

Hasler Vane Gears

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HOW TO USE A TYPE SP GEAR

V4SP March 1970

1. These instructions supplement the advice contained in Publication No V1SP, V2SP and V3SP. It is assumed that these have been read and that the gear has been correctly ordered, mounted and laid out on the boat.

2. The instructions which follow have been divided into four parts :

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|----------|-----------------------------|
| Part I | Preparing the gear for use. |
| Part II | Using the gear. |
| Part III | Adjustment and maintenance. |
| Part IV | Fault-finding check list. |

PREPARING THE GEAR FOR USE

PART 1

THE SERVO BLADE

3. We recommend that the blade be triced up and then unshipped when the boat is on moorings.

4. To ship the blade for use proceed as follows :

- (a) Ensure that the tricing line is secured to the boat or bumkin frame *
- (b) Partially insert (or partially withdraw) the retaining pin in the head of the blade until its end is just clear of the slot in the blade.
- (c) Hold the blade with the retaining pin uppermost and the bottom end of the blade projecting up and aft of the bumkin with the head of the blade aft of the latch gear.
- (d) Thread the head of the blade down and forward so that it passes under the bumkin frame and under the bight of the tripping line, which should be held up aft, and pass it into the jaws of the servo shaft until the fixed pivot pin in the jaws is hard against the bottom of the slot in the blade.
- (e) Push home the retaining pin. Check that it prevents the servo blade from being pulled out of the jaws.
- (f) Fit the bight of the tripping line straight through the guide plate on the after edge of the blade.
- (g) Check that the tricing line is correctly rove. It should lead from the eye on the blade up through the centre hole in the Tufnol block below and aft of the latch gear, thence through the eye on the starboard side of the bumkin frame and to its cleat (if fitted). Its end should be secured with a hitch or stopper knot, so that it is just slack when the servo blade is vertical.
- (h) Cleat or hitch the tricing line to hold the blade up out of the water.

5. The blade is now held in its jaws but is free to swing down and forward to the operating position when the tricing line is released. This can be done either at once or later when the rest of the gear has been prepared and you are ready to put the gear into operation. If you leave the blade standing out aft do not forget it when manoeuvring in crowded situations or near mooring piles and jetties etc. It would obviously be safer to unship it and bring it inboard, and not to ship it until you are clear.

* with a hitch or stopper knot.

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6. To secure the blade in its operating (vertical) position :

(a) Release the tripping Line.

(b) Haul upwards on the tripping line lanyard to pull the blade fully forward and expose the bight of the tripping line above the top of the servo shaft.

(c) Pull up the tripping lever, and hook the bight of the tripping line over the hook, holding it there while you force the lever down until it is held by its nylon clip, ensuring that both parts of the line lead over the sheave at the top of the servo shaft.

7. The blade is now prepared and should be automatically correctly adjusted.

(For correct adjustment of tension and sweep see Publication No V3SP paragraphs 9 and 10, and paragraphs 48 - 59 below).

8. If the blade should strike anything solid it will trip and swing aft to clear itself. If this happens unlatch and proceed immediately as described in paragraph 6 above.

THE VANE

9. The vane can be left mounted on the bumkin in safety provided that the latch button is engaged and the vane cannot foul any mooring pile, jetty or neighbouring boat. If leaving the boat for any extended period, i.e. several days, it may be safer to unship it and stow it below out of harm's way. But a vane that is stowed where it can be stood on is much more vulnerable to damage than one left mounted and free to swing to the wind.

10. Never tie the mounted vane or restrict its free movement through 360 degrees, or it may be damaged in strong winds.

11. To ship the vane, insert the shaft into the latch shaft, and turn it until its bottom slot drops over the rivet (concealed). It does not matter which of the two possible positions the slot drops into. Insert the pin so that it passes through both shafts, and check that it is not possible for the vane to lift off, with its pin in place.

12. Ensure that the latch gear is unlatched, and the latch button is holding the latch disengaged. The vane can now revolve freely without turning the latch arm.

LATCH GEAR

13. The latch gear need never be unshipped from the bumkin frame, in normal usage.

14. The latch line and worm line should normally be left rigged unless the complete bumkin frame is unshipped, eg when racing or laying up.

15. To rig the worm line and latch line, see the instructions contained in Publication No V3SP, paragraphs 52 and 53.

16. When checking the gear before use ensure that the worm line is correctly rove with 1 turn round the worm sheave, and that the lines are so rove that pulling the port line will move the forward edge of the sheave DOWNWARDS.

17. Check that the latch line is correctly rove and that pulling and releasing it will raise and lower the worm carriage freely, acting against the tension of the worm line. When the ring is on its stud the worm carriage should be raised with the worm well clear of the worm wheel. If it is not then shorten the latch line.

18. The latch button, which holds the worm carriage up, is for use for when the gear is not in immediate use, eg when on moorings, or when sailing for a period without using the vane gear. When it is engaged the latch line may be released from its stud.



STEERING ROPES

19. The steering ropes should be checked to ensure that they are correctly rove and the sheaves are free running. Look for signs of chafe and remedy the cause if possible.

20. The correct method of laying out the steering ropes and reeving them is explained in Publication No V3SP paragraphs 26 - 31 (tillers), and in Publication No V3SPW (Wheels).

21. The steering ropes can remain fully rove and connected up, even when the servo blade is triced up or unshipped. Alternatively you may prefer to cast them off the tiller when steering by hand for long periods. With wheel steering and a wheel rope drum it is better to leave the ropes set up to maintain the correct adjustment, but the wheel rope drum can be loosened to "unclutch" it.

22. It is perfectly possible to steer the boat by hand with the gear prepared for use and the blade in its operating position, but the steering will feel slightly stiff as you will be swinging the blade in the water. For prolonged hand steering we recommend that the blade be triced up out of the water, and unshipped before approaching a crowded harbour.

SUMMARISED CHECK LIST FOR PREPARING THE GEAR FOR USE

23. (a) Ship the blade and check tricing and tripping lines.
- (b) Ship the vane and check that it revolves freely.
- (c) Disengage the latch button and check the worm and latch line operation.
- (d) Check the steering ropes and connect up.
- (e) Pull the blade down to its operating position.

USING THE GEAR

PART II

24. If the boat is difficult to steer by hand, it will be equally difficult for the vane gear. Sail area and sheeting should always be adjusted so as to give reasonably easy steering characteristics.

BASIC HANDLING

25. Until you are used to sailing under vane steering, we recommend that you steer by hand until you are clear of danger. When you have gained confidence in the gear however, you should be able to use it in more restricted waters. Hasler Vane Gears have been successfully used by alert watchkeepers when sailing in Dutch canals and similar narrow waterways.

26. It is now assumed that you have carried out the procedure for preparing the gear for use as described in Part I, and that you have cast off your moorings and are under sail.

27. To change from hand steering to vane steering simply lift the latch line ring off its stud and let go. The worm will drop into mesh with the worm wheel and this connects the vane (which should have kept itself pointing into the apparent wind) to the servo blade by way of the servo tiller. (If it does not mesh properly, a tug on one or both lines should make it do so).

28. Allow the gear a moment or two to settle down and take the weight of the helm. Observe the ship's head, which should steady onto a mean course, although perhaps not the exact course you desire. To alter course as desired, observe this simple rule.

To alter course to port pull the port worm line forward.
To alter course to starboard pull the starboard worm line forward.

29. You will soon learn by experience how much line to pull for different degrees of alteration of course and on different points of sailing. When sailing on the wind very small adjustments (perhaps one inch on the worm line) will make a noticeable difference in course. When off the wind, and particularly when running dead before the wind, larger adjustments may be necessary.

30. For as long as you wish to steer by vane gear you should not need to unlatch again, but should be able to make both major and minor alterations of course by pulling the appropriate worm line. When altering course by small amounts watch the worm sheave to make sure that the worm line is not slipping on it. (Paragraph 77(d) below)

31. To tack ship, if she is handy on the helm, simply take a long pull on the appropriate worm line, (experience will soon teach you how much is needed) then leave the gear to tack the ship while you attend to the sheets, runners etc. When she has settled on the new tack make the usual fine adjustments of course. If your boat is not sufficiently handy to tack this way, simply unlatch the gear by pulling the latch line and placing it on its stud, then tack by manual steering. Then latch in and adjust in the usual way.

32. In an emergency, grab the latch line and drop the ring on its stud and steer by hand. NEVER try to overcome the vane gear by brute force when the latch is engaged.

FURTHER POINTS OF HANDLING

33. If the boat needs strong weather (or lee) helm to hold her on the desired course, try to reduce this by sail trimming, readjusting the latch gear to suit.

34. If she still carries heavy weather helm, it may be desirable to take some of the weight off the vane gear by rigging one or two loops of heavy shock cord so as to pull the yacht's tiller up to windward, (or the top of her wheel to leeward), readjusting the latch gear to suit. But note that if she runs into a calm patch the shock cord will tend to make her pay off and gybe.

YAWING.

35. Excessive yawing can originate from a number of causes. It is most commonly experienced when running or broad-reaching with a press of sail in a steep following sea. Under these circumstances the vane gear (which cannot anticipate) will always be inferior to a good helmsman (who can), and the remedy is to shorten sail rather early, so as to reduce your speed somewhat, while keeping your sail area as far forward as possible.

36. Yawing can also be caused by the yacht's main rudder having no self-centering action, either because it is a "balanced" spade rudder or because (particularly in light going) there is excessive friction in the rudder hangings or in the vane steering rope system. In the former case it can often be cured by rigging loops of shock cord to both sides of the tiller or wheel, and experimenting with different tensions until an adequate, but not excessive, self-centering action is produced. The tension may need to be varied in different wind conditions. In the latter case it is essential to eliminate the source of friction.



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37. It is important to distinguish between yawing caused by one of the reasons mentioned above, and sensitive steering by the gear which makes the boat appear to wander around its course but is in fact caused by the varying wind direction. Remember that the vane is steering by the relative wind and not the compass. The wind never blows steadily from exactly the same direction, even in mid-ocean. What is called a steady wind may well wander five degrees or more on either side of its mean direction, particularly when near land, and if the vane gear is steering sensitively the boat will wander by the same amount. This is best illustrated when sailing with spinnaker set or headsails boomed out; the gear is often better at keeping these sails full than an average helmsman, simply because it follows the wind more sensitively.

38. In practice the small wind variations will cancel out, and you will soon learn to judge what your mean course is and adjust it if necessary so that you hit your objective 'on the nose'.

39. If in doubt about whether the gear is following the wind sensitively we recommend fitting some sort of 'telltale' such as a streamer of light cloth or a length of light twine, or a dinghy racing burgee, to the counter-balance arm of the vane. You can then immediately see whether the vane is reacting to the wind, by comparing the angle of the telltale to the angle of the vane. The vane will normally have an incidence of up to 5 degs. to the wind, but yachts needing a lot of helm may need more vane incidence. If the incidence exceeds 20 degs. the gear is overpowered and you should examine and rectify the cause. (See part 1V of these instructions).

40. Even in calm water, and much more so in a seaway, the vane gear and tiller (or wheel) should "hunt" continuously. That is to say the vane and the servo blade should swing slightly from side to side causing the tiller (or wheel) to be constantly making small movements as though the gear were "feeling" the helm the whole time.

FLOATING DEBRIS.

41. If at any time the gear should suddenly appear to stop working properly, first check that the blade has not tripped or picked up any floating weed or debris. If for any reason the blade has been pulled away from its screw stop it will have a very strong self-centering action and the vane may not be able to turn it. Clear the blade and reset it.

GALE CONDITIONS.

42. It is normal practice to carry the gear and use it in gale conditions, including running under bare poles, unless the seas are so dangerous as to require a marked degree of anticipation from the helmsman. The limiting conditions for vane steering depend partly on the seaworthiness and steering characteristics of the individual yacht.

43. If hove-to, or lying a-hull in a severe gale, when there is a lot of leeway and very little forward motion, the yacht can be thrown heavily sideways by the sea and this may put rather an ugly side load on the servo assembly. We would then recommend tricing up the blade and unshipping it. The vane should be safe up to Force 10, provided it is unlatched (preferably on the button) and can lie to the wind.

UNDER POWER.

44. The gear can often be used when under power, provided there is sufficient genuine wind for the vane to sense a change in direction of the yacht's

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course. If the apparent wind is mainly caused by the yacht's own forward movement, the vane will be very slow to sense a change in direction as the wind will always tend to be ahead whatever the course.

45. Excessive turbulence and/or propeller wash may disrupt the action of the servo blade. You can only experiment to find out if the gear will steer your boat under power, and if so under what conditions.

46. The servo blade should not be in the water if you intend to go hard astern and gather more than (say) 1 knot of sternway, otherwise it will be forced heavily against its stops with maximum incidence. This will strain the gear and may break the blade. The steering ropes should be disconnected if the blade is in the water, otherwise this will also apply full helm one way of the other and you may not be able to take it off. Giving the engine a kick astern to slow down or stop will not have the effect described above.

LOOK-OUT.

47. Using a vane gear does not relieve you of the need for keeping a proper look-out, but at sea it becomes possible to use an inexperienced watchkeeper, provided there is always an experienced hand on call. An experienced watch-keeper will find it possible to keep a good look-out as well as attending to other duties, such as navigating and sail trimming.

ADJUSTMENTS AND MAINTENANCE.

PART 111.

SWEEP ADJUSTMENT.

48. Correct adjustment of the "sweep" of the servo-blade is quite essential to good vane steering, and incorrect sweep adjustment is the commonest source of poor steering. Very small alterations of sweep have a pronounced effect. It is possible for the sweep to get out of alignment and it should be frequently checked.

49. The best way of judging the sweep is with the help of a timber batten about 5ft. x $1\frac{3}{4}$ " x $\frac{3}{8}$ " (1.5m x 45mm x 10mm) with one edge planed absolutely straight. (To test the edge, use it to draw a pencil line on a flat surface, then roll the batten so that its other side is upwards, and check the same edge against the pencil line). Having set up the tripping line correctly (para. 58 below), hold this batten with the top end of its straight edge pressed against the forward edges of the two steel cross-strips carrying the vertical bearing pins, and compare its bottom with the toe of the blade. At "normal sweep" the toe of the blade is $\frac{1}{4}$ " (6mm) abaft the straight edge.

50. To take up any slackness in the blade pivot, or bearing, the tripping line should be pulled taut while checking sweep. When afloat, it may help to tilt the servo assembly to one side before applying the straight edge.

51. Adjustment of sweep is achieved by screwing the adjustable stop (at bottom of the servo shaft) in or out, and correspondingly readjusting the tension of the tripping line, (para. 59 below). Turning the screw of the adjustable stop clockwise will increase the sweep, turning it anti-clockwise will allow the blade to return towards normal sweep. If you wish to experiment with sweep adjustment, please do so methodically, one turn of the screw at a time and keeping a note of how many turns you have put on or taken off.

52. Nearly all boats will steer best on "Normal sweep", and all boats should revert first to normal sweep when diagnosing a steering fault.

53. "Normal sweep" gives the most powerful vane steering that any particular servo blade can produce. The toe of the servo blade should never be allowed



to lie any further forward, as this will produce hydrodynamic instability, and although the gear may then be quicker to put on helm, it will be reluctant to take it off again.

54. It follows that the one permissible adjustment is to give the blade more than normal sweep, i.e. adjust it so that the toe of the blade lies further aft. The effect of this is to make it harder for the vane to turn the servo blade, and hence make the gear less powerful, but more self-centering. This effect may be desirable in boats whose rudders are unusually easy to turn when sailing, i.e. have unusually low "tiller moments". (But see also para. 36 above on the provision of artificial self-centering action for rudders which have none of their own).

55. When sailing under manual steering, or anchored in a strong current, you can form your own impression of the effect of varying the sweep of the servo blade, by first unlatching with the latch button and disconnecting the steering ropes, then holding the forward end of the latch arm (immediately above the vertical tube which engages with the servo tiller jaws) and "steering" the servo blade with your fingers. At normal sweep, it should require only modest finger pressure to put full incidence either way on the servo blade, even when sailing fast, but as soon as the fingers are released the blade should centre itself so as to face fore-and-aft, although the "pendulum" will not necessarily return to vertical (para. 56 below). Increasing the sweep will be found to increase the finger pressure needed, and to increase the tendency of the blade to centre itself fore-and-aft.

56. When sailing or motoring with the vane unlatched, the steering ropes disconnected, and the servo blade down in its working position, there is no particular significance in what the "pendulum" does, providing that it is not held strongly over to one side by the fact that the servo blade has not centred itself fore-and-aft. When everything is correctly adjusted, it is usual for the pendulum to swing gently from side to side as the boat is steered, or to take up a position over to one side of the other. Under power the propeller wash may push the servo blade one way or the other, but this is also harmless; unless it causes the blade to vibrate heavily.

57. As the speed builds up the flow of water past the boat tends increasingly to force the bottom of the blade aft, but the tripping line, when set up on the tripping lever, should hold the blade firmly forward against its stop at all speeds.

TRIPPING LINE TENSION

58. Whenever checking sweep, first ensure that the tripping line is holding the blade firmly forward against its adjustable stop. The method of checking tension described in publication V3SP para. 10 cannot be used when the gear is shipped on the yacht's stern, but you will soon learn to judge, from the feel of the tripping lever, when the line has ample tension to prevent the blade from pivoting away from its adjustable stop when sailing at speed. Check this from time to time when sailing, by ensuring (e.g. with a feeler of thin metal) that there is not a gap between the adjustable stop and the metal disc on the blade.

59. The hook on the tripping lever may be moved along its slot, by turning the milled head to maintain or adjust tension when altering the sweep of the blade. It may also need periodic adjustment for minor rope stretch, but major adjustments for rope stretch is achieved by re-tying the knot joining the two ends of the tripping line. This knot should normally lie inside the tube of the servo shaft, but can be exposed by pulling one part of the rope when it is slack. (See also publication V3SP, para 54).

VERTICAL AND HORIZONTAL BEARINGS.

60. These bearings on the servo assembly comprise stainless steel pins working in blind holes in Tufnol blocks. The pins are fitted so that each pair of bearings has detectable movement endways, preferably $1/32'' - 1/16''$ (0.8 - 1.6mm) This "slop" should be confirmed by lifting the servo shaft vertically up and down, and pushing the servo frame horizontally fore-and-aft. Before checking the horizontal bearings, ensure that the two bearing blocks are securely bolted down to the bumkin frame.

62. In addition to the "end slop" described above, the pins may with advantage have a slight "radial slop" i.e. be capable of slight sideways movement in their Tufnol blocks, and this will increase with wear. It should not present any problem in ordinary usage.

WORM LINE ADJUSTMENT.

63. First check that the worm line is rove correctly, and in particular that there are neither more nor less than 1 turn on the worm sheave (publication V3SP paras. 48-52). Stretch in the worm line may be taken up by shortening the shock cord on the worm block but be careful not to put more than an ounce or two of tension on the worm lines, since this would hinder the free movement of the latch arm, and also create heavy resistance to the action of the latch line.

LATCH LINE ADJUSTMENT.

64. Correct tension is described in publication V3SP para. 53. If the line stretches it should be adjusted at the knot on the ring.

STEERING ROPE ADJUSTMENT.

65. The steering ropes should be adjusted for length and attached to the tiller or wheel in such a way that the servo frame is upright (i.e. the drop-nose pin is central between the two after steering blocks) when the main rudder is central, and any moving purchase blocks are in their mean position. This adjustment will be correct for all conditions of sailing.

66. You may have to readjust the ropes after a period of use, to take up stretch. The rope system should be tight, but not bar taut, unnecessary tension greatly increases the friction in the system. When steering, the idle rope should be very slightly slack, and this should be checked in light weather sailing.

MAINTENANCE.

67. Very little maintenance is needed, but the following action is worth taking periodically:-

- (a) Lubricate your main rudder hangings, and moving parts of your wheel steering system (if any).
- (b) Check over any bolts or screws, to ensure that they are not working loose.
- (c) Oil the teeth of worm and worm wheel with a little light oil.
- (d) In dry weather, oil all the Tufnol bearings with a little light oil. (These are efficiently water-lubricated in wet weather).
- (e) Check that the sheaves of all blocks are free and not collecting dirt or sand; oil their bushes.
- (f) Check that ropes and lines are not chafing. All except the worm line may be end-for-ended to prolong their life.
- (g) Carry out normal re-painting or re-varnishing of the vane and servo blade. Some owners prefer to use anti-fouling on the immersed part of the blade, if making long passages.
- (h) Wiping with an oily rag will improve the appearance of Tufnol parts, but lack of it will not effect the properties of the material.

