
1. SCOPE

Free TV Australia Operational Practice 50 is a guideline for the minimum requirements for live television coverage of motorsport. It provides an indication of infrastructure for an outside broadcast production using contemporary production techniques, which meet commercial television presentation formats.

This Operational Practice has been developed by the Free TV Australia Project Group - Outside Broadcasts in the interests of maximising television and radio production potential and productivity at all venues and avoidance of costly omissions at planning and construction stages.

TVOB coverage of motorsport has progressed and expanded with the general availability of Super Slo-Mo Cameras, portable wireless cameras, Point-Of-View (POV) cameras, a transition of analog to digital in-car platforms, and aerial platforms including helicopters and high-reach cranes. This, along with the expansion of an International clientele presence has increased the venue space and infrastructure installation requirements for TV operations.

Televising of Motorsport is generally undertaken by one major television network with reliance on internal producer and project management input. Event duration, including lead-in, can vary between 4 – 14 days, depending on venue and event production. The number of cameras may vary between 10 and 30 between programs and venues.

2. TYPICAL COVERAGE

Camera coverage for Motorsport events is planned on a venue by venue basis to meet the particular requirements of individual circuits. Regularly scheduled circuits on the Australian motor Racing Calender include: Eastern Creek International Raceway, Eastern Creek NSW; Sandown International Raceway, VIC; Bathurst Motor Circuit, Bathurst NSW; Hidden Valley Raceway, Darwin NT; and Symmons Plains Raceway, TAS.

2.1 Cameras

The typical configuration of a motorsport venue is one of sequential coverage:

Cameras covering circuit	8 - 30
Cameras in for studio	1 - 2
Other cameras including aerials, POV	2 – 6
In-Car / On-Board	6 – 10 cars – each with 4 cameras

2.2 Camera Positions

This is venue specific, but could include the following – refer to attached map below:

- Helicopter mounted cameras
- Portable wireless cameras
- Jimmy Jib
- Tracks for Jimmy Jib
- Travel Tower / Cranes
- Cameras on build up kits
- POV cameras
- In-Car

Cam 01 Main Overview of main straight

Positioned with start / finish in view usually at height – variations on 3 – 6metre scaffold above ground. Preference is for an angle of view 30-40m from start / finish.

Cam 02 Generally first corner approach and departing shots

Cam 03 & 06 Bridge mounts

Positioned with approach and depart points of view. Mounted with hardware ably fixed to bridge structure.

Cam 04, 05, 07 – 10 Corners – approaches and departing shots

Cam 30 Pit overview

Enable the production team to oversee a piece of action exiting pit lane with comparisons of pit stops and car activity on track.

Cam 31 – 32 Portable wireless pit cameras

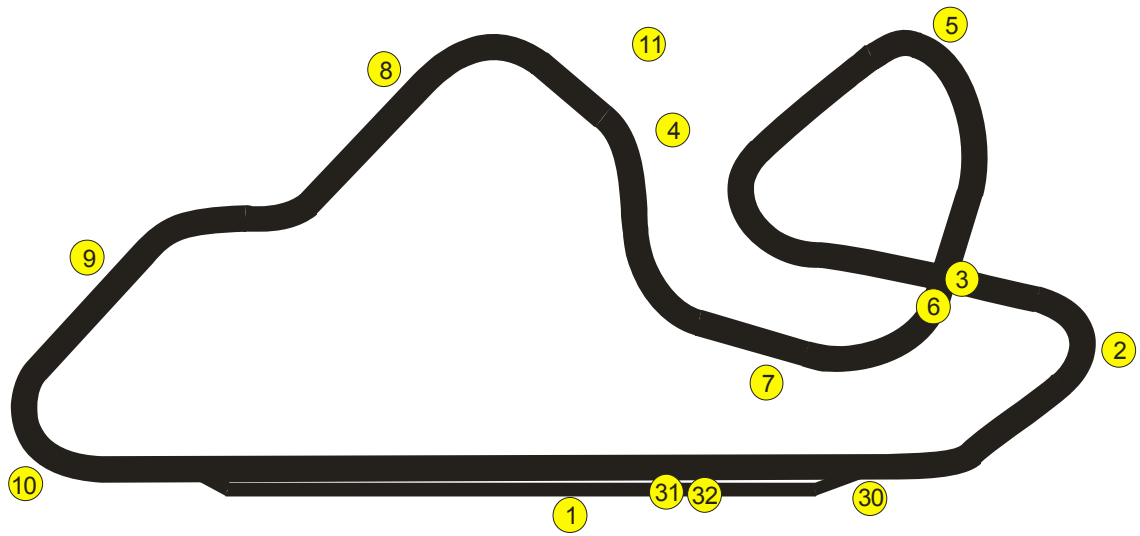
Roaming facilities for pit reporters and overviews within team garages.

Special cameras

Special cameras additional to those used above may be used at certain venues. These include POV cameras within Race Control to monitor activity, helicopters, blimps etc. Specialised cameras shall be negotiated in the lead up and planning of a major event.

This is venue and program specific, but could be configured as below. Example – Oran Park, Narellan, NSW:

Fig 1: Nominal Camera Positions



2.2.1 Final Camera Placement

The above camera positions are typical of a motorsport event but final camera placement will always be at the prerogative of the program producer/s and director. Camera positions, scaffolds barriers etc. are to comply with CAMS, FIA and other relevant safety requirements.

See Clause 9: Safety.

2.3 Commentary Boxes

2.3.1 Commentary Box Position

The TV commentary box should be close to pit garages and overseeing start / finish line. Height should be approximately 15m above track level, a distance of 5 -10m back from the track with a clear view. The box should be able to easily accommodate 4 x commentators, 2 x statisticians, and 2 x producers. Commentators would ideally be seated at the front of the box and facilitators at rear on raised platform. The commentary box needs to be air conditioned with capacity to cope with 12 personnel heat loading. Evaporator fans need to be low noise units (not to exceed NR 35) with local control for optional shut down during program segments.

Commentary boxes are to be acoustically treated in order to minimise external noise and to reduce internal reflectivity.

Provision is required for cable installation from TV OB compound. (See CABLING).

2.3.2 Commentary Box Dimensions

Typical room size would be in the order of 10 metres frontage x 5 metres deep, with a minimum ceiling height of 2.1 metres.

2.3.3 Studio

A TV studio area is required at major events where integration is required for live components and hosting of the program. This area to be close to the main TV commentary area – not more than 50 metres from each other. Preference should be given to areas which face track activity as a background – with double glazed glass frontal area giving a clear view to background on-track activity, able to be treated with tinted lamination for light absorption. The window should be mullion free behind the on-camera position, and should be tilted at approximately 15 degrees (base into the studio) to minimise daylight reflections. The studio should be acoustically treated to minimise external noise and internal acoustic reflections. Typical dimensions for TV studio are 6 metres x 6 metres with a preferred minimum ceiling height of 3.6 metres.

Studio area needs to be air conditioned with capacity to cope with 6 x personnel heat load as well as studio lighting. Evaporator fans need to be low noise units (not to exceed NR 35) with local control for optional shut down during program segments.

Lighting bars are to be installed in the studio area for the mounting of TV lights. Location and load capacity of the bars is to be specified on a venue-by-venue basis. Electrical load provision is to be nominally 3 phase – 32Amp per phase used in conjunction with a breakout box incorporating dimmers and single-phase outlets. A GPO outlet rated at 15Amps for general low wattage lights would also be required.

A 32Amp 3 phase interconnect also required from TV OB Compound for isolation and back up.

2.3.4 Unilateral Commentary Boxes

Unilateral TV commentary boxes should be provided to house international clientele. Up to 4 boxes sited similarly to the main TV commentary, similarly equipped and fitted out. These units are not shared. Nominal floor area for unilateral commentary boxes is 3.5 metres x 3.5 metres with clear line of sight to the track.

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 commentary box is 3.5 metres x 3.5 metres with clear sight to track activity.

Coaxial, Telco and screened audio cables need to be installed between TV OB compound and radio commentary boxes to provide video replays, sound splits and communication circuits between radio and TV services. Connectivity and proximity to local Telco infrastructure is also a consideration.

2.3.6 Pit Lane Commentary position

Pit Lane roaming for up to 3 x camera operators, 3 x “spotters” (safety look-out guides), and 3 x pit reporters. Other personnel requiring access are 2 x producers, 1 x floor manager and 3 x audio assistants. All are to be clothed in fire-retardant overalls.

TVOB personnel operating in or in the vicinity of pit lane are to comply with CAMS, FIA and other relevant safety regulations.

See Clause 9: Safety.

2.3.7 Wireless Microphones

Wireless microphones are extensively used for TV and radio interviews. Wireless microphones frequency co-ordination is required on a venue by venue basis to avoid interference with TV operations, radio broadcasters, venue officials, public address announcers, entertainment, and other legitimate users of wireless microphone equipment.

See Clause 2.3.8: Radio Frequency (RF) Spectrum management.

2.3.8 Radio Frequency (RF) Spectrum Management

Extensive use of the RF spectrum is necessary for comprehensive TVOB cover of major motor racing events.

Allocation of frequency bands is generally as follows:

- 2.5 GHz microwave band: Portable wireless cameras
In-car camera uplinks
Relay helicopter down links
Camera helicopter down links
- 7 / 8 GHz microwave band Medium haul point to point back haul links
- 13 GHz microwave band Short haul point to point back haul and local interconnect links
- 470 – 520 MHz band Duplex Radio Telephone (RT) voice communications
- 520 – 820 MHz band Telemetry and data communications
Wireless microphone operations
- Aggregate RF systems requirements can be in the order of 12 x 2.5 GHz channels, 4 to 6 x 7 / 8 GHz channels, 4 to 6 x 13 GHz channels
- 10 x UHF duplex RT frequencies and 4 to 6 x 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.

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 Units) parking is required convenient to the camera platform / TV commentary box area.

The OB van compound should be fenced off from public access for security of TV operations, and more importantly for public safety.

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 17.5 metres combined trailer and prime mover length, a 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.

On larger events, space requirements can be increased to an area of 3000 square metres. This to cater for increased number of portable buildings / sheds, marquees, temporary office facilities, edit areas, extended VTR areas, meeting areas, catering and international contingency for clientele.

On long duration events, walkways are to be protected from severe weather by use of "duck-board" type flooring and overhead awnings.

Special attention to overhead obstructions is necessary where ramps or uneven road surfaces are involved.

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

Provision is to be made to site a satellite uplink vehicle within the compound, or adjacent to the compound with clear line of sight to the North-East sky.

3.2 Personnel Amenities

Crewing on major TVOB operations can exceed 200 staff.

Adequate personnel services need to be provided in the OB compound.

- These amenities should include:
- Toilet facilities, separate male and female facilities
- Sewer connection
- Town water connection
- 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

4. POWER

Typical power requirement is for 3 phase supply 150 Ampere per phase adjacent to the outside broadcast vehicles hardstand area. Larger events require more – nominally 250 Amps per phase to cater for occupation of portable buildings / sheds. Power should be made available over 4 x three phase outlets or via ‘Power-lock’ bulk connectors. Industry standard power connections are Cutler Hammer DS63 outlets, Wilco 5 pin 3 phase (40 amp/50 amp) connectors and outlets, and / or “Power Lock” bulk supply connectors. Other considerations for connection to bulk mains power supply are threaded tapped studs on mains buss-bars for bolted connection via suitably rated lug connectors.

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.

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 trip current higher than the trip current of the main OB circuit breaker, such that the OB van serves as the main safety switch for the TVOB operation.

TVOB electrical services are to be separately protected from electrical supplies servicing other areas of the event precinct.

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

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. Where larger power sources are required, the need for increased sized generators is required. Preference should be given for synchronous activity between 2 x generators and synchronous mains grid power (if available).

Where generator hardstand cannot be within the OB van compound interconnect cabling specified to full electrical load (150 Amps / phase, three phase) is required to be installed between the generator site and the OB compound.

Three phase 30 Ampere rated interconnect cables (Wilco 5 pin connectors) are to be installed between the OB compound and commentary box/studio area.

5. AUDIO / VIDEO (A/V) CONNECTIVITY

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 generally be 16x9 wide screen analog or digital video, and at least stereo audio.

The venue A/V service provider would need to provide a format converter for reticulation to any 4x3 in house monitors.

Interface connectors for off-air TV distribution, venue A/V distribution, Foxtel 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 a main conduit servicing access to under-track provisions. These may vary to different directional points from the main compound to service all areas around the track/venue. Access for multicore and/or triax or fibre cabling required to service all cameras, microphones and RF receive sites located around venue vicinity. Other areas of consideration are commentary box, studio, unilateral clientele and operational areas.

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 workers or 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 removable cover plates are the preferred option.

Where cables need to be routed above traffic area open cable trays with cantilever mounting from below allow for simple cable runs with "lift in" installation possible.

Cable conduits are not recommended for temporary cable installs, but where there is no other option conduits should be a minimum 150 mm diameter with draw wire installed. A minimum of 3 x 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 complexes may be such as to preclude temporary cable installs.

In such cases permanent installations become the only option.

It should be recognised that TV production techniques change, particularly with equipment innovations, and that cable installations are subjected to continuing upgrades.

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 digital 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 (fibre), satellite uplink or local microwave radio transmission.

The Telco access point should be adjacent to the OB compound and no more than 25 metres away.

Space provision for a satellite uplink vehicle with clear view to the North-East sky is required within or adjacent to the OB compound.

Space allocation within TV compound to cater for increased International clientele or unilateral service providers for future expansion also needs to be considered.

7.2 Microwave Link Platform

A 2.4 m x 2.4 m platform is typically required for TVOB backhaul microwave link installation. On larger events a bigger platform would be required – 7.2 metres x 3 metres. This to cater for increased short haul link hops and multiple receive facilities.

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 venue for mounting of (manned or unmanned) wireless camera microwave receivers.

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 Occupational Health & Safety (OH&S) regulations.

8. LIGHTING

(REFER TO *FREE TV AUSTRALIA OP 31: LIGHTING REQUIREMENTS FOR COLOUR TELEVISION*)

Whilst satisfactory picture quality can be achieved at the minimum lighting levels stated (1000 lux), restrictions are placed on full usage of tele 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.

9. SAFETY

All personnel working on TVOBs are to be familiar with and to comply with relevant OH&S 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.