

It's a complicated conversion but quite straightforward if you follow the drawings and instructions of **Anthony J. Ambrose**

*This aerial view of the real USS Enterprise, shows all the various deck markings, and a somewhat unusual parking pattern as regards the deck aircraft. Note the cluttered appearance of the superstructure upper deck levels due to the massive aerial and ECM array carried (United States Navy photo).*

## From 'Forrestal' to USS 'Enterprise'

On September 24, 1960, the largest warship in the world was launched from the largest private shipyard in the world. The shipyard was that of the Newport News Shipbuilding and Dry Dock Company. The warship was the United States Aircraft Carrier, USS *Enterprise*.

Based on the hull design of the earlier 'Forrestals', the *Enterprise* was the first aircraft carrier to be powered by nuclear reactors. These reactors (eight in total), developed (via the Westinghouse steam turbines) a total of approximately 280,000 horsepower, which gave the vessel an impressive top speed of over 35 knots, and a cruising range between reactor refuels, of thirteen years! Enabling the vessel to work unhampered by breaks for refuelling, and without any problems resulting from fuel shortages.

Her nuclear power gives her the ability to strike anywhere in the world, without the

dependence on shore bases and the so called logistics train, which so hampers the conventionally powered vessel. She was indeed, only the second warship in the world to be nuclear powered, the first being the cruiser USS *Long Beach*.

With a displacement (full load) of over 89,000 tons, she is a very large ship. For example, if taken from the water, she would stand higher than the Post Office tower in London, having a total height the equivalent of a 28 storey skyscraper. She measures 1,112 feet long, by 252 feet wide, her flight deck being some four and a half acres in area; or large enough to stand two other aircraft carriers such as HMS *Ark Royal* and her sister ship *Eagle*, side by side, with room for a handful of frigates as well! She houses a crew of 5,500, and an air wing comprising more aircraft than the average airport can hold, being some 85-90 aircraft.

Although originally constructed with no armament other than her aircraft, she now sports the normal BPDMS, short range Sea Sparrow missiles, for defence against close range attack by aircraft, or indeed, other missiles. The BPDMS (Basic Point Defence Missile System), consists of an eight tube, modified ASROC launcher, housed on a modified 50 calibre automatic gun carriage. *Enterprise* has two such launchers for sixteen Sea Sparrow missiles, the launchers being located aft on either side of the ship.

The Sea Sparrow missiles themselves, are a development of the familiar Sparrow III (AIM-7) air to air missile, which is itself one of the most successful and widely used of US weapons. The missile measures 3.65 metres long and 20 cm in diameter, and carries a 30 kg high explosive warhead. With proximity and contact fusing of the charge. Range is reported to be in the region of 15 miles, and the missile has an efficiency factor in excess of 90%.

Although there are several versions of the point defence system in use, including TV and laser guided variants; the system in use on the *Enterprise* is semi-active radar homing guidance. Target data is acquired from the ship's 'Combat Information Centre' and supplied to the manually operated Mark 115 fire control system. The target is illuminated for the homing guidance by a Mark 51 director/illuminator which is elevated manually by handlebar controls. When the target acquisition phase has commenced the launcher unit is fed target bearing and elevation details, in synchronisation with the director/illuminator. Pre-launch target data and firing commands being fed to the missiles before launch. The missile is fired directly in line with the acquired target but above line-of-sight, and

A Grumman A-6 Intruder aircraft is prepared for launch, with two Phantoms just visible to the rear. The Intruder is the latest in a long line of US aircraft designed specifically for carrier use. Its small size and large payload making it ideal for the job. *Enterprise* presently embarks several of these type in addition to her Crusaders and Corsairs (Grumman Aerospace Inc).



## STARBOARD SIDE VIEW OF USS 'ENTERPRISE'

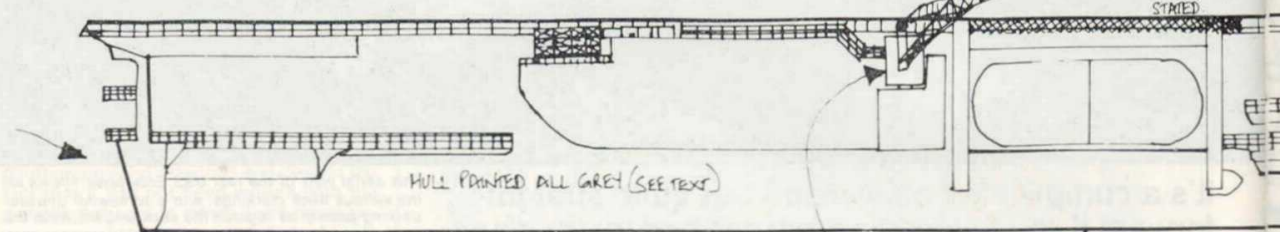
DRAWING A

Note: All drawings full-size for model (1:600 scale). Use kit parts to interpret drawings and relate to text instructions.

AERIAL ARMS  
PAINTED SILVER/STEEL

WINDOWS OF SUPERSTRUCTURE  
PAINTED MATT BLACK

For stern view  
see drawing C



maintains a corrected collision course by use of its radar homing until motor burnout, whereupon the missile descends onto the target until impact.

*Enterprise's* radar and electronics fits, are many and complex to say the least. Each of the big nuclear powered flat-tops now being equipped with the latest Naval Tactical Data System (NTDS) and TACAN, which obtain their information from the ships' radars, the aircraft's radars, the MR and AEW aircraft's sonars, radars and sonars of escort vessels, satellite broadcasts, and of course information from the Pentagon and all the other vessels and bases in the carrier's area of operations. The NTDS is a massive combination of digital computers, displays of various types, data links, computer peripherals and numerous information acquisition sources. The whole system interfacing with almost all the US and NATO tactical data systems, and sources of information supply.

The operators of the system can therefore have a visual display at the push of a button, to give them all available information, from whatever source, of any hostile or friendly craft in any given vicinity in the vessel's area, at any time.

*Enterprise's* own intrinsic radar systems comprise an SPS 32 and 33 set up, with SPS 58 low level, and SPS 10 and 12 radars in addition to the vessel's standard navigational radars. The SPS 10 radar, is a Surface Search radar, employing an open lattice scanner. It has been in service with the USN for about ten years. However, nothing more, as regards information, is readily available. The SPS 12 is a powerful, Long Range Air-Search radar, employing a parabolic open lattice scanner. Once again, little is known of its range or abilities. The SPS 32 radar, is a completely fixed array system, used for both air and surface surveillance, it is believed to have an incredible range and detection ability. However, its range is not public knowledge. It operates in conjunction with the SPS 33 radar, and is used for target acquisition, whereupon once acquired, the Target is then tracked by the pencil beam of the SPS 33, and its movement is then tracked by same.

Slightly more information is available on the SPS 58 radar, but even then, not a great deal more. The SPS 58 is once again an Air-Search, target acquisition radar, which is used primarily with the BPDMS set up. Its ability to distinguish clearly between firm contacts

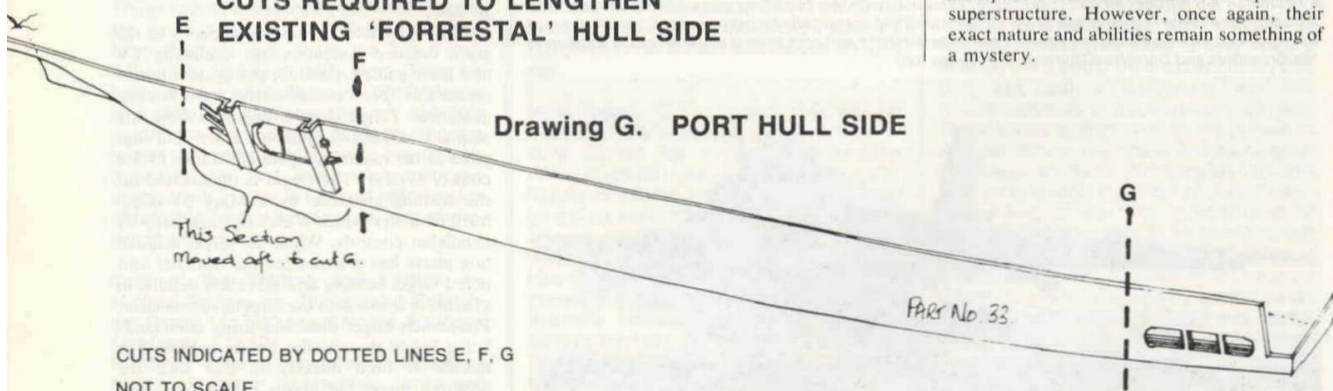
and normal sea clutter (waves, etc) makes it an ideal tool for defence against low flying aircraft and missile attacks. The system incorporates an IFF (Identification Friend or Foe) system, which enables the radar to distinguish instantly between a Friendly contact and an unidentified or hostile contact, enabling the radar to pass friendly aircraft without locking on to the target acquisition and missile launch phase.

An SPS 6 radar is also fitted on *Enterprise*. This system has an air-search surveillance capability, with a range of between 100 and 150 miles, but it is believed that this has been superseded by the greater range and distinctive capabilities of the SPS 12 system.

In addition to the various shipboard systems, there are also the radars of the various AEW/MR aircraft attached to *Enterprise's* Air Wing, which all help to give the carrier an uninterrupted field of view for many miles in any direction. There is also an elaborate Electronic Counter Measure fitted on board the *Enterprise*. This is self-evident from the masses of ECM aerals seen surrounding the *Enterprise's* conical structure on top of the superstructure. However, once again, their exact nature and abilities remain something of a mystery.

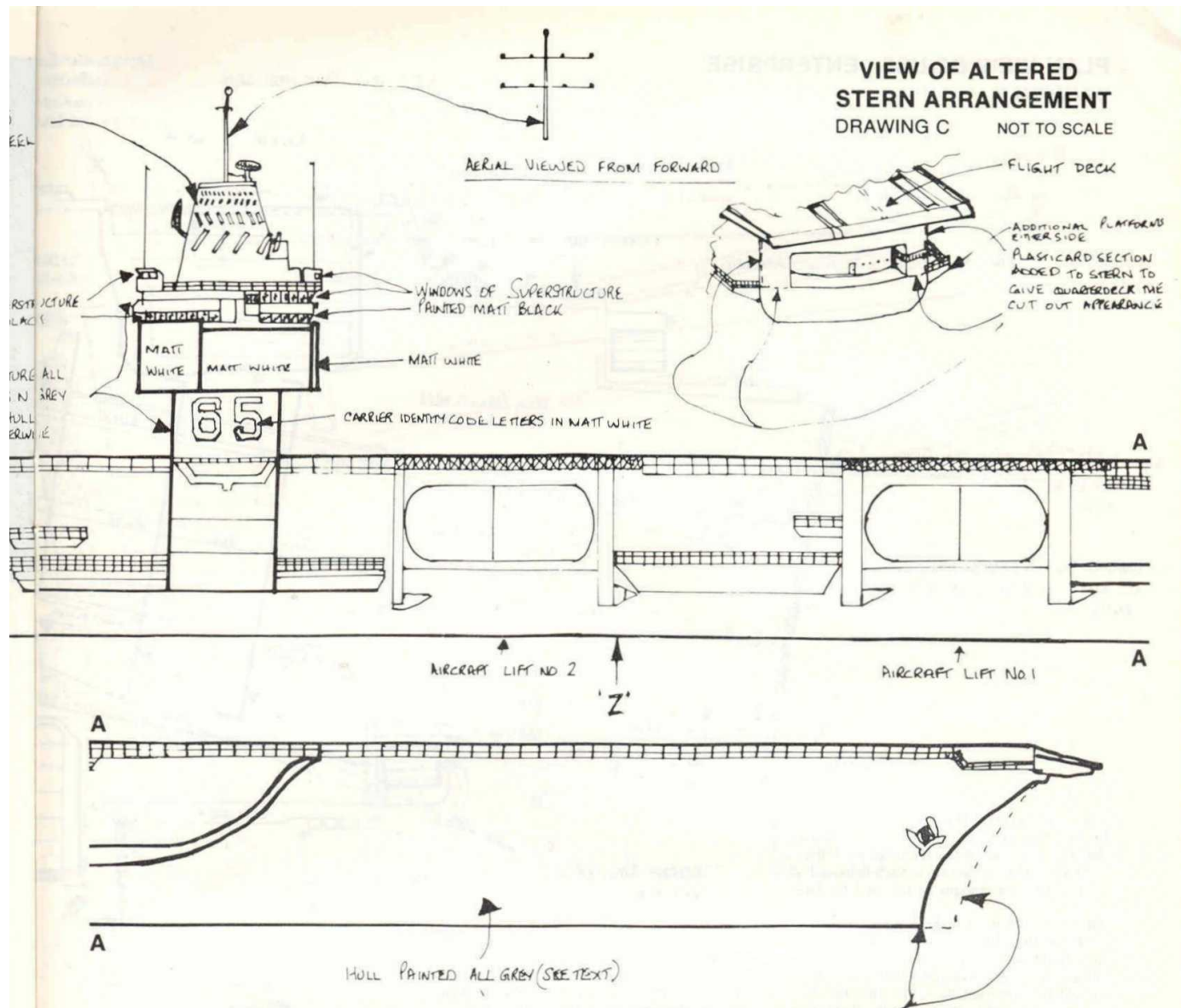
## CUTS REQUIRED TO LENGTHEN EXISTING 'FORRESTAL' HULL SIDE

Drawing G. PORT HULL SIDE



CUTS INDICATED BY DOTTED LINES E, F, G  
NOT TO SCALE





The objective of these aerals is to gain as much information on the enemy's radio frequency, radar, and guidance systems throughout the entire radio spectrum, so that the ship may in turn broadcast other RF signals to interfere with the enemy's missile guidance, even to the point of seducing the enemy's own missile, once fired, and turning it away from the aircraft carrier and back towards the enemy unit!

Other uses of ECM/ECCM are to try and interfere with the enemy's search radars, so that detection of the carrier by the enemy is avoided, consequently allowing the carrier to move about without its position being given away by radar.

Electronic counter measures are the big weapon of the modern age, and although passive in concept, are highly sophisticated and capable. ECM does not simply cover electronics, however; in fact ECM plays a part even in the types of paint used to finish military equipment, as various paint differences nowadays are detectable by some highly sophisticated radar systems currently either under development, or even maybe, in pro-

duction. For example; there are paints which hide/mask heat dissipation, consequently allowing the item so finished to be rendered invisible on infra-red photography. Similarly, there are types of paint available which absorb radio frequency emission, consequently giving no radar return, or reducing the radar return to minimal levels, in turn allowing the vessel so painted, to fire decoy drones and tracers in order to confuse the enemy's radar and guidance systems to the point that radar guided missiles, etc, are fired at incorrect targets.

As to how capable the systems currently operated by the USS *Enterprise* are, is a closely guarded secret, but certainly they are a major contribution to the carrier/strike force's overall effectiveness. It would seem that in an ECM hostile area; the only true way of distinguishing a contact with any degree of certainty, is the age old remedy of Visual Identification!

The actual conversion of the Airfix *Forrestal* into the USS *Enterprise*, is best carried out during the initial stages of construction, following the procedure given below and the

Dotted line indicates line of original Forrestal bow. This section must be removed and plated in using plastic card

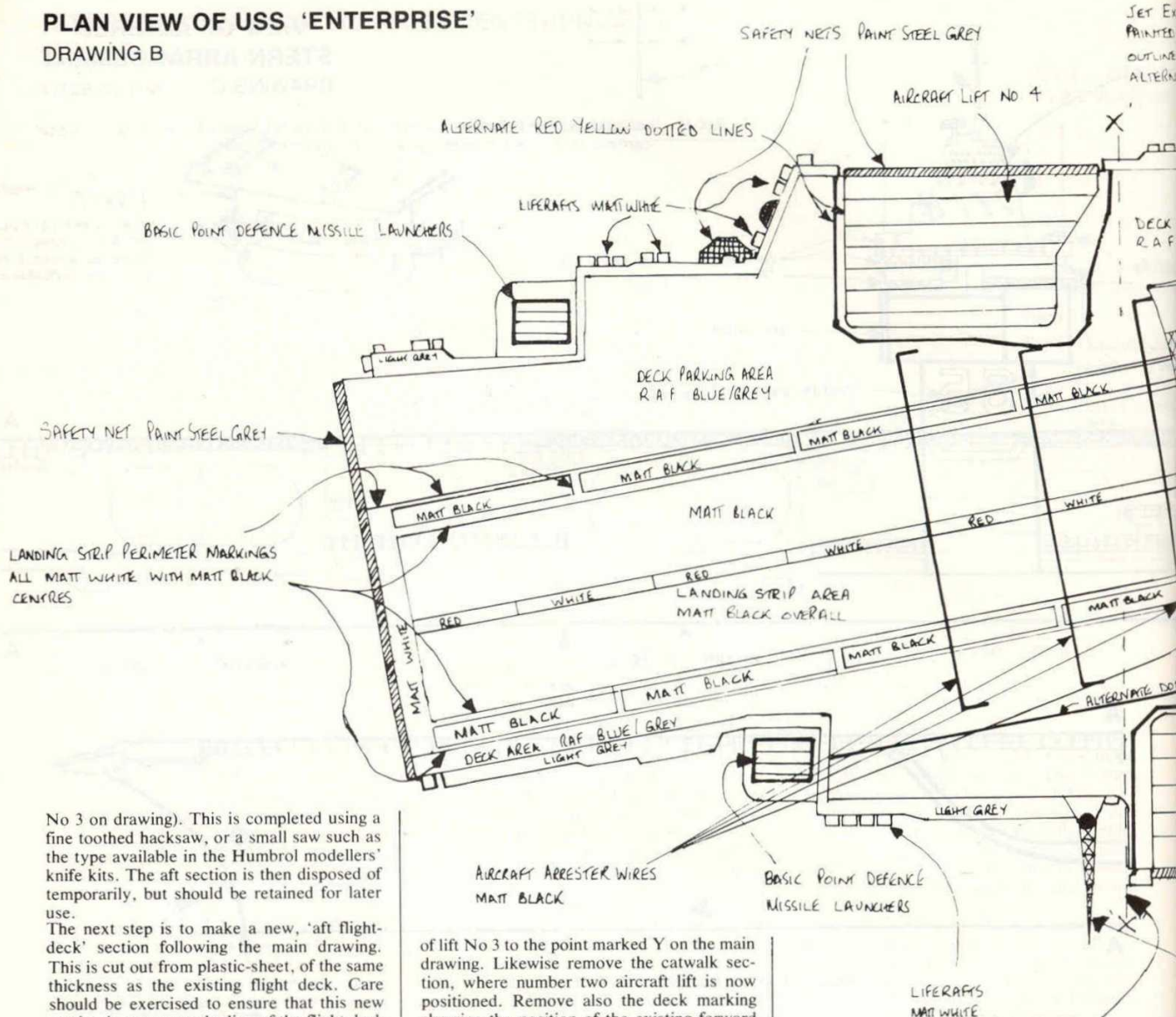
sequence of instructions as supplied with the kit. Section 1 of the kit instructions are omitted as the conversion detailed only covers a waterline model. To convert and lengthen the hull below the waterline section, is unduly complicated and has therefore not been included in the text. Consequently, all the parts detailed in section one (parts 1 to 27), are consigned to the spares box.

Section 2 of the instructions, is where the conversion work is carried out in earnest, in order to achieve the altered and lengthened hull as used in the *Enterprise* model. However, before commencing with any assembly of parts in this section, the flight deck itself must be altered to its new form, so that the proportions of the hull alterations will be correct, and lined up right when completed.

The first step is to remove the aft section of the flight deck. This is done by carefully cutting off the rear section along the line shown, (marked X-X on main drawing) directly aft of the sternmost starboard side aircraft lift. (Lift



# PLAN VIEW OF USS 'ENTERPRISE' DRAWING B



No 3 on drawing). This is completed using a fine toothed hacksaw, or a small saw such as the type available in the Humbrol modellers' knife kits. The aft section is then disposed of temporarily, but should be retained for later use.

The next step is to make a new, 'aft flight-deck' section following the main drawing. This is cut out from plastic-sheet, of the same thickness as the existing flight deck. Care should be exercised to ensure that this new section is cut out to the line of the flight deck only, and not to the line of the catwalk around same. When this has been completed the two sections are cemented together, an additional strip of plastic card being affixed underneath the deck along the join, in order to achieve some measure of strength.

Some additional sections are now needed to the forward area of the flight deck. Following the main drawing, carefully remove the catwalk on the angled section just forward of the foremost starboard side aircraft lift retaining it for later use. Then, (using the same grade of plastic sheet as used for the new aft section), cut out a small section as shown, and affix in position.

A similar pattern of events is followed for the two port side alterations as well, once again following the main drawing B; remove the catwalk as shown, and affix the new sections into position. There is no forward lift on the port side of the *Enterprise*, so the deck should be sanded flat in this position to eliminate the moulded line where *Forrestal*'s forward lift would have been.

Moving back to the starboard side, flush off to deck level, the forward line of lift and 3, and remove completely the moulded line showing the position of lift No 2. Remove also, the catwalk sections at the forward end

of lift No 3 to the point marked Y on the main drawing. Likewise remove the catwalk section, where number two aircraft lift is now positioned. Remove also the deck marking showing the position of the existing forward lift number one. Remove also the locating lugs for the *Forrestal* superstructure.

The next step, is to mark the decks with the revised positions of the *Enterprise*'s aircraft lifts. This is done by simply cutting a deep groove in the plastic with either a sharp modelling knife, or a piece of hacksaw blade. The major alterations to the flight deck should now be complete, and only the catwalks and safety nets now need to be affixed. The catwalks are obtained from the various sections of the flight deck which were removed earlier, and are affixed into position as shown on the main drawing. The safety nets as used on the edges of the aircraft lifts, on the forward section of the waist catapult area (as shown in drawing section E), and across the stern of the flight deck, are made from thin plastic strip, and affixed into position as shown.

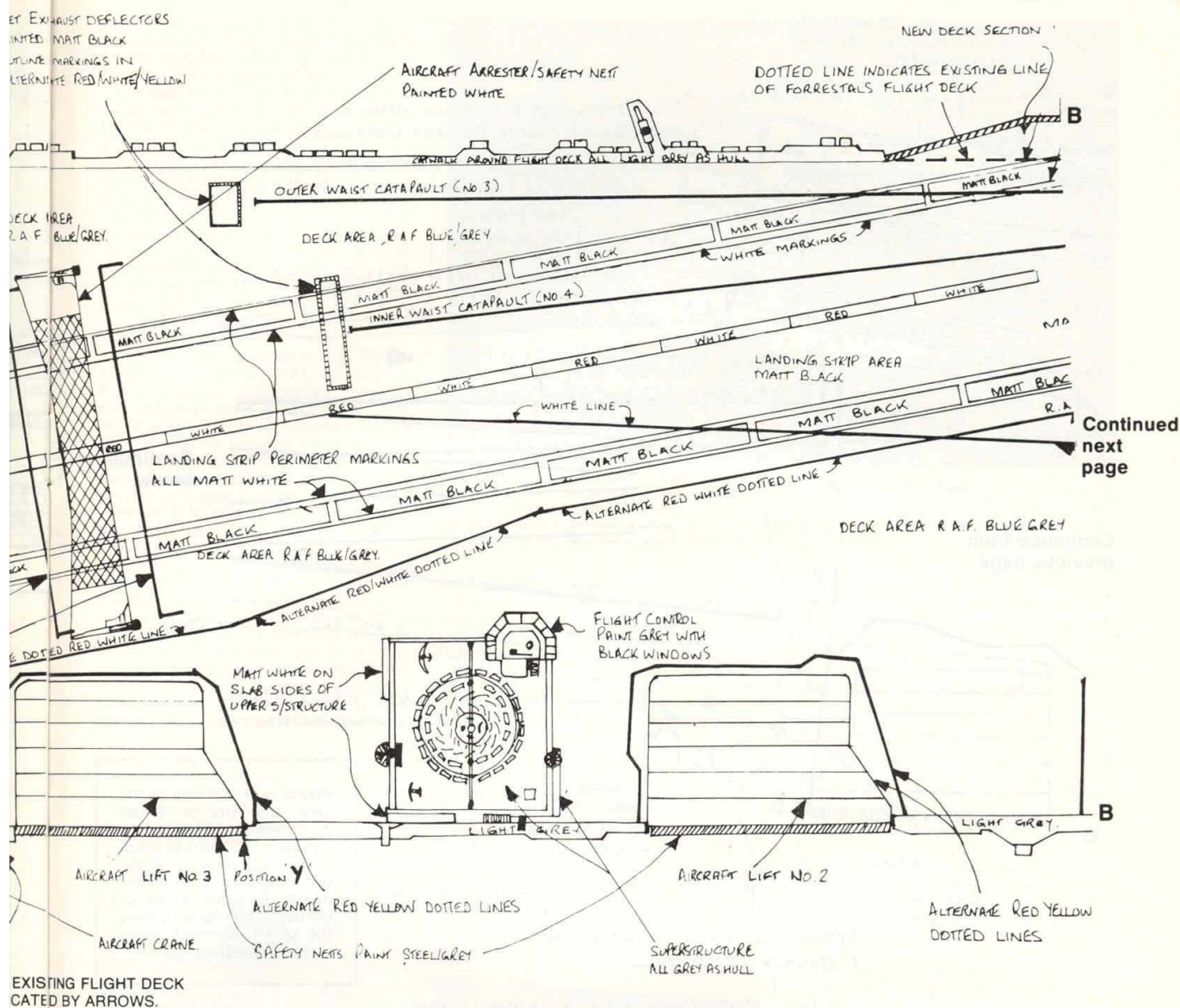
Returning to the kit instructions, saw through the starboard hull moulding (part 29) just forward of the number two aircraft lift at the position marked Z on the main drawing. Then saw again directly forward of the number two lift, and remove the section, retaining it for later use (see drawing F). Cut also, directly aft of lift number two, and directly aft of lift number three as shown. Position the sections of the starboard hull side, as

shown on main drawing, and now 'plate in' the remaining gaps using thick grade plastic sheet as used in the flight deck extension, so extending the hull to that as shown on the main drawing, taking care to ensure that the aircraft lift apertures are positioned correctly as shown, and end up directly beneath the lift markings as already embossed onto the flight deck.

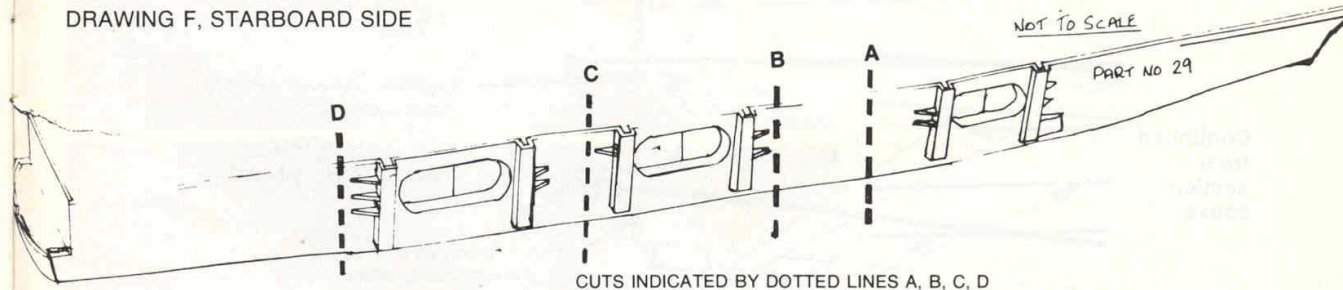
A similar operation is now required for the port hull side (part 33). Make the cuts as shown in drawing G, and cement the stern section to the stern section of the starboard side. Do likewise for the bow section. Care should be exercised at this stage, to ensure that the centre line of the hull mouldings remains straight and flush. This is achieved by trimming out any protruding sections with a sharp knife. The port side aft lift (formerly forward lift) moulding is now positioned as shown, and the remaining gaps in the hull are again filled with the thick grade plastic sheet, and the whole is now left to dry. Any gaps and cracks in the hull moulding are now filled using plastic wood, Milliput or some other form of filler. When dry the joins are then

REMOVE AFT SECTION OF EXISTING  
BY CUTTING HERE AS INDICATED





### CUTS REQUIRED TO LENGTHEN EXISTING 'FORRESTAL' HULL SIDES DRAWING F, STARBOARD SIDE



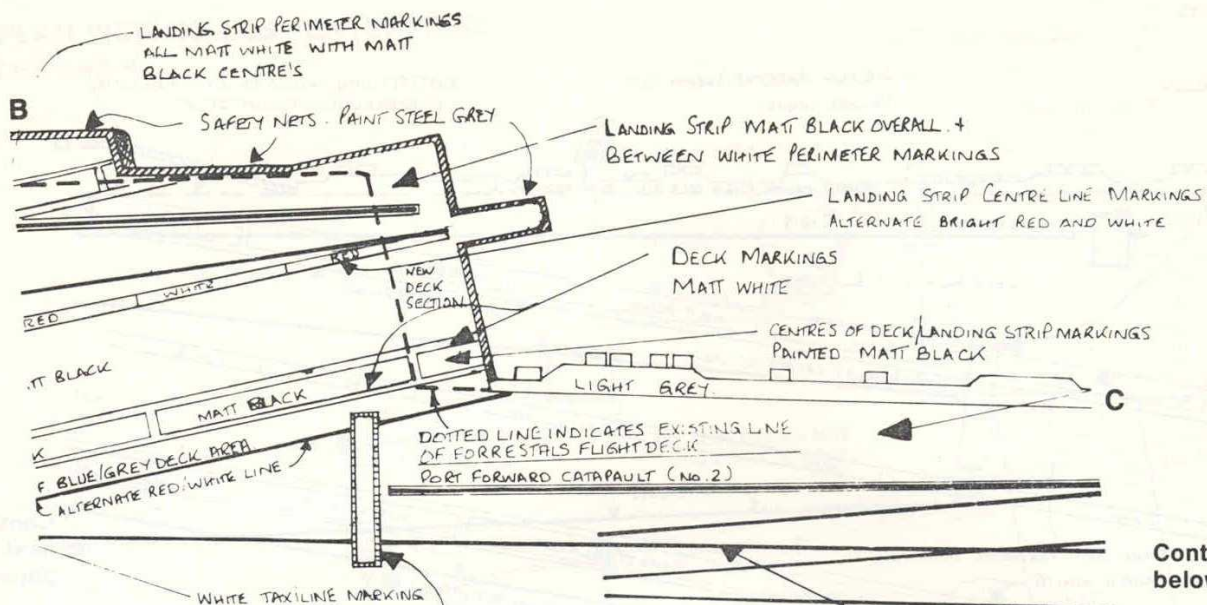
sanded down to leave a flush finish. The revised bow line, is now achieved by cutting out the existing section, and plating in using a thinner, more flexible, grade of plastic sheet. Locate in position, the hangar doors (parts 28 and 30 to 32 inclusive) as shown in section two of the sections. Parts 34 and 35, the quar-

ter deck, can now be affixed into position as shown.

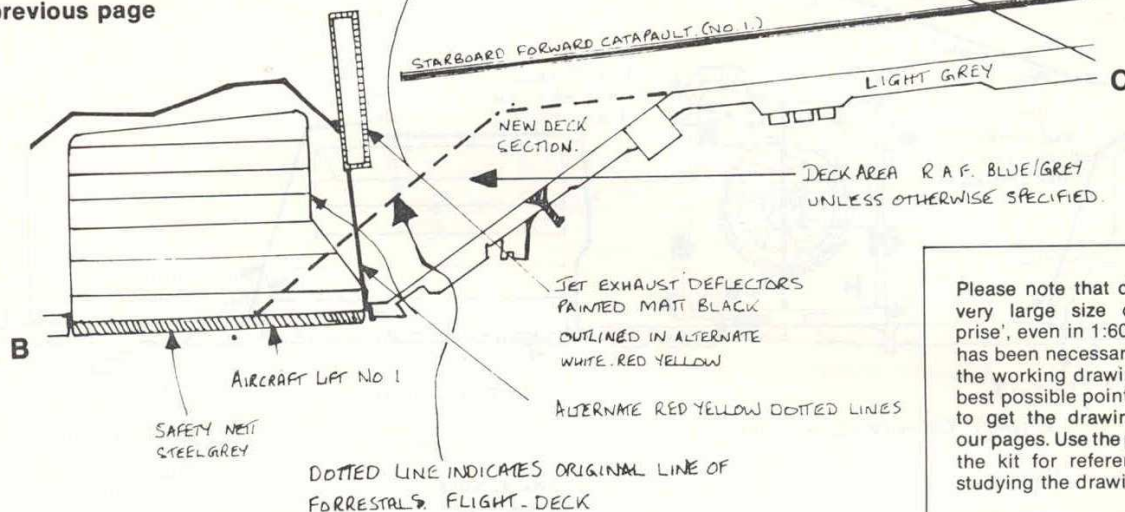
The completed hull should now be cemented firmly to the flight deck. It will be noted, that certain of the detail on the underneath of the flight deck, will need to be removed, to allow this assembly to take place.

Note also that the revised position of the aircraft lifts, will necessitate movement of some of the flight deck's under surfaces, into their revised positions.

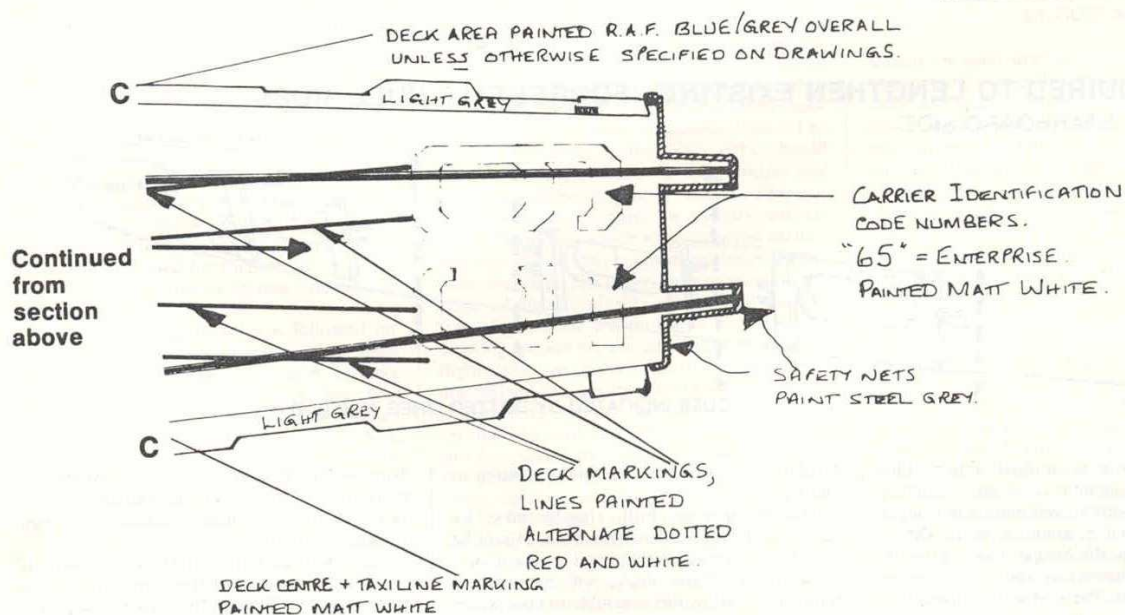
Part 38 in section 3 of the instructions is omitted altogether, and the remaining parts in this section are fitted in their revised positions



Continued from  
previous page



Please note that due to the very large size of 'Enterprise', even in 1:600 scale, it has been necessary to break the working drawings at the best possible points in order to get the drawings on to our pages. Use the parts from the kit for reference when studying the drawings.





as shown in drawing B. Note, that some of these parts now require minor modification with the modelling knife, to enable them to be fixed into their revised positions.

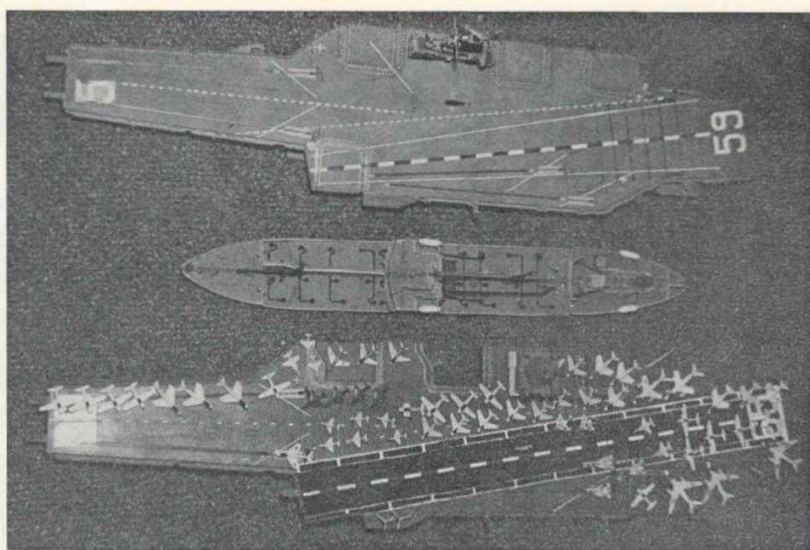
Complete section 4 of the instructions, as shown, but omitting parts 43, 44, 46 and 47. The former parts are now affixed either side of the stern as shown in the drawings and photography. Note also that the aft end of part 45, will need some modification, in order to allow room for the port side aircraft lift.

Sections 5, 6, and 7 are omitted, as there are no guns whatsoever, aboard the *Enterprise*. As regards section 8, cut away the small platform section of parts 73 and 74, (following drawing B), and trim off the rear of this section, and fit into its original position as shown. The remaining parts of section 8 being omitted.

Parts 79 and 80 of section 9, are cemented together as normal, but part 81, is disposed of. Part 83 of section 10 is omitted, as are the guns and gun platform. The remaining assembly of section 9, is fixed in position and the edges of same are plated up with plastic card to give the base assembly for the BPDMS (see main drawings). The BPDMS unit being constructed once again from thin plastic sheet.

Section 12 is completed in roughly the same manner as section 10, but note that the revised position of the No 3 lift will require some modifications to this section. Section 14 is broadly adhered to, but here too, some modifications with the knife are necessary, and part 95 is omitted altogether.

Part 96 of section 14, should be retained, and altered so that it forms the curved structure directly forward of, and attached to lift No 1 forward strut. Note that it is fixed behind and above its normal locating lugs. This section is then plated in flush using a thin



**Above:** The completed model with full complement of aircraft. The new style landing strip markings can clearly be seen in this pilot's eye view of the *Enterprise's* flight deck. (The model at top, is the modernised Forrestal. See September 1979 issue of *Airfix Magazine*). Note that *Enterprise's* No 2 lift is lowered. The landing strip of *Enterprise* is shown here in black. However, *Enterprise* now sports an RAF Blue/Grey landing strip, and so either colour scheme can be adopted if required.

grade plastic sheet. Section 16 of the instructions is now followed, but note that parts 119 and 121 need slight alterations to enable them to be assembled. Part 129 in section 17 is now moved outboard, onto a small extension platform on the port side. This is easily made from plastic card, and affixed as shown in the drawing.

Sections 18 to 21 inclusive, are not followed

at all, as a completely new superstructure must be assembled from plastic sheet. This is done following the main drawings, and is of fairly simple construction. The conical section atop is either adapted from a plastic thimble of suitable size, or once again made from scratch using plastic card. The radar scanners are adopted from the main kit. Note their positions and types. The ECM aerial array on the conical structure is made from suitably chopped up sections of fine plastic strip. The cross trees on the main mast are two of part No 159. Note that a new section must be made from plastic card and affixed beneath the flight deck, on the starboard side, directly beneath the superstructure.

The quarterdeck area on the stern, must now be altered, by boxing in the open area in line with the stern, having previously cut out the arch-like opening therein, this is completed following drawing C and utilizing a thin grade of plastic card.

The majority of the alterations are now complete, and all that remains is the painting, and the addition of such minor details as required. Painting should be undertaken following the notes given on the main drawing. Note the considerable changes in the landing strip and other deck markings on *Enterprise*, when compared to the *Forrestal*. The landing strip is painted black, with white edge markings.

*Enterprise* currently embarks the Air Wing coded NK, and consequently, the tail markings supplied for the Air Wing coded AB are not used, the AB being replaced with the letters NK. *Enterprise's* air wing consists of between 80-95 aircraft, consisting of two fighter squadrons comprising 24 Phantom or Tomcat aircraft, two light attack squadrons using Corsair and Intruder aircraft, one ASW squadron with ten S-3A Viking aircraft, and various other AEW, MR, ECM, and tanker aircraft.

Originally launched in 1960, *Enterprise* is due to enter the shipyards again in 1993, whereupon she will receive her mid life refit, which, under the US Carrier Service Life Extension Program, should, when she emerges again in 1995, give her a new lease of life to well into the second decade of the 21st century.

**Below:** It is really pleasing to see the well-detailed decal sheet supplied with the *Airfix Forrestal Kit*. However, the tail fin markings must be changed from the AB provided, to the NK marking in order to indicate the correct Air Wing embarked on *Enterprise*. This is a close view of an A-3 Skywarrior 'landing' on the model and suitably re-marked. **Bottom:** The white, slab-sided superstructure of the *Enterprise* clearly distinguishes her from the other carriers of the US fleet. The *Enterprise* is, in fact, the only ship of her class. The underside of *Enterprise's* structure is visible in this shot. This must be made from scratch using plastic card. All photos of model by author.

