

SHIFT-BASED PROGRAM SCHEDULING FOR FIREFIGHTERS

There has been progress in research for periodization of training for firefighters, but very little peer-reviewed work on shift-based planning. There is no argument that periodization is successful, and that different models—linear, non-linear, and block—can be applied with success in different fashions (8,11,12,13). The question of how shift work really affects a periodized program, more specifically firefighter shift work is less clear.

It is understood across numerous industries that shift work can influence health risks of hypertension, gastrointestinal conditions, cardiac disease, diabetes, and other endocrine disorders (6,7,9,10,14). This is becoming more widely documented in the fire service as well (3,5). The long-term influence starts in short-term subtleties, suggesting that inconspicuous daily effects would have an impact on both immediate and long-term training well-being.

In 2011, Jorge Carvajal authored an article in the *TSAC Report*, which seems to be one of the only shift-based training articles composed during a review of multiple databases (2). Additionally, the National Strength and Conditioning Association's (NSCA) publications appear to be the only scholarly publications that include allusions to shift-based physical training, suggesting a need for wider refereed discussion.

SCHEDULING

Though the job requires fitness, few firefighters have the ability (or desire) to train 9 – 12 times a week like a top athlete. Those that do train like that often have underlying motivation other than the job. For the rest of the personnel, tactical facilitators should plan for situations that are less than ideal. Tactical facilitators should focus on setting tactical athletes up for small successes and mastery and then letting them decide where to go from there. Due to second jobs, alarm loads, family commitments, and life individuality, a seven-days per week training cycle usually does not work well for firefighters (2). The sample programs in Tables 1 and 2 provide two possible options for firefighters, a high-low scheduling block and mixed modes scheduling block. Both samples are based on the common three-shift 24/48 hour cycle.

The first scheduling option, high-low scheduling, shows variation based on one training mode (e.g., strength training only, running only, etc.). It outlines training based on high, medium, and low load days (load accounting for volume x intensity variations). It is generally intended as a starting point for those who focus primarily on one style of fitness (e.g., strength, conditioning, or endurance).

On the other hand, the second scheduling option, mixed modes scheduling, outlines a variation for those who prefer mixed training methods. It should be noted that these introductory sample do not address highs and lows in terms of load.

Depending on where either of these falls in the year, training styles, intensity, and volume focuses are apt to shift. These samples are simply designed as starting points for focusing on firefighter schedules. The purpose of this article is not to specifically address the intensity of training on- or off-duty, but loading guidelines must be discussed in order to understand the models.

HIGH-LOW SCHEDULING (TABLE 1)

High-low scheduling allows variability based on individual goals, philosophy, duty status, and personal life. Maximal loads will be relative to the individual and mode of exercise, the latter of which is highly dependent on the training options available at work. It is worth noting that there is never a high load day on shift days. In terms of strength work, this would mean no days with a full volume of 4 – 8 repetition maximum sets or persistent power work. For cardiovascular conditioning, this means no long work (including long slow distance [LSD] training) or extensive work at lactate threshold.

DAILY PLANNING VARIATIONS

For athletic performance, Carvajal recommends closely monitoring parasympathetic status to determine post-shift training loads (1). This frequently requires taking the day after a shift as a rest day or recovery training day. Where Carvajal's focus was on higher levels of performance and limiting the shift from interfering with physical training, Dennison et al. focused on limiting training from interfering with shift needs (4). By reserving training for the end hours of a shift or after a shift, exercise fatigue is less likely to interfere with on-duty needs. The large population of firefighters in the middle of the fitness spectrum may want to consider both recommendations, but likely need more than one in three days of moderate or hard training sessions. Building in "medium" days and mixing modalities may help with training general fitness for most firefighters while following these recommendations.

MIXED MODES SCHEDULING (TABLE 2)

The mixed modes scheduling applies three basic approaches to physical training: strength (loads not usually capable beyond 10 repetitions or 30 s), cardiovascular (ongoing, cyclical activity), and conditioning (a medium between, or blend of, the two). For individuals with strength training equipment at the station, strength days are placed specifically during on-duty days. This

allows for strength training during on-duty days, and alternating cyclical cardiovascular and conditioning training on the days off. There are two major benefits of using strength days during on-duty days: it tends to be a lower physical and metabolic demand, thus decreasing risk for alarm safety; and most personnel have access to some form of strength training equipment while on-duty, limiting costs for gym memberships or home equipment (4).

For those who have limited or no strength equipment at the station, strength days can be placed on off-duty days. This may incur cost to the individual firefighters. If cost is prohibitive, use of fire-specific equipment (where permitted) can be beneficial for training purposes (11). Depending on the structure of training, these gains may be less strength-specific and more muscular endurance or conditioning based, but are highly beneficial to most firefighter fitness needs.

DAILY PLANNING VARIATIONS

On-duty strength days should not incorporate medium-to-high or high loads frequently. Typical cardio or conditioning days while on-duty should be mixed with low-to-moderate volume and intensities. It requires strong discipline or quality supervision to stick to that commitment. Those tactical athletes who want the challenge of more frequent medium-to-high and high days can schedule those, but most individuals do not need it.

While it is recommended that these duty days as a whole never hit maximal intensities, a variation can be applied by allowing individual exercises to undulate fully (4). Selecting one or two exercises on a given day as “high intensity exercise” still allows individual challenge to limit plateaus.

PURPOSE AND TARGET AUDIENCE

It is important to note that none of the recommendations or research discourage training sessions while on-duty. On-duty training under a supervised program may actually provide some of the best adherence for firefighters (11).

PREFERENCE

Athletes, whether tactical, recreational, occupational, or self-acclaimed, tend to gravitate towards what they learned developmentally. It is a comfort zone, and the reason for favor is simple enjoyment—whether from the activity or the level they have achieved. This is key for the tactical facilitator to accept in order to promote adherence.

INDIVIDUALITY

Among the infinite other considerations (e.g., availability, age, etc.), these three questions are important to consider when selecting a physical training model for firefighter populations:

1. What is the purpose? (e.g., to become a super firefighter, to focus on a sport, for health reasons, for general wellness, etc.)

2. What is the shift schedule?
3. What is the firefighting focus of the municipality?

While slight changes in periodization styles may be statistically different, they are not practically different to most fitness goals. As such, they should be applied in ways that best match the individual's lifestyle, promote adherence, and enhance participation.

ATHLETES

Many highly fit or highly motivated individuals may feel these concepts do not provide the frequency or volume adequate for performance. Those requiring very specific gains and high-level performance training should take these ideas into consideration to benefit their performance. Central nervous system and endocrine responses combined with those effects of shift work will be the main concern (1,3,14). A tactical facilitator or outside coach must be aware of the influences of shift needs in order to maximize individual athletic gains.

SUMMARY

Although ideal for firefighters, the models proposed here can be varied across the spectrum of populations from sports performance to return-to-health and can be used in individual and group settings. Tactical facilitators should avoid being counterintuitive with programming and consider the primary goal first. Training focuses should still be on the primary goal and individual or group preferences. Daily undulation periodization styles are easily adaptable to those variables while adhering to scholarly recommendations (11,12). These shift-based scheduling models can be applied in a block, linear, or other blended styles and may be beneficial for firefighters, or any population dealing with shiftwork.

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SHIFT-BASED PROGRAM SCHEDULING FOR FIREFIGHTERS

TABLE 1. SAMPLE HIGH-LOW SCHEDULING

WEEK	SUN	MON	TUE	WED	THU	FRI	SAT
1	M	L		M	H	L	
2	M	M	L		M	L	H
3		M	H	L	M	L	

Key:

- L = Low
- M = Medium
- H = High
- Shading = Off-duty
- Blank = Rest

TABLE 2. SAMPLE MIXED MODES SCHEDULING

WEEK	SUN	MON	TUE	WED	THU	FRI	SAT
1	C	V		S	V	C	
2	C	V	S		V	C	V
3		S	C	V	S	V	

Key:

- S = Strength
- C = Conditioning
- V = Cyclical/cardio
- Shading = Off-duty
- Blank = Rest