PIERO

User Guide

VERSION 19.7

ROSS

Thank You for Choosing Ross

You've made a great choice. We expect you will be very happy with your purchase of Ross Technology.

Our mission is to:

1. Provide a Superior Customer Experience
   - offer the best product quality and support
2. Make Cool Practical Technology
   - develop great products that customers love

Ross has become well known for the Ross Video Code of Ethics. It guides our interactions and empowers our employees. I hope you enjoy reading it below.

If anything at all with your Ross experience does not live up to your expectations be sure to reach out to us at solutions@rossvideo.com.

David Ross

CEO, Ross Video

dross@rossvideo.com

Ross Video Code of Ethics

Any company is the sum total of the people that make things happen. At Ross, our employees are a special group. Our employees truly care about doing a great job and delivering a high quality customer experience every day. This code of ethics hangs on the wall of all Ross Video locations to guide our behavior:

1. We will always act in our customers' best interest.
2. We will do our best to understand our customers' requirements.
3. We will not ship crap.
4. We will be great to work with.
5. We will do something extra for our customers, as an apology, when something big goes wrong and it's our fault.
6. We will keep our promises.
7. We will treat the competition with respect.
8. We will cooperate with and help other friendly companies.
9. We will go above and beyond in times of crisis. *If there's no one to authorize the required action in times of company or customer crisis - do what you know in your heart is right. (You may rent helicopters if necessary.)*

PIERO User Guide

- Ross Part Number: 3400DR-001-19 Rev1
- Version: 19.7

The information contained in this guide is subject to change without notice or obligation.

Copyright

Patents

Patent numbers US 7,034,886; US 7,508,455; US 7,602,446; US 7,802,802 B2; US 7,834,886; US 7,914,332; US 8,307,284; US 8,407,374 B2; US 8,499,019 B2; US 8,519,949 B2; US 8,743,292 B2; GB 2,419,119 B; GB 2,447,380 B; and other patents pending.

Notice

The material in this manual is furnished for informational use only. It is subject to change without notice and should not be construed as commitment by Ross Video Limited. Ross Video Limited assumes no responsibility or liability for errors or inaccuracies that may appear in this manual.

End User Software License Agreement

This End User Software License Agreement is a legal agreement between you (the "**Licensee**") and Ross Video Limited ("**Ross Video**") specifying the terms and conditions of your installation and use of the Software and all Documentation (as those terms are defined herein).

IMPORTANT:

BY DOWNLOADING, ACCESSING, INSTALLING OR USING THE SOFTWARE AND/OR DOCUMENTATION AND/OR BY AUTHORIZING ANY THIRD PARTY, INCLUDING WITHOUT LIMITATION AN INSTALLER OR COMMISSIONER ACTING ON YOUR BEHALF TO DO SO, LICENSEE AGREES TO THE TERMS OF THIS AGREEMENT AND THE LICENSE GRANTED HEREUNDER SHALL BE EFFECTIVE AS OF AND FROM SUCH DATE. IF YOU DO NOT WISH TO ACCEPT THE TERMS AND CONDITIONS OF THIS AGREEMENT, DO NOT DOWNLOAD, ACCESS, INSTALL, REFER TO OR OTHERWISE USE THE SOFTWARE AND/OR DOCUMENTATION.

1. **INTERPRETATION. In this Agreement, (a) words signifying the singular number include the plural and vice versa, and words signifying gender include all genders; (b) every use of the words "herein", "hereof", "hereto" "hereunder" and similar words shall be construed to refer to this Agreement in its entirety and not to any particular provision hereof; (c) reference to any agreement or other document herein will be construed as referring to such agreement or other document as from time to time amended, modified or supplemented (subject to any restrictions on such amendment, modification or supplement set forth therein); (d) every use of the words "including" or "includes" is to be construed as meaning "including, without limitation" or "includes, without limitation", respectively; and (e) references to an Article or a Section are to be construed as references to an Article or Section of or to this Agreement unless otherwise specified.**

2. **DEFINITIONS. In this Agreement, in addition to the terms defined elsewhere in this Agreement, the following terms have the meanings set out below:**

   "**Affiliate**" means, with respect to any Person, any other Person who directly or indirectly controls, is controlled by, or is under direct or indirect common control with, such Person. A Person shall be deemed to control a Person if such Person possesses, directly or indirectly, the power to direct or cause the direction of the management and policies of such Person, whether through the ownership of voting securities, by contract or otherwise; and the term "controlled" and "controlling" shall have a similar meaning.

   "**Agreement**" means this End User Software License Agreement including the recitals hereto, as the same may be amended from time to time in accordance with the provisions hereof.

   "**Backup System**" means the secondary piece of Designated Equipment upon which the Software is installed and mirrored for the sole purpose of replacing a Primary System in the event such Primary System is not available or functioning properly for any reason.

   "**Change of Control**" means (a) the direct or indirect sale, transfer or exchange by the shareholders of a Party of more than fifty percent (50%) of the voting securities of such Party, (b) a merger or amalgamation or reorganization or other transaction to which a Party is party after which the shareholders of such Party immediately prior to such transaction hold less than fifty percent (50%) of the voting securities of the surviving entity, (c) the sale, exchange, or transfer of all or substantially all of the assets of a Party.

"Confidential Information" means all data and information relating to the business and management of either Party, including the Software, trade secrets and other technology to which access is obtained or granted hereunder by the other Party, and any materials provided by Ross Video to Licensee; provided, however, that Confidential Information shall not include any data or information which:

(i) is or becomes publicly available through no fault of the other Party;

(ii) is already in the rightful possession of the other Party prior to its receipt from the other Party;

(iii) is already known to the receiving Party at the time of its disclosure to the receiving Party by the disclosing Party and is not the subject of an obligation of confidence of any kind;

(iv) is independently developed by the other Party;

(v) is rightfully obtained by the other Party from a third party; or

(vi) is disclosed with the written consent of the Party whose information it is.

"Designated Equipment" shall mean (a) the hardware products sold by Ross Video to Licensee on which the Software is installed and licensed for use, as the same may be replaced from time to time by Ross Video; or (b) in the case of Software licensed on a stand-alone basis, the equipment of Licensee on which the Software is to be installed and meets the minimum specifications set out in the Documentation.

"Documentation" shall mean manuals, instruction guides, user documentation and other related materials of any kind pertaining to the Software (whether in electronic, hard-copy or other media format) that are furnished to Licensee by or on behalf of Ross Video in relation to the Software.

"Freeware" means Software that is available free of charge from Ross Video, and includes, without limitation the master control system software known as "DashBoard".

"Governmental Authority" means (a) any federal, provincial, state, local, municipal, regional, territorial, aboriginal, or other government, governmental or public department, branch, ministry, or court, domestic or foreign, including any district, agency, commission, board, arbitration panel or authority and any subdivision of any of them exercising or entitled to exercise any administrative, executive, judicial, ministerial, prerogative, legislative, regulatory, or taxing authority or power of any nature; and (b) any quasi-governmental or private body exercising any regulatory, expropriation or taxing authority under or for the account of any of them, and any subdivision of any of them.

"Improvements" means all inventions, works, discoveries, improvements and innovations of or in connection with the Software, including error corrections, bug fixes, patches and other updates in Object Code form to the extent made available to Licensee in accordance with Ross Video's release schedule.

"License Fee" means the fee(s), if any, payable in respect of the Software in accordance with the relevant invoice(s) or other purchase documents delivered in connection with this Agreement.

"License Period" means the period of time that Licensee will have the rights granted under this Agreement, as may be specified in an Order.

"**Modifications**" means any enhancements, changes, corrections, translations, adaptations, revisions, developments, upgrades or updates thereto; and "Modify" shall mean the creation of any of the foregoing.

"**Object Code**" means the machine readable executable form of a computer software program.

"Open Source Components" means third party Open Source software, libraries or other components.

"Open Source License" means the license that governs each Open Source Component.

"Order" means the documents provided by Ross Video to Licensee detailing the Ross Video products contemplated for purchase, the corresponding fees and License Period that may apply to the Software, including any and all quotations, purchase orders, acknowledgments, pro formas, invoices and other purchase documentation.

"**Parties**" means both Ross Video and Licensee and "Party" means either one of them as the context requires.

"**Person**" will be broadly interpreted and includes (a) a natural person, whether acting in his or her own capacity, or in his or her capacity as executor, administrator, estate trustee, trustee or personal or legal representative; (b) a corporation or a company of any kind, a partnership of any kind, a sole proprietorship, a trust, a joint venture, an association, an unincorporated association, an unincorporated syndicate, an unincorporated organization or any other association, organization or entity of any kind; and (c) a Governmental Authority.

"**Primary System**" means the Designated Equipment upon which the Software is installed and executed to deliver its intended functionality.

"Released Claims" has the meaning ascribed to it in Section 9(b).

"Released Parties" has the meaning ascribed to it in Section 9(b).

"Ross Video" means Ross Video Limited and its Affiliates.

"Software" means the version of the Object Code licensed and delivered to Licensee by Ross Video concurrently with delivery of this Agreement, including without limitation the Freeware, and any subsequent error corrections, updates, Modifications or Improvements provided to Licensee by Ross Video pursuant to this Agreement, but specifically excluding any features or plug-ins that may be purchased by you directly from third parties as upgrades or enhancements to the Software.

"**Source Code**" means the human readable form of a computer software program, and all tools and documentation necessary for a reasonably competent computer programmer to understand, maintain and Modify the Software.

"**Third Party Software**" means those portions of the Software, if any, which are owned or controlled by third parties and licensed to Ross Video pursuant to certain license agreements or arrangements with such third parties, including the Open Source Components and NDI®[1] software (http://NDI.video); and

"**Use**" means to execute, run, display, store, merge, network, Modify, translate, host or integrate with Licensee's products or other third party software.

[1] NDI® is a registered trademark of Vizrt NDI AB.

3. **LICENSE. Subject to the terms and conditions of this Agreement, upon payment of the applicable License Fee by Licensee, or, in the case of Freeware only, upon download of the Software by Licensee onto its Designated Equipment, Ross Video hereby grants to Licensee a non-transferable and non-exclusive right to Use the Software and Documentation solely for the internal use of Licensee (the "License"), during the License Period. In the event that a License Period is not identified on the Order, such License Period shall be deemed to be perpetual, subject to paragraph 10 (c) of this Agreement. The Software shall only be used in connection with or installed on the Designated Equipment and, where applicable, shall only be used on the Primary System, provided such Primary System is operating properly."**

   If the Primary System is not operating properly for any reason, the Software may be used on the designated Backup System for that Primary System until such time that the Primary System begins operating properly. The Software and Documentation are provided to Licensee for the exclusive use by Licensee's organization for its ordinary business purposes and shall not be used by any third party for any purposes. Licensee may make copies of the Software as required for internal backup and archival purposes. To the extent permitted hereunder, Licensee may distribute copies of the Software and/or Documentation to members of its organization, provided (a) this Agreement is included with each copy, (b) any member of its organization who uses the Software and/or Documentation accepts and agrees to be bound by the terms of this Agreement and by any other license agreements or other agreement incorporated by reference into this Agreement, and (c) Licensee has paid any applicable additional License Fees in respect of copying and redistributing of the Software. To the extent Licensee is permitted to make copies of the Software under this Agreement, Licensee agrees to reproduce and include on any copy made or portion merged into another work, all Ross Video proprietary notices, including any notices with respect to copyrights, trademarks and this License. With the exception of copying the Software for backup or archival purposes, Licensee agrees to keep a record of the number and location of all such copies and will make such record available at Ross Video's request. The Software may include mechanisms to limit or inhibit copying.

4. **LICENSE RESTRICTIONS.** Except as otherwise provided in section 3 above, Licensee shall not: (1) copy any Software or Documentation, or part thereof, which is provided to Licensee by Ross Video pursuant to this Agreement, in Object Code form, Source Code form or other human or machine readable form, including written or printed documents, without the prior written consent of Ross Video; (2) in any way market, distribute, export, translate, transmit, merge, Modify, transfer, adapt, loan, rent, lease, assign, share, sub-license, sell, make available for download on any website or make available to another Person, the Software and/or Documentation, in whole or in part, provided that Licensee shall not be prohibited from renting or leasing the Software if Ross Video has consented, in writing, to Licensee engaging in such activities in respect of the Software; (3) reverse engineer, decompile or disassemble the Software or electronically transfer it into another computer language; or (4) use the Software or Documentation in a manner that is inconsistent with the License granted hereunder or that will result in a breach of this Agreement. Licensee agrees to take all reasonable precautions to prevent third parties from using the Software and/or Documentation in any way that would constitute a breach of this Agreement, including such precautions Licensee would ordinarily take to protect its own proprietary software, hardware or information.

5. **DELIVERY.** Ross Video shall deliver to Licensee one (1) master copy of the Software in compiled binary (executable) form suitable for reproduction in electronic files only and Ross Video shall deliver to Licensee a minimum of one copy of the Documentation.

6. **IMPROVEMENTS.** Licensee may from time to time request Ross Video to incorporate certain Improvements into the Software. Ross Video may, in its sole discretion, undertake to incorporate and provide such Improvements to Licensee with or without payment of a fee to be negotiated at the time of such request. All Improvements, whether recommended and developed by Ross Video or Licensee, shall be considered the sole property of Ross Video and shall be used by Licensee pursuant to the terms of the License granted under this Agreement.

7. **FREEWARE. Other than the obligation to pay a License Fee, which does not apply to the Freeware, all other provisions of this End User Software License Agreement apply to the Freeware in the same way as they apply to all other Software that is the subject of this Agreement. In addition, in connection with the Freeware, the following provisions apply:**

   a. Licensee will not Use the Freeware to engage in or allow others to engage in any illegal activity.

   b. Licensee will not Use the Freeware in any way that will interfere with or damage the operation of the services of any third parties by overburdening/disabling network resources through automated queries, excessive usage or similar conduct.

   c. Licensee will not Use the Freeware to engage in any activity that will violate the rights of others, including, without limitation, by using it for operations that involve child labour, suppressing the right of freedom of expression or endangering the security of person.

8. **OWNERSHIP. The Parties acknowledge and agree that, as between the Parties, Ross Video shall be the owner of all intellectual property rights in the Software, Documentation and all related Modifications and Improvements, written materials, logos, trademarks, trade names, copyright, patents, trade secrets and moral rights, registered or unregistered. No proprietary interest or title in or to the intellectual property in the Software, Documentation or any Improvements or Modifications is transferred to Licensee by this Agreement. Ross Video reserves all rights not expressly licensed to Licensee under section 3.**

9. **OPEN SOURCE SOFTWARE.**

   a. Software may use and/or be provided with Open Source Components, including those detailed in the Third Party section below. To the extent stipulated by its Open Source License, each such Open Source Component is licensed directly to Licensee from its respective licensors and not sub-licensed to Licensee by Ross Video, and such Open Source Component is subject to its respective Open Source License, and not to this Agreement. If, and to the extent, an Open Source Component requires that this Agreement effectively impose, or incorporate by reference, certain disclaimers, permissions, provisions, prohibitions or restrictions, then such disclaimers, permissions, provisions, prohibitions or restrictions shall be deemed to be imposed, or incorporated by reference into this Agreement, as required, and shall supersede any conflicting provision of this Agreement, solely with respect to the corresponding Open Source Component which is governed by such Open Source License.

   b. If Licensee, or another party on Licensee's behalf, modifies, replaces or substitutes any Open Source Component used in or provided with this Software, Licensee hereby fully, forever, irrevocably and unconditionally releases and discharges Ross Video, its Affiliates and its and their employees, officers, directors, resellers, distributors and representatives (collectively, "Released Parties") from any and all claims, charges, complaints, demands, actions, causes of action, suits, rights, debts, covenants, liabilities, warranties, performance and maintenance and support obligations (collectively, "Released Claims"), of every kind and nature, with respect to such Software, including without limitation any such Released Claims that arise as a matter of applicable Law.

   c. If an Open Source License requires that the source code of its corresponding Open Source Component be made available to Licensee, and such source code was not delivered to Licensee with the Software, then Ross Video hereby extends a written offer, valid for the period prescribed in such Open Source License, to obtain a copy of the source code of the corresponding Open Source Component, from Ross Video from https://www.rossvideo.com/open-source-information/ .

10. THIRD PARTY SOFTWARE.

a. Licensee acknowledges that the Third Party Software is not owned by Ross Video. Notwithstanding any other provision of this Agreement, Ross Video, to the extent permitted by applicable law, offers no warranties (whether express, implied, statutory or by course of communication or dealing with Licensee, or otherwise) with respect to the Third Party Software. Ross Video may pass through to Licensee, if and to the extent permitted by applicable law, any warranties expressly provided by such third parties to Ross Video for such Third Party Software.

b. FFmpeg Notice. The Software may utilize FFmpeg video components and their included libraries. FFmpeg is a trademark of Fabrice Bellard (originator of the FFmpeg project). Ross Video disclaims any ownership claim to FFmpeg. Please refer to http://ffmpeg.org (copyright is in the FFmpeg developers). FFmpeg is licensed under the GNU Lesser General Public License v2.1 or Lesser General Public License v3.0. GNU Lesser General Public License contact information: Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA. Licensee can distribute it and/or modify it under the terms of such licenses.

11. INTELLECTUAL PROPERTY INDEMNITY.

a. Ross Video agrees to defend, indemnify and hold harmless Licensee from final damages awarded by a court of competent jurisdiction (hereinafter referred to as the "**Losses**"), which Licensee, or any of its officers or directors, may incur, suffer or become liable for as a result of, or in connection with, any third party claim asserted against Licensee to the extent such claim is based on a contention that the Software, Documentation or any portion thereof, infringes any valid, registered, enforceable patents, copyrights, trade secrets, trademarks or other intellectual property rights of any third party, provided that (a) the allegedly infringing Software or Documentation has been used within the scope of and in accordance with the terms of this Agreement, and (b) Licensee notifies Ross Video in writing of such claim within ten (10) days of a responsible officer of Licensee becoming aware of such claim. If the Software, Documentation or any portion thereof is held to constitute an infringement of a third party's intellectual property rights, and use thereof is enjoined, Ross Video shall, at its election and expense, either (i) procure the right to use the infringing element of the Software or Documentation; or (ii) replace or modify the element of the Software or Documentation so that the infringing portion is no longer infringing and still performs the same function without any material loss of functionality. Ross Video shall make every reasonable effort to correct the situation with minimal effect upon the operations of Licensee.

b. Notwithstanding the above, Ross Video reserves the right to terminate this Agreement and the License granted hereunder on immediate notice to Licensee, and without liability to Licensee, in the event that the Software or Documentation constitutes or may, in Ross Video's determination, constitute, an infringement of the rights of a third party that Ross Video, in its sole discretion, does not consider to be affordably remediable.

c. Either party may terminate this Agreement immediately should any Software become, or in either party's opinion be likely to become, the subject of a claim of infringement of any intellectual property right and, in such event, there shall be no claim by either Licensee or Ross Video against the other arising out of such termination, provided that the foregoing shall not apply to a claim for infringement by Ross Video against Licensee in the event that Licensee is alleged to have infringed Ross Video's intellectual property rights, in which case Licensee shall remain liable for all outstanding License Fees and other amounts owing to Ross Video.

d. Notwithstanding the foregoing, Ross Video shall have no liability for any claim of infringement based on use of other than a current, unaltered release of the Software and/or Documentation available from Ross Video if such infringement would have been avoided by the use of a current, unaltered release of the Software and/or Documentation provided that such current, unaltered release performs substantially in conformity with the specifications set out in the Documentation and was provided, at no additional cost by Ross Video, to those subscribing for maintenance services for the Software or Documentation.

12. **CONFIDENTIALITY.** Each Party shall maintain in confidence all Confidential Information of the other Party, shall use such Confidential Information only for the purpose of exercising its rights and fulfilling its obligations under this Agreement, and shall not disclose any Confidential Information of the disclosing Party to any third party except as expressly permitted hereunder or make any unauthorized use thereof. Each Party shall disclose the Confidential Information only to those of its employees, consultants, advisors, and/or subcontractors who have a need to know the Confidential Information. Each Party shall, prior to disclosing the Confidential Information to such employees, consultants, advisors and/or subcontractors, obtain their agreement to receive and use the Confidential Information on a confidential basis on the same terms and conditions contained in this Agreement. The receiving Party shall treat the Confidential Information of the disclosing Party with the same degree of care against disclosure and/or unauthorized use as it affords to its own information of a similar nature, or a reasonable degree of care, whichever is greater. The receiving Party further agrees not to remove or destroy any proprietary or confidential legends or markings placed upon any documents or other materials of the disclosing Party. The obligations of confidence set forth in this Agreement shall extend to any Affiliates that have received Confidential Information of the disclosing Party and shall also cover Confidential Information disclosed by any Affiliate. The receiving Party shall be responsible for any actions or omissions of its Affiliates as if such actions or omissions were its own.

    Either party may disclose certain Confidential Information if it is expressly required to do so pursuant to legal, judicial, or administrative proceedings, or otherwise required by law, provided that (i) such Party provides the other Party with reasonable written notice prior to such disclosure; (ii) such Party seeks confidential treatment for such Confidential Information; (iii) the extent of such disclosure is only to the extent expressly required by law or under the applicable court order; and (iv) such Party complies with any applicable protective or equivalent order.

    Each of Ross Video and Licensee (the **"Indemnifying Party"**, as applicable) agree to indemnify the other (the **"Indemnified Party"**, as applicable) for all Losses incurred by the Indemnified Party as a result of a failure of the Indemnifying Party to comply with its obligations under this Section 12 provided that the Indemnified Party has given prompt notice of any such claim and, to the extent that a claim may lie against a third party for the unauthorized disclosure of such Confidential Information, the right to control and direct the investigation, preparation, action and settlement of each such claim and, further, provided that the Indemnified Party reasonably co-operates with the Indemnifying Party in connection with the foregoing and provides the Indemnifying Party with all information in the Indemnified Party's possession related to such claim and such further assistance as reasonably requested by the Indemnifying Party.

    The Parties acknowledge and agree that any breach of the confidentiality provisions of this Agreement by one Party may cause significant and irreparable injury to the other Party that is not compensable monetarily, as well as damages that may be difficult to ascertain, and agrees that, in addition to such other remedies that may be available at law or in equity, the other Party shall be entitled to seek injunctive relief (including temporary restraining orders, interim injunctions and permanent injunctions) in a court of competent jurisdiction in the event of the breach or threatened breach by such party of any of the confidentiality provisions of this Agreement. The relief contemplated in this Section shall be available to each Party without the necessity of having to prove actual damages and without the necessity of having to post any bond or other security. Each Party further agrees to notify the other Party in the event that it learns of or has reason to believe that any Person has breached the confidentiality provisions of this Agreement.

13. **LIMITATION OF LIABILITY.** The limitation of liability provisions of this Agreement reflect an informed voluntary allocation of the risks (known and unknown) that may exist in connection with the licensing of the Software or Documentation hereunder by Ross Video, and that voluntary risk allocation represents a material part of the Agreement reached between Ross Video and Licensee. Should Ross Video be in breach of any obligation, Licensee agrees that Licensee's remedies will be limited to those set forth in this Agreement. No action, regardless of form, arising out of this Agreement may be brought by Licensee more than twelve (12) months after the facts giving rise to the cause of action have occurred, regardless of whether those facts by that time are known to, or reasonably ought to have been discovered by, Licensee.

    (A) EXCEPT AS EXPRESSLY PROVIDED IN THIS AGREEMENT, THE SOFTWARE AND DOCUMENTATION ARE PROVIDED "AS IS" AND ROSS VIDEO (I) MAKES NO OTHER REPRESENTATIONS, AND PROVIDES NO WARRANTIES OR CONDITIONS OF ANY KIND, EXPRESS OR IMPLIED, STATUTORY, BY USAGE OF TRADE CUSTOM OF DEALING, OR OTHERWISE, AND (II) SPECIFICALLY DISCLAIMS ALL IMPLIED WARRANTIES INCLUDING ANY IMPLIED WARRANTY OF UNINTERRUPTED OR ERROR FREE OPERATION, MERCHANTABILITY, QUALITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS VIDEO DOES NOT REPRESENT OR WARRANT THAT THE SOFTWARE WILL MEET ANY OR ALL OF LICENSEE'S PARTICULAR REQUIREMENTS, THAT THE USE AND OPERATION OF THE SOFTWARE WILL OPERATE ERROR-FREE OR UNINTERRUPTED, THAT ALL PROGRAMMING ERRORS IN THE SOFTWARE CAN BE FOUND IN ORDER TO BE CORRECTED, OR THAT THE SOFTWARE WILL BE COMPATIBLE WITH OTHER PROGRAMS, SYSTEMS, AND HARDWARE.

    (B) IN NO EVENT SHALL ROSS VIDEO, ITS AFFILIATES AND LICENSORS, AND THEIR RESPECTIVE DIRECTORS, OFFICERS, EMPLOYEES AND AGENTS, BE LIABLE FOR ANY CLAIM FOR INDIRECT, CONSEQUENTIAL, SPECIAL, INCIDENTAL, PUNITIVE, EXEMPLARY, AGGRAVATED DAMAGES; LOST PROFITS, OR LOST REVENUE ARISING FROM OR IN CONNECTION WITH THIS AGREEMENT, REGARDLESS OF THE FORM OF ACTION, WHETHER IN CONTRACT, OR IN TORT, EVEN IF THE PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

    (C) IN ANY EVENT THE AGGREGATE LIABILITY OF ROSS VIDEO, ITS AFFILIATES AND LICENSORS, AND THEIR RESPECTIVE DIRECTORS, OFFICERS, EMPLOYEES AND AGENTS, FOR ANY CLAIM FOR DIRECT DAMAGES WITH RESPECT TO THE SUBJECT MATTER OF THIS AGREEMENT SHALL NOT EXCEED THE AMOUNT OF THE PURCHASE PRICE PAID TO ROSS VIDEO UNDER THIS AGREEMENT.

14. TERM AND TERMINATION.

(1) Unless terminated earlier in accordance with the terms of this Agreement, the term of this Agreement shall commence upon Licensee's first download, access, installation, or other use of the Software or Documentation and continues until, in the case of Software licensed with Designated Equipment provided by Ross Video, the earliest of (a) the end of the License Period, or (b) if the Designated Equipment is assigned or transferred in accordance with this Agreement, the date on which the Designated Equipment is no longer owned by Licensee;

(2) Either Party shall have the right to terminate this Agreement on notice to the other Party if:

(a) the other Party fails to pay any fees or other amounts when due hereunder or under any other agreement between the Parties (or any Affiliates of the Parties, as applicable) in connection with the Software and/or Designated Equipment and such breach is not cured within thirty (30) days after written notice of such failure to pay is given to the defaulting Party by the non-defaulting Party;

(b) the other Party shall file a voluntary petition in bankruptcy or insolvency or shall petition for reorganization under any bankruptcy law, consent to an involuntary petition in bankruptcy, or if a receiving order is given against it under the Bankruptcy and Insolvency Act (Canada) or the comparable law of any other jurisdiction (and such is not dismissed within ten (10) days);

(c) there shall be entered an order, judgment or decree by a court of competent jurisdiction, upon the application of a creditor, approving a petition seeking reorganization or appointing a receiver, trustee or liquidator of all or a substantial part of the other Party's assets and such order, judgment or decree continues in effect for a period of thirty (30) consecutive days; or

(d) the other Party shall fail to perform any of the other material obligations set forth in this Agreement and such default, in the case of a default which is remediable, continues for a period of thirty (30) days after written notice of such failure has been given by the non-defaulting Party or, in the case of a non-remediable default, immediately upon notice.

(3) Notwithstanding anything to the contrary contained in this Agreement:

(a) Ross Video may forthwith terminate this Agreement if Licensee is in breach of any of sections 3, 4 or 12 of this Agreement. For greater certainty, in such instances Ross Video shall provide written notice of such termination as soon as practicable but written notice shall not be a necessary prerequisite to such termination; and

(b) in the event of a Change of Control of Licensee, Ross Video shall have the right to terminate this Agreement and the License granted hereunder upon thirty (30) days' prior written notice to Licensee. For greater certainty, Ross Video's right to terminate in the event of a Change of Control of Licensee shall continue for a period of six (6) months from the date Licensee delivers notice of such Change of Control to Ross Video.

(c) Ross Video may terminate the License immediately on the date on which it provides notice to Licensee, if its agreements for Third Party Software are terminated.

(4) Upon the termination or expiry of this Agreement:

(a) Licensee shall immediately cease and desist all use of the Software and Documentation;

(b) Licensee shall immediately deliver to Ross Video any of Ross Video's Confidential Information provided hereunder (including the Software and Documentation) then in its possession or control, if any, and shall deliver a certificate of an officer of Licensee certifying the completeness of same;

(c) Licensee shall refrain from further use of such Confidential Information; and

(d) Licensee shall forthwith pay all amounts owing to Ross Video or any of its Affiliates hereunder.

15. **SURVIVAL.** The provisions of sections 1, 2, 6, 8, 9, 10, 11, 12, 13, 14, 18, 22, 23, and 24 herein shall survive the expiry or termination of this Agreement.

16. **FORCE MAJEURE.** Dates and times by which Ross Video is required to render performance under this Agreement shall be automatically postponed to the extent and for the period that Ross Video is prevented from meeting them by reason of events of force majeure or any cause beyond its reasonable control provided Ross Video notifies Licensee of the commencement and nature of such cause and uses its reasonable efforts to render performance in a timely manner.

17. **ASSIGNMENT.** Ross Video may assign this Agreement, or any of its rights or obligations hereunder, in whole or in part, upon notice to Licensee. Licensee shall not assign this Agreement, or any of its rights or obligations hereunder, in whole or in part, without the prior written consent of Ross Video, which consent may not be unreasonably withheld. This Agreement enures to the benefit of and is binding upon each of the Parties and their respective successors and permitted assigns.

18. **GOVERNING LAW. If Licensee acquired the Ross Product(s) in the United States or Canada, the laws of the state or province where Licensee's principal place of business is located govern the interpretation of this Agreement, claims for its breach, and all other claims regardless of conflict of laws principles. If Licensee acquired the Ross Product(s) in the European Union or the United Kingdom, then the laws of England and Wales apply. If Licensee acquired the Ross Product(s) in any other country, then the laws of the Province of Ontario, Canada shall apply.**

19. **LANGUAGE.** The Parties have expressly required that this Agreement and all documents relating thereto be prepared in English. Les parties ont expressément exigé que cette convention ainsi que tous les documents qui s'y rattachent soient rédigés en anglais.

20. **GOVERNMENT CONTRACTS.** If the Software and/or Documentation to be furnished to Licensee hereunder are to be used in the performance of a government contract or subcontract, the Software and/or Documentation shall be provided on a "restricted rights" basis only and Licensee shall place a legend, in addition to applicable copyright notices, in the form provided under the applicable governmental regulations. For greater certainty, Ross Video shall not be subject to any flow-down provisions required by any customer of Licensee that is a Governmental Authority unless Ross Video expressly agrees to be bound by such flow-down provisions in writing.

21. **EXPORT AND IMPORT LAWS.** Licensee acknowledges and agrees that the Software (including any technical data and related technology) may be subject to the export control laws, rules, regulations, restrictions and national security controls of the United States and other applicable countries (the "**Export Controls**") and agrees not to export, re-export, import or allow the export, re-export or import of such export-controlled Software (including any technical data and related technology) or any copy, portion or direct product of the foregoing in violation of the Export Controls. Licensee hereby represents that it is not an entity or person to whom provision of the Software (including any technical data and related technology) is restricted or prohibited by the Export Controls. Licensee agrees that it has the sole responsibility to obtain any authorization to export, re-export, or import the Software (including any technical data and related technology), as may be required. Licensee will defend, indemnify and hold Ross Video harmless from any and all claims, losses, liabilities, damages, fines, penalties, costs and expenses (including attorney's fees) arising from or relating to any breach by Licensee of its obligations under this Section.

22. **AMENDMENT AND WAIVER.** No amendment, discharge, modification, restatement, supplement, termination or waiver of this Agreement or any Section of this Agreement is binding unless it is in writing and executed by the Party to be bound. No waiver of, failure to exercise or delay in exercising, any Section of this Agreement constitutes a waiver of any other Section (whether or not similar) nor does any waiver constitute a continuing waiver unless otherwise expressly provided.

23. **SEVERABILITY.** Each Section of this Agreement is distinct and severable. If any Section of this Agreement, in whole or in part, is or becomes illegal, invalid, void, voidable or unenforceable in any jurisdiction by any court of competent jurisdiction, the illegality, invalidity or unenforceability of that Section, in whole or in part, will not affect (a) the legality, validity or enforceability of the remaining Sections of this Agreement, in whole or in part; or (b) the legality, validity or enforceability of that Section, in whole or in part, in any other jurisdiction.

24. **ENTIRE AGREEMENT.** This Agreement, and any other documents referred to herein, constitutes the entire agreement between the Parties relating to the subject matter of this Agreement and supersedes all prior written or oral agreements, representations and other communications between the Parties.

Updated: November 1, 2023

Warranty and Repair Policy

Ross Video Limited (Ross) warrants its PIERO systems to be free from defects under normal use and service for the following time periods from the date of shipment:

- PIERO Server — 12 months
- PIERO Software Upgrades — 12 months free of charge
- System and Media hard drives — 12 months

If an item becomes defective within the warranty period Ross will repair or replace the defective item, as determined solely by Ross.

Warranty repairs will be conducted at Ross, with all shipping FOB Ross dock. If repairs are conducted at the customer site, reasonable out-of-pocket charges will apply. At the discretion of Ross, and on a temporary loan basis, plug in circuit boards or other replacement parts may be supplied free of charge while defective items undergo repair. Return packing, shipping, and special handling costs are the responsibility of the customer.

This warranty is void if products are subjected to misuse, neglect, accident, improper installation or application, or unauthorized modification.

In no event shall Ross Video Limited be liable for direct, indirect, special, incidental, or consequential damages (including loss of profit). Implied warranties, including that of merchantability and fitness for a particular purpose, are expressly limited to the duration of this warranty.

This warranty is TRANSFERABLE to subsequent owners, subject to Ross' notification of change of ownership.

Extended Warranty

For customers that require a longer warranty period, Ross offers an extended warranty plan to extend the standard warranty period by one year increments. For more information about an extended warranty for your PIERO system, contact your regional sales manager.

Environmental Information

The equipment that you purchased required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

To avoid the potential release of those substances into the environment and to diminish the need for the extraction of natural resources, Ross Video encourages you to use the appropriate take-back systems. These systems will reuse or recycle most of the materials from your end-of-life equipment in an environmentally friendly and health conscious manner.

The crossed-out wheeled bin symbol invites you to use these systems.

If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration.

You can also contact Ross Video for more information on the environmental performances of our products.

Company Address

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Technical Support:	(+1) 613 · 652 · 4886
After Hours Emergency:	(+1) 613 · 349 · 0006
E-mail for Technical Support:	techsupport@rossvideo.com
E-mail for General Information:	solutions@rossvideo.com
Website:	http://www.rossvideo.com

Contents

Introduction

Thank you for choosing a Ross Video PIERO system.

Ross Video designed PIERO with the needs of live production in mind. PIERO is a system for adding graphics to sports footage to aid in analysis of incidents in the match and illustrate points made by analysts.

We appreciate your business and sincerely hope that you have a great experience with your new PIERO system. As always, if there is anything we at Ross Video can do to assist you, please do not hesitate to contact us.

About This Guide

This guide covers the use of the PIERO system.

If, at any time, you have questions pertaining to the operation of PIERO, please contact us at the numbers listed in the section Getting Help 3. Our technical staff is always available for consultation, training, or service.

Documentation Conventions

Special text formats are used in this guide to identify parts of the user interface, text that a user must enter, or a sequence of menus and sub-menus that must be followed to reach a particular command.

Bold text	Bold text identifies a user interface element such as a dialog box, menu item, or button. For example: In the **Slug** column, type a slug name for the story.
Italic text	Italic text is used to identify the titles of referenced guides, manuals, or documents. For example: For more information, refer to the *DashBoard User Guide.*
`Courier text`	Courier text identifies text that a user must type. For example: In the **Username** box, type `postgres`.
Menu Sequences	Menu arrows are used in procedures to identify a sequence of menu items that you must follow. For example: If a step reads **Server > Save As**, you would select the **Server** menu and then select **Save As**.
Hypertext	Identifies a hyperlink to a related topic.

Getting Help

PIERO documentation is accessible by selecting the **Documents** icon in the PIERO Launcher.

Contacting Technical Support

At Ross Video, we take pride in the quality of our products, but if problems occur, help is as close as the nearest telephone.

Our 24-hour Hot Line service ensures you have access to technical expertise around the clock. After-sales service and technical support is provided directly by Ross Video personnel. During business hours (Eastern Time), technical support personnel are available by telephone. After hours and on weekends, a direct emergency technical support phone line is available. If the technical support person who is on call does not answer this line immediately, a voice message can be left and the call will be returned shortly. This team of highly trained staff is available to react to any problem and to do whatever is necessary to ensure customer satisfaction.

Technical Support:

- 1-844-652-0645 (North America)
- +800 1005 0100 (International)
- After Hours Emergency: (+1) 613-349-0006
- E-mail: techsupport@rossvideo.com
- Website: http://www.rossvideo.com

What is PIERO?

PIERO is a system designed to enhance sports footage with graphical elements that support the analysis of key moments during a match. These graphics range from basic visual aids, such as lines, to more complex effects, including 3D computer-generated imagery (CGI), such as a virtual football stadium. In the 3D stadium, analysts can view the action from perspectives where no physical cameras are present.

Many of these graphical elements are "tied-to-field," meaning they are appear to be on the pitch, allowing them to move naturally with the camera as it follows the game, creating the illusion that the graphics are part of the live action.

PIERO Graphics Examples

Getting Started

This section provides an overview of starting and launching PIERO, the PIERO User Interface (UI), and the basic workflow for creating a project in PIERO.

Starting PIERO

The instructions in this guide reference a system that runs on either a MacOS or Linux (Ubuntu) system.

If your PIERO application runs on a MacOS, go to the Starting for macOS 7 section.

If your system runs on Linux (Ubuntu), go to the Starting PIERO for Linux 8 (Ubuntu System) section.

PIERO Launcher

The PIERO Launcher is where you access the parameters for setting up your project in PIERO, PIERO's **Modules** and **Utilities**, and launch the PIERO Software.

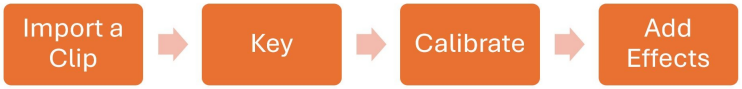
★PIERO must always be accessed from the PIERO Launcher.

For instructions on configuring parameter settings in the Launcher, see Launching the PIERO Software 10.

Once you have configured your parameter settings and launched PIERO, you cannot change the settings. You must close the PIERO application and return to the Launcher to modify your project's parameters and then relaunch PIERO.

Create a Project

Once the parameters are configured in the PIERO Launcher and the application is launched, you can begin creating a project. The basic workflow for setting up a clip-based project is shown in the illustration below. Although keying and calibration are not required for all effects, to get the most out of all effects, the following workflow is recommended.



Basic Clip-Based Workflow

★If you are using PIERO with an EVS/Mira, see the *PIERO Technical Guide* for information on EVS and MIRA system integration.

Modules and Utilities

The Modules and Utilities 185 are found on the PIERO Launcher. The options available depend on individual licenses and may include:

PIERO License Tool—used to update your USB license.

Asset Manager—used to manage the assets (such as textures, movies, squads) used by PIERO effects.

Data Visualization Module—generates graphics from Opta, TRACAB, or STATS data (available as an add-on).

Documentation Tool—used to access PIERO documentation such as the PIERO User Guide.

Starting PIERO

The instructions in this guide reference a system that runs on either macOS or Linux (Ubuntu).

If your PIERO application runs on a MacOS, go to Starting PIERO for macOS 7.

If your system runs on Linux (Ubuntu), go to Starting PIERO for Linux 8 (Ubuntu System).

★Before starting PIERO, make sure your USB license key is plugged in. PIERO will not launch if the USB license key is not plugged in or if it has expired.

Starting PIERO for macOS

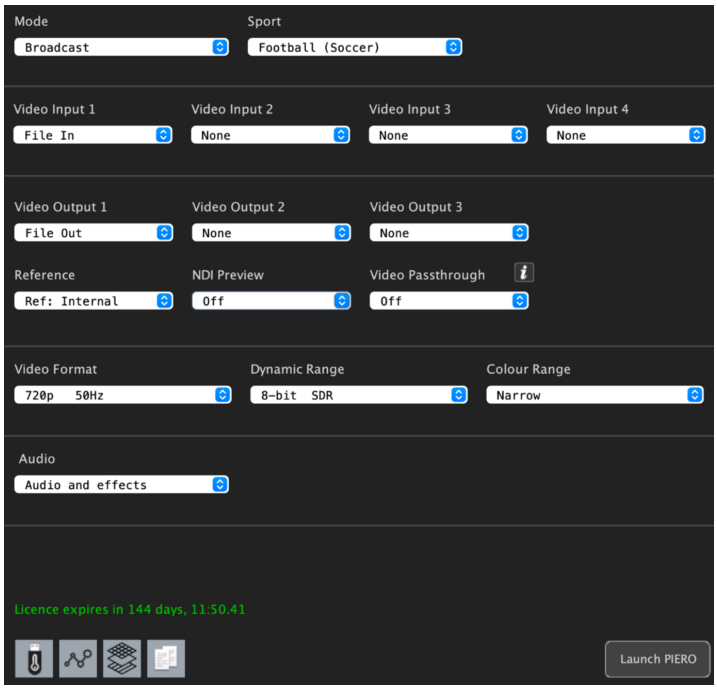
This section covers the procedure for starting PIERO for macOS.

To start PIERO for MacOS:

1. In your **Applications** folder, select the **PIERO** folder and start the **Launcher** application.

   Additionally, you can create a shortcut to the **Launcher** by dragging the **Launcher** to your desktop or dock.

   The **PIERO Launcher** will appear.



PIERO Launcher

2. At the bottom of the launcher window, the license expiry date is displayed in green text.

   Verify your license is still active.

3. Next, configure the presets for the PIERO edition you are licensed to use. For instructions on configuring parameters in the launcher, see the Launching the PIERO Software section.

4. When you have finished configuring the parameters, select the **Launch PIERO** button.

   PIERO Launches.

Starting PIERO for Linux (Ubuntu)

This section covers the procedure for starting PIERO for Linux (Ubuntu).

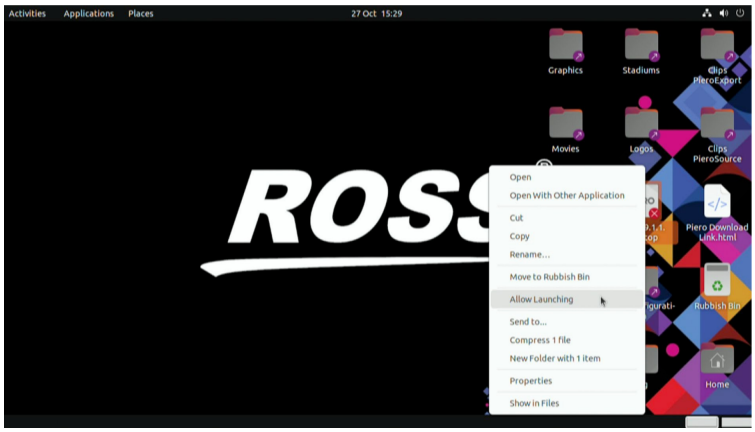
To start PIERO for Linux (Ubuntu):

1. On the desktop, select the **PIERO desktop** icon, and right-click on the icon to reveal the options menu.

Desktop - PIERO Icon

2. From the options menu, select **Allow Launching**.

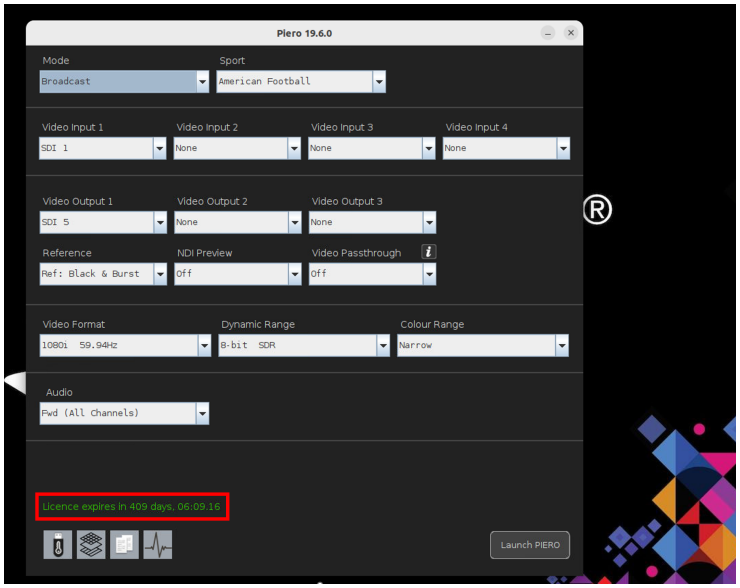
★This step only needs to be done the first time you launch PIERO.



Options Menu - Allow Launching

The PIERO **Launcher** opens.

At the bottom of the launcher window, the license expiry date is displayed in green text.



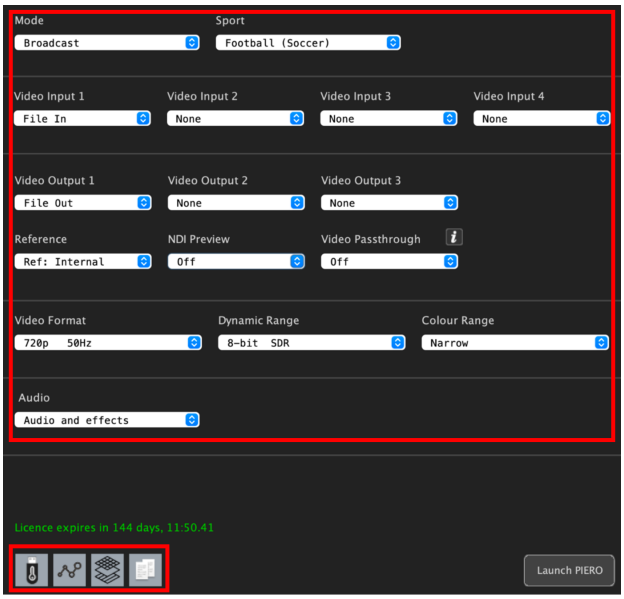
Launcher - License Expiry Date

3. Verify your license is active.
4. Next, configure the presets for the PIERO edition you are licensed to use. For instructions on configuring presets in the launcher, see the Launching PIERO 10 section.
5. When you have finished configuring the parameters, select the **Launch PIERO** button.

   PIERO launches.

Launching the PIERO Software

Use the PIERO Launcher to access the parameters for setting up a project in PIERO, PIERO's **Modules and Utilities** 185, and to launch the PIERO Software.



PIERO Launcher

Parameters

At the top of the Launcher are the parameters. Use the parameters (such as the **mode**, **sport**, **video format**, etc.) to configure the specific settings for your project. The parameter options available to select change depending on the license.

Once you have configured the parameters, you can launch PIERO and create a project.

Modules and Utilities

Located at the bottom-left of the Launcher are the **Modules** and **Utilities**. Use the **Modules** and **Utilities** to access the following (options available depend on license):

PIERO License Tool—used to update your USB license.

Asset Manager—used to manage the assets (such as textures, movies, squads) used by PIERO effects.

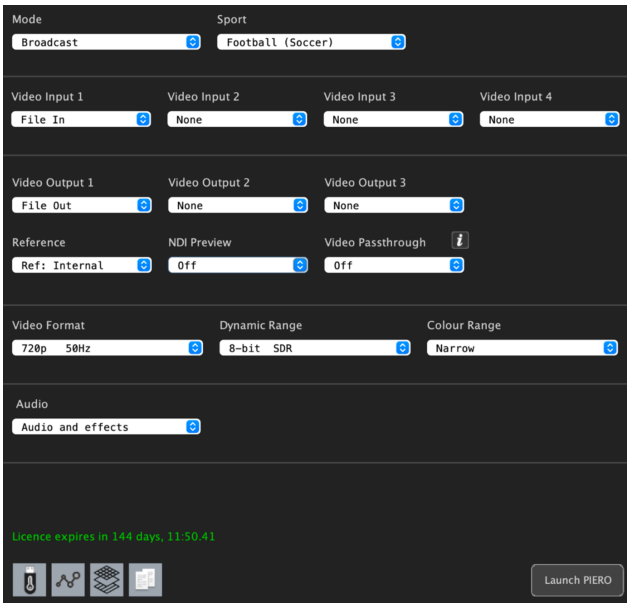
Data Visualization Module—generates graphics from Opta, TRACAB, or STATS data (available as an add-on).

Documentation Tool—used to access PIERO documentation, such as the PIERO

For more information about the **Modules** and **Utilities**, see the Modules and Utilities 185 section in this user guide.

Launching PIERO Broadcast Edition

Use the PIERO Launcher to configure the parameters for your PIERO project and launch the PIERO software.



PIERO Launcher - Broadcast and Live Editions

To configure the parameters for the Broadcast and Live editions:

1. From the drop-downs, make the following selections:
   a. **Mode**: select the PIERO edition you are licensed to use (either Broadcast or Live).
   b. **Sport**: select the sport for which you want to create a project.
   c. **Video Input/Output**: select the video input/outputs you are using.

   ★For additional information on the **Video Input/Output** options, see the *PIERO Technical Guide*.

   d. **Reference:** select the SDI reference source**.**
   e. **Video Format**: select the format of the input video or the video file coming into PIERO.

   ★ **Important**: videos must match the format selected in this section to the format coming into PIERO.

   f. **Dynamic Range**: select the option that matches your video. In most cases, this will be **8-bit SDR**.
   g. **Color Range**: allows the user to select full or narrow color range on the input and output video.
   h. **Audio**: select the audio option you want.

   For additional information on Audio options, see Appendix B: Audio Options 219.

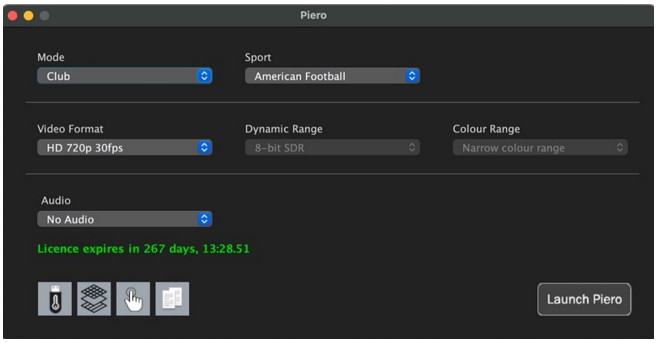
2. When finished with selecting the parameters, select **Launch PIERO**.

   PIERO launches and you are ready to create a project.

   For information on creating a project in PIERO, see Creating a Project 26.

Launching PIERO Club Edition

Use the PIERO Launcher to configure the parameters for your PIERO project and launch PIERO.



PIERO Club Launcher

To configure the parameters for the Club edition:

1. From the drop-downs, make the following selections:
   a. **Mode**: Always remains as **Club**.
   b. **Sport**: Select the sport for which you want to create a project.
   c. **Video Format**: Select the resolution and frame rate of the video files being used.
   d. **Dynamic Range**: Not available in PIERO Club.
   e. **Color Range**: When available, allows the user to select full or narrow color range on the input and output video. Not available in PIERO Club.
   f. **Audio**: Select the audio option you want.

   For additional information on **Audio** options, see Appendix B: Audio Options 219.
2. When finished setting the parameters, select **Launch PIERO**.

   PIERO launches and you are ready to create a project.

   For information on creating a project in PIERO, see Creating a Project 26.

Changing PIERO Parameters

If you need to change the parameters after launching PIERO, you will need to close your project and adjust the parameters in the Launcher.

To change PIERO settings:

1. Close the PIERO application.
2. Open the **Launcher**.
3. In the **Launcher**, change the required parameters.
4. Select **Launch PIERO**.

   The new settings are enabled in PIERO.

PIERO User Interface Overview

In the Broadcast and Club editions, there are two UI modes available - **Analysis** and **Touch**.

In the Live edition, there is only one UI mode available - **Analysis**.

Analysis is the most fully-featured UI mode. This UI mode allows the addition of effects to the video footage, enables full control of how graphics appear and allows control of the video device.

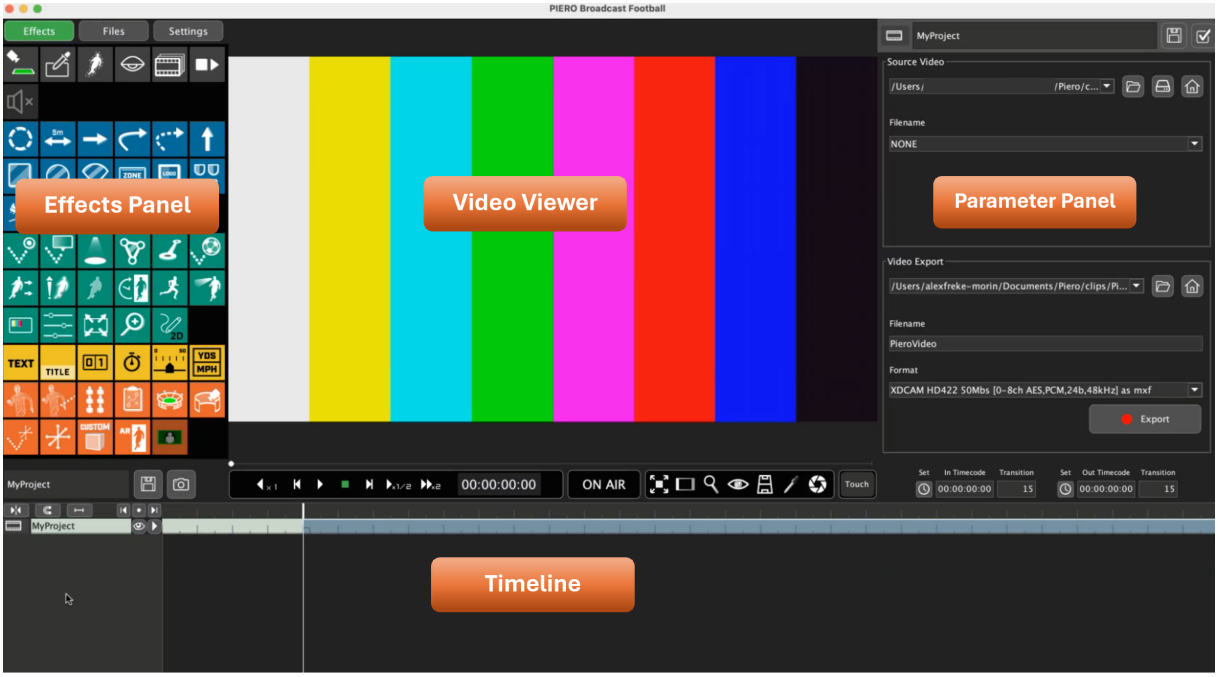
Touch the UI mode used with PIERO Remote Touch to create presets for Touch effects.

Each edition's UI has many common components and some that are unique to each mode. The common components and workflows are described in the Broadcast User Interface Overview 15 section. The Live 75 section covers the UI components that are specific to that edition.

The following topics are covered in this section:

Broadcast Edition User Interface

This section provides an overview of the Broadcast Edition User Interface, as shown below:



PIERO User Interface

Effects Panel

At the top-left of the user interface is the **Effects Panel**. Use this panel to quickly access the library of tools and effects that can be applied to a video. The effect options change depending on the sport selected in the **Launcher**.

For more information on Tools and Effects, see the Effects Panel 16 section.

Video Viewer

In the center of the user interface is the **Video Viewer**, where the video the user is working on is displayed. Any effects the user applies to the video will be displayed here as well as the final playout when the file is broadcast.

Parameter Panel

At the top-right of the user interface is the **Parameter Panel**. Use this window when working with a Broadcast file to find and open the file that is displayed in the **Video Viewer.** Additionally, the **Parameter Panel** will display the settings that can be used to configure **Tool** and **Effect** parameters.

Timeline and Project Panel

At the bottom of the user interface is the **Timeline** and **Project Panel**. Use this panel to manage when effects appear and disappear during the video, and preview the final playout.

For more information on the Timeline and Project Panel, see the Timeline and Project 20 section.

Effects Panel

The Effects Panel consists of the following three menus:

Effects 16

Files 17

Settings 18

Effects

The **Effects** menu provides access to all the PIERO Effects 79 for the chosen sport, as well as the following tools:

- Calibration 31
- Region Tool 65
- RGB Keyer 29
- Hide Tool 64
- Pause Tool 64

Effects Panel - Effects Menu

In the Effects panel, the effects are grouped by color as follows:

- **Grey**—Function Tools

- **Blue**—Static Effects
- **Green**—Track Effects
- **Yellow**—Text Effects
- **Orange**—Virtual Effects

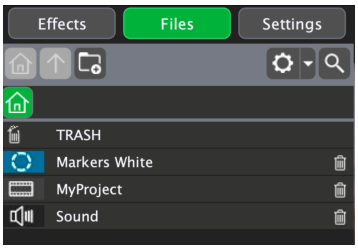
★The effects available to select vary depending on the presets you configured in the Launcher.

Selecting an effect icon adds the effect to the project. Once added, effects can be modified for a particular still or sequence, either by using the effect's property sheet displayed in the Parameter Panel or by interacting with the Video Viewer.

When an effect is selected in the project, the Property Panel displays the parameter settings that can be modified (such as color, transition, etc.).

Files

Use the **Files** menu to access and manage the files associated with the current project.



Files Menu

To add a new folder:

1. Select the **New Folder** button.

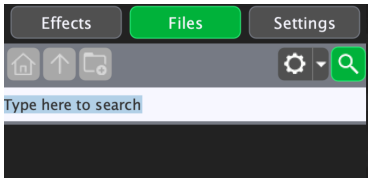
   Alternatively, you can use the **Actions** button and select **New Folder** from the menu options.

   A new folder appears in the list.
2. In the folder name field, enter the name of the new folder.

   The new folder is created.

To search for a folder:

1. Select the **Search** button.

   Files Menu - Search Button

   The search field appears.
2. In the search field, enter the name of the file you are searching for.

The file is displayed.

3. Select the **Search** button to return to the main list of files.

To delete a file:

- Select the **Delete** button next to the file you want deleted.

  The file is deleted.

Settings

Use the **Settings** menu to access and manage the specific project settings such as the **General**, **Video**, and **Touch** settings.

Settings Menu

General Tab

- Select the **Palette** for the color styles used in the effects.
- Select the **Font** style for text used in the effects.
- Select the **Snapshot format** used for taking snapshots.
- Select the **UI theme** you want, either **Light** or **Dark**.
- Select the **Effect Flare** used in the effects.
- Enable or disable the **Small Effect Buttons**.
- Enable or disable the **Power Saving** option.

Video

In the **Video** tab, you can access the **Display Video Settings** and **Video Configuration**.

Teams

In the **Teams** tab, you can select the league, team, colors and Touch Player Captions. This data is used in several effects, such as the Team Line-up effect and Touch.

Live

In the **Live** tab, you can access the **UDP Tally Controller**, **TCP Tally Controller**, and **DataLinq** settings.

Touch

Use the **Touch** tab to set up a connection between the PIERO workstation and a Remote Touch device.

Timeline and Project Panel

This chapter provides a detailed overview of the following two key components in the user interface: the Timeline and the Project Panel.

Timeline

The Timeline UI is the primary control center for managing video playback and editing. It includes essential tools such as the **Video Tape Recorder** (VTR) controls, **Timecode** display, **ON AIR/EDIT** buttons, **Edit** controls, and **UI Mode** selection buttons. The Timeline bar allows users to navigate through video content with precision, monitor timecode information, and manage key operations related to playback and editing.

Timeline Bar - Edit Mode

Timecode

The timecode is a numerical sequence used to uniquely identify each frame in a video timeline. It functions as a reference point, indicating the exact position within the video, represented in hours, minutes, seconds, and frames. Below is an explanation of different background colors that may appear behind the timecode, and what they signify during operation:

- **Red background**: When the timecode is displayed against a red background, it indicates a loss of reference.

  Timecode - Loss of Reference

- **Amber Background**: When the timecode is displayed against an amber background, PIERO is free-running and is locked to its own internal reference.

  Timecode - Free-Running

ON AIR Mode

In **ON AIR** mode, the **Timeline** control panel turns red.

Timeline - ON AIR Mode

EDIT Mode

Deselect the **ON AIR** button to activate **EDIT** mode. When the **Timeline** control panel appears grey, the application is in **Edit** mode.

Use **EDIT** mode for creating, loading and editing effects. Editing handles will be visible in the video window for easy adjustments.

Timeline - Edit Mode

Edit Controls

To the right of the **ON AIR** button are the edit controls, which are described in the following table:

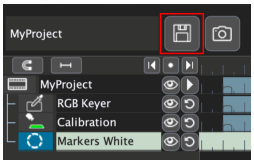
Edit Control	Description
	**Fullscreen Video Mode** - plays the video clip in fullscreen mode.
	**Text Safe Area** - displays the safe area for graphics on the video window. Select the safe area button several times to browse through the various safe areas.
	**Magnifier Video Tool** - magnifies the area beneath the pointer on the video window. Select the button to turn the magnification on or off. Use the mouse scroll wheel to adjust the level of magnification.
	**Show the Selected Effect Only** - displays a ghost of the selected effect. The ghost is only visible on the monitor screen and does not appear on the video output. It is a good way to ensure the effect is at the right place before pressing **ON AIR** when working with the PIERO Live Interface
	**Calibration Overlay** - draws the yellow calibration lines on top of the video. This is only visible on the monitor screen and does not appear on the video output. It helps the operator to see if there is a calibration issue.
	**Keyer Overlay** - turns the visibility of the **Keyer** on or off. In **Live** operation modes only, this allows you to visualize the key and update it in real time if there are any poorly keyed areas.
	**Snapshot** - saves a single frame of the video clip (at the same resolution as the video) to the desktop.
	**Touch** - switches the user interface into **Touch** mode for use with a touch screen or iPad.

Project Panel

The **Project Panel** is essentially a list of effects that have been selected and is displayed beneath the video display. The **Project Panel** provides a comprehensive view of the effects list, along with a visual representation of when they occur along the timeline. The timeline is responsible for triggering these effects on and off according to their corresponding timecode, offering a clear and structured way to manage and review all applied effects within the project.

Project Panel

The default name is **MyProject,** but can be edited to something more meaningful. Select the **Save** button to save the project. It will appear in the **Project** panel.



Project - Save Button

Along the top of the Project Panel are additional Timeline controls, which are described in the following table:

Edit Control	Description
	**Collapse clips on the timeline** - modifies the start or end point of the effect without changing its overall duration.
	**Snap** - allows the movement of an effect along the timeline in half-second increments.
	**Fix effect length** - hides the video segments between clips, ensuring that during playback, only the clips play back-to-back without showing the footage in between.

To delete a project item:

- Press the **F12** key, or press the **Delete** key.

  If you delete something by accident, press **CTRL + Z** to recover the last deleted item.

Time Bar

★The following section outlines the specific visual elements displayed on the timeline, represented as a time bar. While these settings are not typically required during normal operation, it is helpful to have an understanding of their functions.

In the following example the effect will be active from timecode 00:13:26:17 and will animate on (Transition) over 12 frames. It will remain active until timecode 00:13:29:10 and then animate off (Transition) over 12 frames.

Timecodes

Delay indicates the number of frames at the **In Point** before the effect becomes active. This is normally **0**, however if there is a pause point, then you may want to control when the effect becomes active. For example, if there was a pause point at 00:13:26:17 then with a delay of **0** the effect would start to animate exactly at the pause point. If you want to pause and wait before animating, set the **Delay** accordingly.

These values can be altered manually by typing in new values, or you can simply slide the bars on the timeline, which will automatically update the values.

The animation time is shown as a dark triangle at the beginning and end of the time bar.

Animation Time Displayed on Time Bar

The time bar can be moved around using the mouse; the ends can be dragged to new positions. The dark triangles at the ends indicate the transition time (i.e. the time the effect takes to animate on and off). The RGB Keyer and calibration effects have no time bar because they are valid for the entire duration of a clip.

Cue Markers

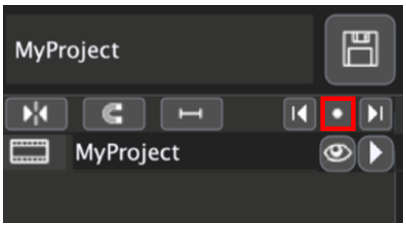
Cue markers (large red lines at the top of the timeline) can be added to the timeline to bookmark timecodes.

Navigate between cue markers to quickly move to another point of interest.

Cue Markers

To add a cue marker:

- In the project panel, select the **Add Marker** button.



Project Panel - Add Marker Button

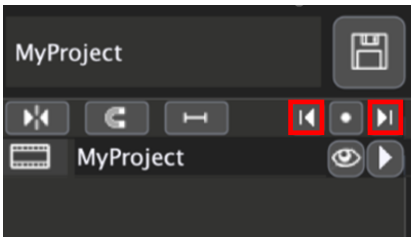
Alternatively, you can use the following keyboard shortcut:

Ctrl + M = Add a cue marker.

The cue marker appears in the timeline.

To move between Cue Markers:

- Use the **Previous Marker** or **Next Marker** buttons to move between the cue markers along the Timeline.



Project Panel - Move to Previous/Next Marker Buttons

Alternatively, you can use the following keyboard shortcuts:

Ctrl + , (comma) = Move to previous cue marker.

Ctrl + . (period) = Move to next cue marker.

Multiple Selection

It is possible to select multiple rows on the timeline (in a project). This can allow you to do a variety of things:

- Delete multiple effects at once.
- Change the duration of the selected effects by setting the **In** and **Out** points for the whole selection.
- Hide or show the selected effects by selecting the **Hide Tool** on the timeline.
- Change common properties of the selected effects.

  These common properties will be shown in the property sheet and will vary depending on which effects are selected together. Changes made will apply to all the selected effects on the timeline.

To select multiple rows:

- Hold the **Ctrl** key and select the rows you want to select.

  OR

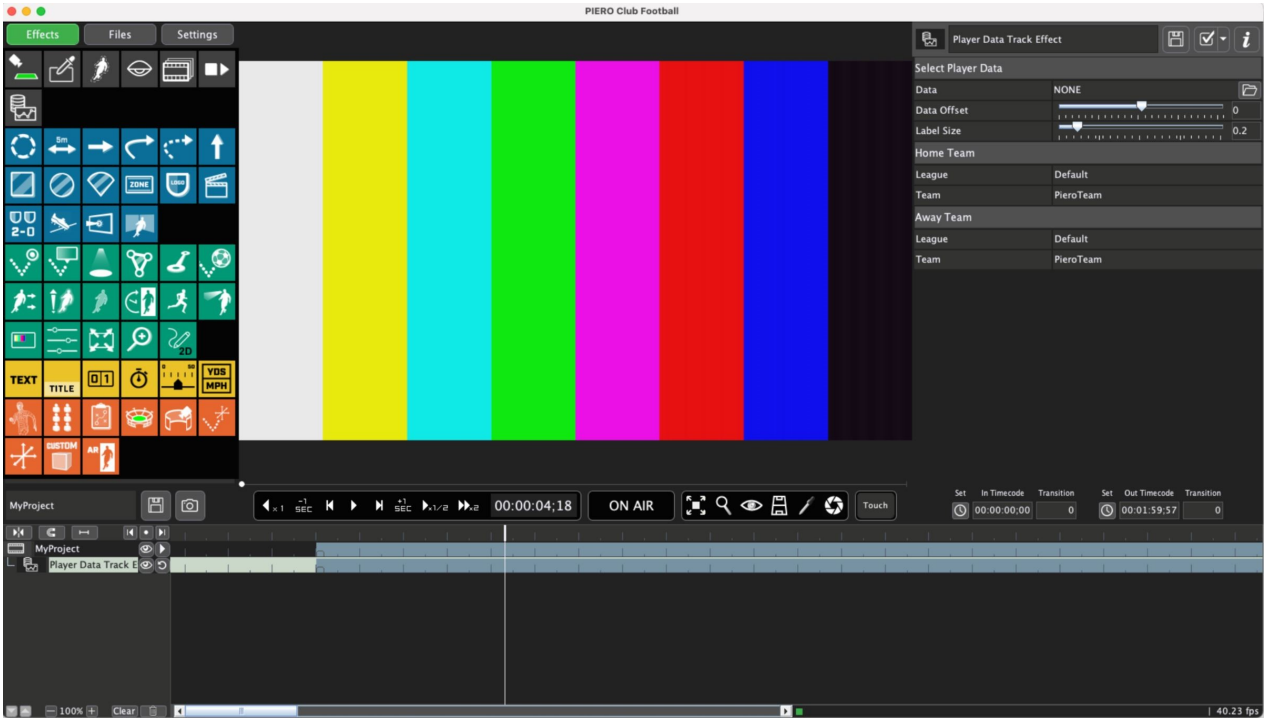
- Click the first row you want to select, press the **Shift** key and select the last row. All the rows in between will be selected.

★Pause points will not be selected when selecting multiple rows.

Club Edition User Interface

The Club edition is a 3D graphics system designed for professional sports clubs. PIERO Club is used as an interface between coaching staff and players to provide visual support when reviewing and preparing a game.

This edition runs on a MacBook Pro laptop, and the user interface is identical to that of the Broadcast edition, but without the SDI option. The settings and options for the Club edition are the same as the Broadcast edition. For information on the settings and options, see the Broadcast Edition User Interface Overview 15 section in this guide.



Club Edition User Interface - Analysis Mode

Creating a Project

The following topics describe a clip-based workflow that serves as a foundation for creating projects in PIERO. While keying and calibration aren't necessary for all effects, the following workflow is recommended to make the most of each effect. A detailed list of effects that require keying and calibration can be found in the PIERO Effects section.

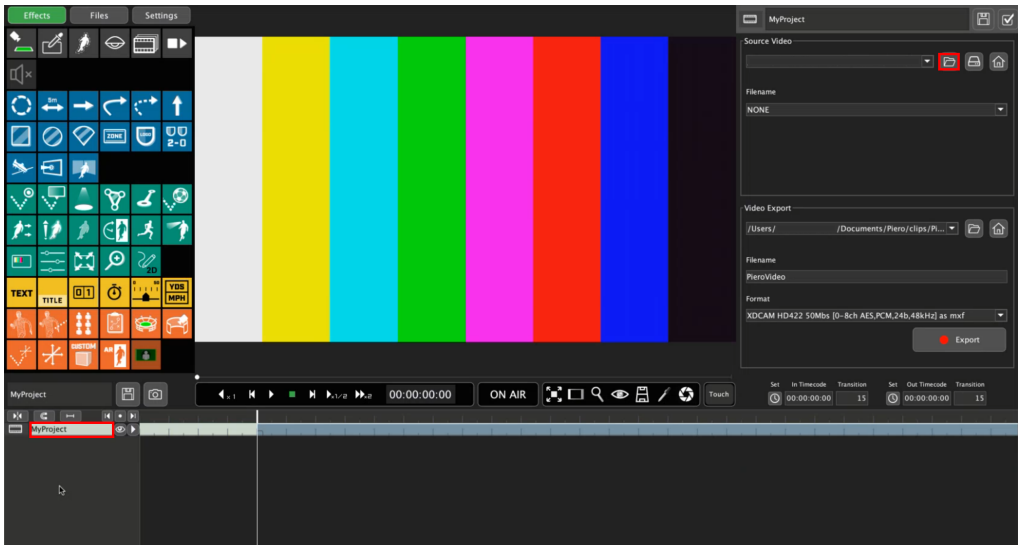
Importing a Clip

The first step in creating a clip-based project is to import a clip.

To import a clip:

1. In the **Parameter Panel**, select the **Folder Directory** button.

   ★PIERO defaults to the window shown in the image below. If you have moved away from this window, you can select **MyProject** in the **Timeline** to return to the default window.



Parameter Panel and Project Folder Directory

   The file explorer opens.

2. Navigate to the location of the source video and select the video file.

   The source video's information is displayed in the **Parameter Panel**, the clip is added to the **Timeline**, and the video is displayed in the **Video Viewer**.

Clip Import Results - Timeline, Video Viewer, and Parameter Panel

   ★**Note:** If you have selected the wrong video parameters in the Launcher, the correct video format information will appear highlighted in red in the **Parameter** panel. You will need to close the project, return to the Launcher, correct the video format, and re-launch PIERO.

Parameter Panel - Correct Video Format Information Highlighted in Red

3. In the **Timeline**, in the **MyProject** field, enter a name for your project and select the **Save** button.

Project Section - MyProject Field

The project is renamed and saved.

Additionally, you can take a thumbnail image and apply it to your project. For information on how to add a thumbnail, see the To add a thumbnail to your project 28 procedure.

4. Once you have imported a clip and saved your project, you can continue building your project by creating a key 29, calibrating 31 the pitch, and adding effects 57.

Although you can add effects at any time, some effects should be added after keying and calibrating. Go to the Keying 29 section of this guide for information on how to add a key to your project. Once you have added the key, calibrate the pitch 31.

To change the project thumbnail:

1. First, you will need to take a snapshot from your clip to create a thumbnail, as follows:

   a. Pause the video on the frame you want to use as a thumbnail.

   b. In the **Timeline**, select the **Snapshot** button to take a snapshot of the current frame.

2. In the project area of the **Timeline**, select the **Add Project Thumbnail** button.

Add Project Thumbnail

The snapshot image is displayed as a thumbnail in front of the project name.

3. Select the **Save** button to save the change to the project.

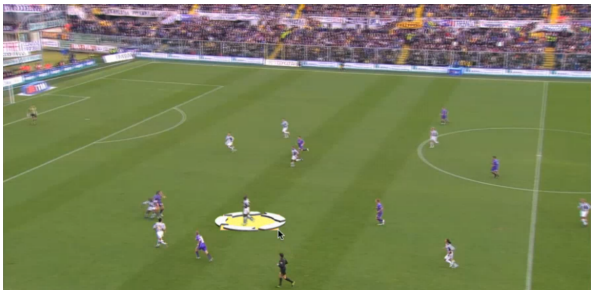
The project is updated and saved.

Keying

The **RGB Keyer** enables you to create the visual appearance of adding an extra layer of depth to your analysis. Keys are made of two basic components: an alpha that cuts a portion out of the background video, and a fill that replaces that portion with a different video. For example, the RGB Keyer cuts out a player, making a **Marker** effect appear painted on the grass under their feet. If you're pressed for time, effects like **Magnifier** and **Spotlight** can be applied without the RGB Keyer. This flexibility allows you to streamline your workflow while still achieving quality visual effects.

For example:

Before Key



After Key

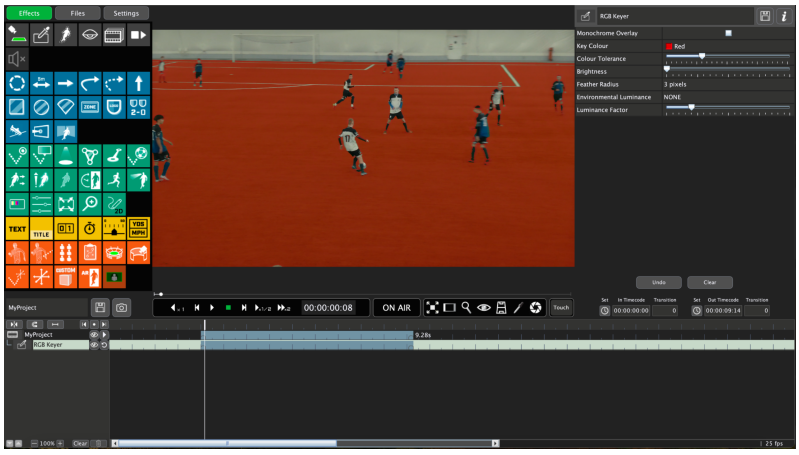
★**Note:** A detailed list of effects that require keying and calibration can be found in the PIERO Effects section.

To create a key:

1. In the **Effects Panel**, select the  **RGB Keyer** button.

   A **Key** is added to the **Timeline,** and the default **Key** is enabled. The **RGB Key** parameter settings are displayed in the **Parameter** panel.

   ★Keying is sensitive to changes in lighting and pitch color, so it needs to be set up for each clip. Since the default **Key** color is red, you should change it when working on a red court such as a clay court in tennis.



Timeline and Property Sheet - RGB Keyer

2. In the **Video Viewer**, click and drag a box on different sections of the playing field to set the **Key** color (the color of the surface of the playing field).

Alternatively, you can use a manual **Key** to select the **Key** color (recommended) as follows:

a. In the **Parameter** panel, select the **Clear** button to clear the default **Key**.

   The playing field returns to its original color.

b. Click and drag a box on different positions of the playing field to sample different variations of the playing field's color.

As you add colors to the key, a red overlay in the **Video Viewer** to help you visualize which colors you have added to the key.

With every box you draw, you sample the colors inside it, expanding the list of colors used to build the **Key**. Selecting and dragging in various locations on the field will add more colors to the Key. If necessary, take more color samples at various places in the video, as sometimes the camera may pan in a certain way, revealing a shade that needs more keying. Obtaining samples of the players' shadows on the field is also important in order to ensure accurate key creation.

Additionally, it may be necessary to adjust the color selection you have just made using the color **Tolerance**, **Brightness**, and **Feathering** sliders located in the **Parameter** panel. This may be necessary in cases like a green shirt on a green soccer pitch or a white shirt on ice.

★If your workflow doesn't require precise key adjustments, you can save a key as a preset, especially if you have multiple clips from the same day or match using the same camera.

3. Next, you will need to calibrate the pitch. Go to the Calibrating 29 section.

Calibrating

Once you have created a key 29, you can calibrate the pitch.

Calibration is the foundation of everything you will do in PIERO. Many graphic effects in PIERO rely on a calibrated pitch, which tells PIERO where the camera is located and where it is looking so that graphics can be placed flat against the ground. Additionally, calibrating the clip allows you to use every effect in the Effects panel.

Before you begin, ensure that you have keyed 29. Next, add a calibration to the timeline by selecting the **Calibration Tool** in the **Effects panel** and then configure the tracking option you want.

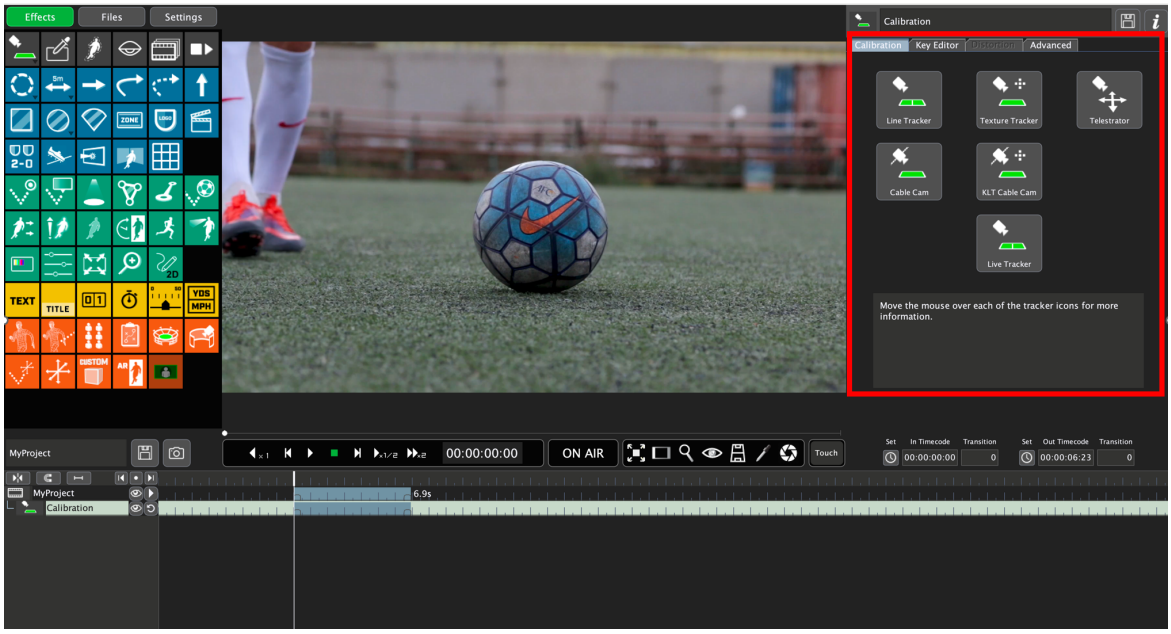
When you have finished calibrating, you can add effects 57.

★**Note:** A detailed list of effects that require keying and calibration can be found in the PIERO Effects section.

To add calibration to the Timeline:

1. In the **Effects** panel, select the **Calibration** tool button.

   The **Calibration** is added to the **Timeline** and its parameter settings are displayed in the **Parameter panel**.



Timeline - Calibration

2. In the **Parameter panel**, select the calibration option you want.

   Go to the corresponding section linked below for instructions on configuring the tracking option you selected.

   Line Tracker 32 - tracks white field or court markings in an image.

   Texture Tracker 32 - tracks groups of pixels it finds from one image to the next.

   Cable Cam 51 - tracks moving cameras that film the field, court, or rink from above.

   Telestrator 51 - enables quick alignment of the calibration on a single frame of video.

Line Tracker and Texture Tracker

This section covers how to calibrate the camera position with the Line Tracker 35 and the Texture Tracker 35.

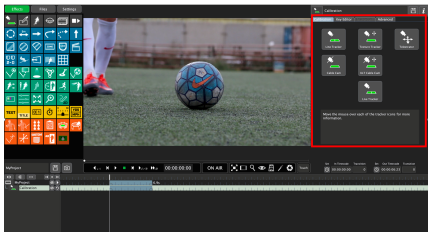
The choice of tracker is mainly defined by the sport being worked on. For sports with white lines (except American football), the choice would be the **Line Tracker**, for everything else the choice would be the **Texture Tracker**.

Before getting started, if you haven't already done so, ensure that you have keyed 29 first. Then, add a calibration to the timeline and select whether to use the **Line tracker** or **Texture Tracker**.

To add a Calibration to the Timeline:

1. In the **Effects** panel, select the **Calibration** tool button.

   The **Calibration** is added to the **Timeline** and the **Calibration's** parameter settings are displayed in the **Parameter** panel.



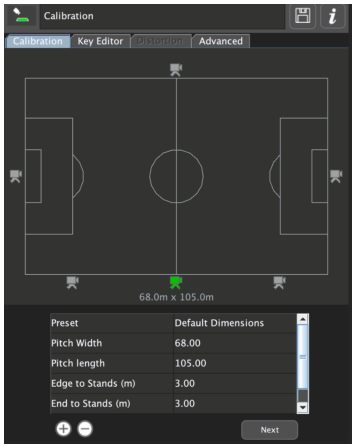
Timeline - Calibration

2. In the **Parameter** panel, select the **Calibration** tab.
3. Select the **Line Tracker** or **Texture Tracker** option.

   A grid is placed over the playing field in the **Video Viewer** and a diagram of the pitch is displayed in the **Parameter** panel.

4. In the **Parameter** panel, the default camera showing the user's perspective is highlighted in green.

   If the default camera view does not match the perspective in your clip, you can adjust the camera view by selecting a **Camera Position** button along the diagram that corresponds to the correct camera view in your clip.



Parameter Panel - Example Calibration for Soccer (Football)

5. Next you will need to define the field/court/rink dimensions.

Below the diagram of the pitch is where you define the pitch dimensions. You can use the default dimensions or if you have a non-standard pitch, you can manually set the dimensions.

For instructions on how to manually set the dimensions, see the Defining the Field/Court/Rink Model 33 section.

6. Once you have defined the dimensions, select **Next**.

   The calibration points are displayed on the diagram of the pitch.

7. Next, you need to match the field, court, or rink markings in the **Calibration's** model to similar points on the field in the **Video Viewer**. This enables the **Calibration** to calculate to position of the camera. Go to the Matching the Model to the Image 35 section for further instruction.

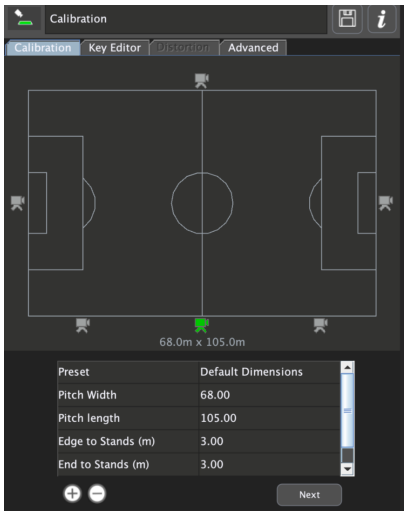
Defining the Field/Court/Rink Model

The **Calibration** tab contains a model representing the field, court, or rink markings of the sport that was selected on the Launcher. The model is of standard regulation size. For each sport, there can be a range of dimensions and regulation layouts, which can be changed by the user to best match the field, court or rink markings in the video. The closer the dimensions of the model match the video, the better the calibration will perform.

★It is important to use the correct dimensions for a good quality calibration that tracks smoothly.

To define the field/court/rink model:

1. Select the **Camera Position** button that best represents the position of the camera used to film the video you are working on.



Calibration - Pitch Model

   The video overlay will move so that the selected camera view is shown.

2. For some sports, select the field, court, or rink type that corresponds to the venue in the video.
3. Below the model, select the **Pitch Width** and **Pitch Length** fields to set the pitch dimensions to match those of the venue in the video.

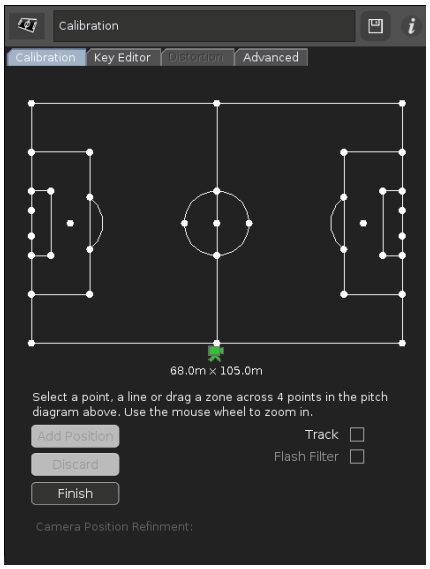
   OR

   From the **Preset** drop-down, select one of the **Preset** pitch dimensions.

   ★Use presets to store field, court, or rink dimensions so you can easily use them again.

4. Select **Next**.

   The property sheet is updated for the next phase of the camera position calibration.



Calibration - Updated Property Sheet

5. Next, you need to match the field, court, or rink markings in the **Calibration's** model to those on the field, which enables the **Calibration** to calculate the position of the camera. Go to the Matching the Model to the Image 35 section for further instruction.

Matching the Model to the Image

Once the camera position has been selected and the field, court, or rink dimensions have been updated, you will need to match the field, court, or rink markings in the **Calibration's** model to those in the image. Matching the model to the image enables the **Calibration** to calculate the position of the camera.

After matching the model to the image, the camera calibration stage is complete, and you will then need to track the scene. See the Tracking the Scene 42 section for additional instructions.

There are three methods to match the model to the image.

The methods are:

One-Click Method 35

Points Method 36

Line-Track Method 38

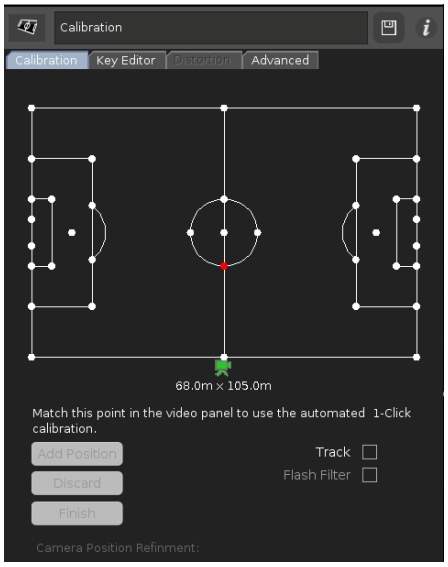
One-Click Method

The **One-Click** method is specifically designed for sports where the field or court lines are white. This tracking method requires two sets of parallel white lines, a feature typically found in sports like soccer (football). Due to this requirement, the **One-Click** method is best suited for this sport.

To use the One-Click method:

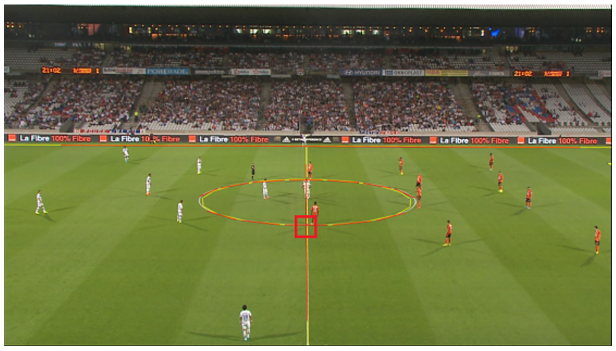
1. In the **Calibration tab**, select one of the calibration points on the model that corresponds to the matching point on the field in the current frame of video.

   The selected calibration point on the model turns red when it is selected.



Calibration Model - Calibration Point Highlighted in Red.

2. In the **Video Viewer**, select the corresponding point



Corresponding Point Selected In the Frame of Video.

3. Refine the position of the yellow lines that have been overlaid on top of the markings in the image.

   See Refining the Position 31 for instructions.

4. Select **Add Position** to accept the position for this frame.

   ★ The video needs to remain on the same frame until the **Add Position** has been selected.

5. Repeat the process at another frame, or frames, in the video where the camera is facing another direction.

   ★While this step is recommended, it is optional. If you already have a good track and the camera movements are not too erratic, it may not be necessary.

6. Select **Finish** to lock in the camera position.

7. Next, you will then need to track the scene. See the Tracking the Scene 42 section for additional instructions.

Tips

- Select **Discard** to start over.
- Refine the position by using either the Click Refinement 39 or Line Refinement 39 methods.
- Add multiple positions at different points in the video, where the camera is facing different directions, to produce a more accurate camera position.
- It is best practice to key properly before calibrating. If the calibration has not worked well, try updating the calibration's internal keyer to help the **One-Click** method find white lines in the image.

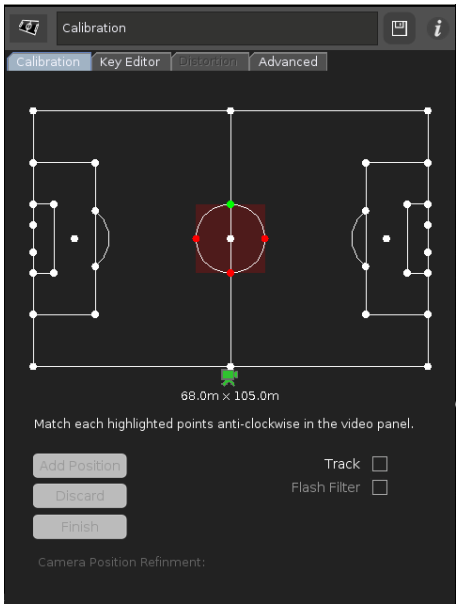
Points Method

The **Points** method takes slightly longer than the **One-Click** method but can be used on any sport, not only those with white lines.

To use the Points method:

1. Go to the frame in the video where you want to begin.
2. Click and drag over an area in the model, covering multiple points.

   The area covered must be visible in the current frame of video.



Calibration - Points Method

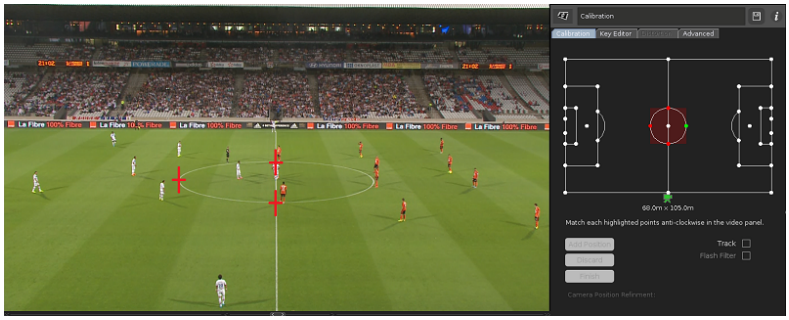
A number of points will be selected, one of which will be green.

3. Click on the point in the frame of video that corresponds to the green point on the model.

   Another point will turn green.

4. Repeat the process until you have matched all the green points.

   Three of the four green points have been matched in the image below. The final green point needs to be matched to complete the selection.



Calibration - Matching Points

5. Refine the position of the yellow lines that have been overlaid on top of the markings in the image.

   See Refining the Position 39 for instructions.

6. Click **Add Position** to accept the position for this frame.
7. Repeat the process at another frame, or frames, in the video where the camera is facing another direction.
8. Click **Finish** to lock in the camera position.
9. Next, you will then need to track the scene. See the Tracking the Scene 42 section for additional instructions.

Tips

- Click **Discard** to start over.

- Refine the position by using either the Click Refinement 39 or Line Refinement 39 methods.
- Add multiple positions at different points in the video, where the camera is facing different directions, to produce a more accurate camera position.

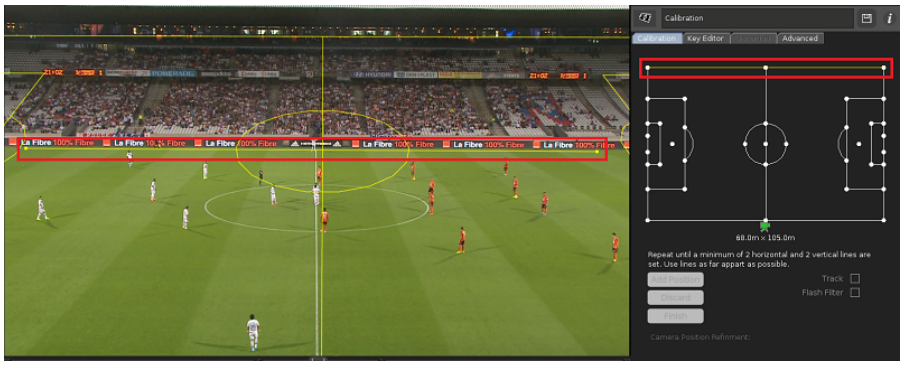
Lines Method

The **Lines** method takes longer than the **One-Click** or **Points** methods but is useful in difficult situations where the other methods do not provide a satisfactory result.

Before you start, ensure you have properly keyed. For information on keying, see the Keying 29 section.

To use the Lines method:

1. Go to the frame in the video where you want to begin.
2. Click on a line in the model that is visible in the current frame of video.



Calibration - Lines Method

3. Draw the line over the top of the corresponding line in the frame of video.
4. Repeat the process until you have drawn at least two sets of parallel lines (four lines), two vertical and two horizontal.
5. Refine the position of the yellow lines that have been overlaid on top of the markings in the image.

   See Refining the Position 31 for instructions.
6. Click **Add Position** to accept the position for this frame.
7. Repeat the process at another frame, or frames, in the video where the camera is facing another direction.
8. Press **Finish** to lock in the camera position.
9. Next, you will then need to track the scene. See the Tracking the Scene 42 section for additional instructions.

Tips

- After drawing a line, you can drag either end to position it better.
- Click **Discard** to start over.
- Refine the position by using either the Click Refinement 39 or Line Refinement 39 methods.
- Add multiple positions at different points in the video, where the camera is facing different directions, to produce a more accurate camera position.

Refining the Position

Before selecting the **Add Position** button, if the yellow lines overlaid on top of the field, court or rink markings are misaligned, use one of the following methods to refine the position of the overlay so that it matches the markings in the video as closely as possible.

Click Refinement 31

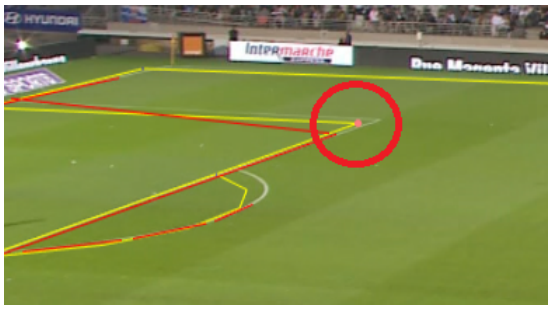
Line Refinement 31

Click Refinement

You can refine the position of the overlay by correcting the position of pink dots that appear in the video window.

To use Click-Refinement:

1. In the video window, move the cursor near to the intersections between the overlaid yellow lines and you will see pink dots appear.



Calibration - Click Refinement

2. If the position of the pink dot does not match the correct location in the frame of video, select the corresponding point in the image.

   The dot and lines will reposition themselves. Try to align them with the image.

3. Repeat the process until you are happy with the alignment.
4. Click Add Position when you have finished.

Line Refinement

You can refine the position of the overlay by drawing more lines.

To use Line Refinement:

1. Select a line from the model that is misaligned in the video.
2. Draw the line over the top of the corresponding line in the frame of video.
3. Repeat the process for other lines that need aligning with the video.
4. Click **Add Position** when you have finished.

Updating the Calibration's Internal Keyer

When using the **Line Tracker**, updating the calibration's internal keyer can help PIERO find white lines on the playing surface.

★Update the calibration's internal keyer when working on sports that have non-green and multi-colored playing surfaces, such as hard-court and clay-court tennis.

The calibration's default internal keyer contains a wide range of greens, sufficient for general lighting situations on most grass-field-based sports.

To update the calibration's internal keyer:

1. Add an RGB Keyer 29 to the timeline.
2. Add the playing surface to the key, being careful not to key the white lines.

   This key will only be used for the calibration, so don't worry if it doesn't work well with graphics.
3. Go back to the calibration on the timeline, select the **Key Editor** tab and press the **Update Key** button.

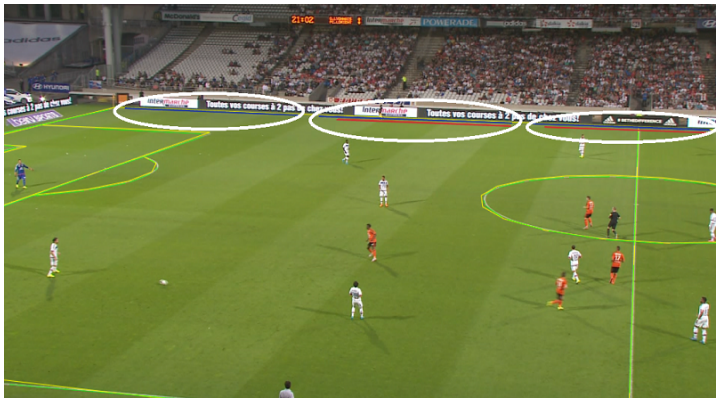
   When this tab is open, found lines that are used by the calibration will be shown in green.

   Lines in the model of the sport's field or court markings that have not been found will be shown in blue.

   Lines that have been found but do not appear in the model of the sport's field or court markings are shown in red.

Calibration - Key Editor

In the image below, the far pitch lines are shown in red and/or blue, meaning the key is not correct. Update the calibration's internal key to try to turn the lines green.



Calibration - Key Editor (Incorrect Key)

4. Adjust the **RGB Keyer** on the timeline so that the surface is keyed but the lines are not keyed and then update the calibration's internal keyer again.
5. Delete or hide the **RGB Keyer** that you have just used on the timeline to prevent it from conflicting with the key you are using for the graphics.
6. When the calibration is complete, select **Finish** to lock in the camera positon.

Tips

- You can update the calibration's internal keyer at any time, even after the initial calibration process.
- When lighting conditions are extreme, the grass is dry, the field is muddy or the hoardings appear close to the field/court lines and the calibration is not tracking well, try updating the calibration's internal keyer to improve performance.

Tracking the Scene

Once the camera calibration stage is completed and the camera position is locked in, you will need to choose a Tracker.

The type of tracking chosen at the beginning of the overall calibration process determines which of the two following Trackers will be available to use at this stage.

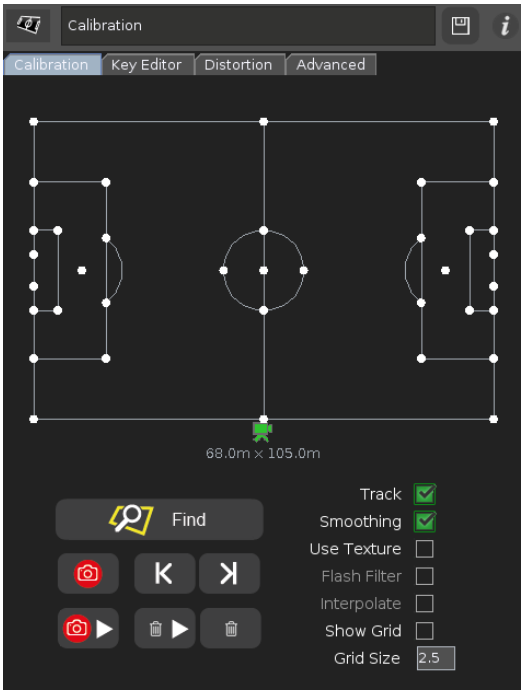
Line Tracker 42

Texture Tracker 31

Line Tracker

The **Line Tracker** tracks the white field or court markings in the image.

When the **Finish** button is selected, PIERO computes all of the possible positions where the field or court lines could be in the image, based on the calibration of the camera position that has just been completed. Once this process is complete, the **Find** button is enabled.



Calibration - Tracking Options for Line Tracking

Key Features

- The **Track** checkbox enables/disables the tracking. It is enabled by default after the camera calibration stage has been completed.
- The **Smoothing** checkbox enables/disables the smoothing feature. Enabling smoothing can help steady the calibration if it shakes a little or drifts as the camera pans and can prevent it from jumping.
- The **Use Texture** checkbox enables/disables combined line and texture tracking. It is disabled by default when the **Line Tracker** has been selected. Enabling it can help on sections of video where the **Line Tracker** struggles to find lines (when the camera zooms in for example).

When enabled, the calibration will automatically switch between line and texture tracking based on a threshold set in the **Advanced** tab of the calibration and will choose the best tracker based on its analysis of the image.

To use the Line Tracker:

1. Select **Find** to get the calibration to search for white lines in the image.

   When the calibration has successfully found enough lines, it will show the yellow markings overlaid on top of the white markings present in the image.

2. Play the video.

   The calibration will track the lines.

3. If you need to move to another point in the video, select **Find** to realign the calibration.

   The calibration phase is complete and effects that require calibration can now be added to your project. For information on adding effects to your project, see Adding Effects 57.

Optional Steps:

- Select the **Use Texture** box to enable combined line and texture tracking.
- Add **Record Points** or record the calibration to maintain its alignment with the image.

Tips

- If the calibration is not aligned because you have moved to a different place in the video, press the Find button to realign the calibration with the image.
- If pressing **Find** doesn't work, try moving to a different part of the video where more white lines are visible.
- Selecting **Use Texture** will enable combined line and texture tracking. Enable this when you find there are areas of video where the line tracking alone struggles to track.
- Add a **Record Point** after pressing **Find** to lock in the position of the calibration on a single frame of video.
- Use the **Record Calibration** button after pressing **Find** to lock in the position of the calibration over a sequence of video.

  This is helpful when working on prerecorded video as it means that you do not need to press **Find** to realign the calibration with the image.

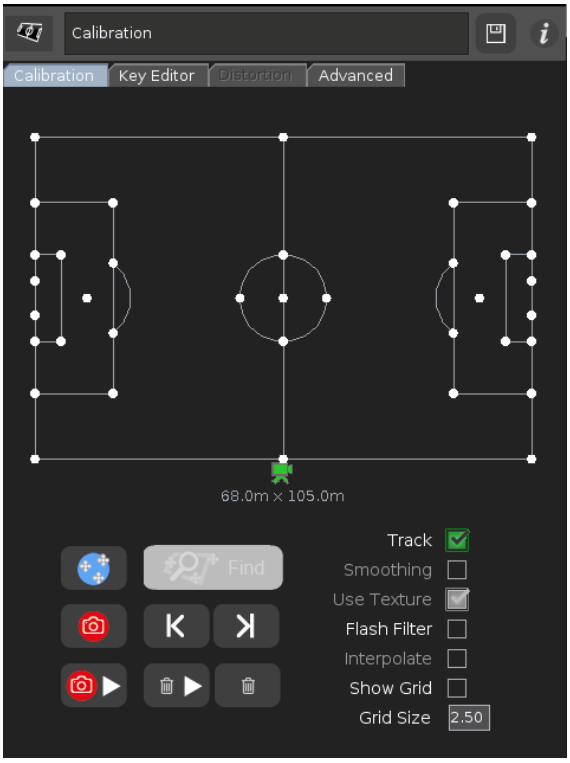
- When using the **Line Tracker** calibration, the **Distortion** tab will be enabled after the camera position has been calculated. Use the Distortion tab to Calibrate Lens Distortion. For more information, see the Calibrating Lens Distortion 46 section.

To reuse a Line Tracker calibration:

1. When calibrating the camera position, make sure you have added positions at both ends of the field or court.
2. Remove any **Record Points**/**Record Calibration**.
3. Save the calibration by selecting the **Save** icon on the property sheet.
4. When you need to use this calibration again, right-click the calibration icon in the effect panel to bring up a list of saved calibrations.

Texture Tracker

The **Texture Tracker** tracks groups of pixels it finds from one image to the next.



Calibration - Tracking Options for Texture Tracking

Key Features

- The **Track** checkbox enables/disables the tracking. It is enabled by default after the camera calibration stage has been completed.
- The **Flash Filter** checkbox enables/disables the **Flash Filter** feature.

  Enable this on ice hockey, basketball or any sport where the play takes place on a reflective surface. The **Flash Filter** filters out camera flashes that reflect off of the playing surface that can cause the **Texture Tracker** to lose tracking.
- The **Grab Reference Textures** button takes a snapshot of texture within the image, which is used when pressing the **Find** button to realign the calibration with the image.

  These reference textures are also used during the tracking process and can help the **Texture Tracker** track in more difficult situations.

To use the Texture Tracker:

1. Use one of the methods (One-Click 42, Points 42, or Lines 42) to align the field, court or rink model with the image.

   Skip this step if it is already aligned on the current frame of video.
2. Ensure the **Track** checkbox is selected to enable tracking.
3. Press the **Grab Reference Textures** button to enable the **Find** feature.

4. Play the video.

   The calibration will track the image.

5. Add **Record Points** or record the calibration to maintain its alignment with the image.

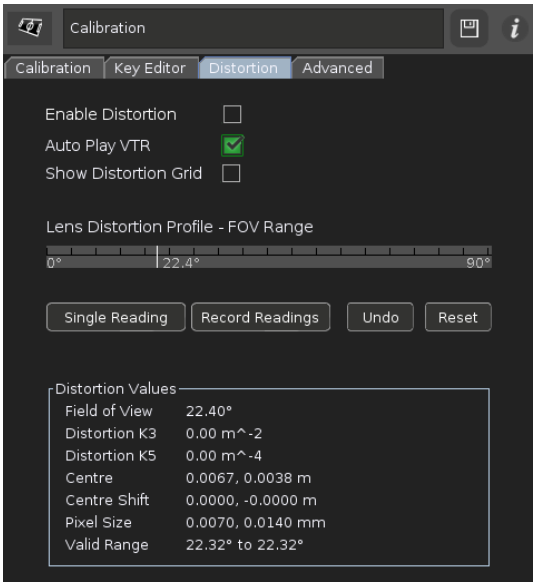
Tips

- If the calibration is not aligned and **you have used** the **Grab Reference Textures** button at different points in the video, press the **Find** button and PIERO will attempt to realign the calibration with the image. **Find** will work on images where there is enough similarity to the ones where you have grabbed reference textures.
- If the calibration is not aligned and **you have not used** the **Grab Reference Textures** button at different points in the video, or you have and **Find** is not working, use one of the methods (One-Click 42, Points 42, or Lines 42) to align the field, court or rink model with the image.
- Add a **Record Point** after pressing **Find** or aligning the calibration, to lock in the position of the calibration on a single frame of video.
- Use the **Record Calibration** button after pressing **Find** or aligning the calibration, to lock in the position of the calibration over a sequence of video. This is helpful when working on prerecorded video as it means that you do not need to realign the calibration with the image.

Calibrating Lens Distortion

When using the **Line Tracker** calibration, the **Distortion** tab will be enabled after the camera position has been calculated. The calibration can calculate lens distortion to help with tracking performance and data visualization on heavily distorted images. The calibration relies on the sport's white field or court markings in the image to calculate lens distortion.

★The **Lens Distortion** calibration can be completed, reset or amended at any time.



Calibration - Distortion Tab

Single Reading Method

The **Single Reading** button takes a snapshot of the lens distortion for the current frame of video. Once the calibration has been given two of these readings, on different frames, it will build a distortion model that will be applied to the tracking. This will be visible as the yellow field markings overlaid on the video image begin to distort and match the distorted white lines of the field itself.

The goal is to give the calibration enough information so it can accurately calculate the lens distortion. Select frames of video that represent different zoom levels, representative of when the camera zooms out wide and when it zooms in tighter, as well as where the camera is pointed at different ends of the field or court (left-hand side, middle, right-hand side). Giving the calibration more readings enables it to calculate lens distortion more accurately for a wider range of fields of view.

To take single readings:

1. Go to a frame of video you want to use to calculate the lens distortion.
2. Press the **Single Reading** button.
3. Repeat the previous two steps at least one more time to give the calibration enough information so it can give an accurate calculation of the lens distortion.

Record Readings Method

The **Record Readings** button makes the calibration continuously take snapshots of the lens distortion on its own, until it is stopped by the user.

In **Analysis** mode the video will play by itself after the button has been pressed. In **Live** mode, the PIERO operator will need to ask the camera operator to pan the camera and zoom in and out during the setup before the game takes place, so they can build a lens distortion calibration that will cover the fields of view expected during the upcoming game. As distortion data is gathered the yellow field markings overlaid on the video image will begin to distort and match the distorted white lines of the field itself.

Pressing **Record Readings** a second time will stop the process. At this point, the calibration builds a lens distortion model based on the data it has gathered. The wider the range of fields of view covered during the recording, the more accurate the lens distortion calibration will be.

To record readings:

1. Go to a frame of video where you want to start grabbing snapshots of lens distortion information.
2. Press the **Record Readings** button.
3. Press the **Record Readings** button again when you are happy with the range of fields of view that has been covered.

 **Tips**

- If you notice that the **Line Tracker** is struggling to track due to distortion, use the **Single Reading** method to get a range of values first, which can then be built upon using the **Record Readings** method. This will produce better results.
- The range of fields of view covered in the calibration process is displayed in green on the **Lens Distortion Profile – FOV Range** meter in the calibration's **Distortion** tab.
- The distortion profile that has been created can be turned on or off using the **Enable Distortion** checkbox.
- If you notice that the overlaid yellow lines are not matching the white lines on the field or court, check whether the **Lens Distortion Profile – FOV Range** meter value has gone outside of the green region. If you need the lens distortion to be calculated for this section of video, simply select a frame of video and take another **Single Reading** or continue to **Record Readings**.
- Due to the quantity of data gathered when using the **Record Readings** method, the resulting lens distortion calibration is likely to be better than one created using the **Single Readings** method.

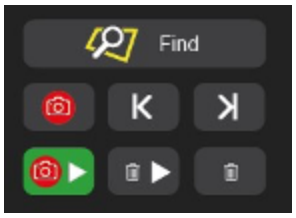
Recording a Calibration

Once tracking is active, you can record the calibration, which means that it is aligned with the video for the duration of the recording. You will not need to press **Find** or add record points.

To record a calibration:

1. Go to the point where you want to start recording the calibration and select the **FIND** button to ensure the calibration is aligned with the image.
2. Press the **Record Calibration** button.

   The video will play.



Calibration - Record Calibration Button

3. Press the **Record Calibration** button again to stop recording.

   Where you have recorded the calibration, the timeline will be red.

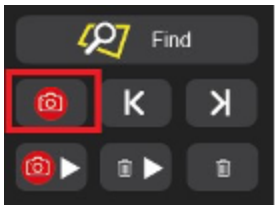
Calibration Recorded on Timeline

Record Points

Add **Record Points** on the timeline to record the position of the calibration on specific frames. **Record points** force the calibration back into alignment when the video plays through them. The most common way to use **Record Points** is to place one at the start of your action. After setting it, you can telestrate, review the playback, and then export.

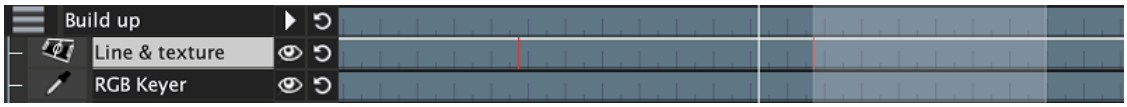
To add record points:

1. Go to the point where you want to add a **Record Point** and press the **FIND** button to ensure the calibration is aligned with the image.
2. Press the **Record Point** button to add a record point.



Calibration - Record Point Button

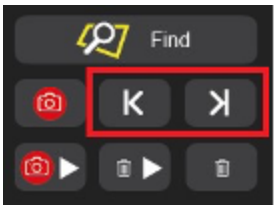
3. Repeat the process wherever you need to in the video.



Calibration - Record Points

Tips

- If you are using **Record Points**, add them at the beginning of a graphics sequence and on every **Pause**.
- **Record Points** appear as red lines on the **Calibration** row of the timeline. You can select them to navigate to that point in the video.
- Remove **Record Points** by navigating to them and pressing the **Record Point** button again.
- Use the **Previous** and **Next** buttons to navigate between record points.

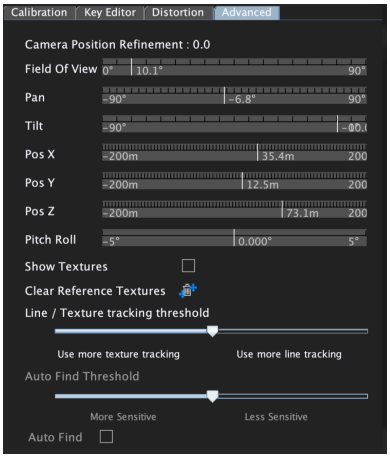


Record Points Navigation Buttons

Alternatively, you can press the comma or period key on the keyboard.

Adjusting Advanced Calibration Parameters

The **Advanced** tab contains advanced parameters that can be adjusted, but that are not required under typical circumstances. It also contains information about the camera position and field of view.



Advanced Tab

Key Features

- The **Show Textures** checkbox enables/disables a visual overlay in the video window showing textures currently used by the calibration. Any textures used will be displayed as crosses in the video window. The size of the cross represents the size of the texture.
- The **Clear Reference Textures** button clears any reference textures that have been grabbed.
- The **Line/Texture Tracking Threshold** slider is used when **Add Texture** has been enabled in the **Line Tracker**. The slider controls the threshold at which the combined line and texture tracker switches from tracking lines to tracking texture.
- The **Auto Find Threshold** slider is used to prioritize the texture tracker against the line tracker.
- The **Auto Find** check box is used to enable the Auto Find feature.

Additional Trackers

There are four other trackers available, each with slightly different calibration procedures. These trackers are described below:

Cable Cam Tracker 51 - a tracker based on tracking white pitch lines from moving cameras.

Telestrator 51 - calibrates a fixed frame manually.

KLT Cable Cam 55 - a tracker based on Kanade-Lucas-Tomasi pixel motion tracking from moving cameras.

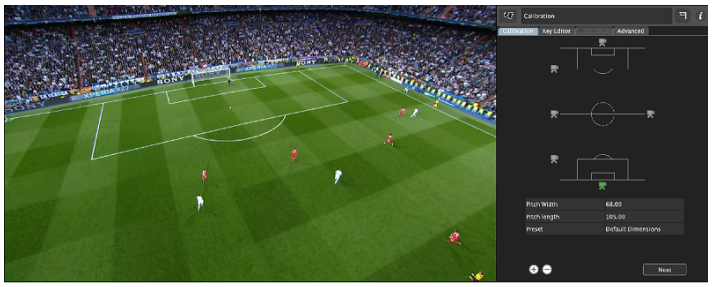
Live Tracker 56 - used to track camera movement on live feed for short periods of time.

Cable Cam

The **Cable Cam Tracker** is designed to track moving cameras that capture footage of a field, court, or rink from an overhead perspective.

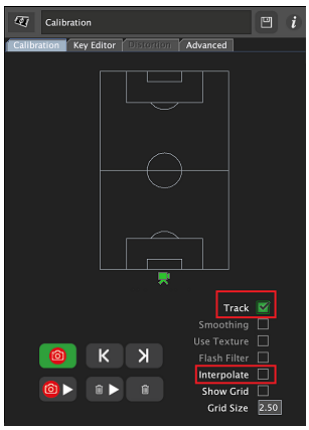
To perform a Cable Tracking calibration:

1. In the **Effects Panel**, select the **Calibration Tool**.
2. In the **Parameter Panel**, in the **Calibration** tab, select **Cable Cam**.
3. Update the field, court, or rink dimensions.
4. Select a camera from the pitch model that is the nearest match to the direction in which the cable cam is pointing.



Select SpyderCam Camera Position

5. Use the One-Click 35, Points 36 or Lines 38 method to calculate the camera position, pressing **Add** to record each position.
6. Repeat the process across multiple points in the video for the best results.
7. Then press **Finish**.
8. Select the **Track** checkbox to enable tracking or the **Interpolate** checkbox to interpolate between record points.



Calibration - Tracking Options

Key Features

- The **Track** checkbox enables/disables **Texture Tracking**.
- The **Interpolate** checkbox enables/disables linear interpolation between **Record Points**.

Telestrator

The **Telestrator** calibration enables quick alignment of the calibration on a single frame of video. This is useful where other calibrations would not work, such as on very close camera shots.

Key Features

- The **Track** checkbox enables/disables **Texture Tracking**.
- The **Interpolate** checkbox enables/disables linear interpolation between **Record Points**.
- The **Show Grid** checkbox enables/disables the grid as part of the calibration overlay.

To perform a Telestrator calibration:

1. Add a **Pause** to the timeline on the frame you want to work on.
2. Add a calibration to the timeline.
3. Select the **Telestrator**.
4. Update the field, court, or rink dimensions.
5. When selecting the camera position, choose the one that is the nearest match to the direction in which the camera is pointing.

Calibration - Telestrator - Select Camera Position

6. Position the **Telestrator** in the video window using the mouse.

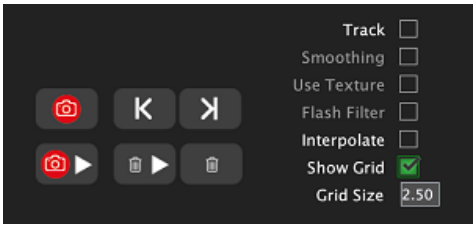
   Align it so that perspective and scale look correct.

Calibration - Telestrator - Position Overlay

Tips

- Use **Show Grid** to add a grid to the calibration overlay. This helps when positioning the Telestrator and gives a guide of the perspective and scale you will achieve.
- Using the **Track** option: After positioning the Telestrator, add a **Record Point** and select the **Track** checkbox. The Telestrator will now track for a short duration.

- Using the **Interpolate** option: After positioning the Telestrator, add a **Record Point**. Move to another point in the video and position the Telestrator again. Add another **Record Point**. Now select the **Interpolate** checkbox. The Telestrator will interpolate between the two **Record Points**.



Calibration - Tracking Options (Telestrator)

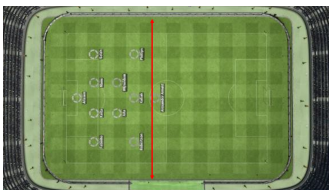
- Positioning the Telestrator is like positioning a Virtual Camera.
  - Press the left mouse button and drag to rotate the overlay.
  - Press the middle mouse button and drag to move the overlay forward, backward, left or right.
  - Press the right mouse button and drag to change the camera distance
  - Use the scroll wheel to change the zoom level.

KLT Cable Cam

The **KLT Cable Cam Tracker** is a type of tracking similar to a texture tracker but optimized specifically for cable cam setups. It is designed to handle the unique requirements of overhead shots, offering a more tailored solution compared to standard line trackers. This tracker is fine-tuned for following the motion of objects in cable cam systems, ensuring smoother and more accurate tracking of objects in overhead or elevated perspectives.

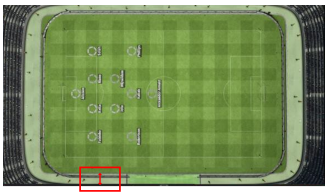
Before starting the calibration for the **KLT Cable Cam Tracker**, it's crucial to provide accurate pitch dimensions. Unlike other tracking systems, where being approximately correct with the width and length of the pitch may suffice, the KLT tracker requires precise measurements.

★**Important**: Make sure you have the following dimensions in advance of your show:



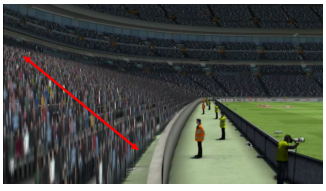
Pitch Width - refers to the measurement of the distance across the playing field or surface, taken from one side to the other. It defines the total width of the pitch.

Pitch Length - is the measurement of the total distance along the longer side of a playing field or surface, from one end to the other. It defines the overall length of the pitch.



Edge to Stands (m) - refers to the measurement, in meters, of the distance between the edge of the pitch and the spectator stands.

End to Stands (m) - refers to the measurement, in meters, of the distance between the end of the pitch and the spectator stands.



Rake Angle (deg) - refers to the angle at which the seating sections are inclined toward the field or playing area, measured in degrees.

To perform a Cable Tracking calibration:

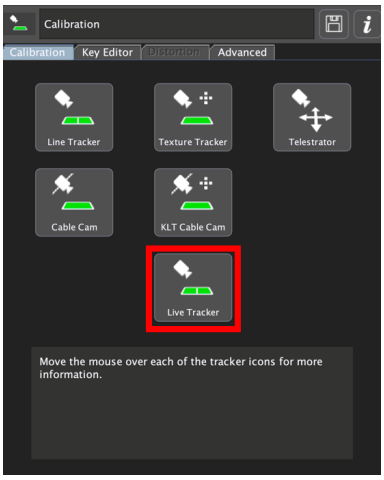
1. In the **Effects Panel**, select the **Calibration Tool**.
2. In the **Parameter Panel**, in the **Calibration** tab, select **KLT Cable Cam**.
3. In the **Calibration** tab, update the following dimensions:
   - **Pitch Width**
   - **Pitch Length**
   - **Edge to Stands**
   - **End to Stands**
   - **Rake Angle**
4. Select **Next** and proceed to calibrate the pitch, making sure to use multiple points in your calibration.

   For information on calibrating using multiple points, see the Matching the Model to the Image 35 section.

Live Tracker

The **Live Tracker** is a fast and flexible tracking solution designed for quick setup and short-term use in live broadcasts. Unlike more precise trackers that require extensive calibration for long-term use, the Live Tracker prioritizes speed.

For example, a camera operator sets up a shot, and the PIERO operator performs a quick calibration in just a few seconds. As the camera operator moves and adjusts to a new position, another rapid calibration can be performed for the next shot. This tracker allows for fast adjustments without needing perfect calibration, since it's only used briefly before recalibrating. While it doesn't offer perfect tracking, it's ideal for scenarios where speed is essential and is optimized for dynamic, real-time events.

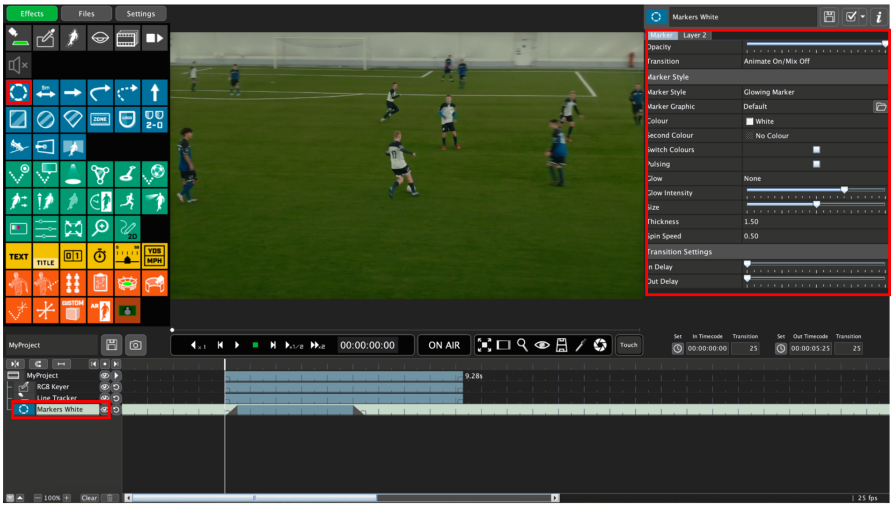


Calibration Parameter Sheet - Live Tracker

Adding Effects

The selection and application of effects are tailored to the sport chosen in the Launcher. After selecting a sport, selecting an effect icon will add it to your project, where it can be customized for a specific still or sequence. Modifications can be made either through the effect property sheet or by interacting directly with the video window. The property sheet displays various effect parameters, such as color and transitions, allowing for precise adjustments.

To fully utilize the system's capabilities, it is recommended to complete keying and calibration before adding effects to your video clip. While not required for all effects, this process helps to optimize their performance. A detailed list of effects that necessitate keying and calibration is provided in the PIERO Effects section.



Effect Property Sheet

To add/edit an effect:

1. Select an effect from the **Effects Panel**.

   Each time you select an effect, a new instance will be added to the project. Take care not to double-click.

   Some effects are added automatically to the clip while others are added to the project and need to be manually added to the clip.

2. In the effect's property sheet, edit the properties (color, transition, etc.) as necessary.

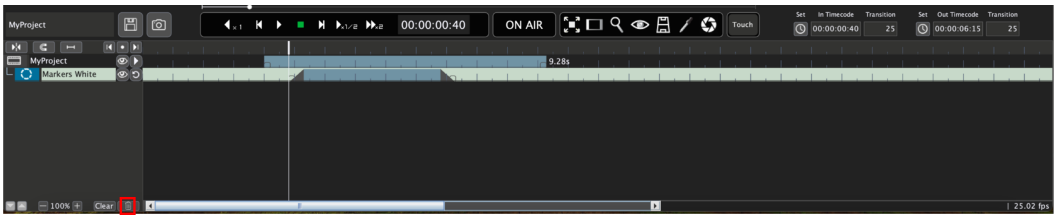
3. If you want to save the new property values as defaults, select **Set As Default**.

   All subsequent instances of that effect will have the default values.

   For an in-depth description of each effect, see the PIERO Effects 79 section.

To delete an effect:

1. In the **Timeline**, select the effect you want to delete.
2. Double-click the **Trash can** button at the bottom-left of the **Timeline**.



Timeline - Delete Button

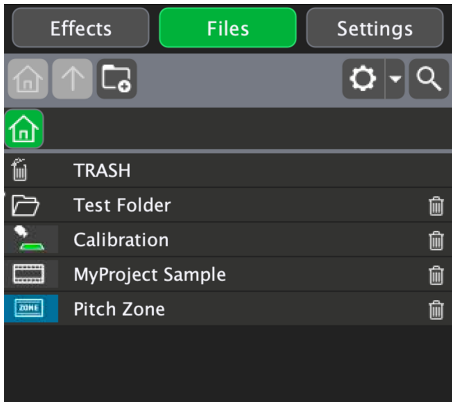
Alternatively, you can you can delete an effect by using the **Delete** key.

The effect is deleted from the **Timeline**.

To save an effect:

1. In your project, select the effect you want to save.
2. In the effect's property sheet, press the **Save** button (the icon in the top right corner).

   The new effect will appear in the **Files** panel in the list of saved effects and projects.



Files Menu

Additionally, you can use presets to create and save your own settings for effects. For additional information, see the Presets 62 section.

To load a saved effect into a project:

1. Select the **Files** tab.
2. Select the effect in the list you want to load.

   The effect is added to the current project.

To change the project:

1. Select the **Files** tab.
2. Select a project in the list.

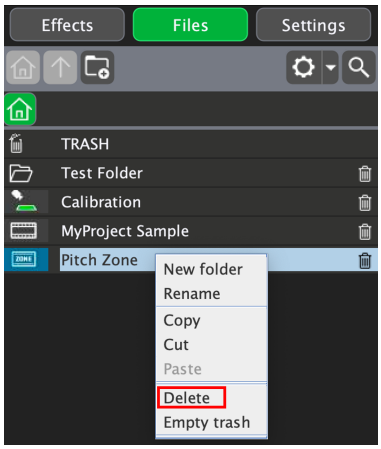
   The current project is replaced with the selected project.

To delete a saved effect:

- Select the effect and then double-click on the trashcan to permanently delete the effect from the **Files** tab.

  OR

- Right-click the effect and select **Delete** from the options menu.



Delete Effect

Selecting and Moving Multiple Effects

In **Analysis** and **Live** modes (Mac and Linux), you can select all the effects in a group and move them using the mouse or the new **Controller** pad in the **Multiple Effects** property sheet.

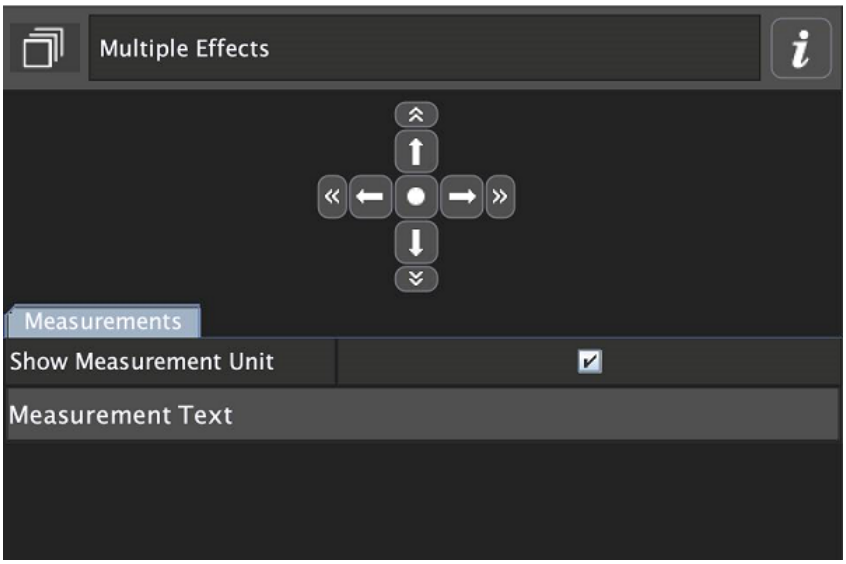
To select multiple effects 60

To move multiple effects 60

Movement of multiple selected effects is supported in the following effects:

- Arc
- Area
- Arrow
- Ball
- Circle (only for one track sample)
- Counter
- Distance
- Freehand arrow
- Point to point effect (only for one track sample)
- Laser eye
- Logo
- Movie
- Markers
- Screen
- Text
- Track effect (only for one track sample)

The property sheet will show all the options shared by the selected effects. In the image below, the effects share 2 options of the **Measurements** tab.



Multiple Effects Property Sheet

To select multiple effects:

- In **Analysis** and **Live** mode, left-click the mouse and use the **Shift** or **Ctrl** keys to select multiple effects in the stack.
- In **LIVE** mode only, you can also press the new hot key **CTRL+A** to select all the effects in the stack.

To move multiple effects:

- Hold the left mouse button and drag within the pink bounding box of the selected effect in the video window.

OR

- In the **Multiple Effects** property sheet, using the **Controller** pad:
  - Select the single arrow to move the group of effects for a short distance.
  - Select the double arrows to move the group of effects for a longer distance.
  - Press and hold the arrows to move the group of effects continuously.
  - Press the center **Controller** button to drag the effects.
  - Press the center **Controller** button and hold the **Shift** key to accelerate movement.
  - Press the center **Controller** button and hold the **Ctrl** key to decelerate movement.

NOTE:

For tracking effects, you can drag tracks using only one sample point.

Trying to drag non-3D effects will be ignored (for example Virtual Stadium, Virtual Camera or 2D effects).

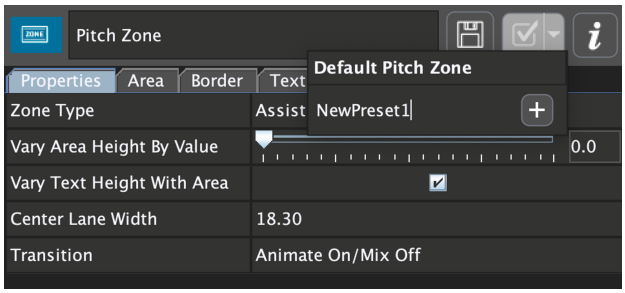
Presets

Use presets to create and save your own settings for effects. You can make multiple presets for the same effect and use whichever one you need.

Presets apply to the sport and workflow mode (Analysis, Touch, Live) in which they were created.

To create a preset:

1. Select an effect.
2. In the effect's property sheet, change the settings as required.
3. Select the **Select Preset** drop-down.



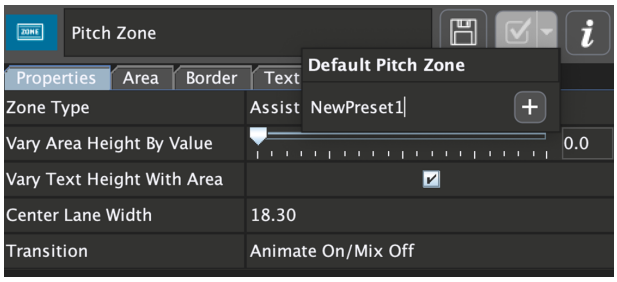
Create Preset

4. Enter a name for the preset and select the **Add Preset** button to save it.

To use a preset:

1. Select an effect.

   The last-used preset for that effect becomes active.
2. In the effect property sheet, select the **Select Preset** button.
3. Select the preset you want to use.



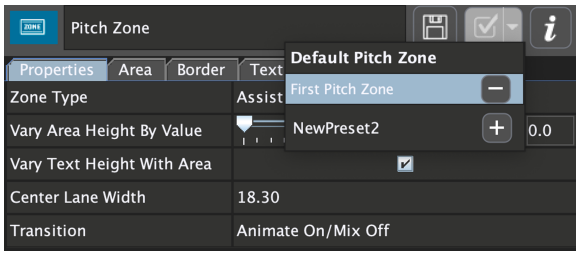
Select Preset

Alternatively, you can right-click an effect in the Effects Panel and select the preset you want to use or revert to the default effect.

The last-used preset will be active whenever the effect is added to a timeline.

To delete a preset:

1. In the effect's property sheet, select the **Select Preset** drop-down.



Parameter Panel - Preset Drop-Down

2. Select the **Delete Preset** button next to the preset you want to delete.

   The preset is deleted from the list.

Additional Tools

The following tools are covered in this section:

Region Tool

The **Region Tool** is used to edit player regions to better segment them for effects such as Multicam, Moveable Players or Player Glow/Grow for raising an arrow between 2 players.

The **Region Tool** requires Calibration 31 and the RGB Keyer 29.

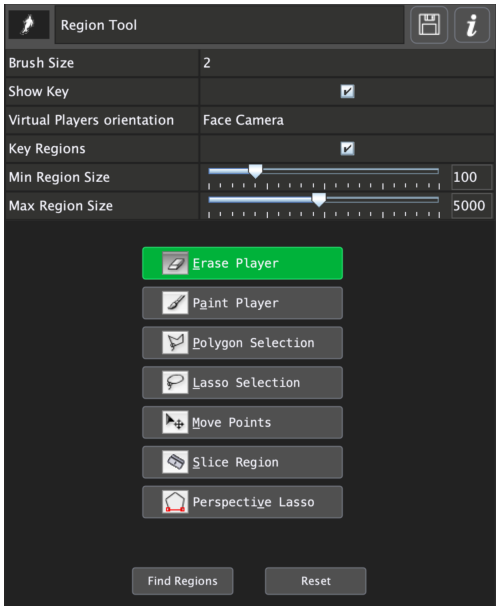
It can refine regions on several frames along the timeline so it is only necessary to have one in a project.

The following effects can take advantage of the refined segmentation:

- Moveable Players 119
- Player Glow/Grow 132
- Virtual Players 67 (on chalkboard or 3D Stadium)
- All effects needing depth information, such as Laser Wall, Arrow (Height), etc.

To use the Region Tool:

1. Press the **Find Regions** button to perform an automatic recognition on the frame.
2. Move the mouse over a region and press **Delete** to remove the region.
3. In the property sheet, use the **Min Region Size** and **Max Region Size** property sliders to define the smallest and largest regions the tool will detect.



Region Tool Property Sheet

4. Use the following tools to refine the region:

Tool	Description
Erase Player	Erases parts of other players that may appear in the region (adds bits to the red key mask).
Paint Player	Adds missing player parts. Useful to force-draw a missing limb (removes bits from the red key mask).
Polygon Selection	Defines a custom region by drawing segments around a player. To complete a region, select the first initial point shown by a green rectangle.
Lasso Selection	Draws a free-hand region around a player. The region is closed when the mouse is released after dragging around the player.
Move Points	Moves the control handles that define a region.
Slice Region	Divides a region into 2 separate regions. Useful for separating 2 players.
Perspective Lasso	Polygonal lasso with perspective (used only with the Mutlicam effect). Start by the base line to set the perspective. When isolating a player and applying a perspective graphic the player may appear unnaturally thin. To correct this, utilize the perspective tool by first positioning the first line beneath the player's feet to define the perspective. Then, outline the remainder of the player accordingly.

Segmenting Example

In the example below the goalkeeper is not automatically recognized. Therefore, they will not appear as a virtual player, cannot be moved, and no graphics can be placed behind them.

There are two ways to bring the goal keeper in as a virtual player:

- Add key (red) to the image until they appear as a region.
- Add a region using either the polygon or lasso tools.

Region Tool - Segmenting Example

Virtual Players

Previous versions of PIERO relied on a virtual player effect to draw the regions (defined by the **Key Drawer**). The **Region Tool** is now responsible for cutting and drawing the regions.

To display the virtual players in the 3D stadium, select the **Draw Player Regions** property checkbox in the stadium's property sheet.

Region Tool - Virtual Players

Raising an Arrow off the Ground

A recurrent problem in basketball is the need to elevate graphics off the ground. PIERO needs regions and depth information to draw the elements in front of each other in 3D space.

Using the **Region Tool** to segment the players allows PIERO to render everything correctly.

Region Tool - Raising an Arrow off the Ground

In ice hockey, skiing and basketball the key is often taking away some part of the athlete (skin color, white shorts, etc.). You can clear the Key Regions property checkbox to force PIERO to render the whole region without transparency. This trick relies on having really well-defined regions.

Hide Tool

The **Hide Tool** is designed to seamlessly manage the visibility of graphics and effects during video transitions, particularly when detecting a cut in the video. The tool's detection is based on changes in key signals and loss of reliability in tracking.

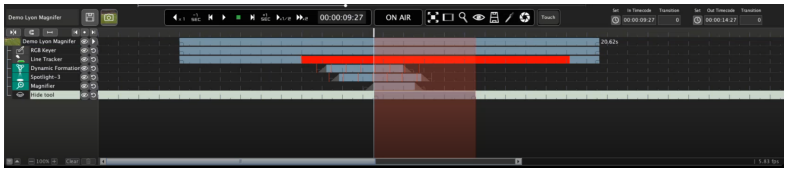
By enabling the Hide tool, PIERO will temporarily stop outputting graphics for the duration of the hide period set in the timeline. This ensures that when going **ON AIR**, the graphics will disappear for the specified time and automatically reappear afterward.

This feature is especially useful in scenarios such as when an advertisement appears on the screen, or during camera position transitions, allowing users to maintain a clean output without unwanted graphics during those moments.

Effects Menu - Hide Tool

To add the Hide Tool:

1. Pause the video at the specific frame where you intend to apply the **Hide Tool**.
2. In the **Effects Panel**, select the **Hide Tool** button.
3. The **Hide Tool** appears in the Timeline.



Timeline - Hide Tool

4. Adjust the Hide Tool's duration by extending it along the timeline to the desired length.

   The **Hide Tool** is enabled and PIERO will temporarily stop outputting graphics for the duration of the hide period set in the timeline.

Clip Tool

The **Clip Tool** is a versatile feature designed to help users create defined segments directly within a video file along the timeline. This tool allows for precise control over each clip, enabling users to apply separate calibrations, keys, and effects to individual segments. When it comes to exporting, the tool provides flexibility—users can choose to export clips individually or collapse the timeline to export all clips collectively, thereby eliminating any content outside the selected clips.

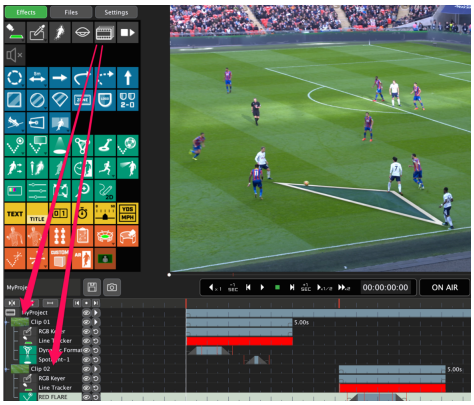
Additionally, clips can be bundled with associated graphics and other assets. However, note that graphics cannot extend beyond the length of the associated clip on the timeline.

Clip Tool

To add a clip:

- In the **Effects Panel**, select the **Clip Tool** button.

  The **Clip Tool** is added to the Timeline.



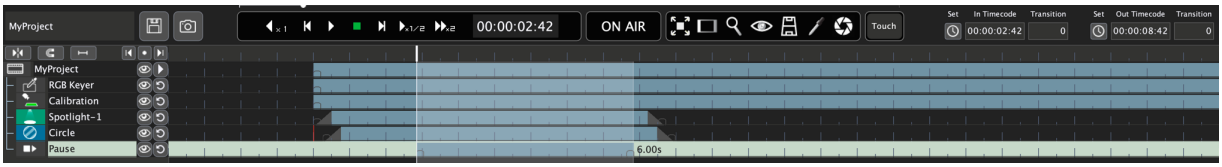
Timeline - Clips Tool

Pause Control

The **Pause** tool has been designed to allow control of the video playback hardware device connected to PIERO (e.g., EVS LSM, Sony digibeta, Local Clip, Blackmagic Hyperdeck). The video device can be automatically paused and played back from any point on the timeline.

★The **Pause** tool behavior is only active in **ON AIR** or **TOUCH** mode (not **LIVE** mode).

Adding a **Pause** tool to the timeline pauses the video at the current timecode. The pause point appears as a red line in the time meter, and the video source is paused for the duration of the **Pause** tool on the timeline. By default, the video will be set to pause at this point for 5 seconds and then play on. To extend the duration of the **Pause**, drag the end of the timebar.



Pause Tool

When the video device is paused, the timecode doesn't change (it's only paused). Effects within the pause will have the same In point, but will be triggered by the delay property. The delay is specified in frames from the **In Timecode** of the effect. This is handled automatically when dragging timebars on the user interface.

Property	Description
Duration	Allows the duration of the pause to be preset.
Out Action	The action the connected VTR device should perform at the OUT point. Default is Play.
Mid Action (LSM ID)	Loads an EVS LSM clip at the Mid Point. The LSM clip should be specified as 3 digits and 1 letter, e.g. 123A.
Mid Point	This is the point in the pause when the load clip command is sent to the EVS.

Troubleshooting

A common problem when using the Pause tool is that the video doesn't stop on exactly the correct timecode frame.

Problem	Description	Solution
The video device stops too early.	When this occurs, PIERO automatically jumps to the correct timecode of the **Pause** tool, causing jitter in the video. PIERO is forced to do this to ensure all effects within the Pause duration are triggered correctly.	In the **Pause** tool property sheet, reduce the **Response Time**. Use the Response Time Procedure 70 to find exactly what the response time should be.
The video device stops too late.	When this occurs, the timebar line will appear after the **Pause** duration and not traverse through the red pause area. However, effects within the **Pause** duration will still be triggered as expected.	In the **Pause** tool property sheet, increase the **Response Time**. Use the Response Time Procedure 70 to find exactly what the response time should be.

Response Time Procedure

The duration of time (in fields) to send the command to the video player in advance. This is to compensate for the delay that occurs between sending the instruction to the video player and the player taking action. The correct value for the Response Time parameter can be found by following this procedure.

To find the correct Response Time:

1. Create a **Pause** tool at the desired timecode, for example 10:00:00:00.
2. Set the **Response Time** parameter temporarily to zero.
3. Set PIERO to **ON AIR** mode and play the video device to the VTR effect pause point.

   You will notice the VTR will play past the desired timecode and will pause too late at something like 10:00:00:05. The five frames difference is the time for the video device to react to the pause command, caused by delays inherent in the video device.

   The **Response Time** can be calculated as double this difference (in this example it is therefore 10).

   It is double because the **Response Time** is measured in fields for fine control over this delay.
4. Enter the **VTR Response Time** into the **PIERO Global Settings** UI for later use.

PIERO Touch Pause

When using the **Pause** tool with a touch screen or iPad the presenter may want to speak indefinitely, then press **Play** to resume the action.

To achieve this, select the **Make Touch Pause** checkbox.

Previewing Final Output

While setting up your project, you may want to preview the video to see what the final playout will look like. In the **Timeline** you can access the **ON AIR** button, which enables you to view what the final output will look like live, by hiding onscreen controls.

When the **ON AIR** button is not selected, any graphic you have selected in the **Timeline** will always show in the video.

To view a final output:

- In the **Timeline**, select the **ON AIR** button.

Timeline - ON AIR Button

The on-screen controls are hidden in the video and the video plays out in the **Video Viewer**.

Exporting Projects

This section covers the process of exporting videos, including instructions for exporting an entire project, a single video clip, multiple clips, and details on the supported video formats.

To Export the entire project:

1. In the **Timeline**, select the project. The default name is **MyProject**.

   The source video's export settings are displayed in the **Parameter** panel.

2. In the **Parameter** panel, select the  **Folder Directory** button.

   The File Explorer opens.

3. Navigate to the location you want to save the video and select the **Select** button.

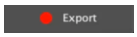
   The File Explorer closes.

4. In the **Filename** field, enter a name for the video file.

5. From the **Format** drop-down, select the video format you want.

   ★**Note: H264 [AAC stereo(s), 16b 48kHz] in MPEG-4 as mov** is good option for compressed video.

   Additionally, different file formats are licensed separately, depending on the PIERO edition you are licensed to use.

6. Select the 

Export button.

   The project is exported and saved to the destination you specified.

   If no destination is specified for exporting the video file, it will be automatically saved to the default location:

   home/PIERO/Clips/PIEROExport/

To export using the Clip tool:

1. Use the  **Clip** tool to define the start and end point of the sub-sequence/clip.
2. Next, preform your PIERO analysis.
3. To export just the clip, select the **Clip** tool in the **Timeline**.
4. Then select the **Export** button in the clip's property sheet.

   The clip is exported and saved to the destination you specified.

To export multiple clips back-to-back in one video:

1. In the **Project** panel, select the  **Collapse Timeline** button.

   When collapsed, the clips will appear next to each other, no matter where they were created on the main video.

2. Select the **Project** row at the top of the **Project** panel and select **Export** in the property sheet.

   The clips are exported as one video and saved to the destination you specified.

Video Formats

Select the resolution of the video you want to use.

Supported formats are:

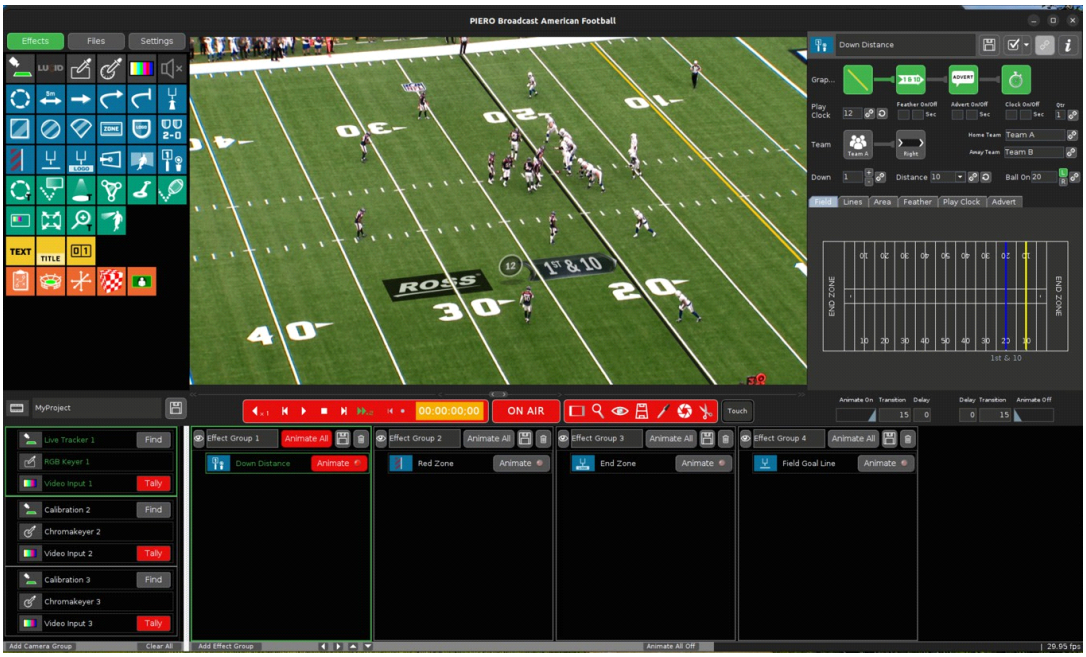
- 480i 29.97Hz (NTSC 16:9 and 4:3)
- 576i 25Hz (PAL 16:9 and 4:3)
- 720p 50Hz
- 720p 59.94Hz
- 1080i 50Hz
- 1080i 59.94Hz
- 1080p 50Hz
- 1080p 59.94Hz

Certain codecs, such as DNxHD and ProRes, are not included with PIERO by default and must be purchased separately as optional add-ons. Additionally, ProRes is available with a watermarked demo version.

For information about supported codecs and file extensions, see the *PIERO Tech Guide*.

Live Edition

PIERO Live is a studio graphics system where graphics are rendered in real time and the user interface is fine-tuned for live use cases.



PIERO Live Edition - User Interface

Effects Panel

At the top-left of the user interface is the **Effects Panel**. Use this panel to quickly access the tools and effects that can be applied to a video. The effect options change depending on the sport select in the Launcher.

Within this section at the top are tools, colored in grey which include calibrations, keyers and video switching. Located beneath the tool icons are the graphic effects available for the sport selected in the Launcher.

Video Viewer

In the center of the user interface is the Video Viewer, where the main input video is displayed, overlayed with any active graphics.

Parameter Panel

At the top-right of the user interface is the **Parameter Panel**. Use this window when working in the property sheet for the currently selected effect or tool.

Timeline Control Bar

At the bottom-center of the user interface is the **Timeline Control Bar**. The **Timeline Control Bar** allows various controls to be applied to this video UI. The most important is the "ON AIR" button which should be activated by the user when going live on air.

Located beneath the **Timeline Control Bar** are columns used for showing active graphic effects. Each column allows grouping of effects so that they can be animated together as a group.

Project Panel

At the bottom-left of the user interface is the **Project** area which displays the current tools, including calibrations, keyers and video input switchers. These can be grouped together using **Add Camera Group** such that a group represents a physical stadium camera within PIERO.

Project Panel

Many of the settings and features for Live edition are the same as the Broadcast edition except for the **Project** area.

In the Broadcast user interface the effects are triggered on and off by timecode, while in the Live user interface they are turned on and off by the operator pressing a button.

An example of the live project is shown below. Effects are switched on and off using buttons rather than time codes, so effects are drawn on-demand. The **ON AIR** highlight indicates if an effect is visible or not. When switching between **Analysis** and **Live** all effects will be turned **OFF**. This is done to optimize the workflow and reduce potential problems when going on air.

Project - Live UI

Multi-calibrations

It is possible to use several calibrations at the same time when using the **Live** interface. Add as many calibrations as required (depending on how many live feeds are connected to the EVS) and ensure it is possible to use the **FIND** command on all.

The active calibration will be displayed in green - a **FIND** will be automatically performed every time the user selects on a calibration effect, so it is quick to switch between cameras and recalibrate. In football this is useful if you need to work on the main match camera and the 18 yard camera.

Cut Detection

Cut detection can be useful when working **Live** on an edited feed. The operator doesn't have to guess when the next cut will happen and can safely lay down graphics on the pitch.

This tool analyzes the live parameters of the **Calibration** and the **RGB Keyer**.

In order for the cuts to be detected, the **Calibration** and **RGB Keyer** must be active and properly set.

Cut Detection can be turned on at any time - in **EDIT** or **ON AIR** mode.

To turn on Cut Detection:

- Press the scissor tool in the toolbox located in the **Live** bar.

Toolbox - Cut Detection

As soon as **Cut Detection** is turned on it will start monitoring the **RGB Keyer** and **Calibration** parameters and automatically turn all effects off. Before turning **Cut Detection** on, set the **RGB Keyer**, **Calibration** and tracking.

TSL UMD v3.1 Support

PIERO can send out tally using the Tally TSL UMD v3.1 protocol, which is triggered when a **Video Input Effect** is made active. This is useful in installations where cameras can be tallied when the PIERO operator has selected their feed. It is assumed the tally delegation and distribution is handled by the customer's tally controller.

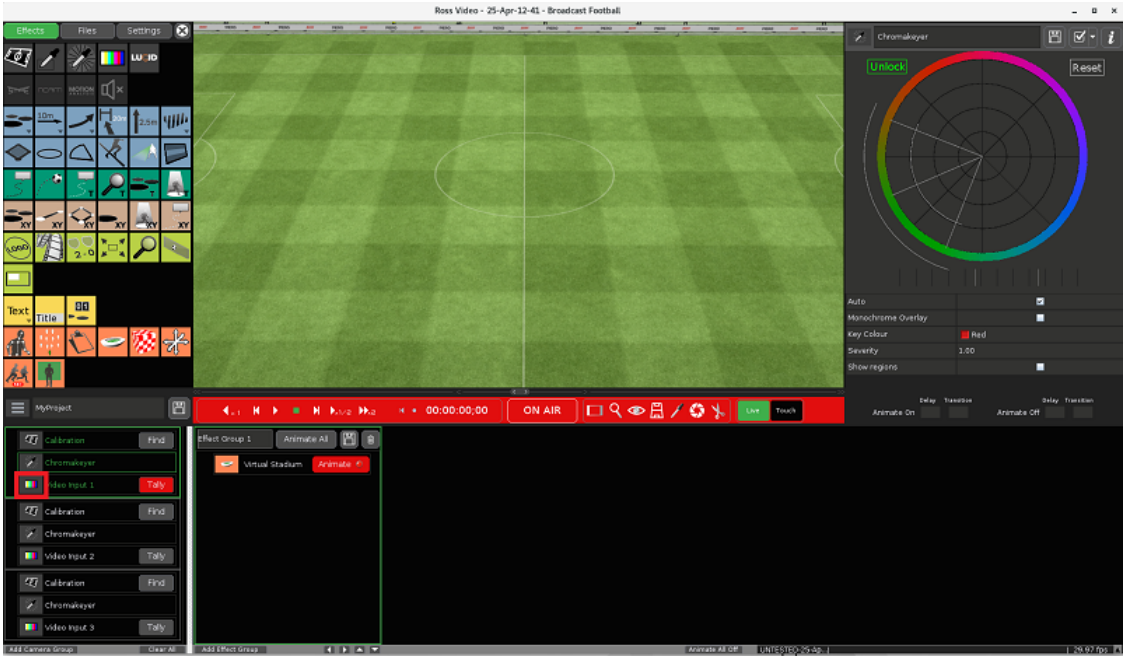
Setup Tally TSL UMD v3.1

When PIERO is operated in **Live** mode, **Tally Settings** (found in PIERO's **General Settings**) can be used to specify network details of your tally controllers, how frequently (in seconds) a complete update should be sent, and whether the tally red or tally green is used to indicate a feed is in use by PIERO.

The connection process is manual and is required each time the PIERO software is started. If there is an issue with the network, PIERO will not reconnect. The user will need to go back to **Tally Settings** to connect again.

As some tally controller solutions interpret tally red and tally green differently, there is the option to swap the state being set.

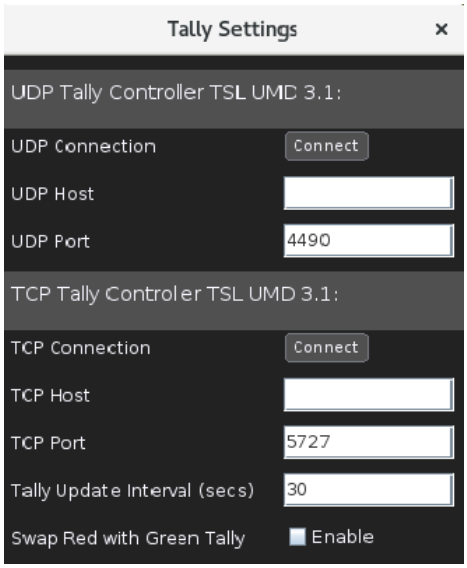
★PIERO reserves the UMD ID values 1 through 8 as a mapping of the SDI inputs 1 through 8. Currently only SDI inputs 1, 2, and, 3 are used. The remaining UMD ID values are reserved for future use.



Tally Button on Effect

To set up Tally

1. Enter the host name and port to access the **Tally Controller**.



Tally Settings

2. Click the **Connect** button

   This will turn green if the network details are valid.

3. If the **Connect** button remains grey, check the user information panel on the lower right of the PIERO operator interface for information.

   TSL UMD v3.1 protocol is one way, so connection issues may not be reflected immediately.

4. In the **Tally Update Interval** field, enter the number of seconds after which PIERO should refresh the tally state.

   To stop PIERO from refreshing the tally state, enter "**0**".

Tally Workflow

1. While in PIERO's **Live** mode go to **General Settings** and choose **Tally Settings**.
2. Confirm the network settings and select **Connect**.
3. Once operating in **Live** mode, **Triple Input**, prepare **Camera Groups** with **Video Input Effects** by selecting the respective SDI inputs.
4. Select a **Camera Group** containing a **Video Input Effect** or select that **Video Input Effect** itself, to trigger a tally event.

   The **Video Input Effect** entry has a **Tally** button which turns red when active.

5. Click the **Tally** button to toggle the current state of that **Video Input Effect** and notify the tally system of its status.

   Any other **Video Input Effects** sharing the same SDI input number will also reflect the same **Tally** button state.

6. Click the **Connect** button a second time to disconnect from the controller.

PIERO Effects

Tips for Using PIERO Effects

Read the following tips to ensure satisfacory results.

- For each effect, do a calibration and an RGB Keyer. This will make your effects appear in the right position and perspective on the pitch.
- You can add sound to any effect, if you select the appropriate audio option in the launcher. Some effects have sound built in, allowing for the sound effect to be triggered separately.
- The Moveable Players 119, Player Glow/Grow 132 and Removable Players 141 will look and function better if you add the Region Tool 65 to your project and make sure the player(s) you want to interact with are defined.
- Information such as keyboard shortcuts and mouse controls is available by hovering over the "i" icon in the top-right corner of the effect's property sheet.
- If you see that the calibration overlay is jumping around when you're adding or editing an effect or the effect itself is jumping around, select the **Calibration** line in your project and then click **Find** to re-establish the calibration.

3D Players

The 3D Player effect is used to position and pose 3D players defined in the Asset Manager 186.

This effect requires Calibration 31 and the RGB Keyer 29.

The teams, strips (uniforms) and players defined in the Asset Manager can be selected and edited in the property sheet. Other editable properties include the orientation of the player (whether facing left or right on the pitch) and the shadow the player emits. Once the properties of the 3D player have been selected, the user can place the 3D players onto the pitch.

3D Player Effect

To use the 3D Player effect:

1. Add the 3D Player effect to the project.
2. In the **Properties** sheet, set the properties of the first player.
3. Click on the feet of the player(s) in the video to add one or more 3D players to the pitch.

   The 3D player will default to the direction set in the **Orientation** property. Use the mouse wheel to rotate the player until it's facing the correct direction, if necessary.

   The 3D player assumes the default stand pose.
4. Double-click on the handle (the square beneath the player).

   This will bring up the **POSES** interface.

   The left-hand side of the interface displays a magnified portion of the video, enabling selection of the pose required. The right-hand side displays the categories of poses available in the library. The goal is to select a pose that closely matches the video of the player.
5. Click on the pose category that matches the player's action, for example - Running.

   This will bring up 9 running poses.

3D Player - Running Poses

6. Select the running pose you want and then select the **POSES** button to return to the pose categories.
7. Click on the individual pose that most closely matches the video on the left to overlay a 3D posed model onto the video.

   Click the pose again to remove the model.
8. Adjust the player's pose according to the following table.

Right Mouse Button	Click and drag the right mouse button over the player in the video portion of the interface to adjust the player's height, for a closer match.
Mouse Wheel	Use the mouse wheel to rotate the player or left-click on a green ball and drag to rotate the player.
Blue 3D Balls	Left-click and drag the blue ball to reposition the player.
Articulation Nodes	Click on the left-hand side panel to display the articulation nodes and right-click a node to bring up the rotation disc, which can be rotated with the mouse wheel. • Red nodes control the right side of the body. • Yellow nodes control the left side of the body. • Black nodes control the spine. • Clicking away from the node makes the disc disappear. • Right-clicking a node several times will change the disc axis.  *3D Player - Articulation Nodes* Two planes can be used to drag the articulation nodes: • A vertical plane parallel to the screen. • A horizontal plane parallel to the ground. Switch between the two planes by left-clicking the mouse.
Cubic Nodes	Left-click and drag the cubic nodes to adjust the hands, elbows and feet. The rest of the body will adjust accordingly. The plane will move with the node it is attached to and eventually intersects with the player's body. This allows you to ensure that a hand or foot has not been placed in an unnatural position. Planes are parallel to the screen not to the player face. If you are changing the player orientation with the mouse wheel, the planes will behave differently and drag the articulation nodes in a different way. Experiment with dragging the planes while spinning the player to fully understand this.

9. When you are satisfied that you have a close match for a player, select **SAVE**.

   If you need to start over, you can select **RESET** to go back to the default pose.

10. If you have more 3D players to pose, select the **NEXT** button to go the next player.

    OR

    If you are finished, select **DONE** to revert to the normal PIERO video screen.

    The posed players will then be displayed at their normal size.

To change a player's strip:

1. Click the yellow square beneath the player whose strip (uniform) you want to change.
2. In the 3D Player effect property sheet, from the **Strip** drop-down, select the strip you want to use (**Home**, **Away** or **Goalkeeper** strip).

To configure 3D player text:

1. After adding a 3D player, in the property sheet, select the **Show Player Name** checkbox.

   A text box appears above each 3D player.
2. From the **Name Layout** drop-down, select what text you want to appear.

   The text you choose will be drawn from the Asset Manager 186.
3. In the **Height Offset** field, enter a value to determine the offset of the text from the top of the 3D player's head, with **0.00** being immediately over the head.

3D Player Data

The 3D Player Data effect provides automatic animation of 3D players based on player positional data.

This effect requires Calibration 31 and the RGB Keyer 29.

The player data is imported from an external system such as the SportVU system or from the PIERO remote link.

3D Player Data Effect

To use the 3D Player Data effect:

1. Add a 3D Player Data effect to the project.
2. Set the **In** and **Out** point using the timeline to determine the limits of the player data needed for import.
3. In the property sheet, from the **Data Directory** property, select the player data directory where the data resides.

   The data will automatically load for the duration defined in Step 2.
4. If precise synchronization is required, in the **Data Offset** property, adjust the value to offset the data by a number of frames.
5. Select the strips of the players and referee.

   The available strips are those created using the Asset Manager 186.
6. Use the **Player Properties > Add** and **Remove** menus to add or remove various graphical effects as required.

   The graphical effect will be added to all players by default, or if an individual player(s) is selected (by selecting the marker underneath the player) the effect will apply only to the selected player(s).

The graphical effects that can be applied include:

- **3D Player** - The 3D player model can be added or removed.
- **Marker** - The marker beneath the player can be added or removed.
- **Pulsing Marker** – The marker beneath a player can be made to pulse.
- **Trail** – A trail can be added to each player showing his path.
- **Speed Trail** – The speed of the player can be shown as a color along a path.
- **Spotlight** – A spotlight can be added to highlight a player.
- **Shadow** – The virtual shadow beneath a player can be added or removed.
- **Ball** – The ball can be added or removed (if present in the player data).
- **Ball Trail** – The ball path can be shown (if present in the player data)
- **Offside Line** – The home or away offside line can be shown based on the player data.
- **Team Shape** – The home or away team shape can be shown based on the player data.
- **Goalkeeper** – A 3D player can be forced to be a goalkeeper if this information is missing from the player data.

7. Select a player and enter text into the **Set Text** property if required.

   The text will default to the players name or number (if defined in the Asset Manager).

8. Use the right mouse button to reposition the text and use the mouse wheel to scale the text.
9. Double-click on the marker at the base of a player to pose the player for an individual video frame.

   This is useful for a pause point where the pose needs to be very precise for a single frame of video. This pose will override the normal animation poses that are applied to the 3D players. Posing the players is similar in procedure to posing static 3D players.

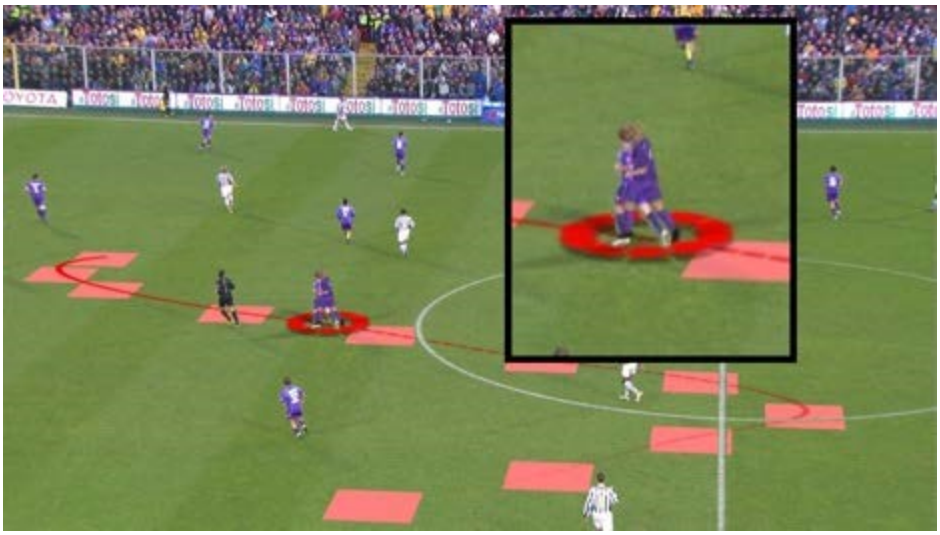
10. In the **Virtual Camera Properties > Camera Position** and **Look at Position** properties, select a player number/name to add an additional virtual camera to the project, if you want to show the player's point of view based on the player data effect.

3D Animated Player

The 3D Animated Track effect combines a 3D player with a track effect in order to control an animated version of the player along the track.

The 3D player's motion matches that of the tracked player automatically.

This effect requires Calibration 31 and the RGB Keyer 29.



3D Animated Track Effect

To use the 3D Animated Track effect:

1. Add a 3D Animated Track effect to a project.
2. From the property sheet, select the appropriate team and player.
3. Double-click a new position in the video window to reposition the player.
4. Start tracking the player as if it was a regular track effect.
5. Add keypoints in the track for each change of speed and direction.
6. Press the **Add Start Pose** and **Add End Pose** buttons at the appropriate time code if required.

   The animation will start and end with the given 3D poses.
7. To display the full track of the player, select the **Show Whole Track** checkbox

To add extra poses throughout the track:

1. Click the **Add Animation** button to briefly blend the player to that pose through the animation.
2. Custom poses (dragging arms and legs) aren't possible. If the player is running in a curved trajectory, it will retain its tilt (leaning left or right).

   This is intended to be used outside a VTR pause.

3D Players (Animated) Controls

3. Click the **Add Pose** button to add a custom position in a VTR pause.

   The player will blend to the custom pose. The tilt angle will be ignored for this time code. You can customize the pose further by dragging arms and legs with this option.

To add the player's name:

1. In the **Text Settings**, select the **Show Player Name** checkbox.
2. From the **Name Layout** drop-down, select what text you want displayed (**Forename**, **Surname**, **Number** and **Surname**, etc.).
3. Use the **Size** slider to change the text size.
4. Edit the other text properties in the **Text Settings**, **Text Style** and **Text Shadow** sections as necessary.

To display a track measurement:

- Change the **Text Measure** property to the relevant unit, such as length or speed.

  It is not possible to display a text string and a measurement at the same time.

Specific Properties

The following parameters can be used to customize the effect.

Parameter	Description
League and Team	Select the team from which to populate the players.
Strip and Player	Select the player and their strip (uniform) for this animated track.
Is a Goal Keeper	The selected player will walk and jog backward to simulate goal keeper movements.
Goal Keeper opposite side	The goal keeper will face the opposite end of the pitch, forcing them to animate in the correct direction.
Goal Keeper Look-at	The goal keeper can look at another track such as an attacker track or the ball track.
Show 3D Player	Select the checkbox to make the 3D player visible.

All players should be tracked manually and then the finished scene played out in the virtual stadium from any camera angle.

3D Players (Animated)

Arc

The Arc effect measures an angle, points to the goal, or can be used as an alternative to the Circle 97 effect.

This effect requires Calibration 31 and the RGB Keyer 29.

Arc Effect

When a player takes a free kick, it is against the rules for any other player to stand within ten yards of the ball. The Arc effect can be used to illustrate the area from which the other players are forbidden.

The arc effect can be used in several ways. You can point the arc towards the goal, extend the lines to the goal posts (as seen above) or extend the whole area to the goal line.

To use the Arc effect:

1. Add the Arc effect to the project.

   The arc will automatically be placed at the correct size (10 yard diameter).
2. Left-click and drag inside the box to reposition the arc.
3. Left-click and drag the control points of the arc to change the arc's size and angle.
4. In the property sheet, in the **Arc** tab, select the **Point to Goal** checkbox to orient the arc towards the goal.
5. In the **Area** and **Border** tabs, define the appearance of the arc.
6. In the **Text** tab, from the **Text Type** drop-down, select whether you want the **Distance to Goal** measurement or the **Arc Angle** measurement to be displayed.

   OR

   Select **None** if you don't want any text.
7. If you chose to display text, configure the other text settings as desired.

To position the arc using the keyboard:

- Press the right arrow to aim the arc at the right goal.
- Press the left arrow to aim the arc at the left goal.

Area

The Area effect is used to highlight a section of the pitch that is relevant to a particular incident or strategy.

This effect requires Calibration 31 and the RGB Keyer 29.

The **Area** effect allows several different styles, as shown below.

Area Effect - Style Examples

To use the Area effect in Analysis mode:

1. Add an Area effect to the project.

   A default square appears with handles at each corner.
2. Left-click and drag the center part of the square to reposition the area.

   OR

   Use the arrow keys to reposition the area.

   OR

   Press **Ctrl + Arrow** keys to reposition the area in smaller increments.

   OR

   Press **Shift + Arrow** keys to reposition the area in larger increments.
3. Left-click and drag the corners to resize the area.

To use the Area effect in Touch mode:

1. Add an Area effect to the project.

   In **Touch** mode, the area is not visible until the user draws it on the touchscreen or iPad.
2. Drag from one corner to another to draw the area.
3. Adjust its size by dragging each corner individually.

   In **Touch** mode, the handles are active but not visible.
4. Move the whole shape by dragging it from its center point.

To adjust the Area effect's appearance:

1. In the property sheet, adjust its **Height**, **Gradient**, **Style**, **Border Style**, **Shadow** and **Thickness** to match a broadcaster's graphical chart.
2. Press **Set-as-Default** once the parameters are set.

Arrow (Distance)

The Arrow (Distance) effect draws a straight arrow with an optional distance measurement.

This effect requires Calibration 31 and the RGB Keyer 29.

Arrow (Distance) Effect

To use the Arrow (Distance) effect:

1. Add an Arrow (Distance) effect to the project.
2. In the property sheet, select **Arrow** tab, and use the **Point To Goal** property to measure the distance between a player and the goal as follows:
   a. Left-click and drag the middle of the arrow to position it.
   b. Drag the end points to change the direction and length of the arrow.
   c. Press the Shift key and scroll to re-size the arrow.

   Alternatively, you can press and hold the **Ctrl** key and scroll to resize.
3. Use the **Opacity** slider to set the opacity of the arrow.
4. From the **Transition** drop-down, select transition effect you want.
5. From the **Arrow Style** options, configure the arrow's style properties.

   The options are:

   - **Arrow Style**
   - **Colour**
   - **2nd Colour**
   - **Gradient**
   - **Transparent Start**
   - **Reflection**
   - **Reflection Intensity**
   - **Shadow Opacity**

6. From the **Arrow Shape** options, configure the arrow's shape as follows:

   a. From the **Shape** drop-down, select the shape style.

   b. Use the sliders to configure the arrow's **Size**, **Size Widening**, **Head Length**, **Head Width**, **Thickness**, and **Dash/Wave Length**.

   c. Adjust the **Angle**, **Height** and **Path Type** of the arrows, if necessary.

   When using these parameters, the order of effects in the project matters.

   In order to prevent 3D collision and depth problems the arrows should be placed at the bottom of the project and a region tool should be defined at this time code.

7. In the property sheet, select the **Measurements** tab and from the **Distance Measure** drop-down select whether the **Distance** measurement.

   The options are:

   - **None**
   - **Metres**
   - **Yards**
   - **Feet**

8. If using the **Distance** measurement, select the **Sub-Units** and **Measurement Unit** checkbox if you want them to be displayed.

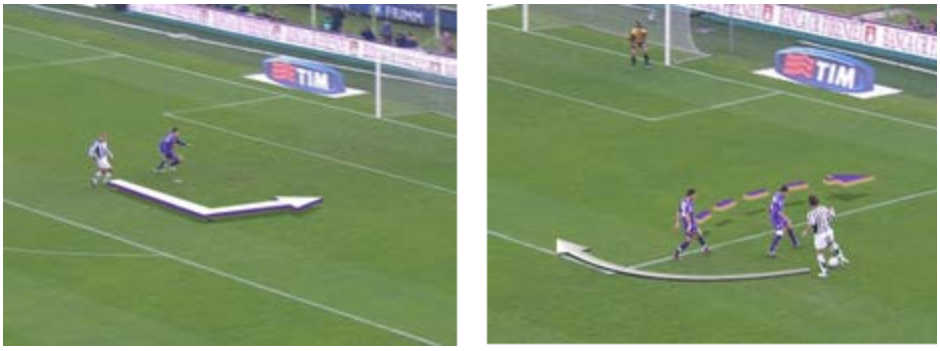
9. If you want the **Measurement Text** displayed, enter the text you want displayed for the **Prefix**, **Suffix**, and **Measurement Unit**.

10. In the property sheet, select the **Text** tab to configure the general text settings (such as opacity, size, tilt, orientation, ect.), and the **Text Style** and **Text Shadow** properties.

Arrow (Freehand)

The Arrow (Freehand) effect is used to draw 3D freehand arrows and lines on the pitch.

This effect requires Calibration 31 and the RGB Keyer. 29



Arrow (Freehand) Effect

The freehand arrow effect draws a curved arrow along a spline. More than one arrow can be drawn onto the pitch by dragging out a new curve. All arrows must share the same properties however, such as color and style.

To use the Arrow (Freehand) effect:

1. Add an Arrow (Freehand) effect to the project.
2. Left-click on a control handle to select it and drag to adjust the shape of the arrow.
3. With a control handle selected, scroll the mouse wheel to change the height of the arrow at that control point.
4. With no control handle selected, scroll the mouse wheel to change the width of the arrow.
5. From the property sheet, select the **Wiggle Frequency** property to change the body of the arrow to show a wavy line.

   This feature is often used by clubs for specific actions: dribble, pass, optional run, next move etc.
6. Use the **Left/Right** arrows on the keyboard to cycle through the set of freehand arrows to make adjustments on each one.

To delete an arrow:

- Press the **Backspace** key to delete the last freehand arrow drawn.

To delete a control handle:

- Click on a control handle and press the **Backspace** key to delete the handle.

Arrow (Height)

The Arrow (Height) effect is used to draw a vertical arrow to illustrate height.

This effect requires Calibration 31 and the RGB Keyer 29.

The Arrow (Height) effect is particularly useful for a line-out in rugby when a player is hoisted into the air to intercept the ball (see the image below).

Arrow (Height) Effect

To use the Arrow (Height) effect:

1. Add an Arrow (Height) effect to the project.
2. Left-click to place the arrow on the ball and while pressing the mouse button, drag the arrow to the ground.

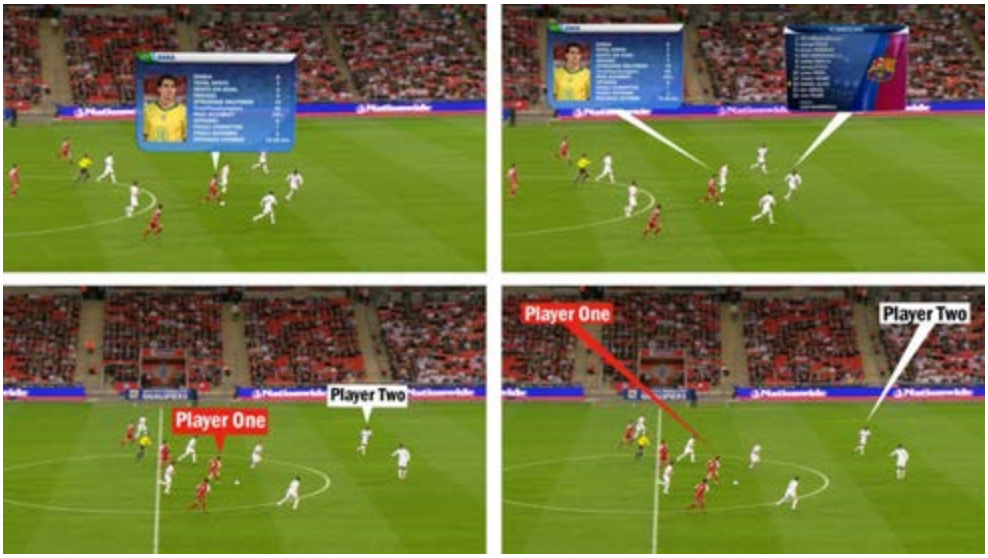
   OR

   Click on the ground beneath the ball and then scroll the mouse wheel forward.
3. Press **Ctrl** and scroll the mouse wheel to resize the text.
4. Press **Shift** and scroll the mouse wheel to resize the arrow.
5. Use the cursor keys to reposition the arrow base more accurately.
6. In the property sheet, select one of the following options:
   - **Animate** - draws the arrow from zero to the given height
   - **Mix** - fades in the arrow with no change in height.

Caption Track

The Caption Track effect tracks a player with a text caption or an image.

This effect requires Calibration 31 and the RGB Keyer 29.



Caption Track Effect

To create a Caption Track (Method 1 - Auto-Tracking):

1. Add a Caption Track effect to the project.

   A blue rectangle appears around each player.
2. Click the middle mouse button in the rectangle surrounding the player you want to track.

   The **Auto Track** mode is applied.
3. Play the video to create a track.
4. Press the **>** key to advance the video in intervals (optional).

To create a Caption Track (Method 2 - Manual Tracking with Intervals):

1. Add a Caption Track effect to the project.
2. In the property sheet, press the **Manual Interval** mode button.
3. Then use the Interval slider to adjust the length of the intervals.
4. In the **Caption** tab, in the **Caption Text** field, enter the text you want to appear in the caption.

   OR

   From the **Preset Names** drop-down, select the name of the player you want to track.
5. Edit the properties of the caption, text and caption line, as necessary.

6. Left-click under the feet of the player you want to track.

   The video will play to the next interval automatically.

7. Left-click again under the feet of the player you are tracking and continue until the track is complete.

To use the Caption Track effect:

1. Create a caption track using one of the above methods.
2. In the property sheet, use the **Ground Offset** property to determine how far off the ground the caption should appear.

   Use the mouse wheel to further adjust the ground offset of the caption.

   Generally, this will be the player's height. The default is 2 m.

3. Left-click to position a point on the track.

   Make sure the arrow is pointing at the player's head.

4. In the property sheet, from the **Style** property, select whether to use a text caption or an image caption.

   For an image:

   a. In the Image section of the property sheet, select an image to follow the player.

      The list of images is the same as that for the Logo 114 effect.

   b. Adjust the **Image Height** property to adjust the height of the image on screen.

   For text:

   In the **Text** property, enter the text you want to display and select the **Show text** checkbox.

5. To make the caption appear in a fixed position on screen, instead of following the player along the track, select the **Fixed** position checkbox.
6. Click and drag to position the caption on screen.
7. Scale the image by entering a value in the **Fixed** position image scale property field – for example, entering 0.5 will show the image at 50% of its normal size.

   For fixed position image captions, the default behaviour is to show the image at actual size, pixel for pixel.

Circle

The Circle effect draws a circle or ellipse onto the pitch. The circle can track over time, changing position and shape as required and could be used to illustrate a free kick zone.

This effect requires Calibration 31 and the RGB Keyer 29.

Circle Effect

To use the Circle effect:

1. Add a Circle effect to the project.

   A 10 yard (9.14 m) circle is placed at the centre of the screen.
2. Click where you want the center of the circle to be.
3. Right-click the center control handle to drag the circle to a different position.

   Alternatively, you can also press and hold the Shift key and use the arrow keys to reposition the effect.
4. Click and drag the bottom-right control handle to adjust the radius of the circle.

   Alternatively, you can scroll the mouse wheel to adjust the radius.

   OR

   In the property sheet, in the **Radius** property, enter a new value.

To create an ellipse:

1. Add a Circle effect to the project.
2. In the property sheet, deselect the Constrain property.
3. Click and drag the bottom-right control handle to draw an ellipse.

To track a circle or ellipse:

1. Create the circle or ellipse.
2. Move the video to another point.
3. Left-click to add a new keyframe.
4. The circle will now track between the center points.
5. Click and drag the bottom-right control handle to adjust the radius.

A number of the circle properties are described in the following table.

Property	Description
Circle Properties	
Radius (m)	The radius of the circle, expressed in metres.
Height	The height at which the circle appears above the surface of the pitch.
Constrain	Select to draw an ellipse rather than a circle.
Transition	The in/out transition of the circle, either **Animate** or **Mix**.
Area Style	The style of the circle, e. g., **Solid**, **Patterned**, **3D**.
Area color	The color of the area of the circle.
Area Opacity	Move the slider to increase or decrease the transparency of the area of the circle.
Border Properties	
Border Style	The style of the border, e. g., **Line**, **Flare**, **Glow**, **3D**.
Border color	The color of the outer line of the circle.
Border Width	Move the slider to increase or decrease the transparency of the width of the border.
Wall Height	The height of the border (making it look like a wall around the circle).
Dashes	Move the slider to break up the border line into dashes.
Animation	Move the slider to animate the border, from 0 (no animation) to **100** (a very fast animation).

To delete a control handle:

Press the **Backspace** button to delete the currently selected or last control handle.

Counter

The Counter effect provides an easy way to count passes, steps, etc.

This effect requires Calibration 31 and the RGB Keyer 29.

Counter Effect Examples

Counting markers will count inside a pause and on running video.

To use the Counter effect:

1. Add a Counter effect to the project.
2. In the property sheet, in the **Counter** tab, select a **Counter Mode** and configure the **Counter's** standard properties.
3. In the **Marker** tab, configure the standard **Marker** properties or in the **Marker Style**, select **NONE** for no marker.
4. In the **Text** tab, configure the standard **Text**, **Text Background**, and **Text Shadow** properties.
5. Click on the screen immediately after each pass to insert a **Counter**.

★ Use the **VTR Half-Speed** button to play the video in slow motion to assist in adding Counters after each pass.

VTR Half-Speed Button

Cross Hair Marker

	The Cross Hair Marker effect adds a cross-hair marker in Touch mode only.

This effect requires Calibration 31 and the RGB Keyer 29.

Cross Hair Marker Effect

To use the Cross Hair Marker effect:

1. Add a Cross Hair Marker effect to the project.
2. Click on the video window where you want the marker to appear.
3. Click again to move the marker to a different location.

   This moves the marker; it does not add another marker.

Direction of Play

The Direction of Play effect displays the direction in which a team will play when they get the ball from a scrum. It is available for Rugby only.

This effect requires Calibration 31 and the RGB Keyer 29.

Type: Area Type: 10 m Strip Type: Strip

Direction of Play Effect

To use the Direction of Play effect:

1. Add a Direction of Play effect to the project.
2. Click at the feet of the player with the ball.
3. Use the left/right arrow keys to position the area on the side of the line where the ball will be played.
4. In the property sheet, configure the area style.

Distance to Goal

The Distance to Goal effect draws an arrow from a given point to the goal and includes the distance measurement. It is available in Live mode for Rugby only.

This effect requires Calibration 31 and the RGB Keyer 29.

Distance to Goal Effect

To use the Distance to Goal effect:

1. Add a Distance to Goal effect to the project.

   The Distance to Goal arrow automatically points to the goal on the side of the pitch that the camera is oriented towards.

2. Modify the arrow using the following mouse and key operations:
   - Left-click to position the start of the arrow.
   - Left-click and drag to point the arrow to the desired goal.
   - Right-click a position to add the distance text.
   - Press the **Shift** key and scroll to re-size the arrow width and the distance text.
   - Press **CTRL** or **C** to re-size the distance text only.

To use the Distance to Goal effect on a Touch screen:

1. Add a Distance to Goal effect to the project.

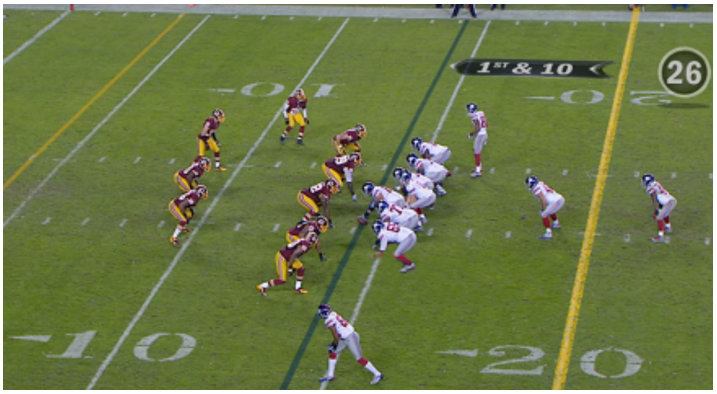
   The Distance to Goal arrow automatically points to the goal on the side of the pitch that the camera is oriented towards.

2. Touch the screen where you want to start the arrow and drag it in the direction of the desired goal.

Down and Distance

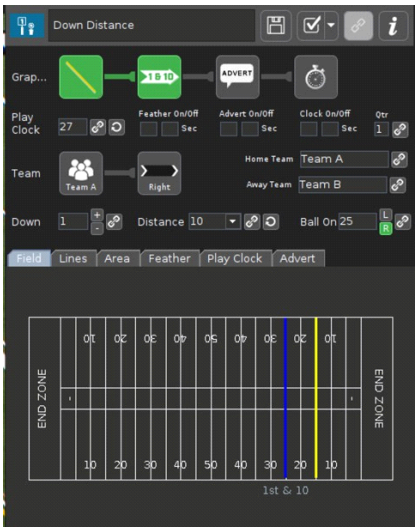
The Down and Distance effect is used for American Football to display the First Down line and the line of scrimmage, as well as a distance marker and timer. This section addresses the use of the effect only. For details on the setup procedures required to utilize the effect, please refer to the *Down and Distance* document.

This effect requires Calibration 31 and the RGB Keyer 29.



Down and Distance Effect

Once keyers and calibrations have been setup, the **Down and Distance** effect can be added. The down & distance property sheet will then be shown on the top right of the UI:



Down and Distance Property Sheet

The property sheet consists of (from top to bottom from example above):

- Four graphic button toggles for the lines, feather, advert and play clock graphic in that order (green means active). Note the connecting line icons which can be activated to allow the parent graphic to automatically control the visibility of the child graphic.
- Current play clock settings and on/off triggers. The triggers allow each graphic (feather, play clock or advert) to be automatically animated on or off at the inputted play clock seconds value. For example to automatically animate on an advert when the play clock is 20, put "20" into the "on" trigger textbox beneath the advert button. Also to automatically animate off the advert when the play clock is reset, put "40" into the "off" trigger textbox. Note if no values are entered then the graphic will need to be

animated manually by pressing the relevant button. These trigger seconds are interpreted differently when the connecting line of the proceeding graphic is activated. In this scenario the seconds become relative to when the parent graphic was manually clicked.

- Current team in play and play direction. Note these can be connected if desired.
- Current down, distance and ball yardage (sometimes called "ball on").
- An overview of the field showing current position of first down and scrimmage lines.
- Further property tabs which allow control of line styles, area styles, feather, play clock and adverts.

Configuration

Before play the following should be configured on the down & distance effect:

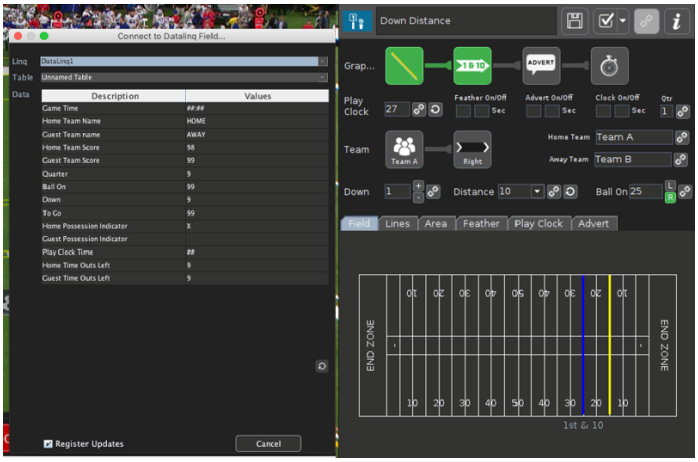
- Team names should be entered into the home/away text fields of the property sheet. These can be datalinqed (see datalinq section below).
- The desired line style and colors should be set using the "Lines" tab on the property sheet.
- The desired area style (which is drawn between the scrimmage line and the first down line) can be set using the "Area" tab of the property sheet.
- The home/away feather graphics should be set using the "Feather" tab on the property sheet.
- The home/away play clock graphic should be set using the "Play Clock" tab on the property sheet.
- Adverts can be configured using the "Advert" tab. Adverts can be images (recommended PNG files) or movies (TGA folders or H264 MPEG). Adverts can be configured per down.

Once the down & distance is configured it is recommended the effect is saved.

DataLinq

Datalinq can be used to automatically drive down & distance properties using a datalinq connection to the stadium score board. Note attempting to drive the down & distance manually is possible but will need a lot of concentration! There are 7 parameters that can be connected to the relevant datalinq score board fields. They are: down, distance, yardage (or ball-on) play clock, quarter, home team name and away team name.

To use datalinq first connect using the PIERO settings tab as described in the datalinq configuration section earlier. Then click on one of the chain icons in the property sheet - a popup window as shown below will appear:



DataLinq Window

Select the relevant cell in the table that matches with the property you wish to link in the property sheet. So for example to connect the "Down" property select the second column table cell that has a matching description name. (Do not select the cell in the first column – it must be the number value in the second column).

Unfortunately scoreboards don't generally know which side of the field play is currently on. The ball yardage of 50 to zero appears on both sides of the field. For this reason the operator must check which side of the field play is currently on and manually set the left/right buttons accordingly in the down & distance property sheet:

Down and Distance Property Sheet - Left/Right Field Selection

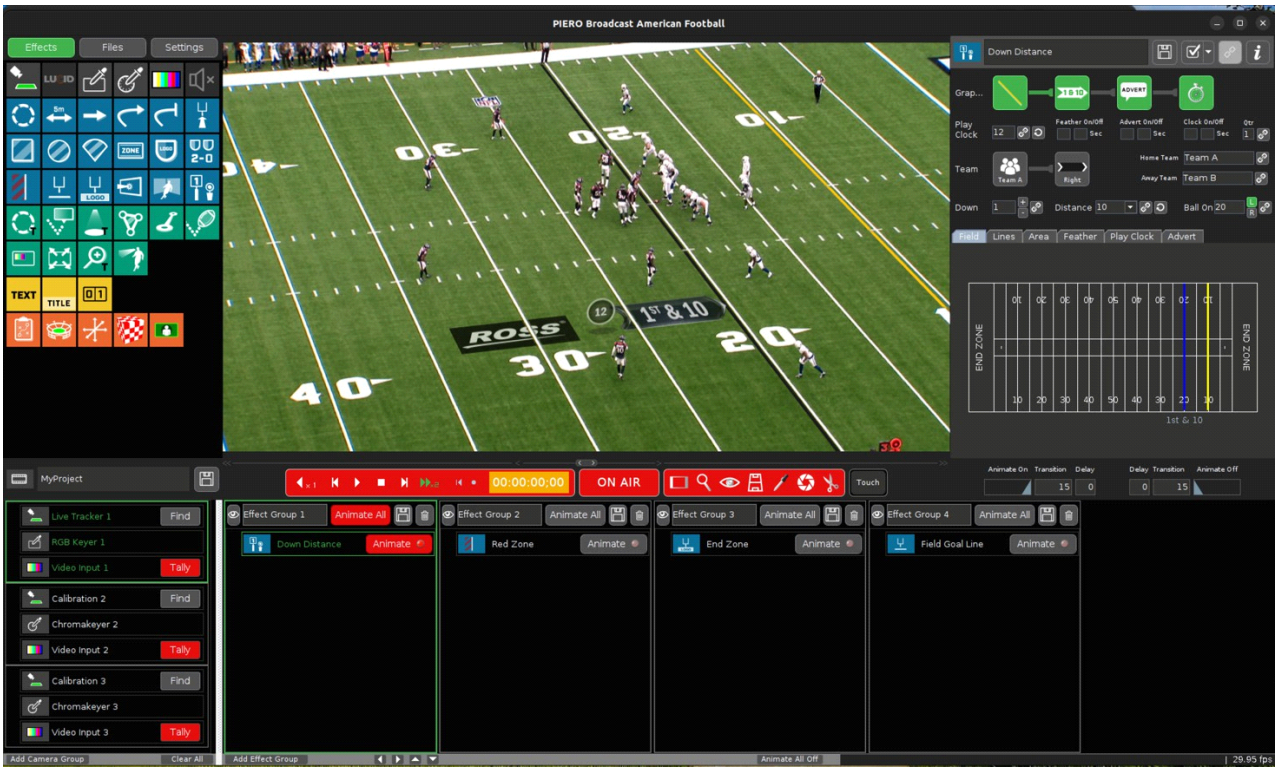
Shortcut Keys

There are a number of shortcut keys available for the down and distance effect the most important of which are summarised below. A complete list of hot keys and mouse usage are available in the "i" help icon at the top right of the property sheet.

Hot key	Behaviour
2 Digit numbers	Typing two digits can be used to quickly choose the current ball on yardage. For example typing "21" will choose the 21st yard.
l	Selects the left side of the field
r	Selects the right side of the field
+	Increase down number
-	Decrease down number
d	Resets to 1st down and 10 yards

Live Operation

Live operational use of the down & distance effect (with 3 cameras) should look like the following:



Down and Distance - Live Operation

For each play, the following steps should be executed:

1. Ensure that you are "ON AIR" with the preview and field control buttons active. This will allow you to preview the calibration and graphics before you animate on anything:

Active On Air and Field Control Buttons

2. Select the current active camera (center, left or right) by clicking on the relevant camera group that you previously setup on the bottom right of the PIERO UI. Hot keys are available to do this: "F1" will select the first camera, "F2" the second camera and "F3" the third etc.

3. Ensure the calibration is correct using the yellow field lines as a visual guide. If it is incorrect then use the calibration find procedures outlined in the calibration section above. Note the F1, F2 or F3 hotkeys will automatically select the calibration effect for fast workflow use.

4. Ensure the keying is correct using the eye dropper tool (on the left of the field lines tool) to show the current key. Note hot keys Shift+F1, Shift+F2 etc can be used to quickly select the relevant keyer for camera 1, 2 etc.

5. Ensure the down & distance effect is positioned correctly and showing the correct information. Do this by using "eye" preview tool which will show the effect in the video window (but won't go to air on the SDI output).

6. If the calibration and graphic look OK then you're ready to animate on the down & distance effect! Use the animate button to do this (or press the space bar if the effect is selected) – it will go red when active:

Animate Button

7. When play has completed, animate off the graphic by pressing the "Animate" button again (or press space again).

8. As each play restarts repeat steps 2 to 6.

Shortcut Keys

To speed up live operation a number of hot keys are available the most important are shown below. A complete list of available hot keys in the live UI can be seen using the "Shortcuts" button in the general settings of the PIERO UI. Hot keys specific for each effect can be seen using the "i" icon in the effect property sheet.

Hot key	Behaviour
F1, F2, F3 etc	Selects the camera group and calibration for camera 1, 2, 3, etc.
Shift+F1, Shift+F2, etc.	Selects the keyer for camera 1, 2, 3, etc.
<Space>	Animates on/off the selected effect.
F10	Execute a "Find" on the current calibration.

Dynamic Formation

The Dynamic Formation effect shows the formations of players or how a group of players works together. These formations can be visualized during a pause or over a period of time, where the area or line will dynamically change.

This effect requires Calibration 31 and the RGB Keyer 29.

Example 1

Example 2

Example 3

Dynamic Formation Effect

To create a Dynamic Formation (Method 1 - Auto-Tracking):

1. Add a Dynamic Formation effect to the project.

   A blue rectangle appears around each player.
2. Click the middle mouse button in the rectangle surrounding each player you want to track.

   The **Auto Track** mode is applied.
3. Play the video to create a track.
4. Press the **>** key to advance the video in intervals (optional).

To create a Dynamic Formation (Method 2 - Manual Tracking with Intervals):

1. Add a Dynamic Formation effect to the project.
2. Left-click under the feet of the players you wish to track.
3. Press the **>** keyboard key to move the video to the next interval.
4. Left-click under the feet of the players you are tracking, in the same order as the first time.

   Use the numbers next to the track handles to help you remember the order of the players.
5. Press the **>** key to play the video to the next interval.
6. Repeat Steps 3 and 4 until the Dynamic Formation tracks are complete.

Other useful Dynamic Formation properties are described in the table below.

Property	Description
Please Add Tracks	Select an existing track from the drop-down list to add it to the project.
Increment Row	When checked, each track is affected by any changes. When not checked, you can work on one Dynamic Formation track at a time without continuing the other tracks. Default is checked.
Formation Shape	Defines the shape of the formation. Options are: • Area • Indented Area • Line • Multiple Text Segments • Ordered Line (vertical line across the width of the pitch, ignoring the tracks order) • Average Line
Marker Style	Select to enable markers. When selected, the standard marker properties will be displayed.
Line Style	When the **Formation Shape** is any of the line options, in the **Borders** tab, from the **Line Style** drop-down, you can select from multiple line styles, **3D Border**, **Line**, **Chalk**, etc.
Text Measure	When selected in the **Measurements** tab, displays the length of the total line or the area of the defined shape or in the case of the **Multiple Text Segments** shape, the length of each segment.

To undo:

1. Press **Backspace** to remove the last point added.
2. Use the cross icon in the track table of the Dynamic Formation property sheet to remove an entire track.

To edit a track:

- Select a track from the list of Dynamic Formation tracks to edit it.

  The entire track and the control handles are displayed.

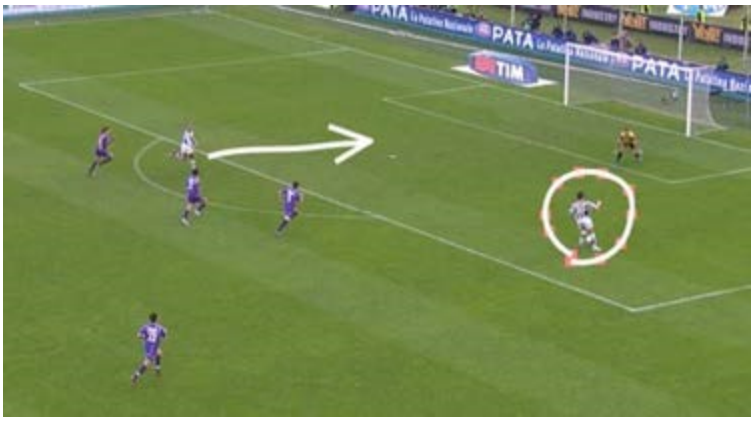
Freehand 2D Line

	The Freehand 2D Line effect draws a freehand line as if you are drawing directly on the screen.

This effect requires Calibration 31 and the RGB Keyer 29.

The Freehand 2D Line effect draws a line over the video image that is not tied-to-pitch but is drawn as if drawing on the screen. It is the graphical equivalent of drawing with a pen over the video image. The lines are not moved when the camera moves and therefore are always drawn over the video image regardless of the changes within the video. The players will never appear over the lines.

The effect can be used to freely draw over any scene. The user is free to write text, circle objects, draw arrows etc.



Freehand Line 2D Effect

To use the Freehand 2D Line effect:

1. Add a Freehand 2D Line effect to the project.
2. Click on the screen and press **Shift** while dragging to draw a straight line.
3. Drag the red control points to adjust the shape of the most recently-drawn line.
4. Press the **Delete** key to delete the last-drawn line.

Goal Zone

Keying 29

	The Goal Zone effect allows you to color and add text to different zones of a goal. Applies to Aussie Rules only.

This effect requires Calibration 31 and the RGB Keyer 29.

Goal Zone Effect

To use the Goal Zone effect:

1. Add a Goal Zone effect to the project.
2. In the effect property sheet, select the **Left Goal?** checkbox if you are illustrating the goal zone for the left goal or clear the checkbox if you are illustrating the right goal.
3. From the **Zone Style** drop-down, select the style for the zones (the illustration above uses the **Color Wall** style).
4. In the **Goal Zone** sections, select the color and text that you want for each zone.
5. Left-click the square handles at the base of the zones to adjust their position to match the goal posts.
6. In the **Text** tab, adjust the properties of the text.

Laser Eye

The Laser Eye effect displays the player's field of view.

This effect requires Calibration 31 and the RGB Keyer 29.

There are three laser styles available:

- **Coloured Laser Eye**
- **Textured Laser Eye**
- **Layered Laser Eye**

Unlike other effects in PIERO, the Laser Eye is positioned at head level.

To use the Laser Eye effect:

1. Add a **Laser Eye** effect to the project.
2. Left-click to place the effect in the video and right-click to another position to create the effect.
3. Click and drag either end of the effect to adjust the position of the effect.
4. Scroll the mouse wheel to adjust the width of the effect.
5. In the property sheet, adjust the standard **Laser** properties.

To use the Laser Eye effect with an unconstrained position:

- Position both ends of the arc manually.

  This is useful when using the effect without a calibration on close ups or trying to adjust to a specific scenario (goal posts etc…)

Link to Track

You can link the laser eye to two tracks with different effects on each.

To link the Laser Eye to two tracks:

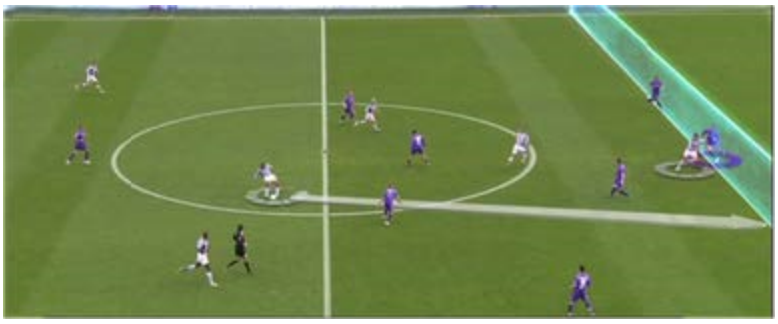
1. Track players using a different effect.
2. Link the origin to one track.
3. Link the end point to another track or position in a fixed position.

Laser Wall

The Laser Wall effect displays a laser wall that cuts across the pitch.

This effect requires Calibration 31 and the RGB Keyer 29.

The Laser Wall effect can be used to demonstrate an offside, or an incident over the line, by graphically cutting the pitch into two. The wall will graphically intersect any other PIERO graphics placed on the pitch, including 3D players the 3D ball effect and billboarded virtual video players (see Virtual Stadium 182).



Laser Wall Effect

To use the Laser Wall effect:

1. Add a Laser Wall effect to the project.
2. Left-click at the point on the pitch where you want the wall to appear.
3. In the property sheet, adjust the **Wall Height** and **Border Width** of the wall.

   The laser wall **Border Width** defaults to the pitch width (usually 68 m).

   To adjust the width to fit the goalmouth, change the value of the **Border Width** to the goalmouth width (7.32 m).

   The **Wall Height** defaults to the goalmouth height (2.44 m).

   Other adjustable properties include the **Laser Color**, the wall **Opacity** and whether you want the **Sheen** highlight to animate along the top and bottom edges.

Logo

	The Logo effect inserts a logo or animated 3D badge onto the pitch.

This effect requires Calibration 31 and the RGB Keyer 29.

Logo Effect

To use the Logo effect:

1. Add a Logo effect to the project.
2. In the property sheet, select a logo from the drop-down list next to the **Logo** property.

   See **Importing Graphics** in the *PIERO Tech Guide* for more details on importing logos and animated badges.
3. Left-click and drag the corners to re-size the logo.
4. Left-click and drag the middle of the logo to reposition it.
5. Scroll the mouse wheel to change the orientation of the logo.
6. Select the **Billboard** property to display the logo as a billboard (i.e., stood vertically in the air facing the camera).
7. Assign a positive or negative **Spin Speed** to control the logo's rotation.

Magnifier

The Magnifier effect is used to highlight or magnify an area of the screen.

This effect requires Calibration 31 and the RGB Keyer 29.

Magnifier Effect

To use the Magnifier effect:

1. Add a Magnifier effect to the project.
2. In the property sheet, configure the **Magnification**, **Shape** (square, circle, rectangle or ellipse), and **Width** settings for the effect.

   The default shape is an ellipse.
3. Left-click to position the center of the highlighted area.
4. Right-click and drag to re-size and adjust the aspect of the highlighted shape.
5. Customize the graphic by changing the **.tga** sequence used for the animation in the PIERO graphics directory.

To track in 2D:

1. After the initial selection of the area to be highlighted, move the video to a new position.
2. Left-click on the center of the area to be highlighted.
3. Repeat several times.

   PIERO will interpolate between the positions automatically.

Tracked Magnifier

The Tracked Magnifier effect is used to highlight or magnify and track an area of the screen. It is available in **Live** and **Touch** modes only. The small **T** in the bottom-right corner of the icon indicates that this is the Tracked version.

This effect requires Calibration 31 and the RGB Keyer.

This effect works the same way as the regular Magnifier effect, except that the tracking is done automatically when the **AutoAnimateOff** checkbox in the property sheet is cleared.

Markers

The Markers effect marks player positions in the real world and in the virtual stadium.

This effect requires Keying 29 and Calibration 31.

You can use one of the markers available in PIERO or create your own marker to use with this effect.

Markers Effect

To use the Markers effect:

1. Add a **Markers** effect to the project.
2. Left-click on the pitch where you want the marker to appear (typically under the feet of the player).

   If two players are standing close to each other, try adding a new marker nearby and then dragging it to the player.
3. In the property sheet, change the color property of the marker to match the player's shirt (optional).
4. If the marker has no color information, you can select the **Use Gloss** property to turn on the gloss shader.

   ★The gloss shader does not work with colored markers.
5. Select the **Loop Animation** property to continuously loop marker designs that were originally created to animate and stop.
6. Use the **In Delay/Out Delay** property to define the way markers are animated, one after the other.
7. Left-click and drag to move the marker to a new position.

To use a custom marker:

1. Save your custom marker graphic to the **Home/Graphics/Markers/images** folder on your PIERO system.

   The graphic must be either a **.png** image (single, flat image with transparency) or an animated **.tga** sequence.
2. Add a Markers effect to your project.
3. From the **Marker Style** drop-down, select **Image Marker**.

4. From the **Marker Graphics** drop-down, from the images folder, select your custom marker graphic.

Tracked Marker

The Tracked Marker effect marks AND tracks a player position in the real world and in the virtual stadium. It is available in **Live** and **Touch** modes only. The small **T** in the bottom-right corner of the icon indicates that this is the Tracked version.

This effect requires Calibration 31 and the RGB Keyer.

To use the Tracked Marker effect:

1. Add a Tracked Marker effect to the project.
2. In the property sheet, adjust the parameters as desired.
3. Left-click on the player you want to mark and track.
4. To track more than one player, add another Tracked Marker effect to the project.
5. Then press **Play**.

   The marker will automatically follow the selected player.

Measurement Table

The Measurement Table effect displays measurements, such as ball speed or kick distance, that are generated by other PIERO effects.

This effect requires Calibration 31 and the RGB Keyer 29.

To make the best use of the Measurement Table effect, use other PIERO effects to generate measurements. Any effect that tracks a player or ball will produce speed and distance measurements.

Measurement Table Effect

To use the Measurement Table effect:

1. Add a Measurement Table effect to the project.
2. In the property sheet, in the **Visual Settings** section, select either **2D** or **Billboard** mode.
3. Click **Add New Measurement** in the property sheet.
4. Under **Current Selection** select an effect on the timeline from which you would like to use the measurement (for example, the **Distance Arrow**).
5. In the same section, select the **Measurement** you want to use and the **Units** in which you want it displayed.
6. Change **Label Text** and **Value Text** in order to display the text you want with the measurement.
7. Repeat Steps 3 to 6 for each measurement you want in the table.
8. In the property sheet, adjust the **Text**, **Background**, **Transition** and **Display Mode** (**2D** or **Tied-to-Field**) as required.

To add text without a measurement:

1. Click **Add New Measurement** in the property sheet.
2. Set the **Select an effect**, **Measurement** and **Units** properties to **NONE**.
3. Then change the text in **Label Text** and **Value Text** to display the text you want.

Moveable Players

The Moveable Players effect is used to move players in the video to a new position while hiding the original player position.

This effect requires Calibration 31 and the RGB Keyer 29.

The moveable players effect allows you to move players to different positions on the pitch. You can move a player to several positions and use a dog-leg arrow to animate them along a path. The players can be highlighted with a glow and the change of position emphasized with an arrow.

Moveable Players Effect

To use the Moveable Players effect:

1. Add a Moveable Players effect to the project.
2. In the property sheet, adjust the **Leftover Player Opacity** property to control the transparency of the original position of the player.
3. Adjust the **Touch Glow Size** property to change the size of the glowing edge on moveable players, allowing the presenter to see which players can be moved by touch.
4. Use the **Line Settings** property to control the parameters of the arrow attached to the player.
5. Press the **R** key to reset the player.
6. Press the **Backspace** key to move the selected player back to its original position.

Set Up for Touch Mode

The **RGB Keyer**, **Region Tool** and **Pause** are used in conjunction with the Moveable Players effect. They need to be set up before using the effect in **Touch** mode. The **RGB Keyer** is required to detect the players and the **Region Tool** is used to refine the detected players. As the segmented regions are only valid on one frame, a **Pause** point (VTR Control) is required to ensure the video pauses at the correct point to use the effect. It is also recommended to set up a calibration to ensure that the players appear in the correct perspective.

Background Manual Clone Tool

When moving a player you may find the algorithm that auto fills behind the player leaves an unrealistic background. This may happen if a player is over a pitch line and a resulting gap in the line occurs. To solve this problem use the manual clone tool.

To use the manual clone tool:

1. Left-click and drag the mouse over the problem area.

   Be sure to drag the mouse beyond the player region otherwise you'll just drag the player again.

   When you let go of the drag you will find the dragged area is now attached to the mouse (albeit slightly transparent).
2. Move the mouse to an area of the video that you'd like to clone.
3. When you are satisfied with the new player background, left-click the mouse to complete the cloning.

★You can cancel a clone at any point by pressing **ESC**.

To clone a piece of video other than the current timecode:

1. Left-click and drag the mouse over the problem area.
2. Move the video to the desired frame.
3. Align the transparent area with the desired background and left-click the mouse.

   Returning to the original timecode will show the newly aligned player background.

★You can abort a clone at any point by pressing **ESC**.

Movie

The Movie effect inserts a movie clip (Mpeg4 or TGA sequence) onto the pitch.

This effect requires Calibration 31 and the RGB Keyer 29.

Movie Effect

To use the Movie effect:

1. Place **.mp4**, **.mov** and **.tga** folders in the **/home/PIERO/movies/ directory**.
2. Add a Movie effect to the project.
3. In the property sheet, select a movie from the **Movie** property drop-down.
4. In **Tied To Field** mode, use the **Keyed** option so that the movie appears under the players (keyed on the pitch like an area).
5. Filtering it will blur the edges to prevent shimmering.

   This can be useful under low angles.
6. Adjust the **Height** and **Tilt** properties to allow advanced positioning of the movie from **Tied to Field**, to **45°** to **upright** (angle = 0, 45, 90).
7. Select **2D** or **Full screen** mode from the property sheet.
8. Use the buttons at the bottom of the property sheet to control the playout of the movie.

   You can loop the movie clip or play it back and forth.

Movie Playout Controls

Multicam

The Multicam effect creates a seamless virtual transition from one camera shot to another.

This effect requires Calibration 31 and the RGB Keyer 29.

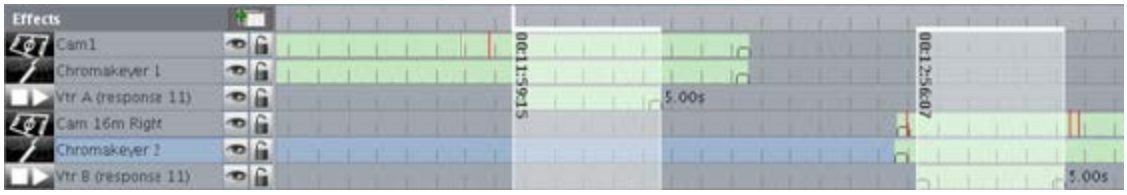
Camera 1 Shot | Virtual Transition | Camera 18 Yard Shot

Multicam Effect

Before adding the Multicam effect, you'll need to set up the clip.

To set up a clip:

1. Locate a replay from a different camera angle.
2. Identify matching frames on the 2 camera angles.
3. Calibrate both cameras and chromakey parts individually.
4. Use the **Clock** button to set the calibrations' **INs** and **OUTs**.
5. Set up 2 **VTR** controls (pause points) on the matching frame.
6. Ensure both calibrations have a record point on the pauses.



Multicam Camera Calibration

7. Change the **VTR A OUT** action to **Seek to VTR B**.

Multicam - Seek to VTR B

PIERO will then seek (jump) to the matching replay frame in the video.

To use the Multicam effect:

1. Add a Multicam effect to the project, making it start in the first **Pause** and end in the second **Pause**.
2. Select the **1st Players** tab.
3. Cut out players and goal posts on the 1st view.

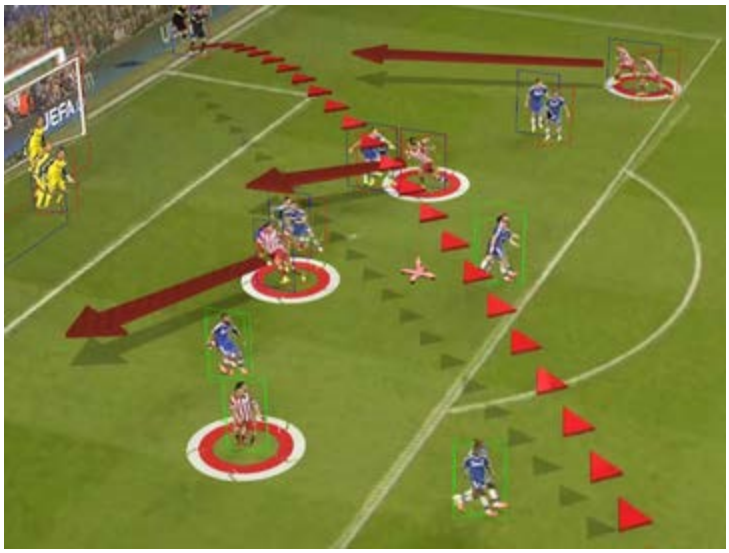
   See To cut out players and goal posts: 122 for instructions.
4. In the **1st Stadium** tab, create a virtual stadium for the 1st view.

   See To create a virtual stadium: 122 for instructions.
5. Move to the second **Pause** and ensure the calibration has a record point.
6. Repeat Steps 3 and 4 for the second **Pause** frame (2nd view) using the **2nd Players** and **2nd Stadium** tabs.

   The timeline should now look similar to the example below.

Multicam Timeline

7. Pair players that appear in both the 1st and 2nd views, to pair them.



Multicam - Pair Players

8. Right-click on players that are only visible in one view.

   This will improve the blending phase and ensure the players are drawn in the correct place.
9. In the **Camera** tab, make adjustments to control the movement during the transition.

   See To adjust the advanced controls: 122 for instructions.

To cut out players and goal posts:

1. In the **1st Players** and **2nd Players** tabs, separate the players so each is in their own region and none are overlapping.

   It's okay if this means some are missing limbs. The animation will be better if PIERO has the right number of regions. These regions always face the camera during the transition movements.

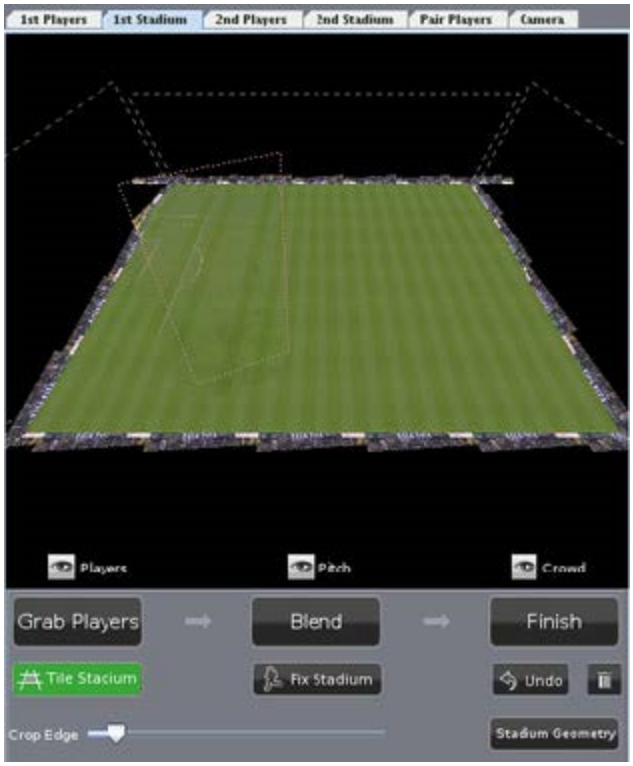
2. Draw the base line first (on the ground) to set the orientation.

3. Then use the **Perspective Lasso** tool to cut out the goal posts.

   This blue region will stay in perspective during the transition movements.

To create a virtual stadium:

1. In the 1st Stadium and 2nd Stadium tabs, select the **Grab Players** button, then the **Blend** button and then the **Finish** button.



Multicam 1st Stadium Tab

2. Play the video back and forth and select **Blend** to grab more textures from the original footage.

   Calibration must track at all time during this process.

3. Left-click and drag to draw a rectangular area on the grass to capture a pattern.

   This pattern will be used to fill the whole pitch where no snapshots have been taken.

4. Left-click and drag to grab a similar rectangular area in the crowd to achieve a similar fill around the stadium.

5. Once enough textures have been sampled, go back to the **VTR A** timecode and select **Finish Stadium** to grab the starting frame of animation.

6. If there are any black borders visible at the edges, adjust the **Edge Blending** to remove them from the animation.

To adjust the advanced controls:

1. In the **Camera** tab, adjust the **Camera Zoom** duration and the **Blend** duration to control how the Multicam effect is rendered.

Multicam Advanced Controls

2. Click **Add Keyframe** to add extra keyframes to create custom movements.
3. Click **Add Pause** to add pause points.
4. Click **Add Blend** at points where you want to blend.
5. Click **End Camera** to stop the camera movement.
6. Click the **Play** button to show a preview of the Multicam effect.

Using the Multicam Effect as a Real Stadium

The multicam effect can be used on a single camera much like the virtual stadium to visualize the scene from a different angle while retaining the real atmosphere.

To use the Multicam effect as a real stadium:

1. Move the video to the exact frame required and add the **VTR** pause effect in the normal way.
2. Add a multicam effect to the project and set up the 1st view on the current calibration.
3. Set the position where the stadium mixes on and off by dragging the delay within the **VTR** effect.
4. Clean up any missing virtual players and extraneous pitch lines on the **1st Players** tab.
5. Finally, add other effects and virtual camera effects to change the stadium view to anywhere within the stadium.
6. In the property sheet, adjust the following properties to fine-tune the final result:
   - Select/deselect the checkboxes for the **Pitch**, **Crowd**, **Players** and **Camera**.
   - Artificial pitch lines can be added using the **Artificial Pitch Lines** slider bar property.
   - The higher the slider, the more opaque and wider the artificial lines.
   - The skydome around the stadium can be changed to a non-video source (such as a sunset) if required using the **Skydome Type** property.

Offside Marking

The Offside Marking effect displays an offside line on the pitch. There are various styles of line available, such as strips or two lines. You can also have an image or movie on a wall along the line.

This effect requires Calibration 31 and the RGB Keyer 29.

One Line Offside Line

Two Line Offside Line

Offside Marking Effect

To use the Offside Marking effect:

1. Add an Offside Marking effect to the project.

   An offside line appears in the video window. The effect defaults to shade the area from the line to the nearest goal.

2. Left-click or drag the defender line to reposition it.

   The length of the offside line is determined by the pitch width and cannot be changed.

3. Press **Shift** and left-click or drag the attacker line to reposition it.

4. In the property sheet, located under the **Offside** tab, the **Type** property can be changed to **Line** to create a single line, **Strip** to create 2 lines, or **Area (10m)** to create a 10m area.

   The default **Type** is **Area**, which creates an area that covers the whole offside area.

5. Edit the settings as required.

6. Amend the text as desired.

   If the distance between the defender and the attacker is positive, then the text will display **"Offside"**. Otherwise the text will display "**Legal"**.

7. Right-click to position the text.

8. Press the left arrow on the keyboard to position the shade towards the left goal.

9. Press the right arrow on the keyboard to position the shade towards the right goal.

To add an image or movie to the Offside Marking effect:

1. In the property sheet, do one of the following:

   a. Select the **Line** type and from the **Style** drop-down, select a style that can display an image or movie, e. g., **Image Wall** or **Movie Wall**.

   If you selected the **Image Wall**, from the **Image File** drop-down, select the image you want to display.

   If you selected the **Movie Wall**, from the **Loop Movie** drop-down, select the movie you want to play.

   OR

   b. Select the **Area** or **Area (10m)** option.

   In the **Area** tab, from the **Area Style** drop-down, select **Image** or **Movie**.

   If you selected **Image**, from the **Image File** drop-down, select the image you want to display.

   If you selected **Movie**, from the **Animation** drop-down, select the movie you want to play.

Pitch Zone

The Pitch Zone effect divides the pitch into different zones for analysis purposes.

The zone options vary with the sport selected when PIERO is launched.

This effect requires Calibration 31 and the RGB Keyer 29.

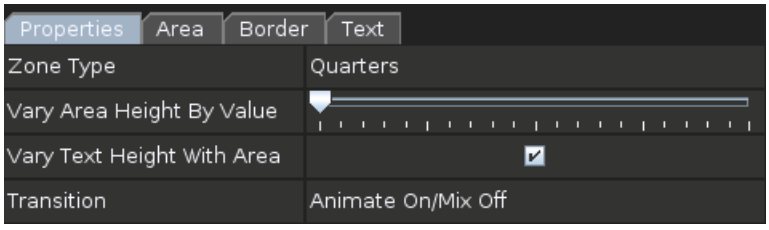
Pitch Zone Effect

To use the Pitch Zone effect:

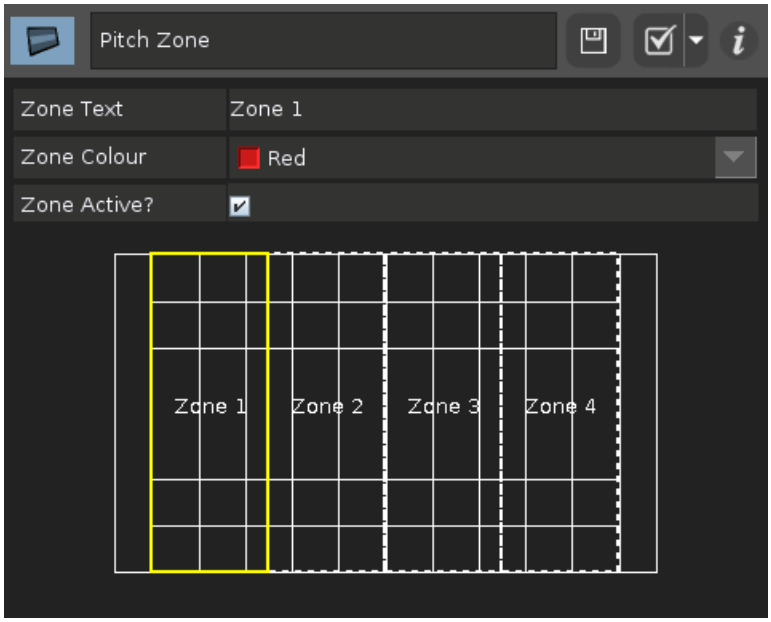
1. Add a Pitch Zone effect to the project.
2. In the property sheet, in the **Properties** tab, use the **Zone Type** property to change how the pitch is divided.

   The options vary according to the selected sport. In this example, for rugby, the options are:

   - Halves
   - Quarters
   - Whole Pitch

   Pitch Zone - Properties Tab
3. In the **Zone Properties** area, left-click on a zone to make it active and then use the properties at the top to change the color of the zone and edit the text that is displayed within it.

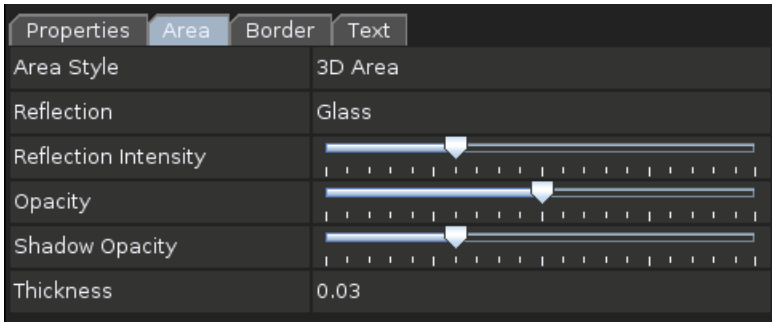


Pitch Zone - Zone Properties

4. In the video window or in the **Zone Properties** area, left-click on a zone to select it and then right-click on the text to reposition it.

To create a graph:

1. Add a **Pitch Zone** effect to the project.
2. In the **Area** tab, select one of the **3D Area Styles** to create a graph such as the one below.



Pitch Zone - Area Properties

Pitch Zone Effect - Graph

3. In the **Zone Properties** area, input text for each zone, including a number.
4. Back in the **Properties** tab, move the **Vary Area Height By Value** slider to increase or decrease the height of the graphical element based on the number in each zone.

Player Data Track

The Player Data Track effect creates tracks from positional player data.

This effect requires TRACAB or STATS positional player data.

This effect requires Calibration 31 and the RGB Keyer 29.

You will need the full match video from a wide angle camera and the matching data for the whole match.

To set up the Player Data Track effect:

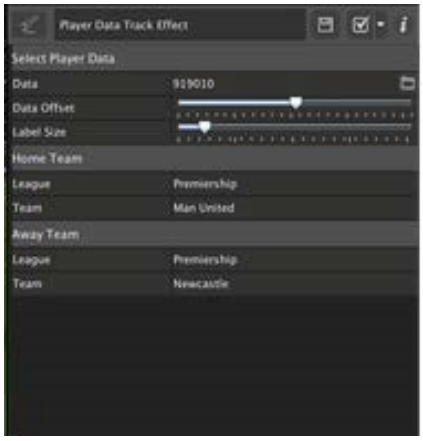
1. Create the teams with names and numbers in the Asset Manager 186.

   The teams you create will appear in the **Teams** tab of the **Settings** panel in the PIERO UI.

2. In the **Settings** panel of PIERO, select the **Home** and **Away** teams.

To use the Player Data Track effect:

1. Add a Player Data Track effect to the project.
2. In the property sheet, use the **Data** file browser to navigate to an **.xml** file containing TRACAB or STATS data.



Player Data Track Property Sheet

3. Click on the feet of four players who are spaced around the pitch.

   The names of the players should appear above the players heads.

4. If not, select some more players.

Player Data Track Effect

5. Use any track effect to link to one of the tracks created by the Player Data Track effect.

Player Glow/Grow

The Player Glow/Grow effect highlights a player by adding a glow around them.

This effect can be utilized with the region tool in challenging situations or when additional precision is required.

This effect requires Calibration 31 and the RGB Keyer 29.

Once the key is done, use the Region Tool to refine the player regions.

Player Glow Effect

To use the Player Glow/Grow effect:

1. Add a Player Glow/Grow effect to the project.
2. Select the player to be highlighted with the glow.
3. Adjust the **Size, Intensity**, and **Color** of the glow as desired.
4. Edit the **Pulsing** and **Glow Delay** properties to make the glowing edge blink.
5. Select the **Grey Image** property checkbox to desaturate the video background.

Player to Player

This effect highlights the distance between two players and has the option to track their movement.

This effect requires Calibration 31 and the RGB Keyer 29.

Player to Player Effect

To create a Player to Player Track (Method 1 - Auto-Tracking):

1. Add a Player to Player effect to the project.

   A yellow rectangle surrounds each player when not selected, and a red rectangle appears when they are selected.

2. Click the middle mouse button in the rectangle surrounding the 2 players you want to track.

   Auto Track mode is applied.

3. Play the video to create a track.

4. Press the **>** key to advance the video in intervals (optional).

To create a Player to Player Track (Method 2 - Manual Tracking with Intervals):

1. Add a Player to Player effect to the project.

2. Left-click under the feet of each of the 2 players you want to track.

3. Press the **>** key to advance the video to the next interval.

   Alternatively, you can select **Play**.

4. Left-click again under the feet of each of the 2 players you are tracking, in the same order as the first time.

   Use the numbers next to the track handles to remind you in which order you selected.

5. Press the **>** key to advance the video to the next interval.

   Alternatively, you can select **Play**.

6. Repeat Steps 4 and 5 until the track is complete.

Tip 1

The **Increment** row checkbox is selected by default on the property sheet. If you un-check this, you can select one of the Player to Player tracks and keep working on it individually, going forwards.

Tip 2

You can select a track from the list of **Player to Player** tracks to edit it. In this case you will see the whole track and handles appear.

Point Map

The Point Map effect marks the location from which a shot was made.

It is only available in **Live** mode for rugby.

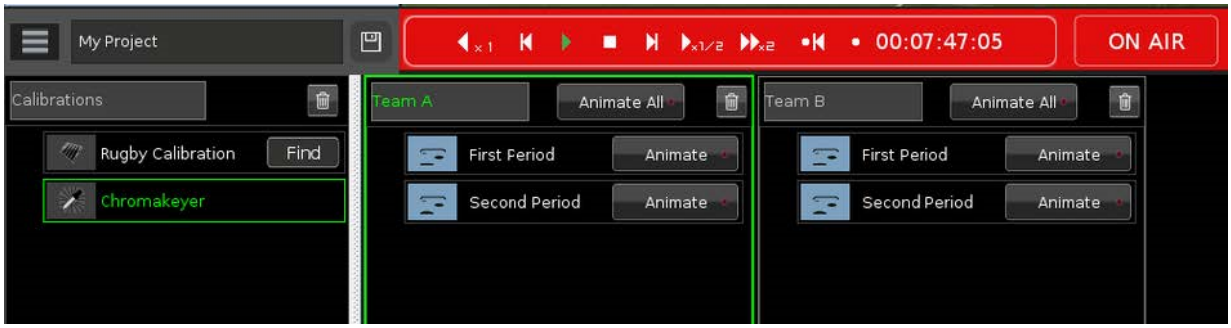
This effect requires Calibration 31 and the RGB Keyer 29.

Use one Point Map effect, per period, per team, to record their successful and unsuccessful shots.

Point Map Effect

To use the Point Map effect:

1. Select **Live** in the main PIERO user interface.
2. Add 2 groups, 1 per team.
3. Name the first group after the **Home** team and name the second group after the **Away** team.

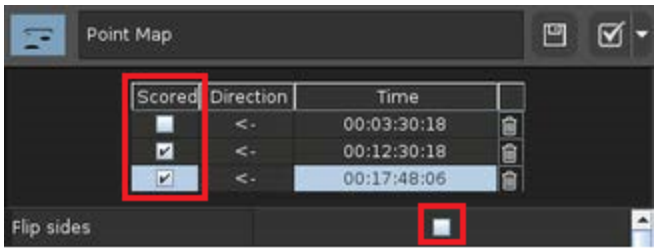


Point Map Setup

4. Add 2 Point Map effects per group to the project.
5. Name 1 effect in each group **"First Period"** and name the other effect in each group **"Second Period"**.

To configure the teams' effects:

1. Select the **First Period** effect for Team A and right-click in the video window where shots are taken from.
2. In the property sheet, select whether or not the shot scored.



Point Map Property Sheet

3. Select the **Flip** sides checkbox and repeat Steps 1 and 2 for the second period.
4. Perform Steps 1 to 3 for Team B.
5. Click the **Animate** button beside each period to view the effects.

Point to Point

The Point to Point effect marks the location from which a shot was made.

It is available in **Touch** mode and in the iPad remote application for rugby.

This effect requires Calibration 31 and the RGB Keyer 29.

To use the Point to Point effect:

1. Add a Point to Point effect to the project.
2. Left-click at the feet of the first player (where the ball pass you want to illustrate originates).
3. Then left-click at the feet of the player receiving the pass.
4. Continue left-clicking until the play is captured.
5. Click again on the point.

To create a Point to Point Track (Method 2 - Manual Tracking with Intervals):

1. Add a Point to Point effect to the project.
2. Left-click under the feet of the players you wish to track.
3. Press the **>** keyboard key to move the video to the next interval.
4. Left-click under the feet of the players you are tracking, in the same order as the first time.

   Use the numbers next to the track handles to help you remember the order of the players.
5. Press the **>** key to play the video to the next interval.
6. Repeat Steps 4 and 5 until the **Dynamic Formation** tracks are complete.

Range

The Range effect counts from a start value to a stop value over a specified amount of time.

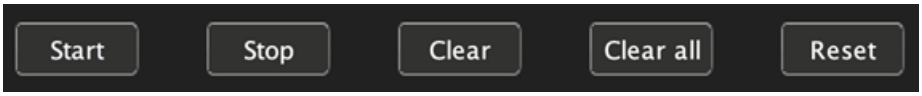
To use the Range effect:

1. Add a Range effect to the project.
2. In the property sheet, set the **Start** and **Stop** values and **Accuracy**.

   You can have more than one **Start/Stop** time range in the same effect.
3. In the **Text** tab, configure the **Text** and **Background** style.
4. In the **Effect** Link tab, you can link the **End** value to another measurable effect (i. e., **Distance**, **Counter**, **Timer Text**) or to a DataLinq source.
5. In the **Sound** tab, add the sound effect to be played at the end of the effect.

Effect Control Buttons

The Range effect control buttons are described below:



Range Effect Control Buttons

- **Start/Stop** - Adds one or more **Start/Stop** time ranges in the same effect.
- **Clear** - Removes the **Start/Stop** point added at that point in the timeline. It activates when the timeline is on a **Start/Stop** point.
- **Clear all** - Removes all the **Start/Stop** points, ignoring the **Start/Stop** value and leaving the effect at **0**.
- **Reset** - Removes all **Start/Stop** points added and resets the original time range.

  If you accidentally add an extra **Start** point, it will be ignored in the time calculation e. g., START - START - START - STOP will be processed as START - STOP.

  Similarly, if you accidentally add an extra **Stop** point, it will be ignored in the time calculation e. g., START - STOP - STOP - STOP will be processed as START - STOP.

Red Zone

The Red Zone effect draws a 20 yard area at the selected end of the pitch.

This effect requires Calibration 31 and the RGB Keyer 29.

To use the Red Zone effect:

1. Add a Red Zone effect to the project.

   A 20 yard area is automatically drawn at the right (default) end of the pitch.

2. In the effect's property sheet, use the **Pitch End** drop-down to switch the **Red Zone** to the left end of the pitch.

3. In the **Area Style** section of the property sheet, adjust the parameters to change the look of the area, including adding an image (such as a logo) to the area.

4. In the **Line Style** section, add and edit a line to mark the edge of the Red Zone area.

Removable Players

The Removable Players effect allows you to focus on one or more players by making the rest of the players in the scene transparent or invisible.

This effect requires Calibration 31 and the RGB Keyer 29. You may also need to use the Region Tool 65 to define the players.

In some sports, like basketball, the **RGB Keyer** alone might not work well enough, due to the similarities in color between the players' clothes and the pitch. In such cases the **Region Tool** is required.

Removable Players Effect

To use the Removable Players effect:

1. Add a Removable Players effect to the project.
2. Click on the player(s) you want to focus on to highlight them.
3. In the property sheet, adjust the **Leftover Player Opacity** property to change the transparency of the non-highlighted players.
   - A value of **0** makes the non-highlighted players invisible.
   - A value of **100** makes the non-highlighted players fully visible.
4. If it's necessary to use the **Region Tool**, add the tool and create regions around the players.
5. Select the **Key Players** property in both the **Region** tool and the **Removable Players** effect.
6. If the players' uniforms are similar in color to the pitch and the key causes parts of the players to be missing, deselect **Key Regions** in both the **Removable Players** effect and in the **Region Tool** to disregard the key and only use the regions that have been created.

   You must have cut the players out using the **Region Tool** for this to work.

Touch

This effect can also be used with **Touch**. Like other effects such as Moveable Players 119 or Player Glow/Grow 132, regions need to be defined for the timecodes that are being worked at or the effect will not work.

Rugby Gain Line

The Rugby Gain Line effect draws a gain line across the pitch and includes text and an arrow that indicates the side of the line on which the ball is dead.

This effect requires Calibration 31 and the RGB Keyer 29.

Rugby Gain Line Effect

In rugby, the gain line is an imaginary line across the field at the point that the ball becomes dead. The center of a scrum, a line out, a maul, etc. are gain lines.

The Rugby Gain Line effect is intended for live use.

To use the Rugby Gain Line effect:

1. Add a Rugby Gain Line effect to the project.
2. Click on the pitch at the line position.
3. Use the left and right cursor keys, or the **Left Direction** checkbox on the property sheet to change the direction of the gain line.
4. Adjust the distance of the arrows from the center line of the pitch using the **Arrow Pitch Fraction** property, with 0.5 (half the pitch) putting the arrows at opposite ends of the line.

Scores and Badges

The Scores and Badges effect displays the team badges and scores on the pitch.

This effect requires Calibration 31 and the RGB Keyer 29.

Scores and Badges Effect

To use the Scores and Badges effect:

1. Add a Scores and Badges effect to the project.
2. Drag the home team badge to the desired location.

   The home team badge has a pink box around it.
3. Click and drag a corner control handle to re-size the badge.
4. Click in the middle of the badge and drag to reposition it.

   When interacting with the home badge, the away badge will mirror the behavior of the home badge. Re-sizing or moving the home badge will generate a corresponding change on the away badge.
5. In the property sheet, under the Logo Properties tab, select the **Billboard** checkbox to display the badges differently. The image below shows the badges in a vertical orientation.

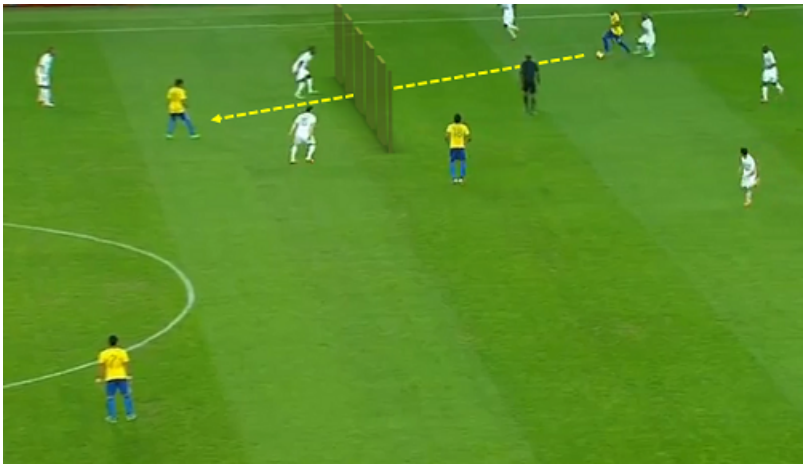
   

   Scores and Badges - Vertical Orientation

Screen

The Screen effect adds a virtual wall to the scene to illustrate a blocking zone.

This effect requires Calibration 31 and the RGB Keyer 29.



Screen Effect

To use the Screen effect:

1. Add a Screen effect to the project.
2. Left-click on the pitch to position one end of the screen and then left-click again to position the other end.
3. Continue to left-click in new positions to add more panels of the screen.
4. In the property sheet, from the **Style** property drop-down, select the type of screen you want to display.
5. In the **Height from Ground** property, enter a value to adjust the location of the screen relative to the ground.
6. Adjust the **Border Width** and **Wall Height** properties to get the size of screen you want.
7. Edit the other properties for appearance and animation style, if desired.

Smash-o-Meter

The Smash-o-Meter effect displays the severity of an impact as a percentage of a known impact.

This effect requires Calibration 31 and the RGB Keyer 29.

Smash-o-Meter Effect

The Smash-o-Meter effect calculates the decceleration in G and compares it to a known impact. The G-Force calculation is based on the player weights, speeds and orientation vectors.

We suggest you measure the biggest impact ever seen or remembered for your league and use it as a reference. This will allow stories such as: "This impact equals 83% of the legendary _____ tackle."

To use the Smash-o-Meter effect:

1. Calibrate and track 2 players.
2. Ensure the players are tracked for a few frames after the impact.

   Stopping the track on the impact can alter readings.
3. Add a Smash-o-Meter effect to the project.
4. Select **Track 1** and **Track 2**.
5. Input the weights of both players.
6. Advance the video to the frame where the impact occurs and select **Get Impact**.

   The G-Force value (decceleration) will be shown in red at the top-left corner of the screen. The percentage shown is based on the **Max Impact Value** (the value of the biggest impact recorded in the league).
7. In the property sheet, adjust the **Animation Speed** property to control the speed of the animation.

Visuals

Although it is crucial to get the impact on the right frame, it is possible to start the animation (numbers going up) at any point. Use the **Start Animation** button to define when the gauge begins animating.

The effect can be used in several ways.

- Graphic appears, players run into each other, video pauses, percentage increases.
- Graphic appears, players run into each other, percentage increases as the video plays.
- Players run into each other, video pauses, graphic appears with percentage increasing.

Graphics can be customized. They are based on **.tga** sequences. You can use a custom introductory video, so that the gauge appears with unique graphics, rather than mixing on or scaling up. Ensure the effect is long enough to allow the animation to play to the end.

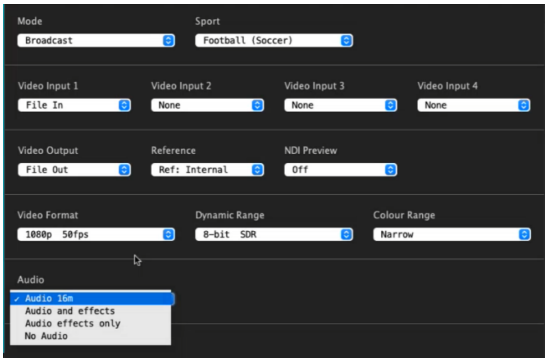
Smash-o-Meter Custom Graphics

Sound

The Sound effect allows you to add sound effects into your analysis.

You will need audio files in the PIERO sounds folder in order to be able to use them.

Audio is enabled via the Launcher at start-up and is configured in the project.



Broadcast Launcher - Audio Section

To add sound to a project:

1. From the **Launcher**, from the **Audio** drop-down, select the audio option you want to use, and launch PIERO.
2. In the **Effects** panel, select the **Sound Effect** button.

   The **Sound effect** appears in the timeline.
3. Position the **Sound effect** where you want it along the timeline and adjust its duration.
4. In the **Sound effect's** parameter sheet, select the File folder icon.

   The file explorer opens.
5. Navigate to the location of the sound file you want to use and select **Open Sound**.

   The file explorer closes and the sound is added to the **Sound effect**.

Spotlight

The Spotlight effect highlights and tracks a player with a spotlight or uplight.

This effect requires Calibration 31 and the RGB Keyer 29.

Spotlight Effect

To create a Spotlight track (Method 1 - Auto-Tracking):

1. Add a Spotlight effect to the project.

   A blue rectangle appears around each player.

2. Click the middle mouse button in the rectangle surrounding the player you want to track.

   Auto Track mode is applied.

3. Play the video to create a track.

4. Press the **>** key to advance the video in intervals (optional).

To create a Spotlight track (Method 2 - Manual Tracking with Intervals):

1. Add a Spotlight effect to the project.

2. In the property sheet, press the **Manual Interval** mode button.

3. Left-click under the feet of the player you want to spotlight.

   The video advances automatically to the next interval.

4. Left-click under the feet of the same player again.

   The video advances automatically to the next interval.

5. Continue left-clicking under the feet of the player you want to spotlight for as long as you want to track that player.

   OR

   Left-click and drag a track point to a new position.

To modify the spotlight:

- In the Spotlight Settings properties, adjust the color and intensity of the spotlight.
- Use the Spotlight Source property to adjust the direction of the spotlight.

  The options are:

  - Auto (aligns the spotlight along the track)
  - Center
  - Left
  - Right
  - Above

Tracked Spotlight

The Tracked Spotlight effect highlights and tracks a player automatically with a spotlight or uplight. It is available in **Live** and **Touch** modes only. The small **T** in the bottom-right corner of the icon indicates that this is the Tracked version

This effect requires Calibration 31 and the RGB Keyer.

Tactical Board

The Tactical Board effect displays a black board or clipboard on which you can draw lines to illustrate game analyses.

This effect requires Calibration 31 and the RGB Keyer 29.

Tactical Board Effect

To use the Tactical Board effect:

1. Add a Tactical Board effect to the project.
2. Use the 3D option in the same way as the Virtual Stadium 182.

   It creates a 3D clipboard or chalkboard on the floor.
3. Place it in 3D space using Virtual Cameras 172 or a Spline Camera 175.
4. Use the **2D** option to fix the Tactical Board texture to the screen allowing the pitch lines to be placed at an angle much like a perspective drawing.
5. Add custom **.png** textures from a folder stored in **/home/PIERO/graphics/chalkboard/**.

   The image below shows the standard graphic and a custom graphic for the same play.

Tactical Board Effect - Custom

Team Line-up

The Team Line-up effect provides a visual representation of the team formation.

This effect requires Calibration 31 and the RGB Keyer 29.

The Team Line-up effect places all the players of a team onto the pitch to present the team formation. It is compatible with all the PIERO effects, opening the way for pre-game analysis.

Set up the players' pictures and movies in the Asset Manager 186 before using the Team Line-up effect. You can associate a team logo with a team in this module. Logos must be stored in a folder in the **Logos** directory.

The teams used in the Team Line-up effect are specified in the **Teams** tab of the **Settings** Panel.

Team Line-up Effect

To configure the Team Line-up effect:

1. Add a **Pause** effect to the project and set the **Out Action** option to **Pause** to be able to stop the video in **Touch** mode and with the **Touch** app.
2. Add a Team Line-up effect inside the **Pause** effect.
3. In the property sheet, select whether to use the **Home** team, **Away** team or both.

   In **EDIT** mode, the camera will automatically adjust to show the **Home**, **Away** or both teams regardless of the selected transitions. This is to make positioning easier before going live.

   When using both teams, you need to select the video window to switch from one team to another. The camera rotation will be performed automatically.

4. In the **Formation** tab, make selections as appropriate.

League	The sport league.
Team	A team from the selected league.
Strip	One of the available uniforms for the selected team.
Formation	The positions of the players on the pitch.
Away Team	Select to display the opposing team (right side of the pitch). The default team is the Home team.
Touch Handle Size	The size of the square used to drag the player (appears beneath the player).
Team Animation	How many players appear at once and when. Click in the video window to make them appear or wait for a timer.
Timer Interval	Interval for players to appear according to the selected Team Animation.

5. In the **Player** tab, use the **Players/Markers/Portrait/Text Animation** properties to configure where the players animate from and the style of the animation.
6. In the **Text** tab, configure the standard text properties.

To use the Team Lineup effect:

- Click on the square (Touch Handle) beneath any player to move them to a new position.
- Click on the square beneath any player and drag them on top of another player to swap the players.

  Alternatively, you can use the Page Up/Page Down keys to move the player up/down in the formation.

Team Line-up - Swap Players

To add an alternative position:

1. Click on the **Touch Handle** of the player you want to move.
2. Right-click at the position to which you want the player to move, once the team animation has completed.

   A line ending in a light blue square will draw the movement and the end point of the new position.
3. Left-click on the **Touch Handle** of the alternative position and drag it to adjust the position if necessary.
4. Press the **M** key to check the forward/back movement of the player.
5. Go **On Air** and play the video.

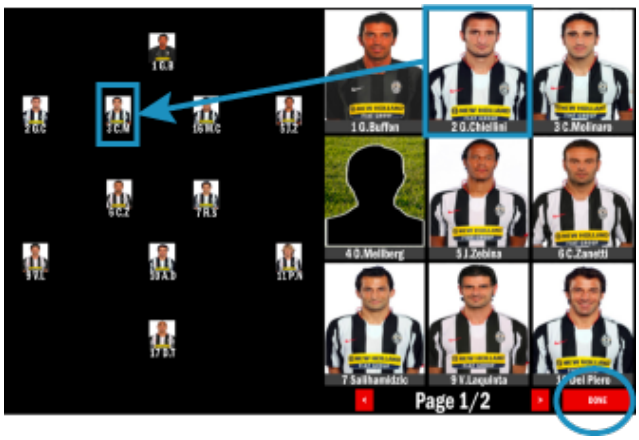
Team Line-up - Alternative Positions

Notes:

- The **M** key activates the movement of all players at the same time.
- To reverse the movement, select the **M** key again.
- The **Alternative Position Touch Handles** are not visible in **On Air** mode.
- You can add an alternative position for every player.

To substitute a player:

1. Double-click the square beneath the player you want to replace to open the **Substitution** interface.



Team Line-up - Player Substitution Interface

2. Click and drag a player from the right side of the squad formation on top of the player on the left side that you want to replace.

3. Click **Done** to save the substitution(s).

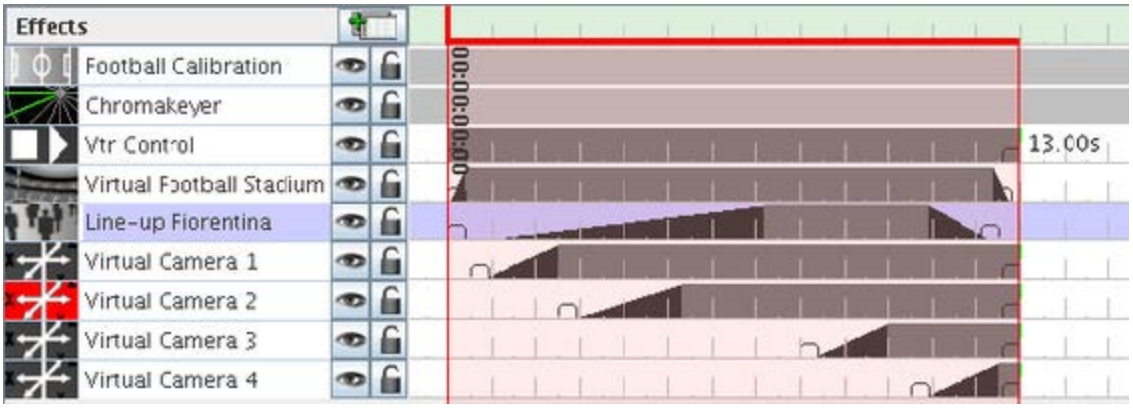
Overriding Camera Transitions

In the example shown, Virtual Cameras 1 and 2 are overriding the transition-IN, thus providing a customized transition movement.

Virtual Camera 3 changes the view while the effect is on. This can be useful to highlight a specific point during pre-game analysis.

Finally Virtual Camera 4 overrides the line-up transition-OUT and lets you move to a customized viewing angle.

In this example, a Virtual Stadium 182 is used in the project and the **Show Stadium** option in the Team Line-up effect is not selected.



Team Line-Up - Overriding Camera Transitions

Jumbotron

The incoming video feed can be put on the Jumbotron.

To play video feed on the Jumbotron:

1. Turn on the Jumbotron in the **Virtual Stadium** tab.
2. In the **Jumbotron** Image property, select **Picture in Picture**.

   This allows the presenters to remain on screen while commenting on the team formation.

Team Line-up Effect in Touch

The setup has to be done in **Analysis** before the presenters can use the Team Line-up effect button in **Touch**.

Once set up, the players can be dragged into position using the Touchscreen by touching and dragging their feet.

 **Tips**

- The Team Line-up effect should not be locked; if it is locked, the players won't move.
- Pressing the **Trash** icon won't delete the line-up effect.
- You can turn the text on and off by pressing **T** on the keyboard while **Live**.

Tennis Score

The Tennis Score effect places photos, names and scores of tennis players onto the court.

This effect is only available for Tennis and requires Calibration 31 and the RGB Keyer 29.

Tennis Score Effect

To use the Tennis Score effect:

1. Add a Tennis Score effect to the project.
2. In the property sheet, select the **Constrain Size** property checkbox so that all the text elements will re-size similarly.

   Photos, names and scores will be aligned on the same row and both players' names will be centered.
3. Photos and text can be billboarded and adjusted as shown below.

Tennis Score - Billboarding Examples

Text

TEXT	The Text effect places text on the pitch or in 2D.

This effect requires Calibration 31 and the RGB Keyer 29.

Text Effect

To use the Text effect:

1. Add a Text effect to the project.
2. In the property sheet, in the **Text** property, enter the information you want to display.

   Players' names for the selected team are available for fast access. Use the Asset Manager 186 in the PIERO launcher to add players to the teams.
3. Left-click and drag the corners or press **Ctrl** (**cmd** on macOS) and scroll to re-size the text.
4. Left-click in the middle of the text and drag to reposition it.
5. Use the keyboard arrows to nudge text in small increments.
6. Press **Ctrl + Arrows** (**cmd + Arrows** on macOS)for a smooth nudge.

   For brands using textured text, you can change the texture in the Asset Manager 186.

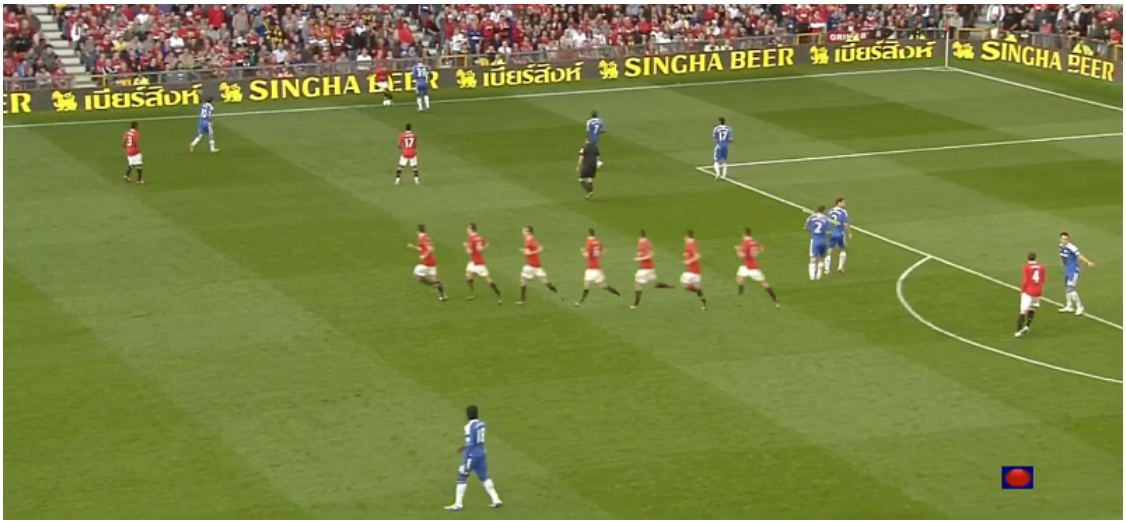
   Alternatively, it is possible to change the texture on the fly and add more custom textures from **/home/PIERO/graphics/textures/text_background** and **text_background_wings**.

Time Lapse

The Time Lapse effect highlights movements, speeds, and player skills and brings a new dimension to tracking players. It is available for American and Gaelic Football, Rugby and Tennis only.

This effect requires Calibration 31 and the RGB Keyer 29.

The Time Lapse effect allows the players and various other objects in the game to be followed by their snap shots. This can enrich the analysis revealing new aspects of the game. These aspects are dependent on the particular sport. In tennis, it helps evaluate and, mostly, compare the technique of the two players. Regarding football and rugby, looking at the players' grabs illustrates their skill set rather well.



Time Lapse Effect

To use the Time Lapse effect:

1. Add a Time Lapse effect to the project.

   White rectangles appear around each player. If the white rectangles don't appear, select your **Calibration** line and select the **Find** button.

2. If the player you're interested in doesn't have a white rectangle around them, add the Region Tool 65 to your project and use the **Polygon Selection** or **Lasso Selection** method to define a region around that player.

3. Use one of the following methods to capture a player's movement.

   Grab on click:

   a. Play the video and pause at the point where you want to take a snapshot of a player's movement.

   b. In the property sheet, select **Grab on click** and then left-click on the player whose movements are to be captured.

   c. Repeat the above steps for each snapshot.

Auto Grab:

a. Left-click on the feet of the player you are interested in.

b. In the property sheet, set the Auto Grab Sampling Rate to the number of snapshots to be taken of the player per second.

c. Click the Auto Grab button.

d. Play the video at normal speed.

Auto grab will take as many snapshots per second as defined in the Auto Grab Sampling Rate.

The process can be stopped at any time.

Grab an area:

Use when the target to be captured is not a player, but for example, the ball.

4. In the property sheet, you can adjust the following properties:

Property	Description
Auto Grab Sampling Rate	Defines the number of snapshots to be taken per second.
Opacity	The transparency of the grabs.
Trail Length	The number of snapshots left visible behind the current one.
Trail Fading	When activated, the trail's opacity will fade off to become transparent.
Show Only Current Player	When checked, only the selected player will be sampled.
Transition	Defines the manner in which the effect will appear and disappear.

Time Lapse Run

The Time Lapse Run effect can be used to show where a player will run. It is available for Football, Rugby and Tennis only.

This effect requires Calibration 31 and the RGB Keyer 29.

It is usually played with a VTR Pause.

The run must be acquired frame by frame over a few seconds. The difficulty in achieving this effect varies greatly with the number of players that intersect with the tracked player.

Time Lapse Run Effect

To use the Time Lapse Run feature:

1. Add a **VTR Pause** to the project.
2. Then add a Time Lapse effect.
3. In the property sheet, set the **Auto Grab Sampling Rate** property to **1**.
4. Select the **Show Only Current Player** checkbox.
5. Select one of the following options:

   If the tracked player never intersects with another player:

   a. Click **AutoGrab**.

   b. Select the player you want to track.

   c. Advance the video and select **AutoGrab** again.

   d. Select the **Animate All Tracks** transition.

   If the tracked player intersects with other players:

   a. In the **Edit** section of the property sheet, use the **Grab Region** or **Lasso** tool to isolate the tracked player, making sure to lasso very close to the player's feet, as it defines the player's position on the pitch.

   b. Select the **Animate All Tracks/Mix Off** transition.

   c. Do not change the **Transition IN** property. The run has to be played entirely at frame rate.

6. Press **Play**.

Timer Text

The Timer Text effect places a timer on the pitch.

This effect requires Calibration 31 and the RGB Keyer 29.

With the Timer Text effect, you can display time in 4 ways, using combinations of the Count Down and Accumulate times properties.

This effect can be linked to a track or displayed in 2D.

Timer Effect

To use the Timer Text effect:

1. Add a Timer Text effect to the project.
2. In the property sheet, use the **Start** and **Stop** buttons to set the effect's **IN** and **OUT** points.

   You can have more than one **Start/Stop** time range in the same effect.

   Timer Count Settings

3. Set the timer to count up from 0 seconds or down from the duration of the defined timeframe.
4. Use the **Text** property to add custom text.
5. Add more **Start/Stop** time ranges if required.
6. Click **Reset** to remove all **Starts/Stops** that you may have added and leave just the original ones.
7. If you want the time of each **Start/Stop** time range to be added to the starting time, select the **Accumulate times** checkbox.

   If you accidentally add any extra trailing starts they will be ignored in the calculation of times e.g., START – START – START – END will be processed as START – END.

   Similarly if you accidentally add any extra ends they will be ignored in the time calculations e.g., START – END – END – END will be processed as START – END.

Title Text

TITLE	The Title effect adds a banner-style title to the video.

This effect requires Calibration 31 and the RGB Keyer 29.

Title Effect

To use the Title Text effect:

1. Add a Title Text effect to the project.
2. Select your background from the property sheet.

   To make the best use of this effect, create your own background as a **.png** file and save it under **graphics/lowerthirds**.
3. Enter your text in the boxes on the property sheet
4. Position the text boxes in the image, relative to the effect's background
5. Drag the background to position the whole effect vertically in the image
6. Use the timeline to control how long it is visible

Track

The Track effect tracks players by setting key frames.

This effect requires Calibration 31 and the RGB Keyer 29.

The following effects will follow a track created with the Track effect, when the Link to Existing Track property is selected in their property sheet.

Area 90

Caption Track 95

Dynamic Formation 108

Markers 116

Spotlight 149

Virtual Camera 175

Track Effect

Track Effect
(with speed)

Track Effect
(showing whole track)

To create a Track (Method 1 - Auto-Tracking):

1. Add a Track effect to the project.

   A blue rectangle appears around each player.
2. Click the middle mouse button in the rectangle surrounding the player you want to track.

   Auto Track mode is applied.
3. Play the video to create a track.
4. Press the **>** key to advance the video in intervals (optional).

To create a Track (Method 2 - Manual Tracking with Intervals):

1. Add a Track effect to the project.
2. Press the **Manual Interval** mode button on the property sheet.
3. Left-click under the feet of the player you want to track.

   The video will play to the next interval automatically.
4. Press the **>** key to advance the video to the next interval.
5. Repeat Steps 3 and 4 until the track is complete.

Optional Moves

- Left-click a track point position to highlight it and drag it to a new position.
- Left-click a track point and press **Backspace** to remove it.
- Press **Ctrl** and left-click to insert a break in the Bezier interpolation mechanism.

Properties

Property	Description
Text	Type the text, such as a player's name into this field.
Text size	Adjusts the size of the text.
Text measure	Displays the entered text as a measurement of the track, such as length or speed.
Show Whole Track	Select to display the player's whole track.

User Model

Use the User Model effect to draw an imported 3D model.

This effect requires Calibration 31 and the RGB Keyer 29.

User Model Effect

A generic 3D Model can be imported into PIERO and drawn in the correct perspective using the User Model effect. The models available to this effect are stored in the **Models/User** folder on the PIERO desktop.

To use the User Model effect:

1. Add the User Model effect to the project:
2. In the property sheet, from the **3D Model** property drop-down, select the model to use.
3. Left-click in the middle of the square beneath the model and drag to reposition it.
4. Left-click on a control handle and drag to scale the model.
5. In the property sheet, from the **Model Orientation** property, select the orientation of the model.

   OR

   Click on the model and scroll the mouse wheel.

Video Effect

The Video effect displays video from one of the two inputs on the PIERO system.

This effect requires Calibration 31 and the RGB Keyer 29.

The Video effect gives you the ability to display video from either of PIERO's SDI video feeds: input 1 (SDI IN A) or input 2 (SDI IN B).

This enables you to analyse a point in the game while showing a replay or other video in the style of picture-in-picture.

To use the Video effect:

1. Select the Video effect.

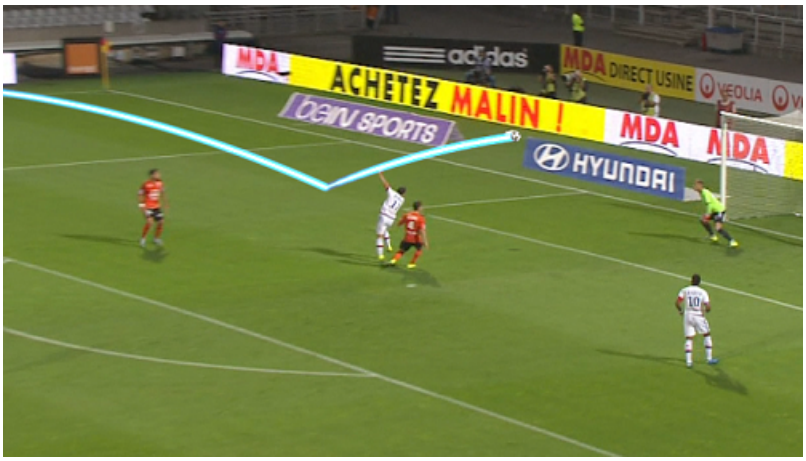
   The effect is automatically added to the scene.
2. In the effect's property sheet, in the **Properties** tab, from the **Video Input** drop-down, select whether to use **Video Input 1** or **2**.
3. Edit the properties of the video as required (**Video Opacity**, **Orientation**, **Transition**, **Height** etc.)
4. Select whether to display the video as a **Billboard** or draw it in **2D**.

   Billboard is the default setting.
5. In the **Border** tab, edit the properties of the border of the video window as desired.

Virtual Ball

The Virtual Ball effect traces the path of a virtual ball from one point to another.

This effect requires Calibration 31 and the RGB Keyer 29.



Virtual Ball Effect

To use the Virtual Ball effect:

1. Add a Virtual Ball effect to the project.
2. In the effect's property sheet, adjust the size of the virtual ball.
3. Move the clip to the frame at which the ball is being kicked, hit or thrown and left-click on the ball.
4. Advance the clip to the frame where the ball hits the ground or a player or is caught and left-click on the ball again.
5. If the ball is in the air at any point, left-click on it and drag down to the ground to create a smooth curve.

   If the ball is in the air for a long time, left-click on it and drag down to the ground at several spots to maintain the curve.

   Don't overdo this, as it can cause the movement of the ball or track to look jittery.

   OR

   If the ball is on the ground the whole time, just left-click on the ball midway through its path.

6. While the ball is in the air, press **Shift**, then left-click and drag to the ground to force the trajectory (curve) to pass through this point.

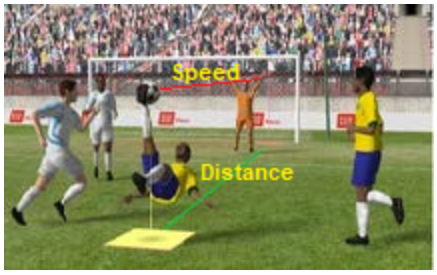
   This is useful when the estimation is not working as expected.

Virtual Ball Effect - Adjust Trajectory

7. Advance the clip again if the ball bounces and left-click the ball to track it to the next point.
8. Left-click the appropriate handle and drag to adjust the start, end or bounce position.
9. In the property sheet:
   - Select the **Show Ball** property to display the ball in the virtual stadium.
   - Select the **Trail Style** and configure its properties.

     Alternatively, you can select **NONE** as the **Trail Style**, if you don't want a trail.
   - In the **Text Measure** property, select a measure to display the speed or distance traveled by the ball.

     The speed is calculated as the speed of the ball through the air and the distance is calculated as the distance the ball has covered on the ground.



Virtual Ball Effect - Speed and Distance Calculation

   - Select the **Show Changing Text** checkbox to display the measurement text throughout the movement of the ball or deselect it to display the text only after the ball has completed its flight.
   - Add a pause at the end to allow enough time for the text to be read.
   - Right-click on the video to place the text in the default position, relative to the ball's current position on the ground.

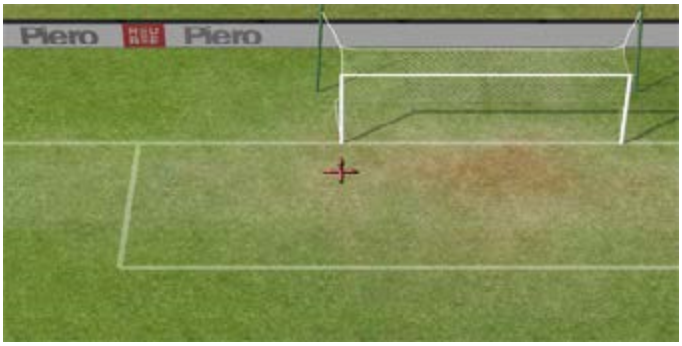
     OR

     Select the **Fixed Text Position** checkbox to keep the text at a chosen location.
10. Scroll the mouse wheel to adjust the ball height.
11. Press **Ctrl** and then scroll the mouse wheel to adjust the text size.

Virtual Camera

The Virtual Camera effect moves virtual cameras to provide other views of the action in a virtual stadium. The virtual cameras can be linked to a track to provide a path for camera movement.

This effect requires Calibration 31 and the RGB Keyer 29.



Virtual Camera Effect

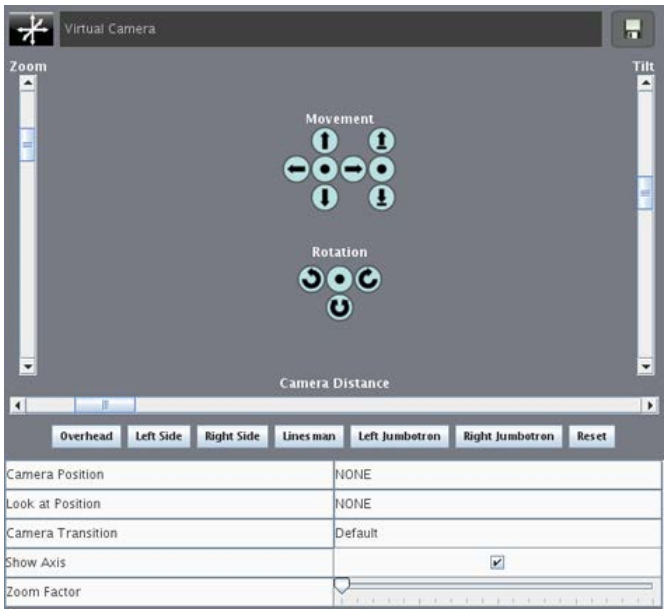
To use the Virtual Camera effect:

1. Add a Virtual Camera effect to the project.

   A target appears in the video window, representing the current viewpoint. The camera locks on the current calibration position and overrides it. All effects will be placed under the Virtual Camera's perspective.

   The virtual camera will interpolate to the target position during the transition **IN**.
2. Change the transition **IN** time of a virtual camera to change the movement speed.
3. Right-click to move the virtual camera closer to or further away from the target.
4. Left-click to move the virtual camera around the target.
5. Press mouse wheel (or middle button) to move the target on the pitch.
6. Press **C** at anytime to reset the camera position to the initial calibration position.

Additional controls are available in the top section of the property sheet, as shown below:

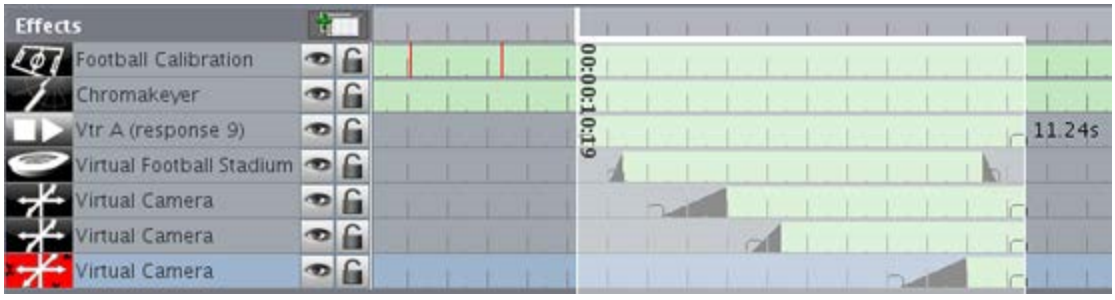


Virtual Camera - Camera Controls

The Zoom Factor option in the virtual camera determines the amount of bounce during transitions to that camera. This bounce helps conceal artifacts during transitions, which is especially important when using multicam setups.

7. Use the pre-defined camera position buttons (Overhead, Left Side, Right Side, etc.) located under the Camera Distance scroll bar when attempting advanced effects such as Jumbotron mix and line man point of view replays.
8. Link the Camera Position and/or the Look at Position to any tracking effect (Track, Markers, Spotlight, etc.) present in the project to produce advanced camera movements within the virtual stadium.

   A typical project with 2 camera movements looks like the picture below:



Virtual Camera Effect Timeline Example

The first and second virtual camera effects are moving in the virtual stadium and the third (selected) camera has been left on its default position allowing it to come back to the calibration position before the stadium is mixed off.

Camera Transition: Alternative Route Option

By default the camera spins around the Z-axis. In some cases it might be useful to opt for the alternative mathematical shortest route to prevent collisions with the virtual stadiums or to ease morphing between different zooming values.

Virtual Camera Live

The Virtual Camera Live effect allows multiple camera positions to be defined and selected, in Live mode only.

This effect requires Calibration 31 and the RGB Keyer 29.

To use the Virtual Camera Live effect:

1. Add a Virtual Camera Live effect to the project.
2. At the top of the property sheet, select one of the numbered set of positions currently in use.

   OR

   Click **Add** to introduce an additional camera position.

   Virtual Camera Live Positions

   Once selected, a camera position can be controlled in the same way as a normal virtual camera.
3. Make sure that you have a virtual stadium on air before using the cameras.
4. Click the **OFF** button to return to the real camera position.

   Virtual Camera Live Control Buttons

   ★Do not turn off the stadium before turning off the camera.

Virtual Camera Spline

This effect makes the virtual camera follow a pre-defined path and allows for advanced camera movements.

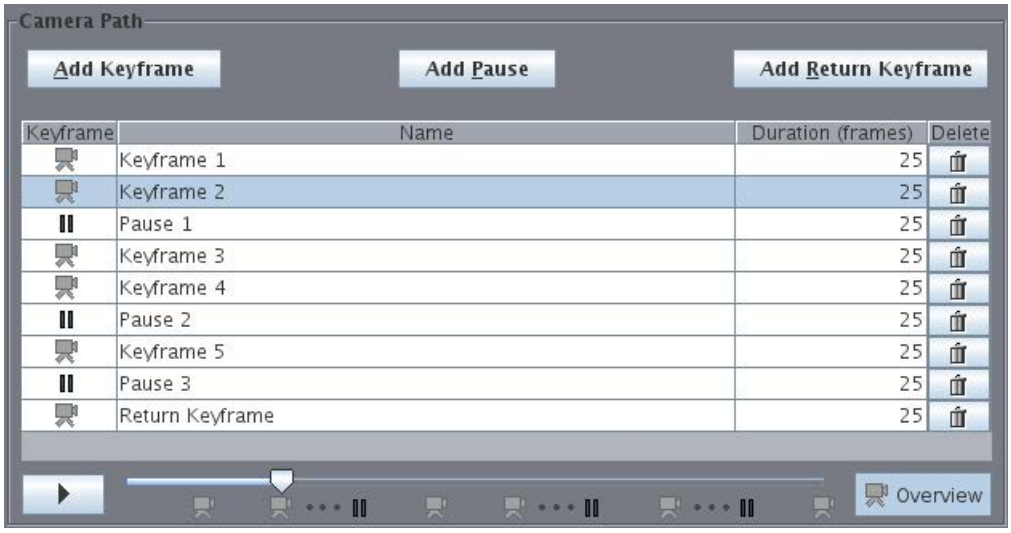
This effect requires Calibration 31 and the RGB Keyer 29.

To use the Virtual Camera Spline effect:

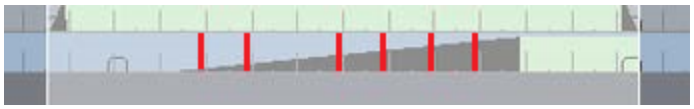
1. Add a **Virtual Camera Spline** effect to the project.
2. Adjust the camera position and look-at-point for the first keyframe as if it was a traditional PIERO virtual camera.
3. Click the **Add Keyframe** button to register this position.
4. Repeat this as many times as necessary to build the camera trajectory.
5. Click the **Add Pause** button to introduce a break of several seconds.
6. At the end, select the **Add Return Keyframe** button to add a final camera at the start position.

   This brings the trajectory back to the calibration shot to transition out of the virtual stadium.

   Each keyframe and pause is added to the list in the property sheet and has a corresponding red bar showing in the timeline to help you visualize the camera path.



Virtual Camera Spline - Property Sheet



Virtual Camera Spline - Timeline

7. Once all the keyframes and pauses are in, adjust the **Duration** of each element to tweak the camera trajectory timing.
8. Click the **Play** button to preview the virtual camera spline movement.

To adjust the spline trajectory:

1. Click on the **Overview** button to activate **Overview** mode where it is possible to browse the 3D scene using the overview camera (not shown when playing live).
2. Click on a camera keyframe handle to select it and change it as shown in the image below.

Virtual Camera Spline - Adjust Spline Trajectory

Notice how pause points introduce inflection points in the trajectory (bottom of the image).

With this effect it is possible to build very complex camera movements to follow a player in an animated 3D scene or spin around a players' face in the EA FIFA module.

Virtual Presenter

The Virtual Presenter premium effect inserts the presenter onto the pitch in real time.

This effect requires Calibration 31 and the RGB Keyer 29.

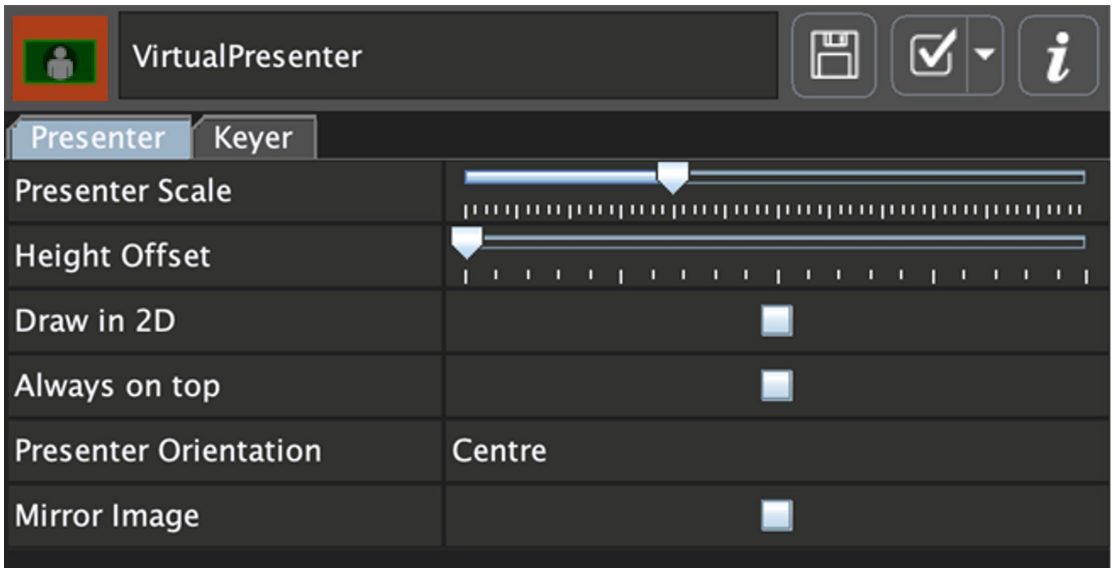
To use the Virtual Presenter effect:

1. Before starting PIERO, make sure the **Mode** on the launcher is set to **Broadcast (Dual Input)**.

   The input 1 (sport video) and input 2 (green screen presenter) for the Virtual Presenter effect needs to have the same resolution and framerate as your main input video, for example HD 1080p (50Hz).

2. Start PIERO.
3. Calibrate and key the scene as usual.
4. Add a Virtual Presenter effect to the project.

   If your system has the second input enabled you will see the following property sheet; if not you will receive an error message in its place.



Virtual Presenter Property Sheet

5. Position it on the pitch by clicking and dragging the red square handle located in the center of the graphic, which may be partially obscured by the presenter box. Adjust its properties as outlined in the table below:

Property	Description
Presenter Scale	Sets the relative size of the Virtual Presenter.
Height Offset	Sets the real world height of the billboard where the presenter is in 3D space. It will be auto-calculated the first time the presenter is keyed.
Draw in 2D	The presenter will be drawn in 2D. This is useful when drawing the presenter against the bottom edge of the screen.
Always on top	Normally the presenter will be either in front of or behind the players depending on its position on the pitch. With this setting the presenter will be always on top (in front) of all the players.
Presenter Orientation	Allows the presenter to face a specific direction or to face the current camera (Virtual Camera or the camera position selected when calibrating).
Mirror Image	Flips the image so that it is easier for the presenter to position themselves and interact with the scene.

6. Click **Done** to register the changes and start using the virtual presenter.

Using Audio

PIERO can forward the audio from the Virtual Presenter to any audio channel on the output.

To use audio:

1. Make sure that on the launcher you have selected an option other than **No Audio**.
2. In the **Settings** tab of PIERO, select the drop-down beside the **2nd input Audio on** option to select in which channels PIERO embeds the audio of the Virtual Presenter.

   The option looks like this:

2nd Input Audio On Option

NOTE:

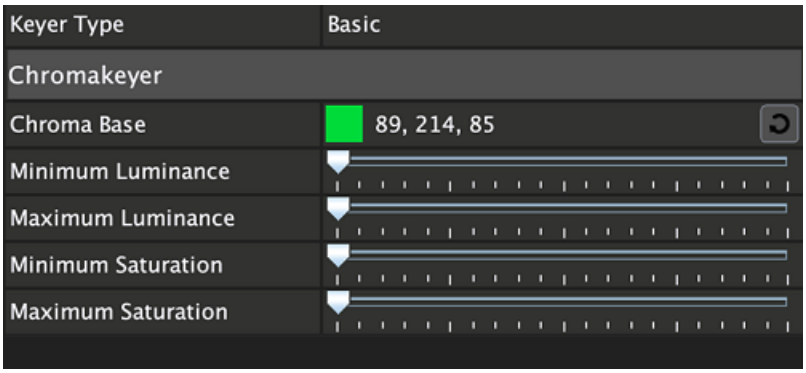
PIERO does not mix the audio of SDI Input 1 with SDI Input 2. On the output, the audio from the Virtual Presenter is embedded on different channels. If the audio from the Virtual Presenter needs to be mixed with the audio from the main video, this must be done externally.

Keying: Basic

The basic keyer works in a similar way to other keyers in PIERO. By left-dragging a rectangle over the background, the keyer receives enough color information to segment the foreground (presenter) from the background (chroma).

This keyer works as a vectorscope and not as an RGB Keyer. This means that it only supports a single uniform color for the background, such as green or blue; it does not support a background that has several distinct colors.

Select an active area or crop an area by using the right button of the mouse to drag a rectangle over the desired area.



Virtual Presenter - Basic Keying

The properties of the basic keyer are as follows:

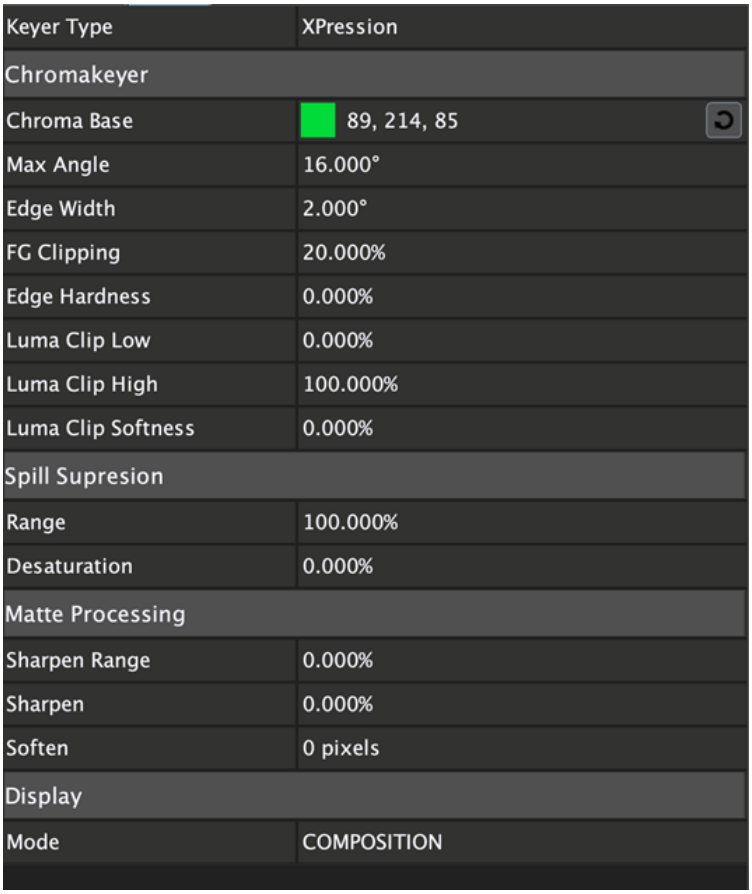
- **Chroma Base**: The main background color that the keyer is using for keying, with a button to reset this color.
- **Min/Max Luminance and Saturation**: These values are automatically populated as more background colors are added by dragging rectangles. They enable you to define the luminance and saturation of the background color that will be removed.

Keying: Advanced Keyer (XPression)

The advanced keyer (or XPression keyer) mimics a full hardware keyer and allows for much more fine tuning than the basic one. It is ideal for more challenging scenarios where the background color might spill or fringe onto the presenter.

The **Chroma Base** (background color) can be defined by left dragging a rectangle over the background. This will also set the maximum angle. This process can be repeated to refine both values.

Select an active area or crop an area by using the right button of the mouse to drag a rectangle over the desired area.



Virtual Presenter - Advanced Keying (XPression)

The properties of the advanced keyer are as follows:

- **Chroma Base**: The main background color that the keyer is using for keying, with a button to reset this color.
- **Max Angle**: The maximum hue angle for the background color. Increasing it will allow more colors to be keyed.
- **Edge Width**: Increases the width of the edge between the foreground and background. Altering this will affect the border around the presenter, reducing effects such as fringing.
- **FG (Foreground) Clipping**: Removes or includes lower saturated colors in the foreground image (presenter).

- **Edge Hardness**: Indicates the slope of the alpha gradient on the edge between foreground and background.
- **Luma Clip High/Low**: Controls the overall brightness of shadows, translucency and transition areas, as well as partial reflections.
- **Luma Clip Softness**: Indicates the slope of the alpha gradient on the edges of the luma clips.
- **Spill Suppression Range**: Spill suppression elements are pixels in the foreground that have a noticeable tint of the background color. This typically occurs around the edge of the foreground subject as glow from the background blue-screen or green-screen spills onto them. The range indicates how much of that suppression is applied.
- **Spill Suppression Desaturation**: In some cases, if the spill cannot be avoided, it is possible to desaturate the edge between the foreground and background to reduce the impact of the spill, this will affect the colors on the edge of the presenter.
- **Matte Processing (Sharpen Range and Soften)**: These settings will blur (soften) or sharpen the whole background mask. This enables the removal of artifacts and can avoid the loss of detail in some cases.
- **Display Mode**: Changes the way the presenter is displayed in the preview window but won't change the output of PIERO.

  The available modes are:

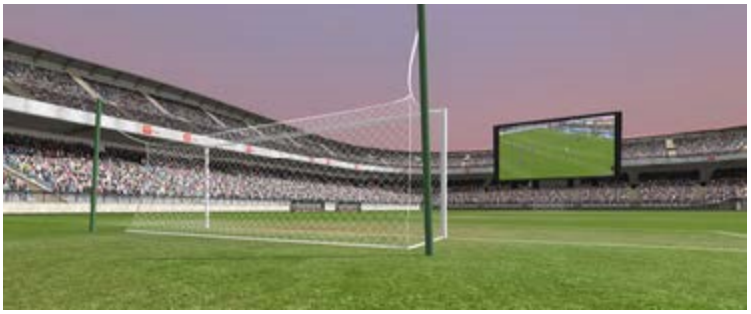
  - **COMPOSITION**: In this mode, a red mist will appear over the area that will be removed (background).
  - **MATTE**: Displays the mask with white for the foreground and black for the background, displaying partial transparency in grey.
  - **SOURCE**: Displays the second video input unaltered. This is useful when checking the integrity of the colors.
  - **PREVIEW**: Displays the presenter in perspective, on the pitch, so you can preview how it will look on the ouput.
  - **REGION**: Displays the bounding box around the presenter. This is used to establish the ground plane of the Virtual Presenter.

Virtual Stadium

The Virtual Stadium effect draws a 3D virtual representation of the stadium, allowing the action to be viewed from any angle.

This effect requires Calibration 31 and the RGB Keyer 29. You will also need to use the Region Tool 65 to define the players.

When created, the Virtual Stadium effect will be drawn at the same camera angle as the active calibration thereby allowing a seamless mix from the real pitch to the virtual stadium.



Virtual Stadium Effect

To use the Virtual Stadium effect:

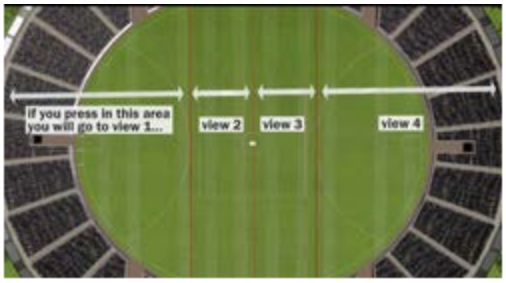
1. Add a Virtual Stadium effect to the project.
2. In the property sheet, adjust the properties described in the table below as required.

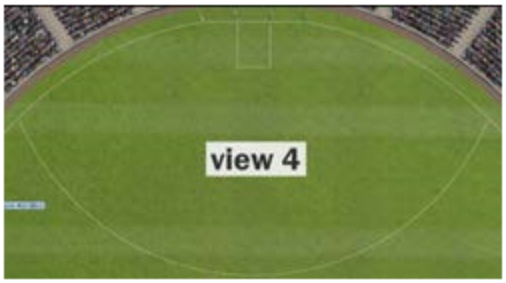
Property	Description
Show Players	Select to display the players found by the **Region Tool** at this timecode.
Clip Distance	Adjust to remove the stadium pitch side geometry closest to the camera, if this is clashing with the camera. 0 = 0 m from the pitch side.
Roof Visible	Select to make the stadium roof visible.
Stadium Visible	Select to make the stands, seating and crowd visible. Deselecting will show the playing field floating in space.
Jumbotron	Select the type of Jumbotron required for the 3D stadium. It can play the current input, allowing real pictures to be combined with the virtual stadium or a still image from the event folder located under **Graphics** on the PIERO desktop.
Sky Type	From the drop-down, select a sky type that matches the current time of day. You can also display a 2D image behind the stadium or incoming video.
Grass Texture	From the drop-down select a texture to adjust for the grass. Sometimes it is more realistic to use a grass color closer to the average color of the current active **RGB Keyer**. Select one of the chromakeyed textures in this case.
Add Mud	Add a default mud texture.

Property	Description
Advert Group	To change the boards around the stadium, select assets in the **stadiums/brand name/adverts** folder. Each board is a 512 x 128 pixel **.tga** file. You can add sub-directories with more boards. The sub-directories are automatically picked up and listed under the **Advert Group** property.

Touch Mode

In touch mode, you can touch different parts of the pitch (football and AFL) to move the virtual camera's position to focus on the selected area (only certain areas can be selected).





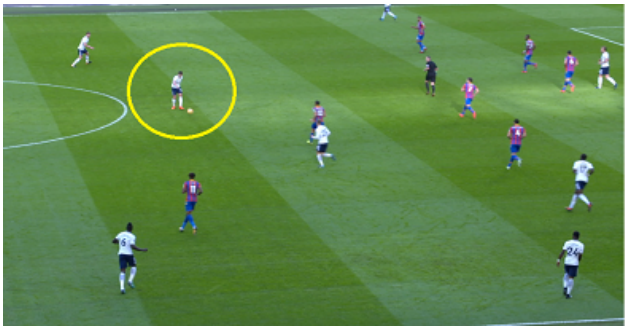
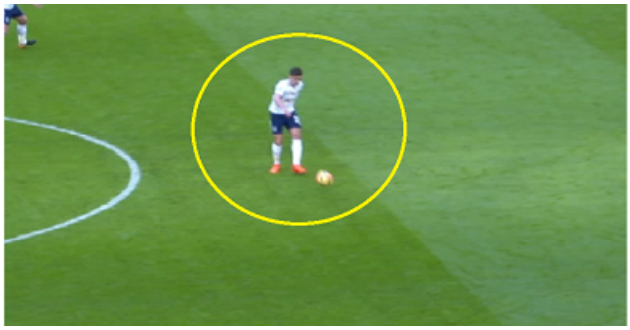
Virtual Stadium - AFL Overview

Zoom

	The Zoom effect zooms in or out on a specific point of the screen.

This effect requires Calibration 31 and the RGB Keyer 29.

The Zoom effect is a 2D effect that can be used with any video footage.

Zoom Effect

To use the Zoom effect:

1. Add a Zoom effect to the project.
2. Left-click on an area to zoom in.

   For workflow reasons, the Zoom effect only shows the zoomed in area when selected in the timeline.
3. Right-click on an area to zoom out.

Modules and Utilities

Modules and utilities are found on the PIERO Launcher (represented by icons). Some features are included in all PIERO systems, while others must be purchased individually.

Asset Manager

The Asset Manager provides a set of tools to manage the assets (textures, movies, squads) used by PIERO effects, as follows:

Import/Export 186

Add Custom Assets 189

Teams 186

3D Players 186

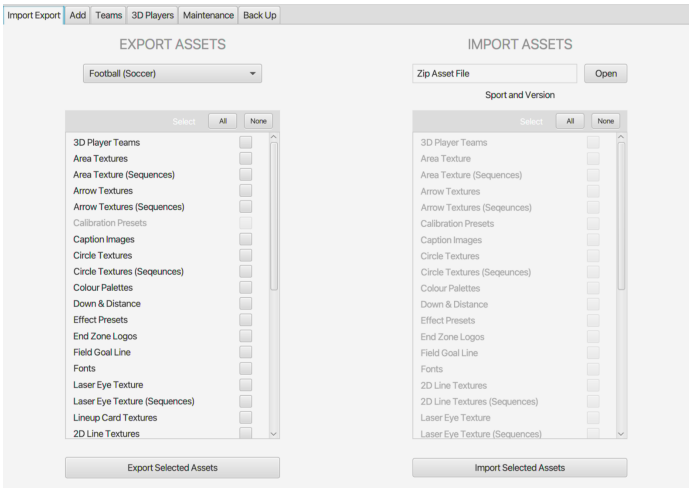
Maintenance 186

Back Up 194

To open the Asset Manager:

1. Launch PIERO.
2. Select the  **Asset Manager** icon on the launcher.

   The **PIERO Asset Manager** opens.



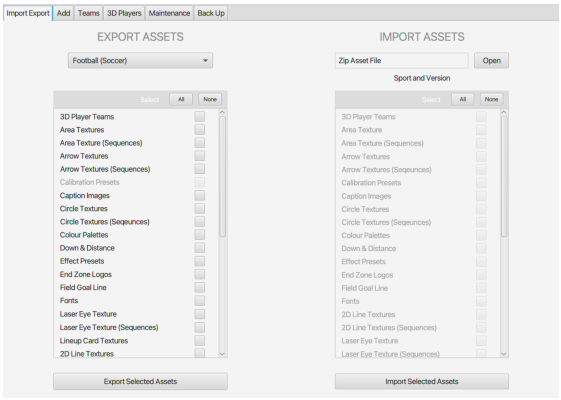
PIERO Asset Manager

Import/Export Assets

In the **Asset Manager**, through the **Import/Export** tab, users have the flexibility to export and import a selection of assets across one or more sports. These assets are packaged into a compressed archive with the extension **.PIEROzip**. To transfer previously imported assets to another PIERO machine, the **Export Asset** feature is utilized, and the corresponding **.PIEROzip** file can then be imported using the **Import Asset** feature on the second machine. However, if the goal is to introduce a new asset that has not been previously imported, such as a PNG file, this must be done using the **Add Asset to PIERO** 189 feature, located under the **Add** tab.

To export an asset:

1. In the **EXPORT ASSETS** column, from the drop-down, select the sport from which you want to export assets.
2. From the export list, select the relevant assets and select **Export Selected Assets**.



Asset Manager - Exporting Assets

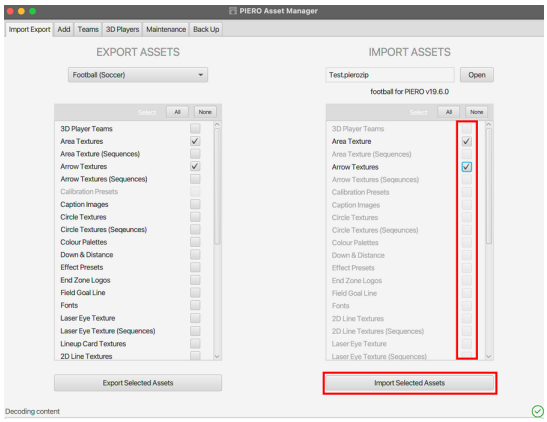
The **Save As** window opens.

3. In the **Save As** field, enter a name form the file.
4. From the **Tags** drop-down, select the Tag you want.
5. From the **Where** drop-down, select the desired location to save the file.
6. Select **Save**.

The assets are exported to the desired location.

To import archived assets:

1. In the **IMPORT ASSETS** column, select **Open.**
2. In the file explorer, navigate to the archive containing the assets you would like to import and select **Open**.
3. From the **Import** list, select the relevant assets and select **Import Selected Assets** to copy the files from the archive to the relevant PIERO folders.



Asset Manager - Import Assets

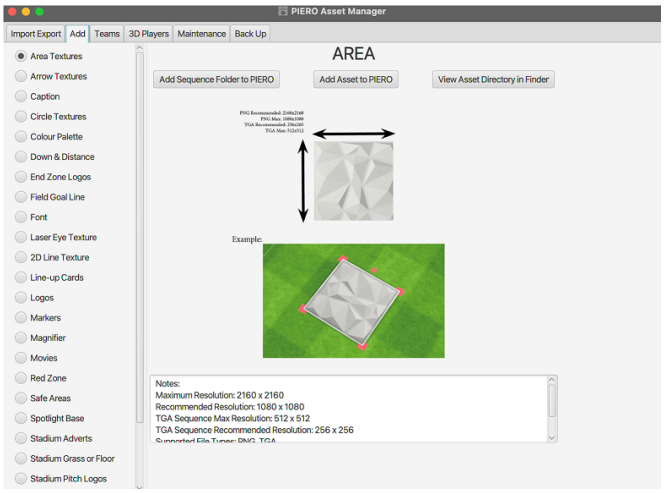
Imported textures, movies, and teams will overwrite existing assets with the same file name. Assets with different names will not be overwritten by this operation.

A confirmation or error message will appear in the status bar in the bottom-left corner of the window.

Add Custom Assets

The **Add** tab allows users to seamlessly add custom assets to PIERO. When an asset is selected from the list, detailed information about the asset format—such as resolution, aspect ratio, file type, and more—will be displayed based on the selected effect. Within the **Add** tab, users can perform several key actions: adding a new asset, viewing the asset directory in its folder, and, depending on the asset type, adding a sequence folder to PIERO. This provides a streamlined approach for managing and organizing assets efficiently.

★**Important**: Imported Assets must follow the specifications given in the Asset Manger.



Asset Manager - Add Tab

To add a custom asset:

1. Select the **Add Asset to PIERO** button.
2. In the folder browser, navigate to the custom asset you want to add and select **Open**.

To add sequence folders to PIERO:

1. Select the **Add Sequence Folder to PIERO** button.
2. In the folder browser, navigate to the folder you want to add and select **Open**.

To see the Asset Directory containing the asset:

- Select the **View Asset Directory in Finder** button.

Teams

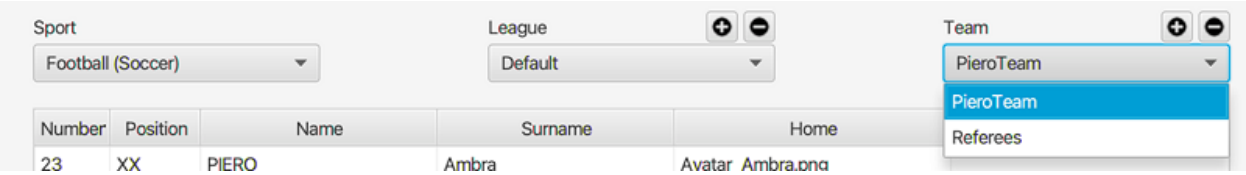
In the Asset Manager's **Teams** tab, users can create and customize teams, each comprising a list of players representing the squad. Teams can be generated based on the sport, providing flexibility in team management. The **Teams** tab functions as a centralized hub for defining and configuring team and player details, streamlining the setup process for various effects such as Team Lineup, Text, and Caption effects.

This section provides instructions on how to complete these tasks manually. However, a more efficient approach is available: in the bottom row of the UI, you can import a team from a **.txt** or **.csv** file, swap **Names**, auto link images (portraits) to players by matching file names with player names, and finally save the current team configuration. This method is recommended over manually entering each value.

To add or remove leagues and teams:

- Select the ⊕ button to add a league or team.
- Select the ⊖ button to remove a league or team.

  The drop-down menus show the list of existing leagues and teams.



Asset Manager - Add/Remove Leagues and Teams

To edit player info:

- Double-click on a cell in the player table and enter new player info (**Number**, **Name**, and **Surname**).
- Double-click on a cell in the **Position** column and select the position from the drop-down.

  Player positions vary with the sport.

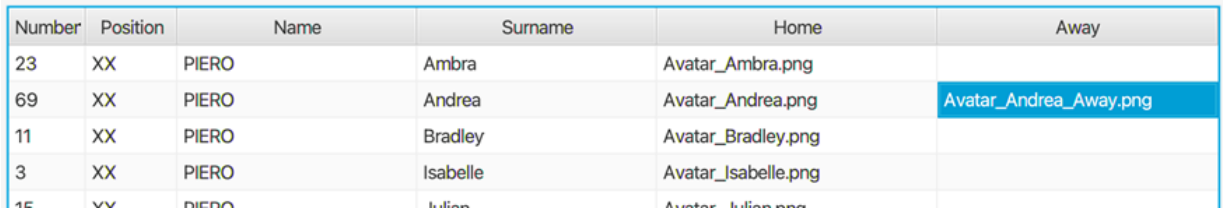
Select Position

- Press **Escape** when you've finished editing.

To add Away and Home images:

1. Double-click on the **Home** or **Away** cell.
2. In the **File** browser, navigate to and select the image you want to use.

   These images are used in the Caption Track 95 and Team Line-up 152 effects.

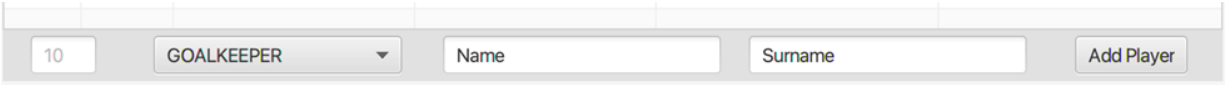


Number	Position	Name	Surname	Home	Away
23	XX	PIERO	Ambra	Avatar_Ambra.png	
69	XX	PIERO	Andrea	Avatar_Andrea.png	Avatar_Andrea_Away.png
11	XX	PIERO	Bradley	Avatar_Bradley.png	
3	XX	PIERO	Isabelle	Avatar_Isabelle.png	

Asset Manager - Add Images

To add a new player manually:

1. Select or enter the information in the row directly below the player table.



Asset Manager - Add Player Manually

2. Select **Add Player**.

   The new player is added to the list of players.

3D Players

The 3D player tab is used to create team outfits (home/away kits, strips). The 3D Player and Team Line-up effects use the 3D players outfits.

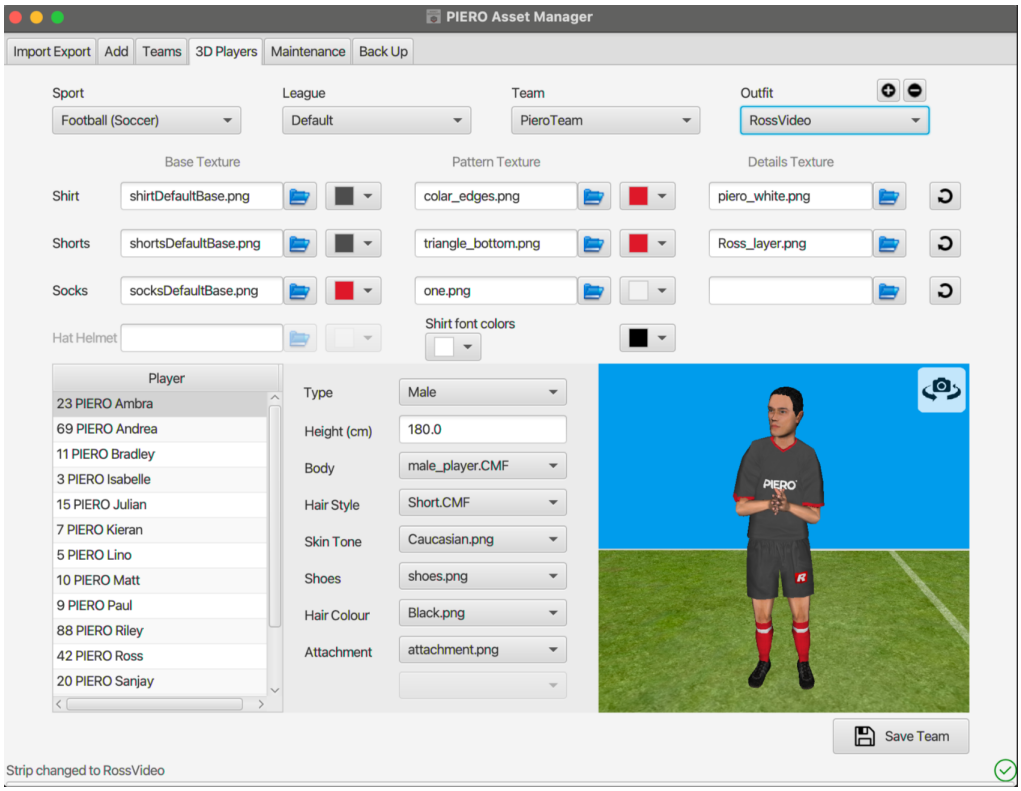
3D players are available for:

- Aussie Rules Football
- Basketball
- Football (Soccer)
- Gaelic Football
- Hurling
- Ice Hockey
- Netball
- Rugby (League and Union)
- Tennis
- Handball (for the team line-up only)

To create a team outfit:

1. From the drop-downs across the top of the tab, select a **Sport**, **League** and **Team**.
2. Then select an **Outfit** or create one for the appropriate type of player.

   Strips can differ between goal keeper and players.



Asset Manager - 3D Players Tab

3. Click and drag inside the **Preview Window** on the bottom-right to change the preview angle and focus on a specific side of the player.
4. If the outfits haven't been pre-generated:
   - Select a **Shirt**, **Shorts**, **Socks** and **Hat/Helmet** (if applicable) from the **Base Texture** drop-downs.
   - Select a pattern such as stripes or hoops from the **Pattern Texture** drop-downs.
   - Apply a color overlay to each selection.

   Long sleeves require a different 3D model than the default one. Select the **longsleeveplayer.CMF** from the player's **Body** drop-down list. Then use the **shirtDefaultLongSleeve.png** texture as a base model for the strip.

Customizing Player Appearance

It is possible to customize each player's attributes such as skin, hair, shoes etc. Several pre-made textures and meshes are available to fully customize the players' appearance and it is possible to add more textures to complement the existing ones.

You can create all the strips in Adobe Photoshop and use them as a base or start with a white base and add color to it.

There can be several strips per team.

To create a new strip:

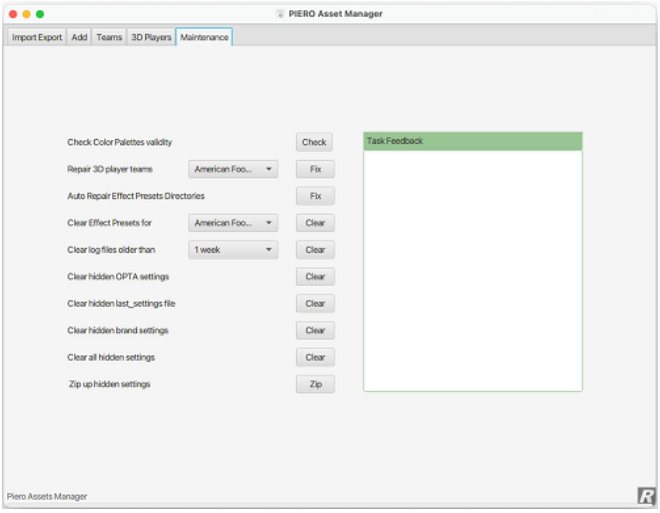
1. Click on the  icon above the **Outfit** dropdown.

   The **Create new outfit strip** dialog opens.
2. Enter a unique name for the new strip and select **OK**.
3. Beside each item (Shirt base, Shorts base, etc.), select the  **File** button.
4. In the file browser that opens, navigate to the folder containing the base texture you want to use and select **Open**.
5. Click the color picker drop-down beside each item to select a custom color.

   You can now apply your custom strip to a team.

Maintenance

The **Maintenance** tab should be used with the help of the Ross Video Support team to clear effect presets from an old version, verify the validity of color palettes and reset some application settings. The Ross Video support team might also ask you to use it in order to zip up the application's hidden settings.



Asset Manager - Maintenance Tab

Back Up

The **Back Up** tab provides access to the tools necessary for backing up and restoring your PIERO assets.

CAUTION: Do not use the **Back Up** tool across major versions (e.g., backing up in V17 and then restoring in V19). However, you can import/export assets between major versions.

Back Up Assets

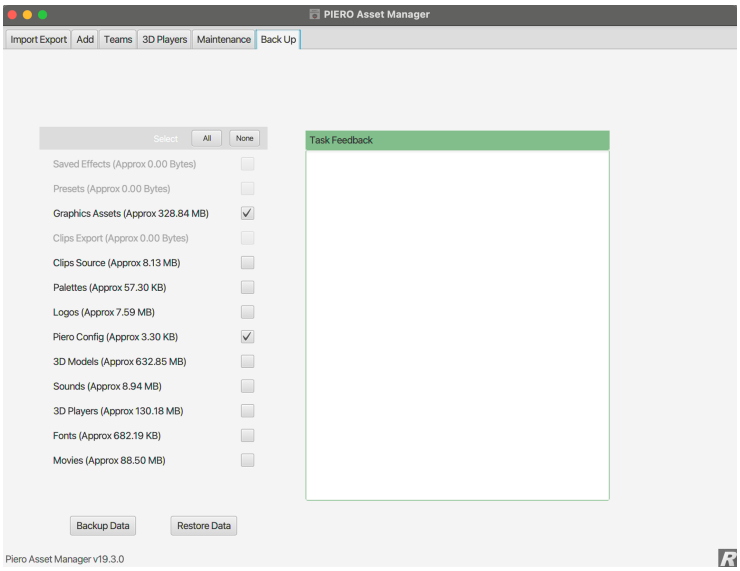
WARNING: Clips stored outside of the designated **PIERO Clips** folder will not be included in the backup process. If you have a significant number of clips in other folders, it is highly recommended to back those up separately. This will help avoid creating a single, large, heterogeneous zip file.

Before you begin, ensure the following:

- Ensure that all of the data you want to back up is located in your default folders; this should already be the case if you have used only the asset manager to manage your assets. For clips, only media within the **PieroSource** and **PieroExport** folders will be exported. If you have data you want to export that is outside of the default directories, you will need to move it to the default folders or backup the data manually.
- Ensure there is enough space on your hard drive to store the exported data. In the PIERO Asset Manager, the approximate size of each asset is displayed to the right of each asset. To determine the storage space required to export the assets, use these approximations. The back up will likely produce a large file, if you want to copy this onto a USB drive, we recommend using the exFAT file format.
- ★**Important**: During the backup and restore process, refrain from opening other tabs or running additional programs on your computer to ensure optimal performance and prevent potential issues.

To back up assets:

1. In the **PIERO Asset Manager**, select the **Back Up** tab.



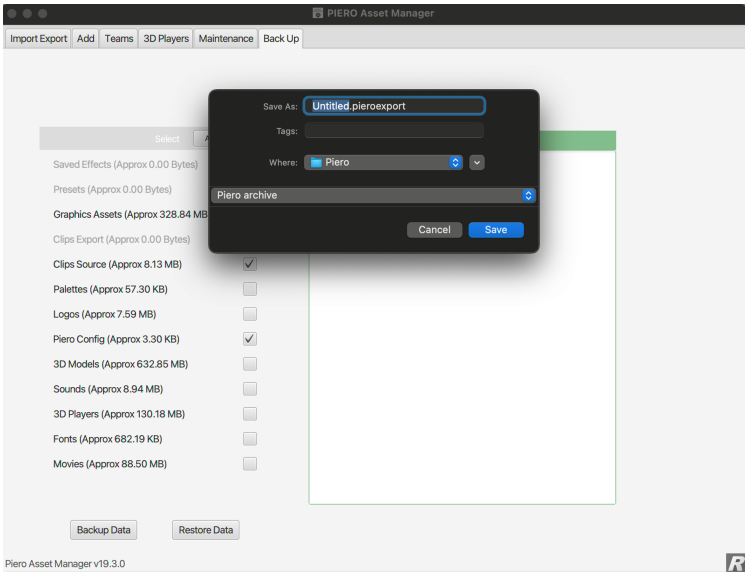
PIERO Asset Manager - Back Up Tab

2. From the list, select the assets you want to back up.

   The assets automatically selected in the list are the recommended assets for export. Additional assets can be selected or deselected from the list as needed.

3. Select **Backup Data**.

   A new window opens.



Window - Export Options

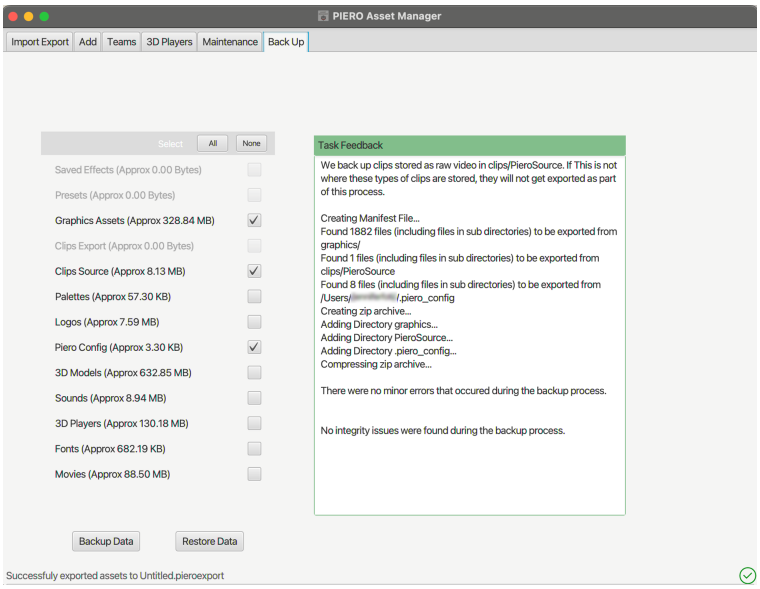
4. In the **Save As** field, enter a title for the export file.
5. In the **Tags** field, enter a tag to add to the file to make it easier to find (MacOS only).
6. From the **Where** drop-down, select the directory where you want the back up to go to.

7. From the last drop-down, select **Piero archive** (default).
8. Select **Save**.

   The window closes and the export process starts.

   Users can follow the back up and restore progress using the progress bar, which incrementally advances with each completed file. While processing large video files, it may take a while, and the progress bar may appear like it isn't processing. The progress bar will jump forward when the large file has been processed.

   Once the export is complete, the results are displayed in the **Task Feedback** panel. Additionally, any errors during the backup and restore process will be indicated in the **Task Feedback** window, which will also provide information on how to resolve the errors.



Task Feedback - Back Up Results

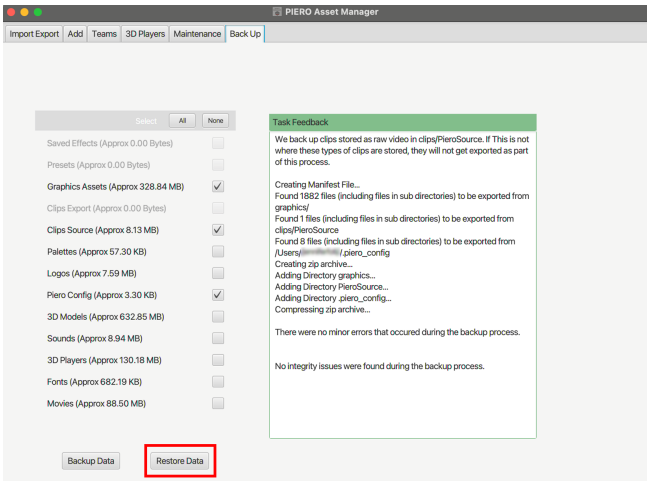
The assets have been exported as a **.pieroexport** compressed file and saved to the location you selected.

Restore Assets

Once you have exported your assets, you can now restore them.

To restore assets:

1. In the **PIERO Asset Manager**, select the **Back Up** tab.
2. In the **Back Up** tab, select **Restore Data**.

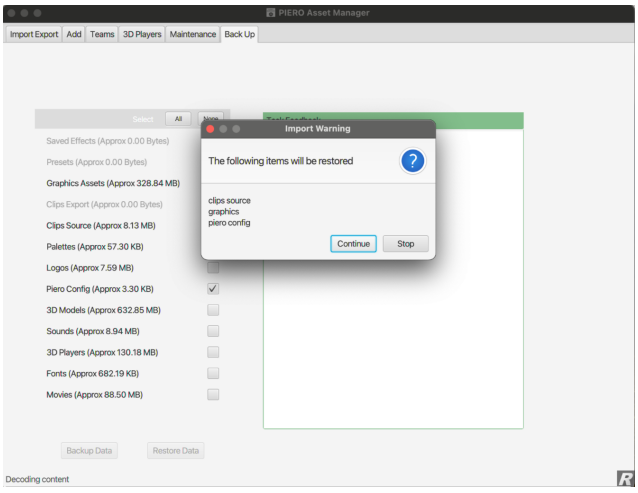


Back Up Tab - Restore Data

The File Explorer opens.

3. Navigate to the **.pieroexport** file.
4. Select **Open**.

   An **Import Warning** dialog opens, indicating the items that will be restored.



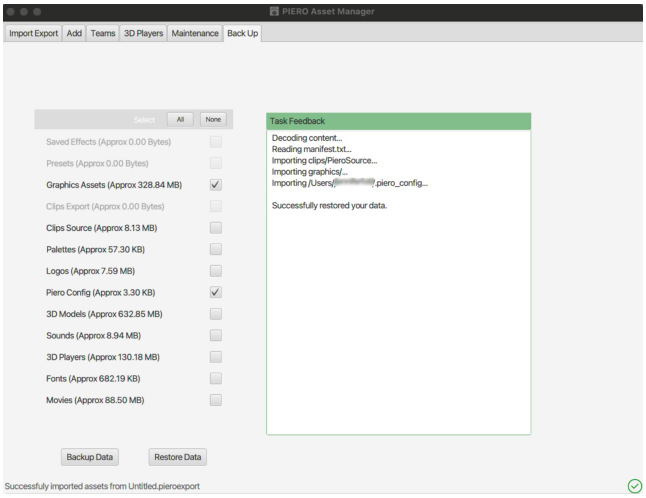
Import Warning Dialog

5. Select **Continue.**

   The restore process begins.

   Once the restore process is complete, the results are displayed in the **Task Feedback** panel.

Additionally, any errors during the backup and restore process will be indicated in the **Task Feedback** window, which will also provide information on how to resolve the errors.



Task Feedback Panel - Restore Results

The restore process is complete and the PIERO system is ready to use.

Data Visualization Module: Soccer (Football) and Rugby Union

The **Data Visualization Module**: Soccer (Football) and Rugby Union module generates graphics from Opta, TRACAB or STATS data. Available as a paid-for add-on. Does not include data feed access.

★OPTA is a third-party product, and an OPTA account must be purchased directly from OPTA in order to access its services and features.

Opta Data Module Interface

To set up and connect:

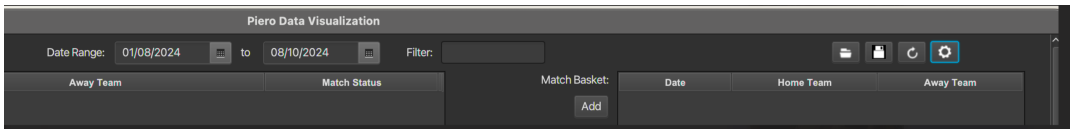
★Before you begin, make sure you have your OPTA login credentials available, as you will need to enter them in the settings window the first time you use the application.

1. Select your sport from the list of sports in the Launcher, then select the **Data Visualization Module** icon to start the associated data module.

   Note: Opta statistics are based upon ball touch events.

   The **PIERO Data Visualization** window opens.

2. Adjust the **Internet Connection** parameters in the **Settings** menu (top-right).



Data Visualization Module - Settings Menu

3. Once connected, select the league you are interested in from the **Competition** menu.

   PIERO will download the match statistics based on the competition you select along with the date and season filters, with the possibility of further refining.

Match Selection

You can filter the match data and then add matches to the Match Basket and select graphics to be added to the output.

Filtering

By selecting the competition, season and date range, you are filtering what data is available. It is possible to further filter the data by using the text filter box to filter by team. You can also filter by using the headed sections under **Match**. It is also possible to choose to filter data by the area of the pitch the event took place in, the controls for this are located around the edge of the pitch preview

Historical data

It is possible to use data not only from the current season but also from previous seasons, with the ability to analyze data from across multiple seasons. You can do this by selecting a season, putting further filters in place and then adding it to the **Match Basket**.

Match Basket

Click on a match and then select **Add in the Match Basket** box to add the match to the **Match Basket**. Add as many matches as you want to the **Match Basket** from any season you can access. The selection in the **Match Basket** remains there while switching between seasons.

Click **Edit** to alter the selection in the **Match Basket**.

Click **Use** to amalgamate the data and place a preview in the data preview area below. It can then be used in the same way data from a single match is used.

You do not need to add a match to the **Match Basket** if you are only using the data from that single match. Just select the match you want, then select the graphic and the data.

Data Graphics

Graphic	Description
Touch Map	A representation of all the ball touches for the selected player(s) It is possible to use standard markers or a 3D ball to visualize the graphics in PIERO.
Heat Map	A heat map for the selected player(s) based on where their ball touches were. In OPTA, there are variations available, so you are not limited to selecting based solely on touches.
Pass Map	A heat map for the selected player(s) based on where their ball touches were.
Shot map	A representation showing the location where the ball was kicked from and where it landed in the goal.
Set Pieces	Allows selection of corners and/or free kicks.
Build Up	Shows the build up to a goal. Select the goal and the number of passes to visualize.
Formation	Average formation. The names are re-sized according to how many times the player touched the ball. The position of each player is an average of all the touches during the selected time frame.

Graphic	Description
Attack	The attack pattern for the selected players divided in 3 columns (Left wing, Middle, Right wing).
Story	Allows you to configure multiple graphics for one player and send them all over to the PIERO application.
Tracks	Take TRACAB or STATS data and rapidly create tracks with it.
Chalkboard	Recreate the game in 2D/3D using TRACAB or STATS data.

Use the **Refresh** button to get the latest data available for a live match. 

Output to PIERO

Once the desired data has been selected and filtered, the information needs to be sent to PIERO.

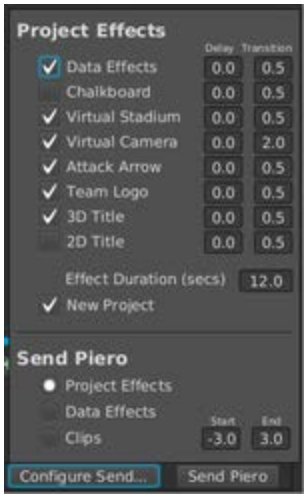
To send data to PIERO:

1. Select the **New Project** checkbox to create a new project in PIERO with a virtual stadium, a virtual camera and data representation (this will clear the effects currently present in the PIERO project).

   OR

   Clear the **New Project** checkbox to send each data effect individually.

2. Press **Alt + Tab** to see the result in PIERO.
3. Click **Configure Send** to select which effects you want to be part of your Opta project.



Data Visualization Module - Output to PIERO

You can also set the delay, transitions times and effect duration here, leaving less work to do it in the PIERO application.

4. Select **Project Effects** to send effects to the PIERO application as they have been configured in **Configure Send...**.

   OR

   Select **Data Effects** to only send effects that represent data (e.g., markers or heat map).

   By default, graphics with the **Smooth Animation** option animate at the **Animation Interval(s)**. If **Smooth Animation** is selected, the graphic animates continuously throughout the selected time range as the data changes.

Timeline and Event Navigation

Use the timeline to filter the data in match time and use the attached events to navigate the video.

To filter by time:

- Define a time filter in one of the following ways:
  - Drag the end points of the time line to change the selection.
  - Edit the text boxes at either end of the timeline.
  - Click on the whistles to select the 1st or 2nd half of the match. To select the 2nd half, press **Ctrl** and select the middle whistle.

To set up navigating by event:

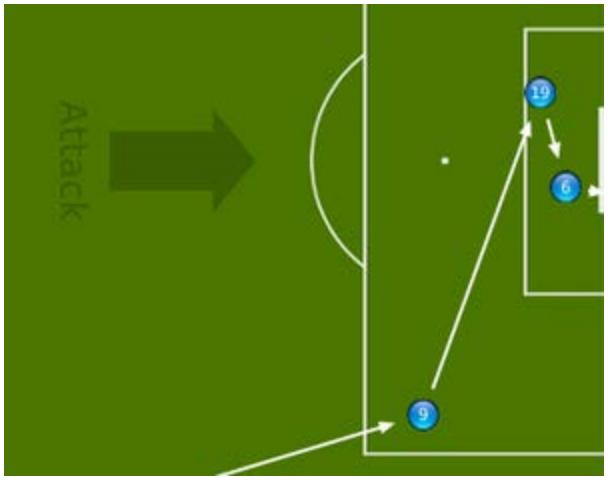
1. Load a full match corresponding to the data into PIERO.
2. In PIERO, navigate to the starting whistle.
3. Press the  button to mark the beginning of the match in Opta and syncronize the data.
4. Press the 

button to be able to control the video from the Opta module
5. Click on the event icons on the Opta timeline to navigate to them in the video.


Timeline Event Icons


Opta VTR Control Buttons

6. Click on the events on the field to navigate to them in the video.



Data Visualization Module - Navigating by Event

To load TRACAB or STATS data:

1. Select the **Competition** and **Season** (uses Opta data).
2. Select a match or use the folder icon in the top-right to load an **Opta F24.xml** file for a game.
3. Load a **TRACAB** or **STATS** data file (**.dat**) for the same match, using the folder icon in the top-right.

To create tracks from TRACAB or STATS data:

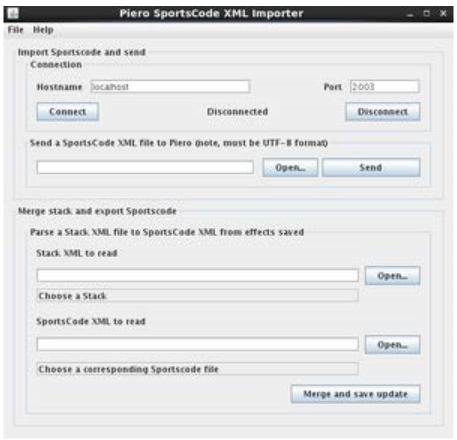
1. Load the full, wide-angle, match video into the main PIERO application.
2. Link the data to the video using the navigating by event setup.

   See To set up navigating by event: 203 for instructions.
3. Use the **Tracks** tabs to send over the tracks you want, at the times you need them.

Sportscode XML Importer

This module allows you to integrate PIERO into your Sportscode workflow.

Extract the clip data from a Sportscode .xml file with the PIERO Sportscode XML Importer and automatically recreate the clips in PIERO that were defined in Sportscode. Export the finished video from PIERO and re-import it into Sportscode complete with XML to recreate the clips.



PIERO Sportscode XML Importer Interface

To import video with XML from Sportscode:

1. Put the video exported from Sportscode in the **Clips PIERO Source** folder.
2. Launch PIERO.
3. Load the video exported from Sportscode as you would load any video in PIERO.
4. Switch back to the launcher by pressing **Alt + Tab**.
5. Click the **Data Module** icon to open the Sportscode XML Importer.

   Data Module Icon
6. Click **Connect**.
7. In the **Import** section use the **Open** button to find the **Sportscode.xml** file associated with the Sportscode footage.
8. Click **Send**.

   This sends the data from the Sportscode .xml file to PIERO. Now you will see all of the clips in PIERO. These have been created from the data in the Sportscode .xml file. The clips produced correspond to the clips made in Sportscode and have the same naming.

To export video with XML from PIERO:

1. Record the finished PIERO video as you normally would with any PIERO video
2. Save the project that corresponds to this video.

3. Switch back to the Sportscode XML Importer by pressing **ALT + Tab**.
4. In the **Merge Project and export Sportscode** section, select the **Open** button corresponding to the Project XML to read subsection.
5. Select the project corresponding to the video that has just been created in PIERO
6. Beneath this subsection in **Sportscode XML to read**, select **Open** and select the original **Sportscode.xml** file that was initially imported into PIERO.
7. Then select the **Merge and save update** button.

   This will produce a new **Sportscode.xml** file including the new PIERO information.

   The pauses in PIERO need to be translated into Sportscode in order for the initial metadata from Sportscode to remain aligned with the new video created by PIERO.
8. Import the PIERO-created video back into Sportscode (optional).

Video Test Tool

This module is used to troubleshoot PIERO's SDI and RS-422 connections.

★**Important**: The Video Test Tool only works with AJA systems and not with Matrox.

Use the Video Test Tool to help diagnose any video, audio, time code or video server control issues you have.

The Video Test Tool can give you information on the following:

- Video definition, frequency and activity on inputs SDI A and SDI B.
- Reference
- Audio (yes/no)
- Frame delay on input and output
- Number of dropped frames
- Timecode
- Video control over 422

Launch the Video Test Tool and check which of PIERO's connections are active and what is being received.

Video Test Tool Interface

To use the Video Test Tool:

1. Double-click the PIERO icon on the desktop to open the Launcher.
2. On the Launcher, select the **Video Test Tool** icon.
3. Once open, the interface will display the video input on **SDI A** and overlay it with all the information the Video Test Tool is capable of providing.
4. Test if you have remote control of the video server by pressing **P** to play the video and **Spacebar** to pause it.

License Utility

This module is used to update your USB license dongle or software license.

Overview

The License Utility module, **Piero License Tool**, is used to create a new software license, update an existing USB or software license, or move a 'floatable' software license between PIERO systems.

A USB license dongle or a software license is required to use a PIERO system.

A software license is created to work on a specific PIERO computer.

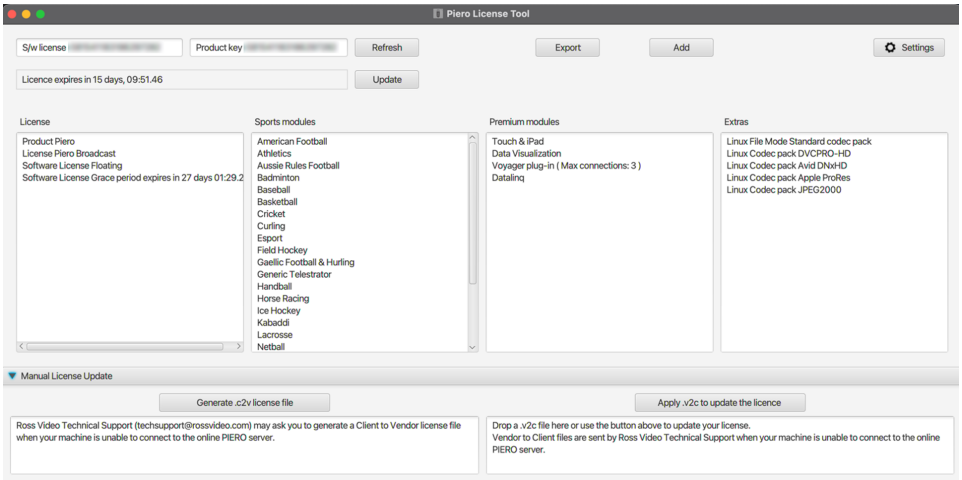
A software license may 'floatable' which allows it to be moved between PIERO computers. Floating software licenses must be updated regularly to keep them valid.

If a USB license dongle is plugged into a PIERO system that already has a software license, the USB license dongle will be used and the software license ignored.

★Certain buttons related to software licenses will not be visible if you only have a hardware dongle.

User Interface Overview

The below image shows the Piero License Tool user interface.



PIERO License Tool

Settings – Holds Internet access proxy details.

Refresh – Updates the User Interface.

Update – If connected to the Internet, this updates a USB license dongle or software license, with latest sports, expiry date, and if a software floating license is in use, also updates its grace period.

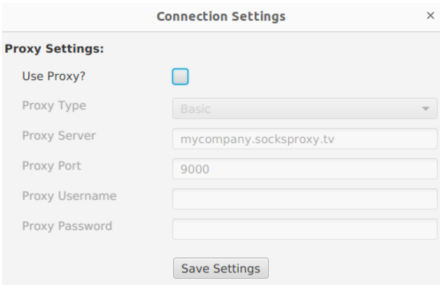
Export – Exports (i.e. removes) a floating software license from the PIERO computer using it, so it can be moved to a different PIERO computer.

Add – Allows a new software license to be added (internet online or offline) or a floating software license to be imported.

Manual License Update – Allows updating of the USB license dongle or software license, when internet access is not available.

Settings

If your access to the Internet is via a proxy you can enter it's details using the **Settings** button. The proxy must be of type SOCKS and use proxy port 9000. The type is typically set to **Basic**.



License Utility - Connection Settings

Software License – Create and Install on PIERO Computer

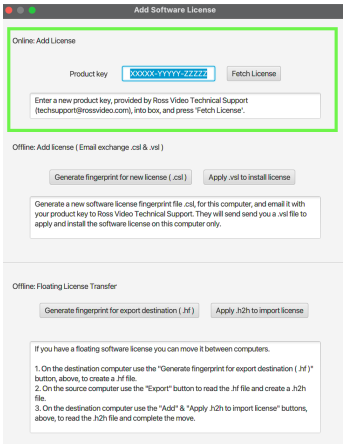
If you haven't already done so, contact techsupport@rossvideo.com and request a product key code, which is of the form XXXXX-YYYYY-ZZZZZ.

Online

If you have access to the Internet, use the following procedure to create and install the software license on a PIERO computer.

To add the software license on a PIERO Computer - Online:

1. In the PIERO **License Tool**, select the **Add** button, type in the product key code, and select **Fetch License**.
2. Close the Launcher, and then re-open it normally to run PIERO.



Add Software License - Online

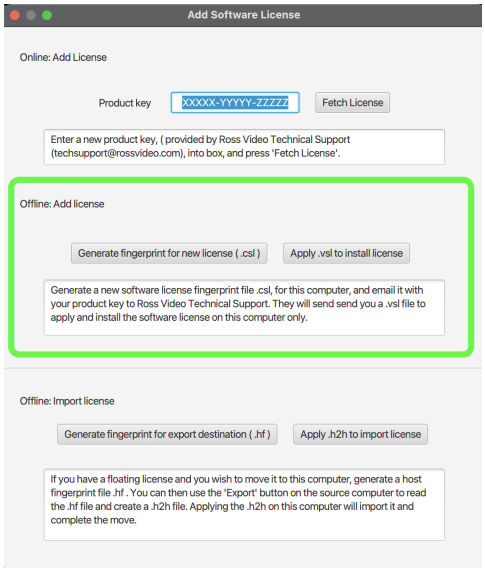
OFFLINE

If you you do not have a connection to the Internet, a new software license can be added using an exchange of files with techsupport@rossvideo.com.

To add a new Software License - Offline:

1. Run the **Piero License Tool** on the specific Piero computer where you wish the new software license to be used, select **Add**, and then select **Generate fingerprint for new license (.csl)**. This will create a **.csl** file which you email to techsupport@rossvideo.com.
2. Tech support will then email you a **.vsl** file.
3. Select **Apply .vsl to install license** and then select the **.vsl** file.

   ★ **Note:** The **.vsl** file will only install a software license on the specific Piero computer where the **.csl** was created.
4. Close the launcher, and then re-open it normally to run PIERO.



Add Software License - Offline

Updating License

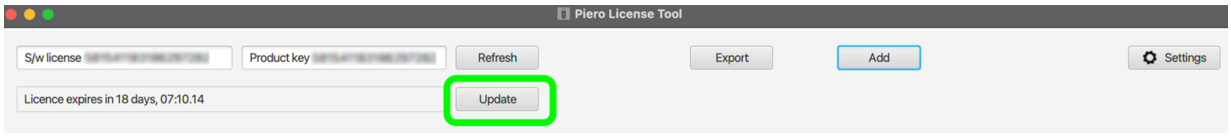
Online

Updating a license updates any new sports you have purchased and ensures you have the latest expiry date. If you are using a floatable software license, its grace period will be reset so it will be valid for use.

Updating a USB license dongle or a software license are both done in the same way.

To update a USB license dongel or software license:

1. Select the **Update** button, and after a few seconds the license details will be updated.



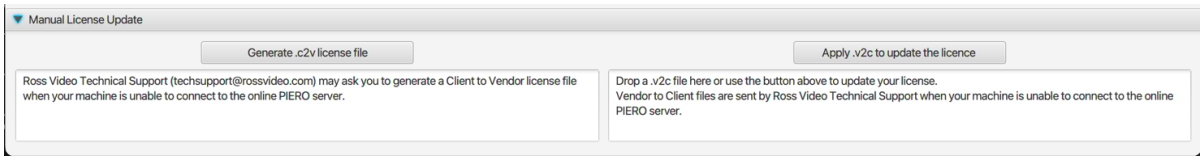
PIERO License Tool - Update

2. Close the launcher, and then re-open it normally to run PIERO.

Offline

If the user is offline, a license is updated in three stages:

1. Generate a license status **.c2v** (customer to vendor) file.
2. Email this license status **.c2v** file to techsupport@rossvideo.com so they can generate a **.v2c** (vendor to customer) license update file for you.
3. Apply the **.v2c** license update.



Manual License Update - Generate a .c2v and Apply a .vtc to Update the License

To generate a license status .c2v file:

1. If you are using a USB key, ensure it is plugged into the computer running the PIERO application.
2. Select the **Manual License Update** section of the **Piero License Tool**.
3. Select **Generate .c2v license file**.
4. Select the **Generate license status.c2v file** button.

   After 10 seconds, a dialog will appear.
5. Select **Save** to create a **.c2v** file on the desktop.
6. Email this license status **.c2v** file to techsupport@rossvideo.com.

To apply a licence update .v2c file:

1. Save the license update **.v2c** file you have received to the desktop.
2. If you are using a USB dongle ensure it is plugged into the computer running the PIERO application.
3. Select **Apply .v2c to update the license** and navigate to the **.v2c** file, and then select **Open**.

   "… updated successfully" will be displayed if the update was successful.
4. Close the launcher, and then re-open it normally to run PIERO.

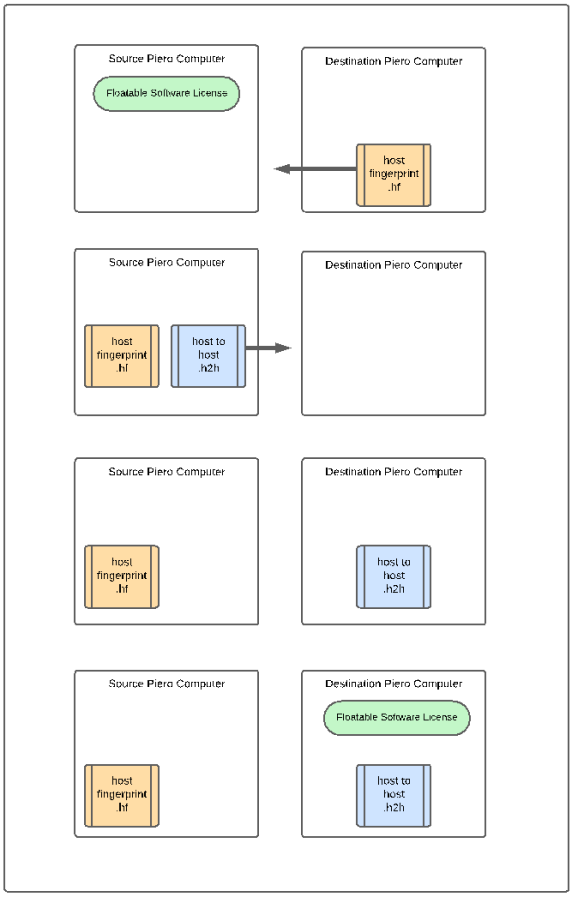
   Alternatively, you can drag and drop the **.v2c** file into the box containing the text *Drop a .v2c here…*

Moving a software license between PIERO computers

A floatable software license can be moved between two PIERO computers, and is achieved using a host fingerprint file (.hf) and a host to host (.h2h), as follows:

1. On the destination PIERO computer where the license is being moved to, a host fingerprint file (.hf) is created.
2. This .hf file is put on the PIERO computer where the software license is coming from (the source computer).
3. The source computer exports the license by reading the .hf file and creating a host to host (.h2h) file.
4. The .h2h file is then put on the destination computer where it is used to import the software license completing move.

Warning: if you delete your h2h file before it is applied on the new machine, you will destroy your license.

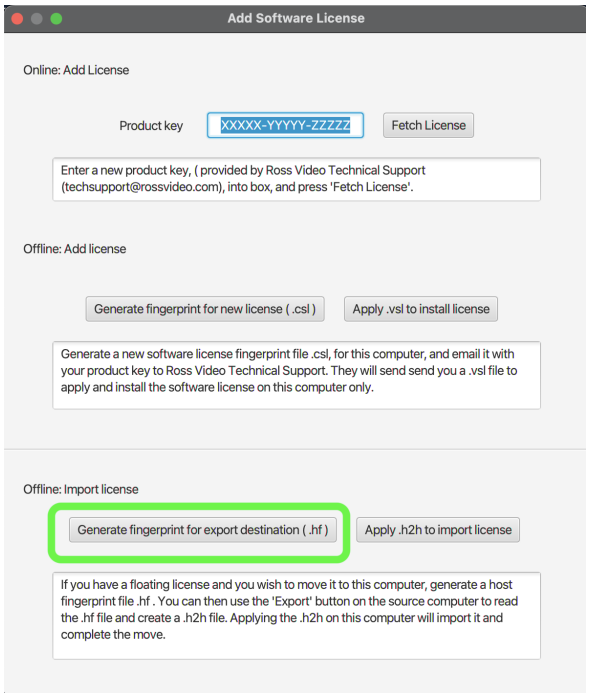


Moving a software license between Piero computers - Worflow

To generate a Host Fingerprint File (.hf) on Destination PIERO:

- In the **PIERO License Tool**, select the **Add** button then select the **Generate fingerprint for export destination (.hf)** button.

  This will let you create a new **.hf** file which you can save to the desktop, making it ready to be taken to the source PIERO computer.



Add Software License - Generate Fingerprint for Export Destination (.hf)

To transfer the Host Fingerprint File (.hf) to Source PIERO:

- Take the **.hf** file created on the destination PIERO computer and put it on the source PIERO computer.

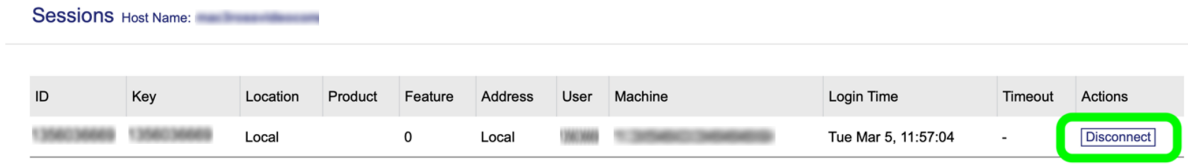
To Remove the License From the Source PIERO and Generate a Host to Host File (.h2h):

For this procedure, ideally only run the Launcher and the PIERO License Tool on the source PIERO computer.

1. If PIERO or any other Launcher modules (e.g. Data Visualization or Asset Manager etc) are running, you must quit the modules. After they have all been quit, wait for 3 minutes to allow the 'sessions' to disappear.

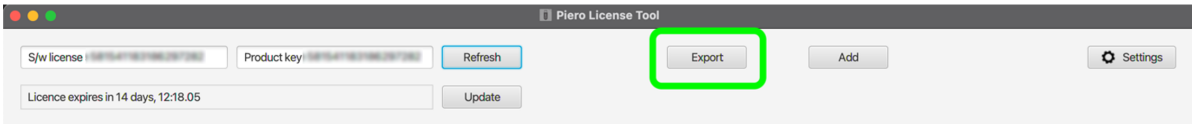
   You can check all sessions have gone by browsing the http://127.0.0.1:1947/_int_/sessions.html.

   If there are any remaining sessions you may select the **Disconnect** button of each as shown below.



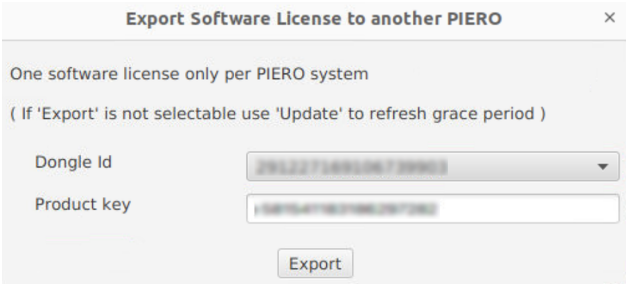
Sessions - Disconnect Button

2. On the source computer select the Piero License Tool's **Export** button, which will open a **Export Software License to another PIERO** dialog shown below.



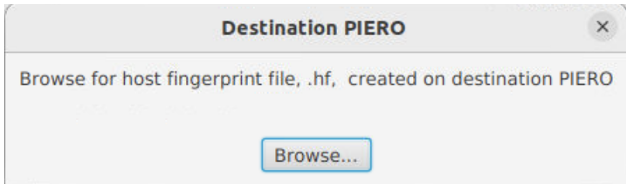
PIERO License Tool - Export Button

3. Select **Export,** as shown in the below dialog, which will open a **Destination PIERO** dialog, where you can select **Browse...** and select the host fingerprint file (.hf) you put on this computer.



Export Software License to Another PIERO Dialog

★**Tip**: If the **Export** button above is visible but not enabled it could mean the grace period has expired on your floatable license. The grace period can be updated by following the Updating instructions above.



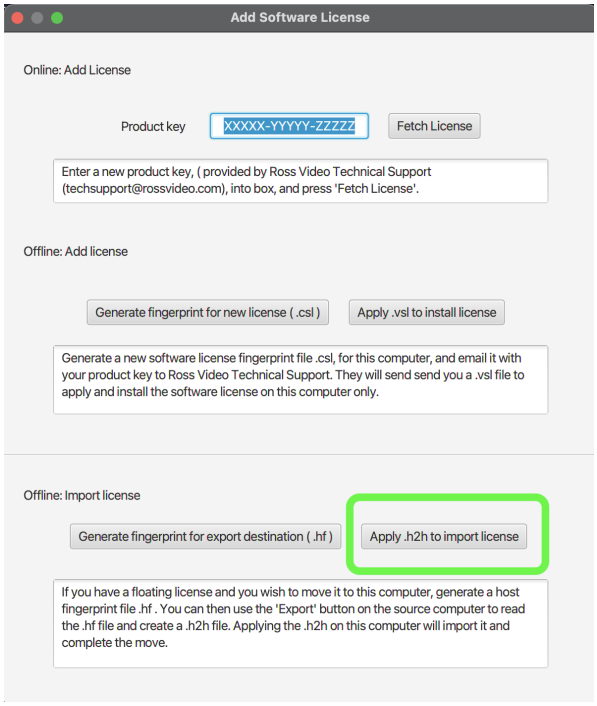
Destination PIERO Dialog

The software license will then be removed from this source Piero computer and a host to host (.h2h) will have been created.

4. The next step is to take this this **.h2h** file to the destination Piero computer.

To Transfer the Host to Host File (.h2h) and apply it to the Source PIERO computer:

1. Take the host to host **.h2h** file created from the source PIERO computer to the destination PIERO computer.
2. In the **PIERO License Tool**, select the **Add** button and then select **Apply .h2h to import license**, which will install the license on this computer.



PIERO License Tool - Apply .h2h to Import License Button

3. Close the launcher, and then re-open it normally to run PIERO.

Appendix A: Keyboard Shortcuts

Cent OS 7 Shortcuts

Start menu/Access applications	Alt + F1
Run new application	Alt + F2
Show desktop	Ctrl + Alt + D
Lock desktop/Switch active user	Ctrl + Alt = L
Task manager	Ctrl + Esc

Function Keys on a Mac

Press the FN key to use the function keys on a Mac.

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
Fast Rewind	Slow Rewind	-1 Second	-1 Frame	Play/ Pause	+1 Frame	+1 Second	Slow Forward	Fast Forward	Find	Reset Selected Effect on the Timeline	Delete Selected Effect on the Timeline

General PIERO Shortcuts

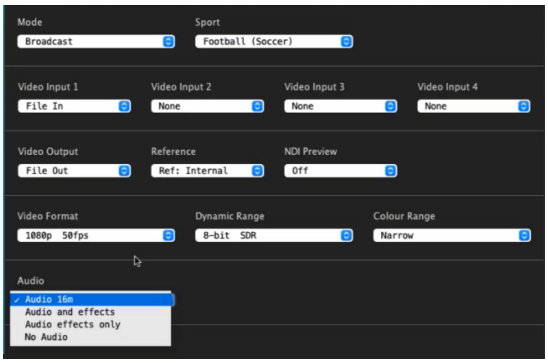
Linux	Mac	Description
ESCAPE		In Touch mode, fade off effects and delete all
INSERT	NOT AVAILABLE	In multiscreen mode - toggle effect
HOME		Rewind clip
PAGE UP		Toggle on-air
DELETE		Delete effect
`	§	Toggle on-air
ENTER + ALT		Toggle full screen
Backspace + Ctrl	⌘ + Backspace	Delete effect
s + Ctrl	s + ⌘	Toggle calibration point
z + Ctrl	z + ⌘	Undo on timeline
s + Ctrl	s + ⌘	Copy on timeline
x + Ctrl	x + ⌘	Cut on timeline
v + Ctrl	v + ⌘	Paste on timeline
m + Ctrl	m + ⌘	Set cue point
< + Ctrl	< + ⌘	Cue previous
> + Ctrl	> +⌘	Cue next
Spacebar		Play/stop (Disabled in Touch mode)

IN/OUT Point Shortcuts

On the number pad, pressing the forward slash key (/) will set the **IN** point of the selected effect and pressing the asterisk key (*) will set the **OUT** point of the selected effect (just like the clock icon).

Appendix B: Audio Options

Audio is enabled via the Launcher at start-up and is configured in the project.



Broadcast Launcher - Audio Section

To add audio to a project:

1. From the **Launcher**, from the **Audio** drop-down, select the audio option you want to use, and launch PIERO.
2. In the **Effects** panel, select the **Sound Effect** button.

   The **Sound effect** appears in the timeline.
3. Position the **Sound effect** where you want it along the timeline and adjust its duration.
4. In the **Sound effect's** parameter sheet, select the File folder icon.

   The file explorer opens.
5. Navigate to the location of the sound file you want to use and select **Open Sound**.

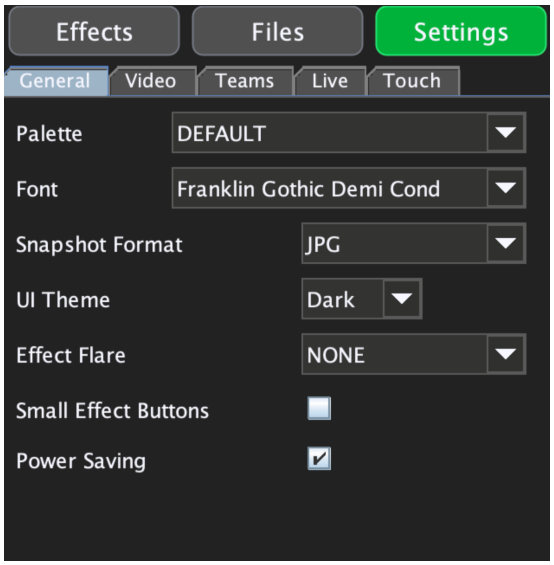
   The file explorer closes and the sound is added to the **Sound effect**.

Appendix C: PIERO User Interface Theme

You have the option to select between two distinct User Interface themes: **Light** and **Dark**. This feature is available across all PIERO interfaces.

To select a UI theme:

1. In the **Settings** panel, go to the **General** tab.



Select a UI Theme

2. From the **UI Theme** drop-down, select either **Light** or **Dark**.
3. Restart PIERO to apply the new theme.

Contact Us

Contact our friendly and professional support representatives for the following:

- Name and address of your local dealer
- Product information and pricing
- Technical support
- Upcoming trade show information

Technical Support	**Telephone:**	+1-844-652-0645 (North America) +800 3540 3545 (International)
	After Hours Emergency:	+1 613 • 349 • 0006
	Email:	techsupport@rossvideo.com

General Information	**Telephone:**	+1 613 • 652 • 4886
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