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A critical survey of the most common errors of technique in eight track and field events

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A CRITICAL SURVEY OF THE MOST COMMON ERRORS OF TECHNIQUE IN EIGHT TRACK AND FIELD EVENTS

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by

Arner Eugene Gustafson

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CHAPTER I

SURVEY OF LITERATURE

The most common errors of eight track and field events have been discussed by Ray Conger[1] (1939), Dean Cromwell[2] (1949), George Bresnahan[3] (1950), Jake Weber[4] (1951), Richard Miller[5] (1952), Don Canham[6] (1952), Franklin Henry[7] (1953), Kenneth Doherty[8] (1953), Cornelius Wamerdam[9] (1954), Jesse Vail[10] (1954).

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[1]Ray M. Conger, Track and Field (New York: A.S. Barnes Company, 1939).

[2]Dean B. Cromwell, Championship Technique in Track and Field (New York: Whittlesey House, 1949), pp. 1-333.

[3]George T. Bresnahan, Track and Field Athletics (St. Louis: C.V. Mosby Company, 1947), pp. 1-500.

[4]Jake Weber, Training Olympic Champions (New York: MacMillan Company, 1951).

[5]Richard I. Miller, Fundamentals of Track and Field Athletics (New York: McGraw Hill Company, 1952), pp. 1-271.

[6]Don Canham, Track Techniques Illustrated (New York: Prentice Hall Company, 1952), pp. 1-310.

[7]Franklin Henry, "Force Time Characteristics of the Sprint Start", Research Quarterly, 23:301, October, 1952.

[8]Kenneth Doherty, Modern Track and Field (New York: Prantice Hall Company, 1953), pp. 1-351.

[9]Cornelius Wamerdam, "Fifteen Foot Vault", Athletic Journal, 30:7, April, 1952.

[10]Jack Vail, "Shot Putting", Athletic Journal, 33:30, April, 1953.

Ray Conger, in his book "Track and Field", discusses the eight track and field events through the use of running text, actual photographs and illustrations.[11] Mr. Conger was an Olympic competitor in 1932 and draws upon actual association with the world champions for his material. His pictorial illustrations exemplify form and technique as do the photographs of world champions. His text is strong in the distance events, as the author was an Olympic miler.

Dean Cromwell covers the eight events in his text, "Championship Techniques of Track and Field".[12] Mr. Cromwell uses text along with a sequence picture series of a collegiate champion to illustrate his points in each event. Reference is constantly made to the brilliant array of previous world record holders in each event. Each technique and style of form is pointed out and exemplified. The emphasis of this text is on the psychology of coaching boys to become champions using sound, basic fundamentals of technique.

In "Track and Field Athletics" by George Bresnahan,

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[11] Ray M. Conger, Track and Field (New York: A.S. Ba Barnes Company, 1939).

[12] Dean B. Cromwell, Championship Technique in Track and Field (New York: Whittlesey House, 1949).

the eight events are throughly discussed and illustrated.[13] Each event is broken down into specific areas of action and covered as to angle, motions, and velocity. Running text, supplemented with charts and illustrations adequately explain each event. Each event is also exemplified with a listing of the errors most commonly committed in that event. The strength of this text is the scientific, thorough, systematic approach to all events.

Jake Weber discusses the eight events in his book, "Training Olympic Champions".[14] The techniques are covered as to distance and event using text and photographs taken at three olympic games. Observation of champions is the approach used by the author to present the techniques. All referals are made to style used by the worlds best performers in each event. The author was trainer for the United States Olympic track team in three different Olympic games. Hence the strength in this book lies in the author's intimate knowledge and working cooperation of the champions of the United States in track and field coverin, a period

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[13] George T. Bresnahan, Track and Field Athletics (St. Louis: C.V. Mosby Company, 1947), pp.1-500.

[14] Jake Weber, Training Olympic Champions (New York: MacMillan Company, 1951).

of twenty years.

Richard Miller's book "Fundamentals of Track and Field Coaching", covers all the events of the sport by way of informative text and the use of sequence type photographs of the first place winner in ICAAAA competition.[15] In addition, the book contains many charts and illustrations pertaining to training, records and research done in this field. The strength of this text lies in its simple, clarifying approach to each event. The important techniques to be stressed are written in italics, a good text for the beginning coach.

Don Canham, in his book, "Track Techniques Illustrated", discusses the eight events with text supplemented and very excellent illustrations.[16] Each pictorial illustration comes in rapid sequence to exemplify the points in the text. In addition, there are numerous charts indicating college, national and world records in each event. The strength of this text lies in its stick drawing pictorial illustrations.

Franklin Henry wrote an article, "Force Time Characteristics of the Sprint Start", which was published in

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[15]Richard I. Miller, Fundamentals of Track and Field Athletics (New York: McGraw Hill Company, 1952), pp. 1-271.

[16]Don Canham, Track Techniques Illustrated (New York: Prentice Hall Company, 1952), pp. 1-310.

many of the leading professional magazines and reports.[17] The article was a report on research carried on at the University of California, Berkeley, California. The report showed scientific conclusions regarding the various types of starts used in sprinting and the advantages of the different starts. The research concluded that the median start was the fastest start of all three styles.

Kenneth Dohertys' book, "Modern Track and Field", concerns itself with the eight events and points out correct and incorrect techniques used by athletes.[18] The author has used action photographs plus illustrations and drawings to point out the techniques involved in each event. While not as comprehensive or technical as other texts, it is a valuable guide of the high school coach.

Cornelius Wamerdam wrote an article, "The Pole Vault", which was published in the leading professional magazines.[19] The article was a complete breakdown of the event into the areas of action. Each area was covered with both scientific analysis and experience from the world record holder. Sequence photographic shots illustrated each

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[17]Franklin Henry, "Force Time Characteristics of the Sprint Start", Research Quarterly, 23:301, October, 1952.

[18]Kenneth Doherty, Modern Track and Field (New York: Prentice Hall Company, 1953), pp.1-351.

[19]Cornelius Wamerdam, "Fifteen Foot Vault", Athletic Journal, 30:7, April, 1952.

area comprehensively. An excellent article, easily assimilated and of interest to both the layman and the experienced competitor.

Jesse Vail wrote an article, "Shot Putting".[20] In this article the author reports on both scientific experiments and actual performance of John Fuehs, former world record holder. Degree of angles for various areas of action were worked out by both mathematical procedure and the trial and error method. Sequence photography of the world record tosser were taken and analyzed and comments made on the procedure. An excellent article for the coach and the student of the sport.

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[20]Jack Vail, "Shot Putting", Athletic Journal, 33:30, April, 1953.

CHAPTER II

INTRODUCTION

In the year 1890 on October 11, John Owens set a new world record of :9.8 for the 100 yard dash. Five years later, Thomas Conneff of New York set the world's mile record of 4:15.6 The shot was put 51 feet by Ralph Rose of the Olympic Club and Nathan Dole of Stanford vaulted to a new world's record of 12'1½". Half a decade later the world's records of these events stand as follows; 100 yard dash :9.3 by Melvin Patton, 1 mile run 3:58 by John Landy, shot put 60'10" by Parry O'Brien, and pole vault 15'7½" by Cornelius Wamerdam.

The psychology of competition and human attainment are universal through the ages. John Owens tried just as hard in setting his record as did Melvin Patton, yet there is a difference of .5 of a second. Nathan Doles' effort in his record vault probably contained all the aspects of desire and attainment as did the record of Wamerdams' vault, yet 3'6" separated the two records. What then can we conclude as having made the difference?

Physiologically our human machine hasn't made any considerable adaptive of genetic change in form in the past half decade. Hence it leaves one aspect to answer

for much of the improvement, improved techniques.

Through the process of trial and error, scientific analysis and intelligent deductive thinking, improvement in technique took place. We have certainly not found all the best answers yet, but we continue to perfect at the point we have arrived at. Concurrently we expect worlds records to improve and to continue to improve.

In the process of coaching, one of the more valuable techniques is the correction of faulty techniques which distract from the best performance. It is the purpose of this thesis to bring together from authoritative sources and observation some of the more common errors of technique, which make for faulty performance in eight track and field events.

Each event has been broken down or separated into the more or less logical areas of operation. For instance, the sprint races break down into four areas, while the pole vault breaks down into eleven areas. Each technique has been photographed both positive and negative in aspect.

These **eight** events will be analysed and the most common errors listed. These events are; sprints, middle distance, distance, relays, pole vault, shot put, discus, and javelin.

CHAPTER III

SPRINTS

The sprint races are those races from 60 yards to 300 yards both indoor and outdoor. The most common being the 100 yard dash and the 220 yard dash. The technique of sprinting is universal for all these distances. It is also a very important technique because its principles apply in other areas of track and field.

To list a few will be sufficient; the sprint approach to the take off board in the broad jump, the approach to the take off in the pole vault, the approach in the javelin throw and of course the technique justly applies to the relays.

In the following pages of this paper certain areas of interest will be covered only once to save repetitous reading. For Example the starting stance for the sprinters will be covered once then reference to this technique will be made several times in other areas.

Each event has been broken down into areas of interest. Our first event being the sprints. It is broken down into four areas; they are: start, full speed stride, coast, and finish.

There are three basic stances in the start of the sprints; they are the 11 inch bunch start, the 21 inch

medium start, and the 26 inch elongated start. Which one is most effective? According to research by Franklin Henry of University of California, after testing 72 runs made while using the triplicate of starts, he concluded that, while the elongated stance produced the greatest amount of foot pressure at the blocks (387 lbs.) and that the 11 inch bunch start produced the fastest times at 2.5 yards (.244 compared to .257 for elongated), the medium start of 21 inches produced 17 of the best 18 times and that not any of the best times were made from the elongated stance.[1] Therefore based on this scientific investigation, we will narrow our field to the medium start.

The common errors in the head carry of the start are; eyes focused straight down to the ground, which will result in low head carry angle and subsequent poor starting balance, "Any extreme head position will constrict free breathing and eye focusing off the track diverts the runners attention",[2] the head in any position but on a direct trunk line extension is a common error, (see

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[1] Force time characteristics of the Sprint Start by Franklin Henry, Research Quarterly, Vol.23, No. 3, pp. 301-318.

[2] Bresnahan and Tuttle, Track and Field Athletics, St. Louis, C.V. Mosby Co., 1947, p.87.

plates 1 and 2) any deviation of arm placement other than straight down from the shoulder in a 90 degree vertical position is an error. "If the arms aren't vertical, chest is too low to come easily into running position".[3] "In the set position if the fingers aren't extended as high as possible it's an error of technique" (see plates 3 and 4).[4]

The position of the hips is the cause of many errors. If the hips are higher than 20 degrees or lower than 10 degrees from the head there is a bad hip placement, hence poor balance. "Good weight distribution is essential to a fast start" (see plates 1 and 2).[5] The errors of trunk angle are a lack of forward lean to accentuate a driving force at the sound of the gun. A 15 degree side angle of the arms approximate a good lean angle, 5 degrees or 20 degrees would be common errors (see plates 1 and 2). "A common error is any extreme lateral placing of the feet which causes a twist of the trunk on coming out of the blocks" (see plates 3 and 4).[6]

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[3] Ibid p. 86.

[4] Kenneth J. Doherty, Modern Track and Field, New York, Prentice Hall Inc. 1953, p. 58.

[5] Ibid p. 59.

[6] Bresnahan and Tuttle, Op. Cit., p. 86.

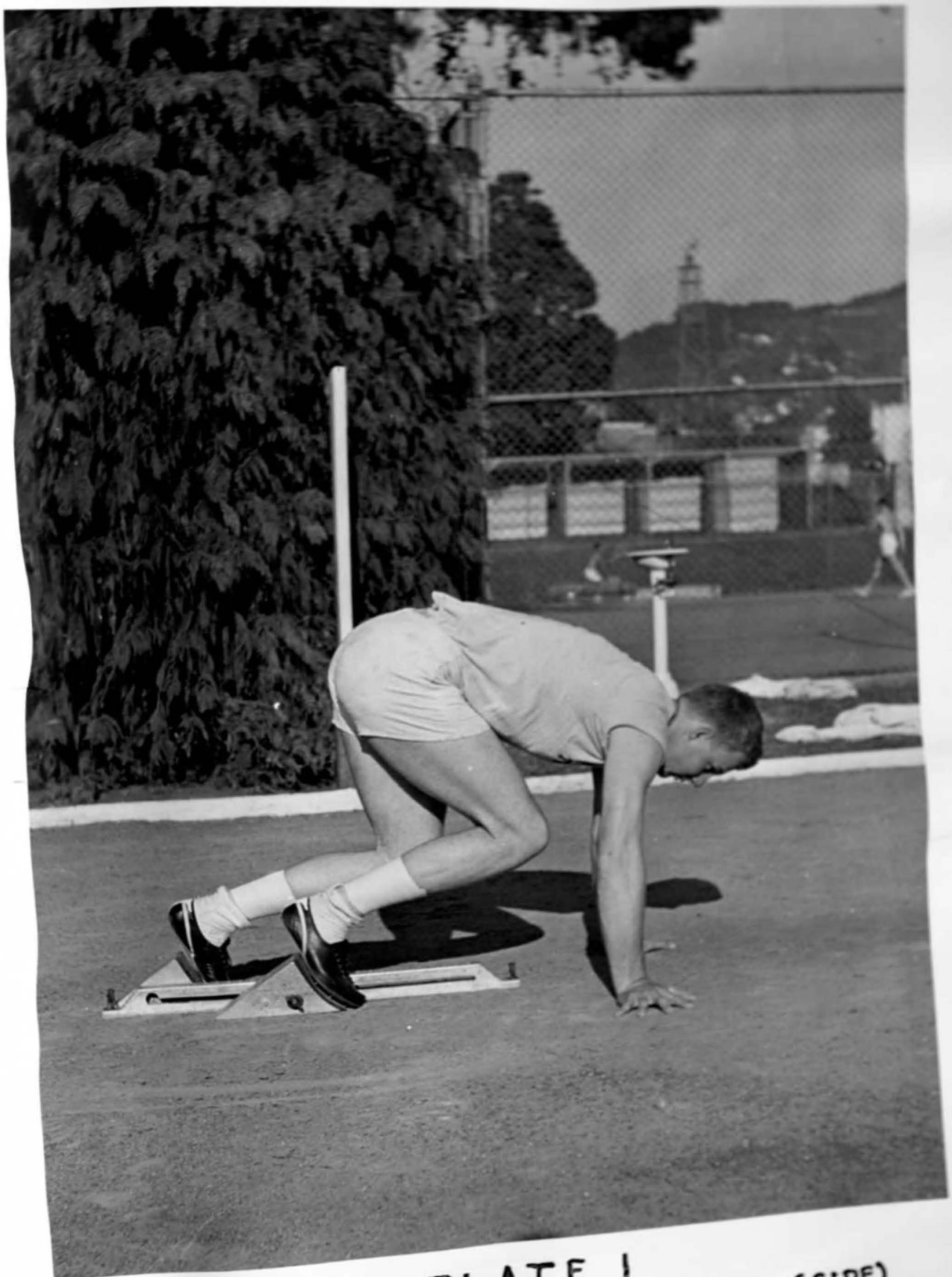

PLATE I
IMPROPER SET POSITION (SIDE)

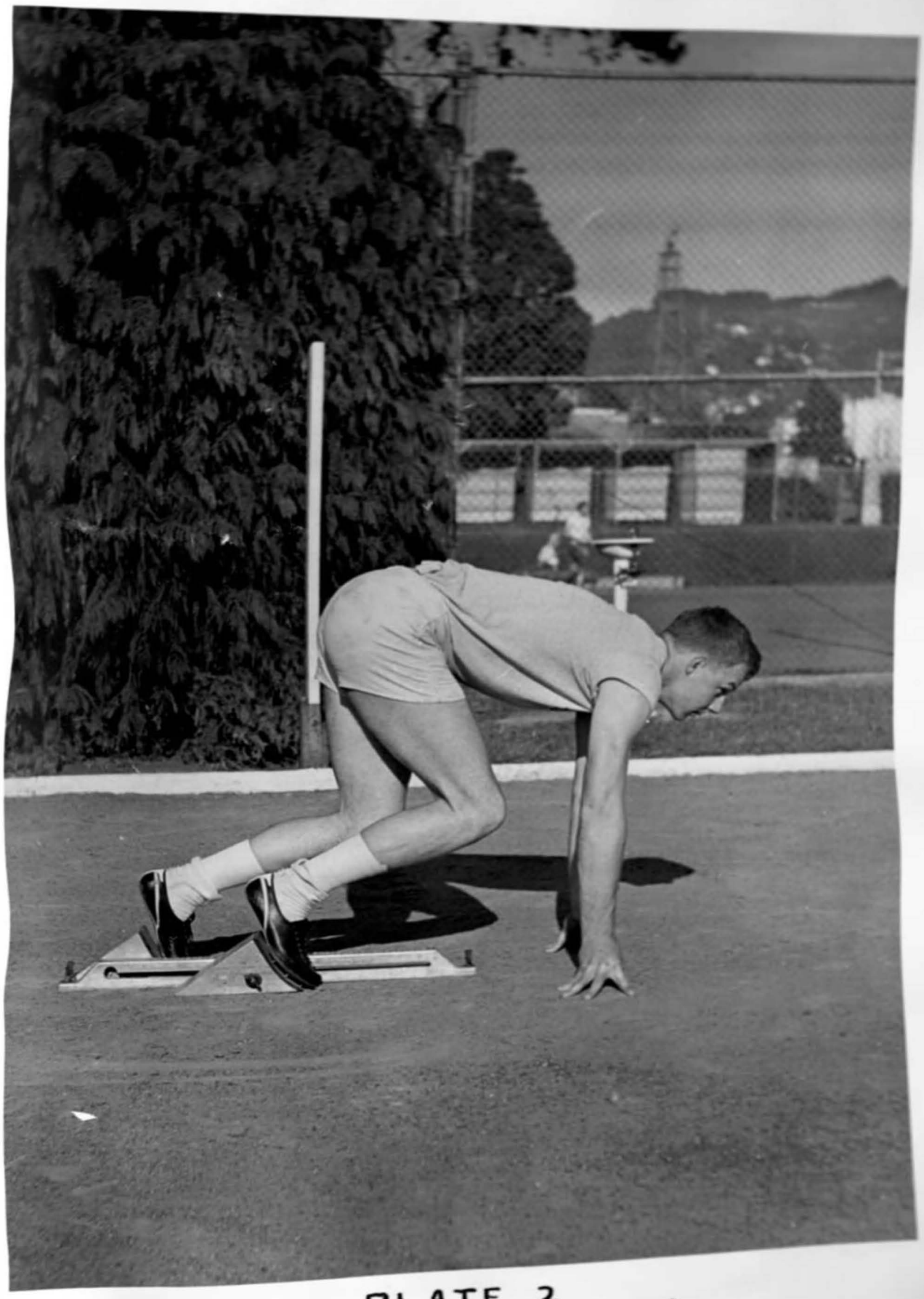

PLATE 2
PROPER SET POSITION (SIDE)

PLATE 3
IMPROPER SET POSITION (FRONT)

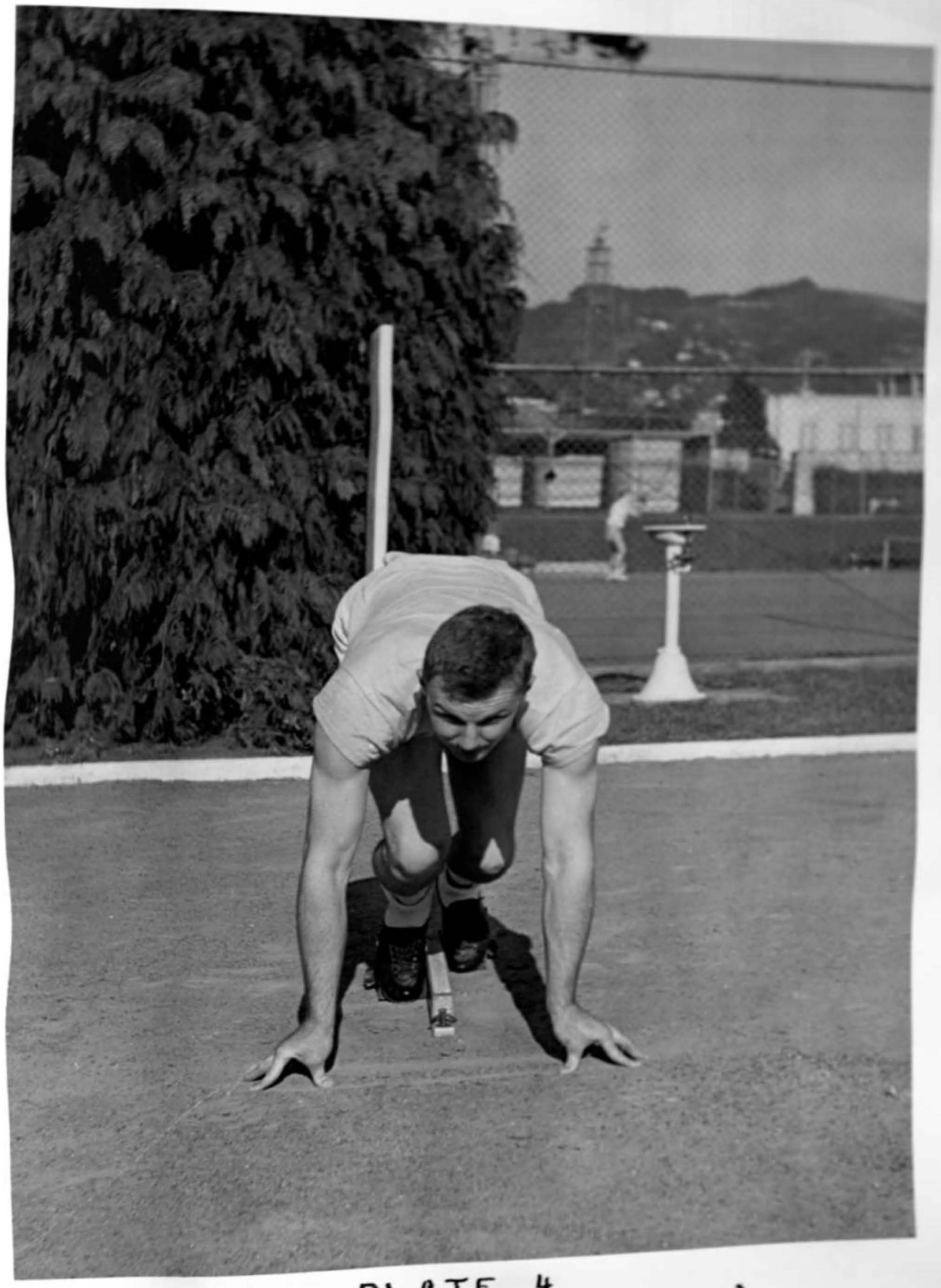

PLATE 4
PROPER SET POSITION (FRONT)

The full speed stride can be marred in performance by many errors of technique, of which the following are a few of the more common; the head should be kept at approximately 30 degrees angle and in direct line with the trunk, any deviation is an error. "To lift the eyes is to lift the head, which lifts the angle of the trunk and subsequent loss of driving power".[7] The arms should be held in a 90 degree fixed pendulum position (see plates 5 and 6). "Any side cross arm carry or too high, or too low arm carry is a common error" (see plates 7 and 8).[8] The trunk angle shouldn't deviate much from 2° to 5° degree lean. "If the trunk angle is too erect driving power and momentum is lost" (see plates 5 and 6).[9] Excessive shoulder twist is another common error resulting in a weaving running pattern, and constriction of the breathing process (see plates 7and 8).

In the coast area of interest, all the previous principles apply, but there is one universal error made by most beginning runners and that is "the most common mistake is applying the brakes instead of relaxing".[10]

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[7]Kenneth J. Doherty, Op. Cit., p. 66.

[8]Bresnahan and Tuttle, Op. Cit., p. 66.

[9]Ibid,p. 88.

[10]Ibid.

The full speed stride can be marred in performances by many errors of technique, of which the following are a few of the more common; the head should be kept at approximately 30 degrees angle and in direct line with the trunk, any deviation is an error. "To lift the eyes is to lift the head, which lifts the angle of the trunk and subsequent loss of driving power".[7] The arms should be held in a 90 degree fixed pendulum position (see plates 5 and 6). "Any side cross arm carry or too high, or too low arm carry is a common error" (see plates 7 and 8).[8] The trunk angle shouldn't deviate much from 25 to 35 degree lean. "If the trunk angle is too erect driving power and momentum is lost" (see plates 5 and 6).[9] Excessive shoulder twist is another common error resulting in a weaving running pattern, and constriction of the breathing process (see plates 7and 8).

In the coast area of interest, all the previous principles apply, but there is one universal error made by most beginning runners and that is "the most common mistake is applying the brakes instead of relaxing".[10]

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[7]Kenneth J. Doherty, Op. Cit., p. 66.

[8]Bresnahan and Tuttle, Op. Cit., p. 66.

[9]Ibid,p. 88.

[10]Ibid.

PLATE 5
IMPROPER SPRINT STRIDE (SIDE)

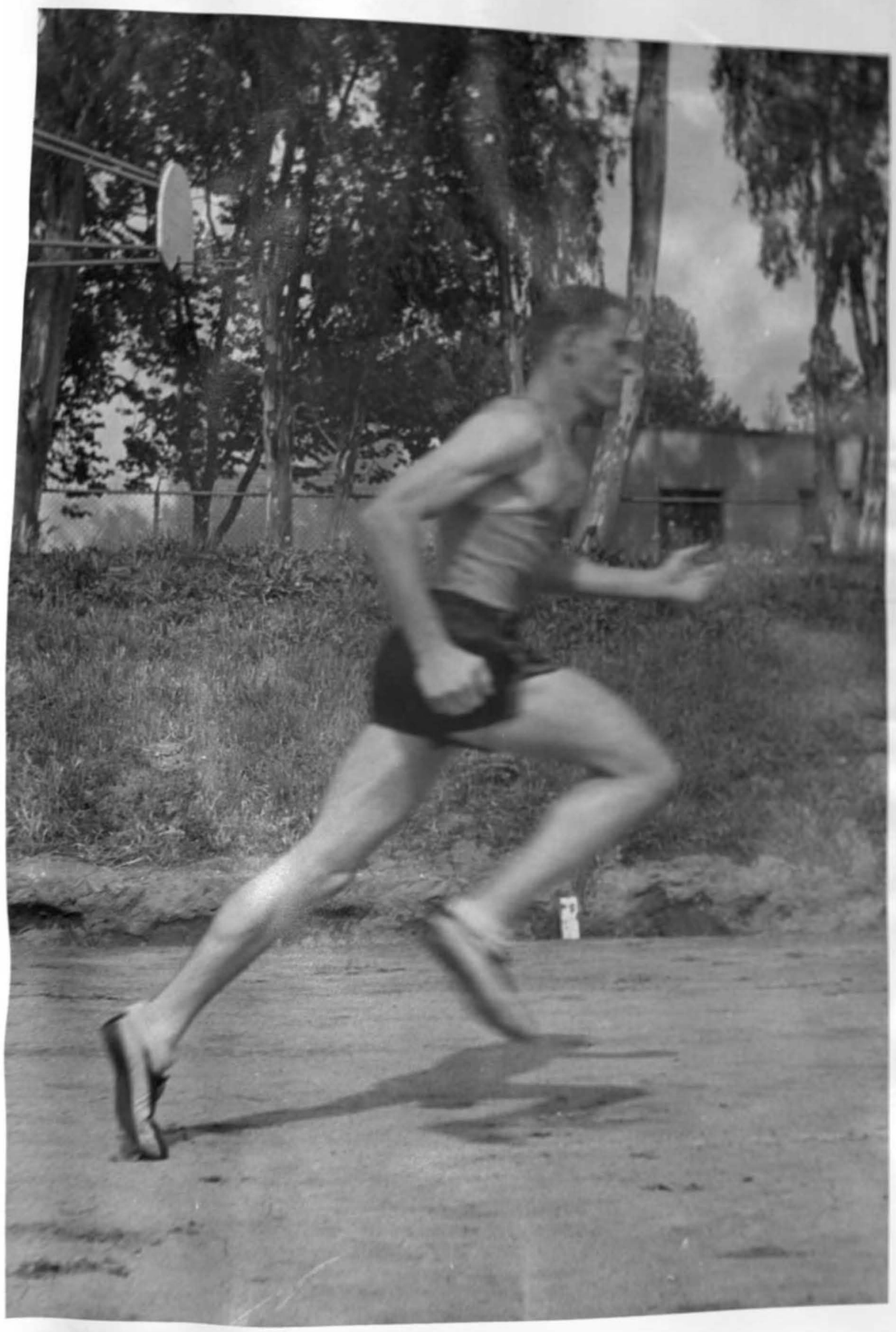

PLATE 6
PROPER SPRINT STRIDE (SIDE)

PLATE 7
IMPROPER SPRINT STRIDE (FRONT)

PLATE 8
PROPER SPRINT STRIDE (FRONT)

Following the coast, the runner comes to the finish and here, any errors made are costly errors. A loss of 3 inches may very well mean losing the race. Any errors that were committed in the full speed stride area will be enhanced during the finish, due to increased fatigue. "We believe it is an error to alter the top striding form in the closing yards of the race".[11] It is also very necessary to correct errors in relaxation at this point. "Wise coaching will place relaxation above increased drive until the sprinter has mastered the art".[12] In other words run right on through the tape (see plates 9 and 10).

The sprinter at the starting line with his hands flat on the track, hips 25 degrees in the air, head and eyes looking straight down to the track, who then takes off striding along with his arms high up across his chest, knees low and a body angle of around 5 degrees, and who then makes a flying lunge at the tape only to take last place is not a rare sight at many track meets.

This concludes the Sprints and we next enter the area of the middle distance races.

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[11] Bresnahan and Tuttle, Op. Cit., p.88

[12] Kenneth J. Doherty, Op. Cit., p.71.

PLATE 9
IMPROPER FINISH

PLATE 10
PROPER FINISH

CHAPTER IV

MIDDLE DISTANCES

Middle distances include any running event which falls between 300 yards and 1,000 yards. Most frequent races are the 440 yard and the 880 yard runs. Middle distance competitiors are runners who have acquired a degree of endurance to match their innate sprinting ability. It is most common to see middle distance runners who are polished in technique, using identical form as is used in the sprints coupled with endurance to cover the distance.

The middle distance technique breaks down into four logical areas of interest. They are the start, the full speed stride, the coast, and the finish.

The start used in the middle distances is identical with the start used in the sprints, hence it would be repititious reading to again cover the start.

The full speed stride in the middle distance races differs in technique from the sprints only in degree. The following are the more common errors committed by the unpolished middle distance runner; the head may be held back, so that the angle is less then that of the trunk angle (see plates 5 and 6). The head angle and trunk angle should be approximately 15 degrees. A 5 degree

angle would be insufficient and a common error.

Failure to bring the knee up to its best height for reach and driving power is also a common error. It should be approximately at a 95 degree angle with the base line of the trunk angle. A 105 degree knee angle would be too low a knee carry, a common error.

The additional errors of technique, such as poor arm carry, shoulder twist, clenched fists, (see plates 5 and 6) are the same as in the sprints and in the words of Doherty "Correct running form for the 440 yard dash is almost identical to that of the sprints, the noticable difference is nil".[13]

Due to the extended time and effort of the race, failure to sprint through the finish tape is a very common error (see plates 9and 10).

In conclusion the errors most frequently committed in the middle distance races are for the most part the same as for the sprints. The trunk angle will be approximately 10 degrees less and the knee lift will be approximately 5 degrees lower, otherwise they are comparable. Most common error is failure at muscular relaxation and failure to sprint through the finish line. This leads us up to the next longer series of races, namely the distance runs.

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[13]Kenneth J. Doherty, Modern Track and Field, p. 89.

CHAPTER V

DISTANCE RUNS

The distance runs are the 1 mile and the 2 mile runs. They are run on both outdoor and indoor tracks and are becoming increasingly popular due to the increased attempts to break the 4 minute mile.

The areas of Interest are again broken into the start, full speed stride, the coast, and the finish. It is also to be noted that correct relaxation and conservation of energy are of the outmost importance in the distance races.

The start is all important to the miler in that he wishes to sprint for the first 20 to 30 yards in order to gain an advantageous running position of the pole, hence the start will be the same as for the faster middle distance races. All of the errors of the sprint start are applicable at this start also.

The full speed stride finds errors in the trunk angle. Most common error will be too little body angle, around 2 degrees, when it should be approximately 5 degrees to 9 degrees. The head may be carried too high in angle, around 0 degrees, which causes constriction of breathing apparatus. The arms may be carried too high, around a 50 degree angle, instead of a relaxed 100 degree angle (see plates 11 and 12).

"The arms and legs should in no way be driven".[14] Another common error is the unconscious clenching of the fist, which in turn causes undue tension on the arms, which under prolonged effort will result in a tight chest. Hip swing is definitely an error. "A pronounced hip swing is an error and will distract from efficiency" (see plates 13 and 14).[15]

Failure to acomplish a ball-heel landing of the foot is a common error of the beginner in high school track. The cultivation of full effort coupled with muscular relaxation isanother common error of the beginner (see plates 11 and 12). This brings us up to the coast.

The coast is that period of the race where a runner maintains a good pace but mentally relaxes for the final spurt of energy output. The big error being the slowing of pace and failure to accomplish any mental or physical relaxation. Slowing of the pace will always be accompanied by less trunk angle, 5 degrees, shortened stride and muscular tenseness.

The finish is that process of exerting all energy left, into the last 20 per cent of the race. Common errors are; neck and arms becoming constricted, causing restricted breathing, arm elbow angle of around 40 degrees

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[14] Kenneth J. Doherty, Op. Cit., p. 169

[15] Ibid.

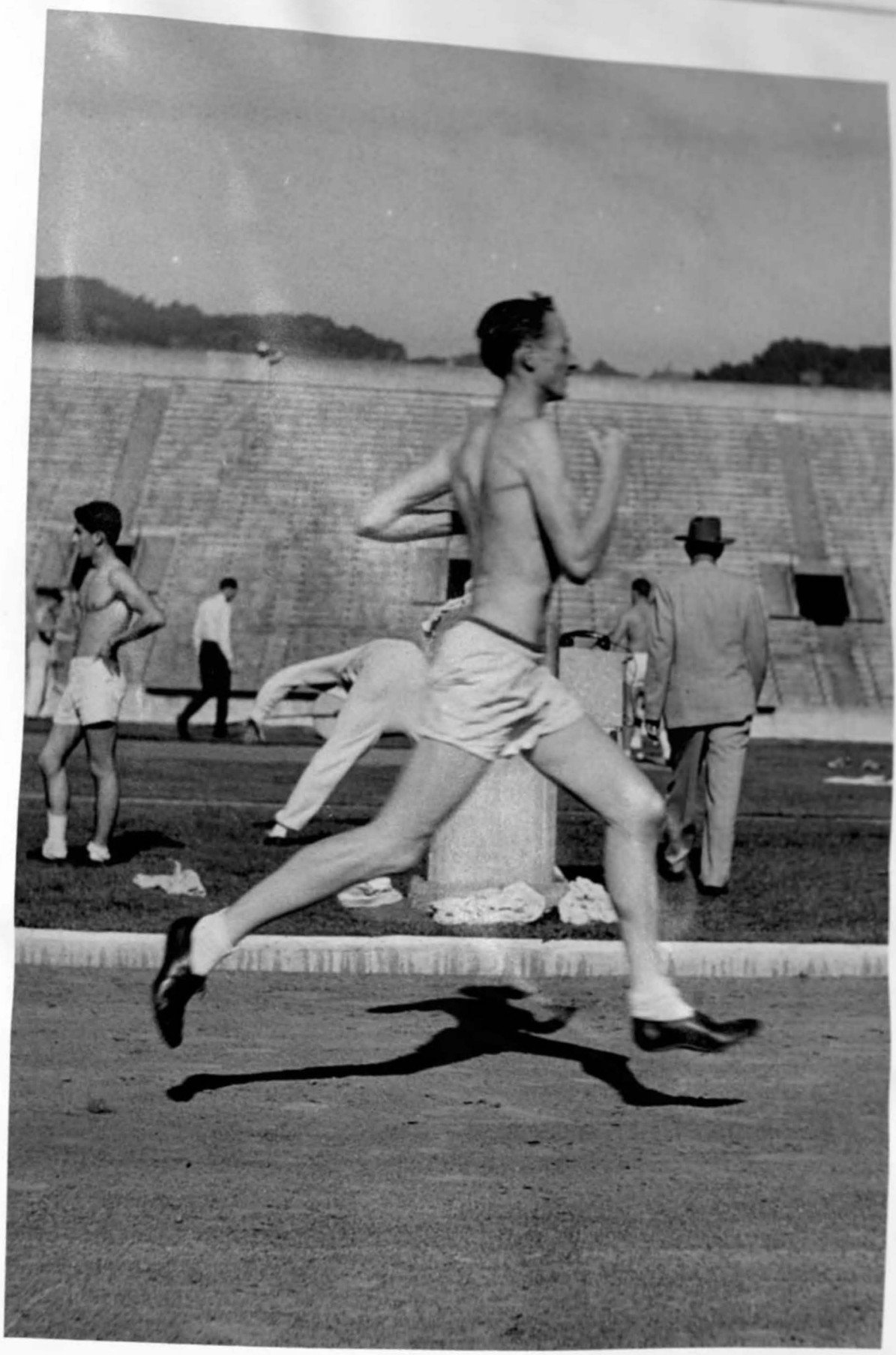

PLATE II
IMPROPER DISTANCE STRIDE (SIDE)

PLATE 12
PROPER DISTANCE STRIDE (SIDE)

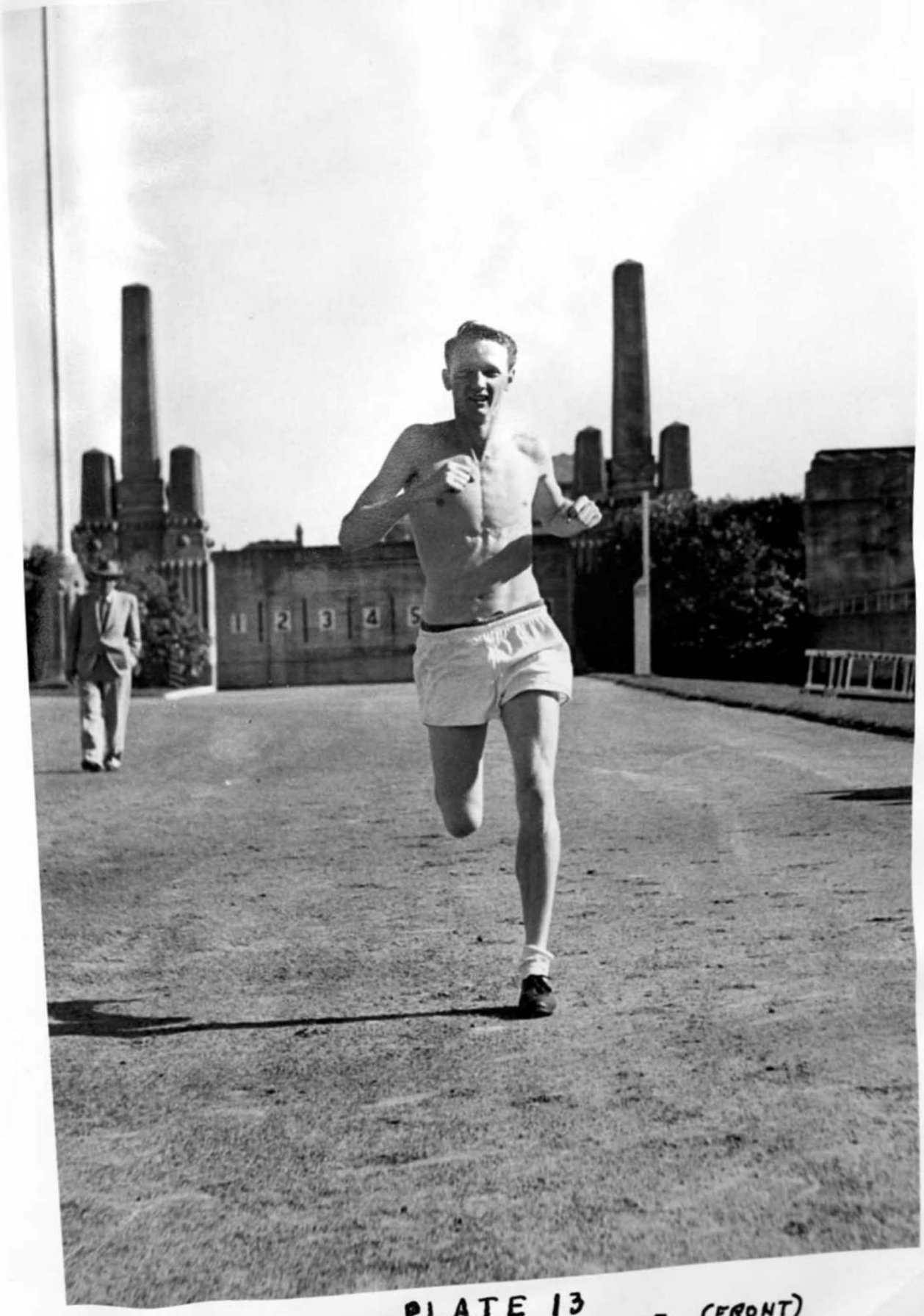

PLATE 13
IMPRORER DISTANCE STRIDE (FRONT)

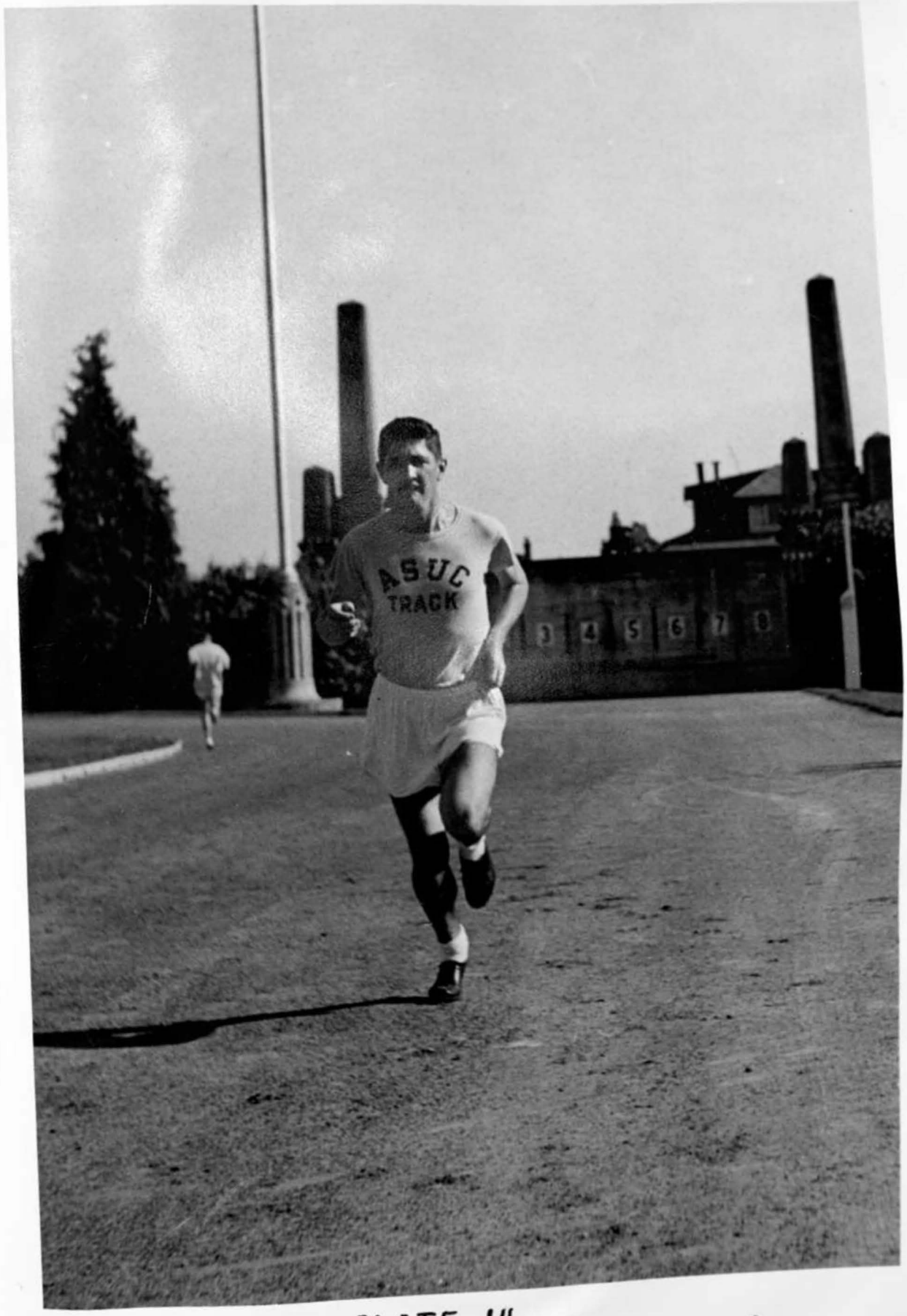

PLATE 14
PROPER DISTANCE STRIDE (FRONT)

instead of 100 degrees. Body angle becomes vertical, knee angle becomes low, around 120 degrees. Arm angle gets less, around 40 degrees. Failure to stride through the finish again is a common error (see plates 11 and 12).

Here then we have a longer race where techniques are about the same as in middle distance runs, different only in degree. The more common errors are deviation in trunk angle, vertical head carry, low arm angle, excessive hip sway, cross chest arm action, failure at ball-heel foot landing and most important a non-rythmic, energy consuming, non-relaxed stride. This event concludes the single event, flat track running events. This brings us to the relays.

CHAPTER VI

RELAYS

In looking for the more common errors in the relays, the event has been narrowed down to the area of the baton pass. This is done to facilitate unneeded repetition, as sprinting techniques are covered in the preceeding chapters. There are no less than 20 accepted AAU relay races so it is self explanatory why I narrowed the area down to the baton pass.

In the baton pass the head and eyes are the clue as to the type of baton pass that will be used. One is the visual method, and the other, the non-visual method.

The visual pass has the advantage in control of action but the disadvantage of having the body turned sideways to the direction of the run. The more common errors are; failure to spread the fingers so as to provide a large target for the passer, failure to reach out with an extended arm to the passer. "Any uncertainty or distraction will produce an instant delay" (see plates 15 and 16).[16] The reciever must be alert to compensate for the fatigued condition of the runner.

The non-visual method has great advantages in that the entire body is in a good starting position for a fast sprint start. The disadvantage being that there is no

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[16] Kenneth J. Doherty, Op. Cit., p. 211.

visual contact with the tired runner. This technique is moe widely used with experienced competitors. The errors of techniques here lie in the baton pass also. Failure to spread the thumb from the forefinger is an error, failure to extend the arm out and to the rear is an error, and most important there is a lack of concentration on the part of the reciever in regard to his immediate start once he feels the pressure of the baton on his hand is a grave error. Any unsteadiness of the receiving hand is an error (see plates 17 and 18). Poor grasp of baton is a needless error (see plates 19 and 20).

To summarize, there are errors that will result in a dropped baton hence a race lost if not corrected before the meet starts. They are, lack of concentration, failure to provide a good baton target, unsteadiness of the hand, fingers that are not spread and a hand held at the wrong level for the tired runner. All or any one of these can result in a dropped baton or a slow pass.

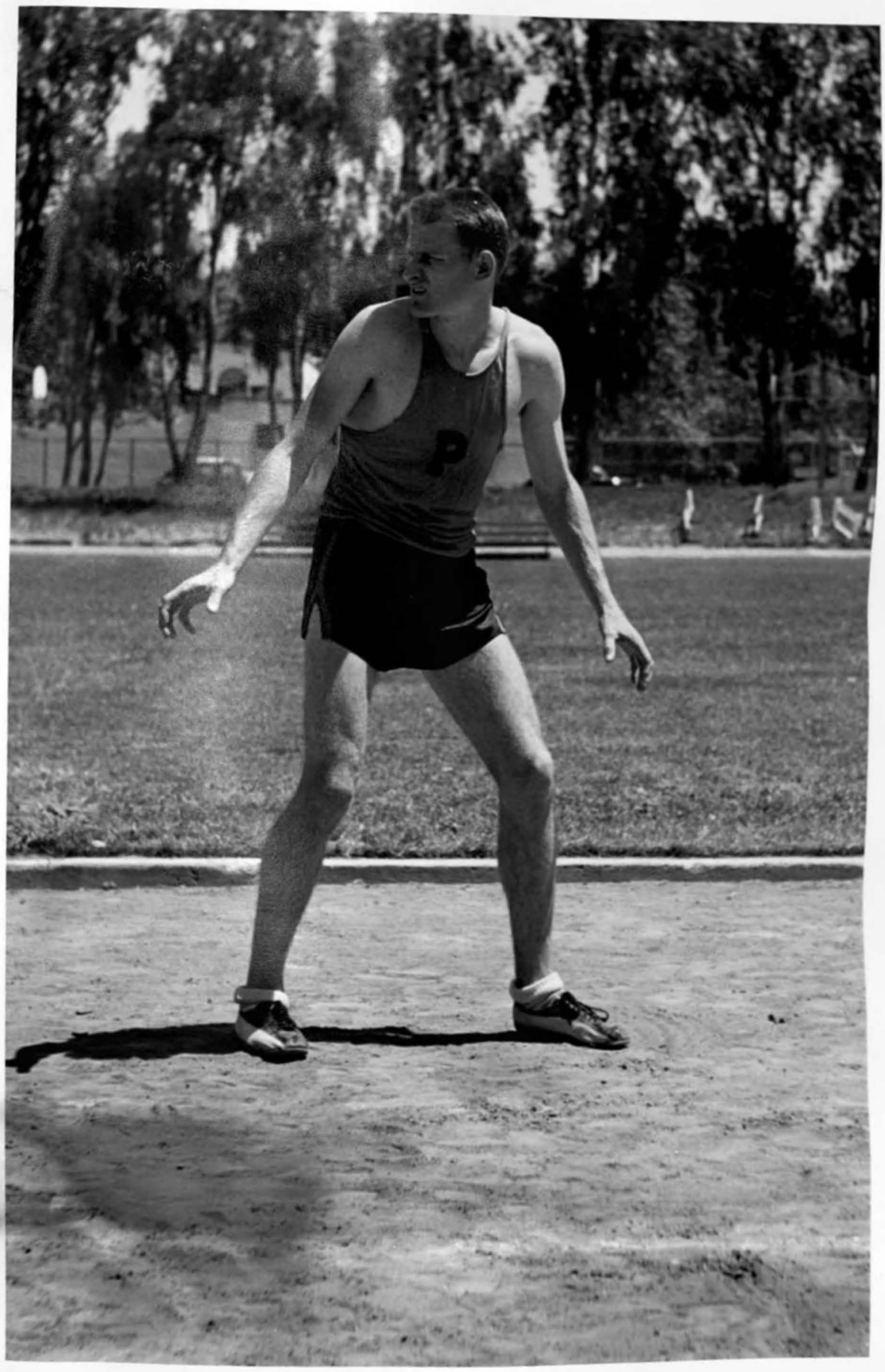

PLATE 15
IMPROPER RELAY STANCE (VISUAL)

PLATE 16
PROPER RELAY STANCE (VISUAL)

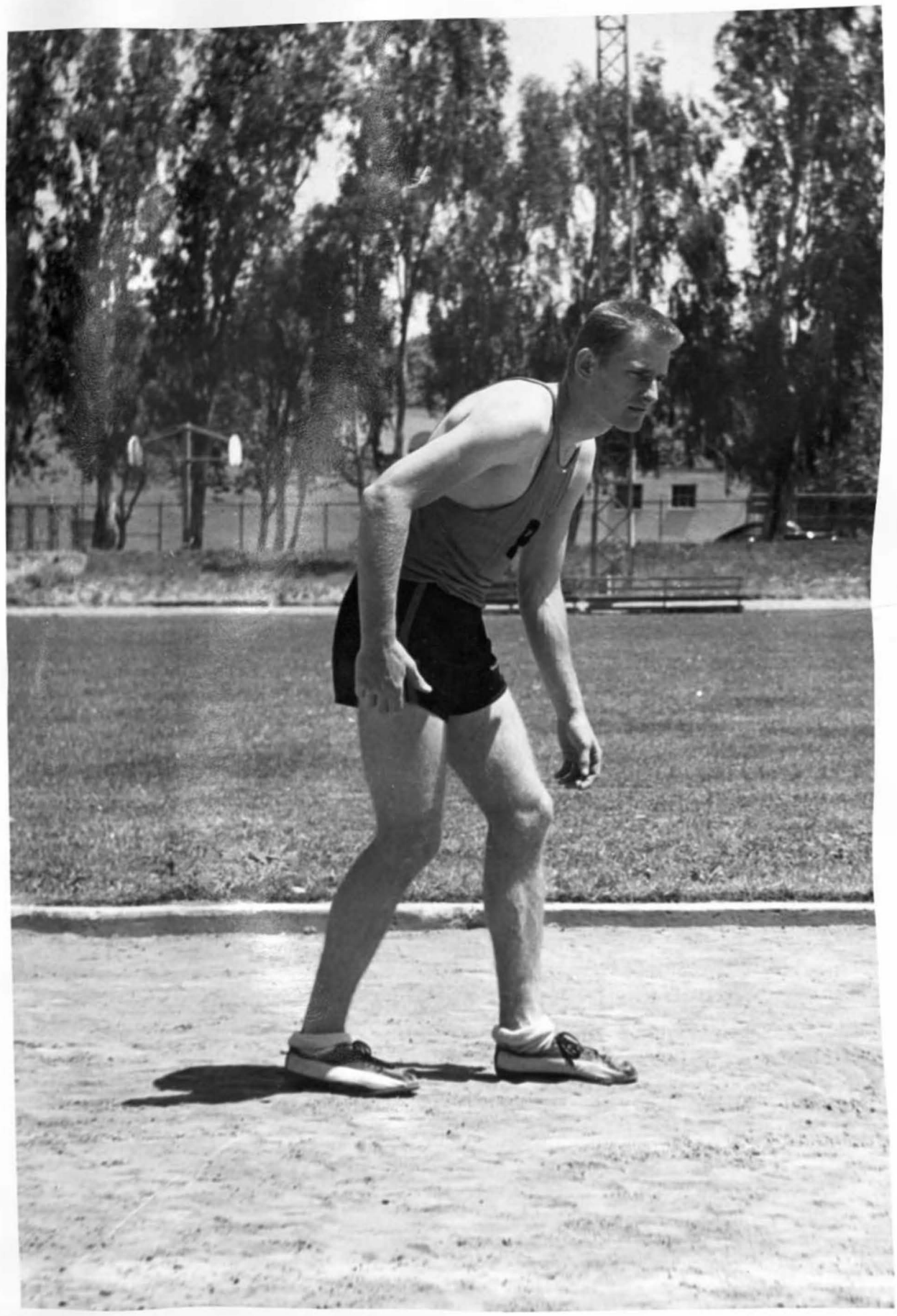

PLATE 17
IMPROPER RELAY STANCE (NON VISUAL)

PLATE 18
PROPER RELAY STANCE (NON VISUAL)

PLATE 19
IMPROPER GRASP

PLATE 20
PROPER GRASP

CHAPTER VII

POLE VAULT

The pole vault started in ancient times with the people of the Orient. It was then a vault for level distance, later they used it in warfare to scale walls, this resulted in vaults for height, and so on down to our present times as a sport we vault for hsight.

It is probably the most technical and difficult of all the events since it involves; running, jumping, climbing, pushing, and falling. Because of all these areas of activity, improvement found itself in many fertile fields. Hence the modern vaulters have improved the records considerably.

The event breaks down into eleven areas of interest. They are; pole carry, approach, poleplant, hand shift, foot stamp, swing up, pull up, body turn, crossbar clearance, push up and landing. Each area will be covered separately in the above order.

The pole carry during the 70 to 80 yards running approach to the pit is all important in terms of efficient running, relaxation and also its effect on the pole plant and subsequent action that follows. The pole should not be carried in a tense manner. "A vaulter may be inefficient because he grasps the pole too tightly".[17] "Tenseness in arms and shoulders is an error which prevents freedom of

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[17]Bresnahan and Tuttle, Op. Cit., p. 314.

movement in the carry".[18]

The pole should be carried, pointed straight toward the pit. "Failure to carry the pole at an angle between 45 degrees and horizontally is an error".[19] Any wide deviation of this angle results in constricted chest action (see plates 21 and 22).

In the approach which combines a good sprint technique with the pole carry, it is important to remember, "a devious run is a bad error,[20] meaning that the better the forward momentum the higher the vault. There should be no swaying of the pole, and excessive hip sway is a common error. Good body lean (20 degrees) should be maintained. Head and eyes should be focused on the planting box (see plates 21 and 23).

The pole vault plant must be executed in a smooth manner, or subsequent vaulting action is affected. "Chief mistake in planting the pole is lack of contration of vision on the plant".[21] Correct arm angle is all important to prevent a jerky pole plant. "At the moment of the pole plant

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[18] Ibid

[19] Ibid

[20] Ibid

[21] Ibid

PLATE 21
IMPROPER POLE CARRY

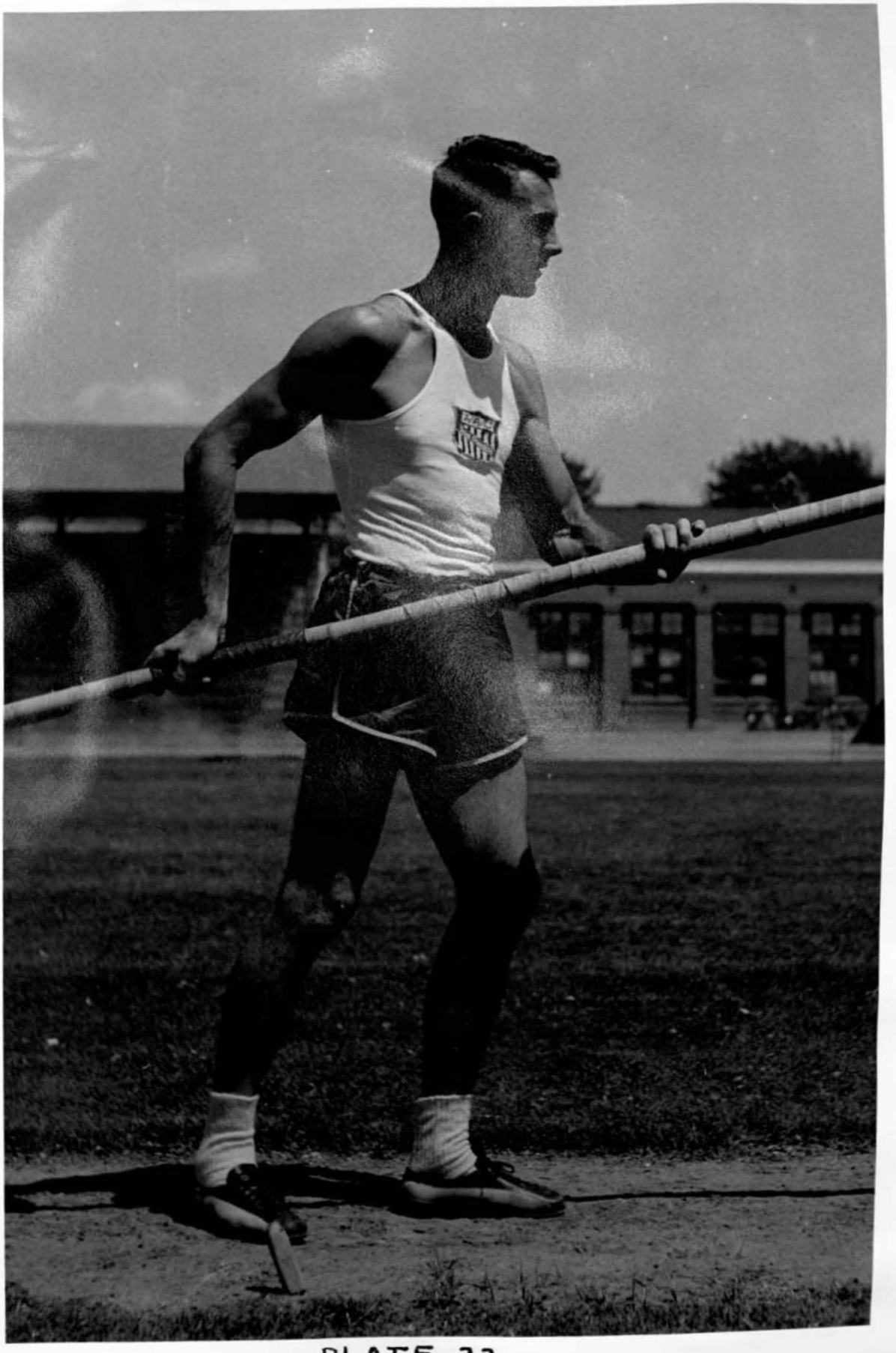

PLATE 22
PROPER POLE CARRY

PLATE 23
PROPER APPROACH

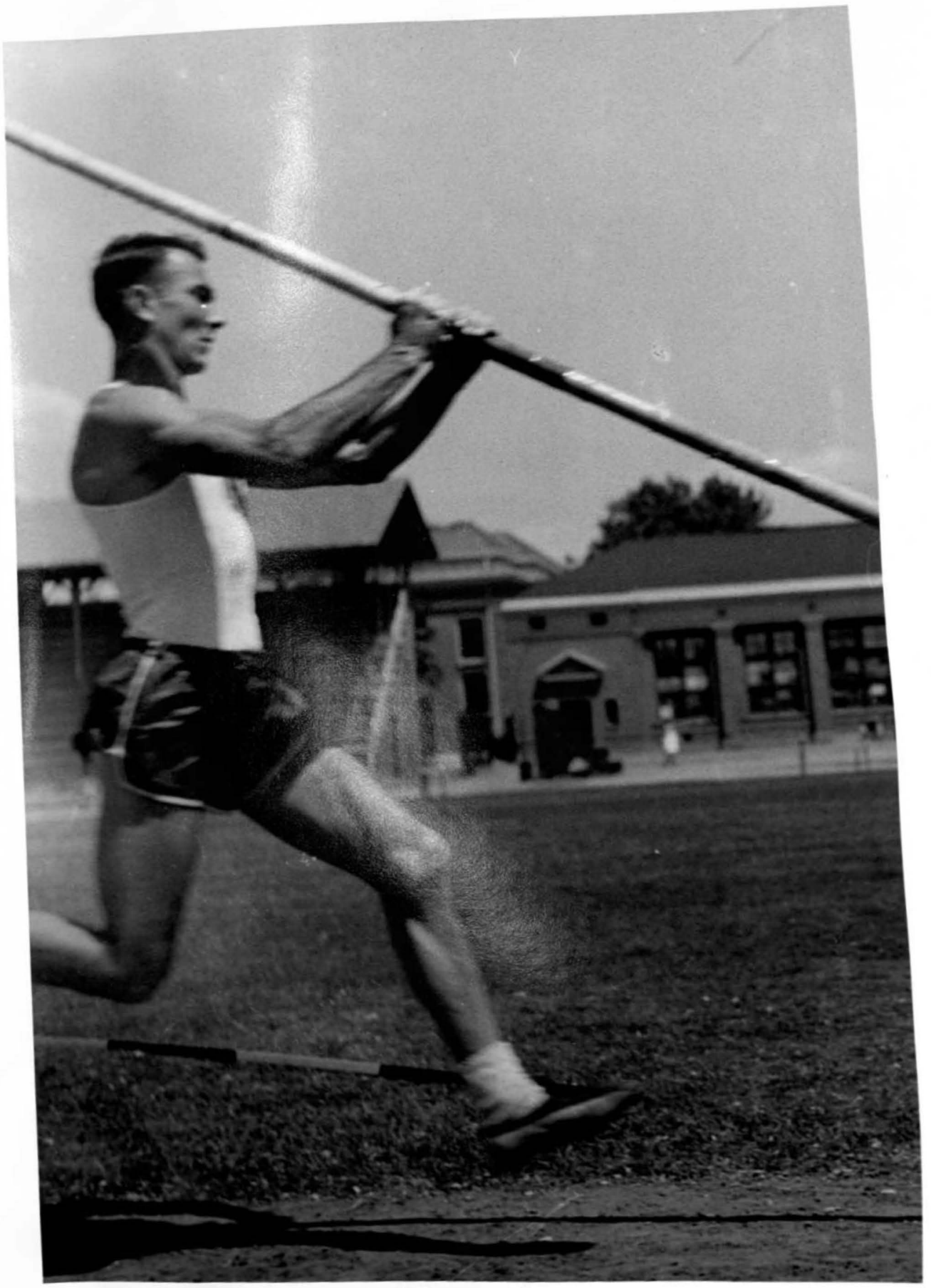

PLATE 24
PROPER POLE PLANT

the arms should be flexed at a 90 degree angle".[22] This allows a shock absorber action by the arms, thus a smooth action follows. At the moment of the pole plant, and deviation from the vertical in body angle is an error, as center of gravity must rise up directly over the take off leg (see plate 24).

Immediatly following the pole plant there must be a shifting of the left hand up to the right hand. "Failure to shift the left hand up to the right is the most noticable error at this point".[23] Failure of hand shift results in a poor position for maximum pull up and push off effort.

The foot stamp finds one common error which distracts from a powerful foot extension, that is, "error possibilities are the planting of the foot too far to the right of left or in front of the pre-determined takeoff spot" (see plates 25 and 26).[24]

In the swing up there is one very common error which breaks the smooth transition of forward momentum into an upward momentum that is, "extreme muscular tension of the arms tends to retard the swing up and a premature pull

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[22]Kenneth J. Doherty, Op. Cit., p. 300.

[23]Bresnahan and Tuttle, Op. Cit., p. 314.

[24]Ibid.

checks the foreward momentum" (see plates 27 and 28).[25] This leads us to the pull up.

In the pull up there is a continuation of this controlled momentum into an upward force. Errors breaking this momentum are; "many inexperienced vaulters start their pullup before their knees are even with their shoulders, thus killing part of thier swing".[26] "The body angle at this pull up stage should be at about 75 degrees trunk angle".[27] "Too late a pull up does not permit the body to assume a position from which to make the turn".[28] Also "an incomplete pull up distract from attaining the highest possible height" (see plate 29).[29] Following the pull up comes the body twist and leg cross over. Errors to watch for here are, "failure to keep feet high",[30] or "incomplete turn before the pushoff"[31] which would result in a crossing of the bar on the side. This would kill most of the push up effort.

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[25] Ibid.

[26] Wamerdam, Op. Cit., p. 8.

[27] Doherty, Op. Cit., p. 363.

[28] Bresnahan and Tuttle, Op. Cit., p. 315.

[29] Ibid.

[30] Ibid.

[31] Ibid.

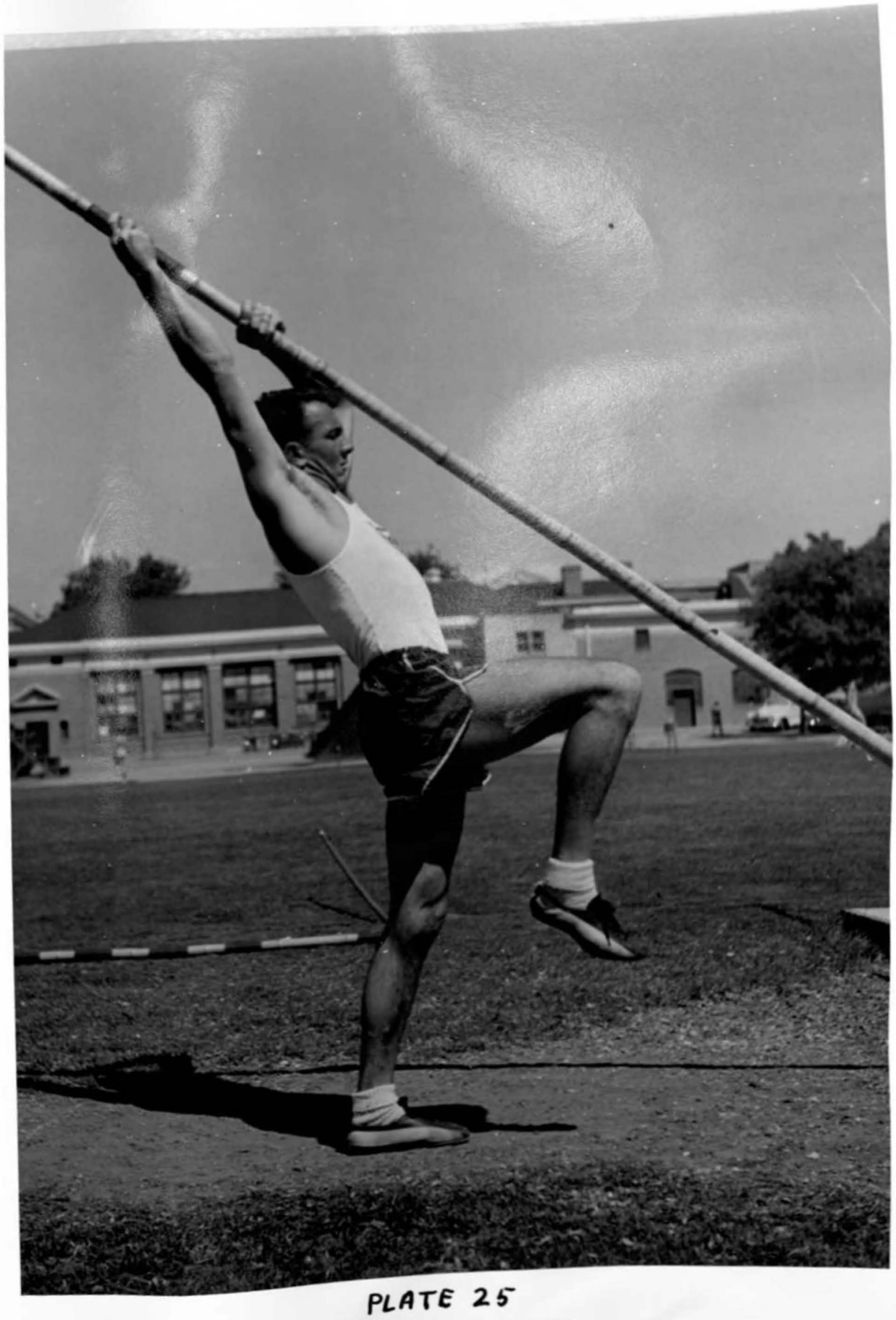

PLATE 25
IMPROPER TAKE OFF

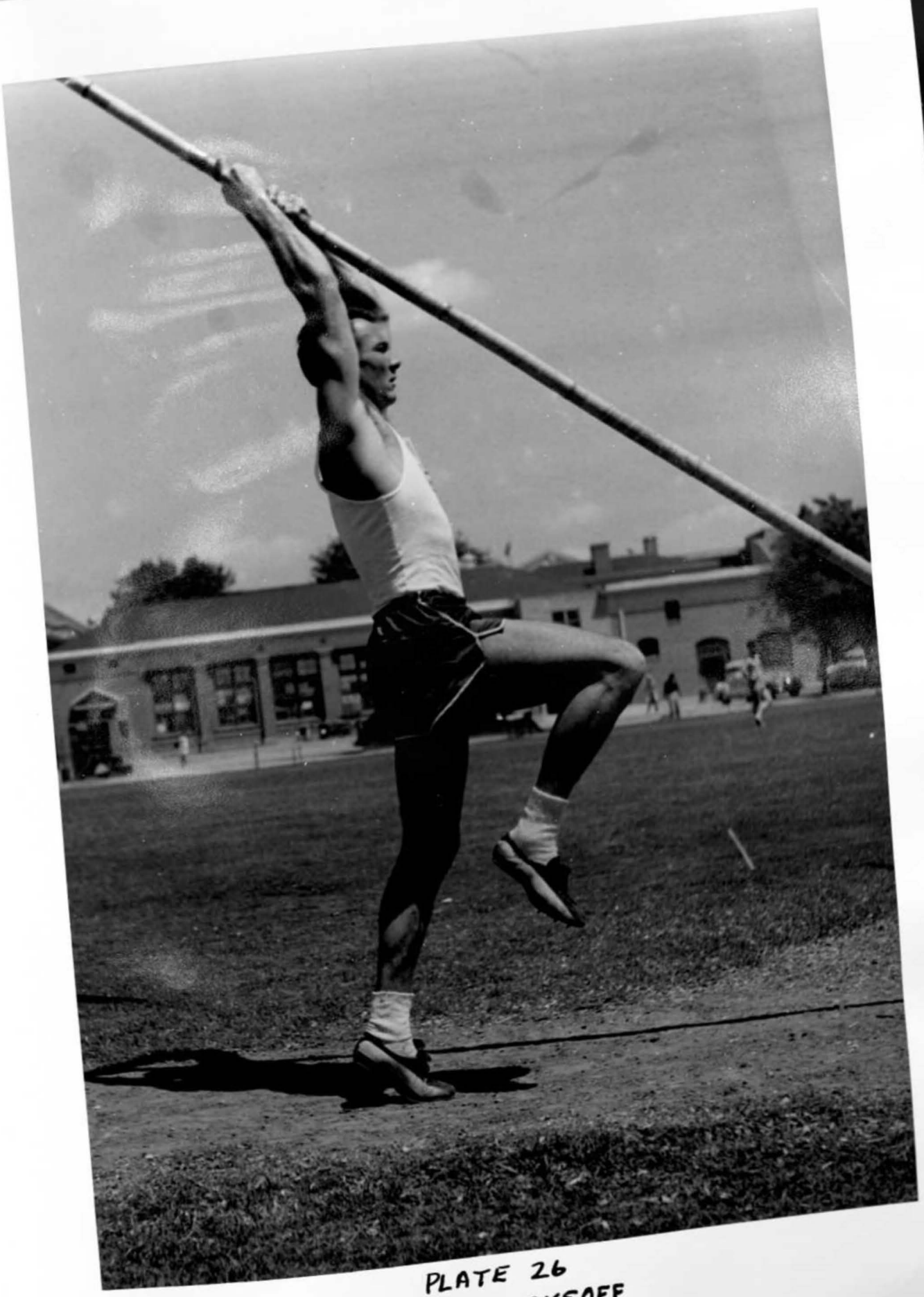

PLATE 26
PROPER TAKEOFF

PLATE 27
IMPROPER SWINGUP

PLATE 28
PROPER SWINGUP

PLATE 29
PROPER PULL UP

At the moment of crossber clearance, "a bending at the hips too soon results in a lowering of the of the height of feet andbrings the chest down to the bar."[32] "A glaring inefficiency is the failure to extend the body to a proper handstand position".[33] The body should be in a horizontal plane in order to attain the greatest potential (see plates 30 and 31). This leads us to the push up.

"The push up angle should be approximately 76 degrees".[34] "For a perfect push up action it is our belief that the legs and body should not start downward until the pushup action has been completed and the hands start to release the pole" (see plate 31).[35]

"Frequently the effectiveness of the push up is lost because it is executed with less than full effort".[36]

Then comes the landing. In the landing there is the one common error, relative to high jumpers also, that of relaxation. "Self protection through the art of relaxation insures safety".[37] Here again the only error is an error that would cause injury (see plates 32 and 33).

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[32] Ibid.

[33] Ibid.

[34] Doherty, Op. Cit., p. 369.

[35] Vamerdam, Op. Cit., p. 8.

[36] Bresnahan and Tuttle, Op. Cit., p. 316.

[37] Ibid., p. 136.

PLATE 30
IMPROPER BAR CLEARANCE

PLATE 31
PROPER BAR CLEARANCE

PLATE 32
IMPROPER FALL

PLATE 33
PROPER FALL

Here then we have an event that consists of eleven areas where one ties into the next with a very close relationship. Errors in any one area cauces inefficiency in the next area.

It is not difficult to surmise that it takes years of hard work to perfect this event. Common errors are; tense pole carry, jerky pole plant, non flexed arm action, ineffective pull up, failure to complete body twist and let cross over, poor cross bar clearance and a half hearted push up leading to a tremendous loss in potential vaulting power, and then the failure to relax during that long fall back to earth. This concludes the pole vault event, and our next event will be the shot put.

CHAPTER VIII

SHOT PUT

The shot put event was started in Scotland with the throwing of a rock, later it was restricted to the pushing of a rock. Later refinements restricted the pushing to a seven foot circle. Later various weights were agreed upon. So today we now push a 16 lb. shot from a seven foot circle. It is interesting to note that just since this event became a championship event, the record has been improved by over 27 feet. There is now an increased interest shown in the event as competitors go over the 60 foot mark.

From the beginning to the end of the putting action there are certain well defined movements, they are; the handhold, the initial stance, the leg swing, the shift, the delivery, the release and the recovery.

The most common errors in the handhold are; "should the weight be grasped too low in the hand, the value of the finger propulsion is lost".[38] It is also bad technique to try and hold the shot to far out on the ends of the fingers as this results in loss of control of the shot.

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[38]Bresnahan and Tuttle, Op. Cit., p. 334.

"Faults of unbalance caused by inaccurate placement of the thumb and little finger are obvious in that the shot may fall to the right of left".[39] It is also an error to have any handhold that is not comfortable to the competitor (see plates 35 and 36). From the handhold we shall go to the initial stance.

The initial stance takes place as far to the rear of the circle as possible, this allows for as long a glide as possible. The more common errors of the initial stance are, "shot putters frequently make mistakes of the initial stance by attaining a position of extreme body tension instead of moderate relaxation".[40] In the stance feet and body should be at a 90 degree angle to the direction of the throw, deviation is an error. "In all cases balance means an erect back and a flat-footed stance".[41] Lack of balance is a very common error. Failure to keep the shot in close to the center trunk line, near the nape of the neck is an error and causes undue fatigue to the putting are (see plates 35 and 36). Next comes the leg swing.

The leg swing is the preparatory movement used in securing poise and balance. Errors are in terms of balance.

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[39] Ibid.

[40] Ibid.

[41] Doherty, Op. Cit., p. 260.

PLATE 35

IMPROPER INITIAL STANCE

PLATE 36
PROPER INITIAL STANCE

"A leg swing out of alignment or improperly timed will be reflected in mal-adjustment of the feet after the shift has been completed".[42] The most common error with beginners is to overemphasize the legswing, which only means loss of balance and effort (see plates 37 and 38). This brings us up to the next area, the shift.

In the shift, the first error commonly committed is, "failure to get low enough at the back of the circle and to stay low enough through the early part of the glide".[43]

"The lower one gets at this point, the longer the duration the putter has contact with shot hence greater opportunity to change velocity".[44]

"Forward incline of trunk or sideward lead distracts from total force",[45] also "twisting the trunk to the left or failing to draw back the right shoulder during the glide is an error".[46] Failure to keep the shot and the shoulders well back when leading across the circle with the hips is an error.

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[42] Bresnahan and Tuttle, Op. Cit., p. 334.

[43] Doherty, OP. Cit., p. 260.

[44] Bresnahan and Tuttle, Op. Cit., p. 335.

[45] Ibid.

[46] Doherty, Op. Cit., p. 261.

PLATE 37
IMPROPER LEG SWING

PLATE 38
PROPER LEG SWING

"Failing to straighten the right leg effectively and failing to swing the left arm and leg vigorously are errors in the shift".[47] A common error in the shift is using a leap instead of a glide across the circle, the putter must maintain maximum contact with the ground for maximum putting effort. Failure to keep an even plane with both arms or dropping the elbow of the putting arm are costly errors (see plates 39 and 40). Now comes the delivery.

In the delivery, any deviations from the sound principles of mechanical levers will lower the efficiency of the putter. These errors are "lack of elbow height,"[48] "failure to lead the right hip soon enough",[49] "insufficient right leg extension",[50] also "failure to drive the right hip first upward then forward".[51] "Dropping the left shoulder and thus throwing the body off balance is a common fault".[52] "Raising the elbow above the level of the shoulder during the put is acommon fault".[53] "Arm push that

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[47]Bresnahan and Tuttle, Op. Cit., p. 335.

[48]Ibid.

[49]Ibid., p. 336.

[50]Ibid.

[51]Doherty, Op. Cit., p. 261.

[52]Vail, Op. Cit., p. 30.

[53]Ibid.

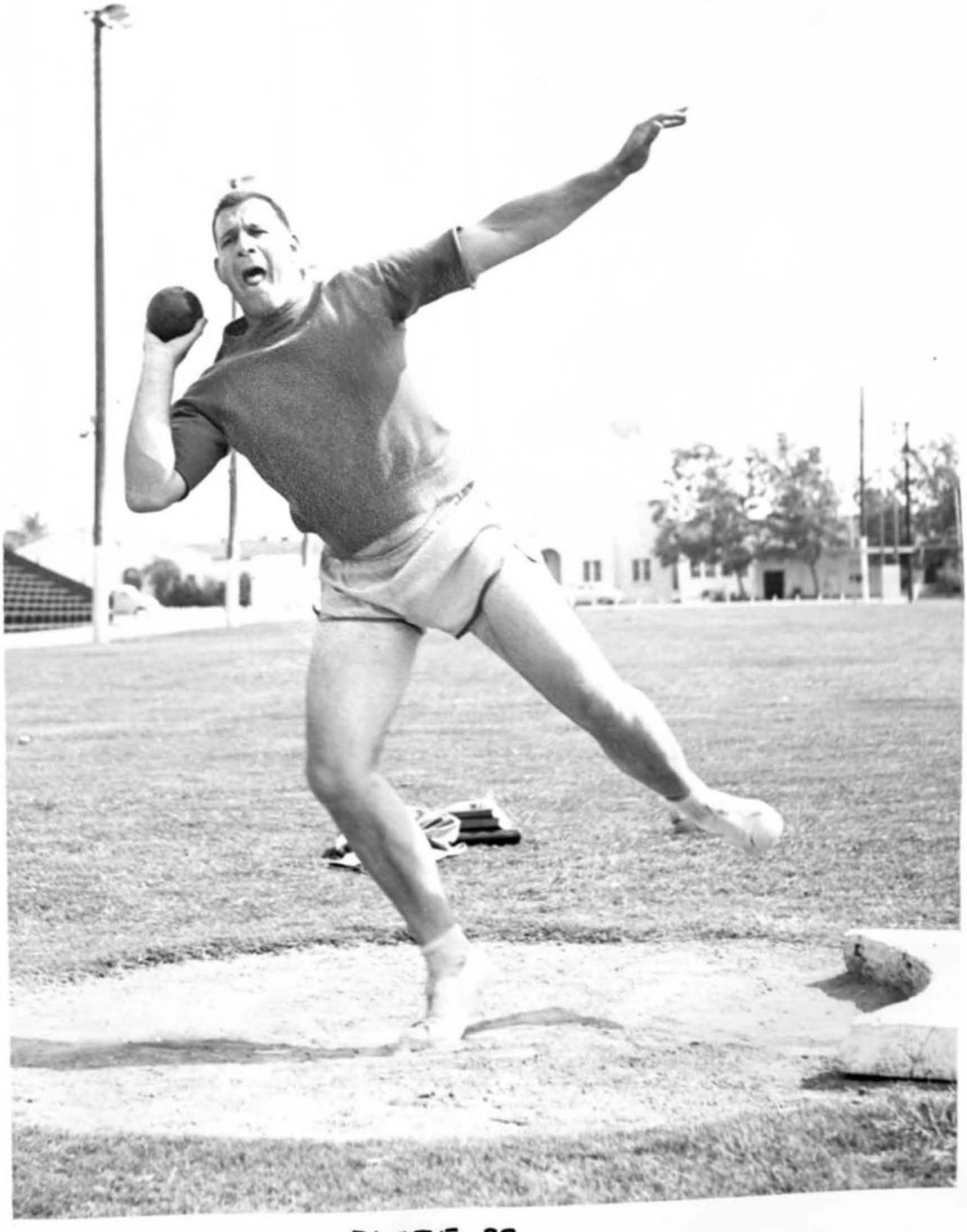

PLATE 39
IMPROPER SHIFT

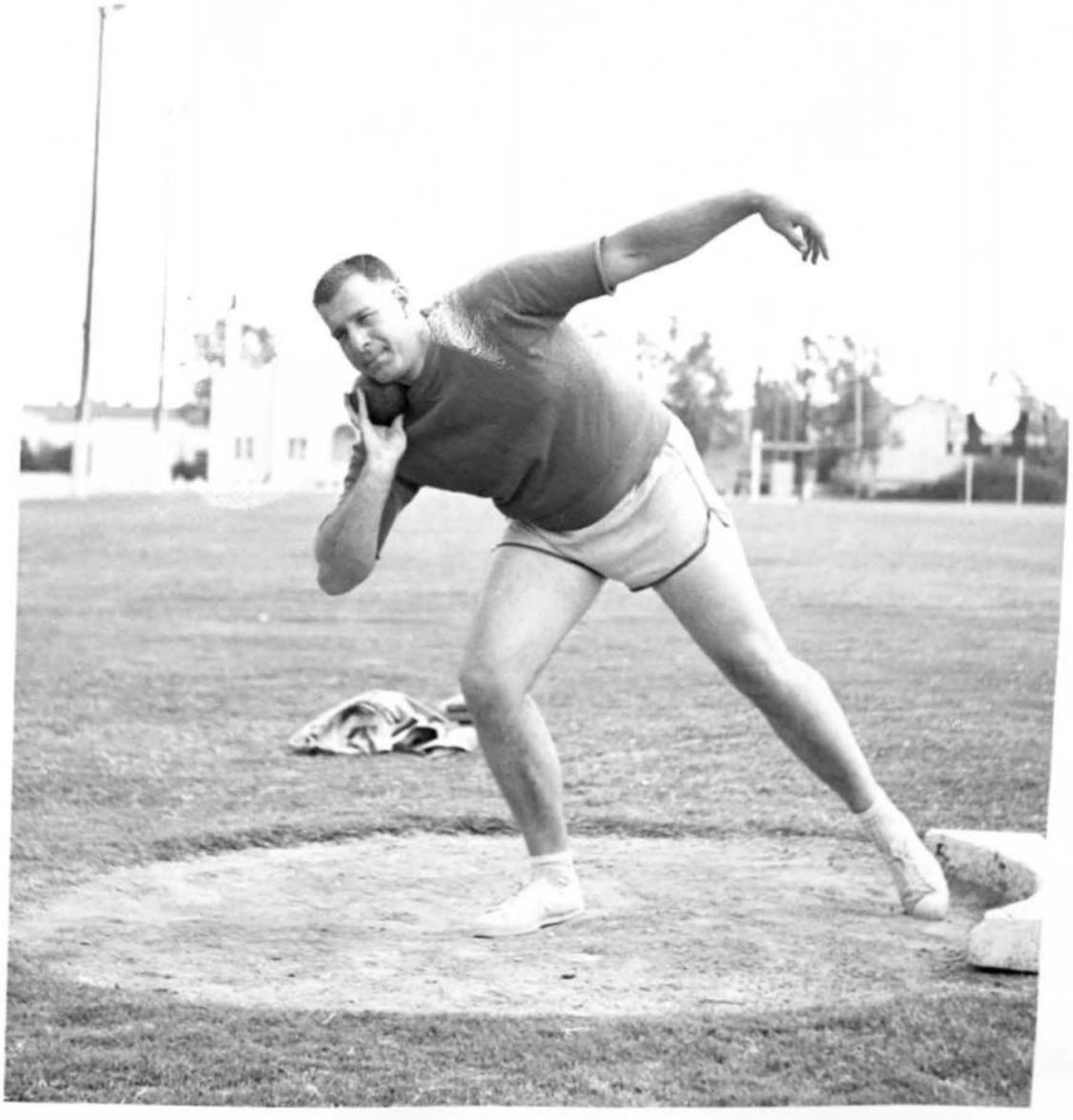

PLATE 40

PROPER SHIFT

deviates from 37 degrees to 42 degrees, when the release is executed, is an error".[54] "The eyes should be on a plane with the direction of the shot".[55] "Failure to put the shot high enough is a very common mistake".[56] "Failure to extend the entire body in the direction of the put is an error".[57] "A deficiency, is the lack of complete rock up on the toes".[58] "Failure to keep the hand in a direct line withe the elbow distracts from the push of the shot".[59] Any failure in the correct execution of putting the shot up and away, through a straight line, that is centered with the vertical line of gravity will cause a weakened put. Any round arm putting or side arm putting is an error resulting in the opposing action of the putting arm against a non-stationary base (see plates 41 and 42). This brings us to the release area, which in reality is nothing more than the last stage of delivery.

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[54] Breanahan and Tuttle, Op. Cit., p. 336.

[55] Doherty, Op. Cit., p. 261.

[56] Ibid.

[57] Ibid.

[58] Bresnahan and Tuttle, Op. Cit., p. 336.

[59] Ibid., p. 337.

PLATE 41
IMPROPER DELIVERY

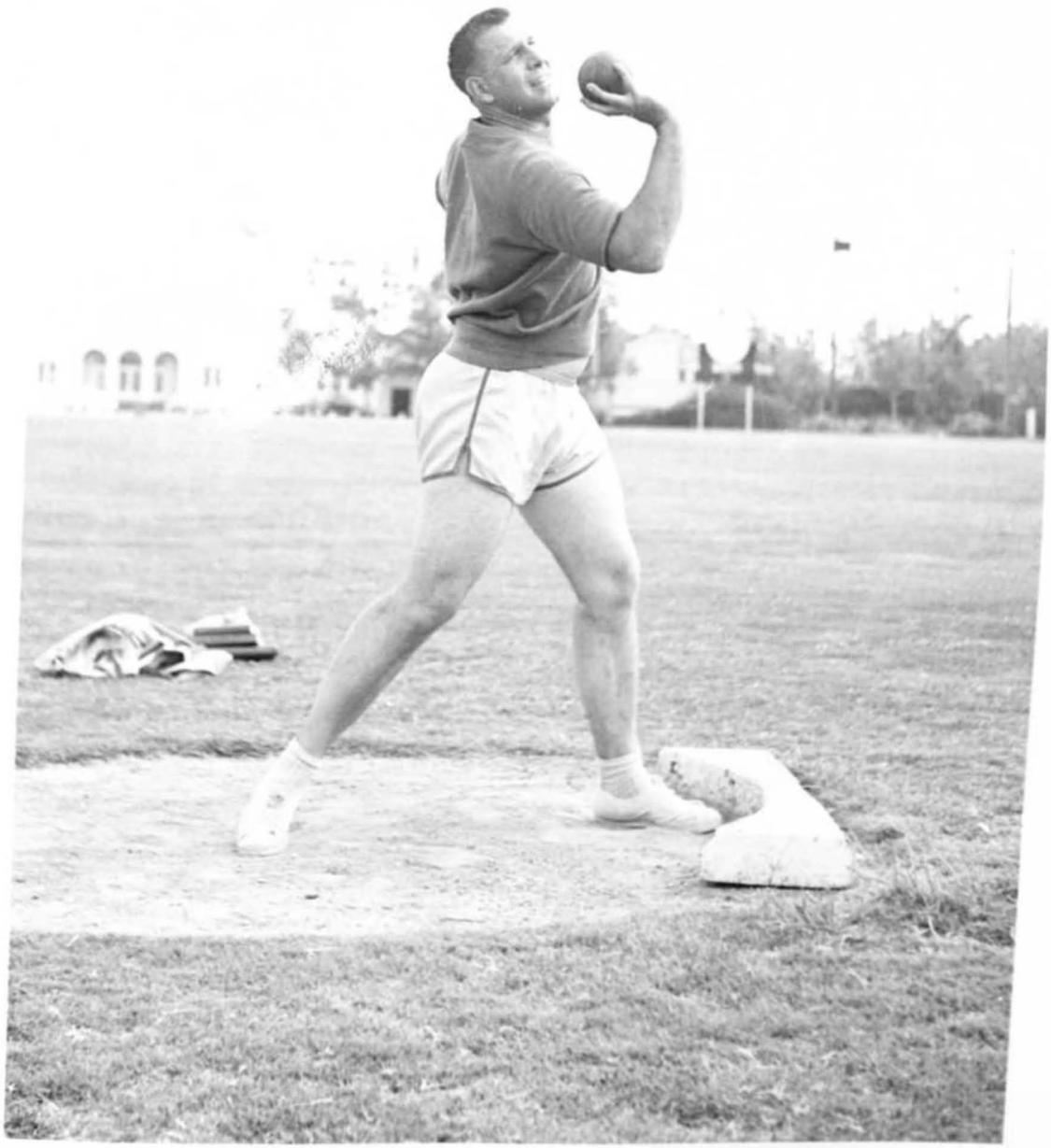

PLATE 42

PROPER DELIVERY

In the release, any errors committed in the delivery will also cause the faulty execution of the release. The common errors in the release are; "puts falling too far to the right or left may be caused by either a premature release of an ill timed trunk twist".[60] "Failure to complete a timely and vigerous wrist snap and finger flip will distract from performance".[61] "If the follow thru is not fully concluded, quite likely there were untapped sources of power not under the shot".[62] The head and eyes should still be on a plane with the shot (37 to 42 degrees). The body should be fully extended and the trunk angle should be approximately 15 degrees (see plates 43 and 44). This leads us to the recovery area.

The recovery is the act of staying inside of the ring, under balance, till the put is over. Errors in the recovery are, "failure to bring the right toe to the board immediately",[63] "an incomplete bend of the right knee preventing a lowering of the center of gravity".[64] One more common error, that is deadily in terms of disappointment

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[60] Bresnahan and Tuttle, Op. Cit., p. 336.

[61] Ibid.

[62] Ibid.

[63] Ibid., p. 337.

[64] Ibid.

PLATE 43

IMPROPER RELEASE

PLATE 44
PROPER RELEASE

is leaving the circle before the judge nods his approval, during competition (see plates 45 and 46).

In conclusion we have an event of pushing a missle from a 7 foot circle. It involves the acceleration of motion and fighting of gravity. Any deviation from good mechanical principles distracts from the efficiency of the human machine. Errors are in terms of balance, lack of speed needed for the instigating velocity, poor arm angles resulting in putting action, lack of concentration, and poor release. All are principles to watch out for in the unpolished putter.

PLATE 45
IMPROPER RECOVERY

PLATE 46
PROPER RECOVERY

CHAPTER IX

DISCUS

The discus is an event in which one tries to obtain the maximum distance by throwing the discus in a series of movements involving forward acceleration through body rotation with the discus held at arms length.

The series of movements used are; handhold, initial stance, preliminary swing, left foot pivot, right foot pivot, delivery, release and the recovery. Here as in other events such as the pole vault, errors in one area effect the efficiency of all movements that follow.

In the handhold the errors are in terms of control of the discus and the power of its release. The different types of holds used will depend on the size of the hand of your competitor. The larger his hand the less spread of fingers and more finger tip control of the first phalanges. The smaller hand will have to cradle the discus more and use greater finger spread. Common errors are; too small a spread of the fingers across the face of the discus, holding the discus flat against the palm of the hand instead od forming an air pocket in between. Improper angle of the wrist is a common error. The wrist should be at approximately a 40 degree angle to the arm. This follows for maximum wrist snap action at the point of delivery (see plates 47 and 48). This brings us to

the next area , the initial stance.

In the initial stance the competitor stands at a 90 degree angle to the direction of the throw.

"The trunk although erect is not stiff".[65] Failure to relax and yet keep concentration on the discus is a common error of the beginner. Failure to take stance as far to the rear of the circle as possible is an error, as the greater the distance of circle travel the greater the opportunity for increasing discus velocity (see plates 47 and 48).

In the preliminary swings, errors are in terms of poise, relaxation, and concentration. Failure to maintain perfect balance and poise is costly. Failure to relax and yet feel ready to explode into action the entire body results in tight, jerky movements to follow. From this moment on until the throw has been made concentration should be so developed as to make all else oblivious to the competitor except his movements. Failure is an error. Failure to bend the knees considerably and to get the body low as one starts his rotation action is an error, as the entire rotating action should be on a plane with the delivery (see plates 49 and 50). This leads us to the start of the pivoting and the pivot and the pivot on the left foot.

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[65] Bresnahan and Tuttle, Op. Cit., p. 371.

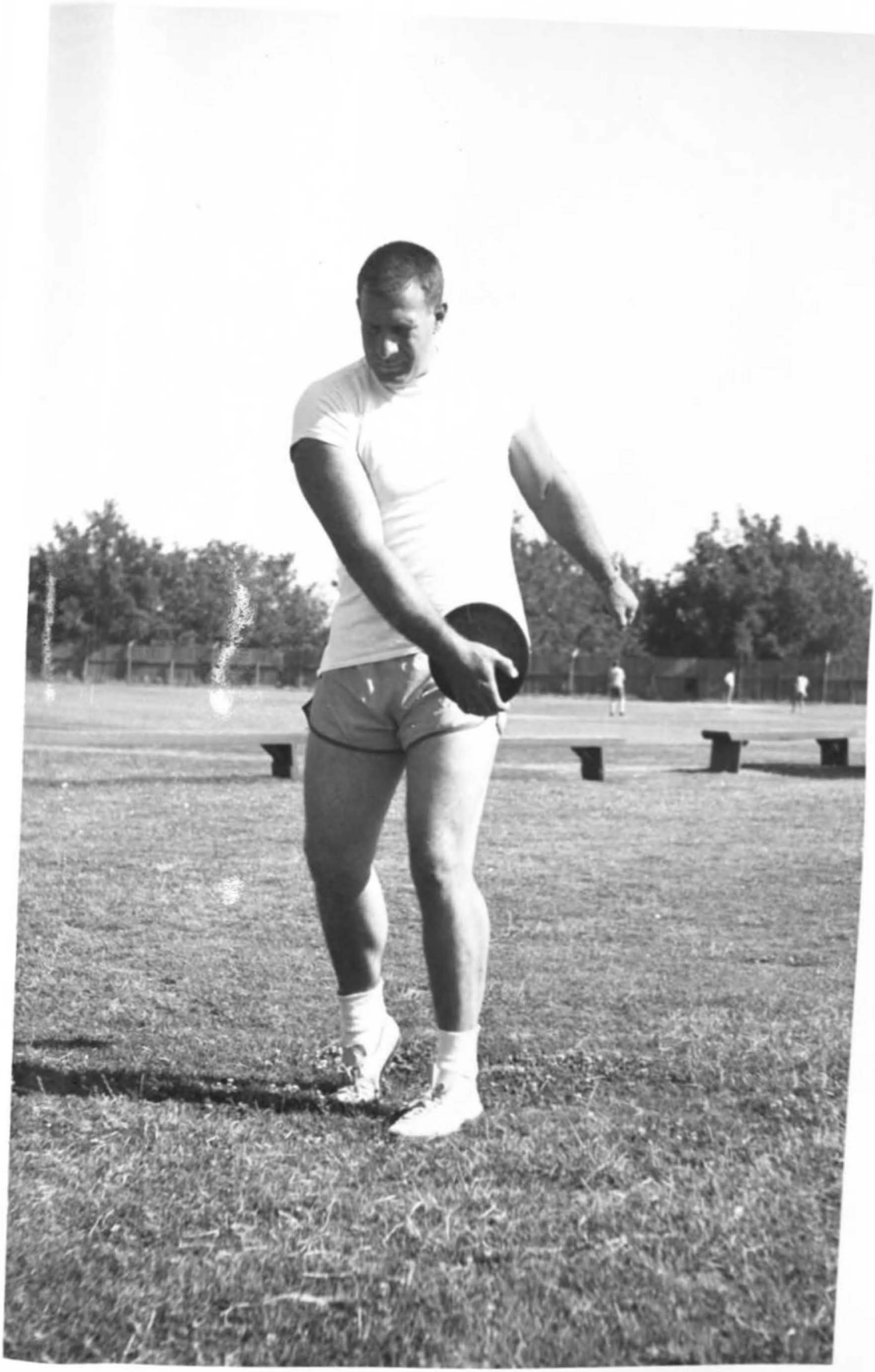

PLATE 47
IMPROPER INITIAL STANCE

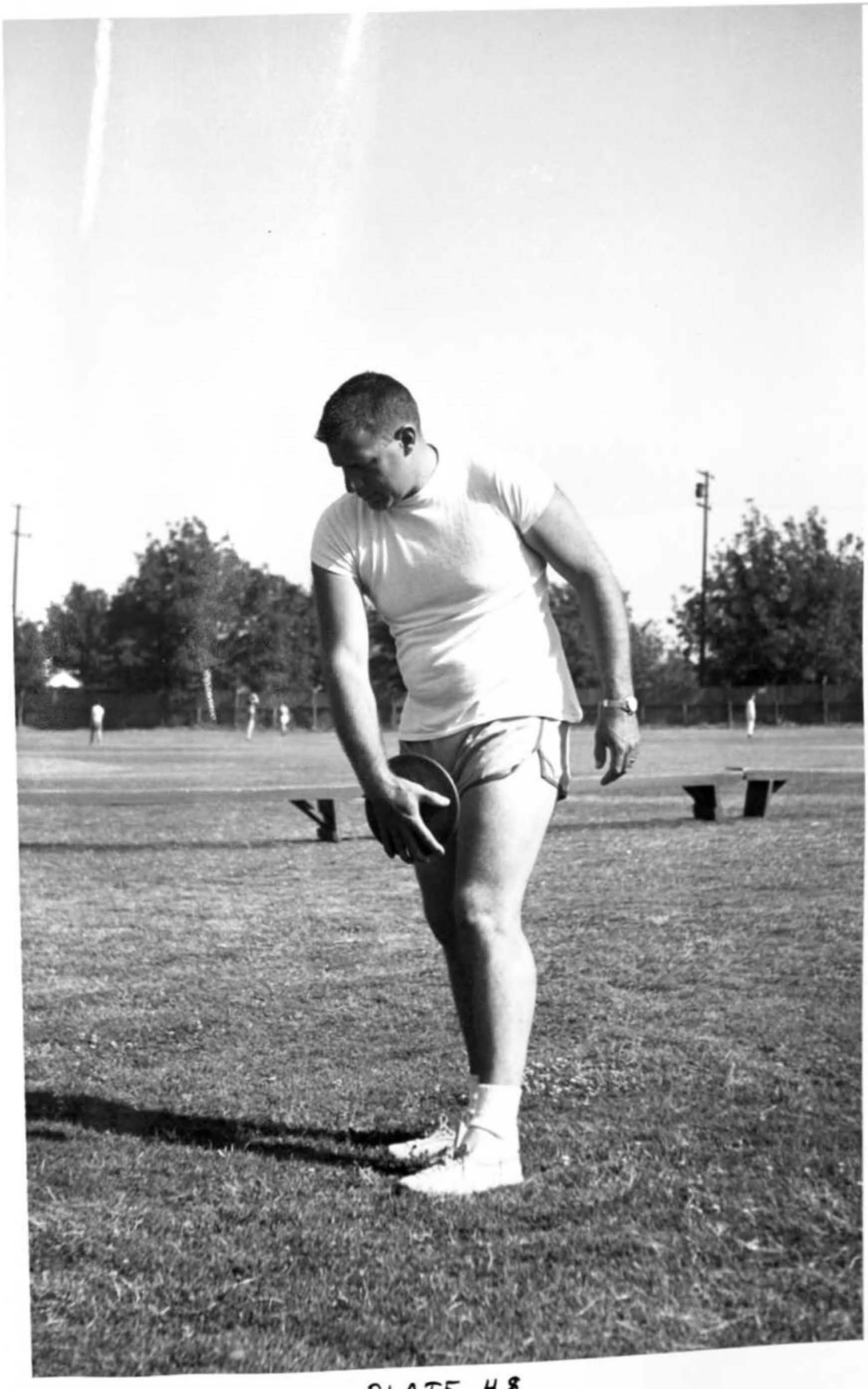

PLATE 48

PROPER INITIAL STANCE

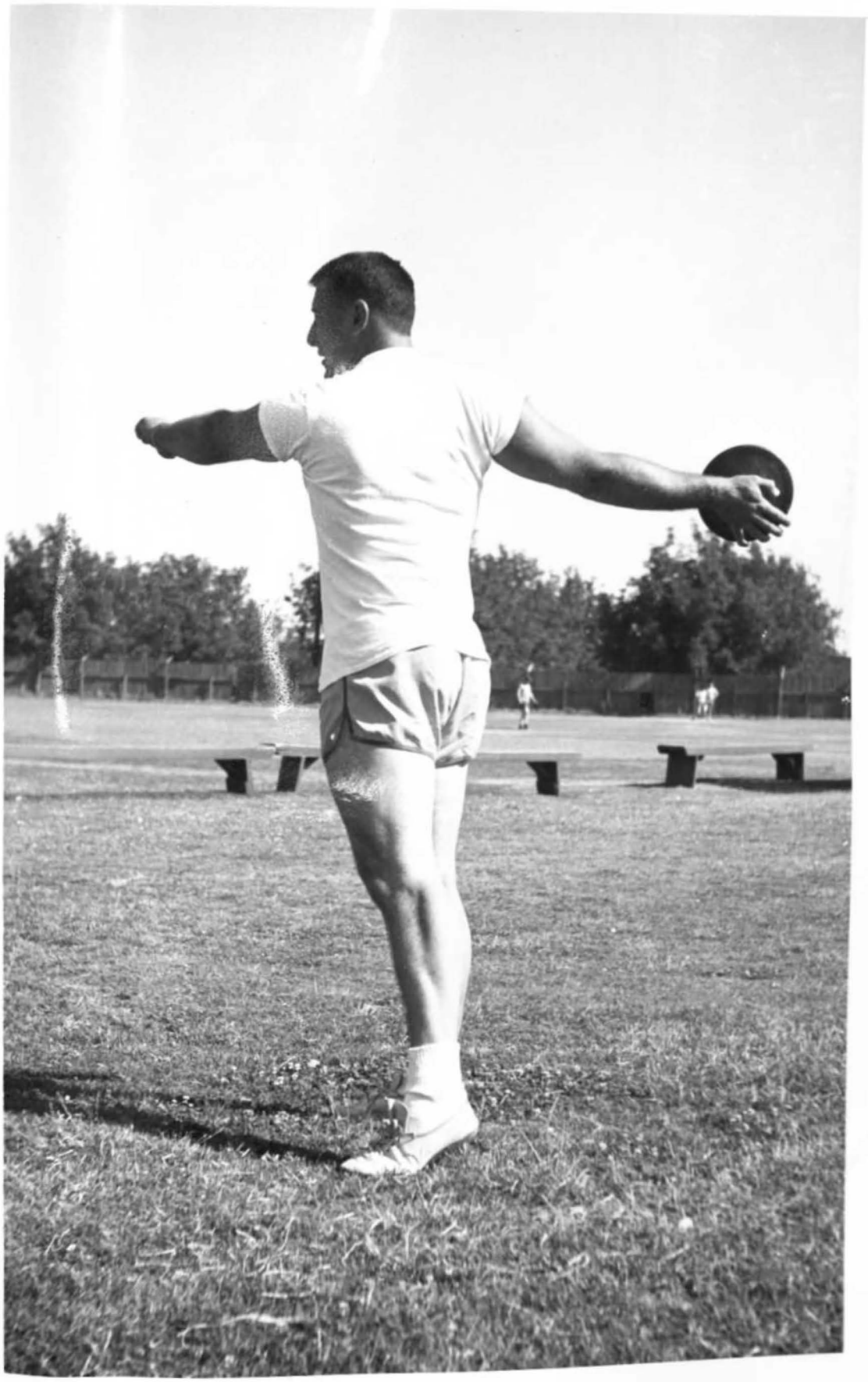

PLATE 49
IMPROPER SWING

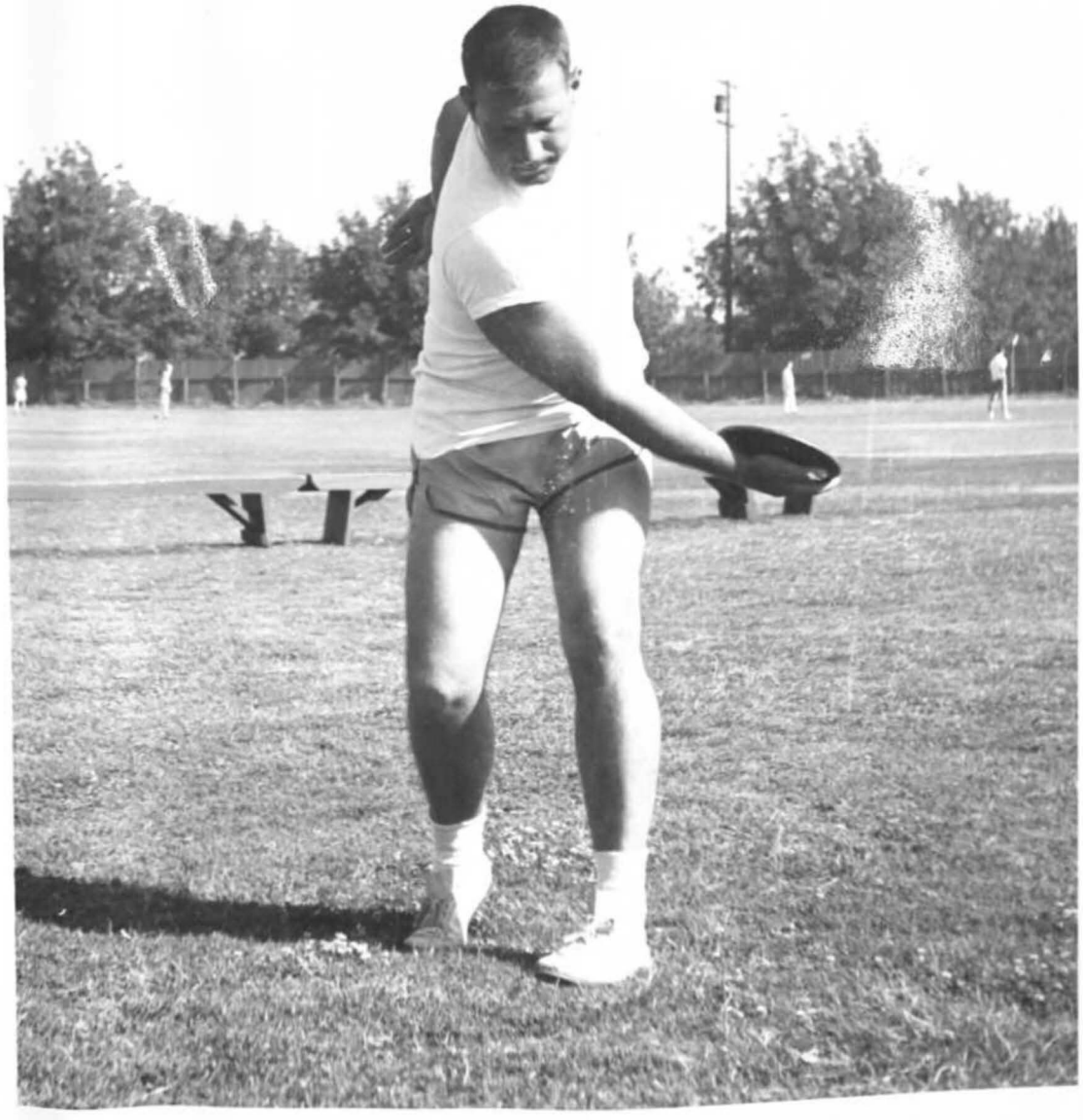

PLATE 50
PROPER SWING

In the area of the left foot pivot the common errors are; failure to sychronize the left arm movement with the swing, failure to keep the knees bent and the body low, failure to keep up on the balls of the feet during the pivot (see plate 51).

The pivot on the right foot finds errors in; failure to maintain a smooth increasing speed of movement, failure to continue his speed and outward twist of the body trunk. Failure in executing the body twist at full effort is most common. "Permitting the upper body to move to far forward and around at the start of the turn is a common error" (see plate 51).[66]

The delivery is the most important area in a good exeeution of the throw. Distraction of efficiency is caused by the following errors in technique; "if the feet are too close together it is very difficult to maintain good balance",[67] "insufficient knee bend causes loss of leg drive",[68] "many discus throwers in their effort to execute the foor reverse prematurely lift their right foot from the ground thus losing the drive off the right

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[66]Bresnahan and Tuttle, Op. Cit., p. 282.

[67]Ibid., p. 373.

[68]Ibid., p. 374.

PLATE 51

IMPROPER PIVOT

leg".[69] "Permitting the eyes to drop below the level of the plane of the throw, is an error resulting in a bloc of the free shoulder swing".[70] Any wide deviation from a 28 to 32 angle of release would be an error, distracting from maximum distance in terms of gravity (see plates 52 and 53). Trunk angle shouldn't deviate much from a 5 to 9 degree forward lean, at the moment of delivery. A common error is to have a vertical trunk angle. Failure to lead the throwing and whipping action of the arm, with the shoulder and hip is the most common error in the event (see plates 54 and 55).

In the recovery the errors are twofold. First, any error in maintaining balance and control of your body can result in disqualification. Here again the thrower s should not leave the circle without the nod of approval from the judges. The second one is, "the position of the thrower during the period of recovery is an index to the proficiency of the form of his throw (see plates 56 and 57).[71]

This concludes the discus event. The chief overall errors of this event are; lack of concentrated speed, failure to lead with the shoulder and hip during the pivots, and failure in releasing. We go next to the javelin.

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[69] Ibid., p. 374.

[70] Doherty, Op. Cit., p. 282.

[71] Bresnahan and Tuttle, Op. Cit., p. 376.

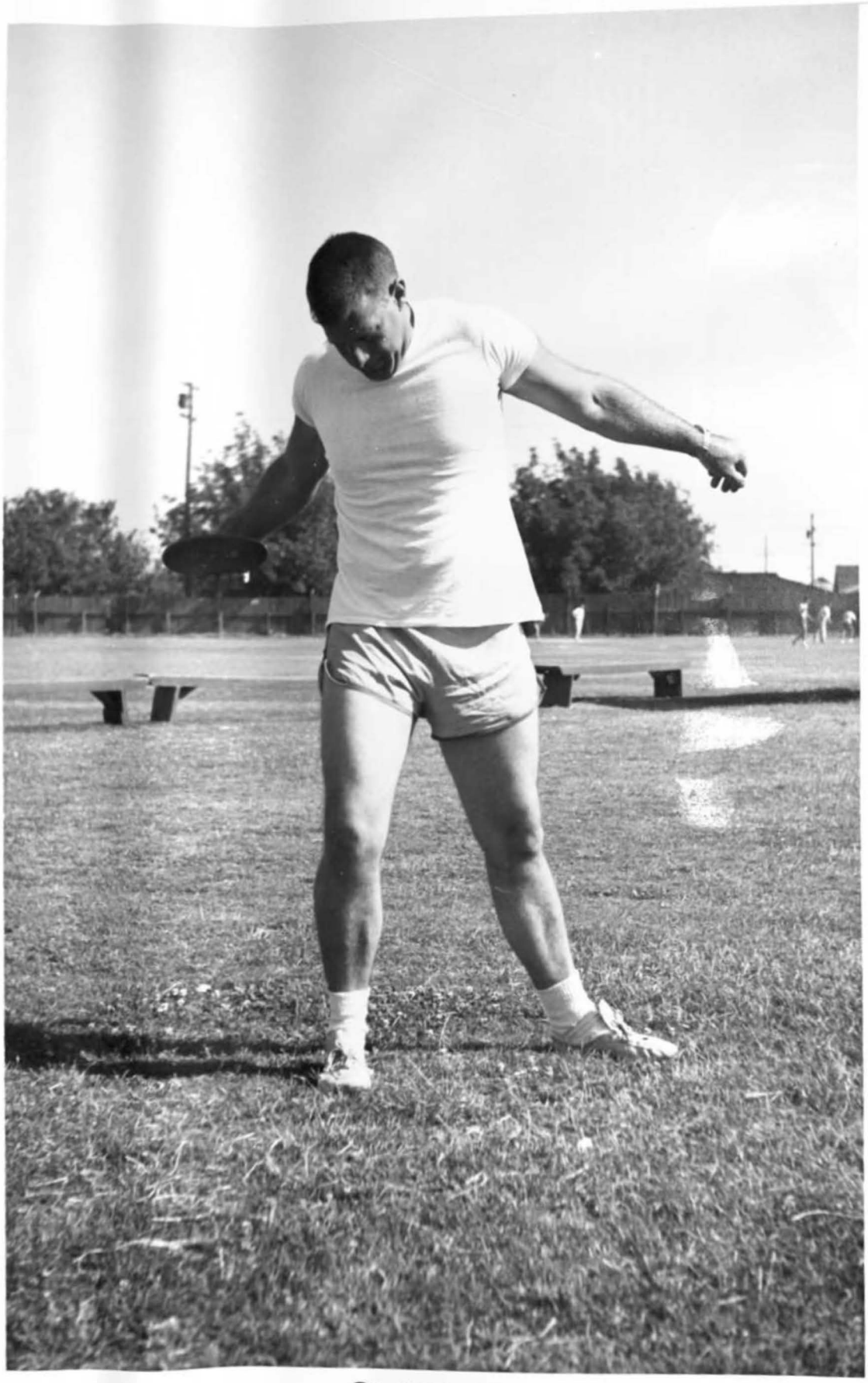

PLATE 52
IMPROPER DELIVERY

PLATE 53

PROPER DELIVERY

PLATE 64
IMPROPER RELEASE

PLATE 55
PROPER RELEASE

PLATE 56
IMPROPER RECOVERY

PLATE 57
PROPER RECOVERY

CHAPTER X

JAVELIN

The throwing of the javelin in a sanctioned meet started with the olympic games, but of course originated as an event in the British Isles during the reign of King Arthur. Since its introduction as a track and field event, the Finnish throwers have completly dominated the record book. That is up until the games of 1952. At that time the world saw the first break of Finland's domination of the event. The break came with quite a powerful force as the Americans took the first 3 places in the event. This was followed a little later with a new world record by Bob Held of Palo Alto, California. At the present, the throwers of America, Finland, and Sweden are even approaching new worlds records. To predict throws of 280 feet is not being over optimistic.

It is an event that is beautiful to watch and spectators are often awed to see the aesthetic values of a good performance. It is truly the human body in beautiful motion.

The event breaks down into 5 areas of interest. They are; the carriage, approach, delivery, release, and recovery.

Any errors in technique distract from the motion that makes up the action of hurling the javelin into space. Effectiveness in the process of changing the inertia into velocity depends on the correct techniques based on the sound principles of levers and motion.

The greatest variance in technique comes in the approach. They vary from the very fast sprint by Bill Miller, to the very slow jog by Cy Young. One style compensates arm power and body whip for speed of forward motion. Then of course there are throwers of all degrees in between.

The common errors in the carriage are; "any grasp of the javelin which fails to provide a firm hold at the instant of delivery is bad form",[72] any hold that isn't comfortable and natural will detract from needed relaxation in the approach, any tight gripping of the javelin prior to the release is an error that will result in a constriction of the upper forearm (see plates 58 and 59).

In the approach we have a sprint or run to the delivery spot in order to gain forward momentum which one attempts to transfer to the velocity of the javelin. The techniques are the same as for the sprint run, except for the carrying of the javelin in the right hand. The errors are in terms of poor sprinting techniques, and improper acceleration of run. The most common error is that the beginner runs too fast on the approach, to allow him to transfer his momentum into javelin velocity. Lack of upper body relaxation during the approach is common with beginners (see plates 60 and 61).

The delivery is the most fruitful area for all errors

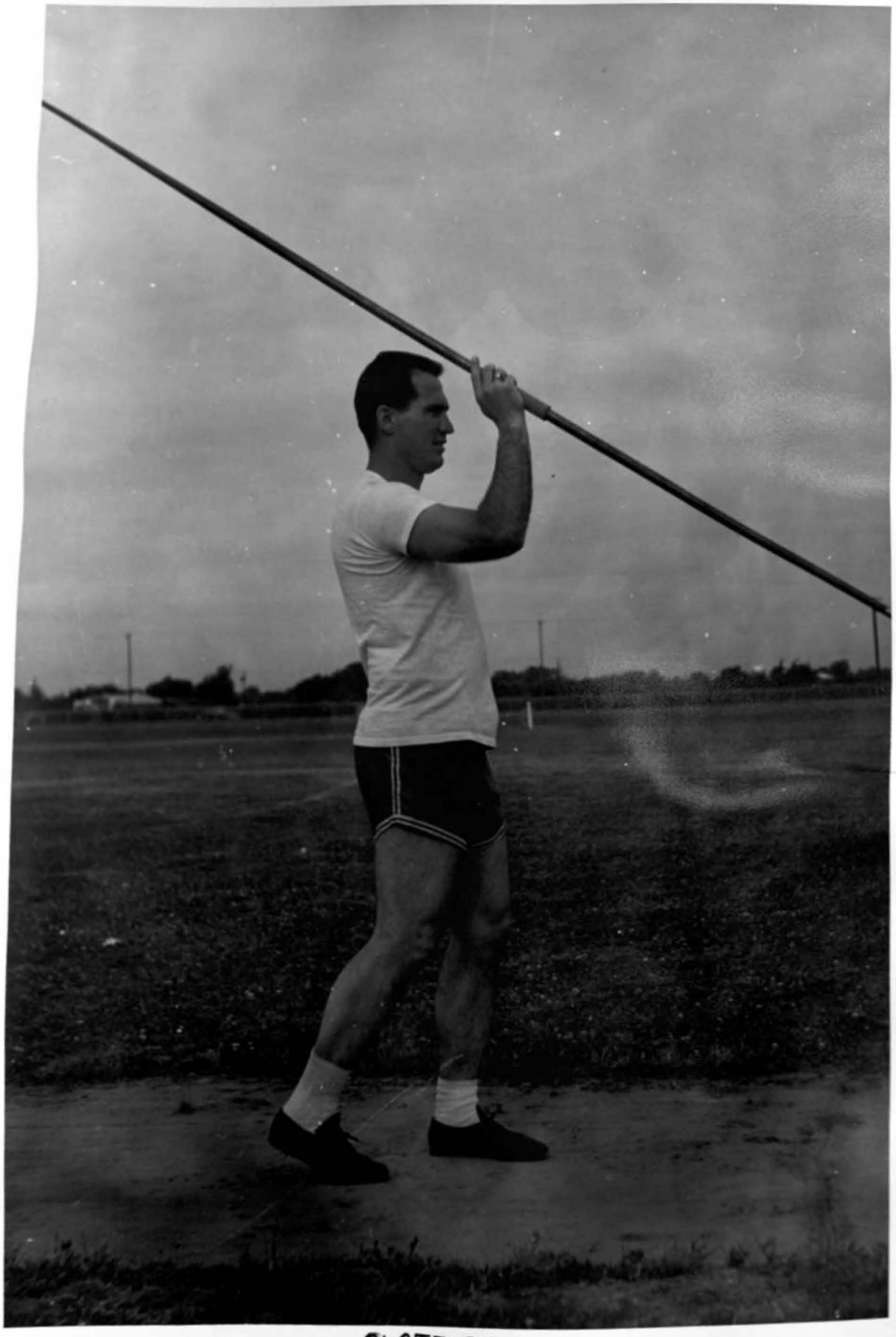

PLATE 58
IMPROPER CARRY

PLATE 59
PROPER CARRY

PLATE 60
IMPROPER APPROACH

PLATE 61
PROPER APPROACH

in technique. These errors are; "on the step preceeding the throw the trunk angle should be leaning back at an angle of about 35 to 40 degrees, failure results in lack of maximum opportunity of changing velocity of the javelin",[73] "an arm drawn back which is out of line with the intended throw is a common error" (see plates 62 and 63),[74] "delivery with a side arm swing instead of an over shoulder whip is bad form" (see plates 64 and 65),[75] failure to lead with the right shoulder is a common fault. "At the moment before the release of the javelin the forearm should be flexed at about a 80 degree angle".[76]

In the release the errors are; "releasing at an angle that is too high or too low will not make an effective throw".[77] "Ideal release of the javelin is between 45 and 50 degrees".[78] "Failing to keep contact with the ground until the javelin has left the hand is a bad fault".[79] Head and eyes should be on a plane with the throw, failure results in a lowered shoulder angle. Failure to whip with the arm and upper body, and lack of concentration

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[73] Doherty, Op. Cit., p. 302.

[74] Bresnahan and Tuttle, Op. Cit., p. 410.

[75] Ibid.

[76] Doherty, Loc. Cit.

[77] Bresnahan and Tuttle, Loc. cit.

[78] Doherty, Op. cit., p. 333.

[79] Bresnahan and Tuttle, Loc cit.

PLATE 62
IMPROPER DELIVERY (SIDE)

PLATE 63
PROPER DELIVERY (SIDE)

PLATE 64
IMPROPER DELIVERY (FRONT)

PLATE 65
PROPER DELIVERY (REAR)

toward explosive power results in a half-hearted, non-effective throw (see plates 66 and 67).

In the recovery, the errors are in terms of fouling. Failure to bring the right foot immediately to the ground and to bend the knee slightly to lower the center of gravity, is an error that might cause you to be carried across the foul line, thus disqualifying the throw (see plate 68).

In conclusion, any error that makes for faulty rhythum, jerky movements, poor mechanical levers, or loss of poise and balance and inadequate explosive action of energy will distract from the total efficiency. Maximum potential in the javelin is very closely related to maximum efficiency in technique. Any error causes tremendous decrease in throwing distance. These errors can be; uncomfortable javelin grip, non-regulated approach, failure to extend javelin back to rear as far as possible before delivery, failure to throw over the shoulder, failure to whip the throw and failure to lead with the shoulder.

PLATE 66
IMPROPER RELEASE

PLATE 67
PROPER RELEASE

PLATE 68
IMPROPER RECOVERY

CHAPTER XI

SUMMARY

It has been the purpose of this survey to bring together many of the errors and faulty tehniques which keep trackmen from going higher, faster and farther. It is quite obvious that all of the errors and factors of bad technique were not listed. It would demand volumes and is out of scope with the desires of this work. Only the more common ones were given consideration and according to authorities the most prevalent errors were all that were mentioned.

In the sprints the errors that are committed in the start are: eyes focused straight at the ground, head in any position other than a natural extension of the trunk, fingers not extended, hips elevated beyond twenty degrees, poor weight distribution, arms not vertical. In the full speed dtride errors are: arms not carried at a ninty degree angle, cross shest motion of the arms, inadequate body lean, excessive shoulder twist. The finish can be marred by errors, either failing to strike through the tape or losing body lean angle.

In the middle distance races the errors of the start are the same as in the sprints. In addition the full speed stride errors are: head carried in a backward angle, less

than fifteen degree body lean, poor knee lift, clenched fists and tight shoulders. The finish errors are: again failure to run through the finish tape, backward body lean, poor knee lift and drive.

The distance runs errors of the stride are: less than five degrees body lean, arms carried too high, excessive hip sway, failure to use ball-heel landing of the foot, lack of relaxation, constriction of neck and shoulders, cross chest action of arms and non-rythmic stride.

In the relays, only the baton errors are listed as the running errors were listed under the sprints. The errors of baton passing are: failure to spread the fingers of the target hand, failure to fully extend the recieving arm, any uncertainty, lack of concentration, poor timing of the take off by the recieving runner.

The pole vault errors are listed by area. In the pole carry the errors are: a tense body approach, too high a pole carry, a devious run, excessive hip sway, head and eyes not focused on the planting box. In the pole plant errors are: jerky arm thrust, poor visual concentration on box, lack of proper arm flexion, failure to shift the bottom hand up to meet the top grip and failure to have body in a vertical position at the moment of the plant of the take off foot. In the swing up the error is

muscular tension which retards the swing up and results in a premature pull up which comes before the knees are even with the shoulders, incomplete pull up, failure to cross legs for body twist. In the cross bar clearence errors are: bending of the hips too soon, and failure to extend body into handstand.

In the push up the error is to let the body start downward before the push up is complete. In landing the error is one of poor relaxation.

The errors of the shot put are: failure to hold the shot with the finger pads, unbalanced shot grip, poor body balance, poor timing in the leg swing, shot held away from the midline of the body, loss of balance during shift, poor trunk twist, failure to keep shot and arms low enough during shift, leaping instead of gliding across ring, failure to lead the delivery with the hip and shoulder, insufficient leg extension, too low a delivery angle, eyes not focused on plane of shot, failure to rock up on toes after delivery, lack of wrist snap, and loss of balance in to recovery because of poor knee flexion.

In the discus throw the more common errors are: lack of finger spread in the hand old, poor wrist hold angle, a non-erect body stance, failure to start at back of ring, failure to flex knees and get body gravity low during the pivot, failure to rise on a constant plane during pivot,

feet too close together during delivery, lifting the right foot off the ground, eyes not on the level of the discus plane, too low a release angle, a vertical trunk angle, failure to use whipping action, and loss of body balance in the recovery stage.

The javelin errors are: lack of a good firm grip, poor sprinting technique, improper acceleration during approach, lack of shoulder relaxation, a poor layback angle preceeding delivery, arm not fully extended, failure to lead with the shoulder, failure to flex forearm to eighty degree angle, poor release angle, eyes and head off the plane of flight, lack of arm whip, poor explosive power, crossing foul line, failure to flex right knee during recovery, and poor recovery balance.

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