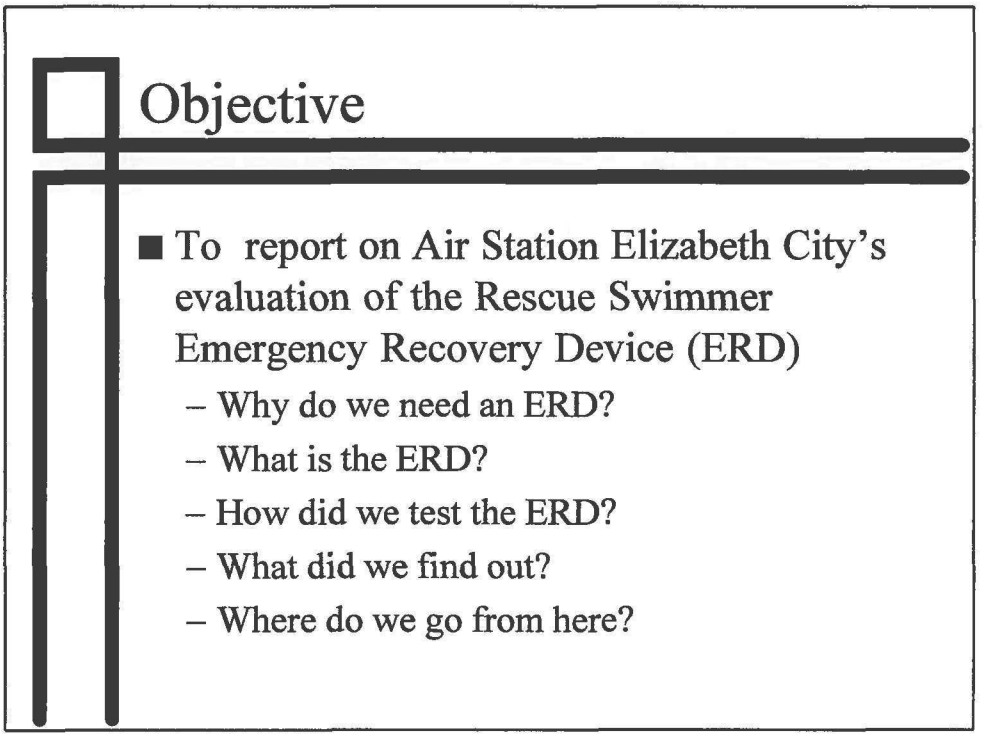
# Rescue Swimmer Emergency Recovery Device

## Operational Evaluation

Things to bring:

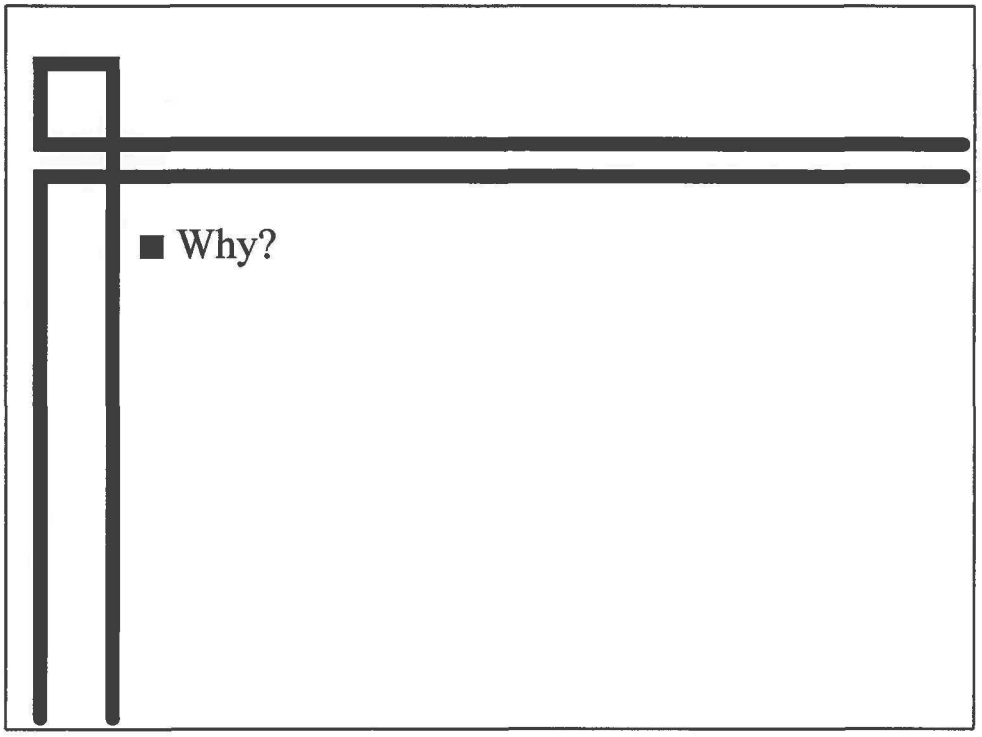
This
Presentation on floppy
Powerpoint viewer on floppy
Presentation videotape
Handouts, 6 slide view, 10 copies
ERD
Improved ERD
Copies of videotape to leave with whomever

NEED:
room, laptop, VHS VCR, projector, laser pointer(?)




Here's what we're going to do in the next 20-30 minutes.

I'll cover why we need it, what it is, how we tested it, what we found out, where we go from here.

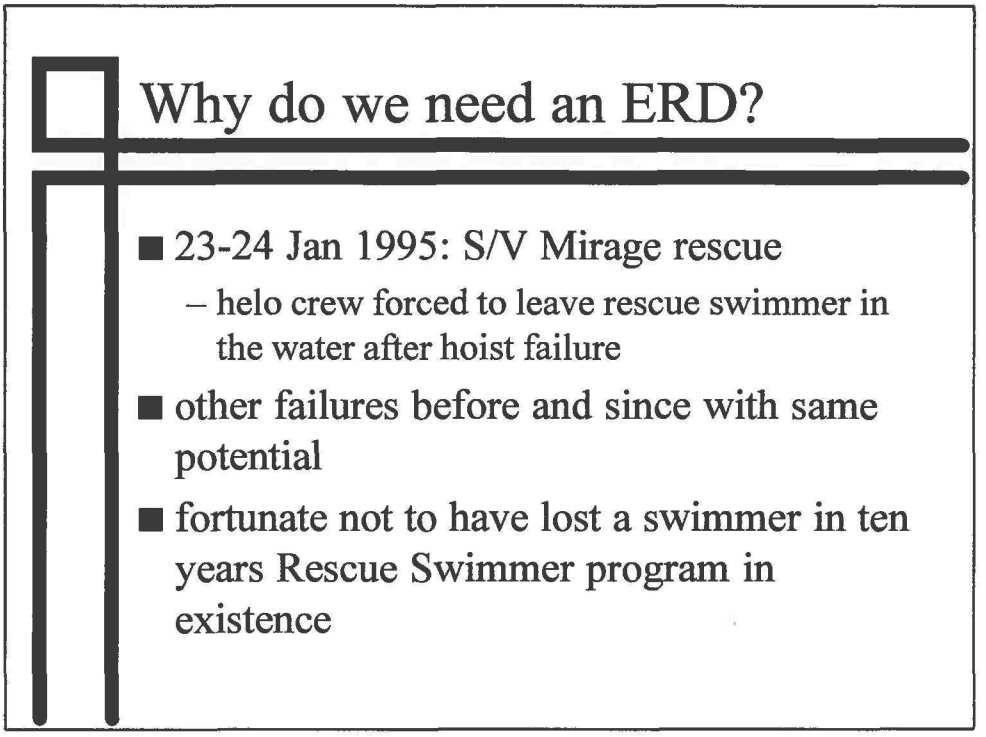



Show videotape of TAM promo to Mirage case.

Video starts 8 seconds after beginning of paused "black."

Video lasts 30 seconds.

Pause and turn volume down or off afterwards (mute?).




Sailing vessel over 345 nm east of Savannah, deployed rescue swimmer, completed hoist of 2 survivors.

Recovering third survivor, cable began to fray. FM quickly raised frayed cable onto drum, rendering it unusable.

Helo crew had no way to recover the swimmer.

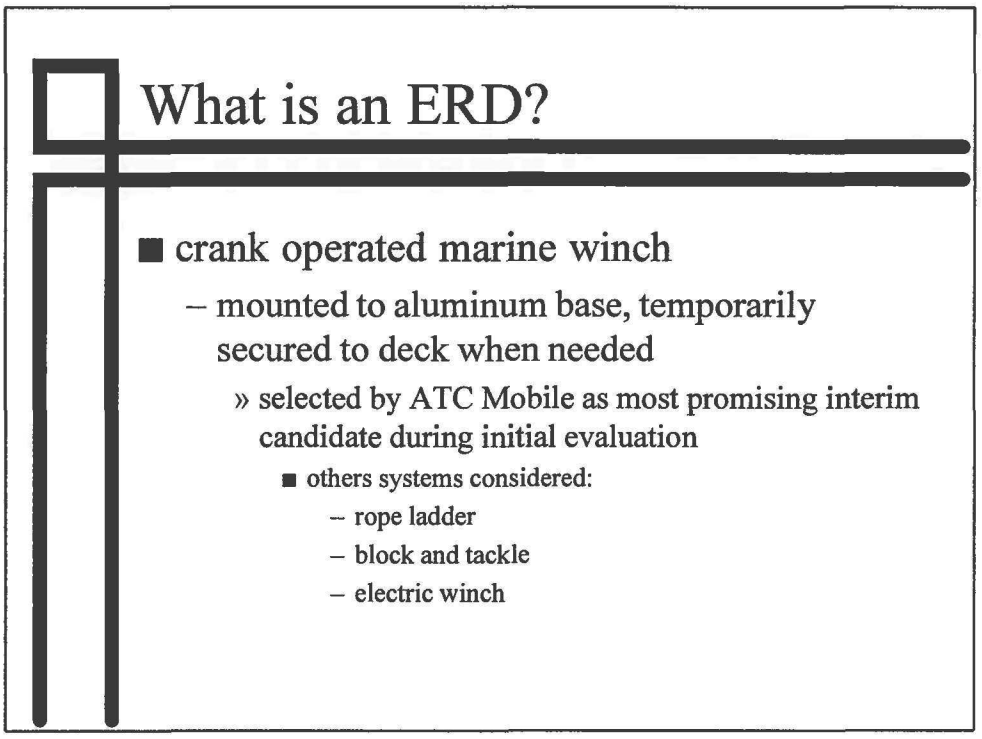
Swimmer left in cold water for over five hours before another helo could recover him. Unconscious when recovered.

E City and other units have had hoist failures before and since, not with such near catastrophic results.

But the potential is always there.

Frankly, we're lucky we haven't lost any in 10 years.

Bottom line: every time we deploy a rescue swimmer, we should be as certain as possible he can be recovered.




Consists of winch mounted to aluminum base. Secured to 3 tie down rings in cabin, each rated for 2500 pounds

SHOW THEM THE STUFF

TWO SPEEDS: depends on direction of rotation: clockwise provides about 15:1 mechanical advantage, counter-clockwise about 5:1 ---> not 20 and 40 to 1 as you may have heard or seen. We tested empirically

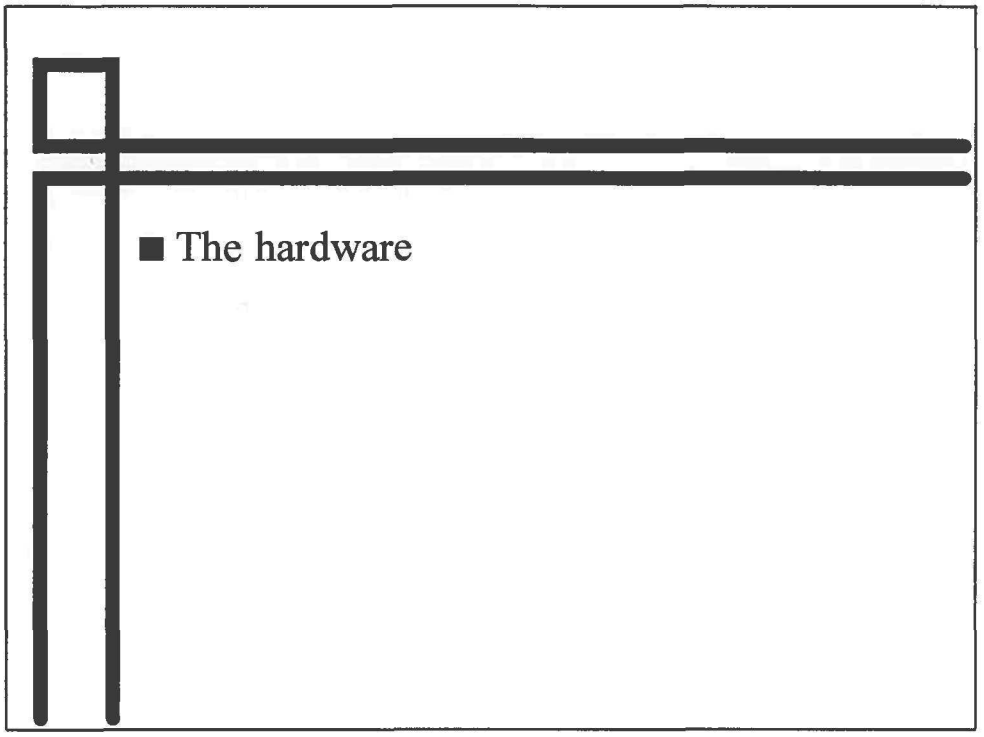
SELF TENDING: winch incorporates a self-tailing groove at the top to provide for single person operation (no need to maintain tension on bitter end of line)

LINE: 100 ft of 1/2" diameter static kernmantle line, nylon sheath over parallel continuous strands of nylon core

PRUSIK MINDING PULLEY: line routed from winch, around roller on base up to pulley attached by carabiner hook to bracket bolted to hoist arm. Prusik knot serves as safety device--takes the load if tension completely released from winch.

HOOK: standard rescue hook knotted to end of line

ELECTRIC WINCH: did some initial investigation, but no operationally tested. ASMCM Gelakoska still exploring possibilities of other powered means.




Video lasts from 0:32 to 3:14 {stop at ASM thumbs up}
ENSURE VOLUME TURNED DOWN

base plate in pouch

safety strap used for eval

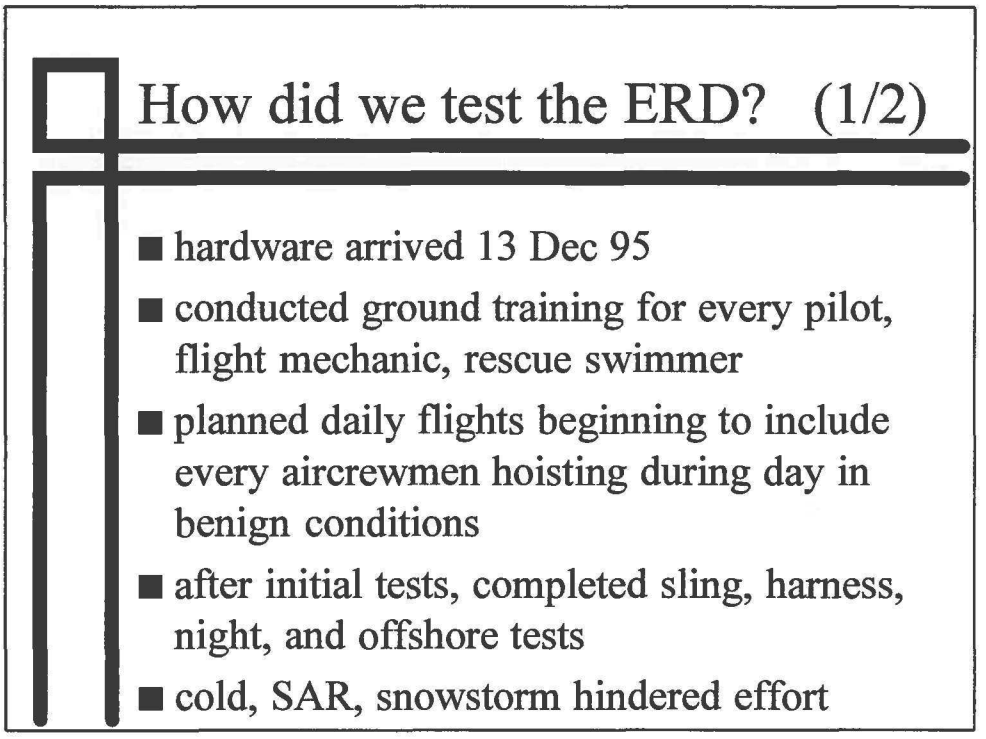
winch mounted to base

mech must guess how much slack to put out

routes under roller

two to three turns on capstan

weight bag attached---> attached sling once we figured out that was best method




hardware delivered by Flight Mech Stan member from ATC Mobile (AM1 Miles Reinhart) 13 Dec

AirSta immediately embarked on plan to produce thorough and complete test in 30 days allotted to us

Flew with Reinhart aboard instructing our FM FEB members on 14 DEC

They then trained FM instructors, conducted ground and static training for all flight mechs

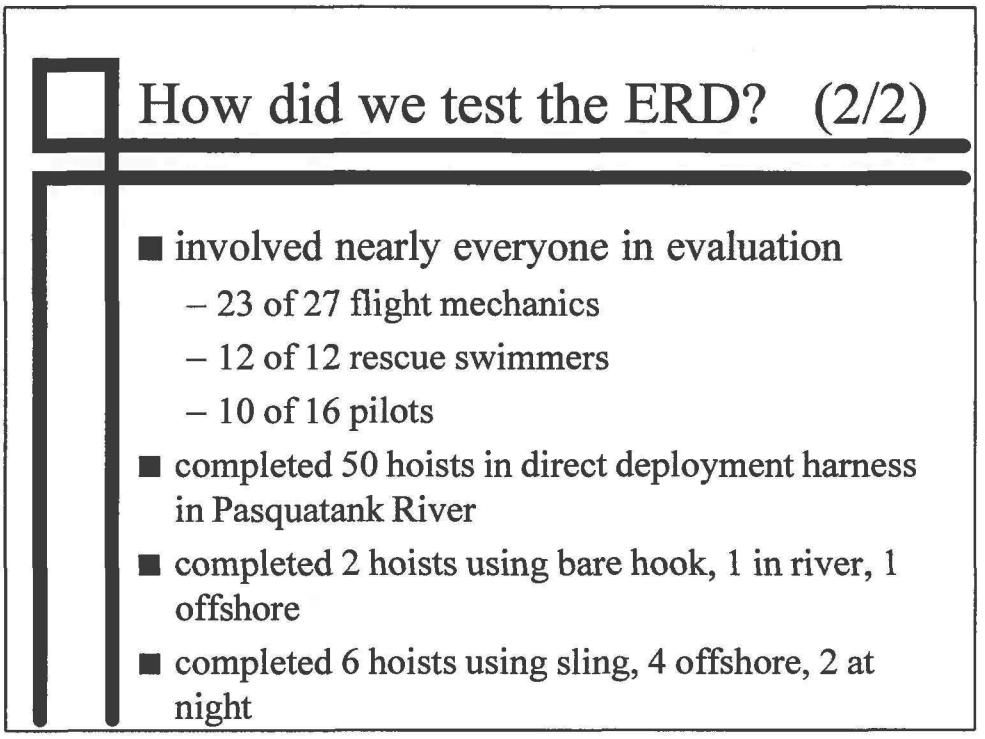
ASMs viewed ATC video and rcvd ground briefing

Pilots viewed ATC video outlining procedures

planned initial tests in river in DD gear for every crewman in benign day conditions

After giving every flight mech opportunity to evaluate ERD in day in river, planned to do offshore, night, and bare hook, sling eval

Unfortunately, couldn't get everyone done because of cold, SAR diverts, snow, and acft availability, but we did

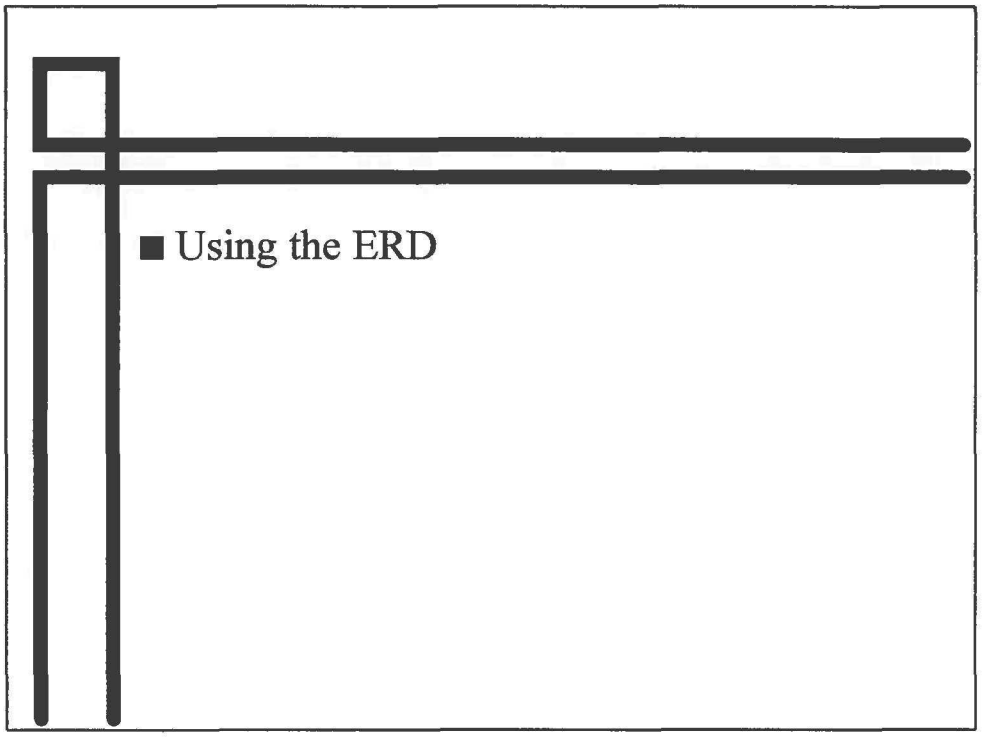



It's clear from the numbers that almost everyone at AirSta E City was given an opportunity to use and evaluate the ERD.

Many crewmen, especially pilots, swimmers, and instructor flight mechanics flew multiple sorties

9 sorties

17 flight hours




Video lasts from 3:14 to 7:36 {stop at ASM outta basket}

mech delivers hook from 20' hover, easy down, takes in excess line, and takes another turn on capstan.

mech commands easy up. Once swimmer is safely clear of water he commands hold, pilot maintains altitude and mech cranks

swimmer swings

mech can't see swimmer as he swings

mech can turn crank both ways

it doesn't get any easier as time goes on: he has to stop cranking to look outside to see how much further

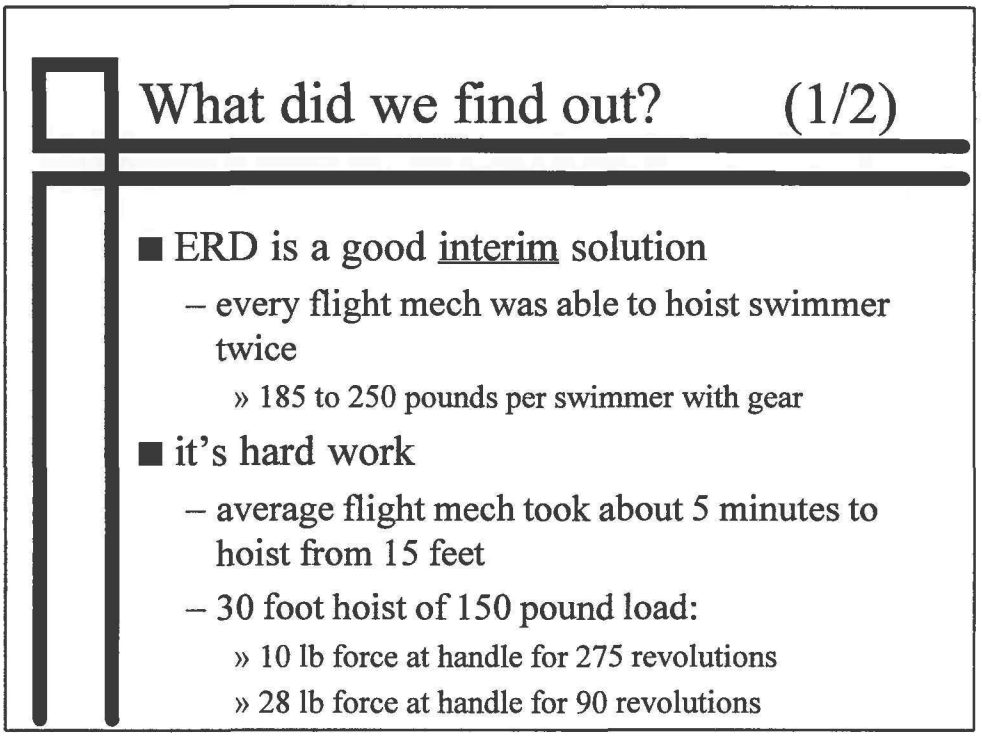
swimmer must step over ERD to get in cabin

tried hoisting in R/S harness--since hook rides higher, knot two-blocked before ASM at door--tough to get in

RESCUE STROP: the preferred way: flotation when delivered, comfy ride, in back first, on feet

since it's comfortable, flight mech can spread work out over time

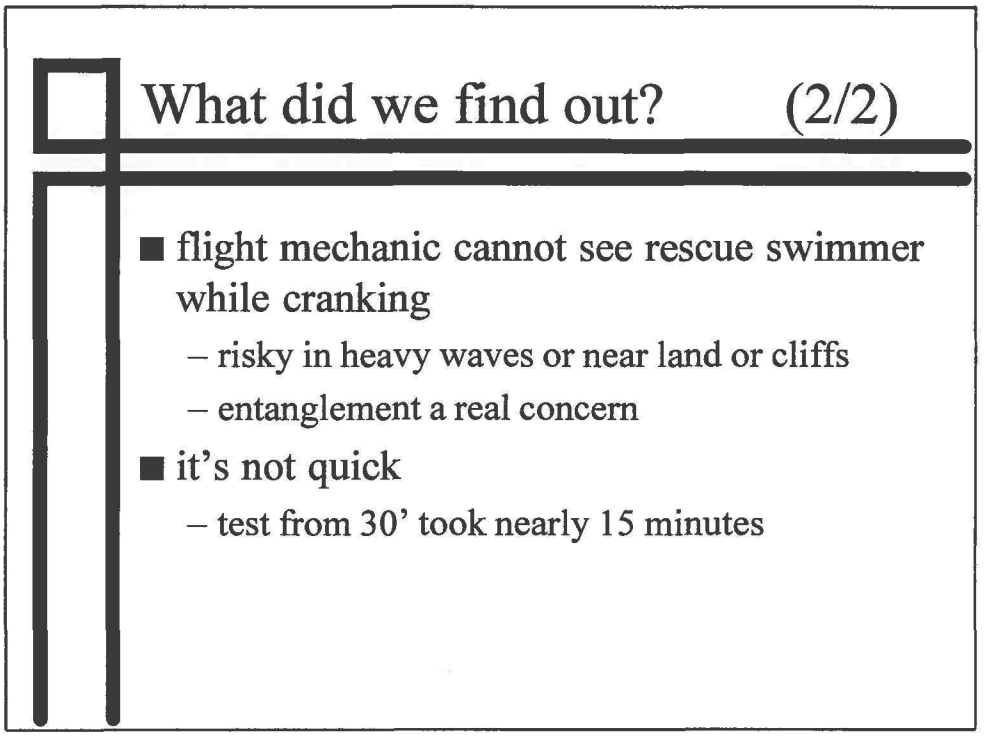
BASKET: works too, didn't try in flight due unpredictable swing and possible risk getting out




touch on each bullet

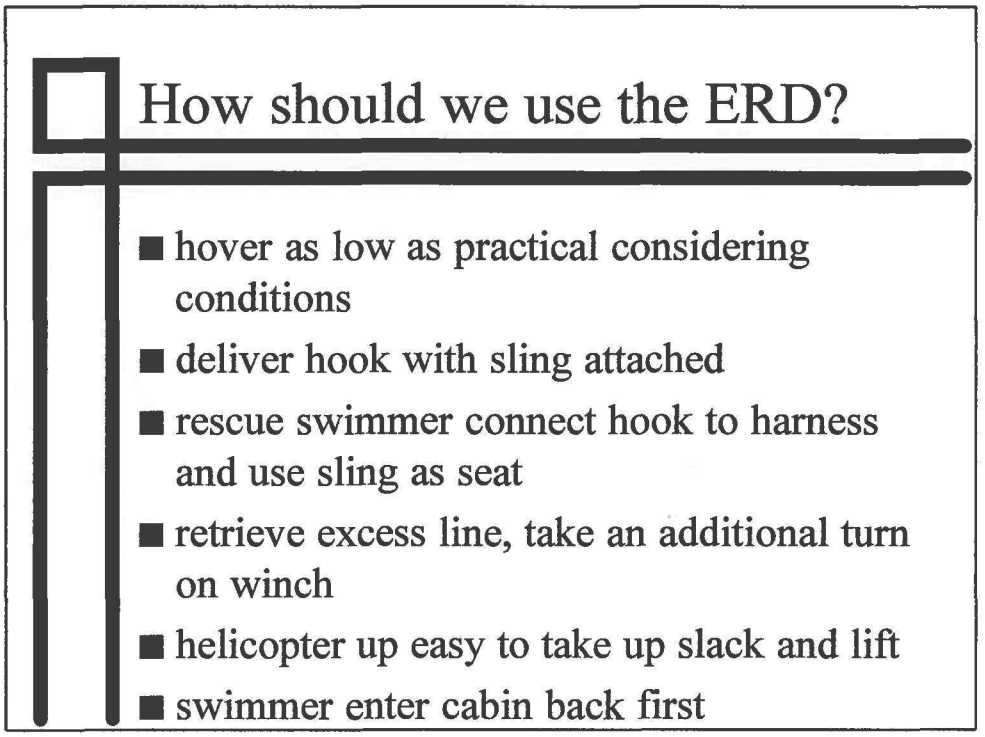
stress level of effort

no mech able to sustain high effort, high speed continuously




It's not quick: This could be a real problem when you're offshore in 30 foot seas with 30 minutes of gas

just delivering the hook to swimmer in seas without ability to quickly go up and down will take time

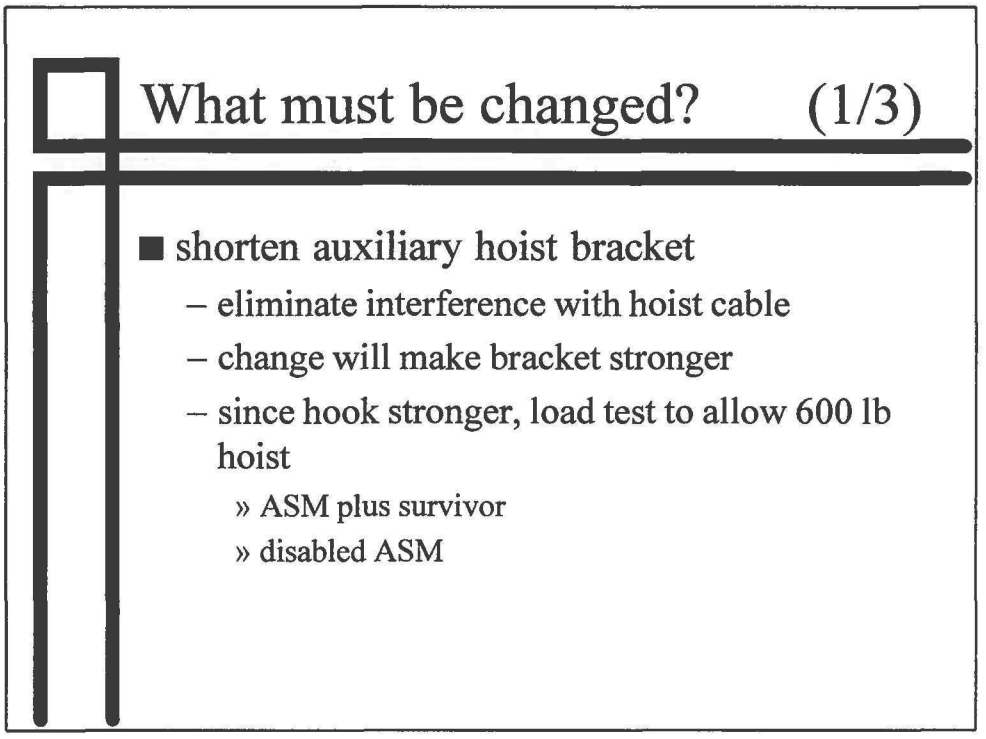



review procedures referring to slide

hover altitude depends on WX, sea state, day/night

high altitude means longer cranking

altitude could get real high in seas at night




following changes recommended for incorporation into production units for H-60

HOOK: interfered with normal hoist operation as cable moved fore and aft along top of cabin door

LCDR Jeff Barker, ARSC Engineering Division H-60 Branch Chief has been given drawings of the modified hook and base plate at LCDR Broxterman's request

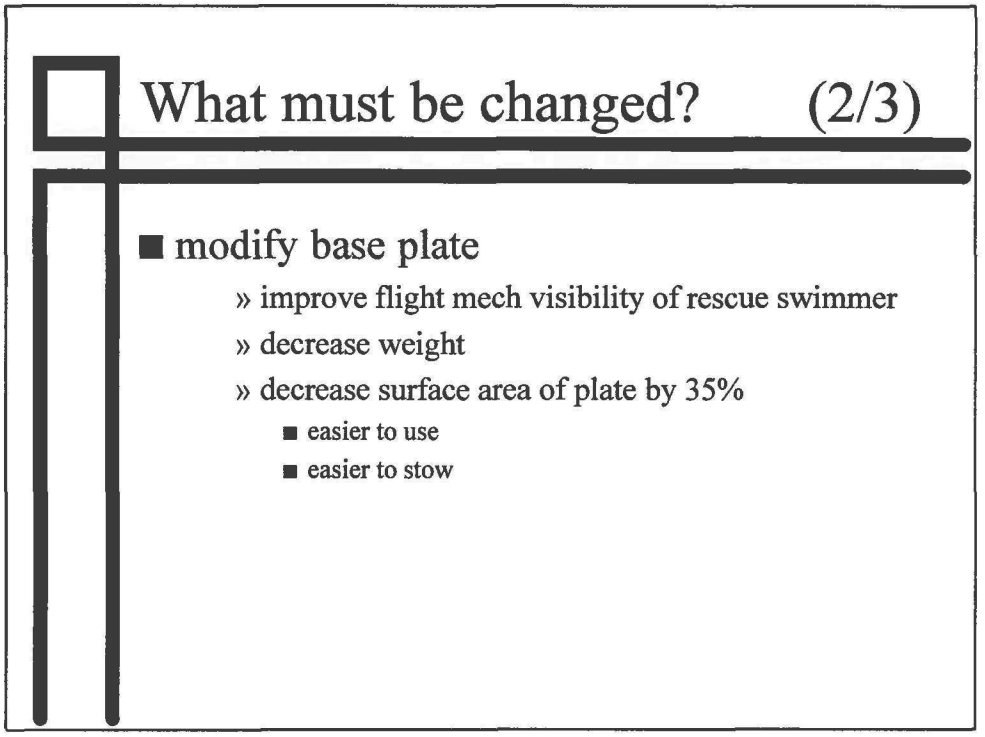
shortening hook makes it stronger. We need to test to 600 pounds vice 300 pounds

old hook static tested to 600 pounds, limited to 300 pounds for use. Modified hook should be tested to 1200 pounds to provide for 600 pound use

we need to be able to recover a rescue swimmer and the guy we told to jump off boat

not always elective!

ensure auxiliary hoist bracket strength and location considered in new hoist boom mod




VISIBILITY: flight mech has to stop hoisting to see below aircraft because ERD virtually blocks door and he must hoist from inboard of device. Smaller base plate allows mech to crank from forward of base, maintaining visibility outside and ability to use free arm to stop swinging (maybe)

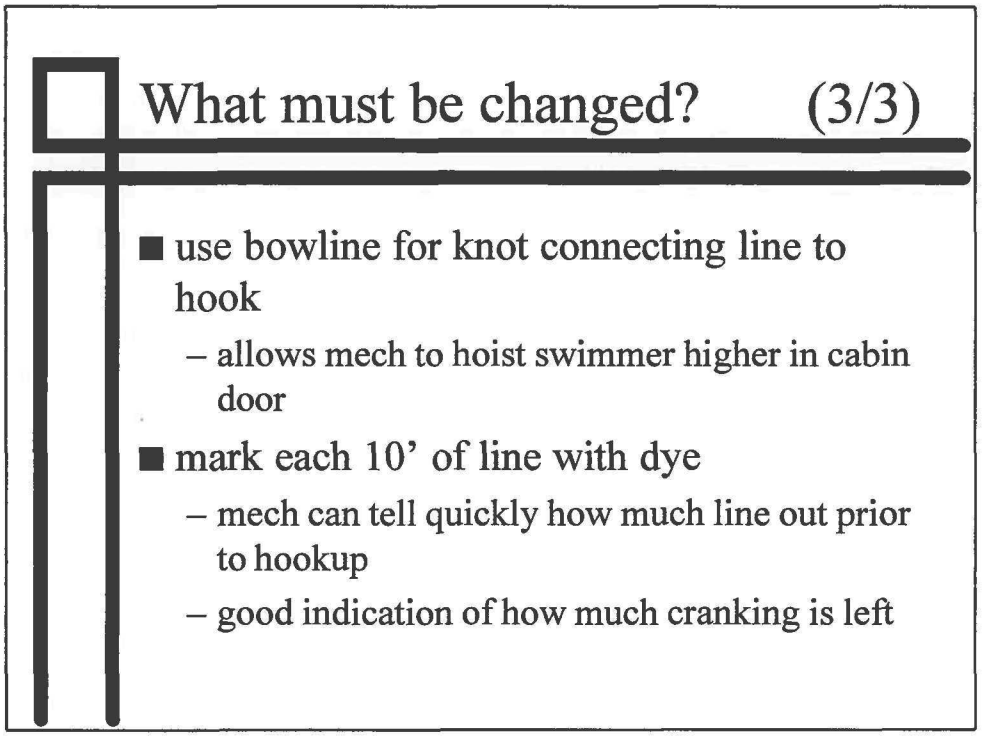
WEIGHT: not a big factor for H-60, but why nickel and dime ourselves to death?

21.5 vice 27.5 + 11 for rope bag

SPACE: cabin space at a premium for MRR asset. Redesigned ERD far easier to stow in out of the way corner of cabin, i.e., forward left corner

We use 2 mounting points vice 3 of original, but each one rated for 2500 pounds.

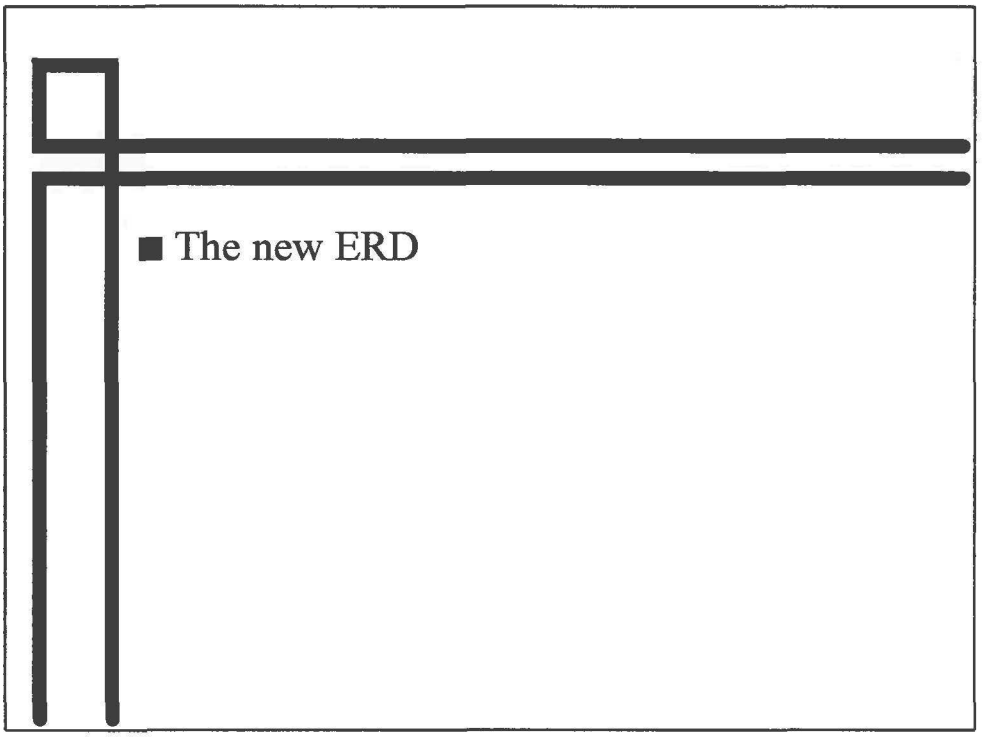
If one fails, it still works -- tested in hanger




KNOT: Once the knot above rescue hook meets the prusik knots, unit can be raised no higher. Originals sent with a "figure 8 loop" knot. A bowline with bitter end whipped to standing portion will allow ASM to be raised higher and facilitate easier entry into cabin

DYE: mechs had to guess how much line they'd put out. Not knowing could lead to either more work or entanglement because they put out too much or a dangerous condition in seas if they put out too little.

quicker: eliminates need to put line out, take turns, check to see if too much/little, take wraps off, adjust line, put wraps on, check




Video lasts from 7:36 to 9:00 {stop at second size comparison}

hook interference with old hook

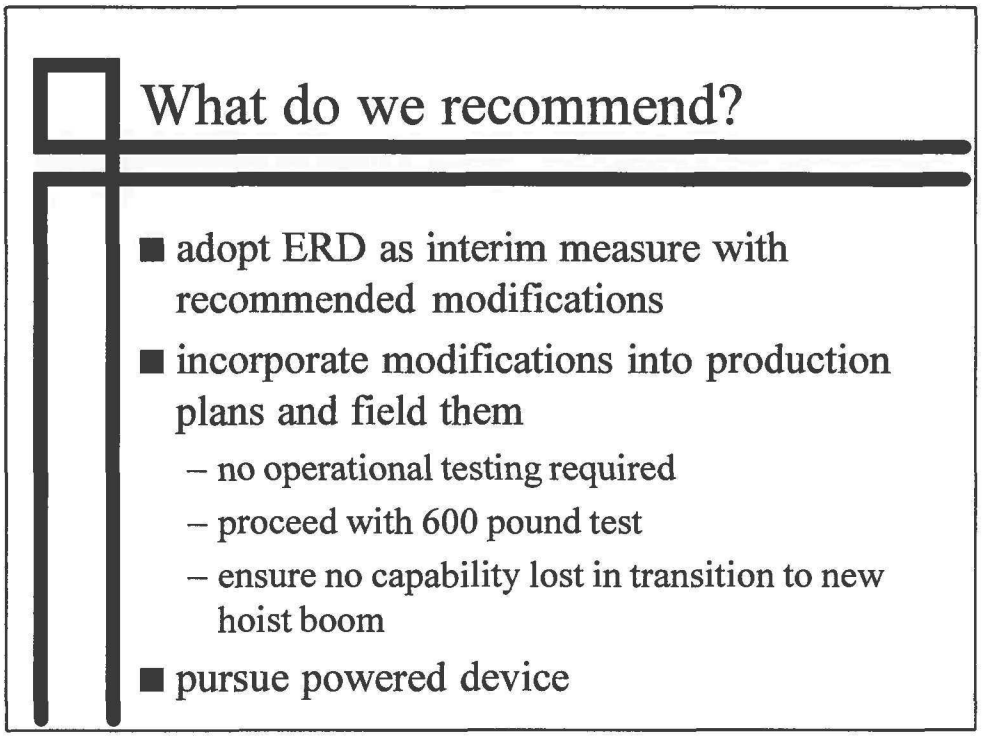
no interference with new hook

original and modified base plate size comparison

using new base plate: mech can crank from beside it and look out door

swimmer needn't step over it

only two fittings, but each rated for 2500 pounds




ERD works: let's make the changes and get it out the the field IMMEDIATELY.

no op eval required. changes to base and bracket serve only to enhance performance

works great in hangar, no need to flight test

600 lb test: we'll proceed with hangar test in conjunction with ARSC Engineering. Once they bless it, we'll test it. Likewise with modified base plate.

ensure no capability lost when in transition to new hoist boom modification

******* PURSUE POWERED DEVICE ********

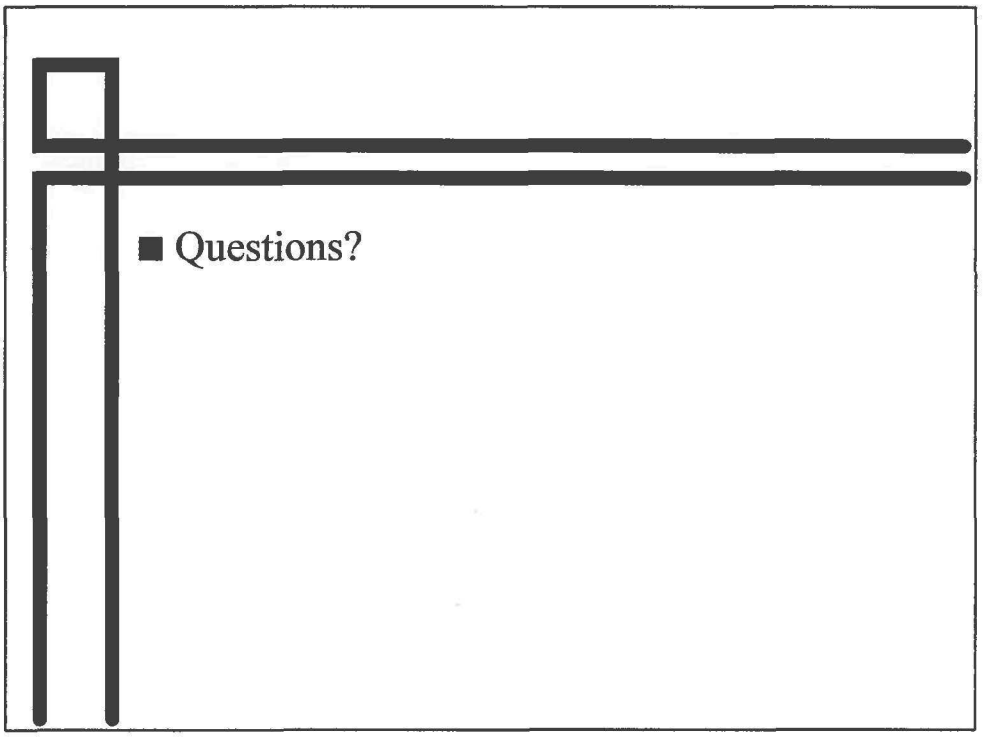
not necessarily powered ERD

could be electric hoist that clips to hard point on hoist, plugged in, controller similar to existing

or could be a hoist on deck routed up to hoist hard point like the ERD

let technology to make job easier

Work smarter, not harder?


■ Questions?

# Rescue Swimmer Emergency Recovery Device

Operational Evaluation

## Objective

- To report on Air Station Elizabeth City's evaluation of the Rescue Swimmer Emergency Recovery Device (ERD)
  - Why do we need an ERD?
  - What is the ERD?
  - How did we test the ERD?
  - What did we find out?
  - Where do we go from here?

- Why?

## Why do we need an ERD?

- 23-24 Jan 1995: S/V Mirage rescue
  - helo crew forced to leave rescue swimmer in the water after hoist failure
- other failures before and since with same potential
- fortunate not to have lost a swimmer in ten years Rescue Swimmer program in existence

## What is an ERD?

- crank operated marine winch
  - mounted to aluminum base, temporarily secured to deck when needed
    - » selected by ATC Mobile as most promising interim candidate during initial evaluation
      - others systems considered:
        - rope ladder
        - block and tackle
        - electric winch

- The hardware

## How did we test the ERD? (1/2)

- hardware arrived 13 Dec 95
- conducted ground training for every pilot, flight mechanic, rescue swimmer
- planned daily flights beginning to include every aircrewmen hoisting during day in benign conditions
- after initial tests, completed sling, harness, night, and offshore tests
- cold, SAR, snowstorm hindered effort

## How did we test the ERD? (2/2)

- involved nearly everyone in evaluation
  - 23 of 27 flight mechanics
  - 12 of 12 rescue swimmers
  - 10 of 16 pilots
- completed 50 hoists in direct deployment harness in Pasquatank River
- completed 2 hoists using bare hook, 1 in river, 1 offshore
- completed 6 hoists using sling, 4 offshore, 2 at night

- Using the ERD

## What did we find out? (1/2)

- ERD is a good interim solution
  - every flight mech was able to hoist swimmer twice
    - » 185 to 250 pounds per swimmer with gear
- it's hard work
  - average flight mech took about 5 minutes to hoist from 15 feet
  - 30 foot hoist of 150 pound load:
    - » 10 lb force at handle for 275 revolutions
    - » 28 lb force at handle for 90 revolutions

## What did we find out? (2/2)

- flight mechanic cannot see rescue swimmer while cranking
  - risky in heavy waves or near land or cliffs
  - entanglement a real concern
- it's not quick
  - test from 30' took nearly 15 minutes

## How should we use the ERD?

- hover as low as practical considering conditions
- deliver hook with sling attached
- rescue swimmer connect hook to harness and use sling as seat
- retrieve excess line, take an additional turn on winch
- helicopter up easy to take up slack and lift
- swimmer enter cabin back first

## What must be changed? (1/3)

- shorten auxiliary hoist bracket
  - eliminate interference with hoist cable
  - change will make bracket stronger
  - since hook stronger, load test to allow 600 lb hoist
    - » ASM plus survivor
    - » disabled ASM

## What must be changed? (2/3)

- modify base plate
  - » improve flight mech visibility of rescue swimmer
  - » decrease weight
  - » decrease surface area of plate by 35%
    - easier to use
    - easier to stow

## What must be changed? (3/3)

- use bowline for knot connecting line to hook
  - allows mech to hoist swimmer higher in cabin door
- mark each 10' of line with dye
  - mech can tell quickly how much line out prior to hookup
  - good indication of how much cranking is left

- The new ERD

## What do we recommend?

- adopt ERD as interim measure with recommended modifications
- incorporate modifications into production plans and field them
  - no operational testing required
  - proceed with 600 pound test
  - ensure no capability lost in transition to new hoist boom
- pursue powered device

- Questions?

U.S. Department of Transportation
United States Coast Guard

Commanding Officer
USCG Air Station Elizabeth City

27909-5004
Phone:(919)335-6350

1543
18 Jan 96

From: Commanding Officer, Coast Guard Air Station Elizabeth City
To: COMDT (G-EAE)
Via: Commander, Fifth Coast Guard District (dcs)

Subj: EMERGENCY RECOVERY DEVICE EVALUATION REPORT

Ref: Your ltr 1543 of 8 Dec 95

1. The operational evaluation of the rescue swimmer emergency recovery device (ERD) was conducted here from 14 Dec 95 to 10 Jan 96 as directed by reference (a). Although hampered by severe winter weather, SAR, and other competing priorities, we conducted a thorough test program, conducting 58 hoists over the course of nine day and night sorties.

2. I endorse the ERD as a good interim measure and support its immediate deployment fleet-wide with the minor modifications outlined below. However, the permanent solution to the backup hoist requirement must be powered by something other than the flight mechanic. Although every flight mechanic was able to complete two hoists from an altitude of 15 feet in roughly five minutes, the effort left each near exhaustion. Since the operation is very slow, the rescue swimmer is placed at risk of being injured while being hoisted from anything but the calmest seas. The flight mechanic is also unable to see outside and below the aircraft while cranking, making it difficult to control swinging and impossible to monitor the rescue swimmer's condition without pausing.

3. The modifications required to make the ERD a workable interim solution are straightforward and simple. The auxiliary hoist bracket must be shortened. It interferes with the operation of the primary hoist. We have redesigned the bracket to eliminate the interference. Enclosures (1) and (2) are drawings of the old and new designs. The shortened hook will be stronger than the original design and should be rated for hoisting 600 pounds (rather than 300 for the ERD tested) to allow for the dual pickup of a rescue swimmer and a survivor when needed.

4. Further modification of the ERD includes a redesign of the winch mounting base. Enclosure (3) and (4) are photographs of the existing and modified base plates. The new, smaller base reduces the surface area by over 35% and increases accessibility to the cabin door. This allows the flight mechanic to crank from a position forward of the plate rather than inboard of it, affording a better view out the cabin door and below the aircraft to the swimmer. The smaller plate also makes the ERD lighter and simpler to stow.

Subj: EMERGENCY RECOVERY DEVICE EVALUATION REPORT

5. I also recommend using dye to mark the line every 10 feet to show the flight mech how much line has been put out and how much is left to crank in. Finally, I recommend using a bowline to tie the line to the rescue hook instead of the knot provided by the manufacturer. The more compact bowline allows the rescue swimmer to be hosted higher in the cabin doorway before the knot is two-blocked against the prusik knot, making it easier to step into the cabin.

6. The above recommendations were based on results of a test plan which included day tests in the Pasquatoank River with the rescue swimmers wearing direct deployment gear, day tests in the river using the rescue swimmer harness and sling, day offshore tests, and night tests in the river. The first 50 hoists were conducted in the calm water of the river. Every flight mechanic was able to successfully hoist a rescue swimmer twice, one hoist right after another, from an altitude of about fifteen feet. The weight of the rescue swimmers ranged from 185 to 250 pounds. The flight mechanics averaged about five minutes to hoist from an altitude of 15 feet. The level of effort expended to complete the hoist is high: to hoist a 150 pound load 30 feet takes 10 pounds of force at the handle for 275 revolutions clockwise, or 28 pounds of force for 90 revolutions counterclockwise. None of the flight mechanics was able to steadily crank in the high-speed, high-effort direction.

7. Following the initial evaluation in the river, we tested the ERD with the rescue swimmer using the V-ring on the rescue swimmer harness. We found that the prolonged ride in the harness caused the swimmer to lose circulation in his extremities. Because the swimmer harness tended to ride up higher than the direct deployment harness, the rescue swimmer couldn't be raised as high in the cabin door. It was difficult for the exhausted flight mechanic to give the numb rescue swimmer the help needed getting in the cabin. I don't recommend using the ERD to hoist by the rescue swimmer harness alone.

8. We then tested the ERD using the rescue strop, or sling. We found that if the rescue swimmer connected the rescue hook to his harness, then wrapped the sling around his buttocks and used it as a seat, he could endure the long ride comfortably. This method had the added benefit of raising the swimmer higher in the doorway, allowing the flight mechanic to turn the swimmer around and pull him into the cabin back-first as the swimmer put his feet down and walked backward into the cabin.

9. The offshore portion of the evaluation was conducted just outside of Oregon Inlet. Aside from the increased altitude necessary to safely hover in seas offshore, the results were the same as in the river. All of the hoists were done using the sling as a seat. The increased altitude corresponded to a longer

time to complete the hoists, but the rescue swimmer remained comfortable due to the seated position and the flight mechanic was able to take breaks as needed to catch his breath.

10. The final airborne test of the ERD was during a night flight. The crew experienced no difficulties setting up or using the ERD in the darkness.

11. We also tested an ERD basket hoist with a static helicopter in the hangar. We found that a rescue swimmer could be raised until the bottom of the basket was almost even with the lower edge of the cabin door, then crawl over the edge into the cabin with minimal difficulty. Because of the flight mechanic's difficulty controlling the swinging basket and the inability to easily get the basket into the cabin as he would for a normal basket hoist, we did not conduct an airborne basket hoist.

12. Given the shortcomings already listed, particularly slow hoist speed and diminished outside visibility for the flight mechanic, we did not test the ERD over land or in a cliff rescue scenario and would not endorse its use in those situations. It's hard to imagine a case where a rescue swimmer would be better off on the end of the ERD line than on land.

13. Enclosure (5) is our recommended procedure for ERD installation and use. The manufacturer's instructions, provided to us by ATC Mobile, are included as enclosure (6).

14. We used the flight mechanic syllabus provided by ATC Mobile and recommend no changes to it. Reference (7) is a copy of the syllabus. It should be completed by every flight mechanic once and followed up annually with static rigging of the device. Initial training for the rescue swimmers consisting of at least one hoist should also be required. Initial qualification for pilots should consist of viewing a video similar to the one provided by ATC Mobile showing the rigging and operation of the ERD, plus a flight with an ERD qualified aircraft commander.

15. Possible damage to the line was also considered. We saw no damage to the line after 58 hoists, but chafing of the line as it swings about and contacts the cabin door bottom edge during hover is possible. However, since the ERD is designed for a onetime use, and the stress imposed on a nylon line under tension are less damaging than to a steel hoist cable, the chafing risk can be acknowledged and accepted as minimal. We also considered the stretch of the line during hoisting. The rescue swimmers found the shock absorbing quality of the line as it stretched to be desirable. A description of the qualities of the line provided by the manufacturer is included as enclosure (8).

16. The ERD we tested is a great step forward. It is a good, inexpensive, short-term fix and should be adopted immediately by

Subj: EMERGENCY RECOVERY DEVICE EVALUATION REPORT

our SRR and MRR communities. However, a powered backup hoist would be faster, safer, and a better long-term answer for the world's premiere maritime service.

17. My point of contact for this matter is LT Dan Taylor, (919) 335-6751.

S.J. WALZ

Encl: (1) drawing of existing auxiliary hoist bracket
(2) drawing of modified auxiliary hoist bracket
(3) photograph of existing winch mounting plate
(4) photograph of modified winch mounting plate
(5) recommended installation and use procedure
(6) manufacturer's procedures for installation and use
(7) ATC Mobile Alternate Recovery Device Training Syllabus
(8) analysis of ERD line

Copy: COMDT (G-OAV) Advance
CG ARSC
CG ATC

| REV | DESCRIPTION | BY | DATE | APPR |
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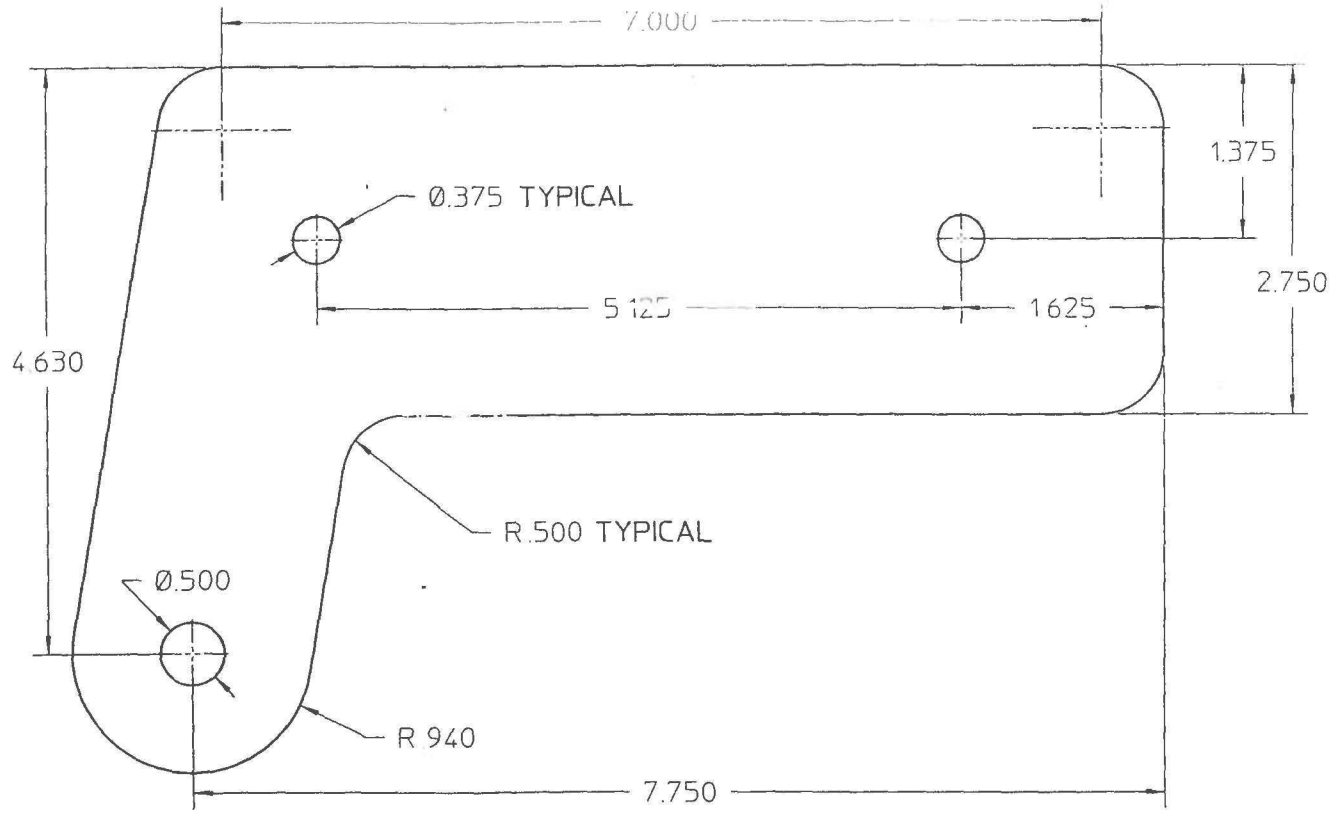


| 975-39 | AUXILIARY HOIST BRACKET | 7075 T6 .25" | 1 |
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| PART NO. | NOMENCLATURE | MATERIAL | QTY |

PARTS LIST

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| DECIMAL | | | ANGLE |
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| .X | .XX | .XXX | |
| ±.1 | ±.03 | ±.010 | ±1/2° |

DRAWN BY: J. PHILLIPS

CHECKED BY:

ORIGINATOR: J. PHILLIPS

APPROVED: DATE:

U. S. COAST GUARD
AIRCRAFT REPAIR AND SUPPLY CENTER
ELIZABETH CITY, NC 27909

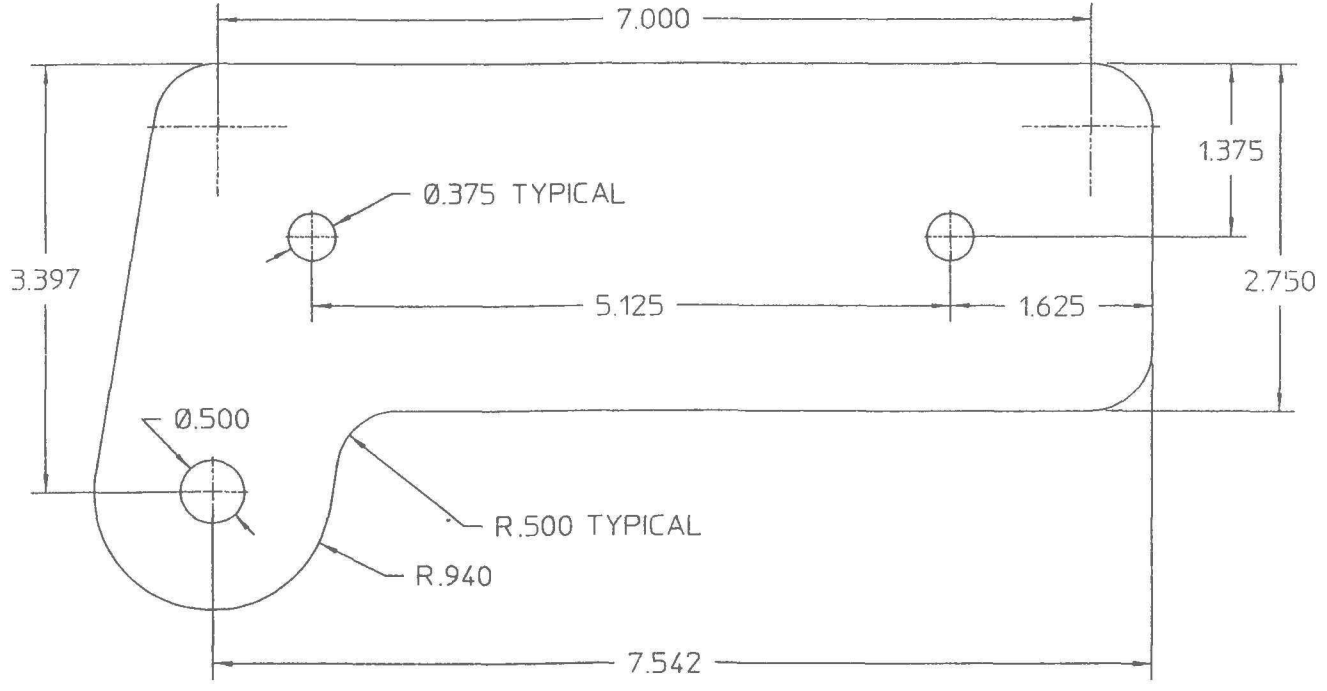
HH-60J
AUXILIARY HOIST BRACKET

| SIZE | CAGE CODE | DRAWING NO. |
|---|---|---|
| B | 27426 | 975-39 |

SCALE

SHEET 1 OF 1

| REV | DESCRIPTION | BY | DATE | APPR |
|---|---|---|---|---|
| 1 | LOAD HOLE TRANSLATION | R. McGOUGH | 1-4-96 | J. BARKER |




| PART NO. | NOMENCLATURE | MATERIAL | QTY |
|---|---|---|---|
| 975-39 | AUXILIARY HOIST BRACKET | 7075 T6 .25" | 1 |

PARTS LIST

PROTOTYPE
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DRAWN BY: J. PHILLIPS
CHECKED BY:
ORIGINATOR: J. PHILLIPS
APPROVED: DATE:

U. S. COAST GUARD
AIRCRAFT REPAIR AND SUPPLY CENTER
ELIZABETH CITY, NC 27909

HH-60J
AUXILIARY HOIST BRACKET

| SIZE | CAGE CODE | DRAWING NO. |
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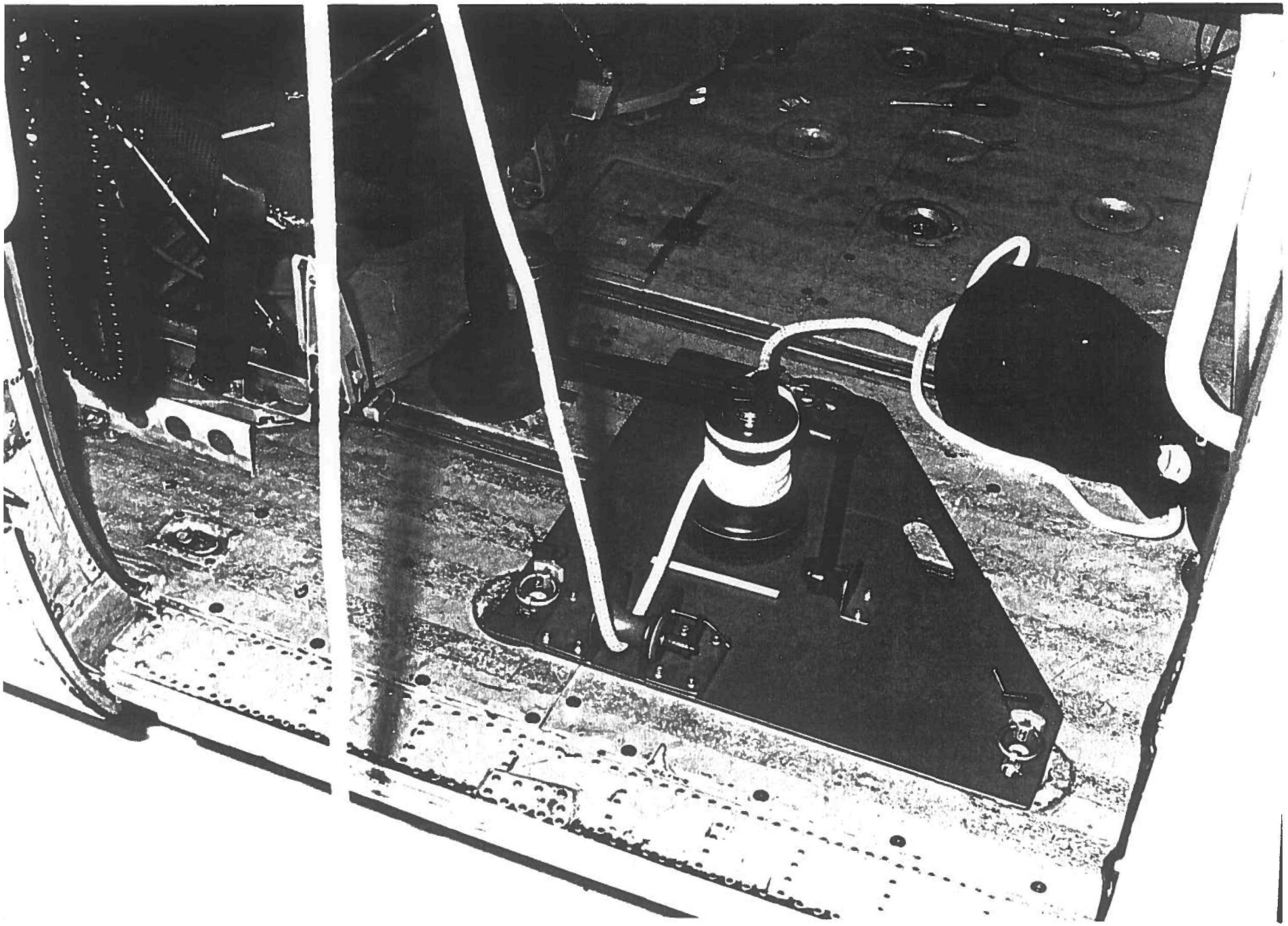
| B | 27426 | 975-39 |

SCALE SHEET 1 OF 1



**RECOMMENDED PROCEDURE FOR INSTALLATION AND USE OF THE EMERGENCY RESCUE DEVICE IN THE H-60 HELICOPTER**

Installation:

1. Align ERD over the appropriate cargo hold-down rings. Pull the floor-mounted cargo rings through the elliptical slots in the ERD base plate. Turn the rings a quarter-turn and lay them in the slotted aluminum blocks. Lock each ring in place by inserting the 1/4" ball-lock pin completely to its stop. All three rings must be secured by ball-lock pins before the winch is safe to use.

2. Pay out 15 to 20 feet more line than established hover altitude. In heavy seas, pay out extra line.

3. Clip the stainless steel carabiner holding the Prusik Minding Pulley onto the mounting bracket on the hoist arm.

4. Disengage the guide roller ball-lock pin and slide the guide roller and ball-lock pin to the side just far enough to allow the 1/2" line to be placed under the guide roller. Replace the guide roller assembly and fully insert the ball-lock pin to its stop. The guide roller assembly is designed to stay intact and not fall away from its bracket. Do not forcibly remove the ball-lock pin.

Use:

1. After pilot directs flight mech to "begin the hoist" and "conn me in," flight mech delivers emergency rescue hook with rescue strop to rescue swimmer using standard commands and advisories.

2. Flight mech wraps the 1/2" line clockwise 2 to 3 times around the winch drum. He continues wrapping the line clockwise around the small chrome roller and into the self-tailing groove at the top of the winch. Additional wraps around the drum can be added if slippage occurs while cranking.

3. Once ERD hook with open rescue stop is delivered, rescue swimmer hooks the lifting V-ring of his harness to the large rescue hook. Rescue swimmer then routes the free end of the rescue strop under one arm, around his back, and under the other arm, then reconnects the V-ring on the free end of the rescue strop to the large rescue hook. Rescue swimmer then positions the rescue stop under his buttocks to use as a seat and gives a "ready for pickup" signal.

**NOTE**

Rescue swimmer must pay careful attention to prevailing seas, especially in high sea conditions. Swimmer must also be aware of entanglement hazard and must be careful not to get line wrapped around neck or extremities.

4. Flight mech conns pilot as necessary to stay over rescue swimmer, then down to minimum safe hoisting altitude and retrieves excess line. When pilot calls out minimum altitude, flight mech takes fourth wrap on capstan drum and conns pilot up until remaining slack is taken out and rescue swimmer is lifted out of the water.

**NOTE**

In heavy seas, the operation of the prusik knot as a wave crest passes and the water drops out from under the swimmer will cause the knot to tighten and the swimmer will be pulled from the water. If this happens, flight mech must conn the pilot up so the swimmer is not hit by next wave crest.

5. Flight mech installs winch handle on capstan drum and begins hoisting.

**NOTE**

Flight mech's position inside cabin during hoisting causes him to lose eye contact with rescue swimmer. Flight mech should monitor hoisting line closely for swinging and periodically check swimmer for spinning.

6. Once the swimmer is outside cabin door and the knot above the rescue hook is two to three inches away from the prusik, flight mech removes hoist handle from capstan drum. Flight mech positions swimmer so back is to the cabin, then grabs swimmer's harness and pulls swimmer in until in a standing position at door's edge. Flight mech removes wraps from the capstan drum and pushes up on prusik knot to release it as the swimmer backs his way into the cabin. Flight mech then reports "hoist complete."

INSTALLATION AND USE OF THE ARD IN THE H-60 HELICOPTER

**Anchoring the Alternate Recovery Device**

1- Align the ARD over the appropriate cargo hold-down rings. Pull the floor-mounted cargo rings through the elliptical slots in the ARD base plate. Turn the rings a quarter-turn (90°) and lay them in the slotted aluminum blocks. Lock each ring in place by inserting the 1/4" ball-lock pin completely to it's stop. *All three rings must be secured by ball-lock pins before the winch is safe to use.*

2- Clip the stainless steel carabiner holding the preset rope system and the Prussik Minding Pulley into the hard point on the extension arm of the electric winch mounted over the cargo door. A properly configured system should look like this:

3- Disengage the guide roller ball-lock pin and slide the guide roller and ball-lock pin to the side just far enough to allow the 1/2" rope to be placed under the guide roller. Replace the guide roller assembly and fully insert the ball-lock pin to it's stop. *Note: The guide roller assembly is designed to stay intact and not fall away from it's bracket. Do not forcibly remove the ball-lock pin.*

4- Deploy the 1/2" rescue rope to the necessary length.

5- Wrap the 1/2" rope clockwise 4 to 5 times around the winch drum. Continue wrapping the rope clockwise around the small chrome roller and into the self tailing grove at the top of the winch (see diagram below). Additional wraps around the drum can be added if slippage occurs while cranking.

6- Remove the winch handle from it's storage socket by pushing on the locking lever on top of the gear assembly.

7- Insert the gear end of the handle into the female splined socket on top of the winch.

Installation is now complete; the ARD is ready for use.

**Using the ARD as a lifting device**

The winch handle can be cranked in either direction providing two lifting speeds (mechanical advantages). The slower lifting speed (cranking clockwise) requires less [cranking] effort to lift the load but has a slower lifting rate. The faster lifting speed (cranking counter-clockwise) requires a greater effort but has a faster lifting rate.

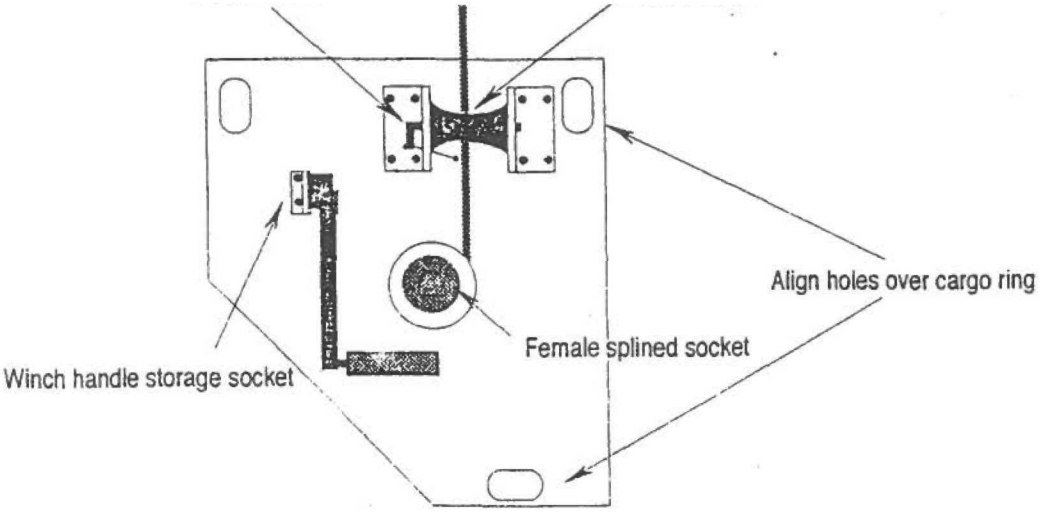
Cranking direction can be changed at any time without any modification or adjustment to the winch.

The ARD has been designed to be operated by a single crewmen but an additional person helping to crank the winch can reduce the effort required to lift heavy loads or may allow using the faster lift speed.

**Using the ARD as a lowering device.**

The ARD can be used as a lowering device by removing the rope from the self-tailing groove and the chrome roller and cautiously removing wraps from the drum one-at-a-time until the rope *just* slides through gloved hands when held loosely. *Although this procedure can be performed with a single crewman, it is more convenient and safer when a second crewman tends the Prussik knots.*

If the rope jams in the Prussiks, wrap the rope over the chrome roller and into the self-tailing groove and raise the load far enough to free the Prussik.




*Layout of ARD*

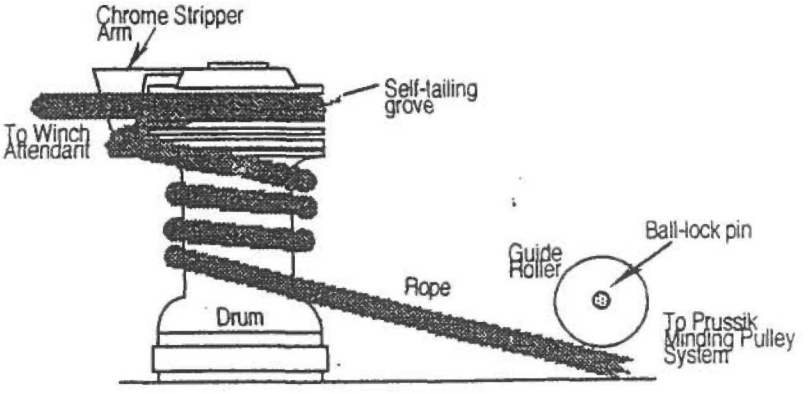
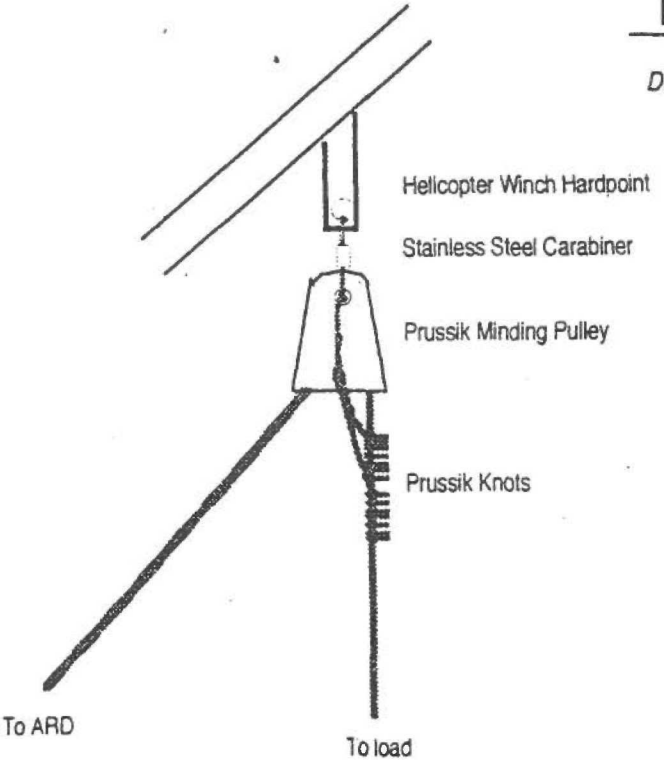



*Diagram of a properly wrapped Capstan (drum)*




*Setup and attachment of Prussik Minding Pulley system*

# Flight Safety

Pilot

1. A hover of approximately 15-20ft for RS "hook-up" is recommended for initial qualification.

2. Higher hoists with "Rescue Randy" may be desired.

FM

1. Rope Spin
   a. Attempt to control as you would with cable spin.
   b. If necessary, con acft to descend to allow swimmer to contact water.

2. Jammed Rope
   a. Release prussik and allow rope to pay out.
   b. If necessary, con acft to descend to lowest possible altitude and cut the rope.

RS

1. For Training/Qualification, swimmer will wear Direct Deployment seat harness.

2. Swimmer will wear helmet.

3. A safety swimmer will be in the water during the evolution.

# ALTERNATE RECOVERY DEVICE (A.R.D.) TRAINING SYLLABUS

## GROUND PHASE

### I. INTRODUCTION

The ground phase provides you with a working knowledge of the A.R.D. equipment, hand signals, and procedures required while performing an Alternate Recovery of a Rescue Swimmer.

The ground phase must be completed prior to entering the flight phase.

### II. OBJECTIVES

A. After completing this phase, the student will be able to:

1. Identify A.R.D. equipment and components.
2. Identify hookup points in aircraft and on hoist mount.
3. Describe hoisting procedures for an Alternate Recovery of a Rescue Swimmer.

### III. ENABLING OBJECTIVES

A. The student will demonstrate a working knowledge of and the ability to use the following equipment or procedures:

1. Rig all A.R.D. equipment [ ]
2. Identify attachment points [ ]
3. Hand signals [ ]

B. Student will describe:

1. When the A.R.D. should/should not be used [ ]
2. Contents of rescue brief [ ]
3. Procedures for Alternate Recovery of Rescue Swimmer using the A.R.D. [ ]

### IV. COMMENTS (On Back)

Instructor/Signature/Date_____
Comments:

# FLIGHT QUALIFICATION

FLIGHT PHASE

I. INTRODUCTION

The flight phase is designed to help you achieve proficiency, standardization, and safety when acting as a flight mechanic using the A.R.D.

II. OBJECTIVES

A. After completing this phase, the student will be able to:

1. Perform a Alternate Recovery of a Rescue Swimmer.

III. FLIGHT PREPARATION

WARNING: SIMULATED EMERGENCIES SHALL NOT BE CONDUCTED DURING LIVE HOISTS.

A. Briefing-discuss:
   1. Hand signals [ ]
   2. Rescue briefing [ ]
   3. Hoisting evolutions [ ]

IV. FLIGHT

A. Perform:
   1. Mount A.R.D. to floor of aircraft and rig remaining equipment for recovery. [ ]
   2. Alternate Recovery of Rescue Dummie from a 30 ft hover. [ ]
   3. Alternate Recovery of Rescue Swimmer from lowest possible hover. [ ]

B. Debrief: [ ]

V. COMMENTS (On Back)

Instructor/Signature/Date_____
Comments:

**ALTERNATE RECOVERY DEVICE (A.R.D.)**
**FLIGHT MECHANIC SYLLABUS**

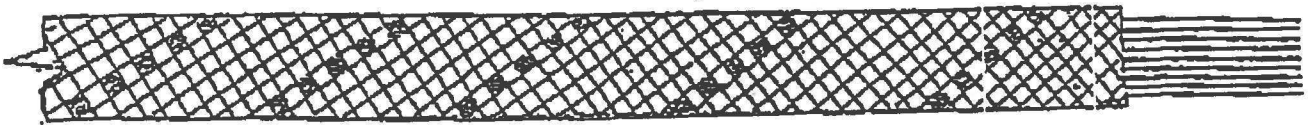
**QUALIFICATION REQUIREMENTS**

Upon satisfactory completion of this syllabus a flight mechanic will be qualified to use the Alternate Recovery Device. This syllabus provides the minimum skills and knowledge required to perform an Alternate Recovery of a Rescue Swimmer.

_____ has completed the Alternate Recovery Device training syllabus and is qualified to use the device.

_____
Instructor/Date

# ROPE



1/2" Static Kernmantle

| | |
|---|---|
| Material: | Dupont 707 type 6.6 nylon |
| Construction: | Braided nylon sheath over parallel continuous strands of nylon fibre core. |
| Elongation: | Less than 2% at 200 lbs. |
| Strength: | 9,000 lbs.<br>sheath - 15%<br>core - 85% |
| *Note: | Prusik Rope - 1/4" - 1885 lbs. |