

# CALIFORNIA 20 CLASS ASSOCIATION OWNER'S MANUAL

MARCH 1, 1989



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This Owner's Manual is being mailed to all 1989 paid up members of the association as an additional benefit of their membership. It is for the exclusive use of association members. Additional copies may be obtained by any member in good standing by mailing \$5.00 [five dollars] along with their name, address and fleet number to the national treasurer. [See page 2 of the latest newsletter for address.] The manual is prepunched for your convenience in inserting in a loose leaf folder which could hold additional reference material and future additions to the manual.

WE DREW UPON VARIOUS SOURCES OF INFORMATION INCLUDING NATIONAL AND FLEET LITERATURE AS WELL AS THE MANUFACTURER'S LITERATURE. WE TRIED TO INSURE THE ACCURACY AND APPROPRIATENESS OF THE MATERIAL BUT NO WARRANTY SHOULD BE IMPLIED. EACH OWNER IS CAUTIONED TO DOUBLE CHECK AND TO USE HIS OWN DISCRETION BEFORE USING ANY OF THE SUGGESTIONS OR RECOMMENDATIONS.

GORDON G. BROWN, JR.  
PAUL C. MERRILL, JR.  
EDITORS



# **CAL 20 OWNER'S MANUAL**

## **SECTION ONE**

### **CAL 20 SPECIFICATIONS AND WHERE TO OBTAIN PARTS:**

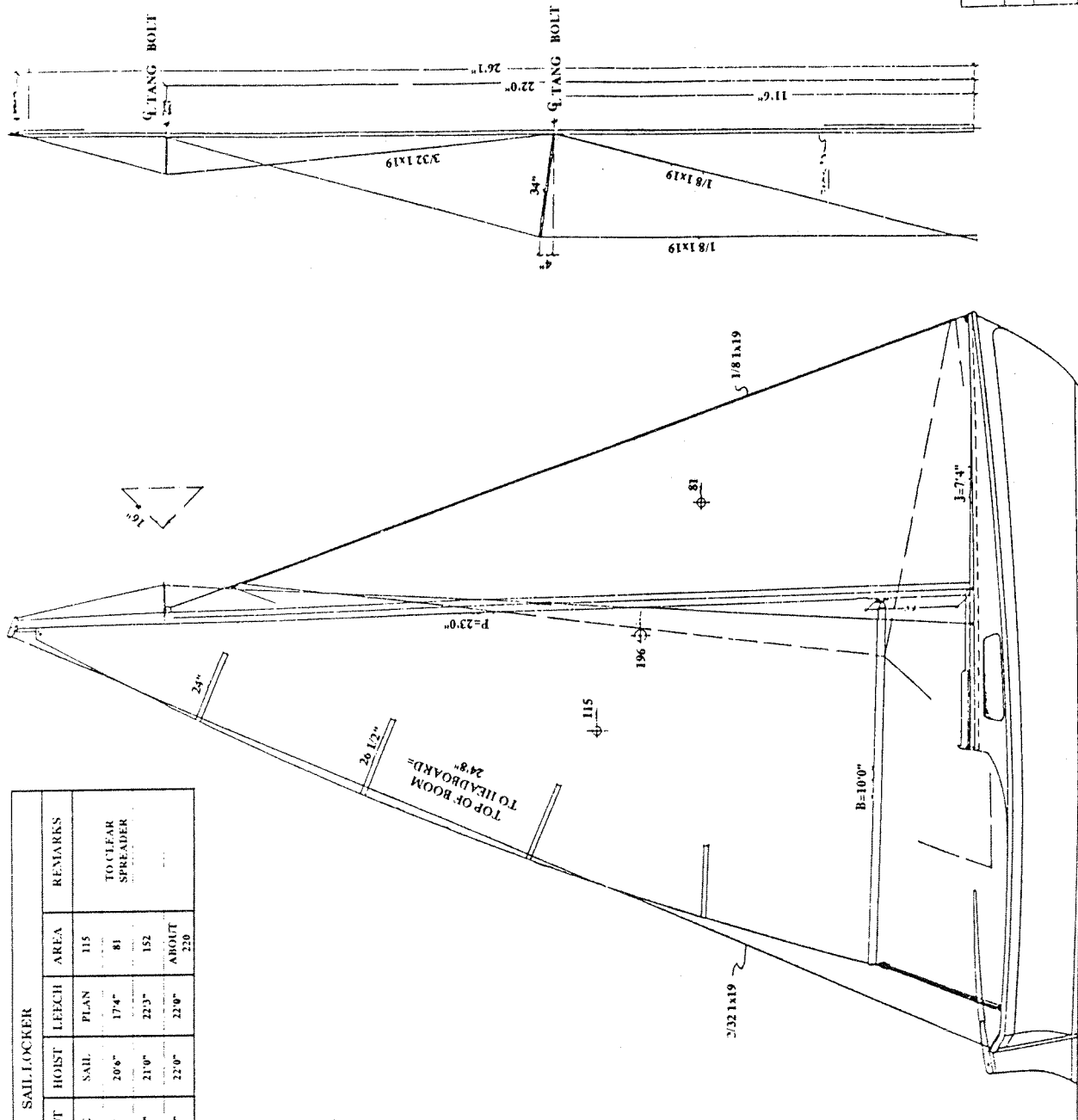
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## I. GENERAL DESCRIPTION

DESIGNED BY	C. Wm. Lapworth		
DESIGNED TO PLEASE	the yachtsman who wants a spacious, seaworthy, low maintenance boat		
	the man who races		
	the family that day sails		
	the family that likes a week-end cruise		
	the sunbather who will enjoy the wide flat surfaces		
	the man who would rather sail than maintain a boat		
	the discriminating yachtsman who demands more boat for less money		
DESIGN INCLUDES	self-bailing cockpit		
	outboard well		
	hinged mast step		
	provision for head		
DESIGNED TO MEET	M.O.R.C. specifications		
SPECIFICATIONS	L.O.A.	20'	Sail Area 196#
	L.W.L.	18'	Displacement 1600#
	Beam	7'	Ballast 900#
	Draft	3' 4"	
<u>CONSTRUCTION</u>			
HULL	one piece molded fiberglass		
DECK	one piece molded fiberglass		
MAST and BOOM	light-weight aluminum alloy with roller reefing		
STANDING RIGGING	stainless steel swaged fittings		
RUNNING RIGGING	dacron		
TURNBUCKLES	stainless steel		

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SAIL LOCKER						
SAIL	WEIGHT	FOOT	HOIST	LEECH	AREA	REMARKS
MAIN	5 oz. D*	SEE	SAIL	PLAN	115	
WORKING JIB	4 oz. D*	9'3"	20'6"	17'4"	81	TO CLEAR SPRAUER
GENOA	2.5 oz. D*	15'0"	21'0"	22'3"	152	
SPINNAKER	75 oz. N*	13'2"	22'0"	22'0"	ABOUT 220	

D=Dacon  
N=Nylon

## **COMPLETE RIGGING SYSTEMS** (Kits)

(Most pictured in article on Cal 20 "4040")

We offer complete rigging systems for Cal 20 ties including:

Backstay Adjusters

Boom Vangs

Cunningham Downhauls

Jib Halyard Adjusters

Barney Post Mainsheet Rigs

Aft Lower Chainplate Re-enforcement Systems

please inquire . . .

## **MASTS AND BOOMS**

**Masts:** In 1982 we began stocking the original "Jensen" Cal 20 Mast Section. It comes with the best clear anodizing available. (Hard Black Anodizing optional)  
We now offer: Complete Cal 20 Masts, building a mast with your re-usable mast fittings, or the mast section only.

**Booms:** We stock replacement boom sections and build Cal 20 booms.

## **HOW TO PLACE ORDERS**

By phone. A phone call instead of a letter is appreciated. Steve Seal is usually available between 9:00 a.m. and 12:00 a.m. on weekdays and sometimes on weekends. If you miss me, **KEEP TRYING!**

# **SEAL'S CAL 20 SERVICE**

1327 Sherman Street  
Alameda, CA 94501

STEVE SEAL [415] 521-7730

# V. MEASUREMENT CERTIFICATE

DATE: \_\_\_\_\_

## CAL 20 SAIL MEASUREMENT CERTIFICATE

OWNER: \_\_\_\_\_

SAIL MAKE: \_\_\_\_\_

BOAT NAME: \_\_\_\_\_

SAIL #: \_\_\_\_\_

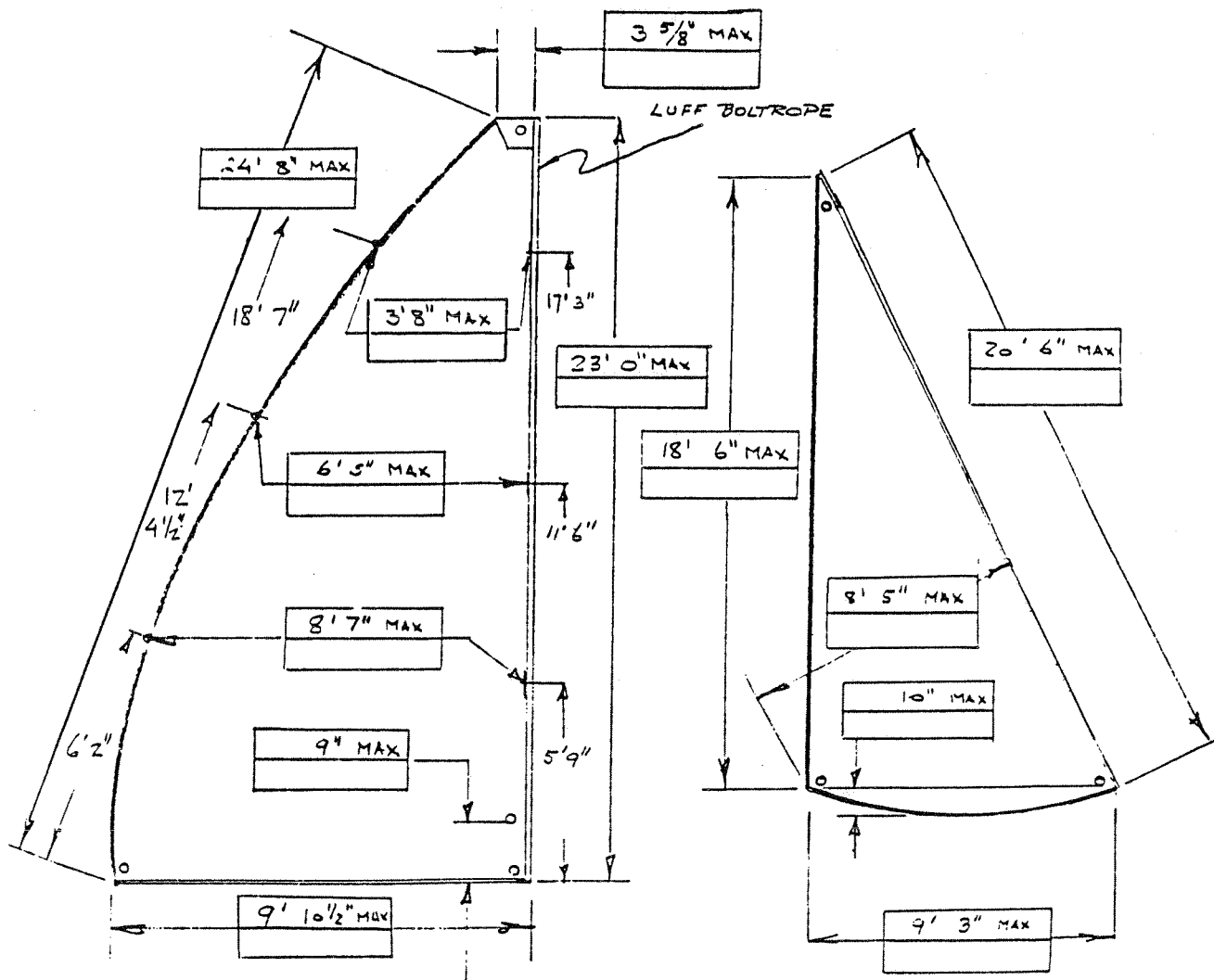
C20 INSIGNIA AND

FLEET: \_\_\_\_\_

SAIL # IN SAIL

DATE PURCHASED: \_\_\_\_\_

YES NO



### BATTENS

#1	#2	#3	#4
24" MAX	26 1/2" MAX	26 1/2" MAX	24" MAX

MEASURER: \_\_\_\_\_

OWNER: \_\_\_\_\_



## VI. HULL & EQUIPMENT CERTIFICATE

Fleet \_\_\_\_\_

Date \_\_\_\_\_

### CAL-20 HULL & EQUIPMENT CERTIFICATE

HULL #: \_\_\_\_\_ OWNER: \_\_\_\_\_

#### RIGGING:

<u>Bands</u>	Bands Min. 1/2" Wide _____ Mastbands 23' 0" Max _____ Boomband 10' 0" Max from Aft Edge of Mast _____
<u>Spreader</u>	Spreader Length 30" Min. _____
<u>Shrouds</u>	Shrouds Length (Slack Removable by Turnbuckle) _____
<u>WH'pole</u>	Whiskerpole Length Max. 8' 6" _____

#### HULL:

<u>Motorwell</u>	Plug Removable _____ Well Drains _____ Plug Max 3" Thick _____ No Foam _____
<u>Keel</u>	Max Web Thickness 1 1/2" _____
<u>Rudder</u>	Max Thickness 2 1/4" _____ Mat'l Mahogany _____ Not Mahogany or All Painted _____ If Not Mahogany or All Painted, Min Wt. 25 lbs. _____ lbs.
<u>Hull Repair</u>	Major Repairwork, Describe: _____

#### EQUIPMENT:

<u>Head</u>	No Head _____ Ballast 31 lbs. at Head loc. _____ Head Not Cer. _____ Weight _____ lbs. Extra Ballast _____ lbs. Ceramic _____ Describe Ballast: _____
-------------	---

<u>Motor</u>	Motor & Gas tank _____ Weight _____ lbs. Extra Ballast _____ lbs. No Motor & Gas tank _____ Ballast 65 lbs. _____ Describe Ballast and Location: _____
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<u>Ground Tackle</u>	Anchor _____ 10 ft. 3/16 chain _____ 100 ft. 3/8 line _____
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<u>Safety Equip.</u>	Fire Ext. _____ Bell, Horn or Whistle _____ Life Vests (1 per person) _____ Flares Kit _____ Throwable Life Pres. (1) _____
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Measurer \_\_\_\_\_

Owner \_\_\_\_\_



# **CAL 20 OWNER'S MANUAL**

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### **RIGGING YOUR CAL 20:**

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## I. RIGGING YOUR CAL-20

### A. JIB HALYARD

1. Attach jib halyard block to forward side of mast at headstay fitting with stainless steel shackle provided
2. Use hole closest to mast.
3. Attach halyard block so that the shackle end leads from the forward side of the block.
4. Secure shackle end and line end of halyard on the port side cleat at the base of the mast.

### B. MAIN HALYARD

1. Run main halyard over both small sheaves at the mast head.
2. Arrange so that shackle end of the wire halyard leads down groove side of mast.
3. Secure shackle end and line end of halyard on the starboard side cleat at the base of the mast.

### C. JUMPERS

1. Place jaws over holes on forward side of masthead fitting (see 1). Refer to the Rigging Diagram in the Appendix for number identification.
2. Secure jaws on other ends to tangs at spreader fittings (see 2).
3. Insert jumper strut tubes (see 3).
4. Insert adjusting bolt into spreader bar, threaded ends are now placed in ends of tubes (see 4). (slotted ends out, nuts on outside).
5. Place jumper wires in slots and tape or wire in place.
6. Adjust the nuts for no slack when mast is straight.

### D. AFTER LOWER SHROUDS

1. Connect jaws to tangs at spreaders (see 5).

### E. FORWARD LOWER SHROUDS

1. Connect jaws to tangs at spreaders (see 6).

### F. SPREADERS

1. Place over sleeves (see 7).
2. Rotate and adjust until holes line up.
3. Insert cotter pins.
4. Rotate complete assembly until slots open aft.

### G. MAIN SHROUDS

1. Connect jaws to tangs at headstay fittings (see 8).
2. Place shrouds in slot in end of spreaders, tighten screw and tape.

### H. BACKSTAY

1. Connect eye to masthead fitting (see 9).

### I. HEADSTAY

1. Connect jaw to headstay fitting (see 10).
2. Use hole above halyard block.

### J. TURNBUCKLES

1. Place 1/4" x 28 stainless steel nut on all threaded rigging ends.
2. Connect a turnbuckle to each threaded end (see 11, 12, 13, 14 and 15) and adjust each end with 1/4" in barrel.

### K. STEPPING MAST

1. Lay mast on boat, the masthead, aft, groove down.
2. Connect backstay (see 15) after lowers (see 14) and one main shroud (see 13).
3. Support mast with a person aft in cockpit.
4. Place foot of mast on step.
  - a. Insert bolt

5. Push mast up.
  - a. Man in cockpit works forward
  - b. Man on cabin top pushes it on up to vertical position
  - c. Watch carefully for fouled rigging
6. Connect headstay (see 11).
  - a. Relax
7. Connect remaining main shroud (see 13).
8. Connect forward lowers (see 12).

#### L. ADJUSTING

1. Adjust headstay and backstay for equal adjustment on turnbuckles.
  - a. Fairly tight
2. Adjust main shrouds for equal adjustment
  - a. Take the slack out
3. Adjust forward lowers same tightness as "mains".
4. Adjust after lowers slightly looser than "mains".
5. Secure all turnbuckles.

#### M. BOOM

1. Slip goose neck in groove.
2. Attach after end to backstay.

## II. RIGGING THE BOAT FOR SAILING

#### A. MAIN SAIL

1. Rig main sheet (becket — boom block — quarter block — boom block — becket block — cleat).
2. Slide foot of sail in groove on boom.
  - a. Secure tack
  - b. Rig outhaul through clew — through large holes — through clew — and around boom.
3. Battens, thin side in first.
4. Hoist sail in groove
  - a. Securing halyard on starboard side
5. Adjust downhaul cleat.

#### B. JIB

1. Fasten tack.
2. Clip on headstay.
3. Splice or tie sheet to clew
  - a. 20' each side
  - b. Lead outside stays

With the sails bent on and sheets rove, we should pause prior to sailing and consider the maintenance of your CAL-20. Much of the maintenance is visual but it IS IMPORTANT. The results will be a more pleasant sail and prolonged future enjoyment of your yacht.

## III. EQUIPMENT MAINTENANCE

#### A. SPARS

The finish of natural aluminum is protected against corrosion by a thin, transparent film of aluminum oxide. Dust, dirt, smoke, salt and traffic fumes will adhere to this film, making the surface dull and unsightly. Coating the new surfaces with a good paste wax like Vista or Simonize, will help protect the aluminum oxide from foreign matter. If the surface has become tarnished, any high grade cleaner — wax — polish (Collinite #34 or #38 for example) will restore the original sheen. Heavier pitting can be removed by wet-sanding with #600 paper prior to polishing and waxing. You need not worry about sanding, cleaning or polishing destroying the aluminum oxide film as it reforms or "heals" immediately.

Painted spars may require a touch-up in areas of chafe. Use the same or compatible paints for this job. Epoxy is applied at the factory. "Rust-Oleum", in spray cans, is an excellent touch-up paint.

If spars are black anodized, hose down portions subject to salt water spray after each sail.

## B. RIGGING

Clean rigging means clean sails. A quick trip aloft with damp rags takes care of this problem. While aloft, check the entire rig for loose screws, nuts, bolts, cotter pins and chafe which may have resulted from hard sailing. Spreader tips well taped? Periodic inspection of the rig from aloft is your best insurance against rigging and spar failure. Keeping halyards tied away from the mast stops the annoying dockside clanking and saves the mast finish.

Salt water will gradually stiffen dacron line. Hosing with fresh water or soaking in warm soapy water will make the line soft and flexible again. Keep coiled and stowed in a dry spot below.

## C. HARDWARE

Many materials are used, all of which clean well with fresh water and a chamois. Winches must be kept clean and well oiled (Lubriplate is excellent unless the manufacturer recommends otherwise) as do all turnbuckles, track slides, sheaves and shackles. The chrome and stainless steel brighten up with the chamois while a good automotive chrome cleaner or mild kitchen abrasive like Comet takes care of the tarnished spots.

# IV. SPECIFICATIONS FOR RIGGING AND GEAR

## STANDING RIGGING

- 1 - Headstay - 1/8" 1x19 s/s x 22' 7 3/4", Fork & 1/4" Thd. Shank
- 1 - Backstay - 3/32" 1x19 s/s x 29' 2 1/2", Marine Eye & 1/4" Thd. Shank
- 1 - Boom Lift - 3/32" 7x19 s/s x 1' 3", Nico-Sleeve & Snap Hook @ 5' 4"
- 2 - Jumpers - 3/32" 1x19 s/s x 14' 11 1/2", Fork each end
- 2 - Uppers - 1/8" 1x19 s/s x 21' 11", Fork & 1/4" Thd. Shank
- 2 - Fwd. Lowers - 1/8" 1x19 s/s x 11' 3 1/2", Fork & 1/4" Thd. Shank
- 2 - Aft. Lowers - 1/8" 1x19 s/s x 11' 4 1/2", Fork & 1/4" Thd. Shank
- 1 - Lifting - 5/16" 7x19 s/s x (2) Legs 4' 0" & 4' 6"
- Slings - (4) Nicopress Thimbles and (1) 5/8" Galv. Pear Link

## NOTE:

- 1) All dimensions center eye to eye or end of Thd. Shank.
- 2) Insulated Backstay: Keep insulators as far apart as possible.
- 3) CAL-20 Extra Heavy Rig for Hawaii: Increase by one size.

## RUNNING RIGGING

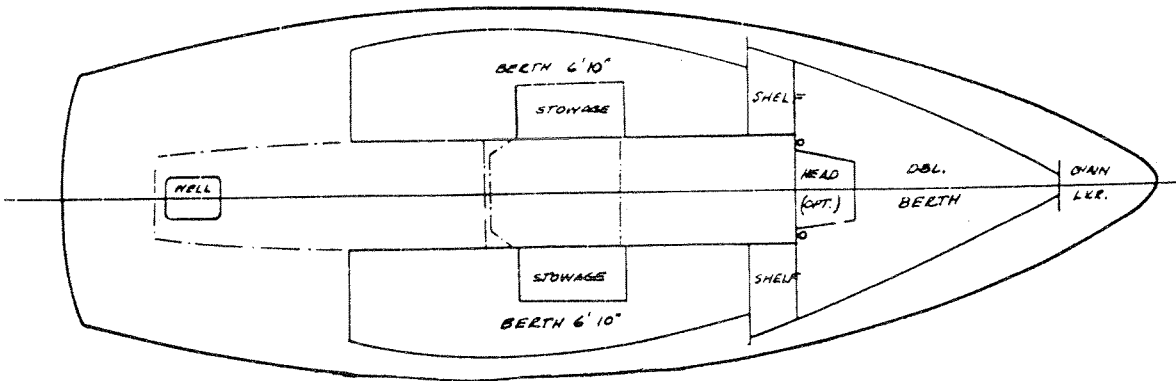
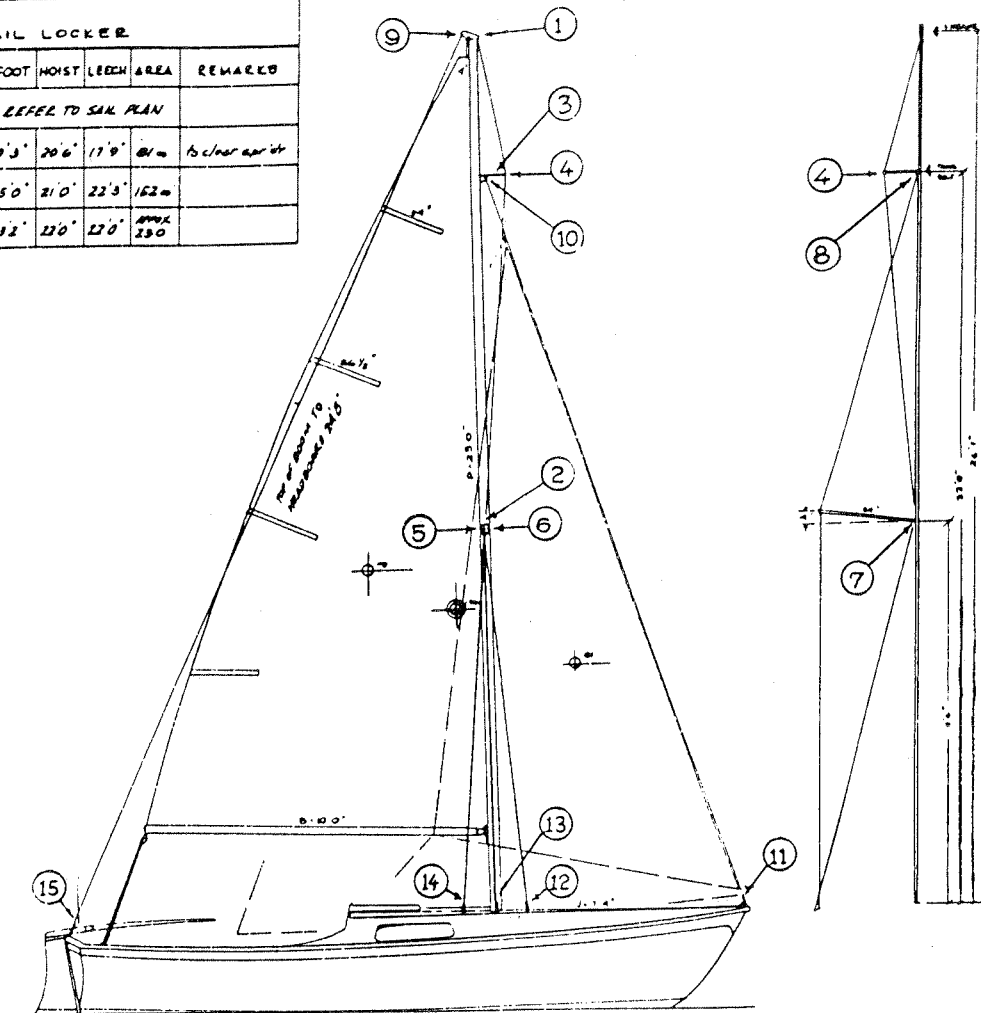
- 1 - Main Halyard - 1/8" 7x19 s/s x 25' 7" Wire Rope
- 1 - Jib Halyard - 1/8" 7x19 s/s x 21' 7" Wire Rope
- 1 - Main Halyard Tail - 1/4" x 30' Dacron Yacht Braid
- 1 - Jib Halyard Tail - 1/4" x 24' Dacron Yacht Braid
- 1 - Main Sheet - 5/16" x 60' Dacron Yacht Braid
- 2 - Jib Sheets - 5/16" x 20' Dacron Yacht Braid
- 1 - Down Haul - 1/4" x 4' Dacron Yacht Braid
- 1 - Out Haul - 1/8" x 4' Dacron Yacht Braid
- 1 - Motor Well Line - 1/4" x 5' Dacron Yacht Braid
- 2 - Genoa Sheets - 5/16" x 28' Dacron Yacht Braid

## SPINNAKER GEAR

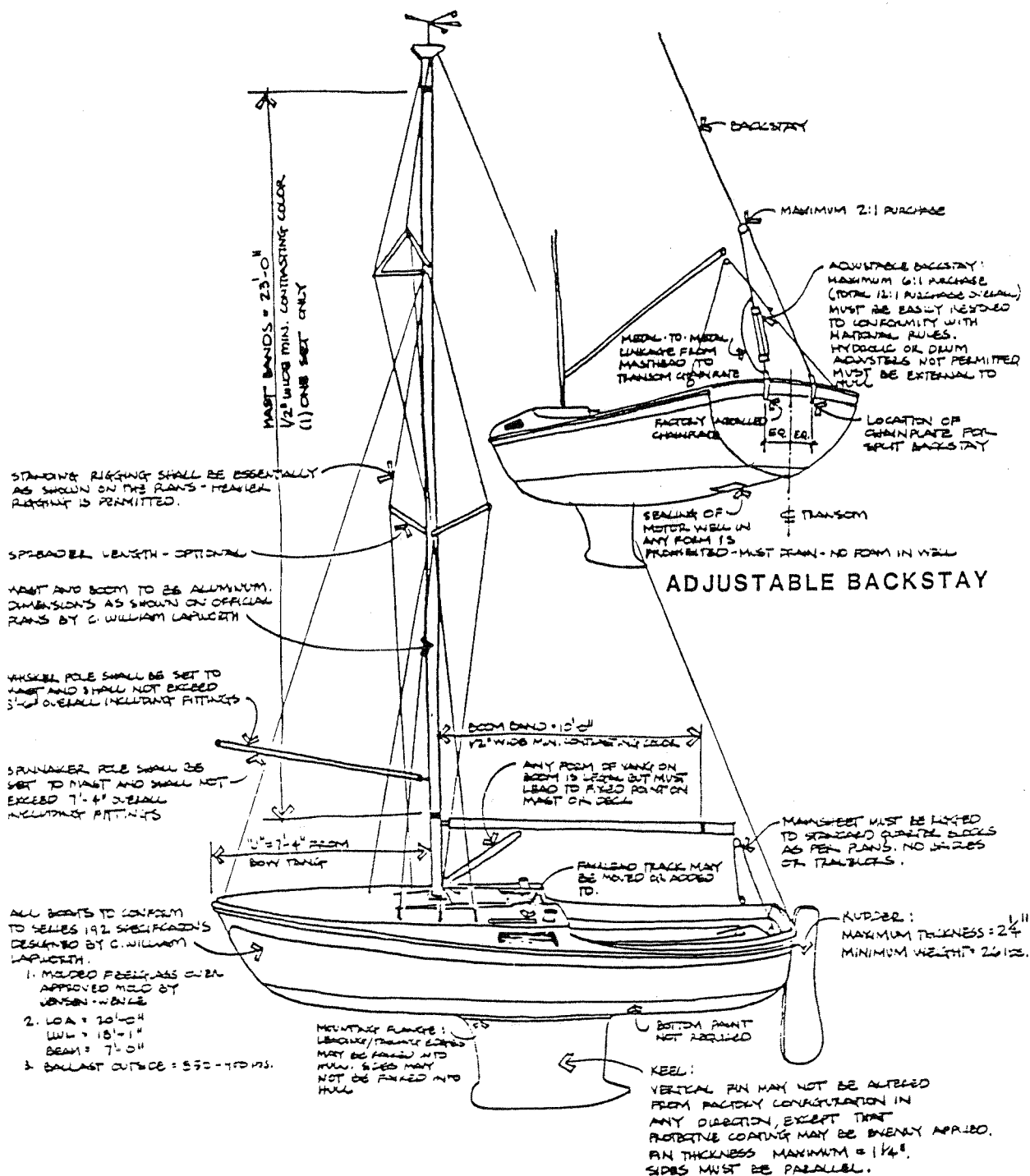
- 1 - Spinnaker Halyard - 1/4" x 55' Dacron Yacht Braid
- 2 - Spinnaker Sheets - 1/4" x 30' Dacron Yacht Braid
- 1 - Topping Life - 1/4" x 25' Dacron Yacht Braid
- 1 - Foreguy - 1/4" x 20' Dacron Yacht Braid

## V. CALIFORNIA 20 SCHEMATIC

SAIL LOCKER						
SAIL	WT	FOOT	HOIST	LEECH	AREA	REMARKS
MAIN	500 D	REFER TO SAIL PLAN				
WORKING JIB	400 D	9'3"	20'6"	17'9"	8100	15 clear spar to
GENOA	2500 D	15'0"	21'0"	22'3"	16200	
SPINNAKER	1/2 H	13'2"	22'0"	22'0"	APPROX 2300	



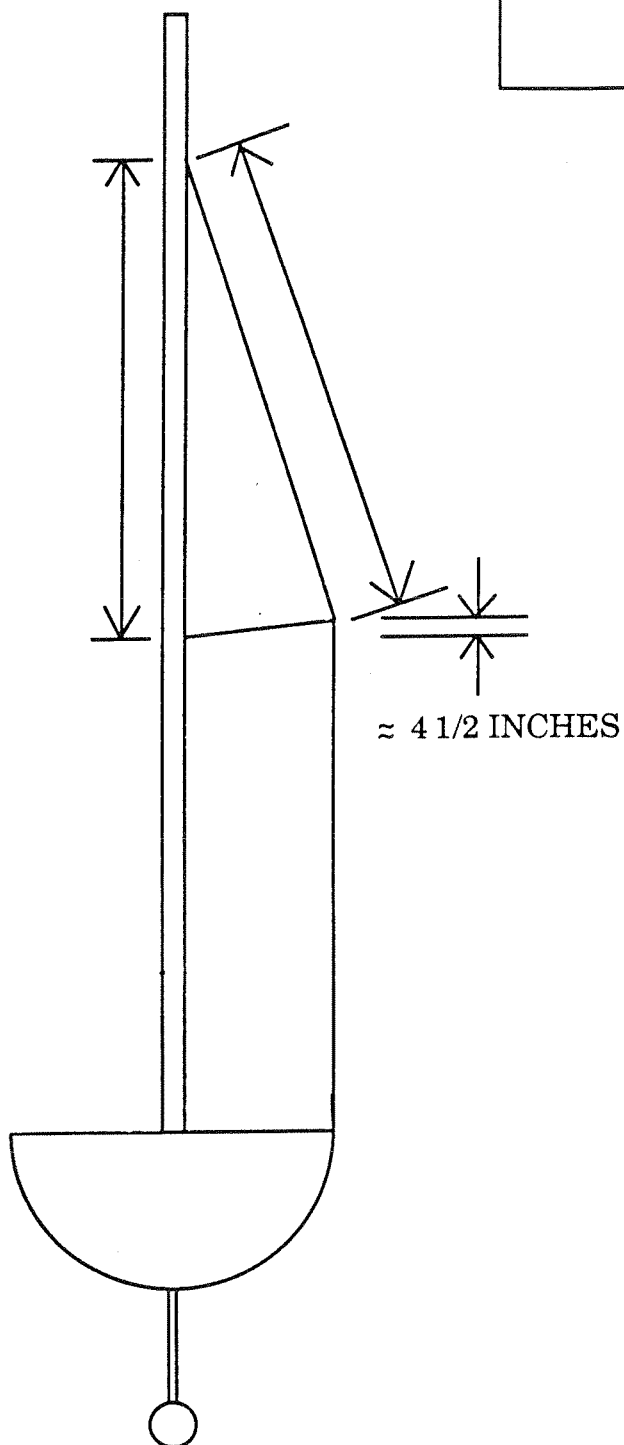
## VI. SPARS AND RIGGING SPECIFICATIONS





## VI. SPARS AND RIGGING SPECIFICATIONS

### CORRECT POSITIONING OF CAL 20 SPREADERS



- MAKE DIMENSION B EQUAL TO DIMENSION A. [EASIEST WAY TO DO THIS IS TO HOLD UPPER SHROUD PARALLEL TO MAST]
- THIS RESULTS IN THE SPREADER ANGLING UP ABOUT 4 1/2 INCHES

NOTE: LOCKWIRE SHROUD CAREFULLY TO SPREADER



# CAL 20

# OWNER'S MANUAL

## SECTION THREE

### PREPARATION OF THE CAL 20 FOR RACING AND CRUISING:

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## I. RACING

An attraction of the Cal 20 is that it can be raced with very little extra equipment; class racing rules prohibit changing sails, the use of spinnakers and genoas, adjusting standing rigging during a race, and sealing the motor well. Moreover, to prevent undue advantage for purely racing boards, the class requires that boats without heads and motors carry compensating weight (see by laws). But there is, of course, some gear that is desirable to make a good showing at racing, and considerable care and maintenance of the boat. Almost any Cal 20, regardless of age or present condition, can be made to do well in racing; indeed, there is a popular school of thought that older boats may be potentially faster.

### A. TUNING

Tuning your Cal 20 is perhaps the task of first importance in preparation for racing. Volumes have been written on this topic and most offer reliable guidance, but nothing is better for fine tuning your boat than a pacing session with other Cal 20s.

Short tests of three to five minutes in close proximity of another Cal 20 are usually enough to identify any differences in boat speed and, in the case of a beat to weather, pointing ability. After each of these short tests, one of the boats should make an adjustment intended to improve performance, while the other should make no changes; the latter boat acts as a reference base on which to judge effectiveness of any change made on the boat being tested. These tests should be made within five to ten boat lengths of the other boat, taking care that one boat is not blanketing the other. Whereas most tuning is done on the wind, reaching and running tests should not be neglected.

Knotmeters and time-trial testing alone is one way to tune, but the accuracy of this kind of test is at very best 1%. On the other hand, pacing with another boat can easily uncover differences of 1/4% to 1/2% in a very short time.

Perhaps the easiest path to awareness and knowledge of the Cal 20s fine points is available from speakers at our fleet meetings and from members (e.g., at the post-race "Ale and Alibis" sessions).

### B. PREPARATION

#### Boat Bottom

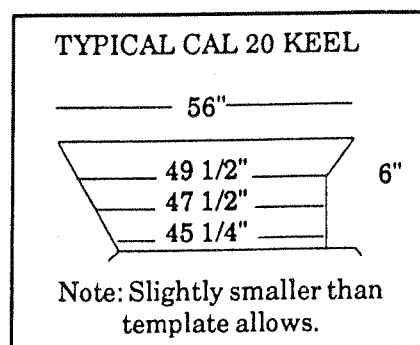
Some skippers have said that next in importance to the nut at the end of the tiller is the condition of the boat bottom. Trying to race a boat with a dirty or rough bottom is a hopeless task, unless the competition is really inept. One solution is to have a very smoothly sanded bottom paint job, or not paint at all. No paint means you must either dry store your boat, get a boat bath (or hull tank) or have a bottom cleaning once a week. The latter is not very satisfactory during the summer months, as coral can built up on the bottom in two days when the weather is warm (the water temperature is above 64° F).

Boats which are dry sailed (stored out of water) have a significant advantage because their bottoms are clean and easily worked on. For a Cal 20 which remains in the water — even with a boat bath — an occasional cleaning is desirable.

#### Keel Shape

The cast iron keel of our yachts has been the despair of more than one skipper. Castings are rough and irregular by nature, and iron rusts. Thanks to modern technology (specifically, polyester resins and putty), help is near at hand.

Keel: The leading and trailing edges of the keel mounting flange may be faired into the hull. Any boats with the latter will be allowed only if the work was completed before November 24, 1963. A 1/4" fillet is allowed between the sides of the flange and hull on all other boats. The leading and trailing edges of the vertical fin may be smoothed or faired and must not exceed the inside dimensions of the official template. The cord lengths are



(maximum dimensions of template): 6" down from flange 49 3/4"; 12" down from flange 47 3/4"; 18" down from flange 45 5/8". The vertical fin of the keel may not be altered from its factory configuration of the keel. Maximum thickness of the fin shall be no greater than 1 1/2". The ball may also be faired and smoothed, but not altered in shape.

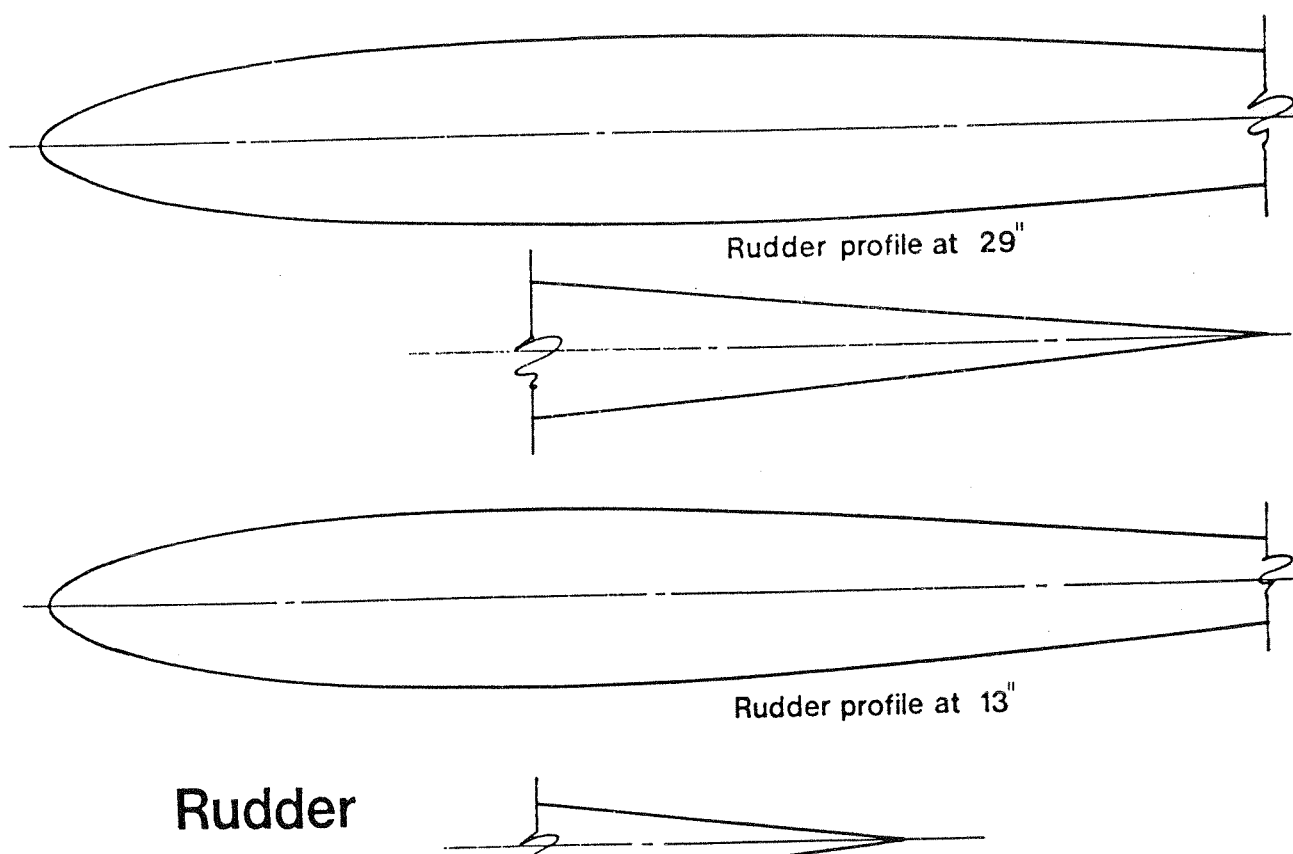
### Rudder Shape

Rudder: The rudder profile shape must be maintained as it came from the factory. If rudders are other than factory type natural mahogany they must weigh at least 25 lbs. with gudgeons. The maximum rudder thickness is 2 1/4".

The stock Cal 20 rudder cross-sectional shape, as delivered from the factory, leaves much to be desired from the standpoint of racing performance. Typically, the cross-section is a flat plank bevelled at the leading and trailing edges. Hydrodynamic drag is higher than necessary and "lift" (i.e., side force developed in steering) is less than for other available cross-sections.

Fortunately, the remedy is both easily accomplished and legal within class rules. The Bylaws permit changing the cross-section shape but prohibit changing the profile dimensions.

To achieve reasonable lift and a reduction in drag, it will suffice to reshape the cross-section from the waterline down, and any conventional symmetrical airfoil shape (e.g., NACA 0010) by removing material in the aft 50% to 60% of chord and slightly building up the thickness from the leading edge to approximately 25% chord. Templates are available in the Marina Del Rey fleet to guide the do-it-yourself enthusiast. Normally, the above modification is finished with a covering of glass cloth and resin from the tip to at least half-way between the hinge points, to strengthen the rudder. (Water soaked rudders have been known to warp, split or break; the glassing job should protect the immersed portion of the rudder from these hazards.) See drawing.



### Stay Tension

Superstition and blind faith have long been the guiding principles for how many turns of the turnbuckle are required. If forestay sag and its influence on the jib shape are of primary concern, the following suggestion may be of interest:

Step One: Determine from your sailmaker the forestay sag for which your jib was designed.

Step Two: Install a length of stainless leader or piano wire between the jib halyard shackle and the lower end of the forestay, with a foot or two of shock cord at the lower end to take up jib halyard tension adjustment. As the wind causes the stay to sag, a visual estimate of sag is possible.

Step Three: Adjust turnbuckle as required.

Stay tension also has a direct and drastic influence upon mast bend, which has a significant bearing upon mainsail shape. Tight stays put bend in the mast and slack stays allow the mast to straighten. If your main has a tight leach, you will probably have adequate mainsail power in light air, but will start to be overpowered at medium wind velocities. In this case, you can find relief in mast bend, through tighter stays, which will both flatten the main and slack the leach of the main. Note that mast bend below the spreaders can be controlled independently of stay tension by coordinated use of the aft and forward lower shrouds.

The interplay between the proper stay tension required for shaping the main and the jib for various wind strengths will determine the proper setting of jumper system tension, although the latter is not particularly critical. Overly tight jumpers will prevent mast bend above the spreaders for all except the tightest stays.

### Shroud Tension

Shroud tension, per se, is not critical. (Some skippers prefer slack shrouds in order to assure no interference between jib leech and aft lower shrouds when beating to weather.) However, the relative tension between the three shrouds on each side is important. Start with the principle that you wish to have:

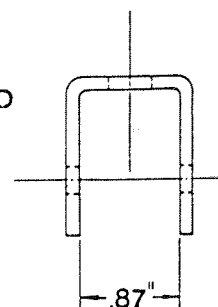
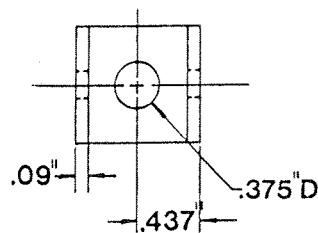
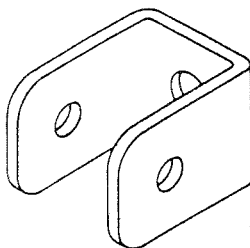
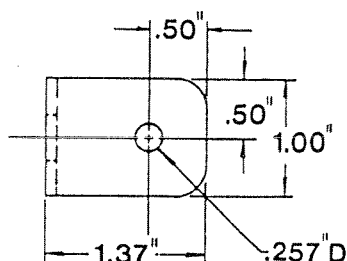
- 1) The mast centered on the boat (check this with the main halyard measuring to each gunwale); and
- 2) The mast straight in the thwartships plane, or falling off slightly to leeward above the spreaders (this you will have to check underway, when sailing to weather in winds of at least 8 knots).

The mast should not hook to weather unless there is some exceptional reason for this configuration, such as a peculiar mainsail shape.

### Spreaders and Jumpers

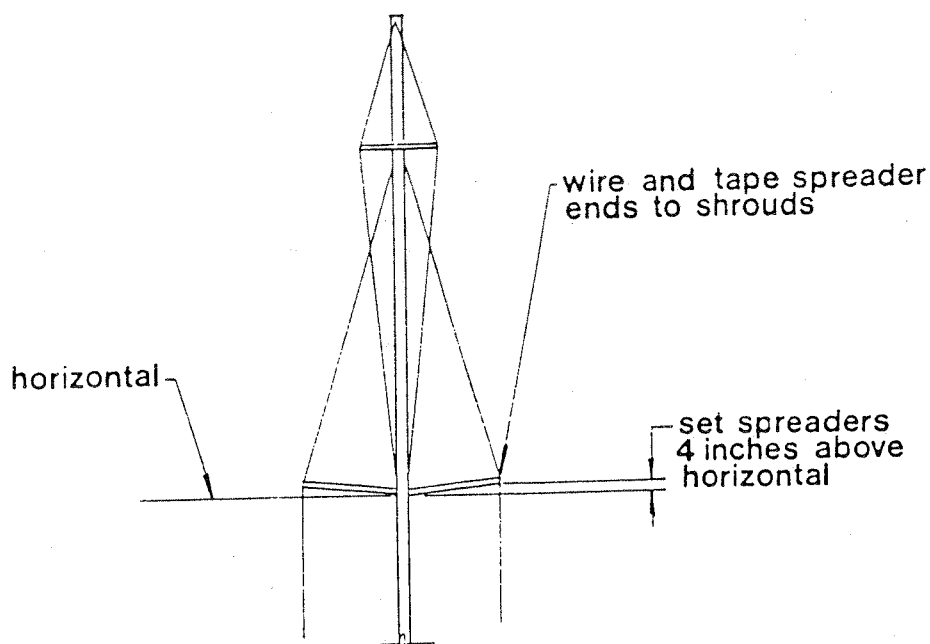
Your spreaders and jumpers should be checked once a year for corrosion and possible failure.

The weakest area of a Cal 20 rig is the spreader brackets. It is a good idea to replace the original brackets with brackets made of 50% to 100% thicker material. See drawing.



**SPREADER BRACKETS**  
Material: 303-304 Stainless Steel

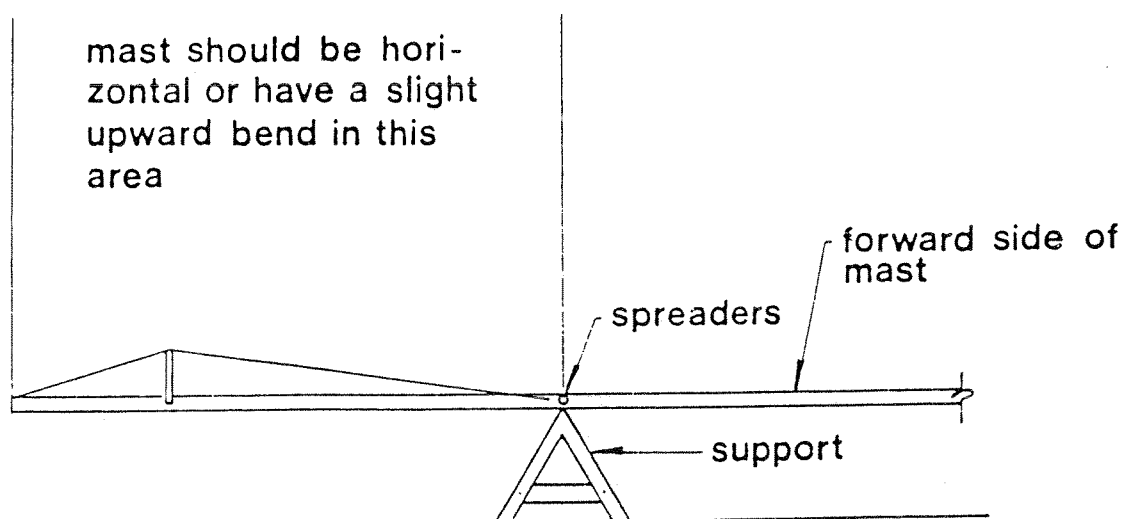
When setting up your spreaders, be sure to have the outboard tips 4" higher than the inboard (next to mast); securely wire and tape the outboard ends of the spreaders to the upper shrouds to avoid slippage. Failure to do so is one of the quickest, surest ways to break your mast. See drawing.



### SPREADER ADJUSTMENT

#### Jumpers

Jumper tension should be established in accordance with mast bend and sail shape requirements of your particular mainsail. In the absence of other information, set the tension so that the mast, when supported at the spreaders, in a horizontal position with the forward side up, is straight or has a slight upward bend from the spreaders to the top of the mast. See drawing.



### JUMPER ADJUSTMENT

#### Sighting Lines

Sighting lines are lines (which can be either painted or made of narrow plastic tape) on the side of the cockpit, placed approximately athwartship and at 45° ahead of and behind the abeam direction. Their use and layout is described fully in Stanley Ogilvy's book on sailboat racing.

An athwartships line such as the cockpit bulkhead is used in estimating when to tack to lay a mark. The 45° lines are used to estimate whether one is ahead of or behind another boat when beating to windward. (For example, "Can I cross X's bow if I go on the port tack?")

### Negative Equipment

Fixed weight hurts boat speed. The higher the weight, or the nearer the weight is to the ends of the boat, the worse the effect. Under this heading of negative equipment is included a wide variety of things: radios (which are also distracting), sleeping bags, bathing suits, foul weather gear, spare anchors, television sets, stereo sets, large motors, spare mooring lines, dishes, silverware, pots and pans, soap, wax, boat bath pills, rags, towels, spare provisions, water, cases of beer, cockpit awnings, cockpit cushions, extra tanks and gasoline, stoves and fuel, iceboxes, anchor chain (but an anchor, ten feet of chain, and 100 feet of nylon rope are required), storage batteries for running lights (flash-light battery lights are cheaper and adequate), forward bunk cushions, curtains. Most people accumulate an astonishing amount of gear on the boat. Tools are important, for instance, but only a small number of tools and spare parts are reasonably required.

A ruthless house-cleaning and continual alertness are the only cures. Most of this equipment can be kept ashore while racing and loaded on the boat for cruising — and will be in better condition for it.

### Keel Bolts

The Cal 20 keel bolts should be checked for corrosion at least once a year. If your bolts have gone unchecked for any great length of time, you stand the risk of having your keel fall off. When installing new bolts, be sure to check with some of the more experienced members in the fleet for advice on how to cut down on corrosion, such as heavy coating with sealant, painting, glassing over, etc.

## C. EQUIPMENT

### Compass

Courses for Cal 20s are long enough and visibility of marks and other "landmarks" poor enough, that a compass is extremely important for navigating on the race course as well as for detecting wind shifts and planning tactics.

### Telltails

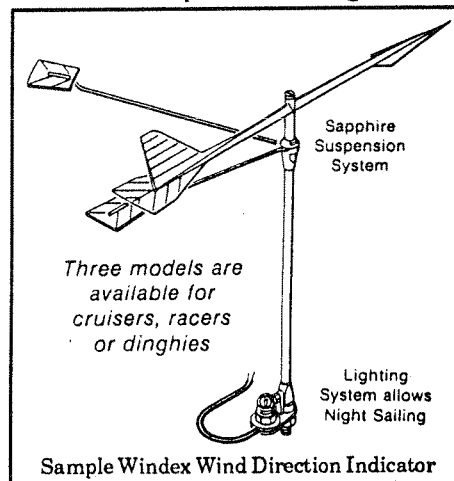
These are indispensable aids for racing. Most frequently used are the yarns (or ribbons) near the jib luff used during upwind work. A minimum of three are required and should be located 8" to 12" from the leading edge. The lower telltail should be about three to four feet above the tack, the middle one seven to eight feet, and the upper telltail five to six feet from the head. Similar yarns near the jib leech are increasingly recognized as important to a proper set of the jib on a reach. Several more sophisticated jib systems have been suggested in recent years (reference: articles in Sail magazine by Arvel E. Gentry), and are worthy of consideration by the avid racer.

The mainsail set, both on a beat and while reaching, can be facilitated and/or improved through use of yarn telltails, particularly near the leech.

### Wind Indicator at Masthead

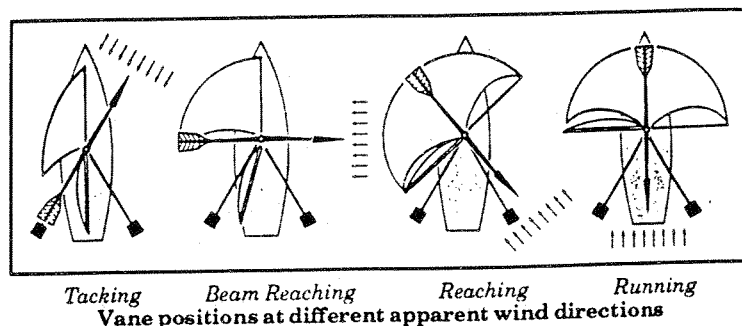
Wind direction indicators are precision instruments designed specifically to provide the helmsman with accurate information of the apparent wind direction. For racers, this means steering the boat for optimal performance in all wind conditions, plus proper sail setting and trimming. For cruisers, wind direction indicators provide timely wind information resulting in simpler, safer sailing. A useful learning tool for beginners as well.

Each wind direction indicator consists of a moving vane and two fixed reference tabs. The balanced vane has low inertia, a large fin area and low-friction suspension.





Fixed reference tabs are set at the proper angle to correspond to the apparent wind direction for starboard and port tacking. The design of the reference tabs makes it easy to read the relative wind direction as accurately as  $\pm 1^\circ$  under tacking conditions, where precise information is most essential for optimum performance. There is no parallax error.

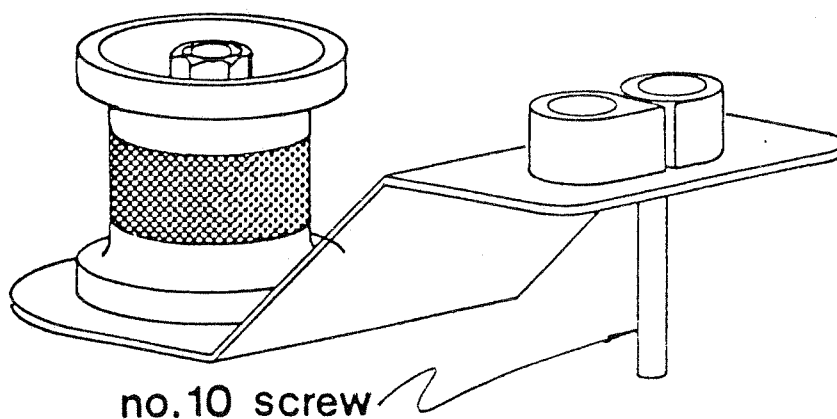


Wind Direction Indicators are designed to be mounted on mastheads. Mounting instructions are provided with each of the models and list various methods for attaching to masts. Also provided are instructions for setting the correct angle of the reference tabs for optimum performance under tacking conditions.

### Jib Leads

The jib lead for beating to windward is inside the upper shrouds and outside the lowers. Some skippers prefer to lead the sheets outside the forward lower shroud only, and inside the other two shrouds. On a reach, the sheets should be outside all shrouds to achieve the optimum sail shape. Thus, when on a reach, the crew reaches forward of the upper (i.e., middle) shroud and leads the sheet outside the upper and aft lower shrouds to a hook (or snatch block) on the rail. This hook is normally placed on the track about half way between the aft lower and the cockpit bulkhead; experimentation will be necessary to find the best hook position for your particular jib.

To return to a beat only requires taking the sheet out of the hook, and trimming the sheet.



### Jib Sheet Cleat

The cleat platform on the jib sheet winch tends to bend up and forward under heavy load. This can be cured by adding a #10 screw through the platform (under the cleat) and bolting it through the deck.

### Inside Tracks and Barber Haulers

Racing experience has demonstrated the advantage of sheeting the jib, when on a beat, closer to the centerline than is possible by use of the fairlead mounted on the standard track which is on the rail. Two means of leading the jib to an inside position have been tried and found satisfactory — inside tracks and barber haulers.

Inside tracks are normally mounted on the deck roughly 6" and 15" inboard of the rail and in a fore-and-aft direction. The jib sheet fairlead is mounted to the track appropriate to the wind conditions. A variant of this system, known as the "H track", involves the stock track on the gunwale and only one new fore-and-aft inside track attached to the deck. An additional transverse track bridges between these two tracks on each end of which is mounted a slider car. The transverse track can be positioned forward or aft as required, and the jib sheet fairlead, mounted on this track, can be positioned inboard/outboard at any position. It is this infinitely variable feature that appeals to its advocates.

Barber haulers are light lines which pull the jib sheet inboard by exerting a force on the sheet roughly half way between jib clew and fairlead. The same result as the inside tracks is achieved and there is the advantage that sheet position can be changed quickly and easily.

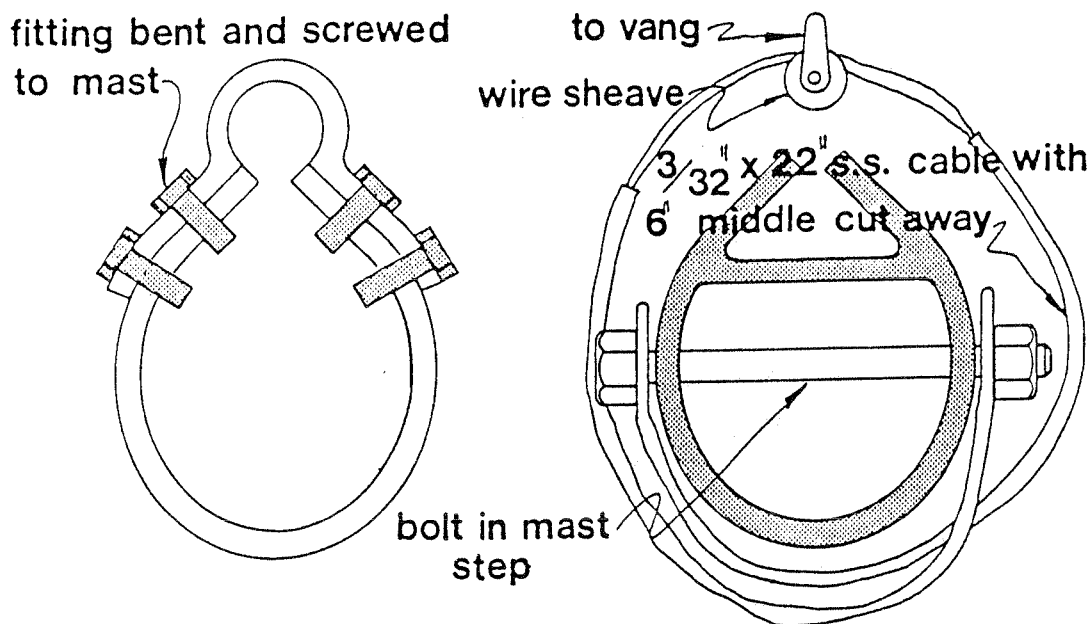
Choice between these methods appear to be a matter of personal preference and should be discussed with experienced fleet members (who will inevitably be delighted to extoll the virtues of their installation).

### Boom Vang

The boom vang is a tackle between the foot of the mast and a point on the boom roughly four feet aft of the mast, used to prevent the boom from lifting and the sail from twisting when on a reach or run. It is particularly valuable in heavy weather. The effect of the boom vang is to make the entire sail operate near the best shape and angle to the wind.

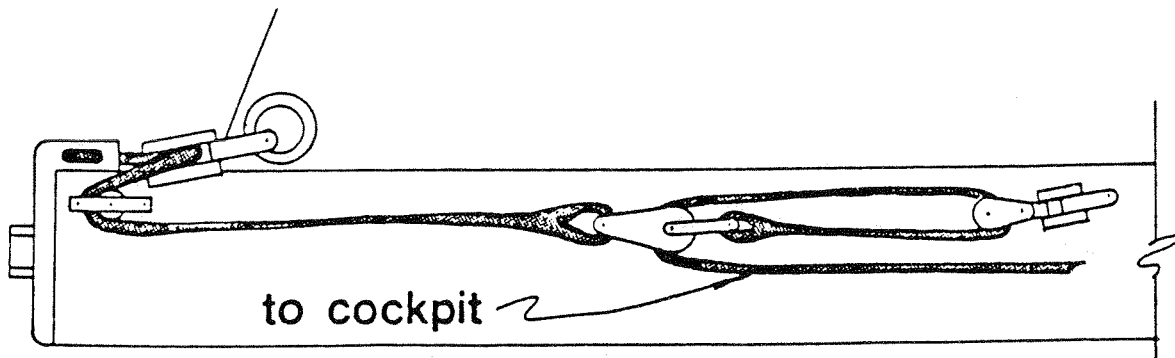
The vang should not be attached to the mast step ears at the foot of the mast because this is a weak point and the ears, when put under much stress, will break off. Attaching a bent strap to the mast is much more reliable. See drawing.

Another method which is even more satisfactory is to attach a stainless cable to the bolt at the mast step. See drawing below.



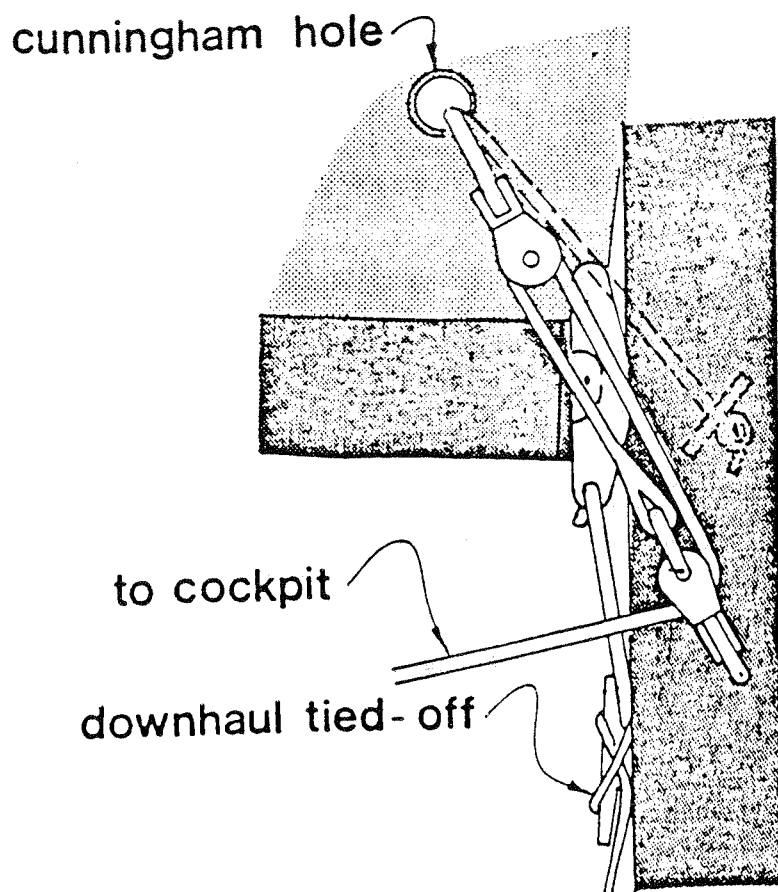
### Outhaul

An outhaul on the boom with a good mechanical advantage is useful for adjusting the draft of the mainsail while under way. Several tackle arrangements are available at modest cost. See drawing for recommended 6:1 arrangement.



### Cunningham

A 4:1 cunningham for mainsail luff tension adjustment is shown.



### Tiller Extension

When sailing to windward in either heavy or very light winds, a tiller extension is useful. It allows the helmsman to get his weight farther outboard (to windward in heavy airs, to leeward in light ones). For a Cal 20, an extension about 18" to 30" long seems to be about right.

### Timer

The use of a stop-watch for timing a start is so standard that it should not require comment, except that there are alternatives. One is a Kodak darkroom timer, which has a large, easily visible (4") dial and a sweep second hand. If mounted at the front of the cockpit, this timer is easily visible and frees hands for other duties during the busy starting period. The Kodak darkroom timer is considerably more rugged than a stopwatch and is much less expensive. Other alternatives include a sweep second wrist watch and a portable tape recorder playing a previously recorded timing tape.

### Bridge

The bridge is a convenience addition preferred by some skippers. It is a piece of wood or metal which either slides on the hatch cover tracks or is mounted on deck tracks or attached permanently to the cabin top. Cleats for the vang, cunningham, halyards, outhaul, barber haulers, etc. are mounted on the bridge.

Weather sheeting can be very helpful under extreme conditions, as it allows the crew to be on the high side of the boat where their weight is most effective.

The use of such aids must be accompanied by considerable (and considered) judgment to be effective, but they are useful if by no means infallible.

### The Rule Book

This is an accessory best stowed on board, ready for possible use in case of protest. But don't plan to use it during a race, because if a question comes up then, there is no time to study it. However, it should be carefully studied, out of fairness to one's competitors if for no other reason. It must be supplemented by actual racing experience before a real understanding can be achieved.

### D. CRUISING GEAR

The obvious space limitation of Cal 20's makes it especially important that cruising gear be well selected and thoughtout. Ideas which make it possible to use one piece of equipment for several purposes, or which make stowage more convenient are especially worthwhile, and several such schemes will be described here.

There is a very wide range of possibilities in almost every area — in elegance, convenience, price, and effectiveness. The ideas described are in no sense to be taken as recommended or guaranteed, but are only described as examples of what can be done.

### Ground Tackle

For cruising, two anchors are desirable in almost any circumstances, because one may be lost or insufficient. But for local conditions, two are virtually mandatory because most anchorages are too crowded to permit swinging to a single anchor. For instance, at Emerald Bay on Catalina on a summer weekend, boats may be packed in as close as 30 feet apart. So they must be anchored both bow and stern. Otherwise, a wind shift in the night — which is common — will cause absolute havoc.

An eight pound Northhill or Danforth with 20 or 30 feet of chain and 100 to 150 feet of 3/8 nylon rope for a bow anchor, and a smaller six pound anchor with 100 feet of 3/8 line will satisfy local requirements well.

### Towing A Dinghy

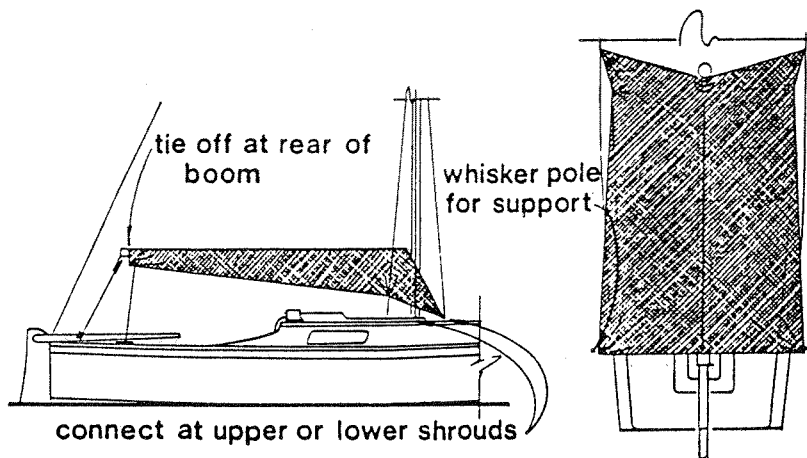
For trips to Catalina, a rubber raft or dinghy is highly desirable; in most anchorages they offer the only way to get ashore, other than swimming. An inflatable rubber raft is one possibility and is entirely feasible. The trouble of inflating and deflating it is a disadvantage; it does have value as a lifeboat in a hard chance.

The other principal alternative is a "hard" dinghy. There is a variety of such, from two-person foam and plastic ones to Sabots. The Sabot tows well and does not wander around or jerk on the tow line. The only difficulty (and this applies only to Sabots which dagger-board cases) is that behind a Cal 20, it will often be towed fast enough to take on water through the centerboard or dagger-board case, eventually swamping. The best cure is a preventive measure — in this case, simply screw down a board tightly on top of the centerboard case. With this modification, a Sabot will tow without taking any water aboard.

A towed Sabot seems to slow a Cal 20 by 1/4 to 1/2 knot.

### Cockpit Awning

When at anchor during a cruise, a cockpit awning is a highly desirable accessory, because the summer sun can get very hot. One version uses the whisker pole as the stiffening member. It is put on top of the boom, which, for the purpose, can be raised to give full headroom in the cockpit by tying the boom up at the forward end (e.g., to the whisker-pole eye) and raising the aft end of the boom with the halyard or by looping the topping lift around the boom. The cockpit awning arrangement is shown at right:



The awning is fastened to the boat at five places; the forward corners are tied to the upper shrouds; the aft corners to the aft mooring cleats; the center of the aft end to the end of the boom. Light ropes permanently fastened to the awning would be convenient. Additional ties to stretch the awning on the whisker pole also should be provided. A side seam at the aft end to go around the whisker pole is a good idea, and the awning could also be made in the shape of a trapezoid for more shade.

### Wind Break

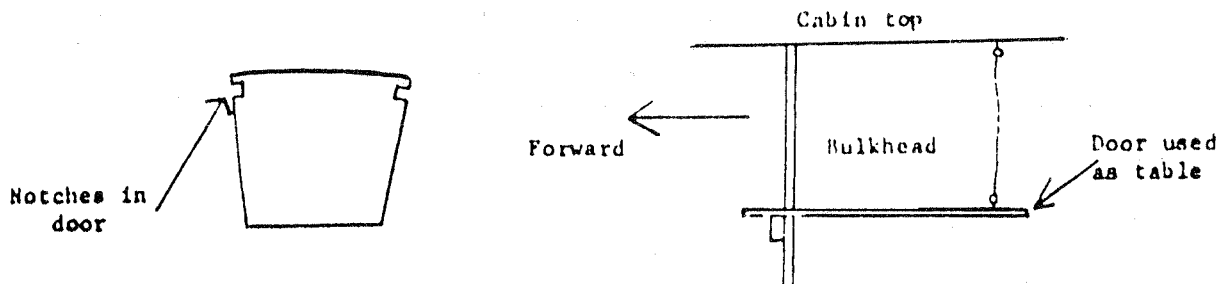
For the evening hours, when a chill wind may come up, a wind break is a useful accessory. This device is about two feet wide and seven feet long, and is attached by light line to the shrouds at deck level just forward of the mast. Some Cal 20 owners use the cabin floor rug for this purpose. This double-duty application is especially appropriate because the dimensions work out just right and the stiffness of rug material is helpful.

### Stoves

Stoves can run a gamut of complexity, depending on one's taste. Canned-heat (Sterno) is satisfactory, but rather primitive. It will boil a pot of water in about five minutes. There are gasoline and bottled-gas camping stoves, which present some additional safety hazards, in comparison to the various "marine" alcohol stoves. Cooking under way is seldom desirable for the kind of cruising likely with a Cal 20. It is relatively easy to provide a sandwich lunch and a thermos of coffee and cold snacks in case of a long trip.

### Table

A good table arrangement, and one which presents no additional stowage problem, is to use the companionway door as a table. It can be notched to fit the cabin bulkhead and supported by blocks on the bulkhead or by a cord to the cabin top.



## III. NAVIGATION EQUIPMENT

It is easily possible to get into trouble due to poor navigation, when more than three miles from home, mostly because of fog — even in the nearly ideal conditions which prevail locally.

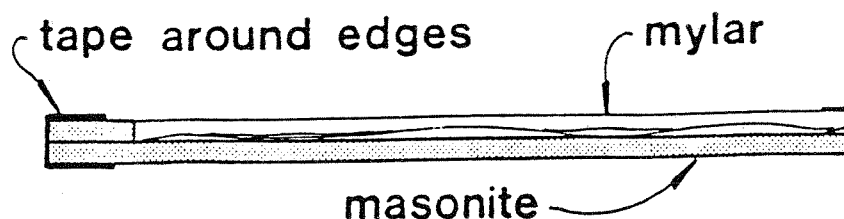
For local cruising to Catalina and other islands along the coast, a compass, charts, and an RDF are the minimum desirable navigation equipment. Many people do cruise to Catalina without an RDF in the summertime. Additional useful items are a hand bearing compass (which also may serve as a spare in case of damage) and a knotmeter (speedometer). But none of these items is useful unless used, and used properly.

### Compass

The compass should be checked for deviations and adjusted (compensated), or a deviation table made. Individual compasses vary, as well as boats. Perhaps the orientation of the keel when cast in the foundry has something to do with the differences in deviation among boats. To check for deviations requires that the boat be pointed in different known directions so that the compass error can be found. There is nothing mysterious about the process, although it requires some time and effort. Refer to Chapman's for an explanation of procedures to do the job yourself — or hire a local expert. Known directions can be found by consulting a chart: for instance, the Main Channel of Marina Del Rey is true north/south (note: not magnetic north/south). Then other known directions can be found by the use of a chart or a pelorus or equivalent.

### Charts

Charts are one of the best bargains available, and there is no reason for not having the most detailed and up-to-date charts available for the areas visited. Stowage represents some problem, however, especially if they are kept rolled. A satisfactory solution for storage, working space, and protection of charts from the weather is a case made of 1/8" piece of masonite, about 18" x 24", with a masonite strip around three sides, and covered with a frosted Mylar plastic sheet which can be written on. A section of this is shown below:



Along the open side, the plastic cover is reinforced with tape or a piece of wire and tape. The charts are folded, stored, and used in this device, which thus also serves the purpose of a chart table. The whole works can be stowed under a bunk cushion. The plastic cover protects the charts from spray when in the cockpit and can be written on and easily erased.

The principal limitation of the charts is that only a few of the available radio stations for RDF use are shown on them. Most marine radio dealers have an up-to-date listing of station locations, and these should be entered on the charts, together with their operating frequency.

### Hand Bearing Compass

This is a hand-held compass with sights and a prism which enables one to take quite accurate bearings on visible landmarks. It is a great aid to precise navigation when the visibility is good, but of course, is of little value when the need is greatest — in poor visibility. But it is useful nonetheless, because through its use in good weather, one can deduce one's speed under various wind and power conditions. It also constitutes a spare compass.

### Knotmeters (Speedometers)

Knotmeters can eliminate — or at least reduce — guesswork as to speed, and hence vastly improve the accuracy of dead-reckoning. But they usually require calibration and should be checked rather carefully. Some skippers have also found knotmeters useful for racing preparation (e.g. tuning).

## **IV. CAL 20 MOTORS: PROBLEMS & SOLUTIONS**

The Cal 20 motor well location is very convenient, but it has (in common with every other location) some drawbacks: the motor tends to make more noise and fumes than one in an outboard (e.g., on the transom) location; the well, if opened when going over about two knots, tends to scoop water into the cockpit, which can be disconcerting the first time; and standard motors when running in the well, tend to set up an oscillation of water into and out of the well with a period of roughly two to three seconds. Under some conditions, this can result in water gushing out of the well into the cockpit. See "Installing and Removing the Motor Under Way".

The well location has the important advantages that the motor is not exposed to "drowning" by following seas, cannot slip overboard during installation, and is much easier to install and remove than is the case with transom mounting.

### Amount of Use

One season's intensive use of the boat involves about twenty hours motor use. Some avid cruisers have used theirs much more, of course. This use has largely been on Catalina trips. The usual summer weather is a calm morning with wind picking up around 11 or 12 o'clock. Catalina is far enough (32 n. mi. from Del Rey entrance to Emerald Bay) that it is desirable to get an early start in order to reach Catalina before dark — or before good anchorages are gone. Use of the motor is therefore highly convenient in such a situation. When the wind picks up, the motor should be removed from the well

because propellor drag reduces boat speed from 1/2 to 1 knot. On the other hand, some prefer to leave it in place (especially those with large motors), sacrificing speed under sail for convenience, e.g., in entering an anchorage.

### Speed and Consumption

A three horse power motor drives the boat at about four knots. The fuel consumption at cruise setting (i.e., at about 3/4 max RPM) is about 2/3 gallon/hour, so that three hours of motoring (typical during a one-way trip to Catalina) uses two gallons for about twelve miles. A six horse power motor drives a Cal 20 a bit over five knots and consumes 5/6 gallon per hour. For a seven to eight hour trip such as Catalina, it is a good idea to have at least ten gallons on board in case there's no wind.

### Installing and Removing the Motor Under Way

The following account from early days of Cal 20 lore identifies the problem:

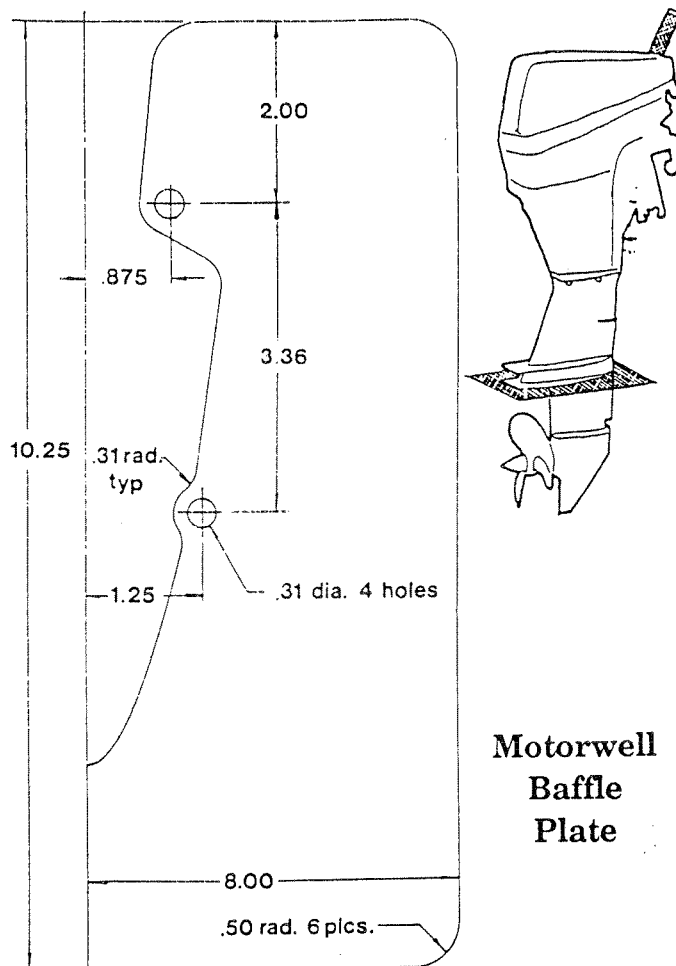
"The first time I did this, I was in the middle of the San Pedro Channel, with the nearest land 1/2 mile away — straight down. A nice breeze had come up and we were sailing along at about 5 knots, and I wanted to remove the motor from the well to reduce drag. While I lifted it up, a fountain of water followed it, filling the cockpit about 4 inches deep. No water came close to going into the cabin, but you can imagine my consternation. We slowed down at once when I recognized the problem and luffed the boat. The water ran back out the well, and I put on the well cover."

"Wet feet or frightened wives can be avoided by slowing the boat to one or two knots by "backwinding" the boat or by luffing the main, or in high winds, both main and jib. It is not necessary to completely stop the boat, and it is desirable to maintain steerage way during the operation of installing or removing the motor, which need only require a minute or two."

### Preventing Motor Surge

The tendency of water to surge into and out of the well while motoring can be eliminated in several ways. It is not necessary to seal the well, or anywhere near it. One solution is to jam a block of styrofoam into the rear of the well behind the motor (see drawing). Another is to build a wooden plug to fit around the motor shaft and roughly fill the well. The most convenient solution is to extend the motor cavitation plate by a larger metal plate. The plate is fastened on top of the existing cavitation plate. This is more permanent than a styrofoam plug (which tends to get eroded and melted by the engine exhaust, only lasting a few hours), and does not interfere with using the motor on a sabot or other dinghy, as does a wooden plate.

An anti-surge plate is sold by Steve Seal — see section one for ordering. It is bolted to the cavitation plate using existing bolts in the motor, or you can make your own. See drawings shown at right.







## I. GENERAL MAINTENANCE

### A. SAILS

The sails are small enough to be folded, bagged and stowed below. Remove the battens and sheets. If the sails are wet, dry by hoisting or stow below spread out to dry. The dacron and nylon sails do get wet and become caked with salt. When they do hose them off with fresh water and dry thoroughly by hoisting them at the dock on a still, warm day.

Take care of your sails with periodic checks, especially spinnakers, for small tears and chafe. Hoisting and lowering sails, except spinnakers, while head-to-wind is good practice and easier on the sails.

### B. FIBERGLASS SURFACES

Periodic application of Tide and fresh, warm water with deck brush and sponge followed by a good hosing and chamois will do the cleaning job. If the gloss dulls or fades, wax the smooth surfaces with Vista or Meguiar's Mirror Glaze paste wax. Surfaces that have started to oxidize can be brought back with Meguiar's Fiberglass Boat Cleaner or DuPont White #7 Polishing Compound. Wax the hull with a power buffer and paste wax once a year. The non-skid surfaces can be brought back to life with a lather of Tide or Mr. Clean. Be sure to follow up with lots of fresh water to avoid streaks on the topsides.

Avoid any metal filings on the fiberglass surfaces as they will leave rust spots. These spots can be removed with oxalic acid or Teak-Brite but first test a small area against bleaching out the surface color.

Consult the enclosed booklet for touch-up work and repair of minor scars or breaks.

### C. WOOD SURFACES

The main companionway hatch trim is teak which is weather resistant due to its natural oils. Teak does fade to a dull gray, which, if objectionable can be scrubbed clean with "Teak-Brite". Teak's natural color and texture can be preserved by applications of Weldwood's "Woodlife" or similar sealers. Teak, when well varnished, produces the ultimate in a yacht wood finish but requires constant loving care! Both the tiller and companionway drop board are well varnished but may need to be re-coated once a year.

The overhead below deck is fiberglassed. All other mahogany surfaces have been well covered with a high grade marine varnish at the factory. In order to maintain the original high luster and protect the wood, sanding and re-varnishing will be necessary when the gloss fades or bare spots appear.

Treat all the materials used below deck as a home interior. Air is a wonderful cleaner: bring the vacuum cleaner aboard and always keep the boat well ventilated, especially the bilge and lockers.

# **CAL 20**

# **OWNERS MANUAL**

## **SECTION FOUR**

### **CAL 20 PREVENTATIVE MAINTENANCE AND UPKEEP:**

I. GENERAL MAINTENANCE	
A. SAILS	PAGE 31
B. FIBERGLASS SURFACES	PAGE 31
C. WOOD SURFACES	PAGE 31
II. PREVENTATIVE MAINTENANCE CHECKLIST	PAGE 32-33

## II. PREVENTATIVE MAINTENANCE CHECK LIST

Component/ Date Inspected	Inspection Frequency	Detection	Prevention
<b>Jumper Adjuster Studs</b>  Inspected: _____/_____/_____ _____/_____/_____ 	Two Years	Inspect studs for deterioration from salt in air.	Slight damage can be retarded by cleaning and corrosion protection with paint or caulking material; severe damage requires replacement.
<b>Mast</b>  Inspected: _____/_____/_____ _____/_____/_____ 	Two Years	Inspect after removal of mast foot fitting.	Clean and Paint
<b>Backstay Attachment Strap [on transom]</b>  Inspected: _____/_____/_____ _____/_____/_____ 	Two Years	Check the tightness of attachment bolts.	Tighten
<b>Pintels</b>  Inspected: _____/_____/_____ _____/_____/_____ 	Two Years	Check the tightness of the attachment nuts inside transom.	Tighten

These critical and non-critical items are important to the structural and functional integrity of your Cal 20.

This is not an exhaustive list; but it is made purely to suggest that you inspect items not routinely observed.

**Our Appreciation to Mike Oliveau for his thoughts.**

## II. PREVENTATIVE MAINTENANCE CHECK LIST [Continued]

Component/ Date Inspected	Inspection Frequency	Detection	Prevention
<b>Keel Bolts</b>  Inspected: /   / /   /	One Year	Remove bolt, inspect for rust damage	Replace damaged bolts; install bolts with quality corrosion protection [e.g., Rustoleum--before dry, and sealing ring of caulking compound at base of bolt head.
<b>Spreader Brackets</b>  Inspected: /   / /   /	One Year	Remove brackets and inspect for cracking	Install brackets made of thick stainless steel than factory brackets [1/16th inch min., 3/32 preferred].
<b>Mast</b> [at Hounds]  Inspected: /   / /   /	Two Years	Remove spreader brackets and tangs which support jumper and lower shroud cables; Look for corrosion of Mast.	Remove corrosion; paint locally with rustoleum; install thin plastic washer [e.g. off of a dish soap container] between mast and tangs.
<b>Standing Rigging</b>  Inspected: /   / /   /	One Year	1] Run finger along cable to detect any broken fibers [e.g. "hooks"]  2] Carefully inspect cable at each swaging.	Replace suspect rigging.
<b>Forestay Attachment Fitting</b> [at Mast]  Inspected: /   / /   /	Two Years	Inspect for wear and/or cracking.	Replace if damaged.