

AN OPERATIONS
MANUAL FOR THE
CANADIAN FORCES
SEARCH AND RESCUE
TECHNICIAN PHYSICAL
FITNESS MAINTENANCE
PROGRAM
(SAR TECH PFMP)

CFPSA/DPE
1999

FOREWORD

1. This “Operations Manual” has been prepared to provide instructions and guidance for conducting the CF Search and Rescue Physical Fitness Maintenance Program (SAR Tech PFMP).

1. The SAR Tech PFMP has been research and developed for the Chief of the Air Staff (CAS) by the Canadian Forces Personnel Support Agency (CFPSA), Directorate of Physical Education (DPE). The Queen’s University Ergonomics Research Group (ERG) was contracted to develop and scientifically validate physical fitness maintenance standards for CF SAR Techs. The CFPSA/DPE provided the scientific authority and project management for this Defence Research and Development Branch (DRDB) funded research project. Based upon the research findings, CFPSA/DPE developed a comprehensive SAR Tech PFMP, consisting of a physical fitness evaluation, an exercise prescription based on physical fitness evaluations results, and counselling components based on performance related physical fitness and health related fitness.

3. The SAR Tech PFMP was designed to ensure that operational SAR Techs are physically capable of carrying out their duties. The SAR Tech PFMP complies with the Canadian Human Rights Act (1985) and the evaluation portion meets the bona fide occupational requirements (BFORs) described in Section 15 of that Act.

4. It is essential that the evaluation protocols and instructions provided in this Manual be adhered to, in order to ensure valid, reliable and comparable evaluation results which serve as the basis for the exercise prescription.

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TABLE OF CONTENTS

CHAPTER 1-INTRODUCTION

Background	4
General	4
Scope	8
Aims	8
Rationale	8
Requirements and Responsibility	8
Components of the SAR Tech PFMP	9

CHAPTER 2 – ADMINISTRATION

General	10
Evaluation Schedule	10
Medical Considerations	10
Statement of Suitability for Evaluation and Training	10
Referral to a Medical Officer or Civilian Medical Doctor	11
Medical Action	11
Reports and Returns	12
Action on Posting of SAR Techs	12
Career Administrative Policy	13
Gold Standard Testing	13

CHAPTER 3 – EVALUATION PROCEDURES

General	15
Pre-Evaluation Instructions for Assessors	15
Equipment	16
Preliminary Instructions to the SAR Tech	17
Pre-Screening Protocols	18
CF EXPRES Health Appraisal Questionnaire	14
Healthy Physical Activity Participation Questionnaire	19
Observations	20
Vital Signs	20
Conduct of the Compensatory Model	23
Conduct of the Lifting Task	23
SAR Tech PFMP Standards	24
Incentive Program	25

CHAPTER 4 – PERFORMANCE RELATED PHYSICAL FITNESS

General 26
Supervision of Exercise Programs 26
Exercise Prescription 27
Aerobic Exercise Prescription 27
Heart Rate Monitoring 29
Muscular Strength and Endurance Exercise Prescription 30
Resource Materials 30

CHAPTER 5 – HEALTH RELATED FITNESS

General 31
Lifestyle Assessment 31
Stengthening the Forces Campaign 32
Nutrition 33

REFERENCES 34

LIST OF ANNEXES

Annex A- SAR Tech Physical Fitness Maintenance Program
(DND 2260 (10-99))

Annex B- Medical Referral Round Trip Memorandum (DND 2259 (10-99))

Annex C- List of Medications

Annex D- Preliminary Instructions for Sar Techs

Annex E- Test Scoring Chart

CHAPTER 1

INTRODUCTION

Background

1. Interim physical fitness standards for CF Search and Rescue Technicians (SAR Techs) were implemented during the period of 1972 – 1995. During this period, SAR Techs had a trade physical fitness standard which was based on various CF aerobic and muscular fitness tests in combination with the additional of a shuttle run and rope climbs. The standards were not scientifically developed or validated based on the occupation requirements of the job. In 1995, Air Command requested that CFPSA/DPE research and develop physical fitness maintenance standards for SAR Techs based on bona fide occupational requirements. In 1996, the Defence Research and Development Branch (DRDB) provided funds to CFPSA/DPE to develop and validate bona fide physical fitness maintenance standards for CF SAR Techs. The Queen's University Ergonomics Research Group (ERG) was contracted to complete the scientific study, and delivered their final report to CFPSA/DPE in January 1999. Based on the research findings, CFPSA/DPE has developed a comprehensive SAR Tech Physical Fitness Maintenance Program (PFMP).

General

2. While it is acknowledged that the CF Minimum Physical Fitness Standards (MPFS) is the minimum level of fitness required by CF personnel to permit them to meet the physical demands of the five common military tasks, there are times when individuals or groups will require other means of assessment to measure and demonstrate their operational capability. Being successful in meeting the MPFS does not necessarily mean that one is fit to perform specific occupational requirements, because some unique CF occupations have specific job requirements which demand a higher level of physical fitness than the minimum level. Therefore, physical fitness standards which reflect the physical demands of the job are required for these unique CF occupations.

3. The CF SAR Tech occupation is unique, as it is comprised of highly specialized personnel who play a vital role in the safety of all Canadians. Job capability is of utmost importance given the intensely demanding work performed by SAR Techs, and the implications for health and safety of both the SAR Techs and the members of the public who require their services. Normal SAR activities such as parachuting, diving, helicopter hoisting, mountaineering, and ground operations require the SAR Tech to be extremely physically fit. A SAR Tech's ability to complete his/her mission is directly related to his/her physical condition. SAR Techs must be conditioned to cope with the stresses imposed by sustained operations and be physically ready to be subjected to the impact forces associated with their penetration methods.

4. In Canada, the creation and implementation of any physical fitness standards as a condition of service is governed by the Charter of Human Rights, under *bona fide* Occupational standards for employment. The Canadian Human Rights Act (1985) prohibits employment policies and practices that discriminate against individuals on the basis of race, national or ethnic origin, religion, age, sex, marital or family status or a pardoned conviction. An exception to this prohibition is given in paragraph 14(a) of the Act states that "it is not an discriminatory practice if any refusal, exclusion, expulsion, suspension, limitation, specification or preference in relation to any employment is established by an employer to be based on a bona fide occupational requirement (Government of Canada, 1985). For a BFOR to exist, the employer must have identified the following:

- a. The necessary tasks required by the job;
- b. The capabilities required to perform these tasks in a safe, reasonable manner; and
- c. A standards which can be met by performing the minimum requirements of the job (Government of Canada, 1985).

5. To establish a BFOR, policy requires that decisions be objective and based on expert opinion and scientific or empirical evidence when available. The detailed nature of tasks to be performed, existing work place conditions, and the effect of these conditions on employees must also be taken into consideration.

6. While employees are required to perform occupational tasks in a safe manner, a job may not be refused simply because safety risks are present, since most life activities pose some degree of risk. It should be the right of the individual to make an informed decision as to whether or not to accept the employment. However, the Canadian Human Rights Commission believes that the health and safety of others is of paramount importance. Therefore, injury to an employee's co-workers or the public should never be risked (Government of Canada, 1988).

7. SAR Techs provide search services to both the military and civilian population in the event of catastrophe or other circumstances by which personnel require that a search be conducted for them. SAR Techs provide rescue services as required including penetration of the site by fixed or rotary wing aircraft or on foot. These services include emergency lifesaving treatment, extraction, sustaining medical care and evacuation from the site. The SAR Tech may be exposed to a variety of working conditions as outlined below:

Environmental Conditions: The SAR Tech is subjected to long, irregular and fatiguing hours under adverse environmental conditions during sea, land or air search and rescue operations. Unlike many other occupations, SAR Techs cannot control the physical requirements of their work environment. At times, SAR Techs are required to operate under extremely adverse climatic conditions, either alone or as a team member, with the barest of necessities such as food, clothing and shelter. Environmental factors can have a significant influence on metabolic demand, and SAR Techs must be prepared to respond to changing emergency conditions. The stress of high altitude imposes significant restrictions on work capacity and physiologic function. Aerobic capacity shows a progressive and somewhat linear decrease with increases in altitude. One can generally expect a 1.5 to 3.5% reduction in VO₂ max for every 305m above altitudes of 1524m (McArdle, Katch & Katch, 1981). Since humans can only tolerate relatively small variations in internal temperature, exposure to heat or cold stress initiates thermoregulatory mechanisms that generate and conserve heat at low ambient temperatures and dissipate heat at high temperatures. Work in the heat can impose an additional stress on the cardiovascular system causing oxygen consumption to be approximately 5% greater than similar activity in a thermoneutral environment (McArdle, Katch & Katch, 1980). Similarly, exercise oxygen consumption is proportionally higher, due directly to shivering, in cold stress than it is during the same exercise in a warmer

environment (McArdle, Katch & Katch, 1981). This is particularly evident during exercise in cold water. It is reported that during exercise in 25 degree and 18 degree celcius water, VO₂ was higher by 9% and 25% respectively, in comparison to exercise in 33 degree celcius water (McArdle, Magel, Lesmes & Pechar, 1976). Other environmental conditions such as the working surface (hard surfaced road, sand, rocks, snow and/or mud) have also been shown to influence metabolic demand.

Hazards: The SAR Tech is also subjected to higher than normal physical hazards, serious injury or death during training or operations when searching from low-flying aircraft; working in flying aircraft with doors open, and in or around crashed aircraft; landing in confined areas; helicopter hoisting; rappelling; parachuting into unknown areas in adverse weather conditions; operating special vehicles; using weapons, pyrotechnics, volatile materials, toxic materials and power tools; diving with compressed air breathing apparatus (CABA); and being exposed to disease, rotating propellers and rotor blades.

Stress: SAR Techs are subjected to above normal stresses as a result of the constant attention to detail and the high degree of mental alertness necessary during search and rescue operations. Unusual stresses are encountered in the performance of hazardous or critical tasks such as descending from or ascending to helicopters by hoist or friction devices; parachuting by day or night into bush, arctic, water and rough or mountainous terrain; diving with CABA; mountain climbing; and performing the unpleasant task of removing and handling human remains.

Physical Effort: SAR Techs must be capable of lifting equipment of various weights to various heights; climbing, and hiking over various terrains carrying loads; operating under Gz conditions; and pulling and/or dragging weight up to and exceeding 200 lbs over various terrains. In order to sustain the strenuous effort which is often required to effect a rescue under severe climatic conditions in rugged and difficult to access terrain, SAR Techs have a requirement to achieve, maintain and be tested for higher standards of physical fitness than is required for the general CF population.

Scope

8. The SAR Tech PFMP consists of a physical fitness evaluation, an exercise prescription based on physical fitness evaluation results, and counselling components based on performance related physical fitness and health related fitness.

Aims

9. The aim of the SAR Tech PFMP is to promote physical fitness and a physically active lifestyle that will have a positive influence on job performance and health. Physical fitness standards are the cornerstone of a comprehensive program that involves exercise prescription and counselling for those SAR Techs who fail to meet the minimum standard, and for those SAR Techs who wish to maintain or improve their current level of physical fitness. Standards are intended to represent the quality of training programs and are not intended to stand alone nor are they intended to be punitive in nature.

Rationale

10. A decision concerning an individual's performance capability must be made on the basis of a relevant and valid individual assessment. Such an assessment is defined as one which accurately tests the capacities necessary to perform the job safely, efficiently and reliably. A valid assessment measures what it is intended to measure, is reliable because it consistently gives the same results, and is both accurate and precise. In order to ensure that assessment procedures are not given on a selective and discriminatory basis, they are to be administered to all SAR Techs in the same manner, and in accordance with the procedures outlined in this operations manual.

Requirements and Responsibility

11. The SAR Tech PFMP became official policy of the Canadian Forces when ADM(HR-Mil) Instruction /99 was promulgated.

12. It is a mandatory requirement that all operational SAR Techs participate in the SAR Tech PFMP. Leadership is fundamental to the program's success. Therefore, the primary responsibility rests with the Commanding Officer to ensure that all SAR Techs actively participate in the program.

13. The Canadian Forces Personnel Support Agency (CFPSA), Directorate of Physical Education is responsible for the delivery of the SAR Tech PFMP. CFPSA physical fitness staffs are responsible to their Commanding Officers for planning, organizing, conducting, instructing and evaluating the SAR Tech PFMP.

14. SAR Techs who are appropriately qualified as Basic Fitness Training Assistants (BFTAs) or Advanced Fitness Training Assistants (AFTAs) may assist professional CFPSA fitness staffs in the training and conduct of the evaluation, but are not authorized to prescribe exercise or develop physical training programs.

Components of the SAR Tech PFMP

15. The three components of the SAR Tech PFMP are:
- a. Evaluation – consists of a health appraisal questionnaire, pre-test screening, and completion of the compensatory model and lifting task;
 - b. Performance Related Physical Fitness – based on evaluation results, each SAR Tech shall be provided with an exercise program detailing the frequency, intensity, time and type of activities (FITT); and
 - c. Health Related Fitness – each SAR Tech shall be provided with information on active living and physical fitness, safer sex, alcohol and other drugs, smoking prevention and cessation, stress management, nutrition and healthy weights, and suicide prevention.

CHAPTER 2

ADMINISTRATION

General

1. The testing of CF SAR Techs is considered a responsibility under the auspices of the CF EXPRES Program.

Evaluation Schedule

2. The evaluation shall be conducted annually in accordance with the ADM(HR-Mil) /99 Instruction. SAR Techs who will not be available during the evaluation time period, as a result of temporary duty, courses, annual leave or posting, shall be evaluated prior to their departures.
3. SAR Techs may be evaluated with other CF members who may be completing their annual CF EXPRES Evaluation, as the protocols for administering the MPFS and SAR Tech PFMP are the same, except that SAR Techs must meet a different standard as well as complete the Lifting Task.

Medical Considerations

4. Statement of Suitability for Evaluation and Training: Prior to attempting the evaluation described in Chapter 3 of this manual, all SAR Techs will answer the Health Appraisal Questionnaire at Section B of DND 2260(Annex A).

5. Referral to a CF Medical Officer: SAR Techs will be medically referred to a CF Medical Officer (MO) utilizing the Medical Referral Round Trip Memorandum, DND 2259(Annex B) prior to evaluation and physical fitness training when any of the following conditions become evident:

- a. A **YES** response is made to any of the item on the Health Appraisal Questionnaire other than question 8; or
- b. A **YES** response is made to question 8 on the Health Appraisal Questionnaire and the drug the SAR Tech is taking appears on the List of Medications (Annex C); or
- c. The SAR Tech's resting heart rate exceeds 100 beats/minute after two measurements conducted in accordance with current CF EXPRES protocol;
- d. The SAR Tech's resting systolic blood pressure **exceeds** 140 mmHG and/or the resting diastolic blood pressure **exceeds** 90 mmHg after two measurements conducted in accordance with current CF EXPRES protocol; or
- e. If the SAR Tech develops any symptoms, which in the experience of the evaluator or SAR Tech, are outside of those normally encountered; or
- f. If there is any concern for the well-being of the SAR Tech; or
- g. If there is any doubt as to a SAR Tech's suitability to take the evaluation.

6. To provide the medical officer with background information pertaining to the evaluation, a SAR Tech PFMP information booklet shall be attached to the Medical Referral Round Trip Memorandum, DND 2259.

7. Medical Action: The CF Medical Officer, based on his/her assessment will make one or more of the following recommendations on the DND 2259:

- a. The SAR Tech is FIT for the physical fitness evaluation and subsequent training:
 - (i) Without limitations; or
 - (ii) With limitations noted; or
- b. The SAR Tech is UNFIT for the physical fitness evaluation and subsequent training:
 - (i) Permanently; or
 - (ii) Temporarily.

Reports and Returns

8. The SAR Tech PFMP form DND 2260 will be the only form used to record individual results and programs. All copies will be treated as Protected B when completed. The completed form will be sent to the member's Commanding Officer who will sign and distribute the copies as follows:

- a. Copy 1 to Wing Surgeon for inclusion on the member's medical documents;
- b. Copy 2 for placement on the member's UPR;
- c. Copy 3 to CFPSA Fitness Section for retention in the members CF EXPRES Physical Fitness Envelope (DND 1117) for ongoing counselling and program adjustments;
- d. Copy 4 to member;
- e. Copy 5 to member to CFPSA/DPE, National Physical Fitness Coordinator for research purposes, within 30 days of the evaluation period.

Action on Posting of SAR Techs

9. When a SAR Tech is posted, the physical fitness records will be forwarded by the PSP Fitness and Sports Director to the URS, and transmitted to the new unit via CF 479 Checklist for Personnel Records Envelope.

Career Administrative Policy

10. The SAR Tech PFMP will be administered in a manner identical to the CF MPFS. Commanding Officers have the requisite authority to remedy all situations. Commanding Officers shall assess unit members who fail to meet the SAR Tech PFMP standards and, having determined the reason for each failure, shall direct appropriate remedial action in accordance with CF policy as follows:

- a. Proficiency failure – CFAO 26-17; or
- b. Medical – CFAO 34-26.

Gold Standard Testing

11. Should a SAR Tech be unable to attain a passing score for the compensatory model after remedial training and career administrative procedures taken by his/her Commanding Officer, he/she will be afforded the opportunity to perform the Common SAR Tasks (Gold Standard) from which the standards for the compensatory model were derived. The Gold Standard criteria are as follows:

- a. **AEROBIC COMPONENT:** Completion of stage 8 on the 20 MSR or achieving a minimum of 44.6 ml/kg/min on the step-test as applicable;
- b. **TOBOGGAN PULL:** Completing this operationalized task is 59 seconds or less;
- c. **STRETCHER PULL:** Completing this operationalized task in 65 seconds or less.

12. The Lifting Task is a bona fide occupational requirement, and therefore is not included as part of the compensatory model. Therefore, SAR Techs failing the lifting task, regardless of whether or not they have met the above Gold Standard criteria, shall be deemed as failing the SAR Tech PFMP standards.

13. Prior to any final career administrative procedures, SAR Techs failing to meet the SAR Tech PFMP standards after remedial training and career administrative procedures taken by his/her Commanding Officer, may request evaluation on the Common SAR Tasks from which the standards for the compensatory model were derived. All requests are to be staffed by the Commanding Officer through the appropriate chain of command to CFPSA/DPE for action.

CHAPTER 3

EVALUATION PROCEDURES

General

1. The SAR Tech PFMP evaluation consists of pre-screening, a compensatory model and a lifting task. Pre-screening components include the administration of the CF EXPRES Health Appraisal Questionnaire, the administration of the Healthy Physical Activity Participation Questionnaire for SAR Techs 40 years of age and older, and the measurement of resting heart rate and resting blood pressure in accordance with current CF EXPRES Evaluation criteria. The compensatory model includes an aerobic component (20 MSR or the step-test as applicable), handgrip, pushups, and situps to be conducted in accordance with current CF EXPRES Evaluation protocols. Based on the analyses from the validation study, it has been scientifically demonstrated that aerobic capacity, situps, pushups, and combined handgrip are significant predictors of performance on physically demanding and representative SAR Tasks. Although the lifting task is classified as a trade standard, it has been determined to be an important physical component of a SAR Tech's job, and is therefore included as part of the SAR Tech PFMP Evaluation, but not as part of the compensatory model.

Pre-Evaluation Instructions for Assessors

2. To create credibility and enhance the potential for compliance, the CFPSA fitness assessor must be friendly, positive, well groomed, physically fit and properly dressed in CFPSA clothing.

3. The evaluation procedures have been standardized to ensure safety and consistent results. Clinical judgement and common sense must, nevertheless, be exercised throughout all components of the SAR Tech PFMP.

4. The evaluator must be open and sensitive to information about the SAR Tech. Rapport with the SAR Tech is important to gather information with respect to lifestyle habits, current levels of physical activity, activity preference, barriers to participation in training programs, job demands etc.

Equipment

5. The equipment required for the conduct of the evaluation is as follows:

- a. Stethoscope;
- b. Aneroid sphygmomanometer;
- c. Chair with arm rests (for RHR and RPB measurements);
- d. Cassette Player;
- e. Numbered pinnies for the 20 MSR;
- f. 20 MSR course;
- g. 20 MSR or CAFT tape;
- h. Steps for CAFT;
- i. Gym mat(s) for pushups and situps;
- j. Handgrip;
- k. Constructed wooden table with a platform height of 1.5 m;
- l. SAR Extrication kit weighing 40 kg.

Preliminary Instructions to the SAR Tech

6. In order to ensure accurate evaluation results, SAR Techs shall be given preliminary instructions at least 48 hours prior to their evaluation. The preliminary instructions (Annex D) shall advise the SAR Tech that prior to their evaluation, they should not:

- a. Exercise the same day;
- b. Consume alcohol for at least six hours; and
- c. Eat, smoke, or drink tea, coffee or other caffeine beverages for a least two hours.

7. The preliminary instructions shall advise the SAR Tech to bring the following personal gear with them to the evaluation:

- a. Running shoes,
- b. Gym shorts or sweat pants;
- c. Gym shirt or sweat shirt

Pre-Screening Protocols

8. CF EXPRES Health Appraisal Questionnaire: This questionnaire is a screening device to identify personnel for whom an evaluation and physical activity might be currently inappropriate. Encourage SAR Techs to read the Health Appraisal Questionnaire carefully and answer all the questions honestly. SAR Techs with **NO** responses are cleared for evaluation. SAR Techs shall be referred to a MO utilizing DND 2259 prior to evaluation when:

- a. a **YES** response is made to any of the items on the Health Appraisal Questionnaire other than Question #8;
- b. a **YES** response is made to question #8 on the Health Appraisal Questionnaire and the drug the SAR Tech is currently taking appears on the List of Medications (Annex C).

9. Questions pertaining to what kinds of medication may affect an individual's ability to undertake a physical fitness evaluation have always existed and caused concern for the evaluator. To alleviate this concern, a list of medications, which affects a member's ability to undertake an evaluation, has been developed by the Canadian Forces Medical Group, Directorate of Medical Policy. If a SAR Tech responds YES to question 8 on the Health Appraisal Questionnaire, ask the SAR Tech to write the name of the drug(s) that he/she is taking in the space provided under question 8. Check the list of medications provided at Annex C, and if the name of the drug appears on the list, refer the SAR Tech to the Medical Officer utilizing DND 2259. **DO NOT EVALUATE** SAR Techs who are taking drugs which appear on the list. If the drug(s) that the SAR Tech is (are) taking does not appear on the list, the SAR Tech may proceed with the evaluation. If the evaluator is in doubt, the SAR Tech shall be referred to the Medical Officer.

10. All SAR Techs shall be administered, and complete the Health Appraisal Questionnaire. Those SAR Techs referred to a Medical Officer should be told that there is not cause for alarm, but that the health appraisal questionnaire is designed to work as a simple safety precaution. **DO NOT ATTEMPT** to diagnose or discuss in detail why the SAR Tech has a **YES** response.

11. Once the SAR Tech has completed the Health Appraisal Questionnaire, the SAR Tech shall date and sign, in the space provided in Section B of DND 2260, confirming the following statement: "I HAVE READ, UNDERSTOOD AND COMPLETED THIS QUESTIONNAIRE. ANY QUESTIONS I HAD WER ANSWERED TO MY SATISFACTION."

12. Healthy Physical Activity Participation Questionnaire: The Canadian Society For Exercise Physiology (CSEP) Healthy Physical Activity Participation Questionnaire, which has been modified, with CSEP permission by CFPSA/DPE, shall be administered to all SAR Techs 40 years of age and older. The 20 MSR is the primary aerobic evaluation method for all SAR Techs, with the following caveats:

- a. All SAR Techs between the ages of 40 and 49 years must score a minimum of 6 points on the CSEP Healthy Physical Activity Participation Questionnaire;
- b. All SAR Techs who are 50 years of age and older must score a minimum of 9 points on the CSEP Healthy Physical Activity Participation Questionnaire.

13. The step-test will remain as an alternate aerobic evaluation for all SAR Techs, and shall be administered to SAR Techs:

- a. Who feel that they are unfit to attempt the 20 MSR:
- b. 40 years of age and older who do not score the required minimum number of points on the CPAFLA Healthy Physical Activity Questionnaire as outlined in para 12; and
- c. As directed by a Medical Officer.

14. Observations: Although the CF EXPRES Health Appraisal Questionnaire will identify most concerns which would make the evaluation inappropriate, the evaluator must also make some general observations during the screening process. The evaluation shall be postponed and rescheduled, if SAR Techs:

- a. demonstrate difficulty breathing at rest;
- b. cough persistently;
- c. are ill or have a fever;
- d. have lower-extremity swelling;
- e. have clearly ignored the preliminary instructions (i.e. have just eaten a heavy meal, alcohol on breath, have just finished a cigarette etc.)

15. These concerns should be dealt with in a similar manner to a **YES** response on the Health Appraisal Questionnaire. SAR Techs should be encouraged to see a MO about some of the concerns (persistent cough, lower extremity swelling) or simply return at the re-scheduled time when the concerns are no longer relevant (i.e. preliminary instructions regarding alcohol, food, exercise, or smoking have been followed).

16. Vital Signs. The CF EXPRES protocols for the measurement of resting heart rate and resting blood pressure will be utilized.

17. Resting heart rate is influenced by many factors. Nervousness in anticipation of the evaluation may elevate the SAR Tech's heart rate. A few minutes of informal chatting can do much to calm apprehensive SAR Techs. The SAR Tech should be seated comfortably in a chair with arm supports, and rest with their feet flat on the floor for a least five minutes before the resting heart rate is measured. During this period, the SAR Tech may wish to complete the Healthy Physical Activity Participation Questionnaire and/or Fantastic Lifestyle Checklist as found in the CPAFLA manual.

18. To determine the resting heart rate, a stethoscope should be utilized. The stethoscope should be positioned so the earpieces point forward. The diaphragm of the stethoscope should be placed either on the sternum or over the second intercostal space on the left side. Should it not be possible to utilize a stethoscope, resting heart rate may be measured by palpating the radial artery. For this procedure, the index and middle fingers should be used to gently apply pressure on the inside of the wrist just above the thumb. The resting heart rate (RHR) is determined using a 15-second count and the first beat is counted as "zero". The total number of beats in the 15-second count is then multiplied by 4, and recorded in beats/minute in the appropriate space provided in Section B of DND 2260.

19. In the event that the RHR exceeds 100 beats/minute, wait an additional five minutes and repeat the procedure. Should the RHR still exceed 100 beats/minute on the second reading, the SAR Tech shall be referred to a MO utilizing DND 2259. The SAR Tech shall not be administered the evaluation or receive an exercise program until appropriate medical clearance is received.

20. Measurement of resting blood pressure (RBP) is an integral part of the screening process. Many conditions can cause RBP to be elevated above the average resting value. Anxiety can cause a transient increase in blood pressure. The SAR Tech's anxieties may be minimized by taking the time to explain the evaluation procedure generally, or blood pressure measurement specifically, and answering questions.

21. When conducting RBP, a stethoscope and sphygmomanometer shall be used. An appropriate size of blood pressure cuff should be chosen and applied to the SAR Tech's left arm. The cuff should be firmly and smoothly wrapped around the left arm with the lower margin of the cuff, two or three centimetres (cm) above the antecubital space. The arm should be comfortably supported at an angle of 10 to 45 degrees from the trunk, with the lower edge of the cuff at heart level. The brachial artery should be located by palpitation and noted. Rapidly inflate the cuff to a level 20 to 30 mmHg above the radial palpatory pressure and quickly position the stethoscope over the brachial artery, ensuring that the diaphragm is in complete contact with the skin and not touching the cuff or its tubing. Release the cuff pressure at a rate of approximately 2 mmHg per second. The systolic pressure is determined by the first perception of sound. The diastolic pressure is determined when the sounds cease to be tapping in quality and are fully muffled. The cuff is then deflated to zero pressure and removed from the fire fighter's arm.

22. The resting systolic and diastolic pressures are recorded to the nearest 2 mmHg in the appropriate space in Section B of DND2260.

23. In the event that the resting systolic blood pressure is greater than 140 mmHg and/or the resting diastolic blood pressure is greater than 90 mmHg, have the SAR Tech rest quietly for five minutes before repeating the measurement. If after two readings, the SAR Tech's resting systolic blood pressure is still greater than 140 mmHg and/or the resting diastolic blood pressure is greater than 90 mmHg, the SAR Tech shall not be permitted to undertake the evaluation, and shall be referred to the MO utilizing DND 2259.

Conduct of the Compensatory Model

24. The compensatory model consists of the 20 MSR or step-test as applicable, handgrip, pushups, and situps. The SAR Tech compensatory model protocols are exactly the same as the CF EXPRES Minimum Physical Fitness Standards (MPFS) protocols for the conduct of the 20 MSR, step-test, handgrip, pushups and situps. Therefore, SAR Tech compensatory model shall be conducted in exactly the same manner as the CF EXPRES MPFS evaluation, as promulgated in CF EXPRES Operationa Manual A-PD-050-062/PT-001. The only difference between the two evaluations is the scoring process and standards. The SAR Techs standards are discussed in para 26 below. The scoring charts for the compensatory model are enclosed asAnnex E.

Conduct of the Lifting Task

25. The lifting task consists of lifting a SAR Tech extrication kit with a mass of 40 kg to the height of 1.5 metres. This task shall be administered after the compensatory model, and after the SAR Tech has been permitted an adequate recovery time (vital signs equal to or below prescreening cut-off criteria). There is no time limit for this task. The evaluator must ensure that the extrication kit weighs 40 kgs, and that the constructed table measures 1.5 metres from the ground to the table top. The SAR Tech shall be encouraged to employ a proper lifting technique (back straight, knees bent). In order to be successful, the SAR Tech must lift the extrication kit from the ground in front of the table to the table top. Failure to lift the extrication kit from the ground to the table top will result in a failure of this task.

SAR Tech PFMP Standards

26. The SAR Tech PFMP evaluation standards have been scientifically validated based on the Bona Fide occupational requirements associated with the successful completion of SAR duties. The SAR Tech PFMP evaluation standards are as follows:

- a. COMPENSATORY MODEL – Completion of stage 8 on the 20 metre shuttle run (20 MSR) or achieving a minimum of 44.6 ml/kg/min⁻¹ on the step test and scoring a minimum of 30 points on the compensatory model;
- b. LIFTING TASK – Successfully lifting a SAR Tech extrication kit with a mass of 40 kg to the height of 1.5 metres.

27. SAR Techs in an operational position drawing Rescue Specialist Allowance are considered as operational SAR Techs. All operational SAR Techs must achieve the SAR Tech PFMP Standards on an annual basis unless excused by:

- a. Medical; or
- b. Release.

28. Non-operational SAR Techs will be required to meet the CF Minimum Physical Fitness Standards (MPFS) on an annual basis unless exempt under the CF EXPRES Incentive Program or excused by:

- a. Medical;
- b. Training; or
- c. Release.

29. Non-operational SAR Techs may elect to be evaluated on the SAR Tech PFMP standards for PER purposes. TD costs associated with non-operational SAR Techs travelling for such an evaluation will be borne by the unit employing that SAR Tech and will not be borne by the CFPSA/DPE.

Incentive Program

30. The incentive program is designed to reward those SAR Techs who score in an elite category with respect to physical fitness level. To meet the SAR TECH PFMP Incentive Program requirements, a SAR Tech must pass the aerobic requirement, lifting task, and score 65 points or more on the compensatory model. If a SAR Tech is rated at this level, the SAR Tech Physical Fitness Form will be annotated accordingly, and the unit CO will report this achievement in the narrative on the members' annual PER. SAR Techs achieving the incentive level **are not** excused from completing their next evaluation.

CHAPTER 4

PERFORMANCE RELATED PHYSICAL FITNESS

General

1. Measurement of physical fitness provides data that are helpful in the development of exercise prescriptions. Physical fitness evaluations permit the collection of baseline data that allows participants to evaluate their progress. A fundamental goal of exercise programs is to promote physical fitness. Physical fitness may be defined as a set of attributes that are either health or performance related. Performance related fitness involves those components of fitness that enable optimal work (CSEP, 1996). The underlying concept of performance related fitness is that better status in each of the constituent components is associated with better performance or optimal work.

Supervision of Exercise Programs

2. The three levels of supervision for exercise programs are as follows:

a. **DIRECT SUPERVISION:**

- (i) if the SAR Tech does not meet the minimum aerobic requirement; and/or
- (ii) as directed by a Medical Officer.

b. **SEMI-SUPERVISED:**

- (i) If the SAR Tech passes the aerobic requirement, but does not score a minimum of 30 points on the compensatory model and/or pass the lifting task.

c. **SELF-SUPERVISED:**

- (i) If the SAR Tech passes the aerobic requirement and scores 30 points on the compensatory model and passes the lifting task.

Exercise Prescription

3. Based on evaluation results, each SAR Tech shall be prescribed an individual exercise program to maintain or improve his/her level of physical fitness. Exercise prescription shall contain a warm-up and cool down, as well as specific aerobic, muscular strength, and muscular endurance programming.

Aerobic Exercise Prescription

4. The following general guidelines for the prescription of aerobic exercise shall be utilized:
- a. Frequency: 3-5 times per week. The frequency prescribed will depend on the SAR Techs current level of activity as well as their fitness level;
 - b. Intensity: The target heart rate zone (THRZ) for exercise prescription should be between 60-90% of age predicted maximum heart rate (maximum HR = $220 - \text{age}$);
 - c. Time: 20 to 60 minutes of continuous activity. The time of the exercise sessions will be based on the SAR Tech's current level of activity; and
 - d. Type: Activities which use large muscle groups and can be done in a continual and rhythmic manner. The type of aerobic activity prescribed should be based upon the activity preference of the SAR Tech.

5. It must be emphasized that these are general guidelines only. It is the responsibility of evaluators to assess the starting exercise intensity, frequency, time and type of exercise. Relying on their professional qualifications and experience, evaluators shall prescribe exercise based upon the above criteria as well as:

- a. their interaction with the SAR Tech;
- b. the current physical activity/training level of the SAR Tech; and
- c. any additional information which is gathered during the evaluation.

6. If in doubt about the starting level of the FITT principle in the exercise prescription, evaluators shall consult with their Wing Fitness and Sports Director. Should a unique situation be present, or if further clarification, with respect to individual programming is required, Wing Fitness and Sports Directors shall consult with the CFPSA/DPE National Physical Fitness Manager.

7. In addition to the above guidelines, the following CF EXPRES (English) Program Guides (series A-PD-050-062/PT-) may be utilized:

- a. Personal Training Record – 007;
- b. CF EXPRES Info Booklet;
- c. Walking – 012;
- d. Swimming – 014;
- e. Stationary Cycling – 016;
- f. Rope Skipping – 018;
- g. Cycling – 020;
- h. Jogging – 022;
- i. Cross-Country Skiing – 024;

- j. Skating – 026; and
- k. Snow-Shoeing – 028.

Heart Rate Monitoring

8. SAR Techs should be encouraged to monitor their heart rate prior to, during and after their physical fitness training sessions. Monitoring heart rate prior to the exercise session will provide the SAR Tech with a resting heart rate value which may be used as a baseline for measuring progress. Resting heart rate values should decrease as the SAR Tech becomes more aerobically fit. SAR Techs should be encouraged to monitor their heart rate during the exercise session to ensure that they are working within their target heart rate zone as prescribed. This will ensure maximum benefits are obtained from the exercise session. Post-exercise heart rates should be taken to ensure that recovery from the exercise session is occurring.

9. Heart Rate may be monitored by a number of methods:

- a. Heart rate monitor;
- b. Radial artery; or
- c. Carotid artery;

10. SAR Techs should be informed that their target heart rate zone is based on average heart rates for persons of similar age, and that their own maximum heart rate could be below or above the average. Therefore, they may have to adjust their level of activity so that they are comfortable.

11. Another method of monitoring exercise intensity is the “talk test”. The principle of the “talk test” is that the SAR Tech should be able to carry on a conversation during exercise, and if he/she cannot, then the exercise intensity is too high.

Muscular Strength and Endurance Exercise Prescription

12. A muscular strength and endurance program shall be given to each SAR Tech. The program will include the recommended quantity and quality of activity to improve and/or maintain muscular strength and endurance. The FITT principle shall be used, detailing specific exercises as well as the number of sets and repetitions to be completed.

13. In addition to developing a personalized muscular strength and endurance program for SAR Techs on Semi or Self-Supervised exercise programs, the following CF EXPRES (English) Program Guides (series A-PD-050-062/PT -) may be utilized:

- a. Muscular Strength and Endurance – 010; and
- b. Nautilus – 030.

Resource Materials

14. All CF EXPRES Materials are available as resource materials. In addition, the Canadian Physical Activity, Fitness and Lifestyle Appraisal (CPAFLA) resource materials may be utilized.

CHAPTER 5

HEALTH RELATED FITNESS

General

1. As stated in chapter 4, physical fitness may be defined as a set of attributes that are either health or performance related. Health related fitness comprises those components of fitness that exhibit a relationship with health status. Positive health is associated with a capacity to enjoy life, to withstand challenge, and the absence of disease. The underlying concept of health related fitness is that better status in each of the constituent components is associated with lower risk for development of disease and/or functional disability (CSEP, 1996).
2. Heart attack, stroke, and cancer are the major causes of death and disability among Canadian adults. Physical inactivity, cigarette smoking, improper dietary habits, and inappropriate responses to stress all contribute to the problem (CSEP, 1996).

Lifestyle Assessment

3. The Canadian Society for Exercise Physiology (1996) has developed a FANTASTIC Lifestyle Checklist which covers a broad range of issues that have a subtle but powerful influence on health. This FANTASTIC Lifestyle Checklist is a tool which will permit the SAR Tech to reflect on various habits and attitudes. This tool does not have to be used, however, it is available as a resource if desired. As a counsellor, the SAR Tech may wish to discuss his/her responses with you. However, the SAR Tech may choose not to discuss his/her responses. SAR Techs may wish to take the Checklist home and complete it on their own. In this particular case, you should explain how to complete the checklist and interpret the results.

Strengthening the Forces Campaign

4. Strengthening the Forces is a campaign to promote health as a fundamental value in the CF and to ensure that the workplace supports healthy lifestyle choices. The campaign doesn't require members to take on extra tasks. Instead, it suggests some simple tips which can easily be done during one's normal routine. The Strengthening the Forces Campaign provides information in respect to the following:

- a. Active Living and Physical Fitness;
- b. Alcohol and Other Drugs;
- c. Smoking Prevention and Cessation;
- d. Stress Management;
- e. Nutrition and Health Weights;
- f. Suicide Prevention; and
- g. Safer Sex.

5. Brochures and materials are available directly from the Canadian Forces Publication Depot (CFPD). They may be obtained by filling out a supply demand form (CF2302) and quoting the NDID. A list of available resources to assist in your health promotion efforts is contained in the April 1996 update on the "Strengthening The Forces" Program documentation.

Nutrition

6. Maintaining healthy nutritional habits in accordance with the Canadian Food Guide will enhance SAR Techs overall efforts in maintaining proper weight and improved health. The following publications can be obtained from the CF Publication Depot:

- a. A-PD-007-005/JD-001 -- Managing Your Weight
- b. A-PD-007-005/DA-001 -- BMI And Your Health
- c. A-PD-007-006/JD-001 -- Maximizing Performance (Nutrition for the Athlete)

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ANNEX A

Sar Tech PFMP Evaluation Form

DND

ANNEX B

**SAR Tech PFMP
MEDICAL REFERRAL ROUND TRIP MEMORANDUM**

DND

ANNEXE C

Medication List

LIST OF MEDICATIONS

Members reporting for evaluation with either the step test or the 20 MSR could be on a wide variety of medications. To complicate matters many medications are known by several different “Brand” names. The following list includes medications which are known to significantly hinder heart rate response to exercise and therefore make the interpretation of fitness testing results more difficult. The “Brand names” are in bold and listed in alphabetical order for ease of reference. The nonproprietary names are shown in brackets () behind each brand name. Anyone on the medications should be referred to his or her medical staff prior to any fitness assessment unless they are already exempt from the step test or 20 MSR.

Apo-Acebutotol (Acebutol hydrochloride)
Apo-Atenolol (Atenolol)
Apo-Metoprolol (Type L) (Metoprolol tartrate)
Apo-Metoprolol (Metoprolol tartrate)
Apo-Nadolol (Nadolol)
Apo-Pindolol (Pindolol)
Apo-Propranolol (Propranolol hydrochloride)
Apo-Timolol (Timolol maleate)
Apo-Timop (Timolol Maleate)
Betaloc (Metoprolol tartrate)
Betaloc Durules (Metoprolol tartrate)
Betapace (Sotalol hydrochloride)
Beta-Tim (Timolol maleate)
Blocadren (Timolol maleate)
Corgard (Nadolol)
Corzide (Nadolol/ Bendroflumethiazide)
Detensol (Propranolol hydrochloride)
Gen-Atenolol (Atenolol)
Gen-Pindolol (Pindolol)
Gen-Timolol (Timolol Maleate)
Inderal (Propranolol hydrochloride)
Inderal-LA (Propranolol hydrochloride)
Inderide ((Propranolol hydrochloride/ hydrochlorothiazide)
Lopresor (Metoprolol tartrate)
Monitan (Acebutolol hydrochloride)
Novo-Atenolol (Atenolol)
Novo-Metoprolol (Metoprolol tartrate)
Novo-Nadolol (Nadolol)

Novo-Pindol (Pindolol)
Novo-Pranol (Propranolol hydrochloride)
Novo-Timol (Timolol maleate)
Nu-Atenolol (Atenolol)
Nu-Metop (Metoprolol Tartrate)
Nu-Pindol (Pindolol)
Nu-Propranolol (Propranolol hydrochloride)
Nu-Timolol (Timolol maleate)
PMS-Metoprolol-B (Metoprolol tartrate)
PMS-Propranolol (Propranolol hydrochloride)
Rhotral (Acebutolol Hydrochloride)
Sectral (Acebutolol hydrochloride)
Sotacor (Sotalol hydrochloride)
Syn-Nadolol (Nadolol)
Syn-Pindolol (Pindolol)
Taro-Atenolol (Atenolol)
Tenoretic (Atenolol/ chlorthalidone)
Tenormin (Atenolol)
Tim-Ak (Timolol maleate)
Timolide (Timolol maleate/ hydrochlorothiazide)
Trasicor (Oxprenolol hydrochloride)
Viskazide (Pindolol/ hydrochlorothiazide)
Visken (Pindolol)

Annex D
PRELIMINARY INSTRUCTIONS
FOR SAR TECHS

Name of SAR Tech:
Date of Evaluation:
Time of Evaluation:

Please adhere to the following conditions for the evaluation:

Dress Requirements: Gym gear (shorts and/or sweat pants, tee-shirt and/or sweat shirt) and running shoes.

Food and Beverages: Do not eat for at least two hours prior to your evaluation. Also refrain from drinking caffeine beverages for two hours and alcoholic drinks for six hours prior to evaluation.

Smoking: Do not smoke during the two hours prior to the appraisal.

Physical Activity: Strenuous physical activity should be avoided the same day as the evaluation.

Note: Failing to adhere to the above conditions may affect your results negatively, and may result in the cancellation of your scheduled appointment.

Annex E
TEST SCORE CHARTS FOR
20-MSR/STEP TEST, PUSH-UPS, SIT-UPS AND COMBINED
HANDGRIP
20-MSR/Step Test Scoring Chart

Step Test (ml/kg/min)	MSR Stage	Test Score
43.1	7.5 and Lower	Fail
44.5	8.0	0
46.1	8.5	1.6
47.6	9.0	3.2
49.2	9.5	4.7
50.8	10.0	6.3
52.2	10.5	7.8
53.6	11.0	9.4
55.2	11.5	11.0
56.7	12.0	12.5
58.1	12.5	14.1
59.5	13.0	15.7
61.1	13.5	17.2
62.7	14.0 and Higher	18.8

Push-ups Scoring Chart

Push Ups	Test Score
17 and Lower	0
18	0.1
19	0.9
20	1.6
21	2.2
22	2.9
23	3.6
24	4.2
25	4.8
26	5.4
27	6.0
28	6.6
29	7.2
30	7.7
31	8.3
32	8.9
33	9.4
34	9.9
35	10.4
36	11.0
37	11.5
38	12.0
39	12.5
40	13.0
41	13.4
42	13.9
43	14.4
44	14.9
45	15.3
46	15.8
47	16.2
48	16.7
49	17.1
50	17.6
51	18.0
52	18.4
53	18.8
54	19.3

55	19.7
Push Ups	Test Score
56	20.1
57	20.5
58	20.9
59	21.3
60	21.7
61	22.1
62	22.5
63	22.9
64	23.3
65	23.7
66	24.0
67	24.4
68	24.8
69	25.2
70	25.5
71	25.9
72	26.3
73	26.6
74	27.0
75	27.3
76	27.7
77	28.0
78	28.4
79	28.7
80	29.1
81	29.4
82	29.8
83 and Higher	30.0

Sit-ups Scoring Chart

Sit Ups	Test Score
20 and Lower	0
21	0.4
22	1.0
23	1.6
24	2.2
25	2.8
26	3.4
27	4.0
28	4.6
29	5.2
30	5.8
31	6.4
32	7.0
33	7.6
34	8.2
35	8.8
36	9.4
37	10.0
38	10.6
39	11.2
40	11.8
41	12.4
42	13.0
43	13.6
44	14.2
45	14.8
46	15.4
47	16.0
48	16.7
49	17.3
50	17.9
51	18.5
52	19.1
53	19.7
54	20.3
55	20.9

Sit Ups	Test Score
56	21.5
57	22.1
58	22.7
59	23.3
60	23.9
61	24.5
62	25.1
63	25.7
64	26.3
65	26.9
66	27.5
67	28.1
68	28.7
69	29.3
70	29.9
71 and Higher	30.0

Combined Handgrip Scoring Chart

Combined Hand Grip	Test Score
78 and Lower	0
79	0.5
80	1.0
81	1.6
82	2.1
83	2.6
84	3.1
85	3.6
86	4.1
87	4.6
88	5.1
89	5.6
90	6.1
91	6.5
92	7.0
93	7.5
94	7.9
95	8.4
96	8.8
97	9.2
98	9.7
99	10.1
100	10.5
101	11.0
102	11.4
103	11.8
104	12.2
105	12.6
106	13.0
107	13.4
108	13.8
109	14.2
110	14.6
111	15.0
112	15.4
113	15.8
114	16.1
115	16.5

Combined Hand Grip	Test Score
116	16.9
117	17.3
118	17.6
119	18.0
120	18.3
121	18.7
122	19.0
123	19.4
124	19.7
125	20.1
126	20.4
127	20.8
128	21.1
129	21.4
130	21.8
131	22.1
132	22.4
133	22.7
134	23.0
135	23.4
136	23.7
137	24.0
138	24.3
139	24.6
140	24.9
141	25.2
142	25.5
143	25.8
144	26.1
145	26.4
146	26.7
147	27.0
148	27.3
149	27.6
150	27.9
151	28.1
152	28.4
153	28.7
154	29.0
155	29.3
156	29.5
157	29.8
158 and Higher	30.0