



ALPINE OFFICIALS' MANUAL

CHAPTER IX

TIMING & CALCULATIONS

Season 2021

OVERVIEW	IX/ 2/20-21
GLOSSARY	IX/ 2/20-21
U.S. SKI & SNOWBOARD TIMING RULES IN THE <u>ACR</u>	IX/ 3/20-21
FIS TIMING RULES IN THE <u>ICR</u>	IX/ 4/20-21
CRITICAL SITUATIONS.....	IX/ 6/20-21
GENERAL TIMING COMMENTS.....	IX/ 7/20-21
EQUIPMENT AND SUPPLIES.....	IX/ 8/20-21
TIMING PROCEDURES AND THE TIMEKEEPING CREW	IX/ 9/20-21
TIMING METHODS AND EQUIPMENT	IX/10/20-21
ELECTRONIC TIMEKEEPING EQUIPMENT.....	IX/11/20-21
MANUAL/HAND TIMEKEEPING	IX/11/20-21
REPLACEMENT (EQUIVALENT ELECTRONIC) TIMES (EET)	IX/14/20-21
READING A TIMING TAPE	IX/17/20-21
Case Study: A Timing Tape.....	IX/18/20-21
THE IMPORTANCE OF POINTS.....	IX/19/20-21
Race Points.....	IX/19/20-21
RACE PENALTIES	
U.S. Ski & Snowboard Penalty Calculations Under Particular Circumstances.....	IX/21/20-21
Minimum Penalties for U.S. Ski & Snowboard-Scored Events	IX/22/20-21
FIS Penalty Calculation Procedures.....	IX/22/20-21
FIS Penalty Calculations Under Particular Circumstances.....	IX/23/20-21
Penalty Point Example 1: U.S. Ski & Snowboard Race Penalty	IX/25/20-21
Penalty Point Example 2: Tie for 10th Place	IX/26/20-21
Penalty Point Example 3: Tie for 5th Place	IX/26/20-21
Penalty Point Example 4: FIS Race Penalty	IX/27/20-21

NOTE: Current edition of FIS TIMING BOOKLET includes timing installation requirements. The Booklet is not duplicated in this Chapter; it is available on the FIS website.

OVERVIEW

In the earliest days of Alpine ski racing, all the competitors made a mass (“geschmozzle”) start in the “straight race”, and the first competitor to reach the village was the winner!

Timing was introduced when “records” were established. It became a necessity years later when competitors started individually. From the beginning, however, timing officials were expected to provide accurate times and post them quickly. The objective is still prompt posting of accurate times, and due to the use of more sophisticated equipment, even Replacement Times (Equivalent Electronic Times – EET) are accurate.

U.S. Ski & Snowboard sanctioned events (scored and non-scored), require the use of electronic timers, start gates, and photocells homologated by the FIS. A list of these approved devices is published on the FIS website. Scored events that use equipment other than what is listed on the homologated lists will not be considered for scoring to the National Points List.

Electronic timing consists of two synchronized electronically isolated systems operating in time-of-day mode. One system is designated as System A (primary system); the other is designated as System B (secondary or back-up); designations are made prior to synchronization of the equipment.

Manual/hand timekeeping, separate and independent of electronic timing, *is required for all* U.S. Ski & Snowboard and FIS events.

Regardless of personnel or procedures utilized, it is essential to record and promptly post competitors’ times accurately. Verification of official times is paramount to a fair, accurate race, and an accurate and fair race for all competitors is the primary goal for all Alpine Officials.

As equipment has become more sophisticated, so have our timing officials. Timekeepers need to know more today than they did before and are required to be true professionals in their approach to their duties. This “professional” approach keeps standards high and timekeeping accurate.

Modern equipment has made our lives much easier, but it has also caused bigger and more complex problems. Competitors may pass each other, times can be “lost,” equipment can malfunction, or a power outage can occur, and timing officials must be able to handle these problems in a “professional” manner. Timing clinics that address the basics of timekeeping for alpine events are held each year to introduce novices to the basic requirements and to refresh the memories of veteran timekeepers. Timing workshops that address the installation and operation of timekeeping equipment and computer software are a new and welcome addition to the education process.

GLOSSARY

BOB RULE: Proposed by Bob Arnott (AUS) and Bob Beattie (USA) for calculating a race penalty. It was adopted by the FIS in 1967 and is currently used as modified. (See “**RACE PENALTY.**”)

REPLACEMENT TIME (EQUIVALENT ELECTRONIC TIME - EET): Time used when a primary electronic time of day – either start, finish, or both – is not available. When primary electronic timing fails, replacement/equivalent time must be calculated by comparing start or finish secondary electronic time-of-day to the corresponding start or finish primary electronic time-of-day for the ten times before the missed times. If both primary and secondary electronic timing fails, replacement/equivalent time must be calculated by comparing the start/finish manual/hand time-of-day to the corresponding electronic time-of-day.

MANUAL /HAND TIME (HT): The calculated elapsed time of a competitor's time on a course is determined *from* hand-held watches or hand-held battery-operated timekeeping devices - at the start and at the finish - operating in time-of-day mode. These devices must be synchronized prior to the start of the first run, preferably with the same time of day as System A and System B electronic timekeeping systems. Manual/hand times *must* be taken at the start at the exact moment the competitor opens the start wand and *must* be taken at the finish at the exact moment the competitor crosses the finish line. *Consistency is required!*

LOWRY FORMULA: Proposed by Warren Lowry (USA) for calculating race points. FIS adopted this formula in 1984. It is better known internationally as the New Alpine Formula or linear formula. (*See "RACE POINTS."*)

POINTS: A determination used when establishing an individual's ranking in a particular event. Usually, this is the average of a competitor's best two results in each event. (There are provisions for using a single result with an additional, applied penalty.)

POINTS LIST: This is a competitor's listing documenting their earned points in each event. We use only two points lists - the National (U.S.) Points List for non-FIS events and the FIS Points List for FIS events. Unless the respective organization issues a points correction, a list is valid as published until the publication of the next list. The publication dates for these lists can be found in the current U.S. Ski & Snowboard Alpine Competition Guide or on the website. National and FIS Points Lists are only available electronically at the appropriate websites. *A FIS list that has been formatted for downloading into race result software is available through a function of U.S. Ski & Snowboard-approved race result software.*

RACE PENALTY: This is a calculation (again defined by the BOB RULE) that is used to equalize races held on different hills. It also allows for weighing the race results according to the caliber of the top five competitors who start the race and the caliber of the top five competitors (relative to their Seed Points) who are among the top ten finishers in the race. (One additional step is included in the calculation of a FIS Penalty. Refer to Penalty Point Example 4: FIS Penalty.)

RACE POINTS: The **LOWRY FORMULA** in which the competitor's time is compared to the winning time determines these points. The winner of a race always gets 0.00 points. Race Points are used in the calculation of the Race Penalty.

RESULT: Competitors "get a result" from each race they finish without disqualification; it is the sum of earned Race Points plus the calculated Race Penalty. When a racer's **Race Result** is lower than their current **Seed Points**, and if averaged with a second similar result, a lower seed point value will be identified in the publication of the next National Points List or FIS Points List. This gives competitors, coaches, and parents an idea as to how an individual is progressing. (FIS results for USA competitors are included in the calculation of the National Points Lists.)

U.S. SKI & SNOWBOARD TIMING RULES IN THE ACR

- For all U.S. Ski & Snowboard sanctioned events (scored and non-scored), electronic timers, start gates, and photocells homologated by the FIS must be used. A list of these approved devices is published on the FIS website. Events using timing equipment other than those on the homologated FIS list will not be considered for scoring to the National Points List.
- For all competitions that are scored to the National Points list, two synchronized electronically isolated systems operating in time-of-day must be used. Prior to the beginning of the race, one

system will be designated as System A (primary system), and the other as System B (secondary/back-up system).

- All time-of-day times must be immediately/automatically sequentially recorded on printed strips at the maximum precision of the timing device according to the requirements for homologation.
- Both systems must allow for calculation of net times by mathematical comparison of each competitor's start time to finish time. The final result for each racer is expressed to 1/100th (0.01) precision by truncating the calculated net time on course.
- Rules allow for the use of wireless timing.
- All timing equipment and technical installations must be demonstrably functional to requirements of the rules when disconnected from external devices, e.g., scoring/results computers.
- All times used for the final result must be from System A. If there is a failure of System A, a calculated net time from System B must be used following the procedure as established for a Replacement Time (Equivalent Electronic Time - EET). *It is not permitted to substitute time-of-day times from System B for use with System A for the purpose of net time calculations.*
- Timing equipment - System A and System B - are to be synchronized as close as possible to the scheduled start for the first run of the event.
- A Timing & Data Technical Report (TDTR) form that contains data for both runs (where applicable), must be completed for each event and each gender of all competitions – both scored and non-scored, and submitted with the required event document packet.
- FIS will only accept electronic submittal of the TDTR (XML format) and has developed software to meet this requirement.
- It is preferable that non-FIS events also use the FIS software and submit the TDTR XML file to tdtr@usskiandsnowboard.org. As an alternative, the paper copy form available in the "Master Packet of Forms" (MPF) on the U.S. Ski & Snowboard website can be used. *If the paper copy is used, it must be legible.*
- Manual/hand timekeeping is required for all U.S. Ski & Snowboard events. Manual/hand timekeeping must not be a part of the secondary or any other electronic timekeeping system and must be totally separate and independent of the electronic timekeeping system. It is done with hand-held stopwatches or hand-held battery-operated devices ***operated in time-of-day mode***. The devices must be synchronized to each other and, if possible, to primary and secondary electronic timekeeping systems. Printed records, either automatic or handwritten of recorded hand times must be immediately available at the start and at the finish.

FIS TIMING RULES IN THE ICR

The most direct comments in the FIS ICR concerning Timing, Calculations and Communications required for ski racing include the following:

- Electronic timing equipment, start gates, and finish photocells must be on the list of homologated/approved devices. Races using devices other than those approved will not be considered for scoring to the FIS Points List. (Refer to current list of Homologated Timing Equipment posted on FIS website.)
- Multiple modes of communication (telephone or radios, etc.) between start and finish should be available.

NOTE: The FIS Timing Booklet states timing without connections (wireless) is *only* allowed for Category 3 and Category 4 FIS races.

- Two synchronized, electronically isolated, timing systems operating in time-of-day mode must be used...time-of-day times must be immediately and automatically sequentially recorded maximum precision of the timing device according to the requirements for homologation.

- Both systems must allow for the calculation of net times by the mathematical comparison of each racer's start time-of-day to finish time-of-day. The final result for each skier's run is then expressed to 1/100th (0.01) precision by truncating the calculated net time on course.
- All times used for the final result must be from System A or the appropriate correction (Replacement Time/EET) must be made.
- If there is a failure of System A, a calculated replacement time of day from System B must be used following the same procedure as for an Equivalent Electronic Time. If both systems fail, and cannot be restarted, manual/hand net times will be used for all competitors.
- It is not permitted to substitute times from System B for use with System A for time-of-day calculations. e.g., subtracting System A time-of-day start from System B time-of-day finish.
- Software that calculates net times must use the precision of time of day as used in the timing device.
- The Start Gate must have separate electronically isolated switch contacts for triggering the start inputs of both System A & System B.
- If a Start Gate requires replacement during a run, it must be replaced with an identical start gate in the same position and with the same rotation.
- Photocells must be mounted so that both beams are triggered at a height that is lower than the knee of racers at the finish. *It is recommended that the lowermost photocell be connected to Timing System A.* The vertical separation must not exceed 20 cm and if, possible, should be less than this measurement.
- The manual/hand timekeeping must record the 1/100ths (0.01) of a second. It must be completely separate and independent of the electronic timekeeping. Times must be recorded/printed and immediately available at the start and finish. Manual/hand timing devices (ToD) should, if possible, be synchronized with the electronic timing.
- Manual/hand times are used in the Official Results after a correction resulting in a time equivalent to the average difference between the 10 times before the missed time recorded by electronic timing and those recorded manually has been calculated. (Replacement Time/EET)
- If the Timing & Data Technical Report (TDTR) indicates a replacement time (EET) was calculated, the actual calculation(s) must be made available for the Technical Delegate's review and must be included with the Technical Data Timing Report submitted in U.S. Ski & Snowboard's Event Document Packet.
- Any manual intervention of the timing must be marked on the timing tape.
- All timing equipment and installations must be demonstrably functional to the requirements of the rules when disconnected from external devices, e.g., scoring and results computers. All equipment must also be fully functional in the case of a power failure; this is when old-fashioned battery power is a necessity.
- Photo Finish Timing, is mostly used at FIS World Cup events and is not addressed in this Chapter. It is addressed in the FIS ICR and in the FIS Timing Booklet.

Other rules related to timing specify the titles and duties of various timing officials, proper start gate specifications, start procedures for all events and determination of a legal start (early and late start rules), and finish line specifications and determination of a legal finish. Additional information is contained in the current U.S. Ski & Snowboard/FIS rules and guidelines.

"Points" receive only a brief mention in the formula for calculating points. Additional information is contained in the current Rules of the FIS Points.

"Chapter VI - Working Papers" of this Manual lists forms that facilitate record keeping and contain information to refresh one's memory. This Manual does not supersede any information contained in

more current U.S. Ski & Snowboard/FIS publications; it is to be used in conjunction with all current rules and bulletins issued by U.S. Ski & Snowboard/FIS. The “MPF” located on the U.S. Ski & Snowboard website contains current versions of all forms that are listed in Chapter VI.

NOTE: Refer to current edition of FIS Timing Booklet posted on the FIS website.

CRITICAL SITUATIONS

Errors can and do occur when setting up the equipment, database, etc., for a race and when completing the necessary calculations and paperwork. This is one of the reasons we check and double-check our work. The most common problem areas are:

- Inadequate maintenance of a “permanent” communication system.
- Incorrect connection of wire/switch at the start gate.
- Breakage of the start “wand”/ “gate” with no “exact” spare available.
- Incorrect alignment of the finish “beam.”
- Failure to properly synchronize System A and System B. (as close as possible to the scheduled start time for the first run of the event.)
- Failure to use synchronization impulse for all timers from one single source (one contact) for all timing devices.
- After initial synchronization is done, failure to confirm synchronization of System A and System B difference is no greater than 0.001seconds
- Inadequate or lack of supervision of manual/hand timekeeping (Assistant Timekeeper) crews.
- Inadequate staffing of additional timekeeping crew officials at start and/or finish.
- Faulty determination of elapsed time from time-of-day (ToD) recordings.
- Rounding or averaging of times. *For ski racing rounding or averaging of times is prohibited.*
- Failure to use **updated** computer software and/or verify the data contained in computer-generated documents. Computers are used exclusively for managing ski race data and producing race results. If the race result software has not been updated for the current season, or if the software and/or hardware introduce errors, incorrect data will be generated. Don't assume that because the information came from the computer, it is correct.
- ***Failure to proactively keep up with precisions and rule adjustments.***
- Failure to use **appropriate** points list: National for non-FIS events; FIS for FIS events).
- Failure to use points list **valid for race date**.
- Failure to use the proper competitors' Seed Points for the event of the race.
- Failure to verify Seed Points against website versions of the appropriate points lists: (Verification must be done even if lists are downloaded into race result software.)
- Failure to prepare First Run Start List according to special seeding rules: e.g., Collegiate, Adaptive, Age Class, etc.
- Failure to post or announce all unofficial times promptly.
- Failure to verify times against timing tapes.
- Failure to prepare Second Run Start List in a timely manner, not being familiar with rules for “bibbo” when a tie occurs at the 30th or 15th position, not being familiar with Second Run seeding requirements for Adaptive competitors in U.S. Ski & Snowboard races (“Golden Rule,” U.S. Ski & Snowboard Alpine Competition Guide), not being familiar with Second Run seeding for Age Class events and scored non-FIS events.
- Failure to use proper “F Value” (factor) for the event when calculating Penalty.
- Failure to check for a 10th place tie for time in the Results which might affect the Penalty.
- Failure to use correct Seed Points in the Penalty calculation.
- Failure to correctly assign “maximum” values.
- Failure to check for a 5th place tie for best (lowest) Seed Points.

- Faulty "rounding" in the Penalty calculation.
- Failure to use current race category Adders for the event category/gender/event. (FIS EVENTS ONLY.)
- Failure to observe maximum/minimum penalties, when required.
- Failure to run "quality checks" on all race data.
- Failure to accurately complete required Timing & Data Technical Report (TDTR) forms, 1 per event per gender for all events.
- Failure to submit Replacement Time (EET) calculations.
- Failure to consider the effects of cold weather and extreme weather conditions on equipment and especially volunteers.

GENERAL TIMING COMMENTS

The essential elements involved in the timing of a ski race are:

1. The race should start on time! There should be no delays caused by insufficient preparation of the timing equipment and/or staff. ANTICIPATE and be prepared to react to problems quickly. Check all your equipment/computers - and their compatibility - at least 24 hours prior to EVERY race. Don't assume because it worked last month (or last season), it will work today.
2. The electronic timekeeping systems must be installed and in good working order at least one hour prior to the start.
3. The electronic timekeeping systems MUST be synchronized as close as possible to the start of the first event of the day.
4. Timing systems are no longer resynchronized prior to the start of the 2nd run.
5. The Starter must synchronize a Starter's watch with those of the Assistant Starter and, by telephone or radio, with the Chief Timekeeper *within ten minutes of the start*.
6. Times should be recorded accurately. Make quality control a component of the system.
7. The times should be announced promptly and correctly. It is recommended, the announcer should be isolated from the timing area as much as possible.
8. The system should be sufficiently redundant and protected to eliminate the possibility of a "missed time" and the subsequent need for rerun(s). Replacement times (EET) must be obtained with minimal delay. If multiple problems accumulate, "hold" the race until the problem(s) can be corrected and controlled – don't allow problems to multiply!
9. Situations that occur in the Timing Building should stay in the Timing Building. Casual or announced comments about problems, etc., can bring the integrity of the timekeeping for the whole event into question.

The records that are needed are:

1. Accurately recorded competitors' times
2. Sequenced list of competitors -
 - a. Corrected Start List
 - b. Competitors' times (ToD and/or Elapsed)
 - c. Final Status of all competitors (Finishers, DNS's, NPS's, DNF's, DSQ's)

The required outputs are:

1. First Run Start List
2. Second Run Start List
3. Unofficial "top 10" finishers or “Results by Class” for Awards Ceremony
4. Documentation of any Replacement Times (Equivalent Electronic Times - EET)
5. Report by the Referee – one per race code; if a two-run event, one for each run
6. Official Results with Race Points and Penalty, when applicable
7. Penalty Calculation(s) for scored events
8. Timing & Data Technical Report forms, 1 per race code (both scored & non-scored)
9. Documentation of "quality control" - may include Results from each run.

Online FIS Timing & Data Technical Report (TDTR) A program is available which is used for preparation and online filing of the “Timing & Data Technical Report” (TDTR) for all events: non-FIS and FIS; filed report is in XML format. A PDF paper copy of the online report must be made available for inclusion in required electronic or paper copy event document packets as noted in “Distribution of Documents – FIS Events.”

The TDTR program is available for download (MAC and Windows) on the FIS website: fis-ski.com/en/inside-fis/document-library/timing-data; it is updated as required. Please verify that the current version is being used.

U.S. Ski & Snowboard can accept the TDTR XML file produced by the FIS software. For a non-FIS event, the software will accept a “National Race Code” (alpha character + 4 digit-number). “Race Codex” is left blank, and either “CHI – Children,” “CIT – Citizen” or “JUN – Junior” category must be selected. The TDTR XML file must not be submitted to FIS for non-FIS events.

EQUIPMENT AND SUPPLIES

Following is a list of suggested supplies that should be supplied by the Organizer.

Manual timing devices w/extra batteries	Adequate supply of required forms
Communication means - headsets or intercom	Pencils
Cables/Connectors, as needed	Pencil sharpener
Power source - battery or hard wire	Felt marking pens
Extra timing printer tape	Paper/ink supply for printers, copiers
Surge protection	Rubber bands
Trash container(s)/liners	Tool set/electrical repairs
Calculator(s)	Tape: Electrical, Scotch, Duct Tape
Clip Boards	Stapler(s)
Plastic lock-top bags, small & large	Staples
	Staple remover

TIMING PROCEDURES AND THE TIMEKEEPING CREW

The degree of accuracy provided by electronic timing is an essential requirement for separating competitors in this highly competitive sport. To accurately time a ski competition, we must determine exactly when a competitor starts, exactly when a competitor finishes, and the elapsed time between the two events. Electronic timing, which allows measurement of times up to 1/10000th (0.0001) of a second and backed up by manual/hand timing which measures times to 1/100th (0.01) of a second, is required. FIS and U.S. Ski & Snowboard scored events require two timers with printers, and it is the Technical Delegate's responsibility to assist with and verify synchronization of the timing. A Timing & Data Technical Report (TDTR) form that documents these procedures is required for each race code.

For races where two electronic timing systems are used, if the primary system fails, the secondary system is to be used but only after being adjusted. The adjustment is to be made with the same procedure used to calculate Replacement Times using manual/hand times when both electronic systems fail. *For information regarding proper synchronization of two electronic timing devices, refer to current edition of "FIS Timing Booklet" and the Timing & Data Technical Report Form.*

When both the primary and the secondary electronic timing systems fail, a Replacement Time (Equivalent Electronic Time - EET) is calculated from the manual/hand times. According to the rules, if the electronic timing, both primary and secondary, breaks down completely during the race, the times taken manually/by hand shall be valid for all competitors. It may also be necessary to use manual/hand times for all competitors if the timing equipment malfunctions repeatedly during a race, the number of required Replacement Times becomes excessive, and the integrity of the electronic timekeeping is in question. *(This is a Jury decision.)*

When the official printing timer allows manual input or correction of a time, some type of indication (asterisk) concerning any effected change must be printed on all timing documentation. If the printer does not identify DNF's, etc., these should also be marked. This will help eliminate any confusion when proofing the competitors' times against the timing tapes. Some timing devices do not calculate net times, and many clubs choose to allow computer software to calculate net times. This is entirely acceptable. However, all ToD start and finish times must be recorded and properly marked if manual intervention occurs.

Synchronized digital stopwatches or hand-held battery-operated timing devices operating in time-of-day mode are needed for modern manual/hand timekeeping. Good manual/hand timekeeping involves human reaction, and this varies from person to person. Varying degrees of fatigue, endurance to cold, span of attention, and competence make accurate manual/hand timekeeping over a long period of time difficult. The Chief of Timing & Calculations should make every effort to assure the wellbeing of the timekeeping crew and the consistency of their performance.

Although the personnel and equipment used, the communications available, and the procedures followed will vary from organization to organization, general descriptions of electronic and manual/hand timekeeping procedures and requirements are useful.

The following is the minimum number of timing officials required to start a race. Their responsibilities are outlined in the ACR and/or the ICR:

Chief of Timing and Calculation/Chief Timekeeper

At Start:

- Start Referee
- Starter
- Assistant Starter
- Start Manual/Hand Timekeeper/Recorder (Assistant Timekeepers)

At Finish:

- Electronic Timer Operator(s)
- Electronic Time Recorder
- Finish Manual/Hand Timekeeper/Recorder (Assistant Timekeepers)
- Posting Person(s) for Scoreboard, if a physical board is used at the area
- Finish Referee and/or Spotter

Additional personnel, such as additional Manual/Hand Timekeepers (Assistant Timekeepers), an Announcer, and runners should be added as needed.

NOTE: Chief of Timing & Calculations is responsible for supervising, documenting, and enforcing quality control of actual timing and results. With the exception of lower-level non-scored events, (e.g., YSL), where staffing issues may require it, the Chief of Timing & Calculations should not be the individual operating the electronic timing equipment or the timing/race result software.

It is strongly recommended the Race Administrator not assume additional duties beyond those required for the position; e.g. timekeeping. Accurate event documentation is imperative for all events as these documents may be required in a legal review.

U.S. Ski & Snowboard's Schedule Agreement requires that Chief of Timing & Calculations as well as other "senior" officials, be appropriately certified and have attended a bi-seasonal Continuing Education Clinic (Update). Certification is a benefit of membership, so these officials must also hold U.S. Ski & Snowboard Official membership. The Chief of Timing & Calculations for National Championships, Continental Cup (Nor-Am Cup/NAC), and World Cup events *should* be certified as TC 3 or higher. ("Senior" official is interpreted as any official whose name appears on official documents or who signs any official document).

TIMING METHODS AND EQUIPMENT

START/STOP TIMING or elapsed timing: This method involves starting a timing device when the competitor leaves the Start and then stopping the same device when they cross the Finish Line. Time accrues from 0.00 (START) to time when the clock is stopped 0.56 (FINISH). This system is used in sports such as track and swimming but is **not permitted** in ski racing.

TIME-OF-DAY TIMING or continuous timing: This method involves taking readings of start and finish times on a continuously running, synchronized, hand-held manual timekeeping devices. The timing never stops although the running time on the screen stops to display and record the time; this is called a "split" time. The competitor's start "split" readout is subtracted from the competitor's finish "split" readout in order to determine the competitors "elapsed" time (the time taken to ski from start to finish).

This last method involves the additional step of calculating the elapsed time. However, this drawback is more than compensated for as it results in greater reliability. Even if the time-of-day device is inadvertently stopped (by an animal, spectator or official crossing the finish, for example) the clock continues to run, and accurate times will be provided for the competitors on course.

ELECTRONIC TIMEKEEPING EQUIPMENT

Electronic timekeeping equipment receives an impulse when a competitor starts and another impulse when a competitor finishes an event. The intervening time is obtained by subtracting the times of the impulses or by a direct readout of the elapsed time when the timing device calculates the difference.

Electronic timekeeping equipment is a delicate machine that operates best above freezing temperatures and requires careful handling to avoid damage. Any required batteries - for the timer and the photocell light source (or electronic eye at the finish as well as some start gates), must be fully charged before the race. Change to fresh batteries frequently as batteries don't last long in below-freezing temperatures! A spare set of batteries and essential tools required for repairs should be available. If possible, batteries should be protected from the cold.

Timers are connected at start and finish by a light weight gauge wire circuit (twisted-pair wires), by which the impulses from the starting gate and the finish photocell are transmitted to the timer.

The wiring must assure that inadvertent induced or variable impulses are impossible.

Continuous Printout Timer: Prints on one continuous tape the time of departure and the time of arrival. They can be set at zero at the start of the race or set to the actual time-of-day. In this case, the operator must mark the bib number of the competitor on the tape opposite the start and finish times. To obtain the elapsed time of each competitor the start time must be subtracted from the finish time. These timers are "continuous timers." Some timers/printers combine the features of continuous printout with elapsed time printout, but a vast majority of the equipment used in the USA only records ToD and requires a computer to do the math. Homologated timing devices are continuous.

Many additional capabilities have been added to modern timers. They may be equipped with a number of sophisticated and "computerized" functions. They may be programmed to print the competitor's bib number automatically on the tape as cued by the operator. They may calculate and print elapsed time on the tape, and they may also drive - send signals to - electronic scoreboards and video monitors. The most complex systems provide coded input into data processing systems which will produce printed results in the approved formats.

Many changes have been introduced regarding equipment capabilities and wiring requirements. Check current specifications regarding timing equipment for all categories of U.S. Ski & Snowboard and FIS competition. Current editions of the FIS Timing Booklet as well as lists of Homologated Timing Equipment are available on the FIS website.

MANUAL/HAND TIMEKEEPING

Manual/hand timekeeping is required as a backup to electronic timing for all FIS and U.S. Ski & Snowboard events. The manual/hand timekeeping system is completely independent of any communications between start and finish and is conducted with hand-held watches or hand-held battery-operated devices. Manual/hand-held watches or battery-operated, hand-held timekeeping devices operating in time-of-day mode that can be synchronized to the electronic timing system are available. *Manufacturers' specifications should be followed for proper performance.*

The Start Manual/Hand Timekeeper must clearly understand that a "start" is the exact time the competitor's lower leg crosses the start line.

The Finish Manual/Hand Timekeeper must clearly understand that a "finish" is the exact time when any part of the competitor's body crosses the finish line.

It is extremely important that both the Start and Finish Manual/Hand Timekeepers trigger their devices consistently so that the time is measured as close as possible to the same location for each competitor.

Prior to Start Manual/Hand Timekeepers leaving for the start, available manual timekeeping devices should preferably be set to the same time-of-day as System A and System B with all systems started in synchronization. This task is the responsibility of the Chief of Timekeeping or Chief of Manual/Hand Timing. (If time-of-day synchronization is not possible, synchronize manual timekeeping devices from 00:00.00.)

The quartz watches we use today are quite accurate and variation is negligible. Elapsed electronic times can be compared with elapsed manual/hand times throughout the race and necessary corrections made. It is a good idea to change the batteries before the first race of each season, at regular intervals during the season, and whenever large deviations begin to occur.

When possible, two manual timekeeping devices should be available at the start and two manual timekeeping devices available at finish. The manual timekeeping device not being used should be kept close to the timer's body so that the display and batteries stay warm. The weight of the manual timekeeping device should be supported with both hands. If the control button is finger operated, the index finger should be used. It is important that Manual/Hand Timekeepers have an opportunity to practice with the manual timekeeping devices prior to the start of the race; they should be instructed to also record forerunners' times.

If possible, the reset button on the manual timekeeping devices should be blocked so that it is impossible to accidentally reset the clock. The suggested procedure to follow IF one of the manual timekeeping devices is accidentally stopped is to switch to a backup device and MAKE A NOTATION on the recording form. If a backup device is not available, restart the first device, MAKE A NOTATION on the recording form and continue - the differential can be figured later. *Devices should be marked with a permanent number to assist with record keeping.* Resynchronization of manual timekeeping devices by radio is possible but is not recommended.

NOTE: The practice of drilling reset buttons and inserting a blocking device may affect the waterproof capability; the vibrations of the drill may damage the circuitry. Drilling the reset button voids the manufacturer's warranty!

It is recommended that the Chief of Timing & Calculations verify synchronization of manual timekeeping devices when all Manual/Hand Timekeepers are in position at the Start and the Finish. This can be done by radio. Count a simple command (3--2--1--GO). At "GO," Manual/Hand Timekeepers activate a split on their continuously running manual timekeeping devices and the Chief of Timing & Calculations can compare start manual timekeeping device display to finish manual timekeeping device display. Verifying synchronization can eliminate missed manual/hand times caused by "mode" reset. (Procedure should be followed when using new/inexperienced manual/hand timing crews and should be explained in race day timing crew instructions.)

Recording forms, manual timekeeping devices, etc., should be given to the Start Manual/Hand Timekeeper(s) early enough that they can reach the Start well before first Forerunner leaves the start gate. The Start Manual/Hand Timekeeper(s) should be close to the start gate and opposite the hinge on the wand, so they are able to observe the opening of the start wand and see the lower leg cross the start line.

Finish Manual/Hand Timekeepers require a clear view across the finish line to determine when the first part of the competitor's body crosses the finish line. They should be positioned as clear of the finish arena as possible and outside of the protection pads and fences. The Finish Referee is responsible for the horizontal marking of the finish line with a coloring substance, and the Chief of Timing & Calculations should verify that it has been done.

When a competitor starts, Start Manual/Hand Timekeepers activate continuously running manual timekeeping devices that have been synchronized with those at the finish. Finish Manual/Hand Timekeepers activate their manual timekeeping devices when the same competitor finishes. Although the time is still running internally, the activation freezes the display. Once the displayed time is documented, the devices may need to be reactivated in order for the display to start running and be ready for the next competitor's start and finish. Newer devices just require that the button be pushed again to display the next time. Knowing how the manual timekeeping devices actually operate is another good reason to "practice"!

Current rules only require one Manual/Hand Timekeeper at the start and one Manual/Hand Timekeeper at the finish. A perfect situation, however, would be two Manual/Hand Timekeepers with a Manual/Hand Time Recorder at the start and an identical team at the finish. Since personnel are not always available for this "perfect" situation, if two Manual/Hand Timekeepers are available for each position, it is suggested that the Primary Manual/Hand Timekeepers at the start and at the finish each operate *ONLY ONE* manual timekeeping device. The Secondary Start and Secondary Finish Manual/Hand Timekeepers can then operate another manual timekeeping device and also fulfill the duties of a Manual/Hand Time Recorder. This will encourage accuracy and teamwork and will result in a better educational atmosphere.

If two competitors are approaching the finish in close proximity and there is not enough time for both Manual/Hand Timekeepers to time the first competitor, read off/record elapsed times and reset for the second competitor, it is strongly suggested that the Primary Finish Manual/Hand Timekeeper records a time for the first competitor to cross the line and the Secondary Finish Manual/Hand Timekeeper/Recorder records a time for the second competitor to cross the line.* An indication must then be made as to whether the recorded times are a "P" (primary) time or an "S" (secondary) time. **This is not a perfect solution, but the alternative may be "no time" for one or both competitors; it is important that manual/hand timekeeping be available for every competitor.*

The manual timekeeping device display is recorded exactly as it is displayed; **times are NEVER rounded**. If two manual timekeeping devices are available and both times are being recorded, the recorded times are **NEVER averaged**.

In order to determine the elapsed hand time of a competitor, the manual/hand start time is subtracted from the manual/hand finish time. In the case of a missed electronic time the time start manual/hand time can be obtained, subtracted from the finish manual/hand time for the same competitor, and a Manual/Hand Time (HT) can be posted on the scoreboard. Competitors' times posted on the scoreboard are **unofficial**, so the Replacement Time (EET) can be calculated later and the corrected time furnished to the result processing person.

AT THE FINISH

A designated official - Finish Referee, Finish Controller, Finish Gate Judge, or Spotter - announces the bib number of the approaching competitor. The times (electronic and manual/hand) are recorded on the respective recording forms for each competitor.

Two different individuals should record electronic times in at least two places. The Chief of Timing & Calculations will develop the preferred method. As noted earlier, manual intervention of the times must be marked on the timing tapes.

It is primarily the Chief of Timing & Calculations' responsibility to verify official times against the timing tapes; they are the only official timing record for the race. These tapes are given to the Technical Delegate for review and are kept by the Race Organizer until the race is officially approved. *In cases of force majeure, the Technical Delegate may choose to retain the timing tapes; the decision of the Technical Delegate must be respected.*

The Chief of Timing & Calculations must account for all competitors at the end of each run. Start List - Total DNS's - Total NPS's - Total DNF's - Total DSQ's = Finishers. (Verify DNS's, NPS's, DNF's, and DSQ's against the Report(s) by the Referee.) The number calculated should be the same as the number of finishers on the results (1st Run, 2nd Run, or Official Results).

Although the Technical Delegate is the official responsible for verifying the competitors' Race Points and the Official Penalty for races that are scored to the points lists, if time allows it, the Chief of Timing & Calculations should also calculate/verify the Race Points and the Official Penalty. Manual verification of Race Points and Official Penalty is a required duty even if a computer has already calculated them. (See "Penalty Calculation" in this Chapter.)

The Chief of Timing & Calculations must also verify and complete the Timing & Data Technical Report Form (TDTR) and provide a copy for the Technical Delegate's review. For information on how to properly complete this form and to ensure that timing is carried out according to the rules, please refer to current editions of the FIS Timing Booklet and current timing rules. *Timing & Data Technical Report (TDTR) is required for all U.S. Ski & Snowboard events – both scored and non-scored. A TDTR in XML format can be electronically submitted for all events, both non-FIS and FIS; paper PDF copy is still required.*

FIS events require that the Chief of Timing & Calculations oversees the submittal of the TDTR in XML format to results@fisski.ch. A paper copy signed by both the Chief of Timing & Calculations and the Technical Delegate is also required.

Non-FIS events also require that the Chief of Timing & Calculations oversees the submittal of the TDTR in XML format to tdtr@usskiandsnowboard.org. A paper copy signed by both the Chief of Timing & Calculations and the Technical Delegate is also required.

REPLACEMENT (EQUIVALENT ELECTRONIC) TIME – (EET)

All times used for the Official Results must be from System A. If there is a failure of System A, a calculated net replacement time from System B must be used. It is not permitted to substitute time-of-day times from System B for use with System A for the purpose of net time calculations. If a System B time is not available, and photo finish time is not available, the manual/hand time is used in the required calculation.

The EET calculation must use time-of-day precision to a **minimum of 1/1000th** for the correction value of the time-of-day.

NOTE: *If manual/hand timing must be used and is only available to precision of 1/100th (.01), the full precision of 1/1000th (.001) or better must be used. Zeroes must be added to the manual/hand time in order to provide precision to 1/1000th (.001)*

Calculation of the Correction:

To calculate the correction time, use the 10 times of day of the competitors who started before the one with the missing time. *If there are not 10 times of day before, complete the calculation with the remaining times of day after the missed time.*

1. Subtract the backup times (System B) from System A times for these 10 competitors.

NOTE: Suggested system is: “What has to be done to this System B time to equal a System A time?” Your decision whether you have to add or subtract determines whether the number is a positive or negative.

2. Calculate the sum of the 10 calculated time differences and divide it by 10; rounded up or down ($0.0449 = 0.04$; $0.0450 = 0.05$). *This provides a “Correction Time.”*
3. Add or subtract this correction time to the System B time of the competitor without a System A time. *This provides the “Replacement Time” (EET).*
5. Apply Replacement Time as required.

NOTE: The purpose of a "Replacement Time (EET)" is to calculate and replace the missing ToD impulse - either start or finish.

Steps for using the EET Worksheet:

1. Record the bib number(s) of the missing time(s) in the appropriate area on the worksheet.
2. Record the 10 bib numbers being used for the calculations in the appropriate boxes.
3. For each respective bib number, record System A time-of-day in the proper column (if not available, use manual/hand time-of-day as recorded on the Start/Finish Timekeeper Recording Form).
5. For each respective bib number record System B time-of-day in the proper column.
6. Calculate the difference between the System A and System B time-of-day for each competitor and record it in the proper column depending on whether the System B time is longer (slower) or shorter (faster) than the electronic time.
7. Subtract the sum of "**Time Longer (-)**" from the sum of "**Time Shorter (+)**" column.
8. Divide this difference by 10 and round up or down ($0.044 = 0.04$; $0.045 = 0.05$). This result serves as a *Correction Factor* (or average margin of error).
9. Apply correction factor to the System B (or manual/hand) time-of-day for the missing System A time-of-day. This provides the “*Replacement Time* (Equivalent Electronic Time - EET).

There is a replacement time-of-day calculation function available in both Split Second and VOLA. When completed, the replacement time-of-day can either be automatically applied or the operator can edit the competitor’s time. Additional software applications are available that will calculate and print a completed replacement time-of-day calculation; an excel version is available in the MPF.

Regardless of the system used for replacement time calculations, it is strongly suggested that all input and calculations be verified for accuracy.

If the Timing & Data Technical Report indicates a replacement time (EET) was calculated, the actual calculation(s) must be made available for the Technical Delegate's review and must be included with the Technical Data Timing Report submitted in U.S. Ski & Snowboard's copy of the Event Document Packet.

When the Timing & Data Technical Report XML file is submitted to FIS, replacement time assignments are flagged. FIS may request a copy of the calculations; it must be submitted accordingly.

READING A TIMING TAPE - WITH INTERVAL TIMES

D1	017	A1	022 1:39.6942
	11:54:00.0769		12:00:39.3009
I2	016 1:08.760	D1	024
	11:54:08.3838		12:00:59.9723
I1	017 0:39.114	I2	023 1:08.775
	11:54:39.1912		12:01:07.2039
A1	016 1:40.0506	I1	024 0:38.846
	11:54:40.5860		12:01:38.8188
D1	018	A1	023 1:40.9974
	11:54:58.7774		12:01:39.4260
I2	017 1:08.0573	D1	025
	11:55:09.0402		12:01:59.0303
I1	018 0:38.740	I2	024 1:08.304
	11:55:37.5179		12:02:08.2772
A1	017 1:41.0517	I1	025 0:38.8988
	11:55:41.1286		12:02:37.9292
D1	019	A1	024 1:40.9590
	11:55:59.8453		12:02:40.9313
I2	018 1:08.258	D1	026
	11:56:07.0361		12:02:59.2753
I1	019 0:37.600	I2	025 1:09.713
	11:56:37.4454		12:03:08.7427
A1	018 1:39.9694	I1	026 0:40.025
	11:56:38.7468		12:03:39.3011
D1	020	A1	025 1:42.8298
	11:56:59.7584		12:03:41.8601
I2	019 1:07.574	D1	027
	11:5707.4202		12:03:59.0525
I1	020 0:37.695	I2	026 1:10.885
	11:57:37.4540		12:04:10.1686
A1	019 1:39.5346	I1	027 0:40.935
	11:57:39.3799		12:04:39.9880
D1	021	A1	026 1:43.2812
	11:58:00.2846		12:04:42.5565
I2	020 1:07.464	I2	027 1:12.659
	11:58:07.2227		12:05:11.7115
A1	020 1:39.6390	D1	028
	11:58:39.3974		12:05:06.8828
I1	021 0:39.519	A1	027 1:46.6823
	11:58:39.8042		12:05:45.7348
D1	022	I1	028 1:17.322
	11:58:59.6067		12:06:24.1787
I2	021 1:09.875	A1	028 1:35.5999
	11:59:10.1602		12:06:42.4827***assigned to 28(?)
I1	022 0:38.171	I2	<u>028 1:57.263</u>
	11:59:37.7777		<u>12:07:04.1197</u>
A1	021 1:42.5023	A1	<u>028 2:39.0066</u>
	11:59:42.7869		<u>12:07:45.8894</u>
D1	023		
	11:59:58.4286		
I2	022 1:07.652		
	12:00:07.2590		
I1	023 0:38.938		
	12:00:37.3673		

Prior to the start of the race, it is important that you know how to read the tapes generated by the timing equipment you will be using

There are many different formats

Reading A Tape

Determine the Start Time, Finish Time and Elapsed or Run Time for the following competitors:

20:

24:

28:

"A"=Arrive=Finish

"D"=Depart=Start

"I1 & I2"=Intermediate times

Case Study: A Timing Tape

Determine the Start Time, Finish Time and Elapsed or Run Time for competitors #20, #24 and #28:

#20: A1: 11:58.39.3974 (Arrive, Finish)
 D1: 11:56:59.7584 (Depart, Start)
 1:39.6390
 Time: (TRUNCATE 100th of a second)
 1:39.63

#24: A1: 12:02:40.9313
 D1: 12:00:59.9723
 1:40.9590
 Time: (TRUNCATE 100th of a second)
 1:40.95

Fastest time on course 1:37.52: This is an actual calculation: LOOK FOR THE PROBLEMS.

#28: A1: 12:06:42.4827
 D1: 12:05:06.8828
 1:35:5999

Assigned Time:

1:35.60*

*Questionable, as fastest time is 1:37.52. Possibly caused by “keying” error by operator at Position A1 (Finish) or early triggering of finish (course worker, animal, blowing snow, etc.) not noted by timing personnel. In addition, 1:35:5999 SHOULD NOT HAVE BEEN ROUNDED TO 1:35.60; rounding and assignment of 1:35.60 was probably caused by manual calculation.

CALCULATION SHOULD HAVE BEEN AS FOLLOWS FOR LISTING ON THE UNOFFICIAL TIMES:

#28: A1: 12:07:45.8894 – Actual Finish
 D1: 12:05:06.8828
 2:39.0066
 Time: (TRUNCATE 100th of a second)
 2:39.00

The usual thoughts at the end of a race are: “okay, last competitor has finished, let's pick up and go home.” Quality Control by cross checking and proofing assigned times against the tape from the primary timing equipment caught the questionable time just as the Start Referee was delivering a report of “Late start on #28.” *Any time that is an anomaly – much faster or slower than the rest of the field’s – must be verified! It is strongly suggested that times for competitors with equal times (ties) also be verified.*

THE IMPORTANCE OF POINTS

Ski racing has a unique position in the world of sports as it pits a competitor against a clock and also against other competitors. There is no set court, field, or track, and no absolute length of a racecourse.

A number of variables such as terrain, snow conditions, weather, racecourse configuration, speed, and turns are also factors. In order to compensate for these variations in terrain and racecourses, U.S. Ski & Snowboard and FIS have set guidelines such as minimum vertical drop, minimum and maximum number of gates, and gate dimensions for the setting of the racecourses. In addition, there is a formula for calculating points by relating a competitor's time to the winner's time (Race Points).

Two factors led the development of a numerical system of scoring competitors in ski events:

1. The problem of combining the results from more than one event, such as Downhill or Super G and Slalom, to obtain the results for the Alpine Combined event. This problem surfaced after the adoption of the Slalom by the FIS in 1928.
2. The problem of seeding competitors by a method other than the Jury's recognition of their performance records.

Competitors are:

1. Scored by points for each competition in which they finish without disqualification.
2. Ranked nationally and/or internationally according to their earned points.
3. Seeded in subsequent competitions according to their points (as listed in the current National and FIS Points Lists), which were earned in previous events.

NOTE: The validity period of a FIS result is the current season. A Base List (BL) is calculated based on the average of a competitor's best 2 results in each event. Following the application of the points adjustment calculation, the first FIS List (NL) is published for the season that begins July 1. Calculation methods are in place for competitors who have requested injured status or who do not have at least 2 results in an event. (Rules of FIS Points)

Base Points must not be used for seeding or penalty calculation purposes.

Everything in ski racing is "done by the numbers," in this case, the "Points." Calculations required to obtain Race Points and Penalty are not difficult. Use proper forms/formulas for either U.S. Ski & Snowboard or FIS Penalties and report calculations rounded to two decimal places (1/100ths).

RACE POINTS

The linear or Lowry formula (New Alpine Formula) has been valid since the 1984-85 season. Both FIS and U.S. Ski & Snowboard points are based on this formula. Factors, (F-Values), are published each fall in the U.S. Alpine Competition Guide and the Rules of the FIS Points. If the F-Values change, the change is noted in the Precisions to the ICR. These factors are based upon statistical analyses for races from previous seasons.

Symbols in the formula:

To = Winner's Time, in seconds: SSS.ss

Tx = Competitor's Time, in seconds: SSS.ss

P = Race Points

F = 60 :- (Cm - 1)

Cm = Average time for all competitors finishing without disqualification,
Divided by the Winning Time.

Normally, an official does not need to be concerned with Cm. The values for F are published and are subject to revision at the FIS Congress in even numbered years.

The formula is expressed in two algebraically equivalent ways:

$$P = F \times (Tx \text{ :- } To) - 1 \quad \underline{\text{OR}} \quad P = [Tx \times (F \text{ :- } To)] - F$$

This 2nd formula avoids the repeated division of Tx by To for each competitor as the fraction (F :- To) can be stored in a calculator's memory as a "constant." This leaves only a multiplication and a subtraction for each competitor. This version is recommended for use with non-programmable calculators that have a single "memory."

For consistency, this version is also recommended for programmable calculators and for digital computers. Programs for programmable calculators and for digital computers should display and print the competitor's points rounded and truncated to two decimal digits - the nearest hundredth.

The principle formula we use for these points is as follows:

$$\frac{\text{Competitor's Time in seconds (Tx)}}{\text{Winner's Time in seconds (To)}} - 1 \times \text{Factor for } \begin{matrix} / \text{ DH } \backslash \\ / \text{ SG } \backslash \\ \backslash \text{ GS } / \\ \backslash \text{ SL } / \\ \backslash \text{ AC} / \end{matrix} \text{ USE CURRENT F VALUES}$$

NOTE: Your calculator may not require "=" after keying "To" or "CLR" before keying "Tx." Some calculators require the use of an " = " after the division process. Do not round off during the calculation - wait until the end.

RACE POINT CALCULATIONS FOR BASIC CALCULATORS WITH ONE MEMORY:

Store in Memory: F :- To

Then, For Each Competitor: Tx X Memory Recall - F = Race Points

U.S. SKI & SNOWBOARD RACE PENALTY CALCULATION PROCEDURES

The purpose of a Race Penalty becomes apparent when considering this scenario: Two races of the same event are run on the same day at adjacent ski areas with different levels of competitors. In each race, the winner receives 0.00 Race Points.

Because of this type circumstance, a "handicapping" system, known as the BOB Rule is used to calculate additional points to be added to each competitor's Race Points to compensate for the difference in the level of competition in the specific event.

These handicap points, or Penalty Points, are calculated by a formula that uses the Seed Points of the 5 competitors with the LOWEST (best) SEED POINTS entered in the race who actually **START** the

first run, regardless of result or status (DNF, DSQ), and the Seed Points and Race Points of the 5 competitors with LOWEST (best) SEED POINTS from among the top 10 competitors who finish without being disqualified. *A self-explanatory form is available for this calculation. Refer to MPF #38. US Penalty Calculation.*

The procedure for a U.S. Ski & Snowboard Penalty calculation is as follows:

1. List the **5 competitors** with the **lowest** (best) **Seed Points** who actually start the first run. Total their Seed Points.
2. List the **top 10 finishers** and their respective **Seed Points**. **CHECK FOR MAXIMUM SEED POINT VALUES AND CHECK FOR TIE AT 10TH.**
3. Working across on the same line for each competitor, choose the 5 competitors from among the top ten finishers who entered with the **lowest (best) Seed Points**. **CHECK FOR TIE AT 5TH.** (If this occurs, verify **current** rules.) Total their Seed Points.
4. List the race points for these **5 best Seed Point finishers**. Total their Race Points.
5. Add total Seed Points of best 5 competitors that started to total Seed Points of best 5 competitors who finished among top 10 without disqualification.
6. Subtract total Race Points in step 4 from sum of step 5.
7. Divide difference by 10; round off to 100ths (.01) if necessary. Result is the Penalty.

CALCULATION OF A U.S. PENALTY UNDER PARTICULAR CIRCUMSTANCES

1. Minimum Penalties for U.S. Ski & Snowboard scored events:
 - a. The minimum penalty for a non-FIS U.S. Ski & Snowboard race that meets minimum vertical drop requirements is 40.00. If the calculated penalty is lower than 40.00, the applied penalty shall be 40.00. If the minimum vertical drop requirement is met, the minimum winning time requirement does not apply.
 - b. The minimum penalty for a non-FIS event that does not meet minimum vertical drop requirement but does meet minimum winning time requirement as published in the 2020 Alpine Competition Guide is 75.00. If the calculated penalty is lower than 75.00, the applied penalty shall be 75.00.
 - c. If both of the published standards – the minimum vertical drop requirement and the minimum winning time requirement are not met, then the greater of the calculated penalty plus an additional penalty as published in the 2020 Alpine Competition Guide, or the minimum penalty of 75.00 shall be applied.

USEFUL HINTS:

If an event meets Vertical Drop: Apply larger of calculated penalty or minimum 40.00

If an event only meets minimum time: Apply larger of calculated penalty or minimum 75.00

If an event meets neither Vertical Drop nor minimum time, apply larger of:

- 1) **Total of calculated penalty + additional penalty or**
- 2) **Minimum of 75.00**

2. Race fails to meet Vertical Drop, Minimum Time Requirements

MINIMUM VERTICAL DROP PER RUN:

ALTERNATE MINIMUM TIME STANDARDS AND ADDITIONAL PENALTY:

<u>EVENT</u>	<u>MIN VD</u>	<u>ALT MIN TIME</u>	<u>ADDITIONAL PENALTY</u>
DH*	400 m	60 seconds combined/max 2 runs	26.00
SL	100 m	50 seconds combined for 2 runs	12.00
GS	250 m	50 seconds combined for 2 runs	17.00
SG	300 m	40 seconds for 1 run	21.00
P	60 m	40 seconds for 2 runs	10.00

NOTE: “combined/max 2 runs” does not eliminate 60-second minimum time for 1-run DH.

3. Fewer than ten racers finish, a minimum race penalty shall be applied regardless of the calculated penalty, as follows:
 - a. DH – 180
 - b. SG – 135
 - c. GS – 110
 - d. SL – 100
 - e. AC – 125

4. When at least five racers with valid National Points finish, but one or more has points over the maximum value, assign points at the maximum value as follows, prior to completing the calculation:
 - a. DH – 820
 - b. SG – 660
 - c. GS – 530
 - d. SL – 360
 - e. AC – 660

5. When fewer than five racers in the first 10 have valid National Points
 - a. Assign maximum value in order to bring the total of racers with points to five
 - b. Remember maximum value is also assigned to any of the best five whose actual National Points are above the maximum level

6. When fewer than five racers finish, *penalty must be calculated manually*:
 - a. Insert “ghost” racers in order to reach a total of five
 - b. Assign maximum National Points to each “ghost”
 - c. Assign race points equal to those of the lowest ranked (slowest) finisher
 - d. Calculate penalty according to the form

PENALTY CANNOT BE CALCULATED WHEN FEWER THAN THREE (3) FINISH!

FIS RACE PENALTY CALCULATION PROCEDURES

FIS Technical Delegates must be aware of the minimum/maximum penalties that apply to the race being scored. The minimum is the lowest penalty at which the event will be entered into the Points List. If the calculated penalty is lower than the minimum, the minimum figure must be applied. If the calculated penalty is greater than the minimum, the calculated figure is used. Minimum penalties are printed on the cover page of the appropriate FIS Points List. There may also be maximum penalties mandated for some events. This information can be found in current copies of the International Competition Ski Racing Rules and/or its Precisions, the Rules of the FIS Points, and the cover page of the appropriate FIS Points List.

1. Repeat steps 1-7; a self-explanatory form is available for this calculation. Refer to MPF #39. FIS Penalty Calculation.
2. Verify and apply Category Adder (**Refer to FIS List Cover Page**) which is competition category and event specific

**CALCULATION OF A FIS PENALTY UNDER PARTICULAR CIRCUMSTANCES
(Refer to “Rules for the FIS Alpine Points”)**

1. There are no minimum time standards, vertical drop must be met
2. When a penalty calculates over the minimum penalty as required by the category of the event and noted on the current FIS List Cover, the minimum penalty is applied

Category/Catégorie/Kategorie	Race level	Minimum penalty	Maximum penalty
OWG WSC WC		0	0
COM WQUA		0	4
WJC ANC EC FEC NAC SAC ECOM EQUA	1	15	999
NC	2	20	999
YOG FIS FQUA AWG JUN NJC NJR CIT	3	23	999
ENL	4	60	999

3. When racers in the top ten have points over the maximum FIS value, maximum value (Max points) as noted on the current FIS List Cover are assigned
4. When fewer than five racers in the first ten have FIS points, maximum value as noted on the current FIS List Cover are assigned. *(The following is a clip from the FIS Points List Cover Page.)*

*Racers who had actual FIS points that were above the maximum are considered “classified.” Racers who had no actual FIS points are not considered “classified.” *When selecting best five out of the top ten, you must select “classified” racers first even though assignment of maximum value FIS points has made their FIS points equal to those who are not “classified.”*

5. At least five racers have to finish and at least three of them must have actual FIS points or the race penalty cannot be calculated, and the event cannot be scored.

Race Category Adder and Minimum Penalty: The relevant race category adder is added to the calculated penalty. If the calculated penalty is less than the minimum, then the minimum penalty is applied. *(The following is a clip from the FIS Points List Cover Page.)*

MEN					GENERAL		LADIES						
ADDER				Z-Value	Men/Ladies		ADDER				Z-Value		
Dis.	Level 1	Level 2	Level 3	Level 4		F Value	Max points	Dis.	Level 1	Level 2	Level 3	Level 4	
DH	0	2	3	13	0.00	1250	330	DH	0				
SL	0	2	3	13	0.00	730	165	SL	0				
GS	0	2	3	13	0.00	1010	220	GS	0				
SG	0	2	3	13	0.00	1190	270	SG	0				
SC						0	0	SC	0				

The race category adders are published on the front page of the FIS List which is available on U.S. Ski & Snowboard and FIS websites.

Validity of Points: The length of validity of each result is the current season.

Base FIS Points list (BL): Published in the middle of June prior to each competition season. The average of the best two results in each event during the past season will be used for the calculation of the BL. For a competitor who has obtained only one result in any of the alpine events during the past season and who has remained registered as active with the FIS, a 20% (+) of the competitor's single result will be added to the result. For a competitor who has not obtained results in any of the alpine events during the past season and who has remained registered as active with the FIS, a 50% (>) will be added to the previous BL points. (Refer to "Rules for the FIS Alpine Points" for additional information regarding injured athletes, etc.) FIS List #1 will be published 1st July based on the BL.

REMINDER: *FIS Base List Points must not be used for seeding/penalty calculation purposes.*



PENALTY CALCULATION

Name of Competition		
Date	Event	Name of the TD

The best 10 at finish

Result	U.S. #	Name	Nat	U.S.-Points	Best 5	Race points
1.		A		54.00	54.00	0.00
2.		B		52.00	52.00	2.00
3.		C		124.00		
4.		D		78.00	78.00	8.00
5.		E		122.00		
6.		F		60.00	60.00	9.00
7.		G		130.00		
8.		H		126.00		
9.		I		66.00	66.00	10.00
10.		J		128.00		

(STEP 2) (STEP 3) (STEP 4)

The best 5 at start (STEP 1)

DNF 1				51.00
2				52.00
DSQ 1				53.00
1				54.00
DNS 2				55.00

TOTALS

(B)	U.S. Points of best 5 at start	265.00	
(A)	U.S. Points of best 5 to finish in top 10		310.00
(C)	Race Points of corresponding competitors		29.00

Calculated penalty (STEPS 5 & 6) (STEP 7)

A 310.00 + **B** 265.00 - **C** 29.00 = 546.00 : 10 = 54.60

(VERIFY IF SUBJECT TO MINIMUM PENALTY)	
Penalty applied	54.60
Signature TD	Nr

Penalty Point Example 2 - Tie for 10th Place

Calculation of Penalty requires the following information - Competitors with lowest (best) SEED points who started first run:

<u>BEST 5-START</u>	<u>NAME</u>	<u>RESULT</u>	<u>SEED POINTS</u>
1	D	4	0.00
2	M	DNF	.85
3	L	DSQ	1.04
4	A	1	2.00
5	B	2	3.00

When two or more competitors are ranked 10th in the race, all shall be taken into consideration for the penalty calculation, if they are part of those five competitors with the best Seed Points.

Place	Competitor	Seed Points	Best-5 Points	Race Points
1	A	2.00	2.00	0.00
2	B	3.00	3.00	2.64
3	C	6.21		
4	D	0.00	0.00	7.16
5	E	6.15		
6	F	8.57		
7	G	5.00		
8	H	7.54		
9	I	7.62		
10T	J	4.28	4.28	18.61
10T	K	3.06	<u>3.06</u>	<u>18.61</u>
			12.34	47.02

Both of the competitors tied for 10th have Seed Points lower than those of competitor number 7 and must be taken into consideration for the penalty calculation. *(For FIS Penalty, Steps 8 & 9 would be included, Minimum Penalty would be verified and if greater than Calculated Penalty, Minimum Penalty would apply.)*

Penalty Point Example 3 - Tie for 5th Best Seed Points

One could also find a tie in for 5th best Seed Points among the top 10.

Place	Competitor	Seed Points	Best-5 Points	Race Points
1	A	2.00	2.00	0.00
2	B	3.00	3.00	2.64
3	C	6.21		
4	D	0.00	0.00	7.16
5	E	6.15		
6	F	8.57		
7	G	5.00		
8	H	4.00	4.00	12.00
9	I	4.28		
10	J	4.28	<u>4.28</u>	<u>18.61</u>

Which competitor is the 5th of our “best 5”? Is it competitor F or I? *Rules require that we choose the competitor whose race points will result in the calculation of a lower (better) Penalty.*

PENALTY CALCULATION
CALCUL DE LA PENALITE
PUNKTEZUSCHLAGSBERECHNUNG

Name of event <i>Nom de l'événement</i> Name der Veranstaltung COC EVENT		
Date <i>Date</i> Datum	Event <i>Événement</i> Veranstaltung	Name of the TD <i>Nom du DT</i> Name des TDs

The best 10 at finish / 10 meilleurs à l'arrivée / Die besten 10 im Ziel

Result <i>Résultat</i> Resultat	Number <i>Dossard</i> Nummer	Name <i>Nom</i> Name	Nat <i>Nat</i> Nat	FIS-Points <i>Points FIS</i> FIS-Punkte	Best 5 <i>5 meilleurs</i> 5 besten	Race points <i>Pts de course</i> Rennpunkte
1.		A		4.00	4.00	0.00
2.		B		2.00	2.00	2.00
3.		C		14.00		
4.		D		8.00	8.00	8.00
5.		E		12.00		
6.		F		10.00	10.00	9.00
7.		G		20.00		
8.		H		16.00		
9.		I		6.00	6.00	10.00
10.		J		18.00		

(STEP 2) (STEP 3) (STEP 4) The best

5 at start / 5 meilleurs points FIS au départ / Die 5 besten FIS-Punkte am Start

DNF 1		K		1.00
2		B		2.00
DSQ 1		L		3.00
1		A		4.00
DNS 2		M		5.00

(STEP 1)

TOTALS / TOTALS / SUMMEN

(B) FIS Points of best 5 at start <i>Points FIS des 5 meilleurs au départ</i> <i>Die 5 besten FIS-Punkte am Start</i>	15.00		
(A) FIS Points of best 5 to finish in top 10 <i>Points FIS des 5 meilleurs dans les premiers 10</i> <i>Die 5 besten FIS-Punkte aus den ersten 10</i>		30.00	
(C) Race Points of corresponding competitors <i>Points compétition de ces concurrents</i> <i>Rennpunkte der entsprechenden Wettkämpfer</i>			29.00

Calculated penalty / Pénalité calculée / Berechneter Zuschlag (STEPS 5, 6 AND 7)

A + **B** - **C** = : 10 =

Category Adder / Additif de catégorie / Kategorie-Adder (STEP 8)

Penalty applied / Pénalité appliquée / Angewandter Punktezuschlag (MINIMUM PENALTY APPLIED)

Signature TD / Signature du DT / Unterschrift des TDs	Nr/No/Nr
--	-----------------

*NOTE: APPLIED CATEGORY ADDER IS GOVERNED BY EVENT CATEGORY.