

FREE TV AUSTRALIA OPERATIONAL PRACTICE OP – 35

TV COVERAGE PLAN FOR INTERNATIONAL AND DOMESTIC TEST, ONE DAY AND T20
CRICKET

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1. SCOPE

Free TV Australia Operational Practice 35 is a guideline to the minimum requirements for industry standard coverage of International and Domestic, Test, One Day and T20 Cricket.

It outlines infrastructure requirements for a television outside broadcast production using contemporary production techniques, which will meet current broadcast television presentation requirements, DRS (**D**ecision **R**eferral **S**ystem) requirements by Cricket's governing bodies as well as catering for future developments. The following description of facilities is based on those for an outside broadcast by one facilitator, with mention being made to events that may see multinational coverages involving numerous OB facilitators being present.

This operational practice has been developed by the Free TV Australia Project Group - Outside Broadcast. It's intention being to maximise TV and radio production potential and productivity at sports venues and the avoidance of costly omissions at planning and construction stages.

TV coverage of all forms of cricket has, and is, still expanding. The use of ultra slo-mo and super slo-mo", wireless, strike-zone, run out, computer tracking, stump and other specialty cameras, computer generated graphics, "second screen" applications and the requirement to interface these in an on site hosting environment along with the associated audio facilities. These developments require certain space and infrastructure requirements and impose more stringent requirements on lighting specifications for night matches.

2. TYPICAL COVERAGE

2.1 Cameras

The configuration of a typical International standard match at an approved venue will be:

Cameras covering the field of play	15 (inc. super and ultra slo motion cameras)
Cameras for O/B studio	2-3
Presentation seating area camera	1 (RF portable)
Stump cam	2-4
Strike Zone	2
Run Out	4
Ball tracking cameras	4-6
Infra Red cameras	4-6
Specialty cams- Aerial (fly on wire), cranes, motorised cameras, POVs	

2.2 Camera positions

2.2.1 Camera platforms

A typical working platform is in the order of 2.0 metres wide for each camera and 2.5 to 3.0 metres deep. TV platforms are to be exclusive of sporting group and venue camera operations.

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2.2.2 Centre-line, follow and high spin (super slomo) cameras, north and south ends

The main camera placement for cricket coverage is to be centred on the centre line of the pitch in use, (directly in line with the stumps at both ends). The camera platform/area is typically located in the centre of each end's grandstand at a height in the order of 15 metres above pitch level and 80 to 100 metres from the centre of the pitch. Actual height and distance is determined by the geography and architecture of individual grounds.

The platform/area should be able to accommodate at least four host coverage TV cameras, including strike-zone—minimum 8 metres. Other broadcasters and venue “in house” cameras will require extra space.

Factors influencing this position are a clear line of sight to mid pitch over the bowler's end umpire for each “centre-line” camera (C1 & C3) and a clear line of sight for each “follow” camera and high spin super slomo camera (C2,C4, 11 & 12) over the sight screen, of the bowlers run up to achieve full coverage of a fast bowler's run-up along with an unobstructed “camera follow” of the ball in play from wicket to boundary (no obstruction from columns, posts, spectators, PA speakers, television monitors etc). The centre line cameras along with the strike zone cameras at each end are integral to the match umpire's DRS.

The positioning of the camera platform should provide a typical working platform/area a minimum of 8 metres wide and 2.5 metres deep to locate the main cameras. Cameras from other broadcasters or venue facilitators would require a minimum of 1.8m width each. In the case of venues with multiple pitches the camera platform/area needs to be locatable to the assigned pitch. If this requirement is not incorporated in the build of the grandstands, the desired result can be achieved by building demountable platforms or scaffolding over grandstand seating. In this instance consideration needs to be given to spectator line of sight from behind the platform and the possible obstruction to cameras from spectator movements in front of the platform.

2.2.3 Slips Cameras, north and south

The nominated positions are immediately behind the perimeter rope, approximately 25m metres anti-clockwise from the centre line of the pitch in use, at both the north and south ends of the field. On field advertising signage in this area to be below 1.2 m

2.2.4 Reverse Slips cameras, north and south (Super Slomo)

The nominated positions are immediately behind the perimeter rope at the clockwise limit of travel of the sight screens (for the pitch in use) at both the north and south ends of the field. On field advertising signage in this area to be below 1.2 m.

2.2.5 Mid Wicket camera

A minimum 1.8m x 1.8m working platform/area is required that is aligned with the midpoint of the pitch on the western side of the arena. The position is generally subject to grandstand architecture, ideal siting is typically at a height of 6m above the field of play, and approximately 20m back from the playing field perimeter fence.

2.2.6 High Camera

A “high shot” camera location platform is proposed wherever grandstand structures can permit placement of a suitable platform or mounting structure. The platform/area should be

1.8m x 1.8m north or south of the field and should comply with current local WH&S regulations.

Access ways to the high camera location should provide for transporting of equipment to the area, which may include “hard” cameras. Lifting aids are to comply with work safety regulations.

Camera platforms above spectator areas should be fitted with kick boards and drop-nets to prevent any items accidentally falling to the spectator area.

2.2.7 “Fish-eye” camera

The “fish eye” camera uses an extremely wide angle lens. It’s positioning within the venue is to be such that it captures as much of the venue as possible.

2.2.8 Field Cameras

Portable cabled cameras are used on-field before and after play as well as during scheduled breaks in play for pitch reports, coin toss interviews and presentations. These cameras are typically used in conjunction with portable RF (wireless) cameras.

2.2.9 Infra Red cameras

Up to 4 unmanned cameras that use technology to indicate areas of differing temperatures that may be caused by a ball hitting—amongst other things-- a cricket bat, pad or glove. Replays of their outputs are used by the umpires in their DRS deliberations. Usually one camera located next to each of cameras 1 & 3 and on occasion, on one side of the ground in line with the popping creases. The on ground cameras are at a low level and are sometimes manned for movement after each over.

2.2.10 Ball tracking cameras

4-6 unmanned fixed cameras are installed around the ground, preferably symmetrically spaced, on stable mountings. This may require the installation of camera fixing points on various structures at each venue with permanent positions being negotiated with venue managements for multiple season use. Computer processing of the camera images generates a point of view from any angle within the field of the cameras coverage and is an integral part of the umpire’s DRS system. Access to the camera mounting points needs to comply with relevant State and Federal work safety regulations.

2.2.11 Strike zone cameras

2 unmanned fixed cameras are located on the main camera platforms and are placed directly in line with the stumps at both ends. Computer processing of the camera images allows accurate display of lbw situations.

2.2.12 Run out/crease cameras

4 x unmanned cameras are located at a minimum of 6 metres relative height, nominally 20 metres back from the boundary, aligned with the “popping crease” at each end from both eastern and western sides. Slo-mo replays ex the run out cameras provides for accurate determination of run outs by the video umpire (“third umpire”). Access is required for installation at least 2 days prior to play. Permanent install of fixing points may be negotiated with venue managements. Access to camera mounting points need to comply with relevant state and federal work safety regulations.

2.2.13 Stump cameras

Special stumps housing a camera have been developed, giving a point of view image from the wicket. These stumps generally connect to a control box unit via an “umbilical” cable. The control box is cut into the turf behind the wicket of the pitch in use. Camera signals are sent from the control box via underground cables to a processing unit located as close as possible to the field of play. They are then backhauled to the outside broadcast compound for further processing. Pitch microphones are usually installed in close proximity to the stump camera control boxes and the signals either cabled back to the outside broadcast compound or sent using Radio Frequency transmission (RF) see *clauses 2.4 & 2.5*. The location of the control boxes, pitch microphones and off field processing equipment are very much dependent on the geography and layout of each individual ground, it also requires a suitable means of accessing cables at the rear of each pitch within the wicket square.

2.2.14 Presentation/Press conference area

An area, preferably close to the player’s dressing rooms is required for post match presentation interview and press conference purposes. Minimum space requirement for television is 6.0m x 4.5m with provision for erection of sponsor backdrops, camera placement, power and fittings for temporary TV lighting installations. This “television area” can be incorporated into a larger media area as required.

2.2.15 Final Camera Placement

The above camera positions are typical for the coverage of cricket in its various forms, but final camera placement will always be at the prerogative of the programme producer and director.

2.2.16 Specialty cameras

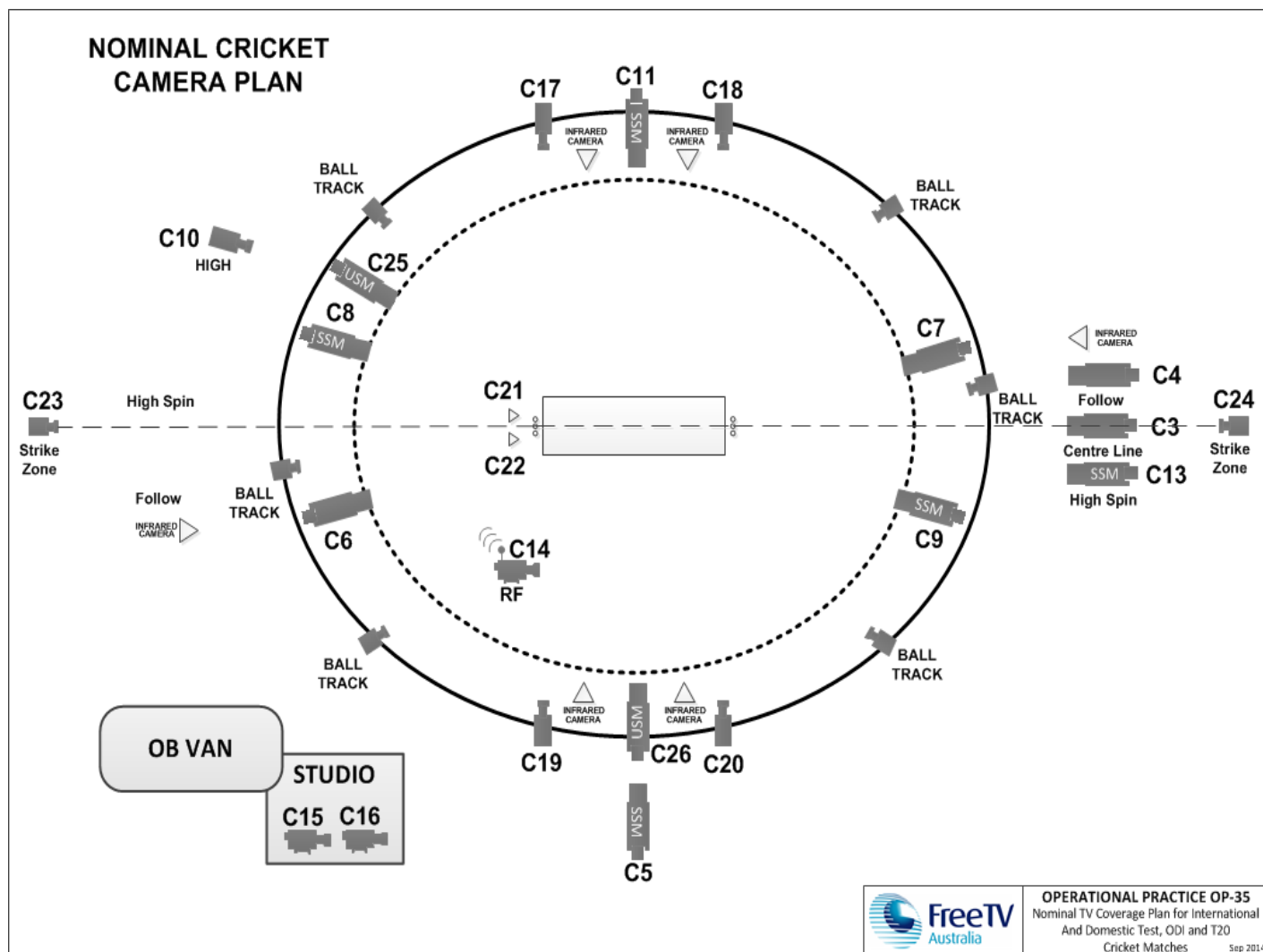
There are various cameras (cable cameras) and facilities available for production use that require “hard” fixing points to be symmetrically placed around the ground for the installation of cameras and other equipment on catenary type mounts. Suitable points, typically ‘high’, light towers, grandstand roofs etc. around the ground need to be identified and engineering specifications made available. In new or renovated venues these points should be included in the design phase of the project.

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2.2.17 Outline technical plan for cricket coverage



Nominal TV Coverage for International and Domestic Test ODI and T20 Cricket Matches

Camera Configuration

Cam 1	Van end centre line	Large format camera
Cam 2	Van end follow	Large format camera
Cam 3	Other end centre line	Large format camera
Cam 4	Other end follow	Large format camera
Cam 5	Mid wicket	Large format/Slomo camera
Cam 6	Van end slips	Large format camera
Cam 7	Other end slips	Large format camera

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Cam 8	Van end reverse slip	SLSM camera
Cam 9	Other end reverse slip	SLSM camera
Cam 10	High	Portable/special/large format
Cam 11	Reverse Mid wicket	Super slomo camera
Cam 12	SLSM van end	Super slomo camera
Cam 13	SLSM non van end	Super slo mo camera
Cam 14	On-field portable	Portable (RF) camera
Cam 15	Studio	Portable camera
Cam 16	Studio	Portable camera
Cam 17	Run out NE	Portable camera
Cam 18	Run out SE	Portable camera
Cam 19	Run out_NW	Portable camera
Cam 20	Run out SW	Portable camera
Cam 21	Stump camera	Special camera
Cam 22	Stump camera	Special camera
Cam 23	Strike zone Van end	Portable camera
Cam 24	Strike zone other end	Portable camera
Cams	Infra Red "Hot Spot"	Up to 4 proprietary cameras
Cams	Ball tracking cams	Up to 6 proprietary cameras
Cams	Low mount near Cams 5 & 8	Ultra slo mo camera

2.3 Commentary Boxes

2.3.1 Commentary Box Position

The main TV commentary box should ideally be behind and above the main camera platform at either the north or south end subject to the OB van site, and able to accommodate up to 4 x commentators, up to 3 producers, a statistician, a scorer and a suitable area for "off duty" commentators to see the match along with hearing the commentary. It is not uncommon to have as many as twelve personnel working in a cricket commentary box at any given time.

2.3.2 Commentary Box

The typical size for the main commentary box is in the order of 4--5 metres frontage x 6 metres deep. The commentary box is to give as clear and unobstructed view of the ground as possible and depending on the venue the ground scoreboard.

Internal layout is typically in tiers with commentators and statistician occupying the area closest to the window at ground level and production staff, scorers etc. on a raised area behind, giving all parties as clear a view of the ground as possible.

There is no need for a permanent bench at front of commentary box as typically TV monitors and other visual aids are placed on the floor with commentators viewing the ground over the top of them.

2.3.3 Studio

A TV Studio area is required, preferably adjacent to the TV commentary box for hosting of the TV program. Typical dimensions for TV studio are 6 metres x 6 metres with 3.6 metres (minimum) ceiling height and have a (background) view to the field of play. The window of the studio is to be as “mullion free” as possible and sloped inwards at an angle between 14-17 degrees to the vertical at the sill (inwards at the head/top of the window) to minimise reflections from studio lights.

The commentary box / studio area needs to be air conditioned with capacity to cope with up to a 12 person heat load plus studio lighting load. Evaporator fans need to be low noise units (Not to exceed NR 35) with local controls for the operation of the unit providing the ability to turn the unit “off” during studio on air segments.

The walls of the studio should be constructed of a material that reduces sound reverberations within the space along with providing sound isolation from adjacent areas. A dark matte finish surface is required to reduce reflections in the background window.

Lighting Bars are to be installed in the studio / on camera area for mounting of TV lights. Location and load capacity of the bars is to be decided in consultation between venue management and TV technical representatives but is typically located 4 metres from the front (in a 6m studio space) and rated to carry in the order of 40Kg.

A 30 Ampere three phase interconnect cable is required from the OB compound for lighting power.

2.3.4 Unilateral commentary box and studio

International Cricket series generally involve overseas broadcasters in addition to the local (host) broadcaster. The overseas broadcasters take the general coverage of play produced by the host broadcaster but require “unilateral” camera locations, commentary boxes and studio facilities to produce a coverage tailored to their specific viewing audience.

Unilateral broadcaster’s commentary and studio facilities should be similar in scope, to that provided to the host broadcaster.

Additional space is required in the OB van compound to accommodate OB facilities for international broadcasters.

2.3.5 Radio Commentary Boxes

Provision needs to be made for radio broadcast boxes adjacent to the TV box area.

Nominal area for a radio box is 3.5m x 3.5m with clear sight line to the field of play and to the main scoreboard.

Coaxial video, telecommunications & screened audio cables and fibre cables need to be installed between the TV OB area and radio commentary boxes to provide for video replays, sound splits and communications circuits between radio and TV services.

2.4 Wireless Microphones, Radio spectrum requirements

Reference should be made to FREE TV AUSTRALIA OP 27: *Operation of wireless microphones in Australia*, for matters concerning radio microphones.

Wireless microphones are extensively used for umpire calling and TV / radio interviews. Wireless mic frequency co-ordination is required on a venue by venue basis to avoid

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interference with TV operations, radio broadcasters, umpires and linesmen, ground announcers, entertainment, and other legitimate users of wireless microphone equipment.

2.5 Radio Frequency (RF) Spectrum Management

Extensive use of the RF spectrum is necessary for comprehensive TVOB cover of International and Domestic, Test, One Day and T20 Cricket.

Allocation of frequency bands is generally as follows:

- 2.0 & 2.2 GHz microwave bands:
 - Portable wireless cameras
 - Specialty POV cameras

For specific information on use and coordination of ENG / TOB in the 2 and 2.2GHz bands refer to:

OP63 Spectrum usage for ENG and TVOB Operations in the Brisbane / Gold Coast / Sunshine Coast Area

OP64 Spectrum usage for ENG and TVOB Operations in the Sydney / Canberra / Newcastle / Illawarra Area

OP65 Spectrum usage for ENG and TVOB Operations in the Melbourne Area

OP66 Spectrum usage for ENG and TVOB Operations in the Adelaide Area

OP67 Spectrum usage for ENG and TVOB Operations in the Hobart Area

OP68 Spectrum usage for ENG and TVOB Operations in the Darwin Area

OP69 Spectrum usage for ENG and TVOB Operations in the Rural and Remote Areas

- 7 / 8 GHz microwave band Medium haul point to point back haul links
- 13GHz microwave band Short haul point to point back haul and local interconnect links
- 470 – 520 MHz band Duplex Radio Telephone (RT) voice communications, telemetry and data communications
- 520 – 694, 1790-1800 MHz band Wireless microphone operations
- Aggregate RF systems requirements can be in the order of 12 of 2.0 & 2.2 GHz channels, 4 to 6 of 7 / 8 GHz channels, 4 to 6 of 13 GHz channels, 10 x UHF duplex RT frequencies and 40 to 50 wireless microphone frequencies

RF spectrum usage is strictly controlled, and specific channel allocations are generally licensed to individual commercial entities. Temporary use of multiple frequencies as is required for operations on the major event scale require frequency co-ordination with established license holders and special licensing for the complete RF requirements for the period of the event.

It is essential that a rigid frequency management procedure be implemented on a venue by venue basis to ensure non interference between services within the precinct involved in TVOB origination, including authorised unilateral operators, and for other licensed users (ENG etc.) operating in near proximity to the OB precinct.

Frequency allocation and usage regulations are becoming increasingly rigid and restricted. To this end it would be advantageous to consider making an enclosed venue electronically

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shielded from areas outside, by incorporating materials and/or design techniques during construction that would reduce or minimise RF interference. Such infrastructure would need to be considered during the design stages of any new venue or those undergoing redevelopment.

Wireless microphone frequency management is the prerogative of the event promoter and venue management, but TVOB operators need to be fully involved in channel allocations from the early planning stage of the project.

Microwave and UHF frequencies are licensed but may be subject to frequency sharing arrangements. Co-ordination between users, including news services not directly involved in the event telecast, but licensed to operate in proximity of the event precinct is an essential pre-requisite for event RF spectrum planning.

Major events involving multiple operators of RF services require overall coordination to be under statutory authority control of use / misuse of RF spectrum assets.

3. OUTSIDE BROADCAST COMPOUND

3.1 General

A level hardstand area for outside broadcast control units (OB vans) parking is required, it should be situated as close as possible to the camera platform/ TV commentary box area. This area (OB compound) should be securely fenced so as to provide security for television equipment, personnel, TV operations and the safety of the public. This is particularly important on large scale television operations where facilities are setup for many days, weeks and there is the need for only accredited personnel to have access to the compound.

Major outside broadcast vehicles are semi trailer units built to Australian road transport regulations. Venue vehicle access and load bearing capacity needs to comply with maximum vehicle dimension and weight specifications. Typical requirements are 22.0 metres combined trailer and prime mover length, maximum height of 4.3 metres, and 8.5 tonne per axle loading.

Access to and egress from the OB compound needs to cater for the turning circle and overhead clearance requirements of maximum dimension articulated vehicles.

Special attention to overhead obstructions is necessary where ramps or uneven road surfaces are involved along with adequate clearance on the underside of the OB vans

Generator hardstand should be incorporated in the OB compound (see Section 5).

Typical hardstand area is in the order of 500 square metres either 25 metres x 20 metres or 50 metres x 10 metres, rectangular. This area would cater for up to two OB facilitators with more space co-sited with it, should the event have a number of Australian or International unilateral broadcasters.

The hardstand area is required to be level to accommodate OB vans with expanding sides with any slope for drainage being kept to a minimum.

Provision is to be made to site a satellite uplink vehicle within the compound, adjacent to the compound or within the venue area with suitable cable/fibre connectivity and local 32A 3 phase power outlets x 3 as a minimum. Clear line of sight to the north eastern sky for the majority of Australian broadcasters and to the western sky for a number of international broadcasters is a location requirement.

Should the OB Compound be situated within an enclosed space (underground or under a grandstand for instance) adequate ventilation is to be provided so as to comply with relevant safe work practice regulations as outlined by each state's regulatory body Code of Practice.

Air conditioning units on OB vans and portable sheds give off a considerable amount of heat which needs to be removed from the area and this along with any exhaust fumes from generators and vehicles (buses, delivery vehicles, fork lift trucks etc), needs to be taken into account when designing ventilation systems.

3.2 Personnel Amenities

Adequate personnel services need to be provided in the OB compound. These amenities should include:

- Toilet facilities, separate male and female facilities
- Sewer or self contained connection, town water connection
- Lighting for personnel movement
- Drainage contours such as to minimise "ponding" during heavy rainfalls
- Food preparation area and catering area
- First Aid facility
- Regular cleaning and rubbish removal services
- Clearly marked emergency egress routes

4. POWER

4.1 Typical Requirements

Typical power requirement is for 250 Amps per phase three phase (415Volt) supply adjacent to the outside broadcast vehicles hardstand area. Power should be available via powerlock connectors with OB facilitators providing their own distribution equipment as required. Major venues likely to be hosting major international events or those whose compounds service more than one venue should provide 2 or 3 installations to accommodate multiple broadcasters should specify 400 Amps per phase in construction and rebuilding planning.

4.2 Heavy neutral currents

The high level of use of switch mode power supplies in TVOB technical equipment has resulted in high neutral current drain in three phase mains supplies. High current neutral connections should be specified for mains power installations planned for TVOB compounds.

4.3 Circuit breakers and safety

Where mains power supplies are protected by residual current devices (RCDs) trip current of the source RCD should be adjustable, to be set to a higher trip current level than the main OB van circuit breaker, such that the OB van main circuit breaker serves as the prime safety switch for the TVOB operation.

TVOB mains supplies are to be separately protected from other electrical supplies servicing the rest of the venue.

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Power reticulation ex the OB van to operational areas is to be RCD protected in accordance with Work Safety requirements.

4.4 Local and standby generators

Generator hardstand should be incorporated in the OB compound and should be adjacent to the mains power connect point.

Sourcing of generators is a TVOB responsibility. Generators are to be silenced to EPA requirements and are to be sited to obviate exhaust fume exposure to TVOB staff and patrons.

For indoor/undercover OB compounds provision needs to be made to extract exhaust fumes. If this is not possible, interconnect cabling specified to full electrical load is required to be installed between the generator site and the OB compound.

Three phase 32 Ampere rated interconnect cables (5 pin connectors) are to be installed between the OB compound and commentary box / studio area, and between the OB compound and sideline for extension of OB van power to main operational areas.

5. VENUE AUDIO / VIDEO (A/V) CONNECTIVITY

5.1 Venue Audio / Video (A/V) Connections

The connect panel for venue A/V services should be located in the OB compound, co- sited with TVOB cable terminations and Telco services.

TV signals emanating from the OB unit will be HDSDI with embedded audio (minimum stereo audio) supplied on BNC connectors.

The video umpire should be provided with HD monitoring, with suitable cabling infrastructure supplied to their location

Interface connectors for off-air TV distribution, venue A/V distribution, Pay-TV cable and venue phone should be available at the connect panel.

6. CABLING

6.1 General

Simple access is required for cabling from the outside broadcast vehicle hardstand to the main camera platform, roof camera platform, main commentary box, unilateral commentary box, on camera position and field, and to all other operations areas, and to the nominated post match presentation area.

TV cable installations are site specific and need to be planned on an individual basis, but provision needs to be made for cable routes which provide ease of access, do not compromise venue aesthetics and do not present risk to OB crews, venue staff or the general public.

Cable routes within the venue should allow for obstacle free installation and removal of cables.

Wherever possible, ground level cable paths clear of public traffic areas are preferred.

Where cables need to be routed below ground level open cable troughs with easily removable and replaceable cover plates are the preferred option.

As a general rule provision for day cabling should allow for full cable install within a 30 man hour rig time, and de-rig within 12-16 man hours.

Where this cannot be achieved due to either stadium access problems or to the scale of the OB operation, installation of “season cabling” is a preferred option.

Cable conduits are not recommended for temporary cable installs, but where there is no other option; conduits should be a minimum 150mm diameter with “draw wire” installed. A minimum of 4x conduits should be available in order to separate signal cables from power cables, and to allow for (inevitable) future expansion.

6.2 Permanent Cable Install

Cable routes in major stadium complexes may be such as to preclude both DAY and SEASON cable installs.

In such cases permanent installations become the only option.

It should be recognised that TV production techniques change, particularly with equipment innovations. Changes to the types of cables used are becoming less with the SMPTE 311M fibre/copper hybrid cable terminated in SMPTE 304M connectors becoming the industry standard for current cameras.

Implementation of specialised equipment is seeing increased demand for fibre optic cables, precision digital video coaxial cable, and (multi way) fibre optic utility use cables for video, audio, data and communications acquisition and transmission.

Co-axial video cable is to be specified for end to end delivery of uncompressed HD video over the installed length of cable.

Cable types and cable technical specifications alter with advances in technology so cable schedules need to be updated prior to planning any permanent installation.

Permanent cable installations should be planned in consultation with venue management and TV Rights holders, with emphasis on specifications for cables, connectors and locations of outlets.

For multi-purpose venues, the total installation should encompass the highest common requirements of all possible event cabling.

Provision needs to be made for replacement and upgrade of such installations.

Preference is for cantilevered cable trays exclusive to TV cabling. Conduits – if provided – should be free of turns no less than 120 degrees from any change of direction. Where conduits are the only option, 150mm diameter is the minimum specification, and multiple conduits should be available to all operations areas with provision for upgrade and expansion.

7. BACKHAUL

7.1 General

TVOB transmission to studio base can be via Telco circuits, satellite uplink or local microwave radio transmission.

The Telco access point should be adjacent to the OB compound, with any powered equipment being supplied from the same supply as the OB Compound.

Compound space to be provided for up to 3 satellite uplink vehicles with a clear view to both the north eastern and western skies is required within or adjacent to the OB compound.

7.2 Microwave Link Platform

A 2.0 m x 2.0 m platform is typically required for TVOB backhaul microwave link installation. The platform is to be sited to allow clear line of sight radio transmission to the TV studios or to a suitable intermediate relay site.

A microwave platform may also be required within the stadium for mounting of RF camera microwave receivers and/or antennae.

The provision of microwave link platforms at the stadium will depend on the surrounding topography and available link paths in and out of the stadium.

Any structures need to comply with relevant Work Health & Safety (WHS) regulations.

9. LIGHTING

(Reference should be made to FREE TV AUSTRALIA OP 31: *Lighting Requirements for Television*.)

A brief summary of lighting standards is as follows:-

9.1 International Standard for TV Venues

Lighting level (E _v) toward main cameras	1400 lux (average)
Lighting level toward other directions	1000 lux
Lighting level toward USM / SSM cameras:	1800 lux within defined zones- no replay zones (SRZ)
Colour temperature (TK)	4000K to 6500K, but within 500K at individual venues: preferred value 5600K.
Colouring rendering index R _a	≥ 90
Maximum GR for main TV cameras:	<40
50 Hz mains flicker	minimise flicker by cross aiming and spreading floodlights over the three phases: ≤10% flicker for ≤600fps ≤3% flicker for ≤1,000fps.

9.2 Professional Standard

E _v toward main cameras	1000 lux (average)
E _v toward other directions	800 lux
Colour temperature	4000 K to 6500 K, but within 500K at individual venues.
Colour rendering index R _a	Minimum requirement Ra 85

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	Ra > 90 preferred
Maximum GR for main TV cameras	<40
50 Hz mains flicker	minimise flicker by cross aiming and spreading floodlights equally over the three phases

Note: Whilst satisfactory picture quality can be achieved at the minimum lighting levels stated, restrictions are placed on full usage of zoom lenses and focusing becomes quite difficult for camera operators on BCU (big close up) camera angles. Super Slo-mo cameras cannot perform satisfactorily below Professional standard lighting.

10. SAFETY

All personnel working on TVOBs are to be familiar with and to comply with relevant WHS regulations.

A site specific risk assessment is to be undertaken by venue management and TVOB operations management during planning stages of the event.

TVOB personnel are to be inducted as to venue and TVOB safety requirements prior to commencement of duties.

Scaffolding, camera tracks, aerial cabling and other constructions are to be installed by suitably licensed persons.

Camera cranes, scissor lifts, fork lifts and other mobile work platforms are to be operated by licensed persons.

Electrical installations are to be undertaken by licensed persons, and tested and tagged in compliance with statutory regulations.

Temporary TV cable installations are to comply with site hazard reduction policies.

As safety regulations can vary subject to individual state government regulations, applicable requirements need to be determined on a site by site basis.

11. CABLE INSTALLATIONS AT CRICKET VENUES

Implementation of HDTV equipment is impacting on cable installation with increased demand for Fibre optic camera cables, precision digital video coaxial cable, and (multi way) fibre optic cables for utility use.

Co-axial video cable is to be specified for end to end delivery of uncompressed HD video over the installed length of cable.

The following cable listings are typical requirements for current day cricket telecasts but intended only for guideline reference. Advances in technology may see cable schedules change, so planning in consultation with the television industry is required prior to any permanent installation taking place.

Permanent cable installations should be planned in consultation with venue management and TV Rights holders, with emphasis on specifications for cables, connectors and locations of outlets.

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Outside Broadcast Compound to Main Camera Platform “Van end”

8 x SMPTE 311M camera cables SMPTE 304M connectors
1 x 6 pair single mode fibre optic cable terminated with LC connectors.
2 x coaxial video
4 x CAT 5 or similar comms cables
1 x 12 way audio multi-mic cable

Outside Broadcast Compound to Main Camera Platform ”non Van end”

6 x SMPTE 311M camera cables SMPTE 304M connectors
1 x 6 pair single mode fibre optic cable terminated with LC connectors.

Outside Broadcast Compound to Roof Camera Platform

2 x SMPTE 311M camera cables SMPTE 304M connectors

Outside Broadcast Compound to TV Comm Box and Studio Number 1

4 x SMPTE 311M camera cables SMPTE 304M connectors
2 x 12 pair single mode fibre optic cable terminated with LC connectors.
6 x digital coaxial video
2 x 12 way audio multi-mic cable
1 x 20 pair Telco (Audio)
1 x 20 pair Telco (Data)
1 x 30 Amp per phase three phase 5 pin power interconnect cable
6 x CAT 5 or greater comms cable

Outside Broadcast Compound to TV Comm Box and Studio Number 2

4 x SMPTE 311M camera cables SMPTE 304M connectors
2 x 12 pair single mode fibre optic cable terminated with LC connectors.
6 x digital coaxial video
2 x 12 way audio multi-mic cable
1 x 20 pair Telco (Audio)
1 x 20 pair Telco (Data)
1 x 30 Amp per phase three phase 5 pin power interconnect cable
6 x CAT 5 or greater comms cable

Outside Broadcast Compound to Field ”Van end”

8 x SMPTE 311M camera cables SMPTE 304M connectors
1 x 12 pair single mode fibre optic cable terminated with LC connectors.
4 x coaxial video

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CRICKET

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2 x 12 way audio multi-mic cables
1 x 20 pair Telco (Audio)
1 x 20 pair Telco (Data)
1 x 30 Amp per phase three phase 5 pin power interconnect cable
4 x Cat 6 computer cable

Outside Broadcast Compound to Field "non Van end"

8 x SMPTE 311M camera cables SMPTE 304M connectors
1 x 12 pair single mode fibre optic cable terminated with LC connectors.

Outside Broadcast Van to High and Run Out cameras

1 x SMPTE 311M camera cables SMPTE 304M connectors to each position

Outside Broadcast Compound to Dressing Room(s)

TV cabling is required to each player activity area of both "home" and "visitors" dressing room as follows:

1 x SMPTE 311M camera cables SMPTE 304M connectors
1 x 6 pair single mode fibre optic cable terminated with LC connectors.

Outside Broadcast Compound to Third Umpire/Video Referee

2 x digital coax video
1 x 6 pair single mode fibre optic cable terminated with LC connectors.
4 x audio cables
2 x CAT 5 or greater comms cable

Outside Broadcast Compound to Backhaul microwave platform

2 x Microwave equipment specification triax.
