UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF TEXAS
DALLAS DIVISION

JEAN MELCHIOR, Plaintiff, v. HILITE INTERNATIONAL, INC., Defendant.	§ § § § § § § § § § §	Civil Action No. 3:11-cv-3094-M

FINAL CLAIM CONSTRUCTION ORDER

Plaintiff Jean Melchior ("Melchior") brings this suit against Hilite International, Inc. ("Hilite"), asserting that certain Hilite products infringe Melchior's patents. Melchior is the named inventor of the patents-in-suit. Defendant Hilite is a global supplier of automotive parts, focused on developing automotive systems and components for improved fuel efficiency and reduced emissions.

The parties seek construction of disputed terms used in the asserted claims of the following patents-in-suit: U.S. Patent Numbers 5,645,017 ("the '017 Patent"), 5,649,506 ("the '506 Patent"), and 5,507,254 ("the '254 Patent"). The Court held a technology tutorial on November 26, 2012, and a claim construction hearing on December 19, 2012. Having reviewed the claims, specifications, prosecution history, prior art, and expert opinions, and having considered the parties' arguments and the applicable law, the Court now construes the disputed terms as stated on Exhibit A.

I. LEGAL STANDARD

Claim construction is a question of law exclusively for the court. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 971–72 (Fed. Cir. 1995) (en banc), *aff'd*, 517 U.S. 370 (1996). "Ultimately, the interpretation to be given a term can only be determined and confirmed with a full understanding of what the inventors actually invented and intended to envelop with the claim." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1316 (Fed. Cir. 2005) (en banc) (internal citations omitted). Accordingly, the correct construction will be the one that "stays true to the claim language and most naturally aligns with the patent's description of the invention." *Id.* (internal citations omitted).

In construing disputed terms, a court looks first to the claim language, for "[i]t is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude.'" *Id.* at 1312 (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). Generally, the words of a claim should be given their "ordinary and customary meaning," which is "the meaning that the term[s] would have to a person of ordinary skill in the art in question at the time of the invention." *Id.* at 1312–13.

In many cases, the meaning of a term to a person skilled in the art will not be immediately apparent, and a court must look to other sources to determine the term's meaning. *See Phillips*, 415 F.3d at 1314. "Those sources include 'the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art.'" *Id.* at 1314 (internal citations omitted).

A court should also consider the context in which the term is used in an asserted claim or in related claims in the patent, bearing in mind that "the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." *Id.* at 1313. Indeed, the specification "is always highly relevant to the claim construction analysis" and "[u]sually . . . dispositive; it is the single best guide to the meaning of a disputed term." *Id.* at 1315 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). Where the specification reveals that the patentee has given a special definition to a claim term that differs from the meaning it would ordinarily possess, "the inventor's lexicography governs." *Id.* at 1316. Likewise, where the specification reveals an intentional disclaimer or disavowal of claim scope by the inventor, the inventor's intention, as revealed through the specification, is dispositive. *Id.*

A court may also consider the patent's prosecution history, which includes the cited prior art references. *Id.* at 1317. When in evidence, the prosecution history "can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it otherwise would be." *Id.* at 1317 (citing *Vitronics*, 90 F.3d at 1582–83).

Finally, a court is authorized to consider extrinsic evidence in construing claims, such as "expert and inventor testimony, dictionaries, and learned treatises." *Id.* (citing *Markman*, 52 F.3d at 980). Expert testimony may be particularly useful in providing background on the technology at issue, explaining how an invention works, and ensuring that the court's understanding of the technical aspects of the patent is consistent with that of a person of skill in the art, or establishing that a particular term in the patent or the prior art has a particular meaning in the pertinent field. *Phillips*, 415 F.3d at 1318. Although a court may consider evidence extrinsic to the patent and

prosecution history, such evidence is considered "less significant than the intrinsic record" and "less reliable than the patent and its prosecution history in determining how to read claim terms." *Id.* at 1317–18 (internal quotation marks and citations omitted).

Thus, while extrinsic evidence may be useful in claim construction, ultimately "it is unlikely to result in a reliable interpretation of patent claim scope unless considered in the context of the intrinsic evidence." *Id.* at 1319. Any expert testimony "that is clearly at odds with the claim construction mandated by the claims themselves, the written description, and the prosecution history" will be significantly discounted. *Id.* at 1318 (internal quotation marks and citation omitted). Finally, while the specification may describe a preferred embodiment, the claims are not necessarily limited to that embodiment. *Phillips*, 415 F.3d at 1323.

Means-plus-function limitations permit a patentee to claim an element of the invention in terms of the element's function, without reciting corresponding structure in the claim itself:

> An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

35 U.S.C. § 112, ¶ 6. The patentee who uses means-plus-function language "must set forth in the specification adequate disclosure showing what is meant by the language." *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1367 (Fed. Cir. 2008) (internal quotation marks omitted). The "use of the word 'means' creates a rebuttable presumption that the drafter intended to invoke § 112, ¶ 6, while failure to use the word 'means' creates a rebuttable presumption that the drafter did not intend the claims to be governed by § 112,¶ 6." *Flo Healthcare Solutions, LLC v. Kappos*, 697 F.3d 1367, 1373 (Fed. Cir. 2012). "Conversely, 'a limitation lacking the term 'means' may overcome the presumption against means-plus-function treatment if it is shown that 'the claim term fails to recite sufficiently definite structure or else recites function without reciting sufficient

structure for performing that function.'" *Id.* (quoting *Mass. Inst. of Tech. v. Abacus Software*, 462 F.3d 1344, 1353 (Fed. Cir. 2006)).

Whether a limitation falls within § 112, ¶ 6 is also a question of law. *Cardiac Pacemakers, Inc. v. St. Jude Med., Inc.*, 296 F.3d 1106, 1113 (Fed. Cir. 2002). Construction of a means-plus-function limitation requires two steps. "First, the court must determine the claimed function. Second, the court must identify the corresponding structure in the written description of the patent that performs the function." *Noah Sys., Inc. v. Intuit Inc.*, 675 F.3d 1302, 1311 (Fed. Cir. 2012). "A structure disclosed in the specification qualifies as a 'corresponding structure' if the specification or the prosecution history "clearly links or associates that structure to the function recited in the claim." *Id.* The determination of whether the specification discloses sufficient corresponding structure to a claim function is to be made from the vantage point of one skilled in the art. *HTC Corp. v. IPCom GmbH & Co., KG*, 667 F.3d 1270, 1279 (Fed. Cir. 2012).

II. OVERVIEW OF THE TECHNOLOGY IN THE PATENTS-IN-SUIT

The patents-in-suit are directed to an improvement in camshaft phasing technology. Variable camshaft timing technology is used in internal combustion engines to adjust the angle of the phase between the engine's crankshaft and its camshaft. By altering the phase relationship, the timing of when the fuel intake and exhaust valves open and close can be modified depending on engine operating conditions.

A camshaft is a rotating rod that has one or more cams, and it facilitates the opening and closing of the valves of the engine to allow fuel in and exhaust out. A crankshaft, also called a driving shaft, is driven by the pistons in the engine to transmit power from the engine to the wheels of the vehicle. Each time a cam interacts with a cam follower, oppositely-oriented forces, or torques, act on the cam. A torque pulse in one direction is caused by the resistance of the valve

return springs when the valve opens, and a torque pulse in the opposite direction is generated by the release of the valve return springs when the valve closes. These opposite torque pulses alternate during rotation of the camshaft. This phenomenon is referred to as a "torque reversal." *See* '017 Patent: 1:5–35.[1]

Cam phasers control intake and exhaust valves by advancing and retarding camshaft timing relative to the crankshaft, based on the engine's revolutions per minute and operating conditions. *See id*. The phase of the camshaft can be "advanced," meaning the intake and exhaust valves open and close sooner than they would have without adjustment, or the camshaft phase can be "retarded," meaning the intake or exhaust valves open and close later than they would have without the adjustment. By adjusting the camshaft phase and controlling valve timing, the engine generates power more efficiently. So long as the engine is running, torque reversals are generated constantly. Whether the cam phaser shifts as a result of the torque reversals depends on whether the state of the cam phaser allows for an adjustment.

The three patents-in-suit are part of the same patent family, and cover methods and apparatuses relating to Melchior's cam phasing technology.[2] The patents-in-suit all relate to technology for transmitting the alternating torques that are generated by cam rotation in order to adjust the camshaft phase, and thus all include "Coupling for the Transmission of Alternating Torques" in their titles. Cam phasers that use alternating torques generated by a cam to adjust the phase of the camshaft were known in the prior art, and they used external pumps to transfer hydraulic fluid, or otherwise relied on an external power source to achieve a camshaft phase

[1] Unless otherwise indicated, the specification of the '017 Patent is identical to that of the '506 and '254 Patents.

[2] The '017 Patent was issued from a U.S. patent application filed in 1990. That application was involved in an interference proceeding between Melchior and inventors of U.S. Patent No. 5,002,023. Melchior filed a continuation application that became the '506 Patent. The '506 Patent was involved in another interference proceeding between Melchior and inventors of U.S. Patent No. 5,107,804. The '254 Patent is a continuation in part, with added subject matter. However, Melchior has not asserted any claims from the added subject matter of the '254 Patent.

change. The patents-in-suit differentiate Melchior's camshaft phasing technology as using not an external pump, but instead internal forces generated by alternating torques to power fluid transfer through a closed loop hydraulic circuitry. '017 Patent: 1:47–50. The closed-loop circuitry is said to allow for a more "rapid phase shift between the driving shaft and the driven shaft" than that allowed by prior art. *Id.* at 1:50–55.

The claimed invention uses a cylinder-piston arrangement with hydraulic chambers and hydraulic closed-loop circuitry to control fluid flow from the hydraulic chambers. *Id.* at 1:45–67. How the torque generated by the rotating camshaft is used to shift the camshaft phase is described in detail in Figures 3–5 of the specifications for the patents-in-suit. The preferred embodiment described by Melchior has two chambers connected by two unidirectional communication circuits, with each chamber having a substantially constant volume of hydraulic fluid. *Id.* at 1:56–67. The embodiment utilizes a "distribution means" arranged in such a manner as to either "bring into action either of these communication circuits while neutralizing the other, or to neutralize both of them." *Id.* at 1:60–67. "The action of the distributing means depends on whether the phase difference between the driving and driven parts of the coupling must be increased, or decreased, or maintained constant." *Id.* The actuation of the hydraulic chambers is controlled by the distributor, and depending on where the distributor is located, the phase can be advanced, retarded, or it can be held in place. In sum, in each of the three patents-in-suit, the Melchior method allows for the desired cam phase shift by transferring hydraulic fluid from one chamber to the other chamber through a unidirectional communication circuit and distribution means acting in response to torque reversals.

While several terms are in dispute, the parties' disagreements stem primarily from two related issues: (1) whether infringement of the patents-in-suit occurs only when the Melchior

technology is used to both advance and retard the phase of the camshaft ("two-way" operation) or when the Melchior technology is used to advance or retard the phase of the camshaft, and (2) whether the asserted claims are infringed when an external power source is used to alter the camshaft phase.

Melchior contends that each of the asserted claims contemplates a technology that allows a camshaft phase to shift in one direction—either advancing or retarding—by relying on internal forces generated by alternating torques, without the use of an external power means. While this technology can be repeated to achieve multiple shifts (*i.e.*, advancing or retarding), Melchior contends the claimed method is directed to a single shift change. For example, Melchior contends that the asserted claims are infringed when the Melchior method is used to advance the camshaft phase, while a different method is used to retard the camshaft phase. Although the preferred embodiments in the specifications depict the Melchior method being used to advance and retard the camshaft phase, Melchior contends this is a depiction of use of the Melchior method twice.

Hilite argues in contrast that each of the asserted claims requires bidirectional movement, meaning that the claims require actuation of phase shifts in both directions—advancing and retarding. Accordingly, Hilite maintains that the asserted claims exclude the use of an external power means.

The Court interprets the disputed terms as stated on Exhibit A.

SO ORDERED.

Dated: September 17, 2013.

BARBARA M. G. LYNN
UNITED STATES DISTRICT JUDGE
NORTHERN DISTRICT OF TEXAS

EXHIBIT A

Disputed Terms in Claims 22-25 of U.S. Patent No. 5,645,017 ("'017 patent")

Disputed Term	Court's Construction	Explanation
"actuating . . . in reaction to torque reversals" Claims 22 and 24 of the '017 Patent '017 Patent: 12:19–34, 46–65	"Actuating" means "to bring the hydraulic means into action" "In reaction to torque reversals" means "in reaction to alternating pressure pulses applied to the hydraulic means by the camshaft"	The Court concludes that claims 22–25 of the '017 patent describe a method to achieve a single phase shift by actuating the hydraulic means in reaction to the alternating torque pulses generated by the rotation of the cam. As used in the context of the claim language and the specification, the phrase "torque reversal" refers to the overall phenomenon where a forward pulse and a reverse pulse are constantly generated by the rotation of the cam. *See* '017 Patent 12:22–65. As used in the context of the patents-in-suit, the Court concludes that a reaction to the overall phenomenon of a "torque reversal" is an advance, retard, or hold of the cam phase. Reaction to a torque reversal does not require a reaction to *both* a forward and a reverse pulse. In an interference proceeding between Melchior and another inventor, Butterfield, Melchior filed a Motion for Judgment of Invalidity of Butterfield claim 1 in view of a prior art patent to Garcia (U.S. Patent No. 3,721,220). Butterfield's claim 1 recited the single step of "actuating . . . in reaction to torque reversals." In its final decision in the interference proceeding, the Board of Patent Appeals and Interferences (the "Board") interpreted the actuating step "in reaction to torque reversals" as requiring a phase shift change in only one direction. *See USPTO Interference Proceeding No. 1-102,923* at 9. The Board, as does this Court, concluded that reaction to a torque reversal does not require a reaction to both the driving and resistant pulses—*i.e.*,

		bidirectional movement of the phaser. The Court concludes that the actuating step of claims 22 and 24 in the '017 Patent defines a single operational mode of a phaser, not necessarily all modes of operation. In light of this conclusion, a negative limitation to the asserted claims that prohibits the use of an external power source is unwarranted. Indeed, the Melchior method may be employed without the use of any additional power source, but there is no basis in the claim language or specification to add a requirement that the patented technology must always be used without any external power source. *See* '017 Patent 1:45–67. Thus, the Court declines to read this negative limitation onto the asserted claim language.
"oppositely acting first and second hydraulic means for varying the position of the at least one camshaft" Claims 22 and 24 of the '017 Patent '017 Patent 12:19–34, 46–65	Function: "Oppositely acting first and second hydraulic means" means "a volume change in one hydraulic means results in an opposite volume change in the other hydraulic means" "Varying the position of the at least one camshaft" means "changing the phase angle of the camshaft in at least one direction" Structure: A pair of chambers 13, 14, or a pair of chambers 32, 33, or a pair of groups of chambers (13a, 13b) and (14a, 14b) formed inside the cylinder (10) by a piston (11) having vane 17 or (17a and 17b)) and radial	The parties agree, and the Court concludes, that this limitation is in means-plus-function form, so that it must be interpreted by referring to the structures disclosed in the specification. *See* 35 U.S.C. § 112, ¶ 6. The Court holds that "oppositely acting" is synonymous with double acting, *i.e.*, that a volume change in one hydraulic means is accompanied by a corresponding volume change in another hydraulic means. This interpretation of "oppositely acting" is supported by the specification and claim language. *See* '017 Patent 1:12–20; 1:45–67; 3:45–48, 6:29–31; 6:37–40. In the interference proceeding between Melchior and Butterfield, the Board similarly used the terms "oppositely acting" and "double acting" to refer to antagonistic hydraulic means where a reduction in volume in one chamber is accompanied by an increase in volume in the other. *See USPTO Interference*

	partition (12) and portions of distributor 22 forming a valve controlling the passageway of one circuit (18 or 19), and one check valve (20 or 21), that permits flow in one direction and prevents flow in the opposite direction	*Proceeding No. 1-102,923* at 8. Although not in any sense binding on this Court, that decision is instructive. The Court also concludes that "varying the position" covers a shift change in at least a single direction, in contrast to the term "oscillates," which defines a back and forth movement, or a plurality of variations. In accordance with the Court's interpretation of varying as meaning at least a phase shift in a single direction, two chambers connected by a single circuit for transferring hydraulic fluid in a single direction is the corresponding structure for the means for varying the position of the camshaft. Contrary to Melchior's proposal, the corresponding structure must include the circuitry because the hydraulic chambers alone cannot vary the camshaft phase. A phase shift occurs when there is a direct transfer of hydraulic fluid from one chamber to another; thus, a unidirectional circuitry must be included in the corresponding structure. While the embodiments disclosed in the specifications describe two unidirectional circuits, the Court views those embodiments as illustrating the process described in claims 22–25 twice, once in each direction. The Court construes this means-plus-function claim as disclosing two different operational modes of the claimed method. Both are not required by the claims, and the Court rejects Hilite's argument otherwise.
"transferring hydraulic fluid from one of the first and second hydraulic means to the	Means "permitting fluid to flow out of one hydraulic means and into the other oppositely acting hydraulic means"	The Court adopts Melchior's proposed construction. As already explained, the Court concludes that claims 22–25 of the '017 Patent describe a method to achieve

other of the first and second hydraulic means" Claims 22 and 24 of the '017 Patent '017 Patent 12:19–34, 46–65		a single phase shift. The language "from one . . . to the other" covers a single shift change. This interpretation is supported by the description of the preferred embodiments shown in Figs. 3–5 in which a transfer of fluid requires movement from one chamber to the other: "When the pressure in the chamber 13 exceeds the pressure in the chamber 14, liquid flows *from the chamber 13 to the chamber 14*…." '017 Patent 4:28–31 (emphasis added). The use of the word "and" between first and second in the claim ('017 Patent 12:23–25) does not support Hilite's contention that bidirectional transfer is required. The word "and" means the Melchior method may be used to advance or retard the cam phaser. The Court is not persuaded by Hilite's argument that a transfer in this context means "from each to the other." *Hilite's Opening Claim Construction Br.* at 14. This interpretation is also consistent with the interpretation of the actuating step, which controls a single phase shift. The language of claims 22–25 does not require a two-way transfer of hydraulic fluid, and the Court finds no basis to import the additional limitations proposed by Hilite.
"providing" Claims 22 and 24 of the '017 Patent '017 Patent 12:19–34, 46–65	No construction required.	The Court declines to construe this term because it has a plain and ordinary meaning and no construction is required. *See U.S. Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1568 (Fed. Cir. 1997) ("Claim construction is a matter of resolution of disputed meanings and technical scope, to clarify and, when necessary, to explain what the patentee covered by the claims, for use in the determination of infringement. It is not an obligatory exercise in

		redundancy.”).
“valve means for selectively permitting flow out of one or another of the first and second hydraulic means into an inlet line leading to the other of the first and second hydraulic means” Claims 23 and 25 of the ‘017 Patent ‘017 Patent 12:35–46, 12:66–13:19.	Function: “Selectively permitting flow out of one or another of the first and second hydraulic means into an inlet line leading to the other of the first and second hydraulic means” Structure: Distributor 22 comprising a slide 23 [or 46], body 24 and groove 25, and spring 43 [or f] and the necessary connection comprising communication circuit (18 or 19) and a check valve (20 or 21).	The word “means” raises a presumption that § 112, ¶ 6 applies and the use of the term “valve” does not rebut the presumption. A “valve” does not define sufficient structure for one skilled in the art to identify the corresponding structure in the specification, especially as the term “valve” never appears in the specification. As used in the claim language, valve is a generic structure that does not encompass all of the structures that can perform the claimed function: selectively permitting flow. Not all valves can perform that function. To perform the claimed function, a distributor, a unidirectional circuit, and a check valve is necessary. Claim 25 refers to a “valve for selectively permitting flow out of one or another of the first and second hydraulic means.” ‘017 Patent 13:4–6. This language is also a means-plus-function claim, although the word “means” is not used, because “valve” as used in claim 25 is a generic structure that does not encompass all of the structures to perform the claimed function. It is interpreted as was Claim 23.
“check valve means in the inlet line for permitting hydraulic fluid to flow therethrough only into the other of the first and second hydraulic means”	Function: “Permitting hydraulic fluid to flow therethrough only into the other of the first and second hydraulic means” Structure: Check valves (20 or 21) and the necessary communication circuit (18 or 19).	The word “means” raises a presumption that § 112, ¶ 6 applies, and addition of the words “check valve” does not rebut the presumption because the claimed function of the check valve is to permit hydraulic fluid to flow into a chamber in one direction, while preventing flow in the opposite direction. A “check

Claims 23 and 25 of the '017 Patent '017 Patent 12:35–46, 12:66–13:19.		valve" does not define sufficient structure for one skilled in the art to identify the corresponding structure in the specification The Court rejects Hilite's argument that the claim language requires two communication circuits and two check valves, for the reasons discussed above, as this Court has already concluded that claims 22–25 describe a single phase shift in one direction.
"hydraulic cylinder" Claims 23 and 25 of the '017 Patent '017 Patent 12:35–46, 12:66–13:19.	Means "a working chamber limited by a piston member moveable in a recess"	The Court adopts Melchior's proposed construction. In its brief, Hilite never discusses the term "hydraulic cylinder" with reference to '017 claims 23 and 25, but only with reference to '254 claim 5. The Court nonetheless addresses the construction of "hydraulic cylinder" for the '017 Patent separately from the '254 Patent. In the '017 Patent, claim 23 recites that the "first and second hydraulic means are first and second oppositely acting hydraulic cylinders." '017 Patent 12:35–65. The claim language clearly describes the hydraulic means or chambers as hydraulic cylinders. Hilite contends that a hydraulic cylinder should be interpreted as a circular, hollow, elongated structure, like a soda can, because the term "cylinder" requires geometrical symmetry. The Court does not find Hilite's position persuasive. The embodiments described in the Melchior patents indicate that the working chambers between which fluid is transferred to effect the phase shift are not necessarily in the shape of a hollow, circular structure. In the specification, the term "cylinder" is used in the sense of a rounded structure to define the shape of the housing, not the working chambers, which are referred to as hydraulic

		cylinders. *See* '017 Patent:4:7-22. Hilite's proposed interpretation would exclude any embodiment with multiple hydraulic cylinders within a circular housing, such as Figs. 3 and 9, since it would require two soda-can-shaped "cylinders," which is found in no embodiment of the '017 specification. *See On-Line Techs., Inc. v. Bodenseewerk Perkin-Elmer GmbH*, 386 F.3d 1133, 1138 (Fed. Cir. 2004) ("[A] claim interpretation that excludes a preferred embodiment from the scope of the claim is rarely, if ever, correct.").

Disputed Terms in Claims 1–2, 7–10, 12–15, and 18 of U.S. Patent No. 5,649,506 ("'506 patent")

"actuating . . . in reaction to torque reversals in the camshaft" Claims 1 and 2 of the '506 Patent '506 Patent 10:14–61	"Actuating" means "to bring the hydraulic means into action" "In reaction to torque reversals" means "in reaction to alternating pressure pulses applied to the hydraulic means by the camshaft"	As these terms are used consistently with their use in the asserted claims of the '017 Patent, the Court interprets them in the same manner as interpreted above. *Kara Technology Inc. v. Stamps.com Inc.*, 582 F.3d 1341, 1347 (Fed. Cir. 2009).
"reactive to torque reversals" Claims 7, 12, and 18 of the '506 Patent	Means "responsive to alternating pressure pulses applied to the hydraulic means by the camshaft"	As already explained, the Court finds that a reaction to a torque reversal does not require the cam phaser to advance and retard. A reaction to a torque reversal simply requires the cam phaser to advance, retard, or hold.
"flow control means for varying the position of the	Function: varying the position of the housing relative to the camshaft by	Unlike claims 22–24 of the '017 Patent, this means-plus-function limitation asserts a method for

housing relative to the camshaft by controlling fluid flow to and from the housing recess to thereby permit the vane lobe oscillation in the housing recess chamber" Claim 1–2, 7, 12, 18 of the '506 Patent '506 Patent 10:14–61; 11:28–53; 12:23–50; 13:36–14:10.	controlling fluid flow to and from the housing recess to thereby permit the vane lobe oscillation in the housing recess chamber Structure: distributor 22 comprising slide 23 [or, 46], body 24 and groove 25, and spring 43 [or, f] and all necessary connections comprising communication circuits (18 and 19) and including check valves (20 and 21).	bidirectional phase shifting. Although the '506 Patent is a continuation of the '017 Patent, the Court is to read the claim language of the '506 Patent independently of the '017 Patent claims. *Kara*, 582 F.3d at 1347 (significant differences in claim language in the same family of patents may warrant different interpretations). Plaintiff agrees with Defendant that the term "oscillation" means "rotation back and forth." Pl.'s Br. at 26. As the function of the "flow control means" is recited in the claims, the Court need not further construe the function. As for the required structure, the hydraulic circuitry controls fluid flow "to and from" the housing recess chambers, which permits "the vanes to oscillate," meaning to move back and forth. The claims require that fluid flow "from" the recess chambers and "to" the recess chambers, and it is this "to and from" flow that permits vane lobe oscillation. The word "permit" in this context does not mean "allow," as Melchior suggests, but instead means "cause." The claim language is clear about what "causes" the vane lobe oscillation: it is the fluid flow to and from the housing recess chambers. Here, in contrast to the '017 Patent, an opposite circuit is needed to enable flow in the opposite direction and to move the vane in the opposite direction, in order to "thereby permit vane lobe oscillation." *See* '506 Patent 10:14–61; 11:28–53; 12:23–50; 13:36–14:10. Melchior's proposed construction of "to and from the housing chamber" as requiring one-way fluid transfer ignores the limitation "to thereby permit vane lobe oscillation." Moreover, the "to permit oscillation" step is not equivalent to "providing oppositely acting

		hydraulic cylinder means." Oscillation requires two-way action, while antagonistic chambers do not. The structure required to perform the functions includes the hydraulic circuitry with distributor 22 (and components 23–25) to control which circuit is open, and circuits 18 and 19 to allow flow of fluid to and from the housing chamber, with check valves 20 and 21 to prevent flow in the opposite direction.
"rotary movement transmitting means for transmitting rotational movement from the crankshaft to the housing" Claim 1–2, 7,12, 18 of the '506 Patent '506 Patent 10:14–61; 11:28–53; 12:23–50; 13:36–14:10	Function: "Transmitting rotational movement from the crankshaft to the housing" Structure: Gear pinion 26	The parties agree, and the Court concludes, that this limitation is in means-plus-function form and is governed by §112, ¶6. During the *Markman* hearing, the parties agreed that gear pinion 26 is the corresponding structure and that the asserted function is assisting in causing the movement of the other shaft to the housing, *i.e.*, the function is focused on connecting the crankshaft to the camshaft.
"Providing" Claim 2 of the '506 Patent '506 Patent 2:35–61	No construction required.	The Court declines to construe this term because it has a plain and ordinary meaning and no construction is required. *See U.S. Surgical Corp.*, 103 F.3d at 1568.
"control means (18–25) for permitting the housing to move in a first direction relative to the camshaft in reaction to a torque pulse in	Function: "permitting the housing to move in a first direction relative to the camshaft in reaction to a torque pulse in the camshaft in a first direction and for preventing the housing from moving in a second direction	Dependent claims 8 and 13 (dependent on claim 7 and 12, respectively) recite the additional function, which is provided for in independent claim 18, of no reverse movement of the phaser during a particular torque pulse. This function requires a structure that includes

the camshaft in a first direction and for preventing the housing from moving in a second direction relative to the camshaft in reaction to a torque pulse in the camshaft in a second direction" Claims 8 and 13 of the '506 Patent '506 Patent 11:54–61; 12:51–58.	relative to the camshaft in reaction to a torque pulse in the camshaft in a second direction" Structure: distributor 22 comprising slide 23, or 46, body 24 and groove 25, and spring 4, or f, and all necessary connections comprising communication circuits 18 and 19 and including check valves 20 and 21	both communication circuits and both check valves, as well as the distributor 22 and its constituent elements 23–25.
"means (18–25) for transferring a hydraulic fluid into one of said first portion and said second portion, said one of said first portion and said second portion of said at least one recess being capable of sustaining hydraulic pressure (p.6, lines 11-21; p.7, lines 21-25; p.12, line 21; p.13, lines 18-25; p.22, lines 4–6)" Claims 9, 14, 19, and 25 of the '506 Patent	Function: "Transferring a hydraulic fluid into one of said first portion and said second portion, said one of said first portion and said second portion of said at least one recess being capable of sustaining hydraulic pressure" Structure: Distributor 22 comprising slide 23 or 46, body 24 and groove 25, and spring 43 or f, and all necessary connections comprising communication circuits 18 and 19, including check valves 20 and 21, and further including: cylinder 10, piston 11, radial partition or rib 12, antagonistic chambers (13 and 14), transverse walls such as 15, shaft 16, radial vane 17, and scaling elements.	Once again, the functions are recited in the claims. As to structure, claim 9 recites that "control means (18–25) comprises means (18–25) for transferring," identifying 18–25 as the required structure to accomplish the function. Melchior's proposed structure—portions of distributor 22 forming a valve control passageway circuit of circuit 18 or 19—is an insufficient structure to transfer hydraulic fluid, and needs each structure described in 18–25, and the correlating necessary components, 11, 12–17, 43, 46.
"means (19, 25) for simultaneously transferring	Function: "Simultaneously transferring hydraulic fluid out of the other of said first	The functions are recited in the claims. The structures that perform the functions appear in the claims, as

hydraulic fluid out of the other of said first portion and said second portion (p.8, lines 1–27, p.9, lines 1–27, p.10, lines 2–22)" Claims 10 and 15 of the '506 Patent	portion and said second portion" Structure: Distributor 22 comprising slide 23 or 46, body 24 and groove 25, and spring 43, or f, and all necessary connections comprising communication circuits 18 and 19, including check valves 20 and 21, and further including: cylinder 10, piston 11, radial partition 12, chambers 13 and 14 (or 13a, 13b, 14a, and 14b), shaft 16, vane 17 (or opposed vanes 17a and 17b), passages 47 and 48.	detailed in the cited page numbers that reference a recess with a first and second portion capable of sustaining pressure. The claimed functions and reference numbers sufficiently clarify the corresponding structure.

Disputed Terms in Claim 5 of U.S. Patent No. 5,507,254 ("'254 patent")

"actuating . . . in reaction to torque reversals in the at least one camshaft" Claim 5 of the '254 Patent '254 Patent: 19:51–65	"Actuating" means "to bring the hydraulic means into action" "In reaction to torque reversals" means "in reaction to alternating pressure pulses applied to the hydraulic means by the camshaft"	As this term is used consistently with its use in the asserted claims of the '017 Patent, the Court interprets it in the same manner. *Kara Technology*, 582 F.3d at 1347.
"hydraulic cylinder" Claim 5 of the '254 Patent '254 Patent: 19:51–65	Means "a working chamber limited by a piston member movable in a recess"	Claim 5 recites "first and second hydraulic cylinders operable by hydraulic fluid therein operably interconnected for varying the position of the at least one camshaft" and "respectively subdividing each of said first and second cylinders into first and second oppositely acting cylinder subchambers." *See* '254 Patent: 19:51–65. Claim 5 of the '254 Patent focuses on embodiments

		with groups of oppositely acting hydraulic cylinders, with each hydraulic cylinder having antagonistic subchambers. '254 claim 5 defines a plurality of "hydraulic cylinders," each hydraulic cylinder having antagonistic "subchambers," that is, an advance subchamber and a retard subchamber. The term "subchamber" is used in '254 claim 5 instead of "chamber." The additional feature defined in '254 claim 5 is that the other side of each piston member defines another working chamber within the hydraulic cylinder. Melchior does not dispute that the "cylinder 10" has a cylindrical shape in the embodiments of Figs. 3 and 9. As noted by Hilite, Melchior described the housing in the specification as a "cylindrical case." '017 Patent: 3:36–37. Hilite argues that as used in claim 5, hydraulic cylinder should be interpreted as a hollow, circular, elongated structure. Again, the Court finds that the housing is not what is referred to as the "hydraulic cylinder" in '254 claim 5. '254 claim 5 requires that the "hydraulic cylinders" must be associated with "piston members" and that they must be "operable… for varying…" The focus is on "operability," not geometrical shape. The hydraulic cylinders are functional, and do not necessarily require a circular elongated structure. Claim 5 uses the definite form "the cylinder" as a shorthand for the previously introduced "hydraulic cylinder." Thus, the hydraulic cylinders are the hydraulic means or chambers that vary the position of the camshaft.

"piston member" Claim 5 of the '254 Patent '254 Patent: 19:51–65	Means a "part designed to move in a recess to form a hydraulic cylinder"	'254 claim 5 recites "providing first and second piston members respectively movable in said first and second cylinder and respectively subdividing each of said first and second cylinders into first and second oppositely acting cylinder subchambers…." '254 Patent: 19:55–65. The words "piston member" appear for the first time in the '254 Patent. Hilite proposes the following construction: a structure that rotates back and forth around or slidably reciprocates along the axis of a cylinder. Hilite's main argument for its proposed construction of "piston member" is that the term "piston member" appears in only one location in the '254 specification, in reference to Fig. 25, so the construction must be limited to just this embodiment. Melchior contends otherwise, arguing the term is to be construed with reference to at least Figs. 9 and 25. The specification states that "Fig 25 is the simplified diagrammatic view of the type of variable phase shift coupling shown in Fig. 23 but provided with the two pairs of antagonistic chambers of the coupling embodiment of Fig. 9." '254 Patent: 3:26-31. The description of Fig. 25 confirms that the embodiment includes the two pairs of antagonistic working chambers of Fig. 9. '254 Patent: 17:38-44. Thus, Fig. 25 has two pairs of antagonistic chambers and must then include the equivalent of two piston vanes (17a and 17b) in the rotational configuration of Fig. 9. The Court concludes that the piston member, as defined by '254 claim 5, is the active part of a piston which moves back and forth in a recess to define the working chamber of a hydraulic cylinder (called

		"subchambers" in '254 claim 5 since there is a chamber on each side of the piston member).
"subchamber" Claim 5 of the '254 Patent '254 Patent: 19:51–65	Means "one of the pair of chambers formed in a recess on opposite sides of a piston member that divides the recess"	Claim 5 recites that a piston member divides the first and second cylinder or chamber into oppositely acting cylinder subchambers. Thus, the Court interprets subchambers as chambers formed in a recess by the pair of pistons that divide the recess.
"transferring hydraulic fluid from each one of the first and second hydraulic cylinder subchambers to each of the other of the first and second hydraulic cylinder subchambers" Claim 5 of the '254 Patent '254 Patent: 19:51–65	Means "moving hydraulic fluid out of one group of permanently interconnected subchambers, and into the other group of permanently interconnected subchambers"	The Court construes this claim as requiring a single mode of operation, moving hydraulic fluid from one subchamber to another oppositely acting subchamber, in response to the torques generated by the rotation of the cam.