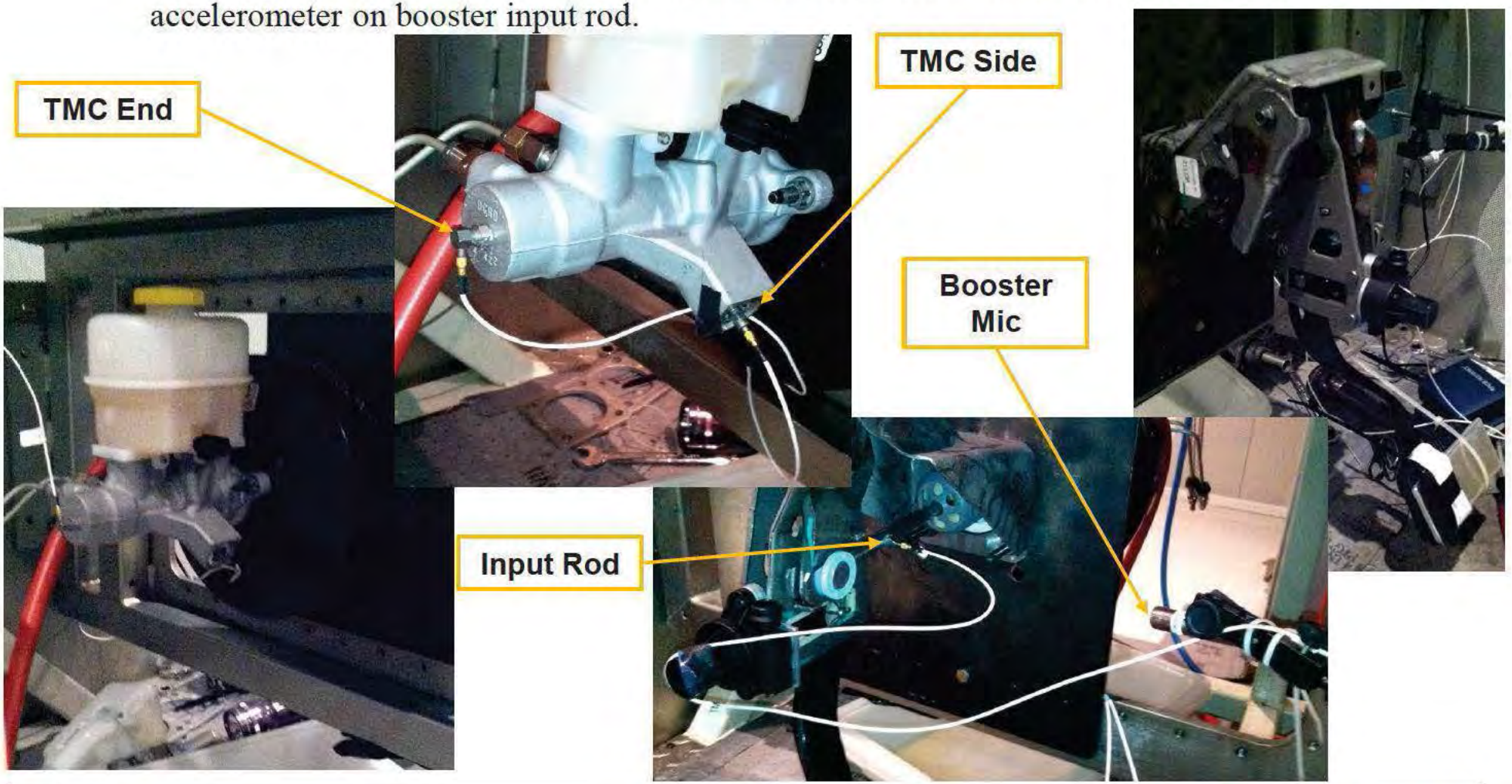
Project #: DD-102022

April 08, 2014

Ford P415 zipper noise.

Set-up for NVH analysis

- Noise analysis of Actuation unit on pedal buck and quiet room environment.
  - Actual pedal and master cylinder are used in set-up. Vacuum supply (up to 950mbar) and hydraulic consumption (hose rack) are made to represent vehicle conditions.
  - NVH Inputs; pedal travel, microphone, two accelerometers on master cylinder, one accelerometer on booster input rod.



Ford P415 zipper noise.

Overall Subjective Evaluations using different master cylinders

- DOE using second return booster from DTP
- Hitachi Master Cylinder
  - Previous version – could not reproduce the zipper noise
  - Latest version – zipper noise could be heard, but lower level than in vehicle complaint, very similar to Dearborn vehicle with KCAP booster



PREVIOUS/OLD VERSION (NO NOISE)



LATEST VERSION (NOISE)

Ford P415 zipper noise.

Overall Subjective Evaluations using different master cylinders

- Objective data from analysis of latest version master cylinder and complaint booster.

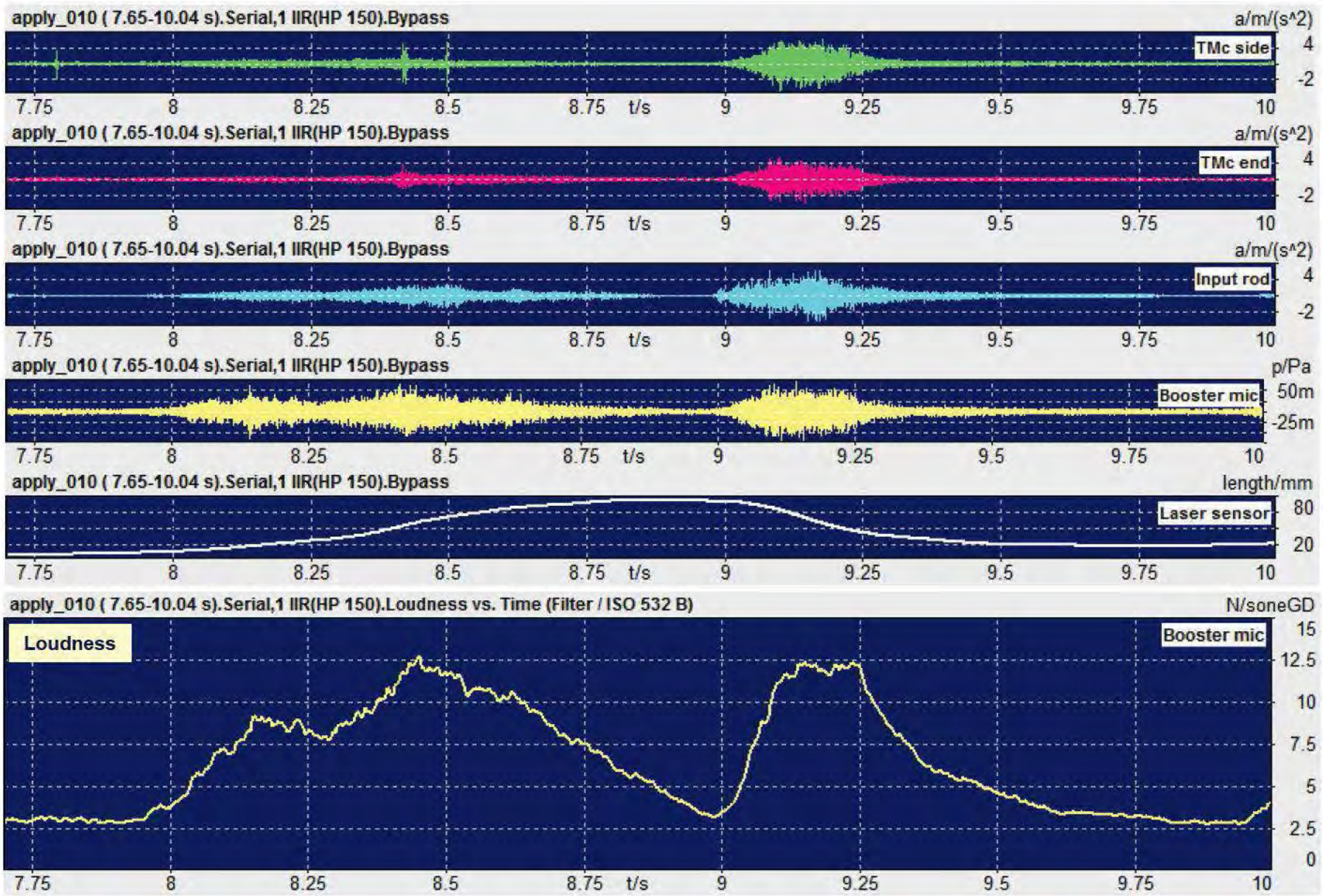


LATEST VERSION (NOISE)

Ford P415 zipper noise.

Zipper noise_latest Hitachi TMC

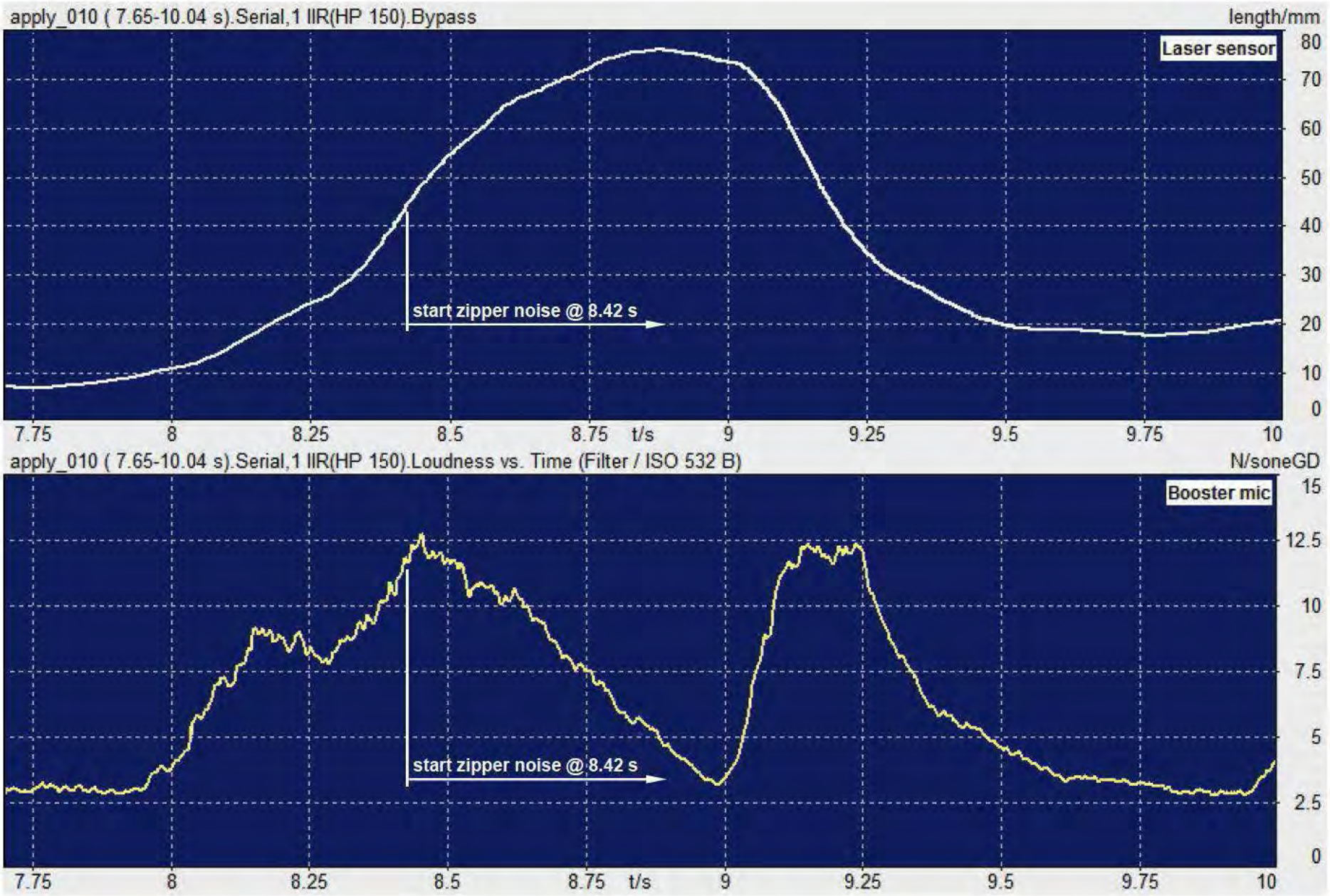
Time data, loudness



Ford P415 zipper noise.

Zipper noise_latest Hitachi TMC

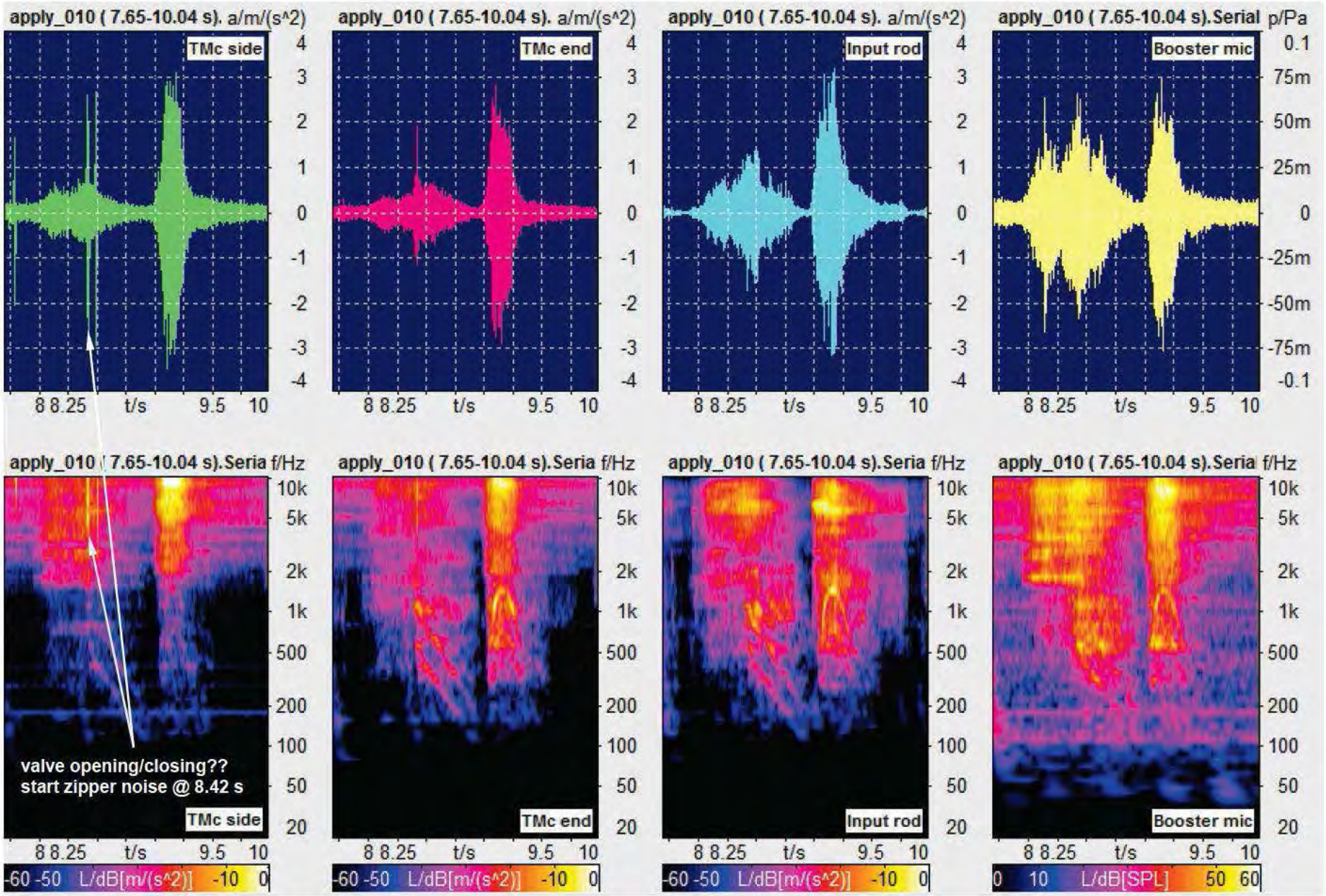
Time data, loudness



Ford P415 zipper noise.

Zipper noise_latest Hitachi TMC

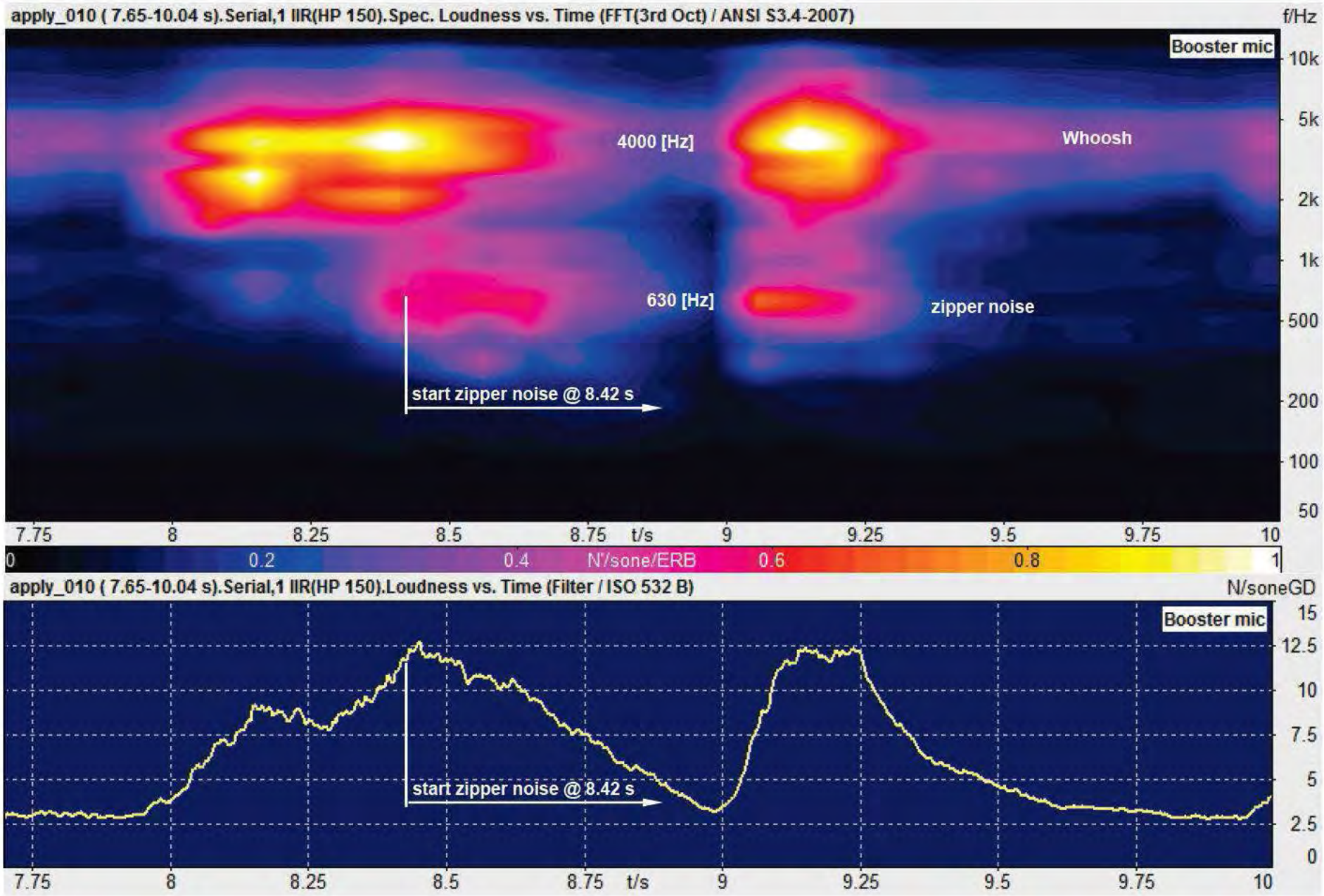
Wavelet analysis



Ford P415 zipper noise.

Zipper noise_latest Hitachi TMC

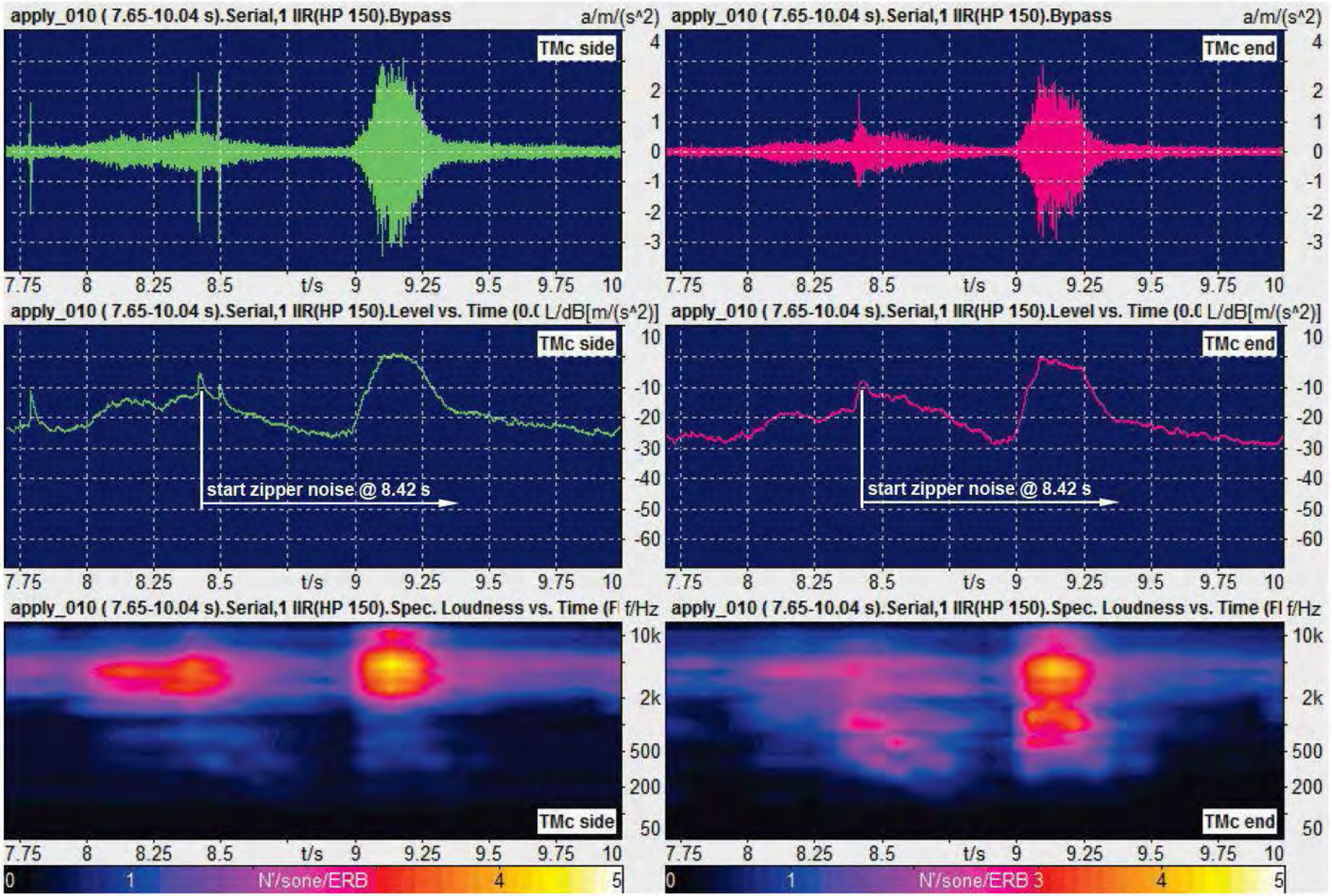
Specific loudness, loudness



Ford P415 zipper noise.

Zipper noise_latest Hitachi TMC

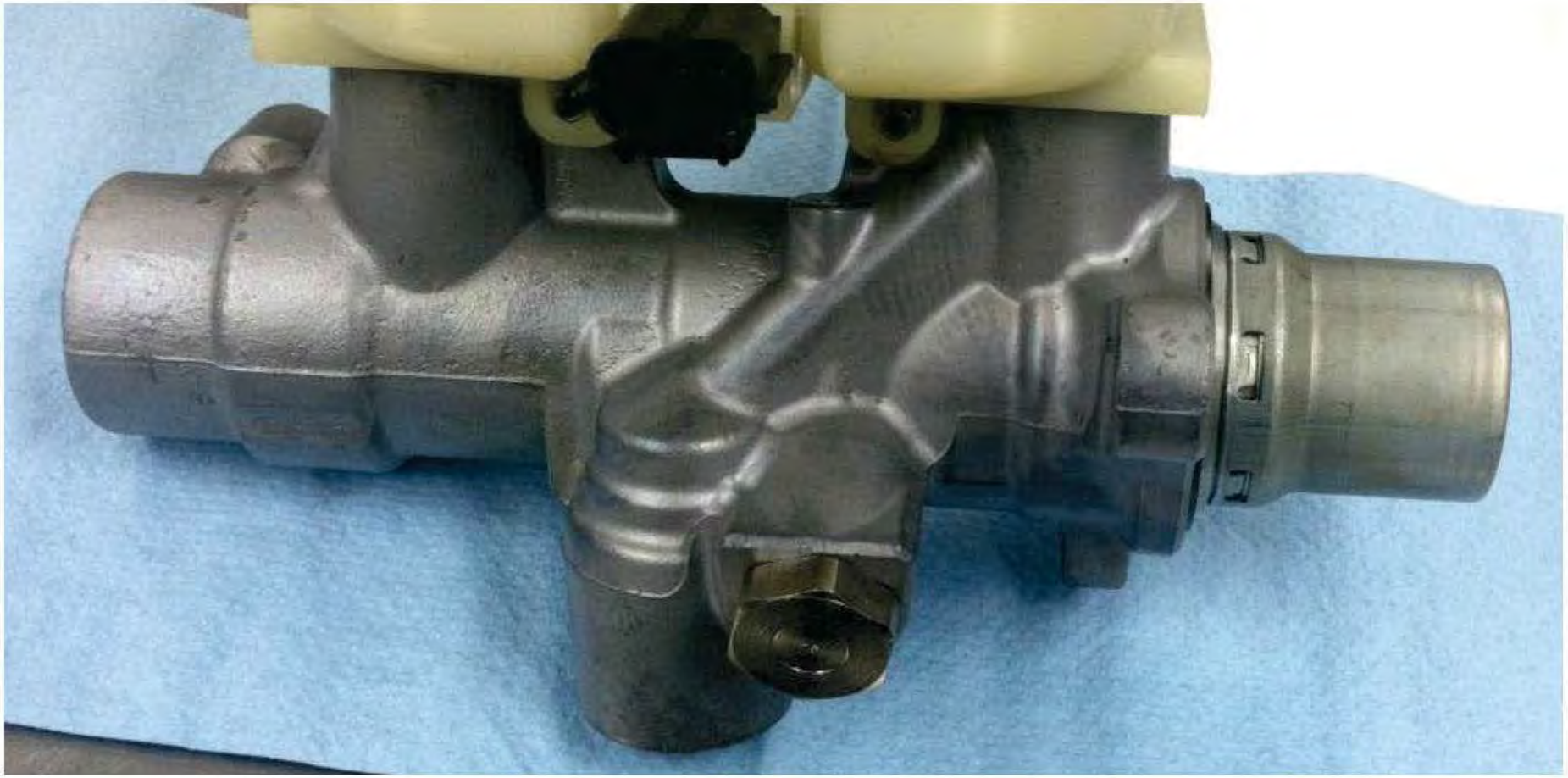
Specific loudness, loudness



Ford P415 zipper noise.

Set-up for NVH analysis

- Objective data from analysis of previous/old version master cylinder and complaint booster.

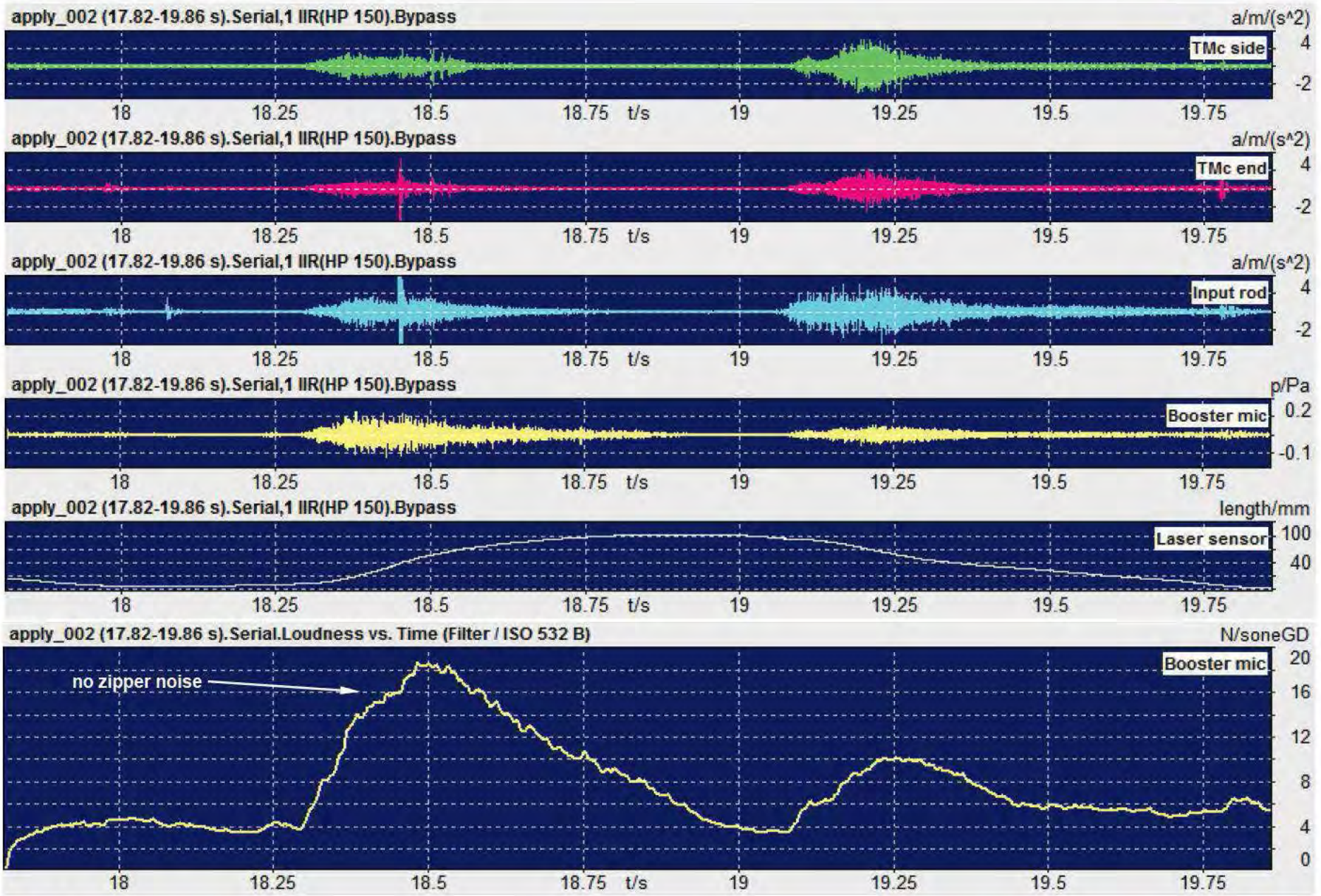


PREVIOUS/OLD VERSION (NO NOISE)

Ford P415 zipper noise.

Zipper noise_old Hitachi TMC

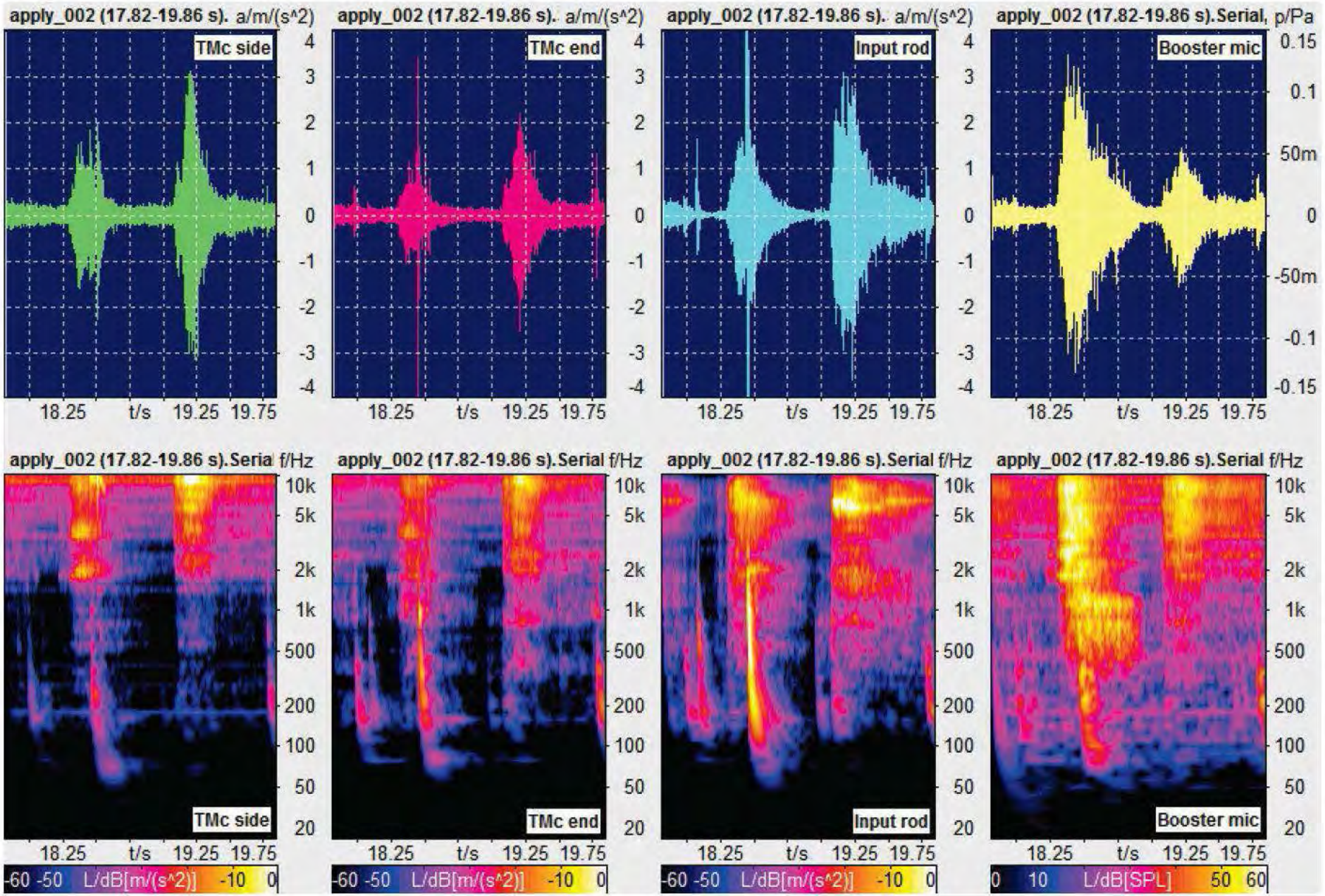
Time data, loudness



Ford P415 zipper noise.

Zipper noise_old Hitachi TMC

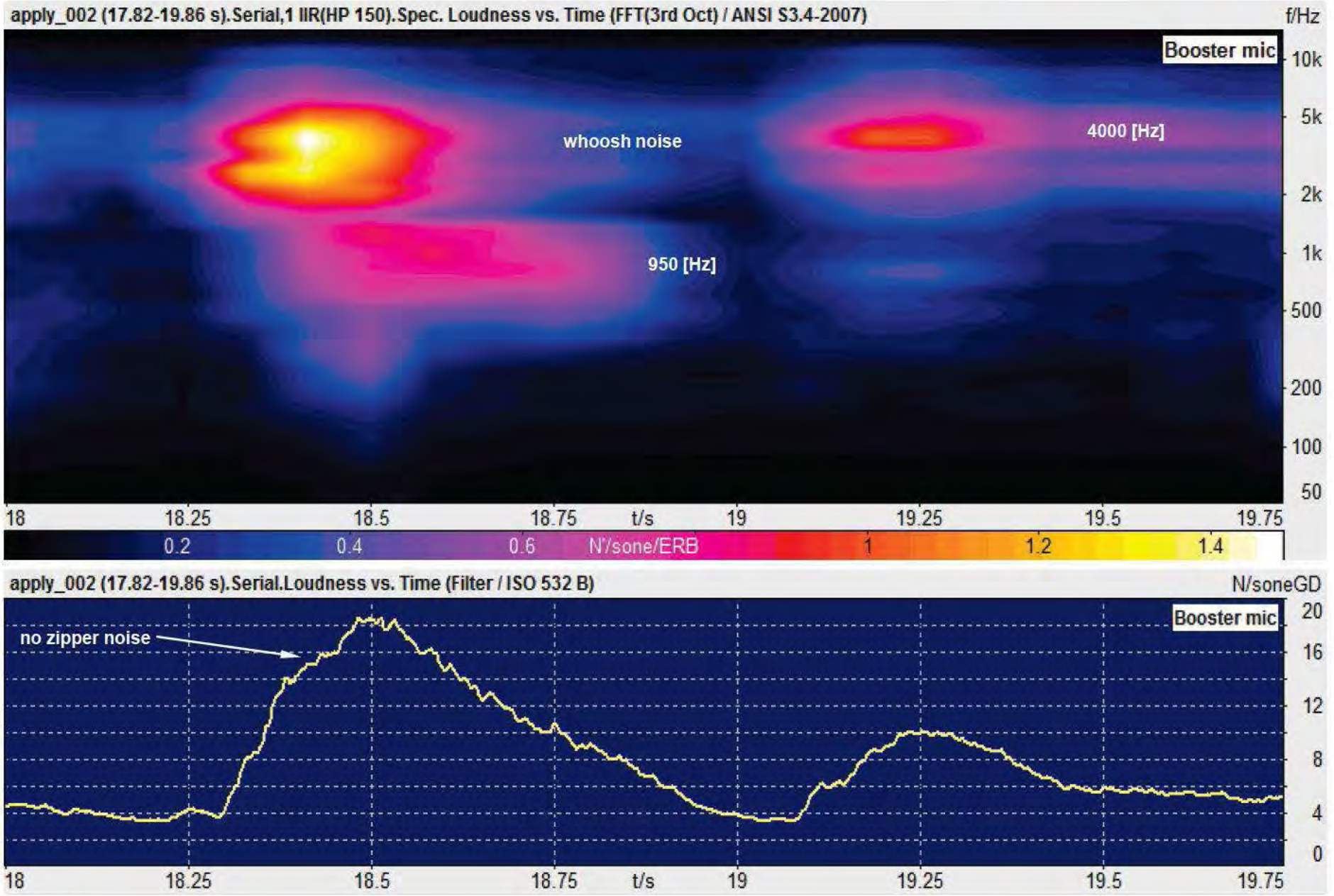
Wavelet analysis



Ford P415 zipper noise.

Zipper noise_old Hitachi TMC

Specific loudness, loudness



Ford P415 zipper noise.

Zipper noise_old Hitachi TMC

Specific loudness, loudness

