



BASIC TIMING & CALCULATIONS - ALPINE SEASON 2022

STUDY GUIDE

This Study Guide is intended to be used as an educational and review aid for individuals interested in alpine officiating. Downloading, printing, and reading the Study Guide must not be substituted for actual attendance at a U.S.-approved Clinic or used as a replacement for actual instruction at any Alpine Officials' approved Clinic.

PLEASE NOTE: The Chief of Timing and Calculations is responsible for supervising, documenting, and enforcing the quality control of actual timing and results. The purpose of this Clinic is training the basics required by the position. With the exception of lower-level non-scored events, (e.g., YSL), where staffing issues may require it, the Chief of Timing and Calculations should not be the individual also operating the electronic timing equipment or the timing/race result software. Therefore, although it is very useful, training in the use of timing equipment and/or timing/result software should not be included in this basic curriculum.

Materials are available for a Timing Operations Workshop. The Workshop includes installation and operation of timekeeping equipment and software and should be scheduled separately from an actual Basic Timing & Calculations Clinic.

REFERENCE PUBLICATIONS:

1. U.S. Ski & Snowboard Alpine Competition Regulations (ACR)
2. ICR of the FIS, Online Edition
3. ICR Precisions
4. Rules for the FIS Points
5. U.S. Ski & Snowboard Alpine Officials' Manual
6. FIS Timing Booklet

***NOTE:** ACR mirrors, when possible, ICR numbering. U.S. Ski & Snowboard exceptions have a "U" preceding the rule number; the "U" is a part of the number.

CERTIFICATION EXAMINATION:

Basic Timing & Calculations Certification Examination (Level 1) will be available at U.S. Ski & Snowboard-approved Alpine Officials' Clinics. Allowed time limit is 2.5 hours. The examination is open book, and it must be administered only at scheduled Clinics. It is NOT A TAKE-HOME EXAM and using computers for the calculation and Penalty section is not allowed. Completed examinations are to be retained by the Clinic examiners; they must not be returned to the individuals taking them. Please refer to Region/Division publications for Clinic schedules. ***This Study Guide is not intended as a replacement for taking notes for use during an open-book examination at any U.S. Ski & Snowboard approved Clinic.***

If you have problems with this Study Guide or have suggestions for improvements, please contact the Chair of the Alpine Officials' Education Working Group: aoewgchair@gmail.com. Thank you.

U.S. SKI & SNOWBOARD

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PLEASE NOTE: Local health authority restrictions may require ski area management to implement procedures to protect the well-being of their employees and guests. These procedures may vary from venue to venue, county to county, and state to state. Procedures which impact your event operations and programs must be relayed to all event officials, Team Captains, and competitors. The procedures must – without question – be respected and observed.

U.S. Ski & Snowboard will continue to maintain a COVID-19 resource page with recommended protocols (usskiandsnowboard.org/covid-19).

There is much information available to us - no one can possibly know it all. What we SHOULD know is WHERE to find it. Most of the sections of this Study Guide require research by the user. This will aid in the ability to understand the layout of the applicable rule books and publications and will reinforce their content.

REFERENCE DOCUMENTS:

The following reference items can be found at the end of this Study Guide and are placed in the order in which they are referenced. Document numbering is not sequential because it agrees with document numbering in the updated Master Packet of Forms (MPF) which can be found on the U.S. Ski & Snowboard website. It is suggested that forms be printed for easy reference while using this Study Guide.

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| 34. Report by the Referee | <u>Timing Tape Review</u> |
| 29. Start/Finish Referee Recording Form | a. Timing Tape #1: ToD Timer |
| 30. Start/Finish Timekeeper Recording Form | b. Timing Tape #2: ToD Timer w/Intervals |
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Study Problems

Exercise: Steps Involved in an EET *

- a. Electronic Time Recording Form
- b. Start/Finish Timekeeper Recording Form
- c. Replacement Time (EET) Calculation

* This exercise is included to demonstrate the use of all of the forms/data required for the calculation of a Replacement Time (Equivalent Electronic Time – EET). U.S. Ski & Snowboard approved race result/timing software programs provide tools for calculating a Replacement Time (refer to applicable PowerPoint presentations for additional information). Excel spreadsheet is also available and can be found in the Master Packet of Forms (MPF) on the U.S. Ski & Snowboard website.

I. Timing: Equipment, Personnel and Job Descriptions

A. Start Area

1. Start Gate specifications [2022 U.S. Ski & Snowboard Alpine Competition Guide; 611.2.1; “FIS Timing Booklet” which can be found in “Miscellaneous Study Guide Forms,” on the FIS website fis-ski.com, or through the FIS link on the U.S. Ski & Snowboard website.
 - a. U.S. Ski & Snowboard non-FIS Events
 - b. FIS Events
2. Starter [612.1]
3. Assistant Starter [612.2]
4. Start Recorder [612.3]
5. Assistant Timekeeper [612.5]; (Start/Finish Manual/Hand Timekeepers)
6. Start Timing [613.5]

B. Finish Area

1. Finish Line specifications [615.2]
2. Finish Photo Cell specifications
 - a. U.S. Ski & Snowboard non-FIS Events
 - b. FIS Events

C. Personnel & Equipment

1. Chief Timekeeper [612.4]; Assistant Timekeeper [612.5]
2. Timing Equipment [611.2]
3. Assistant Timekeepers – both electronic and Manual/Hand Timekeepers [612.5, U611.2.2, 611.3.1]
4. Time Recorders – both electronic and Manual/Hand Recorders [612.5]
5. Finish Spotter/Finish Controller [612.6, 611.3.1]
6. Presentation of Times: Scoreboard/Poster/Runners [611.2.3, 617.1, 617.2.1]
7. Announcer [617.1, 611.2.3]

II. Prior to the Race

A. Terminology you need to know:

The following terms will be referred to many times in this Study Guide and are an important part of ski racing. **(Refer to Study Problems)**

1. **Seed Points** - a numerical indicator of a competitor's individual ranking with all other competitors; used only at scored events. Points lists – both U.S. Ski & Snowboard and FIS – have “closing dates,” which are the ends of the scoring periods, and “valid dates,” which are the dates when a list can first be used. All versions of the race result software used – timing and results – must use the same points lists.

NOTE: *U.S. Ski & Snowboard National Points may only be corrected by U.S. Ski & Snowboard, FIS Points by the FIS Office. FIS Points on the FIS website that are followed by “C” are an indication that the points have been confirmed.*

Foreign competitors with current FIS inscriptions and without current National Points entering U.S. Ski & Snowboard non-FIS events are be seeded with their FIS Points; if part of the penalty, the FIS Points are used. These athletes must, however, hold a U.S. Ski & Snowboard “X Competitor” membership. (2021 ACR Chapter 1: Foreign Competitors in USA Events; U.S. Ski and Snowboard Competitions)

2. **Race Points** - a numerical indicator showing the relationship between the relative times of a competitor and the winner of that specific race; race points are calculated only at scored events.
3. **Penalty** - a numerical indicator that equalizes races of the same event using the seed points of the best competitors (lowest seed points) who “actually” start as well as the seed points and the race points of the best competitors (lowest seed points) who place in the top 10 in time. There are different methods of calculation for FIS and U.S. Ski & Snowboard; a penalty is calculated only at scored events.
4. **Seed and Draw Board** - display boards where cards containing competitors’ names, club or team affiliation, and seed points, if applicable, are posted. Preparation of the Boards is the Race Administrator’s responsibility; the assistance and input from Chief of Timing & Calculations aids in the accuracy of the presented data.
5. **Double Draw** - simultaneous drawing of the competitor number (the place they hold on the seed board) and the bib number by the Referee(s); a double draw is usually done only at scored events. [621.8]
6. **Snow Seed** - referred to as a “Start Order in Extraordinary Conditions” is a process whereby 6 competitors are drawn from the last 20% of the field. These competitors are shown with an asterisk (*), and with the approval of the Jury start prior to start #1 in the reverse order of their assigned start positions. Snow Seed is only valid for DH, GS, and SG. A snow seed may be drawn at both scored and non-scored events. [621.10]
7. **Regular or Fixed Interval** - DH, GS and SG competitors leave the start gate at set intervals pre-determined by the Jury. Intervals apply to all race levels. [622.1]
8. **Irregular or Non-Fixed Interval** - SL competitors leave the start gate at irregular intervals. The Chief of Timing & Calculations or assistant tells the Starter when each competitor should start in agreement with the Jury. [805.1]
9. **Bibbo** — a procedure used to determine the second run start order for 30 or 15 fastest first- run competitors at U.S. Ski & Snowboard-scored events. **NOTE: A standard bibbo is 30; the Jury may choose to reverse 15, but they must announce this 1 hour prior to the start of the first run.** [621.11.2]

NOTE: In the case of a Flip 30-second run, the special group (Golden Rule) starts in the 31st position or in the position immediately following the first run leader when the flip is other than 30 unless their first run time allows more favorable seeding. [U621.11.3.2]

10. **Time-of-Day (ToD) Timing** — Time-of-day timing is the time a racer leaves the start and arrives at the finish taken on continuously running, synchronized timekeeping equipment coordinated to local standard time.
11. **Replacement Time (Equivalent Electronic Time – EET)** — When a System A (primary) time of day is missing, calculation of a replacement time utilizing a

comparison of System A time-of-day start or finish impulse to System B (secondary/backup) time-of-day start or finish impulse is required. *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 the time is not available from System B, the photo finish time, if available, must be used in place of manual/hand timing with no correction required.*

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

If both System A (primary) and System B (secondary/backup) timing systems fail, calculation of a replacement time utilizing a comparison of the electronic time-of-day start or finish impulse to manual/hand time-of-day start or finish impulse is required.

In both instances, the procedure is to compare the System B start or finish time of day or manual/hand start or finish time of day to the corresponding System A time of day time for the 10 times prior to the missed time. The sum of the comparisons is divided by 10, the difference is rounded up or down ($0.0449 = 0.04$, $0.0450 = 0.05$). This correction time must be added or subtracted to the replacement time of the competitor without a System A time.

The EET calculation must only use time of day precision to a minimum $1/1000^{\text{th}}$ (.001) for the correction value of the time of day. If manual/hand timing is only available to a precision of $1/100^{\text{th}}$ (.01), the full precision of $1/1000^{\text{th}}$ or better must be used.

Example:

System A Time in ToD: 10:48:31.9781 Hand Timing: (10):48:31.86(00)

A replacement time (EET), when required, is an official time and is valid at all levels and types of competition. *Forerunners' times must not be used in the calculation of replacement times.*

The actual calculation(s) must be made available for the Technical Delegate's review and must be included with the Technical Data Timing Report (TDTR) submitted in the required Race Result Document Packet.

- B. Determine the time and place for the first Team Captains' Meeting, and attend the meeting. Useful information that is available at the meeting is:
1. Number of Forerunners
 2. Time to start Forerunners
 3. Planned start intervals
 - a. Regular (fixed) start interval races [622.1]
 - b. Irregular start (non-fixed) interval races [805.1]
 4. Start List
 - a. Non-Scored events: Per Region/Division standards; generally random within class
 - b. Scored events: Actual Double Draw is recommended [217, 621.8]
 - c. Snow Seed: If required for scored and non-scored DH, GS, and SG [621.10]

NOTE: For U.S. Ski & Snowboard non-FIS events, the Jury may allow the use of a computer-generated draw. A signed (submitted) entry form is considered acceptance of a computer-generated Draw at a FIS event. *(It is important to remember that computer-generated Draws are governed by a*

random identifier and unless this identifier is changed prior to each Draw, results of a Draw involving the same competitors may only have minimal changes.)

According to U.S. Ski & Snowboard and FIS rules, the draw must be conducted (or confirmed) at a Team Captains' Meeting. A Team Captains' Meeting, attended by Team Captains, Jury, and race officials is an inseparable and mandatory part of the competition and is important for communication of Jury instructions, support of the OC (Organizing Committee), as well as conveying OC requests and information. *It is also a critical element for risk management and liability-related matters.* (Refer to 621.8, 604.3)

With the approval of the Jury and at a time and place announced to all Team Captains, and where a computer-assisted Draw has been approved or is not required (e.g., YSL where TRS by class and gender is used to determine the start order), an informational meeting is still required. The meeting may be held either immediately after the completion of a race for the next day's event or on the morning prior to a race.

For all Team Captains' Meetings for all U.S. Ski & Snowboard-sanctioned events – both scored and non-scored, and regardless of where and when they occur, an Attendance List must be available and signed by everyone attending the meeting. Meeting Minutes must be generated and must be included in the submitted race result packet.

NOTE: USE OF ELECTRONIC SEED BOARD: Electronic seed boards must have the capability to simultaneously and legibly display the entire competition field. Simultaneous display of all competitors allows all Team Captains and officials to verify the overall accuracy as well as additions and deletions to the starting order in “real time.” *Using the race result software to display portions of the competition field is not acceptable.*

- Can the first seed draw be limited to fewer than 15 competitors? [621.3]
 - Were there “special seeds?” E.g., Adaptive competitors with “Golden Rule” seeding? Golden Rule allows adaptive competitors to be seeded after the first group. Golden Rule seeding is not valid for FIS events. [U621.3.1]
 - Age Class, Collegiate, Masters, and Adaptive – according to current rules
 - Was a “snow seed” drawn?
 - An updated race day schedule is a must. It allows the Chief of Timing & Calculations to arrange their schedule, crew, and duties.
- C. Become familiar with the timing equipment you will be using [611.2]; know what it displays and what it prints. The time-of-day times must be immediately and automatically sequentially recorded on printed strips at the maximum precision of the timing device according to the requirements for homologation. The final result is calculated by the mathematical comparison of the finish time and start time. Each skier's run is then expressed to 1/100th (0.01) precision by truncating the calculated net time on course (**Refer to Timing Tape Samples a, b & c**). *Art. 611.3.5 Requires that computer software that calculates net times must use precision of ToD as used in the timing device.*
- D. Understand the definition of a rerun and who has the authority to authorize one
1. What is a rerun? [623]
 2. Who can grant a rerun? [623.1.1, 623.1.2, 623.3.1]

3. Can the Chief Timekeeper grant a rerun?
What if a time is missed due to equipment and manual timekeeping malfunction? What if only electronic timekeeping malfunctions?

NOTE: Allowing a rerun due to the malfunction of the timing systems or other technical difficulties is a responsibility of the Jury. [623.1.2] A calculated replacement time using manual/hand timekeeping is in compliance with the rules.

4. If the Jury decides to approve a provisional rerun, the provisional rerun time must be considered valid even if it is slower than the original time [623.3.3]
5. What is the start time of a rerun? [623.4]
 - a. Regular (fixed) interval races [623.4.1]
 - b. Irregular (non-fixed) interval races [805.3, 623.4.2]
6. What is the difference between?
 - a. Provisional rerun [623.3.1]
 - b. Rerun
7. What if a “rerun” – not a “provisional rerun” is granted, and the Jury determines the competitor had committed an error prior to the incident which allowed the competitor to be granted a “rerun?” If the competitor was already disqualified before the incident entitling the competitor to a rerun, *the rerun is not valid*. [623.3.2]
8. What are the possible consequences if a racer is not informed of the “provisional” nature of a rerun?

E. Gather materials required for the event

The Race Secretary should provide forms and supplies; however, it is a good idea to have your own back-up plan. Although you will not personally need some of these items, officials and coaches often, because of its proximity to the racecourse, come to the timing building when they need supplies.

1. Chief of Timing & Calculations Packet of Forms
 - a. Report by Referee - 1 per run per gender (**Refer to MPF #34. Report by the Referee**)
 - b. Additional Start/Finish Timekeeper Recording Form (**Refer to MPF #30. Start/Finish Timekeeper Recording Form**)
 - c. Replacement Time (EET) Worksheets (**Refer to MPF #32. Replacement Time (EET) Worksheet**)
 - d. Electronic Time Recording Form (**Refer to MPF #31. Electronic Time Recording Form**)
 - e. U.S. Ski & Snowboard or FIS Penalty Point Calculation forms - 1 per race/per gender (**Refer to MPF #38. U.S. Penalty Calculation and MPF #39. FIS Penalty Calculation**)
 - f. Protest forms (**Refer to MPF #35. Protest Form**)
 - g. Timing Checklist (**Refer to MPF #42. Timing Checklist**)
 - h. Timing & Data Technical Report (TDTR) - 1 per *race/per gender* for all U.S. Ski & Snowboard events, both scored and non-scored. *FIS TDTR software will provide the required XML file and PDF report. Paper form in the MPF is suggested for gathering data required by the software.* (**Refer to MPF #43. U.S. Timing & Data Technical Report; MPF #44. Why a TDTR**)

- i. Additional Start/Finish Referee Record Forms (**Refer to MPF #29. Start/Finish Referee Recording Form**)
 - j. Additional Gate Judge Cards (**Refer to MPF**)
2. Supplies in the timing building
- a. Envelope(s) or large plastic bag(s) for sending documents to Race Administration
 - b. Pencils
 - c. Paper clips
 - d. El Marko type pens, permanent ink (scoreboard)
 - e. Tacks or staples and staple gun for scoreboard
 - f. Tape: Scotch tape, Duct tape, etc.
 - g. Clipboards with protective cover sheets
 - h. Manual/hand timekeeping devices with fresh batteries/extra batteries
 - i. Additional paper or tape for the timing equipment
 - j. Additional ink for printer, if one is available in the timing building

III. Morning of the Race

- A. Pick up your forms, supplies, manual timekeeping devices (if not already in your possession), and Start Lists from the Race Administrator.
- B. Organize timekeeping crew early; distribute materials/equipment needed for the entire day
 - 1. Verify the race day schedule and notify the Race Administrator of all changes
 - 2. Confirm job assignments
 - a. Chief of Manual/Hand Timing [U611.2.2, 612.5]
 - (1.) Start area manual/hand timekeeper/recorder [612.5]
What determines an actual "start?" [613.5]
 - (2.) Finish area manual/hand timekeeper/recorder [612.5,]
What determines a "finish?" [611.3.1]
 - (3.) Start and Finish Manual/Hand Timekeepers
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. *With the exception of the highest level of events, this "perfect situation" rarely occurs!*
 - (4.) What are the benefits of two manual/hand timekeeping devices at the Finish? [611.3.1]
When two racers approach the finish in close proximity, there may not be enough time for both Manual/Hand Timekeepers to time the first racer, read off and record elapsed times, and reset for the second racer. It is strongly suggested that Primary Finish Manual/Hand Timekeeper times first racer to cross the line and Secondary Finish Manual/Hand Timekeeper times second racer to cross the line.

*An indication must be made as to whether the recorded times are a “P” (primary) time or an “S” (secondary/backup) time.

**This is not a perfect solution, but the alternative is no time; it is important that manual/hand timekeeping be available for every competitor.*

NOTE: Some devices store recorded times for printing at the end of the run. It is strongly recommended that a paper-copy record also be maintained for immediate needs, e.g., verification of an electronic time, EET calculation, failure of a device.

Confirm that Manual/Hand Timekeepers are familiar with functions for their timekeeping devices as well as your preferred procedures, e.g., malfunctions.

- (a.) Restart failed device and note same on recording report
- (b.) Switch to the backup device and note the same on the recording sheet
- b. Chief of Calculations [612.7]
- c. Electronic Timekeeper Operator(s) [611.2.1]
- d. Electronic Time Recorder(s) [611.2.1]
- e. Scoreboard/Poster [611.2.3, 617.1]; (runners may be required to transfer data)
- f. Announcer - location of; how/when information will be relayed to announcer. [617.1, 611.2.3, 617.2.2]
- g. Confirm start signals with starter
Keep conversation over start communications, radios, or land lines to a minimum; a pre-determined system aids in understanding when there is a lot of noise, etc.
 - (1.) Regular (fixed) start interval races [U613.4]
10 SECONDS – 5, 4, 3, 2, 1 – “GO” – (If racer has not started, count continues 1, 2, 3, 4, 5)
 - (2.) Irregular (non-fixed) start interval races [805.1 - Confirm with Jury; 805.3]
“Ready”.....“GO”
- h. The use of a start clock does not replace verbal start commands. [U613.4]
- i. Synchronize the manual timekeeping devices
(If possible, synchronize manual timekeeping devices with electronic timing system)
- j. Collaborates with the TD regarding synchronization of electronic timing equipment: as close as possible before the start of first racer. Time-of-day times must be immediately and automatically sequentially recorded on printed strips at the *maximum precision of the timing device according to the requirements for homologation*. [611.2.1]
- k. After synchronization is complete, sends new impulse by same source to verify accurate synchronization of systems A & B. FIS Timing Booklet states the times received on each system should be identical or be within a few 1/1000ths (0.001 sec.). If the differential is greater than 0.001 seconds, the electronic timing equipment must be re-synchronized and synchronization accuracy must be re-confirmed.
- l. Cooperate and assist TD with verification/completion of **“Timing & Data Technical Report” (TDTR)** [611.3.3]
- m. For FIS events, oversee the online filing of TDTR in XML format
- n. For non-FIS events, if FIS TDTR software is being used, oversee the online filing of the TDTR in XML format
- n. For all events, provide a paper copy of completed TDTR and required Replacement Time (EET) calculations, for Race Administrator’s reporting requirements

NOTE: FIS Software is available that provides the proper format for FIS-event online filing. The software also produces a PDF copy of the TDTR which, after being signed by the Technical Delegate and the Chief of Timing & Calculations, is required as part of race result document packets. *FIS will only accept the TDTR electronically in XML format.*

The FIS TDTR software is preferred for preparing and submitting the TDTR XML file for non-FIS events; it will produce the required paper copy report. The software will accept a “National Race Code” which is used for a U.S. Ski & Snowboard Race code number (alpha character + 4-digit number). “Race Codex” may require data, and either “CHI – Children,” “CIT – Citizen,” or “JUN – Junior” category must be selected. (Refer to current TDTR tutorials for additional information; TDTR PPT is available on the U.S. Ski & Snowboard website.) If using the software is not an option, a paper copy U.S. TDTR for use at U.S. Ski & Snowboard non-FIS events is available in the MPF on the U.S. Ski & Snowboard website.

If it is necessary to calculate a replacement time (EET), 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 Race Result Document Packet. Copies of the calculation(s) and the Technical Data Timing Report must also be submitted to the assigned Timing Working Group member for each U.S. Ski & Snowboard Region/Division.

IV. Starting the Race

- A. Verify schedule; Jury may have made adjustments.
- B. Verify the number of gates from the Chief of Course, Course Setter, or Chief Gate Judge. Confirm with a Jury member. [601.3.5, 617.3.4]
 - 1. Giant Slalom – actual gate count and direction changes are required for Official Results
 - 2. Super G – actual gate count and direction changes are required for Official Results [1001.3.4]
 - 3. Slalom – actual gate count and direction change are required for Official Results
- C. Verify actual length of DH [701.2] or SG [1001.2] competition course (racing line) has been measured with measuring tape, wheel, or GPS. *This measurement is used to calculate competitors’ speed on course.*
- D. Chief Gate Judge verifies when all Gate Judges are in position.

SUGGESTION: Verify synchronization of manual/hand timekeeping devices at Start and Finish by radio. This is especially important if you are using inexperienced manual/hand timekeepers. Once manual/hand timekeepers are in position, it can be easily done by radioing a count-down: “3, 2, 1, GO” and verifying display. *Waiting until after first Forerunner finishes to verify synchronization is not the preferred option because it can create a delay for the start of the event.*

- E. Forerunners start prior to published race start time
 - 1. Forerunners must have appropriate and current U.S. Ski & Snowboard membership, e.g., Competitor, Youth, Master, Non-Scored Athlete, Short Term, or General.
 - 2. Forerunners’ times should not be published [605.6]
 - 3. Forerunners are not allowed to start in the competition [605.4]

4. Forerunners can be used as a final check of all timing systems
- F. Be ready to start on time. Record weather, snow conditions, start area air temperatures, and finish area air temperatures prior to the scheduled start time. [617.3.4]
- G. If a snow seed was drawn, verify whether or not it will be used. Snow seed is 6 racers drawn from the last 20% of the field and indicated with asterisks (*) run in reverse order of their assigned start numbers - highest bib number first. [621.10] Jury has the right to change this start order. Snow seed starts at published start time.
- H. Verify how many will be reversed for 2nd run - BIBBO [621.11.3]
- I. In U.S. Ski & Snowboard scored non-FIS events, verify whether or not the Jury will allow 1st-run NPS, DNF, and DSQ competitors to take a second run. *This is already allowed in non-scored events.*
- J. Send the information you have gathered to the Race Administrator.

V. **During the Race - Procedures and Calculations**

Develop a system of double-checking. It is very easy to make a calculation and/or data input errors when there are a lot of distractions - check and double-check!

- A. Track the racers at all times (develop your own system) and record all NPS, DNS, and DNF bib numbers on the Report by the Referee as they occur. Relying on computer results or other reports to document NPS, DNS, and DNF bib numbers after they occur can make it difficult to track errors.
 1. Racer in the gate
 2. Racer(s) on the course
 3. Racer(s) having finished
- B. Slalom - The Chief of Timing & Calculations or assistant tells the Starter when each competitor should start in agreement with the Jury. The competitor currently on course need not have crossed the finish before the next competitor starts. [805.1]
- C. Start rules
 1. **Five-second rule** also called “10-second start window” [613.6, 613.7] (**Refer to Early/Late Start a, b and c**) applies to events with regular (fixed) start intervals: DH, SG, and GS. *Competitors who fail to start within the 5 seconds before and the 5 seconds after the start command will be disqualified.*
 2. **Ten-second rule** [805.3, 805.4] applies to SL, which is the only event with an irregular (non-fixed) start interval. *Competitors who fail to start within (about) 10 seconds of the start command will be disqualified.* [805.4]
 3. **Delayed Start - One-minute rule** [805.3.1] applies to all events: regular (fixed) and irregular (non-fixed) interval events. *Competitors who fail to arrive at the start within one minute of being called may be allowed a provisional run if, in the Start Referee’s opinion, delay was caused by “force majeure.” Breakdown of competitor’s equipment or minor illness does not constitute “force majeure.” In cases of doubt, the Jury may allow*

a provisional run. Delayed starts are subject to sanction; disqualification is not mandatory. [628.5]

D. Timing Responsibilities

1. Record all times as they are read on the timing display or as they are printed.
2. System A (primary) electronic times should be recorded in at least two places and preferably, by two different people.
3. System B (secondary/backup) start and finish electronic ToD times should be recorded and compared against the System A electronic ToD times as the race progresses. In case of loss of a System A electronic ToD, an equivalent System B electronic ToD can be easily and quickly calculated.
4. In the case of the failure of the System A electronic ToD, results of the System B electronic ToD will be valid after the calculation and application of the correction factor, if required. [611.3.2] Manual/Hand times may be used in official result after correction (Replacement/Equivalent Electronic Time) has been calculated. [611.3.2.1] **(Refer to Steps Involved in Calculating a Replacement Time – EET)**
5. 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. [611.2.1]
6. If System A timing fails and photo finish timing is available, it must be used without application of a calculated correction; otherwise calculate a correction value using manual/hand times.
7. When subtracting time-of-day times, follow this procedure: Start across the top line to the right checking to see IF any “borrowing” needs to be done. Then, perform the subtraction procedure back across to the left in the normal manner. When a procedure is adopted and followed consistently, fewer errors occur.

When you borrow time, remember 1 minute = 60 seconds; cross a colon from left to right and borrow 60; cross a decimal from left to right and borrow 10.

Start here:

> > > > > > >

03:61

15:04:01.8916

- 15:02:59.8715

1:02.0201

< < < < < < <

TRUNCATE TO 0.01, TIME = 1:02.02

REMEMBER: NUMBERS ARE ROUNDED, TIMES ARE TRUNCATED!

8. Homologated timing systems automatically indicate manual timing interventions and mark the timing tape accordingly. If system does not indicate DNS and DNF bib numbers, or if recorded time is subject to calculation of a replacement time (EET), these should also be marked. Official times must be verified against timing tapes, and required replacement time calculations that are not marked can cause confusion. [611.3.4]
9. System A and, if required, System B timing tapes are the official timing record for the event and must be used to verify Official Results.

10. Label tapes as to date, gender, event, and run. The tapes will be given to the Technical Delegate for review; OC keeps the tapes in its possession until the race has been officially approved. [611.3.3] *In cases of force majeure, the Technical Delegate may choose to retain possession of the timing tapes.*

E. When the last racer finishes, check with the Jury and verify the course is closed. Any provisional starts or provisional reruns must have been inserted prior to the last racer actually starting the run.

F. After each run AND at the end of the race:

1. Start Timekeeper/Recorder deliver timing forms to timing building.

2. Chief Gate Judge picks up the forms from each Gate Judge [601.3.5, 665.1] and delivers them to the Referee(s).

3. Referee/Assistant completes NPS and DSQ information on Report by the Referee. Report is dated and signed with time of posting as well as time of expiration of Protest Period noted. *Chief of Timing's assistance is valuable in providing correct name, nation (or club) of DSQ competitor, their bib number, gate # and type of gate fault (miss or straddle) where fault occurred, or applicable rule citation (for DSQ not involving a gate fault, e.g., start, finish, equipment, etc.), and name of official or Gate Judge documenting the fault.*

Special care must be taken to identify the correct racer if the Start List contains an offset between bib numbers and start numbers due to missing bibs or insertions in the field. The Referee and the Technical Delegate must verify the accuracy of the data entered in the Report by the Referee.

4. A copy of the Report by the Referee is posted on the Official Notice Board or Scoreboard. The original must be returned to the Race Administrator.

5. A competitor is “Not Permitted to Start” (NPS) [627] who:

a. Wears obscene names and/or symbols on clothing and equipment

b. Behaves in an unsportsmanlike manner in the start area

c. Violates the rules in regard to the competition equipment and commercial markings

d. Trains on a course closed for competitors

e. In training for Downhill has not participated in at least one timed training run

f. Does not wear a crash helmet that conforms to the Specifications for Competition Equipment [606.4] **FIS label must be present!**

g. Does not have ski brakes on their skis [606.3]

h. Does not wear or carry an official start number* according to the rules

****An “official start number” refers to any bib issued by the local event organizer; this includes replacement bibs furnished by the Start Referee.***

6. Recording “NPS” Situation – non-FIS and FIS Events

a. Due to rule(s) violation(s), athlete is not permitted to start; this could apply to either run of a 2-run event.

b. Athlete’s status is recorded by the Start Referee as “Not Permitted to Start” (NPS); reason must be stated. (Current Report by Referee posted in MPF on U.S. Ski & Snowboard website, allows for listing of Bib/Name/Nation/Reason or Rule.)

c. If older version of Report by the Referee is being used, athletes who are “NPS” should be clearly identified as the software does allow for an “NPS” designation

- e. Technical Delegate must verify accuracy of Official Results and Penalty posted on U.S. Ski & Snowboard/FIS websites.

NOTE: In cases of *force majeure*, the Technical Delegate may need to complete and post the Report by the Referee or assign the duty to another official. A Report by the Referee that has been signed by the Technical Delegate or the Technical Delegate's designee is valid.

7. DSQ's should be announced over the public-address system. When an announcer is present and is announcing competitors' *unofficial* times, announcement of DSQ data (Bib #, Name, and Club of DSQ competitor) may replace actual posting of Report by the Referee. *Team Captains must be notified beforehand if announcement of DSQ information is going to replace actual posting.* [617.2.2] If disqualifications are announced, protest period starts at the time of the announcement (similar to procedure used when disqualifications are actually posted.)
 8. Protest time is 15 minutes. [643.4]
- G. Chief of Timing responsibilities after the 1st run AND at the conclusion of the 2nd run.
1. **VERIFY ALL TIMES AGAINST TAPES FROM THE HOMOLOGATED TIMING EQUIPMENT.** The Chief of Timing and Calculations is responsible for supplying Data Management/Race Administrator with accurate times for each competitor.
 2. Verify whether or not provisional starts or provisional reruns – have been approved.
 3. When the Protest period has expired, confirm DSQ's with Jury and Race Administrator.
 4. Account for all racers - if you started with 150 racers, account for all 150 racers (Classified Finishers + NPS + DNS + DNF + DSQ = 150 racers).
 5. Verify preparation of Second Run Start List
 - a. Standard bibbo of 30
 - b. Reverse 15 [621.11.3]
 - c. Review procedure for a bibbo where a tie occurs at the flipped position: *30th or 15th place* [621.11.2]
 - d. Review procedure for ranking ties that occur within the flip [617.3.3]
 - e. Review the rule that allows 1st Run NPS, DNF, and DSQ competitors to take a second run in U.S. Ski & Snowboard scored non-FIS events* [U621.11.3.1]
 - f. Review “Golden Rule” requirements [U621.3.1; U621.11.3.2]
 - g. Review procedures for preparing a Second Run Start for non-scored events [U621.11.3.3]

***NOTE: Competitors who are classified as NPS, DNS, DNF, or DSQ in a non-scored event are allowed to take their second run at the end of their class or the end of the field. This rule is not meant to supersede the provisions of TRS; it is meant to accommodate young racers who are classified as DNF or DSQ after falling, missing a gate or being overtaken/passed on a Slalom course as well as those who failed to start. Confirm Divisional policy regarding 2nd run for competitors who are classified as 1st-run NPS, DNS, DNF, or DSQ.**

For non-scored events where each run counts individually, first-run NPS, DNS, DNF, or DSQ competitors start the second run in their original start position. (Verify Division procedure.)

6. Verify procedure for ranking ties - racer with **higher** start (bib) number is placed first. [617.3.3]

7. Verify 2nd Run cutoff, if applicable.
 8. File all 1st run paperwork in an appropriate container so it doesn't get confused with 2nd run paperwork; e.g., Properly labeled large manila envelope or plastic zip-type bag.
This is especially important when issues arise, verification is required, and paperwork must be reviewed.
 9. Verify the accuracy of Second Run Start List. [621.11.2]
 10. If computer problems occur, it may be necessary to create a 2nd Run Start manually. This will allow for a timely second run start. If the computer problem is solved in a timely manner, the manually prepared list will serve as an excellent double-check of the computer input. If a manually prepared Second Run Start List is required, print as many copies as possible but remember the Jury, the Chief of Timing & Calculations, and the Assistant Starter are the only officials who must have a copy. *Always keep the original for required verification.*
- H. Preparation of Second Run Start List: **Due to space constraints, reverse 15 is illustrated.**
1. Rank all first run competitors in time order.
 2. Remove DSQ competitors from the field *unless being given a provisional second run.*
 3. Break all ties, regardless of where they occur, by ranking the tied competitor(s) with the higher bib number(s) before the tied competitor(s) with the lower bib number(s).
 4. Verify the number of competitors that are to be reversed (bibbo).
 5. Check for a tie at the reversal position.
 6. If a tie has occurred at the reversal position – 30 or 15, include those ties in the reversal number. This will result in the lower bib number starting first and the racer with the fastest first run time starting 31/16 (with a 3-way tie at the reversal position, the racer with the fastest first run time would start 32/17, etc.)
 7. Reverse the correct number of competitors, including ties, if applicable.
 8. When ties occur elsewhere in the field other than in reversed group, tied racer(s) with higher bib number(s) will start prior to tied racer(s) with lower bib number(s).

<u>1st RUN TIMES</u>		<u>1st RUN RESULTS</u>			<u>2ND RUN START LIST</u>		
<u>BIB</u>	<u>TIME</u>	<u>PL</u>	<u>BIB</u>	<u>TIME</u>	<u>ST</u>	<u>BIB</u>	<u>1st RUN TIME</u>
1	52.11	** 1	7	49.63	1	12	52.56 \
2	51.56	2	4	49.71	2	17	52.56 / TIE AT 15TH POSITION
3	52.52	3	8	50.30	3	3	52.52
4	49.71	4	9	50.51	4	10	52.20
5	51.48	5	11	51.15	5	1	52.11
6	51.46	6	15	51.20	6	2	51.56
7	49.63	7	16	51.45	7	13	51.51
8	50.30	8	6	51.46	8	5	51.48
9	50.51	9	5	51.48	9	6	51.46
10	52.20	10	13	51.51	10	16	51.45
11	51.15	11	2	51.56	11	15	51.20
12	52.56	12	1	52.11	12	11	51.15
13	51.51	13	10	52.20	13	9	50.51
14	51.31 DSQ	14	3	52.52	14	8	50.30
15	51.20	15T 17	52.56		15	4	49.71
16	51.45	15T 12	52.56		16	7	49.63 - FASTEST 1ST RUN TIME
17	52.56	17	19	52.57	17	19	52.57
18	53.47	18T 20	53.47		18	20	53.47 \
19	52.57	18T 18	53.47		19	18	53.47 / TIE OUTSIDE OF BIBBO

** **NOTE:** This is the racer's place not racer's bib number!

- I. Procedures and calculations during and after the 2nd Run
 - 1. Verify that Jury has closed the course prior to closing timing operation.
 - 2. VERIFY ALL TIMES AGAINST TIMING TAPE.
 - 3. Verify whether or not provisional starts or provisional reruns have been approved.
 - 4. Again, just as for 1st run, confirm DSQ's after the expiration of the Protest Period (15 Minutes) and verify with Race Administrator.
 - 5. Account for all competitors as you did after the 1st run.
(START LIST – TOTAL NPS – TOTAL DNS - TOTAL DNF - TOTAL DSQ
= TOTAL RANKED ON RESULT)
 - 6. Even if the Penalty is computer generated, it is the TD's responsibility to verify the calculation and indicate verification by signing it. If time permits, the Chief of Calculations may also verify the Penalty calculation.

- J. Suggested Procedure for Tracking 1st Run NPS (track in DNS section), DNF, DSQ athletes in 2nd Run

The Chief of Timing & Calculations and the Race Administrator account for all competitors, and the U.S. Technical Delegate Report requires documentation of these calculations. For events where 1st Run NPS, DNF, and DSQ athletes are allowed to start in the 2nd Run, this can create a unique challenge.

It is important that the Chief of Timing & Calculations continue recording after all valid 2nd-run starters have completed their run. Not continuing to record 1st Run NPS, DNS, and DNF

competitors who are being allowed to take a 2nd Run will result in an incomplete record of the event, so the following recording method is suggested:

1. Start Referee notifies Timing when last classified 2nd-run starter has left the start
2. Chief of Timing & Calculations (or assistant), makes appropriate notations in the DNS and DNF sections of the Report by the Referee

Report by the Referee will now concisely reflect how many actual 2nd Run DNS and DNF competitors are to be considered in the calculation of “Finishers/Total Ranked” on Official Results.

The following is only a suggested method. The Chief of Timing or assistant may use a recording method of their choice; e.g., End 2nd Run, Run 1 Racers, etc.

Did not start (No.)/Pas au départ (No.)/Nicht am Start (Nr.)			4	27								
2nd Run complete	18	34	42									
Did not finish (No.)/Pas à l'arrivée (No.)/Nicht im Ziel (Nr.)			1	7	23	29	31	37	41	45	49	52
	65	72	77	81	82							
2nd Run complete	6	15	21	34								
Time published / Heure d'affichage / Anschlagzeit H:mm			Deadline / Délai / Ablauf H:mm			Date / Date / Datum m/dd/yy			Signature Referee Signature du juge arbitre Unterschrift des Schiedsrichter S/			

K. Calculation of a U.S. Ski & Snowboard Penalty

3. Rank all competitors
4. Calculate Race Points
5. Identify the top 10 finishers on the Official Results.
6. Select the 5 best (lowest) seed point holders from among the top 10 finishers.
7. Two possible ties encountered in Penalty calculations:
 - a. **10th in time:** If a tie occurs for 10th place in time consider all competitors, including all in tied position when selecting 5 best (lowest) seed point holders from among top 10 finishers.
 - b. **5th best (lowest) seed points:** If a tie for occurs for 5th best (lowest) seed points, use the competitor with the highest race points in the calculation.

The above procedures allow for the calculation of a better (lower) race penalty.

8. Identify competitors with 5th best (lowest) seed points who are entered and who actually start the first run of the race, regardless of their final result: DNF, DSQ, or DNS run 2.
9. Complete calculations as directed by the form.
10. 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 U.S. Ski & Snowboard race that does not meet minimum vertical drop requirement but does meet minimum winning time requirement as published in the 2022 Alpine Competition Guide is 60.00. If the calculated penalty is lower than 60.00, the applied penalty shall be 60.00.
- 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 2022 Alpine Competition Guide, or the minimum penalty of 60.00 shall be applied.

USEFUL HINTS:

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

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

If an event meets neither VD nor time, apply larger of:

- Total of calculated penalty + additional penalty or
- Minimum of 60.00

9. Calculation of a U.S. Penalty under particular circumstances

- a. 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	200 m	50 seconds combined for 2 runs	17.00
SG	300 m	40 seconds for 1 run	21.00

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

- b. Fewer than ten racers finish, a minimum race penalty shall be applied regardless of the calculated penalty, as follows:
 - 1.) DH – 180
 - 2.) SG – 135
 - 3.) GS – 110
 - 4.) SL – 100
 - 5.) AC – 125
- c. When at least five racers with valid U.S. Ski & Snowboard 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:
 - 1.) DH – 820
 - 2.) SG – 660
 - 3.) GS – 530
 - 4.) SL – 360
 - 5.) AC – 660
- d. When fewer than five racers in the first 10 have valid National Points
 - 1.) Assign maximum value in order to bring the total of racers with points to five
 - 2.) Remember maximum value is also assigned to any of the best five whose actual National Points are above the maximum level
- e. When fewer than five racers finish, the *penalty must be calculated manually:*

- 1.) Insert “ghost” racers in order to reach a total of five
 - 2.) Assign maximum U.S. Ski & Snowboard National Points to each “ghost”
 - 3.) Assign race points equal to those of the lowest ranked (slowest time) finisher
 - 4.) Calculate penalty according to the form.
- f. Race penalty cannot be calculated when there are fewer than three finishers!

L. Calculation of a FIS Penalty

1. Repeat steps 1-7
2. Additional step: (**Refer to FIS List Cover Page**)
Category Adder is competition level and event specific. It is posted on the FIS List Cover Page. (There is a self-explanatory form to use for this calculation. **Refer to 39. FIS Penalty Calculation.**)
3. Calculation of a FIS Penalty under particular circumstances (**Refer to Rules FIS Points**)
 - a. There are no minimum time standards; vertical drop must be met
 - b. When a penalty calculates over the minimum penalty as required by the level of the event and noted on the current FIS List Cover, the minimum penalty is applied
 - c. When racers in the top ten have points over the maximum FIS value, maximum value as noted on the current FIS List Cover are assigned*
 - d. When fewer than five racers in the first ten have FIS points, maximum value as noted on the current FIS List Cover are assigned*

*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.”*
 - e. If less than three competitors with FIS points are ranked within the five which are taken into consideration, or at least three competitors without FIS points are classified, the competition will be considered for FIS points with a double of the maximum value of the respective event as the minimum penalty.

VI. Procedures after the race is over

- A. Verify times reported on the Official Results agree with the timing tapes (*this verification must be noted in “Timing & Data Technical Report”*).
- B. Check all calculations and verify all data entered in the “Timing & Data Technical Report” (TDTR).
- C. If the “Timing & Data Technical Report” (TDTR) indicates, it was necessary to calculate a replacement time (EET either using backup electronic system or manual timekeeping), verify all calculation documents are available for the Technical Delegate’s review and required submittal.
- D. Organize your paperwork and arrange for prompt delivery to the Race Administrator.
- E. The Chief of Calculations is responsible for “... publication of Official Results after expiration of the Protest Period or after any Protests have been dealt with.” [612.7]

- F. Collect manual/hand timekeeping devices, check them for accuracy (no excessive "drift"), and/or malfunction, and return them with necessary comments on their performance.

VII. Review Calculation Procedures, Techniques and Record Keeping

- A. Manual/Hand Timing - Time-of-day Timing (ToD)
1. What is ToD (time-of-day) timing?
 2. Synchronization of manual timekeeping devices; depends on the type of manual device being used.
 3. Operation of the particular manual timekeeping devices with emphasis on procedures if malfunctions occur.
 4. How is a manual timekeeping device held?
(All devices should be kept steady; manual stopwatches require using bony ridge of first joint on index finger to depress the button)
 5. Record the times you see/hear.
 6. Report any display problems.
 7. Start and Finish Manual/Hand Timekeepers
 - a. Should be placed in an area where they will not be disturbed; *positioned as clear of finish area as possible and outside of the protection pads and fences*
 - b. Should be consistent
- B. How forms are used during the race
1. Start/Finish Timekeeper Recording Forms
 2. Forms in the timing building
 - a. Report by the Referee - Record NPS, DNS, DNF as race progresses
 - b. Electronic Time Recording Forms
 - c. Replacement Time (EET Worksheet) [611.3.2.1]
 - d. Timing & Data Technical Report

C. **Online Filing of Timing & Data Technical Report (TDTR): FIS Events**

FIS developed software which allows online filing of the "Timing & Data Technical Report" (TDTR). A PDF copy of the online report must be made available for inclusion in required electronic or paper copy race result document packets as noted in "Distribution of Documents – FIS Events."

The TDTR program is available for download (Windows Vista, 7, 8, 10; MAC OSX 10.10+) on the FIS website at fis-ski.com/en/inside-fis/document-library/timing-data; it will be updated as required. *Software will alert when an updated version is available; please update to current version.*

D. **Timing & Data Technical Report (TDTR): non-FIS Events**

A TDTR is also required for all U.S. Ski & Snowboard events – both scored and non-scored, and the FIS TDTR software is used for preparing and submitting the TDTR XML file for these events to tdtr@usskiandsnowboard.org. The software will also produce the required report in PDF format.

The software will accept a “National Race Code” which is used for a U.S. Ski & Snowboard Race code number (alpha character + 4-digit number). “Race Codex” is left blank but either “CHI – Children,” “CIT – Citizen,” or “JUN – Junior” category must be selected.

The paper copy U.S. TDTR available in the MPF on the U.S. Ski & Snowboard website may be used for gathering data required by the FIS TDTR software.

If a Replacement Time (EET) is required, 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 the required Race Result Document Packet.

- E. Reading Timing Tapes
- F. Accurate completion of the Timing & Data Technical Report (TDTR)
- G. Preparation of a Second Run Start List
- H. Race Points and Penalty Points
 - 1. Use Race Points/Penalty forms provided (***Study Problems***)
 - 2. Where are Factors (F-Values) found and what are they?
 - 3. U.S. Ski & Snowboard Penalty
 - a. Maximum penalties apply – where are they found?
 - b. No Category Adders apply
 - 4. FIS Penalty
 - a. Category Adder - where can it be found; how is it applied?
 - b. Minimum/maximum penalties apply - where are they found?

VIII. Special Topics for Discussion

- A. Crossing the Finish Line and Recording Times. The finish line must be crossed:
 - On both skis, or
 - On one ski, or
 - With both feet in the case of a fall in the finish/timing area. In this case, the time is taken when any part of the competitor’s **body** stops the timekeeping system. [615.3]
- B. Falls in Finish/Timing area [ACR states that a binding release more than 2 gates above the Finish line in SL, GS, or SG, or more than 1 gate above the Finish line in DH shall be considered as a clear DSQ. [611.3.1, 615.3, U628.1.5, U629.4]
- C. Crossing the Finish Line after committing a gate fault [611.3.1]
- D. Intermediate Timing - DH and SG
- E. Private Timing and Speed Measurement by Teams [611.4]
- F. START/STOP and START/STOP, YELLOW FLAG STOP Procedures. Knowledge of these procedures allows the Chief of Timing & Calculations to educate timing personnel.
- G. Not Permitted to Start (NPS)

TIMING TAPE SAMPLE 1: ToD TIMER

ToD TAPE/ELAPSED

S001 10:50:00.5791
S002 10:51:01.0892
S003 10:52:00.1293
F001 10:52:04.5495
S004 10:52:58.5896
F002 10:53:31.0197
F003 10:54:20.1396
S005 10:59:02.2295
S006 10:59:59.5994
F005 11:02:02.4391
S007 11:08:58.1992
F007 11:12:04.9194
S009 11:15:03.0195
S010 11:17:01.2794
F009 11:17:08.0996
S011 11:17:54.7597
S012 11:19:05.1998

This tape show **Start (S)**, **Finish (F)** and **Bib (###)**

S001 would be the start for bib 1

F001 would be the finish for bib 1

EARLY AND LATE STARTS DISQUALIFICATION

[613.7]

FOR REGULAR (FIXED) INTERVALS STARTING ON THE MINUTE:

CLOCK READS:

10:10:54.9900 = Competitor's Start / EARLY START?

*

10:10:55.0000

*

*

10:10:56.0000

*

*

10:10:57.0000

*

*

10:10:58.0000

*

*

10:10:59.0000

*

*

10:11:00.0000

*

START

*

10:11:01.0000

*

*

10:11:02.0000

*

*

10:11:03.0000

*

*

10:11:04.0000

*

*

10:11:05.0000

*

*

10:11:05.0100 = Competitor's Start / LATE START?

*

*

TIME-of-DAY (ToD) / MANUAL (ToD) REPLACEMENT TIME (E.E.T.) WORKSHEET

DATE: _____ EVENT: _____ MEN _____ WOMEN _____ RUN _____ CHIEF CALCULATIONS: _____

TIME-of-DAY (ToD) MISSING: _____ START or _____ FINISH

*Precision of time-of-day as used by timing device; minimum of 1/1000 precision required.

RACER BIB #	START/FINISH	START/FINISH	COLUMN A	COLUMN B
	SYSTEM B ToD* (or MANUAL ToD*)	SYSTEM A ToD* (or MANUAL ToD*)	SYS.B/MANUAL TIME SHORTER (+)	SYS.B/MANUAL TIME LONGER (-)
_____	____:____.____	____:____.____	____.____	____.____
_____	____:____.____	____:____.____	____.____	____.____
_____	____:____.____	____:____.____	____.____	____.____
_____	____:____.____	____:____.____	____.____	____.____
_____	____:____.____	____:____.____	____.____	____.____
_____	____:____.____	____:____.____	____.____	____.____
_____	____:____.____	____:____.____	____.____	____.____
_____	____:____.____	____:____.____	____.____	____.____
_____	____:____.____	____:____.____	____.____	____.____
_____	____:____.____	____:____.____	____.____	____.____

COLUMN A TOTAL + _____

COLUMN B TOTAL - _____

DIFFERENCE = (+) or (-) _____

DIVIDED BY 10 = (+) or (-) _____ = CORRECTION _____

BIB #	TIME OF DAY	(+) or (-)	REPLACEMENT TIME OF DAY
_____	____:____:____.____	____.____	____:____:____.____
_____	____:____:____.____	____.____	____:____:____.____

PROCEDURE TO BE FOLLOWED WHEN BOTH START & FINISH SYSTEM A TIMES ARE MISSED.

**If both Start and Finish ToD impulses are missed, replacement ToD's must be calculated for each ToD impulse as outlined in ICR 611.3.2.1.

Net time is then calculated and verified.

(Use 1 form for Start ToD replacement calculation and 1 form for Finish ToD replacement calculation; complete net time assignment on Finish ToD calculation form.) ALL CALCULATIONS MUST BE SUBMITTED WITH TDTR!

Bib # _____

Fn. ToD _____:____:____.____

St. ToD _____:____:____.____

Net Time: _____



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.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

The best 5 at start

TOTALS

(B) U.S. Points of best 5 at start

(A) U.S. Points of best 5 to finish in top 10

(C) Race Points of corresponding competitors

Calculated penalty

A + B - C = : 10 =

Penalty applied

Signature TD

Nr

PENALTY CALCULATION
CALCUL DE LA PENALITE
PUNKTEZUSCHLAGSBERECHNUNG

Name of event <i>Nom de l'événement</i> Name der Veranstaltung		
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	Time <i>Temps</i> Zeit	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.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							

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

TOTALS / TOTALS / SUMMEN

(B) FIS Points of best 5 at start

Points FIS des 5 meilleurs au départ
 Die 5 besten FIS-Punkte am Start

(A) FIS Points of best 5 to finish in top 10

Points FIS des 5 meilleurs dans les premiers 10
 Die 5 besten FIS-Punkte aus den ersten 10

(C) Race Points of corresponding competitors

Points compétition de ces concurrents
 Rennpunkte der entsprechenden Wettkämpfer

Calculated penalty / Pénalité calculée / Berechneter Zuschlag

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

Category Adder / Additif de catégorie / Kategorie-Adder

Penalty applied / Pénalité appliquée / Angewandter Punktezuschlag

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



**PROTESTS
RECLAMATIONS
PROTESTE**

Place/Lieu/Ort		Country/Pays/Land		Codex	
Name of Event			Date/Date/Datum		
Category		Gender		Event	
Reasons for protest Motifs de la réclamation Gründe des Protestes				ICR References Références FIS Bezugsquellen IWO	
				Name of protester / Auteur de la réclamation / Verfasser des Protestes	
Function Fonction Funktion	Surname, First Name Nom de famille, Prénom Familiennamen, Vorname	Team Equipe Mannschaft	Date and time of submission Date et heure du dépôt Datum und Zeit der Zustellung	Payment of deposit Versement de la caution Einzahlung des Betrages	
Protest and deposit received by / Réclamation et caution reçues par / Protest und Betrag hinterlegt bei					
Function Fonction Funktion	Surname, First Name Nom de famille, Prénom Familiennamen, Vorname	Signature Signature Unterschrift (please print and sign)			
Date Date Datum	Signature of protester Signature de /auteur de la réclamation Unterschrift des Protestverfassers				





TIMING CHECKLIST

- Interconnects 1. Is there wire? Does it work? Are you sure?
- Equipment 2. Is the equipment on the current list of timing equipment homologated by the FIS Timing Working Group?
(fis-ski.com/en/inside-fis/document-library/timing-data)
- Setup 3. Are the Time-of-Day times immediately and automatically sequentially recorded on printing strips at the maximum precision of the timing device according to the requirements for homologation?
- Software 4. If timing software is used to calculate times, is it calculating net times using the precision of ToD as used in the timing device?
- Hand Timing 5. Is hand timing that records to 1/100th (.01) precision available?
- Quality 6. Is the timing crew aware that hand times, even if not used, should be within acceptable limits?
- Start Gate 7. Does the Start Gate meet the following requirements?
a. Does the start have 2 separate electronically isolated switch contacts for triggering the start inputs from both System A and System B?
b. One wand?
c. Installed at proper height?
d. Are identical Start Gate mechanism & Wand available for replacement?
e. Is the placement marked on the Start Posts?
f. Are the Start Posts solidly installed?
- Finish Eyes 8. Do the Finish Photocells meet the following requirements?
a. Are 2 sets available?
b. Are 4 posts with a maximum diameter of 6cm available for mounting photocells? (2 are acceptable; replacements must be available)
c. Is the vertical separation between the beams no greater than 20cm?
- Synchronization 9. Have system A and System B been synchronized as close as possible to the scheduled start time for the first run of the day?
10. Has the synchronization been performed from one single contact switch for all timing devices?
- Systems 11. If System A fails, is the timing crew aware of the requirement to use System B times to calculate a replacement time (EET) for the missing impulse?
12. Is the timing crew aware that manual timekeeping is not used to calculate a replacement time (EET) impulse unless both System A and System B fail?



Timing & Data Technical Report - Alpine

(TDTR SOFTWARE CAN BE FOUND AT: fis-ski.com/en/inside-fis/document-library/timing-data
 One Timing Report Required for each Codex/Transmittal #

Location	Category	Season
Event Name	Competition Type	Race Code
Competition Date	Gender	

TIMING DEVICES	Brand	Model	Serial No.	Homologation No.
System A Timer (at finish)				
System B Timer (at finish)				
Timer A Start (if used)				
Timer B Start (if used)				
Start Device				
Start Clock / Beep				
Finish Cell A				
Finish Cell B				

Result software	Software company	Software name / version
-----------------	------------------	-------------------------

Connection to start	System A	System B	Voice connection
---------------------	----------	----------	------------------

SYNCHRONIZATION	System A (at finish)	System B (at finish)	Hand *	Timer A Start	Timer B Start
Synchronization time					
Synchronization confirmation					

TIMING <small>Time of day (TOD) expressed in precision used for net time calculations equal to the precision of the timing device.</small>	1 st Run			2 nd Run		
	System A	System B	Hand *	System A	System B	Hand *
Start TOD First Competitor						
Finish TOD First						
Net Time System A / BIB First						
Start TOD Last Competitor						
Finish TOD Last						
Net Time System A / BIB Last						
Net Time System A / BIB Best						

* Enter Start and Finish Hand Times exactly as they are recorded/displayed by hand timekeeping device.

Were all results from system A? Yes No

Comments run 1	Comments run 2
----------------	----------------

We certify that the timing and calculations of this event adhered to current ACR rules. Yes No

Technical Delegate	Chief of Timing and Calculations	Timekeeper / Timing Company
Name	Name	Company
Member No.	Telephone	Name
Telephone	Email	Telephone
Signature	Signature	Email

IF "ALL TIMES FROM SYSTEM A" IS ANSWERED "NO", PLEASE INCLUDE REPLACEMENT TIME (EET) CALCULATION SHEETS.

Why Do We Complete a Timing Data Technical Report?

Ski Racing is a competition against the clock.

1. Why do we collect the data on the TDTR?
 - a. To ensure minimum technical standards are met
 - b. Allows the Chief of Timing (CoT) to see how well systems operate together
 - c. Minimizes errors in accuracy of the event, techniques being used
 - d. An audit of the event, integrity check
 - e. Designed to assist you in making the event fair for all competitors
2. What are we looking for on the TDTR?
 - a. Two homologated systems
 - b. Time-of-Day synchronized systems
 - c. Manual (Hand) timing is being used and synchronized
 - d. Synchronization is taking place before first racer's first run to .001 accuracy
3. Synchronization of the timers
 - a. As close as possible to start of first run.
 - b. The synchronization impulse for all timers must come from one single source (one contact) for all timing devices.
 - c. A new impulse must be sent by the same source. Why: Confirm synchronization accuracy of systems A and B.
 - d. The maximum allowed difference between systems A and B may not be more than 1/1000ths (0.001); if larger than maximum, a complete resync is required.
Note: a difference between the two start impulses may happen, depending on how starter opens the wand. Instruct the starter to open the wand with a sharp, crisp motion near the hinge of the start wand.
4. Manual Timing training and how to use the TDTR to help guide your hand timers
 - a. Manual (Hand) timing is required for all events on the U.S. Ski & Snowboard calendar.
 - b. Handheld manual devices recording to 1/100th second are synchronized to time of day.
 - c. Training of the manual (HT) personnel needs to be completed by the CoT, as this official is responsible for their accuracy.
 - d. Manual timing (HT) can be used in official results, after a replacement time (electronic equivalent time - EET) has been calculated.
5. Replacement Time (EET)
 - a. What: A "Replacement Time" (EET) is a calculation used to replace either a missing start or missing finish time of day (ToD) System A impulse.
 - b. Why: Provides an average difference or correction, between the replacement times and System B ToD impulses or Manual Times.
 - c. If failure of System A occurs, then replacement time (EET) is completed using System B impulses. If failure of both systems occurs, the replacement time (EET) is completed using the Manual Times.
 - d. Make sure that the replacement time calculation (EET) is submitted with the TDTR.
6. Posting of times
It is recommended your announcer reminds everyone that the announcement and posting of times is unofficial.

For further information refer to the current version of FIS Timing Booklet located on the FIS website.



Alpine Skiing

2021/2022

1st FIS points list 2021/2022

Valid from 01-07-2021 to 04-08-2021

Category/Catégorie/Kategorie	Race level	Minimum penalty	Maximum penalty
OWG,WC,WSC	0	0.00	0.00
COM,WQUA	0	0.00	4.00
ANC,EC,ECOM,FEC,NAC,SAC,UVS,WJC	1	15.00	999.00
EQUA	1	23.00	999.00
NC	2	20.00	999.00
AWG,CISM,CIT,CITWC,CORP,EYOF,FIS,FQUA,JUN,NJC,NJR,UNI,YOG	3	23.00	999.00
ENL	4	60.00	999.00

MEN						GENERAL			WOMEN						
ADDER					Z-Value	Men/Women		ADDER					Z-Value		
Disc.	Level 0	Level 1	Level 2	Level 3	Level 4		F Value	Max points	Disc.	Level 0	Level 1	Level 2	Level 3	Level 4	
DH	0	0	2	3	13	0.00	1250.00	330.00	DH	0	0	2	3	13	0.00
SL	0	0	2	3	13	0.00	730.00	165.00	SL	0	0	2	3	13	0.00
GS	0	0	2	3	13	0.00	1010.00	220.00	GS	0	0	2	3	13	0.00
SG	0	0	2	3	13	0.00	1190.00	270.00	SG	0	0	2	3	13	0.00
AC	0	0	2	3	13	0.00	1360.00	270.00	AC	0	0	2	3	13	0.00

FÉDÉRATION INTERNATIONALE DE SKI
INTERNATIONAL SKI FEDERATION
INTERNATIONALER SKI VERBAND

**U.S. SKI & SNOWBOARD
STUDY PROBLEMS FOR TIMEKEEPERS - ALPINE
SEASON 2022**

1. List the Chief of Timing & Calculations' race day duties. _____

2. Mark each of the following T (True) or F (False):
 - a. If both electronic timing systems malfunction, a racer has grounds for a rerun. _____
 - b. In a tie, 1/1000ths can be used to break the tie. _____
 - c. Announce all Forerunners times as soon as possible. _____
 - d. Penalty calculation is the same for both U.S. Ski & Snowboard and FIS. _____
3. What start signal does the Starter use for the following races?
 - a. Regular Interval Events: _____
 - b. Irregular Interval Events: _____
 - c. If a start clock/beep is available, is a verbal start command still required? _____
4. What is the minimum start interval for? DH: _____ GS: _____
5. Convert the following times from seconds to minutes:
 - a. 62.19 _____
 - b. 75.01 _____
 - c. 100.45 _____
6. Convert the following times from minutes to seconds:
 - a. 1:14.79 _____
 - b. 2:10.44 _____
 - c. 1:59.41 _____
7. Add the following, and then convert to minutes and seconds:

a. 59.59	b. 49.58	c. 41.18	d. 64.34	e. 71.19
<u>69.49</u>	<u>48.49</u>	<u>41.21</u>	<u>62.97</u>	<u>69.79</u>
8. Explain Time-of-Day (ToD) Timing. _____

9.
 - a. In what calculations are numbers rounded off? _____
 - b. What calculations require that numbers be truncated? _____
10. Round the following numbers to the nearest 100th: (*These are not times!*)
 - a. 49.1146 _____
 - b. 15.1629 _____
 - c. 108.3251 _____
11. Calculate the elapsed times:

Finish time: a. 09:13:00.6509	b. 10:11:59.5703	c. 13:32:01.4406
Start time: <u>09:12:04.9112</u>	<u>10:10:06.5610</u>	<u>13:30:01.1911</u>
12. The Race Points for the winner always calculates to: _____

13. Primary (System A) electric time fails for a racer.
- What timing system should be used? _____
 - What adjustment may be necessary? _____
 - What procedure should be followed if both systems fail? _____
 - What times should be used if the failure of the primary system affects a large percentage of the field?

 - What times should be used, if the failure of both timing systems affects a large percentage of the field?

14. Briefly describe the process used to calculate the adjustment required by 13-b. _____

15. Do a Bibbo from this 1st-Run Result:

Bib #	1st Run Result	2nd Run Start Order	Bib #
1	52.11	1	_____
2	51.56	2	_____
3	52.52	3	_____
4	49.71	4	_____
5	51.48	5	_____
6	51.46	6	_____
7	49.63	7	_____
8	50.30	8	_____
9	50.51	9	_____
10	52.20	10	_____
11	51.15	11	_____
12	52.56	12	_____
13	51.51	13	_____
14	51.31 DSQ	14	_____
15	51.20	15	_____
16	51.45	16	_____
17	52.56	17	_____

16. a. What are the current Factors for?
DH: _____ SG: _____ GS: _____ SL: _____ AC: _____
- Where can they be found? _____
 - How is a “factor” used? _____

17. Calculate the Race Points on the attached Race & Penalty Points.

18. Calculate the Race Penalty for the race on the attached form.

19. Calculate the Replacement Times (EET's) as indicated on the attached form.

U.S. SKI & SNOWBOARD
WORKSHEET for CALCULATION of
RACE POINTS & U.S. / FIS PENALTY - ALPINE
SEASON 2022

SEED POINTS: Rank an individual racer with other racers.

RACE POINTS: Rank racers within one race.

CALCULATION OF THE RACE POINTS - use the following formula:

$$\text{Points} = \frac{\text{Racer's Time in seconds (Tx)}}{\text{Winner's Time in seconds (To)}} - 1 \times \text{Factor}$$

DH - 1250
SL - 730
GS - 1010
SG - 1190
AC - 1360

OR USE: $\frac{\text{Factor} \times \text{Racer's Time in seconds (Tx)}}{\text{Winning Time in seconds (To)}} - \text{Factor} = \text{Points}$

NOTE: Some calculators require the use of an '=' after the multiplication process as well as the division process. Do not round off during the calculation - wait until the end.

PENALTY POINTS: Rank the race relative to other races.

CALCULATION OF THE PENALTY POINTS - follow these steps:

1. List the **top 10 finishers** and their respective **seed points and race points**.
2. Select and add the **best 5 list points from the top 10**. [SUM "A"]
3. Add the list points of the best 5 point holders who started the race, irrespective of where or if they finished (DSQ OR DNF). [SUM "B"]
4. Subtract the race points of the racers with the best 5 list points from the top 10 finishers. [SUM "C"]
5. Divide by 10 and round as necessary.

NOTE: Work across on the **SAME** line for each racer.

Use the following information and calculate race points for this **GIANT SLALOM** race: F = _____

RNK	COMPETITOR	LIST POINTS	TOTAL TIME	RACE POINTS
1	GRANSTROM, Colby	1.11	2:05.19	_____
2	FORD, Tommy	10.97	2:05.80	_____
3	STIEGLER, Seppi	5.74	2:06.46	_____
4	ANKENY, Michael	18.79	2:06.55	_____
5	JITLOFF, Tim	22.09	2:06.57	_____
6	GREGORAK, Will	16.41	2:06.59	_____
7	TRIENDL, ARMIN	29.39	2:06.93	_____
8	PENTTINEN, Juho-P.	5.86	2:06.96	_____
9	TARBERRY, Ace	13.10	2:07.00	_____
10	WUNSCH, Taylor	14.15	2:07.07	_____

BEST 5 AT START:

RNK	COMPETITOR	LIST POINTS	RACE RESULT
1	GRANSTROM, Colby	1.11	1
2	STIEGLER, Seppi	5.74	3
3	PENTTINEN, Juho-P.	5.86	8
4	ARNOLD, Eric	10.18	DNF1
5	COCHRAN, James	10.88	DSQ1

TIES: 10th place – Consider all tied racers to select best 5 seed points - SUM A.
5th place - Use racer with higher race points – SUM C. (Lower Penalty)



PENALTY CALCULATION

Name of Competition		
Date	Event	Name of the TD

The best 10 at finish

Result	Number	Name	Nat	U.S.-Points	Best 5	Race points
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

The best 5 at start

TOTALS

(B) U.S. Points of best 5 at start

(A) U.S. Points of best 5 to finish in top 10

(C) Race Points of corresponding competitors

Calculated penalty

A + B - C = : 10 =

Penalty applied

Signature TD

	Nr
--	----

TIME-of-DAY (ToD) / MANUAL (ToD) REPLACEMENT TIME (E.E.T.) WORKSHEET

DATE: TODAY EVENT: SL MEN WOMEN XX RUN 1 CHIEF CALCULATIONS: C. TC

TIME-of-DAY (ToD) MISSING: START or XX FINISH

*Precision of time-of-day as used by timing device; minimum of 1/1000 precision required.

RACER BIB #	START/FINISH	START/FINISH	COLUMN A	COLUMN B
	SYSTEM B ToD* (or MANUAL ToD*)	SYSTEM A ToD* (or MANUAL ToD*)	SYS.B/MANUAL TIME SHORTER (+)	SYS.B/MANUAL TIME LONGER (-)
<u> 11 </u>	<u>13:00: 00 .4800</u>	<u>13:00: 00 .2631</u>	<u> . </u>	<u> . </u>
<u> 12 </u>	<u> 00: 26 .5200</u>	<u> 00: 26.8802</u>	<u> . </u>	<u> . </u>
<u> 13 </u>	<u> 00: 47 .4100</u>	<u> 00: 47.3684</u>	<u> . </u>	<u> . </u>
<u> 14 </u>	<u> 01: 04 .2300</u>	<u> 01: 04.3686</u>	<u> . </u>	<u> . </u>
<u> 15 </u>	<u> 01: 27 .5400</u>	<u> 01: 27.7750</u>	<u> . </u>	<u> . </u>
<u> 17 </u>	<u> 02: 12 .9900</u>	<u> 02: 12.9123</u>	<u> . </u>	<u> . </u>
<u> 18 </u>	<u> 02: 42 .5000</u>	<u> 02: 42.6169</u>	<u> . </u>	<u> . </u>
<u> 19 </u>	<u> 03: 00 .2100</u>	<u> 03: 00.9443</u>	<u> . </u>	<u> . </u>
<u> 20 </u>	<u> 03: 20 .6900</u>	<u> 03: 20.2800</u>	<u> . </u>	<u> . </u>
<u> 21 </u>	<u> 03: 48 .5600</u>	<u> 03: 48.5591</u>	<u> . </u>	<u> . </u>

COLUMN A TOTAL + .

COLUMN B TOTAL - .

DIFFERENCE = (+) or (-) .

DIVIDED BY 10 = (+) or (-) . = CORRECTION

BIB #	TIME OF DAY	(+) or (-)	REPLACEMENT TIME OF DAY
<u> 22 </u>	<u> 13: 04 : 12 .1500</u>	<u> . </u>	<u> : : . </u>
<u> </u>	<u> : : . </u>	<u> . </u>	<u> : : . </u>

PROCEDURE TO BE FOLLOWED WHEN BOTH START & FINISH SYSTEM A TIMES ARE MISSED.

****If both Start and Finish ToD impulses are missed, replacement ToD's must be calculated for each ToD impulse as outlined in ICR 611.3.2.1.**

Net time is then calculated and verified.

(Use 1 form for Start ToD replacement calculation and 1 form for Finish ToD replacement calculation; complete net time assignment on Finish ToD calculation form.) ALL CALCULATIONS MUST BE SUBMITTED WITH TDR!

Bib #
 Fn.ToD : : .
 St.ToD : : .
 Net Time: