



# Physical Fitness Tests and Standards

for AIR LIAISON OFFICER  
and TACTICAL AIR CONTROL PARTY OPERATORS





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## Operator Physical Fitness Tests and Standards

Air Liaison Officer (ALO) and Tactical Air Control Party (TACP) leadership will soon institute new physical fitness (PF) requirements. These requirements will help ensure that operators have the necessary physical abilities to perform their critical job-related duties. This document describes the steps used to determine these new requirements, including the prototype PF tests and standards that are projected for implementation in 2017. Operators and trainees will have 12 months after the standards are implemented to adapt to the new tests before the standards are officially enforced.

### Why New Physical Tests and Standards?

Per Air Force Instruction (AFI) 36-2905, all Airmen must maintain a certain level of PF to meet the science-based standards of the Air Force-wide fitness assessment. This assessment, referred to as a *Tier 1* PF test, is designed with health criterion standards to ensure Airmen are present for duty in good health and general fitness. However, Tier 1 scores do not necessarily reflect military task achievement. Some specialties, including ALO and TACP, require higher and broader levels of PF to meet the physical demands of their operational mission sets. Thus, such specialties need an additional set of PF tests and standards based on job requirements specific to the Air Force Specialty Codes (AFSCs). We refer to these occupationally specific, operationally relevant tests and standards as *Tier 2* PF tests and standards. With support from RAND Project AIR FORCE (PAF), the Air Force Exercise Science Unit (ESU) began the process of developing Tier 2 physical standards for Battlefield Airmen (BA) operators in October 2011. ALO and TACP career fields were the only BA specialties without an official, periodically required operator PF test.

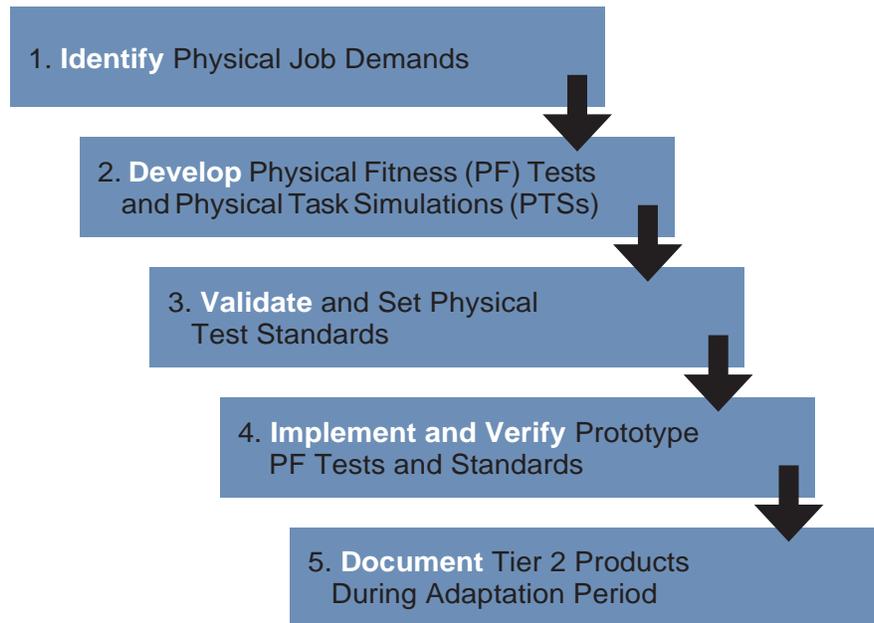
### What is the Process to Develop Tier 2 PF Tests and Standards?

As seen in Figure 1, the Tier 2 fitness tests and standards development process has five steps. In brief, the ESU identified, described, and quantified physically demanding job tasks (Step 1), used those tasks as a foundation to develop realistic physical task simulations (Step 2), and then examined how well different PF tests predicted performance on those simulations in a study using Airmen from a range of occupational specialties (Step 3). Statistical analyses were used to determine the optimal combination of tests to predict physical readiness to perform AFSC-specific critical physical job tasks. In conjunction with the ALO-TACP career fields, the ESU implemented an ALO-TACP Operator Prototype PF Test at 13 Air Support Operations Squadrons (ASOSs) and will conduct final verification testing in January/February 2017 with 60 ALO-TACP operators (Step 4). The last step is to document the final Tier 2 tests and standards and associated studies supporting their validity (Step 5) concurrently with the adaptation period. For a more detailed discussion of these steps, see page 16.

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Figure 1. Tier 2 PF Tests and Standards Process

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## ALO-TACP Operator Prototype PF Test

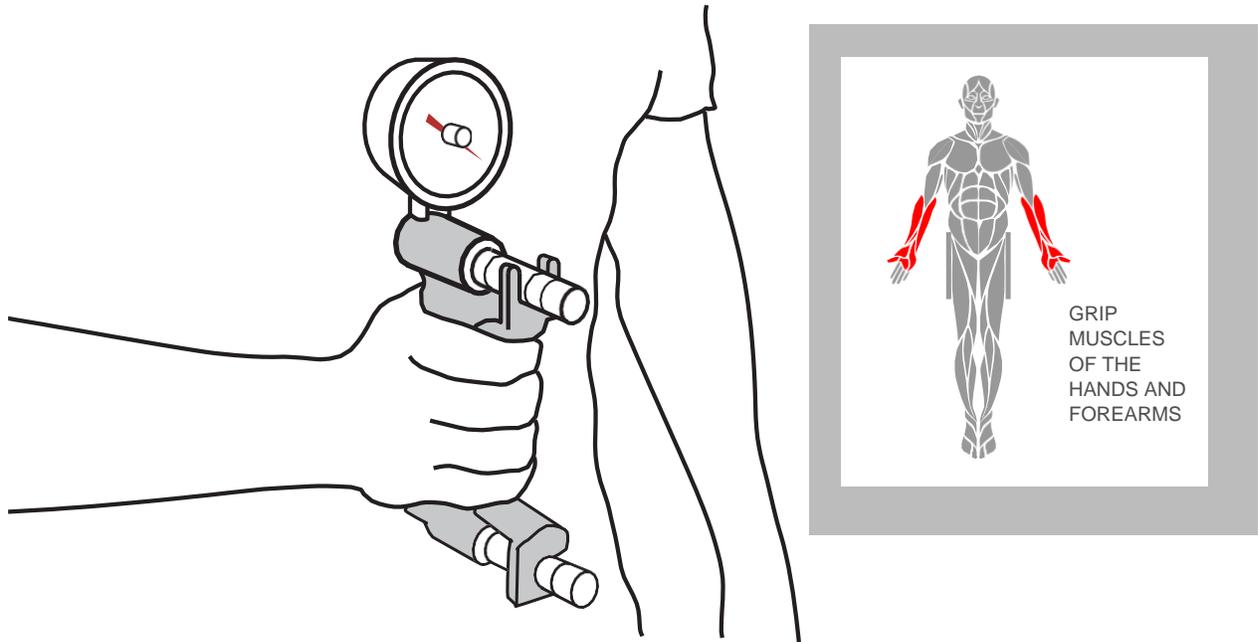
The following sections briefly describe each test component in the ALO-TACP Operator Prototype PF Test. Test component descriptions highlight the specific purpose of the test, muscle groups measured, protocol for administering the test, component scoring, and the relevance of the test—that is, the operational capabilities (critical physical tasks) predicted by the test. **The scoring system is a prototype, and the ESU, in conjunction with ALO-TACP leadership, may modify the scoring per data collected in verification.** Prototype test components are:

1. Grip Strength .....	page 3
2. Medicine Ball Toss, back and side .....	page 4
3. Three Cone Drill.....	page 6
4. Trap Bar Deadlift, 5 RM.....	page 7
5. Pull-Up.....	page 8
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7. Extended Cross Knee Crunch, metronome.....	page 10
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10. Run, 1.5 miles .....	page 13

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## GRIP STRENGTH

**PURPOSE:** Measure muscular strength in the hands and forearms



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### PROTOCOL

1. The test administrator will adjust the hand-grip size to a position that is comfortable for you.
2. Grasp the hand dynamometer in your right hand with gauge facing away from the body.
3. Stand straight, with your upper arm in contact with the torso, elbow flexed at 90°, forearm parallel to the ground, and wrist in slight extension (0° to 30°).
4. Squeeze the dynamometer as hard as possible for 2 seconds to 3 seconds with no extra body movements.
5. Alternate hands for each trial.

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### TEST SCORING

Score	1	2	3	4	5	6	7	8	9	10
Grip Strength (PSI)	95	108	117	124	130	137	144	153	166	198

COMPONENT MINIMUM SCORE

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### RELEVANCE OF TEST

The grip strength test measures muscular strength. Although grip strength could be redundant with other strength measures, our study found that it was an important addition to the test battery, even when pull-ups and the trap bar deadlift are included. Specifically, grip strength contributes to the success of several important tasks that were represented in the physical task simulations. These tasks include the ability to maintain a firm grasp when lifting and carrying litters, executing a casualty drag, and pulling a rescue sled during a casualty movement.

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## GRIP STRENGTH

EQUIPMENT hand dynamometer, chalk

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### PTL GUIDENCE

The BA PTL will adjust the handgrip size to a position that is comfortable for the member (recommend 2nd or 3rd setting starting from the gauge).

Two trials are administered for each hand, allowing a 1 min rest between trials. BA PTL will throw out the highest and lowest scores and record best score from the remaining scores (either the right or left grip strength measurement).

Concluding testing, BA PTL must ensure the dynamometer is safely stored at room temperature.

There is a mandatory minimum 1 minute rest period before the Medicine Ball Toss may begin.

FORM COAHING

PROGRESSION

WORK OUTS

PROGRAMMING

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## MEDICINE BALL TOSS, back and side

**PURPOSE:** Measure muscular power

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### PROTOCOL (Back Toss):

1. Grasp the medicine ball with both hands and stand with heels at, not on, the starting line, with both hands at hip level.
  2. Bend at your knees and toss the medicine ball from an underhand position overhead.
  3. Face backward throughout the entire toss.
  4. Both feet are to remain in contact with the ground.
  5. Alternate back toss with side toss (one trial), allowing a 1-minute rest period between each trial.
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### PROTOCOL (Side Toss; use dominant side):

1. Grasp the medicine ball with both hands and align both feet parallel to the line, in a shoulder-width stance.
  2. Rotate trunk as a counter-movement. Follow this motion by rotating trunk in the throwing direction as you toss the medicine ball as far as possible.
  3. Both feet are to remain in contact with the ground. A pivot of the back foot is allowed.
  4. Overhand throwing or putting, e.g., shot-put, is not permitted.
  5. Alternate side toss with back toss (one trial), allowing a one minute rest period between each trial.
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### TEST SCORING

Score	1	2	3	4	5	6	7	8	9	10
Medicine Ball Toss sum (feet)	30.0	33.5	35.5	37.5	39.0	40.5	42.0	44.5	47.5	50.5

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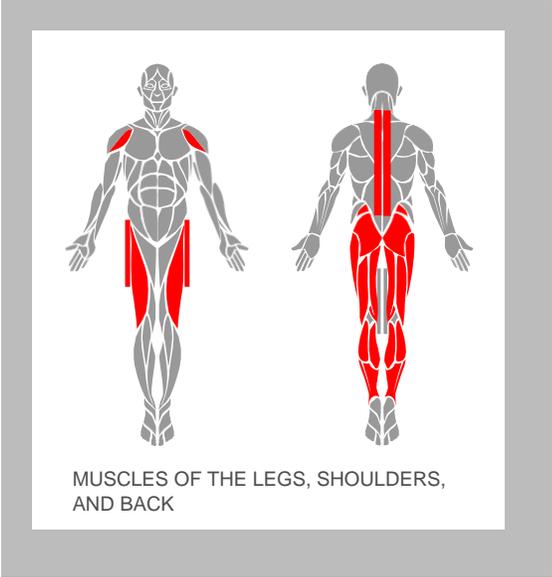
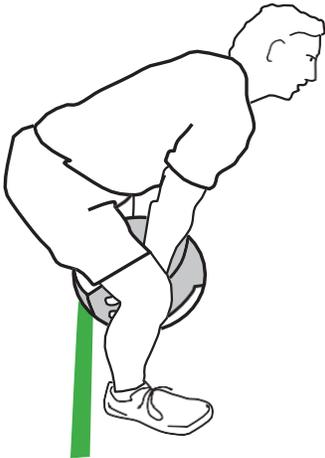
COMPONENT MINIMUM SCORE

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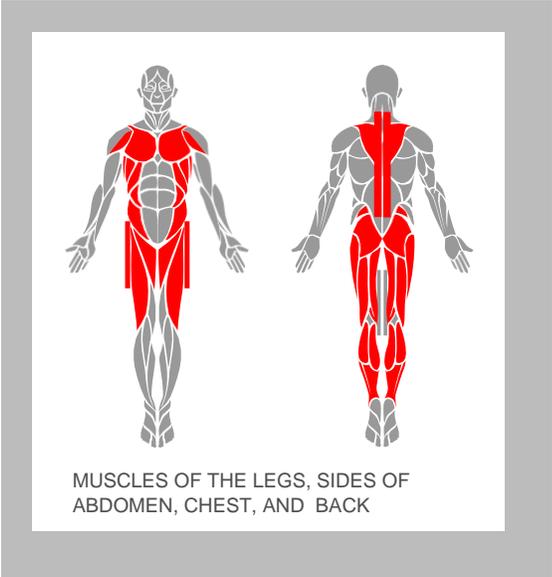
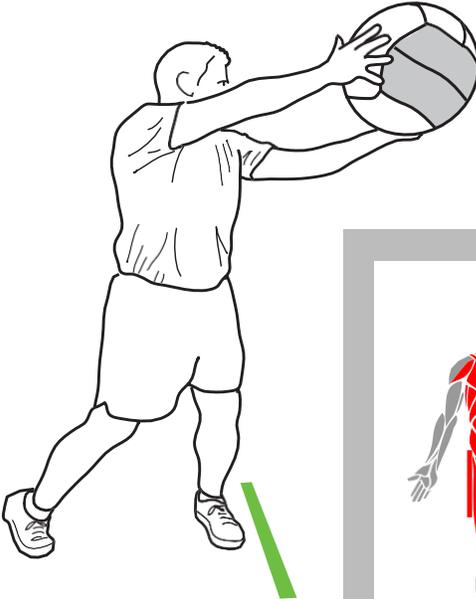
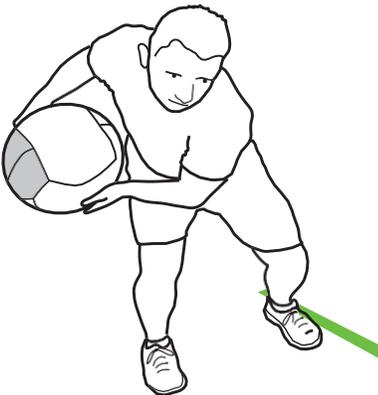
### RELEVANCE OF TESTS

The medicine ball toss measures muscular power. Muscular power contributes to the success of tasks that require quick explosive movements to maneuver equipment and personnel. These tasks include executing a buddy drag to pull an injured person to a safe location, casting equipment over obstacles, and lifting and loading equipment. The medicine ball toss was found to be the second most versatile predictor of performance in the physical task simulations; it predicts performance across all ALO-TACP physical task simulations.

**Medicine Ball Toss,  
back**



**Medicine Ball Toss,  
side**



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## **MEDICINE BALL TOSS, back and side**

**EQUIPMENT: 20 lb medicine ball (14 in diameter), tape measure, marking material (i.e tape, chalk, paint)**

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NOTE 1: Prior to testing, TACP PTL will weigh medicine balls to ensure that each ball weighs 20 lbs. (+ or – 1 lb.) TACP PTL should contact AF Fit Unit if medicine balls are not within weight requirements; measure and mark a 35 foot landing zone in 1 foot increments.

NOTE 2: Measurement is made from the front of the line (side closest to the subject) to the point where the ball lands (center of the ball) in one half foot increments.

NOTE 3: TACP PTL will record the longest distance from the back and side tosses and add together for a combined score.

NOTE 4: In the event that the member fouls on all three trials, the TACP PTL/Assistant may allow an additional trial.

NOTE 5: There is a mandatory minimum 1 minute rest period before the Three Cone Drill may begin.

FORM COACHING

PROGRESSION

WORK OUTS

PROGRAMMING

# TWO CONE DRILL

**PURPOSE:** Measure agility, balance and coordination

## PROTOCOL:

1. Start from the prone position; legs extended and together, head behind the start line.
2. On the “Go” command, push yourself up from the starting line at cone A and sprint forward to the line at cone B [1], touching the line at cone B with your hand.
3. Reverse direction and sprint forward to the line at cone A [2], touching the line at cone A with your hand.
4. Change direction and sprint forward towards cone B [3]. Round cone B counter clockwise keeping cone B to your left (left shoulder to the inside of the turn).
5. Sprint forward towards cone A [4]. Round cone A clockwise keeping cone A to your right (right shoulder to the inside of the turn).
6. Sprint forward toward the line at cone B [5], touching the line at cone B with your hand.
7. Reverse direction and run BACKWARDS finishing through the original starting line at cone A [6].

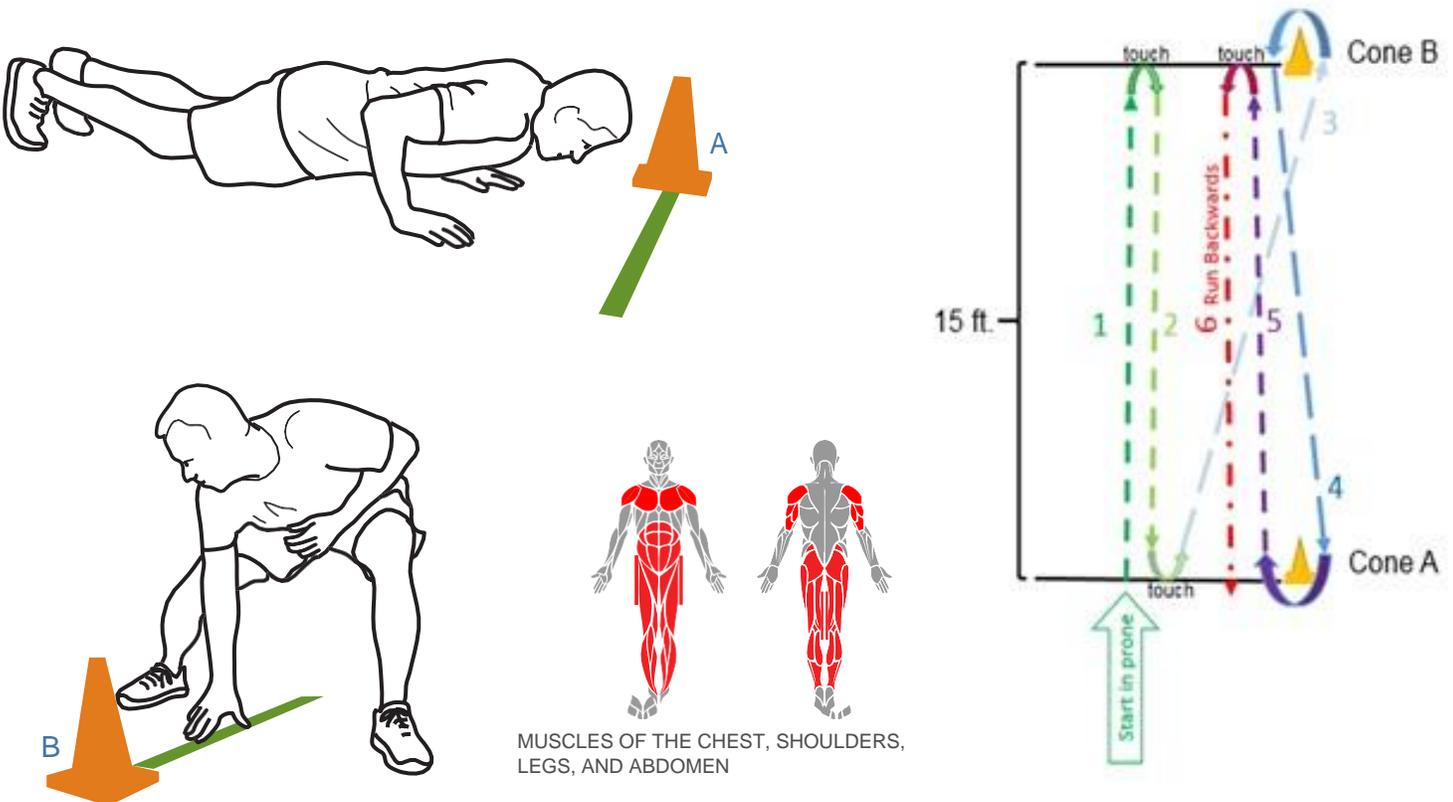
## TEST SCORING

Score	1	2	3	4	5	6	7	8	9	10
Two Cone Drill (seconds)	11.1	10.7	10.4	10.2	10.0	9.8	9.5	9.3	8.9	8.6

COMPONENT MINIMUM SCORE

## RELEVANCE OF TEST

The two-cone drill is a measure of agility, needed to perform tasks that require quick changes in body position or direction of the body. Specifically, the two-cone drill helps predict an operator’s ability to execute a low crawl, perform a series of three- to five-second rushes, take cover, and other individual movement techniques.



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## TWO CONE DRILL

**EQUIPMENT:** Two small orange safety cones, tape or paint, nonslip testing surface, standard stopwatch or electronic testing device

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NOTE 1: LAYOUT: Prior to testing, BA PTL places two cones five yards (15 feet) apart from each other on a flat, clean surface; marks (with tape, chalk, paint) a start / finish line (4 feet) at cone A and a line (4 feet) at cone B.

NOTE 2: TEST SURFACE: Recommend test be performed on thin government carpet, basketball courts, turf, or rubber flooring.

NOTE 3: Two timers are required for this test. Second timer does not need to be a BA PTL. All times are taken from the lead timer.

NOTE 4: Time will begin on member's first movement and end when member passes the line at cone A.

NOTE 5: Complete three trials of this test with a minimum of one minute rest between each trial.

NOTE 6: BA PTL will record time to the nearest hundredth of a second, e.g., 9.16 seconds.

NOTE 7: In the event that the member fouls on all three trials, the BA PTL may allow an additional trial

# TRAP BAR DEADLIFT, 5 RM

**PURPOSE:** Measure muscular strength

## PROTOCOL:

1. Prior to testing, the test administrator will weigh the trap bar and mark the weight on the bar; you will adequately warm up with a light weight. The trap bar deadlift consists of three phases: preparatory, upward movement, and downward movement.
2. Preparatory Phase: Stand inside the trap bar and grasp the handles centered on the grips (if a dual-handled trap bar is used, you will grasp the lower handles, with the upper handles facing down). Arms should be fully extended, back flat, chest held up and out, head in line with the spinal column or slightly hyperextended, heels in contact with the floor, and eyes focused straight ahead or slightly upward. All repetitions will begin from this position.
3. Upward Movement Phase: Stand up and lift the bar by extending your hips and knees. Hips should not rise before your shoulders. Back should remain flat. Continue to extend the hips and knees until you are standing up. There is a slight pause at the top of this movement.
4. Downward Movement Phase: Slowly lower the bar to the floor while still maintaining a flat-back position. Do not lean forward. Trap bar weight plates must touch the floor before beginning the next repetition (“touch and go”).

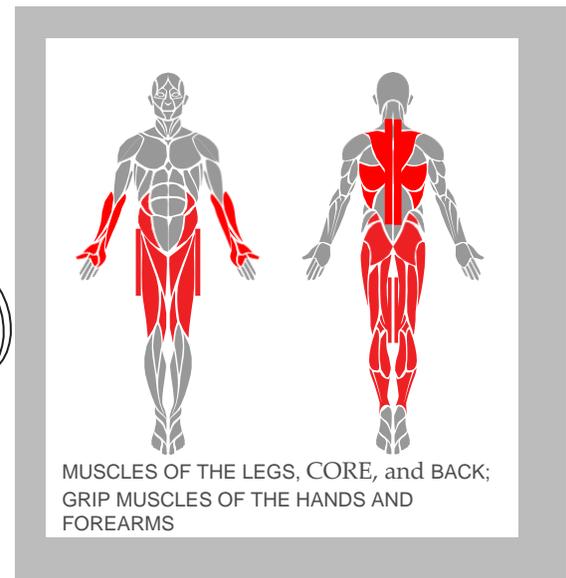
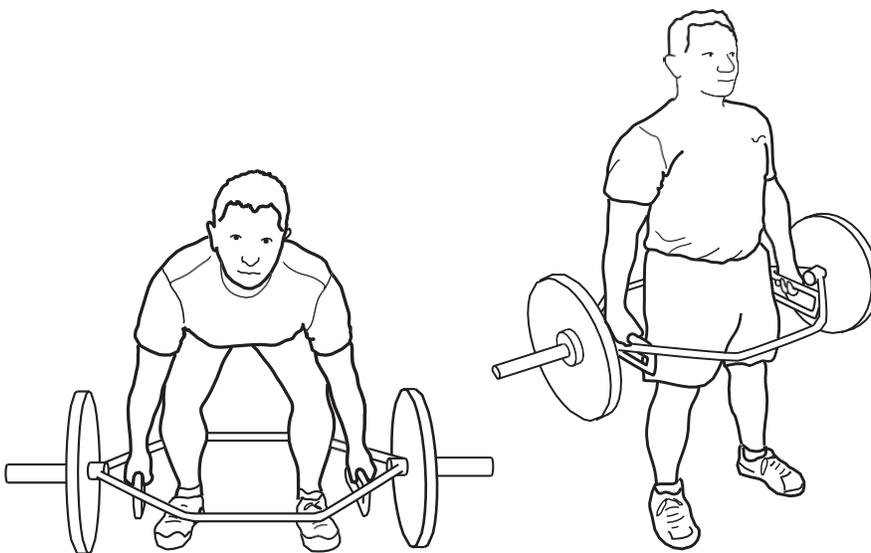
## TEST SCORING

Score	1	2	3	4	5	6	7	8	9	10
5 RM Trap Bar Deadlift (lb)	202	232	252	268	284	299	316	335	365	415

↑ COMPONENT MINIMUM SCORE

## RELEVANCE OF TEST

The trap bar deadlift is a muscular strength test that mimics movements required to safely and effectively lift heavy loads from the ground. For example, the trap bar deadlift is a strong predictor of an operator’s ability to lift and carry a casualty on a litter and to lift and move personnel and equipment.



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## **TRAP BAR DEADLIFT, 5 RM**

**EQUIPMENT: : Trap Bar (Hex Bar), weight plates, collars, chalk**

# PULL-UP

**PURPOSE:** Measure muscular strength

## PROTOCOL (a two-count exercise):

1. Starting position: Hang from a bar, palms facing away from you with no bend in your elbows (“dead hang”). Place hands approximately shoulder-width apart.
2. Count one: Pull your body up until your chin is over (not at) the bar. Legs may bend but cannot be kicked or used in any way to aid upward movement (no “kipping”).
3. Count two: Return to the starting position. If you fall off or release from the bar, the test is terminated.

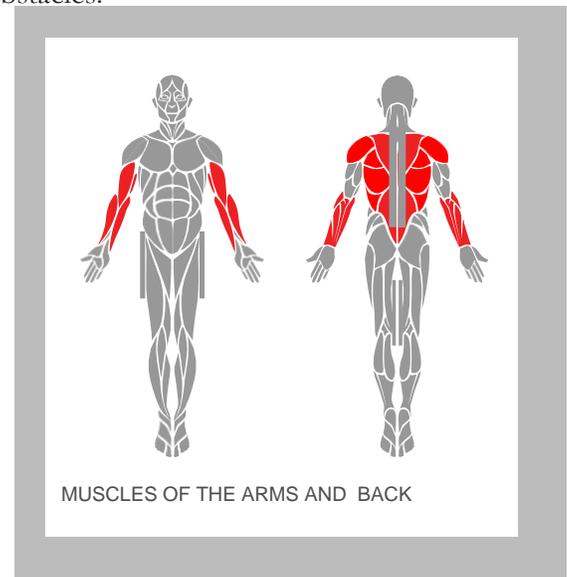
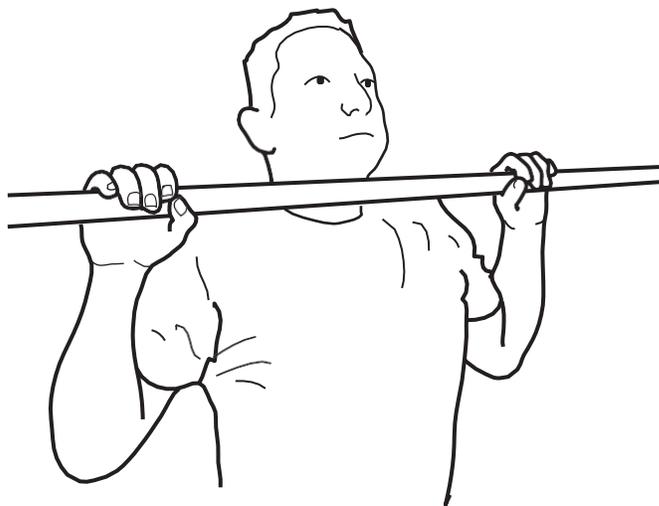
## TEST SCORING

Score	1	2	3	4	5	6	7	8	9	10
Pull-Up (repetitions)	7	11	13	16	18	20	22	24	28	32

↑  
COMPONENT MINIMUM SCORE

## RELEVANCE OF TEST

Pull-ups are a measure of muscular endurance, which is an important ability for lifting, carrying, and pulling equipment or personnel. For example, pull-ups were found to be a strong indicator of operators’ ability to react to contact and drag a simulated casualty to safety. Muscular endurance is also required when repetitively pulling yourself up and over walls or other obstacles.



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## **PULL-UP**

**EQUPTMENT:** Standard pull-up bar

# LUNGES, Weighted, 50 lb, Metronome

**PURPOSE:** Measure muscular endurance

## PROTOCOL (a two-count exercise):

1. Prior to testing, the test administrator will weigh the sandbags to ensure each bag weighs 50 lb.
2. Starting position: Stand with a 50 lb sandbag resting behind the neck and across the shoulders; hold onto the handles or rest your arms around the sandbag.
3. The first movement is to step forward, kneeling down.
4. The second movement is to push the body upright and step back.
5. Alternate right and left leg, so the heel of your front leg is a minimum of 4 inches (10 cm) in front of the knee of your back leg; the knee of your back leg may touch the floor but must be no higher than 4 inches (10 cm) above the floor.
6. Your back must remain stable and your knee should not pass your toes (of the same leg) while lunging.
7. A lunge is counted with the successful completion of movements one and two. The lunge is repeated, continuously, in cadence (56 beats per minute, or bpm) to the limit of muscular endurance.
8. If repetitions are not continuously in cadence with the metronome for two or more repetitions, the test will be terminated. The goal of this event is to complete as many correct repetitions as possible without rest; there is no authorized rest position for this test.

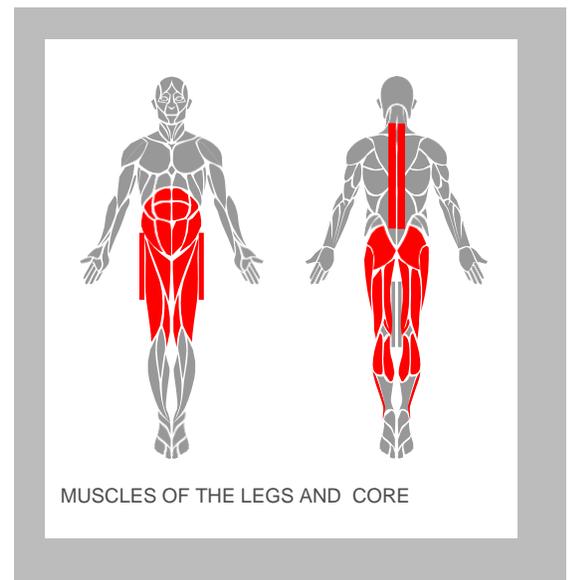
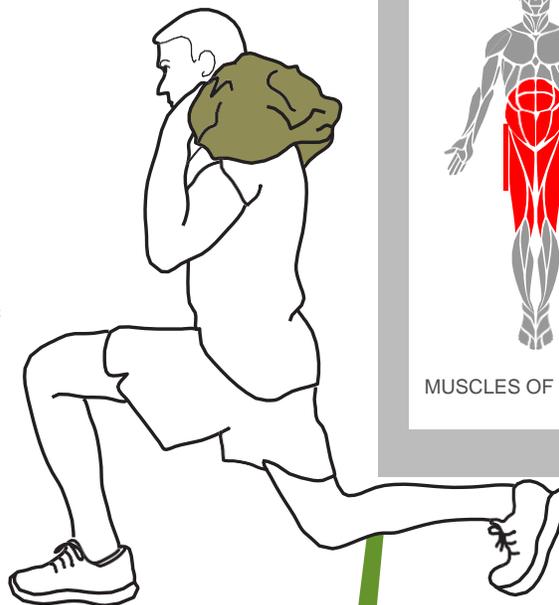
## TEST SCORING

Score	1	2	3	4	5	6	7	8	9	10
Lunges (repetitions)	24	43	58	73	88	104	123	148	161	199

↑  
COMPONENT MINIMUM SCORE

## RELEVANCE OF TEST

Lunges are a measure of muscular endurance, necessary to sustain long distance movements on foot, especially when carrying heavy loads. Lunges were found to be a strong predictor of operators' times to complete a 5 km ruck march under load. This test was also found to contribute to the prediction of several other tasks, including transporting casualties and executing maneuvers when reacting to contact.



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## **LUNGES, Weighted, 50 lb, Metronome**

**EQUIPMENT: 50 lb. sandbag, metronome (56 beats per minute (bpm))**

## EXTENDED CROSS KNEE CRUNCH, Metronome

**PURPOSE:** Measure muscular endurance

### PROTOCOL:

1. Starting position: Lie with your back flat on the surface, legs straight, arms crossed, and hands locked under armpits.
2. Slide feet in while bringing the left elbow and shoulder across your body to reach your left elbow to the top of your right knee. Back must be vertical (straight) to the surface.
3. Return to the starting position. This is one crunch.
4. Slide feet in while bringing your right elbow and shoulder across your body to reach your right elbow to the top of your left knee. Back must be vertical (straight) to the surface.
5. The sequence is repeated, continuously, in cadence (56 bpm) to the limit of muscular endurance.
6. If repetitions are not continuously in cadence with the metronome for two or more repetitions, the test will be terminated. There is no authorized rest position for this test.

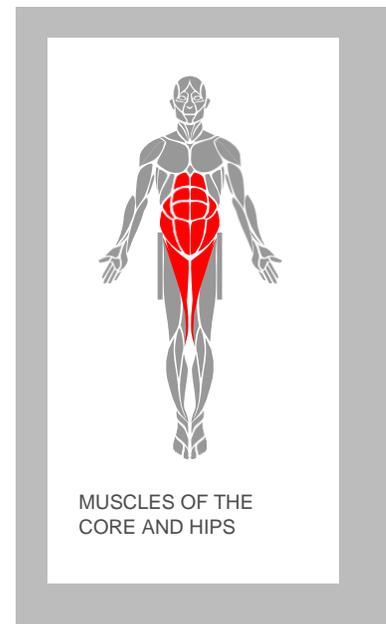
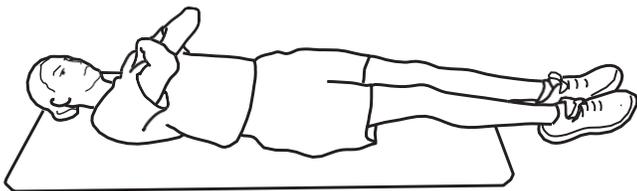
### TEST SCORING

Score	1	2	3	4	5	6	7	8	9	10
Extended Cross Knee Crunch (repetitions)	31	39	46	52	57	62	69	79	94	107

↑  
COMPONENT MINIMUM SCORE

### RELEVANCE OF TEST

The extended cross knee crunch is a muscular endurance test targeting the core and trunk muscles, which provide the stability needed to safely perform a wide range of physically demanding tasks. Because the extended cross knee crunch is a relatively new addition to the test battery, it is undergoing further review to identify which tasks it best predicts.



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## **EXTENDED CROSS KNEE CRUNCH, Metronome**

**EQUIPMENT:** Level ground or mat, stopwatch, 56 bpm metronome

# FARMER'S CARRY, 2x50 lb, 25 yard shuttle

**PURPOSE:** Measure muscular strength and anaerobic capacity

## PROTOCOL:

1. Starting position: Stand between two sandbags positioned behind the starting line. The sandbags may be lifted and put down to familiarize yourself with the weight, but bags and body must be behind the starting line before the test begins.
2. Squat down between the two 50 lb sandbags and grasp the handles.
3. Time starts on the "Go" command.
4. Lift the sandbags and walk, jog, or run with one sandbag in each hand to the cone 25 yards away. Turn around the 25 yard cone and maneuver back to the starting line cone, turn around the starting line cone and repeat the maneuver. Time stops when both the member and the sandbags cross the finish line after two shuttles.
5. Sandbags must be carried by the handles and may not be carried on the shoulders or cradled in the arms.
6. A sandbag must be picked up if dropped. You and the bags must cross the finish line.

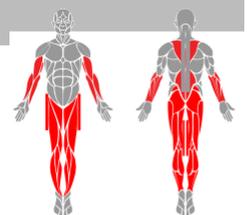
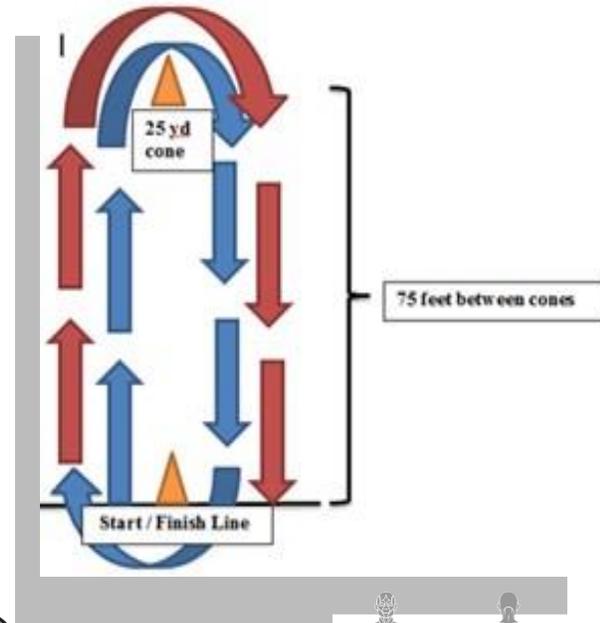
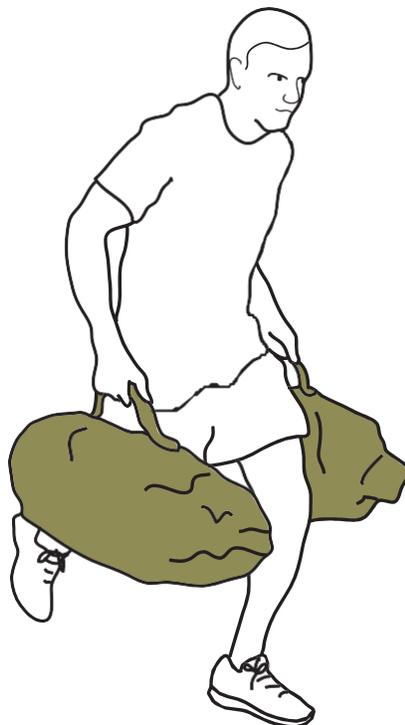
## TEST SCORING

Score	1	2	3	4	5	6	7	8	9	10
Farmer's Carry (seconds)	26.2	24.2	22.8	21.7	20.7	19.6	18.5	17.2	15.1	13.2

↑  
COMPONENT MINIMUM SCORE

## RELEVANCE OF TEST

The farmer's carry is a measure of muscular strength and anaerobic capacity, abilities needed to exert effort at high intensity levels for relatively brief periods of time, from a few seconds to one minute. The farmer's carry was found to be the most important predictor across all tasks evaluated in the validation study. For example, the farmer's carry contributed to the prediction of an operator's ability to extract a simulated casualty from a vehicle and cross load the simulated casualty to another vehicle.



ANAEROBIC  
CAPACITY, MUSCLES  
OF THE ARMS AND  
LEGS

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## **FARMER'S CARRY, 2x50 lb, 25 yard shuttle**

**EQUIPMENT: Two 50lb sandbags with handles, 2 cones, 2 stopwatches, two timers are required for this test**

## ROW ERGOMETER, 1000 Meters

**PURPOSE:** Measure cardiorespiratory endurance, anaerobic capacity, and muscular endurance

### PROTOCOL:

1. Starting position: Sit in the row ergometer. Ensure that the straps are tightened securely around the widest part of your shoes.
2. The aim of the test is to cover 1000 m in the shortest possible time.
3. Time starts on your first pull, and the rower will keep track of your time and distance.

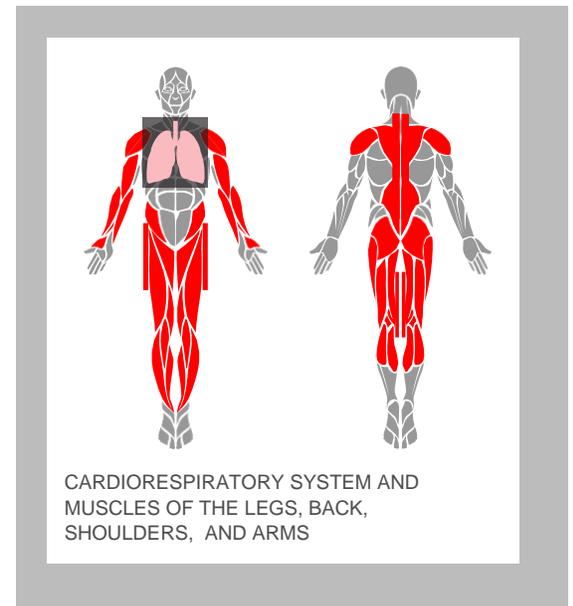
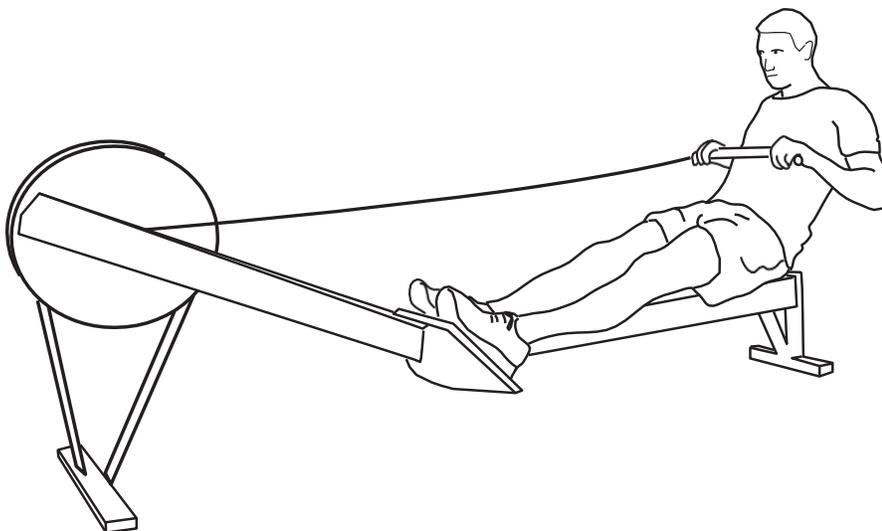
### TEST SCORING

Score	1	2	3	4	5	6	7	8	9	10
Row Ergometer (mins:secs)	4:10	4:01	3:56	3:52	3:48	3:43	3:39	3:34	3:25	3:19

↑  
COMPONENT MINIMUM SCORE

### RELEVANCE OF TEST

The row ergometer measures cardiorespiratory endurance, anaerobic capacity, and muscular endurance, important abilities for sustaining moderate to high intensity physical effort over time. Individuals who performed well on the row ergometer demonstrated a strong capability for moving casualties over distance. Specifically, the row ergometer contributed to the prediction of operators' ability to execute a fireman's carry, transport a casualty using a sled, and carry a simulated litter over distances greater than 100 m. Also, because the row ergometer measures cardiorespiratory endurance, it is a good indicator of how quickly operators will recover between and after repetitive bouts of physically demanding work.



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## **ROW ERGOMETER, 1000 Meters**

**PURPOSE:** Measure cardiorespiratory endurance, anaerobic capacity, and muscular endurance

## RUN, 1.5 Miles

**PURPOSE:** Measure cardiorespiratory endurance

### PROTOCOL:

1. Line up behind the starting line and begin running on the “Go” command.
2. No physical assistance from anyone or anything is permitted.
3. Remain on the designated course for the entire distance. If you deviate from or depart the course, you are disqualified and your test is terminated.
4. The test administrator will call out split times as you pass the start line each lap.
5. The test administrator will call out and record your completion time.

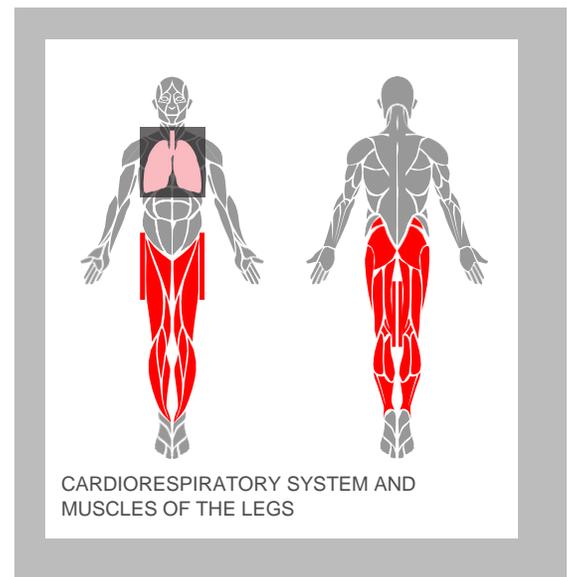
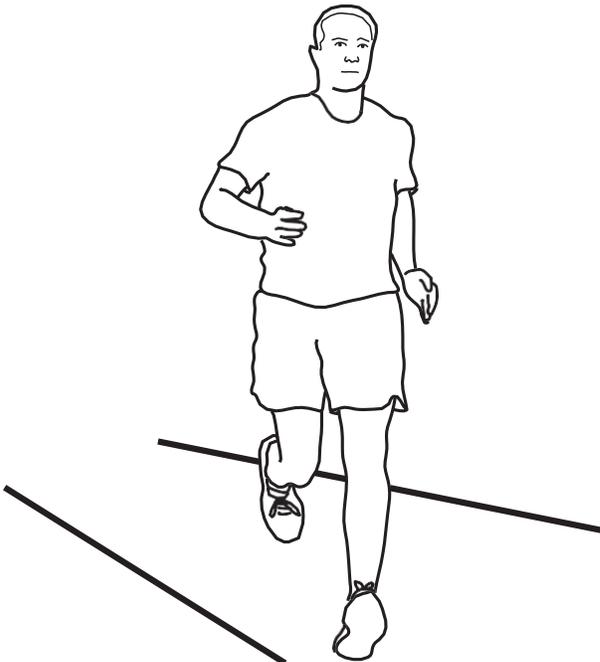
### TEST SCORING

Score	1	2	3	4	5	6	7	8	9	10
Run, 1.5 miles (mins:secs)	12:35	11:48	11:16	10:49	10:26	10:01	9:35	9:03	8:15	7:40

↑  
COMPONENT MINIMUM SCORE

### RELEVANCE OF TEST

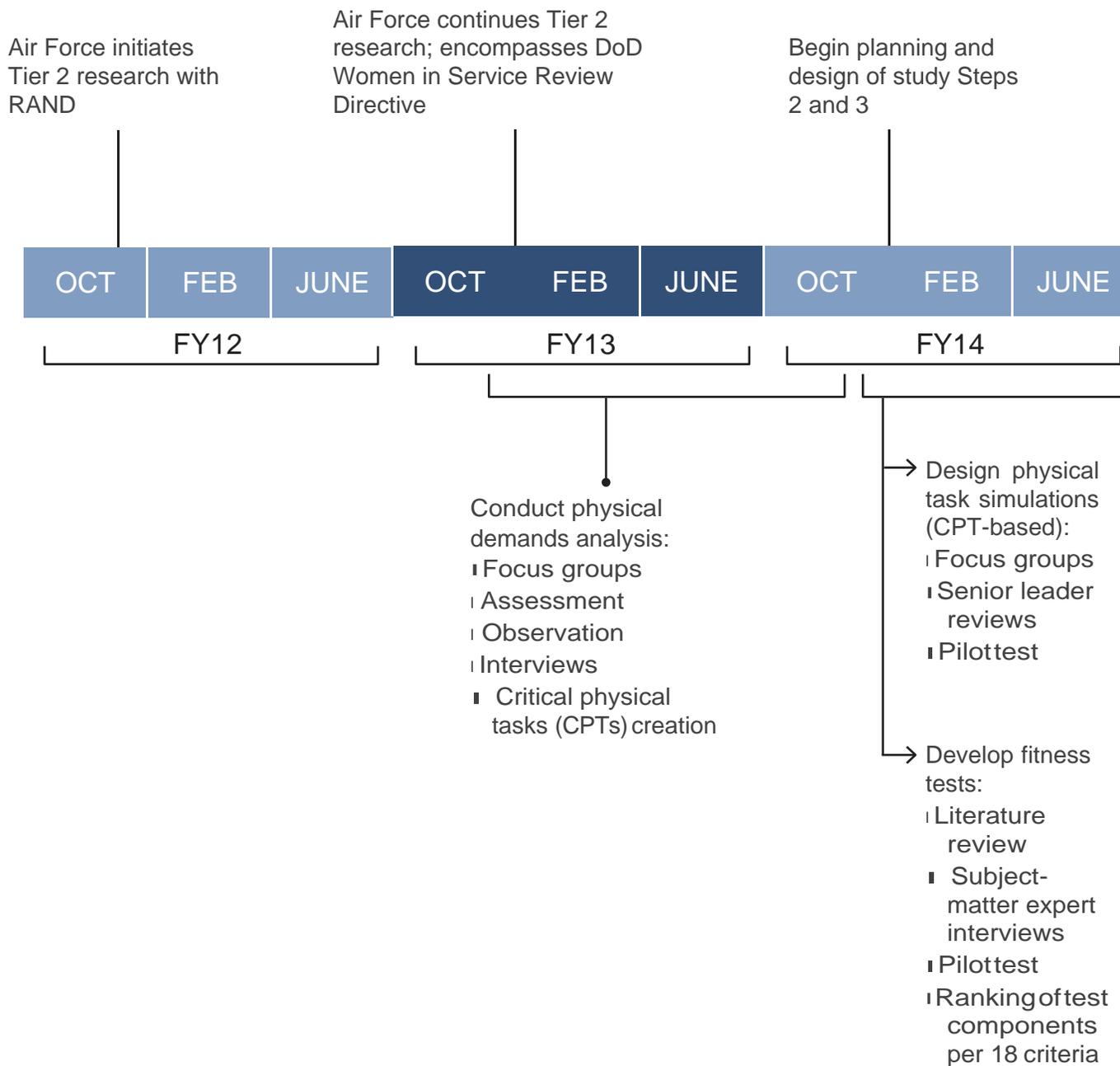
The 1.5 mile run primarily measures cardiorespiratory endurance, which is an important ability for conducting extended operations and ground movements on foot. Specifically, the 1.5 mile run contributes to the prediction of an operator’s ability to execute a long distance ruck march while carrying a heavy load. Having higher cardiorespiratory endurance also helps ensure the body can recover quickly and be prepared to execute other physically demanding tasks that may arise during a ground movement or immediately following, such as reacting quickly to enemy contact.



## A More Detailed Look at the Steps for Developing the Tier 2 ALO-TACP Operator Prototype PF Test

The following sections provide more detail on the steps and data gathered to develop the operator prototype PF tests. First, we present a timeline that highlights major milestones in the Tier 2 process. The Tier 2 process for ALO and TACP career fields has been a multiyear effort combining the expertise of the RAND Corporation and the Air Force. As illustrated in

Figure 2. Timeline for Developing the Tier 2 ALO-TACP Operator Prototype PF Test

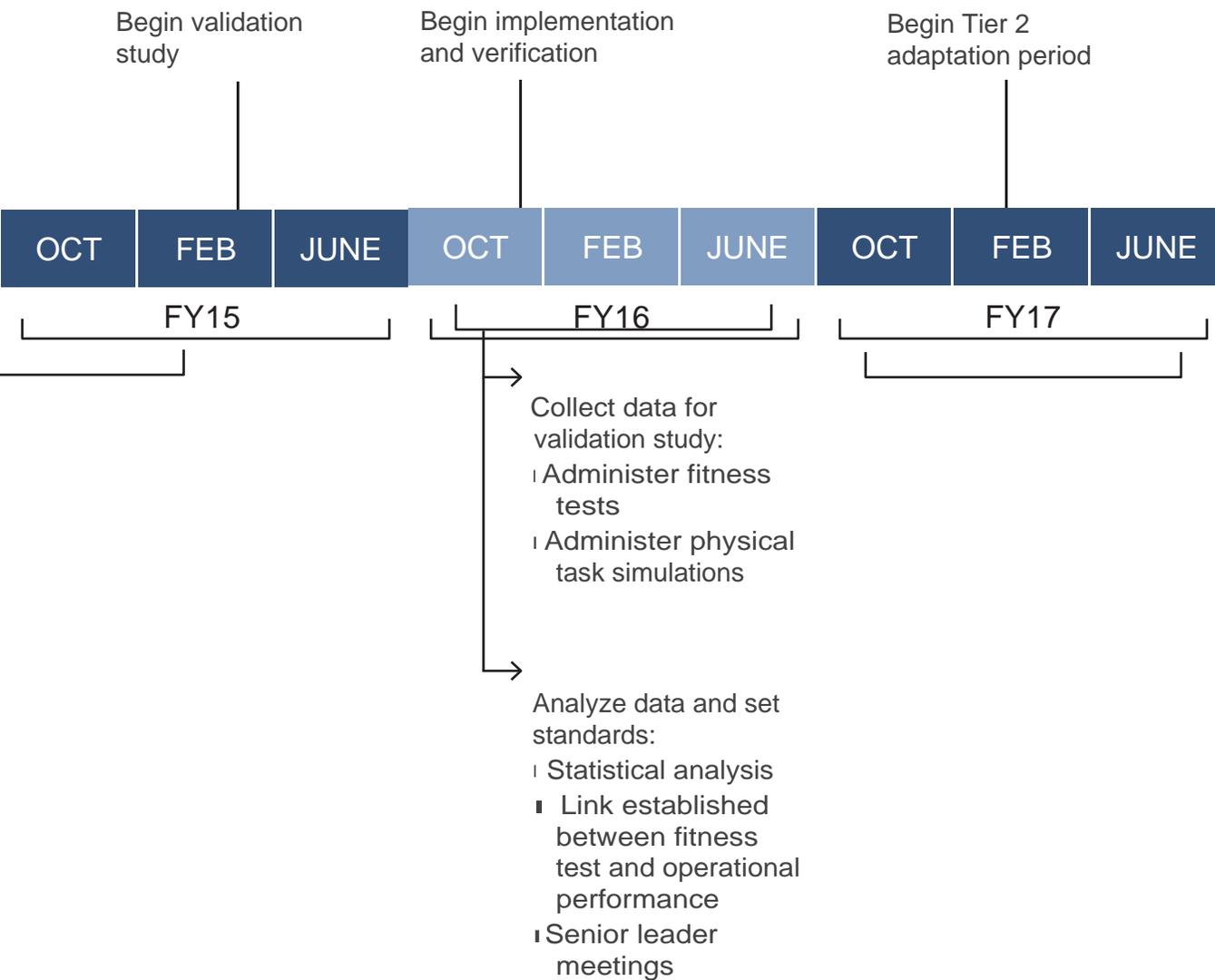


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the timeline in Figure 2, these efforts followed a systematic process that incorporated direct input, participation, and feedback from ALO and TACP operators and Air Force leadership at multiple points.

In the following sections, we summarize the methodology and findings from each of the process steps. We conclude with a short description of the remaining tasks needed to ensure Tier 2 tests and standards are working effectively for the ALO-TACP community.

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## STEP 1 – IDENTIFY PHYSICAL JOB DEMANDS

The physical demands of a job, such as loading equipment into a vehicle, are determined by job tasks that are both physically demanding and essential for mission success. These *critical physical tasks*, or *CPTs*, provide the foundation for all remaining steps in the Tier 2 physical tests and standards process. These tests and standards determine the minimal levels of physical readiness needed by operators to execute CPTs in their specialties.

In FY 2012, RAND PAF conducted a preliminary study to identify the physical demands of several Air Force occupational specialties, which included TACP. Building on this work, the ESU conducted a physical demands analysis to identify CPTs for each BA specialty. The physical demands analysis included the following tasks:

- ▮ Create a list of preliminary physical tasks for each BA specialty based on Air Force documentation, such as career field education and training plans and occupational analysis reports.
- ▮ Hold focus groups with operators to review and refine preliminary physical task lists.
- ▮ With RAND PAF, administer an assessment to 299 ALO and TACP operators to ask them to evaluate preliminary physical tasks and non-physical performance attributes, *e.g.*, situational awareness. Create draft CPTs for each specialty based on results.
- ▮ Observe six Full Mission Profiles run by Air Force Special Operations Command and Air Combat Command to refine CPTs.
- ▮ Interview BA leaders to review and confirm final CPT lists.
- ▮ With RAND PAF, assess relationships between physical job demands (the CPTs) and the physical requirements in BA training pipelines.

For ALO-TACP operators, the ESU identified 44 CPTs (Table 1), which were subsequently reviewed and approved by senior leaders from the operational community. These CPTs provide the foundation for all remaining Tier 2 steps.

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Table 1. ALO-TACP Critical Physical Tasks (CPTs)

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**SMALL UNIT TACTICS**

1. Load and don equipment — e.g., ruck sack, load bearing vest, helmet
2. Transport equipment with combat load
3. Execute ruck march; traverse over adverse terrain
4. Execute low crawl / high crawl
5. Execute posture transitions - prone to kneeling to standing
6. Execute 3 second to 5 second rushes
7. Take cover
8. Perform actions on an objective / secure objective
9. React to direct / indirect fire, react to far / near ambush
10. React to enemy contact / break contact
11. Cast equipment over obstacles e.g., walls
12. Traverse walls / obstacles e.g., walls
13. Assist others over obstacles e.g., walls

**CLOSE QUARTERS BATTLE**

14. Manually breach entry — kick, sledge hammer, battering ram
15. Eliminate threat room to room
16. Attack / defend, grapple with enemy

**CASUALTY COLLECTION**

17. Carry victim, two man litter
18. Transport casualties via one man carry over adverse terrain
19. Transport casualties via one man drag over adverse terrain

**WATER OPERATIONS**

20. Cross river w/ rope system & gear — in / above / partially in water
21. Launch boat from aircraft
22. Tread water and swim
23. Board rib boat

**ROPE LADDER ACTIVITIES**

24. Don gear and climb rope ladder into aircraft or vessel

**FAST ROPE INSERTION EXTRACTION SYSTEM**

25. Disembark helicopter via fastrope with combat load
26. Descend and lock onto fastrope

**PARACHUTE OPERATIONS**

27. Don parachute equipment and combat load
28. Stand up with combat load and parachute — exit the aircraft
29. Disembark aircraft and maintain military free fall position — MFF
30. Derig all jump items
31. JMPI all jumpers and check airspace in front of and behind aircraft
32. Retrieve / pull in pack trays

**PERSONNEL EXTRACTION**

33. Extract personnel out of vehicle or confined space

**VEHICLE OPERATIONS**

34. Maneuver out of rollover or submerged vehicle
35. React to IEDs and perform actions on contact during vehicle ops
36. Recover or repair damaged or disabled vehicles
37. Unload / cross load personnel and equipment from disabled vehicle to evacuation vehicle or aircraft

**PREPARING DEPLOYED LOCATIONS**

38. Move obstacles, remove obstructions, clear lanes of fire
39. Fill and transport sand bags; fill HESCO barriers with sand
40. Dig a two person deliberate fighting position
41. Construct walls using sandbags or other materials
42. Load and unload pallets

**RADIO ASSEMBLY**

43. Assemble / disassemble radio mount; move radio pallet through tight spaces
44. Route and bury antenna cables

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## STEP 2 – DEVELOP PHYSICAL FITNESS TESTS AND PHYSICAL TASK SIMULATIONS

### Physical Fitness Test Battery

The Tier 2 Operator Prototype PF Test Battery includes ten fitness tests. The ESU created it using a systematic process that involved evaluating more than 100 PF tests identified by the scientific literature and subject-matter experts. These tests meet several important criteria, to include:

- ‡ Predict physical capability to perform CPTs
- ‡ Easy to administer and score
- ‡ Applicable to multiple PF components, *e.g.*, aerobic fitness, muscular strength, and PF movement patterns, *e.g.*, bend, squat, pull
- ‡ Relatively inexpensive
- ‡ Relatively low risk of injury
- ‡ Low skill requirements.

The most important criterion is the test's ability to predict task performance. The physical task simulations (PTSs), described next, were used in a validation study (Step 3) to determine how well these tests predict task performance.

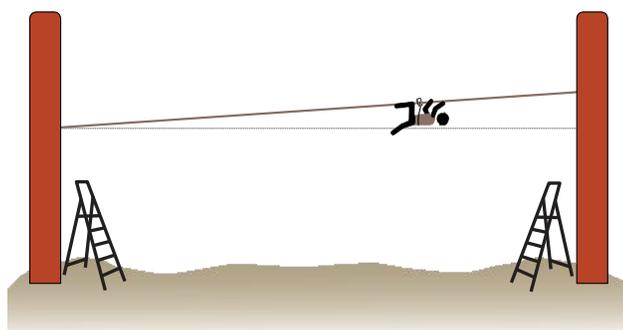
### Physical Task Simulations

ESU and RAND designed eight broad PTSs to approximate the CPTs performed by ALO and TACP operators. These simulations include rope bridge, rope ladder, cross load personnel, casualty movement, and four simulations associated with small unit tactics. These PTSs were developed in collaboration with ALO-TACP operators, reviewed by senior leaders, pre-tested during a pilot study, and finally evaluated for representativeness during the validation study. These steps were followed to ensure the physical demands of each PTS approximated reasonable conditions that could be expected during an operational mission. This section provides a brief description of the PTSs relevant to ALO and TACP operators.

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#### Rope Bridge

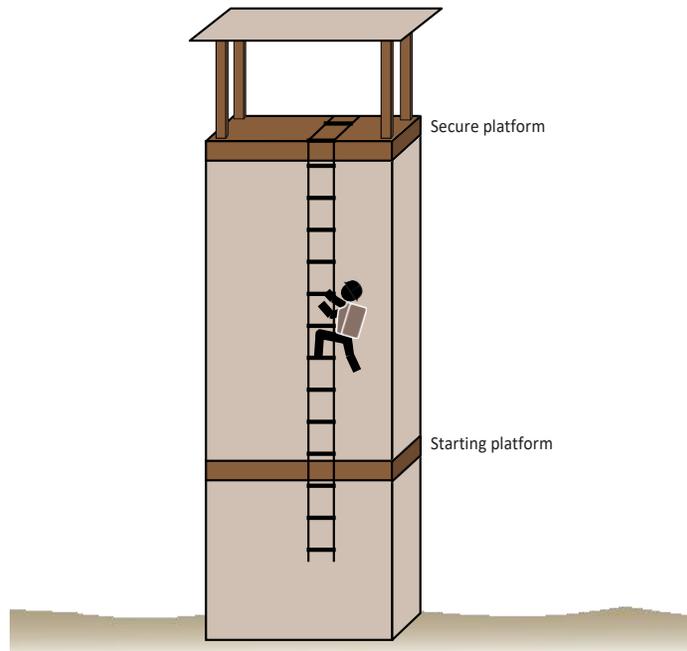
In this PTS, participants wearing a 30 lb vest traverse a 20 m distance on an elevated near-horizontal rope in an inverted position using hands and feet to travel. The *rope bridge* PTS simulates the CPT demands of crossing a river or other terrain obstacle on a near-horizontal rope.



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## Rope Ladder

In this PTS, participants wearing a 20 lb vest and a 50 lb ruck sack traverse a 20 ft vertical distance on a rope ladder. The *rope ladder* PTS simulates the CPT demands of climbing a rope ladder into an aircraft or vessel, which may occur during mission extraction.

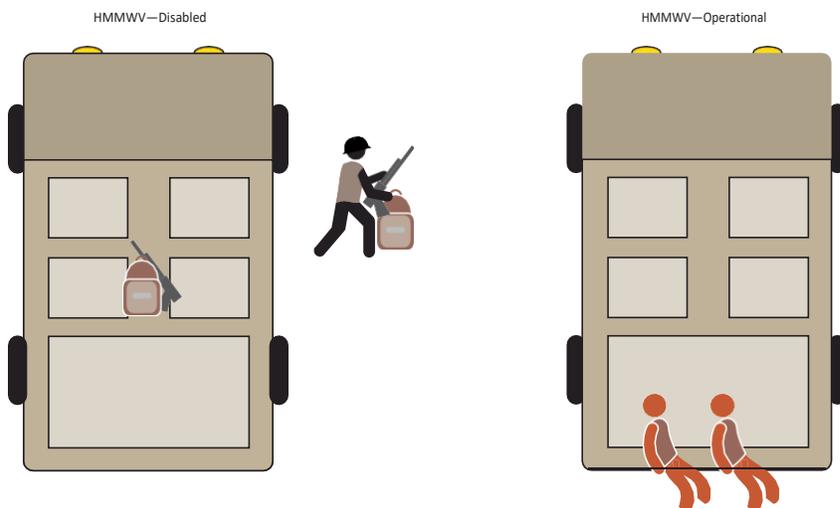


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## Cross Load Personnel

In this PTS, participants wearing a 30 lb vest move one simulated casualty (185 lb + 30 lb vest) from the ground on the far side of a disabled vehicle to the back of an operational vehicle (parked 15 ft from the disabled vehicle) and place the simulated casualty on the tailgate. A second simulated casualty (same 215 lb total) must be extracted from within the disabled vehicle and moved to the tailgate of the operational vehicle. Next, participants remove two ruck sacks (65 lb each) and two simulated weapons from within the disabled vehicle and transport them in as many trips as needed to the operational vehicle.

The *cross load personnel* PTS approximates the physical demands of personnel extraction and vehicle operations—specifically, cross loading personnel and equipment from a disabled vehicle to an evacuation vehicle or aircraft, a very specific and physically demanding



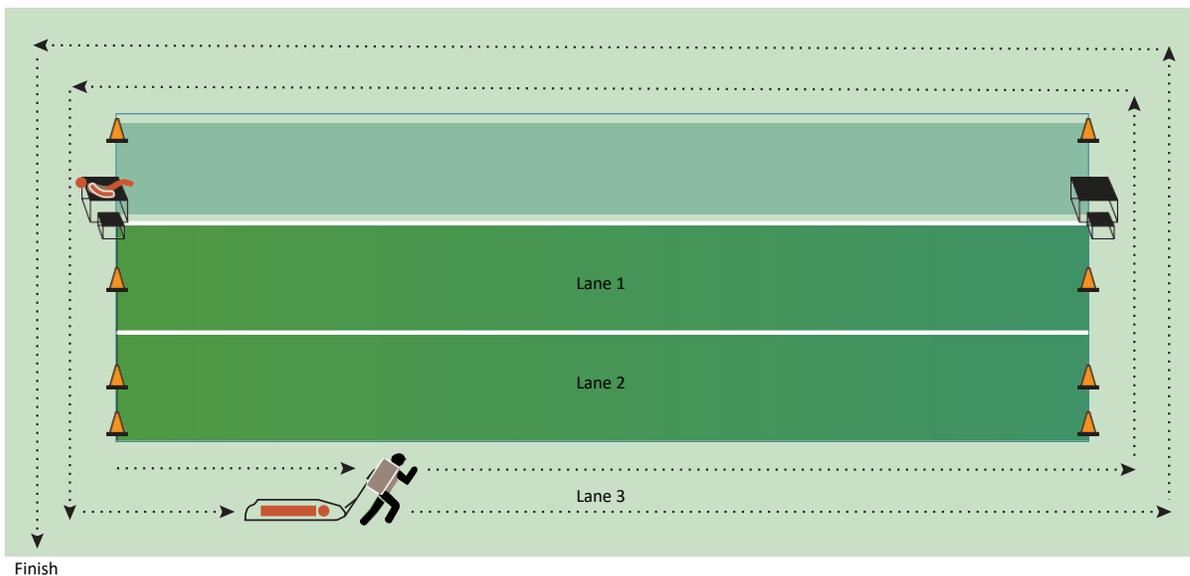
CPT for which ALO and TACP operators must be prepared. It simulates the physical demands that may be required after a tactical vehicle is disabled because it struck a mine, an improvised explosive device detonated nearby, or the vehicle was attacked by rockets or other weapon systems.

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## Casualty Movement

Participants don a 30 lb vest and 65 lb ruck sack while completing a multi-phased casualty movement, which requires a fireman's carry, movement without the simulated casualty, and a sled drag. Specifically, participants complete a 50 m carry (155 lb casualty with 30 lb vest), 100 m movement without the casualty (simulates the time a teammate is carrying the casualty), and a second 50 m carry. After completing the second fireman's carry, participants must pull a Skedco rescue sled with the weight (107.5 lb, half the weight of a full casualty that a two-man team would drag) of a simulated casualty for 250 m.

The *casualty movement* PTS simulates the physical demands present during two common techniques for moving casualties to safety and follow-on medical care. The fireman's carry is an effective and fast technique to move injured personnel from immediate danger. Once out of immediate danger, a casualty may be placed in a Skedco sled and dragged along the ground to reduce the physical demands of moving the casualty over a longer distance, as security and terrain conditions allow.



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## Small Unit Tactics

The small unit tactics PTS comprises four segments (Parts A–D) and was informed by several CPTs, including such tasks as conducting patrols and traversing adverse terrain, moving under and over obstacles, maneuvering to cover, transitioning from prone to standing positions, and conducting offensive and defensive maneuvers, as well as numerous casualty movement tasks.

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### Small Unit Tactics – Part A

In this segment, participants don equipment, a 30 lb vest, and a 65 lb ruck sack and traverse a marked 5 km course as quickly as possible.

The ruck segment simulates the demands of an overland movement to an objective. A ground hike, or ruck, is a common insertion/extraction technique in a wide range of environments and over varied terrain.

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### Small Unit Tactics – Part B

This segment occurs immediately after completing the ruck march. Participants use any technique to crawl under a 2 ft tall platform for 20 m with a ruck sack. Participants may crawl with the ruck sack donned or removed (pulling or pushing the ruck sack). Next, participants alternate between dragging a 215 lb simulated casualty 10 m to a covered position and taking a prone firing position for a minimum of 5 seconds, repeating the tasks for four iterations and 50 m combined distance.

This segment simulates the movements required when a team of operators may have to react to contact with enemy forces during insertion/extraction. Depending on the situation, the team movements may include breaking contact, low or high crawling, taking cover, returning fire, or transporting a non-ambulatory casualty while in contact.

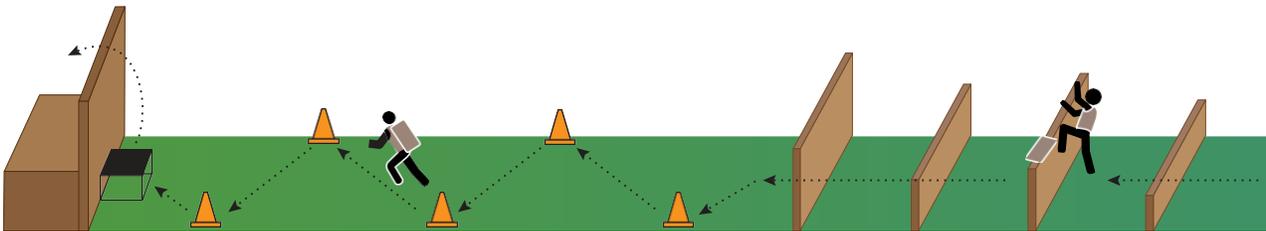


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### Small Unit Tactics – Part C

In this segment, participants move without the simulated casualty to a series of walls that must be negotiated. The participants must carry their ruck sack and move over four walls, 5 m apart, of differing heights (2 ft, 4 ft, 3 ft, 5 ft), then around simulated obstacles (25 m), and finally over an 8 ft wall that has a 2 ft platform at the base to simulate assistance.

This segment simulates the individual movement and agility required to maneuver in the most expeditious manner possible while in contact or immediate threat of contact. Such movements may require the operator to move over and around obstacles of various sizes with personal equipment and weapons.

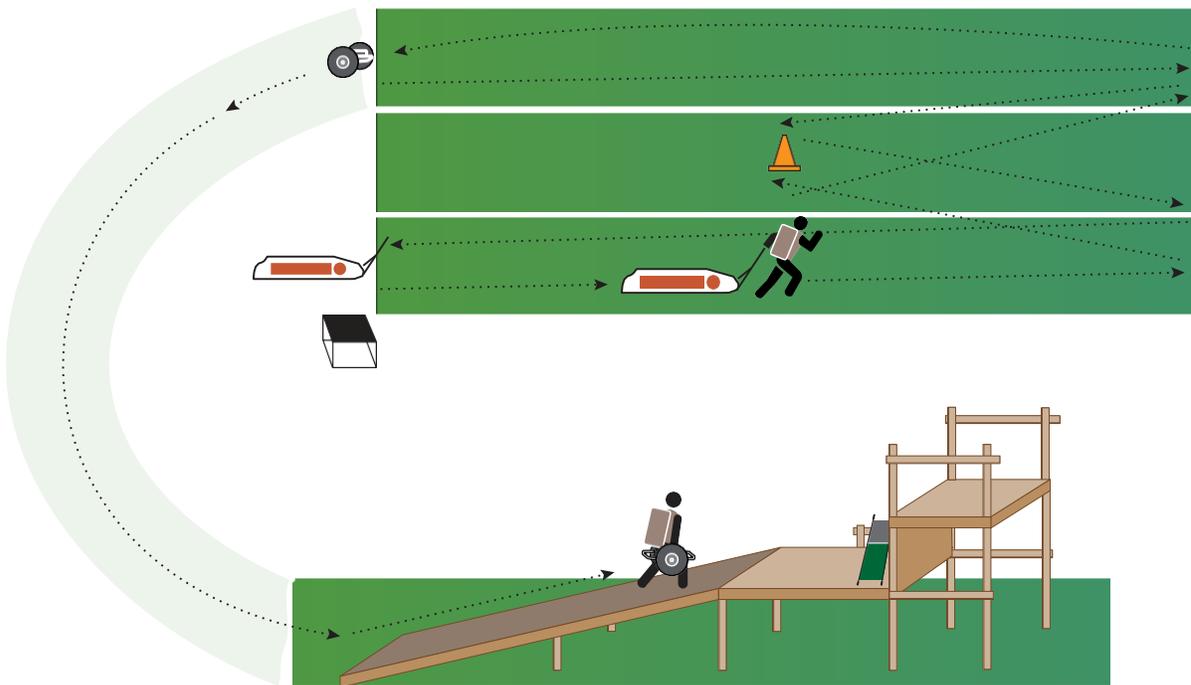


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## Small Unit Tactics – Part D

In this segment, participants use a fireman's carry to move a simulated casualty (185 lb) up a flight of stairs (16 steps), carefully placing the casualty on a platform at the top of the stairs. Participants descend the stairs (without the casualty) and then pull a Skedco rescue sled (107.5 lb casualty) 50 m, ambulate without the sled for 50 m, and repeat the sequence for a total of 200 m. Next, participants carry a simulated litter (simulates one half the lift of a two-man litter) 50 m, ambulate without the litter for 50 m, and carry the litter for 77 m, finishing at the top of a simulated C-17 aircraft ramp where they lift a simulated litter to a 5 ft height and hold for 5 seconds.

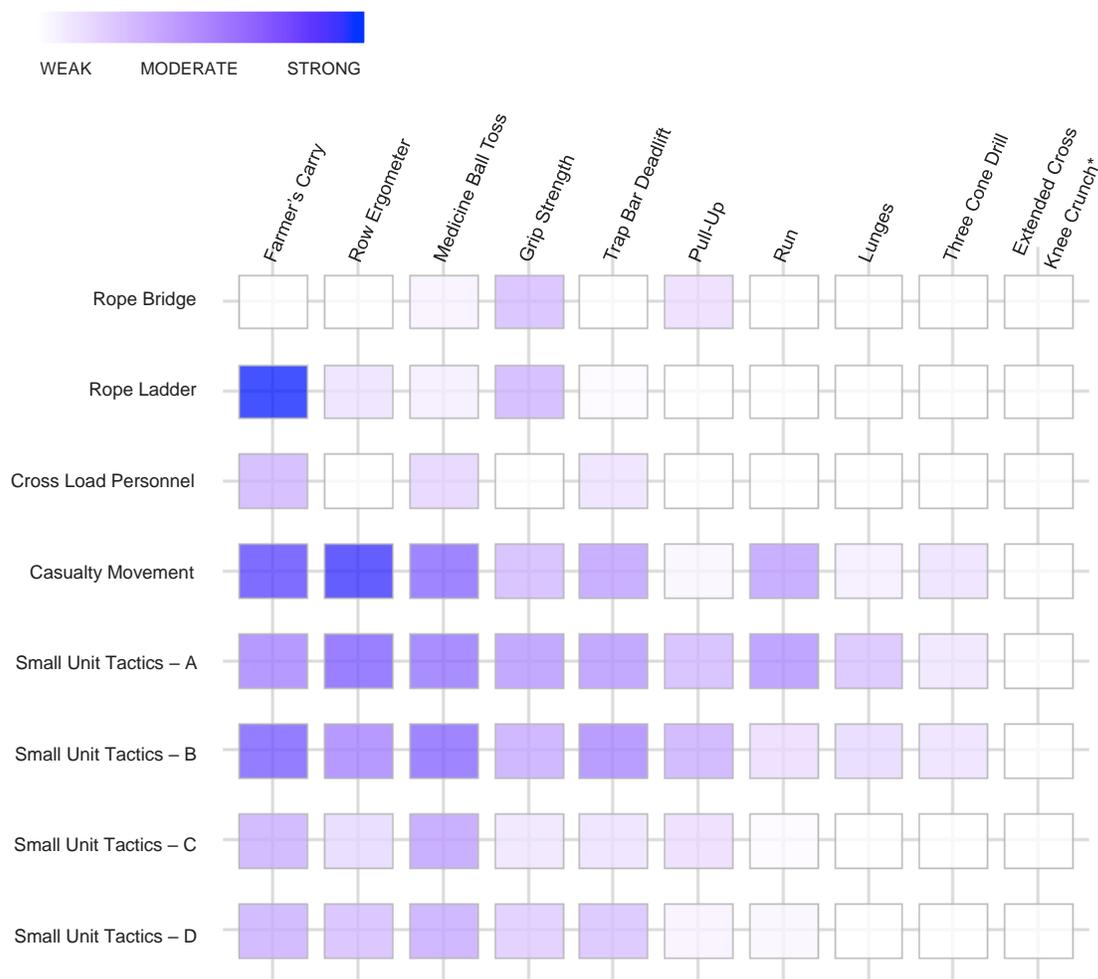
This last segment of the *small unit tactics* PTS simulates the physical conditions associated with moving a non-ambulatory casualty over varied terrain using different techniques. Having reacted to contact initiated by the enemy, the team will be required to react within the terrain they find themselves and using only the equipment they have with them. For example, a fireman's carry may be required to move a casualty up and down stairs inside of a building or up a hill. Once in relatively safer conditions, the team may be able to drag the casualty using a rescue sled, at which time two operators would ideally be used to drag the sled while other members of the team provide security and conduct other operational tasks. Similarly, two operators may carry a casualty on a litter. If the movement of a casualty is required over difficult terrain or a long distance, the members of the team may rotate between assisting the casualty carry and providing security, during which they would continue to move while carrying their own equipment and weapons. Some of this terrain would likely include inclines. Lifting a litter over obstacles or up onto the platform of an aircraft for extraction is also a fundamental physical task of such a movement.



### STEP 3 – VALIDATE AND SET PHYSICAL TESTS AND STANDARDS

With guidance from RAND PAF, the ESU conducted a validation study with 171 participants from April through June of 2015. Each participant completed a battery of 39 PF tests and 15 PTSs over a two-week period. The purpose of the study was to identify how well each fitness test predicted performance on the PTSs. Figure 3 illustrates how well each of the final fitness tests correlates with the PTSs specific to ALO-TACP operators. In the figure, a darker box indicates a stronger link between a specific test and PTS; a lighter box indicates a weaker link. For example, participants who performed well on the farmer’s carry test were much more likely to perform well on the casualty movement PTS compared to participants who scored less well on the farmer’s carry test. The dark box in the figure indicates the strong correlation between the farmer’s carry and the casualty movement PTS. Note that the extended cross knee crunch has all white boxes currently showing no correlation to the PTSs because analysis of this test is still under way. The ESU will collect data in January/February 2017 to complete the analyses of these test-PTS relationships. Finally, the ESU cross-validated (as a separate evaluation) the prototype tests and standards with two separate sets of participants in July 2015; the second cross-validation took into account the effects of mission and environmental stressors.

Figure 3. Strength of Correlations Between Tests and PTSs



\* The Extended Cross Knee Crunch has all white boxes currently showing no correlation to the PTSs because analysis of this test is still under way.

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## **STEP 4 – IMPLEMENT AND VERIFY PROTOTYPE PF TESTS AND STANDARDS**

Once the PF tests and standards were validated, the ESU implemented the prototype PF test at 13 ASOSs, in cooperation with the ALO and TACP community, from December 2015 to March 2016. The ESU conducted “train the trainer” implementation sessions at the ASOSs, teaching ALO-TACP staff how to administer the prototype test. During this step, RAND PAF and the ESU gathered feedback on each test component from operators, physical training leaders, and career field managers.

RAND PAF’s evaluation instrument contained several items that addressed operators’ perspectives on the perceived utility of the prototype test and how well the test measures important job-related abilities. Overall, the general perceptions were positive, with 84 percent of respondents indicating that knowing how well they performed on this prototype test will help improve job-related physical capabilities, and 74 percent indicating that this prototype test measures abilities required of an ALO-TACP operator.

Although most respondents presented favorable perceptions, 18 percent indicated that they disagreed or strongly disagreed that the test would be fair for all operators. Respondents’ open-ended comments suggested that some assignments do not require any (or as much) physical effort to perform the job tasks. Career field senior leaders are currently evaluating different options to address this concern. Any changes to the test protocol will be evaluated over the next several months so that the tests are relevant and ensure the physical readiness of the ALO and TACP community.

To complete Step 4, the ESU will conduct final verification testing in January/February 2017, with 60 ALO-TACP operators completing the ALO-TACP Operator Prototype PF Test and the PTSs specific to ALO-TACP operators. This will be the final testing for the ALO-TACP Tier 2 process.

## **STEP 5 – ADAPTATION AND DOCUMENTATION**

Upon completion of Step 4 verification, data analyses, and ESU recommendations, the ALO-TACP senior leadership will confirm and announce the official ALO-TACP Operator PF Tests and Standards. At that time, ALO and TACP operators and trainees will have 12 months to adapt to the new tests before the standards are officially enforced.

The ESU and RAND PAF are drafting several reports to fully document the process, results, and relevant feedback on the proposed test. The ESU is planning to present results at scientific conferences and in peer-reviewed journals, and RAND PAF will publish some reports independently to document its researchers’ efforts and recommendations.

In the next several months, more information will be made available on how to prepare for testing and how to improve your physical readiness. The ESU is developing a physical preparation guide that addresses exercise training principles and methods, including exercise recommendations and specific activities to address weaknesses and build on strengths. In addition to the guide, you can contact your Physical Training Leader for additional feedback on your form or technique or with other questions you may have about the Tier 2 ALO-TACP Operator Prototype PF Tests and Standards. You may also send comments and feedback to RAND PAF, which will develop a summary report of any feedback provided for AF/A1P, the ESU, and senior leaders in your career field.