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Push-the-bit rotary-steerable systems with multiple high-frequency drilling dynamics recorders

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Motor-assist rotary-steerable system (RSS) bottom-hole assemblies (BHA's) are often used for increasing drilling performance in horizontal sections of shale oil and gas drilling in the United States. Downhole drilling dysfunctions, such as high-frequency torsional oscillation (HFTO), are commonly observed especially when the BHA's are pushed to the limit for maximum drilling performance. To understand the propagation and characteristics of the harmful HFTO, high-frequency continuous recording compact drilling dynamics sensors were embedded into the bit box and outer housing of the RSS, drive mandrel and top sub of the motor.