HADRON H2
OPERATIONS MANUAL

2020

The Hadron H2 was designed in 2015 by Keith Callaghan and is manufactured by
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Previous versions of this document were titled 'H2 Owners Manual' but this and subsequent versions are titled 'Operations Manual' to separate it from the 'Owners Manual' required by the EU Recreational Craft Directive. Apart from the title, this version is unchanged from Version 9.

CONTENTS

1. Introduction

The Hadron H2 singlehander dinghy is a modern design of classic lines which uses the latest materials and techniques in its construction. The boat is of carbon fibre/aramid fibre/Corecell foam/epoxy resin composite construction, with a small additional amount of glass fibre in certain areas. The exterior finish is polyester gelcoat resin. All areas where fittings are attached are reinforced with nylon or high density glassfibre pads or similar materials. No timber is used anywhere in the boat.

The aim has been to keep the hull weight as low as is practically possible, while delivering a robust and long lasting product. Careful handling and use will ensure that the boat maintains its condition and will help maintain its resale value.

Before you sail the H2 for the first time (and at regular intervals after that), check that all shackles, knots etc are tight. Ensure that you have a tool kit handy when you first rig the boat, in case small adjustments need to be made.

The Hadron H2 is a one-design racing dinghy. The hull and centreboard are strictly controlled but the owner is allowed some discretion with regard to type, make and location of fittings. The rig is controlled by dimensions and spars and sail may only be supplied by a manufacturer licensed by Hadron Dinghies Ltd. A new 'standard fit-out' Hadron H2 utilises Super Spars spars and HD Sails sail. For further information, see the Hadron H2 Class Rules at http://hadrondinghy.com/HADRON%20H2%20Class%20Rules%202016%20V6.1.pdf.

The designer originally proposed a Portsmouth Yardstick for the Hadron H2 of 1040. This is based on the principal parameters of the boat and is likely to be amended as real race data is accumulated and analysed. In March 2018 the RYA published an Experimental PY for the H2 of 1037. Experience suggests that the PY may end up 7-10 points lower than this as expertise builds within the class.

2. Preparing & Rigging the H2

These instructions apply to an H2 with the 'standard specification' layout.

Rig Setup – mast rake

The mast rake is adjusted by use of the vernier plates at the base of each shroud.

Always check mast rake with the forestay pulled tight. Note that this adjustment must be carried out ashore – it is not allowed whilst racing (see class rules).

Even in light airs, some rake is required. As the wind increases, progressively more rake is desirable (up to a metre in extreme conditions). With extreme rake, the sail is depowered. A starting point for rake is as follows: with the forestay tightened to provide about 75kg tension on the shrouds, the distance from masthead to top of transom should be approximately 6300mm.
Some raking of the centreboard will be useful in offsetting any weather helm engendered by raking the mast.

Rig Setup – Spreader configuration.

Start off with the spreader tips deflecting the shrouds outboard by about 25mm and forwards by about the same amount: this allows the spreaders to restrain the sideways and fore-and–aft bend in the middle of the mast. Mast bend characteristics may be altered by changing this initial setup. For example, lighter helms may wish to shorten the spreaders and/or rake the spreaders more aft; conversely, heavier or more athletic helms may wish to lengthen the spreaders

Rig Setup – rig tension.

The spreaders are effective in controlling mast bend only if the rig is tensioned fully – by pulling hard on the forestay tackle. In strong winds, some depowering effect can be achieved by reducing rig tension so that the leeward shroud swings loose.

Toestrap adjustment

Before rigging the boat, adjust the toestraps at the forward end to suit your leg length and preferred hiking position. Adjustment for height and reach is possible. Shorter sailors may also want to adjust the lateral position of the middle toestrap plates. To do this, drill a new 3mm hole for each of the two screws holding the plate. The original holes will need to be filled in order to ensure that the buoyancy compartment is watertight.

Rigging the H2

Most of the controls will have been rigged as far as possible prior to delivery. There are 4 control line cam cleats each side, mounted on the inner angle of the side deck, just forward of the thwart. From inboard to outboard, these are:

a. Kicker, aka kicker or kicking strap (RED line)
b. Clew Outhaul (YELLOW line)
c. Cunningham (BLACK line)
d. Forestay (BLUE line)

The control lines for all the above are continuous.

The Hadron H2 is a straightforward boat to prepare for sailing:

1. Fit the wind indicator (if any) to the masthead.
Different techniques can be used to step the mast singlehanded: one approach is as follows:

a. Lay the mast on the boat with the masthead facing aft.
b. Attach the shrouds to the deck fittings, after checking the rake pin position is correct for the anticipated wind strength.
c. Slacken the forestay control to its maximum extent.

d. Lift the mast to a nearly upright position and place the foot in the mast step. Ensuring that the boat is in 'bow down' position will facilitate the lift.
e. Pull the forestay forward and attach it to the shackle on the forestay adjuster line.
f. Tighten the forestay control line to achieve the required rig tension. Check that the rake of the mast is appropriate for the anticipated wind strength and adjust the rake if necessary, using the vernier adjusters on the shrouds.

2. Rig the mainsheet: ensure that the control line tails are positioned forward of the mainsheet strop or hoop. Pass the mainsheet through the swivel jammer cleat, then the ratchet block (ensuring the correct direction by checking that the ratchet does not 'click' when passing the rope through). Then pass the rope through the aft boom block (from aft to forward), rope strop block (from aft to forward), forward boom block (from forward to aft) and finally tie it off with a bowline through the strop block.
If sailing in light airs, the 4:1 purchase thus produced can be reduced to 3:1 (and thus improve response and reduce friction) by untying the bowline and retying it on the forward boom block.
Tie a knot in the aft part of the mainsheet to ensure that the boom can only just touch the shroud if the sheet is dropped.

3. Position the boat so that it is head to wind. Ensure that the mainsheet, kicker, cunningham and clew outhaul control lines are loose and not cleated. Attach the main halyard to the head of the sail. Feed the sail luff bolt rope into the mast track and hoist the sail to within about 500mm of the top. Jamb the halyard in the Clamcleat which is positioned on the front of the mast near the mast foot.

4. Fit the clew band of the sail over the outboard end of the boom. Pass the clew outhaul line through the starboard side of the clew cringle and slip the end knot over the groove in the boom end fitting.

5. Lead the Cunningham line through the Cunningham cringle on the sail luff. (This cringle is situated about 150mm above the tack cringle). Pass the loop in the end of the Cunningham line over the shoulder of the gooseneck pin and insert the gooseneck pin into the boom socket. Attach the kicker shackle to the boom strap.

6. Pull the sail to the top of the mast and ensure that the copper ferrule on the wire strop at the top of the halyard engages in the masthead vee cleat (other methods of securing the halyard may apply to your H2, such as a lateral Clamcleat). Cleat the halyard tail loosely in the clamcleat at the mast base. Coil up the tail and stuff it into the inboard end of the boom or in a halyard bag (if fitted).

7. Secure the tack cringle to the mast using the 'loop and ball' provided.

8. Tie the tail of the clew outhaul line onto the single block on the clew outhaul tackle.

9. Fit the rudder onto its transom fittings. Ensure that the rudder retaining clip is in place. Tighten the wing nut on the rudder pivot just sufficiently to keep the blade in a horizontal position. Lead the rudder lowering line though the Clamcleat on the forward end of the tiller.

10. Cleat the control lines for kicker, Cunningham and clew outhaul. Adjust the clew outhaul to the desired foot draft. Take out the slack in the kicker and Cunningham lines but do not tension at this stage.

The boat is now ready to launch. Note that the Hadron H2 is much lighter than most boats of its size and therefore great care should be taken, once the sail is hoisted, to ensure that when ashore the boat is kept head to wind and tied to its trolley. In stronger winds, if the boat is to be left unattended it should be anchored to a fixed point.

3. Sailing the H2.

The Hadron H2 has been designed very much with ease of handling in mind but each class of dinghy has different characteristics and the H2 may perform in a different way to that which you are used to. The class is young and thus a set of optimum techniques are still evolving. Thus, because of the short time since product launch, the details in this section are part theoretical and part empirical. Early users of the H2 are encouraged to send feedback of their own experiences to Hadron Dinghies Ltd so that this document can be updated and improved.
Much of the tuning guidance derives from a training day led by Jim Hunt at South Cerney SC in April 2018. Thanks to Jim for providing much of the following text.

Launching

(First launch: It may be necessary to adjust the friction device on the centreboard if the board is either too stiff in the case (it cannot be raised or lowered easily) or too loose (it persists in raising itself when you gather way). Therefore take a large screwdriver with you, suitable for 10 gauge slotted head screws. Use this to adjust the friction device on the upper face of the centreboard – this can only be accessed when the board is full down, so you need to be afloat in a least 1.5m of water. Screw clockwise to increase friction, anti-clockwise to reduce friction.)

Push the rudder down a little so that it is just below horizontal.

Wheel the boat into the water, while keeping it as near head to wind as possible, and float it off its trolley. (The Sovereign alloy trolley is so light that it floats: it will facilitate launching and recovery if it is weighted so that it sinks).

Stand in the water on the windward side of the boat and hold the shroud with your forward hand. Pull the 'centreboard down' line sufficiently to lower the centreboard a little. Check that all control lines are cleated on both sides. In stronger winds, ensure that the kicker is cleated but not tensioned.

Ensure that the mainsheet is freed off. Turn the boat slightly away from the wind until the boat gathers a little way and you can climb in over the stern. Push the rudder down half way as you climb aboard.

As soon as the boat is clear of the land and in deep water, lower the centreboard fully, luff the boat and pull the rudder fully down by pulling the rudder downhaul line on the tiller and jambing it off on the Clamcleat. If possible, and especially in stronger winds, tighten the wing nut on the rudder pivot pin. Adjust the rig controls to suit the wind conditions.

Now sheet in and go!

Sailing Upwind

The boat is designed to be sailed upwind with the stem immersed about 40mm. This will require you to sit well forward, especially in lighter winds. In boats with a waterline stripe this equates to the lower edge touching the water. In light airs the stem should be immersed even more (this helps reduce the wetted surface area, and hence low speed resistance, of the hull). The H2 is a well balanced boat and the centreboard should be fully down in all conditions to windward.

As with most dinghies, the H2 should be sailed upright, but a small degree of heel is acceptable. The HD Sails sail has excellent 'gust response' and in a gust you will find that the upper leech will free slightly and thus automatically depower the rig.

In very light airs you don't want a deep sail – the aim is to flatten the sail without closing the leech too much. The forestay tension has a major effect on mast bend fore / aft and sideways and hence sail draft, so start by letting off the forestay so that the leeward shroud is slack. This reduces the effect of the spreaders and allows the mast to bend. The sail will flatten and the leech open. That will allow you to apply more kicker before the leech closes, flattening the sail further. Since the front of the sail is flatter you will be able to sail with the boom further out and still have good height.
Position the boom fairly well out – about over the rear toestraps or a little further (in fact, this is the desired boom position for all wind strengths). However, the shape of the leech (i.e. straight) is more important than boom position. If you need to centre the boom more in order to point, it means that the leech is too open.
The lower leech needs to be closed a little (i.e. a slight return on the lowest batten). To achieve this you need to put some depth in the foot by easing the clew outhaul. There should be around 150mm from the middle of the boom to the sail at the mainsheet blocks.
The draft at the forward end of the sail can be lessened by bending the mast – primarily with mainsheet tension and possibly the kicker also. On an H2 with a mainsheet car, the car is positioned about 150-200mm to leeward (this applies to any wind strength).
If you are not getting enough height, it means the sail is still too deep. Try letting off more forestay in order to allow the mast to bend more and then sheeting the boom closer.
As the wind increases, tighten the forestay. This reduces mast bend and powers up the rig (makes the leech harder). As the wind increases to the point where you cannot keep the boat upright, slacken the forestay to increase mast bend, slacken the leech and thus depower the rig.
Sail with the mainsheet cleated, most of the time. If you get a gust, use it to gain height. If you feel the need to ease the mainsheet because you are getting overpowered and can't steer through it consistently, ease the forestay more to depower the rig. But be careful not to over-do this. The Finns have this technique mastered – they never play the mainsheet in anything but the very strongest winds and big seas.

Tacking

Steer positively into the tack. Ease the mainsheet as you cross the boat so that you can come out of the tack sailing a little free – especially in stronger winds. Pass the tiller extension forward, between tiller and mainsheet. Step smartly across the boat. Try to stay as far forward in the boat as possible. Cleat the mainsheet when you are established on the new tack and swap tiller and mainsheet hands. Sheet the mainsheet in as the boat accelerates.
If you consistently get in stays when tacking, try easing the kicker a little.
If the top battens do not flick over after a tack, try a little Cunningham tension.

Bearing away

No special preparation is required in light winds, but in stronger conditions ease the kicker a little. As you bear away, slide aft down the side deck (in strong winds, get even further back). Keep the boat upright and free the mainsheet as you bear away so as to maintain the balance of the boat.

Starting Technique

Practice slow sailing: if you are the slowest boat approaching the line, other boats cease to be your problem as they have to keep clear of you, until they overlap to leeward. Set up your rig for the beat according to the conditions. At the gun, you need to be pointing high – pull the forestay on (this tightens the leech), hike like mad to keep the boat flat, and climb. Hopefully this will force boats to windward to tack away, but

you won't foot fast on that setting so return to your pre-determined settings as soon as possible.

Reaching

Light airs

The priority is to get flow across the sail. Leave the forestay and outhaul on upwind setting. Ease the kicker until the top batten goes straight, then pull a little back on until the top batten has a shallow bend in it.
Raise the centreboard until you develop lee helm, then put it down a bit to neutralise the rudder. Keep your weight over the thwart and sheet straight off the boom.
Aim to keep the leech tell tales just flowing and the boat flat.

Medium airs reaching - looking for maximum power.

Pull the forestay on so that the leeward shroud is just snug.
Ease the kicker until the top batten goes straight, then pull a little back on until the top batten has a shallow bend in it - this will need more tension than light airs.
Ease the outhaul to give 200mm depth from sail to middle of boom above th mainsheet blocks.
Raise the board until you develop lee helm, then down a bit to neutralise the rudder. You need enough board so that the boat tracks straight and changes direction easily, but no more. Weight in upwind position - bow should be just clear. Sheet off the boom if it's a broader reach.

Heavy airs reaching - looking for control and easy steering.

Pull the forestay on so leeward shroud is just snug.
Ease the kicker until the top batten goes straight, then pull a little back on until the top batten has a shallow bend in it - ease more if you need to steer or are having to move a lot of mainsheet. Leave outhaul on upwind setting. Raise the centreboard enough to unload the rudder, but leave enough to stand on! Move your weight back to keep the bow clear - move forward in lulls.

Running

In light airs, move well forward in order to trim the boat down by the bow. You can sit astride the central tank or 'side-saddle' on the central tank or the thwart. If the latter, you can lean forward comfortably with your forearm along the side deck. In the really light stuff you can even lie in the bottom of the boat with your legs draped over the central tank. No kneeling required! In stronger winds, the best position is on the side deck (see below).

Some easing of the centreboard is acceptable (45 degrees), but if this is over-done the boat will become less stable – especially if your weight is well forward.

A lot of people sail down wind with the boom on the shrouds and the kicker on hard in order to lock the leech up. But because the leech is hard, when you head up it bites you – the boat heads up more aggressively than expected. And when you bear off the flow reverses all in one hit and it bites you again. A bit of twist smooths the flow transition.
In most wind conditions aim to keep the flow going across the sail from leech to luff in the bottom half of the sail. This requires sheeting the boom in enough to stop the shroud distorting the sail and using only sufficient kicker to keep the head of the sail from going forward of the mast. Keeping flow over the rig loads it up so that you can sit

on the side deck and be best placed for rapid reaction to changing conditions of wind and wave. Flow over the sail is further encouraged by sailing slightly by the lee. If you need to head up, once the boat starts turning ease the main to speed up the transition of flow across the sail.
There is no need to tighten the forestay on the run – leave it as it was on the previous leg, as the shrouds are taking all the load.

Gybing – Light airs

Bear away and roll the boat to windward as you do so. Grasp the falls of the mainsheet and pull the boom over. Step across the boat and roll it back upright, pulling the mainsheet as you do so. This will help accelerate the boat out of the gybe.

Running – Strong winds

Steer positively to keep the boat flat - if the boat heels to leeward, bear away; if the boat heels to windward, luff up.

If the bow is driven down in strong winds and waves, head up and pull in the mainsheet a little in order to free the bow. You can be confident in the vice-free handling of the H2 as long as you take positive and prompt action – enjoy!

Gybing – Strong winds

Gybing the H2 is generally straightforward, due to the light weight of the rig and the inherant stability and balance of the hull design. Always gybe at full speed as this gives the boat more dynamic stability and reduces the wind forces on the rig.

Sheet the boom in slightly then cleat and drop the mainsheet. Ensure the boat is upright and steer positively into the gybe. Grasp the falls of the mainsheet and pull the boom over as the boat turns through the gybe. Duck!

Cross the boat and come out of the gybe on a broad reach in order to minimise any tendency to roll to windward. Swap tiller hands, pick up the sheet and carry on.

Calibration

Calibration and recording of the above adjustments is ESSENTIAL if you are going to be able to repeat the settings once you find the ‘sweet spot’ for a certain set of conditions. Develop a matrix of control settings for all wind strengths and points of sailing.

Coming ashore

Raise the centreboard half way. Loosen the rudder pivot bolt wing nut and uncleat the rudder downhaul. Reach over the stern and pull the rudder blade up half way.

If you are returning to a lee shore, the prudent action is to lower the mainsail and blow ashore.

To lower the mainsail, take the halyard out of the boom end or halyard bag and ensure that that it is not tangled, loosen the Cunningham and the kicker fully then pull the halyard out of the masthead lock or Clamcleat. Pull down on the luff rope and ease the boom off the gooseneck as the sail comes down.

Righting after a capsize.

Much thought has been given to the buoyancy configuration of the H2. The central buoyancy tank combined with zero buoyancy under the side decks ensures that the boat floats low when on its side, with the centreboard not much more than 100mm above the water, thus allowing even a tired helm to mount the centreboard. The risk of total inversion is reduced by the use of an external halyard, which means that the mast is semi-watertight.

When righted, most of the water in the cockpit drains out through the stern, with only the foot wells retaining water. Entry into the boat is easily done via the stern – the aft toestraps are convenient to pull oneself aboard. However, in windy conditions and/or rough seas it is preferable to enter over the weather gunwhale. To facilitate this, boats from #123 onwards (January 2018) have righting lines fitted as standard*. The righting line is visible just under the gunwhale for about 600mm each side in the region of the thwart position.It is held in its retracted position under tension by shock cord and it can be deployed by pulling on the forward part – not the aft part, as that end is fixed. When fully extended, the righting line forms a loop approximately 1 metre in depth (the length can be adjusted if required).
Recommended righting procedure:
If the boat is inverted (this happens infrequently), get the boat into a horizontal position by standing on the weather gunwhale while holding the centreboard. Once this is achieved, the boat will be floating with the centreboard horizontal and about 120mm above the water. Now clamber onto the board and reach up to grab the retrieval line. Pull it out from the forward end: it will be under tension so do not let it go. Stand up on the board (caution – it is slippery) and lean backwards. The boat should slowly right itself and as it does so put a foot on the loop of the righting line so that you can propel yourself over the gunwhale and into the cockpit once the boat is upright. It will be helpful to release the kicker tension before entering the boat.
If the mainsheet is still cleated the boat may well capsize again. In that case, swim round the stern and release the mainsheet from the jammer before attempting to right the boat for a second time.

* For H2s numbered 101 to 122 a retro-fit kit for the retrieval lines is available from Hadron Dinghies Ltd.

4. Care and maintenance.

Storage ashore

Because the H2 is so light, when left unattended ashore (e.g. packed away in the dinghy park) it is essential to anchor your H2 to fixed objects (ground anchorage or concrete weight) each side and preferably also at the bow. The H2 hull is strong but it is not designed to take point impacts such as those that might occur if the boat is blown off its trolley.

Hull

The hull mouldings are made using epoxy resin and are therefore less prone to water absorbtion than a polyester hull. However, the gel coat is polyester and thus more prone to water absorbtion, which could cause blistering and increased 'print through'. These problems will not occur if the boat is stored ashore and in a reasonably dry condition. The following simple precations should be taken:

a. Ensure that the boat is stored with self- bailers open and with the boat level or with bow very slightly higher than the stern.
b. Use a breathable top cover.
c. Preferably, do not store outside for long periods with a bottom cover fitted.
d. If the boat has been sailed in salt water, wash the boat with fresh water before storage. Salt water is hygroscopic, corrosive to certain metals and causes galvanic corrosion in others (carbon, stainless steel and aluminium are potentially a toxic mix), so it's best to wash it all off.

Sail

The sail should be rolled up, never folded, and stored dry and in its bag.

Do not attempt to launder the sail. Stains may be removed by using normal detergent and warm water.

Temporary repairs can be made with sail repair tape or similar. Return to the sailmaker for proper repair as soon as possible.

Damage

This falls into 3 categories:

a. Minor: e.g. chipped or scratched gel coat. This type of damage can be repaired by the owner and should be attended to in order to keep the boat looking good. A colour-matched gel coat resin can be obtained from Hadron Dinghies Ltd.

b. Medium: e.g. gel coat crazing, small hole or split. Get the damage repaired as soon as possible, but emergency repairs can be carried out using a reinforced adhesive tape.

c. Serious: e.g. large hole, fracture of laminate. Return the boat to Hadron Dinghies Ltd or other competent repairer for repair. See class rules regarding repair.

5. Class Association

The Hadron H2 Class Association (HH2CA) was set up at the end of 2017 and is affiliated to the RYA. Membership of the HH2CA is open to owners of the Hadron H2 and associate membership is available to other interested parties.
In the year commencing 1 January 2018 all current owners are enrolled in HH2CA at no charge.

6. Insurance

Hadron Dinghies Ltd suggest GJW Direct as insurers for your Hadron H2. Other insurers are available.

For further information, spare parts and accessories, contact:

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