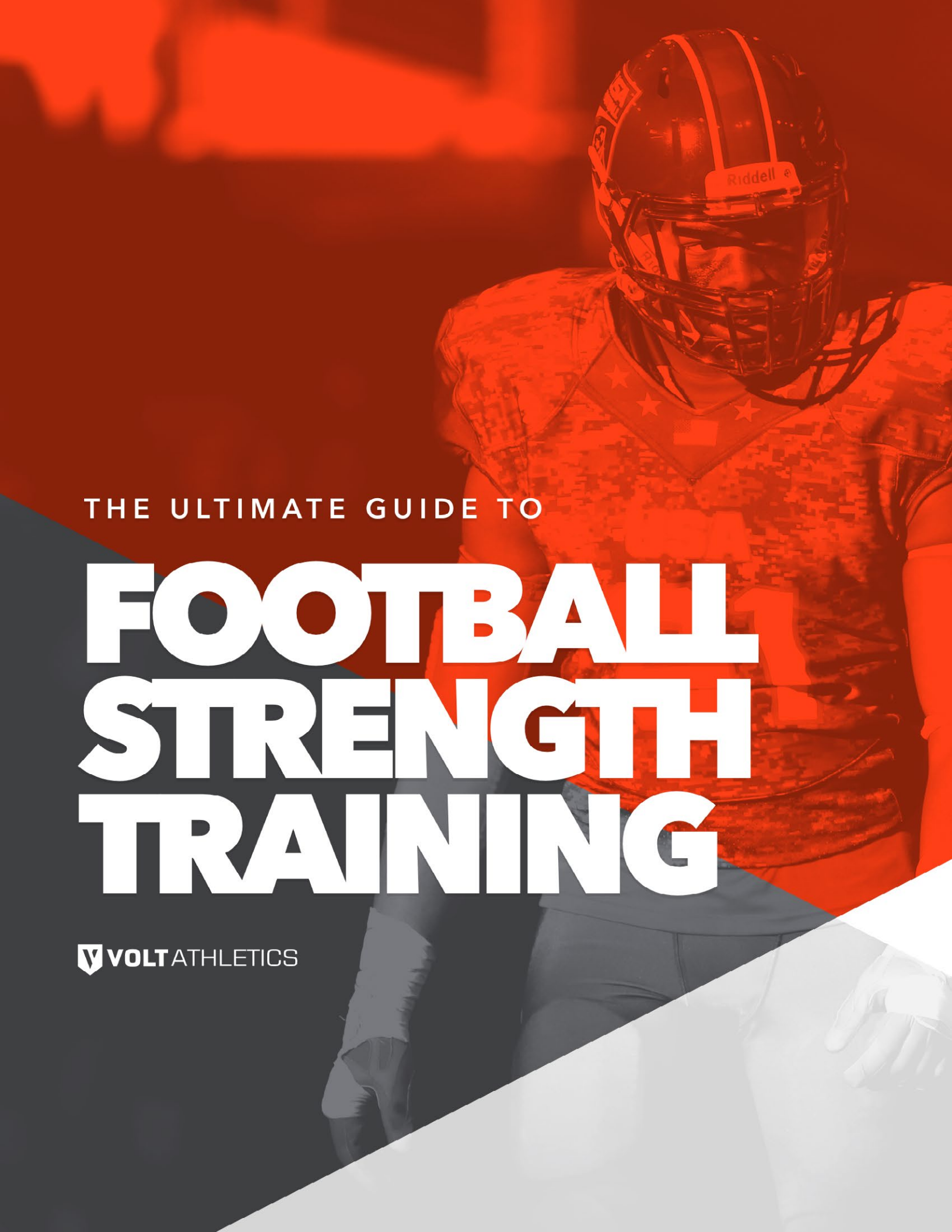

THE ULTIMATE GUIDE TO

FOOTBALL STRENGTH TRAINING

VOLT ATHLETICS

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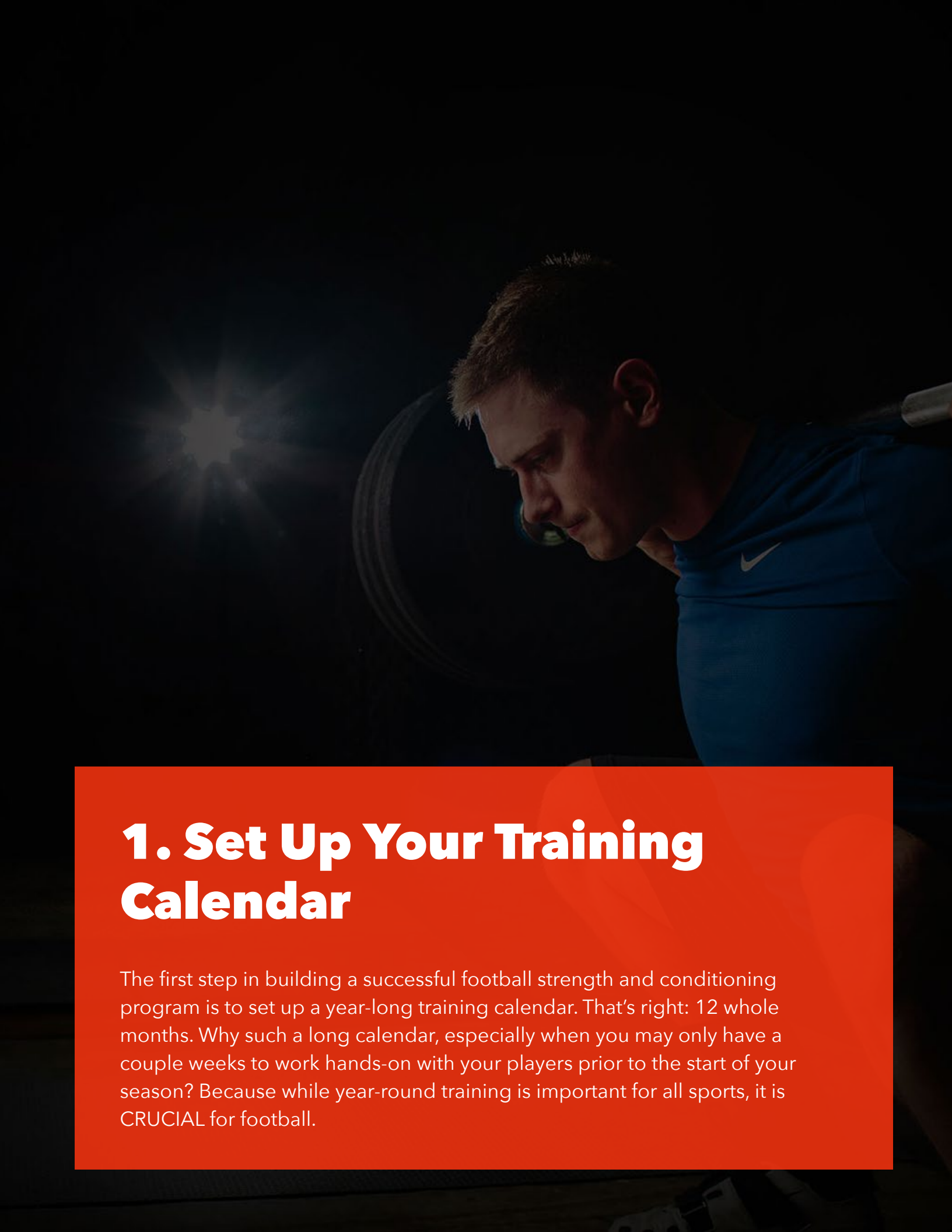
Training is Essential for Football

Proper physical training is important for all sports – but for football and other contact sports, it is critical for preparing athletes for competition. The physicality inherent in football means that players (especially young players) must be structurally strong and conditioned for high-velocity competition in order to succeed. Every coach wants to know that when fall arrives, their athletes will be strong and ready for a long and healthy season, making strength training an essential component to proper football preparation.

Research has shown that athletes who strength train on a periodized training program, designed to strategically peak them for the demands of the football season, perform better on the field AND reduce their risk of getting injured (1, 4). Not only does training strengthen an athlete's musculoskeletal system (muscles, bones, tendons, ligaments, cartilage, and connective tissues), making him or her more resilient against one-on-one contact, but it also helps neurologically ingrain good movement patterns. For example, athletes who strengthen the muscles needed to land safely after jumping up for a catch and practice good landing mechanics in the weight room are less likely to roll an ankle during a game.

This guide is designed to help you create a safe and effective training program for your entire football team – from organizing your calendar to structuring the optimal training session – so your athletes are armed and ready to play hard (and stay healthy) all season long.



1. Set Up Your Training Calendar

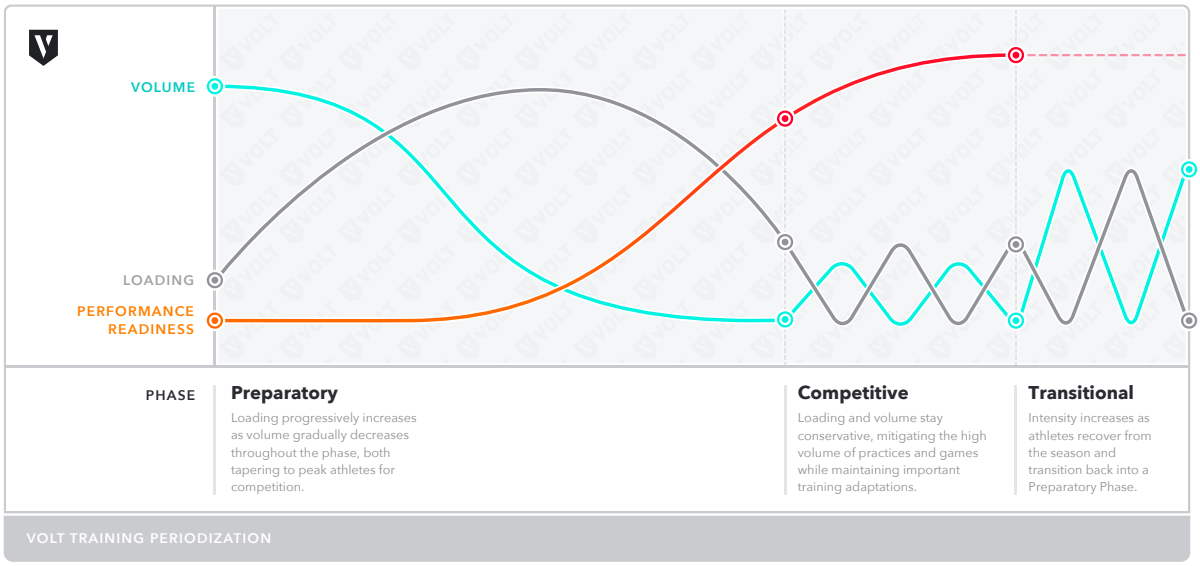
The first step in building a successful football strength and conditioning program is to set up a year-long training calendar. That's right: 12 whole months. Why such a long calendar, especially when you may only have a couple weeks to work hands-on with your players prior to the start of your season? Because while year-round training is important for all sports, it is CRUCIAL for football.

The physicality of the game (and risk of contact injury) highlights the importance of strength training not only for performance on the field, but also for player safety. Even though most football coaches only get their athletes in the weight room for a short period during the off-season, that doesn't mean athletes should show up to training camp without any preparation under their belts. In fact, if you really want your players to be successful during the season, the earlier they can start strength training, the better. Remember (and we'll go into further detail on this later) that athletes don't need to train to exhaustion in every workout in order to see results – so your program shouldn't deplete your players before training camp even starts. But your program should include enough progressive strength training to help prepare your athletes for the demands of the game, and that means taking your training year by year – NOT off-season by off-season. By looking at your strength and conditioning through a 12-month lens, you'll help your players develop throughout the year, setting them down a path of long-term development that looks beyond just one season.

In fact, the need for athletes to have access to training year-round is one of the coaching pain points Volt was founded to solve. Volt's training, accessible via mobile app from anywhere, ensures that athletes have access to their program in the months leading up to the off-season. Coaches have optional visibility into what their athletes are doing (as permitted by the rules of your particular organization), so you'll know who's been putting in the work over the summer – though that's usually apparent on the first day of training camp.

In addition to building out a full 12-month training plan, you'll need to communicate with your athletes about the importance of training even when you're not with them. After all, a workout packet doesn't do anyone any good if a player tosses it in their backseat and doesn't look at it the whole summer. Set up your training calendar, build out your program, and set expectations for your athletes to get in the weight room early and regularly.

DIVIDE YOUR YEAR INTO 3 PHASES OF TRAINING: PREPARATORY, COMPETITIVE, AND TRANSITIONAL.



PREPARATORY PHASE (OFF-SEASON)

At Volt, we call the off-season the Preparatory Phase, reinforcing its function within the training calendar (after all, athletes shouldn't take the off-season "off"). The Preparatory Phase is arguably the most important period of training for your athletes. Not only does it correlate to how physically prepared your athletes are for the start of the season, it's also the longest uninterrupted period of dedicated training your athletes will have all year, giving them enough time to:

- Develop comfort in the weight room
- Strengthen team unity by training together as a team or in position groups
- Rehab any injuries from last season
- Build the size, strength, and power that will translate to on-field skills and performance (and injury prevention) by the start of the season (2)

The Preparatory Phase also gives you enough time to assess your players for individual strengths and weaknesses. The weight room is a great environment for identifying strength imbalances or faulty movement patterns that could lead to injury on the field, and the longer your Preparatory Phase, the more time you have to work toward correcting them. Depending on your facility and schedule, try to allot at least 3 months of training (including pre-season camp) for your Preparatory Phase, and ideally more like 3-5 months.

COMPETITIVE PHASE (IN-SEASON)

When your football season starts, it's time to stop training, right? WRONG. While training in the Preparatory Phase helps get your players physically ready to compete, continuing to train (at a reduced volume and intensity) during the season affects how well your athletes maintain the gains they made in the off-season. If you're not planning to train in-season, you're setting yourself up for diminishing performance and potential injury down the line – not to mention a disappointing post-season.

Strength training in the Competitive Phase will help your athletes:

- Maintain the size, strength, and power built in the Preparatory Phase (and therefore avoid decreases in athletic ability)
- Keep joints mobile and tissues healthy in order to avoid injuries (6)
- Peak successfully for play-offs at the end of a long season

Managing training volume is key for Competitive Phase training. Volt programs just two strength training sessions per week during the season – down from three or four during the Preparatory Phase. Just two sessions is enough to help athletes avoid the loss of strength and power improvements made in the off-season, while still accommodating for the high volume of games and practices (6). Continuing to train will also allow you to peak your athletes for any post-season competition.

TRANSITIONAL PHASE (POST-SEASON)

After your season ends (assuming you do not need to peak your athletes for a secondary Competitive Phase for play-offs), it's time for your athletes to rest and recover – but that doesn't mean training should cease entirely. We recommended giving players two weeks completely off at the end of the season. Then, training can resume (up to three sessions per week) at a reduced volume and intensity.

By continuing your training program through the Transitional Phase, you'll help your athletes:

- Bridge the gap between the physical intensity of the Competitive and Preparatory Phases
- Maintain continuity in strength training routine
- Allow for cross-training and foam-rolling, stretching, and other myofascial (soft tissue) recovery treatments to prepare them for the Preparatory Phase

Transitional Phase training can incorporate many of the same lifts and movements patterns as Preparatory Phase training – just keep volume manageable and save PRs for the off-season. Depending on the length of your calendar, your Transitional Phase should last around 1 month.

2. Optimize Your Training Environment

Before you start programming tire flips and sled pulls, take some time to evaluate your training environment. What equipment does your weight room have? Do you have enough equipment to take many players through the same movements at once, or will you need to break them up into small training groups? Do your guys have access to your facility during the off-season? If not, what environment will they be training in?

Knowing the scope of your training environment will influence what exercises you can select for your program—and while no weight room is perfectly equipped, remember that any tool can be effective in the hands of a good coach!

THE IDEAL FOOTBALL WEIGHT ROOM

Volt recommends the following tools for ideal football training:

- Barbells
  - We recommend stocking 45-lb and 35-lb bars if you train both genders at your facility
- Bumper Plates
  - Allows for athletes to drop the bar during an Olympic lift without damaging the weights or lifting platform
  - We recommend stocking bumper plates up to 25 kg in weight
- Squat Racks (not to be confused with a Smith machine)
- Lifting Platforms/Designated Olympic Area
- Dumbbells
  - We recommend stocking dumbbells from 5 to at least 65 lb (though some athletes may require heavier)
- Medicine Balls
  - We recommend stocking several different weights of med ball, up to around 20 lb
- Resistance Bands
  - We recommend a variety of different types and weights of band, if possible
- Adjustable Weight Benches
  - Allows for incline and high-incline variants of dumbbell bench press, fly, and prone row
- Pull-Up Bars
  - Pull-ups can typically be performed in a squat rack, but if you

have a limited number of racks you might consider stocking a few additional pull-up bars
- Lat Pulldown Machine

OPTIONAL EQUIPMENT

File these tools under "nice to have," because while they may offer some variability in your exercise selection, they are not considered first priority when outfitting a weight room:

- Kettlebells
  - Particularly useful for Turkish get-ups, farmer/suitcase carries, and swings (although you can typically substitute a dumbbell for most kettlebell movements)
- Stability Balls
  - Sometimes called Swiss Balls or Yoga Balls
  - Great for hamstring curls and hip extension exercises
- Sandbags
  - Can be made from scratch using a gym/duffel bag and sand
- Tires
- Weight Sleds
- Ab Rollers
- Boxes
  - We recommend stocking at least 18-inch-high boxes
  - Weight plates can always be stacked on top to increase box height

MACHINES VS. FREE WEIGHTS

While there are benefits to using weight-stack and fixed-lever machines in training, free-weight exercises should comprise the majority of your training. Why? Even though weight machines are easy to use (especially for

new lifters) and may not incur the same risk of being hit or trapped under a barbell, the advantages of free weights are huge for football players (1). While many machines train single-joint movements (like a leg extension or preacher curl), free-weight exercises are usually performed standing, forcing the athlete to support the weight with his whole body. These exercises use more of the body's musculature at once, resulting in greater muscle and bone growth than with single-joint movements.

Perhaps most importantly, free-weight movements also require additional smaller muscles to work as stabilizers during the lift (like the abdominal and spinal erectors during an overhead press). This mimics real-life football actions, as the body uses many muscles to lift, accelerate, and decelerate objects.

So while machines are not inherently BAD, they're simply don't give you as much "bang for your buck" when it comes to training adaptations for football. Free-weight exercises allow for more efficient and effective strengthening of football-specific movement patterns – after all, a leg press will simply never produce the same results as a back squat with a barbell for a player needing total-body strengthening.

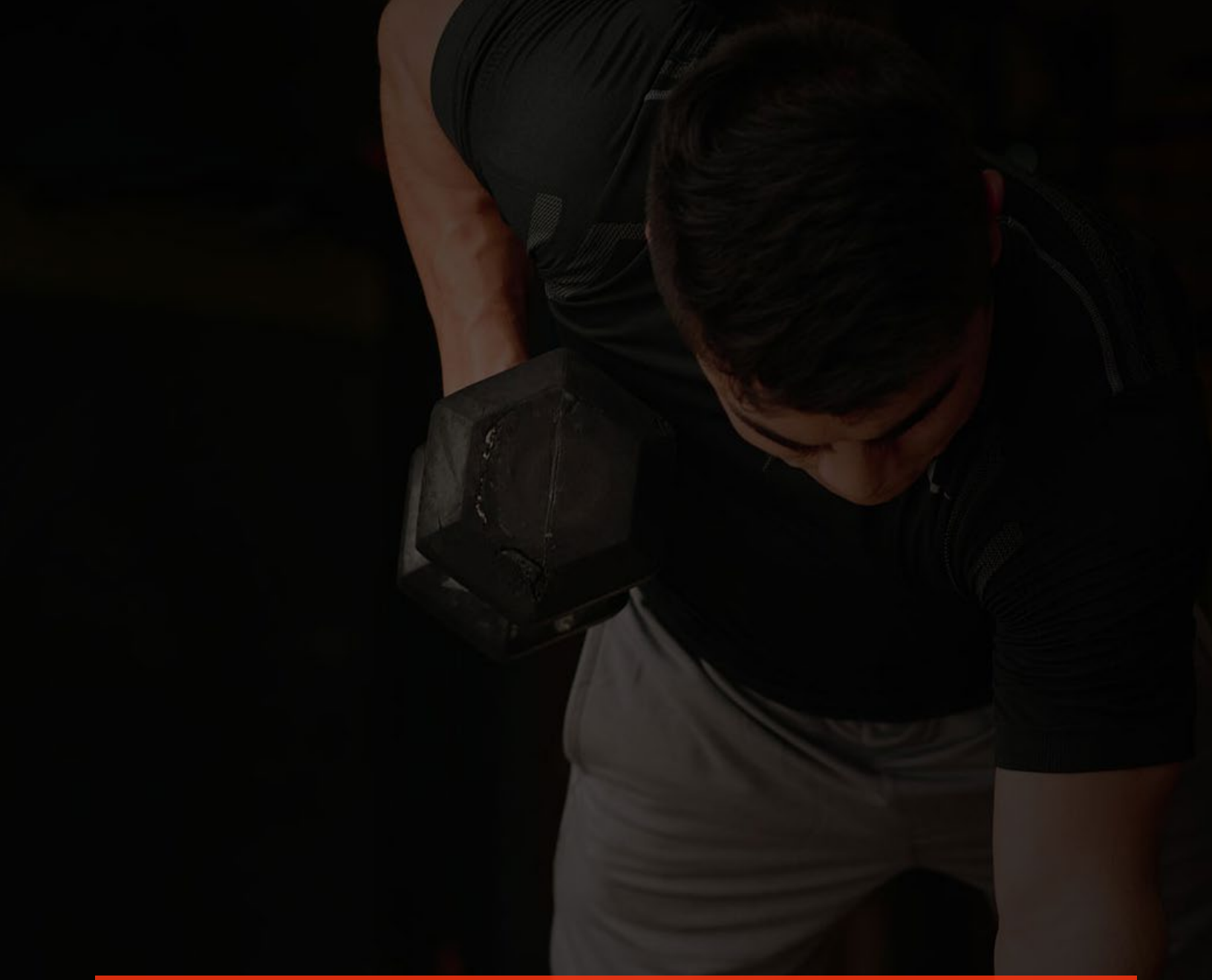
BARBELL TRAINING

If barbells (and plates) are the only equipment you have at your disposal, you can still design a very effective football program. There's a reason barbell work is the bread and butter of all Volt football programs – barbells are some of the best tools for loading and strengthening the axial skeleton (the spine, ribs, and sternum), which is crucial for building strong, injury-resistant football players. Using barbells allows athletes to move a lot of weight while still using the body as the base of support, which simulates most athletic movements on the football field. Barbells are also used in many dynamic strength exercises (cleans, snatches, jerks, etc.) that train athletes to express strength explosively, translating to more powerful sprints, blocks, cuts, and tackles.

FLEXIBLE EXERCISE SELECTION

It's easy to get attached to your training program as written and lose sight of the overarching goal of each movement. Is a barbell lunge more specific to your goals than a barbell split squat, or a dumbbell lunge? Not necessarily. The fact is, no matter how perfect your program is, you'll still need to make adjustments based on equipment, or athlete skill level, or even athlete preference (especially if you can't train your athletes hands-on the whole year).

Having pre-programmed movement progressions, regressions, and swaps handy for your athletes can save you headaches down the line. This is why Volt allows athletes to replace any movement in their daily workout with another from the same category (prioritizing six recommended replacements) – because you never know when an athlete won't have access to the right equipment, or is dealing with a minor injury, etc. Creating a training program that is precise enough to be effective, yet flexible enough to be realistic, is a balancing act, but one that, with enough careful planning, can be pulled off.



3. Assess and Test Your Athletes

From selecting specific exercises to defining the volume and loading of your program, there are many variables you'll need to tackle in building an effective training program. But before you can get down to the nitty-gritty of a single training day, you need to first define exactly what your football training goals are – and then test your athletes in them.

NEEDS ANALYSIS

A needs analysis is a fancy term for examining the specific physiological demands of a sport. It looks at three categories: metabolic demands, biomechanical demands, and common injuries. Taking the time to look critically at exactly what an athlete's body undergoes during a football game is important for figuring out what metrics to use to assess your athletes and ensuring your training is effective overall.

1. Metabolic Demands of Football

In order to properly condition your players for the cardiovascular demands of football, you have to know which energy systems to train. The body has three main systems for creating and using energy: aerobic, anaerobic-lactic, and anaerobic-alactic. And while you don't need a degree in biochemistry to design a good training program, you should at least have a basic understanding of these three energy systems and how they interact during a football game.

Aerobic activity uses oxygen to fuel long periods of low-intensity activity – and though it may not sound important for football athletes, a strong aerobic engine aids players in quicker and more complete recovery between hard efforts and is therefore critical for optimal performance. Anaerobic activity uses available glucose in the blood, glycogen in the muscles and liver, and creatine phosphate in the muscles to fuel short bursts of high-intensity activity. Most football plays (with the exception of long punt returns and routes that require more than 10 consecutive seconds of running) are anaerobic-alactic: the fastest and most intense bursts of strength and speed.

A good Preparatory Phase conditioning plan will incorporate both aerobic and anaerobic-alactic energy system development. While it is outside the scope of this training guide, Volt offers 12-week, football-specific conditioning plans at voltathletics.com.

2. Biomechanical Demands of Football

What are the primary movements athletes make during a football game? Categorizing these demands will allow you to choose the most effective exercises for training to improve these specific movements. Volt football programs focus on movements specific to: sprinting, cutting, accelerating, decelerating, changing directions quickly, jumping, physical contact, and overcoming large amounts of resistance (i.e., opponents) with all limbs. It's important to note that these movements may differ by position – a running back will make more fast cuts and pivots than an offensive lineman, for example. If you have the capacity to customize your training for each position group, it can be more effective at developing your athletes and helping to prevent position-specific injuries.

Most movements can serve multiple training needs: for example, a hang clean can be used to train explosive hip extension needed by both wide receivers and quarterbacks.

In fact, most position-specific considerations will live in the accessory and injury prevention movements, rather than the most important "big rock" exercises in a given training session. Volt football programs prescribe

Football Movement Pattern	Example Related Exercises
Sprinting, running	Snatch, clean, back squat, front squat, lunge, step-up, RDL, toe raise (dorsiflexion)
Pushing/repelling opponents	Push jerk, push press, bench press, explosive push-up, explosive medicine ball throws/slams
Jumping	Snatch, clean, back squat, front squat, box jump
Landing	Lunge, depth drop, depth jump, ice skaters, split jump, band lateral walks, single-leg RDL

Table inspired by the 4th edition of Essentials of Strength Training and Conditioning, pg. 445 (1)

back squats with the same frequency for skill players and linebackers, but linebackers will see more upper-body pressing movements and low-back injury prevention, for example.

3. Common Injuries in Football

Success in a football season is largely determined by how healthy your athletes stay. Training designed specifically to prevent the most common injuries – to the neck/head (concussion), knee (ACL/MCL tears), and ankle (rolls/sprains) – will be more effective in getting your players through a long, hard season. While you cannot prevent contact injuries during the game, you can help get your athletes strong and resilient enough to absorb contact as safely as possible. (4).

Frequently Injured Areas	Cause	Example Injury Prevention Exercises
Neck, spine (bruises, disc compressions, concussions)	Force from impact, contact with the ground, concussions	Stability ball neck leans, yes/no/maybe neck exercises, barbell back/front squats (to develop axial structural integrity)
Knee (ACL, MCL tears)	Force from impact, contact with the ground, improper sprinting/ cutting mechanics, improper landing mechanics	Band lateral walks, band squats, glute-ham raises, stability ball leg curls, depth jumps, Nordic curls
Ankle (rolls, sprains)	Force from impact, contact with the ground, improper landing mechanics	Calf raises, gastrocnemius/ soleus stretching, single-leg RDL, single-leg squat, single-leg stability ball curls, depth jumps

ASSESS AND TEST

Your needs analysis will tell you what energy systems, movement patterns, and injury considerations to prioritize in your training program. You can now figure out the best tests for assessing your athletes at the start of your program and keeping tabs on their improvement throughout the Preparatory Phase. Initial testing informs you where your athletes are at, while periodic retesting during your training will tell you whether your program is effective at developing your desired training adaptations.

3 PRIMARY PERFORMANCE GOALS

When you boil down all the components of a sport into its most important training traits, you get what we at Volt call the Primary Performance Goals. These goals vary from sport to sport – linear speed in baseball, lateral quickness in basketball, stamina in cross country, etc. – and while a sport may have many important performance goals, it's helpful to narrow this number down to three (or so) in order to keep your training laser-focused.

Volt has defined three of the most important performance goals to focus on in football training: muscle mass, strength, and explosiveness. These goals may vary from team to team (or even athlete to athlete), but in general they represent the training adaptations most likely to positively influence football performance – and dictate which tests you use to assess your athletes.

1. Muscle Mass

An athlete's size can play a big role in their safety on the football field. Increasing muscle mass is not only important for athletic performance, but also for ensuring athletes are prepared to safely withstand inevitable contact on the field. Muscle mass is not easy to measure: athletes can use hydrostatic bodyfat testing to find their lean mass (most tests cost around

$35-50), or a coach can extrapolate an athlete's muscle mass using calipers. By measuring an athlete's body fat as a percentage with calipers, a coach can then calculate non-fat mass based on the athlete's weight.

But the easiest way for athletes to track their muscle growth is to simply track their weight throughout the Preparatory Phase. While weight gain does not always coincide with muscle gain, your experience and common sense will tell you when an athlete needs to put on size and when he needs to lay off the snacks.

2. Strength

Strength is defined as the "ability to overcome or counteract external resistance by muscular effort," and is a priority in football training (20). Tests for strength include One Rep Max (1RM) testing on relevant lifts (Volt uses the back squat and bench press to assess and test football athletes' strength).

3. Explosiveness

Good football players get off the line quicker, sprint faster, and make more powerful blocks than less-explosive players. Tests for explosive strength will measure how well athletes can translate their ability to produce force quickly and with power (Volt uses the hang clean to assess and test football athletes' explosiveness).

SPEED, AGILITY, AND QUICKNESS (SAQ)

In addition to muscle mass, strength, and explosiveness, an athlete's speed, agility, and quickness must be assessed and developed throughout your Preparatory Phase. An effective off-season conditioning program will incorporate SAQ training in addition to general energy system development. While the specifics of SAQ training and conditioning is beyond the scope of this training guide, some recommended tests for measuring your athletes' SAQ abilities include shuttle tests, maximum speed tests, and forward/backward/lateral/diagonal drill tests.

Football Performance Goals and their Recommended Tests

Performance Goal	Recommended Tests
Strength	1RM testing (back squat, bench press, deadlift, etc.)
Muscle Mass	Hydrostatic testing, caliper measurements, weight tracking
Explosiveness	1RM testing (clean), vertical jump, broad jump, MB throw (for distance or height)
SAQ	Pro-agility test (5-10-5 shuttle test), 40-yard sprint, T-test

STRENGTH TRAINING AS INJURY PREVENTION

The best football injury prevention is a properly designed strength training program. But in addition to the three primary performance factors, a good program will also incorporate strategic movements to address injury risk to specific joints and muscle groups (3). As previously discussed, the neck/head, knee, and ankle are the most commonly injured areas in football, and your program should include exercises designed to strengthen and stabilize these areas.

Non-contact injuries can be just as devastating to athletes as contact injuries, and paying attention to how your athletes move in the weight room and on the field is important for identifying potential mobility restrictions that can lead to injury down the road. Football players with chronically tight hamstrings, for example, may be at greater risk of a hamstring pull during a max-effort sprint.

Stretching and mobility modalities like foam rolling can go a long way toward bulletproofing your athletes from non-contact injuries. You don't need to be your athletes' physical therapist, but you should keep an eye on how your athletes are moving. Mobility exercises are low-impact and can make for a great active recovery session on off days or unload weeks. Volt created several targeted mobility routines – addressing specific areas, like the hip and rotator cuff – to allow coaches to dose mobility work as needed throughout the Preparatory Phase, to help athletes prevent injury.

Injury Contraindications in Football

Injury Contraindications	Example Corrective Measures
Tight hamstrings	Hamstring foam rolling, hamstring stretching, eccentric hamstring strengthening
Poor hip mobility	Gluteus maximum foam rolling, glute/external rotator stretching, hip flexor stretching, gluteus medius strengthening
Limited shoulder range of motion	Latissimus dorsi foam rolling, pectoral foam rolling, pectoral stretching, rotator cuff strengthening

FINDING ACCURATE LOADS

To customize your program to each athlete's individual capabilities, you'll need to specify precise loading throughout your program (6). 1RM testing – finding the most weight an athlete can lift for one rep in a given exercise – is the most accurate method for determining training loads, but not every athlete has the training experience needed for this demanding protocol. As always, safety is the first priority in the weight room, especially when working with heavy weights. For young athletes or new lifters, a 5RM protocol (or 3RM, etc.) may be more appropriate for finding training loads. Using the chart below, you can guide your athletes to find the most appropriate RM based on their lifting experience, then extrapolate a projected 1RM from that number. (Keep in mind that numbers greater than 10RM will not yield results as accurate as a number closer to an athlete's true 1RM.)

The Boyd Epley Formula for Estimating 1RM

Number of Reps Performed	1	2	3	4	5	6	7	8	9	10
Multiplication Coefficient	1.000	1.066	1.099	1.132	1.165	1.198	1.231	1.264	1.297	1.330

*Note: if more than 10 repetitions are used to estimate 1RM, equations tend to lose their accuracy

Volt uses the Epley formula (above) to project accurate strength numbers in the 1RM from their 5RM performance: 1RM = 5RM x 1.165. So, if an athlete can squat 200 lbs for 5 reps, his projected 1RM is 200 x 1.165 = 233 lbs.

SPOTTING

Young athletes and beginners should always be spotted on difficult multi-joint exercises – especially those that involve a barbell or dumbbells being lifted above the head, on the back, on the fronts of the shoulders, or over the face (1). Of Volt's recommended 1RM testing movements for football (the hang clean, back squat, and bench press), the squat and bench will require spotting. Power movements like the clean do NOT require spotting: the dynamic nature of the lift and uncontrolled bar path make it dangerous for a spotter to interfere. Instead, make sure your athletes can perform power movements with proper technique – it can also be helpful teach athletes how to safely miss or "bail out" of a lift before asking them to perform heavy attempts.

For the back squat, we recommend athletes have one to three spotters (even if using a squat rack). If only one spotter is available, he should stand directly behind the athlete with both arms tracking the bar, ready to assist in lifting the bar if the athlete gets stuck at the bottom of the squat. Two additional (optional) spotters can stand on either side of the barbell, tracking the ends of the bar without touching it unless the lifter needs assistance. If no spotters are available, athletes should set the crash bar inside the rack at about one inch below their full squat depth.

For the bench press, one spotter should stand directly behind the barbell (above the athlete's head) with both hands tracking the bar's path. Bench spotters are especially useful in unracking/racking the bar for the lifter.

In all scenarios, spotters should always spot the WEIGHT being lifted – not the lifter's body – in order to intervene by lifting the weight, if necessary. Spotters should not touch the bar when it is in motion (unless asked by the lifter), but instead stand with hands open, ready, and tracking the bar. As always, athletes should be properly supervised by appropriate staff during every lifting session.

4. Prioritize Your Training Goals

Depending on the length of your Preparatory Phase (step #1) and the training needs and experience of your athletes (step #3), you can now begin structuring your training program. It is important to organize your training to ensure you accomplish your training goals in a safe manner, without injuring or overtraining your players. The most effective and industry-proven method of organizing your training goals is periodizing your training calendar.

THE THEORY OF PERIODIZATION

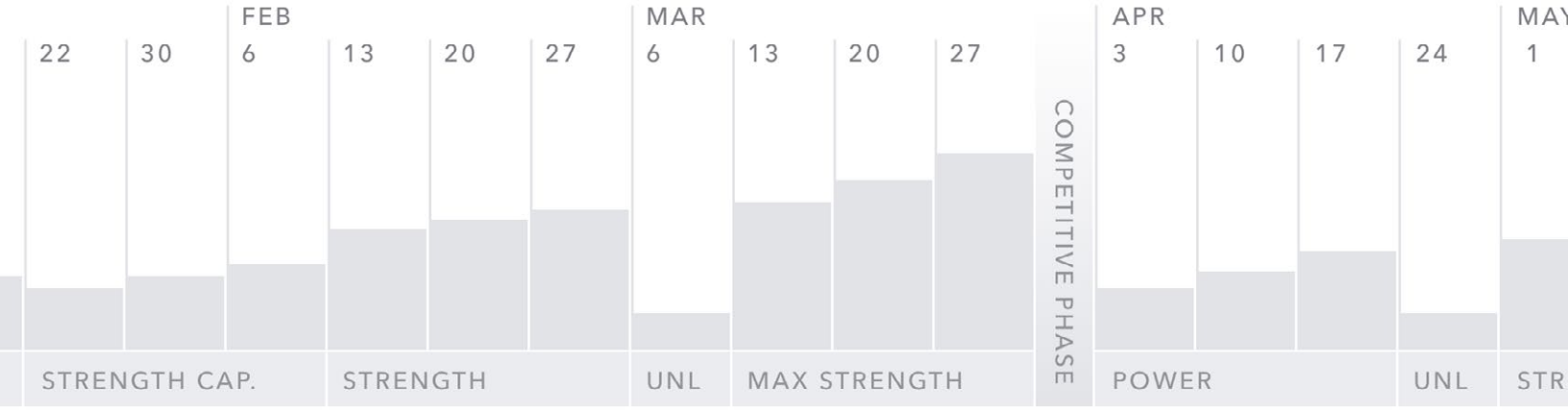
"Periodization" is a method of strategically layering training goals within a training phase in order to produce the most ideal training adaptations. This theory is based on the way the human organism responds to stress (in this case, the stress of strength training). Stress prompts the body to make adjustments in order to adapt to the level of that stress—i.e., an athlete will adapt to a resistance exercise by growing stronger. In order to keep driving adaptations (and keep seeing positive training results), that stress must be increased to prompt more adjustments: a principle known as progressive overload.

But you can't continue to progressively overload the body forever without repercussions. At some point, the stress must be removed before the body reaches a state of exhaustion. Overstressing the athlete with too much loading, intensity, and/or volume, without removing that stress periodically, can lead to a state of overtraining, at which point you may actually see a DECREASE in their performance. It's a concept most of us are familiar with in our own training: you can't work out at 100% intensity every day without hitting a wall, getting sick, or becoming too sore to continue. This is your body's stop-gap measure signaling that you must remove the stress in order to keep seeing improvement.

This is what makes the science underpinning strength and conditioning so vital in determining how to organize training in a way that stresses the athlete's body ENOUGH to make changes, but not SO MUCH that it pushes them into a state of overtraining.

A periodized training calendar will progressively increase the intensity of training over time, with planned periods of reduced intensity, to facilitate the best performance results for the athlete. Although the concept is complex, you can certainly build an effective periodization calendar on your own. Volt uses proprietary technology to create a periodized

calendar for each football athlete, designed to peak them for the season without overtraining.



PERIODIZATION IN PRACTICE

Period	Duration	Description
Macrocycle (year-long training plan)	1 year	An annual plan can contain one or more macrocycles, comprised of various periods of training (i.e., off-season, in-season, post-season)
Mesocycle (block)	2-6 weeks	Medium-sized training cycle, usually three weeks in length
Microcycle (training week)	Several days to 2 weeks	Small-sized training cycle, usually one week in length, composed of multiple workouts
Training day	1 day	Can include multiple training sessions designed in the context of its particular microcycle (i.e., two-a-days)
Training session	45 mins to several hours	One workout

Table inspired by the 4th edition of Essentials of Strength Training and Conditioning, pg. 587 (1)

Depending on which strength and conditioning resource you're consulting, the terminology around periodization may change (e.g., "blocks" vs. "mesocycles"). But the main principles remain the same, no matter the terminology:

- BLOCKS: Training on a periodized calendar enables you to cycle your athletes through periods of high- and low-intensity volume and loads, so they can gain strength and power without overtraining. Volt blocks typically last three weeks, depending on the length of your training calendar.

- ORDER: The order in which you structure your blocks is important because some training attributes build on each other. The loading (%1RM), intensity, and volume (reps and sets) you assign to each movement determine which specific physiological adaptation is developed. Adaptations change based on how these variables are manipulated, and block order will influence the effectiveness of your program in developing these adaptations in your athletes.

- REST and RECOVERY: Managing your athletes' training stress — particularly important for the demanding nature of football training — is key for preventing strength plateaus and overtraining. Volt's algorithms automatically insert unload weeks (more on unloading below) after difficult blocks, in order to optimize athlete recovery and adaptation. Pay attention to your players: if they seem sluggish or tired, it may be appropriate to take a day (or week) off of training. Your periodized calendar should leave your athletes feeling strong, fast, and fresh at the start of the season — not worn out from an exhausting Preparatory Phase.

Periodization Model for Strength Training

Phase	Preparatory (transitioning into) Competitive			
Block	Hypertrophy	Strength Capacity/ Strength	Max Strength	Power/Speed
Intensity	Low to moderate	High	High	High to moderate
	60-75% 1RM	80-90% 1RM	90-100+% 1RM	60-80% 1RM (at maximal velocity)
Volume	Low to moderate	Moderate	Low	Low
	3-6 sets	3-5 sets	3-5 sets	1-3 sets
	6-12 sets	4-8 sets	1-3 sets	1-3 sets

Table adapted from the 4th edition of Essentials of Strength Training and Conditioning, pg. 590

Given the three primary performance goals for football, Volt recommends utilizing the following training blocks to help your players build the size, strength, and power needed to excel at the start of the Competitive Phase (in order): Hypertrophy, Strength Capacity, Strength, Max Strength, Power, and Speed. Each block contains specific training protocols that have been proven to produce strategic adaptations. (This is just one way to organize your Preparatory Phase for football. There are many other methods of periodization beyond the scope of this guide.)

HYPERTROPHY

- Increases muscle mass/size
- Builds new muscle tissue through high reps and time under tension
- Avoid running and heavy aerobic conditioning during Hypertrophy blocks, due to the high-volume nature of strength training

- VERY important to include at the beginning of the Preparatory Phase in order for players to build the size and neuromuscular capacity to gain strength in later blocks

Protocol:

- Training loads: 60-75% 1RM
- Training volume: 3-6 sets of 6-12 reps
- Rest between sets: 30-90 seconds

Why do we train Hypertrophy before Strength? Hypertrophy training increases a muscle's cross-sectional area (size) and potential to generate force, but does not maximize the neuromuscular properties of the muscle. Training strength, power, and speed after first developing size and force-generation capability allows for more neural activation (from bigger muscles). This results in a "conversion" of muscle strength into coordinated sport skill through greater neuromuscular connectivity, resulting in better transfer to sport performance (7).

STRENGTH CAPACITY

- Bridges the gap between Hypertrophy and Strength blocks
- Enhances the capacity of muscle fibers to produce force
- Increases muscle force production

Protocol:

- Training loads: 75-85% 1RM
- Training volume: 3-5 sets of 4-6 reps
- Rest between sets: 2-5 minutes

STRENGTH

- Because loading and volume lie on a continuum, Volt uses a Strength block to potentiate the capacity for strength gain developed in a Strength Capacity block with heavier loads for fewer reps
- Provides a "true" (more direct) strength stimulus to muscles
- Increases muscle force production

Protocol:

- Training loads: 80-90% 1RM
- Training volume: 3-5 sets of 2-4 reps
- Rest between sets: 2-5 minutes

MAX STRENGTH

- Maximizes muscle force production
- Recruits highest number of muscle fibers
- Goal is to increase an athlete's 1RM by the end of the block

Protocol:

- Training loads: 90-100+% 1RM
- Training volume: 3-5 sets of 1-3 reps
- Rest between sets: 2-5 minutes

POWER

- Increases rate of force production in muscle fibers
- Emphasis is on moving lighter loads as quickly as possible (with control)
- Potentiates off Max Strength to translate strength into strength + velocity
- Use near end of Preparatory Phase to help peak athletes for competition

Protocol:

- Training loads: 65-75% 1RM (at higher velocities)
- Training volume: 3-5 sets of 3-5 reps
- Rest between sets: 2-5 minutes

SPEED

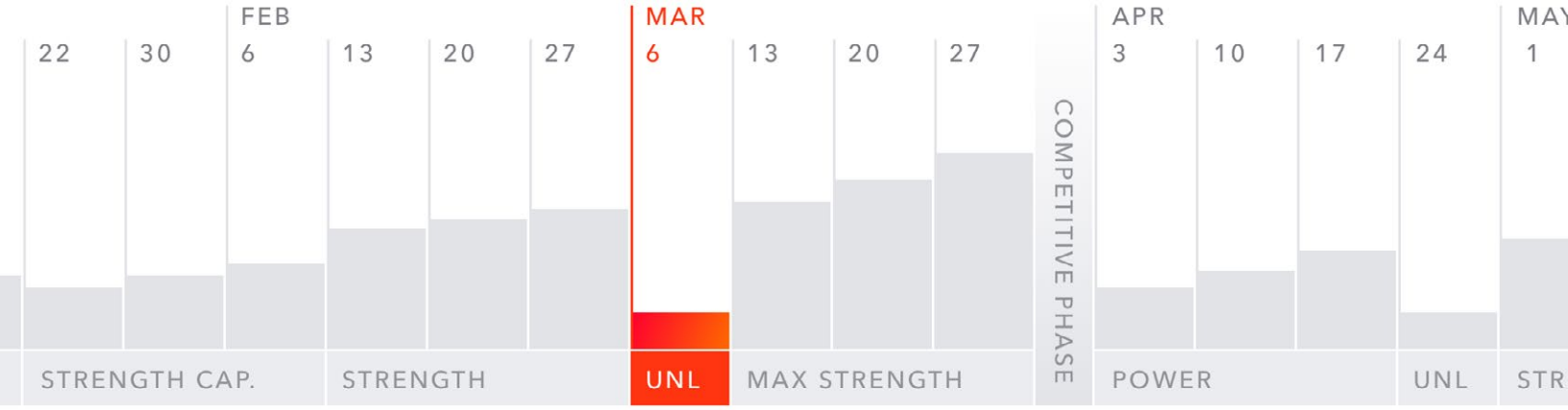
- Similar goals as Power
- Training loads taper near the end of the block to maximize movement velocity leading into the Competitive Phase
- Use near end of Preparatory Phase to peak athletes for competition

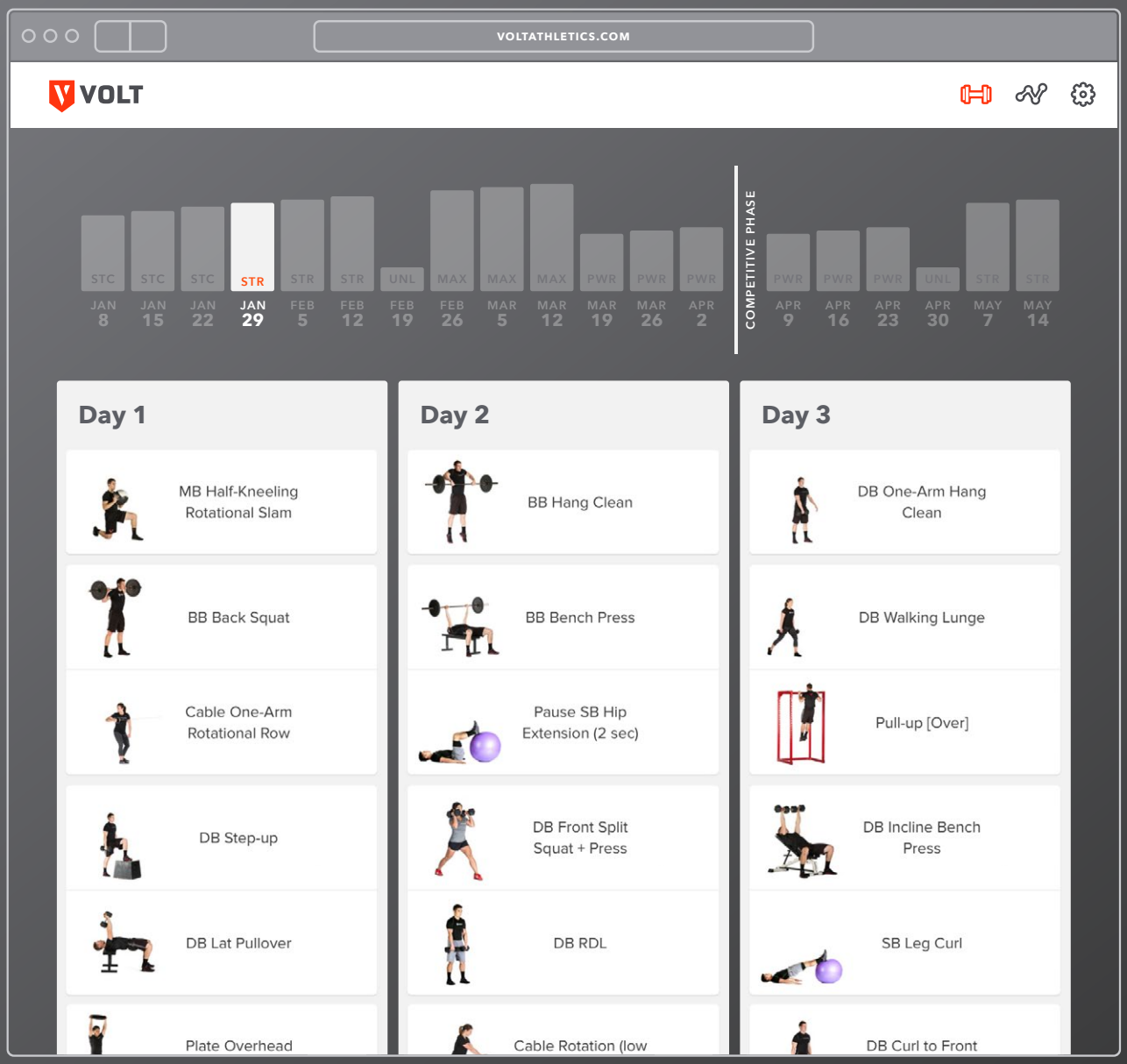
Protocol:

- Training loads: 65-75% 1RM (perform at max velocity; taper loading toward end of block)
- Training volume: 3-5 sets of 1-3 reps
- Rest between sets: 2-3 minutes

UNLOAD WEEKS

Volt recommends scheduling "unload" weeks after demanding blocks of training in order to avoid overtraining your football players. Usually one week in length, an unload features workouts with less demanding movements (i.e., a dumbbell goblet squat instead of a barbell back squat), reduced volume, and moderate loading. This break allows the training adaptations of the preceding blocks to fully take root.





4. Organize Your Training Day

Once you have completed steps #1-4, starting with a bird's-eye view of your training calendar and gradually working down to your periodized block structure, you can now fill in the details of your training program for each block, week, and individual training session.

THE SAID PRINCIPLE: SPECIFIC ADAPTATIONS TO IMPOSED DEMANDS

One of the most important concepts in strength and conditioning, the SAID principle deals with the specificity of training protocols – stating that the type of demand placed on the body will dictate what kind of adaptation will occur (3). If you want to strengthen your biceps, you have to use exercises that train the biceps – i.e., wherever training stress is applied, that is the area that will receive the stimulus. It may seem like a no-brainer, but when it comes to selecting exercises for your training program, choosing exercises that mimic football movement patterns is crucial to your program's success. This is another reason why free-weight training is superior to weight machines: free-weight exercises are more specific to football movements.

It's also worth noting that the MOST specific movement training will come from actually playing football. But the movement selection of your training can play a big role in how well your players apply strength to skill-specific technique on the field.

The concept of SAID should influence your movement selection, especially as it relates to progressive overload. As your players progress through the off-season, all forms of training should gradually progress from general to sport-specific. Just as your training blocks are organized to develop size first (Hypertrophy), your program should focus first on building total-body strength and size from an exercise selection standpoint, then shift to more sport-specific movements and skills nearer to the start of your season. If you're peaking your players with Power and Speed blocks at the end of your Preparatory Phase, then you know that these more skill-intensive exercises will be mitigated with lower loading and volume to allow the most optimal adaptations to take place. The following table is an example of how Volt varies movement selection for a specific pattern (horizontal upper-body pushing) based on where it falls within the training calendar.

Periodization Model for Strength Training

	Early Off-Season	Late Off-Season	In-season*
Exercise Category	General	Sport-Specifc	Sport-Specifc / Supportive
Example Exercise	Barbell bench press	Barbell Close-Grip Bench Press + Explosive Push-up	Barbell Floor Bench Press / Dumbbell Bench Press
Protocol	75-100% 1RM, slow concentric action	65-80% 1RM, fast concentric action	60-80% 1RM, with fast concentric action at reduced volumes

*Note: during the football season, training priority is performance during practice and games, making it the focus of an in-season training program

EXERCISE SELECTION

With the SAID principle in mind, you can start selecting the specific movements to use in your training sessions, depending on the block and where it lies within your Preparatory Phase. Volt highly recommends including exercises from the following three categories.

STRUCTURAL EXERCISES

- Multi-joint strength exercises generally performed with a barbell or dumbbells
- Recruit at least one larger muscle area (e.g., hip, thigh, chest, back, shoulder, etc.)
- Effective for sport performance training because they mimic football movements

- Should be performed directly after power exercises (and before or paired with assistance exercises) during a training session
- Some structural exercises require spotting
- STRUCTURAL EXAMPLES: back squat, front squat, bench press, deadlift, shoulder press, etc.

POWER EXERCISES

- Explosive structural exercises (Volt calls these lifts "Explosives")
- Require the highest level of skill and concentration – therefore most likely to be affected by athlete fatigue
- Should be performed at the beginning of a training session (after a thorough warm-up)
- Do NOT require spotting, due to the unpredictable nature of the weight being moved during a lift
- POWER EXAMPLES: snatch, hang clean, power clean, push jerk, etc.

ASSISTANCE EXERCISES

- Single-joint exercises that recruit smaller muscle areas (neck, abdominals, biceps, triceps, calf, forearm, etc.)
- Generally considered less important for sport performance, but very effective for rehabilitation and injury prevention
- Volt splits this group into "Accessory" exercises (to be paired with a structural exercise, like a back squat paired with a bent row) and "Auxiliary" exercises (to fulfill a rehab/prehab function within a session)
- ASSISTANCE EXAMPLES: biceps curl, triceps extension, back extension, bent row, shrug, etc.

EXERCISE ORDER

The order of movements within a training session should reflect their demands on athlete energy and concentration during a workout, moving from most to least complex. By performing total-body explosive (power) exercises first when your players are fresh, you will increase the effectiveness of the lifts and reduce your athletes' risk of injury. Fatigued athletes performing difficult explosive exercises – like at the end of a workout instead of the beginning – is a recipe for missed reps and weight room accidents.

All power movements should be performed first, followed by other structural movements, and then assistance movements–as outlined in the table below, adapted from the NSCA's Guide to Program Design (6):

Periodization Model for Strength Training

Exercise Order	Exercise Type	Reasoning	Example Exercise
1	Power (Explosive Structural)	Priority; require most skill/concentration	Barbell Clean
2	Other Structural (Non-Explosive Structual)	Multi-joint; directly apply to sport movements	Barbell Squat
3	Assistance	Single-joint; good for injury prevention	Dumbbell Biceps Curl

This ordering of exercise categories is a general rule – you can always pair different types of exercises to create an effective and goal-focused workout. Volt, for example, will typically pair a structural exercise with an accessory movement in a different movement pattern, in order to optimize training efficiency and ensure athletes rest sufficiently between structural reps (e.g., bench press paired with a glute-ham raise). But in general, you will always want to prioritize the most difficult movements first within a training session.

It's also important to note that structural exercises are subject to the intensity demands (%1RM) specified by the training block, while assistance exercises are not (e.g., the bench press gets prescribed loading, while the glute-ham raise does not).

ORGANIZING THE TRAINING WEEK

Beyond the general rules for ordering exercises within a training session, there are many effective ways of organizing your training week. The goal is, as always, to optimize your players' recovery – between sets of individual exercises, and between entire training days. Alternating upper- and lower-body movements within a workout or training week, or "push" and "pull" movements, or any combination thereof, can all be effective methods of programming.

Volt recommends a mixed total-body approach that balances movement patterns (e.g., bent-leg hip extension, lower-body unilateral push, etc.) within a training week, with an emphasis on one general pattern (e.g., lower-body push emphasis on Monday, upper-body push emphasis on Wednesday). We also recommend pairing movements, whenever possible (after all sets of any power movement are complete). Pairing movements is a great way to ensure that your athletes are always productive in the weight room, and helps ensure weight room efficiency (especially if paired movements utilize different pieces of equipment, like a front squat and a

cable row). This keeps athletes constantly moving, limiting their downtime, and allows for maximum recovery between sets without losing the training stimulus (as you might in a 10-movement-long circuit).

And remember, your practice, conditioning, and weight room schedule should all play a role in how you choose to organize your training week to optimize athlete recovery. For example, it's probably not a great idea to do a high-volume conditioning session right before a max strength squat workout.

THE TRAINING DAY

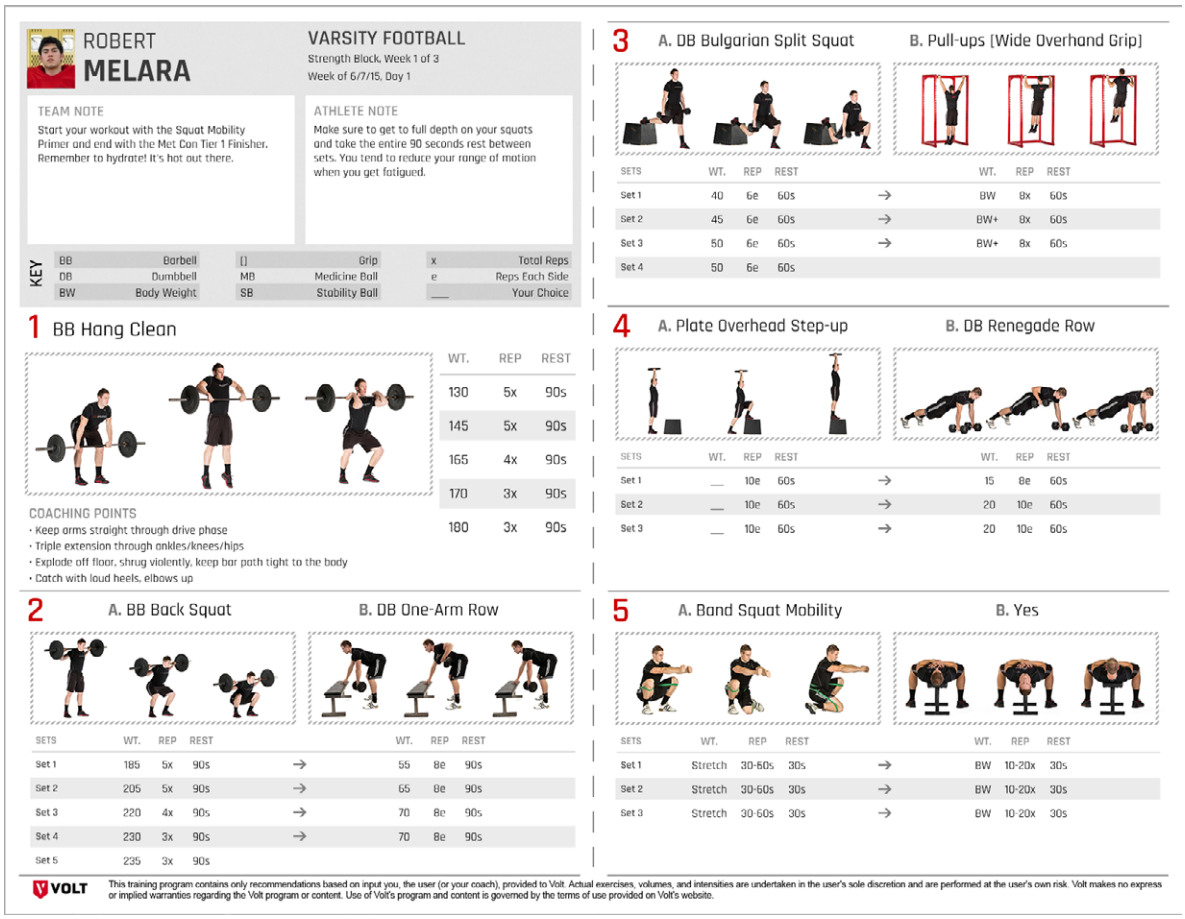
WARM-UP

Athletes should ALWAYS warm up before a strength training workout (or any practice, game, or conditioning session). The warm-up literally raises an athlete's core temperature by increasing blood circulation to working muscles, which can help to prevent muscle injuries like hamstring strains. It can also be an important time for the whole team — an opportunity to focus on the tasks ahead, cement team training culture, and build excitement at the prospect of working hard as a unit. A familiar warm-up can also provide a calming sense of routine before difficult tasks (much the same way a pre-game ritual sets the tone before a division rivalry game).

Volt recommends starting with a few minutes of light cardio activity (jump rope, jogging, stationary bike, etc.) followed by a dynamic, resistance-based warm-up comprised of total-body movements that activate the core. This can always be followed by specific mobility movements focused on addressing chronic issues (tight hips, stiff thoracic spine, etc.) or preparing for specific movements in the upcoming workout.

EXAMPLE TRAINING SESSION

This is an example of a general football (non-position-specific) workout in a Strength block during a 16-week off-season. For this example, let's say the athlete has a hang clean 1RM of 215 lb, a back squat 1RM of 275 lb, and a bench press 1RM of 225 lb. Volt automatically calibrates each workout to the individual athlete, based on his numbers:



ROBERT MELARA

VARSITY FOOTBALL
Strength Block, Week 1 of 3
Week of 6/7/15, Day 1

TEAM NOTE
Start your workout with the Squat Mobility Primer and end with the Met Con Tier 1 Finisher. Remember to hydrate! It's hot out there.

ATHLETE NOTE
Make sure to get to full depth on your squats and take the entire 90 seconds rest between sets. You tend to reduce your range of motion when you get fatigued.

KEY

BB	Barbell	()	Grip	x	Total Reps
DB	Dumbbell	MB	Medicine Ball	e	Reps Each Side
BW	Body Weight	SB	Stability Ball	___	Your Choice

1 BB Hang Clean

WT.	REP	REST
130	5x	90s
145	5x	90s
165	4x	90s
170	3x	90s
180	3x	90s

COACHING POINTS
- Keep arms straight through drive phase
- Triple extension through ankles/knees/hips
- Explode off floor, shrug violently, keep bar path tight to the body
- Catch with loud heels, elbows up

2 A. BB Back Squat B. DB One-Arm Row

SETS	WT.	REP	REST		WT.	REP	REST
Set 1	185	5x	90s	→	55	8e	90s
Set 2	205	5x	90s	→	65	8e	90s
Set 3	220	4x	90s	→	70	8e	90s
Set 4	230	3x	90s	→	70	8e	90s
Set 5	235	3x	90s				

3 A. DB Bulgarian Split Squat B. Pull-ups (Wide Overhand Grip)

SETS	WT.	REP	REST		WT.	REP	REST
Set 1	40	6e	60s	→	BW	8x	60s
Set 2	45	6e	60s	→	BW+	8x	60s
Set 3	50	6e	60s	→	BW+	8x	60s
Set 4	50	6e	60s				

4 A. Plate Overhead Step-up B. DB Renegade Row

SETS	WT.	REP	REST		WT.	REP	REST
Set 1	___	10e	60s	→	15	8e	60s
Set 2	___	10e	60s	→	20	10e	60s
Set 3	___	10e	60s	→	20	10e	60s

5 A. Band Squat Mobility B. Yes

SETS	WT.	REP	REST		WT.	REP	REST
Set 1	Stretch	30-60s	30s	→	BW	10-20x	30s
Set 2	Stretch	30-60s	30s	→	BW	10-20x	30s
Set 3	Stretch	30-60s	30s	→	BW	10-20x	30s

VOLT This training program contains only recommendations based on input you, the user (or your coach), provided to Volt. Actual exercises, volumes, and intensities are undertaken in the user's sole discretion and are performed at the user's own risk. Volt makes no express or implied warranties regarding the Volt program or content. Use of Volt's program and content is governed by the terms of use provided on Volt's website.

- Power and structural movements go up to 85% of the athlete's 1RM, right in the Strength loading range
- Most important and taxing movements are front-loaded at the beginning of the workout
    - The BB Hang Clean stands alone (no movement pairing) in order for athletes to devote their full mental and physical attention to the difficult power movement
- Only the important "big rock" movements carry loading
    - The Plate Overhead Step-Up, for example, isn't central to the athlete's strength development, so there is no need to prescribe exact loading
- All movements arrangements are optimized for a team training environment
    - Athlete 1 can perform the BB Back Squat in a squat rack while Athlete 2 performs the DB One-Arm Row in a different location, allowing for more efficient training
- Movements alternate between patterns (e.g., a lower-body push followed by an upper-body pull) to allow for full recovery between sets
- Mobility and injury prevention movements (Band Squat Mobility and Yes) are included to target hip mobility and neck strength to help football players withstand the physicality of the game

RETESTING

The best way to evaluate both the effectiveness of your program and the progress of your athletes is to periodically retest them in the primary performance goal tests used to find their original training loads. Volt retests football athletes at the end of every Strength Capacity, Strength, and Max Strength block, when players are most likely to increase their 1RMs (about every three weeks). Then Volt's technology recalibrates athletes' training loads going forward, so their program is always dynamically evolving. Players will stop seeing training adaptations if their program stops

progressively overloading them and grows stagnant, making the retesting process an important part of every effective periodized training program.

You can choose to either devote a single training session to retesting your athletes, or combine all tests into one testing day. Volt uses the hang clean, back squat, and bench press to test our football athletes (of all positions), and strategically inserts those lifts into a week of regular training, for a seamless and uninterrupted approach to testing. In our four-day football programs, athletes will be prompted in-app to test their back squat on Day 1 and the hang clean and bench on Day 2. And because Volt also uses those numbers to inform loading on similar movements (e.g., loading for a barbell lunge is informed by an athlete's back squat 1RM, etc.), frequent retesting is crucial for the overall accuracy of training prescriptions. Use the method that works best for your athletes and training calendar, but make sure retesting occurs often enough to keep your program as calibrated and precise as possible — in order to see the best results.

CONCLUSION

Building a safe and effective off-season strength and conditioning program for your football players is not easy. It requires a lot of hard work and planning (not to mention research!) to organize each phase, block, week, and day of training – add properly structured conditioning plan to the mix, and you're looking at hours and hours of work. But remember: there is no single "right" way to structure your training. The difference between a set at 67% and a set at 75% of an athlete's 1RM is very, very small in the grand scheme of things. Because many football players are novice lifters, as long as your program is progressively overloading their bodies, they will see a positive transfer from the weight room to the field.

If you're interested in getting a training program for your entire team – one that is specific to each player's position, experience level, training calendar, and individual strength levels AND includes a 12-week off-season conditioning program – that's what Volt does best! Our full-time Sport Performance team, led by the Volt Advisory Board of strength coaches (chaired by NSCA founder and legendary Nebraska coach Boyd Epley), write each football program to follow the exact principles and methodologies laid out in this guide.

If you want training that will take your team to new levels of performance, injury prevention, and long-term athletic development, Volt may be the solution you've been looking for. Check out what Volt can do for your team at voltathletics.com – and happy training!

About Volt

Volt Athletics (Volt) provides proven strength and conditioning programs through cutting-edge technology to thousands of high school, college, and professional teams around the world. Volt's intelligent training system generates personalized workouts, complete with prescribed sets, reps, weight, movements, and visual cues at the click of a button. Volt is backed by the National Strength and Conditioning Association (NSCA), and is the official strength and conditioning provider of USA Football and the U.S. National Football Team program.

If you're looking for a strength training solution for your team, please visit www.voltathletics.com.

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