



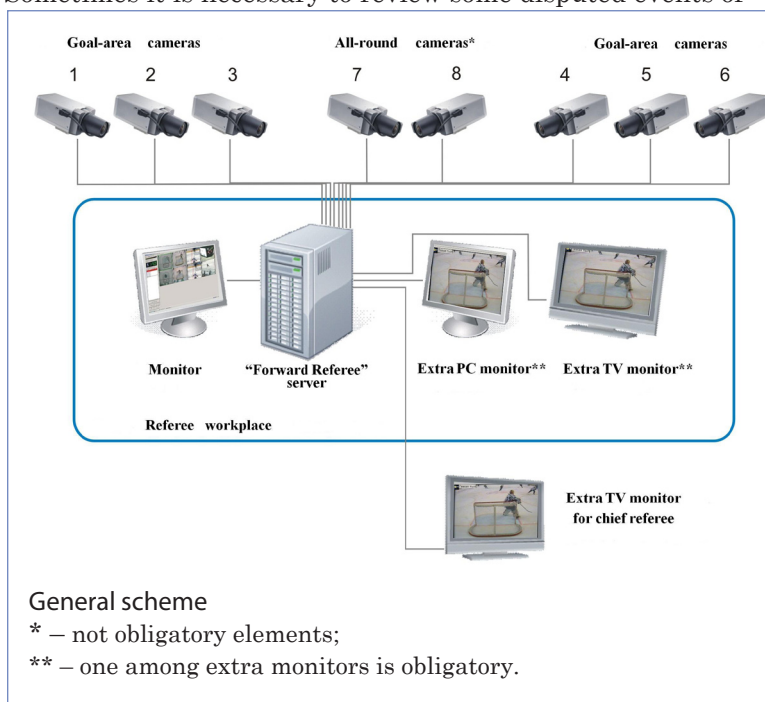
Forward Referee

System for video fixing of goals and disputed events in professional hockey

Hockey is one of the most spectacular, dynamic and difficult sports to referee. In every match we observe different kinds of body-checks with high player speed (puck speed may reach 200 km per hour, for example). Sometimes it is necessary to review some disputed events of the match. Video goal judge reviews replays of disputed goals and other disputed events.

«Forward Referee» system is a software-hardware complex for reviewing on-the-fly of disputed events happened during hockey match. The system allows to review events in frame-to-frame mode (50 images per second). Reviewing does not interrupt recording. You may also get a collection (report) of the most interesting moments of the match via «Forward Referee» system.

The system meets all requirements of Kontinental Hockey League (KHL) regulations. It can be a work place for video goal judge during official KHL matches. Successfully used at KHL matches from 2009–2010 hockey season.



Main features of the system

★ Recording

- Recording with a high quality (suitable for professional broadcasting) by 8 cameras
- «Typing» of playing time in frames over the image
- Integration with score board for receiving of playing time
- Reviewing does not interrupt recording
- Stop and start of recording at any time

★ Review of events

- Frame-to-frame events review (50 images per second)
- Display of image on extra monitor for video goal judge to examine and on remote TV monitor for referee to watch disputed event
- Preview of enlarged image from any camera on extra monitor
- Minimum delay between the event and its display is 2 seconds
- Instant switching between cameras when reviewing event
- Automatic creation of video report on interesting events when necessary
- Broadcasting to the Internet and transmitting of information to the KHL committee office in real time

★ Operating convenience

- Integrated system with simple, intuitive, and configurable user interface
- Marking of event ensures quick navigation for further reviewing
- Use of any analog cameras and possibility of adjusting image parameters
- Disconnection of one or several cameras does not influence the whole system
- The ability to review the input video in the preview panes
- The ability to control the system by external console
- Simple in start-up and takes a short period for staff to learn for further dealing with the system





Description of «Forward Referee» system

«Forward Referee» system is delivered as a video server with preinstalled software. Commutation devices for camera connecting are included in scope of supply. Just connect cameras to begin working.

1. Specifications

Parameter	Value
Number of record channels	Maximum 8
Step-by-step review accuracy (frames per second)	50 (PAL)/60 (NTSC)
TV standard	PAL/NTSC
Resolution	720×576/720×480
Compression	AVI (DV, MPEG2 (I), JPEG)
Frame rate	25/29,97 frames per second
Signal	Analog (composite, component, S-Video)
Language	Russian/English
Processor	Intel Core 2 Quad Q9500, 2,83 ГГц
Storage capacity	2 Terabyte
Case	SuperMicro CSE-745TQ-800B, 4U, 178×437×648 mm

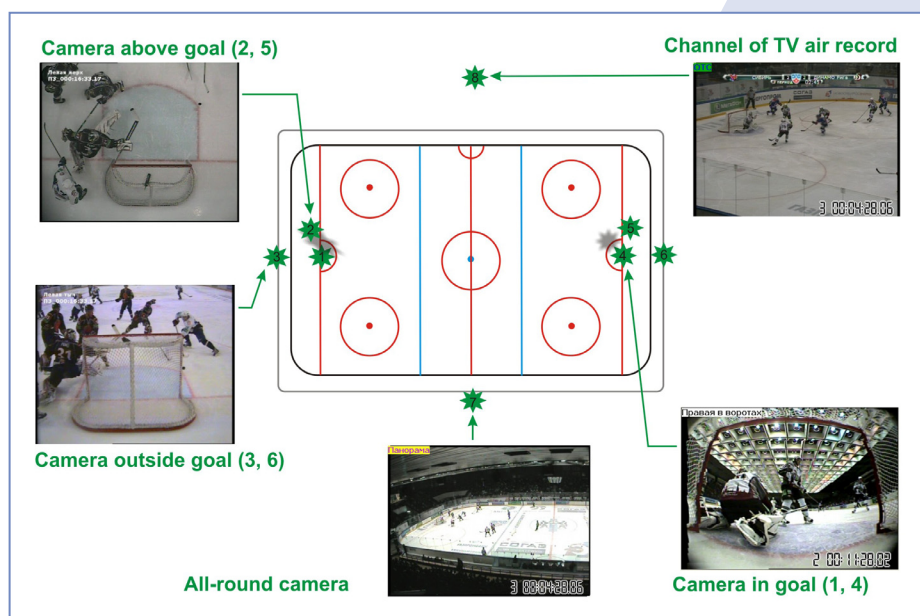
2. Multichannel recording

The «Forward Referee» system may record 8 channels simultaneously. It is possible to connect 6 goal-area and all-around view control cameras. All-around view cameras help to examine events happened in overview of this camera. Also, you may record match broadcasting.

Disconnection of one or several cameras does not influence the whole system. You may connect cameras «on-the-fly» (when match is being recorded) without stopping and restarting of the system. You may watch «live» signal on computer screen when recording.

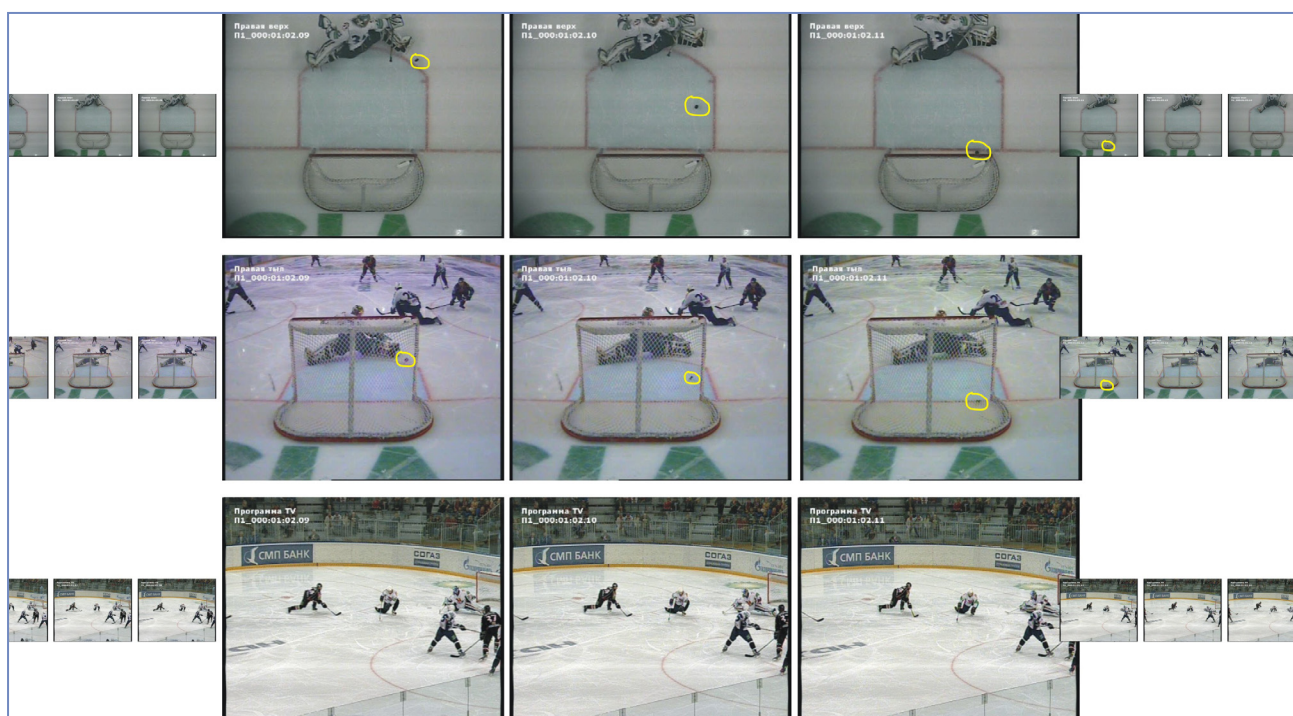
Any analog cameras (with composite, component, S-Video signals) can be used for recording. You may work with purchased and installed earlier equipment.

Signal is of a high professional quality. «Forward Referee» system provides a possibility to edit further recorded material, for example, to create a film for players with the most interesting moments of the match.



3. Increased frame rate when video data viewing

Video data is reviewed step-by-step with accuracy within 50 images per second (for the PAL system) in the «Forward Referee» system. Doubled frames number allows to examine event in details and it increases credibility of puck trajectory identification.



4. Adjusting of camera image parameters

Cameras have a wide range of brightness and chromaticity parameters value. You may adjust camera parameters in the «Forward Referee» system when recording. It simplifies examination of event recorded by several cameras from different angles.

5. Simple interface

The «Forward Referee» system offers easy configurable interface. Signals from all cameras (goal-area and all-round) can be simultaneously displayed on preview panes. Image on all panes is changed synchronously when events are reviewed. Review of events from several angles simplifies its examination and identification of puck location.

Image can be enlarged and reviewed on a separate monitor.

You may place an extra monitor near rink for referee to review disputed events of the match remotely. The system provides an instant access to recorded events. Minimum delay between the event and its review is 2 seconds.



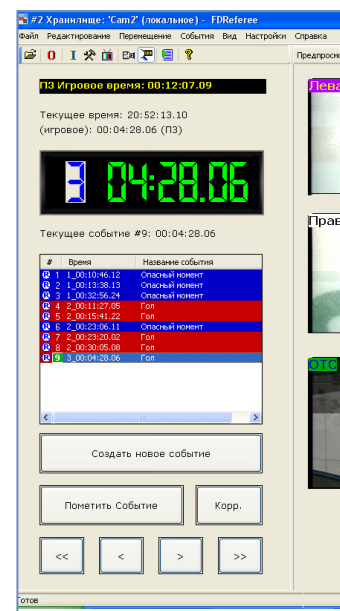
6. Handy navigation over events

The «Forward Referee» system allows to mark interesting events of the match (goal, violation, shooting). You may quickly navigate over marked events when reviewing and getting a report. Every event can be coloured to simplify its further search.

7. «Typing» of playing time in video frame

The «Forward Referee» system provides a possibility to «type» playing time in frames. Time marks are displayed in frames when reviewing a match and in report frames. You may select location, font, size and colour of marks.

According to KHL requirements time should be taken from score board. Now NATA-INFO boards are supported. If necessary other devices for data outputting can be supported.



8. Direct broadcasting of the game to the Internet



The «Forward Referee» system allows to broadcast a signal to the chief KHL office via the Internet. A standard and free Microsoft Windows Media Encoder software is used for this purpose. The software converts analog signal in Windows Media and transmits it to the net. Windows Media Player can be used for receiving of the signal and for reviewing it in real time. This program is included into Windows software complex. You may organize match broadcasting on web site via standard devices.

9. Compact and turnkey system

The «Forward Referee» system is delivered as a video server with preinstalled software. Commutation devices for video cameras connecting are included in scope of supply. You need only to connect cameras to begin working. System simplicity gives chance to prepare staff quickly for dealing with the system. A single person is able to install and to work with the «Forward Referee» system.

Capacity of system hard disks in standard configuration provides storing of 6 full recorded matches (with additional periods and bullets) in DV AVI quality. You may enlarge capacity if necessary.

10. Report with match events

The «Forward Referee» system may create a video report on-the-fly with marked by referee events of the match. The system provides an instant access to recorded material. Every event can be exported in a separate video file. All events can be put into one video file. You may «type» the time in video frames when exporting if necessary.



11. Support of external consoles to control

You may handily control the system from an external console (Jog/Shuttle) in addition to standard controlling devices. External consoles simplify working process. All basic commands can be executed via these devices: match events marking, quick navigating via scroll wheel between events, selecting of a required camera for reviewing, etc.

