

AIRBORNE SYSTEMS CANADA LTD.



IN SUPPORT OF
SEARCH & RESCUE
MISSIONS



AERIAL RESCUE KIT (ARK) TESTING

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AERIAL RESCUE KIT



Presentation Overview



AERIAL RESCUE KIT

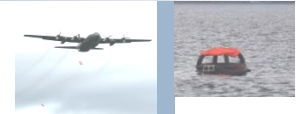


- Background
- ARK Development and Overview
- Test Objectives/Methods
- Test Conditions
- Test Results and Discussion
- Real Validation
- Conclusions and Recommendations

Background

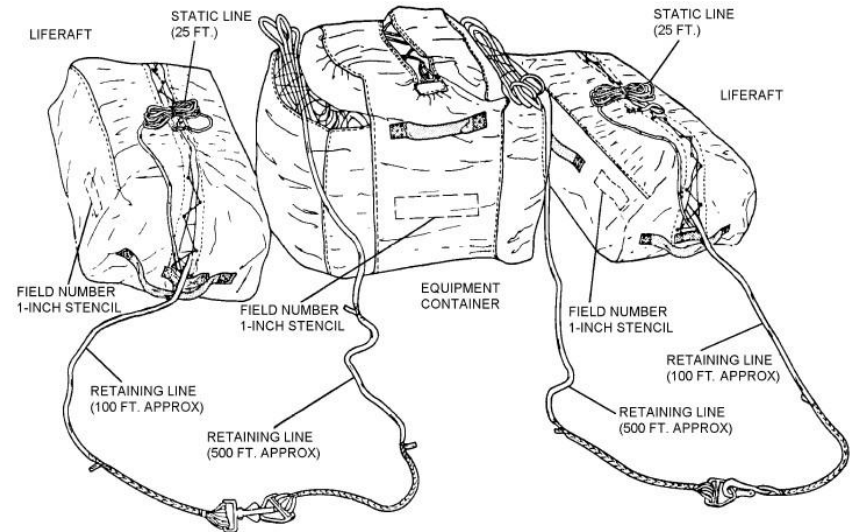


AERIAL RESCUE KIT



■ Problems with Current System

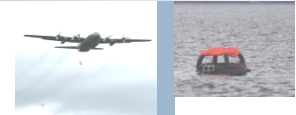
- Also known as MA-1 System
- Accuracy Limitations
- Orientation
- No Anchor
- Distance to Survival Kits
- Lack of Training Systems
- Access Boarding Issues



Background - Continued



AERIAL RESCUE KIT

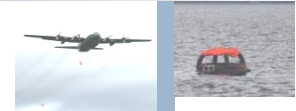


- Deficiencies observed in real rescue operations
- Address specific deficiencies noted in current system
- Desire to update the system
- Improve capability, flexibility, usability

ARK Development



AERIAL RESCUE KIT

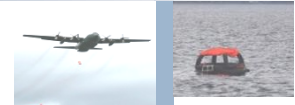


- Maintain similarity in operation to current system (hand launch, static line deployment)
- Minimal re-training
- Combine life rafts with contents
- Revise survival contents and stowage
- Introduce Training Kits

ARK Development



AERIAL RESCUE KIT



- Manually deployed air-to-sea Rescue system

ARK OVERVIEW (cont'd)



AERIAL RESCUE KIT



- Hand-launched from the aft ramp of any aircraft

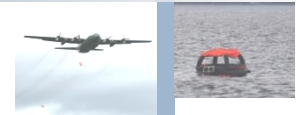


- Also deployable from side door
- Currently qualified by and in service with Canadian Forces for C-130 Hercules and CC-115 Buffalo

ARK OVERVIEW (cont'd)



AERIAL RESCUE KIT



- Kits measure 26"L x 16" Dia
- Compact design – ease in handling, portability, and storage
- Operational kit contains:
 - inflatable life raft
(by compressed gas cylinder)
 - survival contents
(determined by customer)



ARK OVERVIEW (cont'd)



AERIAL RESCUE KIT



- Two to four kits can be dropped in one pass
Life rafts connected by buoyant rope



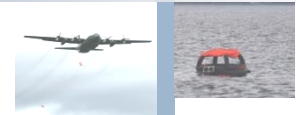
- Descent rate is 70 ft/sec and stabilized by drogue
- Water Activated Device
 - Proprietary/Patented Design
 - Activates inflation of life raft
 - Enhanced accuracy of placement



ARK OVERVIEW (cont'd)



AERIAL RESCUE KIT

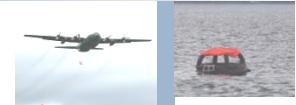


- Training System
 - Training system available that handles exactly like the operational system.
 - Reduced overhead and cost associated with operational systems

ARK OVERVIEW (cont'd)



AERIAL RESCUE KIT



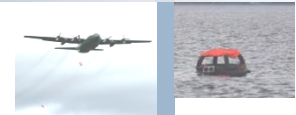
- Modular, identical kits
- Each kit contains:
 - 1 life raft (6, 8, or 10 persons); strobe light automatically activated; boarding ramp
 - Vacuum packed survival kit; sustain life at sea 48 hours; inside of and secured to life raft



ARK OVERVIEW (cont'd)



AERIAL RESCUE KIT

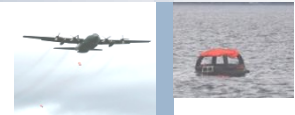


- A water-activated inflation device (inflates life raft upon kit immersion in water)
- Weighted, fast-acting automatically deployed sea anchor
- 280 feet of buoyant polyethylene rope with metal V-ring on each valise
- Small drogue for stabilization and keep bundle from tumbling during the drop

ARK OVERVIEW (cont'd)



AERIAL RESCUE KIT



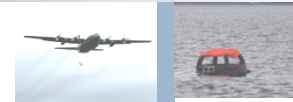
- Typical release altitude: 150 – 500 ft
- System operation is not dependent on release altitude
- Placed side-by-side for aft ramp, two-by-two for side door



ARK OVERVIEW (cont'd)



AERIAL RESCUE KIT

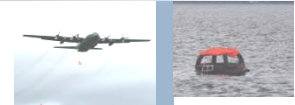


- Once placed at exit door, rope connections are made and static lines connected to the aircraft
- The kits are then simply hand-deployed out of the aircraft at 1-second intervals
- Bundles are connected to aircraft by break-away static lines, leaving nothing to pull back after dispatch
- Deployment procedure much the same as the current system. Minimal re-training required for SAR technicians.

ARK OVERVIEW (cont'd)



AERIAL RESCUE KIT

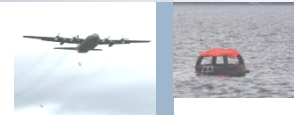


- Handles exactly like operational kit (weight, size, rigging, and deployment)
- Do not contain life rafts or survival equipment

ARK OVERVIEW (cont'd)



AERIAL RESCUE KIT



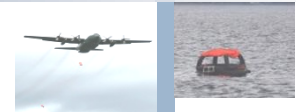
- Eliminates need/cost to replace/repack these equipment
- Just hose down, air dry. It is now ready for next training exercise
- Frequent training exercise more affordable
- Colour differentiates it from operational system →



ARK OVERVIEW (cont'd)



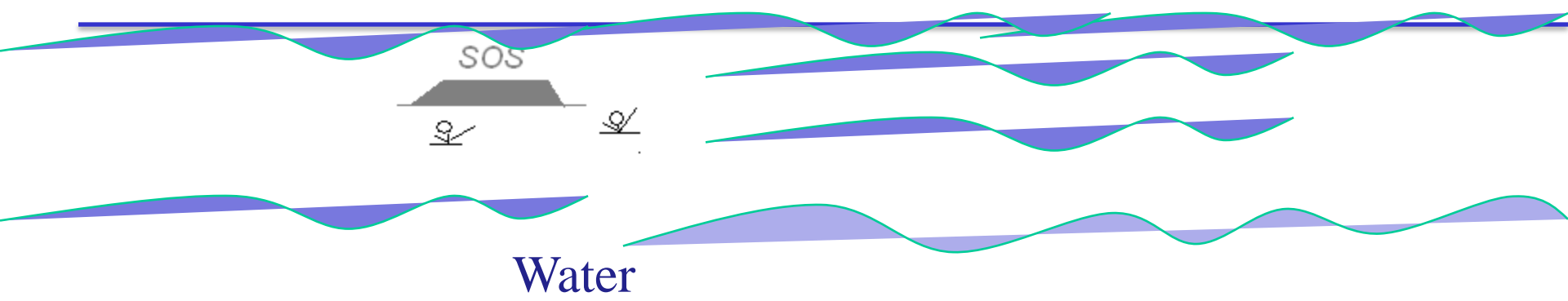
AERIAL RESCUE KIT



- Off-the-shelf, turnkey system
- Any life raft can be easily integrated into the ARK system
- Comes complete with vacuum packed survival equipment
- OR customer may specify items
- Depending on items selected, shelf life of survival contents could be up to 5 years
- Flexibility to pack survival contents outside of life raft to facilitate quick customization



AERIAL RESCUE KIT



Animate

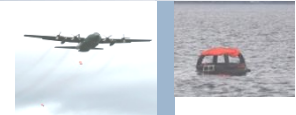


RESET

TEST OBJECTIVES



AERIAL RESCUE KIT

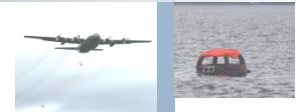


- Evaluate airworthiness
 - Safety (storage, rigging, deployment)
- Operational Suitability and Effectiveness
 - Verify the structural integrity of the kits
 - Assess life raft deployment systems
 - Accuracy, Visibility, Reliability
 - Maintainability, procedures, training

TEST METHODOLOGY

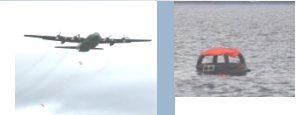


AERIAL RESCUE KIT



- Operational and Training System Deployments
 - Preliminary flight tests (CC130) using mechanical timer only
- Follow on Flight tests utilized both CC130 and CC115 Buffalo aircraft.

TEST CONDITIONS

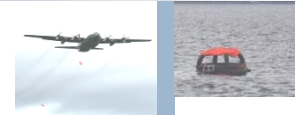


- Preliminary Flight Tests
 - Test Conditions:
 - Day VMC
 - Off coast of Halifax
 - CC130 platform
 - Winds light to moderate (16-23 kts)
 - Sea state variable 1-4 on Beaufort scale
 - Test Points:
 - Altitude: 300 ft AWL (\pm 30 ft)
 - Airspeed: 130, 140, 150 KIAS
 - Deployments: ramp and side door
 - 26 multi kit deployments (9 operational, 17 training runs)

TEST RESULTS



AERIAL RESCUE KIT



■ Preliminary Flight Tests

– Results:

- No anomalies with handling or dispatch (static lines)
- Several valise structural failures occurred at drogue and rope attachment points in initial drops
- All life rafts deployed and inflated:
- 28 operational kits, 3 life rafts were inverted on the surface
- Life raft visibility assessed as good
- Training kits visibility in the water rated poor
- Accuracy – dependent on timing, some drift noted

TEST RESULTS



AERIAL RESCUE KIT



- Preliminary Flight Tests
 - Corrective Action:
 - Reinforce attachment points
 - Consideration be given to breakaway static lines
 - Training valise colour changed to bright yellow
 - WAID design and integration

TEST RESULTS



AERIAL RESCUE KIT



■ Follow-On Flight Tests

– Results – Life Raft:

- All inflated upright
- Additional testing required in heavy seas
- Water Activated Inflation Device

– Results – Training Kits:

- Training Kit visibility much improved over preliminary tests
- matched size, weight, handling, rigging of operational units
- Modification to core to resist rolling tendency (completed)
- Very valuable, positive training tool



TEST RESULTS



AERIAL RESCUE KIT



- WAID allows altitude to be adjusted as required without affecting system operation
- As per observations from CF - Training Kits provide excellent training

REAL VALIDATION



AERIAL RESCUE KIT



- ARK is already



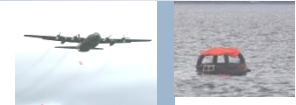
La Pierva, a Quebec-registered boat which also got into trouble, lost its navigation equipment in a lightning strike.
(Department of National Defence)



The pilot and his six passengers from the overturned floatplane were able to climb into the life rafts dropped by the Buffalo aircraft.

RESCUE NEAR BERMUDA – November 9

SUMMARY

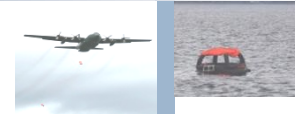


- Airworthiness clearance confirmed
- Accurate delivery
- Modular system, all units are identical
- Small, easy to handle units
- Inflation of life raft on water entry
- Survival contents packaged inside of life raft for easy access
- Wide coverage on the water:
 - ★ 2 bundles - 560 ft / 4 bundles - 1120 feet
- Right-side up inflation of life rafts
- Fast acting, self deploying anchor

SUMMARY



AERIAL RESCUE KIT



(Cont'd)

- Training system saves operational assets and provides low cost positive training for SAR crews
- Customization of survival contents
- Wide range of deployment configurations and conditions to accommodate largest possible rescue scenarios
- Easy to rig and dispatch
- Turnkey system – no training or special skills necessary
- Virtually no maintenance (contents vacuumed packed to increase life)

Future Work



AERIAL RESCUE KIT



A new ARK designed for use on Rotary Wing Platforms is under development.

This product will undergo the same rigorous testing and validation as its fixed wing predecessor.



AERIAL RESCUE KIT



QUESTIONS?