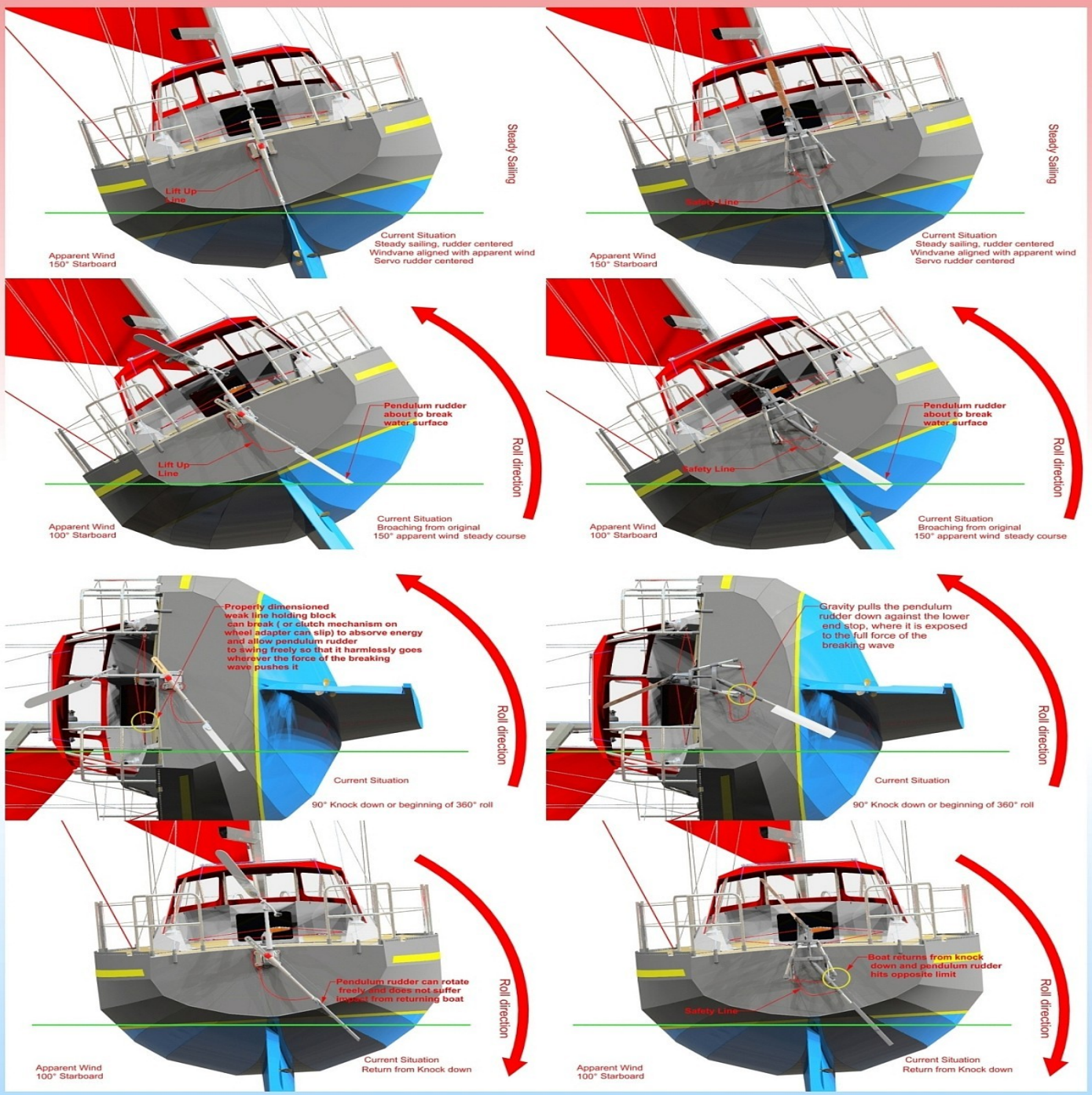
Peter Foerthmann



Windvane Report

A journey through time

PETER FOERTHMANN

WINDVANE REPORT

A journey through time

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FOREWORD
Sail in balance, live in balance

Self-Steering Under Sail is both the title of a book full of information about how to make yourself obsolete in your own cockpit and the subject that has dominated my working existence, bringing me pleasure and friendship and showing how a person can live life in balance on the back of a few simple rules.

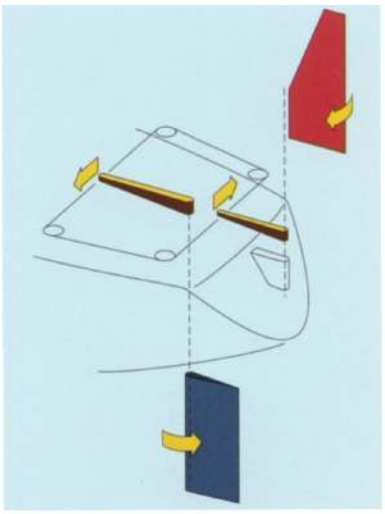
The very thought of sailing makes me sleepy: my boat comfortably balanced with its Windpilot in control, the skipper dreaming contented dreams in his bunk – over and over again with never the slightest hitch (but sometimes with a Paolo Conte soundtrack). How wonderfully sublime to lie back and feel a well-balanced boat (with windvane self-steering system) sailing itself. All too soon though such thoughts are overtaken by weariness, the mind surreptitiously lulled into sleep because of that mysterious irresistible link between the sounds of the sea and the weight of the seafarer's eyelids – a trap one can only escape with an ingenious and effective invention, an uncomplaining slave for the helm that leaves the skipper to sleep in peace while keeping the boat in sync with the wind and waves and ticking off the miles at pace.

The windvane sector is pretty small even at the global level, so it is very easy to attract attention: expressing an opinion (repeatedly and vehemently) is really all it takes. The endless loop of my life. A journey through time that already spans close to half a century – with more to come.

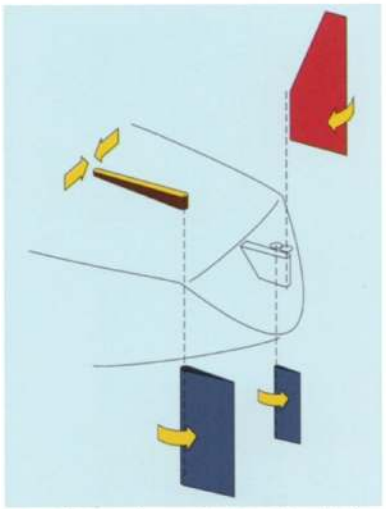
50 YEARS OF MECHANICAL SELF-STEERING AT SEA

A windvane self-steering system steers a course dictated by the apparent wind angle, so provided the crew trim the sails properly, it will keep the boat moving for as long as the wind blows. The wind direction is always the critical factor, of course: with a favourable wind it is possible just to sail the direct compass course to the next waypoint, but the direct compass course will not be any help at all with the wind on the nose!

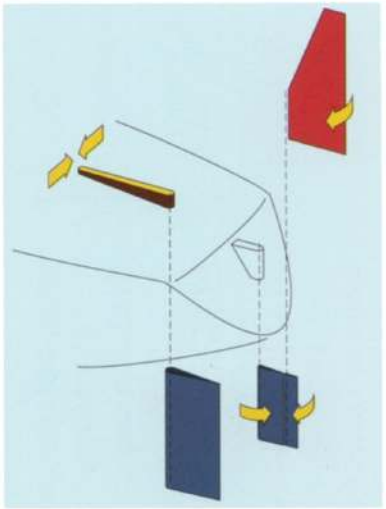
The book Self-Steering Under Sail describes twelve different types of windvane self-steering system, three of which dominate the market today:



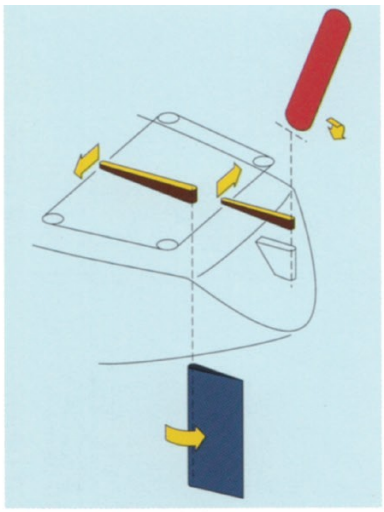
***1** Nur-V-Windfahne*



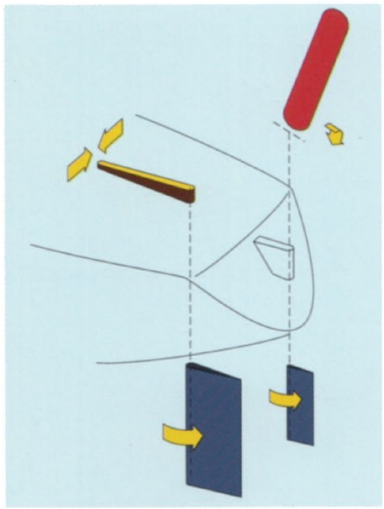
***3** Hilfsruder mit V-Windfahne*



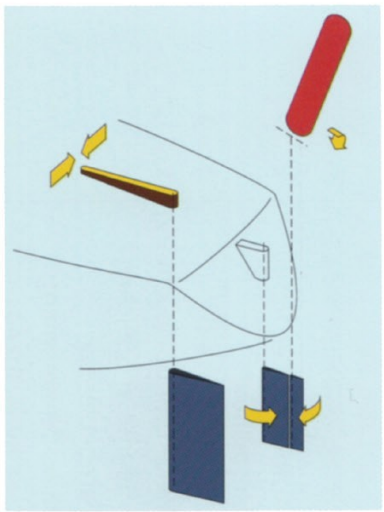
***5** Hilfsruder mit Trim-Tab-V-Fahne*



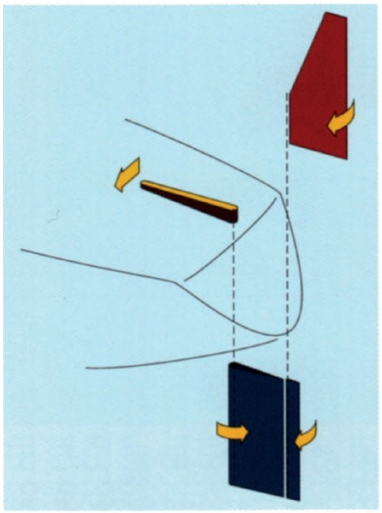
2 *Nur-H-Windfahne*



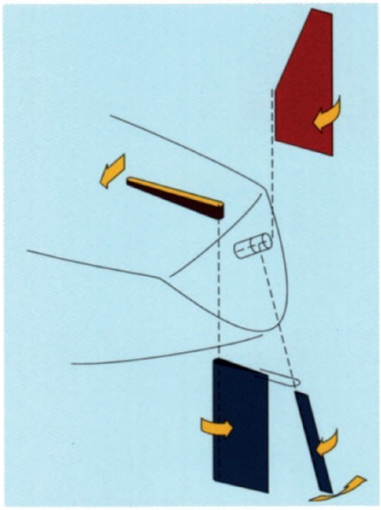
4 *Hilfsruder mit H-Windfahne*



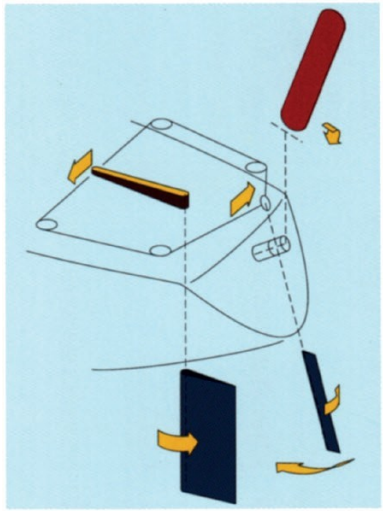
6 *Hilfsruder mit Trim-Tab-H-Fahne*



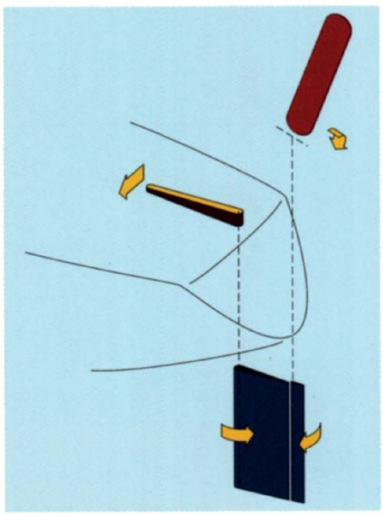
***7** Hauptruder mit Trim-Tab-V-Fahne*



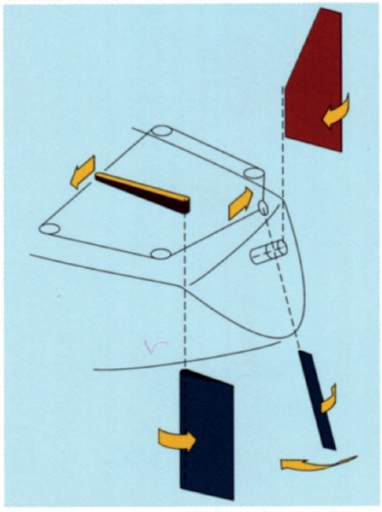
***9** Pendelruder mit -V-Fahne*



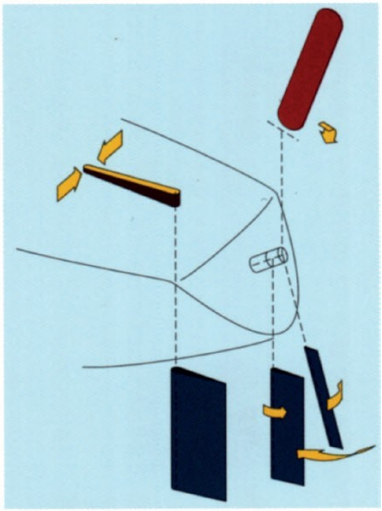
***11** Servo Pendelruder mit H-Fahne*



***8** Hauptruder mit Trim-Tab-H-Fahne*



***10** Servo Pendelruder mit V-Fahne*



***12** Doppelruder mit H-Fahne*

The effective length of the lever that supplies the power to the system essentially determines the amount of force that can be applied to the helm and hence the size of boat the system will be capable of managing.

Summary of the 12 types of system

No	Type	Brand	Country of origin	Vane type	Servo power	Power leverage	Bevel gear	Vessel size	Still in production
1	vane only	Windpilot Nordsee	Ger	V	no	0	no	< 6 m/20 ft	no
2	vane only	QME	GB	H	no	0	no	< 7 m/23 ft	no
3	auxiliary rudder	Windpilot Atlantik 2/3/4	Ger	V	no	0	no	< 10 m/33 ft	no
		Windpilot Caribic 2/3/4	Ger	V	no	0	no	< 10 m/33 ft	no
4	auxiliary rudder	Hydrovane	GB	H	no	0	no	< 15 m/49 ft	yes
		Levanter	GB	H	no	0	no	< 12 m/39 ft	no
5	trim tab/ auxiliary rudder	RVG	USA	V	yes	< 25 cm/10 in	no	< 12 m/39 ft	no
6	trim tab/	Auto Helm	USA	H	yes	< 25 cm/10 in	no	< 12 m/39 ft	yes
	auxiliary rudder	BWS Taurus	NL	H	yes	< 20 cm/8 in	no	< 15 m/49 ft	yes
		Mustafa	I	H	yes	< 25 cm/8 in	no	< 18 m/60 ft	yes
7	trim tab/	Hasler trim tab	GB	V	yes	< 50 cm/20 in	no	< 12 m/39 ft	no
	main rudder	Windpilot Pacific trim tab	Ger	V	yes	< 50 cm/20 in	no	< 12 m./39 ft	no
8	trim tab/	Atlas	F	H	yes	< 50 cm/20 in	no	< 10 m/33 ft	no
	main rudder	Auto-Steer	GB	H	yes	< 50 cm/20 in	no	< 12 m/39 ft	yes
		Viking Roer	S	H	yes	< 50 cm/20 in	no	< 12 m/39 ft	no
9	trim tab/	Saye's Rig	USA	V	yes	< 100 cm/39 in	no	< 18 m/60 ft	yes
	pendulum rudder	Quartermaster	GB	V	yes	< 100 cm/39 in	no	< 10m/33 ft	no
10	servo-	Hasler	GB	V	yes	< 150 cm/59 in	no	< 12 m/39 ft	no
	pendulum	Schwingpilot	Ger	V	yes	< 50 cm/20 in	no	< 12 m/39 ft	no
	rudder	Windpilot Pacific Mk I	Ger	V	yes	< 140 cm/55 in	yes	< 14 m/46 ft	no
11	servo-	Aries Standard	GB	H	yes	< 190 cm/75 in	yes	< 18 m/60 ft	yes
	pendulum	Aries Lift-Up	GB	H	yes	< 190 cm/75 in	yes	< 18 m/60 ft	no
	rudder	Aries Circumnavigator	GB	H	yes	< 190 cm/75 in	yes	< 18 m/60 ft	no
		Atoms	F	H	yes	< 140 cm/55 in	no	< 12 m/39 ft	no
		Atlas	F	H	yes	< 140 cm/55 in	no	< 12 m/39 ft	no
		Auto-Steer	GB	H	yes	< 160 cm/ 63 in	yes	< 15 m/49 ft	yes
		Bogassol	E	H	yes	< 139 cm/51 in	no	< 12 m/39 ft	yes
		Bouvaan	NL	H	yes	120–150 cm/47–579 in	no	< 12 m/39 ft	yes
		Cap Horn	Can	H	yes	120–150 cm/47–59 in	no	< 14 m/46 ft	yes
		Fleming	NZ	H	yes	130–170 cm/51–67 in	yes	< 18 m/60 ft	yes
		Monitor	USA	H	yes	< 160 cm/ 63 in	yes	< 18 m/60 ft	yes
		Navik	F	H	yes	< 140 cm/55 in	no	< 10 m/33 ft	yes
		Super Navik	F	H	yes	< 170 cm/ 67 in	no	< 13 m/43 ft	no
		Sailomat 601	S	H	yes	140–210 cm/55–83 in	no	< 18 m/60 ft	yes
		Sirius	NL	H	yes	< 150 cm/59 in	yes	< 13 m/43 ft	no
		Windtrakker	GB	H	yes	< 170 cm/67 in	yes	< 15 m/49 ft	yes
		Windpilot Pacific Light	Ger	H	yes	< 140 cm/55 in	yes	< 9 m/30 ft	yes
		Windpilot Pacific	Ger	H	yes	160–220 cm/63–86 in	yes	< 18 m/60 ft	yes
12	double rudder	Stayer/Sailomat 3040	S	H	yes	< 130 cm/51 in	no	< 12 m/39 ft	no
		Windpilot Pacific Plus	Ger	H	yes	160–220 cm/63–86 in	yes	< 18 m/60 ft	yes

Definitions

Power leverage = PL (see illustrations) This provides an indication of the steering force obtainable from a system. The longer the lever is, the greater the steering force and, therefore, the better the steering performance will be.

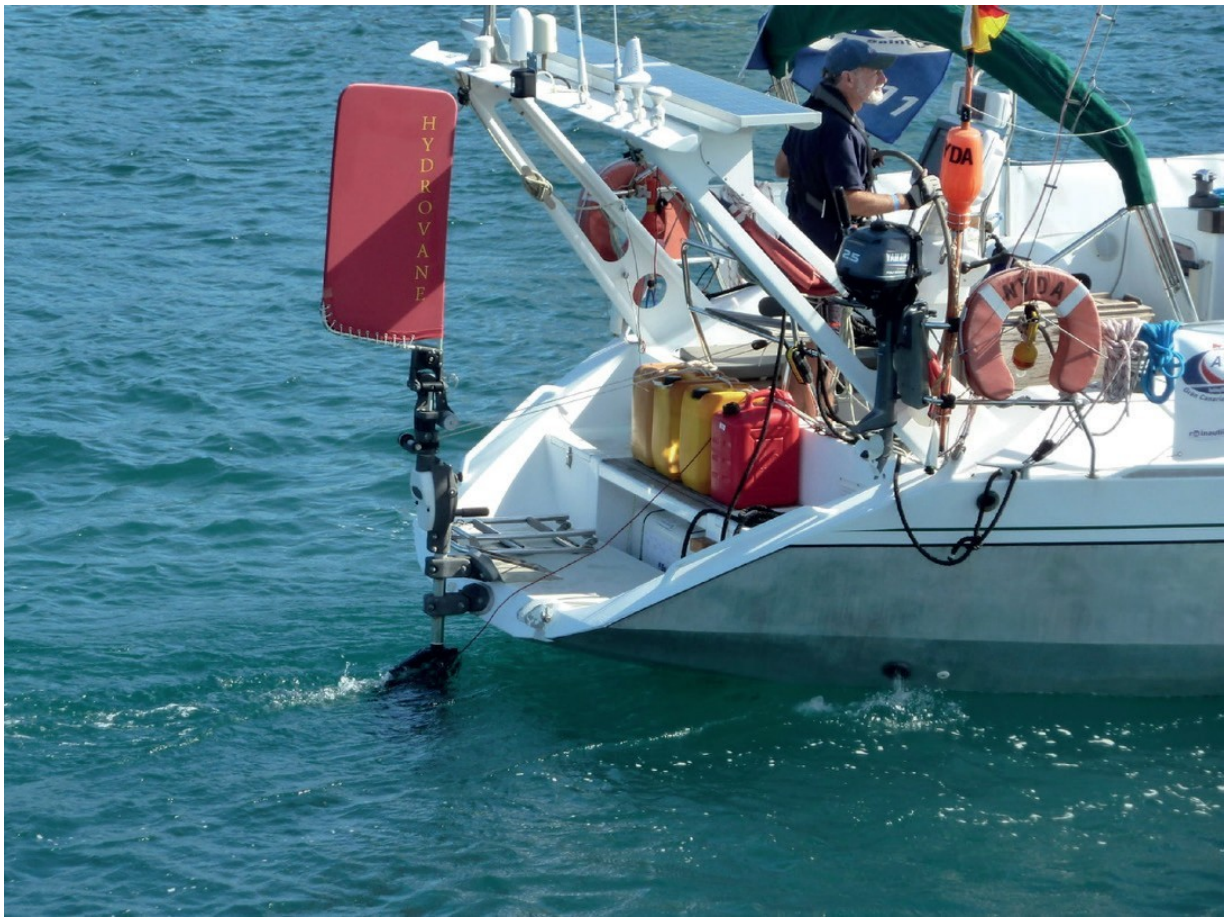
Servo power is generated by harnessing the force of the water flowing past the hull (boat speed).

Vessel size (see manufacturer's specifications) The actual capabilities of a system with respect to maximum vessel size are subject to certain limitations (point 1).

Remember: What is the use of a system that can steer a boat in only 60–70 per cent of likely conditions and gives up off the wind whenever the wind is very light or very strong?

V vane yaw damping This is provided by limited rotational deflection of vane, maximum = angle of the deviation from course.

H vane yaw damping This is provided by a bevel gear linkage with 2:1 step-down ratio; automatic yaw damping, so oversteering is impossible. Systems without perfect damping require more manual trim corrections from the crew.



Hilfsrudersystem Hydrovane on Ovni 435

PREVAILING SYSTEM TYPES TODAY

Auxiliary rudder systems

An auxiliary rudder is an additional rudder capable of steering the boat independently with no connection to the main rudder. An auxiliary rudder needs to be about a third of the size of the boat's main rudder to provide good results. Any smaller and it will struggle to steer effectively. The main

rudder is fixed in position so that the boat is roughly balanced and the auxiliary rudder then handles the minor corrections required to keep the boat on course. The steering force these systems can apply is limited because they lack any sort of servo unit and they are therefore only able to provide effective self-steering for boats up to a certain size.
Auxiliary rudder systems ideally need to be mounted on centre. Offset mounting compromises steering performance because of the effect of heeling: rudder area that is in the air rather than the water serves no purpose whatsoever! The auxiliary rudder also needs to be sufficiently far back from the main rudder that it is not operating in the latter's turbulent wash. An auxiliary rudder can be used as an emergency rudder, although having so much less surface area than the main rudder, it cannot be expected to provide more than limited steering if the entire main rudder is lost.

Servo-pendulum systems

A servo-pendulum system uses the power of the water flowing past the hull to generate servo forces that are transmitted to the main rudder via a system of lines. The force available depends on the length of the pendulum arm – the lever on which the water acts – from the bottom end of the rudder blade to the axle around which the pendulum arm pivots (servo force leverage), which is usually about 150-200 cm. Servo-pendulum systems can cope with boats of almost any size: bigger rudders just need a longer pendulum arm to generate the required force. They can only really be used with mechanical steering systems (wheel or tiller) though and do not perform so well with wheel steering systems that have more than 2.5 to 3 full rotations of the wheel from end stop to end stop. Connecting the self-steering up to the emergency tiller rather than the wheel can be an option, but only if the emergency tiller is robust. It is also important that the emergency tiller be within easy reach of the crew on watch, as it must be possible to disengage the windvane and resume steering by hand immediately in an emergency.

Servo-pendulum system on SV Thuriya at the start of the Golden Globe Race

The most convenient servo-pendulum systems for everyday use are those that allow the pendulum rudder to be swung up out of the water easily (lift-up). The system must be quick and straightforward to set up too if it is to be a practical option for short stints at the helm (when the chart table or nature calls, for example) as well as long. The handling disadvantages of traditional servo-pendulum systems are undoubtedly the main reason – along with their rustic looks – that they never became more popular. Although there have probably always been some owners who kept a windvane self-steering system just to cultivate a certain image despite an apparent immunity to the call of the cruel sea, for a long time it was virtually a sure thing that a boat with a mechanical windvane self-steering system on the transom had covered some serious bluewater miles (or was about to).