BOAT REPORT

SUNSEEKER 58 MANHATTAN

With the latest Detroit Diesel engine-control system and space-age interior styling, Sunseeker's second flybridge motoryacht is in a league of its own. Emrhys Barrell tests it in the Mediterranean, examines the propulsion electronics and talks exclusively to accommodation designer Ken Freivokh.

SUNSEEKER have set the pace in design and styling to such an extent that they often appear to be in a different market from their fellow boatbuilders throughout Europe.

They were using modern fabrics and lacquered woods when other yachts were still stuck with teak and blue Dralon. When their rivals caught up, they kept up the pressure by moving into exotic maple veneers and Italian styling. Two years on, half the boats at the Southampton Boat Show were sporting the highly-polished bird's-eye and crown-cut maple look, so what do Sunseeker do? They unveil the 58 Manhattan.

Designed by Ken Freivokh, the interior of the 58 is a masterpiece of modern materials. Pearl lacquered wood forms the furniture, stainless steel the fittings and details, and Magilite the upholstery. These materials are linked together in a layout that is bold yet practical, creating a spectacular yet very usable vessel which will set people talking on both sides of the Atlantic.

Appropriately for such a ground-breaking vessel, the Manhattan is fitted with one of the first installations of Detroit Diesel's MkIII DDEC electronic engine-control system. This gives remarkable benefits in performance, economy and monitoring, at high and low speeds.

Design

For the external design, Sunseeker have stayed with their long-term partner Don Shead, and he has produced a medium-to-deep vee hull with a variable deadrise of 23° amidships, 18° at the transom. Three sprayrails run parallel to the keel, and up above the waterline at the bow, in his

Freivokh to the fore. The 58 Manhattan's interior is striking to say the least, from the main wheelhouse saloon with its perspex stairway (above and left), through to the master cabin (top right), the galley, toilet and exterior helm (right).

usual style, while at the aft end the propellers are set in tunnels to reduce draught and shaft angle.

Above the waterline, up to the deck-edge, the Manhattan is typically Sunseeker, with an aggressive line to the gunwale and a poise which speaks of speed. On top of this is a fashionably rounded superstructure, with reverse window angles and curved panels. There are too many changes of line here for us to feel comfortable with the whole effect, but beauty is in the eye of the beholder and half a dozen beholders have already handed over their deposit cheques.

Accommodation

The 58 provides three double cabins, two of them with bathrooms en-suite, plus a large midships crew cabin, again with its own facilities, which would double as an overflow cabin or the children's den.

On your right as you enter the saloon is a semicircular settee, with room for four or five people, facing a circular stainless steel table. There is no storage space underneath this settee, as part of it supplies the headroom for the galley below.

Opposite to port is a full-length sideboard, with lockers beneath, containing an icemaker, a cocktail cabinet, glass stowage and a television. The facade is finished in pearl lacquered wood, while the top is superbly veneered in walnut set off by stainless steel vertical posts, round fiddled edges and style strips.

Set diagonally forward are steps leading up to the flybridge and down to one of the cleverest galley designs we have seen.

Some 12ft (3.5m) long, the galley runs along the starboard side of the boat. At its forward end it is open-topped, with a large worktop and serving area, and ample storage. Also here is a combined washing-machine/spin-dryer and a three-quarter-height domestic-sized fridge/freezer. Whether by accident or design, this is set into the aft bulkhead, facing forward, so that when the boat is trimmed up by the bow underway, opening the fridge door does not unleash an avalanche of frozen food.

The aft section of the galley, containing the four-burner halogen hob, combination oven, dishwasher and double sinks, runs under the settee on the level above, so the chef has an area hidden from the view of the guests for food preparation. On the boat we tested, the first off the line, headroom over the cooker is restricted, but this will be improved on subsequent models.

From the forward end of the galley, a door leads to the crew cabin, which runs amidships to the port side of the boat and has an angled single berth, 6ft (1.8m) headroom and good floorspace. Its spacious en-suite bathroom has full headroom and a separate shower stall.

A half-height door from the crew cabin leads aft to the electronics compartment. This is an increasingly vital feature on modern boats, where the ever greater amounts of electrics and electronics need their own dedicated space, away from the heat and mess of the engineroom, with easy access for service and repair.

Back up in the saloon, forward to port, is a raised dinette which will seat four or five people around a semicircular table. A good feature here (and on the aft settee) are the low armrests, which give enough support to wedge you in when the boat is underway but do not prevent you from sliding in or out.

The boat's main electrical panel is forward of the dinette, but laid flat, making it difficult for quick access or checks.

To starboard is the helm position. This is a spectacular array, with a double seat facing an adjustable wheel, and a two-tier console. The radar and chart plotter are set in the lower front tier, while the higher back one contains the two DDEC panels, plus a full set of Robertson engine instruments as back-up. In fact the DDEC panels are set low enough in the dash, behind the first tier, to make it a stretch to see them when sitting down, and a long reach forward to call up any of the menus.

To the left of the wheel is panel of ready-use switches, plus the bow-thruster control; to the right are the single-lever engine controls for the DDEC system. These are completely electronic but, in case of 'black box' failure, a set of manual engine controls are mounted low down by the helmsman's right ankle. Detroit Diesel stress that

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Quality control

It was the likelihood of increasingly stringent emission regulations on road vehicles that prompted Detroit Diesel to look at ways of reducing unwanted exhaust products — 60,000 out of a total annual output of 75,000 Detroit engines are sold to the American truck industry. The key was to control precisely the diesel being injected into each cylinder according to the loading on the engine, to ensure complete combustion with no unburnt fuel. Fortunately, the company had a head start over conventional designs.

In most diesel engines, the injectors are slave valves which open and close when high pressure fuel is supplied to them from the injector pump. The amount of fuel injected, and its timing relative to the position of the piston in its cycle, is controlled by the pump, which usually deals with all the engine's cylinders, or with one bank in the case of a vee configuration. It is driven mechanically from the camshaft, and the amount of fuel delivered and its timing are controlled by the degree of throttle opening and by rpm, sensed by a mechanical governor.

One drawback of this system is that if the throttle is opened wide when the revs are low, as occurs under acceleration, excess fuel is delivered, resulting in the familiar black smoke of unburnt fuel from the exhaust. Refinements can reduce this over-fuelling, but it remains a fundamental problem.

In the Detroit Diesel engine, however, the amount and timing of the opening of each injector is controlled individually. In the original engines this was carried out mechanically, again by a camshaft, but the principle lent itself to being worked electrically, by a solenoid-operated valve in each injector.

Once this step had been taken, it became possible to have total electronic control over each individual injector. The amount of fuel injected into each cylinder, and its timing, could be controlled with total precision, to give only the exact amount required, depending not only on the rpm and loading of the engine but also on a whole host of other factors, such as ambient temperature and fuel temperature. As near as possible total combustion of the fuel could be achieved, which meant reduced emissions, improved consumption, and reduced load and wear on the engine.

This, then, was the basis of the first DDEC (Detroit Diesel Electronic Control) system, introduced in 1985 and now available on all Detroit models from 150hp to 2400hp. Once these basic functions were in place, the company's engineers set about adding to the system's capabilities, not just in respect of the engine but also for other on-board operations. The result is DDEC III, launched in 1993.

One of the first systems was fitted to the new Sunseeker 58 Manhattan, and we were invited by Detroit Diesel to see how it works.

At its heart is the inevitable 'black box', mounted on the engine. This contains a powerful microprocessor which takes information from sensors in every part of the engine, and uses it to control the flow of fuel from the injectors.

The throttle head looks conventional, and can be either single-lever or twin-lever, but there is no mechanical link to either the engine or the gearbox. Instead, the control sends an electrical signal through wires to engineroom receivers which activate the injector controls and the gearshift. Two immediate advantages are that you get silky-smooth control, and that you can fit up to five extra control positions around the boat.

To assuage the fears of traditionalists, Detroit Diesel also supply a set of mechanical controls, sited discreetly next to the helm, as a back-up should the electronics fail. This is unlikely, as DDEC is tried and tested, and has also been made doubly reliable by the fitting of a second microprocessor in the black box. The primary chip controls the engine and all other systems; should that fail, the second chip just runs the engine.

Many of the benefits of the DDEC system are appreciated only by the engine, whose life is made easier and longer by the precise supply of fuel and the monitoring of its systems. But some apply more directly to the skipper.

The first is faster and cleaner start-up. DDEC prevents marina-clearing white smoke, by precisely governing the amount of fuel injected and also by running vee engines on only one bank of cylinders until they have fully warmed up, or until the helmsman engages gear.

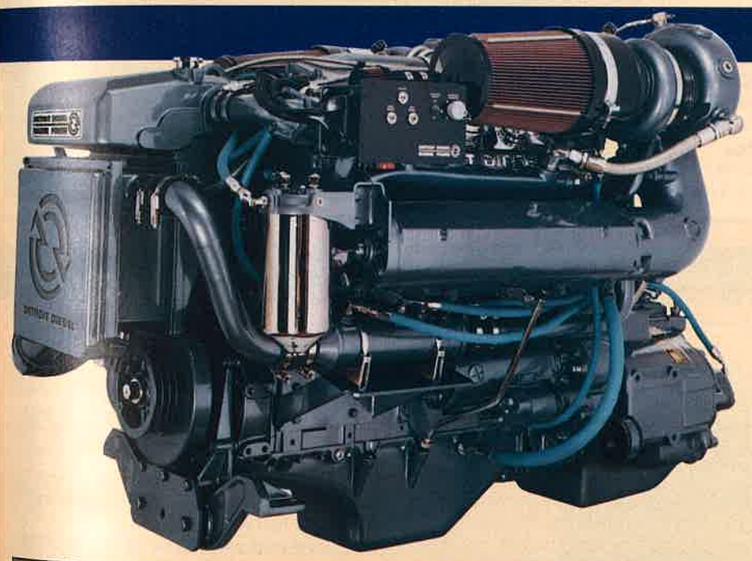
Secondly, when you do engage gear, DDEC gives you the option of selecting low-idle. This drops the tickover speed of the engine to 400-500rpm (depending on the model), which means smoother gearshifts and realistic speeds for manoeuvring in the marina.

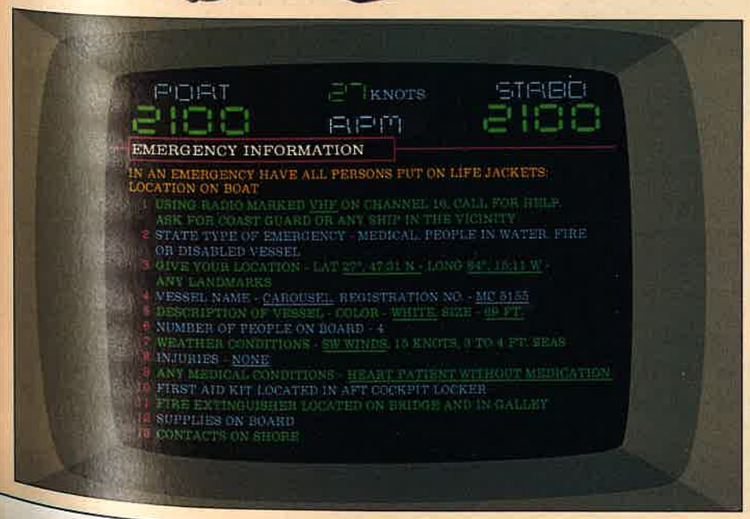
On most diesels, the tickover has to be set artificially high, otherwise when you engage gear the engine would stall, the mechanical governor being unable to react fast enough to the drop in revs. With DDEC, the microprocessor knows in advance that you are changing gear, because it monitors the movement of the lever, so it is already preparing the engine for the extra load; in fact, it will let the shift occur only when the engine is ready for it. All this happens in less time than it takes to read this sentence.

Thirdly, out at sea, DDEC automatically ensures precise synchronisation of engine revs, to within 4rpm, without the need for expensive synchronisers.

Finally, DDEC should allow you to make a crash stop from full ahead to full astern, without stalling and with no damage to the gearbox. On our test the engines had clearly not read this section of the manual, and stalled, but we were assured this was a matter of adjustment.

One feature which did prove itself to us was the diagnostic abilities of the system. On the morning of our test, one of the engines started to lose revs at top speed, which conventionally would necessitate removing each injector in turn to see whether one was faulty. However, a self-diagnostic meter used by Detroit Diesel's service engineers was able to pinpoint the under-performing injector in a matter of minutes.





Continuous monitoring of the fuel supplied by each injector also allows DDEC to give precise readings of fuel consumption, both instantaneous and cumulative, allowing an accurate estimate of the boat's range to be made.

All data is displayed on either an LCD screen or a larger VDU, whichever is more appropriate to the size of the craft. So powerful is the computer installed that on the larger screens it can also supply emergency information (see photograph, below left).

Should the helmsman be taken ill, fall overboard or otherwise become incapacitated, for example, a less experienced crew member just has to punch in the emergency code and DDEC will take over. It will flash up on screen full instructions on what to do, such as how to call for help on the VHF, and give the position of the vessel via an interface with the GPS or Loran navigator. It could, if you wish, be programmed to shut the engine rpm down to idle, subject to an override command.

This might appear to be a gimmick, and purists will argue that every vessel should have a second competent helmsman on board, but in the real world it is still a valuable safety aid. It also shows that the potential of DDEC is limited only by the ingenuity of the programmer of the microchip. Remote transmission of engine operating information back to the service centre has already been achieved, allowing the diagnosis of faults and the prevention of damage, so it should also be possible to have positional information transmitted automatically, which would be both a safety aid and a disincentive to boat thieves.

DDEC would appear to be a very real pointer to the way forward for a new generation of marine engines.

failure is extremely rare, but we agree that a manual back-up is only prudent.

Alongside the helm is an opening window, allowing communication with crew on the side deck. Just to keep one step ahead of the opposition, Sunseeker have made it electrically operated — something we take for granted on cars costing a fraction of the price, but still a noticeable rarity afloat. Critics may argue this is just something else to go wrong, but when everything is electric, including the engine controls, maybe we can accept the risk.

A flight of steps forward from the helm lead down to the accommodation, comprising three cabins and the guest bathroom grouped around a central lobby.

To starboard is a guest cabin with twin berths in an L-shape layout. Headroom over 60% of this cabin is 6ft 6in (1.98m). Storage is provided by a three-quarter-height hanging locker, plus deep unlined lockers under the aft berth.

To port is a twin-bedded cabin, this time with parallel berths but similar headroom and storage space. A door forward makes this cabin en-suite to the guest bathroom, which is also reached from the lobby.

The bathroom itself is superb, with plenty of room, a separate cylindrical shower stall and the WC hidden under a matt-finish lid, useful if you are using it as a seat when it is wet. The moulded sink is recessed into a granite-effect top, with the mixer tap set on a plinth inside it. Storage is provided by lockers under the sink, and another cleverly located behind the mirror.

The master cabin forward is a Freivokh masterpiece. Despite being set in the bow, it is completely circular, with a large double berth and ample storage space, plus a full entertainments centre in the aft bulkhead. The en-suite bathroom to starboard is similar to that for guests.

Exterior

The flybridge is reached either via a dramatic flight of steps from the saloon or via a ladder from the cockpit. The layout is perfectly designed both for passagemaking and sitting at anchor.

Sunseeker have learned from the Italians and Americans the lesson of locating the helm position halfway back, to starboard, rather than stuck up forward. This allows the rest of the seats to be laid out around it, making the helm itself the focus of a seating area which will take up to a dozen people, served by a wet-bar. The sunlounger aft will allow three people to bronze in comfort.

The teak-laid cockpit has a walk-through transom door to port, with an optional passerelle to starboard. It has a half-width seat aft, with some storage space underneath, though a dedicated rope locker would be an advantage. Similarly, while there is stowage for fenders in a large locker set in the aft face of the transom, we would not want to have to venture out here when entering port on a dark, wet night, especially if there is a tender slung in the davits.

Moulded steps lead to side decks 12in (250mm) wide, giving safe passage forward, helped by solid outboard guardrails with a lower wire, and rails on the inward-sloping cabin sides. The moulded non-slip continues across the coachroof, which has a recessed sunpad with recesses for glasses or bottles.

A usefully large foredeck locker takes ropes and a fender, with a half-height bulkhead dividing it from the chain stowage. There are substantial stainless steel cleats, 13in (325mm) forward and aft, and 10in (250mm) amidships.

Right: the Manhattan's interior helm with its tiered array. Closest to hand are the radar and Cetrek chart plotter/autopilot units, followed by the DDEC displays and then the conventional analogue engine instruments.

Engines

The Manhattan is powered by twin diesels, mounted under the cockpit and running through vee-drives. Access to these is via three large hatches in the cockpit sole.

The centre hatch is for routine access, with the outer two available for more involved work on the top of the engines. An aluminium ladder allows you to climb down between them, and space here is excellent, with room to move aft and outboard of the motors. The tops of the cross-frames have aluminium treadplate on them for grip, but you have to step from one frame to the other; a continuous floor would be an advantage.

The huge sea-inlet strainers are mounted forward, alongside the fuel filter/separators, all easily accessible. Similarly, the bilge pumps — Jabsco 3000 and 1750 electric pumps, plus a manual one — are easily reached for cleaning, in a keel well aft.

The 58 has underwater exhausts, together with in-line GRP silencers, plus above-water bypasses for tickover. This makes for one of the

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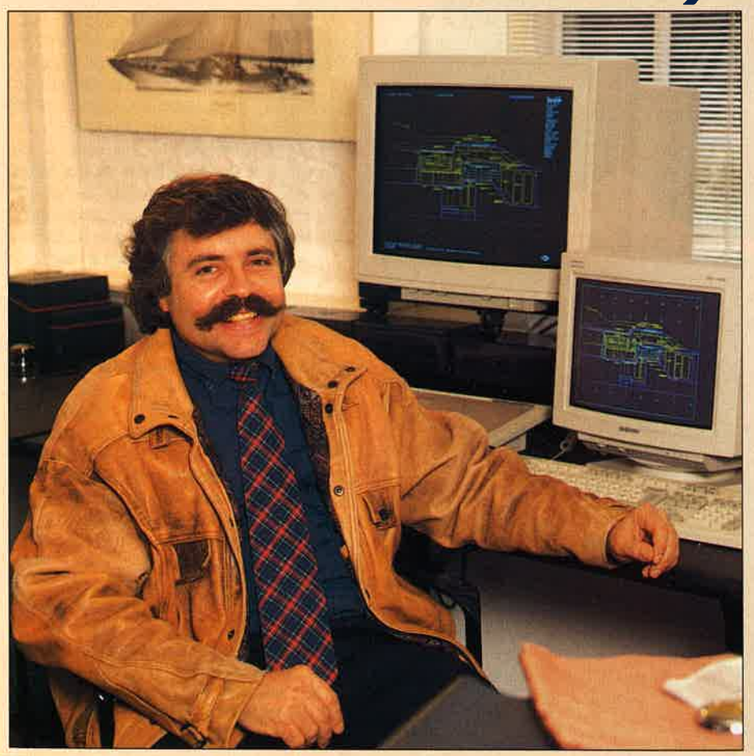
Tomorrow's man, today



Born in California, USA, Ken Freivokh was brought up in Peru, where he gained an MA in architecture. A Duke of Edinburgh Scholarship brought him to Britain, to the Royal College of Art's School of Industrial Design, where he completed his postgraduate studies.

He set up as an industrial designer in London, but his lifetime interest in sailing brought him into contact with Hunter Boats, for whom he designed the interiors of the Horizon 26 and 32, which won succesive Silk Cut Awards for Best British Production Boat in 1975-76. These were followed by the Ancasta 50 and then, in a major shift, the period interiors for Peter de Savary's 1920s tug *St Eval*.

Closer to home, he produced the exciting interior of the Supermarine Swordfish, where his now familiar circular theme had its first airing. To this was added the Seacoral 395, before Fairline asked him to breathe on their flagship.

His initial brief for the Squadron 62 was to work just on the saloon settee, the dinette and the flybridge staircase, but the Freivokh touch was eventually apparent in many other areas, including the vital one of specifying and sourcing materials and equipment. The resultant look earned universal acclaim and has subsequently made the transition to other Squadrons as they have appeared.

The call from Sunseeker came out of the blue, early in 1993. Their flybridge 58 model was to be a quantum leap, and Freivokh was given almost a free hand in designing the layout and styling. By his own admission he was surprised by this. Most production builders would be expected to hem him in with specific requirements and regular checks, but the innovative men from Poole were prepared to back their judgement and let the designer get on and design. The result has fully justified their faith.

The 58 Manhattan progressed from design to production to boat show in just six months. A key to this achievement is Ken Freivokh's computer-aided design (CAD) package, which enables designs to be produced not just visually but with full engineering back-up.

For example, a three-dimensional image of the staircase from the saloon to the flybridge could be viewed from every angle on screen, to see how it impinged on the rest of the saloon both physically and visually. The photograph (right) looks like the real thing; in fact, it is a computer simulation of how it would look, before the work was started.

From this, the program worked out the precise engineering details: how the stainless steel tubing should be formed and bent, and how the perspex steps should be manufactured. This was so accurate that engineering drawings could be produced, enabling Sunseeker to subcontract the construction with complete confidence. When the stairs for the first 58 arrived, the day before the Southampton Boat Show, they were bolted straight into place.

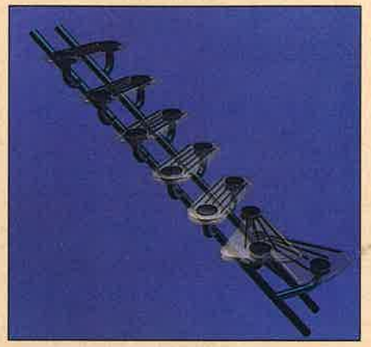
The rest of the interior benefited in the same way. The precise form of the hull, including the size and spacing of internal stiffeners, was programmed into the computer, which then looked at the best way of fitting in equipment and furniture to make maximum use of available space.

A designer would normally have to assume that the envelope for the accommodation is inside the line of the frames, which can give up to 6in (150mm) wasted space out to the side of the vessel. With CAD, equipment such as cupboards and cookers can be designed to fit between the frames, with complete confidence that when the boat is built there will be room for them.

Similarly accurate drawings of the rest of the furniture enabled items of joinery with the special pearlescent lacquer finish to be subcontracted to Italy, where this process has been perfected. Again, on supply to the yard, these components fitted exactly.

The flexibility of the design system will allow Sunseeker to offer a degree of customisation, which they see as essential on a vessel costing over half a million pounds. The computer will enable alternative layouts or interiors to be drawn up quickly and studied in realistic form, and the alterations to be costed before a decision is made to proceed.

Of course, successful styling is computer-aided but not computer-generated, and no-one stepping aboard the Sunseeker 58 can fail to appreciate the presence of an initial spark of genius. To reinforce the point, Ken has just completed the interior of *Twirlybird*, a 140ft (42m) ketch designed by Ron Holland and built by Lurssen, the premier luxury yacht yard in Germany, for a prominent English businessman. It goes someway to showing the true breadth of Freivokh's imagination.



quietest installations you will find, both at speed and in the marina. It also means an almost total lack of sucked-back fumes and spray which can make the cockpit uninhabitable at speed on some flybridge boats.

Handling and performance

Conditions for our test were light to moderate, with the Mediterranean providing little to tax the 58. Those waves we could find were handled with ease, which gave us every confidence in the boat's performance.

This impression was backed up by MBM contributor Mik Chinery, who during the previous two weeks had covered more than 1000 miles in the 58, under conditions up to Force 5-7, at average speeds of 25 knots. He proclaimed it an excellent sea boat, at all directions to the waves.

We were particularly impressed with the steering. Propeller tunnels can give problems in this area, but the 58 delivered tight, precise turns at all speeds.

Slow speed manoeuvring was outstanding, with the low idle speed, a feature of the DDEC system, allowing the engines to tickover at just 400rpm, rather than the 600-800rpm of any other engine. The benefits are twofold: gone is the clunk and surge as the gearboxes engage and disengage, while the boat can be inched around the marina at a precise 2-3 knots, rather than the normal 5-6 knots which requires constant dropping in and out of gear.

A bow-thruster is also fitted, but was not powerful enough for the boat. It could only just move the bow sideways in calm conditions, and it would prove totally ineffective in anything of a blow. A damaged impeller was blamed for some of this, but we would need convincing that it was large enough in the first place.

Performance with 760hp Detroit Diesels was impressive. On trials in Poole, they gave a maximum 36.5 knots; in the warmer water of the Mediterranean, with 40% fuel and 70% water, they still produced 34.5 knots. The DDEC system delivered a real kick in the back as the turbos came in, which translated to a 0-20 knots time of 13sec, with 25 knots coming up just 2sec later.

Fuel consumption is excellent. The engines use a total of 66gph (300lph) at maximum speed, and generous fuel tanks convert this to a maximum range of 414 miles. Drop back to 30 knots and the range improves to 495 miles, remaining close to this figure right down to 20 knots, a remarkable tribute to the hull design.

Noise levels inside are good, helped by the fact that the engines are under the cockpit rather than under the saloon.

Conclusion

Sunseeker's second flybridge motoryacht has turned out even better than its first, the 52. The propulsion package is a perfect match for the hull's typically excellent sea-keeping. The interior layout and that of the flybridge make optimum use of the available space, and are exemplary for a boat of this size.

But the final accolade has to be reserved for Ken Freivokh's interior. He describes it as 'insolent' and 'decadent'. We would call it 'revolutionary', and unlikely to be matched by another production boat for some time. □

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Sunseeker 58 Manhattan

Engines: twin Detroit Diesel 92TA DDECs, 760hp at 2300rpm, V8cyl,12,060cc.

Conditions: wind Force 3-4, sea slight to moderate. **Load:** fuel 40%, water 70%, crew 4.

							sound levels dB(A)		
rpm	knots	gph	lph	mpg	range	trim	saloon	fwdcab	flybg
1000	10.9	11.4	52	0.95	586	—	68	60	73
1200	12.9	18.1	82	0.71	440	—	73	63	78
1400	16.5	25.5	116	0.65	398	—	75	66	86
1600	20.6	32.1	146	0.64	394	—	76	70	84
1800	26.6	39.6	180	0.67	413	—	76	76	82
2000	30.1	46.9	213	0.64	394	—	78	80	80
2200	33.4	57.0	259	0.59	361	—	78	81	80
2350	34.9	66.0	300	0.53	331	—	78	81	80

Acceleration: 0-20 knots, 13sec. (range figures allow 20% margin)

Loa	58ft 2in (17.73m)	**Displacement**	23 tonnes
Beam	15ft 6in (4.71m)	**Fuel capacity**	770gal (3500lt)
Draught	4ft 1in (1.20m)	**Water capacity**	200gal (900lt)

Price: £529,000 ex VAT with 760hp Detroit Diesels.

Builders: Sunseeker International, 27-31 West Quay Road, Poole, Dorset BH15 1HX. Tel: 0202 675071.