



Fina

WATER IS OUR WORLD

**Writing Workouts with
Energy Systems**

- When:
 - After planning your season, week by week
- Why:
 - To match your goals to the physiological state and development of the athlete
- How
 - Create sets where the number repeats, the speed achieved and the amount of rest given will determine the energy system being used



TRAINING CATEGORIES

Energy System	Pulse Rate	Sharps Stress Score*	Work:Rest Ratio	% Velocity	Lactate	Set Duration	Suggested Repeat Distances	Set Examples
REC	UP TO 120	0	CHOICE	80% THRESHOLD SPEED	0 TO 2MM/L	ANY	ANY	3 X 400 CHOICE
EN1	120-150	2	REST 10-30	95%THRESHOLD SPEED	1 TO 3	15 TO 60+ MIN	300 TO 1,000	4 TO 8 X 600
EN2	140-170	2	REST 10-40	THRESHOLD ENDURANCE SPEED	3 TO 5	15 TO 60+ MIN	100 TO 500	6 TO 10 X 400
EN3	160-180	6	20 SEC REST TO 1:1	104 TO 107% THRESHOLD SPEED	4 TO 8	15 TO 30 MIN	50 TO 300	5 TO 10 X 200
SP1	MAX	8	MAX	USE A % OF MAXIMUM VELOCITY	6 TO 12	?	50 TO 200	6 TO 10 X 150
SP2	MAX	8	MAX	USE A % OF MAXIMUM VELOCITY	10 TO 18	?	50 TO 100	4 TO 6 X 100
SP3	MAX	4	MAX	100 TO 110% MAXIMUM VELOCITY	2 TO 3	?	10 TO 25	4 TO 8 X 25

Overview

Energy Systems

Writing a Workout

Conclusion

Great Britain Training Categories

BRITISH SWIMMING		BRITISH SWIMMING ENERGY SYSTEMS & TRAINING ZONES				BRITISH SWIMMING	
Training Zone	Sweetenham & Atkinson	Description	HR (BBM)	RPE (6-20)	Olbrecht		
1	A1	<i>Low intensity aerobic swimming. Used for warm up, swim down and skill development.</i>	>50	<9	AERC		
	A2	<i>Base aerobic training. Improves fitness and enhances Lactate Removal.</i>	40-50	10-12			
2	AT	<i>Maximal Lactate Steady State. Improves the ability to swim with equilibrium of Lactate Production & Removal.</i>	20-30	14-15			
3	MVO2	<i>High intensity work at approximately VO2max (the highest rate of oxygen consumption attainable during maximal or exhaustive exercise). Improves VO2max and Aerobic Power.</i>	5-20	17-19	AERP		
4	LP	<i>Training intensity results in the maximal speed of lactate build up. Enhances the ability to produce lactic acid.</i>	0-10	17-19	ANC		
	LT	<i>High intensity work with medium rest to improve buffering. Used to develop the ability to tolerate lactic acid in the muscles.</i>	0-10	19-20	ANP		
5	Basic Speed	<i>Sprint swimming. Used to improve ATP-PC energy production and fast-twitch muscle fibre recruitment.</i>	N/A	N/A	SPRINT		

Overview

Energy
Systems

Writing a
Workout

Conclusion

Guidelines for Interval Training Sets

Distance	Mid- Distance	Sprint	Energy System
3000-5000	3000-4000	2000-3000	EN1
2000-4000	2000-3000	1500-2400	EN2
1500-3000	1200-2000	800-1600	EN3
800-1200	600-1000	600-800	SP1
400-800	400-800	400-600	SP2
100-200	100-300	100-300	SP3

Overview

Energy Systems

Writing a Workout

Conclusion

EN1 (Aerobic)

- Below Threshold
- Repeats
 - 200 meters and up
- Rest Times
 - 20-30 Secs
- Heart Rate
 - 130-150 BPM during swimming

Overview

Energy
Systems

Writing a
Workout

Conclusion

EN1 (Aerobic)

- **Goal**
 - To swim amounts just below Anaerobic Threshold (AT) and use fat metabolism as energy
 - Sets can be at least 30 minutes for top juniors, longer for accomplished swimmers
 - Partial recovery and progressive stress is reflected in HR
- **Results**
 - Increased general endurance and O₂ capacity for all muscle fibers (mainly Slow Twitch)
 - Allowing better Glycogen & ATP storage in ST muscle
- **Note**
 - More work for distance, less for sprinters



EN2 (LA Steady State)

- Repeats
 - 100m to 400m
- Rest Times
 - 20 to 50 seconds or longer
- Heart Rate
 - 165 to 180 BPM during swimming

Overview

Energy
Systems

Writing a
Workout

Conclusion

- **Goal**
 - To achieve lactate steady state velocity
 - Threshold but below VO_2 Max
- **Results**
 - Improved ability to swim with an equilibrium of lactate production and removal
- **Note**
 - Average time for the set of repeats is the determinant of the training effect
 - As the set improves, so does the average race pace
 - There should be caution as to the limits of this training, especially with sprinters

Overview

Energy
Systems

Writing a
Workout

Conclusion

Sprint Training (SP1, SP2)

- Repeats
 - 10-50 meters
- Rest
 - Long rest, to return towards rested state
 - Work:Rest ratio= 1:6+
 - 30 seconds for 10-15 meters
 - 40+ seconds for 25s
 - 2-3+ minutes for 50s and 100s

Overview

Energy
Systems

Writing a
Workout

Conclusion

Sprint Training (SP1, SP2)

- Goal
 - To improve maximum speed
 - Recruit new Fast Twitch Muscles
 - Improve buffering FT Muscles (recovery)
 - Improve ability to use speed for multiple bouts
 - Note
 - Improve rested speed not fatigued speed
 - SP³ special training

Overview

Energy
Systems

Writing a
Workout

Conclusion

Common Set Types & Training Effects

- Short rest intervals
- Descending & ascending
- Mixed sets & rotations
- Long repeats & sprints together

Overview

Energy
Systems

Writing a
Workout

Conclusion



Things to Consider When Planning Workouts

- **Biological Age**
 - Early maturers achieve shorter distance times earlier due to early AN Capacity
 - Late maturers handle aerobic load better
- **Gender**
 - Difference in flotation ability affects cardiopulmonary system and a subsequent difference in HR
- **Body Type**
 - Ratio between arms, legs and torso
 - Body weight of each will be a factor in performance in both aerobic and anaerobic sets
- **Training History**
 - Previous training defines current physiological makeup of an athlete
 - Athletes with limited aerobic background will require more & different stimulation
 - Others may respond to initial anaerobic stimulation almost immediately

Overview

Energy
Systems

Writing a
Workout

Conclusion



Sample Construction Tools for Workout Creation

Energy System	Duration of Set	Repeat Distance	Rest	HR	LA
EN1	15-90 min	300-4000	10-30s	50 BBM	1-3 LA
EN2	15-50 min	100-2000	10-40s	40-30 BBM	2-3 LA
EN3	8-30 min	100-800	30-90s	30-20 BBM	4-10 LA
SP1	5-20 min	50-200	1:1-1:2 W:R	Max HR	10-16 LA
SP2	5-10	25-100	1:2-1:6 W:R	Max HR	10-20 LA

Overview

Energy
Systems

Writing a
Workout

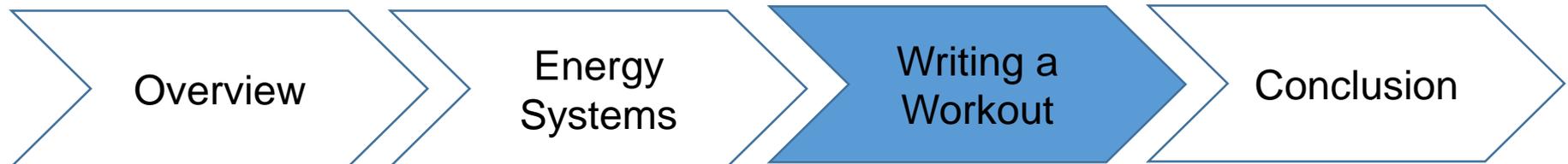
Conclusion

Writing a Set: Part 1

- What type of adaptation are you targeting?
 - Choose and energy category
- How long do you want the set to last?
- How far is each repeat?
- How many repeats (similar to #2)?



- How much rest?
 - Consider the speed you want, the physiological response to your swimmer, and the adaptation that you want to cause or extend
 - Then choose the amount of rest you require
- Set the Intensity
 - Tell the swimmer the desired pace or effect (HR) desired
 - Set the requirement for all aspects (beginning, end & average) of the set
- Convert the desired rest into a send-off interval



REMEMBER

All training can have secondary effects



Overview

Energy
Systems

Writing a
Workout

Conclusion

Some Pre-Workout Rules and Ideas

- Warmup
 - Recovery from last workout/EN1
- Pre set?
- Main set
 - AT, VO₂ Max, SP
- Warm down
 - Lactate recovery

Overview

Energy
Systems

Writing a
Workout

Conclusion



Sample Weekly Plan: Distance Swimmers

	MON	TUES	WED	THUR	FRI	SAT	SUN
AM	EN2 + EN3 Drills & kicking	Best Stroke EN1	Off	Rec. & drills EN1	Rec. EN1 and Kick	EN3 Main Training	Off
PM	Rec. & SP3	EN3 Main Training	EN1 & Rec.	IM or Best Stroke SP1	EN1 and EN2 Drills	Off	Off



Write your own workout!

Overview

Energy
Systems

Writing a
Workout

Conclusion

Questions?



Overview

Training
Factors

Season
Planning

Conclusion