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TECHNOLOGICAL ALTERNATIVES TO BASES OVERSEAS (TABO)

PREPARED FOR

THE DEFENSE ADVANCED RESEARCH PROJECTS AGENCY

MAY 1988

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TECHNOLOGICAL ALTERNATIVES TO BASES OVERSEAS

(TABO)

EXECUTIVE SUMMARY

PREPARED FOR

THE DEFENSE ADVANCED RESEARCH PROJECTS AGENCY

BY

THE *BDM* CORPORATION

MAY, 1988

TABO BRIEFING OUTLINE

- BACKGROUND
- THE BASING PROBLEM
- BASE FUNCTIONS
- GEOGRAPHIC CASES
  - SWA
  - CARIBBEAN
- TECHNOLOGICAL ALTERNATIVES
  - AIR PLATFORMS
  - MATERIALS AND STRUCTURES
  - AIRFIELDS AT SEA
  - ADVANCED SHIPPING
  - FORCE CONFIGURATION
  - C^3I
- TECHNOLOGIES AND FUNCTIONS
- OBSERVATIONS AND RECOMMENDATIONS

#A TABO STUDY TASKS

- These are the study tasks DARPA requested TABO accomplish.
- We reviewed the background critical issues of foreign basing, with particular emphasis on SWA and the Caribbean basing, where the bases and the issues are now centered in Panama.
- We laid out what bases do for us.
- We examined a large number of potential technologies that could be applied to these base functions.

TABO STUDY TASKS

- REVIEW BACKGROUND AND CRITICAL ISSUES OF FOREIGN BASING
- IDENTIFY ESSENTIAL FUNCTIONS OF OVERSEAS BASES
- FIND AND ASSESS POTENTIAL TECHNOLOGICAL ALTERNATIVES TO OVERSEAS BASING
- MAKE PRIORITIZED RECOMMENDATIONS FOR DARPA ACTION

#B THE BASING PROBLEM

- These are the implications for US bases overseas for the next several decades; the results of the trends and forces noted by the Commission on Integrated Long-Term Strategy.

- The increased threats are evident and well known to us all.

- Not so evident are the non-military costs: the political, social, and financial aspects of maintaining or establishing a US "base" overseas. And these factors impact on the domestic US concerns as well as on the host nation. Some of the most bitter debates in Congress have been over the attempts of the US Southern Command to improve the quality of life for military forces deployed temporarily in Honduras for the last five years. Increasing concerns with terrorism and AIDS will exacerbate the problem.

- All leads to greater uncertainness in our ability to get new bases where we need them (e.g., SWA) and to operate where we expect to lose existing bases (e.g., Panama).

- US presence on foreign soil will become more and more problematic in the future.

TABO

THE BASING PROBLEM

- MORE VULNERABLE TO MORE POTENTIAL ENEMIES BY MORE MEANS (LIC, REGIONAL CONFLICTS)
- POLITICAL/ECONOMIC/SOCIAL COSTS RISING
  - — FOR HOST NATIONS
  - — FOR U.S.
- GREATER UNCERTAINTIES
  - — INABILITY TO GET NEW BASES
  - — EXPECTED LOSS OF OLD BASES

CRUX: U.S. PRESENCE ON HOST SOIL ENGAGES SOVEREIGNTY ISSUE

#C TABO CASES

- To frame our analysis, we looked at two "TABO" cases, the Caribbean Basin, centered on Panama; and South West Asia, centered on potential Iranian contingencies. These cases illustrated where the push of requirements was taking us.

- In the policy area, we are looking at the spectrum of conflict from so-called low intensity conflict (terrorism, insurgency, paramilitary activity like counter-drugs operations) to regional conflict (the Iran-Iraq war, to conflicts involving US combat units).

- In the technology areas, we are looking at air platforms, materials, airfields, fast shipping, force configurations, and various C3I systems. These technology areas allow us to explore where technology's pull might take us.

- The TABO cases cut across both the spectrum of conflict, from "low intensity" conflict to mid intensity, and a range of technologies: from the easy to the hard. These are the military factors that shape the two cases.

  - SWA is a very demanding requirement. It has the longest lines of communication from the United States: 8000 miles by sea from the US East Coast; 2000 miles from the nearest US controlled base at Diego Garcia. Warfare there today ranges from low intensity but is clearly in the mid levels most of the time. The United States has no existing bases and only limited access. SWA is a tough problem for military planners.

  - The Caribbean/Latin America are less demanding. Here the LOCs are shortest, especially with the Caribbean. Most of the Caribbean is only a couple of hours by air. Warfare here is best characterized by low intensity, with a growing problem related to drugs, but the potential to go to mid intensity ever present. Cuba and Nicaragua are big unknowns. The region has become an incredible source of funds from drugs. Here we have a good base structure in Panama and the islands. The United States is scheduled to lose its Panama bases at the turn of the century.

- In both cases, as elsewhere, our basic strategy is deterrence: to forestall combat through forward deployment of forces with a credible, rapid capability to augment the forward-deployed forces. Bases, or more precisely the functions performed on bases, have been key to that strategy.

TABO CASES

- **SWA/PERSIAN GULF**
  - LONGEST LOC's
  - LOW → **MID** INTENSITY
  - NO EXISTING BASES; LIMITED ACCESS

- **CARIBBEAN/LATIN AMERICA**
  - SHORTEST LOC's
  - **LOW** → MID INTENSITY
  - BASING LOSS UPCOMING; ACCESS UNCERTAIN

U.S. STRATEGY: DETERRENCE

#D SWA REQUIREMENTS

- We need a base without any political limitations.
- Going to sea appears to be the best alternative at this time.

TABO

SWA REQUIREMENTS

- DIFFICULT TO DEPLOY, EMPLOY, SUSTAIN THE FORCE IN SWA
- NEED BASE CAPABILITY
  - NO POLITICAL LIMITATIONS
  - UNCONSTRAINED OPERATIONS
- CURRENT DETERRENCE NOT ROBUST
- PERSIAN GULF BARGES POINT WAY . . . . GO TO SEA

#E USSOUTHCOM CURRENT PLANNING STATUS

- Here we see a region with ill-defined requirements. Historically Latin America has not had to be a strategic priority for the United States. We have been able to devote only a small amount of resources to protecting our "front yard." The Caribbean is an area where the push of requirements has been very weak and the pull of technology, almost nonexistent until recently. The future Caribbean requirements are not well thought through and it remains difficult for the CINC to obtain high-level attention to this problem.

- The revolutions in Central America, led by Cuba, plus the evolution of the drug cartels into quasi-governments, often more powerful than the governments themselves, has changed our perceptions. The Commission on Integrated Long-Term Strategy clearly saw this. The Caribbean Basin is a region of ever-increasing strategic importance and problems where combined operations and access will be required, ideally without involving political sensitivities.

- Yet the current focus by USSOUTHCOM is now on Panama and the demands on treaty implementation. We may have lost the opportunity to restructure and remain in Panama.

- This slide tries to capture USSOUTHCOM's perception of their long-term requirements--in sum ill-defined. There is a distinct need for a dialogue between DARPA and USCINCSO on that might be done technologically to ease his current and upcoming problems.

TABO

USSOUTHCOM
CURRENT STATUS OF PLANS - POST 2000

- ILL-DEFINED REQUIREMENTS
- FOCUS ON TREATY IMPLEMENTATION AND CONTINUOUS ACCESS
- CARIBBEAN CONTINGENCIES COVERED FROM CONUS
- NO MAJOR CONTINGENCIES ENVISIONED IN SOUTH AMERICA

LOW INTENSITY CONFLICT (LIC):

- COMBINED OPERATIONS AND ACCESS
- U.S. LIC FORCES IN THEATER DESIRABLE - NOT ESSENTIAL

#F OBSERVATIONS

- The observations expressed here are deduced from the collective wisdom of experts rather than from facts derived from a comprehensive data collection and analysis. In addition to looking at the facts, we spoke directly with many of the authors and developers.

- We found that TABO is an orphan problem, lacking in advocates for solution or remedy. Our military commanders, in many cases of power projection, will be required to make do with inadequate levels of supplies and equipment because the transportation throughput is lacking.

- The problem is serious and unlikely to be adequately addressed, not because of mismanagement or callousness, but rather because if falls on a weak area in our concepts of organization. We have difficulty getting R&D focused on the problem.

- Transportation suppliers do not have large R&D funds; transportation users don't have such R&D requirements. Even if DARPA were to assume leadership in a transportation system development effort, there may not be any organization to which to transfer results. With an oversupply of commercial vessels, industrially funded R&D is unlikely.

- In short, there is in all likelihood no one who is currently in the structure who will state a clear and urgent requirement for a better transportation system.

OBSERVATIONS

TABO

- MILITARY PLANNING ASSUMPTIONS WITH RESPECT TO TRANSPORTATION/LIFT CONTAIN ALARMING INCONSISTENCIES
- PRESENT AIRLIFT AND SEALIFT CAPACITY IS INADEQUATE FOR MANY ASSIGNMENTS, BUT USERS ASSUME LIFT WILL BE THERE
- DEFICIENCIES INCREASE SHARPLY IN RELATION TO:
  - DISTANCE FROM CONUS
  - STRENGTH OF POWER PROJECTION
  - URGENCY OF RESPONSIVE ACTION
- THERE IS A WORLDWIDE SURFEIT OF COMMERCIAL CARGO SHIPS & TANKERS, BUT A SHORTAGE OF LIFT DEPENDABLY AVAILABLE IN WARTIME
- MOST THIRD WORLD PORTS ARE INADEQUATE FOR MILITARY USE WITH RESPECT TO:
  - THROUGHPUT/VOLUME
  - RAPID HANDLING OF CONTAINERS
  - INFRASTRUCTURE, PARTICULARLY ACCESS ROADS
  - DEEP-DRAFT SHIPPING
- MILITARY SERVICES FOCUS R&D ON FIGHTING GEAR; TRANSPORTATION TO GET TO FIGHT, OR BASE INFRASTRUCTURE TO SUSTAIN FIGHT, GETS LITTLE R&D
- THESE PROBLEMS WON'T GO AWAY WITHOUT RADICAL INTERVENTION
- BASES ARE AND WILL CONTINUE TO BE A PROBLEM BECAUSE OF SOVEREIGNTY ISSUES
- ARMY, CINCs, SHOULD BE MAIN TABO PROPONENTS !

#G SWA WITH DARPA FIX

- The technological fixes we have recommended would change the power equation in SWA. Not only would the force close sooner, it would do so without providing days of warning time for potential aggressors. Deterrence would be enhanced without impinging on Mid Eastern politics or putting US personnel at risk of terrorist attack.

- A US airfield at sea, within tactical range of the Strait of Hormuz could provide a significant difference in US military capabilities in the region: from low intensity conflict to mid intensity warfare.

SWA WITH "DARPA FIX"

- CLOSE THE FORCE SOONER
- IMPROVE FLEXIBILITY WITHOUT WARNING TIME
- MOVE BEYOND MIDDLE EAST SOVEREIGNTY
- IMPROVE DETERRENCE
- AIRFIELD AT SEA Δ FOR LIC $>$ MID-INTENSITY

#H CARIBBEAN WITH DARPA FIX

- The fixes we have recommended would gain for the US the strategic flexibility we have lost since WWII and especially since 1979 with the signing of the Carter-Torrijos Treaty on the Panama Canal.
- We would be able to engage in the drug war without the political and security concerns that a land base would require. And we could start now.
- USCINCSO's treaty implementation problems, and the more important problems of continued presence with fewer people, would be eased.
- And the uncertainty of US commitment to our hemisphere, would disappear.

CARIBBEAN WITH "DARPA FIX"

- GAIN STRATEGIC FLEXIBILITY
- ENGAGE DRUG WAR
- ASSIST TREATY PLANNING
- RETAIN IN-THEATER PRESENCE WHILE REDUCING U.S. PROFILE
- REDUCE UNCERTAINTY

#I DARPA FIX LIST

- These are the areas in which DARPA should be engaged to provide technological fixes to the US overseas basing problem.
- Note that there are other technologies that should be pursued by the Services.
- Air Platforms are divided into three programs: ICDW, RPV/UAVs, and Advanced Airships.
- An Airfield at Sea needs to be built. There should be a comparison done of the two major concepts--floating platforms supported by vertical "bottles", and building the island of very large ships, joined together into an even larger structure. The CINCs should be given the opportunity to assess the strategic mobility trade-offs.
- Advanced shipping needs a boost. The Wing and Ground Effect (WIG) needs to be revitalized and new propulsion engines developed to make a 100kt Surface Effect Ship feasible.
- Force Configurations need be changed to ease the offload problem and to make echelonment a reality. More and more of our forces must be made container-compatible.
- C3I must be more responsive to shifting geographical requirements. The Light Sat can give the CINC the ability to get the system he needs, where and when he needs it. Interactive Image Communications can significantly reduce the numbers of people sent forward.
- Materials and structures need to reach for the 21st century. Rapidly erectable buildings, made of space age materials could be a reality.

DARPA FIX LIST

- AIR PLATFORMS
  - ICDW
  - RPV's/UAV's
  - ADVANCED AIRSHIPS
- MATERIALS AND STRUCTURES
  - RAPIDLY ERECTIBLE STRUCTURES
- AIRFIELD AT SEA
  - FLOATING ISLAND W/FIXED PLATFORMS
  - FLOATING ISLAND W/SHIPS
- ADVANCED SHIPPING
  - WIG
  - SES (NEW PROPULSION)
- FORCE CONFIGURATION
  - CONTAINER COMPATIBLE
  - SOF "Q" SHIP
- C^3I
  - LIGHT SAT

#J PRIORITIZED RECOMMENDATIONS

- The TABO Study Group has provided its prioritized recommendations for the DARPA fix list.
- Specific programs of what should be done now, plus what the future goal should be.

#1 After a detail engineering and cost analysis of the two basic concepts (platforms or ships), and carefully weighing CINC requirements, we should proceed to prototyping. The prototype would have immediate use in the Caribbean as a base for the drug war.

#2 An advanced airship has so many applications, that we should not delay any longer. An airship with advance propulsion for either logistics, C3I, or other uses is needed.

#3 We need to move military construction out of WWI.

#4 Special Operations Force requirements are different enough to require special attention. The unique signature of SOF makes it difficult to deploy units with tipping off either the press or a potential foe.

#5 Reconfiguring Forces must become a priority, especially for the Army. US Forces must become container compatible, so that they can be moved more efficiently, and then operate from the containers when deployed.

#6 Closing the force taster must be a priority. The 100kt ship might be possible with new propulsion technologies. High temperature superconductivity may be critical here.

TABO

PRIORITIZED RECOMMENDATIONS

DARPA FIX LIST FOR THROUGHPUT AND BASE FUNCTIONS

	TECHNOLOGY	NOW	LATER
1	AIRFIELD AT SEA	PROTOTYPE W/TWO MODULES	BUILD A FULL UP BASE
2	AIRSHIPS	BUILD SURVEILLANCE SHIP	DEVELOP LOG/C^{3}I SHIP
3	RAPIDLY ERECTIBLE STRUCTURES	PROTOTYPE THIN SHELLS & GEOMETRY	PROTOTYPE ERECTION CAPABILITY
4	SOF "Q" SHIP	LEASE AND INTEGRATE C^{3}I	
5	RECONFIGURED FORCES	PROTOTYPE AVIM	ADD TO CAPABILITIES
6	ADVANCED SHIPPING	STUDY WIG	DEVELOP SES PROPULSION

ADDITIONALLY, DARPA CONTINUE DEVELOPING EXISTING PROGRAMS IN ICDW, LIGHT SATS, UAV's

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  - SWA
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  - AIR PLATFORMS
  - MATERIALS AND STRUCTURES
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  - FORCE CONFIGURATION
  - C^3I
- TECHNOLOGIES AND FUNCTIONS
- OBSERVATIONS AND RECOMMENDATIONS

#22 MAJOR BASE FUNCTIONS

- There are many ways to list base functions, but these are the broad categories that we developed. They parallel the classical military functions studied in all our military schools.

MAJOR BASE FUNCTIONS

- INTELLIGENCE
- COMMAND, CONTROL, & COMMUNICATIONS
- OPERATIONS
- LOGISTICS
- POLITICAL
- LIFE SUPPORT
- MISCELLANEOUS

#23 MAJOR BASE FUNCTIONS: DETAILED LISTING

- The broad categories can be further broken down into several functions, as shown.

- It is also clear that many of these functions need not be accomplished overseas. Often the function was accomplished at an overseas site because the site existed.

MAJOR BASE FUNCTIONS

INTELLIGENCE

- COLLECTION
- CONTROL
- ANALYSIS
- PRODUCTION AND DISSEMINATION
- SURVEILLANCE
- LIAISON OPERATIONS
- COVER FOR OTHER AGENCIES
- WEATHER

COMMAND

CONTROL

COMMUNICATIONS

ADMINISTRATION

OPERATIONS

- PLANNING
- STAGING
- DEPLOYMENT
- EMPLOYMENT
- SUSTAINMENT
- TRAINING--EXERCISES,SCHOOLS,ADVISORY
- ENGINEERING AND CONSTRUCTION
- SPECIAL OPERATIONS
- PSYOPS

LOGISTICS

- PLANNING
- STAGING
  - -WAREHOUSING
  - -ASSEMBLY
  - -MATERIAL HANDLING
  - -TRANSPORT
- SUPPLY (ALL CLASSES)
- MAINTENANCE (HANGERS, DRYDOCKS, SHOPS)
- TRANSPORTATION
- HOUSING
- UTILITIES
- HOST NATION SUPPORT
- MEDICINE
  - -CARE
  - -EVACUATION
  - -SUPPLY
- CONSTRUCTION
- SECURITY ASSISTANCE
- EMBASSY SUPPORT

POLITICAL

- SYMBOLIC PRESENCE
- ADVISORY DUTIES
- INTERNATIONAL NEGOTIATIONS
- REPRESENTATIONAL DUTIES
- PUBLIC AFFAIRS
- SUPPORT TO HOST NATIONS
- COVER FOR OTHER ACTIVITIES

LIFE SUPPORT

- SECURITY
- UTILITIES
- HOTEL
- LOGISTICS
- QUALITY OF LIFE

MISCELLANEOUS

- RESEARCH AND DEVELOPMENT
- TEST AND EVALUATION
- REQUIREMENTS AND NEEDS GENERATION
- DISASTER RELIEF

#24 GEOGRAPHIC CASES

- **Now let's look at our geographic cases.**

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#25 TABO CASES

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  - LONGEST LOC's
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  - NO EXISTING BASES; LIMITED ACCESS

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  - SHORTEST LOC's
  - **LOW** → MID INTENSITY
  - BASING LOSS UPCOMING; ACCESS UNCERTAIN

U.S. STRATEGY: DETERRENCE

#26 TABO CASES-SWA

- First a closer look at the SWA/Persian Gulf case.

TABO CASES

- **SWA/PERSIAN GULF**
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- **CARIBBEAN/LATIN AMERICA**
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U.S. STRATEGY: DETERRENCE

#27 IRAN-IRAQ WAR

- SWA today is best characterized by the Iran-Iraq war which has been on-going since 1979.

- A war of incredible proportions with a huge cost in lives and treasure. For the United States today, SWA is a form of "naval LIC," which can quickly escalate to high-tech missile warfare in minutes. Our current operations in the Persian Gulf are tremendous C3I and logistics challenges for the United States and its allies.

TABO

IRAN - IRAQ WAR

- APPROACHING LONGEST MODERN WAR
- ONE MILLION PLUS CASUALITIES
- COSTS (CUMULATIVE)
  - IRAN: $85 B = ANNUAL GNP
  - IRAQ: $80 B = 2 x ANNUAL GNP
- 400 TO 500 SHIPS AND 250 AIRCRAFT IN PERSIAN GULF DAILY (ALL NATIONS)

#28 PERSIAN GULF TRANSPORTATION DISTANCES

- This map shows the enormous distances involved in the SWA case.

- Norfolk via the Suez Canal is 8,210 nm from the Straits of Hormuz. If the Suez Canal is closed to U.S. ships, the distance jumps to 11,510 nm around the Cape.

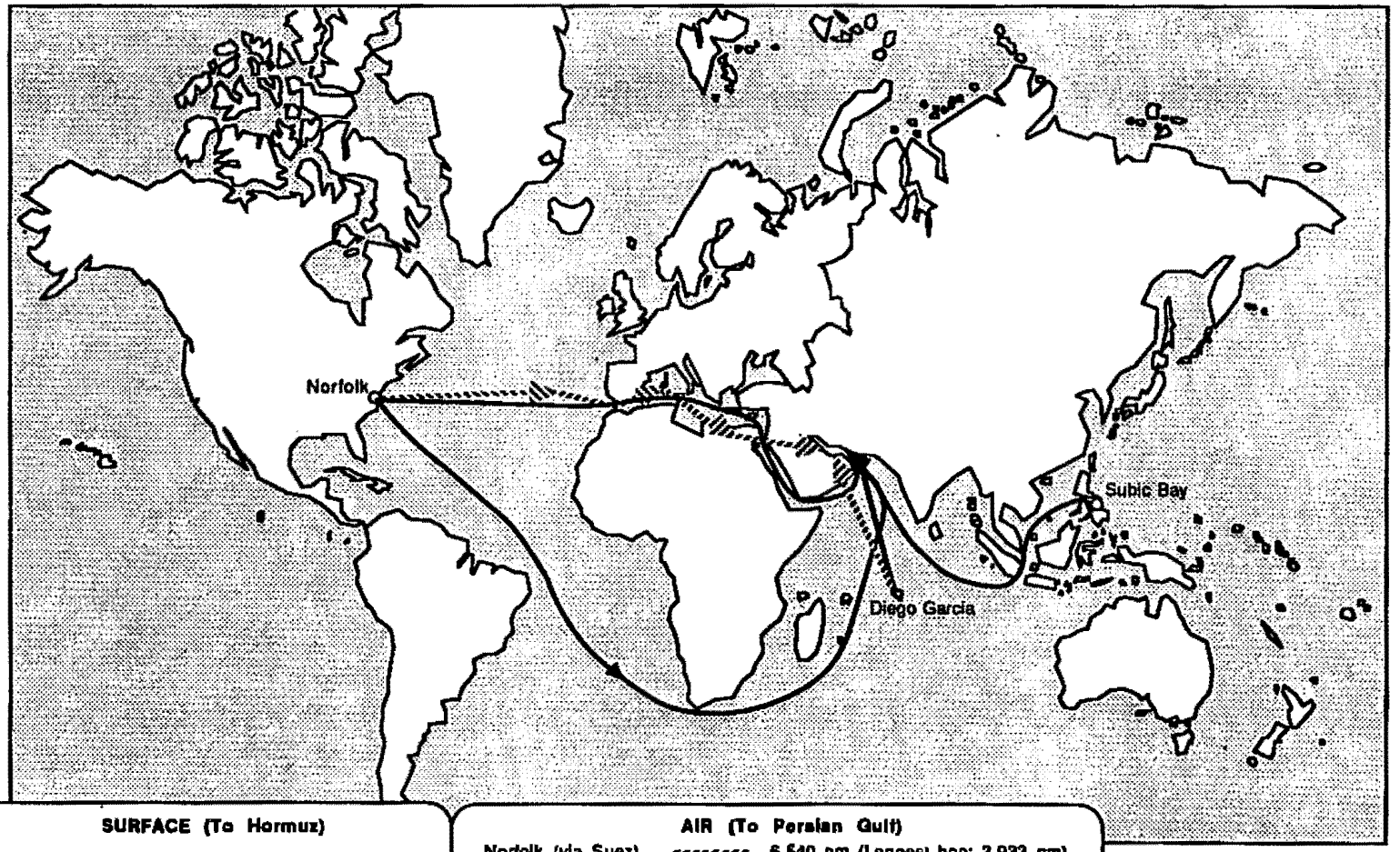
- The closest robust Pacific bases are our facilities at Subic Bay in the Philippines which are 4,660 nm away.

- Air routes are equally difficult, requiring multiple refueling to reach the Persian Gulf and airfields to land enroute and at the termination point.

TABO

PERSIAN GULF

TRANSPORTATION DISTANCES



SURFACE (To Hormuz)

Norfolk (via Suez)	———	8,210 nm
Norfolk (via Cape)	———	11,510 nm
Subic Bay	———	4,660 nm
Diego Garcia	———	1,760 nm

AIR (To Persian Gulf)

Norfolk (via Suez)	- - - - - - - -	6,540 nm (Longest hop: 2,933 nm)
Diego Garcia	- - - - - - - -	1,760 nm

#29 US FORCE LOGISTICS IN THE PERSIAN GULF

- **Diego Garcia, at 1760 miles from the Gulf, does not play in the current logistics stream to the Persian Gulf. The forces currently deployed to the Persian Gulf are depending on airlift, while increasing the sealift LOC from Subic Bay Philippines. Without access to an airfield in Bahrain, Military Airlift Command support would be closed down or become even more difficult to secure.**

TABO

U. S. FORCE LOGISTICS IN PERSIAN GULF

- NO BASES
- LITTLE ACCESS
- FOUR MAC CHARTER FLIGHTS WEEKLY FROM NORFOLK WITH REPAIR PARTS
  - SHIFTING TO SURFACE FROM SUBIC
  - AIR IS 16X > THAN SEA (SURFACE) COSTS

#30 SWA SHORTFALL: US/SOVIET REGIONAL CONFLICT

- This diagram depicts force build-up over time, showing how various transportation methods will contribute to generating the regional forces for a major contingency in Southwest Asia. At the right are the percentages of the force that uses the different transport systems, with D+X as the index.

- The 16% shortfall is even more significant when you consider that this graph assumes airfields/ports are open.

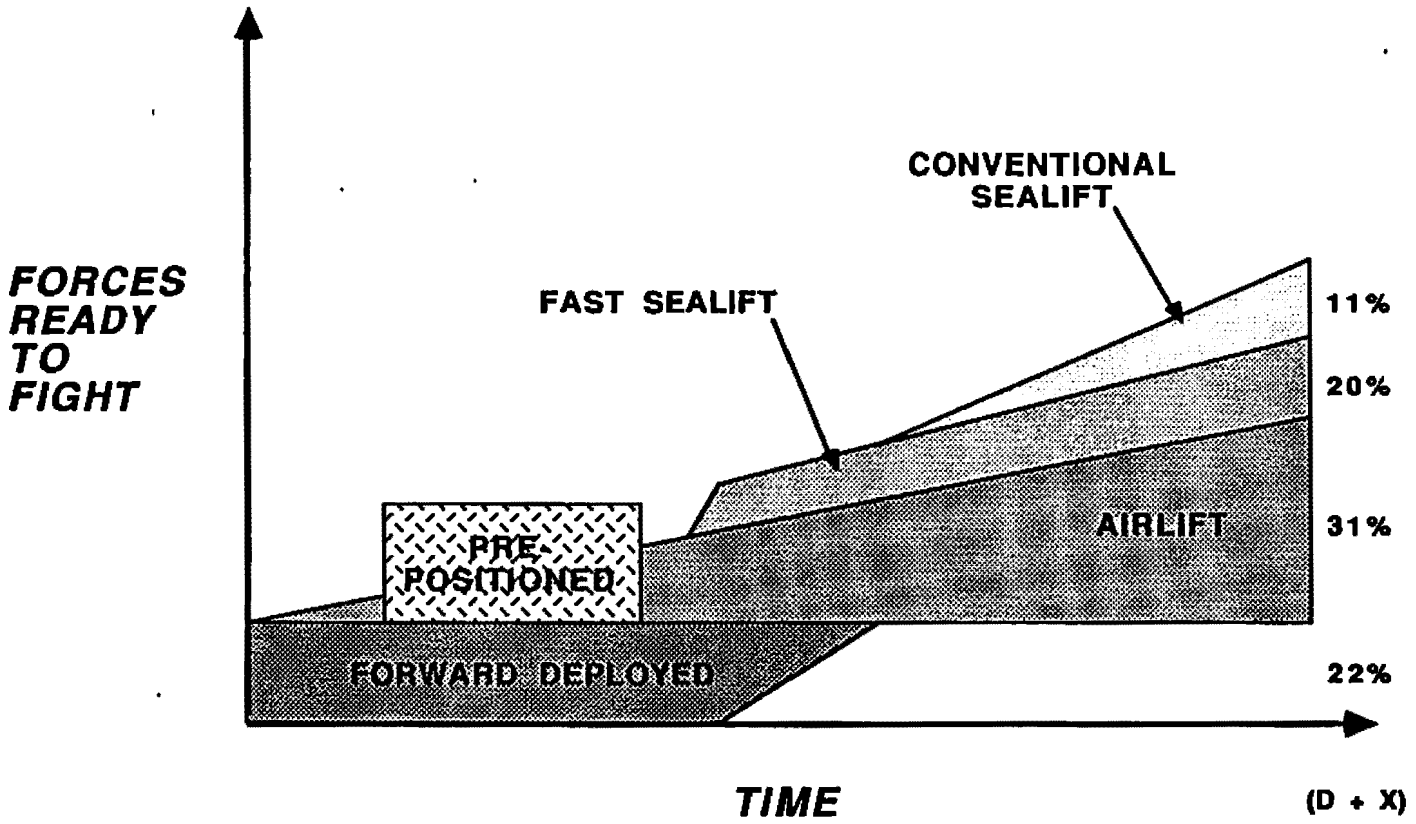
- In reality, the plan is very tenuous. At best it is very demanding; at worst it is unsupportable.

- Without access to in-region ports and airfields, force generation would significantly fall off.

TABO

SWA SHORTFALL

U.S./SOVIET REGIONAL CONFLICT



16% SHORTFALL IN DEPLOYMENT REQUIREMENTS

#31 SWA REQUIREMENTS

- **We need a base without any political limitations.**
- **Going to sea appears to be the best alternative at this time.**

SWA REQUIREMENTS

- DIFFICULT TO DEPLOY, EMPLOY, SUSTAIN THE FORCE IN SWA
- NEED BASE CAPABILITY
  - NO POLITICAL LIMITATIONS
  - UNCONSTRAINED OPERATIONS
- CURRENT DETERRENCE NOT ROBUST
- PERSIAN GULF BARGES POINT WAY . . . . GO TO SEA

#32 TABO CASES--CARIBBEAN

- **Now let's take a closer look at the Caribbean/Latin American case.**

TABO CASES

- **SWA/PERSIAN GULF**
  - LONGEST LOC's
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U.S. STRATEGY: DETERRENCE

#33 USSOUTHCOM CURRENT PLANNING STATUS

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CURRENT STATUS OF PLANS - POST 2000

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LOW INTENSITY CONFLICT (LIC):

- COMBINED OPERATIONS AND ACCESS
- U.S. LIC FORCES IN THEATER DESIRABLE - NOT ESSENTIAL

#34 CENTRAL AMERICA/CARIBBEAN--MAP

- **The arcs here show the fueled and unrefueled ranges of tactical aircraft operating from bases in the southern United States.**

- **Mid-Intensity conflict in this case is militarily much more easy than we saw in the SWA case. The quick employment of US combat forces and their rapid reinforcement and sustainment are not the problem here.**

TABO

CENTRAL AMERICA / CARRIBEAN

#35 PLANNING CONSTRAINED BY SOVEREIGNTY

- We enter here into a very complex set of issues that are beyond the scope of the study--yet are at its core. Small, third world countries can not be placed in the position of appearing to be overly influenced by Uncle Sam. The presence of a US base on their soil is a powerful influence on the host country's political, social, and economic life. A genuine fear of being overwhelmed by a U.S. presence, a ready cadre of anti-U.S. agitators in the body politic, and an intellectual tradition and culture very different from the United States all make a strong anti-Americanism part of the Latin political culture. Call it "anti-Americanism" or whatever, it is a fact of life.

- Again, the question is one of access, whether it be for a Caribbean Basin Radar Network to help stem the tide of drugs, or to bolster Latin perceptions of the United States and our commitment to the Hemisphere. The USG has been trying since at least 1983 to establish the CBRN. Negotiations have been continually frustrated by the sovereignty issue.

- A series of "North-South issues" still divide the United States and the Latin Americans. The recent experience in Honduras, when crowds burned the Embassy Annex over the arrest and deportation of a drug smuggler, is an example of how quickly political sovereignty can be engaged. Yet how could we carry out our Central American policy without access to Honduran bases and airspace?

TABO

PLANNING CONSTRAINED BY SOVEREIGNTY

- CARIBBEAN RADAR NETWORK (CBRN)
- RISE IN NARCO-TERRORISM
- LATIN PERCEPTIONS:
  - U.S. STRATEGIC WITHDRAWL
  - U.S. DEFEAT IN CENTRAL AMERICA ?
  - U. S. UNRELIABLE ALLY
- NORTH-SOUTH ISSUES STILL DIVIDE
- HONDURAS EXAMPLE -- U.S. PRESENCE IS A TWO-EDGED SWORD

#36 DSB DRUGS--CONCLUSIONS

- These are the conclusions of last summer's Defense Science Board study of Detection and Neutralization of Illegal Drugs and Terrorist Devices.

- The "war on drugs" is likely to be the major political issue for 1988. Congressional leaders and Presidential candidates are all calling for greater Defense involvement in "the War on Drugs."

- We note it here as a reminder of a mission not being planned for by USSOUTHCOM, nor calculated into anyone's basing equation. Yet actively countering the flow of drugs to the United States from Latin America is a mission that is very likely to be undertaken. The impact on the TABO Caribbean Case could be immense.

Detection & Neutralization of Illegal Drugs and Terrorist Devices

UNCLASSIFIED

EXECUTIVE SUMMARY

GENERAL CONCLUSIONS

- THE LAW ENFORCEMENT AGENCIES ARE AT WAR AGAINST CRIME
- NATIONAL SECURITY IS THREATENED BY TERRORISM AND DRUGS
- TERROR/DRUG ISSUES ARE PART OF BROADER CRIME PROBLEMS
- CRIMINALS SHIFT RAPIDLY TO PATHS OF LOWER PERCEIVED RESISTANCE
- WAR ON TERROR RELIES MORE ON INTELLIGENCE & PENETRATION
- DRUG WAR RELIES MORE ON SOURCE DENIAL, INTERDICTION & PROSECUTION
- NEITHER WAR CAN BE "WON" WITH TECHNOLOGY & HARDWARE ALONE:

  ....THERE MUST BE DEMAND-REDUCTION BY "DETERRING THE USER"

UNCLASSIFIED

#37 CARIBBEAN REQUIREMENTS

- These concluding statements summarize the likely future Caribbean requirements for basing.
- These requirements are today ill-defined but very real.
- Drug war must be factored into our thinking about our basing requirements for this region.

TABO

CARIBBEAN REQUIREMENTS

- LIC FORCES NEED UP CLOSE AND INTIMATE CONTACT WITHOUT POLITICAL LIABILITIES TO HOST OR USG
- WITHDRAWAL TO CONUS UNDER TREATY?
- USCINCSO NEEDS ANOTHER WAY TO LOOK AT TREATY PLANNING AND POST 2000 OPERSTIONS
- DRUG WAR?

#38 TECHNOLOGICAL ALTERNATIVES

- With that background, now let's look at the technologies that might be useful.

- For presentation the technologies have been grouped into broad categories. Keep in mind that these technologies can be grouped to satisfy a number of new strategic options.

TABO BRIEFING OUTLINE

- BACKGROUND
- THE BASING PROBLEM
- BASE FUNCTIONS
- GEOGRAPHIC CASES
  - SWA
  - CARIBBEAN
- **TECHNOLOGICAL ALTERNATIVES**
  - AIR PLATFORMS
  - MATERIALS AND STRUCTURES
  - AIRFIELDS AT SEA
  - ADVANCED SHIPPING
  - FORCE CONFIGURATION
  - C^3I
- TECHNOLOGIES AND FUNCTIONS
- OBSERVATIONS AND RECOMMENDATIONS

#39 AIR PLATFORMS

- **First a look at air platforms.**

TABO BRIEFING OUTLINE

- BACKGROUND
- THE BASING PROBLEM
- BASE FUNCTIONS
- GEOGRAPHIC CASES
  - SWA
  - CARIBBEAN
- TECHNOLOGICAL ALTERNATIVES
  - **AIR PLATFORMS**
  - MATERIALS AND STRUCTURES
  - AIRFIELDS AT SEA
  - ADVANCED SHIPPING
  - FORCE CONFIGURATION
  - C^3I
- TECHNOLOGIES AND FUNCTIONS
- OBSERVATIONS AND RECOMMENDATIONS

#40 AIR PLATFORMS

- We see two alternatives to the current types of air platforms, Intercontinental Discriminate Weapons, and Low Speed, High Endurance air platforms--airships and UAVs.

- TABO identified work underway at DARPA and SDIO that could be applied directly to the TABO problems identified in our case studies. Lockheed has conducted feasibility studies on the installation and operation of electromagnetic guns in aircraft. The objective of one study was to reduce the vulnerability of the AC-130 gunship to ground fire. The approach selected involves the use of an electromagnetic gun to increase standoff distance and lethality.

- DARPA also has programs for RPVs/UAVs which are relevant to TABO.

- Our work was to characterize these technologies in the TABO context. Is there a way to shift force requirements that currently require overseas bases to more long range,high endurance aircraft that can accomplish part of the missions of current air and land tactical formations.

- TABO investigated how an ICDW could effect the force mix in SWA to lower the requirements for tank killing air/land formations and weapons systems and thereby reduce requirements for bases.

- We also examined the practical applications of advanced airships, to include using an airship as a "base ship" for RPVs and UAVs launch and recovery.

- We also note that the requirements for future ICWDs, and RPVs and UAVs should ensure that these systems can operate either without bases, or from the types of base alternatives we will discuss later.

TABO

AIR PLATFORMS

- CURRENT
  - HIGH SPEED/SHORT ENDURANCE (HS/SE) (+ TANKERS)
  - RPV - LOW SPEED/SHORT ENDURANCE (LS/SE)
  - CONVENTIONAL BOMBING (CB)
  - CRUISE MISSILES (CM)
- ALTERNATIVES
  - INTERCONTINENTAL DISCRIMINATE WEAPONS (ICDW)
  - LOW SPEED/HIGH ENDURANCE (LS/HE)
    - AIRSHIPS
    - UAV'S

#41 GAINS IN ACCURACY

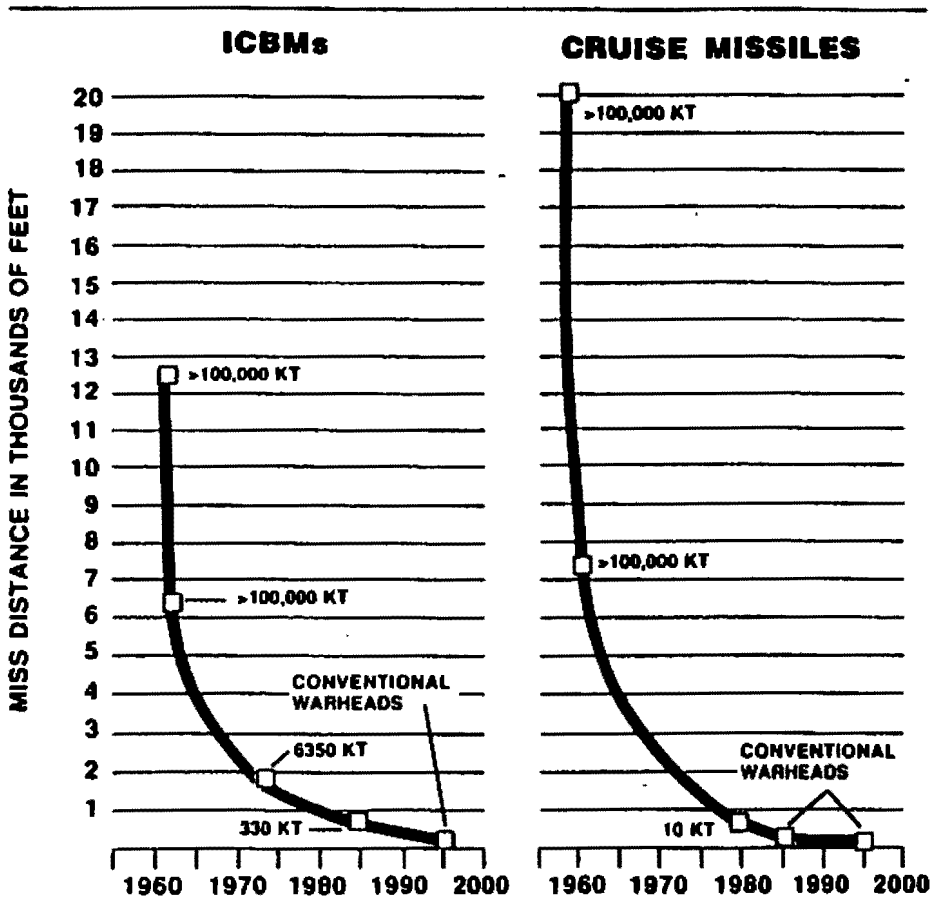
- This chart is from "Discriminate Deterrence" and shows that, as accuracy increases, first the nuclear yields, and then the types of weapons required changes dramatically. We are now reaching the point on the curve at which conventional warheads can destroy the targets that only nuclear weapons could destroy in the 1970s.

- An Intercontinental Conventional Discriminate Weapon should sharply reduce the requirements for overseas bases--provided the real time targeting is available--by giving USCENTCOM a weapon that does not require in-region bases to use early and often to deter or deflect Soviet armored formations.

- If such an armored force can be attacked and weakened, if not defeated, the number of ground and tactical air force units CENTCOM needs might conceivably be reduced.

GAINS IN CONVENTIONAL WEAPONS ACCURACY BOLSTER THE CASE FOR DISCRIMINATION

TABO



☐ INDICATES YIELD NEEDED FOR 90% PROBABILITY OF DESTROYING A 1000 psi POINT TARGET WITH ACCURACY SHOWN

#42 SWA AIR SUPPORT

- The TABO requirement would be met with an aircraft, such as a B-52 or a 747, equipped with a similar hypervelocity weapon and appropriate fire control system. Satellite targeting would be a big plus. It is estimated that this type of weapons system could engage armor at a 70km standoff range.

- ICDWs would increase deterrence

- ICDWs could fill the response gap until strategic lift permits air/land force generation and employment of the force. ICDWs could lower the requirement for heavy maneuver battalions and A-10 squadrons. We need to keep in mind that the United States currently requires all available ports and airfields to be open and accessible and we still have a force generation shortfall.

TABO

SWA AIR SUPPORT

- CURRENT REQUIREMENTS FROM SWA STRATEGY
  - FORWARD DEPLOYED, BASE-HUNGRY FIGHTER BOMBERS
  - B-52 IN CONVENTIONAL BOMBING
  - USED BEFORE AND DURING GROUND FORCE EMPLOYMENT
- CAPABILITIES NEEDED - - ICDW :
  - STEALTH
  - INTERCONTINENTAL STANDOFF GUNSHIP
  - LINKED TO REAL TIME IMAGING SATELLITES AND UAV'S FOR TARGETING
  - USING AIR-LAUNCHED, HYPERVELOCITY, ARMOR VEHICLE KILLING WEAPONS

REDUCE REQUIREMENTS IN CURRENT CASE

#43 PROJECT 413

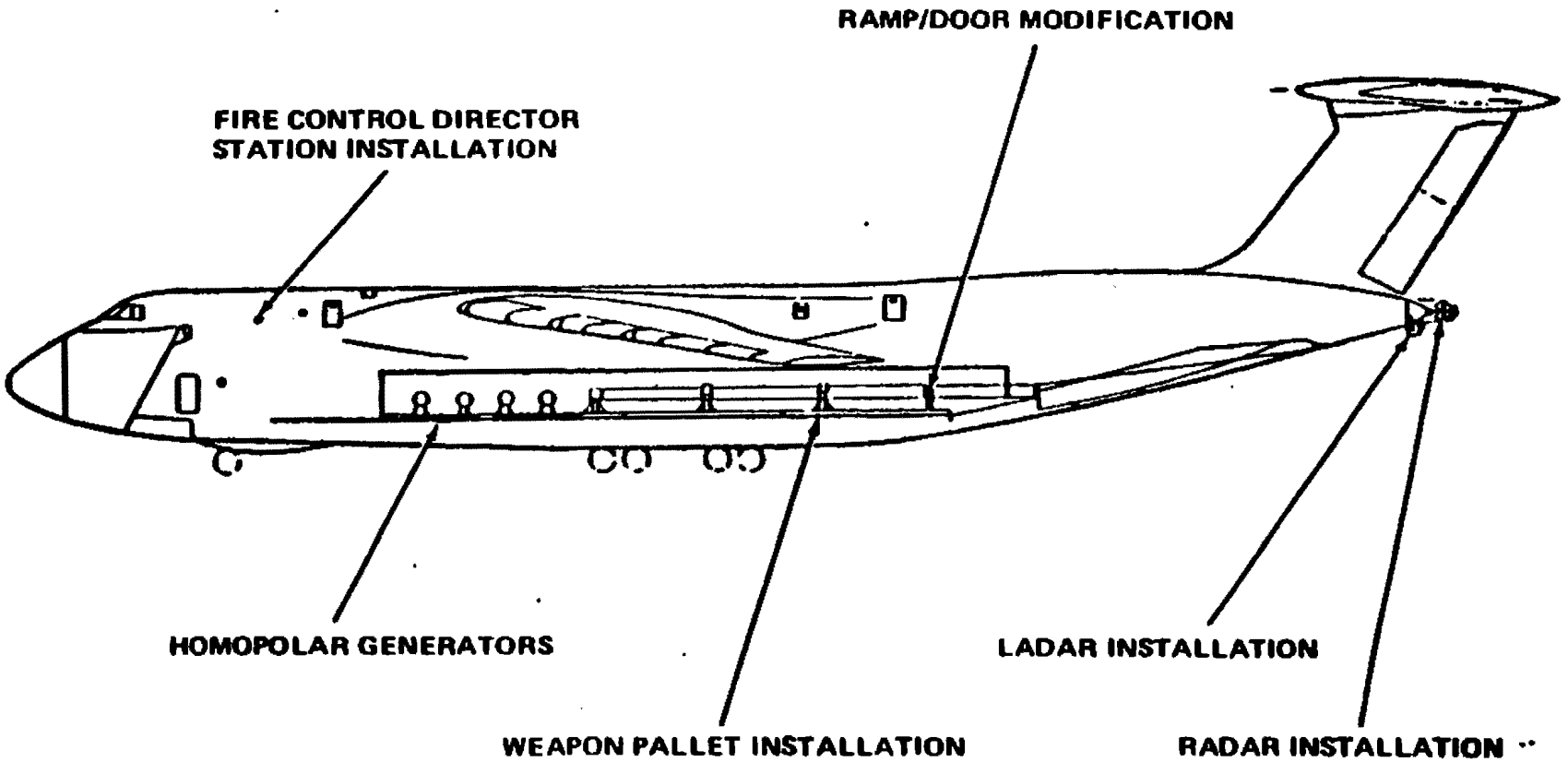
- This is a conceptual drawing of an air platform with electromagnetic weapons. The drawing represents work done for SDIO. The objective here is to engage incoming Reentry Vehicles.

- The point is, that it may be possible to apply some of this technology to the tank killing problem.

- Obviously such a capability would have application not only in SWA but in NATO and North Asia as well. In the multipolar world envisioned by the Commission on Integrated Long-Term Strategy, an ICDW would have great value to military planners.

- Deterrence and war fighting would be greatly enhanced.

PROJECT 413 (DEMON)
GENERAL ARRANGEMENT DRAWING



CM102-17

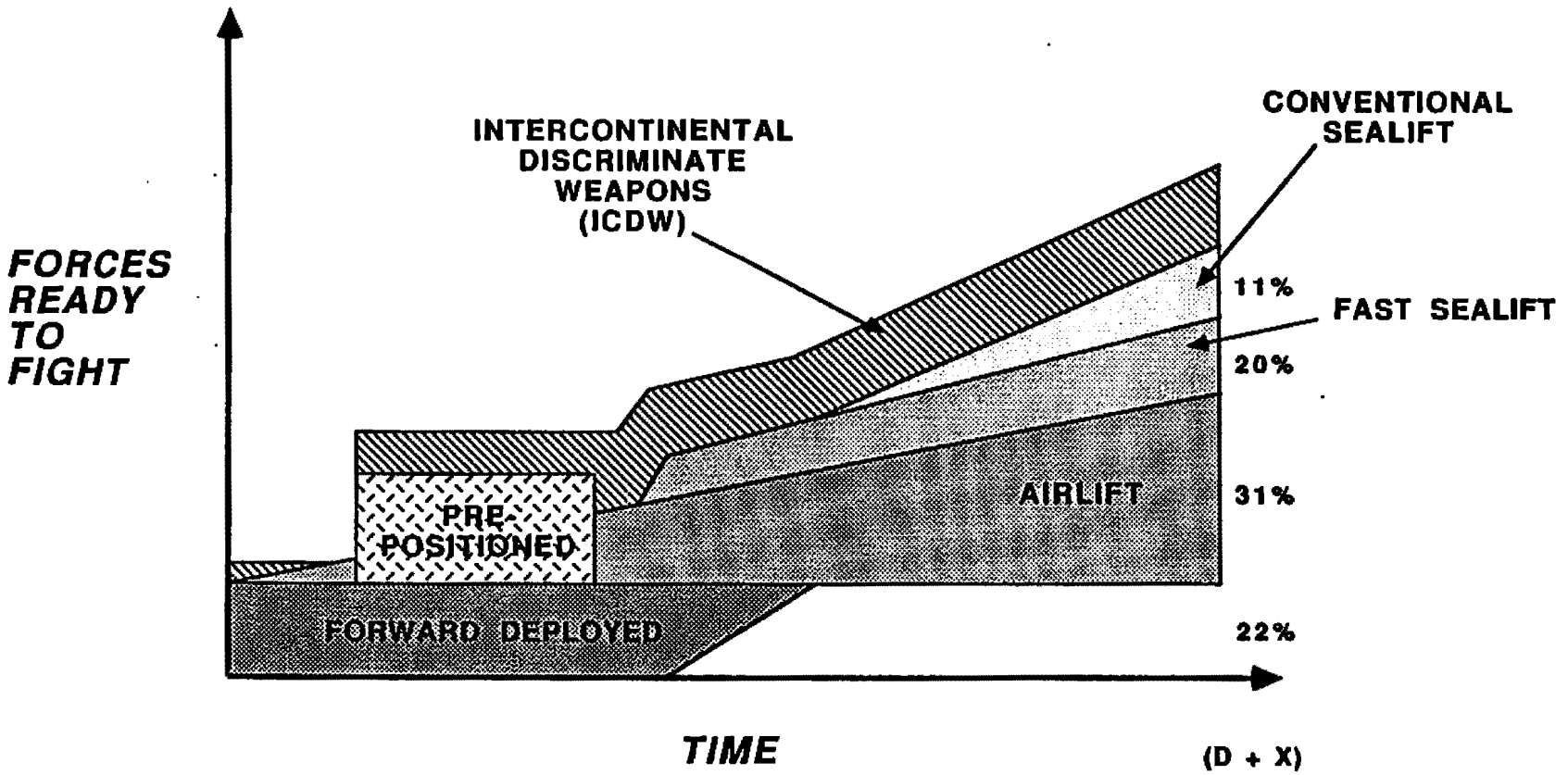
#44 SWA SHORTFALL-US/SOVIET REGIONAL CONFLICT

- **Returning to our force generation model, we see that the ICDW could help fill that 16% shortfall.**
- **It is conceivable that an ICDW could allow the U.S. to respond to a Soviet attack into Iran during the initial 24 hours.**

TABO

SWA SHORTFALL

U.S./SOVIET REGIONAL CONFLICT



#45 ICDW CONCLUSIONS

- Valuable work capable of being used to develop an ICDW is underway today.

- In terms of technical difficulty, we judge that the ICDW falls between the first generation AC-130 and the third generation C-5. Current work within DARPA has not considered the potential impact of these types of systems on the basing problem. A "Second Generation" ICDW is estimated to cost between $50-75 millions for development.

ICDW CONCLUSIONS

- AC-130 VERSION (1st GENERATION) BEING WORKED BY DARPA AND LOCKHEED
- C-5 VERSION (3rd GENERATION) BEING WORKED BY SDIO AND LOCKHEED
- ICDW WOULD REPRESENT A 2nd GENERATION PROGRAM - W/B-52 OR 747
  - ROUGH COST ESTIMATE: $50 - $75 M

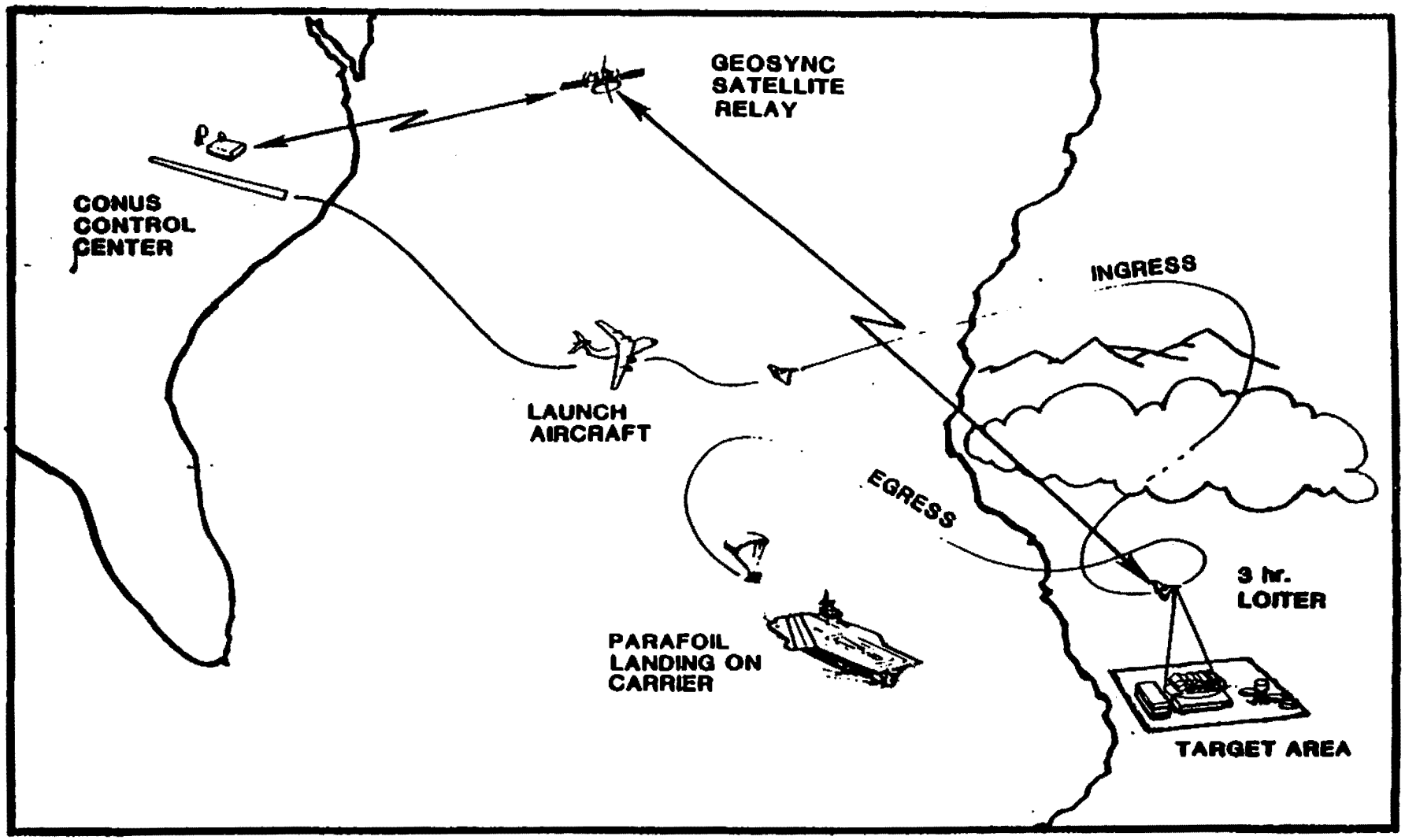
#46 LONG RANGE ROBOTIC INTELLIGENCE PROBE

- Here is a conceptualization of a RPV launched from an aircraft, controlled by satellite, and recovered at sea by the Navy.

- Note that the launch platform need not be an aircraft. It could be an airship. And a Navy Aircraft Carrier is not needed for recovery. A leased container ship, an airfield at sea, or a barge would do just fine.

TABO

LONG RANGE ROBOTIC INTELLIGENCE PROBE



#47 ADVANCED AIRSHIP

- Multi-mission capability in an advanced airship could replace many overseas base functions: C3I, logistics, and the less traditional base functions which we termed "political."

- An operational system does not require an operating base. Landings are not necessary for continuous operations.

- Continuous 3-6 month deployments are possible, with infrequent inflight resupply and crew rotation from ships, airfields at sea, or helo transfer.

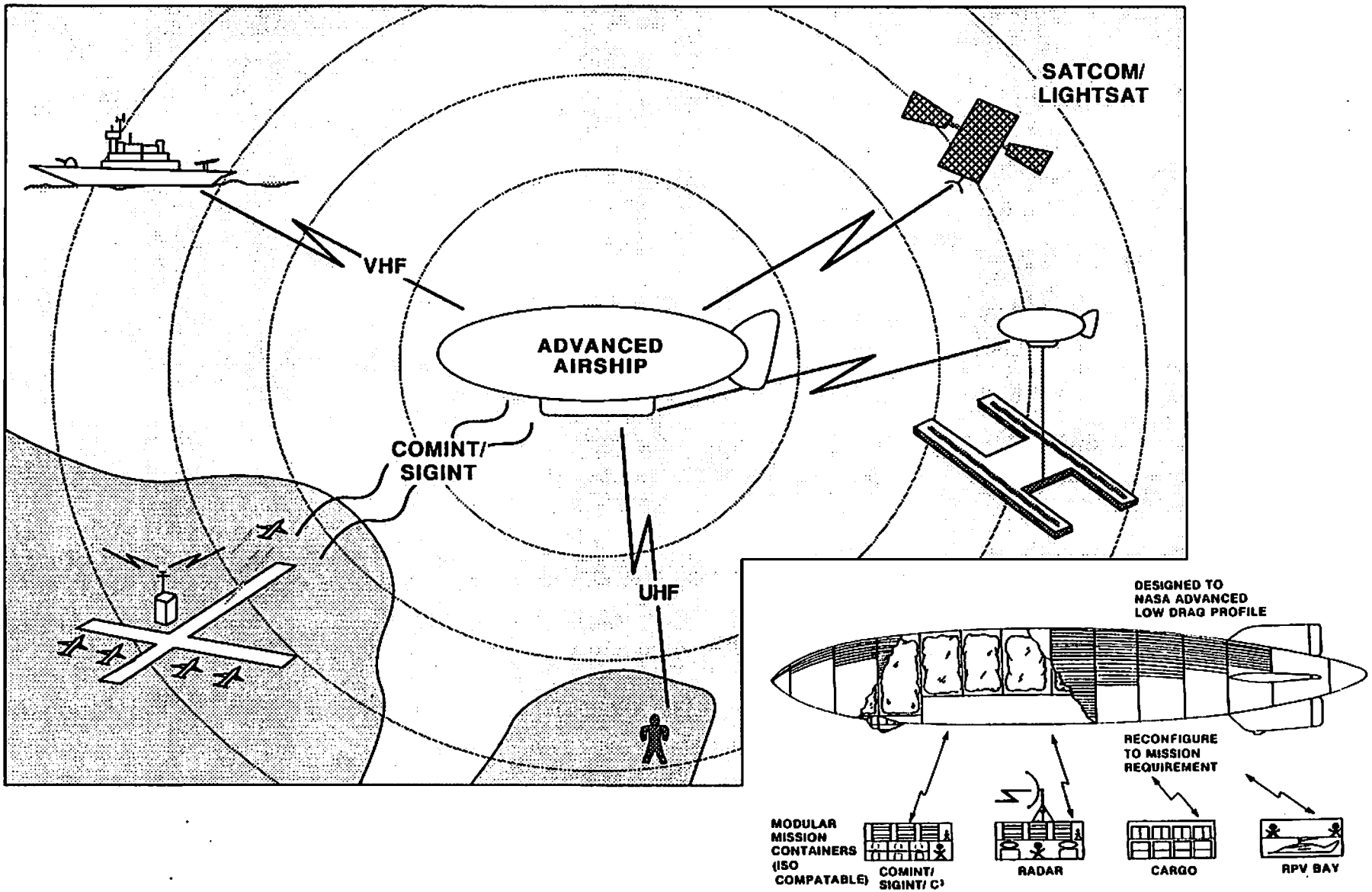
- A single airship can give greater capability/coverage than 4-7 conventional aircraft (at 2.5-5 x cost) flying continuous cyclic operations.

- A second-generation airship would utilize 150 compatible mission modules permitting rapid configuration of the airship for several missions.

- The advanced technologies to be considered in developing an advanced airship could include:

  - NASA efficient low drag profile
  - Advanced composite materials with thin film cover
  - Advanced propulsion system with ether, hull-imbedded photovoltaic cells, regenerative fuel cells and high-capacity motors, or an advanced lightweight diesel engine with exhaust water recovery ballast system
  - An automatic flight control and ballasting system
  - Low- to zero-airspeed flight dynamics

ADVANCED AIRSHIP



#48 ADVANCED AIRSHIPS IN C3I ROLE

- An airship can allow continuous 24-hr sensor coverage with a >275 nm surface traffic coverage and <400 nm air traffic coverage from a 10-15KFT altitude loiter

- Unrefueled endurance varies from approximately 10 days with conventional propulsion, to 30-45 days with advanced solar/fuel cell propulsion. Resupply/refuel can be accomplished from passing ships or airfields at sea.

- ISO compatible modular sensor suites to include:

  - Large antenna radar arrays.
  - Single platform SIGINT and RDF (using large size or with RPVs).
  - C3, comm relay, UGS readout, etc

- Airship could serve as a launch and recovery platform for RPVs, thus extending sensor/weapons range and reaction time, while maintaining real-time C3I.

- Ideal platform for combined crews for cooperative action.

TABO

ADVANCED AIRSHIPS IN C^3I ROLE

- MISSION
  - UNOBTRUSIVE, INDEPENDENT GLOBAL OPERATIONS
  - HIGH ENDURANCE AIRBORNE STATION KEEPING
    - CONTINUOUS SURVEILLANCE OF ALL SURFACE AND AIR TRAFFIC (ELIMINATES STOP AND GO)
    - 24 HOUR/DAY SIGINT
      - ONBOARD PROCESSING FOR LOCAL SUPPORT
      - SATCOM RELAY TO NCA
    - C^3I RELAY FOR DISPERSED AIR/LAND/SEA UNITS
- CHARACTERISTICS
  - NOT WEATHER DEPENDENT
  - CAN BE OPERATED WITH COMBINED CREWS
  - NO BASE OF OPERATIONS REQUIRED
  - INFREQUENT INFLIGHT RESUPPLY FROM:
    - PASSING SHIP
    - FLOATING BARGE/ISLAND
    - HELICOPTER TRANSFER
  - ONBOARD RVP
    - EXTENDS HORIZON, RANGE, AND PROXIMITY
    - ALLOWS RECONFIGURABLE SPECIAL MISSIONS

#49 ADVANCED AIRSHIP IN LOGISTICS ROLE

- The logistics/transport configuration would trade off reduced crew and altitude requirements for increased cargo lift.

- Avionics and crew modules would be replaced by cargo and fuel modules, resulting in the ability (by remaining at low altitude) to transport approximately 50 tons 2200nm at 90kts, or 70 tons for short-range transfers.

- By exploiting static lift and exhaust water recovery ballast, the airship arrives at the objective area at or near equilibrium, with a full payload. Containerized cargo could then be vertically offloaded directly to the field, and retrograde material onloaded for return to a ship or airfield at sea.

- May be the "fast ship". Heavy lift, speed advantage plus ability to onload/offload without developed ports and MHE.

- Jump the beach line, deliver containers from the factory to troops in field. Might solve the transshipment problem.

- Concept should be modelled. Expect tremendous advantage, when the entire logistics stream is looked at.

ADVANCED AIRSHIPS IN LOGISTICS ROLE

- MISSION:
  - CARGO TRANSPORT
    - GLOBAL TRANSOCEANIC OPERATIONS ≈ 90 KTS AIR SPEED
    - RAPID SEA TO SHORE TRANSFER ≈ 140,000 LBS
    - EVACUATION TO AIRFIELD AT SEA OR ADVANCED SHIP
- CHARACTERISTICS:
  - ALL WEATHER OPERATIONS FOR TRANSIT AND CARGO OPERATIONS
  - CARGO TRANSFER TO LAND SITE, SHIP DECK, OR AT SEA PLATFORM
  - NO AIRFIELDS OR PREPARED LANDING SITES REQUIRED
  - NO PORTS/MHE REQUIRED
  - NO LANDING ON ARRIVAL REQUIRED

#50 AIRSHIP SURVIVABILITY

- Current advertising blimps (which lack any helium compartmentalization) are punctured by approximately 100 bullets during a year's use. Despite this surprising number of bullet strikes, there is no structural effect and no significant helium loss. The holes are patched and the helium purity is increased by 1% - 2% during annual scheduled maintenance.

- USAF F-15 fighters using guns and missiles have not succeeded in shooting down small aerostats when they have broken free.

- An airship's design allows the forces induced by its load or cargo to be distributed over the very large hull -- resulting in a low stress structure that is impact tolerant.

- Advanced materials, lightly loaded composite structures, and helium compartmentalization all would contribute to a survivable vehicle which is expected to tolerate multiple 'hits' (blast and/or penetration) before a potential vehicle loss.

- Low vehicle IR signature and trailing IR decoys could be expected to negate IR missile effectiveness against an airship.

- If not operated in a standoff position, the crew, not the vehicle, is most likely to be susceptible to low and mid intensity conflict threats.

AIRSHIP SURVIVABILITY

- UNIQUE SURVIVABILITY VIS-A-VIS AIRPLANES
  - RELATIVELY LOW RCS
  - LOW IR SIGNATURE
  - REDUNDANCY AND COMPARTMENTALIZATION
  - GAS AT VERY LOW PRESSURE
    (< 2 in H_2O / .1 PSI)
  - MULTIPLE DISTRIBUTED LOAD PATHS
  - IR DECOY EASILY DEPLOYED
- CAPABLE OF SELF PROTECTION
  - AAAM, STINGER,SPARROW, ETC.

CREW LESS SURVIVABLE THAN AIRSHIP

#51 MATERIALS AND STRUCTURES--INTRO

- **Now let's shift to materials and structures.**

TABO BRIEFING OUTLINE

- BACKGROUND
- THE BASING PROBLEM
- BASE FUNCTIONS
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  - SWA
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  - AIR PLATFORMS
  - **MATERIALS AND STRUCTURES**
  - AIRFIELDS AT SEA
  - ADVANCED SHIPPING
  - FORCE CONFIGURATION
  - C^3I
- TECHNOLOGIES AND FUNCTIONS
- OBSERVATIONS AND RECOMMENDATIONS

#52 MATERIALS AND STRUCTURES

- Essentially military construction has not changed since WWI. It is labor and equipment intensive, and a heavy burden on the logistics and transportation commands.

- For example, the US National Guard units exercising in Ecuador required 5 cubic yards of rock for each square meter of base camp they needed to build before starting a recent project. Rock crushers are no longer TO&E to engineer units and are hard to keep operating in third world environments. Site preparation problems are compounded by logistics and overhead just to get ready to perform the primary mission.

- We need to move into the 21st century with pre-constructed, modular forms that can be rapidly put in place and quickly integrated for the on-scene commanders needs. Security can be built in.

MATERIALS AND STRUCTURES

- CURRENT: WW I ERA
  - CUT AND FIT
  - LABOR & EQUIPMENT INTENSIVE
  - HEAVY LOGISTICS BURDEN
  - VULNERABLE
- ALTERNATIVES: 21st CENTURY
  - PRE-CONSTRUCTED
  - PLACE AND USE EASILY AND QUICKLY
  - EASILY INTEGRATED
  - BUILT-IN PROTECTION

#53 COLOR VUGRAPH OF TENTS

- **These are tents used at Palmerola in Honduras.**
- **We ought to do better than this.**

TABO

COLOR VU GRAPH OF TENTS

THE *BDM* CORPORATION

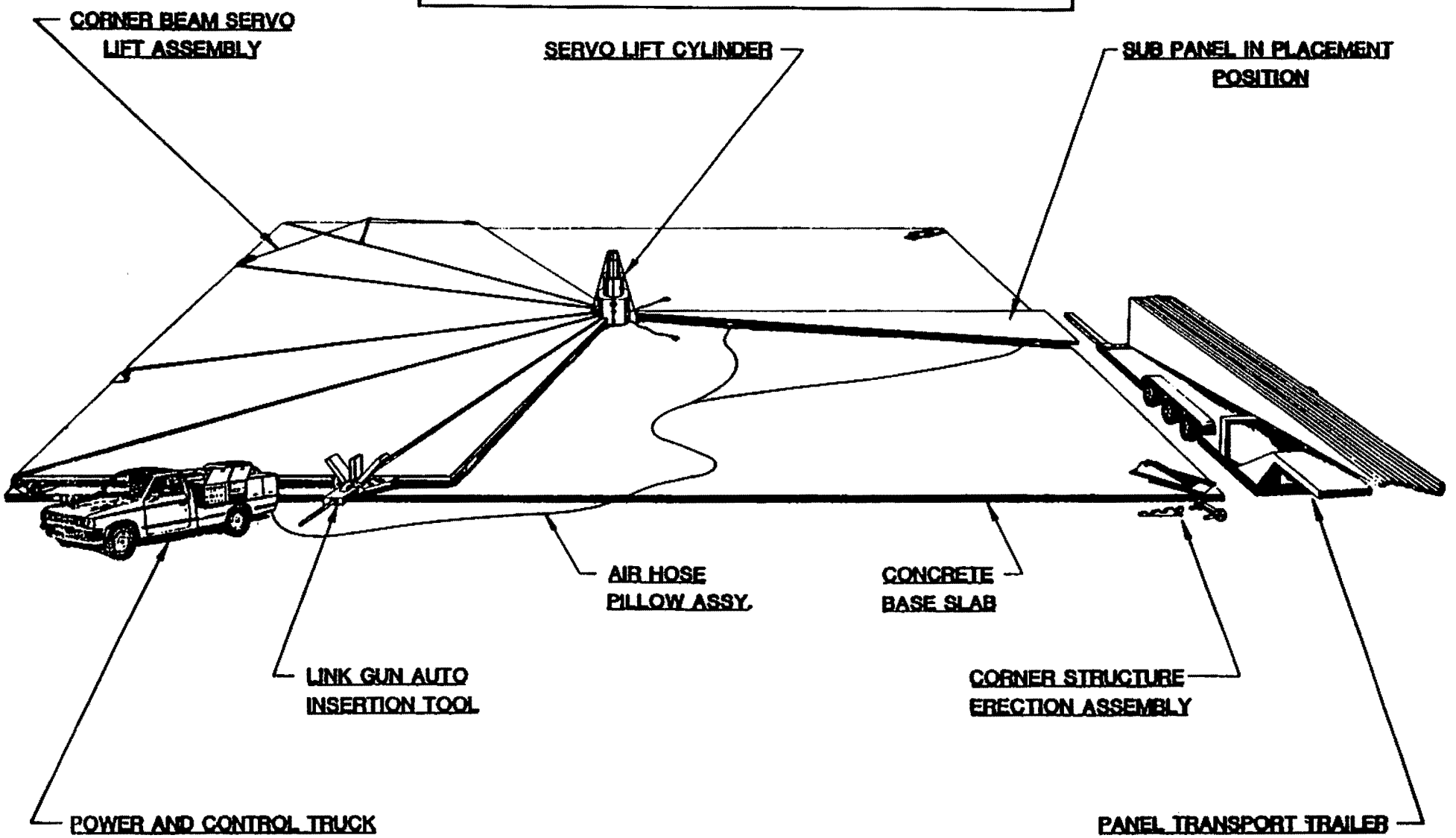
#54 SPANFORM: SITE LAYOUT AND ASSEMBLY

- SPANFORM is one very promising material and concept. Strong and light, it can be cut to form any number of shapes quickly and cheaply.

- Here we see a SPANFORM layout. All carried in one truck and trailer and assembled by two people.

TABO

SPANFORM:
SITE LAYOUT AND ASSEMBLY



#55 SPANFORM: PANELS

- This is what the individual panels look like. These are aluminum, although it might be useful to look at composites.

- The core can be made of a variety of materiel, including empty aluminum cans. Fire-retardant cores should be possible.

- Some of the panel shells could have embedded photovoltaic films, antennas could be built in, etc.

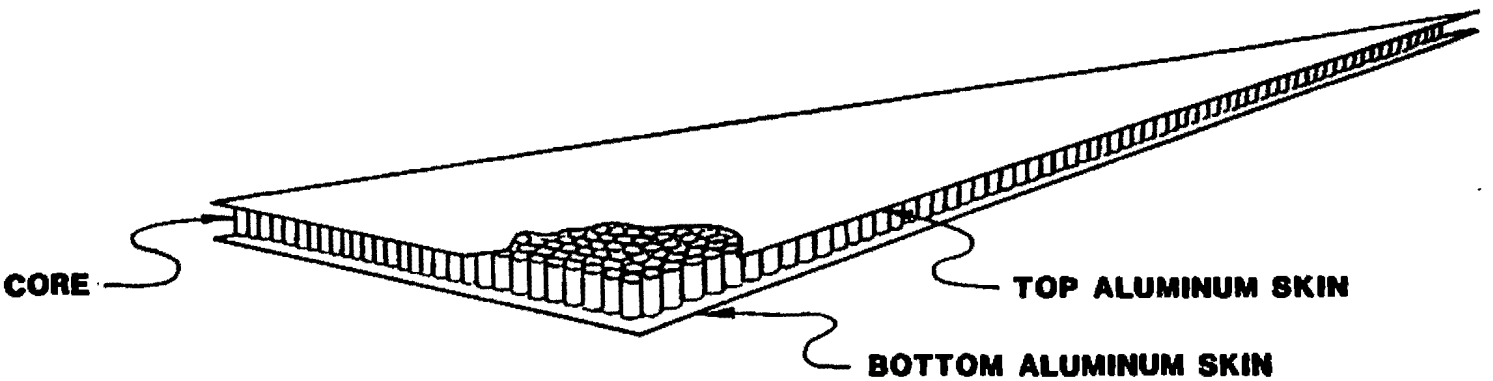
- Computer programs can design the panels to form the final structural shape.

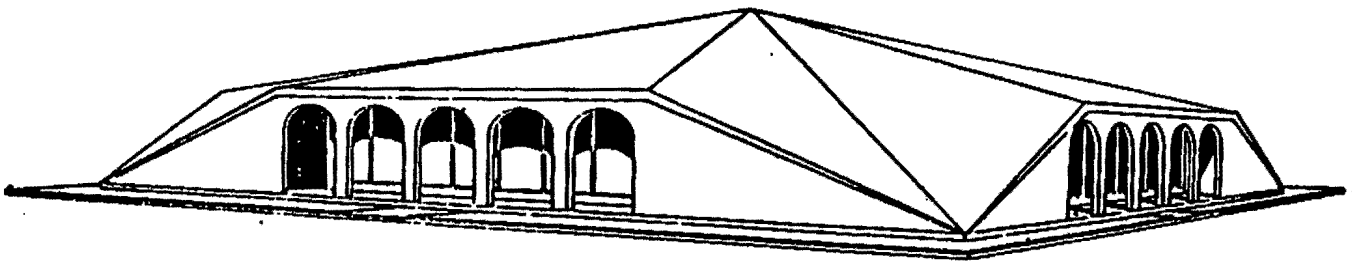
TABO

SPANFORM:
PANELS

PANEL CELLS OR CORES WILL BE FOAM FILLED

FOR HIGH INSULATION FACTORS, SOUND DAMPENING AND INCREASED RIGIDITY.



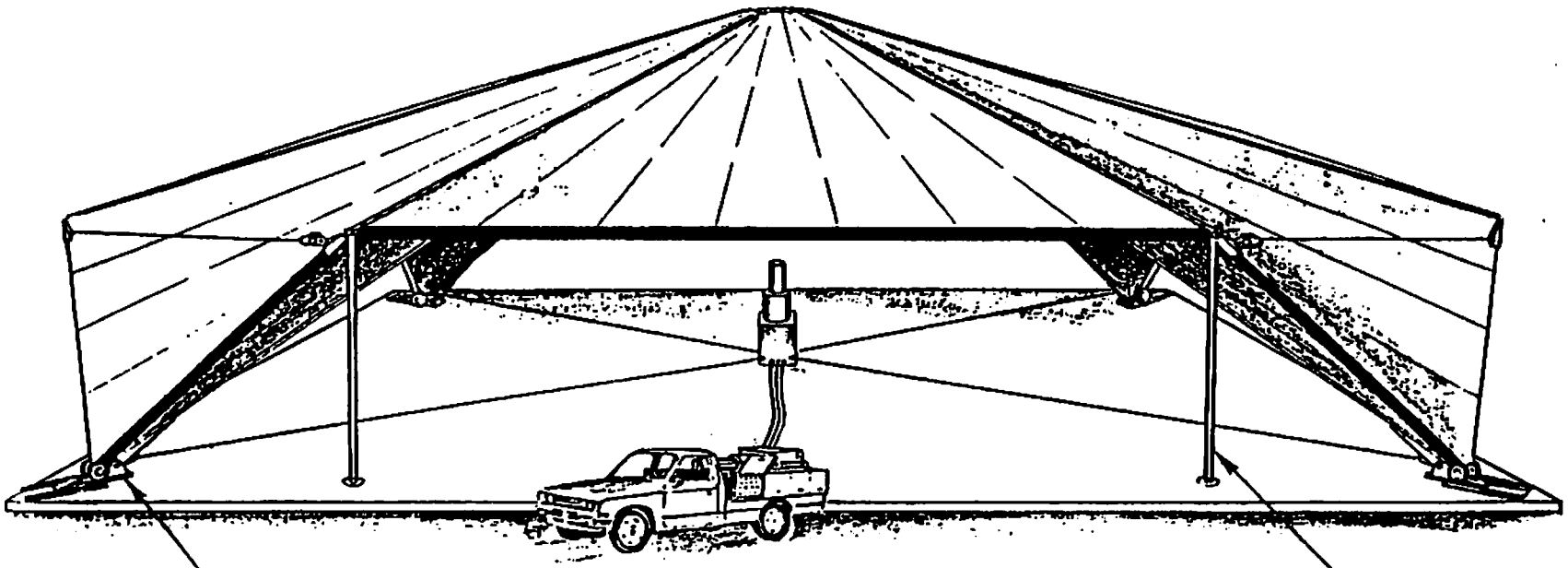


#56 SPANFORM: LIFT

- **The structure is then lifted into shape automatically, using power provided by the truck.**

TABO

SPANFORM:
LIFT



SET PIN CAPS
AND ADJUST

SET VERTICAL BEAMS
AND ADJUST

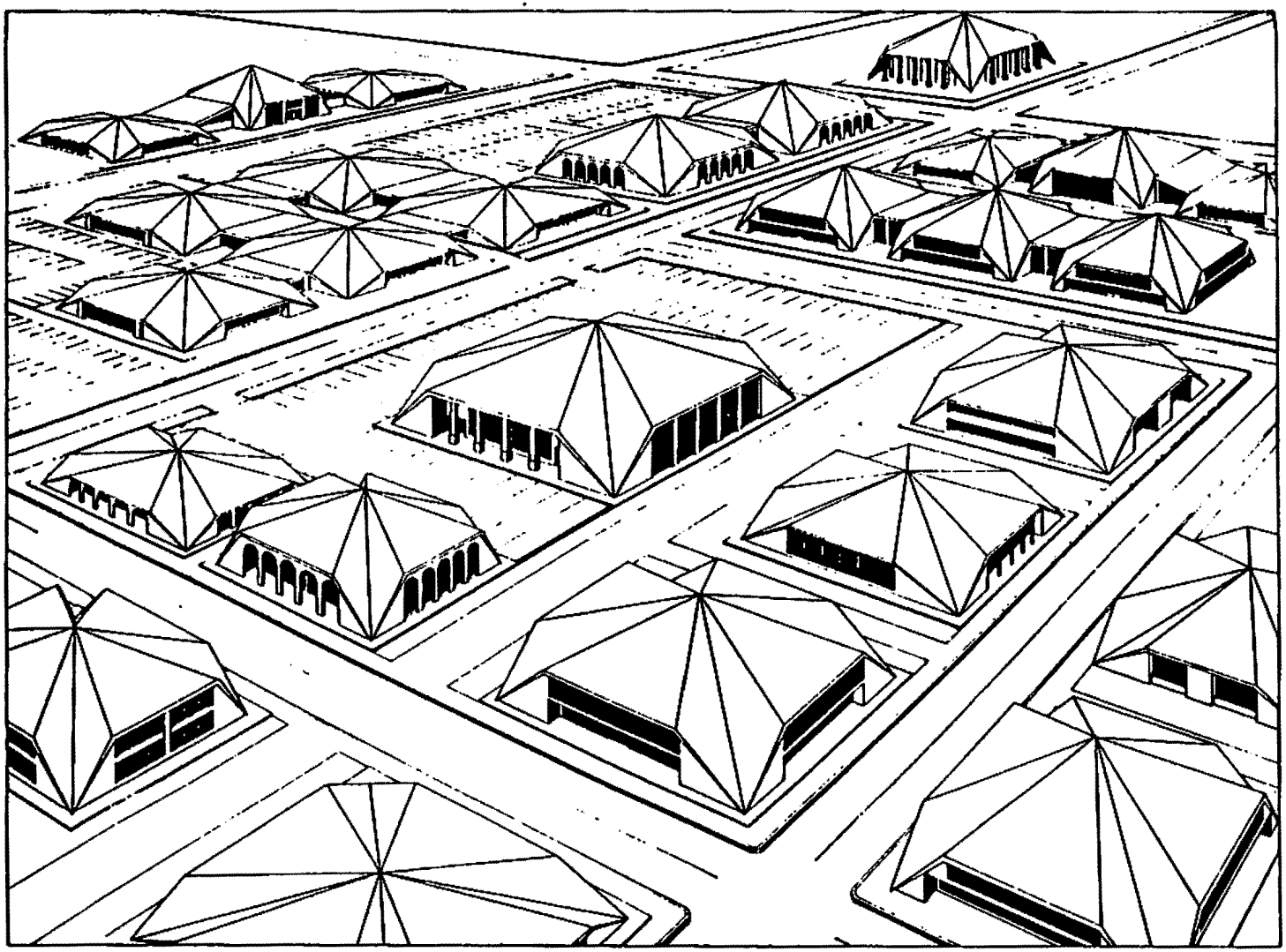
- REMOVE SERVO ASSEMBLIES -

#57 SPANFORM: COMPLEX

- **This is how the expeditionary base of the future could look. A far cry from Palmerola today.**

TABO

SPANFORM:
COMPLEX



#58 COLOR VUGRAPH OF CAT HOUSES

- **This is about the best that the US military can do today: Central American Tropical (CAT) houses at Palmerola Honduran AFB.**

TABO

COLOR VU GRAPH OF CAT HOUSES

THE *BDM* CORPORATION

#59 CONSTRUCTION TECHNIQUES: COST COMPARISON

- This slide compares conventional construction with the SPANFORM concept. As you can see there are great cost savings, especially in life cycle costs.

- Not calculated here, but even more significant are the savings in personnel to construct these bases, and the transport saving in material and equipment.

- Also not calculated is the fact that a SPANFORM base would be recoverable or relocatable. It can be taken down, packed up and moved where and when needed.

TABO

CONSTRUCTION TECHNIQUES
COST COMPARISON

		INITIAL	LIFE CYCLE
BILLET	CAT HUT (2X4 FRAMING)	$15 SQ FT	$20 SQ FT
	RAPID ERECTIBLE	$10 SQ FT	$5 SQ FT
HANGER	10,000 SQ FT (2X4 FRAMING)	$18 SQ FT	$20 SQ FT
	10,000 SQ FT (RAPID ERECTIBLE)	$6 SQ FT	$3 SQ FT

ASSUMPTIONS

- SITE COSTS CONSTANT
- EQUAL SIZE
- 5 YEAR LIFE CYCLE FOR CAT HOUSES
- USING ERECTIBLES IN LARGE NUMBERS

#60 CONCLUSIONS

- Although a mundane topic that does not lead one to think of "hi-tech", new building technologies are needed.

- Such R&D would have large spin-offs for civilian as well as military builders.

- These buildings would have great potential for disaster relief efforts and low-cost housing in the United States and overseas.

CONCLUSIONS

- NEW BUILDING TECHNOLOGY NEEDED
- IMPORTANT SPINOFFS FOR PRIVATE/CONUS MIL CONSTRUCTION
- WIDE APPLICATIONS TO ASSIST MILITARY AND NON-MILITARY NEEDS
- COST SAVING REAL
- WE NEED SHIFT IN APPLICATION OF EXISTING TECHNOLOGY

#61 AIRFIELDS AT SEA--INTRO

- **Now we move to a particularly promising area.**

TABO BRIEFING OUTLINE

- BACKGROUND
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  - AIR PLATFORMS
  - MATERIALS AND STRUCTURES
  - **AIRFIELDS AT SEA**
  - ADVANCED SHIPPING
  - FORCE CONFIGURATION
  - C^3I
- TECHNOLOGIES AND FUNCTIONS
- OBSERVATIONS AND RECOMMENDATIONS

#62 AIRFIELDS AT SEA

- This is one of the richest areas that TABO explored. There are a number of existing design concepts that was done in the late 1960s and mid-1970s. Much of the work was ARPA sponsored.

- The alternatives generally divide into two categories:

  - Modular structures, often supported by vertical columns that extend hundreds of feet into the ocean. Alternatively the platforms can be anchored or otherwise fixed to the seabed.

  - The connecting of several very large hulls to form a supership.

- The runway would be built across the modular platforms. Multiple decks can be constructed, providing immense storage areas.

TABO

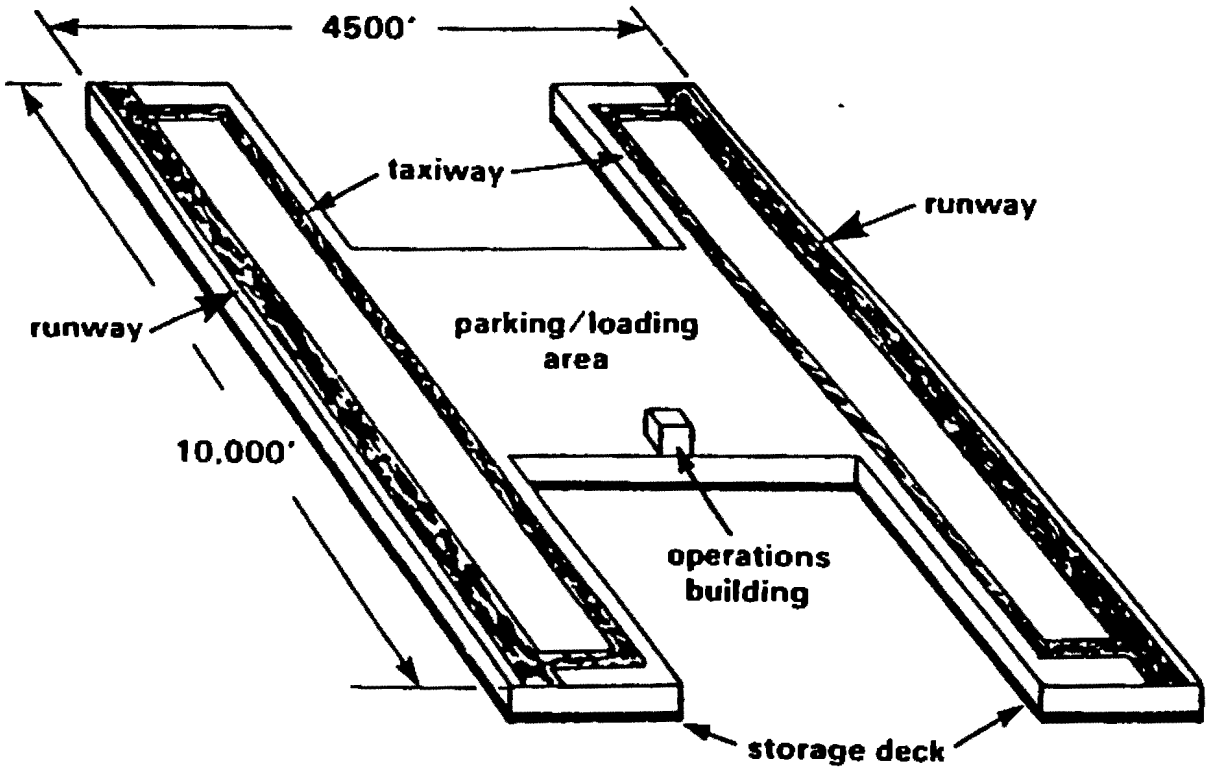
AIRFIELDS AT SEA

- CURRENT
  - CONCRETE ON THE GROUND
  - CARRIERS (CV)
- ALTERNATIVES
  - MOBILE OPERATIONAL LARGE ISLAND (MOLI)
  - SEMI-SUBMERSIBLE MOBILE OPERATING BASE (SSMOB)
    - NAVAL RESEARCH CONCEPT
    - SCRIPPS FLOATING ISLAND
    - OIL PLATFORMS
  - INTEGRATED SUPERSHIP SYSTEM (ISUS)

#63 MOBILE OPERATIONAL LARGE ISLAND BASE (MOLI)

- The MOLI concept is from a Rand study commissioned by the USAF
- MOLI would be C5A-capable and provide parking for 55 aircraft
- Storage for 5 1/2 division sets was envisioned
- Built on concrete bottle technology using steel and concrete as the basic materials
- MOLI would be self-propelled at 5 knots. It would take 3 months for the transit from CONUS TO SWA
- MOLI was the largest structure of all we investigated. It has an important disadvantage of not being capable of using the existing world canals like the Suez or Panama Canals.

MOBILE OPERATIONAL LARGE ISLAND BASE (MOLI)



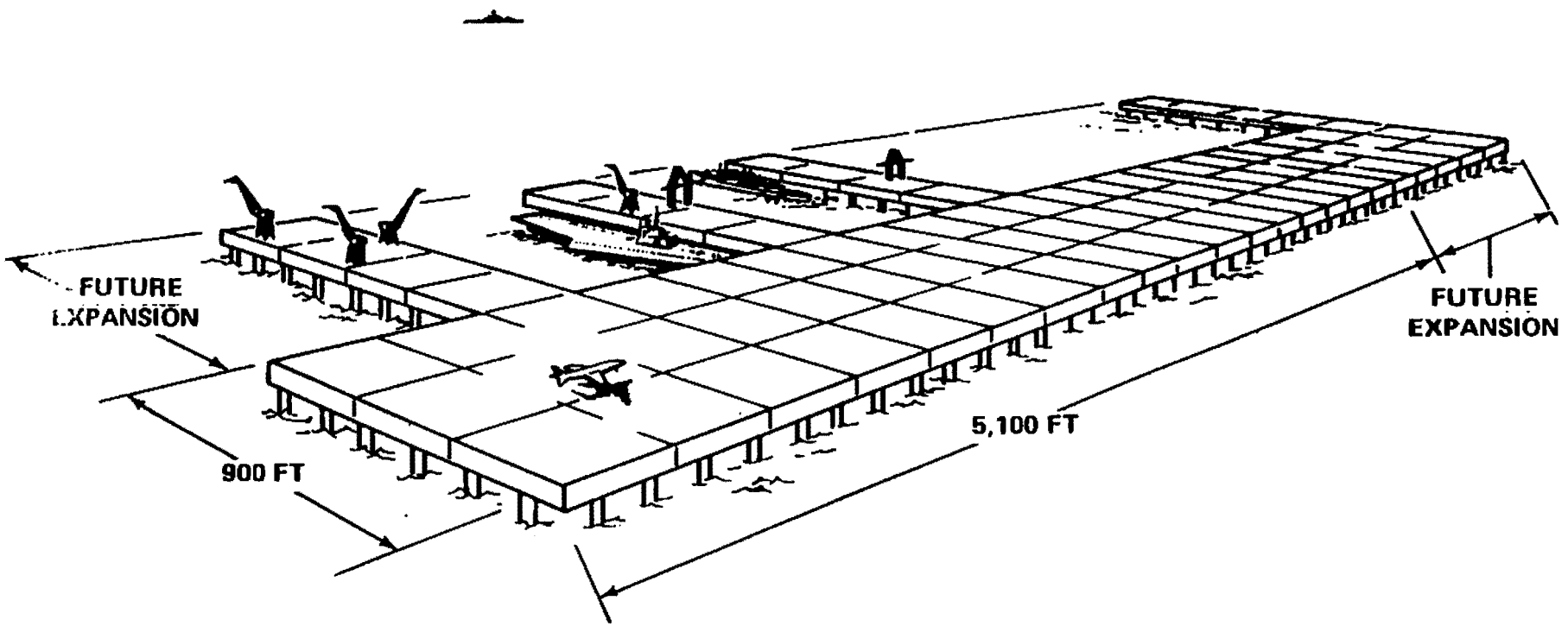
#64 STABLE OCEAN PLATFORM

- This is the concept of the David Taylor Naval Research & Development Center.
- Assembled from many modules (min 51). Each module:
  - 300'x300'x37'depth
  - 4 decks and double bottoms to protect the storage area from the seas and wave damage
- It was also C5A-capable
- Constructed from steel, aluminum and concrete
- Not self-powered but require towing. Each module requires 2 tugs. 3 months transit time from the US to SWA
- Cost estimate was $1.4B ('81$). This figure was based on accepted marine construction techniques. Brown and Root stated that using new techniques, a platform like this could be constructed cheaper than in the late 1970s and early 1980s.
- Joining the modules at sea is unresolved. Area that requires further study.
- NCEL has similar concept. Brown and Root states concepts are doable today.

TABO

STABLE OCEAN PLATFORM

Naval Research and Development Center



Artist's Conception of Future U.S. Foreign Naval Base

#65 SCRIPP'S FLOATING ISLAND CONCEPT

- We talked to Dr. Bill Nierenberg about his concepts for floating islands that use the FLIP ship concept. FLIPs are semi-submersible ships that flip into a vertical attitude and are extremely stable in the vertical plane.

- Airfield combined from large number of platforms built of steel and concrete. Moved by barge and assembled on site.

- Combines FLIP technology and barges.

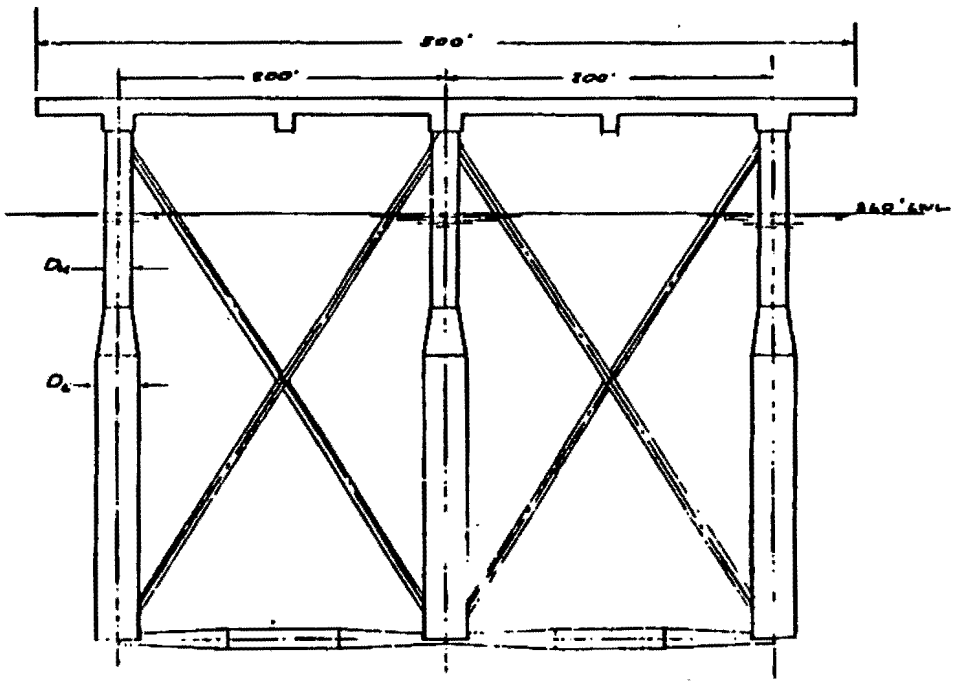
- Dr. Nierenberg estimates cost at $2B (85$)

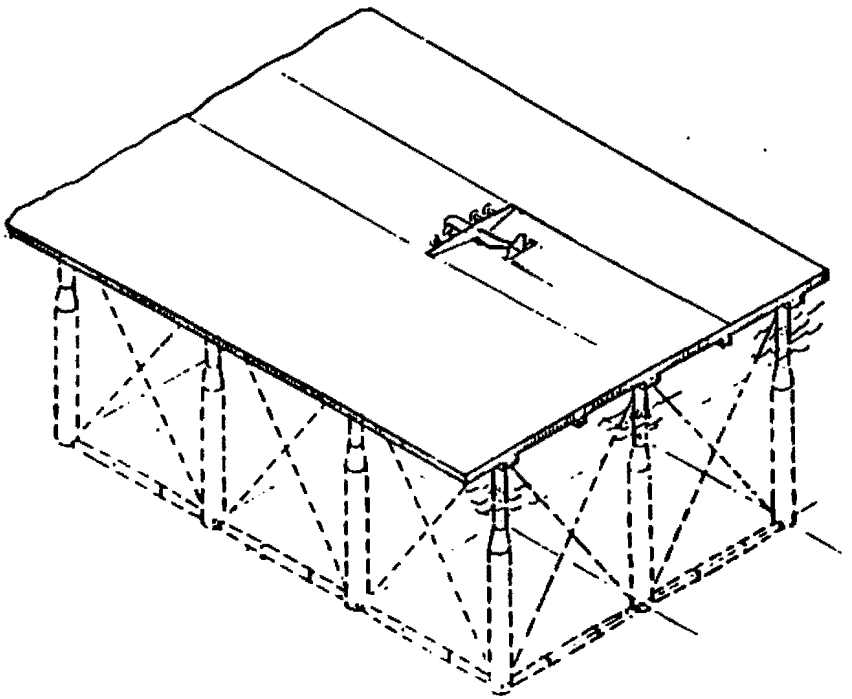
- Joining concept shown here was successfully tested with 1/8 model

- Again this airfield was envisioned C-5A-capable

TABO

SCRIPP'S FLOATING ISLAND CONCEPT





TYPICAL PLATFORM ARRANGEMENT
200' LEG SPACING

#66 OFFSHORE PLATFORMS

- Concept would use the existing large inventory (170+) of offshore oil platforms used by the offshore oil industry to build bases for a wide range of missions and base functions.

- There are three basic types:

  - Jackups: limited to 250' of water.
  - Semi-submersibles: Can operate in greater depths
  - Ships: not depth limited.

- Platforms can be clustered together as needed. Most platforms have cranes and moorings for service vessels.

- Some of the rigs and semi-submersibles have their own propulsion. However, most are towed or are carried to the site by heavy lift ships.

TABO

OFFSHORE PLATFORMS

- EXISTING SEMI-SUBMERSIBLE PLATFORMS
  - LARGE NUMBERS AVAILABLE
  - $400 - $500 K MOBILIZATION COSTS
  - $12 K/DAY TURNKEY/HOTEL OPERATION
  - $3 K/DAY TO MAINTAIN IN 24 HOUR READY STATUS
- TOWED AT 10 KNOTS
- MAX DEPTH FOR ANCHORING - 1,500 FEET
- C^3 I,LOGISTICS AND SPECIAL OPERATIONS USES:
  - RADARS
  - RPV
  - INTEL
  - RELAY
  - PLANNING CELLS
  - AIRSHIP
- LAUNCH PLATFORMS FOR MISSILES?

#67 MODULAR PLATFORM CONCEPT

- **The Navy Civil Engineering Lab envisions modules of about 2000'x200', supported on semi-submersible barges.**

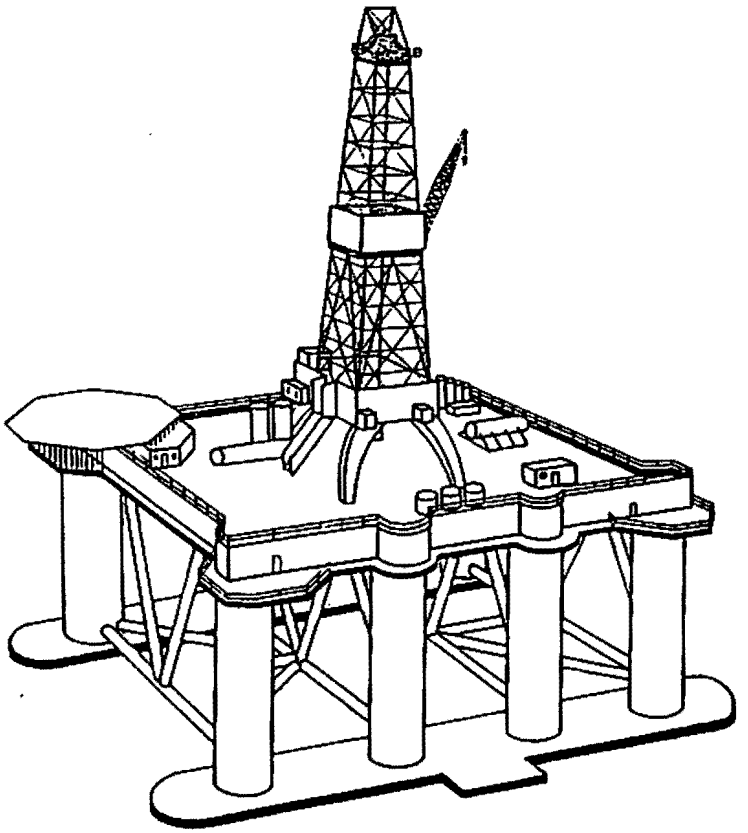
- **The modules could be towed unballasted to the operational area and there joined together as needed.**

- **Construction is state of the art.**

TABO

MODULAR PLATFORM CONCEPT

SEMI-SUBMERSIBLE PLATFORM



#68 INTEGRATED SUPERSHIP SYSTEM

- The supership concept is another idea of the David Taylor lab.

- Concept calls for three or more very large hulls (1500-2000'), similar to super tankers, that would be joined together to form the runway.

- The strategic mobility of this system (each hull has its own propulsion capable of 18kt) is valuable. Endurance for these ships is 20,000 nm. The hulls could be kept unjoined within a given area, then married up when needed to reduce warning time to the enemy.

- The concept needs to be costed, but Mr. Bruce Wooden estimates $2B for entire project if excess supertanker hulls were used.

- Wave tank model testing done by David Taylor.

- Hinged type joining envisioned.

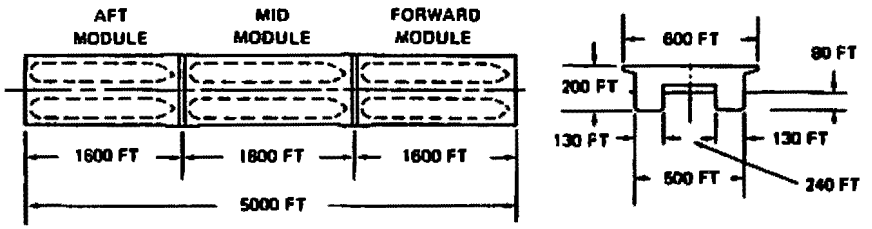
TABO

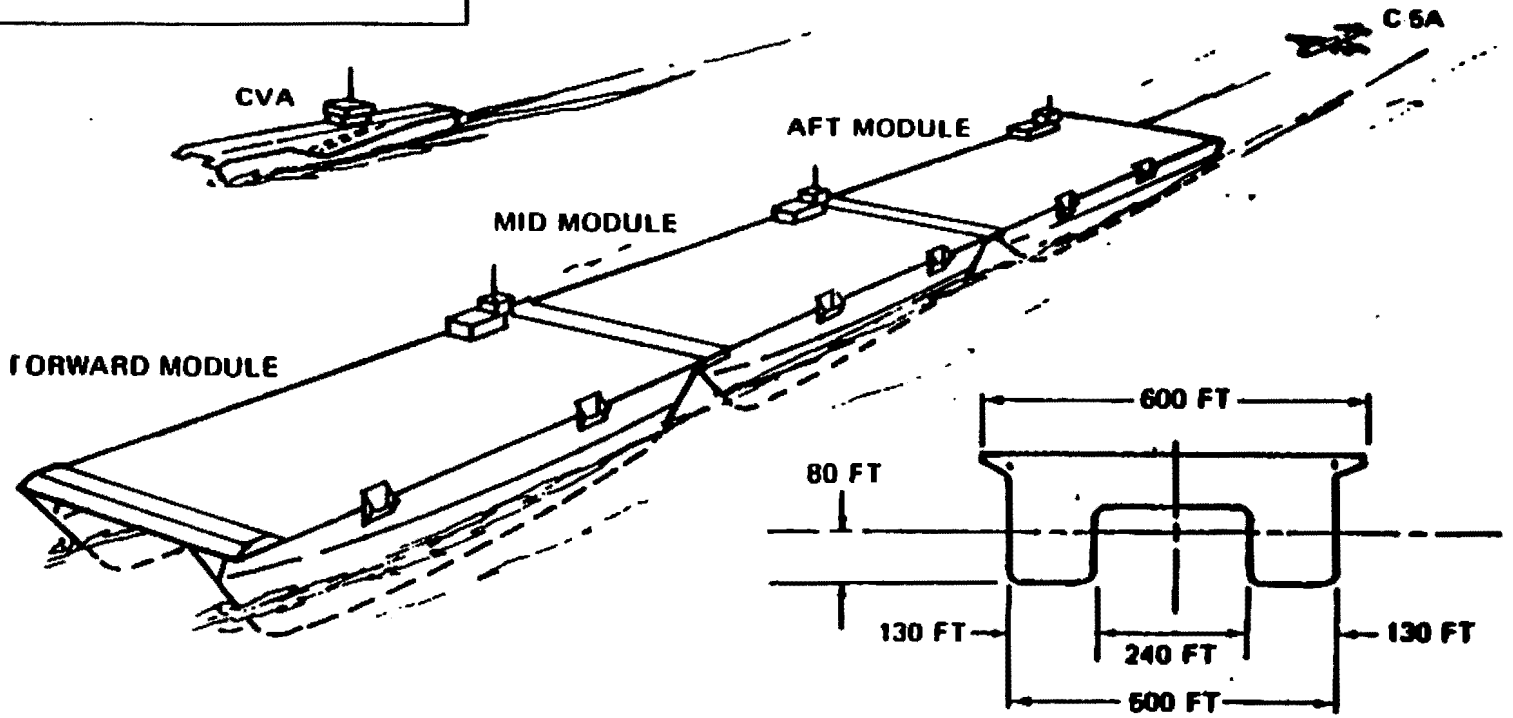
INTEGRATED SUPERSHIP SYSTEM

NAVAL RESEARCH AND DEVELOPMENT CENTER

Characteristics	Aft Catamaran Module	Middle Catamaran Module	Forward Catamaran Module	Integrated Supership
Length, ft	1,600 ft	1,800 ft	1,600 ft	5,000 ft
Beam (at waterline), ft	500 ft	500 ft	500 ft	500 ft
Draft, ft	80 ft	80 ft	80 ft	80 ft
Displacement, tons	600,000 tons	800,000 tons	600,000 tons	1,800,000 tons
Speed, knots	18 knots	18 knots	18 knots	12 knots*
Power, shp	200,000 shp	240,000 shp	200,000 shp	200,000 shp

*Aft propelling only





MIDSHIP SECTION

THE *BDM* CORPORATION

#69 HINGED JOINING MECHANISM

- One of the more difficult engineering challenges of these systems is the joining of the various modules.

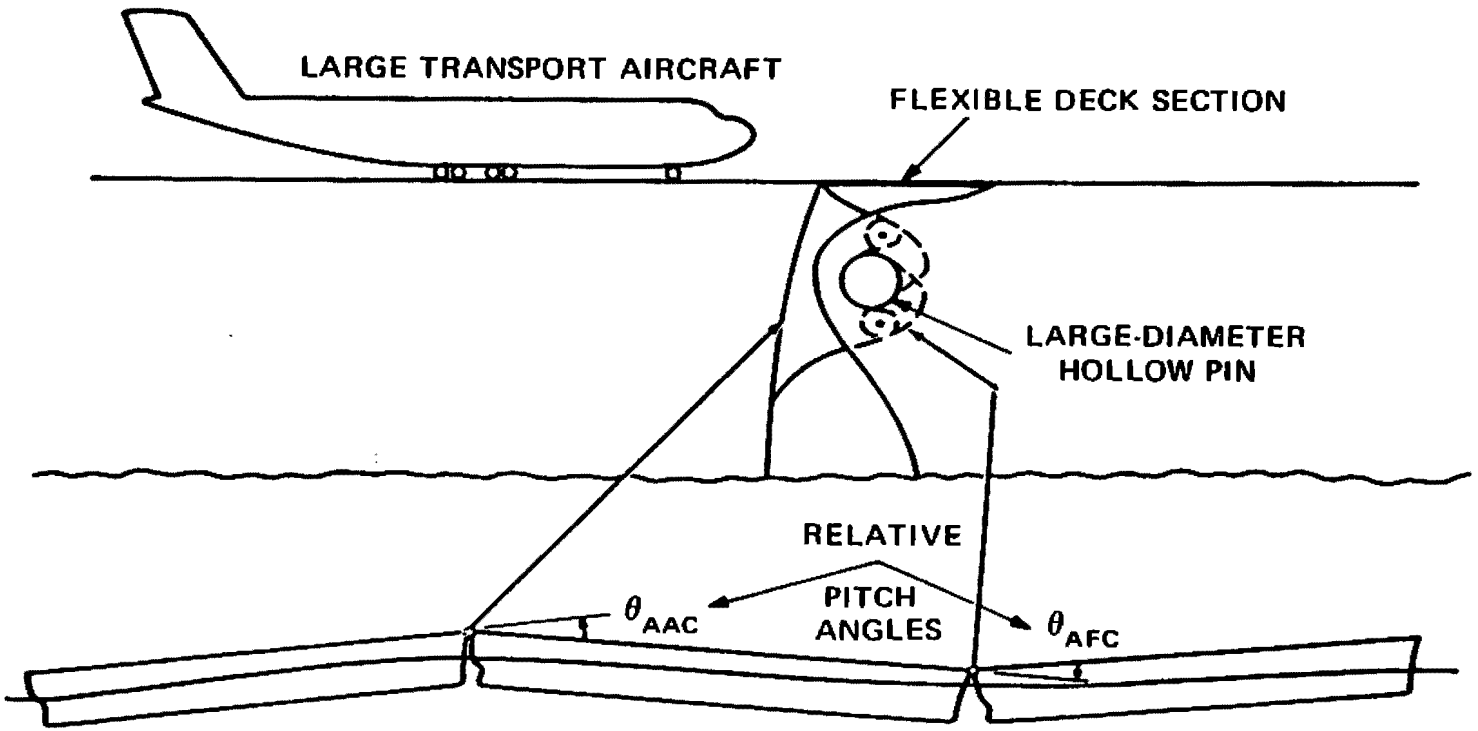
- Some type of joining mechanism would have to be developed and tested.

- Hinged joining mechanism appears feasible to withstand the vertical movement that could be generated by wave action.

- The hinged joining mechanism was designed by David Taylor as the most feasible method of joining the ships in three hours which was the requirement David Taylor worked under.

TABO

HINGED JOINING MECHANISM



#70 LAW OF THE SEAS CONSIDERATIONS

- TABO consulted with the experts in Law of the Seas (LOS) matters at the State Department on the legal considerations of building and operating an "airfield at sea." There are three cases:

- If the mission required operating inside another country's territorial waters, generally twelve miles, we would need their permission which would entail an agreement similar to an access or base rights agreement. This case would usually apply for small platforms; where we wanted to support an ally or friend without building a land base or engaging the political issues we discussed earlier.

- The second case concerns operating within a nation's 200-mile economic zone and claimed area of the continental shelf. If the platform is to be anchored, an agreement would be necessary. (Anchoring is possible in waters of great depths--2000+ft) If not anchored, the platform is treated essentially like a ship. This situation would undoubtedly raise political issues that the National Command Authorities would have to consider. This might be the Caribbean case.

- Outside the 200-mile economic zone and claimed continental shelf area, there are no LOS considerations. The platform would come under the rules, regulations, and customs of freedom of navigation. This is the probable SWA case.

- If dual civilian and military use was involved, a possible issue of control could arise. For example, the Department of State might wish to assign an Ambassador as the senior official and President's representative.

TABO

AIRFIELDS AT SEA
LAW OF THE SEAS CONSIDERATIONS

- THREE CASES
  - IN TERRITORIAL WATERS = AGREEMENT
  - IN CLAIMED 200-MILE ECONOMIC ZONE:
    - IF ANCHORED = AGREEMENT
    - IF NOT ANCHORED = NO AGREEMENT
  - OUTSIDE 200-MILE ECONOMIC ZONE = NO PROBLEM

- DUAL CIVILIAN/MILITARY USE
  - MORE COMPLICATED
  - U.S. JURISDICTION ISSUE RAISED WITH STATE

#71 AIRFIELDS AT SEA: ADVANTAGES & DISADVANTAGES

- Each of the concepts has advantages and disadvantages ranging from degree of technical and engineering difficulty, to cost, to mobility and flexibility of operations and missions.

- Additional study would be needed to finalize the concept or concepts to be pursued. The CINCs should be involved in this study.

TABO

AIRFIELDS AT SEA

- **ADVANTAGES**
  - STRATEGIC FLEXIBILITY IMPROVED
  - AVOIDS SOVEREIGNTY ISSUE
  - NOT EASILY DESTROYED BY CONVENTIONAL ATTACK
  - CAN BE MOVED IN CLOSE FOR LIC MISSIONS
  - MULTIPLE USES BY MULTIPLE USERS
  - MASSIVE STORAGE IS PART OF STRUCTURE
  - NO SITE PREPARATION
  - SAME POWER PROJECTION AS CARRIER WITH LESS RISK
  - FASTER TO RELOCATE THAN LAND BASE
  - LIFE CYCLE COSTS COMPETITIVE OR POSSIBLY LOWER THAN LAND BASES?
- **DISADVANTAGES**
  - SLOWER TO RELOCATE THAN FLEET ASSETS
  - MIGHT ENGAGE LAW OF SEAS ISSUES
  - INITIAL COSTS MAY BE HIGHER?

#72 COST COMPARISONS

- This is an attempt to capture some Rough Order of Magnitude costs.

- An updated cost analysis is required. There are several large corporations with experience in building large maritime structures and platforms and very large ships which need to be asked to cost these concepts in 1988 dollars.

- Diego Garcia's cost is somewhat misleading since it was built with military engineers (the Seabees).

COST COMPARISONS

CONVENTIONAL CONSTRUCTION	
DIEGO GARCIA	$1.2 B

OFFSHORE CONSTRUCTION		
MOLI	$5.9 B	('81)
SOP	$1.4 B	('88)
ISUS	$2 B	('88)

#73 AIRFIELDS AT SEA - CONCLUSIONS

- Everyone we talked to thought that it was technically feasible to build an airfield at sea. The question is how big, and where.

- The strategic advantages of having this capability are powerful.

- The process to decide which concept to pursue should involve the CINCs early on.

- Most of these concepts did not proceed beyond concept design because there was no stated requirement for an airfield at sea.

- Today it is clear an airfield at sea would enhance both USCINCSO's and USCINCCENT's capability to accomplish current and future missions.

TABO

AIRFIELDS AT SEA
CONCLUSIONS

- OFFSHORE PLATFORMS AVAILABLE NOW AND USEFUL
- OCEAN BASES CAN SATISFY WIDE RANGE OF NON-DEFENSE NEEDS
- AIRFIELDS AT SEA CAN BE SIZED TO MISSION
- SUPERSHIP AIRFIELD HAS GREATER STRATEGIC FLEXIBILITY AND MOBILITY
- AIRFIELDS AT SEA ARE DOABLE; THERE ARE TECHNICAL ASPECTS THAT MUST BE OVERCOME BUT THESE APPEAR MANAGEABLE
- COSTS ARE OLD ESTIMATES; BUT CONSTRUCTION COSTS APPEAR TO BE IN THE $2 B RANGE FOR THE STRUCTURE

#74 ADVANCED SHIPPING

- Getting there with more is central to the logistics problem. Now we will look at what might be done to develop the "100kt ship."

TABO BRIEFING OUTLINE

- BACKGROUND
- THE BASING PROBLEM
- BASE FUNCTIONS
- GEOGRAPHIC CASES
  - SWA
  - CARIBBEAN
- TECHNOLOGICAL ALTERNATIVES
  - AIR PLATFORMS
  - MATERIALS AND STRUCTURES
  - AIRFIELDS AT SEA
  - **ADVANCED SHIPPING**
  - FORCE CONFIGURATION
  - C^3I
- TECHNOLOGIES AND FUNCTIONS
- OBSERVATIONS AND RECOMMENDATIONS

#75 ADVANCED HIGH SPEED SHIPPING

- Think back to the force closure diagram we considered for the SWA case. Much of the closure problem is a function of the speed of the shipping. The best we can do today is about 33 kts with the SL-7.

- Another major delay in force closure, especially in the third world's unimproved ports, is the offload and throughput problems.

- Of the various concepts for advanced hull forms, only two seem worth pursuing and only one is doable in the near-term.

- The Wing-In-Ground (WIG) effect vehicle has been considered for some time but never brought to prototyping. The Soviets have operational WIG models today.

TABO

ADVANCED HIGH SPEED SHIPPING

- CURRENT:
  - SL-7 . . . 33 KNOTS
  - SES . . . DROPPED FROM BUDGET
- ALTERNATIVES
  - 5 ADVANCED CONCEPTS
  - 100 KNOTS = WIG

#76 ADVANCED SHIPS

- This graphic lays out the five concepts that have been studied by the United States in the past.

- We just discussed the WIG. There might be as much as a 3:1 payload advantage over the C-5. It would be a seaplane. It has not been pursued by the U.S. Navy because no airfield could withstand the pressure of a WIG landing. If the WIG were used in conjunction with an airfield at sea, the WIG could greatly improve U.S. capacity to move cargo over long distances quickly.

- The SWATH or Small Water Plane Area Twin Hull is a type of catamaran with the buoyancy coming from hulls that are mostly submerged. The SWATH has lower reserve buoyancy but provides a very stable platform.

- Hydrofoils have poor sea keeping characteristics and low payload capacity.

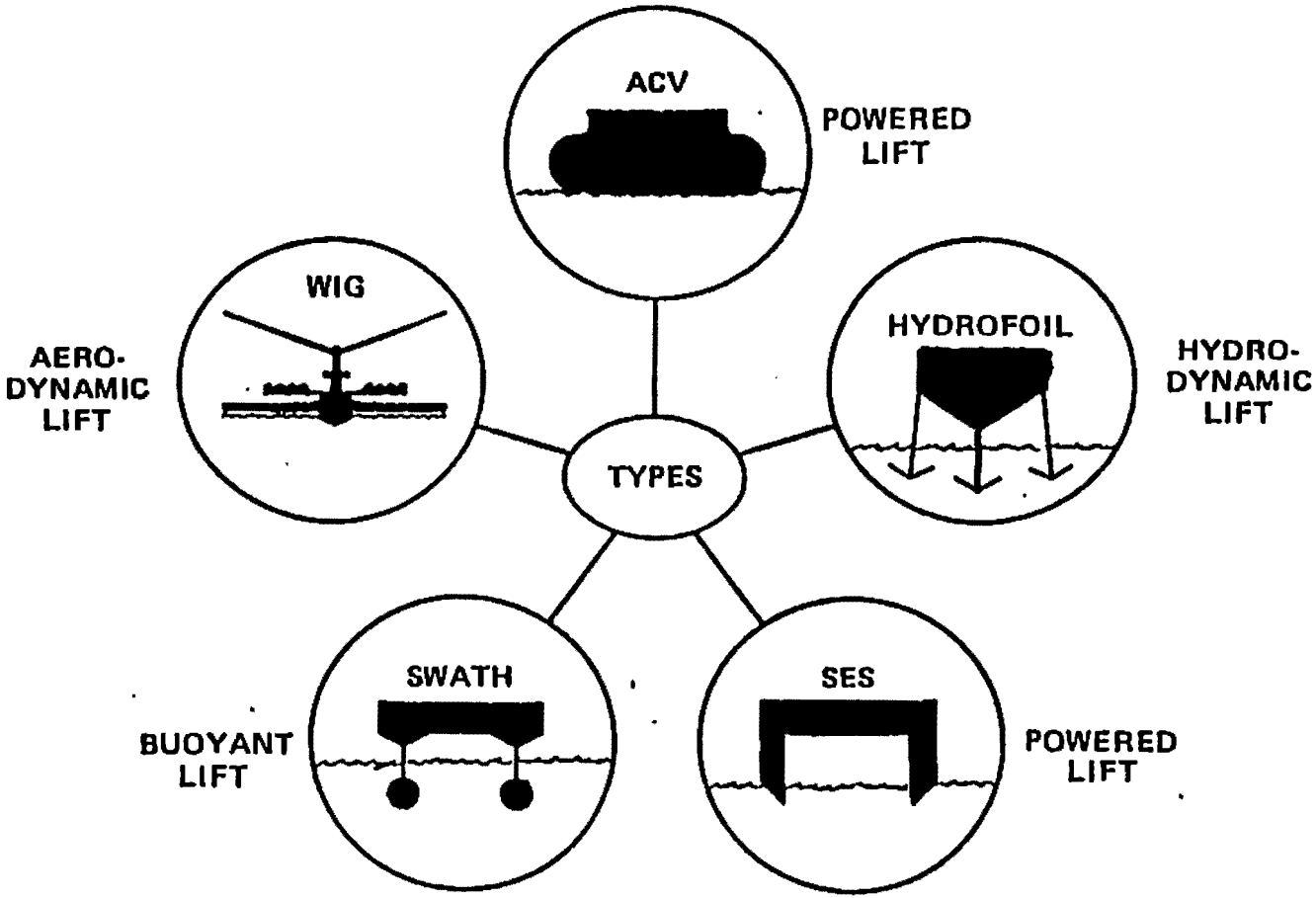
- Air Cushioned Vessels using powered lift are not fuel efficient.

- The Surface Effect Ship (SES) also gets its heavy payload from powered lift. Current prototypes have high fuel consumption and a 50kt SES appears to be the best available with current propulsion technologies.

- Only WIG and SES are considered technologically feasible for heavy lift cargo ships.

TABO

ADVANCED SHIPS



#77 COMPARISON OF SELECTED ALTERNATIVES

- This is an initial comparison of advanced sealift. Additional analysis needs to done.
- Interestingly, only the WIG and the advanced airship seem reasonably capable of answering the search for a 100-knot ship.

TABO

COMPARISON OF SELECTED ALTERNATIVES

	MAXIMUMS			
	LOAD	RANGE	SPEED	REFUELS TO PERSIAN GULF
C-5A	250,000 lbs	2,500 nm	400 kts	3 *
SL-7	45.8 M lbs	12,200 nm	33 kts	none; 1 @ 33 kts
SES	11.2 M lbs	3,500 nm	51 kts	3 via Suez 5 via Cape
WIG	750,000 lbs	4,350 nm/12' seas 5,600 nm/6'seas	180 - 330 kts	1 to 2
AIRSHIP (2nd Generation)	110,000 lbs	2,200 nm	90 kts	3**
AIRSHIP (RAND Study)	900,000 lbs 1,235,000 lbs	8,600 nm	90 kts	1**

* RAND Study says 3X load or 750,000 lbs

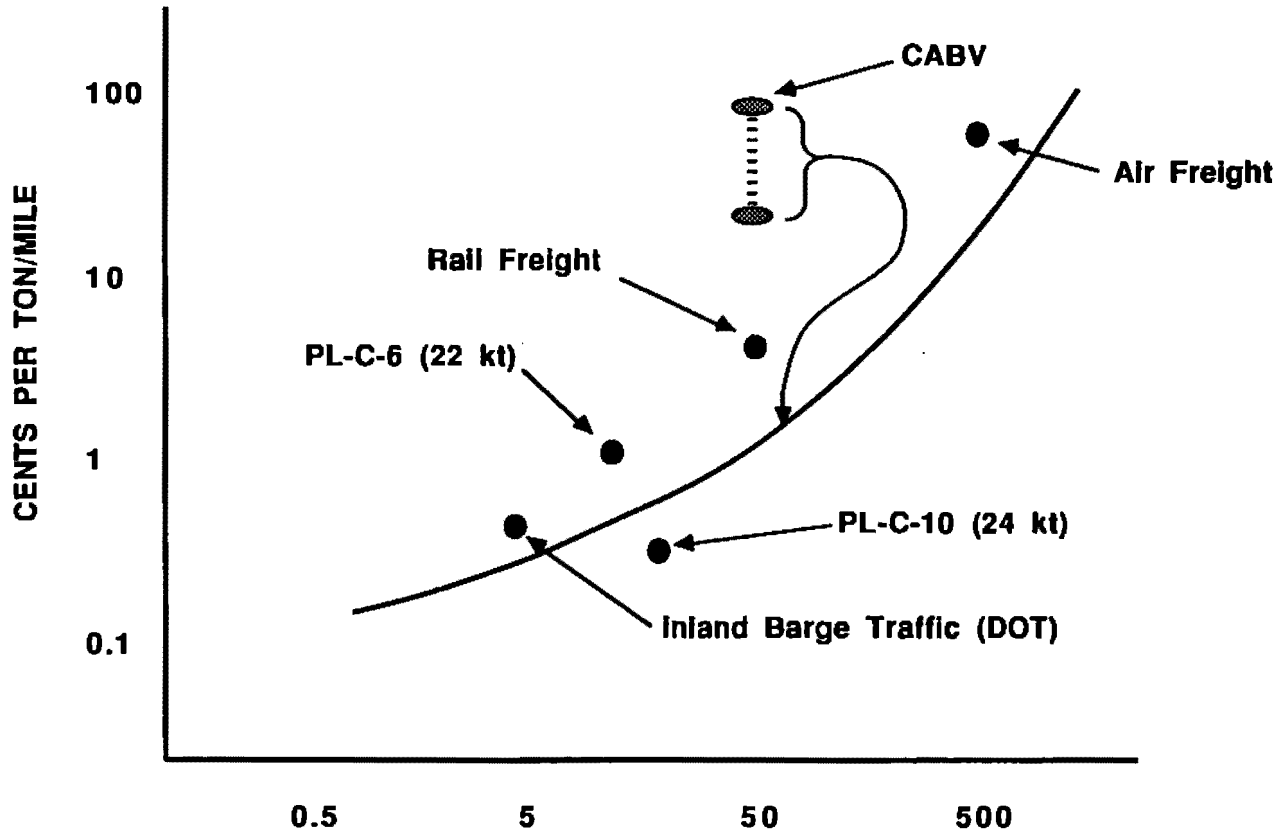
** No airfields required

#78 TON/MILE COSTS: VARIOUS MODES OF TRANSPORTATION

- On a ton per mile basis, the costs versus transit speed curve looks like this.
- The advanced sealift ships need to be compared against this curve.
- We should remember that the economics of sealift could change significantly as the economies of the Pacific Rim continue to grow. Fast, small ships may be commercially economical to support hi-tech industries where managers want to minimize inventory.

TABO

TON/MILE COSTS
VARIOUS MODES OF TRANSPORTATION



NOTE:
Both Axis
Logrithmic

#79 ADVANCED SHIPS CONCLUSIONS

- We have seen nothing to indicate that the WIG is not feasible or economic. The WIG has languished for the lack of a requirement. The WIG should be examined in the TABO context as floating bases can be served by a new vehicle with a new mission.

- The SES also shows promise, if a new propulsion system can be developed. High Temperature Super Conductivity maybe the answer here.

TABO

ADVANCED SHIPS
CONCLUSIONS

- SES AND WIG ONLY CANDIDATES
- SES (DARPA CANDIDATE FOR TECHNOLOGY DEVELOPMENT)
  - BECAUSE OF FUEL/PAYLOAD TRADEOFF -- AIR CHEAPER
  - REJECTED COMMERCIAL -- NOT COST EFFECTIVE
  - REQUIRES DEVELOPMENT OF NEW PROPULSION SYSTEM
- WIG (DARPA CANDIDATE FOR DETAILED STUDY)
  - HAS NOT BEEN EXPLORED FULLY EXCEPT FOR THE DTNSRDC STUDY (1977)
  - NO "REQUIREMENTS PULL" TO DATE
  - QUESTION: DOES THE CONCEPT OF FLOATING OFFSHORE BASES CREATE A NEW MISSION BEST SERVED BY WIG?

#80 FORCE CONFIGURATION

- Also central to moving men and materiel is their shape and packaging.

TABO BRIEFING OUTLINE

- BACKGROUND
- THE BASING PROBLEM
- BASE FUNCTIONS
- GEOGRAPHIC CASES
  - SWA
  - CARIBBEAN
- TECHNOLOGICAL ALTERNATIVES
  - AIR PLATFORMS
  - MATERIALS AND STRUCTURES
  - AIRFIELDS AT SEA
  - ADVANCED SHIPPING
  - **FORCE CONFIGURATION**
  - C^3I
- TECHNOLOGIES AND FUNCTIONS
- OBSERVATIONS AND RECOMMENDATIONS

#81 RECONFIRGURED AIR/LAND FORCES

- Currently forces deploy with every piece of equipment in their TO&E; in other words, they deploy for the worst case. Once in theater, these forces rely on a base structure to provide the necessary support infrastructure for their sustainment. Where this base structure does not exist, and that represents the most likely areas of deployment, we should look to TABO.

- Commission on Integrated Long-Term Strategy stated:

"The United States must develop alternatives to overseas bases....Among the approaches studied, one of the most interesting is the use of standard merchant container ships to support specially configured units, with the containers carrying all military equipment needed."

- The key words here are "Container-Compatible." US forces could reconfigure their units and equipment so that they can operate and be carried by container ships. There is some progress in this area, but it is much too slow.

- Tables of Organization need to be adapted and tailored to base availability and to the mission. This has not been one of our deployment concepts.

- We must combine the requirements push and the technology pull to do things differently. What goes forward, what stays behind?

TABO

RECONFIGURED AIR/LAND FORCES

- CURRENT
  - TOE/MTOE
  - UNITS DEPLOY WITH EVERYTHING FOR WORST CASE
- ALTERNATIVES
  - CONTAINER COMPATIBLE
  - ADAPTED/TAILORED TOE TO BASE AVAILABILITY AND MISSION

- DO THINGS DIFFERENTLY
- WHAT'S SENT FORWARD?
- WHAT'S LEFT BEHIND?

#82 RECONFIGURED FORCES: CONTAINER COMPATIBLE

- This combination would result in great reductions of personnel forward, more rapid and flexible deployment, and minimal land base requirements for combat support and combat service support forces.

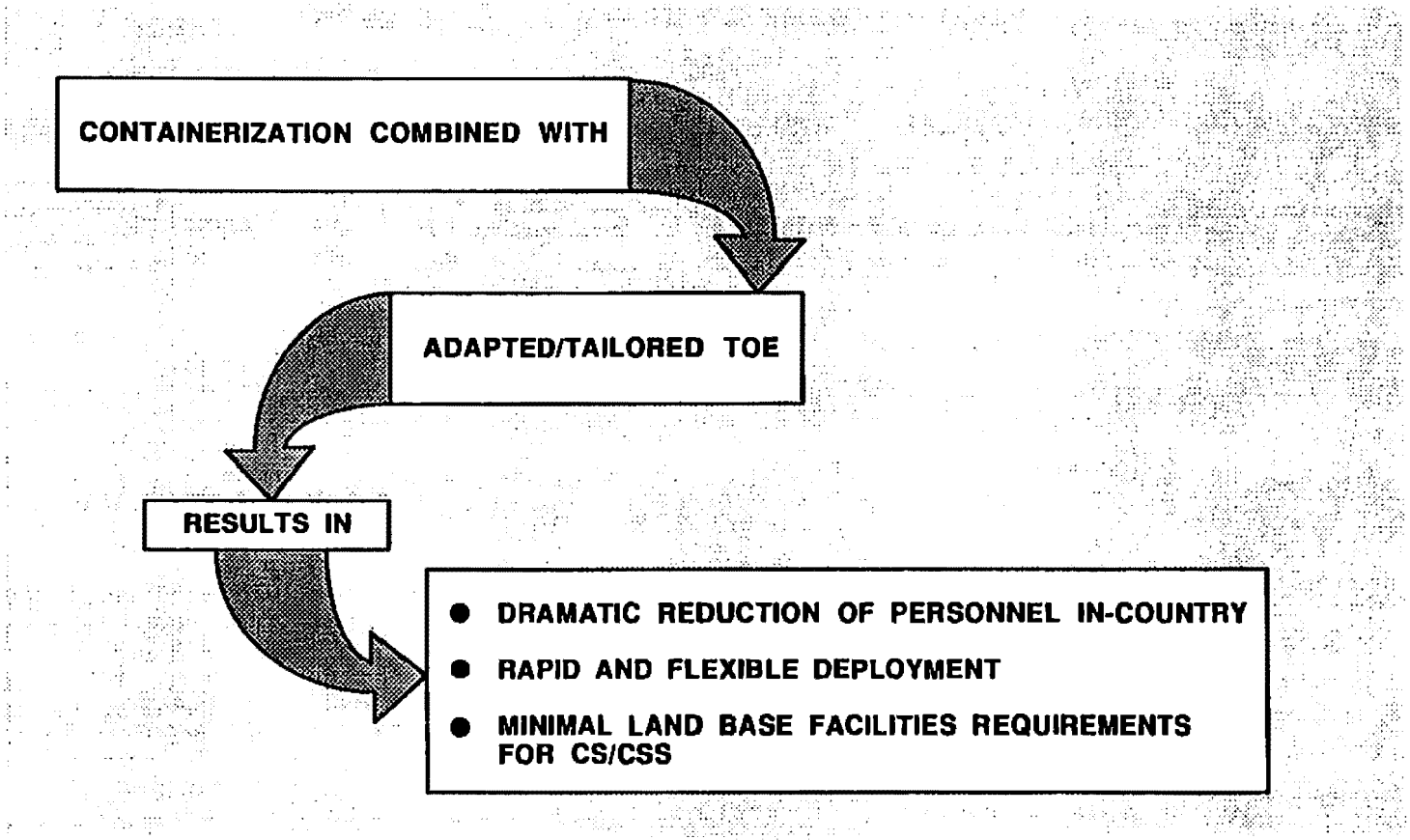
- The US military has yet to take full advantage of containerization or intermodalism. The simple use of standard sized (ISO) containers which can be readily and efficiently handled by land (road and rail), sea, and air transport would dramatically increase the transportation efficiency over traditional break-bulk shipping methods in cost and transit time. A recent study by American President Lines showed that a division-sized force could be deployed from CONUS to Korea in 16 days, using two C-9 container ships, 2000 containers, and five 100-car trains.

- By taking the concept one more step--changing the force TO&Es--even more significant reductions can be realized in the requirements placed on the transportation system and on the bases overseas. Studies done by the Foster-Miller, Inc on the ARAPAHO concept showed that an Army Aviation Intermediate Maintenance unit (AVIM) could be reconfigured to operate from containers, either on land or on standard container ships. These concepts would apply equally to other combat support and combat service support forces.

- The alteration in the force structure results in dramatic reductions in the burdens placed on an overseas base because if the unit moves ashore, it brings much of its own infrastructure with it.

- Reconfigured forces--containers--is compatible with and must be integrated in to the TABO offshore basing concepts.

RECONFIGURED FORCES:
CONTAINER COMPATIBLE



COMPATIBLE WITH OFFSHORE BASING CONCEPTS

#83 ARMY MODULARIZED SUPPORT SYSTEM - ARAPAHO

- Concept not new. Navy studied using an ARAPAHO-type concept for ASW. Army had USNS Corpus Christi Bay as a floating aviation repair facility in Vietnam.

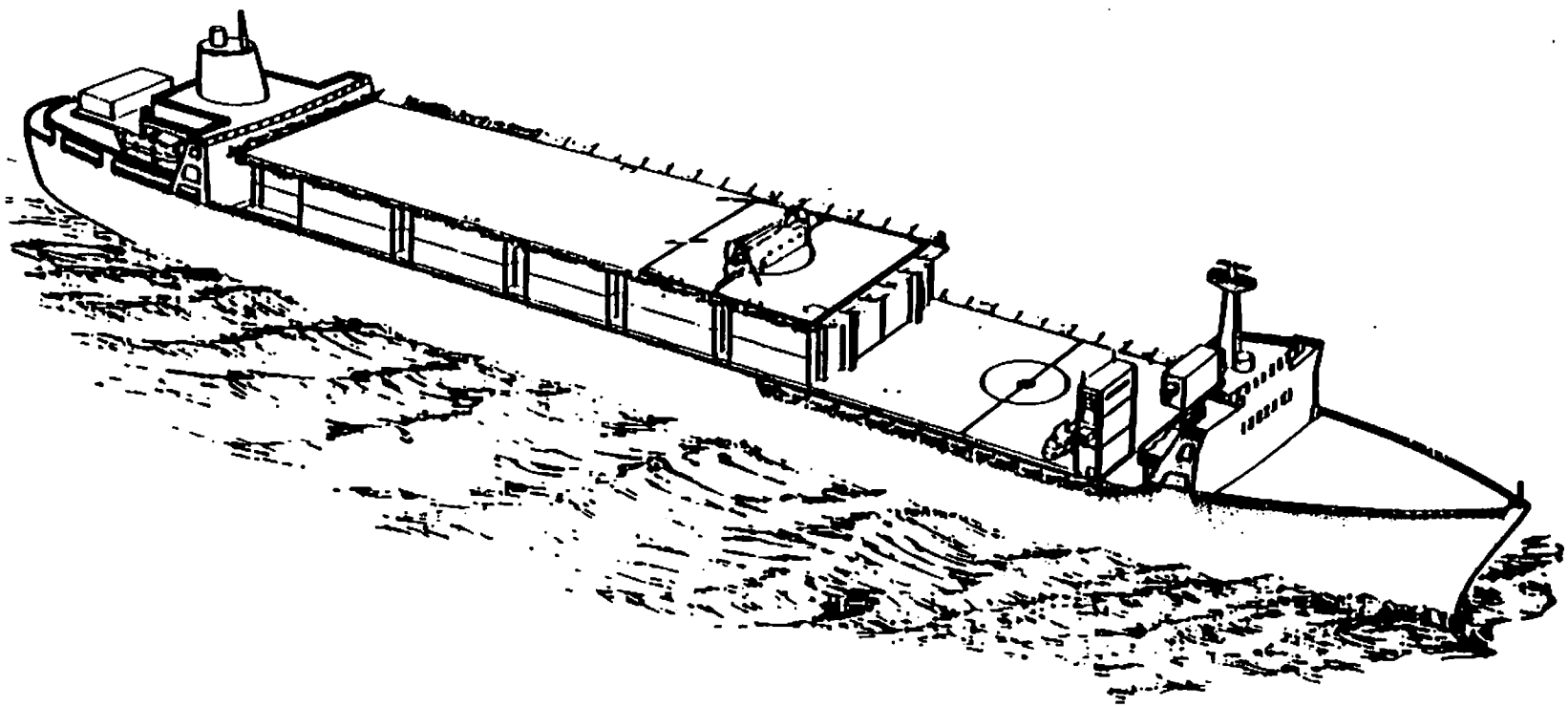
- ARAPAHO is a current Army project designed to provide all AVIM capabilities within the containers for employment on leased ship or ashore.

- Container units are designed to provide three basic functions:

  - Complete habitat requirements for all unit personnel; independent of ship's capacity to house personnel.
  - Structural capability to support helo deck.
  - Flexible, modular interconnections to integrate with various classes of ships.

TABO

ARMY MODULARIZED SUPPORT SYSTEM



#84 ARRANGEMENT

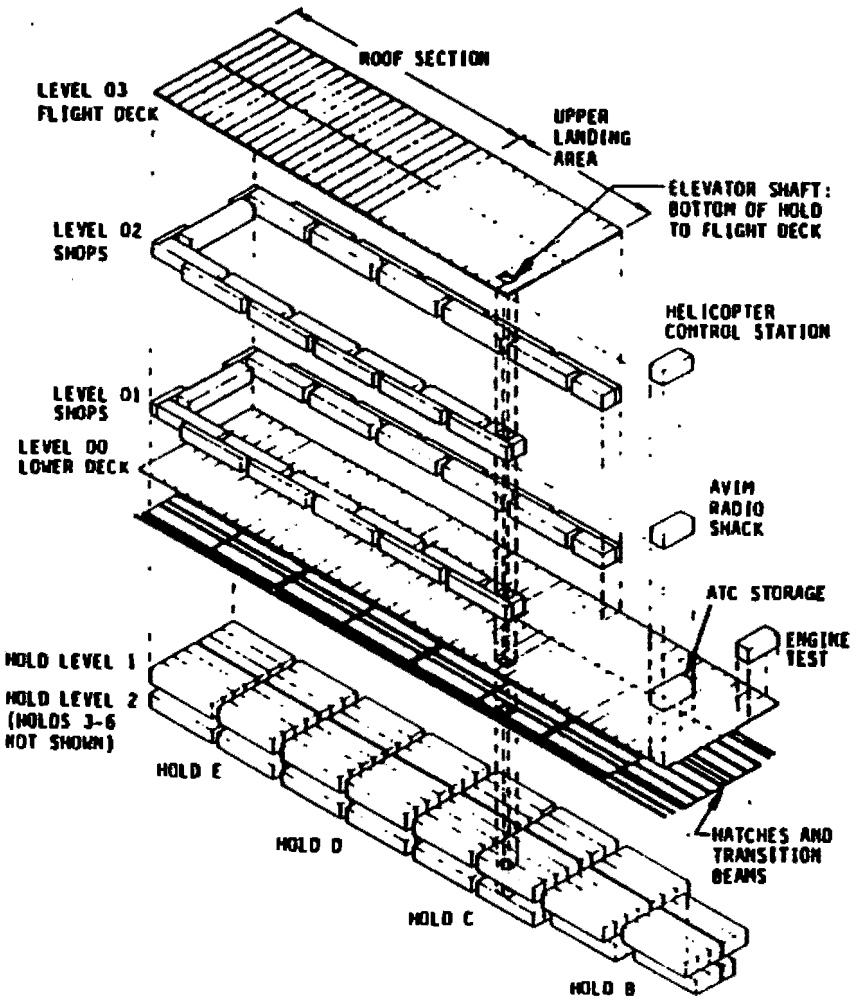
- **ARAPAHO was designed to load onto any of the American flag container ships in less than 15 hours of the unit's arrival at the port**

- **Diagnostic, repair and rework shops ring the main deck in a "U" shape (nominally 250'x50'), stacked two containers high. Flight deck covers this arrangement; hanger deck is formed within the "U". Other shops, "hotel" spaces, power generators and POL storage in in holds below the main deck.**

- **As designed, an ARAPAHO AVIM-capable ship could support 83 nondivisional and 120 divisional helicopters.**

TABO

ARRANGEMENT



#85 CURRENT EXAMPLE: SWA PROBLEM

- This slide describes how Army helo maintenance is currently accomplished in the Persian Gulf.
- A reconfigured Army helo maintenance units deployed on a container ship would significantly reduce this long repair line today.

CURRENT EXAMPLE
SWA PROBLEM

HELICOPTER MUST BE:

- **RECOVERED ON WARSHIP**
- **SLING LOADED TO LAND BASE (UAE?)**
- **AIRLIFTED (C-141) TO FRG OR CONUS**
- **RETURNED TO PERSIAN GULF**

#86 FOSTER-MILLER AVIM TOE MODIFICATIONS

- Reducing the numbers of people deployed forward, or echelonment rearward, is part of the TABO strategy.

- This table shows how up to 95% percent of a units personnel could be kept offshore. Only a small contact team is sent ashore for coordination.

- Some personnel can even be left in CONUS. They perform administrative tasks such as scheduling and inventory control. Modern communications systems, such as the Interactive Image Communications concept we will discuss later, can reduce the numbers of people sent forward from CONUS even more significantly.

- The Foster-Miller analysis also identified some 53 people no longer needed in the reconfigured TO&E.

FOSTER-MILLER AVIM TO&E MODIFICATION

CONSIDERED:

CURRENT TOE AND MODIFIED TOE BASED ON HISTORICAL WORK ORDER DATA BASE.

RESULTS:

PERSONNEL LOCATION	EXISTING TOE	MODIFIED TOE	*PERSONNEL REDUCTIONS -- MODIFIED TOE*
IN-COUNTRY	281	1 - 12	269 - 280
OFF SHORE	N/A	203	
CONUS	N/A	13	
Totals	281	228 (MAX)	53

#87 RECONFIGURED CONTAINER COMPATIBLE AVIM ECONOMICS

- This slide shows some initial costs of the reconfigured AVIM unit. Time did not permit a cost comparison with other methods of operation.

- Of interest to TABO, is the concept of performing a very much needed capability without requiring a land base.

TABO

RECONFIGURED CONTAINER COMPATIBLE AVIM ECONOMICS

SYSTEM COST (HARDWARE):

DESIGN/DEVELOPMENT	$13 M
PROCUREMENT	$10 M
	$23 M

PERSONNEL + COST SAVINGS (ANNUAL)

53 X $33,560 * = $1,778,680

DCF (20 YRS @ 5%) = $24.4 M

REAL AND INSTALLATION PROPERTY (LAND BASED) ?

* Composite Per Capita. SOURCE: USA OMA&MPA Cost Factors

#88 RECONFIGURED FORCES - CONCLUSIONS

- With the work done for the Army's ARAPAHO project, we have illustrated how the combination of containerization and force structure analysis as "technologies" can significantly reduce US requirements for and dependence on overseas land bases. The concepts are similarly applicable to other CS/CSS forces and functions.

- When integrated with modern communications, even greater savings are possible.

- The bottom line here is to improve the "tooth-to-tail" ratio problem at the same time we reduce requirements for overseas land bases.

RECONFIGURED FORCES
CONCLUSIONS

FOR CS/CSS:

- 90% SOLUTION TO THE LAND BASE PROBLEM
- PAYS FOR ITSELF IN PERSONNEL COSTS AVOIDED
- ELIMINATION OF REAL AND INSTALLATION PROPERTY IS EXTRA ECONOMIC BONUS

CAN IMPROVE TOOTH/TAIL PROBLEM

#89 SPECIAL OPERATIONS - MARITIME

- **While the US Navy SEALs have some excellent capabilities in this area, they are very limited in numbers and deployment modes.**

- **Containerizing these units is an attractive alternative, both for the many reasons we have already discussed, but also to ease one of the biggest problems: the unique "signature" SOF units have when men and their special equipment move from their bases in CONUS. Usually such deployments are reported within hours in the U.S. press, providing an easy tipoff to potential adversaries.**

TABO

SPECIAL OPERATIONS - MARITIME

- CURRENT
  - VERY LIMITED
  - DIFFICULT TO COMBINE LAND/AIR/SEA FORCES
- ALTERNATIVES
  - SOP "Q" SHIPS

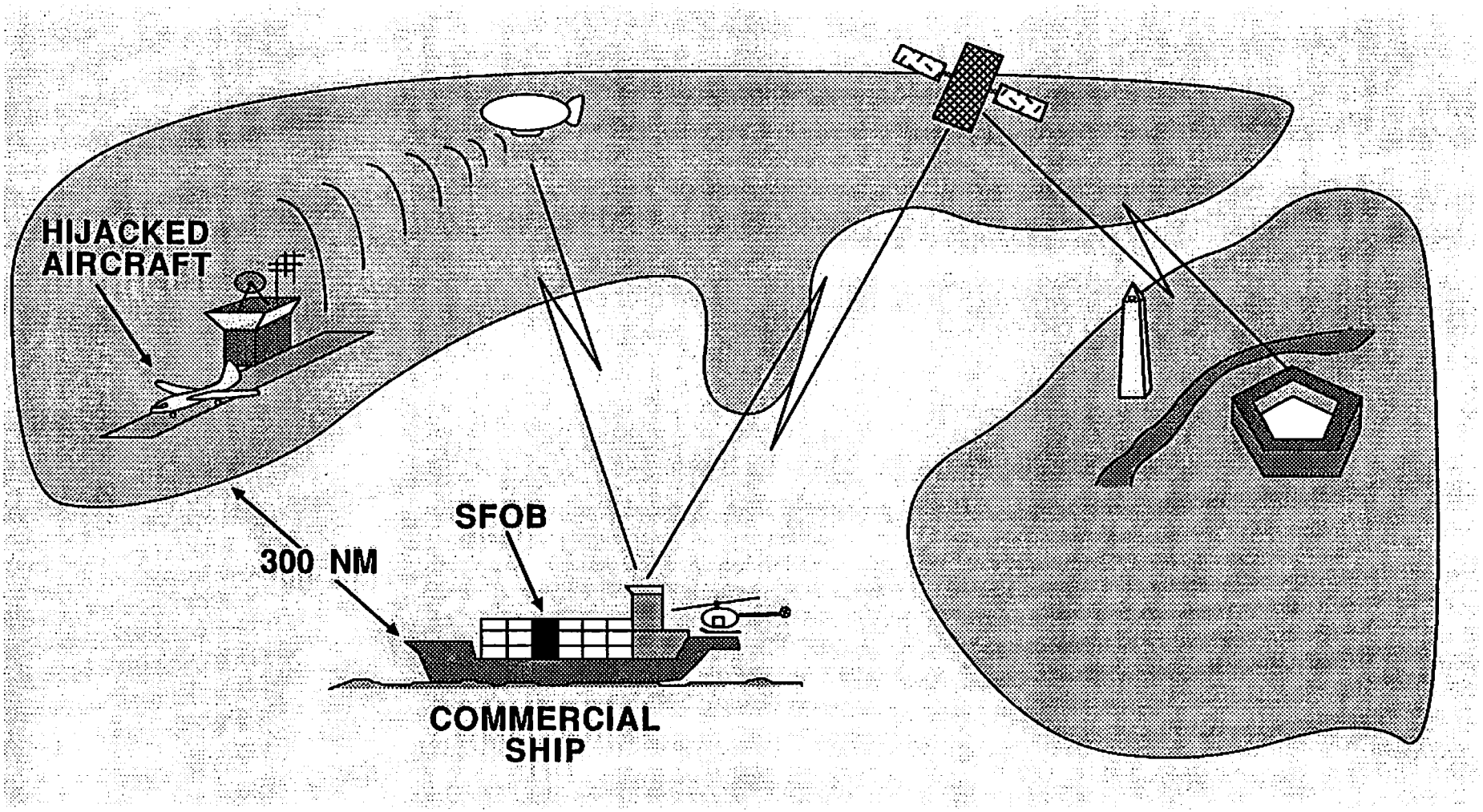
#90 SPECIAL OPERATIONS "Q" SHIP

- This envisioned concept involves the deployment of SOF equipment (with minimal personnel) on leased container ships. The ships would carry commercial cargo and routinely operate near likely areas of SOF operations.

- When required, SOF personnel could marry up with their equipment while the ship moves closer to the target to carry out their missions.

- Very elegant C3I suites would be included to maximize operational effectiveness.

SPECIAL OPERATIONS "Q" SHIP



#91 C3I

- Command, Control, Communications and Intelligence are critical functions in any military operation. Next we will examine what technologies might reduce base requirements for these functions.

TABO BRIEFING OUTLINE

- BACKGROUND
- THE BASING PROBLEM
- BASE FUNCTIONS
- GEOGRAPHIC CASES
  - SWA
  - CARIBBEAN
- TECHNOLOGICAL ALTERNATIVES
  - AIR PLATFORMS
  - MATERIALS AND STRUCTURES
  - AIRFIELDS AT SEA
  - ADVANCED SHIPPING
  - FORCE CONFIGURATION
  - C^3I
- TECHNOLOGIES AND FUNCTIONS
- OBSERVATIONS AND RECOMMENDATIONS

#92 C3I

- This is an area of tremendous hi-tech potential, yet we found that much of our capability mirrors that of commercial satellite capabilities and relay sites.

- Alternatives that fit the TABO context are several

  - Offshore platforms, airships, and low-speed/high endurance UAVs have already been discussed.

  - One of the advance hull designs previously discussed, the SWATH ship, has potential use to replace functions of some land-based C3I functions.

  - A relatively new technology of Interactive Image Communications has great potential in reducing the numbers of people deployed forward and for generally making staff coordination and operational planning and execution more efficient.

-Finally, the Light Satellite program should be viewed as one of the alternatives to overseas bases. A wide variety of communications and intelligence functions can be transferred to space. LIGHTSAT has the capability for launch when and where needed.

TABO

C^3I

- CURRENT
  - COMMERCIAL SAT
  - RELAY SITES
- ALTERNATIVES
  - OFFSHORE PLATFORMS AND BARGES
  - AIRSHIPS
  - LS/HE UAVs
  - SWATH SHIPS
  - INTERACTIVE IMAGE COMMUNICATIONS
  - LIGHT SATS
    - COMMS
    - COLLECTION

#93 SWATH SHIPS

- SWATH, or Small Water Area Twin Hull, is one of the advanced hull designs that has been examined.

- While SWATHs capabilities need further examination, their extremely good stability for a small ship may make them uniquely well suited for signals intelligence collection roles.

- Three or more SWATHs, the relative positions of which could be precisely calculated with laser devices, could form the necessary platforms for a wide number of intelligence roles. The SWATHs speed, combined with long endurance, seem to be a natural alternative for some land sites that we are scheduled to loss at the turn of the century.

- Flexibility of deployment also make this concept strategically attractive.

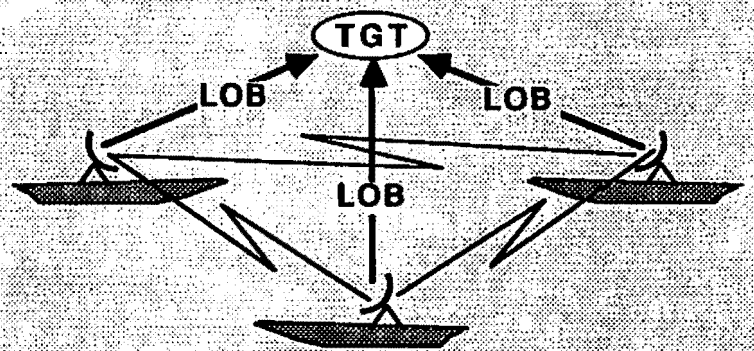
SWATH SHIPS

CURRENT

GALETA ISLAND

TYPICAL
LAND BASED
INTELLIGENCE SITE

ALTERNATIVE



#94 C3I LIGHTSAT

- The advantage of the lightsat is its flexibility and quick response. One can envision a warehouse of lightsats awaiting configuration and launch to respond to the CINCs operational requirements. The satellite and its launch could be located at an airfield at sea.

- Long negotiations with a foreign country will not be needed to get some electronic capability in place.

- Another benefit would be to provide inexpensive ground stations to countries that the US is supporting, while we maintain control of the satellite. The ability to rapidly provide secure communications to a besieged Third World government would be a strategic and tactical advantage that we should seek. Maintaining control of the satellite would provide the United States added advantages and reduce the costs to our friends.

C^3I LIGHTSAT

- LIGHTSAT BEING DEVELOPED FOR DIRECT SUPPORT TO OPERATING FORCES IN REALISTIC TEST/DEMO/EVALUATION
- WILL HAVE ABILITY FOR QRC RESPONSE
- EXPLOIT EXISTING/EVOLVING TECHNOLOGIES
- SYSTEM WILL LEND STRONG SUPPORT TO TABO CONCEPT
- MUST BREAK TETHER TO FIXED GROUND SITES

#95 INTERACTIVE IMAGE COMMUNICATIONS (IIC)

- Concept started with Video Teleconferencing

- VTC traditionally focused on meetings and presentations. Interactive image communications focus on C3I = work

- IIC has the ability to geographically disperse people, reconfigure forces making echelonment even more possible. Technology can reduce the numbers of people forward even more.

- IIC accepts wide range of inputs: camera, scanner, computer, direct digital from sensors.

- IIC new data compression algorithms permit use of narrow bandwidth (standard telephone lines). Does not add to the communications load.

- IIC provides real time editing/annotation and permits physically separated analysts, staff officers, and commanders to make recommendations and decisions without being co-located.

TABO

INTERACTIVE IMAGE COMMUNICATIONS

- PICTURE = 1,000 WORDS
- MULTIPOINT REMOTING
- REALTIME EDITING/ANNOTATION
- NARROW BAND WIDTH REDUCES COMM REQUIREMENTS
- ENCRYPTED

MOVE IMAGES/NOT PEOPLE = REDUCED PEOPLE FORWARD

#96 INTERACTIVE IMAGE COMMUNICATIONS (IIC)

- This slide depicts a concept for dispersing staffs and headquarters to reduce personnel forward and, therefore, the basing requirements.

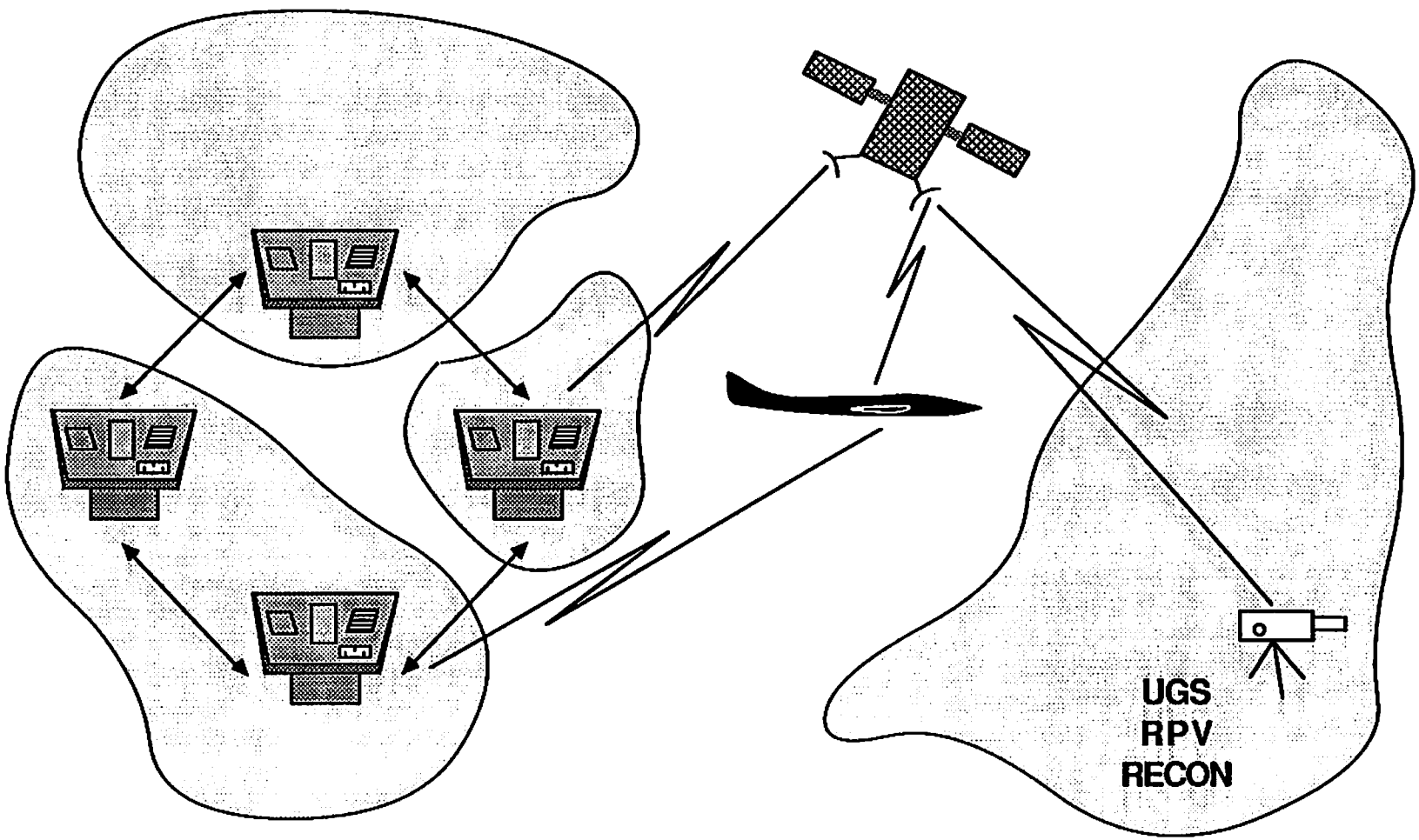
- It is estimated that by using this technology, 85-90% (approximately 500 people) of HQ USSOUTHCOM could be returned to CONUS without adverse impact on C3I, planning, administrative, and other staff functions. Only some 70 people would remain in Panama; most of those are tasked with daily coordination with Panamanians.

- Similar reductions possible in component staffs. Although the closer to the combat unit, the smaller is the number of possible reductions.

- When combined with other TABO concepts, like reconfigured units, interactive image communications could offer significant reductions in basing requirements.

- Network easily extended to operations to include inputs from field sensors (UGS, recon, RECCE, satellite) and planning and orders to forces in field and enroute.

INTERACTIVE IMAGE COMMUNICATIONS



#97 TECHNOLOGIES AND FUNCTIONS

- Now we will overlay our technologies on our base functions.

TABO BRIEFING OUTLINE

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  - MATERIALS AND STRUCTURES
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  - ADVANCED SHIPPING
  - FORCE CONFIGURATION
  - C^3I

TECHNOLOGIES AND FUNCTIONS

- OBSERVATIONS AND RECOMMENDATIONS

#98 KEY QUESTIONS

- **These were the key questions we began by asking.**
- **How do these technologies relate to the base functions with which we started.**

KEY QUESTIONS

- WHAT IS THE RANGE OF TECHNOLOGICAL POSSIBILITIES?
- HOW FAR ON THE RANGE OF POSSIBILITIES SHOULD WE PROCEED?
- ARE THERE TECHNOLOGIES WHICH CAN BE COMBINED TO LEAD TO NEW CAPABILITIES?

WHAT SHOULD DARPA DO?

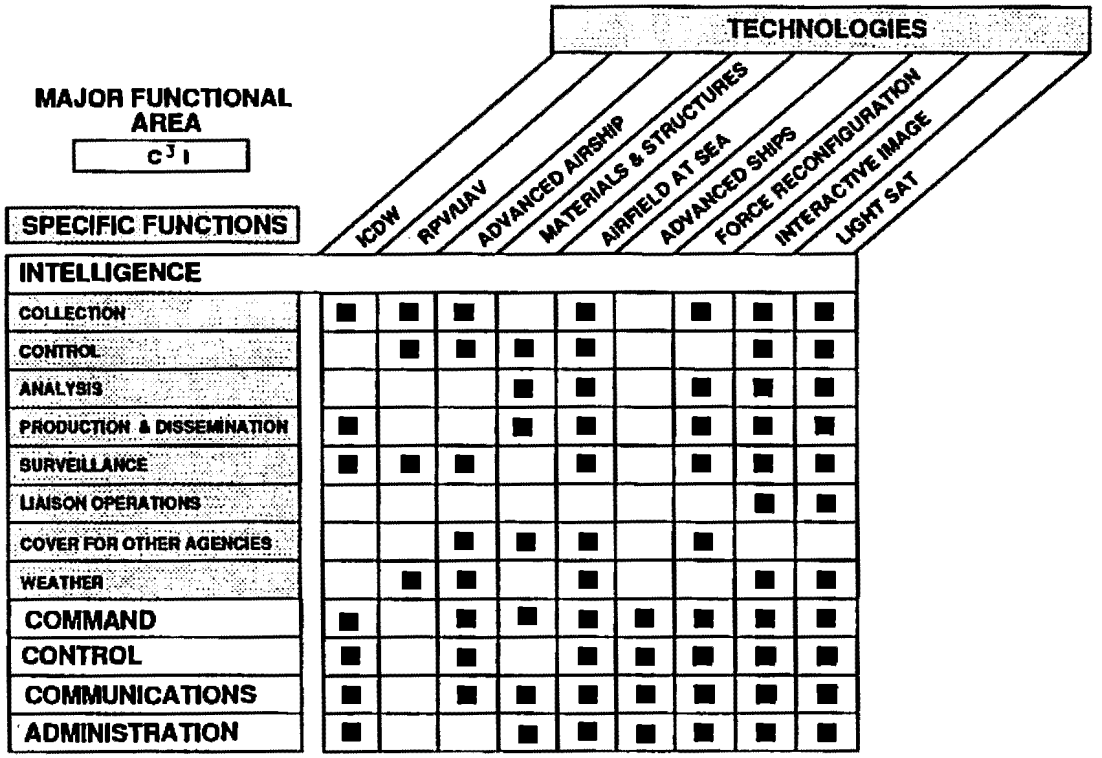
#99 CROSSWALK - C3I

- Here we begin to apply our TABO technologies and concepts to the base functions we laid out earlier. This matrix shows Command, Control, Communications and Intelligence applications.

- These functions are very much advantaged by the TABO technologies.

- Approximately 68% of these functions could be improved, changed, or shifted by the technologies described previously.

CROSSWALK: FUNCTIONS AND TECHNOLOGIES

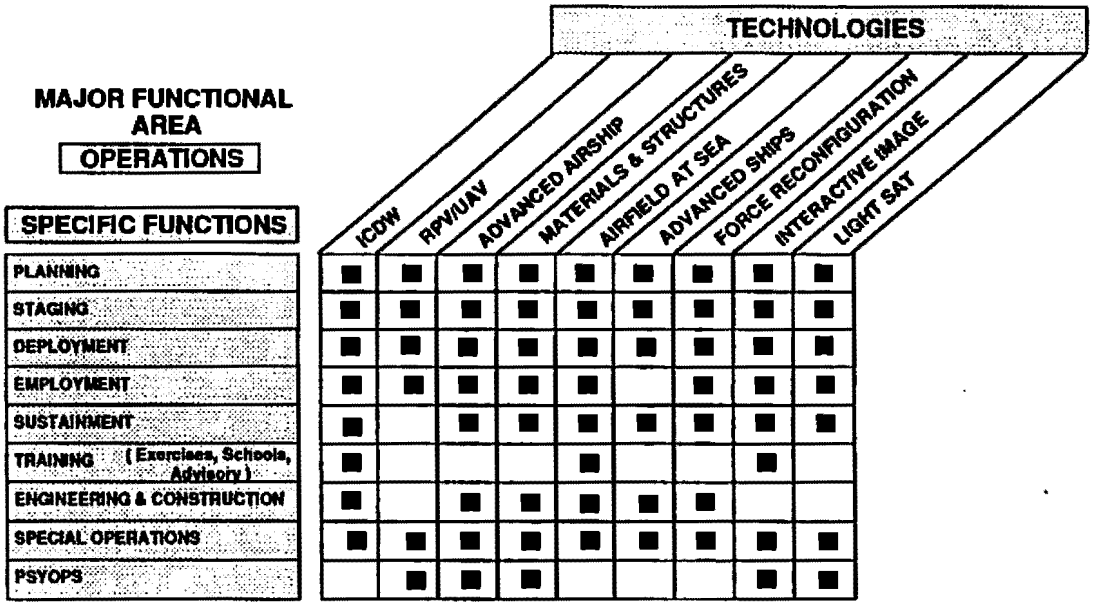


#100 CROSSWALK -OPERATIONS

- Here we crosswalk our TABO technologies and concepts with the operational functions that bases perform.

- Again, an area very much advantaged by TABO. 82% of these functions could be effected.

CROSSWALK: FUNCTIONS AND TECHNOLOGIES



#101 CROSSWALK -LOGISTICS

- Logistics functions are also clearly improved by TABO.

- 60% of the logistics functions could be effected.
- The advanced airship, airfield at sea, and force reconfiguration show the most promise in reducing logistics burdens on land bases.

CROSSWALK: FUNCTIONS AND TECHNOLOGIES

MAJOR FUNCTIONAL AREA
LOGISTICS

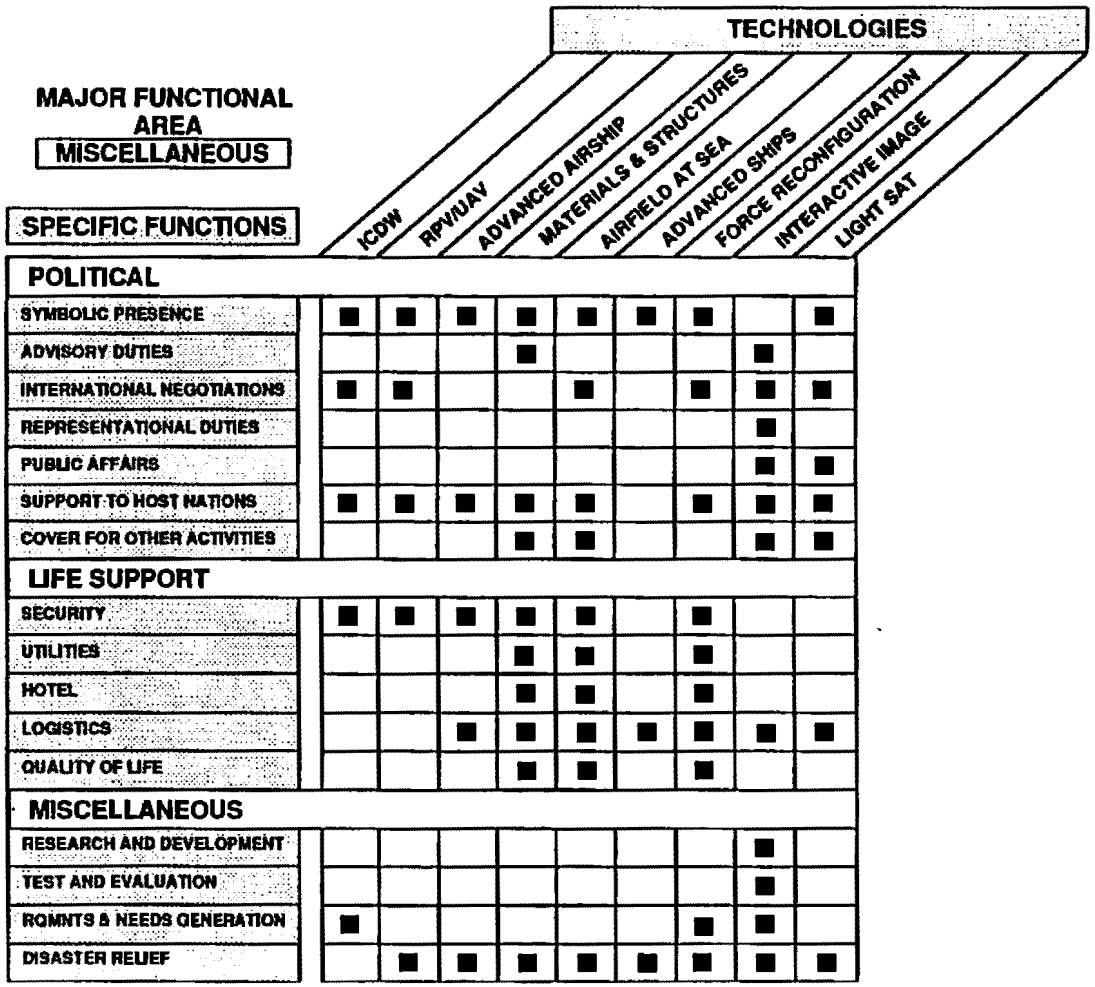
SPECIFIC FUNCTIONS	ICDW	RPV/UAV	ADVANCED AIRSHIP	MATERIALS & STRUCTURES	AIRFIELD AT SEA	ADVANCED SHIPS	FORCE RECONFIGURATION	INTERACTIVE IMAGE	LIGHT SAT
	TECHNOLOGIES								
PLANNING	■		■	■	■	■	■	■	■
STAGING	■						■		
— WAREHOUSING			■	■	■	■	■		
— ASSEMBLY			■	■		■	■		
— MATERIAL HANDLING			■	■	■	■	■		
— TRANSPORT			■		■		■		
SUPPLY (ALL CLASSES)	■		■	■	■	■	■	■	
MAINTENANCE (HANGERS/SHOPS/DRYDOCKS)	■		■	■	■	■	■	■	
TRANSPORTATION	■		■	■	■	■	■	■	
HOUSING	■		■	■	■		■	■	
UTILITIES	■		■	■	■		■	■	
HOST NATION SUPPORT			■			■	■		
MEDICINE	■		■	■	■			■	
— CARE	■			■	■		■	■	■
— EVACUATION	■		■		■		■	■	■
— SUPPLY	■		■		■	■	■	■	■
CONSTRUCTION	■		■	■	■	■	■	■	
SECURITY & ASSISTANCE					■		■	■	
EMBASSY SUPPORT				■	■		■	■	■

#102 CROSSWALK -MISCELLANEOUS

- The miscellaneous functions that overseas bases perform are somewhat less impacted by TABO, but these functions routinely require fewer people and have less of a traditionally military impact.

- Approximately 46% of these functions would be advantaged by TABO technologies.

CROSSWALK: FUNCTIONS AND TECHNOLOGIES



#103 OBSERVATIONS AND RECOMMENDATIONS

- **Finally we reach our observations and recommendations.**

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- BACKGROUND
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  - ADVANCED SHIPPING
  - FORCE CONFIGURATION
  - C^3I
  - TECHNOLOGIES AND FUNCTIONS
- OBSERVATIONS AND RECOMMENDATIONS

#104 OBSERVATIONS

- The observations expressed here are deduced from the collective wisdom of experts rather than from facts derived from a comprehensive data collection and analysis. In addition to looking at the facts, we spoke directly with many of the authors and developers.

- We found that TABO is an orphan problem, lacking in advocates for solution or remedy. Our military commanders, in many cases of power projection, will be required to make do with inadequate levels of supplies and equipment because the transportation throughput is lacking.

- The problem is serious and unlikely to be adequately addressed, not because of mismanagement or callousness, but rather because if falls on a weak area in our concepts of organization. We have difficulty getting R&D focused on the problem.

- Transportation suppliers do not have large R&D funds; transportation users don't have such R&D requirements. Even if DARPA were to assume leadership in a transportation system development effort, there may not be any organization to which to transfer results. With an oversupply of commercial vessels, industrially funded R&D is unlikely.

- In short, there is in all likelihood no one who is currently in the structure who will state a clear and urgent requirement for a better transportation system.

OBSERVATIONS

- MILITARY PLANNING ASSUMPTIONS WITH RESPECT TO TRANSPORTATION/LIFT CONTAIN ALARMING INCONSISTENCIES
- PRESENT AIRLIFT AND SEALIFT CAPACITY IS INADEQUATE FOR MANY ASSIGNMENTS, BUT USERS ASSUME LIFT WILL BE THERE
- DEFICIENCIES INCREASE SHARPLY IN RELATION TO:
  - DISTANCE FROM CONUS
  - STRENGTH OF POWER PROJECTION
  - URGENCY OF RESPONSIVE ACTION
- THERE IS A WORLDWIDE SURFEIT OF COMMERCIAL CARGO SHIPS & TANKERS, BUT A SHORTAGE OF LIFT DEPENDABLY AVAILABLE IN WARTIME
- MOST THIRD WORLD PORTS ARE INADEQUATE FOR MILITARY USE WITH RESPECT TO:
  - THROUGHPUT/VOLUME
  - RAPID HANDLING OF CONTAINERS
  - INFRASTRUCTURE, PARTICULARLY ACCESS ROADS
  - DEEP-DRAFT SHIPPING
- MILITARY SERVICES FOCUS R&D ON FIGHTING GEAR; TRANSPORTATION TO GET TO FIGHT, OR BASE INFRASTRUCTURE TO SUSTAIN FIGHT, GETS LITTLE R&D
- THESE PROBLEMS WON'T GO AWAY WITHOUT RADICAL INTERVENTION
- BASES ARE AND WILL CONTINUE TO BE A PROBLEM BECAUSE OF SOVEREIGNTY ISSUES
- ARMY, CINCs, SHOULD BE MAIN TABO PROPONENTS !

#105 SWA WITH DARPA FIX

- The technological fixes we have recommended would change the power equation in SWA. Not only would the force close sooner, it would do so without providing days of warning time for potential aggressors. Deterrence would be enhanced without impinging on Mid Eastern politics or putting US personnel at risk of terrorist attack.

- A US airfield at sea, within tactical range of the Strait of Hormuz could provide a significant difference in US military capabilities in the region: from low intensity conflict to mid intensity warfare.

SWA WITH "DARPA FIX"

- CLOSE THE FORCE SOONER
- IMPROVE FLEXIBILITY WITHOUT WARNING TIME
- MOVE BEYOND MIDDLE EAST SOVEREIGNTY
- IMPROVE DETERRENCE
- AIRFIELD AT SEA Δ FOR LIC $>$ MID-INTENSITY

#106 CARIBBEAN WITH DARPA FIX

- **The fixes we have recommended would gain for the US the strategic flexibility we have lost since WWII and especially since 1979 with the signing of the Carter-Torrijos Treaty on the Panama Canal.**

- **We would be able to engage in the drug war without the political and security concerns that a land base would require. And we could start now.**

- **USCINCSO's treaty implementation problems, and the more important problems of continued presence with fewer people, would be eased.**

- **And the uncertainty of US commitment to our hemisphere, would disappear.**

TABO

CARIBBEAN WITH "DARPA FIX"

- GAIN STRATEGIC FLEXIBILITY
- ENGAGE DRUG WAR
- ASSIST TREATY PLANNING
- RETAIN IN-THEATER PRESENCE WHILE REDUCING U.S. PROFILE
- REDUCE UNCERTAINTY

#107 DARPA FIX LIST

- These are the areas in which DARPA should be engaged to provide technological fixes to the US overseas basing problem.

- Note that there are other technologies that should be pursued by the Services.

- Air Platforms are divided into three programs: ICDW, RPV/UAVs, and Advanced Airships.

- An Airfield at Sea needs to be built. There should be a comparison done of the two major concepts--floating platforms supported by vertical "bottles", and building the island of very large ships, joined together into an even larger structure. The CINCs should be given the opportunity to assess the strategic mobility trade-offs.

- Advanced shipping needs a boost. The Wing and Ground Effect (WIG) needs to be revitalized and new propulsion engines developed to make a 100kt Surface Effect Ship feasible.

- Force Configurations need be changed to ease the offload problem and to make echelonment a reality. More and more of our forces must be made container-compatible.

- C3I must be more responsive to shifting geographical requirements. The Light Sat can give the CINC the ability to get the system he needs, where and when he needs it. Interactive Image Communications can significantly reduce the numbers of people sent forward.

- Materials and structures need to reach for the 21st century. Rapidly erectable buildings, made of space age materials could be a reality.

TABO

DARPA FIX LIST

- AIR PLATFORMS
  - ICDW
  - RPV's/UAV's
  - ADVANCED AIRSHIPS
- MATERIALS AND STRUCTURES
  - RAPIDLY ERECTIBLE STRUCTURES
- AIRFIELD AT SEA
  - FLOATING ISLAND W/FIXED PLATFORMS
  - FLOATING ISLAND W/SHIPS
- ADVANCED SHIPPING
  - WIG
  - SES (NEW PROPULSION)
- FORCE CONFIGURATION
  - CONTAINER COMPATIBLE
  - SOF "Q" SHIP
- C^3I
  - LIGHT SAT

#108 PRIORITIZED RECOMMENDATIONS

- The TABO Study Group has provided its prioritized recommendations for the DARPA fix list.

- Specific programs of what should be done now, plus what the future goal should be.

#1 After a detail engineering and cost analysis of the two basic concepts (platforms or ships), and carefully weighing CINC requirements, we should proceed to prototyping. The prototype would have immediate use in the Caribbean as a base for the drug war.

#2 An advanced airship has so many applications, that we should not delay any longer. An airship with advance propulsion for either logistics, C3I, or other uses is needed.

#3 We need to move military construction out of WWI.

#4 Special Operations Force requirements are different enough to require special attention. The unique signature of SOF makes it difficult to deploy units with tipping off either the press or a potential foe.

#5 Reconfiguring Forces must become a priority, especially for the Army. US Forces must become container compatible, so that they can be moved more efficiently, and then operate from the containers when deployed.

#6 Closing the force faster must be a priority. The 100kt ship might be possible with new propulsion technologies. High temperature superconductivity may be critical here.

PRIORITIZED RECOMMENDATIONS

DARPA FIX LIST FOR THROUGHPUT AND BASE FUNCTIONS

	TECHNOLOGY	NOW	LATER
1	AIRFIELD AT SEA	PROTOTYPE W/TWO MODULES	BUILD A FULL UP BASE
2	AIRSHIPS	BUILD SURVEILLANCE SHIP	DEVELOP LOG/C^{3}I SHIP
3	RAPIDLY ERECTIBLE STRUCTURES	PROTOTYPE THIN SHELLS & GEOMETRY	PROTOTYPE ERECTION CAPABILITY
4	SOF "Q" SHIP	LEASE AND INTEGRATE C^{3}I	
5	RECONFIGURED FORCES	PROTOTYPE AVIM	ADD TO CAPABILITIES
6	ADVANCED SHIPPING	STUDY WIG	DEVELOP SES PROPULSION

ADDITIONALLY, DARPA CONTINUE DEVELOPING EXISTING PROGRAMS IN ICDW, LIGHT SATS, UAV's