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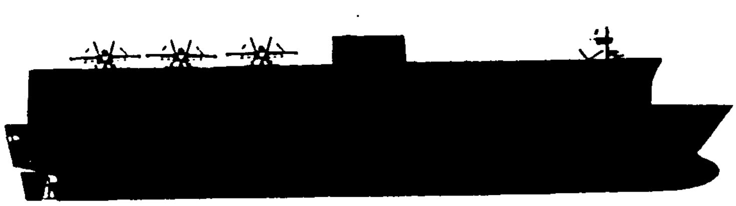
THE ROYAL INSTITUTION OF NAVAL ARCHITECTS.
(AUSTRALIAN DIVISION)

"DISCUSSION PAPER ON THE DESIRABILITY AND CONCEPTUAL DESIGN OF AUSTRALIAN MOBILE AIRFIELDS"



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DISCUSSION PAPER

ON THE DESIRABILITY AND

CONCEPTUAL DESIGN OF AUSTRALIAN

MOBILE AIRFIELDS

1. Introduction

This paper is really about Australia obtaining a more mobile Defence Force. It is hoped to demonstrate that if new ideas are embraced, an airborne strike force operating from portable platforms on land and at sea may prove to be viable and obtainable. The Army can become more mobile than it already is. There is also economic benefits that will be elaborated on later in the paper. It must be stated however, this discussion deals with concepts only. To discuss all the detail of the chosen subject is well beyond a single individual with a limited amount of private time.

There is a very necessary prerequisite for any reader. One must be in a receptive state of mind. The writer would ask his reader to apply the following thinking. "To each new idea, try not think of reasons why it cannot work, but instead, what contribution can be made to make it work.

The necessity to write is driven by the author's perception of several issues. Firstly, the unfortunate acceptance by defence policy makers that there was no alternative to scrapping the RAN fixed-wing Air Arm. In economic terms perhaps there was no other way, but how much creative thinking was done into possible alternatives? On the surface the answer appears to be very little.

Secondly, the very questionable thrust of the "Dibb Report" which effectively returns to the "Fortress Australia" principle. This document leads the reader to believe that a future Australian Defence Force should concentrate on arbitrary defence boundaries with little offensive capability outside them. This surely must be a grave policy mistake. Any potential enemy would be very comfortable with that thought in a drawn out conflict.

The subsequent defence white paper has recognised this point but believes the new surface combatant design will overcome the weaknesses to some degree. On this matter the writer is emphatic, no small surface combatant has sufficient strike capability to be a meaningful sustained force. Without highly capable strike aircraft, small surface ships have limited offensive capability. This is particularly true seeing Australia does not own VSTOL aircraft.

While on the "Dibb Report" and without being critical of the documents total genuine worth, the author feels obliged to echo the words of T. B. Millar on the issue of perceived threats.

> "The notion that we can base our military preparations and planning on "no foreseeable threat for 10 years" is so absurd as not to warrant comment.
>
> It should not be forgotten that from the time Hitler became Chancellor of a disarmed Germany until he launched World War II, a war in which more than 40 million people died and that destroyed most of Europe and half the Soviet Union, was just over six years.
>
> There is a common assumption in government that we will always have plenty of what is called "strategic warning", and that as the world fundamentally proceeds by evolution rather than revolution, we will always have enough time to prepare for whatever comes.
>
> One wonders how people who read the newspapers, or the smaller but still sizeable group that have studied history, can believe such things.
>
> It is self-delusion based on a reluctance to make sacrifices or spend money in advance of an actual demand.
>
> It is a gamble which we know will usually pay off, but one day may not." (1)

Thirdly, that just perhaps in the spirit of the Bicentennial year, there may be sufficient patriotism and public awareness to want to take a new direction with defence related initiatives. Could it just be that the "Australian cultural cringe" is at last going into decline.

2. Some Background Discussion

It is accepted that a sole purpose aircraft carrier is not affordable under this country's present economic circumstances. However, if such a ship or ships could also engage in commercial activities, much of the cost could be offset to a large degree. As the first cornerstone to any aircraft platform at sea, the ship/s must be capable of earning their way in peacetime circumstances.

Equally, again on the question of economy, the writer no longer accepts an independent role for the RAAF and RAN with certain types of aircraft. The F/A-18 fighter aircraft for instance was designed to be equally at home operating from land bases or at sea. These aircraft are very capable, but extremely expensive, and pilot training is also a costly business. As circumstances could dictate, it is felt that Australia should have the flexibility to operate these aircraft from sea platforms anywhere in the world. It is important to make the distinction between weapon systems and weapon platforms. This paper is not about weapons, but is concerned greatly about some of the platforms they operate from, (namely aircraft and ships).

As has been pointed out many times in the past, Australia is an Island continent. Yet do we fully take into account the special geography and vastness of the country when planning our defence needs. The 1987 Defence paper discusses this point, and in the writers view, recognises the need that our forces must be extremely mobile. "Mobility" and "Flexibility" becomes two further cornerstones for much of the discussion to follow.

There is one other trend that seems to perpetrate much of our defence thinking. That Australia's defence capability is linearly linked with the amount of money spent on it. While high technology warfare invariably comes with a high price tag, it does not necessarily follow that the winner of two opposing military forces is the one that spent the most money on its hardware. Indeed, there many other factors that come into question. Mr Kim Beasley has rightly pointed out self reliance is a task involving the whole nation, and that Australia's greatest resource is the skill of its people. Perhaps now is the time to demonstrate some independence of thought in regard to our defence approach for the future.

While it is recognised that Australia does process a strike capability outside its immediate area through the F-111 aircraft, it will also be appreciated that such activity cannot be totally sustained over lengthy periods. The situation can of course be somewhat improved through the use of air tankers for mid-flight refuelling. The Government is planning to obtain this capability in future years and these tanker aircraft will also be used for F/A-18 fighter bombers.

Without discussing the issue of early warning, of attacking aircraft, this approach in the author's mind, ignores several decisive factors. Firstly it is not possible to re-arm an aircraft mid-air, so any aircraft which has spent its bombs and/or ammunition must return to home base. In our circumstances that is Australia, perhaps many flying hours away. Secondly, the pilots are not robots and only have a limited endurance period in the air.

It follows them, that if our defence forces are to project power outside our immediate area, then it would be highly desirable to move our air bases at will. To have the further flexibility of these bases on land and sea is a great multiplier on the effectiveness of the Air Force. The Army also needs to be uplifted very quickly.

3. **Desirable Seaborne Requirements of a Mobile Airfield**

a. Must be capable of paying its way for the national good. Therefore commercial viability is paramount.

b. Converted quickly as an aircraft carrier. In the Australian situation this means F/A-18 fighter bombers, rotary wing aircraft, and maybe AWACs and Harrier aircraft at a later date.

c. Capable of supporting the Army by moving large quantities of equipment including tanks and helicopters. This will mean a considerable RO/RO feature in the design.

d. Provide fuel and replenishment for escorting vessels.

4. **Desirable Landborne Requirements of a Mobile Airfield**

a. All equipment must be completely portable and able to move via standard containers.

b. So designed that it is compatible with seaborne use.

c. Highly desirable that the airfield could be set up in almost any terrain.

5. **Discussion of Aircraft Types Available to Australia**

There has already been some mention of the F/A-18 which is the front line aircraft of Tactical Fighter Force (TFF). It is believed that these aircraft can be modified to enable them to operate from sea borne platforms. The USN operates large numbers of them from its carriers. Blackhawk and Seahawk helecoptors will soon become the backbone aircraft for the Army and Navy respectively. For this exercise then the above aircraft are extremely important and will be concentrated on.

VSTOL aircraft are very flexible in their use. They do have range limitations but without doubt can operate from any number of platforms at sea. In Australia's situation, we simply do not have these aircraft, so it does seem premature to plan any ship type until we do. There is however an important point to always keep in mind, all conventional aircraft carriers can also operate VSTOL without any difficulty. Much the same could be said for various types of new helicopters.

In summary then, if the sea platform can handle fixed wing conventional aircraft, it will also be able to function with rotary wing and Harrier vertical takeoff types.

A-18A. Single-seat escort fighter/interdictor to replace
rmed with fuselage mounted Sparrows; also a single-
ttack aircraft to replace A-4 and A-7, with FLIR and a
tracker, which are being developed as part of the
t programme, replacing the Sparrow missiles.

-18B. Tandem two-seat version of F/A-18A for
g, with combat capability, formerly known as TF/A-
uel capacity reduced by under 6 per cent.

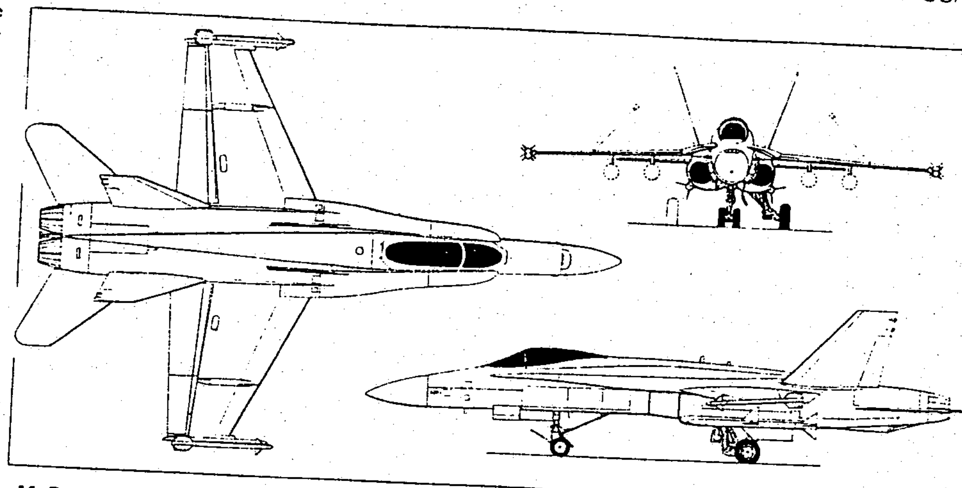
-18C and F/A-18D. Single- and two-seat aircraft
sed from FY 1986 onwards. Similar to F/A-18A/B,
h provision for carriage of AMRAAM weapons, IR
ck missiles and airborne self-protection jammers,
aissance equipment, new 'air common escape sys-
ction seats, improved mission computer, and a flight
recording and monitoring system. First flight
C) Summer 1986; deliveries scheduled to begin in
1987. F/A-18C/Ds delivered from October 1989
addition, carry equipment for all-weather night
missions, including a FLIR navigation pod, new
d pilot's night vision goggles.

8(R). The US Navy began evaluation of a simple
ssance conversion of the standard F/A-18A in the
of 1982. This involves removal of the gun from the
nose, and its replacement by a twin-sensor pack-
two windows in a slightly bulged underfairing.
can include a Fairchild-Weston KA-99 low/
ltitude panoramic camera and/or Honeywell
R linescan. Additional sensors, including a low
mera, are being studied. The F/A-18(R) can be
overnight to the fighter/attack configuration
operational squadron. Flight testing of the first
ted with reconnaissance equipment began on 15
84.

. Version for Canadian Armed Forces, which
rchase 138, including 40 **CF-18B** two-seaters.
nnounced on 10 April 1980. First example made
flight on 29 July 1982. Deliveries began with
nd CAF902 on 25 October 1982 and are
o continue at the rate of two per month until
March 1986 a total of 77 CF-18s had been
irst CAF unit was No. 410 Squadron, based at
ake, Alberta, followed by No. 425 at Bagotville.
d Nos. 439, 409 and 421 Squadrons of No. 1
ir Group at Sollingen, West Germany. CF-18s
g CF-101s, CF-104s and CF-5s. By comparison
vy version, CF-18 has different ILS and added
port side of fuselage for night identification of
t in flight.

n F/A-18A/B. Versions for the Royal Aus-
orce. The intention to procure 75 Hornets was
n 20 October 1981. Two of the RAAF F/A-
manufactured by McDonnell Douglas, and
ir from NAS Lemoore, California, to RAAF
near Sydney, on 17 May 1985. The first F/A-
d in Australia by Government Aircraft Fac-
on, near Melbourne, made its first flight on 26
5 and was handed over to the RAAF's No. 2
onversion unit in the following month. The
n manufactured aircraft (F/A-18B A21-104)
flight on 3 June 1985. The RAAF's F/A-18s
F/A-18As and 18 two-seat F/A-18Bs) will
ult Mirage III-Os. Three operational
be formed, with deliveries scheduled for
990.

on for Spanish Air Force, which has ordered
from 1986, with an option for 12 more.
d in May 1983. First aircraft rolled out
85 and due for delivery to Spain with three
er 1986, with IOC anticipated in 1987. In
rce service, aircraft will be designated **C.15**
CE.15 (two-seat).



McDonnell Douglas F/A-18A Hornet (two General Electric F404-GE-400 turbofan engines) *(Pilot Press)*

On 22 January 1976 it was announced that full scale development had been initiated by the US Navy, with initial funding of /16 million. Total cost of the development programme included the production of 11 F-18s for the flight test programme. A total of 1,377 Hornets, including the 11 development aircraft, is planned for construction into the 1990s, for the US Navy and Marine Corps. More than 150 of those built will be two-seat trainers. Deliveries of all versions totalled 375 by March 1986, including 287 F/A-18As and F/A-18Bs to the US Navy; the overall total had passed 400 by September 1986.

The first Hornet (160775) made its first flight on 18 November 1978; the second flew on 12 March 1979, and all 11 development aircraft were flying by March 1980, including two TF/A-18A two-seat combat-capable trainers. The first batch of nine production Hornets was authorised in FY 1979, followed by 25 in FY 1980, 60 in FY 1981, 63 in FY 1982, 84 each year from FY 1983 to FY 1987, and 96 per year from FY 1988. In the fourth quarter of 1979, a Hornet became the first modern jet aircraft to complete initial sea trials within one year of its first flight, and the first production aircraft was delivered to the US Navy for operational evaluation in May 1980.

The first development squadron (VFA-125) was formed at NAS Lemoore, California, in November 1980. Operational evaluation and Navy BIS (Bureau of Inspection and Survey) trials began in early 1982. Fleet training began in mid-1982 and the Hornet officially entered operational service on 7 January 1983, with Marine Fighter/Attack Squadron 314 at MCAS El Toro, California, and later with VMFA-531 and VMFA-323. On 1 February 1985 the first Atlantic Fleet F/A-18A operational squadrons began forming at Cecil Field NAS, Florida, after training at NAS Lemoore, California. Also in February, two F/A-18A squadrons, VFA-113 'Stingers' and VFA-25 'Fist of the Fleet' embarked in the aircraft carrier USS *Constellation* for the aircraft's first extended deployment at sea.

In mid-1986 the following US Marine Corps and US Navy squadrons were operational with F/A-18As: VMFA-115 'Silver Eagles' at MCAS Beaufort, South Carolina; VMFA-314 'Black Knights', VMFA-323 'Death Rattlers' and VMFA-531 'Gray Ghosts', all at MCAS El Toro, California; VFA-106 'Gladiators', VFA-131 'Wildcats', VFA-132 'Privateers', VFA-136 'Knight Hawks' and VFA-137 'Kestrels' with Atlantic Fleet, Cecil Field NAS, Florida; and VFA-25 'Fist of the Fleet', VFA-113 'Stingers', VFA-125 'Rough Raiders', VFA-192 'Golden Dragons', VFA-195 'Dambusters' and VFA-303 'Golden Hawks' with Pacific Fleet, Lemoore NAS, California.

In February 1986 the F/A-18A was selected to replace the US Navy Blue Angels Flight Demonstration Squadron's A-4F Skyhawks from 1987. Eleven early production aircraft, not suitable for shipboard operation, have been fitted with smoke-generating systems and special seat harnesses. The Blue Angels will begin training on the F/A-18A at El Centro NAS, California, in January 1987.

By early 1986 US Marine Corps and US Navy F/A-18As and F/A-18Bs had completed some 150,000 flight hours.

McDonnell Douglas is prime contractor for the Hornet, with the centre of activities at St Louis, Missouri. Northrop builds the centre and rear fuselage, which is delivered totally assembled to McDonnell Douglas. Assembly is completed at St Louis. Details of a projected multi-role land-based version, designated F/A-18L, can be found in the 1985-86 *Jane's*.

The following information applies specifically to the single-seat US Navy F/A-18A:

TYPE: Single-seat naval strike fighter.

WINGS: Cantilever mid-wing monoplane. Moderate sweep multi-spar structure, primarily of light alloy and graphite epoxy. Boundary layer control achieved by wing root slots. Full span leading-edge manoeuvring flaps have a maximum extension angle of 30°. Single-slotted trailing-edge flaps, actuated by Bertea hydraulic cylinders, deploy to a maximum of 45°. Ailerons, with Hydraulic Research actuators, can be drooped to 45°, providing the advantages of full span flaps for low approach speeds. Leading- and trailing-edge flaps are computer programmed to deflect for optimum lift and drag in both manoeuvring and cruise conditions, and ailerons and flaps are also deflected differentially for roll. Wing root leading-edge extensions (LEX) permit flight at angles of attack exceeding 60°. Wings fold, by means of AiResearch mechanical drive, at the inboard end of each aileron.

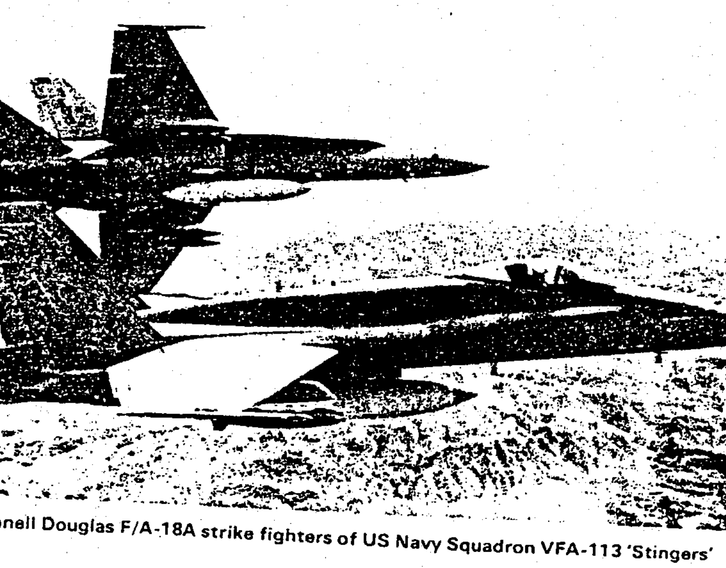
FUSELAGE: Semi-monocoque basic structure, primarily of light alloy, with graphite/epoxy used for access doors panels. Titanium firewall between engines. Airbrake in upper surface of fuselage between tail fins. Pressurised cockpit section of fail-safe construction.

TAIL UNIT: Cantilever structure with swept vertical and horizontal surfaces. Twin outward-canted fins and rudders, mounted forward of all-moving horizontal surfaces (stabilators), which are actuated collectively and differentially by National Water Lift servo-cylinder hydraulic units for pitch and roll control.

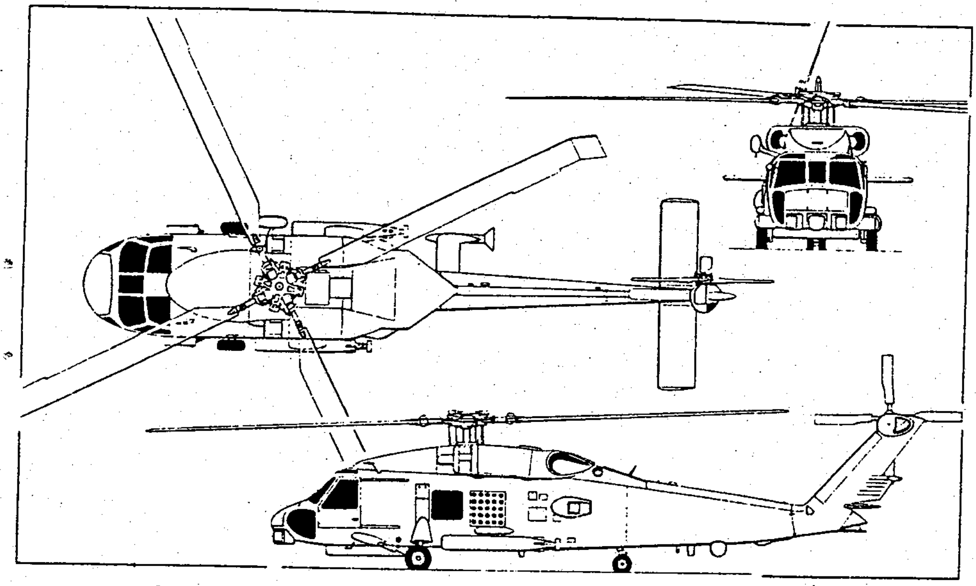
LANDING GEAR: Retractable tricycle type, with twin-wheel nose and single-wheel main units. Nose unit retracts forward, mainwheels rearward, turning 90° to stow horizontally inside the lower surface of the engine air ducts. Bendix wheels and brakes. osewheel tyres size 22 × 6·6-10, 20 ply, pressure 24·13 bars (350 lb/sq in) for carrier operations, 10·34 bars (150 lb/sq in) for land operations. Mainwheel tyres size 30 × 11·5-14·5, 24 ply, pressure 24·13 bars (350 lb/sq in) for carrier operations, 13·79 bars (200 lb/sq in) for land operations. Ozone nosewheel steering unit. Nose unit towbar for catapult launch. Arrester hook, for carrier landings, under rear fuselage.

POWER PLANT: Two General Electric F404-GE-400 low bypass turbofan engines, each producing approx 71·2 kN (16,000 lb thrust). Self-sealing fuel tanks and fuel lines; foam in wing tanks and fuselage voids. Internal fuel load approx 4,990 kg (11,000 lb); provision for up to three 1,249 litre (330 US gallon) external tanks, increasing total fuel capacity to more than 7,983 kg (17,600 lb). Flight refuelling probe retracts into upper starboard side of nose. Simmonds fuel gauging system. Fixed ramp air intakes.

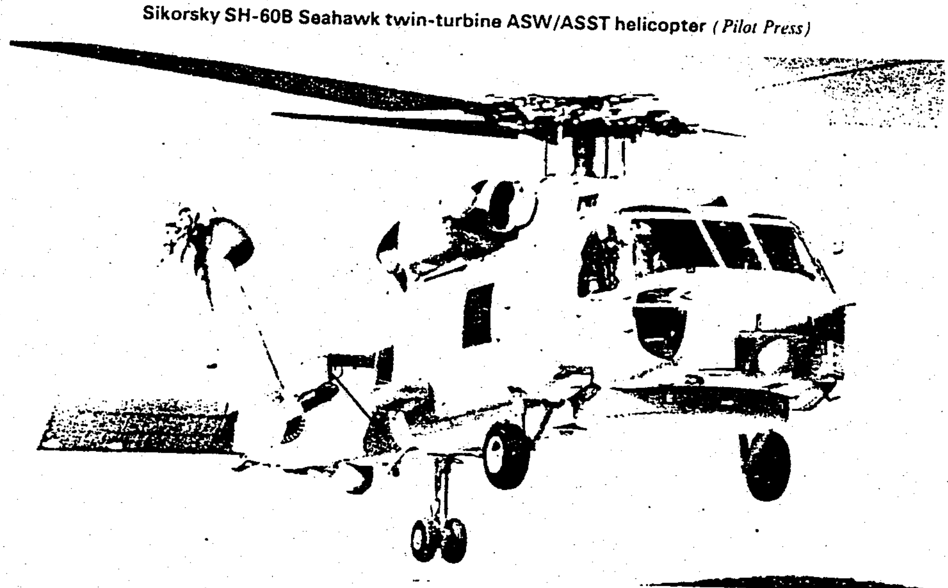
ACCOMMODATION: Pilot only in F/A-18A, on Martin-Baker US10S ejection seat in pressurised, heated and air-conditioned cockpit. Martin-Baker Navy Aircrew Common



nell Douglas F/A-18A strike fighters of US Navy Squadron VFA-113 'Stingers'



Sikorsky SH-60B Seahawk twin-turbine ASW/ASST helicopter *(Pilot Press)*



First production Sikorsky SH-60B Seahawk, the US Navy's LAMPS Mk III helicopter *(Howard Levy)*

main rotor folding system; main rotor brake; tail pylon folding; modified landing gear; a DAF Indal RAST (recovery assist, secure and traversing) device to haul down the helicopter in rough seas on to a small deck, and stow it in the ship's hangar; a sliding cabin door; hover in-flight refuelling system; and buoyancy features. The pilot's and co-pilot's seats are not armoured.

The first of five prototypes flew on 12 December 1979, and details of subsequent development and operational testing can be found in the 1982-83 *Jane's*. By mid-1982, the prototypes had logged a total of nearly 3,000 flying hours, including extensive shipboard trials. Production of a first batch of 18 SH-60Bs was authorised in FY 1982, followed by 27 more in FY 1983. Total planned requirement by the US Navy is 204 aircraft. The first production Seahawk flew on 11 February 1983, and deliveries to the Navy continue at the rate of two per month, with a total of 62 delivered by February 1986. First USN squadron was HSL-41, at North Island, San Diego, California. Operational deployment began in 1984. Japan has selected the SH-60B to replace the SH-3A Bs of the JMSDF. Two Sikorsky built Seahawk airframes, designated **XSH-60J**, have been delivered to Mitsubishi at Nagoya for installation of Japanese electronics and mission equipment under a $27 million contract from the Japan Defence Agency's Technical Research and Development Institute. The first of these helicopters is expected to fly in 1987. The SH-60J Seahawk will be built by Mitsubishi, and is scheduled to enter service with the JMSDF in the early 1990s, with replacement of SH-3s completed by the middle of the decade.

On 9 October 1984 the Royal Australian Navy confirmed an initial order for eight Seahawks for its full-spectrum ASW requirement, and ordered a further eight in May 1986. The Seahawks, designated **S-70B-2** RAWS (role adaptable weapon system), will operate from the RAN's 'Adelaide' (FFG-7) class guided missile frigates. Fifteen of the S-70B-2 RAWS will be assembled in Australia by Hawker de Havilland. The RAN helicopters will be equipped with MEL Super Searcher radar and Collins advanced integrated avionics including cockpit controls and displays, navigation receivers and communications transceivers, an airborne target off-hand data link and a tactical data system (TDS). The Spanish Navy has ordered [illegible] S-70Bs for 1988 delivery.

US Navy SH-60Bs will be deployed on a total of 106 'Oliver Hazard Perry' class frigates, and 'Spruance' class and Aegis equipped destroyers. They will provide all-weather capability for detection, classification, localisation and interdiction of surface vessels and submarines. Compared with the LAMPS Mk I, range, loiter time and endurance are increased significantly. ASW listening time is increased by 57 min, ASST (anti-ship surveillance and targeting) loiter time by 45 min. The helicopter interfaces with its mother ship via a data link, but can also operate independently. Secondary missions include search and rescue (SAR), vertical replenishment (vertrep), medical evacuation (medevac), fleet support and communications relay.

On 6 March 1985 Sikorsky received a $50·9 million contract for full scale development and production options for a 'CV-Helo' version of the Seahawk designated **SH-60F** and known officially as the CV Inner Zone ASW helicopter. Intended as a replacement for the SH-3H Sea King, this helicopter will operate from aircraft carriers to protect the inner zone of a carrier battle group from submarine attack. The SH-60F will differ from the SH-60B in having all LAMPS Mk III avionics, sensors and pneumatic sonobuoy launcher equipment removed, together with the cargo hook, recovery assist secure and transverse system main probe, tail probe and control panel, although installation provisions will be retained. An integrated ASW mission avionics suite will be installed comprising a MIL-STD-1553B tactical data system with dual Teledyne Systems AN/ASN-123 tactical navigation computers, a tactical data link to other aircraft, a communications control system, and display units for each of the four crew members.

Additional equipment planned for the SH-60F includes an Allied Bendix Oceanics AN/AQS-13F sonar system; internal/external auxiliary fuel system and an additional weapons station on an extended pylon on the left side of the fuselage. Modifications will also include rearrangement of the cabin interior, removal of external sensor fairings, and improvements to the automatic flight control system to permit increased rates of deceleration on automatic approaches in addition to automatic coupled sonar cable angle hover or coupled Doppler hover. Provision will be made for a chaff/sonobuoy launcher system, an attitude heading referencing system and global positioning system, with future growth potential for a fatigue monitoring system, surface search radar, FLIR, passive ESM, MAD, air-to-surface missile capability and a sonobuoy data link. Secondary missions will include SAR and standby during launch and recovery of the carriers' fixed-wing aircraft to provide a rescue service in case of ditching. The US Navy requirement is for 175 SH-60Fs. The initial contract provides production options for 76 helicopters in five lots. In January 1986 Sikorsky received a contract for the first seven SH-60Fs. By early 1986 some 100 hours of testing had been completed on the helicopter's automatic flight control system installed in an SH-60B. The first SH-60F was expected to fly in late 1986 with production deliveries to the US Navy anticipated during 1988.

In September 1986, the US Navy awarded Sikorsky a contract for an initial production increment of five combat search and rescue/special warfare support (**HCS**) helicopters for the Navy, and two medium range recovery (**MRR**) helicopters for the Coast Guard. The Sikorsky HCS/MRR is a close derivative of the SH-60F. It is expected that 18 will eventually serve with the Navy and 35 with the Coast Guard.

The following description applies to the SH-60B:

TYPE: Twin-turbine ASW/ASST helicopter.

ROTOR SYSTEM: As for UH-60A, except that main rotor blades can be folded by electrical power, and a rotor brake is provided.

AIRFRAME: Identical to UH-60A in construction. Wheelbase is shortened by 46·6 per cent, with twin wheels on tail unit, tyre size 17·5 × 6·00-6. Multiple disc brakes on main-wheels. Landing gear structure is less complex since the SH-60B's vertical impact requirement is 71·5 per cent below that of the UH-60A.

POWER PLANT: Two 1,260 kW (1,690 shp) General Electric T700-GE-401 turboshaft engines. Internal fuel as for UH-60A. Hovering in-flight refuelling capability. Two auxiliary fuel tanks on fuselage pylons optional.

ACCOMMODATION: Pilot and airborne tactical officer backup pilot in cockpit, sensor operator in specially equipped station in cabin. Dual controls standard. Sliding door with jettisonable window on starboard side. Accommodation is heated, ventilated and air-conditioned.

SYSTEMS: Generally as for UH-60A.

AVIONICS AND EQUIPMENT: Com equipment comprises Collins AN/ARC-159(V)2 UHF and AN/ARC-174(V)2 HF, Hazeltine AN/APX-76A(V) and Bendix AN/APX-100(V)1 IFF transponders, TSEC/KY-75 voice security set, TSEC/KG-45(E-1) com security, Telephonics OK-374/ASC com system control group and Sierra Research AN/ARQ-44 data link and telemetry. Nav equipment comprises Collins AN/ARN-118(V) Tacan, Honeywell AN/APN-194(V) radar altimeter, Teledyne Ryan AN/APN-217 Doppler, and Collins AN/ARA-50 UHF DF. Mission equipment includes Sikorsky sonobuoy launcher, Edmac AN/ARR-75 and R-1651/ARA sonobuoy receiving sets, Texas Instruments AN/ASQ-81(V)2 MAD, Raymond MU-670/ASQ magnetic tape memory unit, Astronautics IO-2177/ASQ altitude indicator, Fairchild AN/ASQ-164 control indicator set and AN/ASQ-165 armament control indicator set, Texas Instruments AN/APS-124 search radar (under front fuselage), IBM AN/UYS-1(V)2 Proteus acoustic processor and CV-3252/A converter display, Control Data AN/AYK-14 (XN-1A) digital computer, and Raytheon AN/ALQ-142 ESM (in chin mounted pods). External cargo hook and rescue hoist standard.

ARMAMENT: Includes two Mk 46 torpedoes.

DIMENSIONS, EXTERNAL: As UH-60A except:

Length overall (rotors and tail pylon folded)	12·47 m (40 ft 11 in)
Width (rotors folded)	3·26 m (10 ft 8½ in)
Height to top of rotor head	3·63 m (11 ft 11 in)
Height overall, tail rotor turning	5·18 m (17 ft 0 in)
Height overall (pylon folded)	4·04 m (13 ft 3¼ in)
Wheel track	2·79 m (9 ft 2 in)
Wheelbase	4·83 m (15 ft 10 in)

AREAS: As UH-60A

WEIGHTS (estimated, A. ASW mission; B. ASST mission; C. Utility role):

Weight empty: A	6,191 kg (13,648 lb)
Mission gross weight: A	9,182 kg (20,244 lb)
B	8,334 kg (18,373 lb)
Max gross weight: C	9,926 kg (21,884 lb)

PERFORMANCE:

Dash speed at 1,525 m (5,000 ft), tropical day	126 knots (234 km/h; 145 mph)
Vertical rate of climb at S/L, 32·2°C (90°F)	213 m (700 ft)/min
Vertical rate of climb at S/L, 32·2°C (90°F), one engine out	137 m (450 ft)/min

SIKORSKY/US ARMY S-75 (ACAP)

On 25 February 1981, it was announced that the US Army's Applied Technology Laboratory had selected Sikorsky as one of two contractors to negotiate a contract for the Army's Advanced Composite Airframe Program (ACAP). The objective was to develop, build and evaluate a helicopter fuselage made entirely of composite materials, in order to achieve a weight saving of 22 per cent and cost

6

6. The Australian Sea Freight Disgrace

It is in order at this time to quote some figures obtained from reference 2.

a. 99% of exports and imports by volume is transported by sea.

b. Overseas Ships visiting Australia 1985/86

	Number of visits	Million DWT
Bulk carriers	4,331	259
General cargo	1,828	30
Tankers	547	17
Other	116	1
	6,822	307

c. Australia has always been heavily dependant on foreign controlled and foreign manned shipping services. In 1985/86 Australian Flag Ships (AFS) carried only 3.2% of our total seaborn trade.

d. Total Freight revenue - Australia's trade 1985/86

	$ Million
Foreign Ship operators -	6,418 - 88%
Australian Ship operators -	881 - 12%

However one looks at the above figures, there is a terrible imbalance against Australia's long term economic interests. How have we allowed such a situation to happen and remained unchecked?

Much has been written about Australia's dire economic need to improve our trading position in regard to imports or exports. but it also appears obvious that we must make a concerted effort to improve our market share of sea freight revenue.

The above of course ignores the strategic importance of this country being able to obtain the use of Australian flag vessels in times of emergency.

There are problems in regard to Australian high overhead costs in running commercial ships, these must be faced up to and overcome.

7. Commercial Viability of Australian based Container Ships

For this section the author is in debt to Mr Peter Dent and Sea Containers Inc. As a baseline ship that would be commercially viable, the "Contender Class" container ship has been chosen. Smaller ships were looked at, but, the larger ship was considered best to sort out many of the conceptual ideas.

Mr Dent's own thoughts are included in Annexe A, and is necessary reading for those wishing to look further into the commercial aspects. He does discuss the prospect of smaller container ships however, but much of this material is still relevant.

The following sketch provides an outline of the basic ship. Annexe B gives the full "Contender design" specification.

Basic Particulars Are:

LOA:-	173 metres
LBP -	160 metres
Breadth -	30.4 metres
Depth - (Upper Deck)	17.0 metres
Depth - (Main Deck)	9.0 metres
Cargo DWT -	16,500 tons
Trial Speed -	19 knots
Twin Screws	
Range -	20,000 miles

8. Containerisation

There can be no doubt that containerization has changed sea and air transport thinking every dramatically in recent decades. It has been said that the initial concept came as an Australian idea. That being so, the originators have something to be proud of.

The use of containers is not new in defence circles either. For instance the new Australian catamaran minehunter uses the concept to changeout its electronics suite as necessity would require it.

An overseas warship builder has taken the idea to even greater lengths. As will be seen by the attached sheets, Blohm and Voss can now provide great flexibility in ship outfitting, weapons and electronic suites.

It is of no accident then that a container vessel has been chosen for the baseline ship. The container or modular concept will be put to other uses.

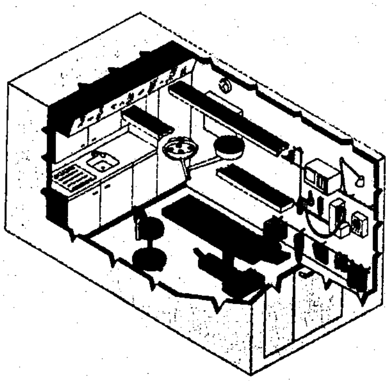
Some Unique containers considered appropriate for an Australian converted ship.

1. Additional power (Generators)
2. M/C and Hangar Vents
3. Pumps etc with portable connections
4. Aircraft Maintenance Modules
5. Munitions - Arming etc
6. Accommodation - A/C modules
7. Sanitary
8. Food Stores (Refrig and Dry)
9. workshops
10. Ammunition
11. Weapons Ship protection weapons if considered necessary
12. Fire-fighting etc
13. Galleys
14. RAS & FAS equipment

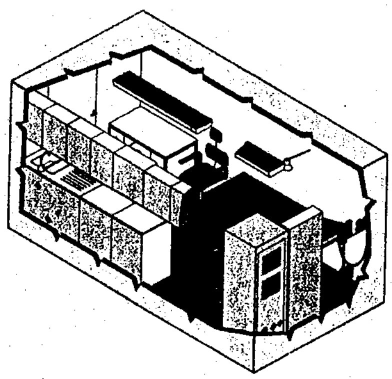
Modularity

Modular Outfitting

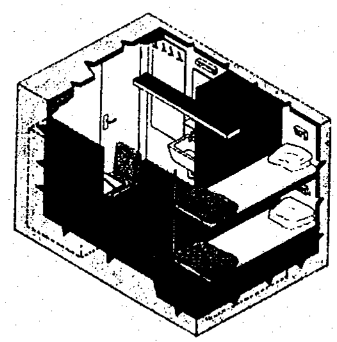
Operating Theatre



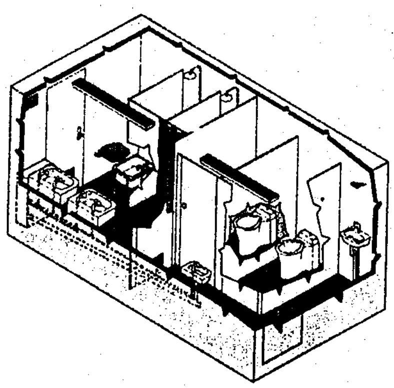
Medical Treatment



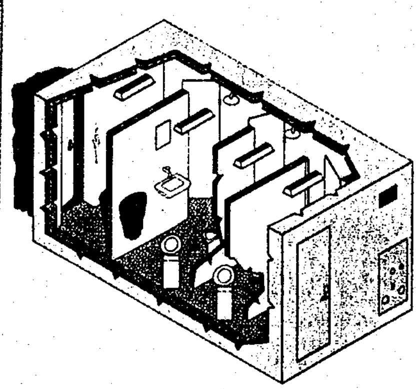
Accommodation



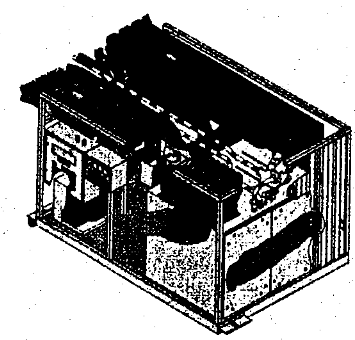
Sanitary Unit



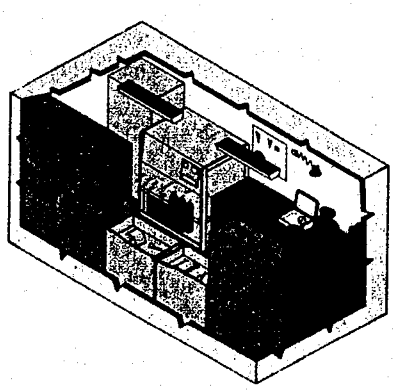
NBC-Decontamination



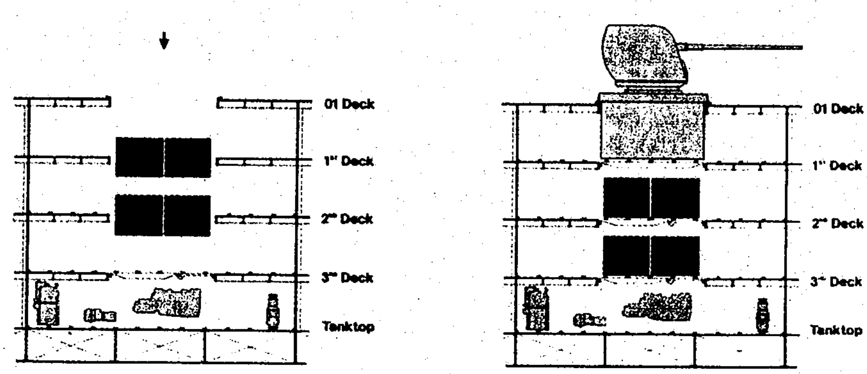
Ventilation



Damage Control Unit (Diver)

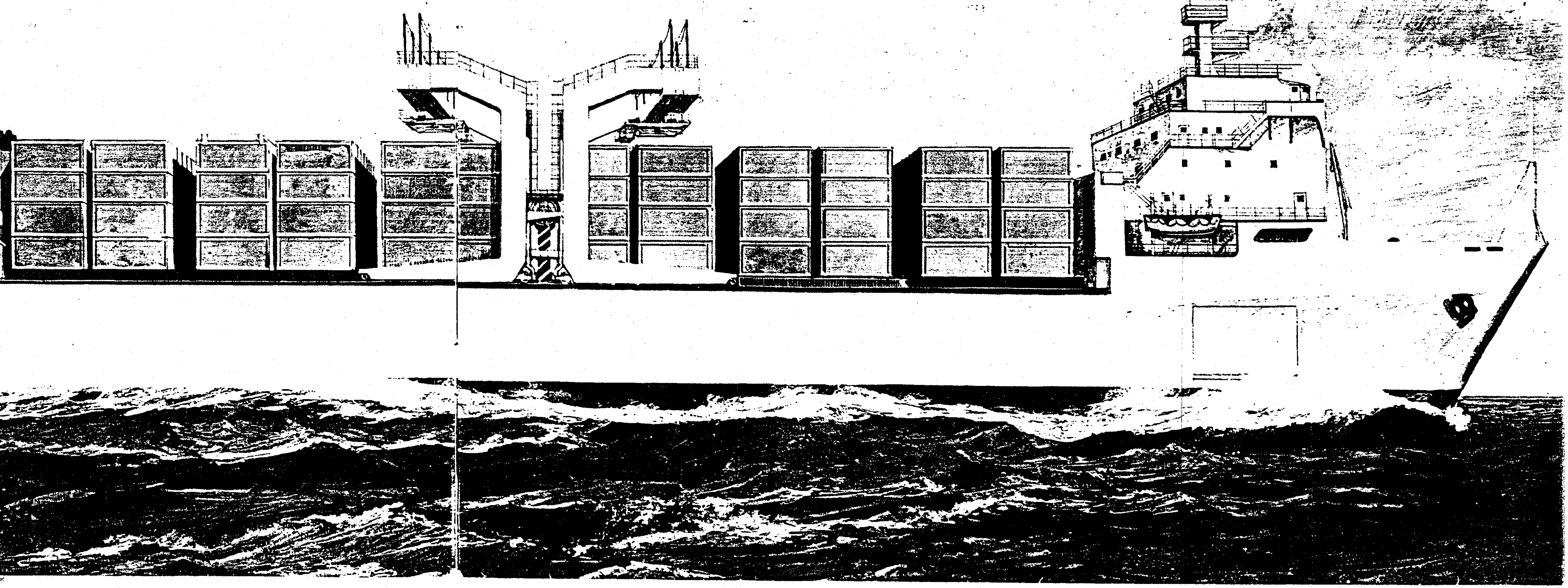


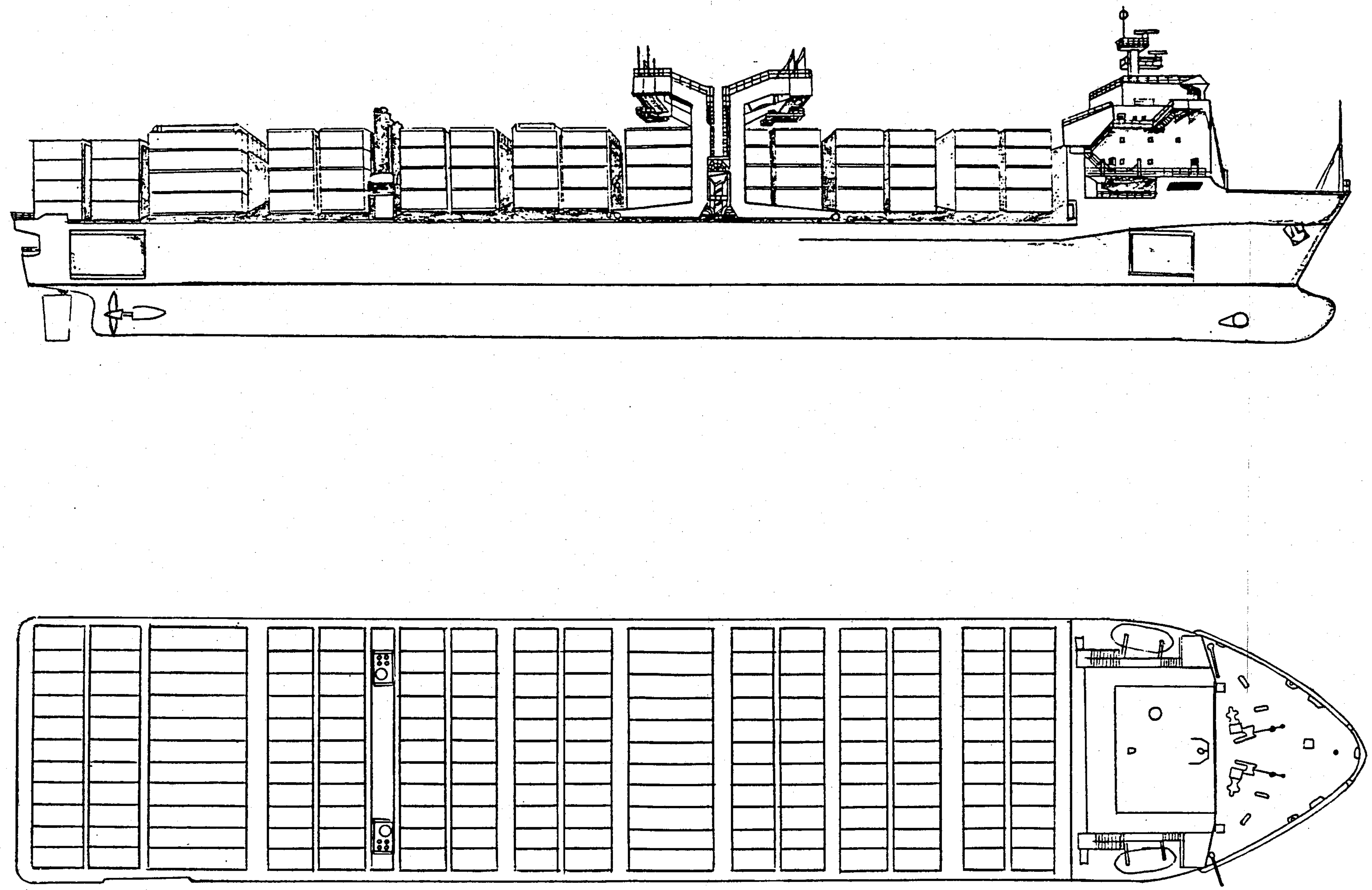
Opening and Passage System



THE CONTENDERS CAN CARRY 1308 TEU.

Length overall: 173m Breadth: 30.4m
Twin screw propulsion: 8.2m draught
Range: over 20,000 miles.





CONTENDER CLASS

Weapon and Electronic Modules

Blohm+Voss

GUN-FU				SAM SYSTEM-FU		SSM SYSTEM-FU	ANTI SUB-SYSTEM-FU	VERTICAL LAUNCHING SYSTEM-FU	
155mm VERTICAL LOAD GUN SYSTEM	4,5" MARK 8 ○	35mm AUTOMATIC GUN ○	25mm SEA ZENITH ●	ROLAND II M SYSTEM	RAM LAUNCHER ○	EXOCET SYSTEM ●	ASW ROCKET LAUNCHER ○	MK41 VLS MODULE (8) ○	SEAWOLF VLS ○
	100mm COMPACT GUN ○	30mm AUTOMATIC GUN ○	30mm TWIN GUN ○	LIGHTWEIGHT SEAWOLF LAUNCHER ○	NATO SEASPARROW LAUNCHER ●	OTOMAT SYSTEM ●		MK41 VLS MODULE (16) ○	NATO SEASPARROW VLS ○
127mm COMPACT GUN ●	76mm COMPACT GUN ●	30mm SEA VULCAN ○	TRINITY WEAPON SYSTEM ○	ALBATROS/ ASPIDE LAUNCHER ●	CROTALE NAVAL LAUNCHER	SEA DART SYSTEM ○		MK41 VLS MODULE (32) ○	
5"/54 COMPACT GUN ●	57mm AUTOMATIC GUN ○	GOALKEEPER ○	25mm SEA VULCAN ○	LIGHTWEIGHT ALBATROS LAUNCHER ○		HARPOON SYSTEM ●			
120mm COMPACT GUN	40mm AUTOMATIC GUN ●	CIWS-PHALANX ○						MK41 VLS MODULE (64)	

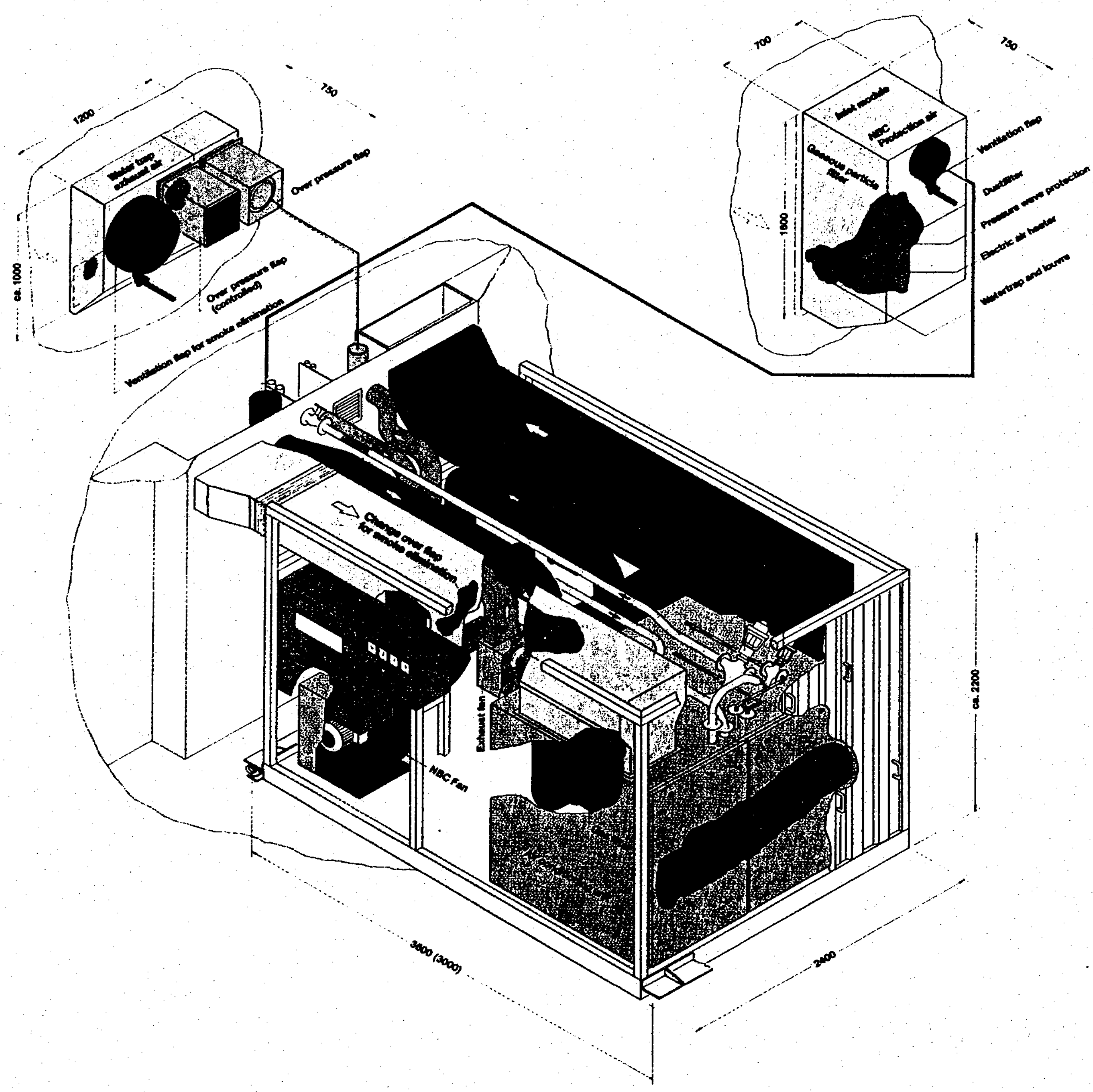
SEARCH RADAR-FU		SEARCH/FIRE CONTROL-FU		ELOKA-FU	IR-SENSOR-FU	COMMUNICATION STANDARD-FU	SONAR-FU	NAVIGATION-FU	TRAINING-FU
DA08/LW08 ●	RAN 10 S ○	WM 22,25,28 ●	STIR 18,24 ●	FL 1800 S ○	IR-SCAN ○	TRANSCEIVER-STATION ●	DSQS-21 ●	INT NAV WORKING-SPACE ○	SIMULATION-MODULE ○
AWS-5 ●	DOLPHIN ●	ZENITH TRACKER ●	ORION RTN 10X ●	RAPIDS SCIMITAR ●	SPIRAL ○	COMMUNICATION-CENTER ●	ASO-4 ●	GYRO ●	TEST-MODULE ●
DA05 ●	TRITON II ○	GEMINI ●	9 LV-200 ○	NEWTON C		TAICOS ●	PHS-32 ●		
RAN 11 L-X	9 LV-200 ○		RTN-20X (DARDO)	CUTLASS/RCM		CIC-EQUIPMENT ●	AN/SQS 56 ●		
SMART ○	MW08 ○		CASTOR II ○	AN/SLQ-32 ○					
M-BAR	ZW08 ○		CASTOR ○	APECS II ○					
SEA TIGER ○	1022 ○		STING ○						

● These functional units are service proven or under construction at Blohm + Voss.

○ These functional units are feasible concepts, proved by drawings.

Survivability

Ventilation Module



Main Characteristics:

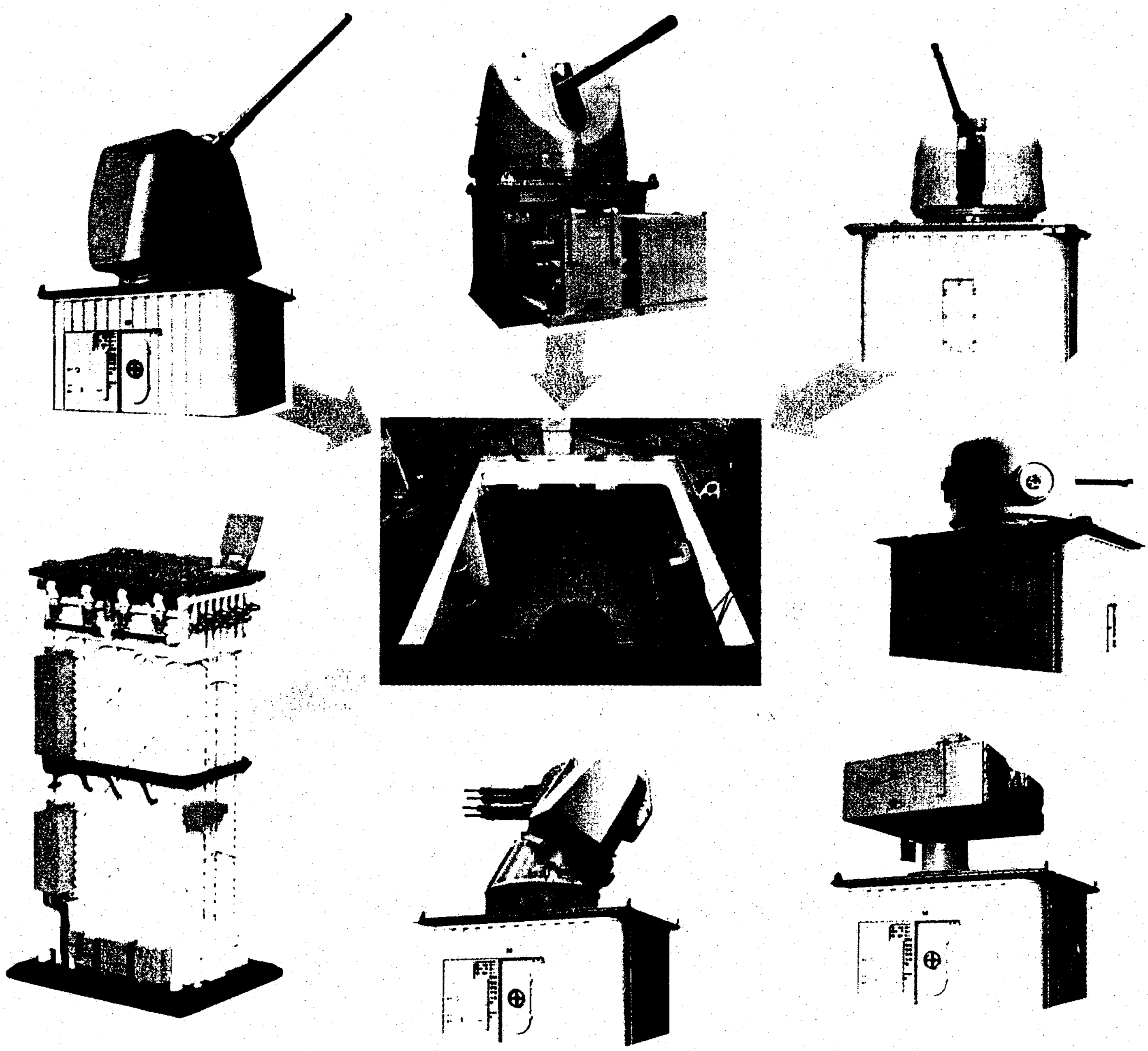
1. Total replacement of conventional fan rooms
2. Reversible air flow for smoke elimination
3. Optimum logistic support by exchange of units
4. Reduced design and construction
5. Clear interface between subcontractor and yard
6. Outfitting and testing on workshop conditions

Compatibility between SSES and FES Modules is based on common
- deck opening sizes
- bolthole patterns
- bolthole spacings
- bolthole diameters
- base supports for VLS

Conditions including a standard mechanical interface have been realised for the interchangeability of all US and European weapon modules, from Phalanx to the 64 VLS module.

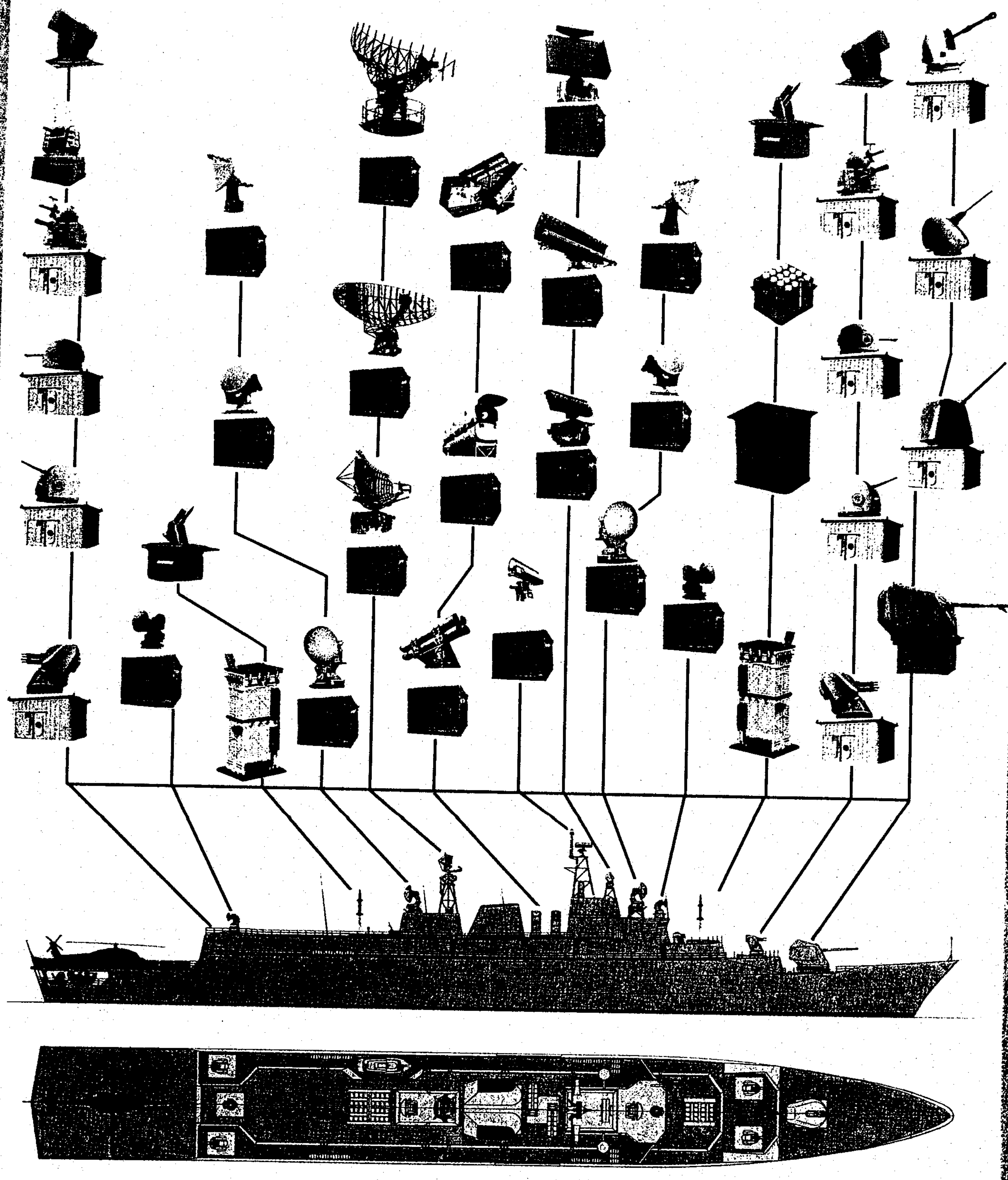
Through the use of the established standards any desired weapon module exchange is possible, without design changes to the ship's structure and without time-consuming machining of the supports.

This exchangeability could be used on surface warships of varying displacement (from 500 to approx. 12.000 tonnes).



MEKO® Mod. 3

Standard Platform with Variable Payload



Modularity
– A Tested and Proven Concept –
Weapon and Electronic Modules

9. Discussion on the converted container ship to take fixed wing aircraft (F/A-18 for instance) - Option 1.

a. First and foremost, the ships commercial viability shall not be compromised. Therefore basic ship operations should not change greatly regardless of what task the vessel is undertaking. Navigation, crew accommodation and ship machinery spaces remain unchanged. Small modifications are required to the main machinery exhaust stacks, and also the navigational and communication aerials. These will be positioned above the FLYCO containers. It will be understood that the navigation bridge being positioned well forward eases many of problems in this regard. It was necessary to restrict the superstructure to a height of five standard containers. (See Sketch No. 9.1)

b. Main Flight Deck (Sketch No. 9.3)

The flight deck is made up of flat sections or panels that are placed aboard by crane at a convenient container terminal. The main structural support is provided by special containers stacked five high on the pontoon hatch covers. The outside containers also make up the walls/bulkheads of the main hangar deck. The flight deck is so designed that it can provide a catapult and arresting wire arrangement. There can be no doubt some careful design will be needed around the catapult. It has been suggested that more than one catapult is required to be truely effective. Whether or not a steam catapult is really the answer remains to be seen. The writer believes that rocket assistance may prove a better alternative in our circumstances. Recesses are provided to take two elevators. Holding down wires both longitudinally and athwartship are needed to ensure there is no movement in a seaway. There are locking U sections to join each flight deck panel. This section also ensures a flat surface is provided for aircraft operations. Material of the panels can be steel or aluminium depending on the wheel loads and location on the flight deck.

c. Elevators (lifts) (Sketch No. 9.2)

Elevators must be a unique design and must be completely portable. It is not expected that the ship will carry these during commercial voyages. The larger deck elevator will be designed to fit into a standard pontoon hotel cover. Once in position and power connected the elevator should be ready for immediate operation. Some guidance arrangement of the elevator platform itself will probably be needed.

The maintenance deck elevator is also portable and fits into "a well" fabricated into the deck. When the ship is in its commercial mode, there will be cover plates over the recess. Its position will be directly over a hatch opening to allow the elevator to be dropped into position by crane.

d. Hangar Deck Cover Plates (Sketch No. 9.4)

To ensure there is a flat surface in the hangar area, portable cover plates are provided between the pontoon hatch covers. As can be seen by the sketch, there is a very convenient space provided for running temporary hoses and electric cable.

Weather Tight Wall/bulkheads on hangar Deck (Sketch No. 9.5)

This sketch shows the container walls requiring a quick-action fastening and release arrangement. To close off as many air draughts as possible, a felt material is placed between the containers.

f. RAS and FAS Stations (Sketch 9.6)

In the event of long voyages, obviously the escorting vessels will require replenishment and fuel every so often. Two RAS and FAS stations are provided port and starboard. These are fully portable and should be designed to take up the space of two standard containers.

g. Accommodation Modules Placed in the Hatch Coamings (Sketch No. 9.7)

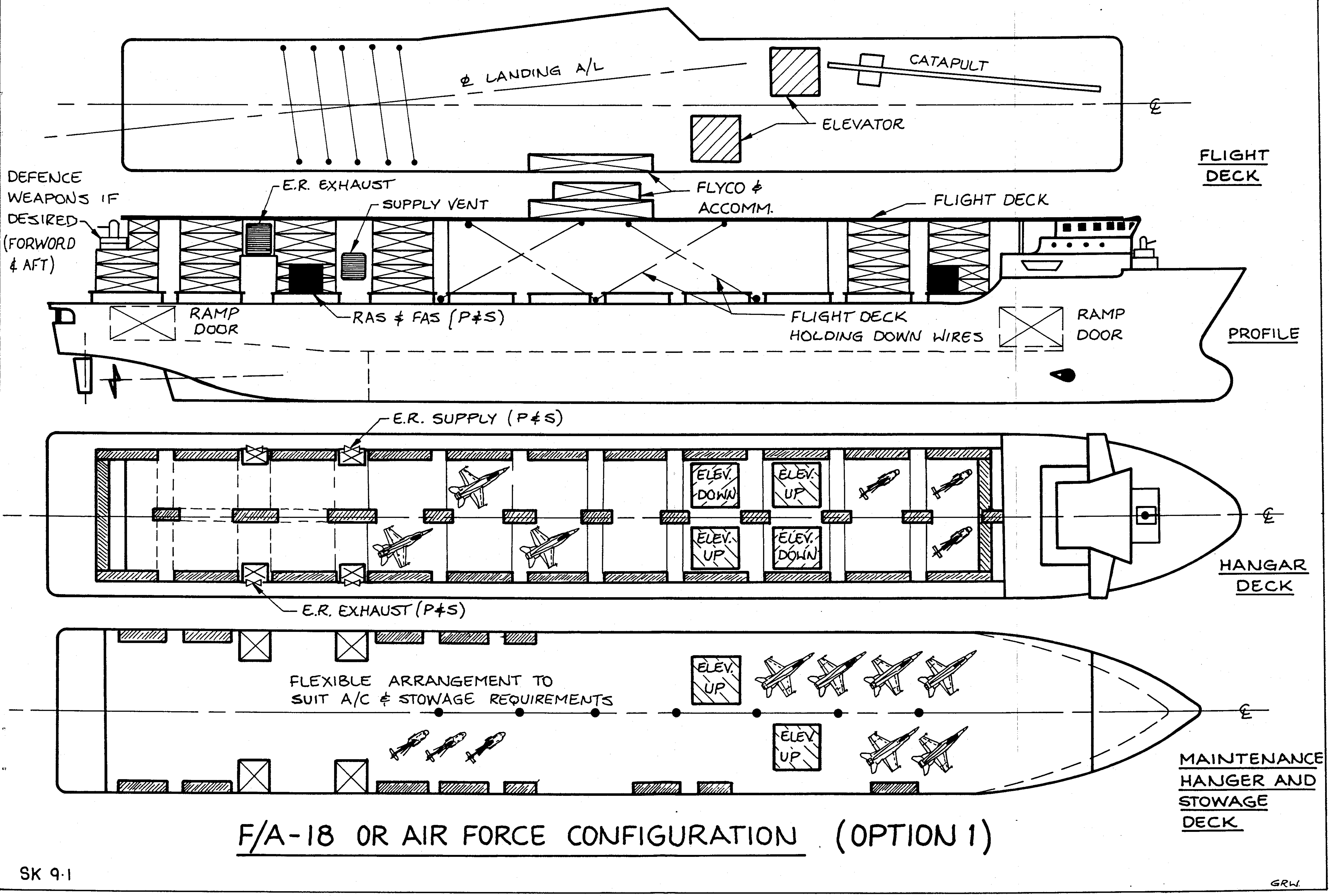
To turn an otherwise commercial ship into a weapon carry vessel will require additional accommodation space. In this case the answer lies with containers once again. With the chosen baseline design, the coamings provide a convenient space to store accommodation modules. This area is away from the noise generating parts of the ship, and is not a space which hinders in any way the other functions of the ship.

h. The carrying of ammunition (Sketch No. 9.8)

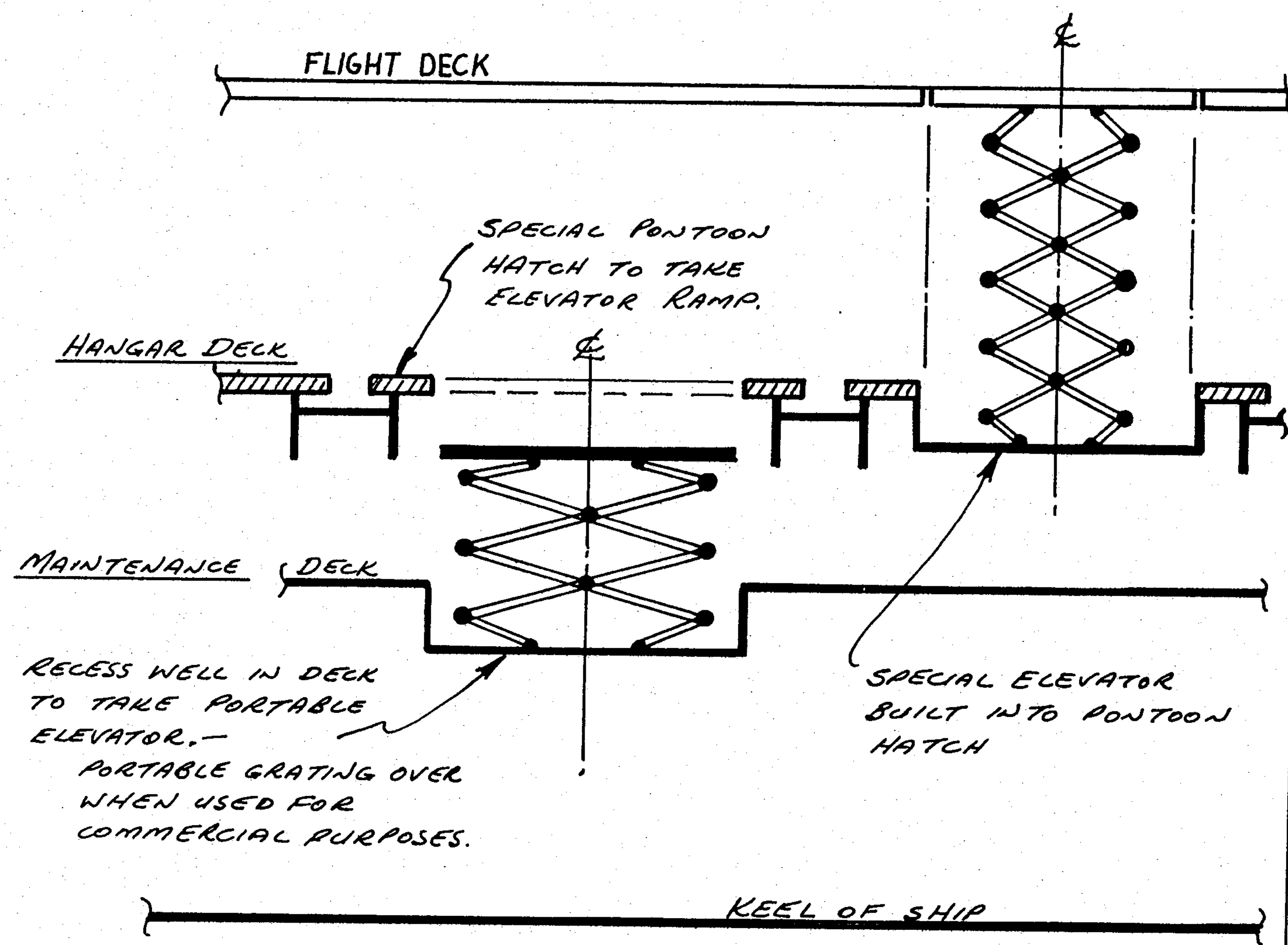
Once again, this subject will require careful thought and design. All the answers are not provided here. As a starting point however, it does seem desirable to place the ammunition as low in the ship as possible. Again the writer is talking about containers. For this discussion the ammo containers have been placed in special wells sunk into the maintenance hangar deck.

i. Flyco Container (Sketch 9.9)

All flying operations must be controlled by a command area. Flyco is best postiioned topsides where visability is good. For option 1 the Flyco containers have been placed around the midship region. The flight deck arrangement is by no means fixed and all sorts of variation can be made to it.


CATAPULT
℄ LANDING A/L
ELEVATOR
FLIGHT DECK
DEFENCE WEAPONS IF DESIRED (FORWORD & AFT)
E.R. EXHAUST
SUPPLY VENT
FLYCO & ACCOMM.
FLIGHT DECK
RAMP DOOR
RAS & FAS (P&S)
FLIGHT DECK HOLDING DOWN WIRES
RAMP DOOR
PROFILE
E.R. SUPPLY (P&S)
ELEV. DOWN
ELEV. UP
ELEV. UP
ELEV. DOWN
E.R. EXHAUST (P&S)
HANGAR DECK
ELEV. UP
FLEXIBLE ARRANGEMENT TO SUIT A/C & STOWAGE REQUIREMENTS
ELEV. UP
MAINTENANCE HANGER AND STOWAGE DECK
F/A-18 OR AIR FORCE CONFIGURATION (OPTION 1)
SK 9·1
GRW.

SKETCH OF ELEVATOR ARRANGEMENT.



NOTES:

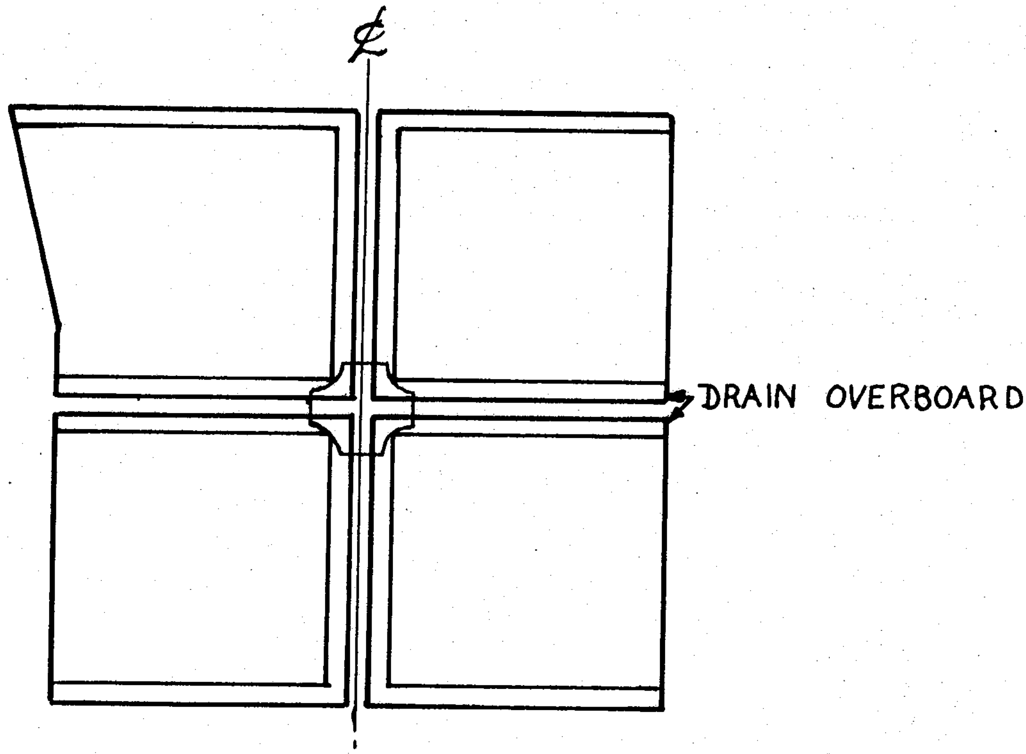
1. "RECESS WELL" IN DECK WILL ACT AS SUMP AND THEREFORE WILL HAVE SUCTION DRAIN.

2. EMPHASIS ON PORTABLE ELEVATORS, THESE ARE NOT REQUIRED FOR COMMERCIAL PURPOSES.

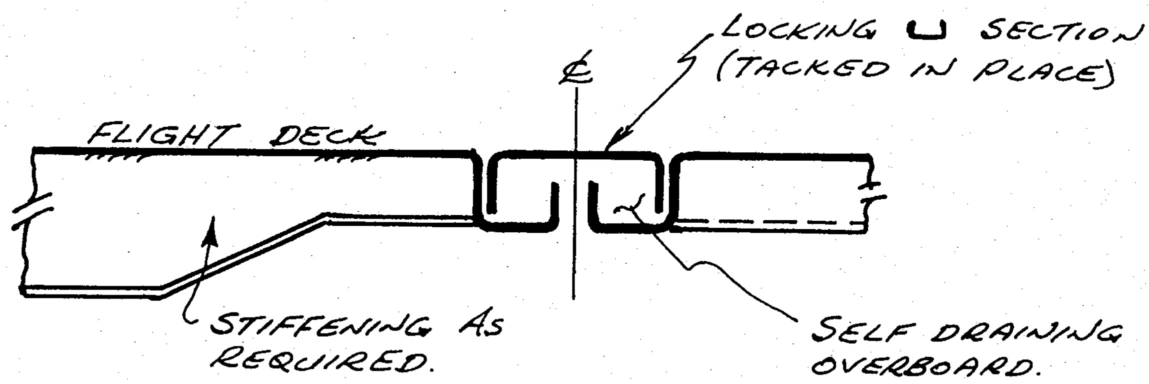
3. SUMP STRUCTURAL STIFFENING NOT SHOWN.

SK 9·2

R.K.H.



PLAN.



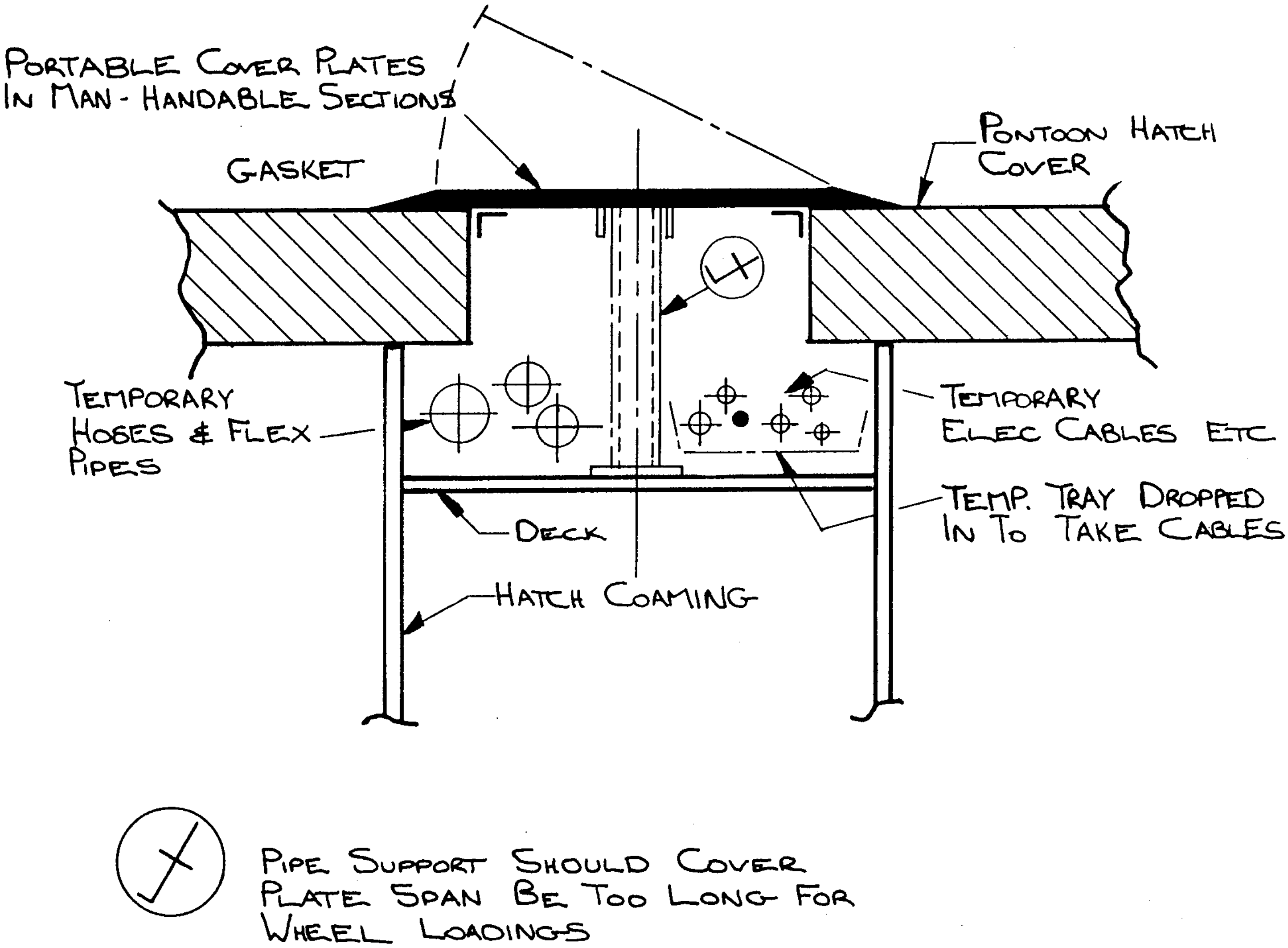
SECTION SHOWING TWO DECK PLATES.

SKETCH OF PORTABLE FLIGHT DECK SECTIONS.

NOTE: SOME AREAS THE MATERIAL WILL BE STEEL, OTHERS ALUMINIUM ALLOY.

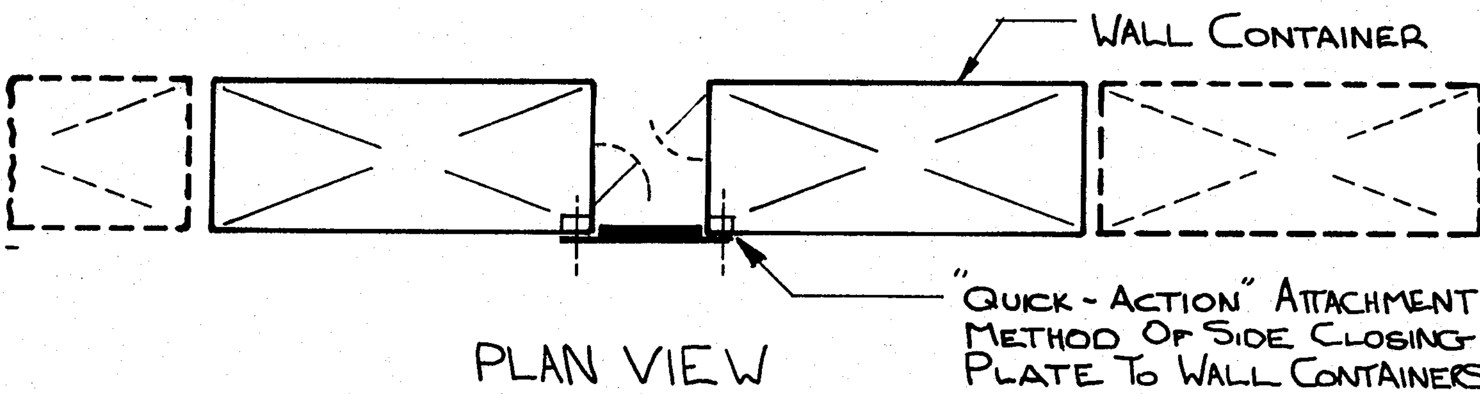
SK 9·3

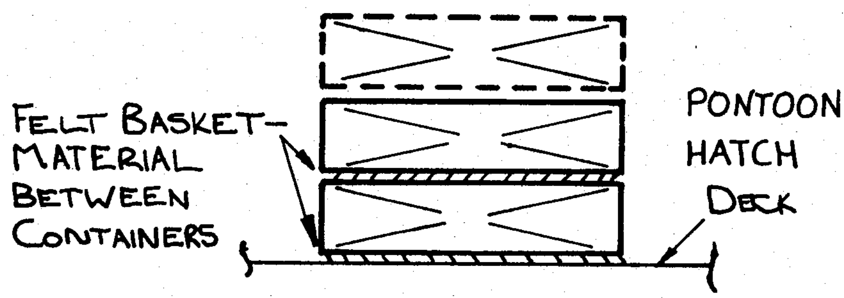
R.K.H.



SKETCH OF COVER PLATE BETWEEN HATCH COVERS ON HANGAR DECK

SK 9·4





NOTE:-

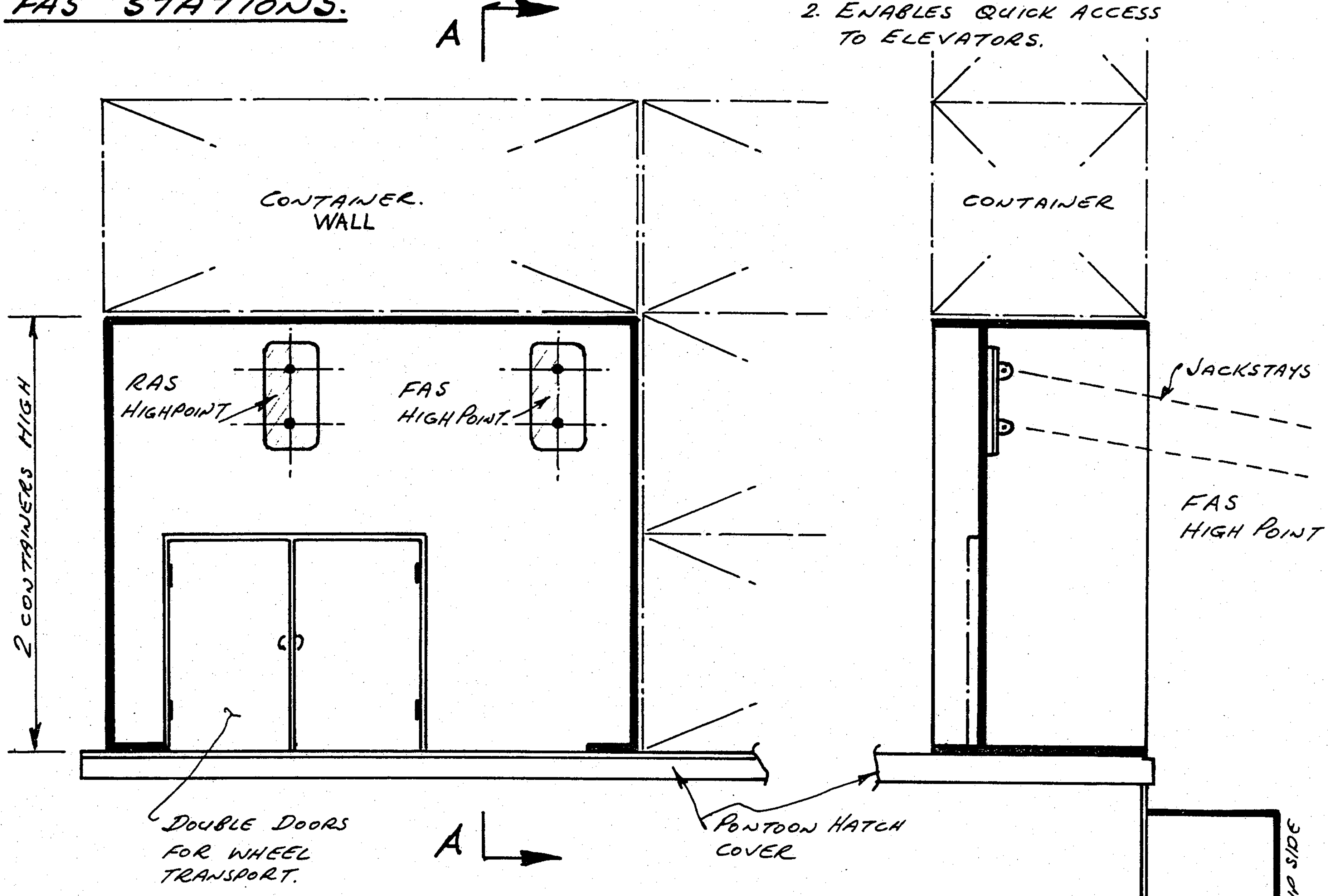
IN SOME CIRCUMSTANCES IT MAY BE POSSIBLE TO LAYER THE CONTAINER WALL IN BUILDING BRICK FASHION

SKETCH SHOWING ARRANGEMENTS TO KEEP CONTAINER WALLS WEATHER-TIGHT

SKETCH OF PORTABLE RAS & FAS STATIONS.

NOTES:

1. POSITIONED P. & S.
2. ENABLES QUICK ACCESS TO ELEVATORS.



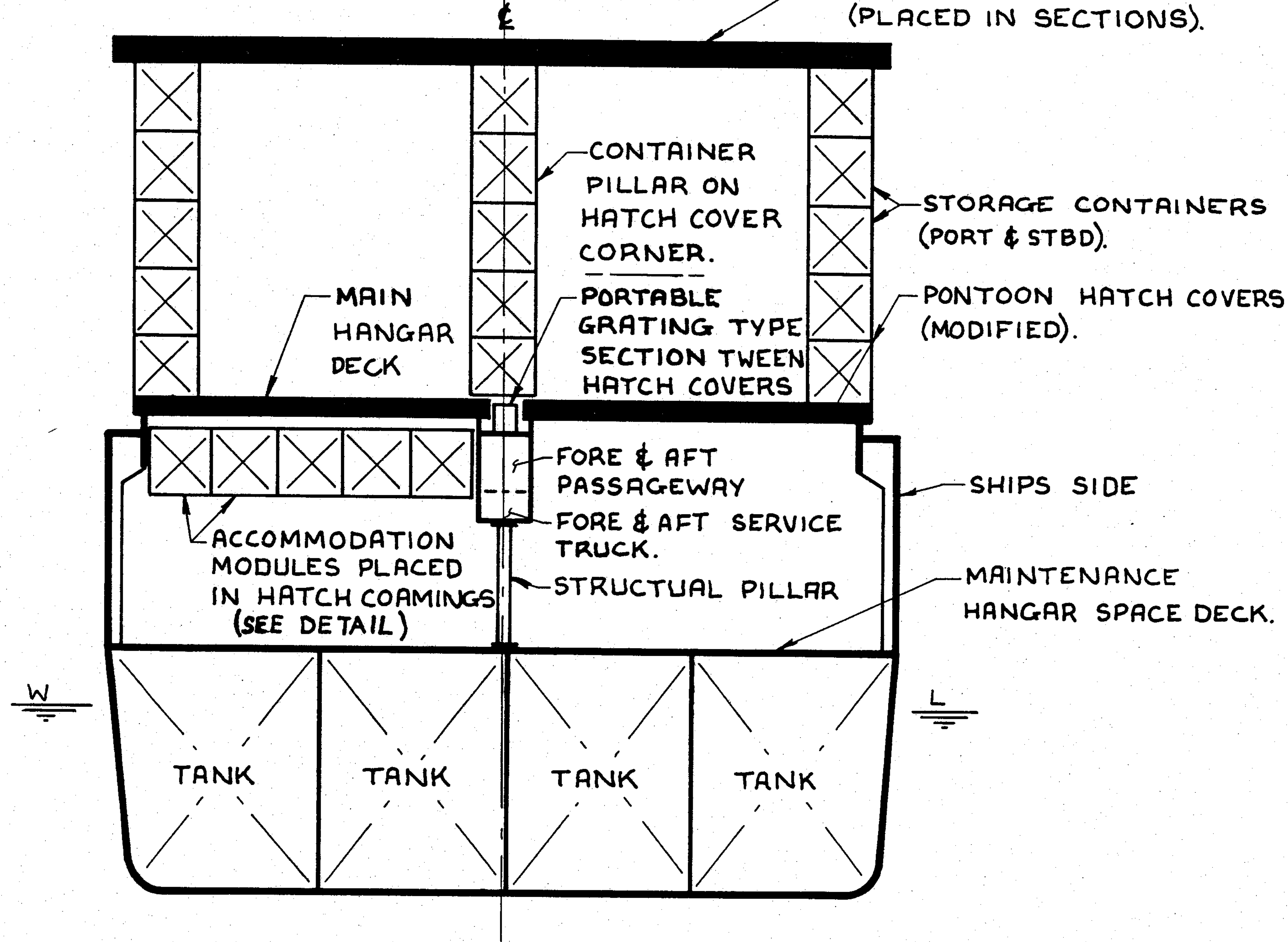
SK 9·6

ELEVATION

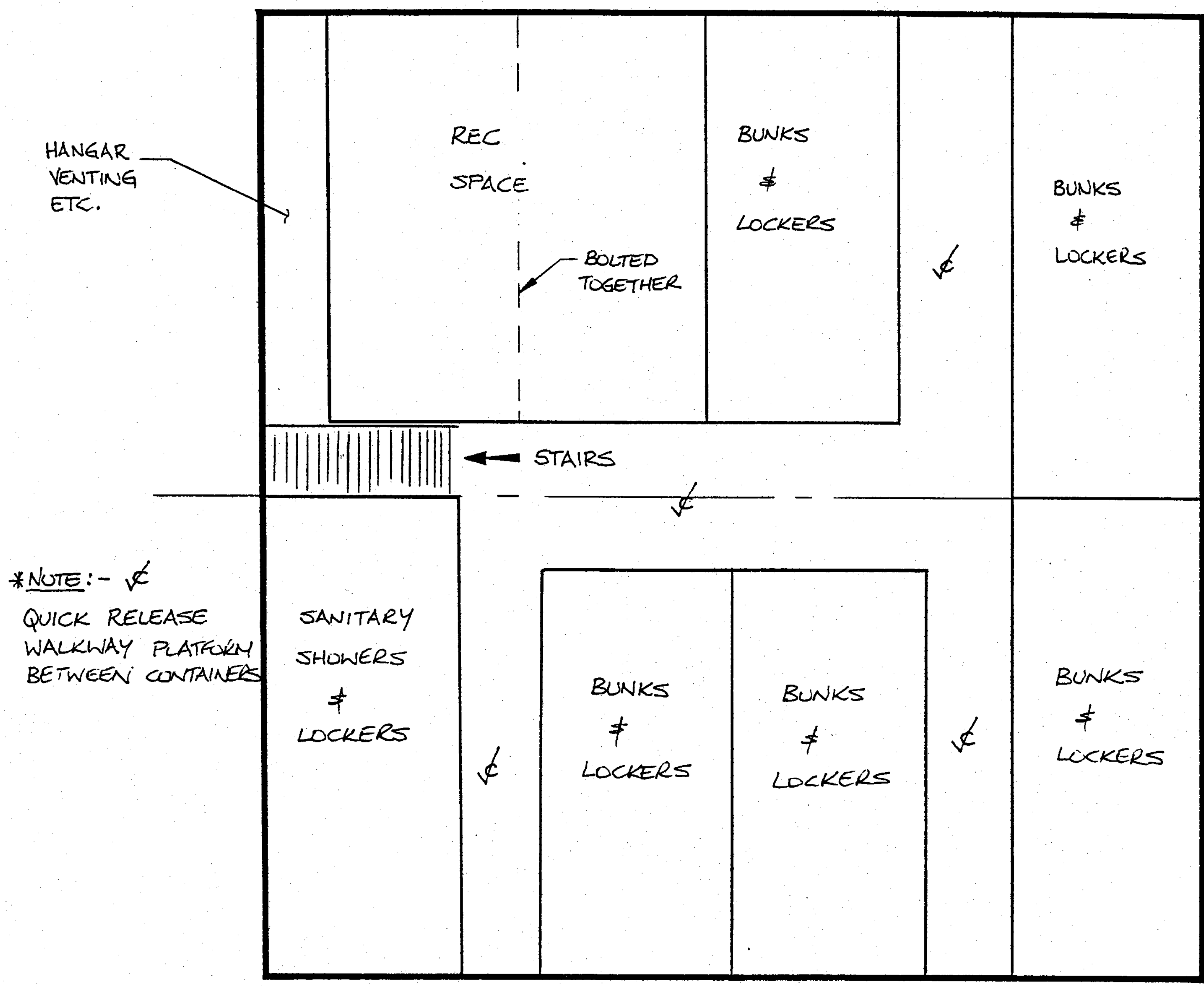
SECTION A-A

R.K.H.

SKETCH OF TYPICAL SHIP SECTION



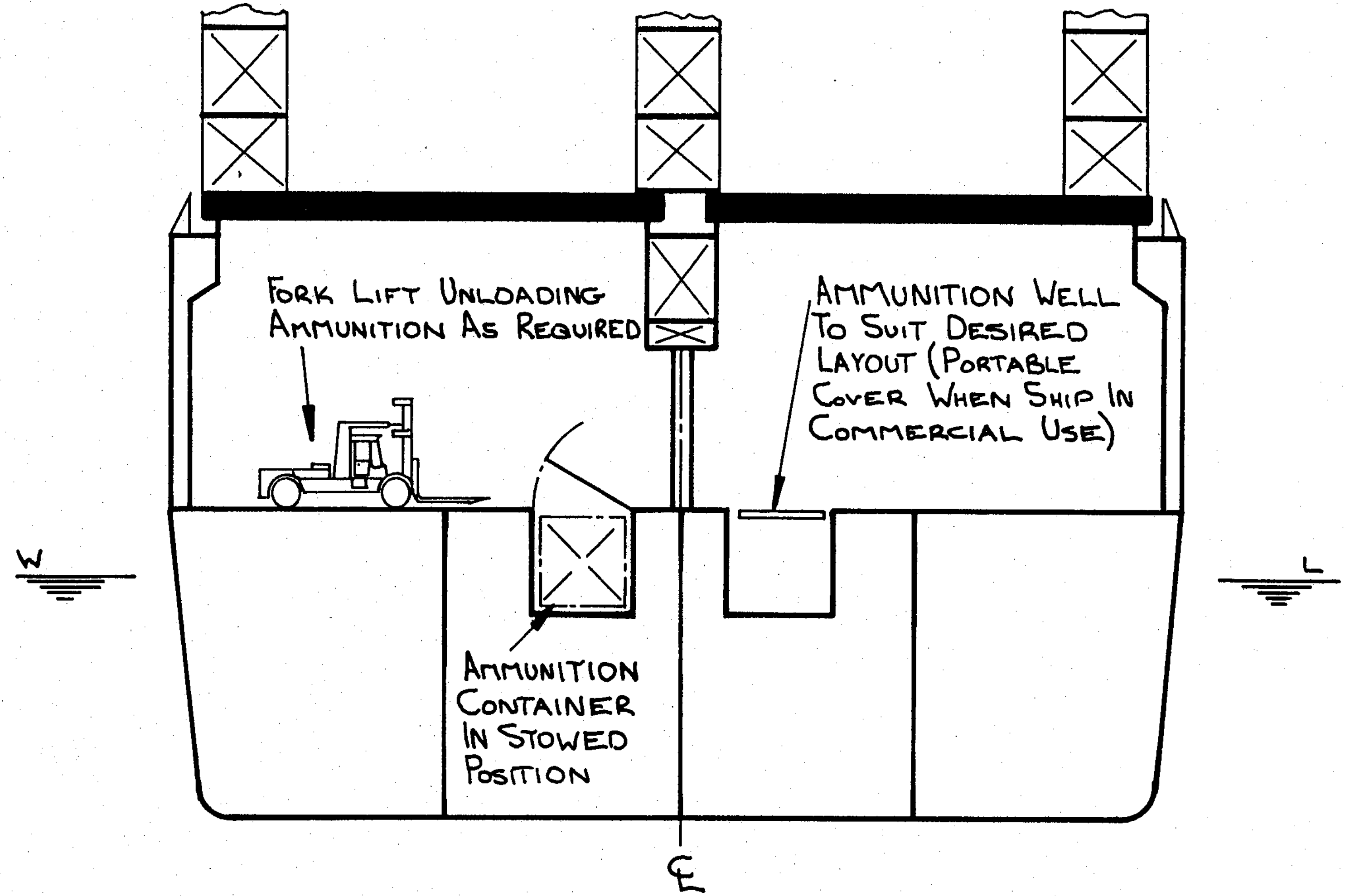
SK 9.7



PLAN VIEW OF ACCOMMO-DATION IN HATCH COAMINGS.

SKETCH 9.7(A)

SCALE: $\frac{1}{4}'' = 1'-0''$



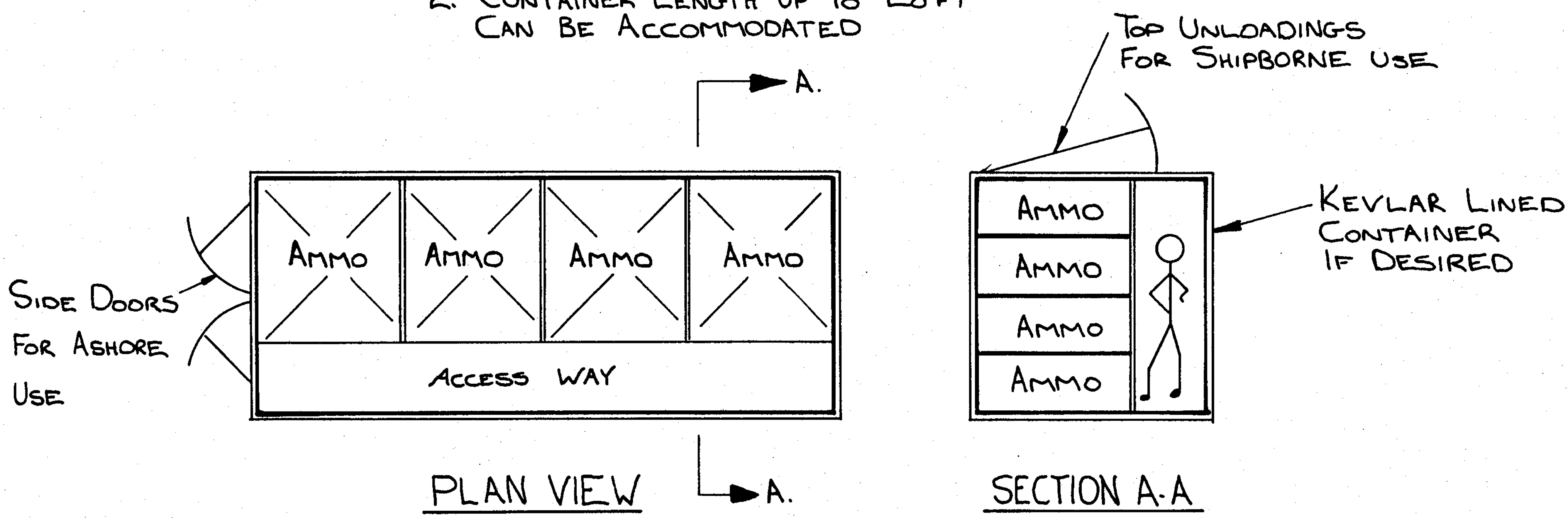
DETAIL OF AMMUNITION CONTAINERS & SHIP STOWAGE

SK 9·8 A

NOTES:-

1. AMMUNITION LOAD & UNLOADED IN PALLET FORM

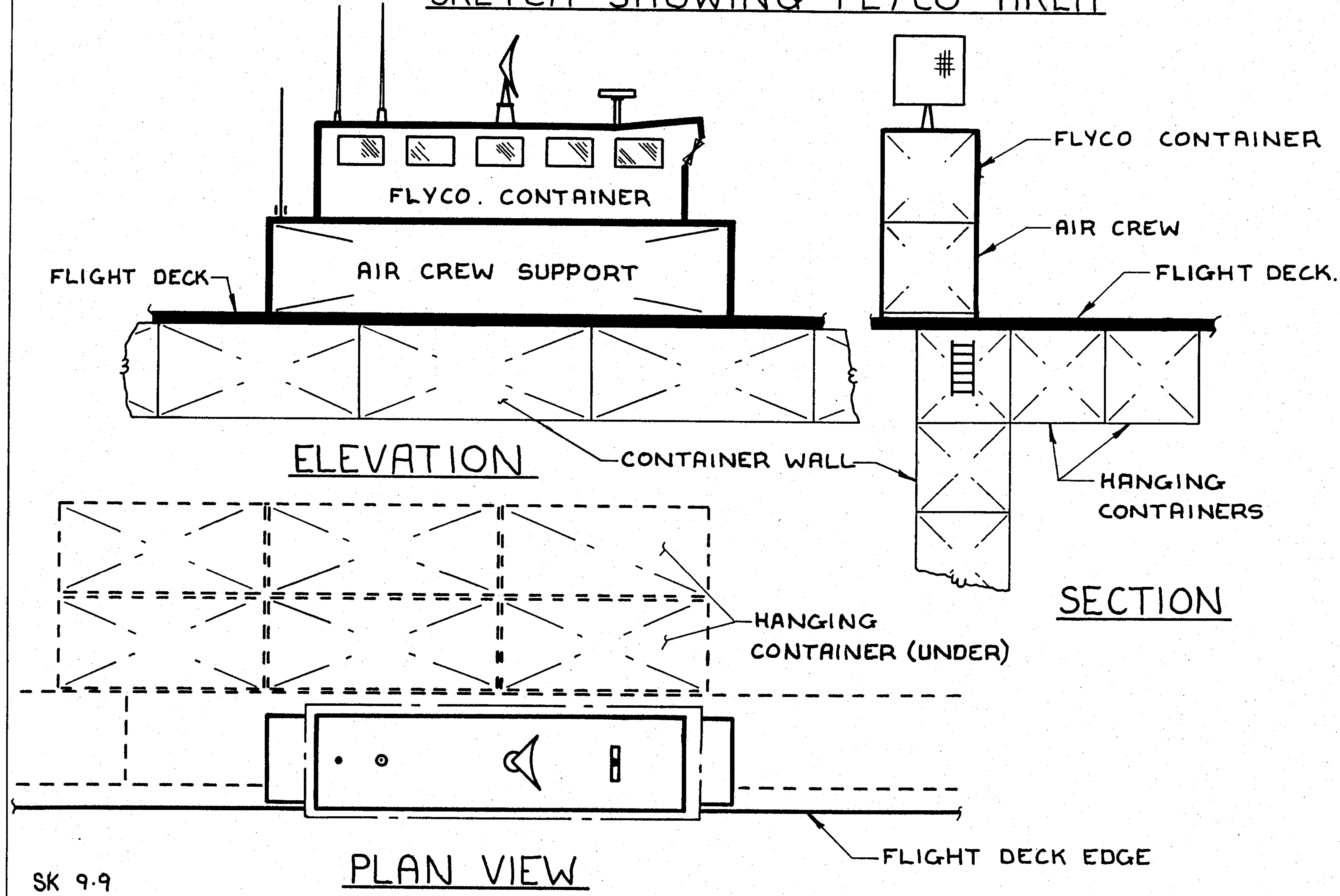
2. CONTAINER LENGTH UP TO 20 FT CAN BE ACCOMMODATED



DETAIL OF TYPICAL AMMUNITION CONTAINER

SK 9.8 B

SKETCH SHOWING FLYCO AREA

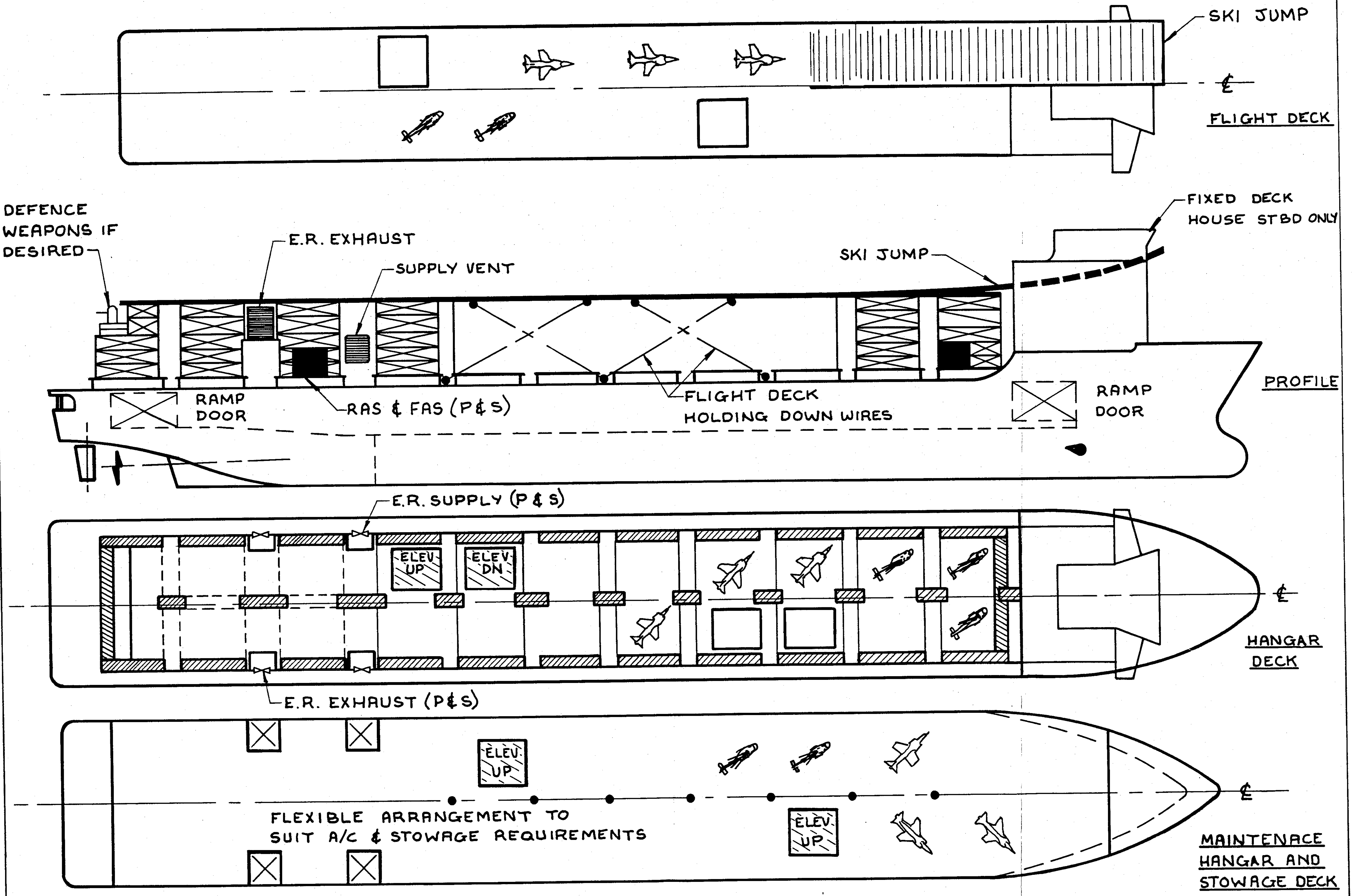


SK 9.9

10. The Harrier and Helo Ship Option (Sketch 10.1)

As a variation to Option 1 which was concerned with fixed wing aircraft like the F/A-18, Option 2 is for jump jets and helicopters only. The sketch shows a ski jump on the port side with the elevators in different positions.

The deckhouse has been placed forwards and would not be altered in any way between commercial and aviation operations. This feature could also be used for Option 1 if one was prepared to pay for the extra unused deckhouse space during its commercial life. Another variation would be to have FLYCO positioned on top of the normal deckhouse as bolt-on attachment. This certainly has a lot of advantages. The remainder of the ship very much like Option 1.



HARRIER CONCEPT WITH HELO^{S} (OPTION 2)

SK 10·1

11. <u>Army Configured Ship</u> (Option 3) (Sketches 11.1 & 11.2)

Briefly the variations can be summarised as follows:

a. Large flight deck no longer required but extensive helo pad and hanger can also be provided.

b. Stowage of heavy equipment is by RO-RO to lower deck.

c. Elevators to lower deck can be placed aboard if desired.

d. RAS-FAS capability maintained.

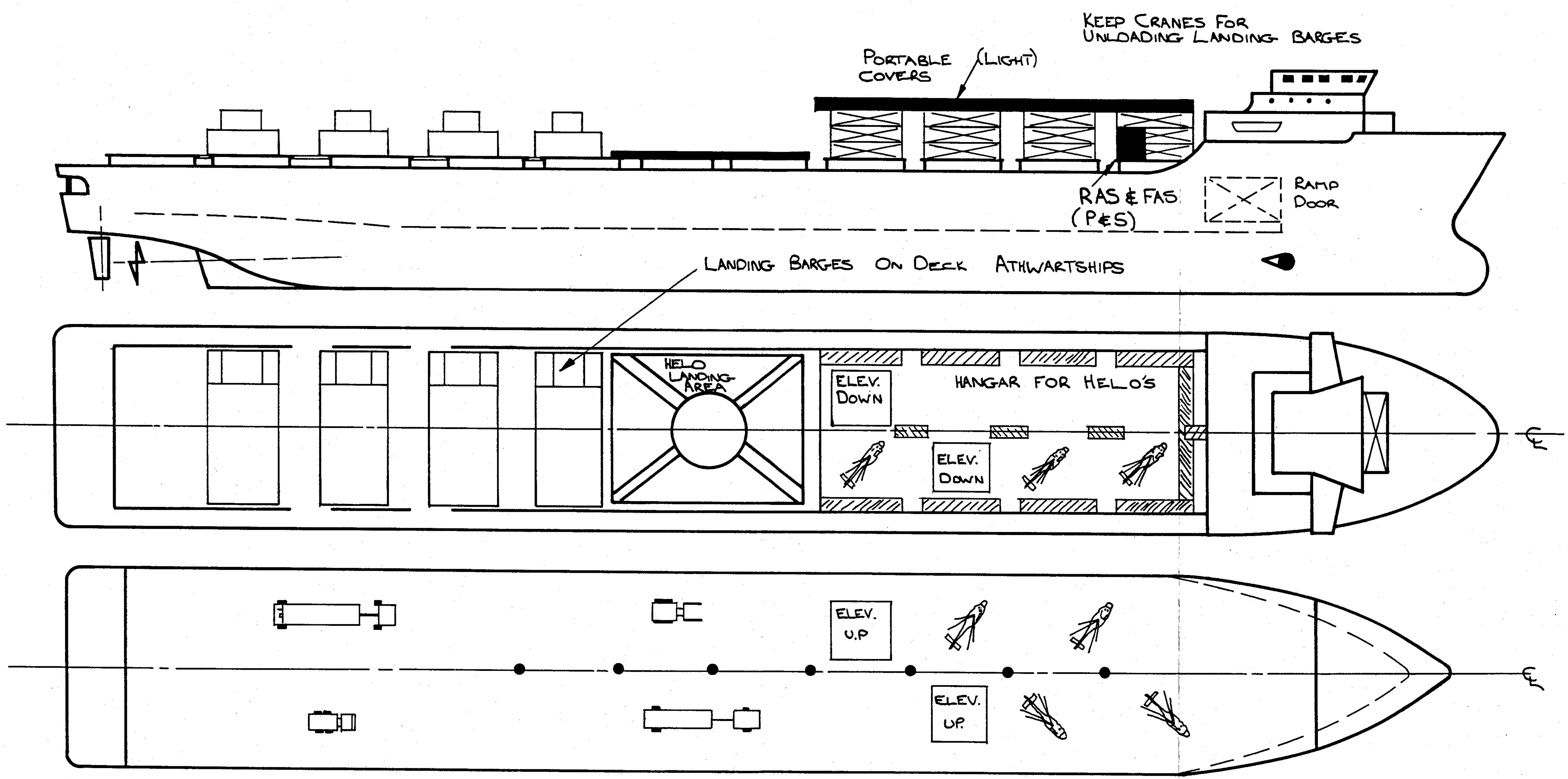
e. Cranes remain and are put to many uses.

f. Landing craft are carried on main deck aft, and are loaded and unloaded by ships cranes. Once afloat, troops can load through ramp doors.

g. Once again the ship operation is completely independent of the secondary operations

h. Accommodation can be provided in hatch coamings, but some M/C modules will need to be provided topsides.

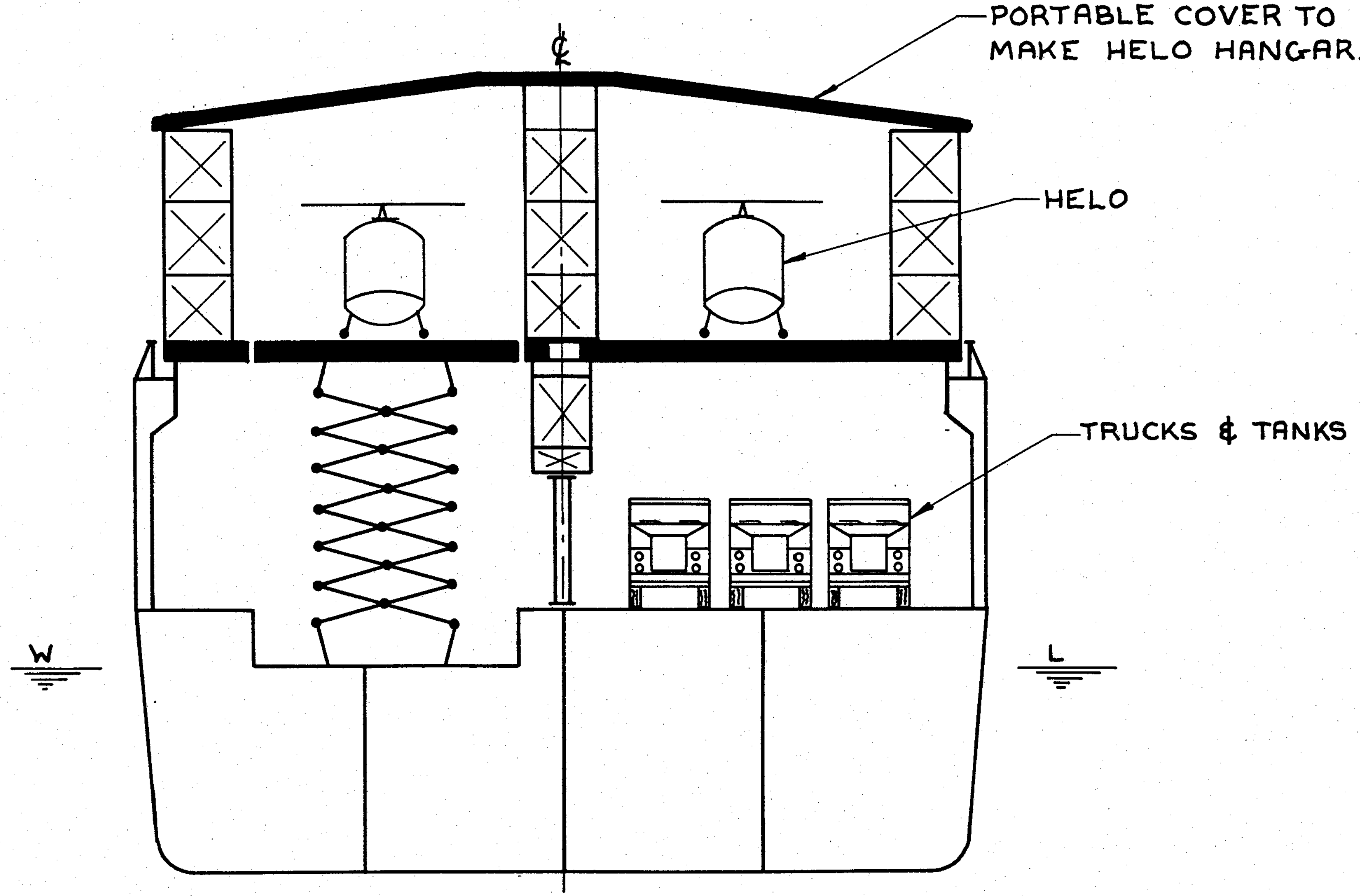
With the Army becoming more mobile with its Blackhawk aircraft in future years, this arrangement should be very attractive.



HELO ARMY CONFIGURATION (OPTION 3)

SK 11.1

ARMY CONFIGURATION



SK 11·2

12. Conclusions and Final Discussion

It should be now realised that a conceptual paper cannot provide all the answers on a subject as vast as this. Indeed, the author has more questions now than he started with. In some ways the paper is purposely provocative. It is hoped there will be meaningful discussion and readers are earnestly encouraged to contribute ideas and improvements. Early in 1988 the writer intends to revisit this subject, and with good feedback the outcome will surely be vastly superior to this first step.

It is believed some good points have emerged and include:

a. a "container carrier" appears quite feasible. It is extremely flexible and any number of configurations are obtainable. The changeouts could be done very quickly through Australian container terminals.

b. it has the potential to derive our income through commercial operations for the national good. Incidently it is proposed that a fleet of these ships would operate world wide, but always with some vessels in Australian waters.

c. there are 'land base' uses for much of the container equipment that supports the aircraft. This provides flexibility and potential cost savings.

d. no cost studies have been done but undeniably the concept is an extremly cheap way of obtaining an aircraft carrier capability.

e. with these ships the Army becomes extremely mobile.

Acknowledgements

The writer would like to thank a number of people who have freely given their time with this paper. Rear Admiral Andrew Robertson and Mr Peter Dent were extremely helpful. Glenn Whybro and the staff of the Ship Drawing Office of Garden Island provided great support which invaluable in recent times. Sandra Baram has been very patient with the typing and her help is greatly appreciated.

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2. ANL - International Shipping Report September, 1987. "Australia's International Shipping - Facts and figures.

3. Honourable Kim C. Beasley, MP the Defence of Australia 1987 - March, 1987

4. Commodore A. J. Robertson - Replacemnt for HMAS MELBOURNE - 1975

5. Janes, Fighting ships and aircrafts. 1986

ANNEXE A

Phone (02) ~~997-1082~~
997-7183

Pittwater Court
5/4 Rednal Street
Mona Vale NSW 2103
Australia.

July 30, 1986

A NEW EXPANDABLE COMMERCIAL ARM FOR THE SHRINKING RAN

Concept . . . .

1. RAN purchases, locally or foreign built, cargo carrying ships for commercial trading in Oceans adjacent to Australia. An operating fleet of 5-10 ships can be established over a period of 3-4 years. The ships are a peacetime safeguard and a wartime bonus.

2. During construction, RAN selected-designed non-commercial facilities are inbuilt to cover some peacetime and wartime needed configurations - functions capable of activation at short notice. RAN peacetime functions need not greatly inconvenience commercial operations.

3. Three envisaged prime functions include operation of ocean located surveillance platforms for Helo-aircraft in peacetime, and competencies to participate in "over the beach landings" in wartime when the ships can also provide "mini carrier" competencies.

4. These RAN owned and manned ships will be chartered to an Australian Shipping Company owned 50/50 by the RAN and local Private Sector interests. Private capital is already available. This company would trade the ships commercially, pay to RAN quarterly hire, as well as dividends from profits earned. Generally freights are earned in foreign currency. The Company would earn its income from freights carried, paying all freight related expenditures, e.g: Port Agencies, Stevedoring, port costs, fuels used, etc. The quarterly paid hire will redeem the capital invested in the ships for trading purposes, and possibly for many of the non-commercial RAN selected "modifications".

5. During normal freight-carrying commercial operations, a wide range of Service Training facilities can be accommodated on board. Platforms will be provided for continuous Air Surveillances within a moving radius of several hundred miles around each ship. Both Helos and light aircraft can be handled, as well as longer range seaplanes. From time to time ships can be withdrawn from commercial trading operations to suit Owners' requirements for the ship(s) to carry out other activities, e,g: Naval exercises with other Nations or specific politically determined needs. The ships can be built to "ICE Class", if prospects exist for "Southern Voyages".

6. Manning complements for commercial operations will require some 20-25 men per ship on a continuous basis. This nucleus can be extended on a temporary or rotational basis to suit Owner's needs. The presence of Army or RAAF personnel on certain special exercises/programs can be accommodated within many areas without great commercial trading inconvenience. (RAA already charters merchant ships to train personnel.) Annual dockings/repairs can be done in Australia or in overseas yards.

7. The commercial life of the ships will be around 15 years by which time their initial capital cost will be redeemed from hire paid to the RAN. Owners will then have a multiple choice situation to scrap, or sell or modify as is deemed appropriate having acquired in-house knowledge from actual performances as to the best type of replacements to be built.

8. Trading routes include but are not limited to the following Zones.

East Coast Aust. to/through	Coral Sea/PNG/Solomon Is. and return to Aust. direct or via NZ.
East Coast Aust. to/through	NZ/Fiji/Pacific Is./PNG/Darwin and return direct or via NZ.
East Coast Aust. to/through West Australia Ports to	PNG/Darwin/Singapore/Pacific Is./NZ/ Aust./Darwin/Indonesia/Singapore with return West or East about to Fremantle.

Most of the cargo traded in these Zones is carried in non-Australian owned-manned ships.

9. The ships will be self-sustaining for voyages of 12,000 miles, and for loading and unloading their entire cargo with their own equipment. Envisaged cargoes include:-

(a) Containers . . . . twenty and forty footers, both reefer and dry cargo, closed and open, up to 30 tons weight.
(b) Palletised and unitised modules up to 20-25 tons.
(c) Wheeled cargo . . . . tractors, earth moving equipment, buses/trucks/ livestock.
(d) Heavylift loads and long lengths . . . . may be LOLO or RORO; Outreach from ships side min. 25 ton, 60' (up to say, 100 tons lifts could be included).
(e) Roll On/Roll Off . . . . stern, quarter or side ramps with capacity to handle a wide range of variable dock heights/tidal changes with controlled heeling/trimming; ramps/decks can be strengthened for Army tanks.
(f) Multiple grades of liquids using ships own pumps, e.g: D.O. - HVO - Chemicals.

10. Flexibilities in cargo handling will give Owners resourceful tonnage to handle a wide range of Wartime situations. Provision can be made for high non-commercial operating speeds beyond the usual 14-15 knots envisaged for commercial trading. The "mini carrier" possibilities will have far reaching implications.

11. Approximate outline data of first vessels (sub. further study).
Modified Boxer layout (engines aft/house forward/all cargo carried on two decks/two ramps).
150M x 25M x 12M (extra length is possible)
Slow speed diesel engine.
Cargo DWT. around 10,000 L/T, tankage around 5,000 tons.
Container capacity, 550 TEU min.
Hangar for Helos with transfer facilities between decks.

12. Rationale.
The concept is advanced in the conviction that our shrinking Blue Water Navy is becoming a brown water Navy, a prelude to becoming increasingly a "Stranded Navy". The alarmful Dibb Report is a concealed warning for the immediate future which is being determined by a self-interested bureaucracy dominating service chiefs, and also politicians allegedly representing an uninformed electorate, parsimonious in their outlook to fund defence. This cyclical situation will continue for at least a decade until some type of national renewal displaces the current socialistic malaise. Shortages of Government funds will dictate real reductions in each annual Defence Budget, whose primary allocations unfortuantely will be to pay for an ever expanding and increasingly expensive wasteful bureaucratic overhead. Reductions can be expected in funds for "operating costs", e.g: spares/fuels/repairs/ ammunition, etc. Delayed decision dates will excuse long term capital expenditure programs and their efficient integrations, especially where foreign exchange is required for overseas purchases.

Deteriorating situations demand novel solutions. It is essential, nay, imperative to retain a core of practical sea-going skills and equipment, to maintain competence in maritime communications, and to plan for the re-establishment of a rightful role for seaborne fixed wing aircraft. It is critical to retain and to expand our knowledge of the Blue Waters surrounding this Continent. We shall always be an Island Nation. We must be seen and measured as a flexible maritime nation by S.E. Asian/Pacific neighbours. We must learn to project power outwards from our home base, and to be so perceived in the corridors of power in the Northern Hemisphere. We must never allow the demise of our Navy, its people and their skills. It is our duty and responsibility to shoulder our share of support for the Western Alliance.

The concept, and then the actuality, of a Commercial Arm to the RAN offers a serious practicable route to help oversome the present tragic and deteriorating bureaucratic, political and electoral disposition of negative elements. The envisaged fleet will "yield more for defence spent dollars". As such it will become politically attractive. Even Canberra and Union bureaucrats cannot for ever thwart the logic of this proposal.

"Every Russian ship, irrespective whether fishing boat, dry cargo or tanker or passenger ship, is a WARSHIP . . . . each is an integral part of the economic and political struggle between opposing antagonistic Social Systems"
Seapower and the State - ADMIRAL GORSKOV.

In 1950, Russia had very few cargo-ships and a small coastal Navy. Today Russia has more than 2,500 cargo ships trading globally, as well as the world's largest fishing fleet, and a "Tremendous modern Navy".

ANNEXE 'B'

Contender Specification and General Arrangement

1308 TEU/632 FEU Ro-Ro container ships with self-sustaining ability by means of container portal cranes working over the starboard side, and two side ramps. Provision also exists for the fitting of an additional stern ramp. Access to the enclosed trailer deck is either by the ramps/watertight doors, or through the pontoon hatch covers by means of cranes. Containers can be loaded 4 high on deck.

1. Principal Dimensions

Length, overall about 173.0m
Length, bp about 160.0m
Breadth, moulded about 30.4m
Depth to upperdeck about 17.0m
Depth to main deck about 9.0m
Draught, summer load about 8.2m
GRT about 12,000 tonnes
DWAT (at 8.2m draught) about 18,500 tonnes
Cargo deadweight about 16,500 tonnes

2. Propulsion

Two sets of Lindholmen Pielstick 18PC 2.5Vs driving twin screws through horizontally offset reduction gearboxes with a ratio of about 4.4:1.

Each engine develops 11,700 Ps at 520 rpm. Service rating (NCR) at 90% MCR = 10,530 Ps at 500 rpm giving a total NCR of 21,060 Ps.

Trial speed at 90% MCR about 19.2 knots. Range without refuelling exceeds 20,000m. Speed (loaded, 90% MCR, 15% sea margin) about 19 knots. Fuel consumption: the specific fuel consumption is 148 gm/Ps/hr plug 5% when burning fuel with a lower calorific value of 10,100 k.cal/kg. Fuel: the main engine is designed to burn fuel of up to 177 c/s at 50°C. (1,500 seconds Redwood No. 1 at 100°F). Anticipated fuel consumption at about 19 knots fully laden about 67 tons (177 c/s) daily.
Anticipated fuel consumption at about 17 knots fully laden about 41 tons (177 c/s) daily.
Anticipated fuel consumption at about 19 knots at 7.4m draught about 55 tons (177 c/s) daily.
Anticipated fuel consumption at about 17 knots at 7.4m draught about 33 tons (177 c/s) daily.
Fuel heating is by means of steam from exhaust gas economiser or auxiliary boiler.

Electric Power

Three x 1200 kw (1500 kVa, 0.8 pf), 450 v, 60 Hz, 3 phase alternators driven by GMT type BL 230.8 diesel engines, 1600 Ps at 900 rpm each. Emergency generator: 250 kw, 450v, 60Hz, 3 phase.

4. Cargo Capacity

20ft units	stowed longitudinally	stowed partly athwartships
Upper deck	594	594
Trailer deck	500	356
Suspended longitudinally	-	160
	1094	1110
Additional 4th tier on upper deck	198	198
	1292	1308

Maximum load with 15m tons homogeneous containers = 1094 x 20 ft units assuming 2000 tons of stores, lashings, constant and other consumables.

40 ft units	
Upper deck	292
Trailer deck	230
On trailers	6
	533
4th tier on deck	99
	632

Trailer Capacity

64 x 40ft units plus 16 x 20 ft units corresponding to a net track length of 879m. Gross track length is about 920m.

5. Refrigerated Container Capacity

165 Electrical outlets are provided and sufficient electrical power for 165 x 40 ft reefer containers at 440v, 60Hz, 3 phase.

6 Cargo Handling Equipment

Container cranes: Two 'C' type portal cranes having an 8m outreach. The cranes have a capacity of 38m tons under the wires and are fitted with automatic spreaders to suit 20 ft and 40ft ISO containers.

Ramps: two on starboard side. Provision also exists for additional stern ramp.

Forward: about 11.3m length inclusive of fingers and 8m clear width - 4.5m clear height
Aft: about 11m length inclusive of fingers and a maximum 9m clear width - 4.5m clear height
Ramps act as watertight doors.

Ramps are operable at an inclination of 10 degrees from the horizontal at even keel, and have safety margin of 2 degrees below horizontal, i.e. minus 12 degrees. The ramps are raised and lowered by hydraulic winches and are locked hydraulically. To enable the ramps to operate when the hinge is below the quay height, the vessel is breasted off by means of wide fenders. Further range of quay heights can be provided by trimming and heeling the vessel by up to 2 and 5 degrees respectively. This, with adjustment of ramp angle, can provide a total range of 6.95m (22.8 ft).

Container securing

Securing is principally by means of twistlocks with additional diagonal cross lashings as necessary. Short cell guides are fitted at each hatch opening suitable for 20 ft and 40 ft container configurations which also incorporate a device for suspending containers over a FLT transverse container stow or RoRo cargo if required.

7. Trailer Deck

Ventilation of the trailer deck when in port is by means of six axial flow supply fans. Additional recirculating fans and trunking, CO_2 fire protection and ventilation of six changes per hour on an empty hold whilst at sea, enable road vehicles to be carried with fuel in their tanks.
Clear height in the trailer deck:
a. under hatch covers: 8,250 m.
b. under hatch end beams: 6.700m
c. under hanging cargo arrangement: 5.45m. The height at the entrance is restricted to 4.5m.

8. Strength of Structures

The hatch covers, upper deck and trailer deck are designed to accept loads of 60m tons per stack produced by 3 high stacks of containers of 20m tons each in case of 20 ft containers and 90m tons per stack (each 30m tons) in the case of 40 ft containers. The trailer deck can also withstand the following wheel loads:

(1) Road trailers of 20m tons per axle with 4 wheels per axle;
(2) Fork lift trucks with 55m tons per axle;
(3) Mafi trailers with 2 x 20m tons 20 ft containers four axles/16 wheels.

9. Complement

Officers	11
P & Os & ratings	15
	26

10. Accommodation

All cabins have private WC and shower.

Individual cabins are provided for the full complement and in addition there are spare cabins for owner and pilot.

Separate hospital berths, accommodation for four Suez Canal personnel (or additional crew) and a further two spare cabins for officers and one spare for crew are provided. Accommodation is situated forward and is air conditioned.

11. Auxilliary Machinery

Steering gear: Rotar vane, electro-hydraulic, twin rudder.

Steam generators: Auxiliary boiler and 2 exhaust gas economisers each with a capacity of 1500 kg/hour at 7kg/cm^2 each.

12. Mooring and Berthing Arrangements

Forward: Two windlasses each with 15T hawser drums - hydraulic, self-tensioning. One mooring winch - 10T, hydraulic, non self-tensioning.

Aft: Two mooring winches - 15T, hydraulic, self-tensioning

Two mooring winches - 10T, hydraulic, non self-tensioning.

Bow thruster - 12T, variable pitch - operated from wheelhouse and bridge wings.

13. Tank Capacities

Ballast water about 11,630m^3

Heavy fuel oil about 4,515 m^3

Diesel oil about 1,565 m^3

Fresh water about 220 m^3

Feed water about 32 m^3

14. Classification

Lloyds Register of Shipping + 100A1, + LMC, UMS, container and Ro-Ro cargo ship.

It is as well to remember the ships are envisaged as spending the majority of their working lives as commercial vessels, and hence their viability in that regard is of paramount importance.

The writer would foresee a fleet of these ships operating world wide service and from Australian ports. Australia certainly needs to stop spending enormous amounts of money to overseas shippers for freight to and from this country. Strategically it would be a good idea to have several of these ships on our coast at any one time.