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SUBJ: Special Report-PHM Deployment Experience "RIMPAC-78"

TRANS-OCEANIC DEPLOYMENT/FLEET EXERCISE EXPERIENCE
(Small Combatant Ship)
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1. In response to a request from DTNSRDC (Hydrofoil Program Manager) the following special report on PHM experience during the "RIMPAC-78" deployment of USS PEGASUS has been compiled and forwarded herewith.

2. The U.S. Navy Patrol Hydrofoil, Missile (PHM), USS PEGASUS, became the first hydrofoil as a commissioned naval combatant ship to join a mid-pacific multi-national fleet exercise in March 1978 as an integral unit of the U.S. Navy battle group. This historical event represents an operational and logistical milestone for small combatant advanced type ships in demonstrating trans-oceanic long deployment sustainability while still maintaining a full and continuous combat readiness status.

3. USS PEGASUS' initial role was to serve as a surface escort in company with six amphibious ships enroute from San Diego to the mid-Pacific exercise area. A simulated submarine threat scenario necessitated a nine day transit due to frequent course changes. A speed of advance (SOA) of 12 knots was maintained by the convoy formation with USS PEGASUS keeping station from 30 miles ahead to 30 miles astern using sprint/drift techniques. Underway replenishments were accomplished every two days from one of the amphibious LPD ships. On 4 April 1978, USS PEGASUS joined the main group of a four nation naval exercise involving 41 ships, 225 aircraft and 22,000 personnel. The exercise named "RIMPAC - 78" involved the "Rim of the Pacific" nation's maritime forces from the United States, Canada, New Zealand and Australia.

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"RIMPAC - 78" was under the overall direction of Vice Admiral Samuel L. Gravely, Jr. USN, Commander Third Fleet. Major at-sea commanders were Rear Admiral M.S. Holcomb, USN, Commander Carrier Group One; Rear Admiral F.H. Miller, USN, Commander Cruiser Destroyer Group One; and Rear Admiral N.E. McDonald, AO, RAN, Commander Australian Fleet. US naval unit participants included the following ships: San Diego....USS HORNE; USS LONG BEACH; USS TRUXTON; USS WADDELL; USS DECATUR; USS LEAHY; USS HULL; USS HEWITT; USS JOHN PAUL JONES; USS ALBERT DAVID; USS SOUTHERLAND; USS BRONSTEIN; USS JOHN R CRAIG; USS KINKAID; USS ABNAKI; USS PLUNGER; USS OGDEN; USS PEORIA; USS MONTECELLO; USS FREDERICK; USS POINT DEFIANCE; USS CLEVELAND; USS GUITARRO; USS RACINE; USS SAN BERNARDINO; USS PEGASUS. Pearl Harbor....USS HAROLD E. HOLT; USS DAVIDSON; USS WHIPPLE; USS HAWKBILL. Long Beach...USS PLEDGE; USS CONSTANT. San Francisco....USS ROANOKE; USS WICHITA.

4. The following underway statistics represent the total accomplishment for USS PEGASUS during the entire deployment and transit period (17 March 1978 to 4 May 1978) for exercise "RIMPAC - 78":

		<u>HOURS</u>	<u>MILES</u>	<u>%</u>
TRANSIT: SAN DIEGO	F/B	24:21	1157	13
TO PEARL HARBOR	H/B	167:12	1254	87
(9 DAYS U/W,CONT)	TOT	191:33	2411	--
SOA: 12.58 KNOTS				
RIMPAC-78	F/B	58:54	2798	35
(12 DAYS U/W)	H/B	108:38	814	65
SOA: 21.14	TOT	167:32	3612	--
TRANSIT: PEARL				
HARBOR TO SAN DIEGO	F/B	38:28	1827	20
(9 DAYS U/W CONT.)	H/B	157:00	1178	80
SOA: 15.39	TOT	195:28	3005	--
DEPLOYMENT	F/B	121:43	5782	22
SUMMARY	H/B	432:50	3246	78
	TOT	554:33	9028	--

SHIP WAS UNDERWAY 30 OF 49 DAYS FOR 61%.

5. A daily diary was kept by the author of this article which serves as the major input for the deployment and exercise scenario. Relative comments to expound on lessons learned or amplify on experiences encountered are made following each respective daily diary entry.

3-16-8 Final preparations for transit to Pearl Harbor and the "RIMPAC - 78" exercise were completed. An additional foundation for a fourth frequency convertor was installed in machinery room as a backup due to poor convertor reliability. Two 40 foot (supply and

mechanical) vans were loaded on board the USS SAN BERNARDINO including 17 MLSG personnel with their OIC. Seventy five percent of the available spare parts were on loaded which included two frequency convertors, a complete SSPU, and forward/aft flap activators. Heavy items such as F/B turbine/gearbox, H/B diesel/gearbox, F/B and H/B propulsor assemblies, strut/foil major assemblies and strut retract/extend actuators were not taken along. COMMENT: Due to lack of deployment experience up to this point, a composite list of on-board repair parts (OBRP) had not been compiled. As a result many needed parts were not available and had to be air shipped to Pearl Harbor; conversely many non-needed parts occupied sorely needed working space in the single supply van which had to serve also as an ADMIN and electronics repair facility.

3-17-8 USS PEGASUS underway from San Diego, Ca. at (0900) for "RIMPAC-78" transit to pearl Harbor, Hawaii. USS BERNARDINO underway at (1030) with the PHM MSLG support group contingency, ^{of} two 40 foot vans loaded in the vehicle well of the LST and spare parts and consumables. USS SAN BERNARDINO (LST), USS MONTECELLO (LSD), USS FREDRICH (LST), USS POINT DEFIANCE (LSD), AND USS CLEVELAND (LPD). Weather, calm, clear, and temperature 90 degrees F. Sighted USS PEGASUS off starboard bow (hullborne) at five miles near San Clemente Island at (1900); no report received from her.

3-18-8 Sighted USS PEGASUS at (0530) three miles aft port side (hullborne). At (1030) she reappeared (foilborne) off the port beam and shortly disappeared over the horizon. USS PEORIA began falling behind the convoy pack with engine problems. At (1200) weather partially cloudy, light winds, mild swells, sea state one and temperature at 70 degrees F. USS PEGASUS successfully accomplished a refueling hook-up with USS OGDEN which was a scheduled practice run. However, an actual fuel transfer was made at that time (1300). After falling astern following refueling USS PEGASUS (foilborne) approached, crossing astern, disappeared over the horizon within twenty minutes at a bearing of 245 degrees. At (2100) night formation steaming with only five ships remaining in the convoy and the two ships with mechanical casualties falling being a considerable distance by now.

3-19-8 Sighted USS PEGASUS at (0600) three miles abeam and aft port side (hullborne). Only four ships remaining in the convoy with the USS MONTECELLO falling behind during night due to a shaft casualty. Leapfrog exercise commenced at (1300), weather, squalls, light rain, sea state three with moderate swells. USS PEGASUS sighted off port bow three miles (1600) foilborne, weather deteriorating further.

3-20-8 At (0500) heavy seas developing, ship indicating 15 degree rolls and experiencing light hull shudder during pitch excursions. USS FREDRICH ordered to fall back and remain with USS PEORIA who was operating on one shaft only due to propeller pitch control problems. USS POINT DEFIANCE and USS MONTECELLO rejoined the convoy during the past night. Received a call from USS PEGASUS (0530) requesting transfer of a huck rivet gun and a quantity of sheet metal rivets. Problem not defined, but, was later discovered to be popped rivets along forward deck house skin to coaming. USS PEGASUS informed by

MLSG OIC, Lt. Paul Johnson that no rivet gun nor rivets were available from either the MLSG vans or the USS SAN BERNARDINO resources. At (0600) the sea state had progressed to a 4-5 condition. At (0700) USS PEGASUS was observed off the port beam at three miles on a bearing of 239 degrees (hullborne), and was taking white water over the gun turret and pilot house. At (0805) USS PEGASUS shifted to ~~port~~ starboard and proceeded to rendezvous with the LPD USS OGDEN four miles abeam starboard. She approached from astern and took up her refueling position along the starboard side of USS OGDEN at (0930). Considerable difficulty was experienced in maintaining the desired refueling position due to increasing weather deterioration. Winds increased to 43 knots from 030 deg causing USS SAN BERNARDINO to experience occasional 30 degree rolls to port and starboard (1600); shipboard furnishings were tossed about. At (1715) received a message from USS PEGASUS requesting the availability of a SPS-63 navigational radar antenna- reply was negative; not with on-board spares; location at home port; San Diego and AFPRO (Boeing Parts Support). SURFPAC Seattle requested for shipment to Pearl Harbor of the navigation radar assembly and dispatching a structural repair team to conduct the necessary inspection/repair of failed deckhouse.

3-21-8 Heavy seas continued through the night with winds increasing to 45 knots; severe rolls to 35 degrees were experienced. USS PEGASUS had taken on considerable amounts of water into the CIC, radio/electronic equipment room; and captains stateroom. Message dispatched at (0330) to USS SAN BERNARDINO to transfer at first light several gallons of marine (putty) sealant compound to check the water entry into CIC along the deckhouse skin to coaming seam. Weather improved considerably by (0800) and USS PEGASUS was sighted three miles off the port bow. Scheduled refueling was accomplished at (1300) with the USS OGDEN who had also been informed to transfer the marine sealant compound to USS PEGASUS at that time. COMMENT: Lessons learned so far on this transit not only revealed spare parts shortcomings; but also in the vital area of damage control where the complete absence of proper type of sealant and PHM emergency repair equipment indicated that planning did not take into account the unique repair requirements of a hybrid ship/aircraft structural arrangement.

3-22-8 Mild seas prevailed; temperature 70 degrees F.; wind 12 knots with slight swells. USS PEGASUS was not sighted during the day and was reported maintaining station twenty miles to the starboard. No significant events reported for this twenty-four hour period.

3-23-8 At (0700) moderate swells developed causing 12 to 15 degree rolls. USS PEGASUS sighted astern and starboard. USS SAN BERNARDINO took on life guard position steaming 1,000 yards behind USS OGDEN for the scheduled refueling which occurred at (0815). Both LST's USS PEORIA and USS FREDRICH rejoined the convoy formation at (1500). Extensive convoy maneuvering was conducted from (1500 through 2100).

3-24-8 No significant events; seas calm.

3-25-8 USS PEGASUS dispatched early from convoy (0600) as landfall to Hawaii occurred and was consequently instructed to enter Pearl Harbor (hullborne). USS SAN BERNARDINO docked at (1030). At (1130) the CO of USS PEGASUS conducted a transit debriefing with the MLSG OIC and Pearl Harbor maintenance support liaison officer. The following material conditions were reported by the CO and CHENG of USS PEGASUS:

- * No CASREPS were issued during the transit.
- * The major problem was considered to be the water leakage into the deckhouse CIC space due to numerous rivet head failures mainly around the base coaming angle of the deck house structure (forward, port, and starboard sides) which allowed the the deckhouse skin to separate from the coaming, frame, and stringers. Two inches of water had accumulated in the captain's stateroom; the interior of the CIC space where the skin separations had occurred were stuffed with bedding and clothing items. Water had also accumulated in the electronic/radio rooms and machinery room NR. one.
- * Speed controller on SPS-63 navigation radar failed resulting in intermittent or no antenna rotation at all during wind conditions in excess of 30 knots while foilborne.
- * Starboard diesel saltwater cooling line gama fitting leaking severely.
- * Lost port stanchion and life line next to machinery room ^{number} (Nr) one door during the third refueling. The high line hook engaged the life line during breakaway as both the USS OGDEN and the USS PEGASUS rolled towards each other.
- * NR 2 SSPU shutdown on high EGT indication, failed sensor.
- * Mast head navigation light failed.
- * NR 4 bilge pump failed
- * NR 2 saltwater pump failed
- * Main turbine exhaust duct to eductor assembly flange had 50 percent of the attachment bolts loosen and drop out into the bilge, another 20 percent were loose but still in place. This condition allowed hot air to bleed off into the main turbine space and deteriorate the rubber seals on the aft main turbine room enclosure panels. As a result the hot air continued past the deteriorated seals and caused a burn-through of the fresh water (PVC) line and Nr. 1 pack hydraulic level sensing cable, in the adjacent diesel/pump room. COMMENT: A serious fire condition could have erupted had this condition not been discovered in time.

- * The A-5 PCB card failed in the Foilborne Engine Control System (FECS).
- * NR 2 generator control unit cannot maintain voltage setting (450V)
- * Port diesel clutch engage light remains on after disengaging.
- * NRs 1,3,4,and 5 sea water pump bleed lines leak excessively.
- * Soft patch over machinery room NR. 1 leaks
- * Feed water flow meter glass to the distiller broken.

3-26-8 The Boeing Marine System sheet metal repair team who had arrived the previous day began repair work on the damaged deck house structure.

3-27-8 Deck house repair work continuing with ship's force and MLSG correcting all outstanding voyages discrepancies.

3-28-8 MLSG inspection team discovered a 27 mm long spanwise crack in the upper surface of the forward port foil. A request to Boeing Marine Systems for welding repair support was made since no experienced 17-4 stainless steel welder was available.

3-29-8 Boeing welder arrived to accomplish the necessary repairs. Further strut/foil/flap inspections revealed 2 pin holes in the upper surface of the forward port NR 2 inboard flap. Inspection of a stop drilled crack which was accomplished at San Diego just prior to departure in the port aft strut splitter vane showed a total growth of 150 mm past both stop drill holes. Boeing sheet metal repair team completed all deck house repairs and departed for Seattle. At (1600) lost shore power to ship due to a shorted breaker box on the shore power cart. NR 2 generator control unit (GCU) failed.

3-30-8 Weld repair completed on splitter vane, foil crack and upper pin hole which was crystallized for 1/4 inch radius when ground out. Lower surface flap pin hole could not be reached with available rig, will be accomplished later. Did not purge foil since crack was to be ground out to 2 mm depth only. However, due to strong wind torch cut through foil skin, (no protection against the wind ie. tenting and no protection against wave action ie. welder was riding on a float vice scaffolding which was not provided). COMMENT: Fortunately no unusual conditions such as fire or explosion occurred.

3-31-8 Received results back from the Pearl Harbor shipyard lab on NR. 1 SSPU oil spectrographic analysis samples taken from filter and sump after voyage. Oil analysis showed black gritty carbon-like material. Analysis indicated no metal particle, but metal traces > 1PPM of heavy organic deposits from saltwater contamination. Samples were scheduled again after 25 hour operations.

4-1-8 Changed out oil cooler on NR. 1 SSPU. Suspect that the cooler may have failed and contributed to saltwater contamination of the SSPU oil.

4-3-8 Underway at (0900), delayed due to discovery of saltwater leak coming from NR. 1 SSPU turbine section. Found leak in ships bleed air cooler copper line (several pin holes) allowing pressurized salt water to leak into turbine plenum. Line was repaired by the tender USS BRYCE CANYON. Underway at (1100) for first RIMPAC voyage. USS PEGASUS returned to pier at (1930) hours with a C-4 and C-3 casrep. NR 2 SSPU generator experienced a catastrophic failure of the rear bearing which caused a shaft/bearing seizure and resulted in shearing/twisting the fan section off which then rubbed against the fan cover and caused its separation from the generator casing. Examination of the oil fittings and passages leading to the bearing oil galleries showed oil film present. The labyrinth pack orifice fitting to the generator oil passages was removed and no contaminate or exterior visible plugging was noted. The orifice was tested under 800 PSI hydro pressure with no flow evident suggesting possible failure (plugging) within the labyrinth orifice pack had occurred. The pack was disassembled by USS BRYCE CANYON but in the process it was crushed to the point where no further mechanical analysis could be made; no contaminant could be found. Frequency converter S/N 003 failed - would not reset. NR. 2 SSPU ^{serial number} S/N 003 was replaced with a spare on hand S/N 004. A new generator, oil cooler, air start compressor, and oil pump were installed. A labyrinth orifice fitting replacement was not in stock and had to be ordered from Airesearch Co. During a high three sea state the forward strut area around bulkhead three was exhibiting a popping/cracking noise intermittently. The crew suspected serious problems with the king post bearing assembly. Deck house still leaks in forward area where skin had not drawn up tightly against the coaming during last Boeing repair action. Boeing was notified at (2200).

4-4-8 Boeing issued king post bearing inspection procedures for a preliminary assessment of bearing /retainer condition; however, did not accurately pin point locking device description and location. Ships initial report to Boeing indicated a potentially backed-off retainer ring (approximately 1/8 inch). Boeing initiated action to send engineering and repair support to help in resolving the bearing problem. Boeing recommended constructing a cradle strong back to allow for application of ten tons preload for tightening the retainer this was preparatory action for the Boeing repair team who are to bring along special tools required.

4-5-8 Joe Gaunt, Boeing Liaison engineer and Larry Polite, Vern Atwood, Bob Bridges, Harly Engen, and Ken Sutter arrived (1700). Joe Gaunt conducted several extension and retraction tests including strut steering. He could not detect any irregularities with the king post bearing installation. He acknowledged the presence of the noise but could not trace it to either the king post or trunion bearings. He concurred with my initial assessment of structural working around the bulkhead three area which is manifesting via metal fatigue

separations into the described noises. Further investigation to continue. COMMENTS: Detailed NDT inspections during a special strut/foil inspection six months later revealed numerous cracks present throughout the lower bulkhead three assembly. It is believed that at the time the cracks were in beginning stages and not surface visible yet.

4-6-8 Boeing team continued inspecting general structure area around bulkhead NR 3 for visible indications of structural deformation or cracks which might be the origin the cracking/snapping noises. Nothing was found - Seattle requested Boeing team ride ship on Friday and listen to noises while underway. A slight leak was found after last Mondays voyage on the seawater (cooling) starboard main propulsor take-off stack which turned out to be a crack on the forward weld bead (1.5 inches) for starboard diesel cooling line connection. Stack fittings removed at (1700) for repair, however, could not determine from available information as to what type of material it was made from. After much difficulty a lab analysis from a machined off sample determined it to be titanium 2400 - Only three titanium welders were available in the entire Pearl Harbor area - two U.S. Navy and one U.S. Air Force - A Navy instructor welder was finally located at (0100) and after two hours a satisfactory repair was made. COMMENT: Titanium components present a difficult repair and field support problem - need to consider a different material for future application. The macerator pump in the crews head which had been removed, cleaned, and reinstalled two days previously jammed and was replaced with another unit.

4-7-8 Ship underway for demonstration for Admiral Miller and staff. Boeing team including A. Maier on board for forward strut noise examination. Noise experienced during a sea state 2-3 completely resembled that heard during static (moored) extension and retraction. Serial number 006 position NR 1 frequency converter failed (1030), Kicked breaker several times, Serial number 006 was removed and serial number 002 installed and failed to start. Ship departed frequency converter with positions NR 2 and 3 in operation only. No discrepancies were noted during the voyage. Three failed frequency convertors are awaiting repair action from the vendor (Bendix).

4-8-8 Al Campoli (Bendix) representative met at the airport (1735) and rushed to the ship. Tackled serial number 003 first, came on line immediately when plugged in - then the transistor heat sink exhibited very high temperatures - this might have led to a thermal runaway, transistor logic affected. Thirty two (1/4) inch cooling holes (lower area of case assembly) were added to serial number 003 by Bendix Rep as a preliminary remedy.

4-9-8 Removed serial number 002 frequency converter from NR 1 position and installed serial number 003 in NR 1 position, serial number 002 found to have high resistance in reverse voltage network due to bad solder connection - serial number 002 repaired and running.

4-10-8 Two hour standby for ship from (1300). Demonstration for Admiral Hayward CINCPAC Fleet who did not show. Tech Rep Anderson arrived who updated MK-94 program to provide "Closest Point of Approach" (CPA) capability which gives a print out for range and bearing surface and designate marker plus serving as a navigational aid. Al Campoli requested Bendix to send four sets of DIRT input inductors to modify NRs 3,4,5, and 6 frequency convertors. Main function of inductors is to prevent the input SCRs from burning out due to input (in-rush current) during turn-on cycle.

4-11-8 Serial number 002 has been running with load bank for fifteen hours satisfactorily. Serial number 006 repaired (1800) - problem A-14 board had open diode in a LED SCR has now been running for 16 hours. (1230) serial number 002 plugged in - would not run. Serial number 003 tripped once during the night but reset at (0930). Tripped three more times but would not reset - repaired in place, A-14 shorted SCR (1100). While repairing convertors from positions 1 and 2 the standby converter, serial number 005 was energized which tripped off line, reset, then tripped off line twice again and would not reset. At (1400) serial number 005 was removed and serial number 006 was installed in position NR 3 - serial number 006 would not take a load, tripped bus tie breaker NR 1 and shut down everything in EOS. AT (1415) serial number 006 was removed and serial number 002 which had started to run with a load again at (1330) was installed in position NR 3. The result was no output - terminal jumper was found reversed grounding out the output, jumper reinstalled on serial number 002, however, it continued to trip repeatedly, possible open phase. At (1600) Commanding Officer made the decision to remove serial number 003 from position NR 1 and switch to position NR 3 and take serial number 005 which was on shore and install it in position NR 1. This was accomplished at (1700), With all convertors operating satisfactorily ship got underway at (1715) - originally scheduled for (1400).

4-12-8 Ship returned (1115) no problems, after switching to shore power 15 minutes later frequency converter position Nr 1 serial number 005 tripped four times. Machinery room NR 1 temperature at 104 degrees F. Serial Number 005 removed and replace with serial number 006. Ship underway again at (1930) serial number 005 plugged in on shore and running.

4-13-8 Serial number 005 ran all night - DIRT inductor mod installed, no report from ship. Seattle design project called for information on fresh water pump problem data - information needed to select the proper type and make for production ship configuration. The current task pump appears to be satisfactory only two failures have occurred in 2.5 years, however, need to strengthen discharge flapper valve, have had some radial cracking. Received message from ship that position NR 1 frequency converter serial number 006 would not hold the load. C-2 CASREP was issued by the ship. Commander Duff and John Griswold at Seattle were informed. Ship to operate on two convertors.

4-14-8 Ship moored (0800), all frequency converters running, position NR 1 serial number 006 energized after being off all night and operated. Serial number 006 tripped in position NR1 thirty minutes after leaving harbor (2014) with SSPU NR 1 running - at (2020) NR 1 reset and stayed up with no load - at (2100) load applied and tripped - standby NR 3 running and machinery room one doors opened, NR 3 reset and held load (2340) until (0030) and tripped - (0040) NR 3 brought up again and held the load all the way in, NR 1 SSPU running. NR 1 converter energized and held load during docking (0800). After docking (0810) NR 1 SSPU shutdown and NR 1 converter turned off. At (0820) NR 1 SSPU lit off and NR 1 converter turned on to conduct tests and observe machinery room temperature - converter NR 1 serial number 006 shut down and could not be restarted (switching through) 100 degrees F. temperature - no output on NR 1. Decision made to change out NR 1 serial number 006 with serial number 005 and carry serial number 002 on board as an uninstalled spare. Decision changed at (1100) - to not carry extra spare because of securing difficulties and questionable installation problems (rough water) while underway. Serial Nr 002 converter installed in position Nr 1. Only other casualty was NR 1 saltwater pump. Ship underway again (1400). Port diesel "B" turbo internal oil leak - needs replacement, "A" turbo should be replaced also.

4-15-8 Ship moored at (1630) returned to refuel: Problem - blew both NR 1 and 2 bus tie breakers, overload NR 2 generator, shutdown NR 2 fresh water pump motor (no spare), and shutdown NR 2 weapons console. UGTI teletype NR 1 down - corrected. At (2150) with NR 1 SSPU running position NR 1 serial number 002 tripped twice and would not reset - Note: in both last 2 cases of failure NR 1 position, NR 2 teletype transmission via fan antenna (79.95 megahertz) was in progress. Serial number 002 replaced by serial number 006 at (2200) - Ship underway at (2230). COMMENT: Intermittent EMI was responsible for extensive frequency converter casualties prior to Bendix and Boeing filter mods.

4-16-8 Ship experienced failure of the forward flap system (C-4 CASREP) while tailborne 145 miles out from Hawaii at (0300). A loud snap like report was heard on the bridge. Simultaneously the bow of the ship went down with out any roll indications either to port or starboard. The F/B engine power lever was retarded and ship assumed a normal landing attitude. Turbine taxi with ACS in "test enable" and turbine at 76% PT resulted in a pitch down attitude of the ship to a point where water was coming over the bow and spray over the pilot house with water coming into pilot house through the aft door - speed was 16-17 knots. Ran in this configuration until (0800) - diesel disengaged - went to strut steering and bow came up in normal configuration with decreased engine power 74% PT and ship's speed increased by one knot. Ship continued uneventfully back to port - moored at (1400). Removal of starboard center pod cover revealed ~~failed~~ forward flap push rod had failed. Boeing informed and engineering assistance requested.

4-17-8 Forward and aft pod covers removed, flap linkage disconnected and the broken rod end removed; the break occurred at the lower threaded end jam nut point. Awaiting parts, tools and a technical representative from Boeing Seattle.

4-18-8 John Connal and Hans Westphal arrived (0030). Boeing team picked up at motel at (0715) and escorted through security and onto the ship. Flap rod missed (1230) flight arrival from Boeing - difficulty experienced in getting LN₂ (liquid nitrogen) from shipyard which was needed to remove the ~~aft~~^{fw} foil to strut attachment pin and loosen the forward attachment pin to allow foil rotation and accomplish the control rod removal and replacement - dry ice was purchased locally at (1600), which proved to be unsatisfactory - (1900) shipyard delivered 10 gallon canister of LN₂ about 3/4 full. LN₂ applied to lower pin for one hour. Without the aid of a pin puller, after two hours of pounding, pin was finally extracted and as a result some galling was incurred in form of two longitudinal lines one 1/8 wide the other 1/64. (2300) hours.

4-19-8 Broken rod extracted after upper pin was cooled for one half hour and foil rotated by crane (0100) - replacement rod missed (0130) arrival team - no further work can be accomplished until the rod arrives. Seattle ACS project engineers called, Bill Farris, Arlyn Harang are concerned about flap alignment and the up/down flap travel dimensions. Rod arrived (1500) - immediately installed without any problems. Sufficient LN₂ delivered by shipyard to freeze both pins - no problem experienced in inserting pin. Upper rod/clevis lock nut could not be torqued to full value while using a rubber dinky as a working platform in the strut well. To ensure that the lock nut would not back off it was tack welded in place. Flaps checked out satisfactorily on interference check - rod dimensions were held to the exact value as on the failed rod. ACS self check completed satisfactorily (2130). Pods and fairings installed, complete (2200) hours. Several pod/fairing nutplates replaced with aluminum rivets since stainless steel types not available - these should be changed as soon as feasible. At (2310) after starting NR 1 SSPU, NR 1 position frequency converter serial number 006 kicked breaker - reset and ran for one minute, kicked breaker again. No output this time - reset again but no output. Decision made to get underway with two converters operating. A spare, serial number 002, was lashed in place between the door and LP compressor in machinery room NR 1. Strut centering indicator inoperative, proximity switch failed.

4-20-8 Underway at (0015) - uneventful, no reports.

4-21-8 Received message info by telephone 0500 - starboard fresh water pump inoperative, tape perforator failed, forward strut steering sluggish, and forward flaps will not shuttle. Frequency converter serial number 002 installed in position NR 1, serial number 006 removed (1900). John Connal picked up broken threaded end of flap push/pull rod for return to Seattle to accomplish failure analysis.

4-22-8 Ship moored (1215) exercise terminated. Discrepancies as logged in message of 4-21-8 plus : NR 1 UHF amp modulator inoperative and NR 1 chill water pump inoperative. Exercise was very successful and ship performed well in spite of frequency converter and flap problems. COMMENT: The MLSSG and ships force exhibited outstanding skill and competence in repairing and correcting difficult casualties up to the extent of accomplishing many depot level tasks. Operationally, the ship demonstrated superior fire power and targeting skill.

4-23-8 Trouble isolation conducted on the following problems:

1. Sluggish strut steering - transducer feed back to pilot house indicator - indication only - strut response is satisfactory - corrective action delayed until San Diego.

2. Forward flaps will not shuttle hydraulically from NR 2 SSPU to NR 1 SSPU - pressure dessicant ACS conduit air can on bulkhead NR 3 in magazine had water contamination from a loose pressurization air line (to flap actuator in forward in strut well). This caused pin corrosion and inoperative shuttle valve operation. While trouble shooting this problem the "D" pin in the 28 VDC plug P-3 to the transducer for flap position and self test broke off and pushed down into the integral connect plug of the flap actuator servo module. This necessitated change-out of the flap actuator; this was accomplished and checked out at (2200) hours. Frequency converter serial number 006 changed out. Problem consisted of two SCRs (Y2B and Y2B) plus A2 and A4 control cards. Serial number 005 unable to run because of a short to the case and frame caused by residual moisture from previous flooding by torrential rain storms on shore.

4-24-8 Frequency converter (additional spare) mount base installation in machinery room NR 1 between door and compressor (welded to deck). Extra spare converter, serial number 006, installed and bolted down. Serial number 005 still inoperative due to flooding.

4-25-8 Ship underway (1530), Admiral Hayward (CNO) and Vice Admiral (Red Dog) Davis (new CINCPACFLT) on board for demonstration. Demonstration successful; both admirals impressed with performance and their visit to the machinery spaces while hullborne - moored (1700) - no discrepancies to report.

4-26-8 Ship underway (0830) - no problem - return voyage to San Diego underway.

4-28-8 Ship made two unplanned landings during turning maneuvers "A" channel vertical gyro failed - ship landed uneventfully - "A" channel disconnected and while in 1.5 degree per second turn to starboard "B" channel failed and ship landed abruptly with the water line reaching up to the gunwale. "A" channel reconnected and subsequent check out revealed no further problems. Lost three starboard stanchions, life line, anchor line reel, and tore a hole on forward deck house from reel.

5-2-8 During refueling from the USS Wichita (AO1) with sea state high five to low six and ACS in test enable turbine taxi at 12-13 knots both height sensors locked up driving the bow under water about one to two feet, tearing away the starboard anchor line reel and consequently punching a six inch hole into the forward starboard deck house skin.

5-4-8 Ship arrived at (1500) foulborne to end of pier, major discrepancies:

1. Water leaks throughout CIC, machinery room NR 1, EOS, and Captains stateroom.
2. Lost three stanchions and life lines starboard forward.
3. Lost starboard anchor reel.
4. Damaged skin of forward starboard deck house.
5. Titanium water stack fitting starboard side main propulsor leaking from cracks in parent metal next to repair weld.
6. Bilge pump (grounded) for turbine space.
7. Fire main green thread piping over distiller leaking.
8. Distiller discharge pressure high - suspect compressor failing.

5-8-8 Arrival conference with SUPSHIP to discuss thirty day work package for the month of May PSA Phase II. Captain Molzahn here with PMS 303 PHM project engineers - Gene Leanderer and Tom Gallagher to cover ship discrepancies and interface with SUPSHIP. Al Campoli (Bendix) arrived to fix SN OOS frequency converter.

5-9-8 Boeing - John Griswold, Dick Dugan, and Phil Janosik arrived to discuss ship work package and handling data from the last exercise to Hawaii. Bill Hoffman and Bill Ostrander from Aerojet arrived to recommend fix on hullborne propulsor problem. Starboard hullborne propulsor leaking internally - port leaking at forward shaft seal.

5-10-8 Ship underway to unload ammunition - (0730) - ship moored (0950).

5-12-8 SUPSHIP work commenced with non-skid sandblasting

1. Life line / stanchion repair
2. Anchor and mooring reels
3. MK-7 life raft installation
4. Deck house leaks - installed eight inch modified coaming
5. Strip paint inside, paint fresh water tank.
6. Reinforce deckhouse entry door framing
7. Exhaust stack grating
8. Platform grating and deckplate fasteners.
9. NR 2 SSPU inadequate air supply.
10. Refinishing galley and mess decks.
11. Replace label plates

6. CONCLUSION COMMENTS: In addition to inadequate spare parts composition for the trans-oceanic deployment/transit and exercise, a critical shortcoming of special equipment and tools was also noted. Transfer of needed parts, equipment and supplies from the support ship presented a constant problem since there was an absence of a suitable helicopter landing or drop pad area on the PHM platform. Consequently, all support requirements had to be accomplished by high line ship to ship transfer method which proved to be very difficult at times. Previous long distance transits (Seattle to San Diego) were carried out in relatively close proximity to the coastline (30-50 miles off shore maximum). This route provided at all times a short diversion to reach a port to acquire land or air support help for parts, equipment and supplies. This dimension was not available on the trans-oceanic transit, and should more serious casualties have occurred such as denying self propulsion, towing would have become mandatory. Even with considerable improvement in PHM reliability over the past seven years since "RIMPAC-78" it still appears to be a very risky situation to conduct a small ship trans-oceanic deployment unless well prepared escort service is provided. This support should include a larger ship with a helicopter and a small (whale boat type) transfer boat. Baxter bolt fittings should be installed at port and starboard locations preferably aft of deck house for a "build-up" tripod type hoisting device. This hoist can be assembled from tubes with a chain hoist attached allowing safe lifting of heavy items aboard from a small transfer boat (for example a frequency converter (450 pounds) or flap actuator (225 pounds)).