# ASA 106 Notes

**Distress Signals (14)**

- November Charlie signal flags
- Square flag over ball
- Orange flag with black square and circle
- Dye marker – any color
- Red meteor flares
- Red parachute flare
- Hand held flare or smoke
- Fire in bucket
- Gunshots at one min intervals
- SOS
- VHF or SSB mayday
- EPIRB
- Continuous foghorn
- Person waving arms

**USCG required equipment (5)**

- Appropriate PFD for each person + 1 type IV
- Fire extinguishers ( 2 type B-1 for 26 - 40ft boat)
- 3 day, 3 night flares
- Horn, whistle or bell
- Running lights
- Inboard gas engine requires flame arrestor

**ASA recommended equipment (14)**

- Flashlight waterproof + extra batteries
- Anchors (2)
- Bailer
- VHF radio
- Compass
- Charts and nav equipment
- Soft wood plugs
- First aid kit
- Life buoys (2, one with self igniting light)
- Buoyant heaving line
- Tools and spares
- Life raft
- Dinghy
- 6 flares incl 2 rocket parachute type

- Safety harness for each person

**Barometer rules**

- Falling barometer, easterly wind - foul weather coming
- Rising barometer, westerly wind – fair weather coming
- Rapidity and intensity of coming storm predicted by rate and amount of fall. 0.05 in/hr is high
- Falling glass and rising temp forecast rain
- Glass and temp rising together forecast fine weather
- Slowly rising barometer = settled weather
- Slow, steady fall forecasts unsettled or wet weather

**Fog**

- Radiation (ground) fog – stable, cold moist air under warmer layer of air
- Advection fog – caused by wind carrying warm, moist air over colder surface. Ex. Coastal fog formed by onshore wind carrying warm oceanic air over colder coastal water. Pacific prevailing winds are onshore in summer, producing this.
- Precipitation fog – evaporation of raindrops
- Steam fog (sea smoke) – cold air passing over much warmer water

**Buys-Ballot's Law**

- Back to the wind, left hand points to the low.

| Name | Description | Altitude (000 ft) | Weather |
|---|---|---|---|
| **Cirrus** | Least substantial - wispy | 18 - 45 | Warm front coming |
| **Cirrostratus** | Wispy sheets or ceiling | 18 - 40 | Warm front or storm coming if halo on sun or moon |
| **Altocumulus** | Grayish white rolls or mackerel | 6 - 23 | Rain if wind steady between NE and S |
| **Stratocumulus** | Thick solid layer with lumpy base. Large dark puffy balls | 0 - 7 | Bad weather |
| **Cumulonimbus** | Thunderhead. Dark, tightly packed balls | 6 + | Anvil threatens. Otherwise brief rain. |
| **Cumulus** | Puffy white cotton balls | 6 | Fair weather. Over land by day mean sea breeze. |
| | | | |

TRIMMING THE SAILS

MAINSAIL:

1. Trim the *mainsheet* hard enough to make the top batten parallel to the boom. Once the boat has accelerated and you want to point higher, trim harder and cock the top batten slightly to weather. If the

mainsheet is too tight (evidenced by top batten hooking way to weather) you will stall the main and slow down.

2. Set the *traveler* car up to the inner edge of the windward seat so that the boom is on or just below center line. As the breeze increases, gradually drop the traveler to de-power the main.

3. Use the *outhaul* for balance. Adjusting the outhaul changes the depth of the lower 1/3 of the main which affects helm, speed and pointing.

KNOTS: OUTHAUL TENSION

0 - 5: eased 1 1/2"

6 - 10: eased 1"

11 - 14: eased 1/2"

15 +: maximum

4. The *cunningham* is used to position draft in the main. Your goal should be to keep the maximum draft point 50% back in the sail. We use no cunningham up to 10 knots, enough to remove most of the wrinkles 11 - 15 knots and progressively tighter in higher winds to remove all wrinkles.

5. Applying the *vang*. Upwind the vang is loose in most conditions, off the wind, however, we apply the vang just enough to make the top batten parallel to the boom. Be careful! Rhodes 19 booms are not that strong, so in a breeze, watch how much the boom is bending.

JIB:

1. *Luff* tension is one of the most critical parts of the boat. In 0 - 10 we sail with medium wrinkles in the luff, 11 + set luff progressively smoother. If you feel you are not getting enough power in chop, try easing luff tension.

2. *Jib leads*. In every up-wind breeze condition, the jib lead should be positioned so that the jib luff breaks evenly when you luff up slowly into the wind. Moving the lead forward will make the jib break quicker down low while moving the lead aft makes the luff break quicker up top.

HEADSTAY SAG - LIGHT AIR:

To increase pointing and upwind speed in light air you must carry a loose headstay. With mainsheet tension and backstay tension you can adjust the amount of headstay sag. With the backstay loose the headstay should be able to make a 12" circle.

BACKSTAY:

1. Pulling on the *backstay* has two effects. First, as the mast bends, the upper half of the main flattens and the leech opens up - which relieve helm and heeling. Second, it makes the forestay tighter which flattens the entry of the jib and eases its leech, thus increasing pointed ability and reducing heeling. Whenever adjusting the backstay, you should adjust the mainsheet.

Mainsails must perform over a wide variety of sailing conditions. This required versatility is achieved by adjustment and trimming.

The mainsail can be adjusted to vary the amount and location of draft, and trimmed to control the shape of the leech and its angle to the wind. While bewildering verbiage is sometimes used to describe this process, we are doing only three things to the sail:

1. Adjusting the tension on the three edges.

2. Adjusting the shape of the leading edge if mast bend is possible.

3. Trimming the boom in and out.

Here's a brief explanation of terms dealing with mainsails:

- DRAFT: The amount of curvature in the sail. Sometimes called depth, draft is measured along a straight line running between the leech and the luff.
- DRAFT LOCATION: The point where the draft is the greatest, measured along a straight line running between the leech and the luff.
- LEECH SHAPE: The straightness or curve of the leech.

The mechanics of attaining proper mainsail characteristics vary according to class rules, rating rules, and personal preference. The basics of control are:


- LUFF TENSION: Controlled by the halyard, Cunningham, and boom downhaul if the boat is equipped with one.
- FOOT TENSION: Controlled by the outhaul and flattening reef.
- LEECH TENSION: Controlled by the mainsheet and traveler upwind, and by the boom vang off the wind. The leech line is used primarily to remove flutter from the very edge of the sail.
- MAST BEND: Controlled by various combinations of the backstay, baby stay and running backstays. Blocks of wood or hard rubber can also be used to chock the mast where it goes through the deck to control bend.
- TRIM: Controlled by the mainsheet and the traveler. Although closely interrelated, each control has a distinct effect on the mainsail's characteristics. It is instructive and fun to work the controls and observe the effects

LUFF TENSION
Increased luff tension moves the draft forward.
Decreased luff tension moves the draft aft.

TO ADD LUFF TENSION:

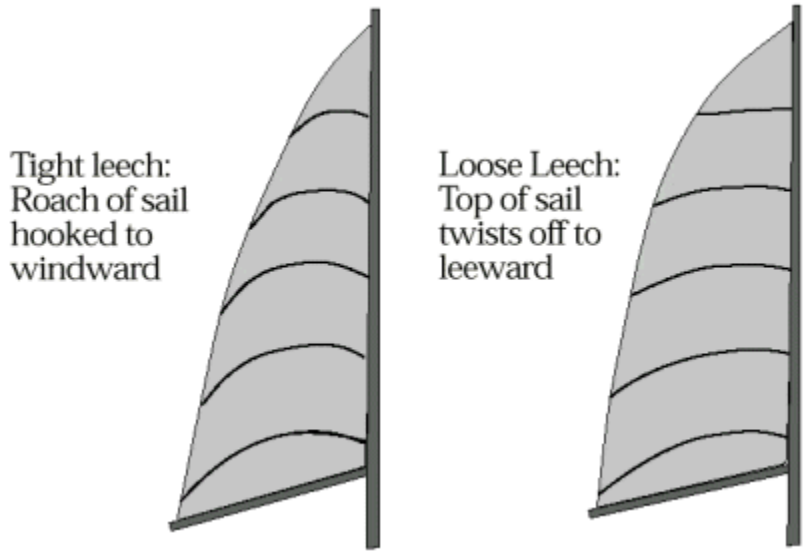
- 1. Increase halyard tension until the headboard reaches the upper black band.
- 2. Pull down the main boom downhaul until the lower black band is reached.
- 3. Put tension on the Cunningham.

FOOT TENSION
Increased foot tension removes draft from the sail.
Decreased foot tension adds draft to the sail.

TO ADD FOOT TENSION

- 1. Tighten the outhaul. Note: The effects of foot tension are most pronounced in the lower third of the sail.

LEECH TENSION
Increased leech tension straightens the leech and cups the sail.
Decreased leech tension eases the leech and twists the sail.




TO TIGHTEN THE LEECH:

- 1. Trim mainsheet harder when sailing on the wind.
- 2. Tension boom vang when sailing off the wind.
- 3. Tighten leech line to control leech flutter.

TO EASE THE LEECH:

- 1. Ease tension on mainsheet and boom vang. When beating in light winds, you'll need to pull the traveler above the center line in order to trim the mainsail close enough while keeping the upper leech open.

- 2. Ease the leech cord.
- 3. In very light air, reduce the effect of the weight of the boom by tightening the topping lift.

MAST BEND

Bending the mast decreases the draft in the sail, it flattens the sail. Removing mast bend adds draft to the sail.

TO BEND THE MAST:

1. Tighten backstay.

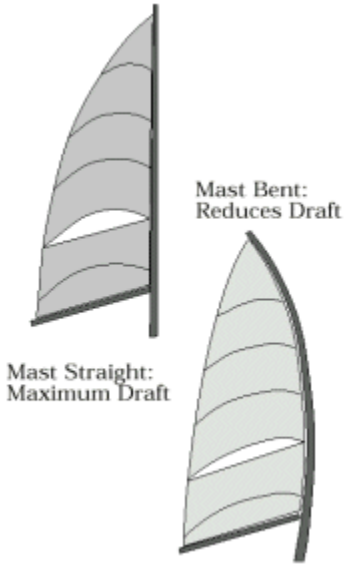
2. Tighten baby or midstay, or forward lowers.

TO STRAIGHTEN MAST:

1. Ease backstay and/or tighten headstay.

2. Ease babystay and/or forward lowers.

3. Tighten running backstays and/or after lowers.




Before working on sail shape and trim, check these points:

- 1. Battens should be straight with the flexible end forward and the back end snug against the pocket. The most flexible batten should be in the top pocket.
- 2. Telltales should be installed on the leech near the top two battens. Additional telltales midway between the luff and the leech are also useful.
- 3. Check mast tune with the main and jib set. Some bend aft is desirable, while there should be no bend to the side.

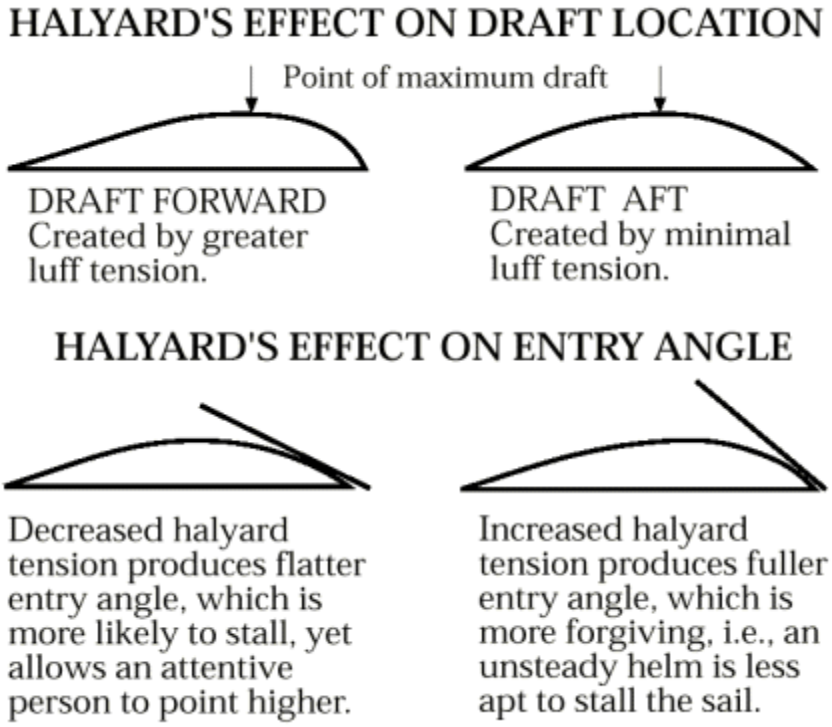
Variations in wind velocity, wind direction, and sea state require the mainsail to be very adjustable. Experimenting will help you get the best results on your own boat, but these general principles should be kept in mind.

- 1. Sailing upwind requires a flatter sail than reaching and running.
- 2. Rough water requires a fuller setting than smooth water.
- 3. Light winds require a fuller setting than strong winds.

## Genoa Trim

The major characteristics of genoa, or jib shape, are the amount and location of draft, and the angle of entry. The shape of the jib is controlled by the fore and aft location of the jib leads,

luff tension, sheet tension and headstay tension.
LUFF TENSION: Tension on the leading edge of the sail is controlled by jib halyard and by jib Cunningham. The principal effect of luff tension is to position draft in the sail. Increased luff tension moves draft forward. Decreased luff tension moves draft aft.




LEAD POSITION: Most boats have provisions for moving the jib sheet lead block fore and aft. The position of the lead controls the tension on the leech and the foot, as well as the draft location in the upper and lower portions of the sail:

**Jib lead aft** moves the draft in the top of the sail forward and moves the draft in the bottom of the sail aft. With the lead aft, the leech is loose and foot is tight.

**Jib lead forward** moves the draft in the top of the sail aft and moves the draft in the bottom of the sail forward. The leech is tight and the foot is loose.

**The correct jib lead position** distributes draft evenly in the sail and the tension on the leech and foot are relatively equal.

**Jib leads can be located** by observing which portion of the sail begins to luff first.

- Luffing in the upper portion means that the

lead should be moved forward.

- Luffing in the lower portion requires the lead point to be moved aft.

SHEET TENSION: Along with controlling the angle to the wind (trim), the jib sheet controls the amount of draft and twist in the jib. A tight jib sheet will remove draft from the sail; easing the sheet will add draft to the sail.

HEADSTAY TENSION: The straightness of the headstay is controlled by tension on the backstay on a masthead rig or by running backstays on a fractionally rigged boat. The looser the headstay, the more the middle of the stay sags to leeward and astern. Increased tension reduces the draft of the genoa and flattens the entry angle. Decreased tension increases the draft and creates a rounder entry.

JIB SHAPE: Variations in wind velocity, wind angle, and sea conditions make adjustments in jib shape desirable. The following adjustments can be made to adapt to changing conditions.

CHANGING WIND VELOCITY: Decreased velocity requires more draft in the sail. A fuller sail creates more power. As the wind increases, you flatten the sail. To help understand this, think of an airplane; to create lift at slow speeds, a pilot lowers the flaps , which creates more draft in the wing. Once up to speed, the flaps come up and the wing gets flatter. In-creased velocity calls for decreased draft.

Another adjustment you have to make as the wind increases is increased amounts of halyard tension. As the wind blows harder, the draft of the sail gets pushed aft. By increasing halyard tension, you return the draft back toward the middle or forward third of the sail where it belongs. Some boats can move the draft forward with a jib Cunningham.

CHANGING WIND DIRECTION: When the wind goes forward so that you are sailing on a beat or a close reach, less draft and a flatter entry angle are required for pointing ability. When the wind goes aft, additional draft and rounder entry are required for added power.

CHANGING SEA CONDITIONS: Rough sea conditions make a slightly fuller sail with a rounder entry angle desirable. In smooth

seas you trade power for pointing by flattening the entry angle.

Modern, easily driven boats can trade speed for pointing especially if they have a tendency to be overpowered in heavy air. This means setting the boat up with less draft and a flatter entry angle. A flat entry angle lets you point higher, but the sail stalls out easier. To power up the sails in light winds or in choppy seas, tighten the jib halyard to move the draft of the jib forward, which also increases the entry angle. A rounder entry angle will also make it easier for a less-than- attentive helmsman to keep the boat going fast since the sail will not stall as easily.

Even on top racing boats, when a new person takes the helm, they usually ask for more halyard tension, which produces a rounder entry angle, to make it easier to keep the boat sailing in the groove. After they get the feel of the boat in the current conditions, then they ease the halyard slightly for higher pointing.

SHEETING THE SAIL

Once the shape is set, the sail can be trimmed to the desired angle to the wind. Two controls are available: jib sheet lead position and jib sheet tension. Jib sheet tensioning will be covered in the following section on using telltales.

On many older boats, the only jib or genoa sheeting point available is a lead block on the toe rail. While some cruising sailors may be content with this As the wind velocity increases when beating and the boat starts to heel too much, the lead should be moved progressively aft on the inboard track to reduce heeling. Heeling is reduced by moving the lead aft because the top of the genoa is allowed to twist off and luff. The top of the sail luffs because the jib sheet is pulling the sail back more than it is pulling it down. (See diagram below.) Pulling the lead aft also flattens the lower section of the sail. Flatter sails produce less heeling moment.

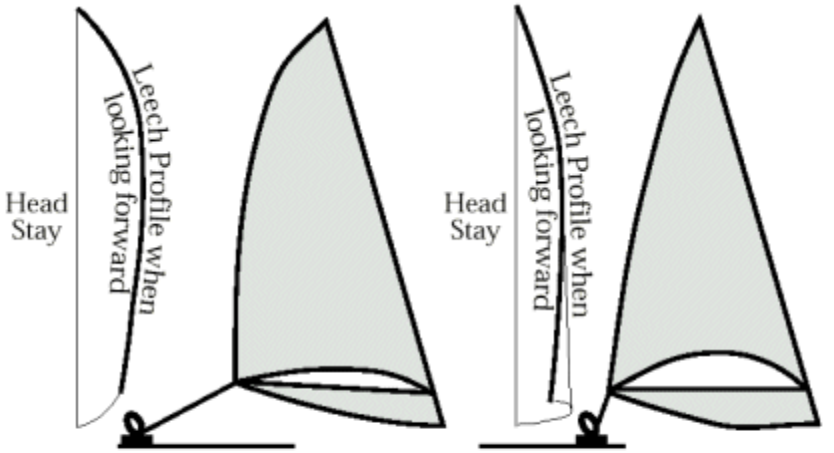
As the wind velocity decreases, moving the lead forward adds draft to the sail, which makes it more powerful.

In wavy conditions on a beat, move the lead outboard to a block on the toe rail to increase drive at the expense of pointing. The boat needs power to get through the waves.

After a while, you will find an average point on the track where

you will keep the lead for each genoa in your inventory. Mark these positions so that you can quickly set the lead. Any adjustments you make from the average position will then be fine tuning. The most common ways of marking lead positions are with stick-on numbers or a magic marker. Place the number "1" where the No. 1 genoa sheets to, and a number "2" and number "3" where they sheet to if you have those sails.

Cruising sailors with roller/reefing genoas need two marks on the track; one mark aft for when the genoa is rolled out all the way, and one mark forward for where the lead should be when the sail is reefed to the reef point on the foot (which all UK Passagemaker genoas have).




Jib lead aft flattens the foot and loosens the leech because the sheet pulls aft more than it does down.

Jib lead forward loosens foot & tightens the leech because the sheet pulls down more than it does aft.

As the wind angle frees up from a reach to a run, move the lead outboard and forward to a block on the toe rail, assuming there are attachment points on your rail for this. The lead moves outboard to open up the slot between the jib and the main, and the lead goes forward to counteract the tendency of the sail to twist. With the jib shaped to the conditions, and the lead located in the best position, the sheet is trimmed to control the sail's angle to the wind. When sailing to windward, the spreaders provide a good reference point. Experimenting with a sensitive speedometer or with another boat will show how close the sail can be trimmed in given conditions.

When sailing off the wind, set a course, then ease the jib to the point of luffing, or until the inside telltales stop streaming aft.

Then trim slightly. If the leads have been set for windward sailing, they will have to be moved forward to counteract the tendency of the sail to twist.

Downhaul = cunningham for mainsail.

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