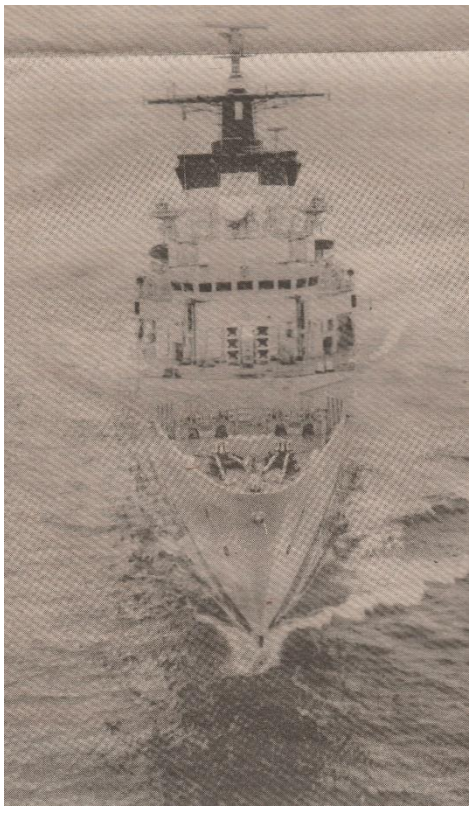


Above 'Broadsword Too' approaches the flight-deck sideways a few moments before increasing the ship's flight to two Lynx for the first time.

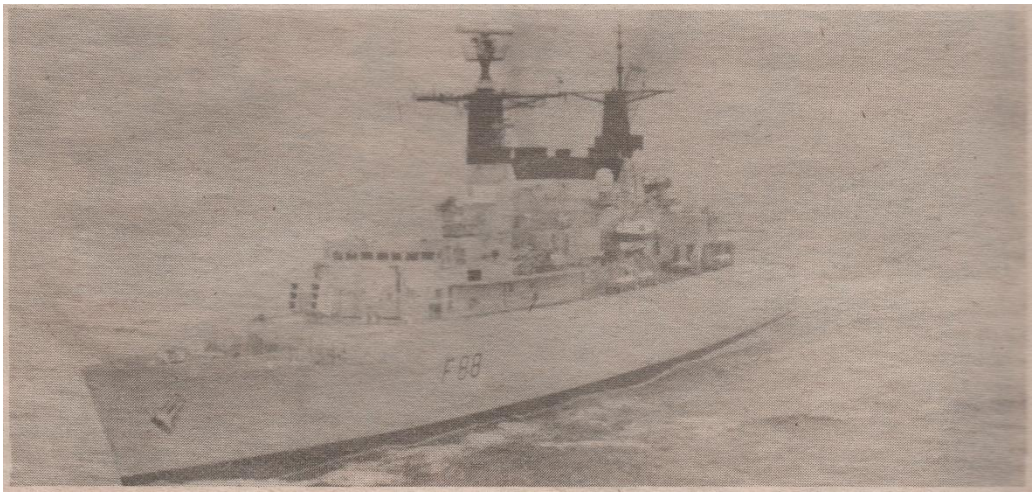
Paul Jackson reports from HMS Broadsword

EQUIPPED with some of the latest sophisticated avionics, and shortly to receive Britain's newest anti-ship missile, the agile Lynx HAS.2 personifies the naval equivalent of 'a quart in a pint pot'. First deployed aboard a frigate at sea in February 1978, the Fleet Air Arm's Lynx have recently undergone a change of 'ownership' following the re-formation of 815 Squadron, and it was thus with alacrity that Aviation News accepted an offer to see the new unit at work aboard the Navy's first all-missile frigate, HMS Broadsword.

Stationed at Yeovilton (HMS Heron), 815 Squadron formed on 2 January from the initial Lynx squadron (702) and commissioned exactly three weeks later, having inherited 23 ship's flights and a-Headquarters flight of three dual-control helicopters. Strength will steadily increase — eventually to 51 flights — as the Wasp HAS.I5 of 829 Squadron are withdrawn. and progress towards that goal has included formation of a ship's flight for the Type 22 frigate HMS Brilliant on 15 May, to be followed by Type 42s Southampton and Exeter later this year.

With the appropriate motto 'Strike Deep', 815 squadron comprises a core of 11 officers and 55 ratings, commanded by Lt. Cdr. David Yates. It is the task of the squadron to act as 'parent' for the front-line flights at sea (each consisting of a Lynx, two officers and seven maintenance ratings)

Above and below: Performing the nautical equivalent of a rate three turn, HMS Broadsword displays its impressive manoeuvrability for the benefit of the camera. The ship is not without other aeronautical connections; it is powered by two Olympus and two Tyne gas turbine engines.



and to provide continuation training for personnel returned to Yeovilton when their vessel is temporarily out of commission. Additionally. No.815 is charged with service trials of new equipment and the co-ordination of tactical development affecting Lynx operations.

In a wider context, the embarked flights have a vital role to play within NATO. The Royal Navy provides 70 per cent of NATO's forces in the eastern Atlantic, among which are Lynx aboard all Types 22 and 42 frigates, most Type 21s and almost all the eight Exocet carrying. Leander class vessels, and 815 Squadron is therefore assigned the tasks of containment of the Soviet Navy, defence of trans-Atlantic reinforcements in the event of a European war, and anti-submarine operations in support of the NATO strike fleet.

The squadron will continue to operate from Yeovilton until at least the middle of 1982, after which it will transfer to Portland, together with 702 Squadron and the Lynx simulator. It appears certain that throughout this period, and well beyond, 815 will be fully occupied with perfecting the Lynx as a weapon system and testing the numerous items of equipment and armament associated with the early service of any new aircraft.

Appropriately, Broadswords Lynx, XZ695 / 346 carries a white broadsword on the tail section, together with the deck letters 'BW'.

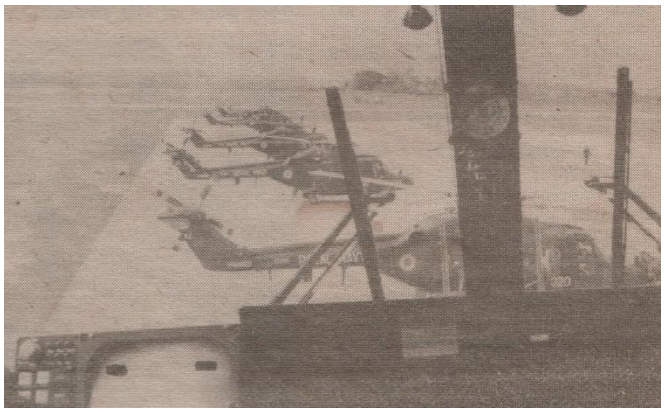
`CLEVER KIT'

In naval parlance, the Lynx is a `clever piece of kit', and in confirmation of this assessment, over 300 have been ordered for service in countries as far apart as Brazil and Qatar, including 80 for the FAA and a further 114 for, the British Army. At the heart of the HAS.2 is the Ferranti Sea Spray radar, capable of scanning to the horizon through an angle of 180 degrees, and linked to the BAe Sea Skua anti-ship missile guidance system. Of equal importance over the featureless ocean Air Navigation System (TANS)

The latter enables the Lynx observer to store up to ten en-route `way points' (latitude and longitude) in its computer, and monitor progress throughout the flight by giving bearing and distance-to-run to the next pre-selected point, within an accuracy of two per cent of overall flight distance. TANS is a simple-looking push-button box mounted in the centre floor console, and only requires feeding with the ship or aerodrome co-ordinates at the start of each flight.

Lynx crews show enthusiasm for the Decca Orange Crop electronic support measures (ESM) equipment which is fitted in an external housing above the helicopter's nose. This is essentially a receiver providing warning of hostile radar transmissions, and also possesses a limited search capability for enhanced effectiveness. Orange Crop has been under evaluation for about a year (initially in XZ696) and, after a final check-out in June, it will be cleared for issue to the ship's flights.

Standard Lynx armament is currently two Mark 44 or Mark 46 homing torpedoes but by the end of the year these will be augmented by Sea Skua for operations against surface vessels, particularly fast, missile-armed patrol boats. The first live firing of a Sea Skua took place at Aberporth in November 1979 from a Lynx of No.29 Joint Service Trials Unit and when evaluation is completed in December, the FAA will possess a weapon that is far more effective than the Aerospatiale SS-11 and AS-12 missiles carried by the wasp.



Lift off from Yeovilton. Five Lynx, including the temporarily unserviceable XZ246 / 320AZ, are lined up on the apron as XZ695 leaves to keep its rendezvous with HMS Broadsword

Sea Skua is a semi active weapon, in that it homes on reflected emissions from the Lynx's Sea Spray radar. After launch, it free-falls a short distance before its motors ignite and it descends to one of four pre-set heights (determined by sea state) to skim the wave-tops on its path to the target. Early production Lynx will require the addition of new electronic circuitry before they can carry the missile, but the three 'black boxes' associated with Sea Skua are easily interchangeable with equipment, torpedo control and the helicopter can thus convert rapidly from anti-ship to anti-submarine operations.

The Mark 44 and 46 torpedoes are scheduled for replacement by the British-developed Stingray during the mid-1980s, but the latter programme has drawn criticism because of its escalating cost, and it remains under threat of cancellation. Whatever transpires, replacement of the present torpedo armament is a matter of some importance, as the latest advances in submarine technology have diminished the effectiveness of the older torpedoes.

As deployed aboard the Navy's frigates, Lynx roles fall in two principal categories: anti-surface vessel (ASV) and anti-submarine warfare (ASW). With the advent of the Lynx, frigates have at last gained a long-range helicopter equal in many respects to the Sea Kings carried by their larger brethren, and far superior to the Wasp Already gathered on the blacked-durance when equipped with two torpedoes.

For ASV work, the Lynx can patrol away from its parent vessel for 21/2 hours, extending this to 31/2 hours (equivalent to a 150 nautical mile radius) if an overload fuel tank is installed in the cabin. Duties include reporting on sightings during the outbound and inbound legs, marking and shadowing hostile ships, ESM probe and searching, tactical direction of fixed-wing strike air-craft, over-the-horizon target marking for Exocet and Harpoon missiles fired by friendly vessels, and attack with Sea Skua.

In the latter role, an ASV strike would be a two-helicopter operation, one Lynx scouting ahead for the missile-carrier. Four Sea Skuas can be fitted to a Lynx, but with a consequent reduction in endurance to just one hour.

Five modes of operation are envisaged for the Lynx in the ASW context, although only three are currently on line. Radar and visual search can be undertaken to detect or hold-down (for fear of detection) a submarine; the Lynx may carry two torpedoes for a two-hour patrol; or it may attack under sonar-guidance from its parent or another ship. At a later stage, Lynx will be capable of dropping sonobuoys to assist other aircraft and will receive magnetic anomaly detection (MAD) equipment.

Assessment of American MAD apparatus will begin later this year by four of 815 Squadron's aircraft, and sea trials are to take place from HMS Broadsword, whilst four Sea Kings will also be involved. MAD will enable the Lynx to obtain a final pinpoint position on a submerged vessel before releasing its torpedoes, but although this facility is already enjoyed by Dutch Lynx, there is no intention to extend the similarity by addition of 'dunking' sonar.

A unique opportunity presented itself to see the operational role of 815 Squadron when, on 11-13 May, two Lynx were operated for the first time from a single frigate. Aviation News was privileged to view the trials, and so on the morning of Monday 11th, I was kitted-out with flying gear at Yeovilton, before embarking on HMS Broadsword.

Above: Ready for stowing. Lt Crd Richard Clapp, pilot of Broadsword's Lynx, hoses down his helicopter whilst the maintenance crew prepare to fold the rotors. Below: Maintenance ratings alternately slacken and tighten the restraining straps as '320' is slowly winched into the hanger.

TWO INTO ONE

The Broadsword flight comprises pilot Lt. Cdr. Richard Clapp and observer Lt. Charles Thornton, plus Lynx XZ695/346BW, as yet without ship or squadron insignia applied to the cabin sides, although with the usual addition of the vessel's name to the radome. Captain Anthony Pearson of the Broadsword has recently been appointed commander of the second frigate squadron (which will eventually comprise all six Type 22s currently built or on order: Broadsword, Battleaxe, Brilliant and the uncompleted Brazen, Boxer and Beaver) and XZ695 therefore carries the additional legend 'Captain F2'. Above the windscreen of the Lynx is the ship's pennant number 'F88' — the nautical equivalent of an aircraft's code — whilst the tail is decorated with a white broadsword.

Type 22s have hangarage for two Lynx, and although the Navy has insufficient funds to fill the hangar, it was decided to operate a couple of aircraft to gain practical experience against the day when this becomes possible, or operationally necessary. The first three-day preliminary trial was under- taken during May. and this is being followed by a three week deployment during Broadsword s operational work-up in June.

The second Lynx was borrowed from HMS Amazon in the form of XZ246/320AZ, wearing its ship's insignia to port, and that of No.702 Squadron on the starboard side. Its allocation to another vessel attracted the inevitable 'zap', and it conducted its half of the trials with the neatly-applied radome titles 'HMS Broadsword Too'.

XZ246 was accompanied by its normal crew of Lt. Cdr. Philip Machin (pilot) and Sub. Lt. Neal Yates (observer) whilst HMS Amazon was nearing the end of a re-fit. They thus have the unenviable prospect of a hard working-up period with Broad-sword immediately before repeating the operation when their own ship recommissions.

As is apparent, there is a broad spread of ranks within 815 and 702 Squadrons, for only recently have a few Lynx crew been taken directly from training schools. Most pilots have come from a tour on Sea Kings or Wessex, together with observers from Sea Kings. (plus a few from Gannets, Buccaneers and Phantoms), and the usual rank is Commander or Lieutenant Commander. In approximately half of the ship's flights, the observer is the senior, and thus flight commander. Crews remain with their ship for an average of two years, and may be reassigned to another frigate if their first vessel is laid-up for a long refit.

The planned formation flight from Yeovilton to Broadsword had to be abandoned when '320' went unserviceable on engine-start and, whilst the ground crew attended to the problem, '346' flew out to Mevagissey Bay (south of St. Austell, Cornwall) where its parent ship was steaming. Less than an hour later we were photo-graphing Broadsword being put through its paces in a fine display of manoeuvrability, and after it had resumed a steady course, '346' began its landing approach.

Helicopters prefer to land into wind, like their fixed-wing counterparts, but where the land-ing ground is also on the move, the pilot must be informed by the ship of the relative wind speed and direction. Unless there is a signifi-cant cross-wind, the Lynx over-takes the ship from the rear, and slightly to the windward side (to avoid turbulance generated by the superstructure). When abeam the landing deck, speed is equalised with the ship, and the Lynx edges sideways until it is over 'the spot' -in the centre of the platform.

Positioning is important, for the Lynx must land with its harpoon directly over a circular grid on the deck. This is not a 'wind-down' (beartrap) harpoon but even in high seas the helicopter can hold itself to the deck by 3,000 lb of reverse thrust from the rotors for the few moments it takes the harpoon to deploy. Once firmly anchored, the Lynx's steerable nosewheels allow it to swivel around the harpoon like a spinning top.

This is more than just a clever party-trick, for it enables the Lynx to land and take-off without the ship having to change course. The operation is monitored by the Flight Deck Officer (FDO) who is linked to the bridge and control room via a headset and cable, and directs the helicopter by two hand-held bats (or at night, illuminated wands).

After landing, it was necessary for '346' to be stowed in the hangar, to make room for the arrival of '320', and after it had been lashed to the deck by four straps, the deck crew folded the tail and rotors. Helicopters are winched in and out of the hangar by two hawsers in the stern and one at the forward extremity of the hangar, but as an added safety precaution, the straps are tightened, slackened and moved ahead to other deck-mounted lashing points as the Lynx edges into its 'shed'.

At last, its start-up problems cured, 'Broadsword Too' arrived overhead, although by this time, the ship was at anchor for sonar trials. '320' touched-down at 1400 hours, and the first double Lynx ship's flight was in business.

SUB-HUNTERS

Although ASV will become the Lynx's prime role when Sea Skua is available, it is still tasked with the Wasp-like duty of carrying homing torpedoes to the location of a submarine, under the direction of the ship's sonar. Broad-sword is equipped with the new Type 2016 sonar, but preoccupation with Sea Wolf missile trials has meant that submarine detection has had to take a back seat until recently. This is now being rectified and, as part of the

work-up programme, we were given the task of locating and attacking the 3,500-ton nuclear-powered fleet submarine, HMS Sovereign.

Sonar has progressed a long way from the 'ping, ping' equipment to be seen in war films, and the three circular screens of the control console located in the dimly-lit ship's operations room are strongly suggestive of an airfield GCA display. For all this sophistication, sonar lacks the pinpoint accuracy of radar, because sound waves travel through water in anything but straight lines, much of their erratic behaviour being the product of temperature changes in deeper regions.

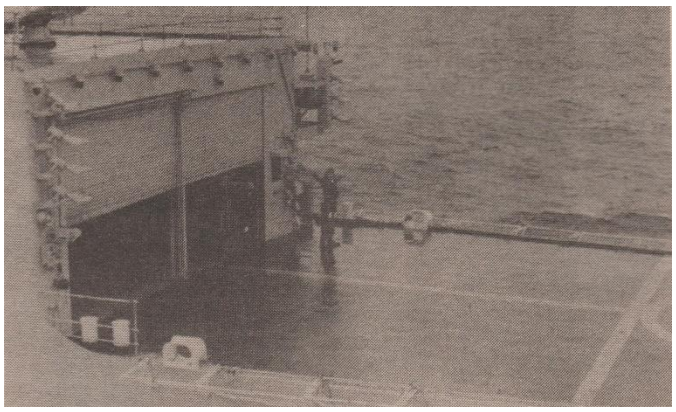
To stand a good chance of sinking the target submarine, the ship must direct its Lynx to within the torpedo's sensing range of the enemy, using radar and sonar plots superimposed on a single screen. The airborne component of the exercise was Lynx '346', crewed by Lt. Cdr. Clapp, Lt. Thornton and myself.

As normal, briefing for the helicopter sortie was held on the bridge an hour before take-off or commencement of stand-by whichever is the sooner. Our rendezvous with Sovereign was at 0300 on Tuesday morning, and thus it was that a three-parts somnambulant Aviation News re-porter was to be seen groping his way for'ard through the red-lit interior of the ship towards the bridge at the wholly uncivilised hour of 01.55.

Already gathered on the black-out bridge were the captain, aircrew, FDO (who is also the meteorological officer), Principal Warfare Officer, officer of the watch, Helicopter Controller and the senior maintenance rating. After hearing the object and 'rules' of the exercise, we organised frequencies and call-signs, noted the forecast weather and synchronised watches, before the helicopter crew took up their stand-by positions in the comparative comfort of the wardroom.

There are three states of helicopter readiness. 'Alert 45' (45 minutes) is little different from stand-down, with the flight crew carrying on their normal business anywhere aboard the ship, and the Lynx in the hangar, but at 'Alert 15', the helicopter is on the deck with the pilot and observer nearby in flying kit. The highest state of preparedness is 'Alert 5', at which the crew is strapped-in and awaiting the order 'action Lynx'.

After weighing anchor earlier in the evening, Broadsword was some 50 miles south of the Scilly Isles when contact was made with the submarine. Once Sovereign's echo had been differentiated from that of seabed wrecks and merchant vessels in the area, 'action Lynx' was called, and within moments we were airborne. The sprightly helicopter leapt from the gently rolling deck and was soon enveloped in darkness as we turned on course for the sonar pilot under direction from the ship.



A pilot's eye view of the flight deck officer controlling his touchdown. Two vertical banks of four loudspeakers ensure that the maintenance crew can hear the ships announcements whilst helicopter engines are running. A row of ten lights is positioned above the hanger door, the centre supports of which can be pulled to port to give unrestricted access.

At a steady 80 knots, and just 400 feet above a sea which revealed its presence only by the occasional white breaker, '346' droned onwards into the gloom. The actual attack was simulated by minature depth charges, each about the size of a beer-can and 'primed' in the same way by removing the top. Holding two charges by the opened side-window, Lt. Thornton released them on Broadsword's command, 'now-now-now', whilst below in the depths, Sovereign listened for the detonation.

Immediately the charges exploded, the submarine released a floating flare, and the Lynx banked sharply at an unerring 400 feet to fly overhead and advise our ship when exactly on top. From these observations, and notification from the submarine of any delay in firing its flare, the accuracy of the attack can be computed,

although it is clear that efficiency will be greatly improved when Lynx are fitted with MAD to provide precise location of a submerged vessel.

Three more attacks were made on the Sovereign before we landed at 05.30, after some 90 minutes' flying. At night, Lynx take-off and recovery is made from only the fore/aft position, but by the end of our sortie it was light enough to land into wind, at 90 degrees to the motion of the ship. Approaching from starboard, Lt. Cdr. Clapp edged '346' over the deck in perfect synchronisation with the ship's motion (although actually flying sideways in relation to a fixed point), and with the impact cushioned by the Lynx's sturdy undercarriage, we were pinned to the 'spot' by the harpoon before turning the nose round towards the hangar.

Substitute torpedoes for 'beer-can' depth charges — and that is how you kill a submarine.

INCREASED VERSATILITY

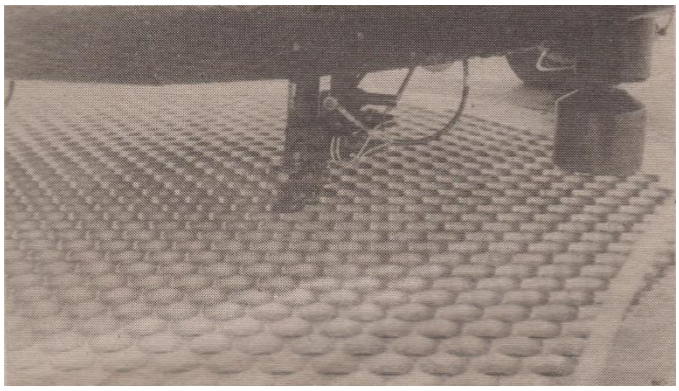
Despite being the first time on which two Lynx were used on a frigate, no major problems were encountered with the initial three-day deployment. The main draw-back, of course, is the necessity to stow one aircraft in the shed before the other can land, and whilst it normally takes 25 minutes to clear the flight deck (including a fresh water wash-down for the Lynx), an emergency might dictate that this be accomplished more rapidly.

During the trial period, both Lynx were simultaneously airborne on several occasions and although the number of maintenance ratings was increased only by four to a total of 11, split into three watches, their hard work ensured that all flying took place on schedule.

Several advantages are afforded by the two-Lynx flight, not least the fact that the helicopters can be left on readiness in different role configurations, enabling a fast response to either a surface or submarine threat, without the need for hurried switching of 'black boxes'. The frigate can also maintain a helicopter in the air around the clock, virtually exempt from crew-fatigue and service-ability problems, and the larger ship's flight appears to be a good way of adding one to one and achieving the equivalent value of three.

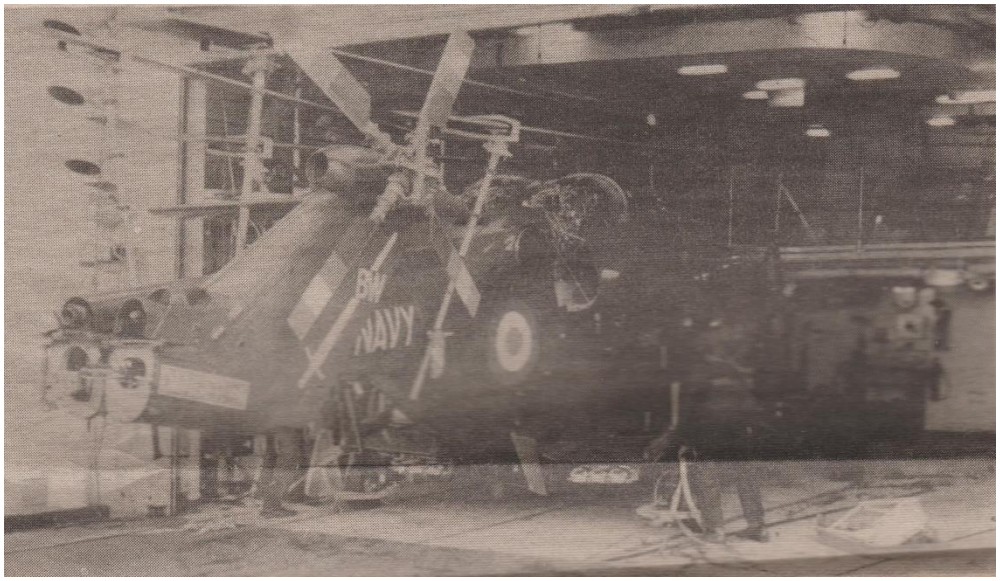
As a weapons system, the Lynx is still new. In the coming months and years, its versatility will be further enhanced by Orange Crop, Sea Skua, MAD and Stingray, greatly improving the already formidable striking power of frigates such as Broadsword. This offensive capability is vital for the maintenance of Europe's supply lifeline from the United States, and it is essential that the Lynx is kept abreast of the latest technological developments to ensure maximum effectiveness.

Denial of a permanent two-Lynx allocation to the Type 22s is symptomatic of the economies forced upon all the armed services, but enlargement of 815 Squadron in this context would be a valuable asset to the fleet as soon as it can be accomplished. The squadron plays an important role in the Royal Navy and to quote a former First Lord — Sir Winston Chruchhill — 'Sea power. When properly understood, is a wonderful thing'.



Left: lynx's harpoon anchored to the grid centrally positioned on the flight deck. The helicopter can swivel round to any position before releasing the harpoon moments before take off.

Below: With tail folded for compactness '346' is manoeuvred to the port side of the double size hanger aboard HMS Broadsword



SHIP'S FLIGHT

Lynx HAS.2
XZ695 346 BW c/n 4A132 815 Squadron (no marks)
XZ246 320 AZ c/n WA70 702 Squadron (HMS Amazon)
As with all Westland-built helicopters except the Gazelle, the c/n is not applied to the aircraft. The only permanent identity is the fuselage number which is located on a plate inside the cabin (on the starboard frame between the pilot's door and the main cabin door).
Fuselage numbers run in approximate sequence with the cit.), and XZ246 is 7077, whilst XZ695 is TO159. The differences are accounted for by changes in production order on the line, and the inclusion of a number of non-flying airframes which receive a fuselage number, but not a c/n. A typical case is the Army instructional airframe TAD007 at Middle Wallop, which was built from the outset for ground training, and has only the f/n 1042.

Acknowledgements:
Sincere thanks are extended tp Captain Pearson and the crew of HMS Broadsword – especially Lt Graeme Ewins, and to Lt Crd Yates and his personnel of 815 Squadron – in particular Lt Thornton and Lt Crd Clapp of '346' , plus Sub Lt Yates and Lt Crd Machin of '320'