

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BMW OF NORTH AMERICA, LLC

MERCEDES-BENZ USA, LLC

Petitioners

v.

MICHIGAN MOTOR TECHNOLOGIES LLC

Patent Owner

Case IPR2023-01234

U.S. Patent No. 6,588,260

Issue Date: July 8, 2003

Title: “Electronic Throttle Disable Control Test System”

**PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. § 312 AND 37 C.F.R. § 42.104**

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PETITIONER'S EXHIBIT LIST

Exhibit No.	Description
EX1001	U.S. Patent No. 6,588,260 (Pursifull)
EX1002	U.S. Patent No. 6,588,260 Prosecution History
EX1003	Declaration of Gerald Micklow, Ph.D.
EX1004	Curriculum Vitae of Gerald R. Micklow, Ph.D.
EX1005	U.S. Patent No. 5,303,581 (McQueen)
EX1006	U.S. Patent No. 5,048,485 (Terazawa)
EX1007	<i>Volkswagen Group of America, Inc. v. Michigan Motor Technologies LLC</i> , IPR2020-00451, Paper 18 (Aug. 28, 2020)
EX1008	William L. Husselbee, “Automotive Computer Control Systems”
EX1009	Declaration of Sylvia D. Hall-Ellis, Ph.D. in Support of Petition for <i>Inter Partes</i> Review of U.S. Patent No. 6,558,260
EX1010	Curriculum Vitae of Sylvia D. Hall-Ellis, Ph.D.
EX1011	Hans Mauser, “Electronic Throttle Control –A Dependability Case Study” (1999)
EX1012	Hans-Martin Streib, “Electronic Throttle Control (ETC): A Cost Effective System for Improved Emissions, Fuel Economy, and Driveability,”SAE: Electronic Engine Controls (1996)
EX1013	U.S. Patent No. 5,332,965 A to Wolf <i>et al.</i> , titled “Contactless Linear Angular Position Sensor Having an Adjustable Flux Concentrator for Sensitivity Adjustment and Temperature Compensation,” issued July 26, 1994 (“Wolf”)
EX1014	U.S. Patent No. 6,047,679 A to Matsumoto <i>et al.</i> , titled “Control Apparatus for an Internal Combustion Engine,” issued April 11, 2000 (“Matsumoto”)

EX1015	U.S. Patent No. 5,415,144 A to Hardin <i>et al.</i> , titled “Throttle Position Validation Method and Apparatus,” issued May 16, 1995 (“Hardin”)
EX1016	U.S. Patent No. 5,146,892 to Krampe <i>et al.</i> , titled “Method and Arrangement for the Open-loop and/or Closed-loop Control of the Engine Power of an Internal Combustion Engine of a Motor Vehicle,” issued September 15, 1992 (“Krampe”)
EX1017	Ronald K. Jurgen, “Automotive Electronics Handbook,” McGraw-Hill, Inc., ISBN0-07-033189-8, c.1994 (“Jurgen”)
EX1018	U.S. Patent No. 5,673,668 A to Pallett <i>et al.</i> , titled “Method and Apparatus for Electronic Throttle Monitoring,” issued October 7, 1997 (“Pallett”)
EX1019	U.K. Patent Application No. 2227076 to Berger <i>et al.</i> titled “Monitoring the Integrity of a Safety Shut-off Device,” published July 18, 1990 (“Berger”)
EX1020	Federal Court Management Statistics, March 31, 2023, accessed at https://www.uscourts.gov/sites/default/files/data_tables/fcms_na_distprofile0331.2023.pdf
EX1021	49 C.F.R. § 571.124 (1973)

I. INTRODUCTION

BMW of North America, LLC and Mercedes-Benz USA, LLC (collectively, “Petitioners”) request *inter partes* review of claims 1-17 of U.S. Patent No. 6,588,260 (the “’260 patent”) (EX1001), owned by Michigan Motor Technologies, LLC (“PO”), pursuant to 35 U.S.C. §§ 311-19 and 37 C.F.R. § 42.100.

The ’260 patent and challenged claims relate generally to methods and systems for testing the integrity of a feature for disabling motor drive electronics. As explained below, all elements of the challenged claims were well-known in the prior art discussed herein.

II. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8(B)(1)-(4)

A. Real Party-In-Interest – 37 C.F.R. § 42.8(b)(1)

BMW of North America, LLC and Bayerische Motoren Werke AG, as well as Mercedes-Benz USA, LLC, Mercedes-Benz Intellectual Property GmbH & Co. KG, Mercedes-Benz AG, and Mercedes-Benz Group AG, are the real parties-in-interest.

B. Related Matters – 37 C.F.R. § 42.8(b)(2)

PO has asserted the ’260 patent in the following litigation against
Petitioners: *Michigan Motor Technologies, LLC v. Bayerische Motoren Werke AG et al.*, C.A. No. 22-3804 (N.D. Ill.); *Michigan Motor Technologies, LLC v. Mercedes-Benz USA, LLC*, C.A. No. 22-03957 (N.D. Ill.).

C. Lead And Back-Up Counsel – 37 C.F.R. § 42.8(b)(3)

Petitioners designate the following counsel. Powers of attorney pursuant to 37 C.F.R. § 42.10(b) accompany this Petition.

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D. Service Information – 37 C.F.R. § 42.8(b)(4)

Please address all correspondence to counsel at the address above.

Petitioners also consent to electronic service by email at: MMT-BMWNA-IPR@us.dlapiper.com and ge-mmt-mbusa@quinnemanuel.com.

III. CERTIFICATION OF STANDING – 37 C.F.R. § 42.104(A)

Petitioners certify that the Challenged Patent is available for *inter partes* review and Petitioners are not barred or estopped from requesting IPR.

IV. PAYMENT OF FEES – 37 C.F.R. § 42.103

The undersigned authorizes the Director to charge the fee specified by 37 C.F.R. §42.15(a) and any additional fees that might be due in connection with this Petition to Deposit Account No. 50-3266.

V. SUMMARY OF THE '260 PATENT

A. Brief Description

The '260 patent does not purport to have invented a novel throttle control system. Indeed, three years before the '260 patent was even filed, Pallett disclosed the identical throttle control system—complete with the same figure and accompanying description. *See* EX1003, Micklow Decl., ¶¶37-38 (*comparing* EX1001, '260 patent, 2:41-3:26 *with* EX1018, Pallett, 2:65-3:39). Surprisingly,



The '260 patent also does not purport to have invented a disable function for a throttle control system. EX1001, 1:37-42. Indeed, the '260 patent admits:

One **previously known** type of protection to avoid unintended actuation of excessive throttle is to use **a disable function** of the electronic throttle drive electronics. The disable function allows the PCM to shut down the electronic throttle drive electronics in the event that the PCM senses a throttle position differing from expected throttle position.

EX1001, 1:37-42 (emphases added). The '260 patent instead is directed to the basic idea of testing whether this **known** disable function of a **known** throttle control system is working. *Id.*, 1:44-45.

Specifically, the '260 patent claims a generic testing technique: (i) establishing an initial condition, (ii) changing a variable, and (iii) determining whether the initial condition has changed to test this known disable function. As applied to the known disable function of a known throttle control system, all this entails is disabling drive electronics for a throttle motor and determining a default position of a throttle plate (*i.e.*, establishing an initial condition), commanding a full closing voltage (*i.e.*, changing a variable), and determining whether the throttle plate moved from the default position (*i.e.*, determining whether the initial condition has changed). EX1001, 4:48-59; EX1003, ¶56.

But the '260 patent's testing technique is as routine as testing a light switch to confirm it can be turned off:

Generic Testing Protocol	'260 Patent, Claim 1	Light Switch Test Protocol
Establish an initial condition	“disable said drive electronics;” “determine a default throttle position sensor (TPS) output voltage corresponding to said default position”	Turn off main breaker and light switch; Check whether a light connected to the light switch is off
Change a variable	“command a full closing motor voltage”	Turn on main breaker
Determine whether the initial condition has changed	“compare a full closing TPS output voltage to said default TPS output voltage;” “engage failure mode management when said full closing TPS output voltage and said default TPS output voltage are significantly different from each other”	Check whether the light is still off; Determine the light switch has malfunctioned if the light turned on

Id. Regardless, the problem of throttle component failures and testing for such failures (*i.e.*, the “integrity” of the component) was known years before the ’260 patent as demonstrated below. EX1003, ¶¶56-59.

The Petition, supported by the expert declaration of Dr. Gerald Micklow, who has over 45 years of experience related to electronic throttle control systems, demonstrates that all claims of the ’260 patent are unpatentable. Therefore, Petitioners respectfully request that the Board institute review and ultimately find all claims unpatentable.

B. Alleged Problem in the Prior Art

The ’260 patent is directed to the purported problem of detecting faults in known components of throttle control systems. EX1001, 1:45-57. As explained above, testing the “integrity” of throttle control system components to detect faults and avoid undesired engine conditions (*e.g.*, unintended acceleration) was well-known long before the ’260 patent. *See supra* §V.A. The ’260 patent adds nothing to the realm of previously known testing methods. EX1003, ¶¶55-59.

C. Alleged Invention of the ’260 Patent

As noted above, the ’260 patent admits that the claimed throttle control system components were known, monitoring throttle control systems for failures was known, and taking remedial action in the event of a failure was known.

EX1001, 1:12-44. While many remedial actions were known, the '260 patent admits that one possible and “**known** type of protection to avoid unintended actuation of excessive throttle **is to use a disable function** of the electronic throttle drive electronics,” which “allows the PCM to shut down the electronic throttle drive electronics in the event that the PCM senses a throttle position differing from expected throttle position.” *Id.*, 1:37-44 (emphasis added). But according to the '260 patent, “typical electronic throttle systems do not test the integrity of the disable function.” *Id.*, 1:44-45. The alleged novelty of the '260 patent is thus to simply use known, basic, and logical techniques for testing a known feature of certain throttle control systems. EX1001, 1:55-57; EX1003, ¶¶55-59.

But well before the '260 patent, testing throttle control system components, including whether they are properly enabled or disabled, was taught by the prior art. EX1006, 12:66-13:46, 14:15-30; EX1016, 1:35-40, 1:50-64, 4:31-59, Fig. 2; EX1019, Abstract, 6:5:-9:8, Fig. 1; EX1003, ¶¶37-53, 55-59. The '260 patent claims thus recite nothing more than what was already taught in the prior art and well-known to POSITAs. *Id.*

D. Priority Date

The '260 patent was filed on October 24, 2000, and does not claim the benefit of an earlier-filed application. Petitioners apply a priority date of October 24, 2000, for the purposes of this IPR only.

E. Prosecution History of '260 Patent

The application that issued as the '260 patent underwent multiple rounds of prosecution at the U.S. Patent and Trademark Office (“USPTO”). The USPTO issued a first non-final office action rejecting the claims under 35 U.S.C. § 112, second paragraph, as being indefinite and under 35 U.S.C. § 103 as obvious over U.S. Patent No. 5,088,461 to Ohashi *et al.* In response, the applicant amended the claims in view of the § 112 rejection and presented arguments in response to the obviousness rejection. The applicant specifically argued that each independent claim requires “that the powertrain control modular disable the throttle drive electronics such that the electronic throttle plate returns to a default position which the Ohashi reference does not teach.” EX1002, '260 history, 0047-48; EX1003, ¶60.

The USPTO issued a final office action maintaining the obviousness rejection over Ohashi. In response, the applicant amended the claims to recite that the PCM has control logic to “determine a default throttle position sensor (TPS) output voltage corresponding to said default position” and reiterated the previously presented arguments. EX1002, 0084-88; EX1003, ¶61.

The Examiner issued a second non-final office action again maintaining the obviousness rejection over Ohashi. In response, the applicant reiterated the previous arguments, specifically arguing that “the Ohashi reference does not

disable the throttle drive electronics as part of any test to determine whether the assumed default position of the electronic throttle plate is indeed a fully closed position.” The applicant further argued that

In the present application, the default position, with the throttle plate drive electronics disabled, is measured and compared to the commanded fully closed position with the throttle drive electronics enabled. Any significant measured difference between the electronic throttle plate position with the drive electronics disabled and the electronic throttle plate position with the throttle drive electronics enabled and commanding a fully close position, indicates a potential fault with the electronic throttle system.¹

EX1002, 0097-99; EX1003, ¶62.

The USPTO then issued a Notice of Allowance. None of the prior art discussed below was considered by the USPTO. EX1002, 0100-04; EX1003, ¶64.

F. Prior IPR Proceedings

One IPR petition has been filed challenging the ’260 patent, and the Board instituted trial on that petition. Volkswagen Group of America, Inc. (“VW”) filed

¹ The specification and claims of the ’260 patent are directed to comparing the default position to the commanded fully closed position with the throttle drive electronics disabled, not enabled. EX1001, 1:62-2:3; EX1003, ¶##.

an IPR proceeding relying on McQueen, Terazawa, and Husselbee on similar (but not identical) grounds to those presented in this Petition. IPR2020-00451. The Board granted institution on August 28, 2020, finding:

- VW demonstrated a reasonable likelihood of success in establishing the unpatentability of claims 1-10 as obvious over the combination of McQueen, Terazawa, and Husselbee.
- The Board was persuaded that independent claim 11 and dependent claims 12 and 13 are unpatentable as obvious over the combination of McQueen and Terazawa, and dependent claims 14-17 are unpatentable as obvious over the combination of McQueen and Terazawa in view of the skilled artisan's knowledge demonstrated by Husselbee.

EX1007, at 32-33. On March 22, 2021, the Board terminated the proceeding in view of VW's settlement with PO. IPR2020-00451, Paper 35.

VI. IDENTIFICATION OF CHALLENGES UNDER 37 C.F.R. § 42.104(B)

A. Prior Art

The challenges in this Petition are based on the following references:

Prior Art Reference	Exhibit	Filing Date	Pub. Date	Prior Art Section(s)
U.S. Patent No. 5,303,581 (“McQueen”)	EX1005	10/27/1992	4/19/1994	§102(a), (b), (e)
U.S. Patent No. 5,048,485 (“Terazawa”)	EX1006	5/29/1990	9/19/1991	§102(a), (b), (e)
William L. Husselbee, “Automotive Computer Control Systems: Fundamentals and Service”	EX1008	N/A	1998	§102(a), (b)
Hans Mauser, “Electronic Throttle Control –A Dependability Case Study”(1999)	EX1011	N/A	10/28/1999	§102(a), (b)

B. Challenges

Petitioners request cancellation of claims 1-17 of the '260 patent based on the following grounds

Ground	Claims	Basis	References
1	1-5, 8	§103	McQueen, Terazawa, Husselbee
2	11-13	§103	McQueen, Terazawa
3	14-15	§103	McQueen, Terazawa, Husselbee
4	6-7, 9-10, 16-17	§103	McQueen, Terazawa, Mauser, Husselbee

Each prior art reference is analogous art to each other and to the Challenged Patent

because they describe systems and methods related to throttle control methods for internal combustion engines. The references are thus from the same field of endeavor as the Challenged Patent. EX1003 (Micklow Decl.), ¶##.

VII. LEVEL OF ORDINARY SKILL IN THE ART

A POSITA at the time of the alleged invention would have had a B.S. degree in Electrical Engineering or Mechanical Engineering (or equivalent), as well as at least 2-4 years of academic or industry experience in the relevant field of throttle control systems. EX1003, ¶¶68-73. In the VW Petition Institution Decision, the Board found “the parties’ proposed definitions as substantially the same and consistent with the prior art.” EX1007, at 9.

VIII. CLAIM CONSTRUCTION

In an *inter partes* review, claims are “construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100 (b); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-1313 (Fed. Cir. 2005) (en banc).

None of the claim terms require construction for the purposes of this Petition, and thus they should receive their plain and ordinary meaning in the context of the ’260 patent. EX1003, ¶66. In the VW Petition Institution Decision, the Board found “[b]oth Petitioner and Patent Owner submit that the claim

limitations in the '260 patent should be given their ordinary and customary meaning.” EX1007, at 10.

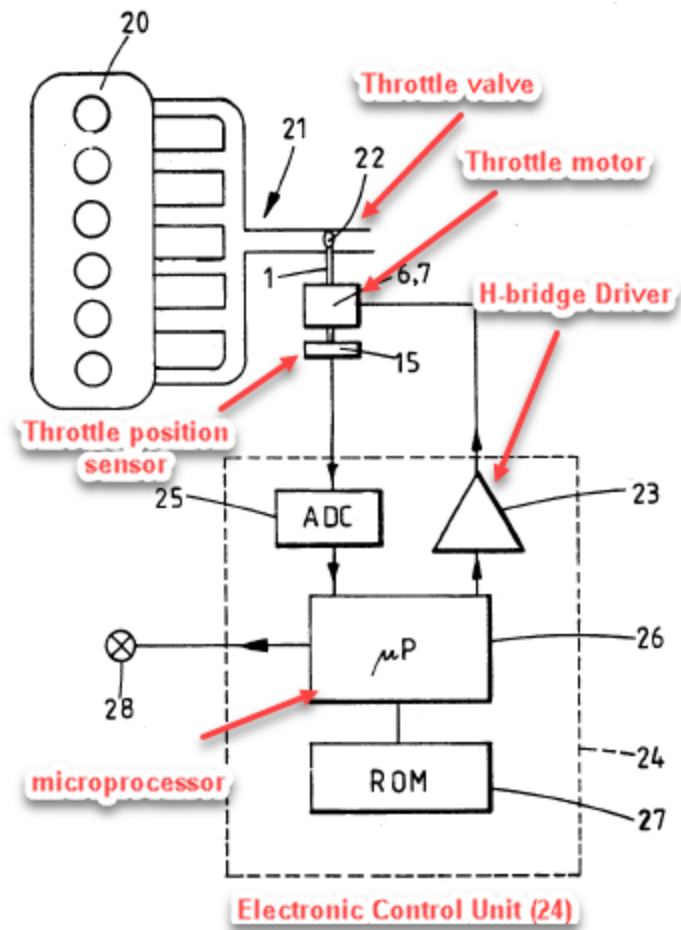
IX. DETAILED EXPLANATION AND SUPPORTING EVIDENCE

The Challenged Patent claims priority to October 24, 2000 (before March 16, 2013), so pre-AIA versions of 35 U.S.C. §§102, 103 apply.

A. Technology Overview

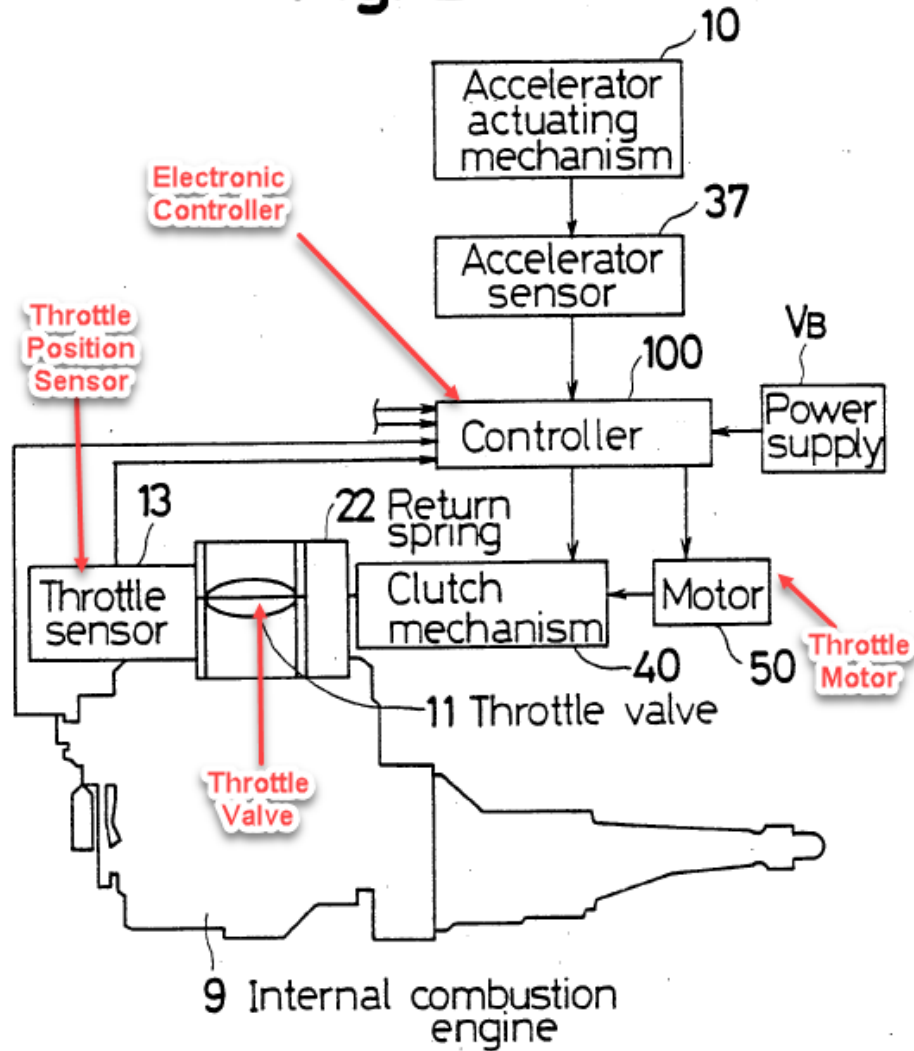
The '260 patent admits that *the claimed throttle control system components were known*. EX1001, 1:12-45. The '260 patent also admits in its discussion of the prior art that *the claimed functionality of its throttle control system was known*. EX1003, ¶55. Indeed, Pallett disclosed the exact throttle control system shown in the '260 patent, including a powertrain control module (PCM) 16, a throttle position sensor 24, and an actuator and interface 30 having a drive motor to change the angle of the throttle plate 34. *Compare* EX1018, 2:65-3:39, *with* EX1001, 2:49-3:26; EX1003, ¶38.

McQueen and Terazawa also disclose throttle control systems having these same, well-known components—control units to control the angular position of a throttle plate via a motor and throttle position sensors to measure the position of the throttle plate. EX1005, McQueen, 3:1-57; EX1006, Terazawa, 3:50-4:19; EX1014, Matsumoto, 5:61-6:12, 7:3-19; EX1003, ¶¶39-40.



EX1005, FIG. 2 (annotated).

Fig. 2



EX1006, FIG. 2 (annotated).

It was well-known before the '260 patent that problems with throttle control systems can create undesired operating conditions for an engine, and thus it was important to test such systems. EX1003, ¶¶41-53. For example, Jurgen recognized the need for monitoring throttle control system components and disclosed a throttle control system with a failsafe mode of operation in the event that the

microcontroller or actuator drivers failed as a basic safety feature to avoid the unexpected engine fault of runaway acceleration. *See* EX1017, Jorgen, 14.2; *see also* EX1011, Mauser, 732 (“To make sure that the system is functioning correctly also in case of faults, several checking strategies were designed. The overall goal was to discover as many faults as possible and to trigger an adequate reaction, in order to avoid critical states. Particularly the runaway case, *i.e.* undesired high engine performance, has to be avoided.”); EX1014, Krampe, 1:35-40, 1:50-64, 4:31-59, Fig. 2; EX1019, Berger, Abstract, 6:5:-9:8, Fig. 1; EX1003, ¶¶42-44.

Pallett, in particular, recognized that failures can occur in the same powertrain control module (PCM) of the '260 patent and that such failures can induce power output exceeding power demand (*i.e.*, unintended acceleration). EX1018, 1:44-53, 2:4-9, 3:61-64. Pallett disclosed an electronic throttle monitor to monitor the power train control module to ensure that “neither a control module fault nor a system fault can result in an excessive engine operation.” EX1018, 1:44-2:9. If a fault is detected, the power delivered by the powertrain can be limited. EX1018, 2:9-13, 5:35-42; EX1003, ¶¶45-46.

McQueen recognized that a “common” safety requirement in throttle control systems is having two “return-to-closed” systems—(i) a return spring that constantly urges the throttle towards its closed position, and (ii) a servomotor that drives the throttle to its closed position under control of an electronic control unit

(ECU). EX1005, 1:24-39; EX1021 (49 CFR §571.124) (requiring “at least two sources of energy capable of returning the throttle to the idle position”); EX1003, ¶¶47-48. McQueen further recognized, however, that the return spring, servomotor, and driver in these “return-to-closed” systems can fail. EX1005, 1:36-59, 2:41-45. If a problem with these components goes undetected, the ECU may not be able to return the throttle to a closed position. *Id.*, 1:44-54. McQueen thus disclosed a method to detect faults in a throttle system. *Id.*, 1:5-8. And if a fault is detected, “[s]uitable action may then be taken, for instance to disable further operation of the engine or to limit operation in order to provide a ‘limp home’ mode” and “therefore improve the safety of the system.” *Id.*, 2:41-48, 2:57-60; EX1003, ¶¶48-50.

Terazawa is also directed to a throttle control system and recognized that “it is necessary in order to **check the operating function of each device** to detect an operating condition of the motor and other devices.” EX1006, Abstract, 1:44-51 (emphasis added). If an abnormality or failure is detected, a limp home mode can be engaged. *Id.*, 11:62-12:5 (“Addition of the limp home mechanism enables the vehicle to run at low speed and arrive at a repair shop even when the motor 50, the controller 100 or other constituent element breaks down.”); EX1003, ¶51.

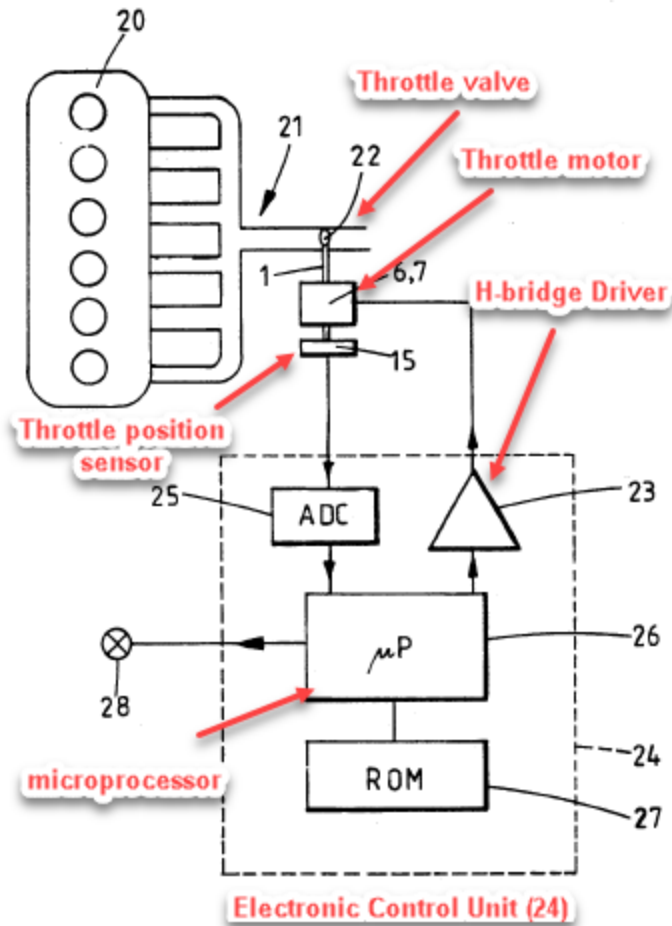
Thus, the recited elements of the ’260 patent’s claims were basic components and concepts of a well-known throttle control system at the time of the alleged invention. EX1003, ¶¶37-53.

B. Overview of references

Each applied reference is directed to a throttle control system and thus is from the same field of endeavor as the '260 patent. EX1003, ¶74.

1. McQueen

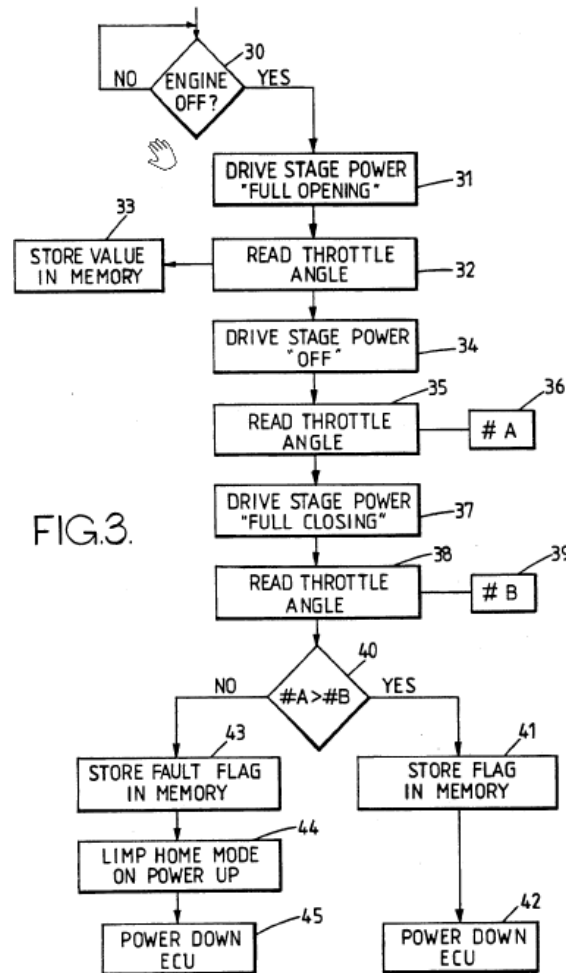
McQueen discloses an internal combustion engine 20 having an induction system 21 including throttle 22, which controls the supply of air through the induction system. EX1005, 3:33-37. The engine further includes an electronic control unit 24 having an H bridge driver 23 to drive throttle motor 6/7, a microprocessor 26, memory 27, and a throttle position sensor 15 in communication with the electronic control unit 24. *Id.*, 3:38-57; EX1003, ¶75.



EX1005, FIG. 2 (annotated).

McQueen further discloses a method of detecting faults in the throttle control system that is very similar to the '260 patent. This method is illustrated in Figure 3 and includes the steps of disabling the driver 23 (step 34), determining an initial throttle position (A) from the output of the throttle position sensor 15 (step 35), storing the initial throttle position (step 36), having the microprocessor cause the driver 23 to supply full closing power to the motor 6/7 (step 37), determining an updated throttle position (B) from the output of the throttle position sensor 15 (step 38), storing the updated throttle position (step 39), comparing the throttle

positions (A and B) (step 40), and if the initial throttle position (A) is not greater (i.e., more “open”) than the updated throttle position (B), a fault is indicated so the engine is controlled to operate in a limp home mode. *Id.*, 3:58-4:34; EX1003, ¶76.

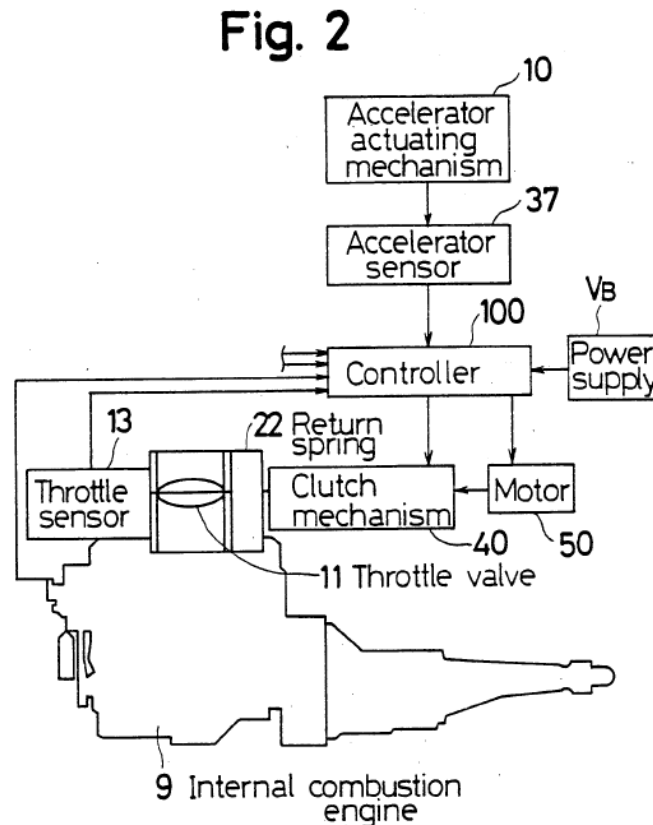


EX1005, FIG. 3.

C. Terazawa

Terazawa discloses a throttle control method and system in which a throttle motor is connected through a clutch mechanism to a throttle valve. EX1006, Abstract. Figure 2 of Terazawa illustrates the throttle control system, which

includes a motor 50 connected to a throttle valve 11 through an electromagnetic clutch mechanism 40, a throttle sensor 13, and a controller 100. *Id.*, 3:50-68; EX1003, ¶¶77-78.

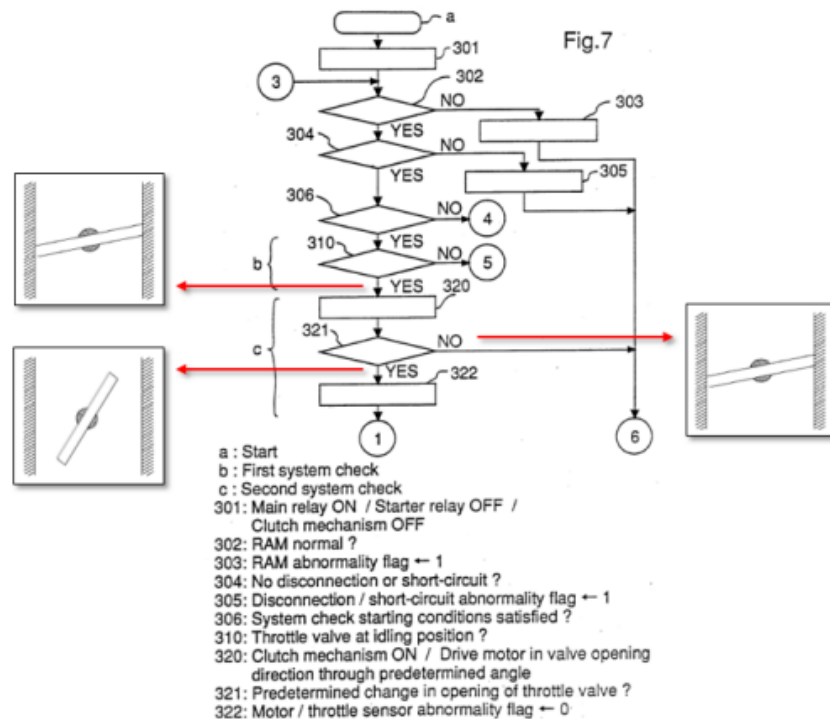


EX1005, FIG. 2.

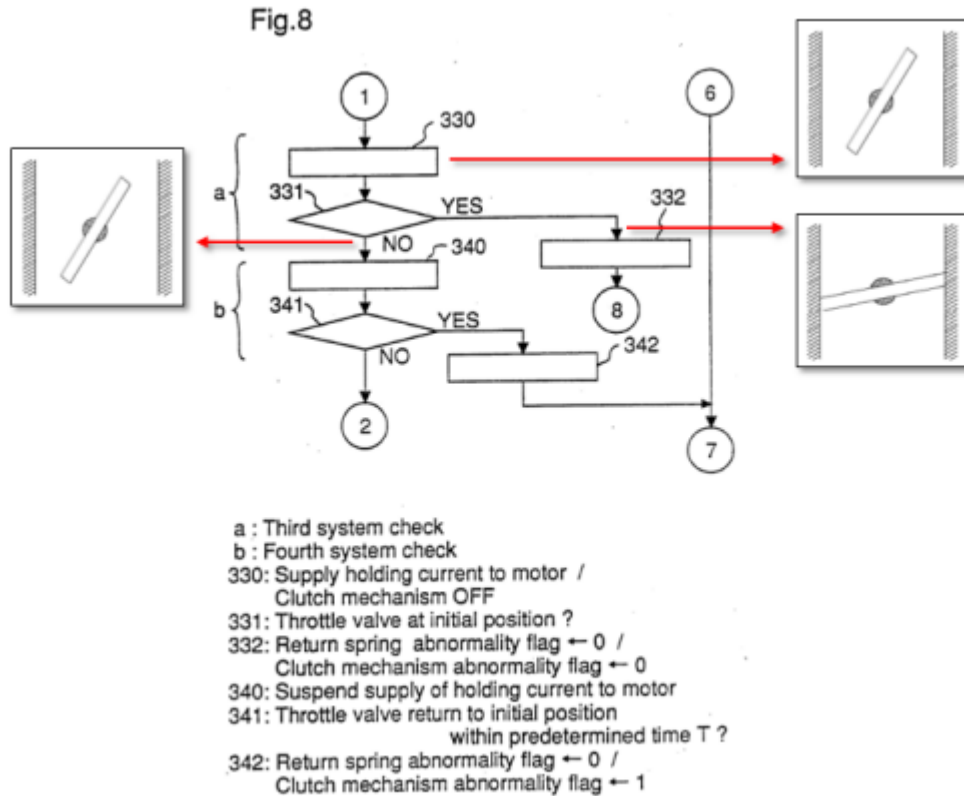
Terazawa's throttle control method is illustrated in Figures 7 and 8 below. Specifically, Terazawa discloses a method including a processing routine of system checks on the performance of the constituent elements of the throttle control system. *Id.*, 11:24-29. This method includes a first set of tests that include disabling the clutch 40 to disconnect the motor 50 from throttle 11 (step 301), determining whether the throttle valve is in an idling position based on the output

of the throttle sensor 13 (step 310), engaging the clutch and driving the throttle open by a predetermined amount (step 320), and checking whether the throttle valve 11 moved to the predetermined position (step 321). *Id.*, 12:29-62.

Terazawa's first throttle control system test thus checks whether the throttle plate 11 can be moved by the motor 50. EX1003, ¶79.



EX1006, FIG. 7 (annotated).



EX1006, FIG.8 (annotated).

The method includes a subsequent set of tests that include supplying the motor 50 with power to open the throttle valve to a predetermined position and disabling the clutch (step 330), determining whether the throttle valve returns to the idling or initial position (step 331), stopping the supply of power to the motor 50 (step 340), determining whether the throttle valve returns to the idling or initial position (step 341), and disabling the motor 50 and clutch 40 if the throttle valve does not move properly. EX1006, 12:66-13:46, 14:15-30. That is, Terazawa's subsequent throttle control system test checks for faults in the return spring 22 and/or the clutch 40. EX1003, ¶80.

D. Husselbee

Husselbee is a textbook published twelve years before the '260 patent and discloses details of throttle control systems that would have been readily known to a POSITA by 2000. For example, Husselbee discloses that potentiometer throttle position sensors, like McQueen's throttle position sensor 15, output a voltage signal corresponding to the throttle valve angle (*e.g.*, 5V when the throttle plate is fully open and 0.5V when the throttle plate is closed).

As the wiper arm moves along the resistance material in response to changes in throttle valve angle, the voltage at the signal connector will increase or decrease. For instance, with the throttle plate fully open (*i.e.*, at 80 to 85 degrees) the voltage signal to the processor is nearly 5 volts, or reference voltage (Fig. 4-10). However, as the throttle plate closes (angle decreases), the signal voltage drops until it reaches about 0.5 volt at closed throttle (*i.e.*, a 0 degree angle). In the throttle position sensor and in the other potentiometer-type units, the signal voltage increases or decreases by changing the resistance between the reference voltage connector and the wiper arm connector.

EX1007, Husselbee, 60; EX1003, ¶81.

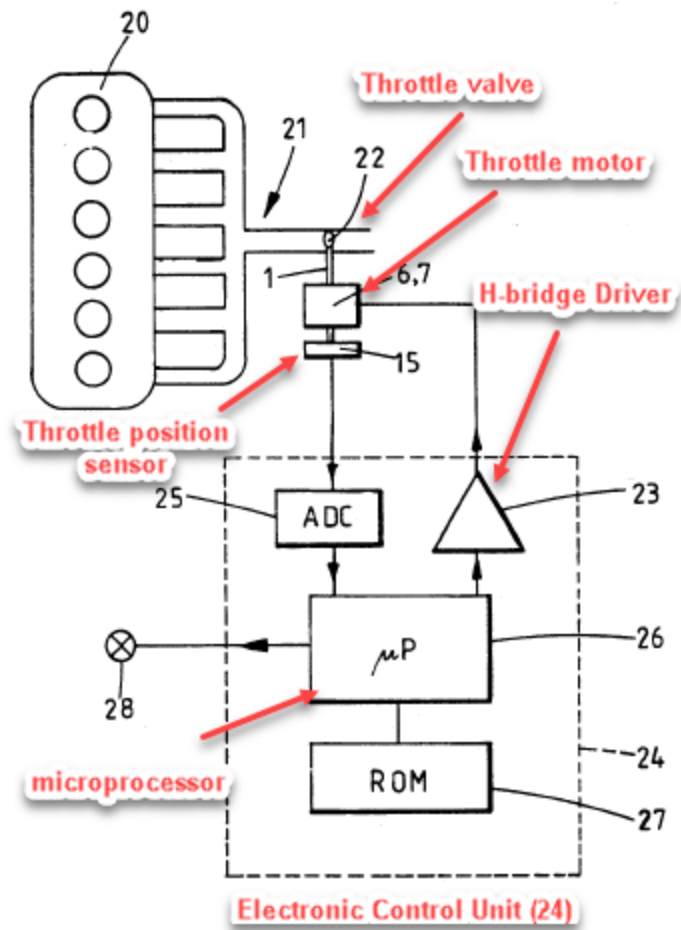
X. GROUND 1: CLAIMS 1-5 AND 8-10 ARE OBVIOUS OVER MCQUEEN IN VIEW OF TERAZAWA, AND HUSSELBEE.

A. Rationale for Combining McQueen, Terazawa, and the Knowledge of a POSITA Demonstrated by Husselbee

A POSITA would have been motivated to combine the teachings of McQueen and Terazawa—both patents in the same field of endeavor as the '260 patent, throttle control systems. EX1003, ¶¶83-108; EX1004, Abstract, 1:5-8, 2:64-65; EX1005, Abstract, 1:7-14, 1:59-2:3. Indeed, a POSITA would have had multiple reasons for making this combination and would have had a reasonable expectation of success in doing so, rendering the claims obvious. EX1003, ¶¶83-108.

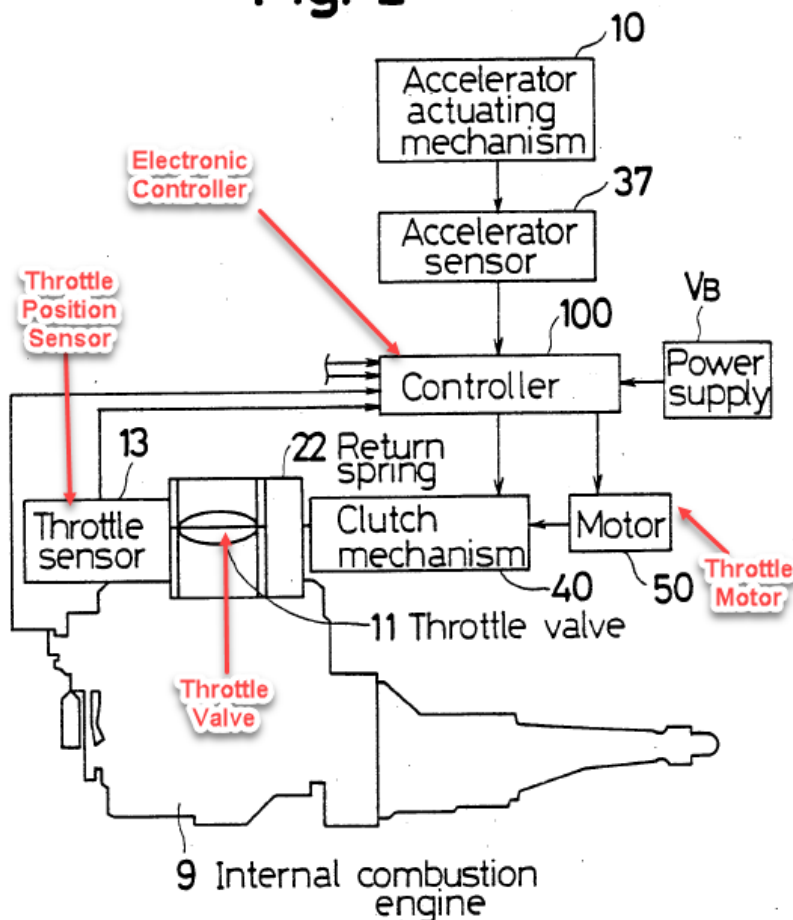
First, as shown below in Figure 2 of McQueen and Figure 2 of Terazawa, each system includes the same structural components. EX1003, ¶84.

McQueen	Terazawa
Throttle Valve 22	Throttle Valve 11
Motor 6/7	Motor 50
Return Spring 4	Return Spring 22
Electronic Control Unit 24	Electronic Controller 100
Throttle Position Sensor 15	Throttle Position Sensor 13



EX1005, FIG.2 (annotated).

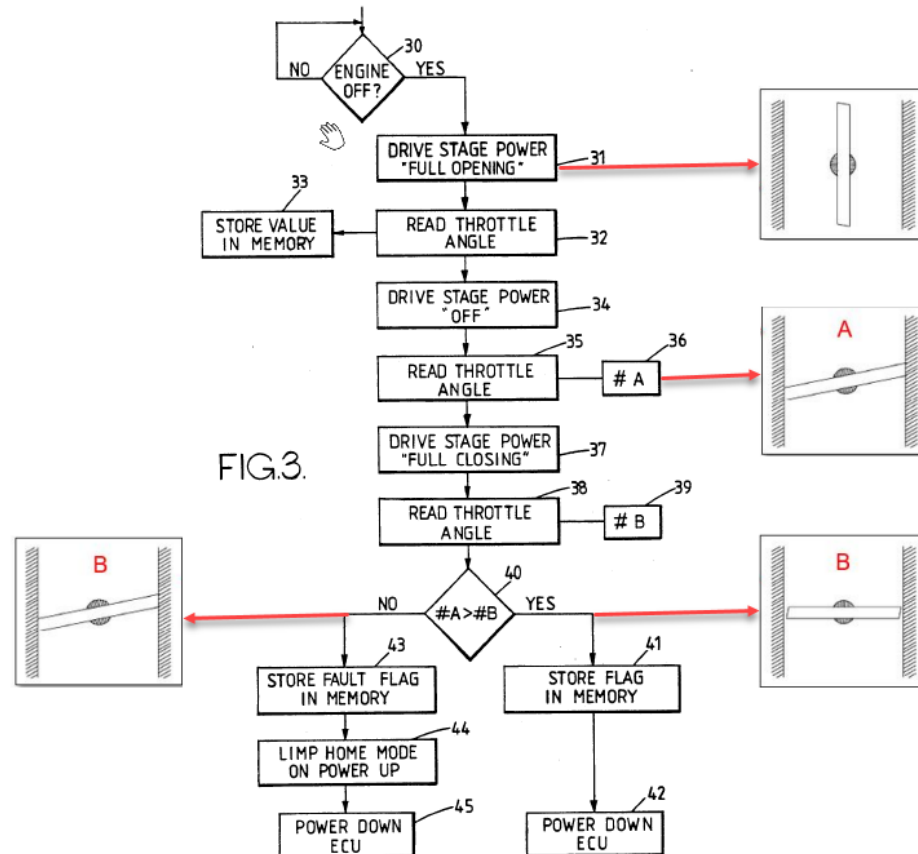
Fig. 2



EX1006, FIG.2 (annotated).

McQueen recognized that a “common” requirement in throttle control systems is having the two “return-to-closed” systems discussed above which are subject to faults that can go undetected. EX1003, ¶¶85-86. Accordingly, McQueen disclosed a technique for detecting certain faults (*e.g.*, whether the driver 23 or motor 6/7 failed to fully close the throttle plate 22) in the throttle control system. McQueen’s process is shown in Figure 3 and includes the steps of: disabling the driver 23 (step 34), determining an initial throttle position (A) (step 35), storing the

determined throttle position (step 36), enabling the driver 23 and causing it to supply full closing power to the motor 6/7 (step 37), determining an updated throttle position (B) (step 38), storing the determined throttle position (step 39), comparing the throttle positions (A and B) (step 40), and if the initial throttle position (A) is not greater than the subsequent throttle position (B), the engine is controlled to operate in a limp home mode. EX1005, 3:58-4:34. This is shown in Figure 3, annotated below:

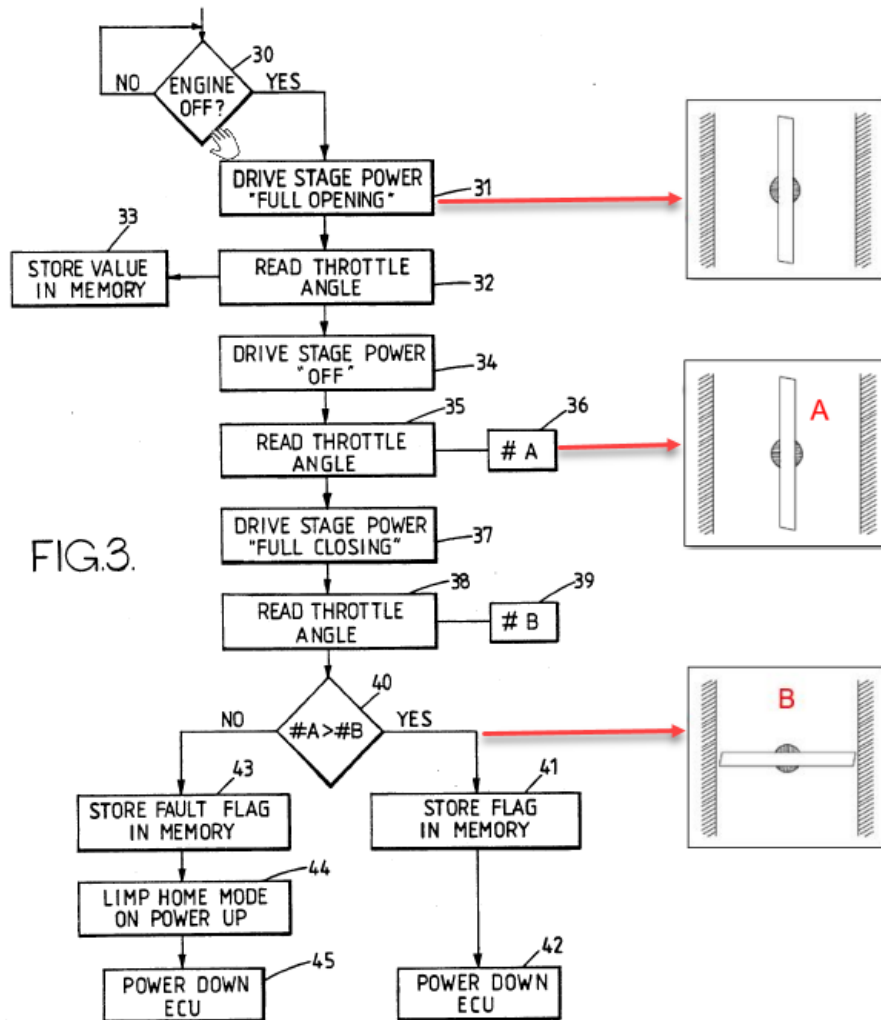


EX1004, FIG.3 (annotated).

EX1003, ¶¶88-89.

However, a POSITA would have understood that McQueen's fault detection method may not detect particular failures that even McQueen contemplates. EX1003, ¶90; EX1004, 2:41-45, 4:1-2. Many others also recognized that these throttle components can fail. *See* EX1006, 12:2-5 (disclosing limp home mechanism when motor, controller, or other elements fail); EX1011, 732 ("The remaining faults appear in the ECU: Examples are processor faults, computing faults caused by hardware defects, or driver faults."); EX1012, Streib, 0008 ("In an ETC system there are several components of which a failure could result in uncommanded acceleration..."), ("Failures can occur not only in peripheral elements, also the microcontroller itself could be affected by failures."); EX1017, 11.49 (noting failures of microcontrollers need to be determined "as quickly as possible in safety-related applications"); EX1003, ¶91.

If McQueen's return spring 4 failed and/or the driver 23 failed to turn off at step 34, the throttle angle (A) at step 35 would correspond to a fully open throttle and the throttle angle (B) at step 38 would correspond to a fully closed throttle. Because A would still be greater than B, McQueen would not detect either of these faults, leading to the undesirable condition that McQueen seeks to prevent. EX1005, 1:44-53; EX1003, ¶92. This scenario is illustrated below. EX1003, ¶93.



EX1005, FIG.3 (annotated).

McQueen discloses that the throttle angle (A) read at step 35 may be compared to another throttle angle to determine whether the return spring is functioning properly but does not disclose how to determine the other throttle angle. EX1005, 4:56-60.

POSITA would have been motivated to find a solution to detect these known problems to prevent an undesirable operating condition. *See* EX1005, 2:41-45, 4:1-

2 (noting safety factors in vehicle speed control design, the “most basic” being “a method designed into the throttle control circuit to insure a failsafe mode of operation” to avoid runaway acceleration); EX1021 (49 CFR §571.124) (requiring failsafe of “at least two sources of energy capable of returning the throttle to the idle position”); EX1017, 14.2-3; *see also* EX1015, Hardin, 1:26-28 (“In case of a failure in the electronics resulting in false output signals, the vehicle engine speed could become uncontrollable by the operator.”); EX1011, 732 (disclosing fault checking strategies “to discover as many faults as possible and to trigger an adequate reaction, in order to avoid critical states” such as a runaway case, *i.e.* undesired high engine performance); EX1016, 1:35-40, 1:50-64, 4:31-59, Fig. 2; EX1019, Abstract, 6:5:-9:8, Fig. 1; EX1003, ¶95.

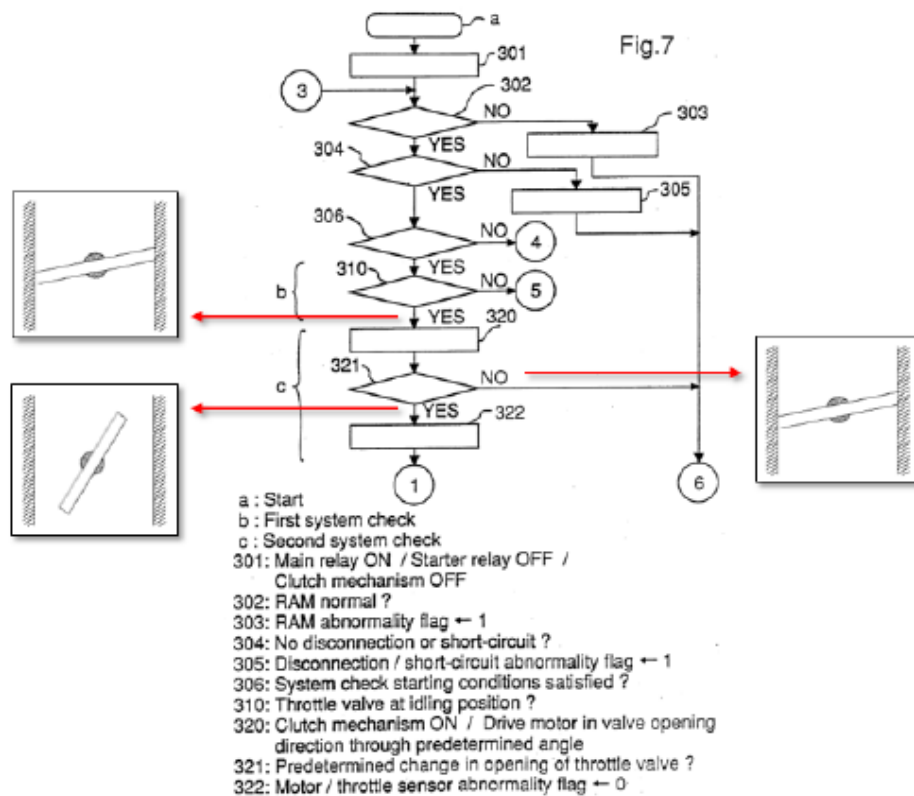
Terazawa, like McQueen, is directed to a throttle control system and similarly recognized that “it is necessary in order to check the operating function of each device to detect an operating condition of the motor and other devices.”

EX1006, 1:44-51. Accordingly, Terazawa disclosed a method of:

detecting an operating condition of each of the devices, that is, the motor, the throttle sensor, the clutch mechanism and the return spring by activating the motor and the clutch mechanism, and deactivating both the motor and the clutch mechanism when an abnormality is detected in at least one of the devices.

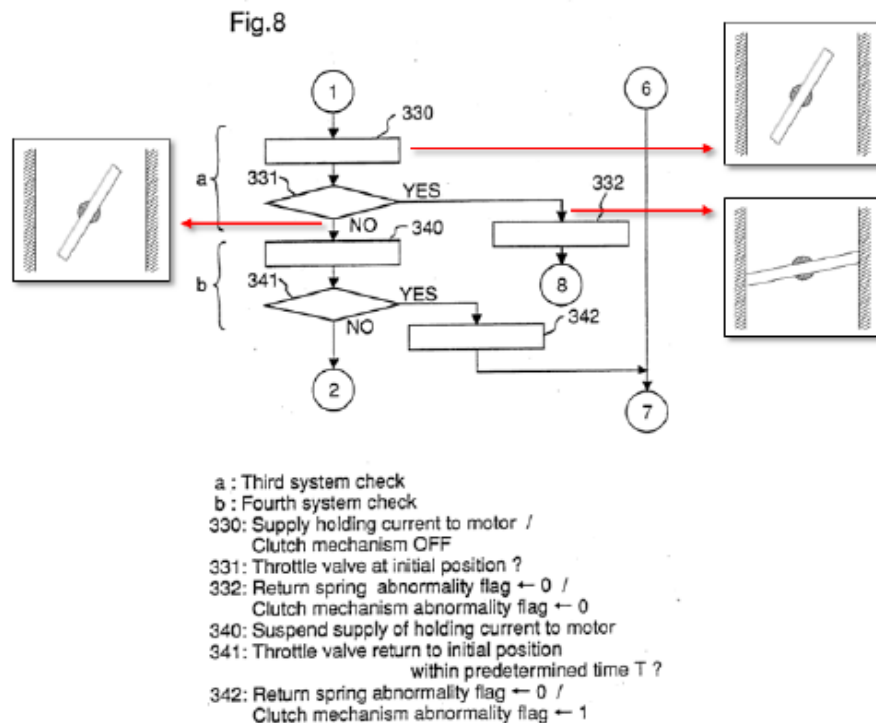
EX1006, 2:16-22; EX1003, ¶96.

Terazawa's throttle control method is illustrated in Figures 7 and 8 below. Specifically, Terazawa discloses a method including a processing routine of system checks on the performance of the constituent elements of the throttle control system. EX1006, 11:24-29. This method includes a first set of tests that include the steps of engaging the clutch and driving the throttle open by a predetermined amount (step 320), and checking whether the throttle valve 11 moved to the predetermined position (step 321). *Id.*, 12:46-62; EX1003, ¶97.



EX1006, FIG.7 (annotated).

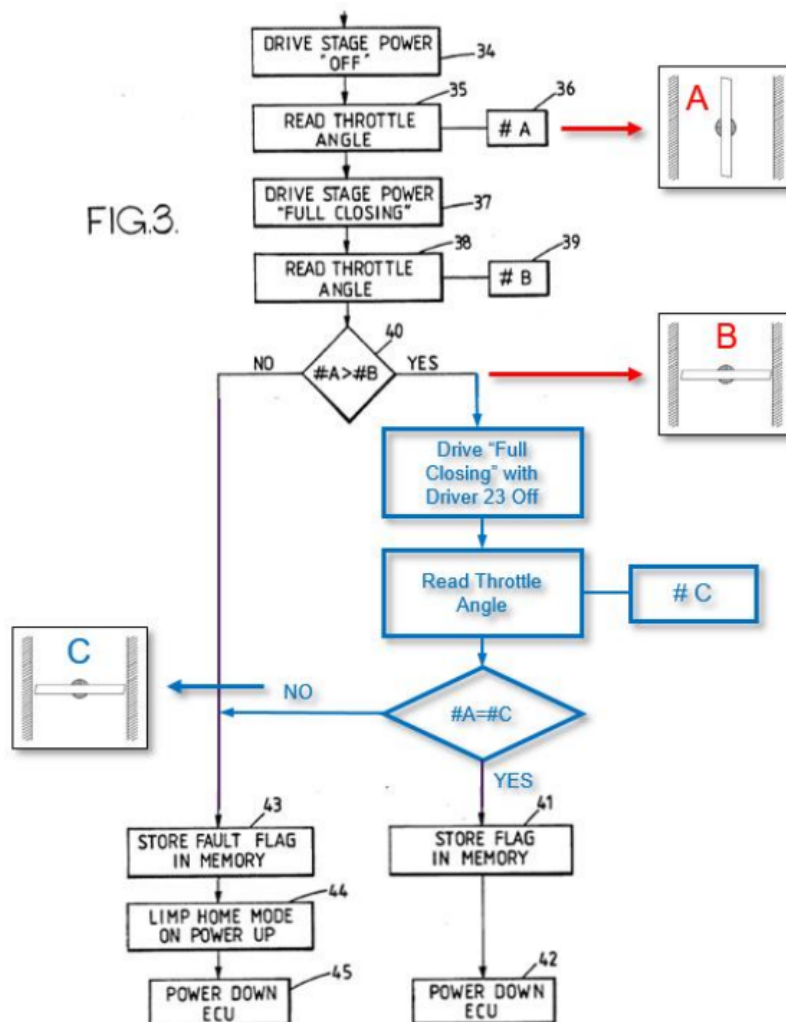
Terazawa's method further includes the steps of commanding a predetermined motor voltage (step 330), disabling the clutch (step 330), and determining whether the throttle plate 11 has moved to an idling or initial position (step 331) due to the return spring. EX1006, 12:29-13:15. If the throttle plate 11 returns to the idling or initial position under tension of the return spring, the clutch was properly disabled and the return spring is determined to be functioning properly. If the throttle plate 11 did not move to the idling or initial position, however, a failure in these components is detected and additional checks are performed. *Id.*, 13:31-33; EX1003, ¶98.



EX1006, FIG.8 (annotated).

Since McQueen's process may not detect certain failures as described above, POSITA would have been motivated to use Terazawa's technique for testing the return spring and electromechanical clutch, which are analogous to McQueen's return spring and H-bridge driver 23 because they provide the same functionality. POSITA would have been motivated to modify McQueen's fault detection process by incorporating a test analogous to Terazawa's steps 330 and 331 to test the return spring 4 and driver 23. EX1003, ¶¶99-100.

It would have been obvious to modify McQueen's fault detection process by continuing to command the full closing voltage at step 37 after the driver 23 has been disabled, like Terazawa's step 330, reading the position (C) of the throttle 22 and comparing position (C) to throttle position (A), like Terazawa's step 331. Figure 3 of McQueen from above has been annotated to illustrate incorporating Terazawa's test (in blue) in the scenario in which the return spring is defective. *Id.*, ¶¶101-102.

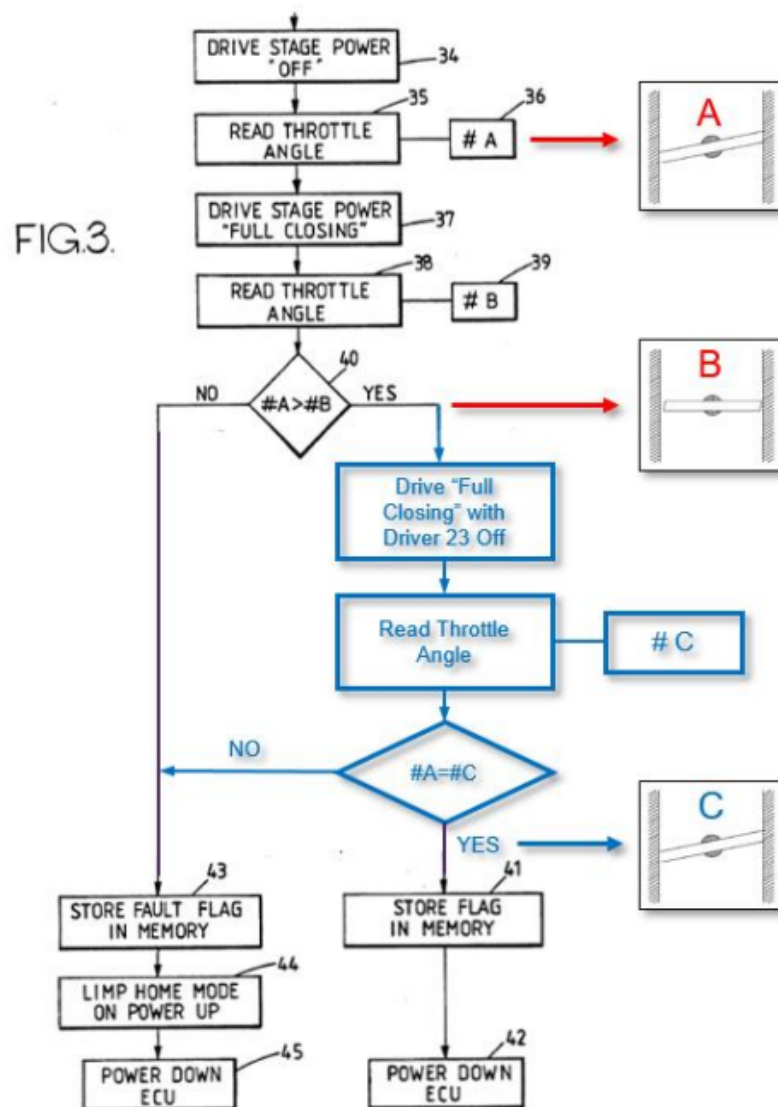


EX1005, FIG.3 (annotated).

By incorporating Terazawa's test, if the return spring 4 failed and/or the driver 23 failed to turn off and went undetected, at step 40, McQueen would detect that the throttle position (A) is not equal to throttle position (C) and shift to the limp home state as shown above. However, as illustrated below, if the return spring 4 was normal and driver 23 properly turned off, the throttle plate 22 would return to the same position at step 35 such that throttle position (A) would be equal to

throttle position (C) and normal operation can proceed. Doing so is analogous to Terazawa supplying motor voltage with the clutch disabled (step 330) to determine whether the throttle plate 11 has returned to an idling or initial position (step 331).

EX1003, ¶103.



EX1005, FIG.3 (annotated).

Combining Terazawa's technique for testing "return-to-closed" components (e.g., a return spring and clutch) would have provided an improved method of testing McQueen's throttle control system components. EX1003, ¶104. POSITA would have been motivated to combine Terazawa and McQueen in this way in view of McQueen's express desire "to provide an arrangement which is capable of detecting a latent fault or failure in a return system, such as a throttle closing system." EX1005, 2:28-31. Terazawa's technique for testing throttle components would have improved McQueen by, for example, "check[ing] the operating function of each device to detect an operating condition of the motor and other devices." EX1006, 1:48-51, 1:66-2:3, 2:23-35. EX1003, ¶¶104-105.

Combining the teachings of McQueen and Terazawa would have yielded predictable benefits and results because it was applying Terazawa's known technique to McQueen's similar, known throttle test process. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007); EX1003, ¶106. POSITA would have also understood that Terazawa's technique for testing throttle components would have been combined in a known way to provide the predictable benefits disclosed in McQueen. *KSR*, 550 U.S. at 419-421; EX1003, ¶106.

POSITA would have had a reasonable expectation of success combining McQueen and Terazawa. EX1003, ¶107. POSITA would have understood how to combine the teachings of McQueen and Terazawa by modifying the software

instructions stored in McQueen's electronic control unit. *Id.* This would have been routine and within the skill of POSITA due to the similarities in McQueen's and Terazawa's throttle control systems and testing methods. *Id.*

Accordingly, it would have been obvious to combine McQueen with Terazawa. *Id.*, ¶108.

Should PO argue that McQueen does not expressly disclose a "throttle position sensor (TPS) output voltage," Husselbee confirms that this would have been within the basic knowledge of a POSITA by 2000. EX1003, ¶¶109-117. McQueen's throttle position sensor 15 is a rotary variable potentiometer that outputs a voltage corresponding to the angular position of the throttle 22. EX1005, 3:25-32. The voltage output of the throttle position sensor 15 is provided to the electronic control unit 24 via an analog/digital converter 25 whose output is connected to the microprocessor 26. EX1005, 3:39-42; EX1003, ¶¶109-110. Husselbee discloses specific implementation details of a throttle position sensor that would have been known to a POSITA and pertinent to McQueen's throttle position sensor 15. *Id.*, ¶¶111-112. Husselbee discloses what was well-known—that potentiometer throttle position sensors, like McQueen's throttle position sensor 15, output a voltage signal corresponding to the throttle valve angle (e.g., 5V when the throttle plate is fully open and 0.5V when the throttle plate is closed)

For instance, with the throttle plate fully open (i.e., at 80 to 85

degrees) the voltage signal to the processor is nearly 5 volts, or reference voltage (Fig. 4-10). However, as the throttle plate closes (angle decreases), the signal voltage drops until it reaches about 0.5 volt at closed throttle (i.e., a 0 degree angle).

EX1008, 60; EX1013, Wolf, 5:7-8, 5:26-33, 7:25-33; EX1003, ¶¶112-113.

Thus, POSITA would have readily understood that McQueen’s rotary variable potentiometer throttle position sensor 15 outputs a voltage corresponding to the angular position of the throttle 22 as confirmed by Husselbee. EX1003, ¶114. Combining the teachings of McQueen (as modified by Terazawa) and the knowledge of a POSITA demonstrated by Husselbee would have yielded predictable benefits and results—for example, precise detection of the throttle valve’s rotational position. *Id.*; *KSR*, 550 U.S. at 417; *Koninklijke Philips N.V. v. Google LLC*, 948 F.3d 1330, 1337 (Fed. Cir. 2020) (noting an IPR inquiry does not “ignore the skilled artisan’s knowledge when determining whether it would have been obvious to modify the prior art”).

A POSITA would have had a reasonable expectation of success implementing the knowledge of a POSITA demonstrated by Husselbee with McQueen and Terazawa. EX1003, ¶115. Specifically, a POSITA would have recognized that there are a finite number of ways to determine a throttle position and compare throttle positions (*e.g.*, by comparing throttle angles or voltages

corresponding to throttle angles) and doing so based on an output voltage corresponding to the throttle angle was a common, predictable solution. *Id.*; *KSR*, 550 U.S. at 416.

POSITA would have understood how to implement the knowledge of a POSITA demonstrated by Husselbee with McQueen and Terazawa to determine the position of the throttle valve. EX1003, ¶116. POSITA would have simply used their general knowledge as confirmed by Husselbee’s implementation details, for example, outputting a voltage corresponding to the actual angular throttle position to accurately detect McQueen’s throttle valve position. *Id.*; *KSR*, 550 U.S. at 419-421.

Accordingly, it would have been obvious to combine McQueen with Terazawa and the knowledge of a POSITA demonstrated by Husselbee. EX1003, ¶117.

B. McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee render obvious independent claim 1.

1. [1.P] “An electronic throttle control apparatus for testing integrity of a motor drive electronics disable feature comprising”

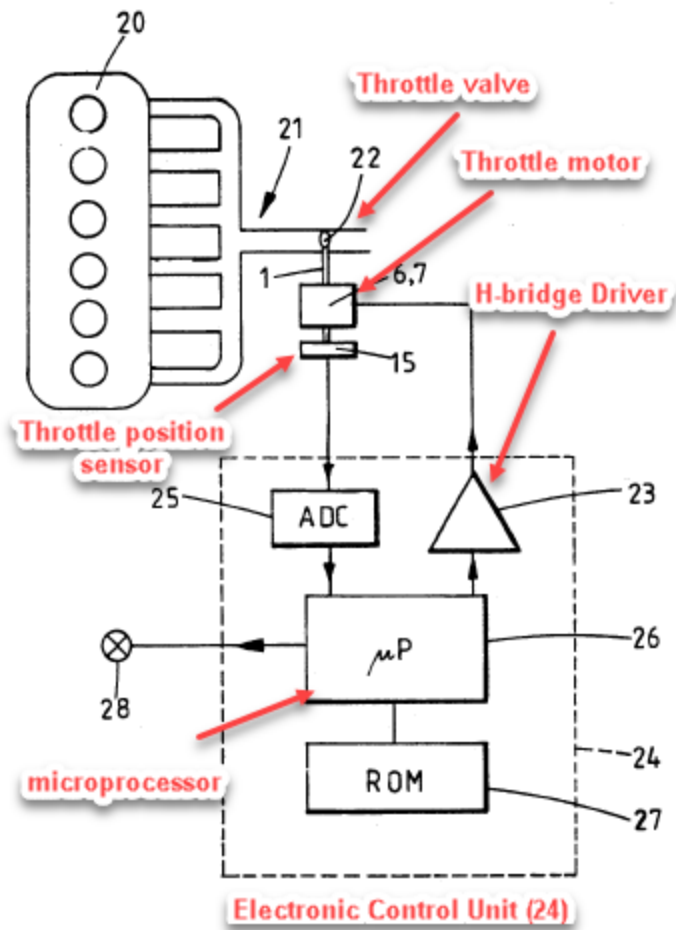
McQueen and Terazawa render obvious this preamble should PO argue it is limiting. Specifically, McQueen discloses the same structural components of the claimed electronic throttle control apparatus (*e.g.*, an electronic control unit 24 including a microprocessor 26 and driver 23 for controlling a motor 6/7 coupled to

a throttle 22, and a throttle position sensor 15). *See* EX1005, 3:3-32. Moreover, McQueen and Terazawa disclose testing the “integrity” of various components of the electronic throttle control apparatus, including the motor drive electronics, and shifting to a limp home state when a failure is detected. *See* EX1005, 3:33-4:42; EX1006, 11:24-14:30; EX1003, ¶¶118-119.

Thus, McQueen and Terazawa render obvious [1.P]. EX1003, ¶120.

2. [1.A] “a PCM having drive electronics for controlling a motor coupled to an electronic throttle plate”

McQueen discloses this limitation. McQueen discloses a powertrain control module, or “PCM”(e.g., electronic control unit 24) having drive electronics (e.g., H-bridge driver 23) for controlling a motor (e.g., motor 6/7) coupled to an electronic throttle plate (e.g., throttle plate 22). Figures 1 and 2 of McQueen, below, illustrate the electronic control unit 24 including microprocessor 26 and H-bridge driver 23 for controlling the motor 6/7 coupled to the throttle 22, just like the '260 patent. EX1005, 3:3-45; EX1003, ¶121. In a preferred embodiment of the '260 patent, the PCM is an H-driver. EX1001, 1:61-67, 2:48-55; EX1003, ¶122.



EX1005, FIG.2 (annotated).

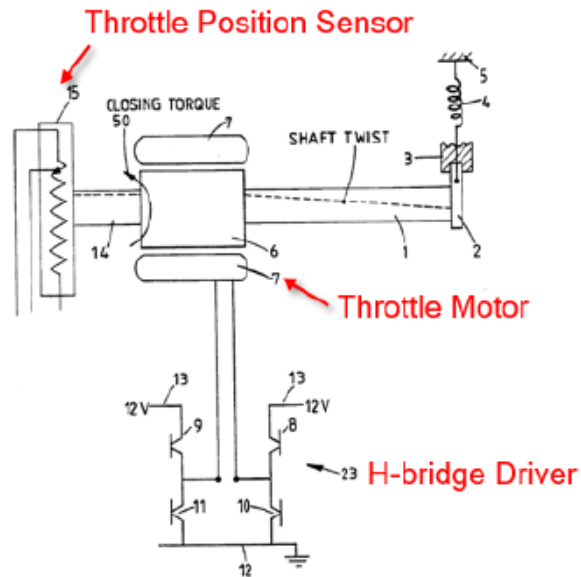


FIG. 1.

EX1005, FIG.1 (annotated).

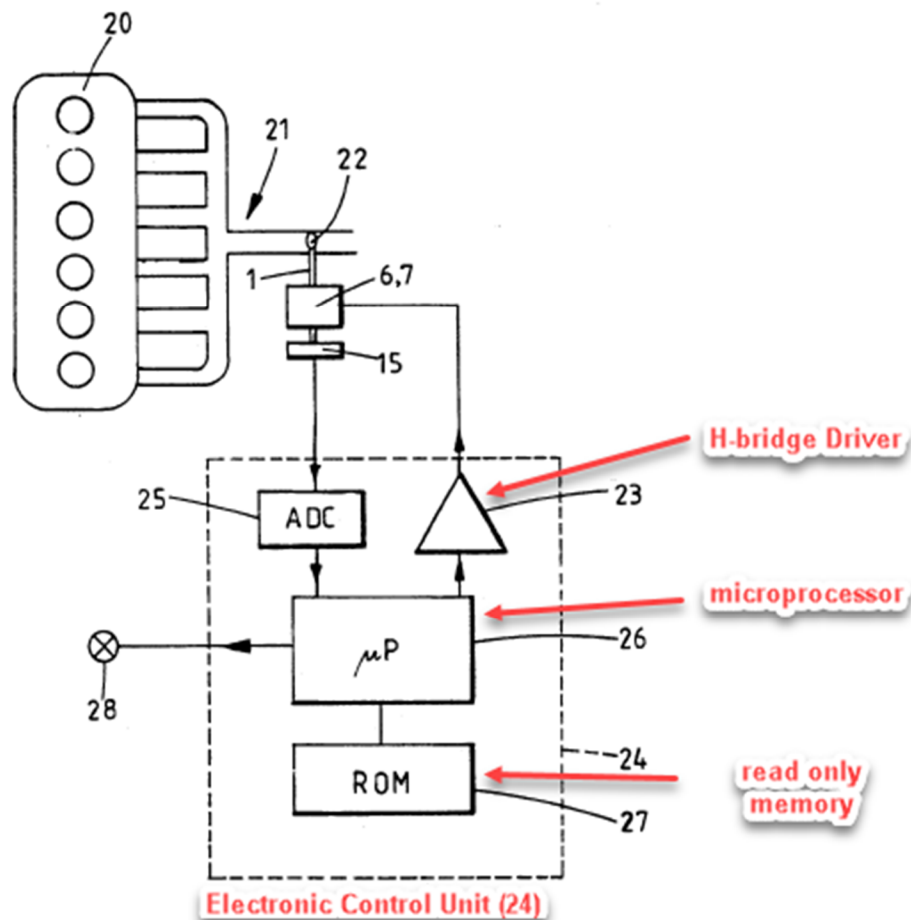
Thus, McQueen discloses [1.A]. EX1003, ¶123.

3. [1.B] “said PCM having control logic to disable said drive electronics and return said electronic throttle plate to a default position”²

McQueen discloses this limitation. Specifically, McQueen discloses that the PCM (*e.g.*, electronic control unit 24) includes control logic (*e.g.*, microprocessor 26, software stored in ROM 27) to disable the drive electronics (*e.g.*, H-bridge

² Petitioner notes that the '260 patent specification, at EX1001, 3:54-56, is inconsistent with [1.B]. However, for purposes of this Petition, Petitioner explains how the prior art discloses [1.B] as claimed and reserves the right to challenge the claims under 35 U.S.C. § 112 in other forums. EX1003, ¶124.

driver 23) and return the electronic throttle plate (*e.g.*, throttle plate 22) to a default position (*e.g.*, throttle angle A). Figure 2 of McQueen illustrates the electronic control unit 24 having read only memory (ROM) 27 storing software executed by the microprocessor 26 to enable and disable the H-bridge driver 23. EX1005, 3:32-57; EX1003, ¶¶125-126.

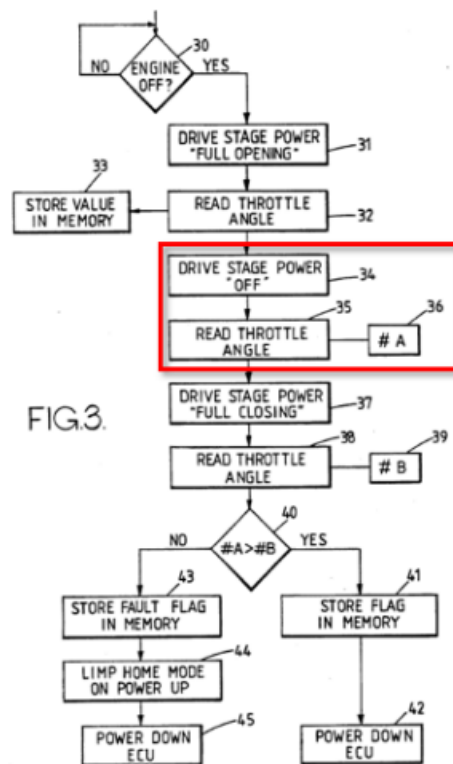


EX1005, FIG.2 (annotated).

Figure 3 of McQueen illustrates, at step 34, the electronic control unit 24 disabling the H-bridge driver 23 such that the throttle 22 returns to the default position—throttle angle (A).

At 34, the driver is switched off. In the absence of a fault, the return spring 4 closes the throttle such that the cam 2 abuts against the stop 3. After a suitable time interval to allow the throttle to close under the action of the spring 4, the throttle angle is read at 35 and stored as “A” at 36.

EX1005, 3:68-4:5; EX1003, ¶127.



EX1005, FIG.3 (annotated).

Thus, McQueen discloses [1.B]. EX1003, ¶128.

4. [1.C] “determine a default throttle position sensor (TPS) output voltage corresponding to said default position”

McQueen, alone or in combination with the knowledge of a POSITA demonstrated by Husselbee, discloses or renders obvious this limitation. *Id.*, ¶129. Figure 1 of McQueen illustrates the throttle position sensor 15, which is a rotary variable potentiometer that outputs a voltage corresponding to the angular position of the throttle 22. EX1005, 3:25-32; EX1003, ¶130.

The voltage output of the throttle position sensor 15 is provided to the electronic control unit 24 via an analog/digital converter 25 whose output is connected to the microprocessor 26; EX1005, 3:39-42; EX1003, ¶131.

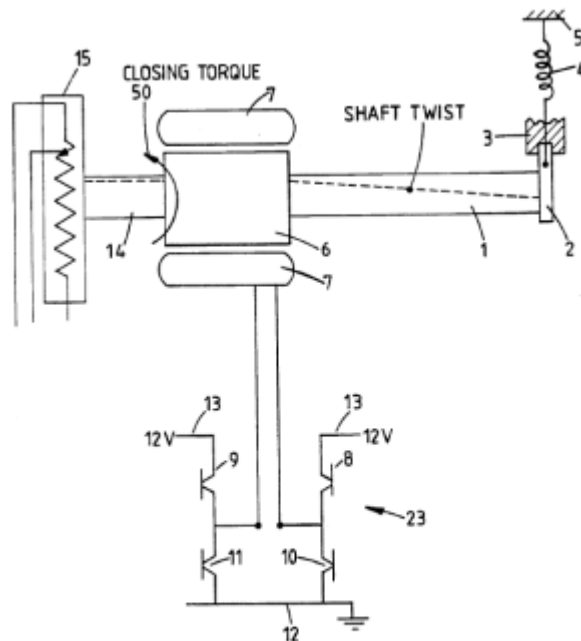
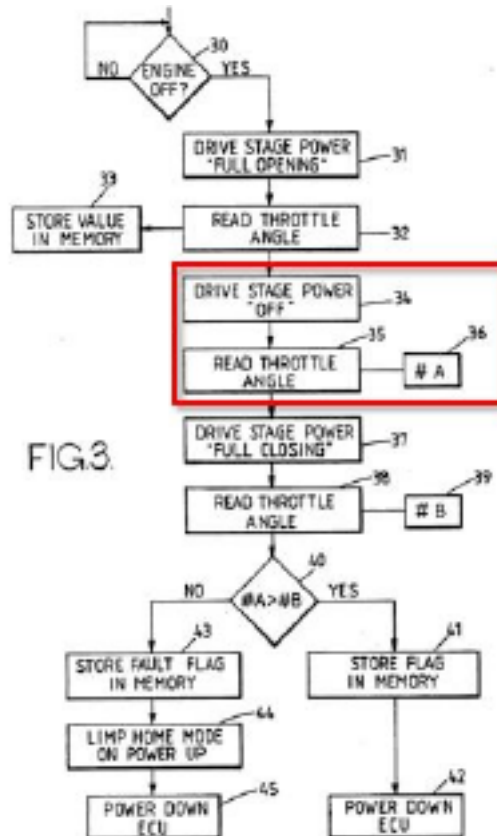


FIG. 1.

EX1005, FIG.1.

McQueen further discloses that when the driver 23 is disabled, the return spring 4 closes the throttle to a default position (step 34) and throttle angle (A) is then read from the voltage output by the throttle position sensor 15 (step 35) and stored (step 36). EX1005, 3:68-4:5; EX1003, ¶132.



EX1005, FIG.3 (annotated).

A POSITA would have thus understood that McQueen's electronic control unit 24 includes control logic (*e.g.*, microprocessor 26, software stored in ROM 27) to determine a default throttle position sensor (TPS) output voltage from the

throttle position sensor 15 corresponding to the default position (*e.g.*, throttle angle A) at steps 35 and 36. EX1003, ¶133.

Thus, McQueen discloses [1.C]. *Id.*, ¶134. However, if McQueen is found not to disclose this element expressly, Husselbee confirms that this would have been within the knowledge of a POSITA. *Id.*, ¶135. Specifically, Husselbee confirms that potentiometer throttle position sensors, like McQueen's throttle position sensor 15, output a voltage signal corresponding to the throttle valve angle (*e.g.*, 5V when the throttle plate is fully open and 0.5V when the throttle plate is closed). *Id.*; EX1008, 60.

McQueen and Husselbee both disclose potentiometer throttle position sensors. EX1005, 3:25-32; EX1008, 60. It would have thus been obvious to a POSITA for McQueen's electronic control unit 24 having control logic (*e.g.*, microprocessor 26, software stored in ROM 27) to determine a default throttle position sensor (TPS) output voltage from the throttle position sensor 15 corresponding to the default position (*e.g.*, throttle angle (A)) at steps 35 and 36 in view of the knowledge of a POSITA demonstrated by Husselbee. This would have simply required McQueen's electronic control unit 24, which is already configured to determine a default throttle position sensor (TPS) output corresponding to the default position, to use the existing voltage output from the throttle position sensor (TPS) 15. This would have been an obvious design choice and merely been

applying a known technique in a known device to yield predictable results. *KSR*, 550 U.S. at 417; *see supra* Section X.A; EX1003, ¶¶136-137.

Thus, McQueen, alone or in view of the knowledge of a POSITA demonstrated by Husselbee, discloses or renders obvious [1.C]. EX1003, ¶138.

5. [1.D] “command a full closing motor voltage”

McQueen, alone or in combination with Terazawa, renders this limitation obvious. McQueen discloses that the PCM (*e.g.*, electronic control unit 24) includes control logic (*e.g.*, microprocessor 26, software stored in ROM 27) to command the driver 23 to supply full closing motor voltage (step 37).

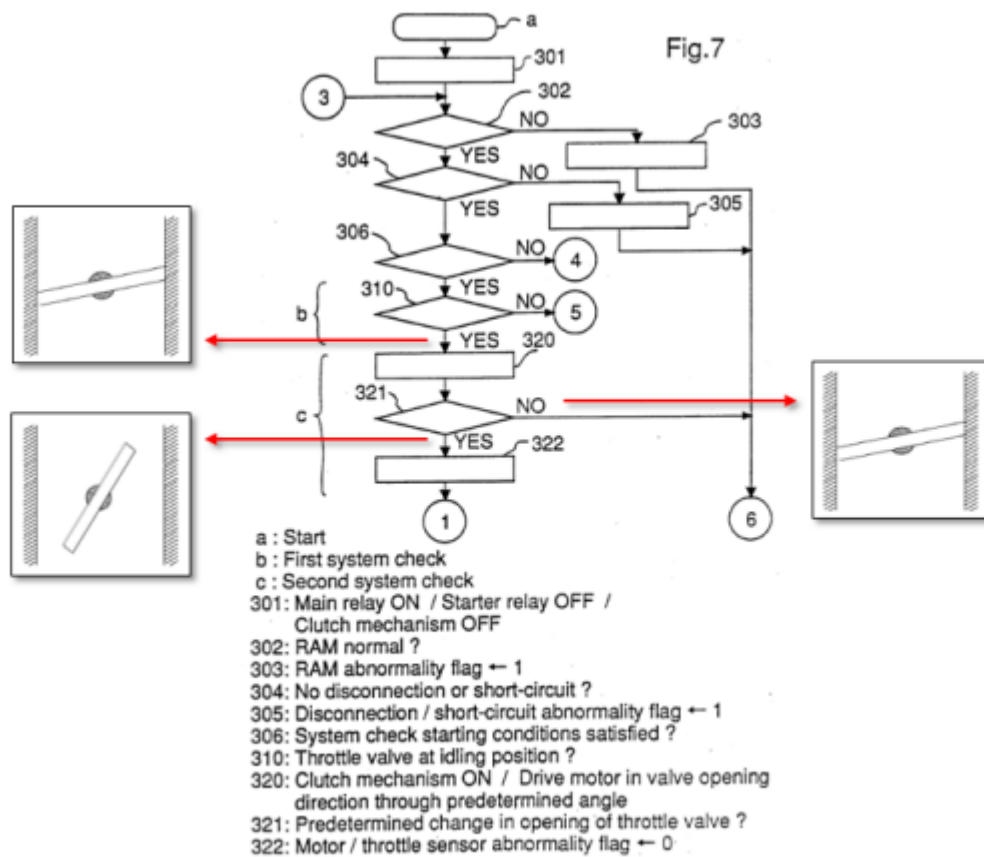
At 37, the microprocessor 26 causes the driver 23 to supply full closing power to the motor 6, 7. The motor therefore rotates the adjacent end of the throttle shaft 1, in the direction indicated by the arrow 50 in FIG. 1. The closing torque of the motor acts on the resilience of the shaft 1 such that the sensor 15 detects a position which is “more closed” than the position detected when the throttle was closed by the spring 4 without the closing torque supplied by the motor.

EX1005, 4:6-15; EX1003, ¶139.

McQueen further discloses that the electronic control unit 24 may disable the driver 23 after supplying the full closing motor voltage at step 37. *Id.*, 4:15-17; EX1003, ¶139.

Likewise, Terazawa discloses commanding a throttle motor voltage when a component of a throttle control system is disabled to determine whether that component is functioning properly. EX1006, 12:66-13:2; EX1003, ¶140.

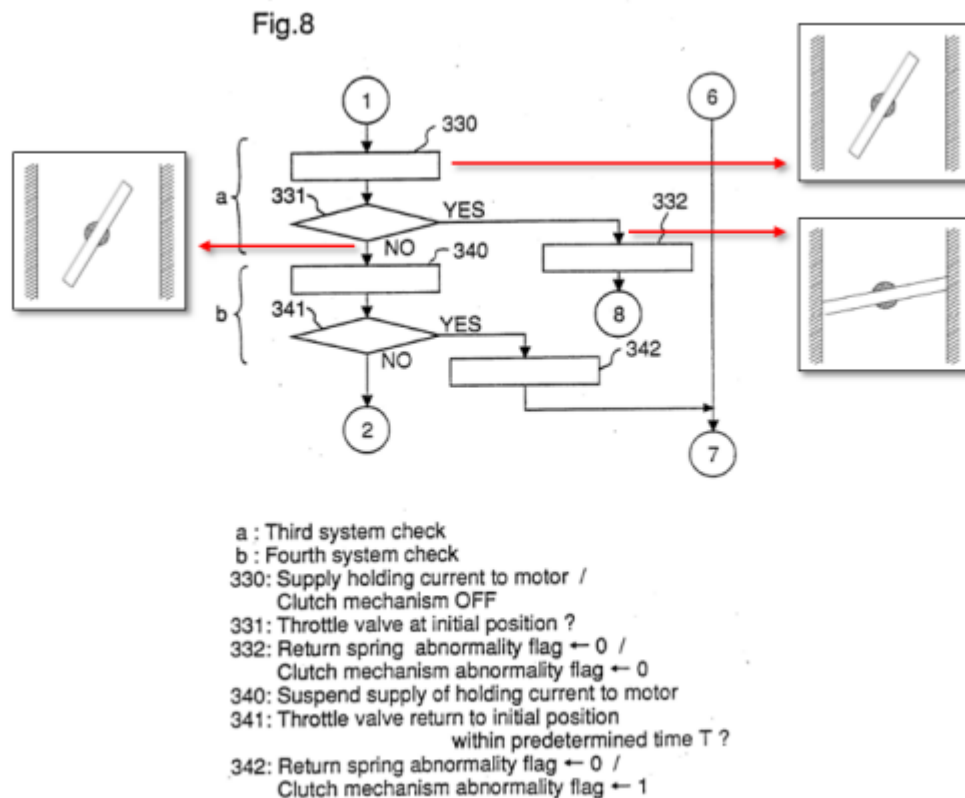
Terazawa discloses testing whether an electromechanical clutch and return spring in a throttle control system are functioning properly. First, Terazawa enables the clutch (step 320), commands a predetermined motor voltage (step 320), and determines whether the throttle plate 11 has moved to a predetermined position (step 321). EX1006, 12:46-62. This is analogous to McQueen's process of determining whether throttle angle (A) is greater than throttle angle (B) at step 40. EX1003, ¶¶141.



EX1006, FIG.7 (annotated).

If the throttle plate 11 is properly moved to the predetermined position in Terazawa, a subsequent test is performed. Terazawa commands a predetermined motor voltage (step 330), disables the clutch (step 330), and determines whether the throttle plate 11 has moved to an idling or initial position (step 331) due to the return spring. EX1006, 12:66-13:15. If the throttle plate 11 returns to the idling or initial position under tension of the return spring, analogous to McQueen's position (A), the clutch was properly disabled and the return spring is determined to be

functioning properly. If the throttle plate 11 did not move to the idling or initial position, however, a fault is detected. EX1006, 13:31-33; EX1003, ¶¶142-143.

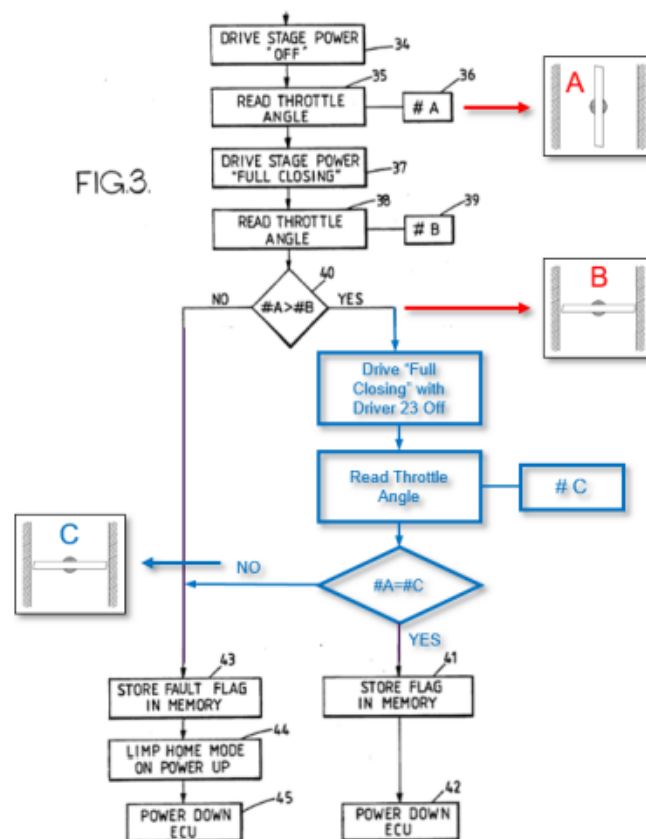


EX1006, FIG.8 (annotated).

McQueen and Terazawa both disclose throttle control systems having a motor and return spring. McQueen discloses disabling and enabling the driver 23, and Terazawa discloses disabling and enabling the clutch 40. EX1005, 3:68, 4:15-17. Terazawa's method of disabling the clutch to check whether the throttle plate 11 returned to the idling or initial position due to the return spring is analogous to disabling the driver 23 of McQueen to check whether the throttle plate 22 returned to position (A) due to the return spring 4. EX1003, ¶144. POSITA would have also

understood that McQueen's driver 23 and Terazawa's clutch 40 are analogous as both disengage a throttle plate from a throttle motor. *Id.*, ¶145. Moreover, a fault in McQueen's return spring 4, driver 23, or electronic control unit 24 would prevent the throttle plate 22 from returning to position A, just like a fault in Terazawa's return spring or clutch 40 would prevent the throttle plate 11 from returning to the idling or initial position. *Id.*, ¶146. However, POSITA would have understood that McQueen's process would not detect a fault in the return spring 4, driver 23, or electronic control unit 24 that would prevent the throttle plate 22 from returning to position A. *Id.*; *see supra* Section X.A.

POSITA would have thus been motivated to find a solution to detect these known problems to prevent an undesirable operating condition. *See* EX1005, 2:41-45, 4:1-2; EX1017, 14.2-3; EX1015, 1:26-28; EX1011, 732; EX1003, ¶147. Specifically, it would have been obvious to POSITA to combine Terazawa's technique with McQueen's by disabling McQueen's driver 23 while continuing to command the "full closing" power to test whether the driver 23 is actually off and that the return spring 4 brings the throttle back to throttle angle A. Figure 3 of McQueen has been annotated to illustrate incorporating Terazawa's test (in blue). EX1003, ¶147.



EX1005, FIG.3 (annotated).

By incorporating Terazawa's test, if the return spring 4 failed and/or the driver 23 failed to turn off and went undetected, at step 40, McQueen would detect that the throttle position (A) is not equal to throttle position (C) and shift to the limp home state. POSITA would have been motivated to combine Terazawa's technique for testing throttle components with McQueen in view of McQueen's express desire "to provide an arrangement which is capable of detecting a latent fault or failure in a return system, such as a throttle closing system." EX1005, 2:28-31; EX1003, ¶148. Using Terazawa's technique for testing throttle components would have improved McQueen by, for example, "check[ing] the

operating function of each device to detect an operating condition of the motor and other devices.”EX1006 1:48-51, 1:66-2:3, 2:23-35; EX1003, ¶149.

Combining the teachings of McQueen and Terazawa would have yielded predictable benefits and results because it applies Terazawa’s known technique of testing throttle components to a similar device in the same way to determine whether McQueen’s return spring 4 and driver 23 are working properly to avoid an undesirable condition. EX1005, 1:30-33, 1:49-52, 1:54-59; EX1006, 13:43-56. *KSR*, 550 U.S. at 417; *see supra* Section X.A; EX1003, ¶¶149-150.

Thus, McQueen and Terazawa render obvious [1.D]. EX1003, ¶151.

6. [1.E] “compare a full closing TPS output voltage to said default TPS output voltage”

McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee render obvious this limitation. McQueen explicitly discloses that the electronic control unit 24 includes control logic (*e.g.*, microprocessor 26, read only memory 27) to compare throttle position variables based on outputs from the potentiometer throttle position sensor 15. EX1005, 4:18. Husselbee discloses that potentiometer throttle position sensors, like McQueen’s throttle position sensor 15, output a voltage signal corresponding to the throttle valve angle. EX1007, 60; EX1003, ¶152.

It would have been obvious to POSITA for McQueen’s electronic control unit 24, as modified in view of Terazawa and Husselbee, to compare: (1) the

voltage output from the throttle position sensor (TPS) 15 when commanding the full closing voltage and the driver 23 is disabled, with (2) the voltage output from the throttle position sensor (TPS) 15 corresponding to throttle angle A stored in memory. *See supra* Section X.A; EX1003, ¶153. To do so, McQueen's electronic control unit 24 would use existing voltages output from the throttle position sensor (TPS) 15 in the comparison. EX1003, ¶154. Doing so would have also merely been applying a known technique to a similar device in the same way. *Id.*; *KSR*, 550 U.S. at 417. POSITA would have understood that there were a finite number of ways for McQueen's electronic control unit 24 to compare throttle positions. *KSR*, 550 U.S. at 421; EX1003, ¶154.

Thus, McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee render obvious [1.E]. EX1003, ¶155.

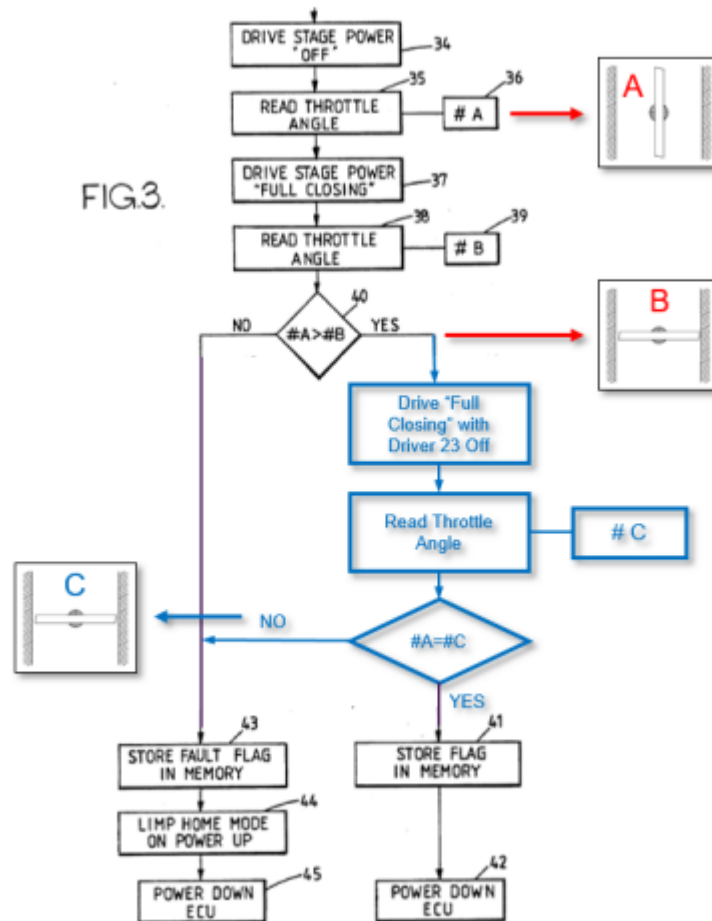
7. [1.F] “engage failure mode management when said full closing TPS output voltage and said default TPS output voltage are significantly different from each other”

McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee render this limitation obvious. McQueen specifically discloses that the electronic control unit 24, having microprocessor 26 and software stored in ROM 27, engages the limp home mode and illuminates a warning light 28 to alert a driver to a failure of the system based a comparison of the throttle positions (*e.g.*, A and B). EX1005, 4:29-49; EX1003, ¶156.

As described above, it would have been obvious to a POSITA for McQueen's electronic control unit 24, as modified in view of Terazawa and the knowledge of a POSITA demonstrated by Husselbee, to compare the voltage output from the throttle position sensor (TPS) 15 when commanding the full closing voltage and the driver 23 is disabled with the voltage output from the throttle position sensor (TPS) 15 corresponding to throttle angle A stored in memory. *See supra* X.A; EX1003, ¶157. It would have also been obvious to a POSITA for McQueen's electronic control unit 24 to engage the limp home mode and illuminate the warning light 28 to alert a driver to a failure of the system based a comparison of output voltages for these throttle positions. EX1003, ¶158.

Doing so would have merely been applying a known technique to a similar device in the same way to determine whether McQueen's return spring 4 and driver 23 are working properly to avoid an undesirable condition. *KSR*, 550 U.S. at 417; EX1003, ¶158. Specifically, a POSITA would have understood that if McQueen's electronic control unit 24 determines that the voltage output from the throttle position sensor (TPS) 15 when commanding the full closing voltage and the driver 23 is disabled (C) is different from the voltage output from the throttle position sensor (TPS) 15 corresponding to throttle angle (A), the return spring 4 has failed and/or the driver 23 failed to turn off as shown below in annotated Figure 3. Either of these failures would create the undesirable condition that

McQueen specifically seeks to avoid. EX1005, 1:30-33, 1:49-52, 1:54-59; *see also* EX1006, 13:43-56; *see supra* Section X.A; EX1003, ¶159. For example, annotated Figure 3 below discloses a method of throttle valve control when the return spring fails.



EX1005, FIG.3 (annotated).

Accordingly, McQueen, as modified in view of Terazawa and the knowledge of a POSITA demonstrated by Husselbee, renders obvious the electronic control unit 24 including control logic (*e.g.*, microprocessor 26, software stored in ROM 27) to engage failure mode management (*e.g.*, limp home mode,

illuminate a warning light 28 to alert a driver to a failure of the system) when the full closing throttle position sensor (TPS) output voltage (“C”) and the default throttle position sensor (TPS) output voltage are significantly different from each other. *See supra* Section X.A; EX1003, ¶160.

Thus, McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee render obvious [1.F]. EX1003, ¶161.

C. McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee render obvious claim 2.

Claim 2 depends from claim 1 and recites “wherein said PCM further includes control logic operative to enable said drive electronics.”

McQueen discloses this limitation. Specifically, McQueen discloses that the PCM (*e.g.*, electronic control unit 24) includes control logic (*e.g.*, microprocessor 26, software stored in ROM 27) to disable *and* enable the drive electronics (*e.g.*, H-bridge driver 23). For example, Figure 3 of McQueen illustrates step 31 of the electronic control unit 24 enabling the H-bridge driver 23 such that the throttle 22 is fully opened. EX1005, 3:60-4:5 (“At 34, the driver 23 is switched off.”), (“If the engine is off, the microprocessor 26 causes, at 31, the driver 23 to supply full opening power to the motor 6, 7 so as to open the throttle fully.”); EX1003, ¶163.

Thus, McQueen discloses claim 2. EX1003, ¶164.

D. McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee render obvious claim 3.

Claim 3 depends from claim 1 and recites “wherein said PCM further includes control logic operative to apply close stop voltage to said motor.” The ’260 patent discloses that in step 48, the “PCM 16 commands full closing motor voltage.” EX1001, 3:55-57. The ’260 patent further discloses that in step 58, the PCM 16 applies “full voltage in the closing direction to throttle motor 30,” which corresponds to the “close stop voltage.” EX1001, 4:6-13. Thus, according to the ’260 patent, the “full closing motor voltage” is the same as the “close stop voltage.” EX1003, ¶166.

McQueen discloses this limitation. Specifically, McQueen discloses that the PCM (*e.g.*, electronic control unit 24) includes control logic (*e.g.*, microprocessor 26, software stored in ROM 27) operative to apply close stop voltage (*e.g.*, full voltage in the closing direction) to the motor (*e.g.*, motor 6/7). EX1005, 4:6-15; *see supra* Section X.B.5; EX1003, ¶167.

Moreover, McQueen discloses that the motor 6/7 can be driven to any angle between fully closed and fully open by microprocessor 26 via H-bridge driver 23. EX1005, 3:11-47. Doing so controls the supply of air through the system and the output of the engine. *Id.*; *see also* EX1006, 10:8-21. Thus, should PO argue that the “full closing motor voltage” of claim 1 must be different from the “close stop voltage” in claim 3, a POSITA would have understood, or at least found it obvious,

that McQueen's electronic control unit 24 also includes control logic (*e.g.*, microprocessor 26) operative to apply a voltage to the motor (*e.g.*, motor 6/7) in the closing direction other than fully closed. *See supra* Section X.A; EX1003, ¶¶168-169.

Thus, McQueen discloses claim 3. EX1003, ¶170.

E. McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee render obvious claim 4.

Claim 4 depends from claim 3 and recites “wherein said PCM further includes control logic operative to compare said full closing TPS output voltage to said close stop TPS output voltage.”

McQueen, as modified by Terazawa and the knowledge of a POSITA demonstrated by Husselbee, renders obvious this limitation. McQueen discloses storing voltage outputs from the throttle position sensor (TPS) 15 for later comparison. EX1005, 4:3-5, 4:14-17. As described above, McQueen's electronic control unit 24, in view of Terazawa and the knowledge of a POSITA demonstrated by Husselbee, includes control logic (*e.g.*, microprocessor 26, software stored in ROM 27) to compare the full closing TPS output voltage to another voltage output from the throttle position sensor (TPS) 15. *See supra* Section X.B.6; EX1003, ¶¶172-173.

Moreover, McQueen recognized the need to detect faults to reduce the possibility of an engine operating in an undesirable mode as noted above. *See*

supra, Section X.A. And Terazawa discloses repeating checks to ensure that abnormalities are detected. EX1006, 13:60-14:14. Thus, it would have been obvious to a POSITA to have McQueen's electronic control unit 24 perform additional checks under similar conditions (*e.g.*, apply full closing voltages while the driver 23 is disabled) to ensure that faults can be detected. Doing so would have merely been applying a known technique to a similar device in the same way. *KSR*, 550 U.S. at 417. Indeed, a POSITA would have readily understood that by repeating the same condition and checking whether the throttle position changes, a fault can be easily detected. EX1003, ¶174.

Therefore, it would have been obvious to a POSITA to have McQueen's electronic control unit 24 reapply full voltage (or a voltage less than full but more than zero) in the closing direction while the driver 23 is disabled, determine the voltage output from the throttle position sensor 15, compare that voltage output to the full closing TPS output voltage stored in memory, and shift to the limp home state and illuminate the warning light 28 to alert a driver to a failure of the system if the output voltages are different. Doing so would provide an additional check for faults in the throttle control apparatus, which is consistent with McQueen's express objectives. EX1005, 1:44-53; EX1003, ¶175.

Indeed, the '260 patent admits that it would have been obvious to a POSITA to perform such additional testing to check for faults by comparing the full closing

TPS output voltage to another TPS output voltage under similar conditions.

EX1001, 4:21-29 (“[O]ne skilled in the art would realize that testing may also occur before learning the default voltage by simply comparing the voltage obtained in step 48 with the close stop voltage.”); EX1003, ¶176; *see PharmaStem Therapeutics, Inc. v. ViaCell, Inc.*, 491 F.3d 1342, 1362 (Fed. Cir. 2007) (“Admissions in the specification regarding the prior art are binding on the patentee for purposes of a later inquiry into obviousness.”).

Thus, McQueen, in combination with Terazawa and the knowledge of a POSITA demonstrated by Husselbee, renders obvious claim 4. EX1003, ¶177.

F. McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee render obvious claim 5.

Claim 5 depends from claim 4 and recites “wherein said PCM includes control logic operative to engage failure mode management when said full closing TPS output voltage and said close stop TPS output voltage are significantly different.”

McQueen, in combination with Terazawa and the knowledge of a POSITA demonstrated by Husselbee, renders obvious this limitation. EX1003, ¶178. As discussed above, it would have been obvious to a POSITA to have McQueen’s electronic control unit 24, as modified in view of Terazawa and the knowledge of a POSITA demonstrated by Husselbee, reapply full voltage (or a voltage less than full but more than zero) in the closing direction while the driver 23 is disabled,

determine the voltage output from the throttle position sensor 15, compare that voltage output to the full closing TPS output voltage stored in memory, and shift to the limp home state and illuminate the warning light 28 to alert a driver to a failure of the system if the output voltages are different. *See supra* Section X.E. Doing so would provide an additional check for faults in the throttle control apparatus. *See supra* Section X.E; EX1003, ¶179.

Thus, McQueen, in combination with Terazawa and the knowledge of a POSITA demonstrated by Husselbee, renders obvious claim 5. EX1003, ¶180.

G. McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee render obvious independent claim 8.

1. [8.P] “An electronic throttle control test system for an automobile having an internal combustion engine, said system comprising”

Claim 8 recites a system analogous to the apparatus of claim 1. EX1003, ¶181. [8.P] is similar to [1.P], which is rendered obvious by McQueen and Terazawa should PO argue this preamble limiting. *Id.*; *see supra* Section X.B.1.

For example, McQueen discloses the same structural components of the claimed electronic throttle control test system (*e.g.*, an electronic control unit 24 including a microprocessor 26 and driver 23 for controlling a motor 6/7 coupled to a throttle 22, and a throttle position sensor 15) for an automobile having an internal combustion engine (*e.g.*, internal combustion engine 20). *See* EX1005, 1:5-22, 3:3-35. Moreover, McQueen and Terazawa disclose systems for testing various

components of the electronic throttle control apparatus and shifting to a limp home state when a failure is detected. *See* EX1005, 3:33-4:42; EX1006, 11:24-14:30; *see supra* Sections IX.A-B, X.A; EX1003, ¶182.

Thus, McQueen and Terazawa render obvious [8.P]. EX1003, ¶183.

2. [8.A] “a motorized throttle located on the internal combustion engine, said motorized throttle having a throttle plate coupled to a motor for controlling an amount of airflow entering the internal combustion engine”

[8.A] is similar to [1.P], which is disclosed by McQueen. *See supra* Section X.B.1; EX1003, ¶184.

McQueen discloses a motorized throttle located on the internal combustion engine (*e.g.*, internal combustion engine 20), the motorized throttle having a throttle plate (*e.g.*, throttle 22) coupled to a motor (*e.g.*, motor 6/7) for controlling an amount of airflow entering the internal combustion engine (*e.g.*, internal combustion engine 20). EX1005, 1:5-22; 3:2-37 (“FIG. 2 shows an internal combustion engine 20 provided with an induction system 21 including a throttle 22 attached to the shaft 1. The throttle 22 controls the supply of air through the induction system and hence the output demand of the engine 20.”); EX1003, ¶185. Thus, McQueen discloses [8.A]. EX1003, ¶186.

3. [8.B] “a PCM having drive electronics for controlling said motor coupled to said throttle plate”

[8.B] is similar to [1.A], which is disclosed by McQueen. *See supra* Section X.B.2; EX1003, ¶187.

For example, McQueen discloses a PCM (*e.g.*, electronic control unit 24) having drive electronics (*e.g.*, H-bridge driver 23) for controlling the motor (*e.g.*, motor 6/7) coupled to the throttle plate (*e.g.*, throttle plate 22). EX1005, 3:3-45; EX1003, ¶188.

Thus, McQueen discloses [8.B]. EX1003, ¶189.

4. [8.C] “said PCM having control, logic to disable said drive electronics such that said throttle plate returns to or remains at a default position”

[8.C] is similar to [1.B], which is disclosed by McQueen. *See supra* Section X.B.3; EX1003, ¶190.

For example, McQueen discloses that the PCM (*e.g.*, electronic control unit 24) includes control logic (*e.g.*, microprocessor 26, software stored in ROM 27) to disable the drive electronics (*e.g.*, H-bridge driver 23) such that the electronic throttle plate (*e.g.*, throttle plate 22) returns to or remains at a default position (*e.g.*, throttle angle A). EX1005, 3:32-57; EX1003, ¶191.

Thus, McQueen discloses [8.C]. EX1003, ¶192.

5. [8.D] “determine a default throttle position sensor (TPS) output voltage corresponding to said default position”

[8.D] is similar to [1.C], which is disclosed by McQueen, alone or in combination with the knowledge of a POSITA demonstrated by Husselbee. *See supra* Section X.B.4; EX1003, ¶193.

For example, McQueen, alone or in view of the knowledge of a POSITA demonstrated by Husselbee, discloses the electronic control unit 24 having control logic (*e.g.*, microprocessor 26, software stored in ROM 27) to determine a default throttle position sensor (TPS) output voltage from the throttle position sensor 15 corresponding to the default position (*e.g.*, throttle angle A) at steps 35 and 36. EX1005, 3:25-42, 3:68-4:5, Figs. 1, 3; EX1008, 60; EX1003, ¶194.

Thus, McQueen, alone or in combination with the knowledge of a POSITA demonstrated by Husselbee, discloses [8.D]. EX1003, ¶195.

6. [8.E] “command a full closing motor voltage”

[8.E] is similar to [1.D], which is rendered obvious by McQueen and Terazawa. *See supra* Section X.B.5; EX1003, ¶196.

For example, McQueen discloses that the PCM (*e.g.*, electronic control unit 24) includes control logic (*e.g.*, microprocessor 26, software stored in ROM 27) to command the driver 23 to supply full closing motor voltage (step 37) and to disable the driver 23. EX1005, 4:6-17. Terazawa discloses commanding a throttle motor voltage when a component of a throttle control system is disabled to

determine whether that component is functioning properly. EX1006, 12:66-13:2.

As described above, McQueen, in combination with Terazawa, renders obvious commanding a full closing motor voltage while the driver 23 is disabled. *See supra* Section X.B.5; EX1003, ¶197.

Thus, McQueen, in combination with Terazawa, renders obvious [8.E].
EX1003, ¶198.

7. [8.F] “compare said full closing TPS output voltage to said default TPS output voltage”

[8.F] is similar to [1.E], which is rendered obvious by McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee. *See supra* Section X.B.6; EX1003, ¶199.

For example, McQueen’s electronic control unit 24, as modified in view of Terazawa and the knowledge of a POSITA demonstrated by Husselbee, renders obvious comparing the voltage output from the throttle position sensor (TPS) 15 when commanding the full closing voltage and the driver 23 is disabled to the voltage output from the throttle position sensor (TPS) 15 corresponding to throttle angle A stored in memory. *See supra* Section X.B.6; EX1003, ¶200.

Thus, McQueen, in combination with Terazawa and the knowledge of a POSITA demonstrated by Husselbee, renders obvious [8.F]. EX1003, ¶201.

8. [8.G] “engage failure mode management when said full closing TPS output voltage and said predetermined default TPS output voltage are significantly different”

[8.G] is similar to [1.F], which is rendered obvious by McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee. *See supra* Section X.B.7; EX1003, ¶202.

For example, McQueen, as modified in view of Terazawa and the knowledge of a POSITA demonstrated by Husselbee, renders obvious the electronic control unit 24 including control logic (*e.g.*, microprocessor 26, software stored in ROM 27) to engage failure mode management (*e.g.*, limp home mode, illuminate a warning light 28 to alert a driver to a failure of the system) when the full closing throttle position sensor (TPS) output voltage (C) and the default throttle position sensor (TPS) output voltage are significantly different from each other. *See supra* Section X.B.7; EX1003, ¶203.

Thus, McQueen, in combination with Terazawa and the knowledge of a POSITA demonstrated by Husselbee, renders obvious [8.G]. EX1003, ¶204.

XI. GROUND 2: THE COMBINATION OF MCQUEEN AND TERAZAWA RENDERS OBVIOUS CLAIMS 11-13.

Claims 11-13 addressed below in Ground 2 are directed to a method substantially similar to the apparatus of claims 1-3, respectively, addressed above in Ground 1. Thus, the rationale for combining McQueen and Terazawa discussed above in Ground 1 is equally applicable here. *See supra* Sections X.A-D; EX1003,

¶¶206-229. Claims 11-13 do not require the throttle position sensor TPS “output voltage” of claims 1-3 that would have been within the knowledge of a POSITA demonstrated by Husselbee. EX1003, ¶230.

A. McQueen and Terazawa render obvious independent claim 11.

1. [11.P] “A method for testing integrity of an electronic throttle plate driver disable function controlled by a powertrain control module (PCM) comprising the steps of”

Claim 11 recites a method analogous to the apparatus of claim 1. EX1003, ¶231. [11.P] is similar to [1.P], which is rendered obvious by McQueen and Terazawa should PO argue this preamble limiting. *Id.*; *see supra* Section X.B.1.

For example, McQueen and Terazawa disclose testing the “integrity” of various components of the electronic throttle control apparatus, including the electronic throttle plate driver (*e.g.*, H-bridge 23), and shifting to a limp home state when a failure is detected. *See* EX1005, 3:33-4:42; EX1006, 11:24-14:30; *see supra* X.B.1. Moreover, McQueen discloses the same powertrain control module (PCM) claimed (*e.g.*, an electronic control unit 24 including a microprocessor 26 and software stored in ROM 27). *See* EX1005, 1:5-22, 3:3-35; EX1003, ¶232.

Thus, McQueen and Terazawa render obvious [11.P]. EX1003, ¶233.

2. [11.A] “disabling said driver”

[11.A] is similar to [1.B], which is disclosed by McQueen. *See supra* Section X.B.3; EX1003, ¶234.

For example, McQueen discloses that the electronic control unit 24 disables the driver (*e.g.*, H-bridge driver 23). EX1005, 3:32-57; EX1003, ¶235.

Thus, McQueen discloses [11.A]. EX1003, ¶236.

3. [11.B] “determining a first throttle position value with said driver disabled”

[11.B] is similar to [1.C], which is rendered obvious by McQueen and Terazawa. *See supra* Section X.B.4; EX1003, ¶237.

For example, McQueen, as modified in view of Terazawa, renders obvious the electronic control unit 24 determining a first throttle position value (*e.g.*, throttle angle A) with the driver (*e.g.*, driver 23) disabled. EX1005, 3:25-42, 3:68-4:5, Figs. 1, 3; EX1008, 60; EX1003, ¶238.

Thus, McQueen and Terazawa render obvious [11.B]. EX1003, ¶239.

4. [11.C] “commanding full closing voltage”

[11.C] is similar to [1.D], which is rendered obvious by McQueen and Terazawa. *See supra* sections X.B.5; EX1003, ¶240.

For example, McQueen, in combination with Terazawa, renders obvious commanding a full closing motor voltage while the driver 23 is disabled. *See supra* Section X.B.5; EX1003, ¶241.

Thus, McQueen and Terazawa render obvious [11.C]. EX1003, ¶242.

5. [11.D] “determining a second throttle position value at said full closing voltage”

[11.D] is similar to [1.E], which is rendered obvious by McQueen and Terazawa. *See supra* Section X.B.6; EX1003, ¶243.

For example, McQueen’s electronic control unit 24, as modified in view of Terazawa, renders obvious determining a second throttle position value at the full closing voltage. *See supra* Section X.B.6; EX1003, ¶244.

Thus, McQueen and Terazawa render obvious [11.D]. EX1003, ¶245.

6. [11.E] “comparing said first and second throttle position values”

[11.E] is similar to [1.E], which is rendered obvious by McQueen and Terazawa. *See supra* Section X.B.6; EX1003, ¶246.

For example, McQueen’s electronic control unit 24, as modified in view of Terazawa, renders obvious comparing the throttle position when commanding the full closing voltage and the driver 23 is disabled to the throttle position A stored in memory. *See supra* Section X.B.6; EX1003, ¶247.

Thus, McQueen and Terazawa render obvious [11.E]. EX1003, ¶248.

7. [11.F] “engaging failure mode management when said first and second throttle position values are significantly different”

[11.F] is similar to [1.F], which is rendered obvious by McQueen and Terazawa. *See supra* Section X.B.7; EX1003, ¶249.

For example, McQueen, as modified in view of Terazawa, discloses the electronic control unit 24 engaging failure mode management (*e.g.*, limp home mode, illuminate a warning light 28 to alert a driver to a failure of the system) when the compared throttle position values are significantly different. *See supra* Section X.B.7; EX1003, ¶250.

Thus, McQueen and Terazawa render obvious [11.F]. EX1003, ¶251.

B. McQueen and Terazawa render obvious claim 12.

Claim 12 depends from claim 11 and recites “further comprising the step of enabling said driver.” Claim 12 is similar to claim 2, which is disclosed by McQueen. *See supra* Section X.C; EX1003, ¶252.

Thus, McQueen discloses claim 12. EX1003, ¶253.

C. McQueen and Terazawa render obvious claim 13.

Claim 13 depends from claim 11 and recites “further comprising the step of applying close stop output voltage to a motor.” Claim 13 is similar to claim 3, which is disclosed by McQueen. *See supra* Section X.D; EX1003, ¶254.

Thus, McQueen discloses claim 13. EX1003, ¶255.

XII. GROUND 3: THE COMBINATION OF MCQUEEN, TERAZAWA, AND THE KNOWLEDGE OF A POSITA DEMONSTRATED BY HUSSELBEE RENDERS OBVIOUS CLAIMS 14 AND 15.

Claims 14 and 15 addressed below in Ground 3 are directed to a method substantially similar to the apparatus of claims 4 and 5 addressed above in Ground

1. Thus, the rationale for combining McQueen, Terazawa, and the knowledge of a

POSITA demonstrated by Husselbee discussed above in Ground 1 is equally applicable here. *See supra* Sections X.A, X.E-F; EX1003, ¶¶256-257.

A. McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee render obvious claim 14.

Claim 14 depends from claim 13 and recites “further comprising the step of comparing a throttle position sensor (TPS) output voltage at said full closing voltage to a TPS output voltage at said close stop voltage.” Claim 14 is similar to claim 4, which is rendered obvious by McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee. *See supra* Section X.E; EX1003, ¶258.

Thus, McQueen, in combination with Terazawa and the knowledge of a POSITA demonstrated by Husselbee, renders obvious claim 14. EX1003, ¶259.

B. McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee render obvious claim 15.

Claim 15 depends from claim 14 and recites “further comprising the step of engaging failure mode management when said TPS output voltage at said full closing voltage and said TPS output voltage at said close stop voltage are significantly different.” Claim 15 is similar to claim 5, which is rendered obvious by McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee. *See supra* Section X.F; EX1003, ¶260.

Thus, McQueen, in combination with Terazawa and the knowledge of a POSITA demonstrated by Husselbee, renders obvious claim 15. EX1003, ¶261.

XIII. GROUND 4: THE COMBINATION OF MCQUEEN, TERAZAWA, MAUSER, AND THE KNOWLEDGE OF A POSITA DEMONSTRATED BY HUSSELBEE RENDERS OBVIOUS CLAIMS 6-7, 9-10, AND 16-17.

A. Rationale for Combining McQueen, Terazawa, Mauser, and the knowledge of a POSITA demonstrated by Husselbee.

Claims 6-7, 9-10, and 16-17 addressed below in Ground 4 are directed to systems and methods that depend from the claims addressed in Grounds 1 and 2, respectively. Thus, the rationale for combining these references discussed above in Grounds 1 and 2 is equally applicable here. *See supra* Sections X.A, XI.A; EX1003, ¶263.

In addition, POSITA would have been motivated to combine these references with Mauser, which teaches POSITA to test “safety-critical” systems like electronic throttle control systems. EX1003, ¶264. Specifically, Mauser teaches POSITA that for certain safety-critical features, such as an electronic throttle control system, it is important to “scrutinize safety and availability” through a variety of known tests for faults. EX1011, 729-730; EX1003, ¶264. Mauser discloses several known tests, including testing for sensor faults, actuator faults, and faults of the ECU, which can be monitored using processor monitoring, process monitoring, and plausibility monitoring and signal comparison. EX1011, 731-733; EX1003, ¶264. POSITA developing a safety-critical system like an

electronic throttle system would have thus been motivated to combine the system with the testing and monitoring disclosed in Mauser. EX1003, ¶264.

B. McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee render obvious claim 6.

Claim 6 depends from claim 1 and recites “wherein said PCM includes control logic operative to test said motor drive electronics disable feature before lea[r]ning said default throttle position sensor output voltage.”

McQueen, in combination with Terazawa and the knowledge of a POSITA demonstrated by Husselbee, renders obvious this limitation. EX1003, ¶266. As discussed above, McQueen, in combination with Terazawa and the knowledge of a POSITA demonstrated by Husselbee, renders obvious the PCM (*e.g.*, electronic control unit 24) having control logic (*e.g.*, microprocessor 26, software stored in ROM 27) operative to test the motor drive electronics disable feature by reapplying full voltage (or a voltage less than full but more than zero) in the closing direction while the driver 23 is disabled, determining the voltage output from the throttle position sensor 15, comparing that voltage output to the full closing TPS output voltage stored in memory, and shifting to the limp home state and illuminate the warning light 28 to alert a driver to a failure of the system if the output voltages are different. *See supra* Section X.A, X.B.7; EX1003, ¶267.

Furthermore, it would have been obvious to a POSITA to perform this test *before or after* determining the output voltage from the throttle position sensor 15

at steps 35 and 36, as the '260 patent admits “one skilled in the art would realize that testing may also occur *before* learning the default voltage.” EX1001, 4:21-29; EX1003, ¶268. POSITA would have understood that there were a finite number of instances for conducting such a test (*i.e.*, before or after learning the default throttle position sensor output voltage). *KSR*, 550 U.S. at 421; EX1003, ¶269.

Thus, McQueen, in combination with Terazawa and the knowledge of POSITA demonstrated by Husselbee, renders obvious claim 6. EX1003, ¶270. If it is found that McQueen, Terazawa, and knowledge of POSITA alone do not disclose this element, Mauser discloses continuous monitoring of the “safety-critical” Electronic Throttle Control (ETC) system, which would include testing before (and after) other functions and routines. EX1011, at 730-31; EX1003, ¶271. Mauser conducted a dependability study to test motor drive electronics, including the sensors, actuators, and ECU, for faults. EX1011, at 732; EX1003, ¶271. Mauser discloses performing this testing in three ways: (1) processor monitoring for monitoring the function of the ECU; (2) process monitoring for assessing the complete function of the ETC system; and (3) plausibility monitoring and signal comparison for detecting signal errors. EX1011, at 732; EX1003, ¶271. POSITA would understand that monitoring the ETC as in Mauser would be done continuously during operation, including before and after other tests or routines. EX1003, ¶271. Thus, it would have been obvious to POSITA to combine the

continuous monitoring of Mauser to test the motor drive electronics disable feature before testing the default throttle position sensor output voltage. EX1003, ¶271.

Thus, McQueen, in combination with Terazawa, Mauser, and the knowledge of a POSITA demonstrated by Husselbee, renders obvious claim 6. EX1003, ¶272.

C. McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee render obvious claim 7.

Claim 7 depends from claim 1 and recites “wherein said PCM includes control logic operative to test said motor drive electronics disable feature before checking PCM memory.”

McQueen, in combination with Terazawa and the knowledge of a POSITA demonstrated by Husselbee, renders obvious this limitation. EX1003, ¶273. McQueen discloses that the electronic control unit 24 includes read only memory (ROM) 27. EX1005, 3:48-57. Terazawa discloses checking the memory of the throttle controller as part of the overall process of testing the throttle control system. EX1006, 11:39-54. Thus, it would have been obvious to a POSITA to check the memory 27 of McQueen in view of Terazawa. *See* EX1018, 5:54-65 (“The Power On Self-Test 44 includes a number of tests including stack, RAM, ROM/EPROM, A/D convertor, and timer.”). Doing so would have merely been applying Terazawa’s known technique to McQueen’s similar, known device in the same way. EX1003, ¶¶274-275.

Indeed, the '260 patent admits that it would have been obvious to a POSITA to check memory as a routine function after testing the functionality of other throttle control system components. EX1001, 4:21-29; EX1003, ¶276; *Koninklijke Philips*, 948 F.3d at 1337. Moreover, a POSITA would have understood that there were a finite number of times for conducting such a test (*i.e.*, before or after testing the motor drive electronics). *KSR*, 550 U.S. at 421; EX1003, ¶276.

If it is found that McQueen, Terazawa, and knowledge of POSITA alone do not disclose this element, Mauser discloses doing so for the reasons discussed with respect to claim 6. *See supra* Section XIII.A-B. POSITA would understand that monitoring the ETC as in Mauser would be done continuously during operation, including before and after other tests or routines, such as checking the PCM memory. EX1003, ¶277. Thus, it would have been obvious to POSITA to combine the continuous monitoring of Mauser to test the motor drive electronics disable feature before testing the default throttle position sensor output voltage. *Id.*

Thus, McQueen, in combination with Terazawa, Mauser, and the knowledge of a POSITA demonstrated by Husselbee, renders obvious claim 7. EX1003, ¶278.

D. McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee render obvious claim 9.

Claim 9 depends from claim 8 and recites “wherein said PCM includes control logic operative to test disabling of said drive electronics before learning said default throttle position sensor output voltage.” Claim 9 is similar to claim 6,

which is rendered obvious by McQueen, Terazawa, the knowledge of a POSITA demonstrated by Husselbee, and Mauser. *See supra* Section XIII.B; EX1003, ¶279.

Thus, McQueen, in combination with Terazawa and the knowledge of a POSITA demonstrated by Husselbee, renders obvious claim 9. EX1003, ¶280.

E. McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee render obvious claim 10.

Claim 10 depends from claim 8 and recites “wherein said PCM includes control logic operative to test disabling of said drive electronics before checking PCM memory.” Claim 10 is similar to claim 7, which is rendered obvious by McQueen, Terazawa, the knowledge of a POSITA demonstrated by Husselbee, and Mauser. *See supra* Section XIII.C; EX1003, ¶281.

Thus, McQueen, in combination with Terazawa and the knowledge of a POSITA demonstrated by Husselbee, renders obvious claim 10. EX1003, ¶282.

F. McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee render obvious claim 16.

Claim 16 depends from claim 11 and recites “said testing occurs before learning default throttle position sensor output voltage.” Claim 16 is similar to claim 6, which is rendered obvious by McQueen, Terazawa, Mauser, and the knowledge of a POSITA demonstrated by Husselbee. *See supra* Section XIII.A; EX1003, ¶283.

Thus, McQueen, in combination with Terazawa, Mauser, and the knowledge of a POSITA demonstrated by Husselbee, renders obvious claim 16. EX1003, ¶284.

G. McQueen, Terazawa, and the knowledge of a POSITA demonstrated by Husselbee render obvious claim 17.

Claim 17 depends from claim 11 and recites “wherein said testing occurs before checking PCM memory.” Claim 17 is similar to claim 7, which is rendered obvious by McQueen, Terazawa, Mauser, and the knowledge of a POSITA demonstrated by Husselbee. *See supra* Section XIII.B; EX1003, ¶285.

Thus, McQueen, in combination with Terazawa, Mauser, and the knowledge of a POSITA demonstrated by Husselbee, renders obvious claim 17. EX1003, ¶286.

XIV. THIS PETITION IS PROPER UNDER 35 U.S.C. §§ 314(A) AND 325(D)

The Board should decline to exercise its discretion to deny this Petition.

A. Institution Should Not Be Denied Under *Fintiv*

The *Fintiv* factors weigh against discretionary denial. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential).

Petitioners intend to promptly seek a stay of the related district court actions if the Board institutes this proceeding. This factor weights against discretionary denial, or at worst, is neutral.

A Final Written Decision is expected by around February 2025. In the corresponding district court litigations, a schedule has not yet been set, and thus the courts have not yet set a *Markman* hearing or trial date. Moreover, the Federal Judiciary Report for the period ending March 31, 2023, states that the Northern District of Illinois civil trials have taken approximately 48.9 months from filing to trial, which would place the trials in the corresponding litigations in January 2027.³ EX1020, 47. Thus, this factor weighs against denial. *See Sand Revolution II, LLC v. Continental Intermodal Grp. - Trucking LLC*, IPR2019-01393, Paper 24 (June 16, 2020) (informative).

Petitioners stipulate that, if the Board institutes *inter partes* review, Petitioners will not seek resolution in the District Court of any ground of invalidity for the '260 Patent that utilizes the same combination of prior art reference relied upon in the grounds of the instant petition. Petitioners' proposal addresses the concern of narrowing the issues, as this stipulation ensures there is no overlap between the '260 patent invalidity theories before the Board and at issue in the District Court. Accordingly, this factor weighs in favor of institution.

Petitioners and the PO are the parties before the District Court actions. However, members of the Board have noted that *Fintiv* "says nothing about

³ The corresponding litigations were filed on July 22 and July 29, 2022.

situations in which the petitioner is the same as, or is related to, the district court defendant.” *Cisco Sys., Inc. v. Ramot at Tel Aviv Univ. Ltd.*, IPR2020-00122, Paper 15, at *10 (PTAB May 15, 2020) (APJ Crumbley, dissenting). This factor is neutral.

This Petition presents compelling unpatentability challenges that warrant institution. *See* USPTO Memorandum, Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation. This factor weighs against discretionary denial.

B. Institution Should not Be Denied Under § 325(d)

McQueen, Terazawa, Husselbee, and Mauser were not cited during prosecution of the '260 patent. All four were cited in IPR2020-00451, filed by VW, with McQueen, Terazawa, and Husselbee relied on in the asserted grounds of unpatentability and Mauser cited as background art. EX1007 at 8. Since the Board previously instituted review of the '260 patent in IPR2020-00451 on three similar grounds, and the trial was only terminated due to settlement before the Board reached a final written decision, the Board should not invoke its discretion under §325(d) and deny this petition. In addition, this petition presents a new fourth ground not presented to the office during examination and one ground that is distinct from the VW Petition.

To the extent similar Grounds were considered during prosecution, the examiner made a material error by failing to recognize and reject the challenged claims based on the challenges in this Petition.

XV. CONCLUSION

For these reasons, Petitioners request that the Challenged Claims be found unpatentable.

Respectfully submitted,

Dated: July 21, 2023

/s/ Ed Sikorski

CERTIFICATION OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(c) and (d), Petitioners certify that the word count of the foregoing Petition for *Inter Partes* Review (exclusive of any table of contents, table of authorities, mandatory notices under § 42.8, certificates of service and word count, and list of exhibits or claim listing) as measured by Microsoft Word totals 13,666 words, which is less than the 14,000 allowed under 37 CFR § 42.24.

Respectfully submitted,

Dated: July 21, 2023

/s/ Ed Sikorski

**CERTIFICATE OF SERVICE
UNDER 37 C.F.R. § 42.105**

Pursuant to 37 C.F.R. §§ 42.6(e) and 42.105(b), the undersigned certifies that, on July 21, 2023, a complete and entire copy of this Petition for *Inter Partes* Review, together with all supporting exhibits, were served on Patent Owner electronically, by agreement, by emailing a copy of the same to the following attorneys for the Patent Owner:

Timothy Devlin	tdevlin@devlinlawfirm.com
Jim Lennon	jlennon@devlinlawfirm.com
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Dated: July 21, 2023 /s/ Ed Sikorski