FORCE combat RESEARCH and EVALUATION

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Army Fitness Standard - Background

• Occupational Fitness Standards (OFS) project
  – CMTFE / FORCE covers 60-90% of CA requirements, depending on MOC/role

• Combat Arms trades have a greater gap between UofS and their front line roles than support trades.
BFT to FORCE combat timeline

• 1993 LFCPFS (BFT) partially adopted

• 2009 DFIT changes Cas Evac at request of LFDTS

• 2012 BFT No longer recognized as official fitness std because lack of correlation to U of S

• 2013 adoption of the FORCE Evaluation (13km in IBTS only)
### Army Standards Review 2008-2010

<table>
<thead>
<tr>
<th>Exercises Participated/Observed</th>
<th>Exercises Physiological Data Collection</th>
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<tbody>
<tr>
<td>Exercise Maple Guardian CFB Wainwright – 2008</td>
<td>Dismounted Section Attack 3 R22R Valcartier October 2009</td>
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<tr>
<td>Tactical Combat Casualty Care CFB Valcartier – 2009</td>
<td>NATO Urban Ops Exercise CFB Petawawa – 2009</td>
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#### Qualitative Tool

- Online Survey 2009
- Dismounted Operations

- Return from deployment
- Urban Ops Interviews CFB Petawawa (N=51)
- 1 PPCLI (N=27)

**Current loaded march is not an accurate representation of actual dismounted demands**
- Load/distances not reflective of recent combat situations

**Missing an Urban Ops component**
- 13 km march only requires a relative oxygen cost of 20-22 ml/kg/min - not sufficient

**Need manual material handling component**
- Original LFCPFS had ammo box lift, trench dig

- Participated in ≥ 2 exercises involving urban ops
- 75% had also participated in urban ops in theatre
- Many reported encountering urban ops daily on patrols
- 73% perceived urban operations as physically demanding

Ranked Urban Ops in top 4 physically demanding tasks
Capturing demands of Urban Ops

Designed by infantry School
- Approach 70m run
- Enter window using ladder
- Walk through a cleared building up to the third floor
- Haul-up ram
- Enter and clear room
- Transport jerry cans to building entrance (40kg) (sim. stretcher carry)
- Casualty evac from building (carry and drag 82kg, 25m)

Participants (N=20) on course – paced by instructor- 1 leader – 3 team members
Current CA Doctrine

Infantry Rifleman: Fighting Order (FO)

- Wpn: C7A1 (incl 1x mag, PEQ 4C LAD) 4.7 kg
- CADPAT + Boots 2.9 kg
- Helmet 1.6 kg
- Fragmentation Vest:
  - Ballistic plates 5.1 kg
- NBCD Mask and Carrier: 2.3 kg
- MNVG with head/helmet mount: 0.5 kg
- Tactical Vest 1.1 kg
  - 4x mags (loaded) 1.9 kg
  - Bayonet: 0.5 kg
  - 2x HE Frag Grenades: 0.9 kg
  - 2x Smoke Grenades: 0.9 kg
  - 2x field dressings: 0.2 kg
  - 1x Mini-mag light: 0.1 kg
- 1x Personal Role Radio w/headset: 0.5 kg

Total Weight of Infantry Rifleman FO: 26.0 kg
**FORCE Evaluation – CA options…**

**U of S Requirements**
- FORCE

**Canadian Army requirements**
- FORCE (in CADPAT) + LBM (5km / 25kg)

**TRAINING OBJECTIVE**

**Combat requirements**
- Higher aerobic demands
- Load bearing activities
- Greater specificity

**Not a pass/fail test**
- Empty ruck
- 1x sand bag
- C7/ Helmet

**FORCE_{combat}** could be a progressive set of benchmarks built in DFIT.ca
Données initiales pour FORCE_{Combat} (n=1)

- Essai avec un seul sujet
- Marche de 5 km avec charge de 35 kg – pause de 15 min – circuit FORCE avec frag et veste tactique/casque (25 kg)
- Durée du circuit : 7 h 21
- VO_2 moyen ; 37,9 mLO_2/kg/min
The Urban Ops Scenario was 5:37 minutes (3:20 - 8:20)
There is a metabolic requirement of a VO$_2$$_{\text{max}}$ > 36 ml O$_2$/kg/min (4 minutes)
The FORCE Evaluation (as a circuit) can elicit up to 42 ml O$_2$/kg/min (@ MPFS)
**FORCE Combat**

**LOADED MARCH** (in Battle Order - 35kg)
5 km march in 50-60 minutes

Remove 10 kg Day Bag
5 minute rest between Loaded March and **FORCE Combat**

**FORCE Combat** (in Fighting Order - 25kg)

Best effort - No rest between **FORCE** components

**Battle Order (35kg)**
- Combat dress + Boots + Helmet (4.5 kg)
- Frag vest with Training plates (7.9 kg)
- Tactical vest (9 kg)
- Training weapon - C7 (3.7 kg)
- Day Bag (10kg)

**Fighting Order (25kg)**
- Combat dress + Boots + Helmet (4.5 kg)
- Frag vest with Training plates (7.9 kg)
- Tactical vest (9 kg)
- Training weapon - C7 (3.7 kg)

- **20m Rushes (20mR)**
  - Weapon is in hands while performing 20mR

- **Sandbag Lift (SBL)**
  - Weapon is slung while performing SBL

- **Intermittent Loaded Shuttles (ILS)**
  - Weapon is slung while performing ILS

- **Sandbag Drag (SBD)**
  - Weapon is slung while performing SBD
FORCE_{combat} Evolution 2015/2016

August 2015
- Trial of 2 potential options of a modified FORCE to replicate demands of Urban Ops (N=14 CG)

September 2015
- Working group with Infantry School and CADTC
  - Potential for 5-15 minutes pause

September-November 2015
- Trial of FORCE_{combat} with 15 minute pause on HQ staff (+40 yrs and 24 females) (N=32)

May 2016
- Reliability trials of 5 administrations of FORCE_{combat} over 3 weeks (N=30)
Ceremonial Guard (N=14)

Age : 28 years (21-33)
Ht : 178.5cm (170-191)
Wt : 91Kg (70-122)
$VO_2^{max}$ : 46.8 ml/kg/min (39.4 – 59.4)

FORCE time : 4:42 min:sec (4:13 – 5:20)
FORCE$_{combat1}$ : 8:21min:sec (6:19 – 10:59)
FORCE$_{combat2}$ : 7:46 min:sec (6:19- 9:17)
Direct $O_2$ measures of $FORCE_{combat}$

Sept-Nov 2015

Army HQ (N=32)

$FORCE_{combat}$ With a 15 minute pause between march and circuit

8 Males  24 Females (11 DNF)
Age : 41 years (23-56)
Ht : 171cm (158.5-191.5)
Wt : 75Kg (54-103)
$VO_2\text{max}$ : 37 ml/kg/min (25 – 52)

$FORCE$ time : 5:52 min:sec (4:07 – 7:33)
$FORCE_{combat}$ : 12:02min:sec (6:50 – 22:47)
FORCE\textsubscript{combat} Reliability (5 trials)

CFB Petawawa (N=32)
29 Males - 3 Females
Mean Age 29 yrs (19-46)
Mean VO\textsubscript{2max} = 47ml/kg/min (32.6-71.3)
Mean FORCE\textsubscript{combat} time : 9:22 (6:22 – 14:55)

Mean FORCE\textsubscript{combat} Circuit Time (N=26)

Mean Improvement Time (sec)

<table>
<thead>
<tr>
<th>Trial</th>
<th>Marchers</th>
<th>Non-Marchers</th>
</tr>
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<tbody>
<tr>
<td>1 to 2</td>
<td>40</td>
<td>13</td>
</tr>
<tr>
<td>2 to 3</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>3 to 4</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Switch</td>
<td>48</td>
<td>-29</td>
</tr>
</tbody>
</table>
circuit time = 7:53

Relative VO2 (mL/kg/min) vs. Time (min:sec)
circuit time = 14:56
Preliminary trials in the heat has identified that $\text{FORCE}_{\text{combat}}$ circuit performance time can increase by 50% due to fatigue of marching in 26°C.

Current study at UOttawa with the Cameron Highlanders to assess the effects of loaded march on operational readiness ($\text{FORCE}_{\text{combat}}$) in ambient and hot environments:
- Modify current heat advisory policy if required.

FORCE$_{\text{combat}}$ HEAT

<table>
<thead>
<tr>
<th>Time (minutes)</th>
<th>Core Temp (C)</th>
<th>HR (bpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:00</td>
<td>37.0</td>
<td>0</td>
</tr>
<tr>
<td>20:00</td>
<td>37.5</td>
<td>20</td>
</tr>
<tr>
<td>40:00</td>
<td>38.0</td>
<td>40</td>
</tr>
<tr>
<td>60:00</td>
<td>38.5</td>
<td>60</td>
</tr>
<tr>
<td>80:00</td>
<td>39.0</td>
<td>80</td>
</tr>
<tr>
<td>100:00</td>
<td>39.5</td>
<td>100</td>
</tr>
<tr>
<td>120:00</td>
<td>40.0</td>
<td>120</td>
</tr>
</tbody>
</table>

FORCE combat = 7:27m:s @ 21°C & 11:01m:s @ 33°C

- Ambient HR
- Heat (33°C) HR

FORCE combat performance time can increase by 50% due to fatigue of marching in 26°C.
FORCE combat times to date (N=90)

- DNF (11F, 6M) 17%
- >15:00 (8F, 5M) 16%
- 10:00-15:00 (13M, 8F) 21%
- <10:00 (37M, 2F) 46%

- After 4 wks of 12
  - 3:13 (4 to 0 DNF)
  - 2:14 (3 to 2 DNF)

- 0:28:48
- 0:25:55
- 0:23:02
- 0:20:10
- 0:17:17
- 0:14:24
- 0:11:31
- 0:08:38
- 0:05:46
- 0:02:53
- 0:00:00

- 0:13:00
- 0:08:13
- 0:07:46
- 0:09:22
- 0:13:48
- 0:15:51

Support (CAHQ)   Cbt Arms (CAHQ)   Cbt Arms (CG)   Cbt Arms (Pet)   Cbt Arms (CADTC)   Support (CADTC)

- 25 Males    6 Females
- Age: 46 years (26-56)
- Predicted VO2max: 36.2 ml/kg/min (18.1-50.6)
- FORCE combat: 14:44 min:sec (7:53-25:18)

- After 4 wks of 12
  - 3:13 (4 to 0 DNF)
  - 2:14 (3 to 2 DNF)

- 0:28:48
- 0:25:55
- 0:23:02
- 0:20:10
- 0:17:17
- 0:14:24
- 0:11:31
- 0:08:38
- 0:05:46
- 0:02:53
- 0:00:00

- 0:13:00
- 0:08:13
- 0:07:46
- 0:09:22
- 0:13:48
- 0:15:51

Support (CAHQ)   Cbt Arms (CAHQ)   Cbt Arms (CG)   Cbt Arms (Pet)   Cbt Arms (CADTC)   Support (CADTC)
2017: Re-investigate Demands of “Combat”

- 35ml/kg/min - 37ml/kg/min
- Measured on Infantry males
- Does not include “section attack” activities
- Large amount of variability in the pacing

- More data needed to capture the whole picture of “Combat” demands
Roll out of FORCE combat: PSP HP R&D

1. DFIT.ca: Changes : where to find FORCE combat
2. Ops Manual Draft
3. FORCE combat POSTER for gyms etc
4. FORCE combat video (Instructional)
5. FORCE combat Reporting Tool
6. FORCE combat FAQ
7. Housing of all PR information
8. Trademarking of FORCE combat
9. Maple Leaf Article
Role of PSP

• **Annex A** - CA Physical Fitness training and IBTS (FORCE Combat)
• **Annex D** - CA injury prevention measures and responsibilities
• REF C. [HTTP://WWW.DFIT.CA](HTTP://WWW.DFIT.CA)

Training Programs. PSP has developed and validated a twelve week training program designed to ensure a CA soldier will succeed at FORCE Combat. This training program is available and accessible to all CA team members who have a DFIT.CA account and requires no special equipment or facilities to conduct. Training for FORCE Combat should normally be conducted at the section/team or platoon/troop level.

• All members of the CA Chain of Command should become familiar with the FORCE Combat training program and consult with local PSP staffs to understand how to most effectively conduct it within their organisations.
FAQs

1. FORCE vs FORCE combat?
2. KIT for the Evaluation?
3. PSP Staff involvement in the Evaluation?
4. Who will have to FORCE combat?
5. Where will FORCE combat be performed?
6. What is the “time” standard
References:

- **T Reilly, Olinek, S, Driscoll, C.** (2011) Development of a new battle fitness test which captures the physical demands of conducting operations in an urban environment 2nd International Congress on Soldiers' Physical Performance May 4-7, 2011, Jyväskylä, Finland