FIGURE 1 To illustrate the theoretical distribution of tell tales on the sails, the editor has used a marking pen and ruled them in on an old photo of his boat.

Editor's Note: Ray Fletcher has a six year teaching background with the California State High School Adult Evening Education Program and also is a sailing instructor with the U. S. Navy Sailboating Association. Ray's classes deal with all phases of seamanship and navigation. His articles have been printed in "YACHTING" magazine.. You can look forward to more articles by Mr. Fletcher in future issues of "REGATTA INTERNATIONAL." We would like to thank Ray very much for his contribution to our magazine.

(Tell Tales Tell All...)

by Ray A. Fletcher

Telltales on the shrouds, telltales on the main mast, telltales on the spinnaker boom and telltales on the backstay; they all have a message, but the most explicit message comes from the telltales on the sails themselves, Figure 1. In fact they supply some of the scientific information that would normally be provided by a wind tunnel. Upon completion of this article the reader may qualify as an honorary (?) layman nautical/aeronautical scientist (what's that), figuratively speaking.

Many articles have expounded on the airfoil characteristics of the sail and pressure differential that causes the sail to function . . . smooth air flow, minimization of turbulence over the sail's surface, laminar flow, etc., some of which can be substantiated by wind tunnel data.

All of this information is interesting and informative, but can it be applied in terms of adjusting the boom vang, trimming the jib sheets and slacking the main sheets? Indeed, some of it can.

Telltales, air flow, and sail adjustment can be inter-related by the use of telltales properly distributed on both sides of the sails and the intelligent interpretation of the action of the tales.

Selection of the telltale material is subjective. Nylon stocking, wool string, cotton string, etc., are quite adequate but for longevity and a responsive material, nylon yarn (that has been treated with beeswax to strengthn it) is the most satisfactory. The author installed black nylon yarn on a set of sails and at the end of the year the tales were in good condition and functioned very well.

The tales are attached to the sail by the use of a sail needle and a "figure 8 knot." The sail needle is threaded with approximately six feet of beeswax-treated black nylon yarn. Tie a "figure 8 knot" about 8 inches from the bitter end of the nylon yarn, Figure 2. Insert the sail needle into the sail and pull the yarn until the knot is against the surface of the sail, cut the yarn to a length of 9 inches on the opposite side of the sail and tie a "figure 8 knot" close to the sail's surface. This will secure the yarn to the sail.

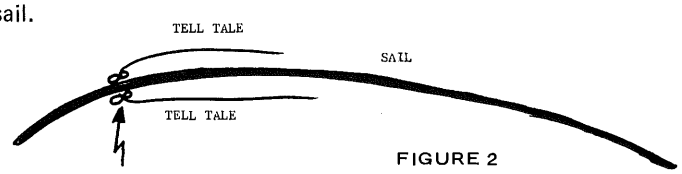

FIGURE 2

Figure "eight" knot

For a better understanding of the subject to be discussed, the following definitions and/or illustrations in Figures 3, 4, 5 will be helpful to the reader.

a. induced drag – is caused by the motion of the air from the high pressure side to the low pressure side of the sail.
b. telltale – is any device that will indicate the direction from which the wind is blowing.
c. stalled – a sail is stalled when it is not drawing its maximum because the sheet is trimmed too much. Refer to Figures 3 and 5.

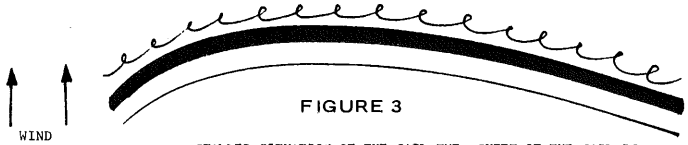

FIGURE 3

STALLED SITUATION OF THE SAIL-THE SHEET OF THE SAIL IS TRIMMED TOO MUCH CAUSING AIR TURBULENCE (DISTURBANCE) ON THE LEEWARD OF THE SAIL.

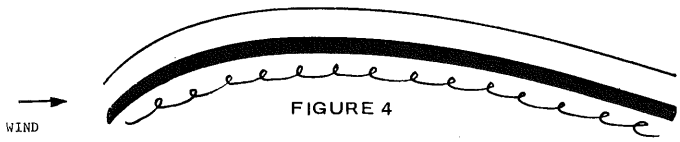

FIGURE 4

LUFFING SITUATION OF THE SAIL-THE SHEET OF THE SAIL IS TOO SLACK CAUSING AIR TURBULENCE (DISTURBANCE) ON THE WINDWARD SIDE OF THE SAIL.

d. luffing – a sail is luffing when it is not drawing its maximum because the sheet is slacked too much. Refer to Figures 4 and 6.
e. turbulence – is a disturbed air flow as opposed to smooth air flow.
f. apparent wind – is the resultant of the true wind and the wind due to the motion of the boat. It is the wind indicated by the telltale.
g. trim a sheet – is to pull in on a sheet.
h. slack a sheet – is to let out on the sheet.

The distribution pattern of the telltales on the sails is shown in Figure 1. Note the tales on the jib and the main sail are on the same longitudinal line so that the same air flow affects the same

row of tales on each sail. Some of the tales are sewed close to the luff of the main sail to detect and illustrate turbulence in that area; other tales are approximately one foot back from the luff and out of the expected turbulent area. Additional tales are located near the top of the leech and foot of the sail to indicate induced drag or the equalizing of the differential pressure. Other tales are distributed over the sails to indicate total air flow.

To properly interpret the significance of the position or motion of the telltales, the following must be considered:

a. telltales that assume the horizontal position indicate smooth air flow.
b. telltales that hang vertically represent the absence of airflow or vertical airflow.
c. random motion of the tales indicate air turbulence or eddys.
d. observing tales on the lee side of the sail may be accomplished by viewing the sun shadows on the tales cast on the sail.

Initially the sails are adjusted separately beginning with the jib sail. Bring the boat about so that the wind is coming over the port bow or starboard bow whichever direction causes the sun to shine on the lee side of the sail. This permits the shadow of the lee telltales to be observed. Trim or slack the jib sheets until the tales on both sides of the jib sail are horizontal and not fluttering randomly. Sometimes the foot of the jib does not draw because of maladjustment of the jib fair leads and the tales are vertical. Frequently this can be corrected by adjusting the jib sheet fair leads.

Whether to trim or to slack the jib sheets can be determined by observing the action of the tales as described in the following two paragraphs and referring to Figures 5 and 6.

Figure 5 displays the motion of the tales when the jib sail is over trimmed; the windward tales are horizontal and the motion of the leeward tales is random, indicating the sail is stalled. To correct this condition, slack the sheet until the leeward tales are horizontal. If the sheets are slacked too much, the windward tales will move randomly.

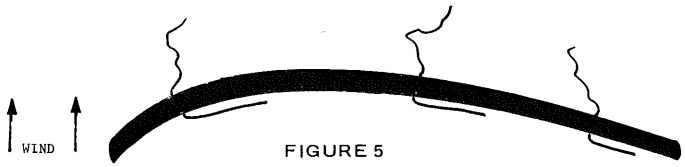

FIGURE 5

Figure 6 demonstrates the motion of the tales when the jib sail sheet is too slack. The leeward tales are horizontal and the windward tales flutter randomly, indicating a luffing situation. To correct the condition, trim the sail sheet until the windward tales are horizontal. If the sheet is trimmed too much it becomes a "sail stalled" situation and the leeward tales will move randomly.

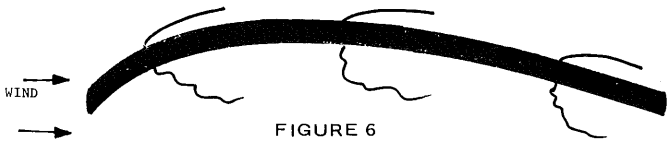

FIGURE 6

Ideally, the air flow over the sail is optimum when all the tales on each side of the sail are horizontal. This is difficult to achieve because of the sail imperfections, air turbulence because of rigging, eddy currents, etc., Figure 7.

At the time that the jib is correctly adjusted, note the position of the main mast telltale in relation to the jib. This relationship can be utilized for future trimming and slacking adjustments of the jib.

Adjusting the main sail is somewhat similar to adjusting the jib sail but is more involved. Whereas the air flow in the vicinity of the jib luff is free of turbulence, the air flow near the luff of the main sail is expected to be somewhat turbulent because of the mast interference of the air flow. This can be verified by the tales close to the edge of the main sail luff and their random motion regardless of the position of the main sail in relation to the apparent wind.

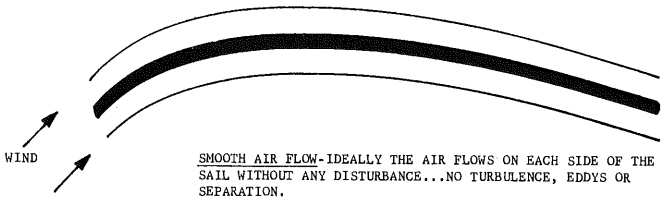

FIGURE 7

The guide lines pertaining to adjusting the main sail are very much the same as the ones that pertain to adjusting the jib sail insofar as the stalling and luffing conditions are concerned, also the reaction of the telltales is the same. Once the proper adjustment is obtained, then the relation of the main sail to the masthead telltale (apparent wind) should be observed for future reference when adjusting the main sail to the apparent wind.

The main sail has an additional characteristic which is twist in the sail. Twist is desirable because the velocity of the true wind at the top of the sail is greater than the velocity of the true wind at the bottom of the sail. This difference in wind velocity changes the direction of the apparent wind at different altitudes on the sail. Refer to Figure 8, the twist of the main sail is exaggerated in the figure, only to indicate the difference between twist and draft in the sail which is sometimes confused one with the other.

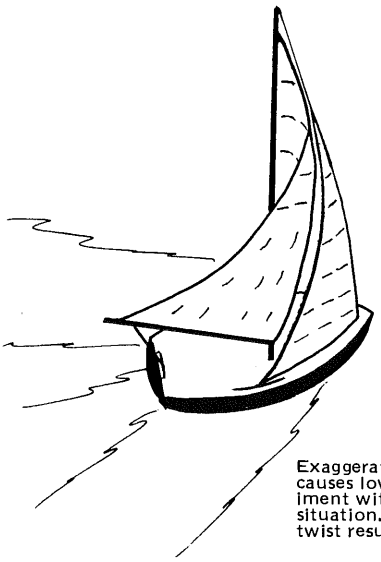

FIGURE 8

Exaggerated view - Too much twist in mainsail causes lower portion to become stalled. Experiment with boom vang tension to remedy this situation. Opposite condition is not enough twist resulting in upper portion of sail stalling.

The correct amount of twist can be determined by the telltales. Too much sail twist is apparent when the top of the sail is trimmed correctly but the bottom of the sail is in the stalled position. The telltales on the leeward and windward side of the upper portion of the mainsail will be horizontal; whereas the telltales on the lower portion of the sail will indicate a stalled position, i.e., the windward tales will be horizontal and the leeward tales will flutter randomly.

This condition can be corrected by increasing the tension on the boom vang until all the telltales on the sail are horizontal or practically so.

Upon completion of the experiment, most of the telltales may be removed, leaving a few remaining in advantageous positions to be used as a guide for future sail adjustment.