A METHODOLOGY OF TEACHING OLYMPIC CANOE RACING

Thesis for the Degree of M. A.

MICHIGAN STATE UNIVERSITY
RENE A. PILON

1967


LIBRARY
Michigan State
University


WITHDRAWN 1987
MICHIGAN STATE UNIVERSITY
INSTRUCTIONAL MATERIALS CENTER
COLLEGE OF EDUCATION

ABSTRACT

A METHODOLOGY OF TEACHING OLYMPIC CANOE RACING

by René A. Pilon

Statement of Problem

From this methodology it is hoped a program of Olympic Canoe racing can be developed for physical educators, coaches and instructors in order that the status of Olympic canoe racing in North America can be improved.

Methodology

The framework of the entire program, the overall philosophy of the sport, the statement of objectives (namely top paddlers for international competition), the developmental characteristics of beginners, a theory and training program and prerequisites for athletes entering the canoeing sport have been compiled and developed for this study. The physiology required by this sport was also described.

Questions It Is Hoped This Methodology Will Answer

1. Where did Olympic canoe racing begin and who controls it?
2. How do we select a paddle?
3. What are the racing regulations?
4. How do we select athletes?

5. What are the material and formal pre-requisites for a paddler?
6. What is the role of the nervous system?
7. Which methods of breathing are best for paddling?
8. Are salt pills necessary when racing?
9. What are the psychological limitations ?
10. How does one paddle?
11. What are the modern theories of training?

Method of Securing and Source of Data

Information was obtained by discussions and correspondence with various members of the International Canoe Federation, present and former coaches of the Canadian team, and Olympic athletes. The material used was also gathered from books found at the Michigan State Library, Inter-Library Loan, Personal Library. Visits were made to various people connected with paddling.

Summary

Generally speaking the main facts derived from this study are: what the paddler is ready to learn, what he should learn, and how he should best learn. This should provide a realistic and scientifically based framework for continuity in methodology development.

This research study has been approved for the Division of Physical Education and Athletics by

Randolph W Webster
Professor of Physical Education

A METHODOLOGY OF TEACHING OLYMPIC CANOE RACING

By

René A. Pilon

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF ARTS

Department of Health, Physical Education,
and Recreation

College of Education

1967

ACKNOWLEDGMENTS

The writer wishes to express his gratitude and appreciation to those who participated in the research and particularly Mr. F. Clement, T. Dienstmann, B. Collins, M. Fiorito and also my Academic adviser Dr. Randolph W. Webster, without whose cooperation and patience this research would not have been possible.

TABLE OF CONTENTS

Page

ACKNOWLEDGMENTS ii

LIST OF CHARTS vi

LIST OF ILLUSTRATIONS vii

LIST OF PICTURES. viii

Chapter

I. HISTORY OF CANOEING, AND THE INTERNATIONAL CANOE FEDERATION 1

Organized Canoeing. 3
International Canoe Federation Statutes. . 5
I. Purpose of the Federation 5
II. Membership. 6
III. The Congress. 6
IV. I.C.F. Committees 7
V. I.C.F. Amateur Rule 7

II. TERMINOLOGY AND EQUIPMENT 9

Single-Blade and Double-Blade Paddles . . 12
Length of Paddle in a C-Boat 12
Length of Paddle in a K-Boat 13
Classes and Building Rules 14
Kayaks. 14
Canoes. 14
Limitations 15
Measuring. 15
Weighing 15
Canoe Types 16
The Racing Canadian Canoes 17
The Racing Kayaks 18

III. PREREQUISITES AND PROBLEMATIC IN CANOEING . . 19

Prerequisites to Efficient Movement in Canoeing 19
Physical Prerequisites 19
Mental Prerequisites 22
Emotional Prerequisites 22

Chapter Page

Organization of Prerequisites and Controls Leading to Efficient Movement 25
Problematic of the Paddler 27
Nervous System 29
Coordination. 31

IV. PHYSIOLOGY RELATED TO CANOEING. 33

The Physiology of Respiration 33
Breathing Method for the C-Paddlers . . 36
Breathing Method for the K-Paddlers . . 37
Muscular Endurance. 39
Value of Taking Salt Pills 40
Competitive Fear 41
Extension of the Psychological Limit. . . 42
Second Wind 43

V. TECHNIQUE OF CANOE RACING 44

Basic Position to Double-Blade Paddling. . 44
Double-Blade Paddling Technique 46
German Technique 46
Swedish Technique 50
Hungarian Technique 51
Technique is not Encugh 52
Basic Position to Single-Blade Paddling. . 52
Czech Technique. 53
Canadian Technique. 54
Modern Technique 54
Description of the Two Paddling Techniques 55
The Hip and Shoulder Rotation Technique. 55
The Waist Bending Technique. 56
Summary of Waist Bending Technique . . 57
Methods of Changin Direction 57

VI. SCHOOL PROGRAM 61

The History of Riverside Paddling Program . 61
Requirement for a Paddling Program in an Elementary School 68
Paddling--An Elementary School Physical Education Program 68
Advantages 68
Layout of a School Program 69
Conditions 69
Prerequisites 69

Chapter Page

VII. MODERN THEORIES ON TRAINING. 70

Training 70
Three Kinds of Muscle Contractions . . . 70
Isometric Paddle Action 71
First Day. 71
Second Day 72
Overload, Not Isometric Contraction, Counts. 72
How Can Muscles Be Overloaded 73
Annual Training Program for Canoeist. . . 75
Today's Rational Type of Training. . . 77
General Rule. 79
The Four Periods of the Annual Program . . 80
I. Preparatory Period 81
II. Formation Period. 86
III. Top Form Maintenance Period. . . 87
IV. Transitory Period 90
Water Training Program 98
First Phase 98
Second Phase. 98
Third Phase 98
Fourth Phase. 99
Fifth Phase 99

BIBLIOGRAPHY 100

Appendix A Films Available to C.C.A. Clubs and Prospective Club Groups. . . . 103

Appendix B Follow-Up Chart 105

Appendix C International Canoe Federation Members . 107

Appendix D Canoe and Kayak Prices 111

Appendix E Training Raft 113

Appendix F Indoor Training Basin. 115

Appendix G Using a Plank on a Raft 117

LIST OF CHARTS

Chart Page

1. Prerequisites to Efficient Movement 24

LIST OF ILLUSTRATIONS

Figure		Page
1.	Canoe Nomenclature, C-2	11
2.	Kayak Nomenclature, K-2	12
3.	Hands Position with a K-Paddle	45
4.	Balance Trainer	47
5.	Corner of a Swimming Pool	66
6.	Balance Beam	67
7.	Training Pontoon in Swimming Pool	94

LIST OF PICTURES

Picture		Page
1.	War Canoe (Lachine Racing Canoe Club) . . .	62
2.	A Four-Man Crew, C-4 (Lachine Racing Canoe Club)	64

CHAPTER I

HISTORY OF CANOEING, AND THE INTERNATIONAL CANOE FEDERATION

The term canoe has probably a legitimate Indian pedigree. Although it has reached us through a French agency in the form of "canot," there can be little doubt that it is the carib word "canaoa"; the natives of San Salvador, at least, are said to have called small boats by this name when Columbus first landed there (16, p. 34).

The terms boat and canoe are used interchangeably not only in reference material but also in early descriptions of water craft.

The first floating thing on which man rode and transported goods was an ordinary log. He first propelled this by means of hands and feet and later by the use of a pole. This is estimated to have been more than 12,000 years ago. Archeologists have excavated a boat in the Valley of the Nile which is thought to have been in use 10,000 B.C.

The next step was the fashioning of a paddle which gave primate man greater speed than the pole. The dugout, which was a log hollowed out by means of stone tools or fire, followed the raft (15, p. 167).

The various stages in the development of the canoe and related water craft listed chronologically, come, in general, in the following order:

1. The log propelled by hands and feet.
2. The log propelled by a branch or pole.
3. The raft (logs, brushwood or reeds fastened together by thongs).
4. Platforms built on rafts.
5. The raft propelled by a paddle.
6. The sail (a skin stretched on a pole).
7. The dugout
8. The canoe made by stretching bark or skin on a framework.
9. The canoe made of several pieces of wood stitched together with thongs or fibers.
10. The canoe with bow and stern, bulging sides, flat bottom, a keel piece and built up side.
11. The canoe with several pieces of wood, fastened together by wooden pegs (20, p. 404-409).

There is a long history in the building of water craft and canoe. I would recommend for such history, the work done by Evelyn Ezell Dobson on the "History and Development of Canoes and Canoeing."

Modern canoeing is a recreational sport activity. It began in 1866 when the Royal Canoe Club was founded in England, and the Prince of Wales, later King Edward VII, became commodore. Its headquarters are at Kingston on the Thames. There is also the British Canoe Association which was and still is an active organization devoted to cruising.

After the English canoes were seen in Paris at the exhibition of 1867, others like them were built in France (5, p. 792).

Modern canoeing as a sport owes its popularity largely to two men in England who built canoes capable of being either paddled or sailed, and took long journeys in them: John Macgregor in the Rob Roy between 1866 and 1869, and Benden Powell in the Nautibus (5, p. 792).

Organized Canoeing

All organized canoeing in the United States is headed by the American Canoe Association (A.C.A.). This body, founded in 1880, is divided into nine geographic divisions. Each division holds paddling and sailing races and there is an annual national meet, held at a different site each year according to the best interests of the association. This first local organization in the U.S., the New York Canoe Club, dates from 1871. In Canada the sport is supervised by the Canadian Canoe Association (C.C.A., 1900)(5, p. 793).

Every year there is an international competition, Canada vs U.S., the North American Championship started in 1953. The North American Canoe Racing Association was formed in 1966. The constitution of this association has now been approved by both A.C.A. and C.C.A. This association has the responsibility to conduct the yearly championship regatta between the member countries as well as to promote interest in the sport of canoeing.

The world governing body is the International Canoe Federation (I.C.F.), formed in 1945 as the successor to the Internationale Representationschaft des Kanusport (I.R.K., 1924) which was dissolved during World War II. The I.R.K. was responsible for canoeing becoming an Olympic sport (5, p. 793).

There are only two categories of racing canoe at the Olympics. The first form is the kayak which was used by the Eskimo. It has a rigid deck with a covering laced about the paddler and is propelled by a double blade paddle with a rudder or a sail. The second form is the Canadian canoe. It is similar to a small boat except that it is longer, narrow and sharp at both ends. It is propelled by a single blade paddle and does not have a rudder or a sail.

For each of these categories there is also a specially built racing canoe. The "K" kayak boat and "C" racing boat are different in both origin and method of propulsion. The K-paddler, seated in the kayak, used the double-bladed paddle; whereas the C-paddler is in a half-kneeling position, with one knee resting on a bun using the single-bladed paddle. Both the racing kayak and canoe are under the ruling of the International Canoe Federation.

The racing canoes were first introduced in Paris, at the 1924 Olympic. The first official Olympic regatta was held in Berlin in 1936, where nineteen countries and one hundred and twenty-one athletes took part. Frank Amyot, a

young Canadian from Ottawa, won the first gold medal in C-1 category.

International Canoe Federation Statues

I. Purpose of the Federation

The I.C.F. is internationally known in these names:

1. In English: International Canoe Federation.
2. In French: La Fédération Internationale de Canoe.
3. In German: Internationale Canu Föderation

Abridgement: I.C.F., F.I.C. and I.C.F.

The federation consists of those national canoe associations which are recognized in their respective country by the leading sports organizations, or by the Olympic Committee of that country, as the representative national canoe association and which have duty affiliated to the I.C.F. (8, art. 1).

Duties of the I.C.F.

a. To issue rules and regulations for the building and classification of racing kayaks and canoes.

b. To issue rules and regulations to be followed in international canoe contests.

c. To see that the statues and racing regulations of the federation are observed.

d. To arrange for Continental and World Championchip contests.

e. To make every possible effort to spread water tourism and to promote this activity by facilitating international communications.

f. To supervise the right of competitors to take part in international competitions.

g. To settle disputes which may arise between member associations.

h. To obtain international enforcement of disqualifications, reprimands or penalties inflicted (8, art. 5).

II. Membership

Application for membership in the I.C.F. shall be sent in writing to the Management of the I.C.F. together with the statues of the association, in duplicate, making the application and information regarding the number of its clubs and members. The application shall be accompanied by the appropriate subscription for the current year. If the application is rejected, the amount paid will be refunded.

Election of members shall take place at the Congress. A majority of two-thirds of the votes is required. The Management of the I.C.F. is entitled to accept provisionally as a member an association applying for affiliation--subject to ratification by the next Congress (8, art. 6).

III. The Congress

The supreme authority of the I.C.F. is the Congress, formed by the delegates from the affiliated national associations. Each national association is entitled to send one delegate to the Congress and shall have one vote. The Congress shall be under the chairmanship of the President or in his absence of one of the Vice-Presidents (8, art. 10).

English, French, German as the official languages which shall be used at Congresses, other meetings and correspondence with the I.C.F. English only is the official language for the issue of official documents, except the I.C.F. Slalom Rules which shall be in French. At a Congress each delegate is entitled to speak in the language of his country, provided that his speech is translated into one of the official languages by a competent interpreter (8, art. 21).

IV. I.C.F. Committees

The following Standing Committees of the I.C.F. shall deal with specific activities of the federation:

a. The Paddling Racing Committee.
b. The Slalom Committee
c. The I.C.F. Touring Committee.
d. The Sailing Committee.
e. The Committee for Propaganda and Information.
f. The Committee for Sports Medicine.

All committees are responsible for their activities to the Board of Management (8, art. 35).

V. I.C.F. Amateur Rule

An amateur is a sportsman who devotes himself to the sport of canoeing for his own pleasure and for his moral and physical well-being without deriving from this either directly or indirectly any material advantage. He is, therefore, not allowed:

a. to advocate professionalism in any competitive sport, taking into account the loss of earnings and the expenses caused by the participation in competitive events.

b. to participate in competitions in which money prizes are given.

c. to use championship titles for the purpose of financial or material gain which does not represent recompensation for actual work done; for instance the use of championship titles in the publicity of commercial firms (8, art. 41).

The present secretary-treasurer is Mr. Olov Verner with his office at 11 Biblioteksgatan, Stockholm 7, Sweden.

CHAPTER II

TERMINOLOGY AND EQUIPMENT

Like any other sport, canoeing has some words and phrases which are not used in general conversation. These words are used to describe parts of canoe (see Figures 1 and 2), techniques, training and competition, and therefore help the reader with the methodology of canoe racing.

Back Water:	Back stroke pushing the water forward.
Bail:	Remove water from a canoe.
Bun:	Kneeling pad, usually rounded a cushion.
Bow:	The forward part of the canoe.
C:	Canadian racing canoe.
C-1:	C followed by a number means the number of athletes in the canoe.
Feather Blade:	During the recovery the paddle is slightly parallel to the water.
Freeboard:	Part of the boat above the waterline.
Gunwale:	The part of a canoe where topsides and deck meet.
J-Stroke:	Paddling with a single-bladed paddle so as to steer at the end of each stroke.
K:	Kayak racing boat.
K-1:	K followed by a number means the number of athletes in the boat.
Keel:	The central part of the canoe.

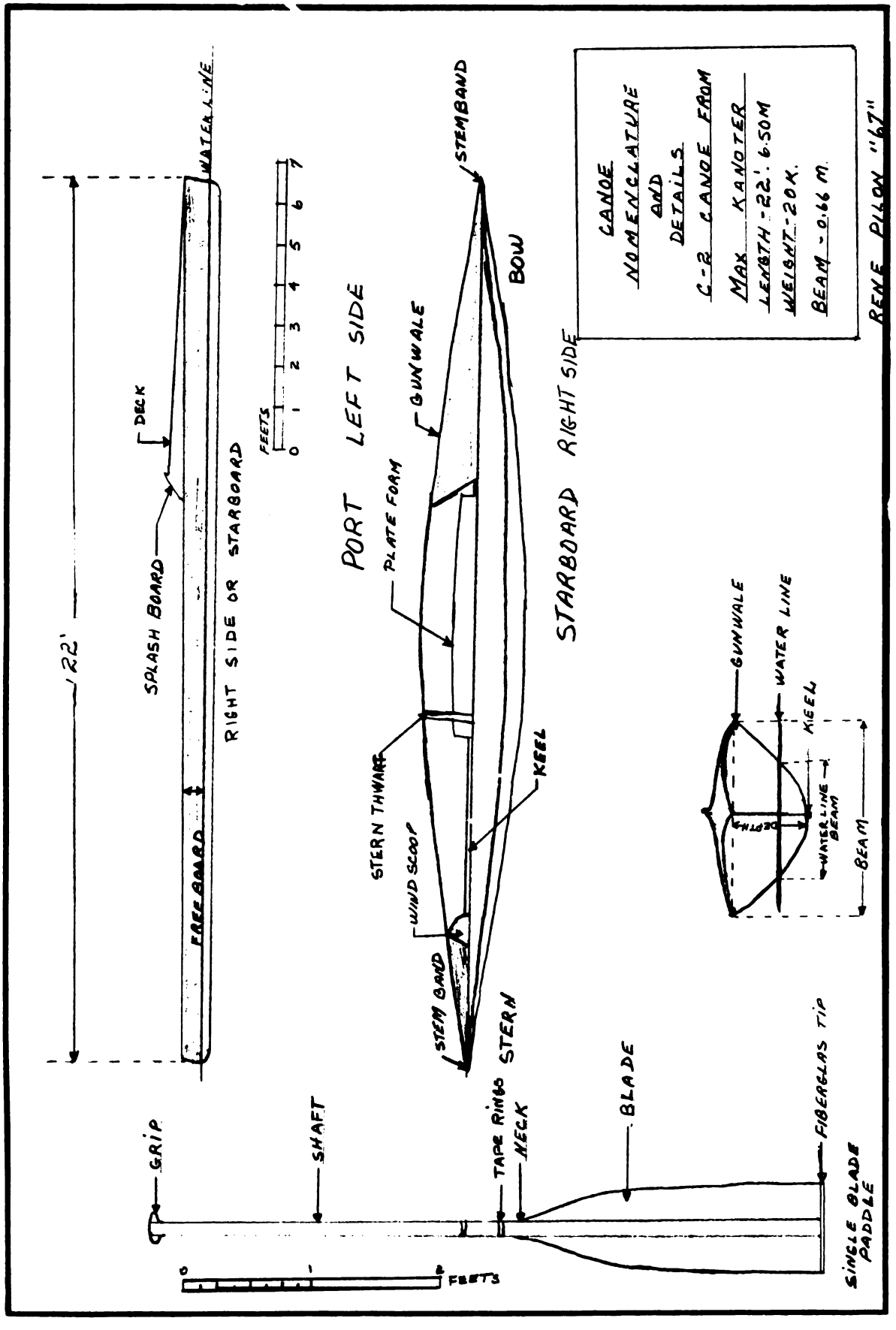

CANOE
NOMENCLATURE
AND
DETAILS
C-2 CANOE FROM
MAX KANOTER
LENGTH - 22'. 6.50M
WEIGHT - 20K.
BEAM - 0.66 M.
RENE PILON "67"
PORT LEFT SIDE
STARBOARD RIGHT SIDE
22'
WATER LINE
DECK
SPLASH BOARD
FREEBOARD
RIGHT SIDE OR STARBOARD
FEETS
0 1 2 3 4 5 6 7
STEMBAND
BOW
GUNWALE
PLATE FOAM
STERN THWART
WIND SCOOP
KEEL
STEM BAND
STERN
GUNWALE
WATER LINE
KEEL
WATER LINE BEAM
BEAM
GRIP
SHAFT
TAPE RING
NECK
BLADE
FIBERGLAS TIP
SINGLE BLADE PADDLE
0 1 FEETS

Figure 1.

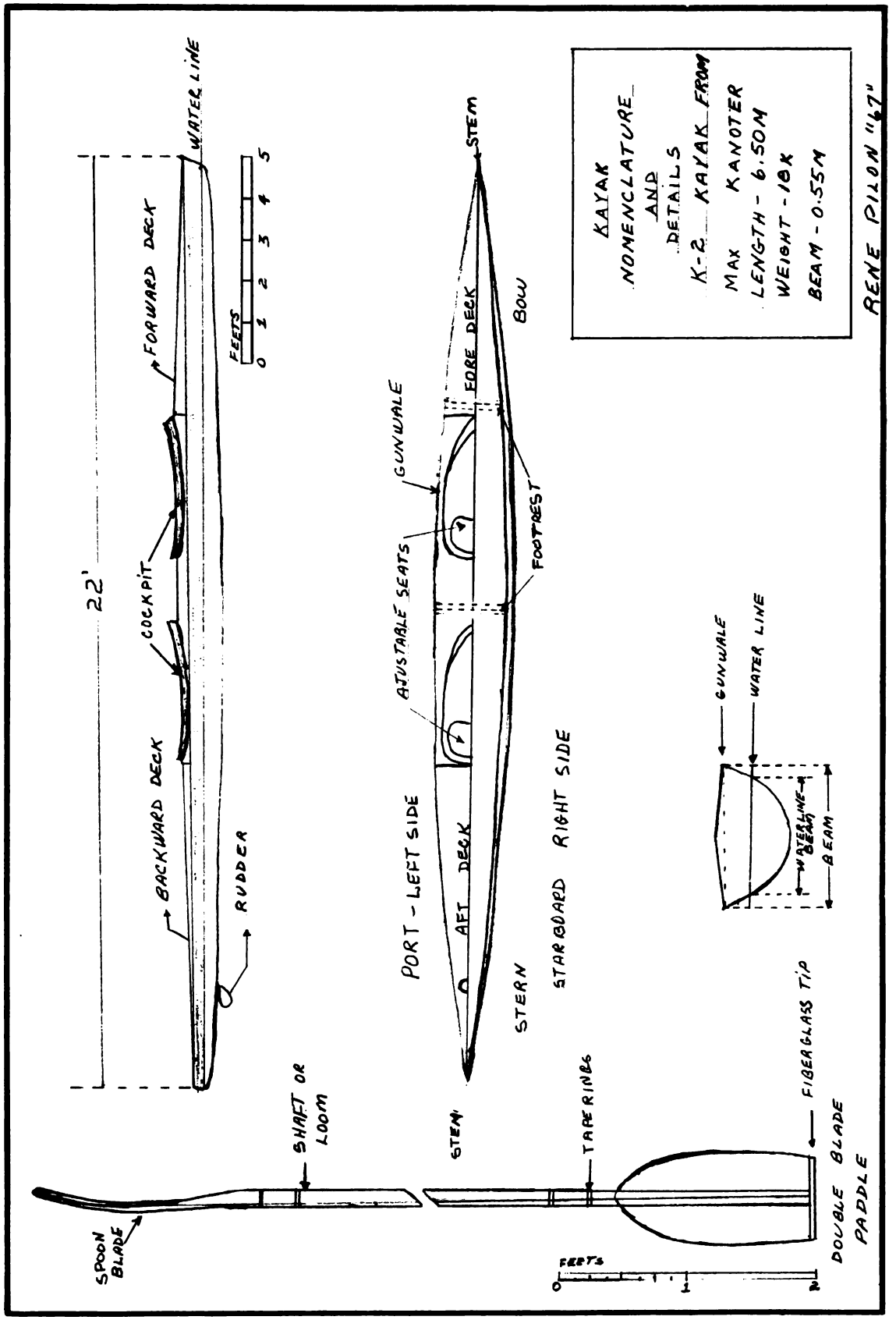

KAYAK NOMENCLATURE AND DETAILS
K-2 KAYAK FROM
MAX KANOTER
LENGTH - 6.50M
WEIGHT - 18K
BEAM - 0.55M
RENE PILON "67"
22'
WATER LINE
FORWARD DECK
COCKPIT
BACKWARD DECK
RUDDER
FEETS
0 1 2 3 4 5
STEM
BOW
FORE DECK
GUNWALE
ADJUSTABLE SEATS
FOOTREST
PORT - LEFT SIDE
AFT DECK
STERN
STARBOARD RIGHT SIDE
GUNWALE
WATER LINE
BEAM
WATERLINE BEAM
SPOON BLADE
SHAFT OR LOOM
TAPE RINGS
STEM
FIBERGLASS TIP
DOUBLE BLADE PADDLE
FEETS

Figure 2.

Knifing: During the recovery the paddle is parallel to the canoe.

Left side: The side when facing forward or port.

Paddle: An implement with a broad blade used without support to propel and steer the canoe.

Right side: The side when facing forward or starboard.

Seat Cover: An apron to fit over the cockpit and around the canoeist.

Side Stroke: Stroke to pull the canoe sideways.

Stroke: The movement of the blade through water.

Stroker: The person who sets the stroke for the crew.

Shaft: The long bar which joins the blade with the grip.

Stem: The stern or bow of a canoe.

Stemband: Piece of wood joining the port and starboard of a canoe.

Stern: The rear end of a canoe.

Steer: To aim the boat in a direction

Tape Rings: Rings fitted at the neck of the blade, to mark hands position.

Wind Scoop: Piece of wood affixed to the stern of the canoe to deflect air from the stern.

Single-Blade and Double-Blade Paddles

Length of Paddle in a C-Boat

In selecting the right paddle, place the tip of the blade on the ground so that the hand grip reaches about eye level. The length of the paddle, however, will vary

according to the type of canoe raced and the paddler's position in the canoe. The paddle has to be very light and strongly built.

Another method of determining a paddle of suitable length for average use is based on the length of the paddler's arms. Curl the second joints of the fingers of one hand around the grip and the second joints of the fingers of the other hand around the tip of the blade. For the average person this is equivalent to the eye-level measurement, and is more convenient to apply when kneeling in a canoe (1, p. 51).

Length of Paddle in a K-Boat

To select the right paddle, first place the blade tip on the ground, and then curl the second joints of the fingers around the tip of the other blade. The length of the double blade, however, will vary according to the kayak used and the paddler's position in the boat. The stroker usually takes a smaller paddle. A paddle should be as light as possible and should be well protected with marine varnish. It should have also adequate strength. The improperly coated paddle will soon become water logged. Varnish, however, will help to protect the paddle.

Classes and Building Rules

Kayaks

All kind of building materials are permitted. Sections and the longitudinal line of the hull of the kayak must be convex and not interrupted. Steering rudders are allowed. The maximum thickness of the rudderblade must not be less than 10 mm. in the case of K-2 and K-1 or 12 mm in the case of K-4, in cases where the rudder forms an extension to the length of the kayak (7, p. 1).

Canoes

All kind of building materials are permitted. Sections and the longitudinal line of the hull of the canoe must be convex and not interrupted. The canoe must be built symmetrically upon the axis of its length. Steering rudders or any guiding apparatus directing the course of the canoe are not allowed. A keel, if any, must be straight, must extend over the whole length of the canoe and not project more than 30 mm below the hull. The C-1 canoe may be entirely open and must not be covered more than 150 cm. from the stem and 75 cm. from the stern, reckoned from the outer edge of the stem or stern to the furthest point of the edge of the deck for the fore or aft decks respectively open. The minimum length of the opening must be half of the boat length (7, p. 1, 2).

Limitations

K-1	K-2	K-4	C-1	C-2	C-10	
520	650	1100	520	650	1100	cm. max. length
51	55	60	75	75	85	cm. min. beam
12	18	30	16	20	50	kg. min. weight

All measures in cm. and all weight in kg. (7, p. 1).

Measuring

The length of a kayak or a canoe must be measured between the extremes of the stem and the stern. Stem-bands or other protection of the stem or stern, if any, are to be included. Any rudder forming a continuation of the length of a kayak is not to be included in the measurement. The beam of a kayak or a canoe must be measured at the widest part. Rubbing strake, if any, is not to be included in the measurement (7, p. 2).

Weighing

No alterations in canoes and kayaks are permitted after the measuring and weighing and before the competition has taken place. All loose outfittings shall be removed from the kayaks during the weighing except for permanent rudders, the steering devices belong to them, and fixed seats. When canoes are weighed, all fittings other than permanently attached floorboards, widescoops and thwarts must be removed. The first four boats in the final race as well as all boats which have qualified for one more

race shall immediately after the race be measured and weighed again (7, p. 2).

The C-4 and war canoe (C-14) races are not included in Olympic, International, World Championship competitions. The C-8 is included in the International and World Championship competitions.

The C-4 racing canoe: maximum length, 20 feet; minimum beam, 30 inches; minimum depth, 10 1/2 inches; minimum weight, 70 pounds. The C-14 racing war canoe: maximum length, 30 feet; minimum beam, 36 inches; minimum weight, if built prior to 1941--170 pounds, if built subsequent to 1940--190 pounds (3, p. 14).

Canoe Types

Today, freedom of movement during the paddle strokes grows more and more important due to the advances in paddling technique. Consequently, the widest point of the canoes is located so far aft that canoes are very narrow at their bow and middle part. At the widest point the freeboard is so high that the width can be reduced above the water level.

The narrow bow develops until there is just room enough for the canoeist. Unfortunately, the speed in rough water and even also in calm water is affected by this. The fineness tends to be too low, planing effect no longer exists and the buoyancy is kept within a larger wetted surface than before. The solution to this problem is to add

buoyancy to the bow below the gunwale, and at the same time to keep the narrowness where it is advantageous to the paddle work. In latest canoes the bow sections continuing edgeless into the deck and the arched freeboards are deflecting the bow wave much better than the earlier vertical ones (18, p. 28).

In racing canoes only the speed counts, but as speed also includes rough water performance, seaworthiness comes into consideration. Due to the high speed and the long narrow hull, racing canoes cut through the waves rather than climb over them. In rough water they are almost constantly swash and even in the wake from competitors the deck occasionally cleaves the water. To avoid this, we need extremely high freeboards but as the wind resistance must be the lowest possible they have never been introduced (18, p. 28).

The Racing Canadian Canoes

C-1 and C-2 began developing later than the kayaks, but then continued until they had not the slightest likeness with traditional Canadian Canoes. All that is left is the Canadian beam of 75 cm. being located like a sort of rudiment far aft and high above the water line. In a racing single, 75 cm. is also an enormous width, which interfers with proper steering. The beam can be measured anywhere on the canoe and so it only influences the grinwale shape, whereas below the water line the canoes are exactly as

narrow as the kayaks. Even if this means a larger wetted surface the directional stability gained is essential to the steering. Turns are made by leaning the canoe (18, p. 30).

The Racing Kayak

The racing kayak include K-1, K-2, and K-4. Earlier the size of wetted surface was considered as being nearly fixed and almost impossible to bring down. Nevertheless, it has decreased about six per cent compared with the 1950 boats. A still narrower and deeper section is too unstable and has proved no advantage in the speed. Rocker generally decreases the wetted surface but increases the change of trim. A rocker line being flat at its middle and curved more and more intensively towards the ends provides the best results. The K-1 is especially sensitive to changes in the rocker--a quarter of an inch can be felt in performance. Too much makes the kayak bounce in the spurts and too little makes it feel "dead" and harsh running over the racing distances (18, p. 28).

Planing features such as deep and flat aft sections are efficient only to a smooth paddling style. In the latest K-1 and K-2 planing forms only exist in so far as the center of buoyancy is worked deeper in the hull towards the stern. In a K-4 no planing or lifting effect is possible: here the frictional resistance is still more important than in the K-1 and K-2 (18, p. 29).

CHAPTER III

PREREQUISITES AND PROBLEMATIC IN CANOEING

Prerequisites to Efficient Movement in Canoeing

In canoeing all basic physical laws to movement are applied but cannot be overlooked. There are certain physical, mental and emotional prerequisites that must be recognized and dealt with as the need arises.

Physical Prerequisites

The degree to which movement can be effective may be influenced by body build, reaction, strength, power, flexibility, endurance, acuity of the senses and water conditions. The importance of each of these is dependent upon the movement task to be performed. For example, reaction time is important in canoeing. Reaction time, of course, is tied in with the physical acuity of the senses and many mental abilities. Without acute senses and the ability to make quick decisions, reaction time would be slow. In a race of 500 m. or 1000 m. if the athlete does not respond fast enough, automatically he loses few seconds and this may be enough for him to lose the race (2, p. 13).

Strength, on the other hand, is extremely important to many tasks of the pushing and pulling type action done

by the canoeist. For example, if a beginner canoeist is weak, then the coach or instructor must develop his strength or power. Power is the maximum weight which can be lifted by a muscle indicates its absolute muscle power. The length of time during which this weight can be lifted consecutively indicates the endurance.

Exercises leading to muscle power are those which require the pushing and pulling of the blade through water or the overcoming of resistance. The weight represented here is the pushing and pulling of the blade through water. Sometimes the muscles are too weak to do the action of pushing and pulling then the beginner will take a shorter and a slower stroke. The quantity of pushing and pulling action, the resistance to the movement and the time of application must be increased gradually.

Power building exercises should, therefore, begin on a gradually increasing scale so that the negative phase can be avoided. The practice of exercises should be done regularly to improve his initial capacities of pushing and pulling movement.

The principle of buoyancy equilibrium, leverage and application of force are all importance in canoeing just as they are in understanding swimming. Application of swimming can be helpful in learning canoeing and vice versa.

A canoe is buoyed up by a force equal to weight of the water displaced. The racing canoe does not have air chambers running from low to stern, like in a sponson.

This is the reason why the stability is so difficult in a racing canoe. The racing canoe are made in various sizes and shapes. In Europe they build racing canoe according to the build of the athlete so that they will be more effective. But they are still made according to the I.C.F. rules.

Both the canoe and the paddle are levers and all the principles of leverage apply. The canoe is a lever of the first class with its fulcrum at its center of gravity. The center of gravity shifts according to the weight and the position of the athlete in the canoe. The paddle, like the shovel, is a combination of levers. The resistance is offered by the water and thus is always applied against the blade of the paddle. The lower hand is the fulcrum for any force applied by the top hand (first class lever) and the top hand is, at the same time, the fulcrum for the force applied by the lower hand (third class lever) (2, p. 304).

When an athlete enters a canoe, the center of gravity must be considered. If the canoe is to remain in equilibrium this center of gravity of the total weight must be over the base of support. Since the base of the canoe (the keel plus a few inches on either side) is narrow from port to starboard and long from bow to stern, the canoe lacks stability from side-to-side but is extremely stable from end to end. It is important for the paddler to keep his weight as low as possible to reduce the rotatory tendency resulting from a high center of gravity. To keep the center of gravity over the base it is necessary to step

into a canoe directly over the keel. This will reduce the rotary force inherent in a high center of gravity (2, p. 304).

It is important to keep the center of gravity over the base from port to starboard; the athlete must kneel in the center (from side-to-side) of the canoe keeping his own center of gravity over the base of support. When there is more than one athlete like in a C-2, C-4, C-8 or war canoe, it is important that all keep their weight centered. It is possible, of course, to balance a canoe by all athletes kneeling slightly off-center in opposite directions.

The balance of the canoe is very important. It has a more or less rounded bottom and tapering ends. Obviously all weight should be over the base or evenly distributed on each side of it. Wrong position of the athlete makes the canoe very unstable, kneeling near the bow or the stern changes the center of gravity and it is difficult to balance the boat. If the athlete is too much in front in his canoe, the bow is heavily loaded, the weight canter shifts forward, the bow dips deeper in the water, and steering becomes more difficult. If the athlete is back too much in his canoe, the stern is heavily loaded, the bow is lifted out of the water and is more subject to the effect of the wind (17, p. 318).

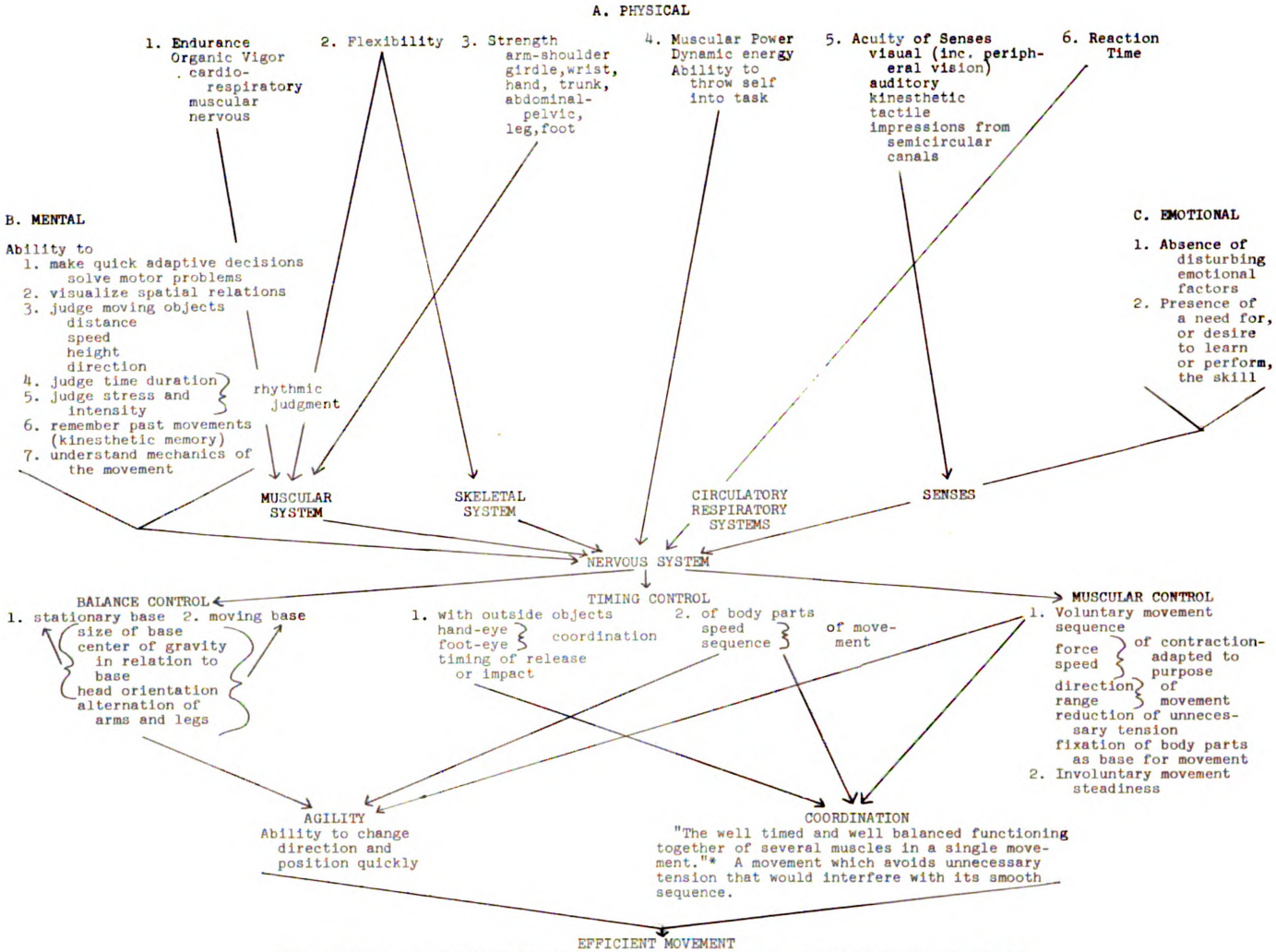
Mental Prerequisites

Through the years the paddler has built up a spatial concept of the distance that he can reach. The length of his arm is familiar to him and he can quickly judge how far he can reach with the paddle. The improvement of that reach can be done by teaching him the right position for a better reach. We may ask him to increase the length of stroke from 24 inches to 36 inches or maybe even more or less according to the length of his arms. In the long-run, teaching time could be saved if, when a new implement is introduced, some time were taken to help the paddler gain the new spatial concept. Perhaps some of these problems have arisen because it has been taken for granted that these new spatial concepts are developed immediately and automatically (2, p. 15).

Besides the ability to judge spatial relations and timing, there are many other mental prerequisites to efficient movement (see Chart I). The ability to solve motor durations and to make quick adaptive decisions, to remember past movement experiences so that they can be applied and to understand the mechanics of effective movement are all important (2, p. 15).

Emotional Prerequisites

In spite of the physical and mental equipment of the paddler, teaching will not be effective unless there is a feeling of need for, or desire to learn, the particular



*Kraus, Hans: Therapeutic Exercises in Pediatrics. Medical Clinics of North America, 31:629, May, 1947.

Chart I.--Prerequisites to Efficient Movement.

canoeing skill involved. Discussion of purpose followed by teaching through problem solving is an excellent method for making the paddler aware of the necessity for following the principles basic to the particular task and creating a realization of need and a desire to learn (2, p. 16).

The coach or instructor must also recognize the fact that disturbing emotional factors may block efficient movement. This is tremendously important in teaching canoeing when fear of loss of support, the unstability in the canoe cause great retardation of learning. Fear must also be recognized in a case of a bad weather condition, lack of confidence of other partner(s). In fact, simply fear of something new can be involved in most any movement situation. There may be also in the emotional prerequisites presence of a need for, or desire to learn or perform, the skill (2, p. 16).

Organization of Prerequisites and Controls Leading to Efficient Movement

An attempt to chart the organization of the various prerequisites and controls that lead to efficient movement can be found in Chart I. This chart shows clearly the importance of the nervous system to human movement. Obviously, efficient movement is impossible without its smooth functioning. In any movement all of the systems of the body are brought into play and work through the nervous system to produce balance, timing and muscular control which lead to what has been termed agility and coordination, and

finally, when coordinated movements are combined to produce the force required by the particular purpose and to apply it at the most advantageous point and in the most advantageous direction with the least expenditure of energy, to efficient movement. The agility in canoeing is not a very important factor because of the kneeling and sitting position which the paddlers have in their racing canoes (2, p. 18).

The importance of coach, instructor and paddlers understanding of the basic mechanical principles--principles of balance, force production, and control--is obvious. While body size, shape, strength, and so forth, are factors in the determination of the success attainable in physical performance, the degree to which an individual can approach his potential depends upon the way in which he uses his physical, mental, and emotional equipment (2, p. 18).

The degree of success in most physical activities is determined by the manner in which forces are applied. Through more effective use of available forces, a small man can outpaddle a larger man, a short statured paddler can outpaddle a taller paddler, a person with short arm can paddle faster than another with long arm, and a weak muscle person can paddle faster than a strong muscled person.

Problematic of the Paddler

Synoptic table of necessary potential of the paddler.

Subject:	Optimal dimension expected of him.
Paddler:	The necessary potential.
His Capacity:	Unknown at the beginning.

Problematic

Material dimensions:

- Muscles:
  - Speed
  - Relaxation
  - Skill
  - Resistance
  - Strength
- Articulations:
  - Flexibility
  - Solidity
- Bones:
  - Rigidity
  - Solidity
  - Lightness
- Acuity of senses:
  - Proprioceptive
  - Exterioceptive means
- Reaction Time:
  - Voluntary
  - Involuntary

Formal dimensions:

- Perceptions:
  - Spacial-temporal
  - Reference adaptation
- Receptiveness:
  - Inward:
    - attitude of mind
  - Outward:
    - Intensity
    - Dimension
    - Contrast
    - Repetition
    - Movement
- Movement:
  - Distance
  - Similarity
  - Lack of symmetry
  - Relationship between the plan of movement and the execution of movement.

Exterior forces:

- Weight of corporal segments
- Weight of the paddler
- External resistance
- Inertia
- Atmospheric conditions

Mechanic elements:

- Movement:
  - uniform
  - accelerated
  - rotational
- Forces:
  - centrifugal
  - centripetal
- Equilibrium of forces:
  - parallelogram of forces (Torque)
- Work and resistance:
  - level reactions (Newton laws)
  - friction
  - power
- Energy
  - potential
  - kinesthetic
- Force momentum
- Simple machine

Weight:

- *Universal attraction (Newton laws)
- Form
- Rhythm
- Association phenomena
- Visible movement

Memory:

- Kinesthetic and mental

Imagination:

- Productive
- Reproductive
- Deliberate

Thought:

- Concept, abstraction, dynamic's genesis

Affective Life:

- Emotion
- Affective feeling
- Simple feeling
- Affective state
- Affective disposition
- Complex affective reaction

Adaptation:

- Topographical milieu
- Physical milieu
- Social milieu

equilibrium of bodies
law of falling bodies
simple pendulum

Motivations:

Physical needs

Psychological needs

Affection needs

Security needs

Conviction needs

Actualisation needs

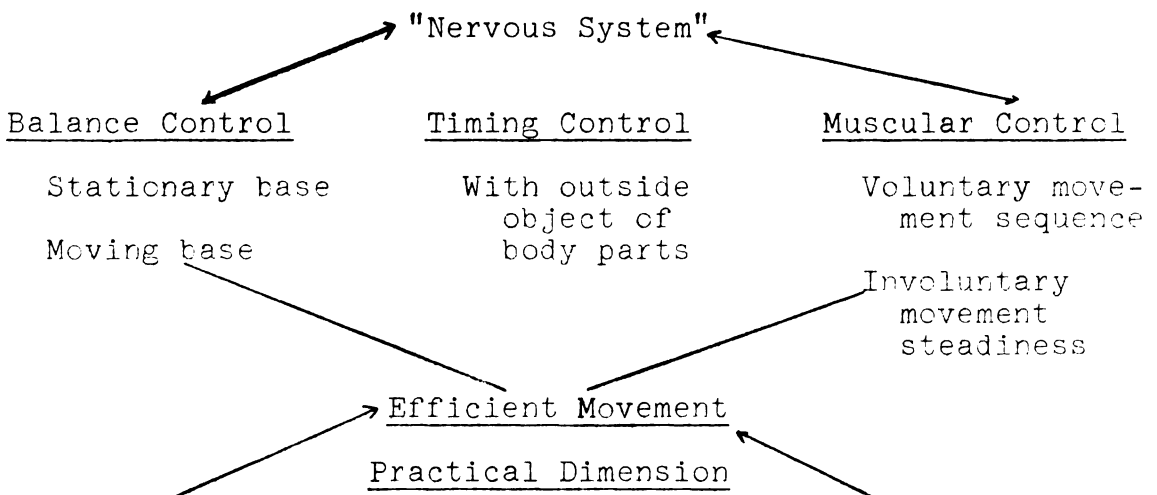
Independance needs

Newness needs

Social needs:

participation
approbation
etc.

(13, p. 33)



(see Chart I, p. 25)

The efficient movement is the combining of coordinated movements to produce the force required by the particular purpose and to apply it through the most advantageous point, in the most advantageous direction with the least expenditure of energy (10, p. 629).

Perfection of movement is the most prominent results of training. It is also the most specific. The most important by-product of the development of skill is the economy of effort which the more purposeful use of the muscles entails, thus reducing the total load and at once postponing fatigue (19, p. 199).

Nervous System

The nervous system is the central, the intercommunication system of our body. The nerves are the connections from the central nervous system to muscles and glands. Through the nervous system every part of the body is directly or indirectly in potential communication with every other part. This means that stimulation of any sense ending may result in nerve impulses being delivered, ultimately, to any or all muscles or glands. Coordination is undoubtedly the greatest and most lasting change which training induces in man takes place in the nervous system, namely changes in behavior. Among these changes only those that manifest themselves in "muscles learning" or improved coordination need enter this discussion. Objectively, these improvements have been measured in two ways. The increased mechanical

efficiency or reduced work cost of the trained state have already been discussed.

The approach consists of analyzing the movements of the athletes by the well-known slow-motion film or the television replay of the movement (19, p. 196).

There is a great deal of evidence that improvement is due entirely to better coordination. The improvements in mechanical efficiency which come with practice are really a measure of the effect of training on the central nervous system and not a measure of improved metabolism in the sense of more economical intracellular activity. A poorly coordinated man consumes more oxygen because he is actually doing more work than the well coordinated man (19, p. 193).

There is, besides the nervous system, another great coordinating or integrating mechanism, namely, the endocrine system composed of eight glands of internal secretion. All of them exert most profound influences over the entire body. There are two integrating mechanisms on whose activities the development of the individual and the expression of his personality is ultimately dependent. The one is nervous, the other chemical. It is easier to see how "mind may affect the body," sometimes called the psychogenic origin of disease or other body changes (19, p. 51).

Coordination

Coordination is the well timed and well balanced functioning together of several muscles in a given movement.

The function of a group of muscles is well balanced if the necessary degree of contraction is matched by an adequate degree of decontraction in the antagonists. Normal movements of joints are produced by the concerted action of several muscles. These are made up of contractions of one group and decontractions of another. Changes of muscle length and tone occur in varying degrees. The simplest movement, therefore, constitutes a combination of many different muscle actions in several muscles and muscle groups. This constitutes a movement pattern. The movement pattern in canoeing is our stroke (10, p. 629).

CHAPTER IV

PHYSIOLOGY RELATED TO CANOEING

The Physiology of Respiration

First, there are two important phases in the respiratory movement--the inhalation or inspiration and the exhalation or expiration of the air from the lungs. The inhalation is the action to draw (in, especially) into the lungs. The exhalation is to breathe out; it is the most important phase for the competitor. The oxygen consumption in canoeing is enormous due to the muscles' work for this type of activity. The best method of breathing is a combination of the inferior (abdominal) and superior (costal) method of breathing. The application of this combination is called the total or complete respiratory movement.

It is the function of the respiratory organs to bring oxygen to all body tissues and to remove carbon dioxide. It is clear that the lungs, ribs, diaphragm, and related areas, can only play the initial part in capturing oxygen and the final act in carbon dioxide elimination. After the oxygen has entered the alveoli of the lungs, it is picked up by the blood and pumped by the heart to all parts of the body. Thus it is obvious that the circulatory system has as much to do with respiration as has the respiratory

system proper, Not only must the blood be pumped to the periphery, the main function of the heart, but it must also be brought back again. The heart alone is incapable of returning the blood from the periphery without assist from other units of the body. Its force is spent almost entirely in overcoming the resistance to flow in the arterial system. In the capillaries there remains less than 20 per cent (12 to 32 mm. mercury) of the original pressure imparted to the blood by the heart. This is not enough to bring the blood back to the heart (19, p. 122).

The two most important factors aiding this return flow are: first, the contracting and relaxing of skeletal muscles and, second, the respiratory movements. The first factor operates to bring blood out of the arms, legs, and trunkwall into the large veins of the shoulders, neck, and abdomen. From here on it becomes the task of the respiratory apparatus to help bring the blood to the heart (19, p. 123).

The lungs form, virtually, the inner wall of an airtight two-walled jacket. A deflated basketball and bladder could serve as our model if there were an airtight connection between the protruding valve stem and the outer cover or hide. The valve stem would represent the trachea. If now the opposing walls of the ball cover were pulled apart, air would enter the bladder through its trachea. But even before this happens there would develop a slightly negative pressure in the space between the bladder and inner surface of the ball cover. This is a most essential fact. Now to

apply this simple illustration: The space between the bladder and cover corresponds to the thoracic cavity which is really no more of a cavity than is the space between the bladder and inner surface of the ball cover. But this cavity contains also the heart and the large and thin-walled veins leading to it. Corresponding to the cover of the ball is the bell-jar shaped thorax separated from the abdomen below by the sheet-like diaphragm. The thorax enlarges its diameter by the raising of the ribs and its length by the descent of the diaphragm. Both movements tend to produce a negative pressure in the thoracic cavity, that is, not only the process of respiration occurs but also the action of the blood returning from veins to the heart. Because the lungs are elastic and therefore tend to contract there is always a remnant of this negative pressure in the thoracic cavity, except during forceful expiration or when respiratory pressure is applied against a closed glottis. Thus blood is being sucked into the thorax, although at a lesser rate, even between inspirations. The descent of the diaphragm, further, not only helps to produce a negative pressure in the thorax but it also simultaneously puts positive pressure on the abdominal organs including veins. One could imagine no more ideal pump arrangements (19, p. 123).

It is important to breathe the air in from the nose because of the nose's action. The nose regulates the intake volume of air, cleans the air and also modifies the temperature of the air. This breathing method is more difficult

than the method done through the mouth. The nose's breathing cannot be used during vigorous exercises especially during races because there is not enough oxygen to produce power, strength and energy. The nose-breathing method should be taught because it is the ideal method, especially due to the nose's duties.

Breathing Method for the C-Paddlers

With this type of canoes, the stroke is divided into four phases.

First phase: We have the reach and the entry of the paddle at a 90 degree angle in the water.

Second phase: We have the pushing and pulling action of the paddle.

Third phase: We have the steering of the boat by the paddle.

Fourth phase: We have the recovery with the paddle.

It is recommended to do one full respiratory movement per stroke. The average strokes per minute is 55, this means that there should be 55 complete respiratory movements per minute. Due to the large amount of respiratory movements it is necessary to force the complete exhalation of air to have the necessary oxygen intake to produce energy.

The inhalation ends with the first phase of the stroke, when the paddle enters the water. The exhalation starts at the beginning of the second phase when the power and energy to move the canoe is produced by the athlete. This phase

requires a large amount of muscle work to produce the necessary power so the exhalation has to be done correctly. The exhalation continues during the third phase of the stroke which is the steering of the boat. At the beginning of the fourth phase the exhalation ends and the inhalation begins with the recovery of the paddle. It is very important to exaggerate the exhalation to have a complete respiratory movement. During the recovery the paddler straightens the upper part of the body, expands his chest so the inhalation develops automatically. The thoracic cage and the dorsal muscles are relaxed. This secures a good position for a deep inhalation. The paddler satisfies his oxygen need with a deep inhalation during the recovery and at the beginning of his stroke. During training the athlete may breathe through the nose and also at every second stroke because the oxygen need is less. During competition every stroke must be matched with a complete respiratory movement which includes a deep inhalation and an exaggerated exhalation. It is recommended that before the end of any type of race (500 m., 1000 m., relay races, and especially for the 10,000 m.) the athlete should exaggerate his exhalation due to the need for more oxygen consumption to sprint the end of the race.

Breathing Method for the K-Paddlers

In the kayak canoes, the paddler does not pair every stroke with a full respiratory movement. The top kayak

athlete paddles around 90 strokes per minute. The breathing method of the C-paddler gives a better opportunity for breathing due to the different phases of the C-stroke. The kayak paddler has to produce a continuous effort due to his stroke which is done consecutively on each side of the boat. It is very difficult to prescribe the exact amount of respiration movement that he has to do per minute. The K-paddler should secure himself in the boat before he leaves the wharf to have the best favorable condition for correct breathing. He should be seated high enough in the boat to insure proper breathing. This raised position will vary according to the type and kind of boat that he is using. The athlete has to secure his stability in the boat to put all his power into the paddle action, to facilitate an easier breathing. The good-technique of paddling in kayak is related with a good breathing method. If the athlete in his seating position leans too much forward, he will limit his respiratory movement. Another limitation in his respiratory movement occurs when the athlete tends his legs too much; this may be caused because his footrest and his adjustable seat are too close to each other. These causes have a certain effect on the diaphragm muscle which is very important in a complete respiratory movement. The K-paddler should lean forward in the boat so that he has to adjust both the footrest and seat to give him the best position for his stability and for his respiratory movement. During the race the athlete should make a complete respiration, placing attention of a deep

exaggerated exhalation. The athlete who does not exhale completely, is forcing the inhalation which results in a poor breathing method and the athlete is struggling for oxygen. During various races the athlete has to pay more attention to the start and the finish of the race because it demands more oxygen consumption to produce power which comes only by a deep exhalation. If during a race the athlete wants to increase his power, he has to prepare himself with a deeper and faster exhalation and then increase the speed and the power of his stroke.[1]

Muscular Endurance

Best results are gained when the exercise is strenuous. Muscles grow larger and stronger only when taxed by increasingly greater demands. Under such conditions there is enlargement or hypertrophy of the constituent muscle cells or fibers. The resulting increase in cross-section is accompanied by a corresponding increase in strength. Recent studies in Sweden have demonstrated that especially in animals the thickening of fibers is accompanied by the development of more capillaries. This increased capillarization may amount to 50 per cent and obviously contributes its share to the improved "muscular endurance" of the enlarged muscles. But these thickening of muscle fiber and the increase in number of capillaries are reversible. In animals,

---

[1]Personal traduction from Granek, Istvan; Kajakosaskenuzas, Budapest, 1966.

all of the increases due to sixty days training disappeared completely in ninety days of subsequent rest. Strength and endurance built in youth will not persist throughout life without practice (19, p. 63).

Researchers conclude that the trained man differs from the untrained man in his ability to supply adequate amounts of oxygen to the active muscles so that the reduction of lactic acid shall take place on the sport of its production. The lactic acid is produced in exercising muscle. Even the trained man has his limit. When this is reached the lactic acid gets into the blood and here displaces CO_2 thus reducing the blood's efficiency in carrying this waste product to the lungs for elimination. No doubt the heart and blood vessels are primarily responsible for oxygen delivery. It is increasingly evident that improvement of their functioning is the essential fact in training for endurance (19, p. 105).

Value of Taking Salt Pills

Sometimes, during hard work at high temperatures, too much salt may be lost as a result of excessive perspiration. Canoeing does produce such perspiration especially during competition and hard training practice. This may cause interference with nerve function, resulting in cramps or interference with heart function, which in turn causes collapse. Salt pills are to keep the salt concentration of the blood and tissues up to normal level. It is probably unlikely that a person who eats balanced meals regularly will ever

be short of salt. The taking of salt pills is an extra safety measure. Some people feel better because of using them (19, p. 347).

To endure, the body must rid itself of the waste products and excessive heat. This usually presents no special problem at normal temperatures, but at high temperatures it appears that the body must learn still another adjustment if it would survive. The heat generated in the muscles is brought to the skin by the blood. Here, also, the sweat glands are stimulated to greater activity. The evaporation of the perspiration takes heat from the peripheral blood vessels and skin. Thus even at temperatures of 100-120 degrees F. it becomes possible for a person actually to "refrigerate" himself down to approximately body temperature. This requires a lot of perspiration and therein lies a danger. Sweat normally contains sodium chloride. With profuse sweating too much of this salt may be lost and this may lead to heart failure (19, p. 17).

Competitive Fear

The old fear that competitive sports may be overdone and become a detriment to the heart no longer need concern us. There is ample evidence that a sound heart cannot be damaged permanently by physical exertion no matter how strenuous. The high school star who fails to produce at the college level may have burned out his interest, surely not

his heart. Obviously a thorough physical examination must precede and guide all strenuous participation (19, p. 64).

Extension of the Psychological Limit

A person's ultimate performance is limited by the physiologic capacity of the organs involved. But usually long before this physiologic limit is reached, performance is reduced or discontinued. This stopping point is the psychologic limit and is conditioned by slight aches, respiratory distress, and many mental factors, such as fear of overdoing, parental warnings, and boredom. Its appropriate role is that of a safety factor to prevent overstrain. Too often, however, it stops exercise short of overloading the physiologic mechanism sufficiently to stimulate growth. Thus some people have never driven themselves into second wind. Competition against others, against a scoring table, or against a previous record; other factors, such as music, an audience, an instructor, or a compelling desire to become fit, are effective in extending this limit. Successful athletes reduce the distance between their psychologic and physiologic limits to a minimum. This is probably one of the most important concomitants of athletic training (19, p. 274).

One seldom produces work up to one's physical maximum limit but instead up to one's psychological limit. Researchers' findings appear to support the thesis that in every voluntarily executed, all-out maximal effort,

psychologic rather than physiologic factors determine the limits of performance (see the problematic p. 27). Because such psychologic factors (including pharmacologically induced psychic states) are readily modified, the implications of this position gravely challenges all estimates of fitness and training effects based on testing programs that involve measures of all-out or maximal performance. And because the home and school play decisive roles in the formation of restraining mechanisms, there are also implications for education of the young.

Second Wind

The onset of second wind is accompanied by a reduction in vital capacity and a much increased absorption of oxygen from the lungs. Apparently this marks the time when the heart catches up in forwarding the blood that has been accumulated in the large veins, into the lungs and the left heart. There may be other vasomotor adjustments associated with the establishment of second wind (19, p. 92).

Canoe racing demands split-second responses to unpredictable opponents or to passing moods. This call for agility and initiative. This stimulus of competition in athletic or its counterpart, the dervish type of emotion (wandering) often experienced in the dance, are prominent in this group. These often drive the individual into second-wind. The consequent changes in the structure and function of heart and lung account for the improvement in cardio-respiratory endurance (19, p. 64).

CHAPTER V

TECHNIQUE OF CANOE RACING

The technique of canoe racing is divided into two classes of events: double-blade paddling and the single-blade paddling. The purpose of this chapter is to describe the movement of the stroke in both categories.

Basic Position for Double-Blade Paddling

To double-blade, the paddler sits amidship on a low seat, astride the keel facing forward, stroking first on one side and then the other, with a paddle that has a spoon-shaped blade on each end. The paddles are usually made in one piece, so that when the blades are turned almost at right angles to each other, the spoon face of one side is pressing against the water, while the opposite and returning blade is feathered and cuts edgewise through the air. A paddle constructed for feathering with the right hand has a reversed 90 degree relation of blades from one designed for left-hand control. The control hand maintains a firm grip on the shaft most of the time, while the other hand permits the shaft to turn in its loosened grip when the blade is being feathered on its return for another stroke (see Figure 3).

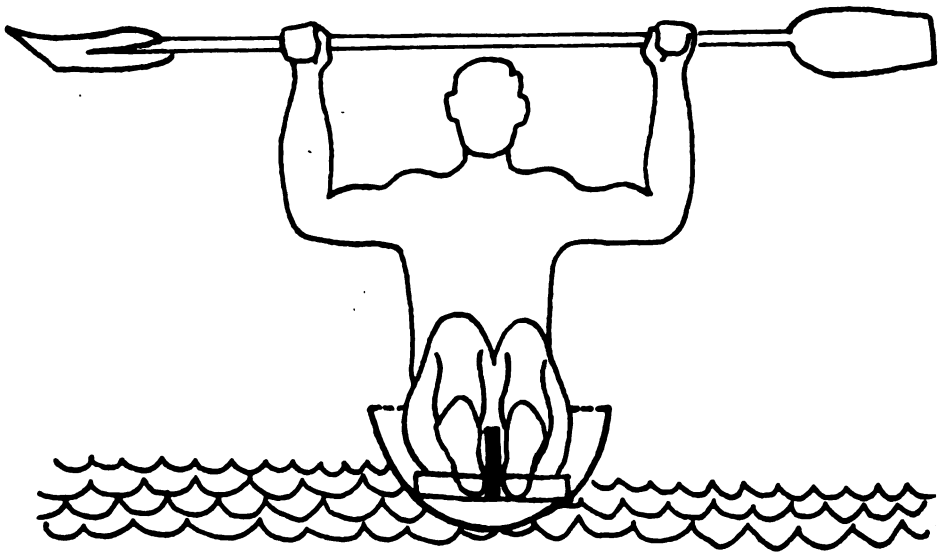


Figure 3.--Hands position with a K-paddle.

Double-blade paddling appears deceptively easy. A new paddler often does very well without instruction, learning enough by observation to make paddling a pleasure. His mistakes are not very noticeable and do not interfere very much with satisfactory progress over the water. A new man is introduced to racing by putting him on the water in a canoe or touring kayak with a double-bladed paddle. He feels a welcome sense of security due to the lower center of gravity of the sitting position as opposed to half kneeling in a single-blade paddling, and particularly with the broad beam stable feature of a canoe or touring kayak. Moreover, he has simple control of direction through the symmetry of movement and alternate side paddling. Before permitting the athlete to use a racing kayak he should train himself for balance (see Figure 4)(11, July, 1960).

Double-Blade Paddling Technique

German Technique

The basic principle of German technique is: the stroke does not start in the shoulders, but in the hips. The movement runs from the hip muscles over back and chest to shoulders and on to the upper and forearem. The body-work is supported by corresponding legwork; the leg opposite to the pushing hand is stretched in rhythm with the stroke and the foot is pressed against the footrest.

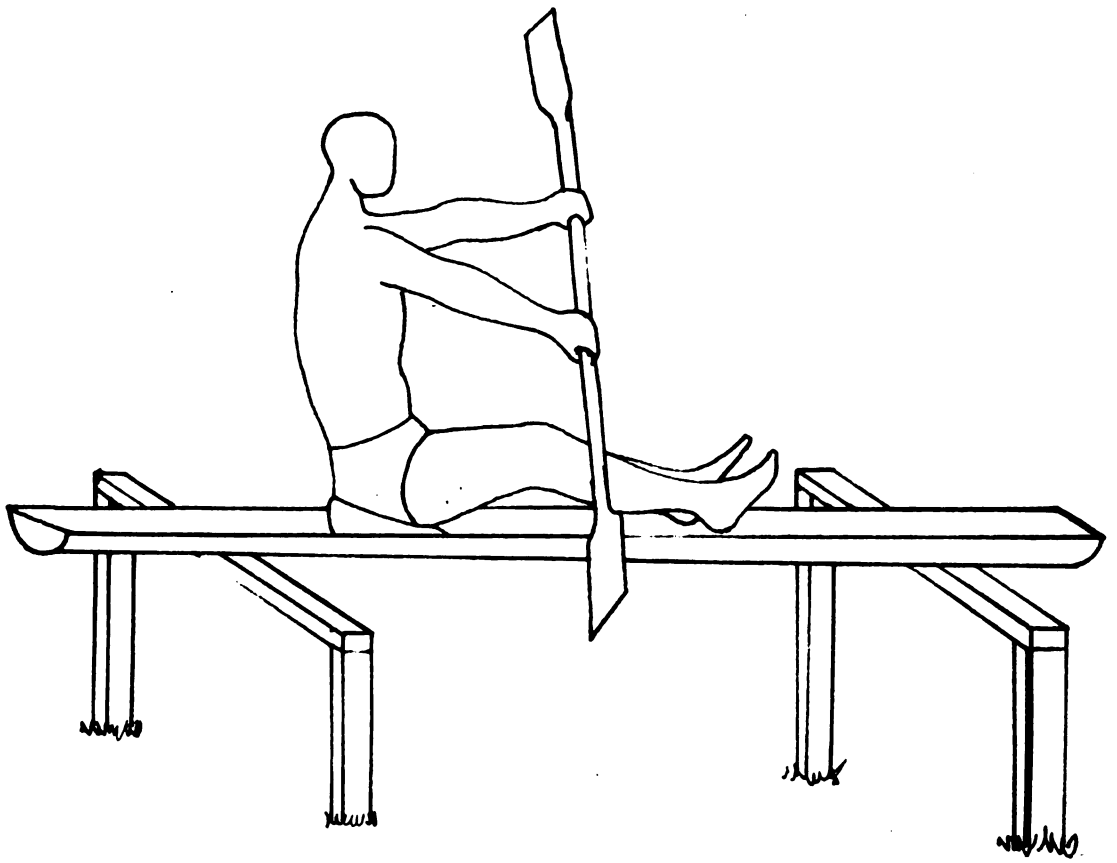


Figure 4.--Balance trainer.

1. Sit upright in the boat.

Do not lean forwards or backward. Do not pull up the shoulders--let them hang loose. Do not look into the cockpit or to the bow: this tends to endanger the straight running of the boat.

2. Legs should be slightly bent with closed knees and heels while the toes point outwards.

Do not press the knees against the washboard.

3. The work of the body starts by moving the hip in the direction of the first stroke--at the same time sway the shoulder in a forward and downward direction. Simultaneously with this movement the hand brings the paddle forward at eye level and in a straight line in the direction of the gunwale.

The hand must not keep too tight a grip around the loom of the paddle. Hold the paddle loosely between thumb and forefinger. The paddle has no joint, and if you hold the paddle too tight, the cramped movement will in due course lead to strained muscles in the forearm.

The back of the hand forms one line with the forearm.

Do not lift the elbow--keep it as low as possible.

Do not move the hand in the direction of the centre line of the boat.

Don't forget: at the beginning of the turn of the hips the trunk of your body must be upright.

4. When the arm is straight, bring the hand with the paddle straight down. Just before the blade (which is still

horizontal) dips into the water turn it by a quick 90 degree flick of the wrist of the other hand.

Do not turn the blade at the beginning of the stroke.

No matter which way the paddle is feathered, the turning of the blade must always be done with the hand which pulls opposite to the stroke.

5. The blade must be dipped into the water smoothly and not with a splash and just outside the wave which runs from bow to stern. The blade when entering the water must be vertical. If the blade enters the water too closely to the boat, the paddle tends to make, in the first and last quarter of the stroke, a slight semi-circle which changes the direction of the boat with a reduction of speed.

6. Now the pulling hand grasps the paddle firmly and moves it in a straight line backwards. The blade must remain in the water, fully covered, until the end of the stroke.

The stroke is carried out in the main with a powerful pulling movement from the hip and shoulder muscles. The stroke ends level with the hip or at the most three inches after the hip.

Do not use the elbow to lift the blade out of the water. In the meantime the other arm and hand have been brought into the starting position, and a proper start of the next stroke lifts the blade automatically out of the water. Using the elbow brings the paddle into an unfavorable starting position for the next stroke.

Do not move the blade too far back. If the elbow is brought behind the body, the mechanics of the stroke result in breaking the speed and the remainder of the movement remains without any effect whatsoever.

This description of the German technique was done by Werner Boehle (Germany) member of the I.C.F. paddling racing committee (6; 1960, 61).

Swedish Technique

The new technique was first introduced in 1938 by Karl Wilmark. His technique is based on the idea of letting the paddle do its work, in a way, underneath the hull so as to reduce as much as possible the sheering effect of each stroke. This method creates a very high stroke and a slow striking rate--a technique which looks very easy, but is actually very tiring and requires well trained shoulders since with each stroke the arm has to lift the paddle high over the head. From the starting position over the head the blade enters the water with such a powerful blow that the water splashes into the competitor's face.

> This was the origin of the Swedish style. The high stroke was to a certain extent maintained later, but in due course the driving momentum was transferred into a more swinging movement, the back was brought into play through a swaying movement from the hips and the stroke was lengthened by proper stretching of the pushing arm.
>
> This technique was adopted practically in all countries from the forties onward, with the one proviso, of course, that most top paddlers developed, to a varying degree, their own personal style. One can hardly claim that Frederiksson has used it very

> much though certain elements of it can be found even in his paddling--just as was maintained that in Szollosi's highly personal technique one can discover some elements of the new technique. This is characterised by a low seat, short paddle, long stretched-out and low stroke in which the driving force lies in what I have called short, quick pushes like "upper cuts" in which the whole body sways to and fro.

The description of the Swedish technique was done by Leif Anderson (Sweden) (6; 1960, 61).

Hungarian Technique

The normal Hungarian paddling technique is as follows:

1. The body position is approximately the same as described by Werner Boehle--except perhaps the Hungarians lean their body more forward in an approximately 10^{o} - 15^{o} angle. The right arm is stretched, the blade is at right angles to the longitudinal axis of the boat and close to the hull, the left hand is above the shoulder and the body is turned to the right and the right knee slightly raised. The paddle enters the water quickly.

2. The pulling arm pulls the blade close to the hull while the left arm pushes the paddle at eye level until approximately the center line of the boat. The work of the arms is supported by a turn to the right of body and shoulder--at the same time the right leg is being stretched and the left knee raised (just as in cycling). The leg work supports the work of body and shoulders.

3. The paddle is lifted out of the water when the left hand has reached the hip line.

4. The right hand goes up, the blade is turned and moved up to the shoulders while the left hand reaches the starting position.

Of course, individual paddler's adjust this technique to their own requirements.

The description of the Hungarian technique was done by Istvan Granek (6, 1960, 61).

Technique Is Not Enough

However, technique is not all, says Istvan Granek. "Even the most perfect technique must remain uneffective if not combined with fitness and strength," and Leif Anderson concludes in agreement: "Technique is not decisive. All the competitors whom I have mentioned have shown that they could reach the top no matter which technique they adopt" (6, 1960, 61).

Basic Position to Single-Blade Paddling

The racing fraternity single-blades on one knee because it allows a longer, more vertical stroke, and there is freedom to rotate the body through a longer arc. The canoe wobbles around freely under one knee, trimming itself to the least wetted surface and streamlined plane, especially in rough water. Use the knee on your paddling side; turn your back foot pigeon-toed so that a broad area of your knee supports your weight. Kneel erect, head up, chin over kneeling point, and face slightly diagonal to the keel with the shoulder opposite the kneeling knee turned forward.

Keep little weight on the front foot except as needed for balance or when pressing sideways to sweepstroke. Pressure on your back foot tips the canoe laterally and is a great annoyance to a crew (tandems and fours).

A one-man single-blader places his knee directly over the keel. For crew work the men kneel closer to the gunwale. This separates the men laterally, permitting a crew to kneel so that each following man can cross his front leg over the back leg of the man in front. This position allows the stroke-path of each pair to reach almost as far fore and aft on one side as the other. Close proximity is best for trim, timing, control of direction, and to nullify to some extent the normal tendency of the stern man to turn the canoe (11, July, 1960).

Czechoslovakian Technique

The significance of this technique is that the whole effort is done in a pulling position. The athlete leans forward from his waist and his knee bends a little. His hands push the paddle down into the water and pull it back. At the beginning of the pull the body straightens up, the supporting leg stretches out and the arms are straightened. When the paddle gets close to the body the pulling and pushing arms bend. During the recovery both arms lift the paddle out of the water and they are ready for the next stroke.

Canadian Technique

The Canadian technique is based in the strength produced in hip and shoulder rotation during the pulling and pushing movements. At the beginning of the stroke the pushing arm is straightened and the pulling arm is bent at the elbow and both arms are involved in pushing down the paddle into the water. The pulling of the paddle harmonizes the hips and shoulder rotation with the pulling of the bending arm and the pushing forward of the top arm. During the recovery the pulling and pushing arms lift up the paddle in front of the body; the pulling arm reaches forward and the top arm comes close to the shoulder with an elbow bend. In other words, this is similar to one cycle of the kayak paddling technique. The body stands still during the stroke; only the upper part of the body moves, the hip and the shoulder turn sideways. The arms pull and push the paddle only during the stroke. The recovery starts when the paddle has passed the kneeling leg. So the paddle stays longer in the water than with any other technique, and the number of strokes per minute is reduced.

Modern Technique

Today the hip and shoulder rotation technique, the waist bending technique, or a combination of the two are used. Between the two canoeing techniques there are no major differences. With the hip and shoulder rotation technique the center of gravity is stable and the boat

glides on the water. In the waist bending technique, the center of gravity moves forward and backward (at every stroke); therefore the boat bounces on the water. One of the main advantages of this technique is that all the body muscles are involved in every stroke. Some athletes, in short distance racing, use the waist bending technique from the start up to 200 m. and for the next 500 m. they use the hip and shoulder rotation technique. For the last 300 m. they switch back to the waist bending technique. They use the hip and shoulder rotation technique to speed up the boat at the start and at the end of the race. All the body muscles are involved in the strokes and this will help increase boat speed. In Europe the canoe builders especially design the boat according to the technique used by the paddler so as to avoid bouncing particularly when the paddler is using the waist bending technique.

Description of the Two Paddling Techniques

One centers on the force produced by the hip and shoulder rotation and the other on the bending of waist and the straightening up of the body; both will move the canoe forward. The two paddling techniques allow enough freedom to develop your own paddling style.

The Hip and Shoulder Rotation Technique

This technique is recommended for tall athletes with a well developed upper body and large, strong muscles. This

paddling technique relies upon the pulling and pushing of the arms and the rotation of hip and shoulder.

The Kneeling Position.--In the C-1 boat, the athlete kneels amidships on the keel. The body is perpendicular to the direction of the boat; the kneeling thigh is in line with the body and the kneeling foot is placed at a 20° to 30° angle towards the side of the boat. The front foot is resting on the platform and is pointed toward the paddling side.

In the C-2 boat, you kneel closer to the side of the boat. The closer the athlete is to the water, the more power he can produce. The body is straight forward in the direction of the boat. The distance between the two paddlers is greater than usual because this technique requires more room for the recovery. The legs' position is the same as in the C-1.

The Waist Bending Technique

All the body muscles are involved in moving the canoe. The technique is designed for weaker paddlers due to the fact that there is no special group of muscles involved to move the canoe. The heavier athlete in the C-1, with an especially designed canoe can use this method and obtain very good results.

The Kneeling Position.--In the C-1 boat, the athlete kneels amidships and the body is turned slightly to the

paddling side. The thigh of the kneeling leg is in line with the body and the lower part of the leg is placed at a 45° angle on the side of the boat and the foot is placed in the footrest. The front leg is stretched forward and the foot is pointed toward the paddling side and resting on the platform.

In the C-2 canoe, the paddlers kneel to the side of the boat and the leg position is the same as in the C-1.

Summary of the Waist Bending Technique

All the muscles of the body are involved during the stroke. The athlete catches the water with a great force and he puts his whole weight on the paddle at the beginning of the stroke. The athlete using this technique does not care about the smooth movement of the boat, but he concentrates on the strength and speed of the stroke to shoot the boat forward. The boat's bouncing movement occurs because of the displacement of the center of gravity. This technique is highly recommended for short distance races.[2]

Methods of Changing Direction

There are three principal methods for changing the direction (or keeping direction) in a race. They are the hook stroke, the push-over and the draw stroke.

The "hook" is a corrective wedge action applied to the last third of a regular stroke after the paddle has

---

[2]Personal traduction from Granek, Istvan; Kajakosaskenuzas, Budapest, 1966.

been pulled beyond midship. It is intended to compensate for the deviation caused by paddling on one side. It is a continuous smoothly executed stroke which moves the canoe forward and at the same time applies just the proper amount of effort to pry the stern over and cause the bow to aim back on course. The hook-stroke is pulled through vertically, especially in the lateral plane. The top hand is extended out over the gunwale and the blade is even paddled under the hull. The wedging is done by turning the top hand so that the thumb points forward. This rotates the blade so that its inside edge moves rearward and outward. The wedge is started gradually when the lower hand has passed the hip. Hooking too soon will move the whole canoe sideways. An extreme hook is performed by actually levering the paddle across the gunwale by pulling the top hand in and down over the keel. The recovery is made by guiding the paddle into skimming attitude with the top hand and whipping the paddle forward above the surface of the water.

Make use of the wind and waves and trim your canoe to avoid hooking. In crew work the bow-man reaches more forward than normal and may push over stroke whenever the stern-man hooks. Corrections are initiated by each paddler strcking further forward or aft as required. The stern-man who normally paddles the canoe around to the other side, begins and ends his stroke forward of his usual place and the bow-man aft of normal. This minimizes the inherent weakness of staggering the power in crew paddling. When a

choice is available the least retarding means is used to control direction. When paddling alone, reach out and draw the bow into the desired direction, continuing into a hook stroke. In practice, always support one action by the other, the degree depending on the magnitude of the change in course. In racing, the paddler uses sweeps, draws, push-overs, and hooks in minimal amount, in order to substract as little as possible from forward speed.

Pushovers, or as racing paddlers refer to them, "paddling wide," are used by a bow man to complement the hook stroke (by a stern man) when an extreme change in direction is required. The paddle is thrusted into the water as close to the hull as possible and is swept outwards as the paddle is pulled through. The effect is to push the bow sideways.

Draw strokes are performed by thrusting the blade into the water at arms-length distance from the gunwale, with the blade parallel to the keel, and drawing in to the gunwale. Their main application is at the starting line and during landing. They may also be used in modified extent in moving the bow or stern sideways during a race. The top of the paddle must be held out over the water and the lower arm extended so that the paddle is vertical at the start. This is maintained as nearly vertical as practicable during the draw. The recovery is made over the surface by knifing the blade out toward the stern and then swinging it into the next draw. For an underwater recovery, the top hand turns the

forward edge of the paddle away and the paddle is knifed back and turned into position without removing it from the water.

Draw and sculling strokes are used to move the entire canoe sideways, principally at the starting line. In sculling the blade is held, as for the draw stroke is concerned, and moved fore and aft, vertically, in the same path (like a vertical windshield-wiper) at right angle to the direction the canoe is to be moved. To move sideward, present the blade at a 45° angle to the keel, and move it in three foot lines parallel to the keel. At the end of each stroke the blade is turned with the top hand so that the inner edge becomes the outer edge. The pressure is always applied on the inside face of the paddle. To move back sidewards, the procedure is reversed and the pressure is applied to the outside face of the blade so that the paddle will move in toward the gunwale. To move sideward in crew work, one paddler does the opposite side-paddle stroke of the other. When one partner draws, the other pushes over. When one sculls forward, the other sculls in a reverse manner. To pivot, each paddler does the same stroke on opposite sides of the canoe since one is forward and the other is aft of center (11, July, 1960).

CHAPTER VI

SCHOOL PROGRAM

The History of Riverside Paddling Program

The Mississauga Canoe Club embarked upon a school program two years after its inception. The club was limited in its quantity of equipment, space and members; and had failed to gain a point at the Canadian Canoe Championships in the junior and juvenile divisions.

To create an interest in paddling in the area the M.C.C. turned over all of its equipment, without charge, to Riverside Public School. By using a war canoe, one instructor was able to teach the basic skills of paddling to fourteen boys at a time. Two teams were created of fourteen boys to a team, selected from grades seven and eight; one group paddled in the morning before school and the second paddled after school (see Picture 1).

By the end of June, thirty boys were able to paddle, with varying degrees of efficiency, and paddling was gaining in popularity with some of the boys. More than half of the group left the school system to go to a High School which had a rowing program and were lost to paddling. As a result of a lack of organization and coaching help at the club level, little use was made of the young paddlers the first

Pic. 1.--This is a fourteen-man war canoe, plus a captain or coxswain. This boat is 30 feet long, 36 inches wide, and has a minimum weight of 190 pounds. (Lachine Racing Canoe Club)

year but in spite of this, three boys were found to be still involved in paddling five years later, to the extent that they were winning at the National Championships.

The following year the program was resumed in the fall, and, whereas during the first year the sport was introduced tc a group totally inexperienced in paddling, the second year began with a nucleus of semi-skilled paddlers. By the end of the school year, the boys were introduced to singles, tandems and fours (see Picture 2).

The Mississauga Canoe Club appears to have intensified its interest in the juvenile age bracket at this time. A great deal of stress and time was put upon the team and three boys were taken directly from the school program, to round out the club crew. Mississauga success that year at the Nationals in the juvenile races added impetus to the school program. Members of the winning juvenile crew turned out at the elementary school in the morning on their way to school and after four each day. The program was then reorganized on a team basis with the High School boys acting as team leaders and trainers for their own crews. This practice greatly increased the number of students which could be put on the water so the program was extended to the grade six level. With the added assistants the school instructor was able to give more individual attention to those who were experiencing difficulties and to those who showed exceptional ability.

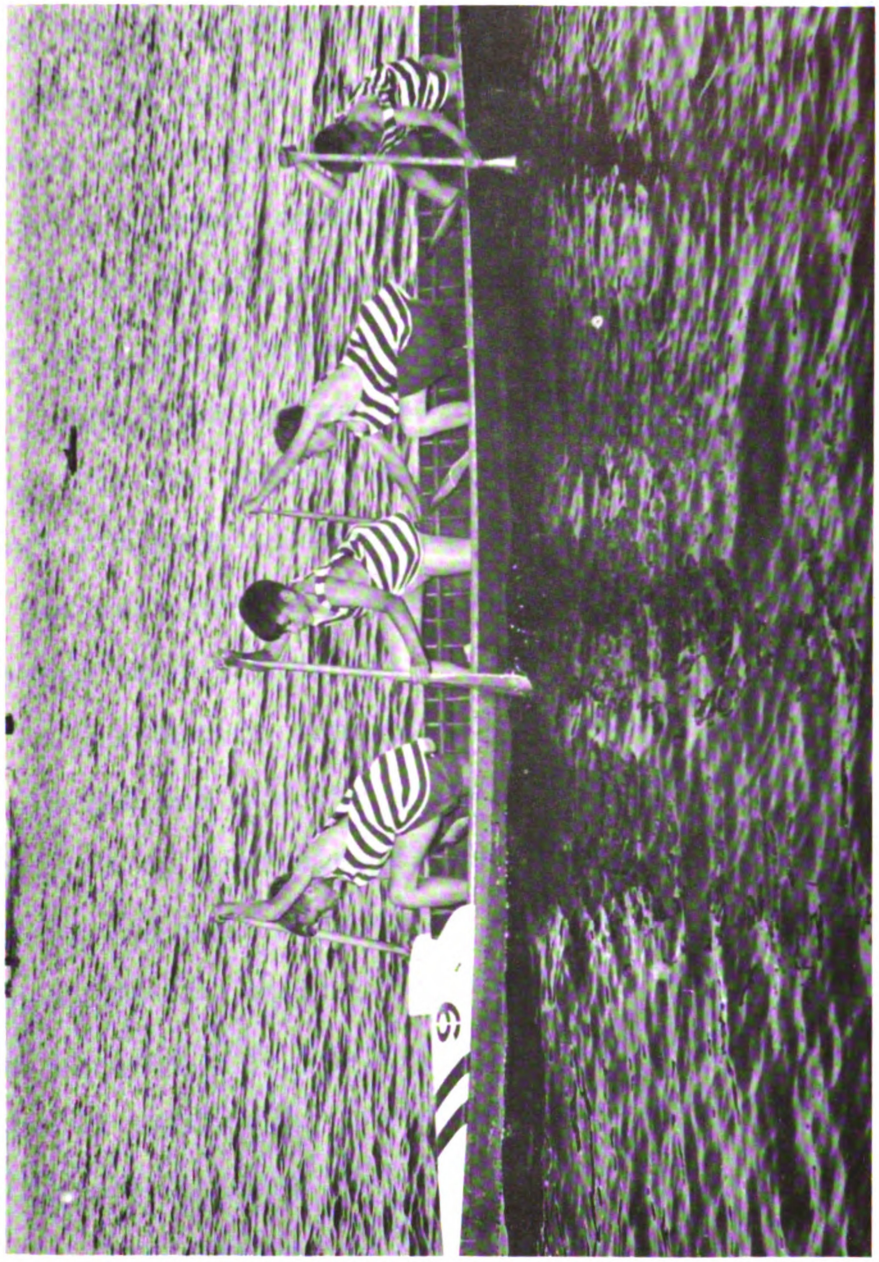


Fig. 2.--A four-man crew paddling with single-blade in the 20 feet long, 30 inches wide, 10½ inches deep boat and has a minimum weight of 70 pounds. (Lachine Racing Canoe Club)

Several other advantages were to be reaped from the use of older boys. Apart from greatly increasing the number of participants, this system created a competitive spirit among the teams which spurred the boys to greater efforts and thereby turned them into polished performers in a much shorter time. A valuable by-product was the creation of a group of younger paddlers who were capable of assisting the coaches at Mississauga and who, in some cases, have now become part of an expanding Mississauga coaching staff.

The team system made it possible for the school to stage its own regatta at the close of the school year. This event did much to increase the interest in the sport both on the part of the pupils themselves, but also there was an aroused parent interest.

The M.C.C. continues to dominate the juvenile division in Canada and now the positions on the team are completely occupied by graduates of the Riverside School Program. Every spring and fall a paddling program is organized at the school level, which culminates in a school regatta at the end of June. We believe a paddling organization has been created which will insure an abundance of talented youngsters for years to come (14).

The physical educator should use school facilities and apparatus to introduce paddling in his physical education classes (see Figures 5 and 6).

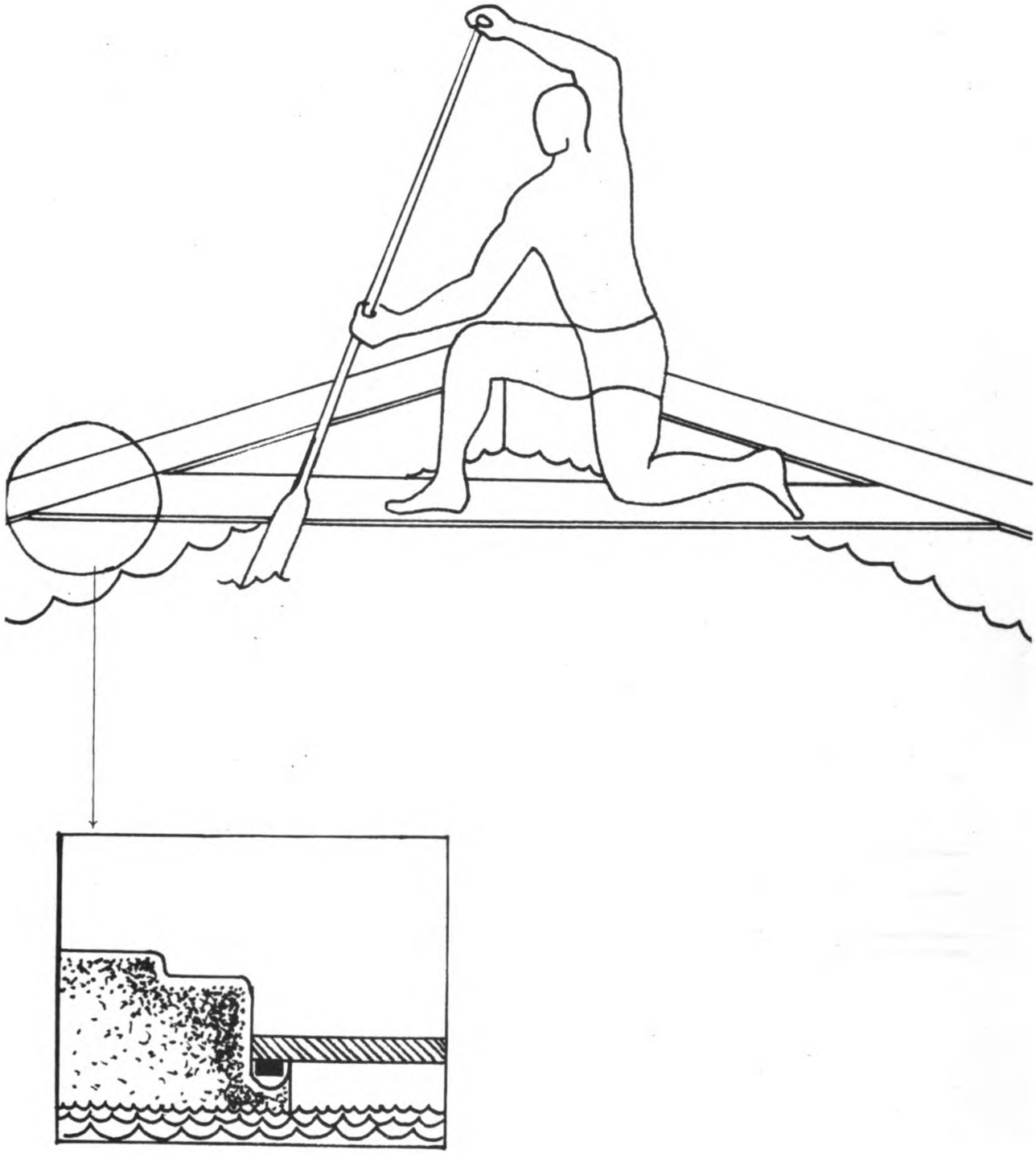


Figure 5.--Corner of swimming pool.

Requirements for a Paddling Program in an Elementary School

A body of calm water

Proximity to a canoe club

A teacher with a background of pleasure and competitive canoeing

Access to club equipment as well as club members to aid in the training

The backing of the school board

Medical examination

Paddling--An Elementary School Physical Education Program

Advantages

Outdoor activity

Strenuous muscular activity

Builds endurance and strength

Pupils acquire a useful skill (carry over to later recreation)

Pupils are instilled with good water safety habits

Instructor has direct control in the initial stages (the 14 man war canoe)

Paddling can be initiated at an early age as the equipment is durable

Teaches teamwork

Provides avenues for the individualist

Both girls and boys participate

Provides possibilities for correlation with geography and science.

Contributes to the leadership ability of the graduates of the program when they return to aid in the development of younger paddlers (14).

Layout of a School Program

It is very important to explain to all students the prerequisites and the rules regarding canoeing. They should be posted. Also a canoe sketch with the different parts that will help the student to learn the technical terms.

Personal security and rescue.

The student must know several ways of escaping from bad situations and ways to rescue.

Conditions

a. During practice on water there should always be a rescue patrol.

b. The student should know the elementary principles of water safety.

Prerequisites

a. Know how to swim (endurance).

b. Know what to do when you capsize.

1. The student should learn how to carry, launch, board, disembark the canoe.
2. The student should possess the ability and good judgment before having the responsibilities of a canoe.
3. He should know the canoeing techniques.
4. He should know how to take care of a canoe.

Note: Reference books which will be useful in teaching canoeing: American Red Cross, Canoeing, New York: Doubleday & Company; Skilling, B. and Sutcliffe, Canoeing Complete, London: Nicholas Kaye.

CHAPTER VII

MODERN THEORIES ON TRAINING

Training

It is important to distinguish between practice and training. Practice is to develop skill. The skill requires for canoeing. Training is to develop strength endurance and the other factors that make for stamina (capacity for enduring). You practice the canoeing stroke, but you train to develop strength and endurance. Practice produces changes in the central nervous system which last a long time whereas strength and endurance result primarily in more temporary changes in the muscles and circulatory system. You learn how to paddle once in your life but strength and endurance must be redeveloped each year (19, p. 323).

Three Kinds of Muscle Contraction

Muscles work by contracting in three different ways, as follows:

1. Concentric (con=with or together, centric=center) when the muscle shortens: its ends are brought together.

2. Eccentric (ec=away from) when the muscle lengthens: its ends go away from the center as when one lowers his body while hanging by the hand.

3. Static or isometric (iso=same, metric=length) when the muscle holds or builds up tension without shortening or lengthening.

Isotonic contraction is not the opposite of isometric. It means same tension. Whenever the tension or pull of a muscle remains unchanged it is isotonic. This can be during concentric, eccentric or isometric contraction (19, p. 323).

This layout on kinds of muscle contraction is to introduce the isometric training method for canoeing.

Isometric Paddle Action

First Day

Hold position number one (start of stroke for 5 seconds--rest 10 seconds--hold again for 5 seconds--rest 10 seconds, and repeat twice more for a total of four holds at 5 seconds. Then move to position number two (one quarter way through stroke) and repeat this procedure--four holds of 5 seconds, with 10 seconds rest between. Do the same for position number three (at point three-quarters way through stroke). Repeat again at fourth position (about 6 inches before your recovery point). Between positions--rest 60 seconds to recover from the tremendous pressure you are applying. Total contraction time all over--80 seconds for C-1 and C-2 paddlers. 160 seconds for K-1 and K-2 paddlers who do this for both sides.

Second Day

The procedure is quite different. You take position number one, hold your maximum contraction for 20 seconds, then rest 60 seconds and move to position number two. Hold position two for 20 seconds, and rest for 60 seconds. Do the same for positions three and four. Now go back to position number one and follow the same procedure with the exception that the holding time is now 15 seconds. Repeat this procedure using a 10 second hold for the contraction time. Total contraction time over all--180 seconds.

Note: The second day's isometric paddle action is repeated as indicated in the program for a day's total of 360 seconds of contraction time. K-1 and K-2 paddlers do only one side during the first session and the opposite side for the second.

Remember C-1 paddler: On every second hold in positions three and four, duplicate a steering position to bring into play the exact muscles used in this movement. You will have to set up an angled grip for your blade area to accomplish this (12).

Overload, Not Isometric Contraction, Counts

A muscle will grow in strength whenever it is overloaded whether in concentric, eccentric or isometric contraction. Overload is any work of greater than usual intensity. Many studies show that a muscle grows in size and strength only when the intensity of the work required of it

is increased. It takes overload to make a muscle grow. Isometric or static contraction is just one way by which overload may be attained. Müller and Hettinger, a ten year study, led to the conclusion that a contraction equal to 40% of maximum, held for 6 seconds once a day, made muscle strength grow as fast as it can grow. A 100% maximal contraction held for just about one second did the same thing.

Apparently, the holding time should be about 10% of the full time that the load in question could be held. Because isometric contractions are quick and convenient ways of overloading, this does not mean that other forms of overloading are not equally effective, and perhaps for training in various sports even better suited (19, p. 323).

How Can Muscles Be Overloaded

Overloading to develop strength as a part of athletic training may be considered under three headings.

1. Formal Overloading.--Weight training and heavy calisthenics are examples of what I choose to call formal overloading. Such activities can be used to strengthen any muscle or muscle group. They are easily described and graduated. They are effective to the extent that they develop the muscles that are important to the sport and do not increase inordinately the size and weight of muscles inappropriate to the sport in question. Corrective or adapted exercises are generally of the kind that are here called formal overload.

Some uses of isometric contraction also belong here. Coaches have devised pushing against immovable door posts, stemming into various forms of rigid harness, spanning the body on the floor between knees and fingertips with forward stretched arms, etc., as ways of overloading (19, p. 323).

2. Functional Overloading.--It is to designate activity that overloads the movements used in the sport. If in canoeing you would use three paddles, you use the regular paddle adding lead bars to the shaft about four or five times as heavy as the paddle or you add weight in the boat. The first and second are overloads and the process is training. The standard weight object is used to develop skill. This is practice. Probably our greatest mistake is that we like to practice and forget to train throughout the season. One way for functional overloading in canoeing is to build your own isometric rack out of old lumber. It should be added that speeding up any movement is itself a form of overload.

3. Self Resistive Exercise.--This is displayed whenever one group of muscles is used to resist another; both groups may be simultaneously overloaded. This may or may not result in movement.

Such exercise has several advantages. It is safe because there is no weight to fall on the trainer and the amount of exercise is completely under his control. It takes little space for one to do it. Obviously, it is the

only kind of muscle strengthener adapted to weightlessness in the space world of tomorrow.

Important. One warning is in order. The breath should not be held with the glottis closed lest the increased intrathoracic pressure create a Valsalva effect. This results whenever the chest pressure is greater than the pressure in the veins that bring blood back to the heart. Thus deprived of blood, the heart has none to send to the brain and fainting results. The same caution holds equally for any strength effect that involves breath holding.

This part of the work deals entirely with strength and laws governing its development. Fitness, even physical fitness, is much more than strength. The problematic, flexibility, agility, skill, and endurance are important ingredients of physical fitness. Some of these depend in part on strength, but the development of each follows also other laws (see problematic) (19, p. 325).

Annual Training Program for Canoeists

The strongest nations in canoe and kayak sports have been preparing their athletes for international competitions for years by rigorous, methodical and precise training. All those nations, who in the past ranked highly in international races, are now hovering near the bottom of the champions' list, simply because their training methods have not been brought up to date in a rational and modern manner, i.e., those training methods which are rigorous and methodical and

which are developed progressively and last for the whole year. (For example: in kayak sports--Austria, France, Finland; in canoe sports--Canada, U.S.A., Austria, France, etc.)

In our sports discipline, the strength of individual nations should not be judged on the basis of the accomplishments of one exceptional athlete (for example: Sweden's Fredrickson, Finland's Stronberg, Belgium's Van der Moere-Verbrugghe pair, France's Gantois, etc.) Judgment should be based on the results of the combined efforts of all the participants at an Olympic competition or, better yet, at a World or European Championship game.

Therefore, these days, it is necessary to prepare oneself for international competition in the most methodical and scientific manner possible, is proved by the accomplishments of the athletes of the presently strongest nations in kayak and canoe sports.

At one time, Sweden and Finland, by using a severe training program in comparison to other nations, ruled uncontested. The program used by these countries was long and intensive training in boats in the summer, and in winter skiing on varied terrain.

The training program used by the above mentioned countries was considered, by others, as excessively rigorous. Some even went as far as to express themselves as follows: "It is humanly impossible to withstand such

rigorous and heavy work, both winter and summer, without prejudicing the athlete's health."

Others, however, were induced to commence studies on the subject in order to prepare a training system no less rigorous than that of the Swedes and Finns, and even more scientific.

Therefore, today we find that the Finns and Swedes, who believed their system to be perfect and therefore did not bother bringing them up to date, have not progressed, whereas other nations, having invented newer methods, have not only caught up, but, in some cases, have surpassed by far those who were considered unsurpassable.

Today's Most Rational Type of Training

Today's most rational type of training is based on a principle of gradualness, i.e., that the organism must be prepared for the achievement of certain objectives, established in advance, by way of methodic exercises, regular and progressive over a period of years, but with diverse methods of training, whether theoretical or practical, scientifically set up, to render the athlete or crew physically fit for the specific training, at a higher level which is the one that takes place at "intervals."

Naturally, the intensity of the preparatory work must be measured, keeping in mind the age and physical fitness of the elements on hand.

The improvements in speed that have been obtained in these last ten years in our sport can be attributed exclusively to the major intensity and severity in training, while technique has not improved and, if anything, has become worse.

The reason for this would seem to be that the trainers, as well as the athletes, find it more convenient to exert themselves toward obtaining more immediate results rather than to concentrate on improving their style, since the latter requires a great deal more patience. Needless to say, that is not the best way.

Every year, during international competitions, speed is notably improved by athletes of those countries where, for a good many years, work-outs have been based on the most modern training systems.

We must no longer hesitate either: we must definitely break away from inferior training systems which no longer bring desired results. Our little, but game, group had begun to work definitely in the right direction, before the Olympics, and while their work met with many obstacles, its effectiveness was demonstrated during the Olympics and confirmed later in the Italian Championship Games.

In order to arrive at the best results in the future, we must develop a more intensive training program on the widest level. By constructive criticism, we must establish

the basis of these modern methods, which cannot help but be fruitfull.

Canoeists demonstrate, during a race, abilities as to technique and tactics, acquired during a whole year's work.

The training program for a whole year must be prepared in advance. The methods applied must be selected in such a manner as to help the athlete reach maximum efficiency right at competition time.

Top form should be assured for the most important sports event of the year in which one intends to participate. An athlete, prepared during the course of the year by multiple and efficient training, can keep himself in top form for four to five months without much difficulty.

General Rule

The intensity of training must be increased gradually and, in the course of training, it is necessary to go from the simpler exercises to the more complex. The annual program is divided in periods having different characteristics and aiming at different objectives. In kayak and canoe sports we can differentiate between four principal periods. These main periods unite to form a tight relationship: their boundaries blend and, almost inadvertently, it is necessary to effect the passing from one to the other period, even if the accomplishments, objectives and training methods of each are different.

The characteristics, methods, intensity and duration of training of these four periods, must be selected, or even better, established in such a manner as to maintain, rather than obtain, positive results concerning race distances; above all, it is necessary to develop strength and resistance and secondly to acquire speed and technique. Races organized for 1,000 meter (app. 3280 feet) and 500 meter (app. 1,640 feet) distances are considered short distance races. However, the basis of the preparation for these is the development of resistance and strength.

As has already been mentioned, the annual preparation program for our sport is divided into four periods. Each period may be shifted or changed somewhat according to the prevailing climatic conditions. The various training "methods," which are the most efficient, should be chosen by keeping in mind the local climatic conditions.

The Four Periods of the Annual Program

1. Preparatory period (Jan. 1st to March 31st)
2. Formation period (April 1st to May 31st)
3. Maintaining of fitness period (race period) (June 1st to September 15th)
4. Transitory Period (Oct. 1st to Dec. 31st)
   a. Diminution part (Oct. 1st to Nov. 30th)
   b. Active rest (Dec. 1st to Dec. 31st)

The Annual Program is compiled in writing and must indicate, for each week of the four periods in which it is divided, the number of training exercises, methods of

training and other occupations. In it is reported the canoeing schedule and the dates of other events connected with sports activity (medical examinations, related training, etc.)

A. Annual training methods:

Training in boats
Training on floats (or pontoons)
Training in a gym
Training in outdoor races
Training in swimming
Training in other complementary sports
Training in cycling
Training in skiing (maximum)

B. Lectures (theory concerning regulations, technique, tactics, training system, race evaluation, etc.)

C. Local, inter-zone and national competitions. National, international, world-wide, European or Olympic championship competitions.

D. Medical Examinations

E. Cultural Program.

I. Preparatory Period
(Jan. 1st to March 31st)

The Objective.--The objective is to not only maintain active element of the organism on the basis of the principle of gradually increasing and developing strength, but on the basis of a higher grade of resistance as well.

Training Methods: We refer here to the training methods which promote the general development of the organism. The general and specific development of the organism is promoted by the following methods:

A. Gym Training: In this type of training we can include the following exercises: general gymnastics, specific gymnastics, exercising in pairs, climbing (rope or pole), ability exercises (acrobatic jumping), muscle building exercises (with weights, medicine balls, etc.), games (basketball, volleyball, light rugby), specific individual exercises (exercises to improve limberness, to strengthen arms, legs, and abdominal muscles).

B. Outdoor Training: These exercises may consist of light running for warm-ups, respiration exercises, general exercises, specific exercises, exercising in pairs, exercises in ability, strengthening exercises (on exercise bars, with weights, medicine balls, etc.), on varied terrain, races of 5 to 10 kilometers (3.11 to 6.21 miles), games of 5 to 10 minute duration (basketball, volleyball, soccer or rugby).

C. Swimming Training: (in an indoor swimming pool), may include the following exercises: exercise in respiration, warming-up exercises, light swimming, varied style of 10 to 20 min. duration, rest 10 to 15 minutes, strengthening exercises (with weights or exercise bar), 10 min. rest, swimming for 10 to 20 min. and then diminution exercises.

D. Basic Ski Training: This training must commence with specific exercises to prevent eventual accidents (muscle strain, dislocations). Ski training must be executed on gentle slopes. Light descent is permitted experienced skiers, after training. Finally, light exercises, executed at will.

E. Bicycle Training: Must begin with breathing exercises followed by a 20 to 30 kilometer (12.42 to 18.63 miles) bicycle-race, in regular, medium rhythm and by speed exercises of 1 to 2 kilometers (.62 to 1.24 miles).

F. Training in Sports: Consists of soccer, basketball, volleyball, etc. Of course, this type of training must begin and end with gynmastics and breathing exercises.

G. Exercises in a Training Boat: Helps to acquire the proper technique. Other types of exercises to blend with technique training, are gynmastic strengthening and breathing exercises, ending with a light 15 to 20 minute race.

H. Training in Boats: In this period we must mould the basis of our endurance by daily exercises of 12 to 20 minute duration, to be intensified gradually. At the same time, by harmonious movement, we can acquire a perfect technique. Training in boats, which must begin in March, must be constructed and developed on a methodic basis.

All training exercises must be prepared and executed according to a methodic division in five parts. Among many others, the special training method for our sport is in a boat, but this does not mean that the program and practice employed in other training methods has less importance as far as good and certain results go.

This training program and practice is divided into the following five phases (see outline in Appendix):

1. Introductory.
2. Preparatory.
3. Principal.
4. Gradual diminution.
5. Conclusive.

Instruction in Theory.--It is highly recommended and useful to hold lectures every other week, for an hour and a half to two hours, concerning race regulations, canoeing history, technique and tactics, training, hygiene, sportistic spirit, alimentation, etc., and promoting an exchange of ideas by and with the athletes.

Races.--During the preparatory period there are no boat races. It is useful to organize, among the athletes, sociable competition in other complementary sports. This has a bearing on increased work in complementary activities and trains one for competitions.

During this period, we can organize for our athletes, providing they are physically prepared, outdoor races (of 1000 to 3000 meters, i.e., 6.21 miles to 18.63 miles), swimming races, cycling races, ski races, etc., possibly of medium or long distances, because the object of these races is to measure, or rather, control the amount of the athlete's development and resistance. In order to observe this increase in strength and resistance, we might insert in the training program the following exercises, under the guise of competitions: hanging on handbar, arm muscle flexing exercises, push-ups, weight lifting involving 10

to 15 kilograms (app. 22.046 to 33.60 lbs) or tug-of-war, etc.

Of course, race type exercises must, above all, differ in continuity, quantity and quality. We may also, in proportion to the conditions and equipment, organize for our training program, stamina races, strength of ability and of play competitions. The object being the spirit of emulation.

Medical Examination.--During the month of March, the candidates should be closely watched by the doctor. In this way, at the end of the preparatory period, a clearer picture of the athletes' health may be obtained and one may know with what amount and quality of work any given athlete may continue his preparations.

Culture.--For sports-spirited friendship's sake, it is advisable for the Sports League directors to participate, along with the athletes, in cultural programs, at least once a month, at a theatrical presentation, a concert or at a major sports event, etc.

The Number of Weekly Exercises During the Preparatory Period.--The required training program duration is from 1-1/2 to 2-1/2 hours.

January: The number of weekly exercises.....5
Exercises in pontoons or training vessels.....2
Other types of exercises in proportion
to local conditions.....3
Lectures: once every two weeks.

February: The same.

March: The number of weekly exercises.....6
Training in boats.....4
Other types of exercise.....2
Lectures: once every two weeks.

II. Formation Period
(April 1st to May 31st)

Objective.--Acquiring specific endurance. Developing strength acquired during the preparatory period and increasing general endurance in order to insure special high level endurance. Athletes having neglected, during the preparatory period, some phase of training apart from medium intensity training in boats, must execute with gradual intensity, general exercises, above all for development of strength and endurance.

Means of Training.--The accent rests completely on training in boats, but other types of exercise must be executed as well.

A. Training in Boats: During the first phase of this period, the objective is the acquisition of the highest level of endurance. It is necessary, therefore, to cover, with gradually increasing intensity, 12 to 20 kilometers (app. 7.45 miles to 12.42 miles) daily, keeping in mind, however, automatic acquisition of the right technique. During the second phase of this period, we must execute, already only at intervals, greatly intensive training in endurance and at the same time implant perfect technique.

B. Other Means of Trainings: Allowing for local conditions and level of preparation in training of our athletes, we can, in this program and in this period as well, insert other types of training, executing same, however, with only medium intensity.

Lessons in Theory.--Every other week we hold lessons in theory, possibly discussing matters concerning races.

Races.--During this period the first races take place and the results of these must be examined on the basis of an exchange of experiences; in this manner further training programs must be prepared and preparations continued.

Culture.--A monthly common cultural program is also useful during this period.

The Number of Weekly Exercises During the Formation Period.--The length of weekly exercises is 1-1/2 to 2-1/2 hours.

April: Number of weekly exercises.....6
Training in boats.....5
Other means of exercise.....1
Lectures: once every two weeks.

May: Same as above.

III. Top Form Maintenance Period
(Race period--June 1st to Sept. 15th)

Objective.--Maintenance of specific endurance, of strength and of the good form already acquired and in this

manner not only the building of top form for the more important competitions, but deeper assimilation of details concerning technique and tactics as well.

Means of Training.--The plan of training at intervals is based on exercises divided in short and long distances and other equilibrious games, corresponding to the person's or crew's capacity. During boat training we must also strive to execute exercises for development of complementary movements. This is rendered necessary by the fact that during the specific training period, we execute, in general, the same cyclic movements, or spend the better part of the time with more exertion.

A. Training in Boats: It is more opportune to prepare the training program from race to race, elaborating according to the races in which our athletes participate, individually or in teams, for long or short distances. We must take into consideration: the training distance, intensity, individual or crew technique, race tactics, preparation, development of take-off speed, etc. In accordance with the preceding period, during the course of training, we generally decrease the number of kilometers, but increase the intensity of work. We must bring canoeing technique to the highest level.

B. Other Training Methods: In order to offset the increased intensity of the race period, and the nervous

tension, we must concentrate more on our boat training, alternating it with light gymnastics and games.

Lessons in Theory.--On one of the day preceding a race, it would be opportune to give the athletes a lecture on particulars of the race program, the place, assembly time, and method of embarkation.

After the race, we must, of course, hold a meeting to discuss and evaluate the race. It is essential that best results and the poorest performances be objectively criticized. On the basis of experience gained, we must, for future races, find a way to, generally and individually, correct any errors committed in training, technique and tactics. We must continuously call our athletes' attention to modest behavior, that they may, during races, compete in a sportsmanlike manner.

Races.--During this period we must account for a year's work. In the races only those athletes may participate who meet the necessary physical and technical requirements and who are completely familiar with race regulations. The results achieved in individual competitions must be evaluated keeping in mind the degree of preparedness with which we confronted them, keeping in mind the opponents and all the other circumstances which might have influenced our good or bad performance. Taking all this into consideration it is necessary to evaluate the results of the races and of our work during the year, so that we may decide which

part of our training program, or anything relating to same, had a positive effect and which had a negative effect.

Medical Examination.--About a month before the date fixed for achievement of top form, it is advisable to arrange a medical examination. This usually takes place in June.

Culture.--During this period a collective cultural program is advisable.

The Number of Weekly Exercises During the Period for Maintaining Top Form (or Race Period).--Duration of required exercises: 1-1/2 to 2-1/2 hours.

June: number of weekly exercises.....6
Boat training.....5-6
Other exercise (such as games).....1

July, August, until Sept. 15: as above.

IV. Transitory Period
(Sept. 15th to Dec. 31st)

Divided into two parts:

1. Gradual diminution (Sept. 15th to Nov. 30th)
2. Active rest (Dec. 1st to Dec. 31st)

Objective.--(A) Gradual Diminution Phase: Gradual diminution in quality and quantity of work in relation to the period of intensive strength maintenance. (B) Active Rest Phase: Active rest is necessary, above all, to relax the nervous system. Necessary medical attention should be

obtained during this period (i.e., tonsillectomies, dental care, etc.)

Directors, trainers and athletes commit a grave error during the transitory period, because at the end of the last race or championship competition, they place their boats in drydock and meet again only on the first sunny late spring day. This conception and behavior is wrong. Our grandfathers and fathers trained this way and attained success, it is true, but in those days, the athletes of other nations did likewise. However, there is a great difference between the circumstances and results of today and those of days gone by.

Particularly during the race, preparatory and the formation period, the athlete's body had to withstand a heavy load, while his nerves wavered under tension. A state of extreme physical and nervous tension cannot cease on short notice without damaging the athlete's health. In the interests of health preservation, a gradual diminution program is of the greatest importance during the transitory period.

Newcomers to the crew must be instructed during the transitory period. Owing to the fact that this period is more peaceful, the trainer, with the help of the more experienced athletes, may begin teaching the beginners regularly. If the beginner accomplishes, by working regularly, all he should during the preparation period, we can be

fairly sure that by working diligently and willingly, he will become an athlete of good potential.

Athletic candidates must be selected on the basis of physical attributes required by this sport; it is advisable to not waste time and patience on persons who are physically weak, rejected or considered unsuitable for other sports as these would only weaken the team set-up. Of course, a well-built, strong athlete may be surpassed by one of medium build, but diligent and willing. However, in the selecting, one must consider all the endowments and characteristics of the men.

During the transitory period, the team directors in collaboration with the more experienced athletes, should unfold a large scale advertising and organizing program (in schools, in business concerns, among friends) in order to acquire suitable applicants who truly enjoy this type of sportistic discipline. The amount of work involved in this is sufficiently compensated for by the results.

Training Methods (during the diminution phase).-- Besides boat training, during the diminution period, we can also introduce into our program, all the other training methods, but the general work must be established with gradual diminution in quantity and quality.

A. Boat Training: At the conclusion of the races, we pass into less intensive training on water. In the course of light rhythmic training, based on distances of

15 to 10 and then 12 to 8 kilometers (approx. 9.31 mi. to 6.21 and then 8.69 to 5 mi.) daily, we must pay complete attention to perfecting our paddling technique.

During these exercises, we must try all the technical and stylistic innovations, which appeared the most perfect and economical of all those seen during the competition period. Should we become convinced of their usefulness and advantageousness, we should certainly try to learn and assimilate them perfectly.

Nothing disturbs this training period, which is particularly fruitful owing to the fact that the preparatory and formation period phases, requiring much strength and heavy work, have passed, as well as the racing period with its nervous tension.

One may now take advantage of the rich experiences, so recently gained, in the interests of next year's performance.

B. Other Training Methods: Besides diminutive type boat training, during the course of which one will experiment with innovations, introduction of other practical training methods of lesser intensity are of greatest importance, for the maintenance of physical balance: outdoor training, bicycle training, games, swimming, etc.

Training Methods (during active rest phase).--During this phase we must completely abandon boat training and work only with the newcomers in training vessels and pontoons (see Figure 7).

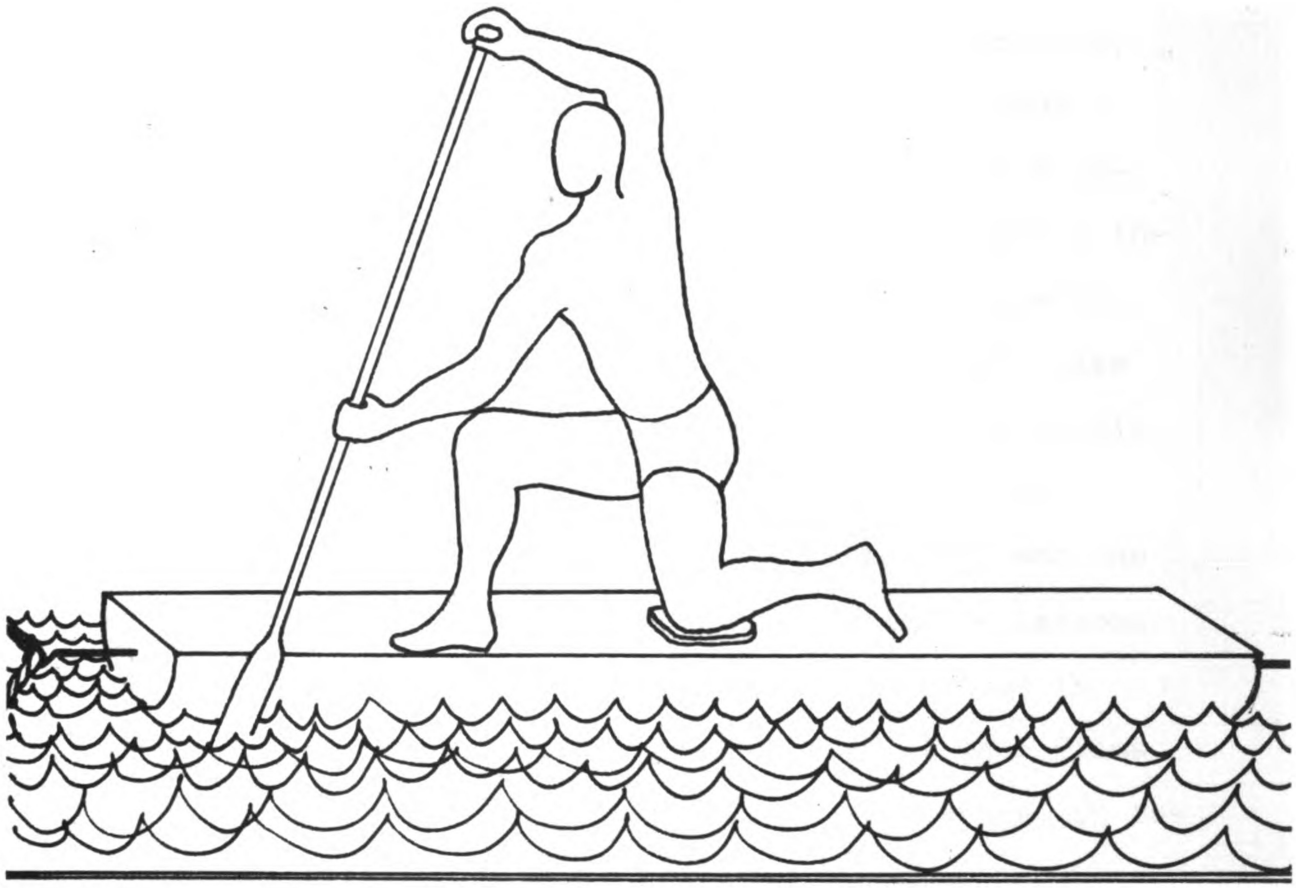


Figure 7.--Training pontoon in swimming pool.

A. Exercises in a Training Vessel (or Pontoon): Instructions in basic canoeing technique for beginners.

B. Other Training Methods: The following training methods, executed with little intensity, as games, allowing for local circumstances are advisable: gym training, swimming, excursions, skiing, games, outdoor training, cycling.

Technical Instruction.--In the course of lectures, we must evaluate, on the basis of relativity, the team's negative and positive accomplishments. We may also individually criticize our athletes' accomplishments during the course of the year. We may praise their accomplishments, but, of their errors, a severe but constructive criticism is required, while a study of betterment methods is developed. Let us examine, from a view-point based on our achievements, tactics, technique and preparedness, and the relief games between nations, and then utilize the lessons learned and let us try and use them to our advantage in our work program of the following year. Let us show films, taken during the year, and let us evaluate the races, on the basis of a technical point of view. The films are most interesting provided each of our athletes has been photographed during the course of the race.

Medical Examination.--During this period, a thorough physical examination is necessary, since this will give us an idea as to what physical condition our athletes are in.

By knowing the results of this examination, we are able to judge the amount of work our athletes will be able to withstand during the coming season, without damaging their health. During this period we must arrange for any required medical care as this will eventually become necessary for the better development of the athlete (tonsillectomies, etc.).

Culture.--During this period, organization of common amusement programs is advisable.

The Number of Weekly Exercises During the Transitory Period.--The duration of weekly exercises is 1 to 2 hours.

Sept. 15th to Oct. 30th: number of weekly exercises.....5
Boat Training.....3
Other exercises.....2

November: number of weekly exercises.....4
Boat Training.....2
Others.....2

December: number of weekly exercises.....2
Others.....2

We have already illustrated the system on whose basis of principles and methods we must build an annual training program for our kayakers and canoeists. I can understand where, to many, this program may appear too perfect, but if we wish to be included among the strongest canoeist nations, we must follow this training program until such time as a more perfect and fruitful system is discovered, which will probably be even more intensive.

With not only a well prepared program, but with a year's work executed in a serious and willing manner as well, we can practically guarantee success and put ourselves on the road to further improvement and development.

Even by using long surpassed training methods, some of our athletes and some foreigners still get excellent results are of a fleeting quality, i.e., not permanent.

We must not allow ourselves to be lulled into believing that, if we use many-sided training methods for one or two weeks or months, our success will be assured. This is an enormous error because, in order to be surely and permanently successful, one must work rigorously for many years.

It is wrong to believe (and to me indicates incompetence) that in order to acquire good performance, it is sufficient to strengthen only one element or conception of the training method, of tactics, technique, the circumstances of the athlete's life, etc. The high development level of some abilities has little importance in the general development scheme, if the rest are allowed to remain too underdeveloped. The whole idea is to develop all of our abilities to the highest possible limit, not just to develop one of them to an eventual high level.

For each of the five phases, in which a training meeting is subdivided, we will give an outline of how same may be carried out.

Water Training Program

1st Phase (Introductory)
(10-20 minutes)

A. The instructor ascertains the physical and psychological condition of the athletes, and

B. Outlines the training program for the day, distance to be covered and the intensity of training.

C. The athletes must ascertain their embarkation efficiency.

2nd Phase (Preparatory)
(20-30 minutes)

Gymnastics and breating exercises (minutes must be indicated). Work-outs in boats for warming up purposes (kilometers or miles must be indicated).

3rd Phase (Main)
(30-60 minutes)

Light exercises (indicate kilometers--miles)
Medium exercises (indicate kilometers--miles)
Heavy exercises (indicate kilometers--miles)

100 meters or 30 seconds
250 meters or 60 seconds
100-200-300-meters or 30-60-90 seconds
100-200-300--200-100 meters or 30-60-90-60-30 seconds
300-200-100--200-300 meters or 90-60-40-60-90 seconds

500 meters or 150 seconds (2 min. 30 sec.)
800 meters of 225 seconds (3 min. 45 sec.)
1000 meters or 270 seconds (4 min. 30 sec.)
1200 meters or 330 seconds (5 min. 30 sec.)
3000 meters or 900 seconds (15 min.)
5000 meters or 1500 seconds (25 min.)
10,000 meters or 3600 seconds (1 hour.)

Exercises in take-offs (about 50 to 150 meters).

Zig-zag exercises with buoys, exercises in overtaking and in following single file, etc.

Favoring the annual period, we should select and combine the distances daily, indicating for each one, the intensity and number of repetitions.

4th Phase (Gradual Diminution)
(10-20 minutes)

Gradual diminution work in boats (indicate distance) approximately 2 to 3 kilometers (1.242 miles to 1.863 miles).

Gymnastics and breathing exercises (indicate minutes).

5th Phase (Conclusive)
(20-30 minutes)

A. Return to boat house
B. Showers
C. Weighing
D. Massage
E. Trainers' observations

A complete set of exercises must last from 90 to 160 minutes.

There is no use here of outlining the other program for those activities:

A. Exercises in training vessel
B. Gym Training
C. Outdoor Training
D. Training in sportistic games
E. Training program in cycling
F. Training program in swimming
G. Training in skiing

They follow the plan as the preceding water training program (9).

BIBLIOGRAPHY

BIBLIOGRAPHY

1. American Red Cross. Canoeing. Garden City, New York: Doubleday, 1956.

2. Broer, Marion R. Efficiency of Human Movement. Philadelphia: W. B. Sauder Company, 1960.

3. Canadian Canoe Association. Constitution, Regatta and Laws of Canoe Racing. Canada, 1964.

4. Canadian Canoe Association. Canadian Paddler 66. Port Credit, Ontario.

5. Encyclopaedia Britannica. Chicago: William Benton, 1965.

6. International Canoe Federation. Bulletins. Stockholm, Sweden, October 1960 to March 1961.

7. International Canoe Federation. Racing Rules. Stockholm, Sweden. *Valid from January 1st, 1966 until December 31st, 1970.

8. International Canoe Federation. I.C.F. Statutes. Adopted by the Congress at Bosön, Sweden, 1946 and amended by the Congresses in London, 1948; Copenhagen, 1950; Prague, 1958; Rome, 1960; Essen, 1962; and Tokyo, 1964.

9. Kalman, Blaho. Modern Theories on Training. Notes from Coaches Clinic at Cartierville Canoe Club, Montreal, 1963.

10. Kraus, Hans. Therapeutic Exercises in Pediatrics, Medical Clinic of North America, 31:629, May, 1947.

11. Lysak, Stephen. Racing Paddling Supplement of American Canoeist, 1960.

12. Mossman, Jimmy, and Percival, L. Olympic Training Program. Toronto, 1964.

13. Pilon, Rene. A Monographie sur le Canotage, University of Montreal, 1964, Unpublished.

14. Renton, Jim. History of Riverside Public School, Paddling Program. Port Credit, Ontario, 1967.

15. St. Clair, Labert. Since Time Began Transportation ...Air...Water. New York, 1933.

16. Schele De Vere, M. Americanism. The English of the New World. New York: Scribner, 1872.

17. Scott, Gladys M. Analysis of Human Motion. State University of Iowa. New York: F. S. Crofts & Co., 1942.

18. Skilling, B. and Sutcliffe. Canoeing Complete. London Nicholas Kay, 1966.

19. Steinhaus, Arthur H. Toward an Understanding of Health and Physical Education. Iowa, Dubuque: Brown Company, 1962.

20. Wallace, Dillon. "The American Canoe," Outing Magazine (June), 1910.

APPENDIX A

FILMS AVAILABLE TO C.C.A. CLUBS AND PROSPECTIVE CLUB GROUPS

FILMS AVAILABLE TO C.C.A. CLUBS

AND PROSPECTIVE CLUB GROUPS

At present the following films are available:

1. C.C. film taken at Lachine in fall of 1965: shows different types of boats, paddling style, and training.

2. C.B.C. film of 1965 C.C.A. Championships at Ottawa, Ontario

3. C.B.C. Film of 1965 North American Championship at Gananoque, Ontario.

Clubs wanting films should contact as far ahead of showing date as possible.

A cheque made out to C.C.A. for $25.00 must come with request. (This will be returned on receipt of film in good condition).

Films will be shipped to club C.O.D. and must be returned promptly. Any cost repairing or rewind film will be deducted from the clubs deposit.

Address: Mr. David G. Findlay - 156 High Street, Carleton Place, Ontario, Canada

(4, p. 2).

APPENDIX B

FOLLOW-UP CHART

NAME: _____ Date of Birth: _____

ADDRESS: _____ Tel: _____

QUALIFICATIONS: 1._____ 2._____ 4._____ Years of Exp: _____

MEDICAL EXAMINATION: Yes __ No __; If yes, when _____

TESTS

Date												
Weight												
Pulse												
Chin-Up												
....lbs. Press												
Sit-Up												
Push-Up												
Pulse												
+5 min. Pulse												

TIMES

Date												
Distance	TIME	TIME	TIME	TIME	TIME	TIME	TIME	TIME	TIME	TIME	TIME	TIME
250												
500												
750												
1000												

RACES

Place	Chat.			Ott-burn			Lachine			Cart.			Gr. Tk.			Eastern			Ottawa		
Nerves																					
Event	1	2	4	1	2	4	1	2	4	1	2	4	1	2	4	1	2	4	1	2	4
Start																					
Weakest																					
Finish																					
Placed																					
Time																					

NOTES:

*Dienstmann T., Pilon R.

APPENDIX C

INTERNATIONAL CANOE FEDERATION MEMBERS

INTERNATIONAL CANOE FEDERATION MEMBERS

Canoeists living or touring overseas can always obtain the latest information on local canoeing from the appropriate national canoeing organization. The list given below is of national canoeing organizations affiliated to the International Canoe Federation.

Australia	Australian Canoe Federation 34 Hardy Terrace, East Ivanhoe, Melbourne
Austria	Oesterreichischer Paddelsportverband, Berggasse 16, Vienna IX
Belgium	Fédération Belge de Canoe, Elisabethlaan 99, Aarschot
Bolivia	Federacion de Canotaje y Remo, P.O. Box 2951, La Paz.
Bulgaria	Fédération Bulgare de Canoe, Boulevard Tolboukhine 18, Sofia. Cable address: Besefese Sofia
Canada	Canadian Canoe Association, c/o Frank Clement, 3210 St. Joseph Boulevard, Lachine, Quebec.
Czechoslovakia	Section Tchecoslovacque de Canoe, Na porici 12, Praha I. Cable address: Sportsvaz Prague
Denmark	Dansk Kano of Kajak Forbund, c/o Allan Jonsen, Lyngvej 26, VI, Kongens Lyngby. Cable address: Dancasport Copenhagen
Finland	Suomen Kanoottillitto, Topeliuksenkatu 41 A, Helsinki 25.

France	Fédération Francaise de Canoe-Kayak, 22 Avenue Victoria, Paris I
Germany East	Deutscher Kanusport-Verband, Storkower Strasse 118, Berlin NO 18. Cable address: DTSB (Kanusport)Berlin
Germany West	Deutscher Kanu-Verband, Berta-Allee 8, 41 Duisburg
Great Britain	The British Canoe Union, 26-29 Park Crescent, London W 1
Hungary	Magyar Kajak-Kenu Svövetseg, Rosenberg Hazasparu. 1, Budapest V. Cable address: Comsport Kajak Budapest
Iran	Iranian Rowing and Yachting Federation, Tehran Kakh-Varzesh
Ireland	Irish Canoe Union, 33 Pearse Street, Dublin 2
Italy	Federazione Italiana Canottaggio, Viale Tiziano 70, Rome
Japan	Japan Canoe Association, 25 Kannami-cho, Shibuya-ku, Tokyo
Luxembourg	Federation Luxembourgoise de Canoe-Kayak, rue Blochausen 21, Luxembourg.
Mexico	Federacion Mexicana de Canotaje, Luisiana 4, Mexico 18, D. F.
Netherlands	Nederlandsche Kano-Bond, Hagedoornweg 46, Amsterdam Noord
New Zealand	New Zealand Canoeing Association, c/o Miss J. E. Wallace, C.P.O. Box 3523, Auckland
North Korea	Canoe Association of the Peoples Republic of Korea, 49 Gaisun-dong, Moranbong District, Pyongyang
Norway	Norges Kajakk Forbund, Youngstorget 1, Oslo
Poland	Polski Zwiazek Kajakowy, ul. Sienkiewicza 12, Warsaw. Cable address: Kajak Warsawa

Rumania	Federatia Romina de Sporturi Nautice, Str. Vasile Conta 16, Bucuresti. Cable address: Sportrom Bucuresti
South Africa	South African Canoe Association. P. O. Box 185, Vereeniging, Transwaal
Spain	Federacion Espanola de Piraguismo, Cea Bermudez 14, 30, Dp. 10-11, Madrid
Sweden	Svenska Kanotförbundet, Biblioteksgatan III, Stockholm
Switzerland	Schweizerischer Kanu-Verband, rue Pierre-Fatio 9, Geneva
U.S.A.	American Canoe Association, c/o Doris C. Cousin, 400 Eastern Street, New Haven, Connecticut
U.S.S.R.	The Canoe Federation of the U.S.S.R., Skatertny perenlov 4, Moscow 69. Cable address: Sojuzsport Moscow.
Yugoslavia	Kajakaski Savez Jugoslavije, Bulevar Revolucije 44 I, Belgrade. Cable address: Brodosavez Belgrade.

List of addresses as of 1st April 1967.

APPENDIX D

CANOE AND KAYAK PRICES

Struer Wood			A. Bredovskis 369 Rouge Hills Dr. West Hill, Ont. Fibreglass		Man-Zel Fibreglass Fabricating Co. 510 Evans Ave. Toronto 14		Industrial Moulders Jasper, Ont. Fibreglass		Rilco Industries Ltd. Lakefield, Ont. Wood	
K-1	Pointer (65-75)	$350.00	Pointer	$225.00						
	Hunter	$380.00								
K-2	Glider	$440.00	Ribelle	$325.00						
Ri	Ribelle	$530.00								
K-4	Shanty	$820.00								
C-1	Delta	$390.00			Trig-1	$225.00			16'	$290.00
C-2	Aspida 21'	$500.00			17'	$225.00	17'	$225.00	16'	$290.00
C-4						$250.00		$265.00		$390.00
War Canoe										$990.00

N.B. The Struer prices have been increased. Prices should be checked with Raymond A. Dodge, 1625 Broadway, Niles, Mich. U.S.A.

Prices of Canadian manufactured boats include Federal Sales Tax, Provincial and Municipal Taxes extra, if applicable.

Crating extra if required. Normal charge is $25.00 per boat, War Canoes $50.00.

All prices F.O.B. Factory

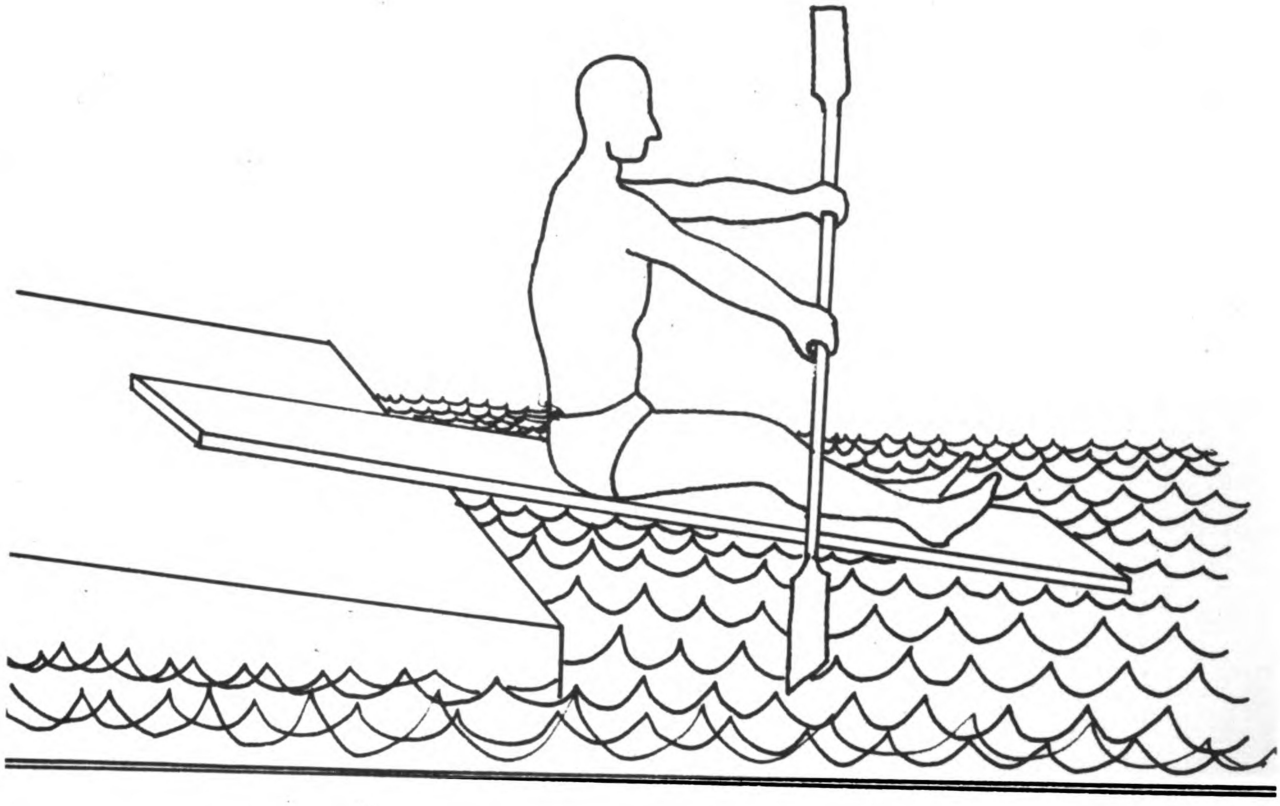
Kayak's have been imported from England by Mike Scott, on which full particulars are not available at this time. For details contact R. P. Scott, 13 Philip Drive, Ottawa, Ontario.

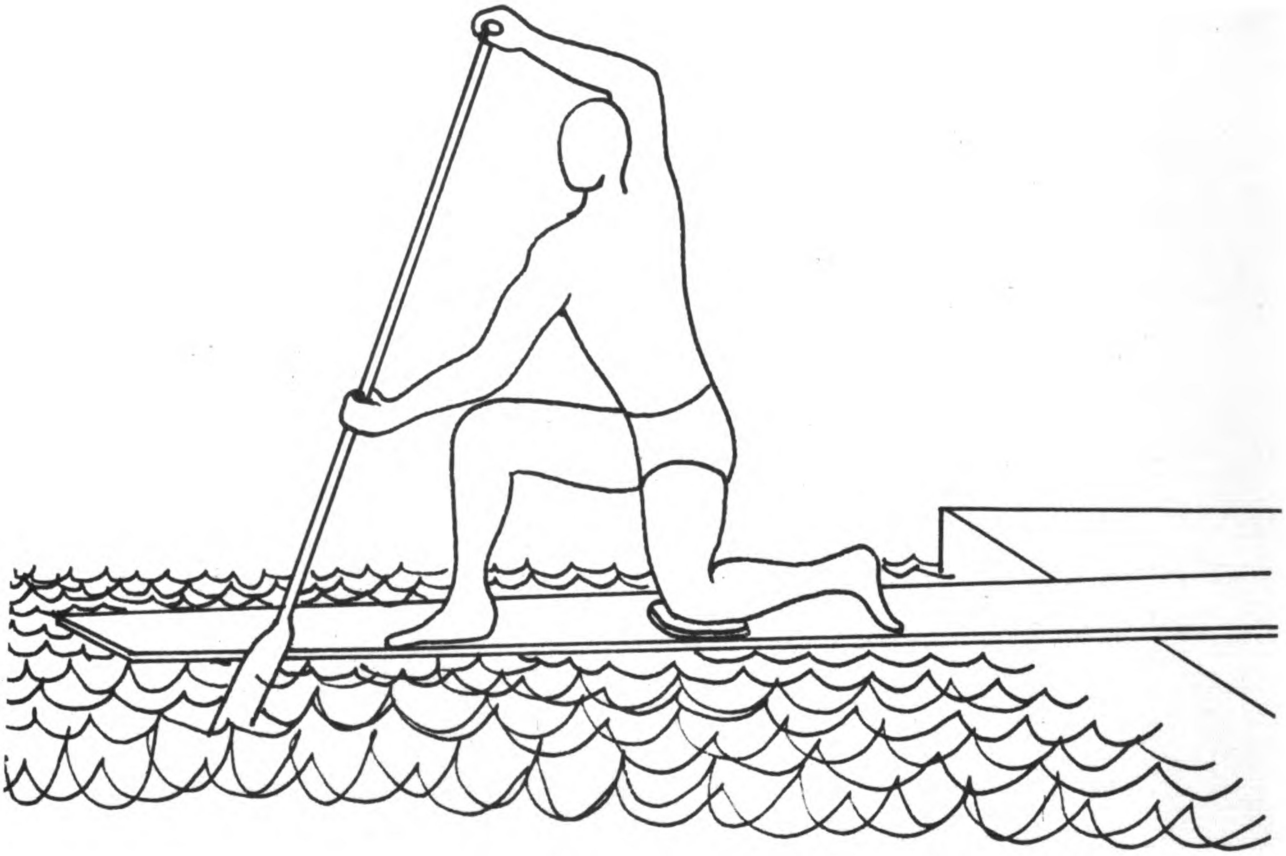
From Canadian Association. (October 25, 1966)

APPENDIX E

TRAINING RAFT

USING A PLANK ON A RAFT





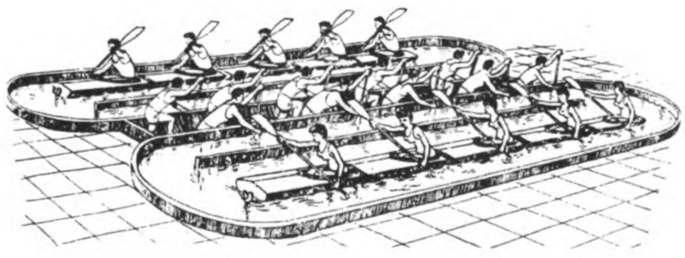
APPENDIX F

INDOOR TRAINING BASIN

INDOOR TRAINING BASIN

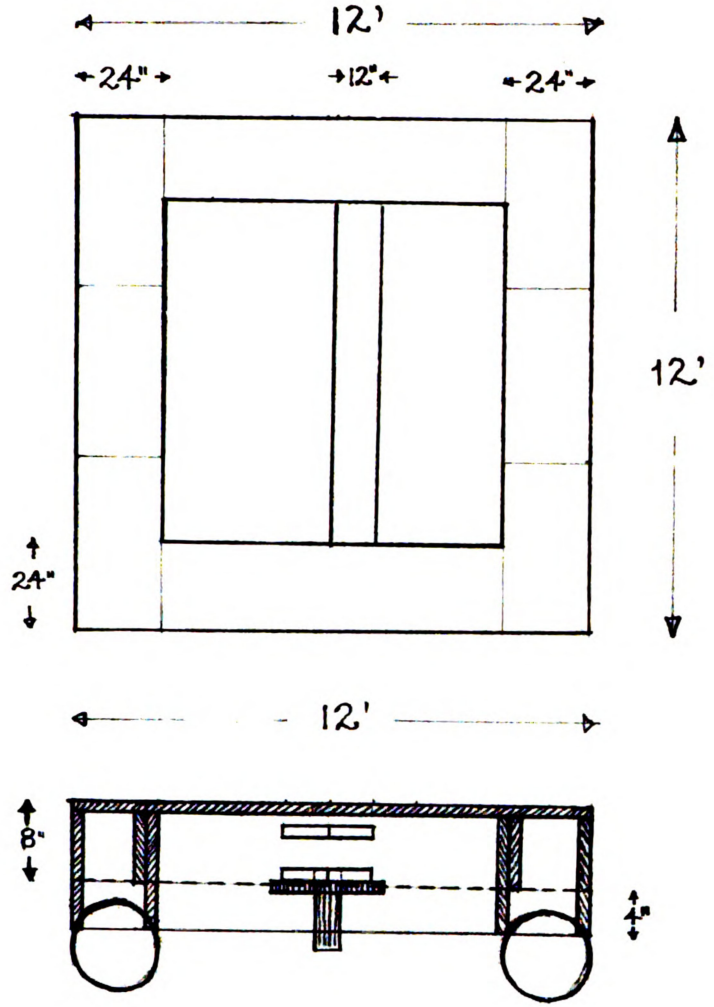
Training basins such as the Hungarian Canoe Federation's in Budapest, shown below, permit year round conditioning of the muscles; they also allow study at close quarters of the mechanics of the paddle stroke, and correction of possible faults and weaknesses. There are other basins in Finland, Austria and East Berlin. To simulate natural conditions the water must be kept moving at the correct speed. (Kayak, 1,000 m: 4.30 min; Canadian, 1000 m: 5.30 min). This requires careful design of tank proportions. The units float in the water but are kept in position by retaining forks. Mirrors are fixed on the end walls.

The Austrian basin has been installed model, but it, too, incorporates the idea of keeping the water moving. The paddle unit looks like a shortened K-4, floats on the water but on both ends bolts are fixed which slide up and down between two uprights. Normal sized paddles are used.



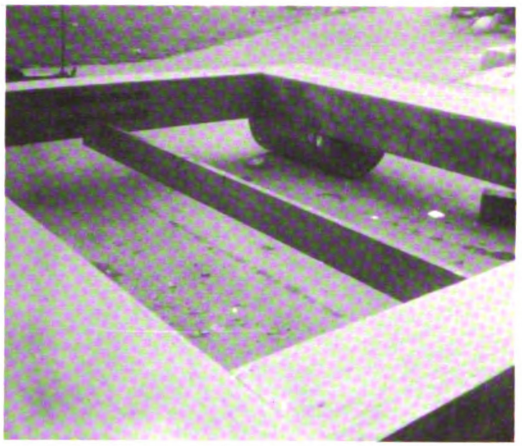
APPENDIX G

USING A PLANK ON A RAFT



SCALE: 1/4" = 1'

TRAINING RAFT



THOMAS DIENSTMANN
RENE PILON. 1966.

R.A. Pilon
M.A.

1967