

Victorian Casino
and Gaming Authority

**Technical Requirements for Gaming Machines
and Electronic Monitoring Systems
in the Melbourne Casino**

the "Technical Requirements Document"

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Version 3.0

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Technical Requirements for Gaming Machines and Electronic Monitoring Systems in the Melbourne Casino

Final Version 3.0 - 10 July, 1996

1. Introduction

1.1 Description of Document

This document defines minimum technical requirements for Electronic Gaming Machines (EGM) and Electronic Monitoring Systems (EMS) in the Melbourne Casino.

The Requirements specified in this document are supplementary and additional to and do not take the place of any of requirements of the Casino Control Act or any Regulations made under that Act.

The technical requirements provide the criteria against which approval under Section 62 of the Casino Control Act for Electronic Gaming Machines and Electronic Monitoring Systems for use in the Melbourne Casino will be granted by the Director of Casino Surveillance (hereafter called the "Director").

1.2 Related Approvals

The Director also approves plans and specifications (under Section 59 of the Act) of the security and surveillance system to operate in the Casino.

The Victorian Casino and Gaming Authority (hereafter called the "Authority") approves (Under Section 121 of the Act) a system of internal controls and administrative and accounting procedures for the casino. The Authority also approves (under Section 60 of the Act) the games to be played in the Casino and the rules for those games.

Accordingly, the EGMs and Electronic Monitoring systems in the Melbourne Casino must not only comply with these minimum technical requirements outlined in this document, but must be operated so as to comply with the system of internal controls and administrative and accounting procedures approved by the Authority and must also operate with the security and surveillance plans and specifications approved by the Director.

1.3 Standards

The Victorian Casino and Gaming Authority aims to set the highest possible standards for gaming machine operations within a Casino whilst at the same time providing a regulatory environment where the Casino Operator is encouraged to adopt world best practice for all aspects of its operations, including gaming machines, internal controls, security and surveillance.

These technical requirements address three fundamental issues consistent with the Authority's objects under the Act "to ensure that the management and operation of the casinos remains free from criminal influence or exploitation, to ensure that gaming in casinos is conducted honestly and to promote tourism, employment and economic development generally in the State". These three issues or areas that are addressed by the technical requirements are:

a. Security

The protection of the VCGA, Casino Operator and Patrons from improper interference with gaming, fraud and other actions intended to compromise the integrity of the gaming machine operation.

b. Financial

The establishment of appropriate accounting, financial and audit controls.

c. Operations

The application of minimum standards for acceptable and safe player operations, machine performance and reliability and the establishment of requirements for ensuring gaming is conducted fairly and within the law.

2. General

2.1 Approval of Gaming Equipment

Gaming Equipment must not be used for gaming in the casino unless:

- (i) the Director has approved in writing of the use in the casino of that equipment or of the class or description of equipment concerned, whether or not subject to conditions; and
- (ii) the equipment is used only in accordance with conditions to which the approval is subject.
- (iii) the Casino Operator must not, without the approval of the Authority, install or cause to be installed a linked jackpot arrangement.

2.2 Approval may be withdrawn

Approval may be withdrawn by the Director subsequent to finding that an EGM or Electronic Monitoring System does not conform to its specifications or to requirements that were in effect at the time approval was granted or for any other technical reason determined by the Director and notified in writing to the Casino Operator.

2.3 Revisions to Technical Requirements

2.3.1 Adoption of new or changed Requirements

The Director may adopt new or changed Requirements from time to time which re-define or set forth new requirements to which in some cases previously approved EGMs or other components of the Electronic Monitoring System do not comply. Reasonable notice of new or changed requirements will be given.

2.3.2 Retrofitting to existing EGMs

The Director may or may not require that all existing and previously approved EGMs be brought into compliance with a new or modified Requirement. In cases where such retrofitting of modifications is required by the Director, the Director shall specify a time limit by which all such modifications must be complete. The criteria for such retrofitting modifications will be change of regulations (either Director or other regulatory body, safety or observance of a failure of the EGM to meet current Regulations or the Act.

2.3.3 Application to new EGMs and sunset date for non-compliant EGMs

Alternatively, the Director may require that a new or changed Requirement need only apply to new EGMs manufactured or approved after a certain date. In this case, the Director may also set a date ("sunset date") after which existing EGMs that do not conform to the new or changed Requirement cannot be used.

2.3.4 Decision on case by case basis

All decisions in this regard (e.g. mandatory retrofitting; time to complete; date to apply to new EGMs; sunset date for non-compliant EGMs) will be determined by the Director in consultation with the Casino Operator on a case by case basis having regard to the nature, extent, severity and importance of each individual new or changed Requirement.

2.4 Retention of records

The Casino Operator and Manufacturers must maintain and retain all records (such as those pertaining to the design, manufacture, testing and firmware of equipment) which are required by the Director for periods as specified by the Director. This requirement refers to both a generic EGM (e.g. brand X Draw Poker) and individual EGMs for the life of the machine (e.g. brand Y serial number zzzzzzzz). The latter is a maintenance requirement rather than an EGM requirement.

3. Technical Requirements - Security

3.1 Machine Access - Lockable areas

3.2 Machine Access - Locks and Keys

3.2.1 Lock Types

Lock types for all EGM must be robust and resist opening without a key. Locks are to resist vandalism. Lock types must be approved by the Director.

3.2.2 Key Control

Records must be kept by the lock manufacturer(s) of all locks and keys supplied to the Casino Operator.

3.2.3 Commonality of Locks and Keys

All doors of a specific type for all types of EGMs within the Casino must have the same kind of lock. All "key groups" (as defined in the section 3.2.4) are to have the same key.

3.2.4 Key Groups

The following key groups are defined:

- a) General - this includes general area (outer door) and employee mode keys. The locks and keys are to be designed such that it is not possible to remove a key while remaining in employee mode.
- b) Cash box - this key must be separate from the general key group.
- c) Logic area - it is recommended that the logic area key type be common across all EGMs in the Casino. The logic door key should not be generally available to employees and only issued to technicians under supervised circumstances.
- d) Jackpot reset / cancel credit - this key must be different from each of the other three groups. It is intended that this key will be held by authorised Casino employees.
- e) Audit keys - separate Audit (or privileged employees) modes may be provided by EGM manufacturers. The Audit keys must be different to the other four groups and will be held by the Authority's Inspectors.

3.3 Machine Access - Monitoring

3.3.1 Locked areas

All locked areas, as specified in section 3.1, within an EGM must be monitored by approved detectors or sensors. All detected door opens and tamper detections must be reported to the Electronic Monitoring System.

The detection system must be designed so that it is not possible to activate a door open/close condition without actually opening the door e.g. the door cannot have sufficient movement to allow sensors to misalign and register an open condition.

The detectors or any part, must not be accessible in any way unless the door is opened.

If a sensor is unplugged the EGM must interpret this as a door being opened.

The sensor system must register a door as being opened as soon as the door is moved sufficiently from its fully closed and locked position to permit the entry of any object (eg. a steel rule). That is, it is not permissible to have the EGM consider the door closed while the door is ajar.

There must be no exposed wiring such that the door sensor can be easily short circuited.

For EGM cabinet doors it must not be possible for mechanical sensors to be jammed in the 'door closed' position. shut.

Cable runs and mountings for tamper detectors are to be fitted in such a way that any interference is obvious.

3.3.2 Machine to be Inoperable for Game Play When Any Door Open

The EGM must revert to an inoperable play state when any of its doors are opened or remain opened. That is, it must not be possible to play games, accept coins as credits or to dispense coins from the coin mechanism whilst any of the lockable area doors remain open.

3.3.3 Access to the Logic Area

All accesses to the logic area must be detected by the EGM and reported to the EMS. This is a mandatory requirement so as to achieve electronic sealing of the logic area.

This requirement includes detection by the EGM of all logic area door opens even while the equipment is off-line or powered-off. Obviously in such cases detection cannot be completed until the equipment is on-line and resumes operation. If the logic door is opened more than once while off-line or powered-off, it is only necessary for the EGM to treat this as a single opening.

To achieve the required physical security monitoring, the logic area tamper system must be one:

- (1) that can be triggered even while the equipment is off-line or is powered-off, and
- (2) whose recording of a tamper event can only be cleared by authorised personnel or can only be cleared under software control from the EMS.

If the logic door is opened more than once while off-line or powered-off, it is only necessary for the EGM to treat this as a single opening.

Once a logic area is penetrated, the tamper system itself may be tampered with. Consequently, the manufacturer must comply with one of the following for all EGMs to be supplied to the permanent Casino:

1. the tamper system itself must not be able to be tampered with or replaced without leaving evidence that this has occurred, or
2. The tamper system must be sufficiently complex in nature of operation that only a person who possessed intimate knowledge of the design and method of operation (eg. test laboratory or manufacturer) would be able to bypass the tamper system.
Note: a single-state or repeatable pattern of information will not be accepted.

It may be acceptable for an EGM vital component, as described in section 3.1.2, to not employ Electronic Seals, but reside in a logic area which is able to be secured by way of the Authority's Physical Seals. Suppliers MUST NOT assume dispensation in this regard, but must have the risk associated with the components assessed by the Director and a decision made on appropriate protection on a case by case basis.

It must not be possible to reset the logic area door open state, by either hardware or software means, if the logic door is still open.

If the logic detection circuitry or sensors rely on a stand alone power source (eg. battery) for normal operation, then if the power fails, the logic area is to be assumed to have been accessed, and the gaming equipment deactivate itself and notify the CMC accordingly when power is restored. This power source must be able to last at least 24 hours.

3.3.4 De-activation When Logic Door Has Been Opened

When an EGM determines that a logic door has been opened, the EGM is to de-activate itself until appropriate investigations are conducted at which time the EGM may be re-activated by one or more of the following approved methods:

- (1) A command is entered on a terminal connected to the EMS which is then forwarded to the EGM by the EMS to clear the logic door.
- (2) An Audit or "jackpot reset" key is inserted into a special lock on the EGM and turned by a VCGA Inspector or authorised Casino personnel.
- (3) Entry of PIN or variable code pattern in the EGM employee mode by the VCGA Inspector or authorised Casino personnel.
- (4) A combination of Employee mode key switch and predefined security code (PIN) to be initialised at cold power up. The PIN, known only to VCGA Inspectors and authorised Casino personnel, would be entered via EGM play buttons and/or a touch screen. The PIN must be changeable by approved personnel.
- (5) Any other method approved by the Director.

3.4 Software Integrity

3.4.1 Software Signature

3.4.1.1 Requirement for Software Signatures

In the Melbourne Casino the Director requires the ability to validate / verify the software in an EGM without the need to open the EGM's outer and logic area, remove ROMs and physically compare them with known good versions. To this end the EGMs must implement a variable signature algorithm based upon the principles of section 3.4.1.2 and 3.4.1.3. The signature implementation and verification may be by the following methods:

- (1) A variable signature algorithm based upon the principles of section 3.4.1.2 and 3.4.1.3 initiated by command from the EMS with variable parameters passed to the EGM. The EGM will pass its answer (signature) back to the host which will ensure that the EGM is disabled if the signature fails.
- (2) Any other method approved by the Director.

For EGM operation in the Galleria Casino the Director will accept EGM software verification by method (1) or (2) above, or one of the following methods:

- (3) A variable signature algorithm based upon the principles of section 3.4.1.2 and 3.4.1.3 initiated by commands from the Employee mode of the EGM by an Inspector. The Inspector will need to key-in variable information on which the EGM will base its signature calculation. The EGM will display the result of the signature (on VDU or LED display) when completed, the Inspector will manually compare it with his/her own expected answer and if incorrect effect a manual disablement of the EGM (e.g. power it off).
- (4) EPROM comparison using approved comparator devices and procedures.

3.4.1.2 Signature algorithm requirements

A signature algorithm must meet the following requirements:

- (1) it must combine all the contents of the software or data being processed, i.e. each and every bit of the contents must influence the signature result.
- (2) it must combine the bits in a complicated and cross-interactive manner. An example of such a technique is the popular CRC method.

Use of primitive techniques such as parity or simple "checksum" (regardless of whether 8 or 16 bit or whether exclusive-or or add arithmetic is used) is inadequate and will not be acceptable.

- (3) it must produce a result of at least 16 bits in width. The algorithm must detect at least 99.995% and preferably 99.998% of all possible data errors.

3.4.1.3 Signature Seeding

Signature algorithm "seeds" (or more generally "algorithm coefficients") are to be supplied by the initiator of the signature request at the time of activation. The following principles must apply to signature seeding:

- (1) The "seed" information is to be at least 15 bits in length.
- (2) The "seed" information is to influence the behaviour of the algorithm in a non-trivial way.

An example of unacceptable "seed" information would be, for a CRC algorithm, the initial value of the CRC register.

An example of acceptable "seed" information would be, again for a CRC algorithm, the initial value of the CRC register together with the CRC generator polynomial.

3.4.1.4 Data Partitioning

1. So as not to complicate the validation of software, the following requirements apply:
2. All individual device-specific information (eg. EGM terminal identification number or address, venue name, touch screen calibration, etc.) and all machine-group specific information (eg. list of active games or paytables) are to be stored in separate devices (EPROM based systems) or files (disk based systems) from those used to store any common information (ie. common to all EGMs of a particular type or capable of playing a particular game or set of games) such as programs, pay tables etc.
3. Such storage media for machine-specific or group-specific information must employ some appropriate non-volatile memory technologies. Such information should be appropriately duplicated if or as necessary so as to achieve reliability of storage.
4. The intention here is that all gaming equipment of some designated type (or capable of playing some particular game or set of games) have identically the same software (EPROM) set (and game software file-set for disk based systems). That is, the machine-specific and group-specific information is not stored within the main program EPROMs (or program files) and we do not end up with each device having a different set of EPROMs (or program files) for main program storage. No gaming equipment will be approved if it has machine specific information within program EPROM (or program files).
5. Note that a device identification number must not be easily alterable, (ie. switches are not allowed to determine the identification number). If the identification number is to be held in NV-RAM, the device must be designed to prevent the modification of the identification number once it has been initially entered. The method of storage of the identification number must be approved by the Director.

3.4.1.5 Signature Calculation Requirements

1. At a minimum a signature check must be completed over the entire memory range of a device's game programs.
2. If the normal signature check of the said entire program exceeds 10 seconds, the Authority may approve a strategy of an immediate signature check of the "secure" parts of the program EGM plus a background check of the entire program range when signatures are required. If this strategy is adopted in an EGM, the Director must approve the separation of modules into the "secure" and "insecure" groups.
3. Note that the Director will not require signature checks of program space that cannot be "interrogated" by the processor (eg. a character ROM).
4. The Director will require a "foreground" Signature Check of the entire range of the program, including fixed data such as animations, for an EGM when any of the following events happen:
 - Large win
 - The signature seed set is changed at the EMS (eg. by request of the Government Inspector),

- New software is installed in the EGM or gaming device - ie. a new ROM set is installed or a “down line load” of new software has been actioned,
 - Any power or communications failure of an EGM. The Director may approve the foreground check of only the secure area of the program but a background signature check of the entire program range must be immediately initiated and validated upon completion,
 - A memory reset has occurred,
 - The logic door has been shut after being earlier opened.
5. The Director may approve the foreground check of only the secure area of the program but a background signature check of the entire program range must be immediately initiated and validated upon completion.
 6. If the background signature check fails then the EGM must be shut down immediately.
 7. Where the software (including fixed data tables) to be checked is held in multiple places, then signatures are to be computed for all instances of the software.
 8. It is recognised that in some instances of multiple storage of software, the signatures computed for each instance of the software may well be different. In such cases, the “total signature” becomes the concatenation of the signatures for each of the instances.

3.4.1.6 Signature Requirements on Distributed Processing

There must be some means whereby signature verification of all software resident on all processor boards associated with a gaming device (including programmable coin or note acceptors, card reading devices, display drivers, I/O boards, printer and other peripheral controllers) are able to be verified by a secure signature checking method, or a self-checking method approved by the Director e.g. internal software CRC.

3.4.2 Software Version Display

Each EGM must have a mode whereby the current software version(s) can be displayed (e.g. under employee mode).

3.4.3 Software Storage Devices

Programs residing in EGMs must be stored such that the program is not alterable through any use of the circuitry or programming of the gaming machine itself. For this purpose, it is likely that program storage in non-alterable devices (e.g. EPROM or CD-ROM) will be considered satisfactory. If the storage device is alterable (e.g. magnetic disk), the Director will need to verify through a testing process that there is no way for the program storage to be changed without permission. The Director must be satisfied that alterations of such devices can be detected and reported.

3.4.4 EPROM Protection

Wherever EPROMs are used in an EGM, the following protection methods must be implemented.

3.4.4.1 Unused Areas in EPROM

The Director requires that all unused areas of EPROM be written with the inverse of the erased state which for most EEPROMs is zero bits (00 hex) rather than one bits (FF hex).

3.4.4.2 Sealing of EPROMs

All EPROMs are to be fitted with covers over the UV-erasure windows.

3.4.4.3 Labelling of EPROMs

EPROMs must be clearly marked with sufficient information to identify the Software Version, modification, etc. of the EPROM. The identification used is at the discretion of the supplier but it must strictly follow that supplier's identification system as detailed in the supplier's software change control procedures.

3.4.4.4 ROM Checksums

All EPROMs should contain internal checksums that are validated at least every time the EGM hardware is reset (e.g. turning the power off and on) or the software is reset. The internal checksum algorithm must combine the bits in a complicated and cross-interactive manner.

3.4.5 Programmable logic elements

All programmable logic elements (e.g. PAL, FPLA, etc.) incorporating read-inhibit fuses must be programmed to prevent unauthorised reading or copying of these devices. The Director requires the supply of (at least) one of each such element with the fuses intact so as to allow verification that the devices contain the authorised contents.

3.5 Game Result Determination

3.5.1 Random Number Generators

An EGM game must include elements of chance, i.e. a game must include game play events that are random in nature. In addition to elements of chance, an EGM game may optionally also include elements of player skill.

The behaviour of all events of chance depicted in games are to be solely determined by numerical values obtained from a pseudo random number generator (RNG). That is, all random behaviour is to be solely controlled by the RNG.

The RNG algorithm must be approved by the Director. Detailed specification of the minimum requirements for EGM random number generators is contained in Appendix A of this document.

3.5.2 Game Fairness Objectives

EGMs will only be approved by the Director if they meet strict game fairness guidelines. Detailed specification of the minimum requirements for EGM game fairness objectives is contained in Appendix B of this document.

3.6 EGM Identification

The EGM must have an identification badge permanently affixed to the machine cabinet by the manufacturer. The badge must be affixed in a location approved by the Director and must include the following information.

- (1) Manufacturer.
- (2) Unique EGM terminal identification number as issued by the Director.
- (3) Model identification.
- (4) Date of Manufacture.

3.7 Approved Games Only

3.7.1 Game Approval

Only games approved by the Authority can be played on EGMs.

3.7.2 Prize Tables to be Approved

Approval for a specific game will also include evaluation and approval of its respective prize table(s).

All games submitted for approval must theoretically payout a mathematically demonstrable percentage of all amounts wagered.

The theoretical player return percentage of a game must not be capable of being changed without hardware or software changes approved by the Authority.

Each game must meet maximum and minimum percentage player return amounts during a reasonable level of play as determined by the Authority.

Prize determination shall:

- (a) be for attainable combinations of game outcomes,

- (b) be not relative, but independent of the playing history and
- (c) have a statistical expectation that the percentage return to the player, over a reasonable level of play, be as determined by the Authority.

3.7.3 Display of Game / Prize Table Version Numbers

The Authority recommends that EGMs be capable of displaying the current game/prize table version numbers. This could be achieved via an "Employee Mode" function.

3.8 Metering

3.8.1 General

3.8.1.1 Definition

A meter is a storage area within some form of computer memory (e.g. disk or RAM) into which the computer's software is programmed to store and update the current count of the metered quantity.

3.8.1.2 Recording of Meters

The EGMs or EMS must be capable of recording the meter information. In the case of EGMs recording of meter information is defined in section 3.8.13. In the case of the EMS, recording of meter information is defined in section 6.1.2.

3.8.2 Meter display

The contents of a meter may be displayed by any of the following means.

- a. A display device that forms part of a meter device.
- b. On an EGM's video display screen or LED/LCD display for stepper motor EGMs.
- c. On an external device and/or computer to which the EGM is capable of transmitting such meter data.

3.8.3 Measurement units

The measurement unit for money amounts is most appropriately Dollars (\$), but alternatives may be acceptable (e.g. Cents (¢) or number of coins). In the text below the term "credits" is used to refer to the selected measurement unit or units.

3.8.4 Meter overflow

In the event that a meter, of any type, reaches its maximum value it must automatically wrap back to zero and subsequently continue counting (from zero) in the normal way.

3.8.5 Meter wrap handling and meter width

Meter width is the number of digits or bits of storage of the meter, so as to cater for a particular range of meter counts.

Operational procedures, software, etc. must be in place which, together with the width of the meters and the expected rate of meter counts, are sufficient to cater for resulting meter wrap events (i.e. to detect and correctly handle meter wraps), and so preserve the true total statistics.

3.8.6 Meter integrity

No software may have a mechanism by which an error will cause a meter, of any type, to clear or to assume any other incorrect value.

3.8.7 Meter change procedures

Clearing or loading of software meter contents are subject to the Director's audit procedures. All meter readings must be recorded both before and after a meter is changed.

3.8.8 Meter Housing

An electro-mechanical meter must be housed in a readily accessible locked machine area (normally the "general area"). This locked area must not be the cash area (i.e. inside the drop box) and can only be the logic area if the meters can be viewed without opening the logic door.

A display of an electronic increment meter must be housed in a readily accessible locked machine area (normally the "general area"). This locked area must not be the cash area (i.e. inside the drop box) and can only be the logic area if the meters can be viewed without opening the logic door.

The logic of an electronic increment meter must be housed within a locked machine area which either is the logic area or is the area in which its display is located.

3.8.9 Meter Layout

The Director recommends but does not mandate that meter displays be arranged in a left-to right and/or top-to-bottom configuration in the same order as the items listed in section 4.1.

3.8.10 Manufacture

Meter devices must be manufactured in such a way as to prevent access to the internal parts without obviously damaging the meter.

3.8.11 Meter cabling

Cabling (i.e. between the EGM logic area and an electro-mechanical meter; or between the EGM logic area and the electronic increment meter logic, if this is external to the EGM logic area) must be protected in at least one of the following ways. Of these, item (1) is preferable.

- (1) The EGM logic unit detects any break in the cabling to the meters and treats such as an EGM malfunction leading to an EGM "tilt" and shutdown.
- (2) Meter cables are hardwired from the logic cabinet to the meters (no "quick connect" or other connectors are used in the meter cabling). It is not required for the cables to be hardwired within the logic cabinet, but care in the design must be taken to ensure that the cables will not easily be unplugged accidentally or deliberately. The Director may approve the use of connectors outside the logic cabinet, provided that they are sealed in such a manner that breaking of the seal may be observed by an Inspector, who will consider such breaking of the seal a serious offence.
- (3) Any other method approved by the Director.

3.8.12 Software Meter Recovery

The EGM must be able to cater for the partial failure and/or destruction of software meter information. The EGM must be able to determine when some of its memory is corrupted but other is still valid and appropriately recover the valid information into all of the meter storage devices.

The Director recommends the use of validity codes within software meter memory which will assist in the determination of which meter set is in error. Checksums and time stamps maintained on all copies of the meter set may all be used to determine which is valid if there is an inconsistency.

3.8.13 Meter Information Storage

3.8.13.1 Allowable Storage Devices for Meters

Allowable devices for storage of software meters include the following.

- a. A disk drive at the EMS, but only if the metered information is always up to date on the disk.

- b. A disk drive at a local controller or computer, but only if the metered information is always up to date on the disk.
- c. A disk drive within the EGM, but only if the metered information is always up to date on the disk.
- d. A NV-RAM chip at the EMS, but only if the metered information is always up to date at the EMS.
- e. A NV-RAM chip at a local controller/computer, but only if the metered information is always up to date at the controller/computer.
- f. A NV-RAM chip within the EGM.

3.8.13.2 Number of Storage Devices

Critical Data (inclusive of Category “A” and “B” information, refer Section 4.1) is to be recorded in at least three (3) logically and two (2) physically separate and distinct devices.

Critical Data constitutes memory locations storing at least the following information:

1. RNG outcome,
2. Security events buffer,
3. Category “A” and “B” metering information,
4. Current credit amount,
5. Last game information,
6. Current game information,
7. Critical game state flags and memory variables,
8. Configuration Information (denomination, device ID, etc).

Storage of information in two or more areas of the one device (e.g. twice on one NV-RAM chip; once in each of two RAM chips but with both RAM chips powered from the one battery) is considered to be only one physical storage of the information: 2 physically distinct storage devices are required.

Note that the physically distinct storage devices requirement will be satisfied if the EMS or approved component of the EMS maintains up to date, suitably protected copies of the required information.

The Director will not fail the assessment of EGMs for use in the Galleria Casino purely because they do not fully meet the distinct physical storage requirement.

3.8.13.3 Detection of Corrupted Memory and Recovery

1. All memory devices containing program memory or critical data must be validated by some form of check such as Signatures, Checksums or use of validity codes.

2. Memory that does not dynamically change (eg. EPROM) must be validated at least every time the hardware is reset (eg. turning the power off and on) or the software is reset.
3. A validity check of critical data must be undertaken at least before and after a game play or transaction of significance.
4. If a validity check fails, the software must act in accordance with error handling requirements.
5. If validity checking of critical data information fails, and data memory remains operational, the software must be able to recover the critical memory information, where all instances of critical data information are not corrupt.

3.8.13.4 Security of Program and Memory

1. A program residing in the gaming device must not be able to be physically replaced or physically modified unless the logic area in which it is housed is accessed.
2. A program or data residing in gaming equipment must not be able to be remotely replaced or modified unless the methodology is secure and has been specifically approved by the Director.
3. Memory clears must only be able to be undertaken by accessing the logic area in which it is housed.
4. The use of Clearing EPROMs, or similar devices that write to memory is not permitted, unless the Director has evaluated the source code of these devices and has established confidence in the associated controls to ensure that only approved devices are used in the field.
5. The risk associated with exposure through the need to physically access a restricted area (refer 'a' and 'c', above) is minimised if game program or game data information is able to be changed remotely. Consequently, the Director may grant exemptions to the above requirements where it is satisfied that the degree of compensating controls and security in place adequately address its concerns.

3.9 Coin acceptors and receivers

3.9.1 Number of mechanisms

An EGM may have one or more mechanisms that accept coins.

3.9.2 Minimise cheating

Any such mechanisms shall be designed to minimise the potential for cheating (i.e. prevent obtaining credits without paying) by any means, such as slugging, stringing, spooning, slamming or drilling. If the EGM detects multiple tampering attempts, the EGM shall suspend itself from operation and enter a "Coin Tilt state" (i.e. individual or infrequent coin mis-reads are not to cause EGM "tilts").

The coin input system must be constructed in a manner that protects against vandalism, abuse or fraudulent activity. As a guide the following should be addressed:

- a) the ability to insert foreign objects into the coin input system e.g. "straight through" coin paths should be avoided and it must not be possible to easily alter the coin path from the exterior of the EGM without leaving evidence of physical modification of the device,
- b) the ability to resist malfunction due to liquid spill,
- c) the ability to deliver the coin to the correct area of the EGM i.e. hopper, cash box or cash safe.
- d) the ability to prevent disablement of any validation feature and thereby register any counterfeit coin as a valid input.
- e) the ability for the software to detect and/or logically deduce when potential cheating is taking place

3.9.3 Distinguish types of coin

Coin acceptors must be designed to accept designated coins or tokens and reject (return to the coin tray) all others.

The acceptance device(s) must be electronically based and be designed to ensure that it only accepts valid coins of Australian legal tender (or Approved Coin Tokens), and rejects all others.

Once set, the acceptance device(s) must be protected from any form of simple adjustment.

If a coin acceptor uses "reference coins" as a part of its validation process, the reference coins must be securely sealed in the acceptor and any adjustment or calibration devices (eg. potentiometers) must be provided with an appropriate cover that will leave evidence of access if alterations occur sealed with an appropriate cover after the device is calibrated.

Multiple denomination acceptance devices may be permitted, provided the Director is satisfied that the security and audibility of the gaming equipment in which it is installed is not able to be compromised.

Jams of coins are to be reported to the EGM.

3.9.4 All Accepted Coins Credit the Balance

Any coin that is accepted by an EGM (i.e. is not returned to the coin tray) must be credited to the customer's balance by the correct amount as prescribed for that coin value.

3.9.5 Prevent coin acceptance when inoperable

Coin acceptance mechanisms must include devices (referred to as "lockouts") which prohibit the device from accepting coins or alternatively reject coins entered during periods when the EGM is inoperable for whatever reason.

3.9.6 Inappropriate coin-in

An "inappropriate coin-in" is a legal coin of the correct denomination which has been accepted by an EGM after the device has already accepted its maximum number of coins or when the device is in a state which normally rejects additional coins. An inappropriate coin-in may occur as a result of exceeding electrical or mechanical timing limits or "timing windows" in coin handling equipment.

Inappropriate coins-in must either be returned to the player, e.g. by activation of the hopper, or must be credited to the customer's credit balance. The EGM must be capable of handling rapidly fed coins so that the occurrences of inappropriate coins-in are minimised.

3.9.7 Coin Direction Sensors

3.9.7.1 Coin Directions Sensors

The EGM must have appropriate detection sensors to determine which direction a coin has traversed once it has passed the coin input device. This is required to provide proper accounting of coins between the hopper and the drop box to cater for "slow" or malfunctioning diverters. It is highly desirable that the EGM be able to detect and provide "tilt" warnings when there are internal coin jams (coins pass acceptor but not sensors).

3.9.7.2 Minimum Requirements

The Authority requires, at a minimum, that there be a coin sensor on the path to the drop box. The Director strongly recommends that there also be a sensor on the path to the hopper. If the latter sensor is not present, the Director requires that the hopper have a physical "hopper full" detector that can force diversion to the cash box if normal accounting is incorrect and/or help diagnose a faulty or failed diverter. If there is no physical hopper full sensor, the Director may approve a strategy where a software limit is enforced such that if the theoretical count of coins in the hopper exceeds this limit, the EGM enters an error or "Tilt" state.

3.9.8 No Possibility of Hopper Overflow

There must be no circumstance of any kind where an EGM will overflow coins from the hopper to the inside of the EGM general area. This means in specific that diverter failures must be identified by the EGM which should then disable itself before an overflow can occur.

3.9.9 Programmable Coin Acceptors

3.9.9.1 Security of Programming

Programmable coin acceptors represent a potential serious security risk. Therefore, such devices will only be approved by the Director if (at least) the following strict security measures are present in the device.

- (1) The device is to be preconfigured in the factory so that only standard Australian coins and denominations or approved Casino Tokens can be selected by the programming device once in the field.
- (2) There is to be some sort of Director approved communications protocol between the coin acceptor and the programming device such that only specially supplied programming devices (which are released exclusively to the Casino Operator and its maintenance group) may program the coin acceptor in the field.
- (3) A "read only" version of the coin programmer is to be provided to the Director so that an Inspector can examine the current settings of any such device but without having the ability to change the configuration.

3.9.9.2 Coin Acceptor Program

Like other computer devices within the EGM, the source program for the coin acceptor is to be provided to the Director in machine readable form. The Director will require access to computer facilities to enable separate compilation of the program. A machine readable copy of the mask ROM that has been sent to the manufacturer is also to be forwarded to the Director.

3.9.9.3 Liquid Spill

The coin acceptor must be designed to prevent any liquid from entering the "logic area" of the device.

3.9.9.4 Multiple Coin Denominations

The Director may permit programmable coin readers to be configured to accept more than one valid coin denomination or Token. This will only be permitted in one of two circumstances:

- (1) The coin acceptor routes all valid coins or Tokens directly to the drop box (i.e. does not send coins to the hopper)
or
- (2) The coin acceptor has an inbuilt diverter that can route one denomination to the hopper (if the hopper is not full) and all other valid denominations to the drop box. Invalid coins must still be rejected and sent to the coin tray.

EGMs which accept multiple coin denominations or Tokens are subject to the specifications relative to tokenisation in section 3.9.11.

3.9.9.5 Signature Checking

For EGMs installed with programmable coin validators the EGM processor must be able to initiate a signature check of the entire program space of the coin validator. If this signature check is not provided, the Director must be able to read the contents of the program, for comparison purposes, via some other approved method.

3.9.10 Coin Clearance Procedures

The Director recommends that the EGM and/or Electronic Monitoring System provide the following capabilities to support a casino Coin Clearance:

- (a) The EGM and/or EMS be able to display the appropriate meter information. The accounting information must be available both for the entire period of operation of the EGM (since the last memory reset) and since the last coin clearance.
- (b) The primary meter information required is the Coins to Cash box since the last coin clearance.
- (c) The meter information since the last coin clearance that is to be provided is:
 - (1) Total plays
 - (2) Total wins
 - (3) Coins in
 - (4) Coins to hopper
 - (5) Current hopper level
 - (6) Collects from coin out
 - (7) Collects from cancel credit
 - (8) Counts of door opens for the logic door
 - (9) Counts of EGM failures, tilts, etc. for each kind
 - (10) Total monetary value of notes accepted by the EGM (master meter)
 - (11) Current credit balance of the EGM

3.9.11 Tokenisation

3.9.11.1 Tokenisation Acceptable

The use of "tokenisation" of EGMs whereby the input coin value is not the same as the EGM's unit bet will be acceptable. For example, an EGM might have a \$1 coin reader and hopper but a 20 cents unit bet. The Director must be satisfied that there are no technical or security problems caused by the use of such tokenisation. In specific, the Director must be assured that if a sequence of higher value coins are entered that no credits will be lost even if there is a power failure of the EGM before all of the credits are incremented to the player's balance (the "worst" effect might be a string of \$2 coins being entered into an EGM with a 10 cent unit bet).

In games where tokenisation is used, each valid coin inserted must register the actual dollar value or number of credits as stated clearly on the EGM artwork, video or other form of information display.

3.9.11.2 Payout of Odd Credits

Payout of credits to the player may be made from a hopper. However, when there are "odd credits" (i.e. less than the hopper base coin) in the player balance and a Collect is attempted on an EGM with a coin hopper, the EGM may payout the balance as if it were a "large credit balance" (e.g. by cash ticket or cancel credit) instead of from the hopper. An operational scheme where customers are requested to play out odd credits to reduce administrative overhead for cancel credit processing will be acceptable.

3.9.11.3 Multiple Coin Denomination EGMs

An EGM that can read multiple coin denominations, either by having more than one coin input device or a programmable coin reader (refer to section 3.9.9.4) must be able to implement tokenisation.

3.9.11.4 Tokenisation Parameter Changes

Tokenisation parameter changes may only be made on any EGM with prior approval of the Director.

The EGM should be designed such that it will not allow tokenisation parameter changes unless there is currently a zero customer balance.

3.10 Coin Hoppers

3.10.1 Detection of Hopper Error Conditions

The hopper mechanism on gaming devices must be designed to detect jammed coins, extra coins paid out, hopper runaways (i.e. more than one unintended coins paid out), disconnection/malfunction of coin-out sensor and hopper empty conditions. The EGM software must monitor the hopper mechanism for these error conditions. The Director recommends that there be a coin sensor on the coin output chute or the hopper itself to assist in the detection of hopper runaways and jams.

3.10.2 Protection Against Vandalism

The coin output system must be constructed in a manner that provides protection against vandalism and abuse. The design must avoid paths that allow foreign objects to be inserted from the exterior of the EGM.

It must not be possible to access the hopper contents when the main door (to the general area) is closed.

3.10.3 Hopper Cover

The Director requires that all hoppers have a cover fixed evenly around the perimeter of the coin container. The cover should have only a minimal opening to allow coins to enter the container and restrict hand access.

3.10.4 Hopper Full Sensors

The Director requires that the hopper have a physical "hopper full" detector that will lead the EGM to (try to) divert subsequent coins to the cash box.

The Director recommends that there be an additional "hopper overflow" sensor that will detect that the hopper is about to "spill" coins into the body of the EGM when there has been a malfunction such as a diverter failure.

3.10.5 Hopper Tests

The Director neither requires nor precludes a hopper test mechanism. However, if a hopper test does exist, all coins must still be properly accounted for in all circumstances.

3.10.6 Diverters

3.10.6.1 Diverters to Resist Coin Jams

Coin diverters are to be designed so that they resist "coin jams" especially in the circumstance when coins are being input when the diverter is being moved from one state to another.

3.10.6.2 Default State of Diverter

The Director recommends that the default state of the diverter in the case of its malfunction is to direct coins to the cash box. For example, if the diverter uses an electric magnet to change the direction of coins, the state when no current is applied to the magnet should be to direct coins to the cash box.

The Director may approve EGMs that have the default state of the diverter directing coins to the hopper but only if it is convinced that the goals of 3.9.8 (no hopper overflows) are achieved. The Director will not approve an EGM without a hopper if the only method of routing coins to the drop box is "software diversion" when the default state of the diverter is to direct coins to a hopper.

3.10.6.3 Diverter Failure Sensor

The Director recommends that diverters have sensors to enable the EGM to detect that the diverter has not moved to the state that the EGM is expecting. If the EGM observed this circumstance, the EGM should enter a "tilt" state. If such a sensor is not provided software methods must be used to determine when the diverter has not moved to its commanded position.

3.11 Manipulation of EGM hardware

3.11.1 No means of manipulation

The EGM may not have any means of manipulation that affect the probabilities of random event outcomes during game play.

3.11.2 Switches and jumpers

3.11.2.1 Assessment of function

Where an EGM includes any switches, jumpers, wire posts or other means of manipulation, the Director shall assess whether each such device ("jumper device") is considered to have the potential to affect in an unacceptable way the play of a game, the outcome of a game, the display of a game or to affect the operation of the EGM in any other important regard (as described by 3.1.2).

3.11.2.2 Location of devices

If the Director determines that a jumper device has any such potential, then it must be located within the sealed logic area (as described by 3.1.2) of the EGM.

3.11.2.3 Hardware versus software effects

In assessing the effect of a jumper device, the Director will distinguish between devices that directly affect the operation of some part of the electronic hardware versus devices whose settings are or could be read by a processor.

3.11.2.4 Software readable devices

Where the settings of a jumper device are or could be read by a processor, the resulting software actions for all possible device settings will be assessed by the Director. An inappropriate possible software action may be cause to fail the software assessment.

3.11.2.5 Marking of devices

The normal operation setting of a jumper device, if such device has a normal mode, must be clearly marked on or immediately adjacent to the device. If there is no room for such marking, a concise component layout diagram with all normal settings clearly marked must be provided instead. The Director prefers this diagram to be a sticker easily visible somewhere within the logic cabinet of the EGM.

3.11.3 Circuit board alterations

EGM printed circuit boards must be of production quality and must have zero (0) track cuts and zero (0) patch wires. The Director may at his/her discretion and on a case by case basis relax this restriction provided that the following requirements are satisfied.

- (1) There are fewer than ten (10) track cuts per 0.1 m² of PCB area (approx 0.3 m x 0.3 m board or equivalent dimensions).
- (2) There are fewer than ten (10) patch wires per 0.1 m² of PCB area.
- (3) The same set of track cuts and patch wires applies to all EGMs of a distinct hardware revision level.
- (4) No track cut or patch wire is to be applied to only a single PCB or to PCBs of a subset of the EGMs of a particular hardware revision level.
- (5) All patch wires must adhere to its logic board so that they cannot be broken or pulled off accidentally. Very long patch wires should be laid in silicone coating or some other similar substance.

The Director recommends that the guide lines given in AS 2546 and AS 3508 are adhered to in the design and manufacturing of PCBs.

3.11.4 External adjustment

In order to prevent illegal tampering, the EGM may not have any functions or parameters adjustable by or through any separate computer, input device or input codes except for the following.

- (1) The adjustment of features that are wholly cosmetic (i.e. that do not affect game play in any manner) as approved by the Director.
- (2) The downloading in an authorised manner of any software, data or operational parameter.
- (3) The replacement of a reference coin for comparison purposes in a coin reading device.
- (4) Other operational parameters as approved by the Director.

3.12 Physical Construction

The Director is concerned with the construction of equipment cabinets of all EGMs from the following points of view.

- Ruggedness and physical security.
- Externally applied electrical, radio, magnetic or electromagnetic interference affecting game play or other functioning of the equipment.
- Electromagnetic interference generated by the equipment.
- Safety of patrons, employees and others.
- General reliability.

The Director is particularly concerned about the ability to withstand deliberate attempts to interfere with the proper functioning of equipment by any means.

3.12.1 Ruggedness and physical security

Resistance against physical penetration is an important requirement from various points of view. A number of construction materials should be able to afford equivalent and satisfactory protection in this regard.

3.12.2 Door Construction

3.12.2.1 Front Opening Doors

All doors are to be front opening only.

3.12.2.2 Hinges and Locks

Hinges and locks should be affixed to the machine door in a manner that will prevent dismantling or removal from the exterior of the cabinet. Special care must be taken with the centre rod of the hinges.

3.12.2.3 Free Play of Hinges

Free play of the door hinges should be minimal.

3.12.2.4 False Door Open Indications

There should be no possibility of false indication of the open/close status.

3.12.2.5 Door Seals

The seal between the door and the cabinet should have no gaps and should be designed to resist the entry of objects.

3.12.2.6 Doors Easy to Close and Lock

The door should close and lock in an easily executed and satisfactory manner.

3.12.3 Audible Alarm

An audible alarm must be provided for signalling of significant door open events and EGM error conditions (commonly called "tilts"). When the alarm is activated it must remain audible for a minimum period of 1.5 seconds regardless of whether the door is closed in between or the alarm condition is cleared.

The significant door open and EGM error conditions which must activate an audible alarm are:

1. Logic door open without main door open
2. Stepper motor reel related faults
3. Unauthorised outer door open
4. Unauthorised cash box door open
5. Repeated coin/note faults

3.12.4 Holes In Cabinets

Where holes or slots exist in the exterior of a locked cabinet, there must be sufficient external or internal protection to ensure that the insertion of foreign objects would not compromise the security or safety of the material or information stored or operated in that cabinet.

3.13 Electromagnetic interference affecting EGM operation

Electrical, magnetic, and electromagnetic interference that might either deliberately or unintentionally affect game play or other functioning of the equipment may be of several forms.

- Static magnetic interference (e.g. bring a strong magnet or electromagnet near the equipment). This is most likely to affect mechanical operation of components, such as coin handling devices, card handling devices, tamper switches and disk drives.

- Electromagnetic interference (e.g. bring any source of EMI/RFI near the equipment). This is most likely to affect the correct operation of the electronics, e.g. halting game play, and in extreme (i.e. deliberate) cases may corrupt memory contents or may physically damage/destroy electronic components.
- Static electricity discharge (e.g. touch the equipment after building up a high static charge on carpet). This is most likely to affect correct operation of the electronics, e.g. halt game play, spill coins from the hopper, corrupt memory contents, or physically damage/destroy electronic components.
- Lightning. A severe form of static discharge is a lightning strike to the building, cabling, or equipment. (It is understood that little can be done about a direct lightning strike on a piece of equipment, however, the design of the equipment and the wiring and cabling supporting the equipment within the Casino should be such that lightning strikes other than to the device should cause minimum damage and disruption).

3.13.1 Magnetic and electromagnetic interference

3.13.1.1 Equipment shielding

The Director advises that the most easily achievable method of protection against magnetic or electromagnetic interference is to case equipment in steel. Note that other metals (e.g. aluminium), plastic, fibreglass, wood and glass, are virtually useless.

3.13.1.2 Adherence to EMI/RFI emission standards

Although there is not a firm rigid relationship between EMI emissions and EMI sensitivity, the Director advises that for digital electronic equipment a fair indication as to whether the equipment is reasonably protected against electromagnetic interference from outside is whether the equipment satisfies Austel requirements regarding generation of electromagnetic interference. For this reason, the Director requires that the EGM must have obtained a compliance certificate for radio emission standard AS 3548 (Class A or B) or the equivalent.

The EGM that is submitted for EMI/RFI testing must be a production model and must be in "normal operation" during the test including communication with a EMS or approved simulator.

For EGM operation in the Galleria Casino, the Director will conditionally accept, if all other criteria are met, EGMs that have not yet received a compliance certificate if the manufacturer can demonstrate that the device has been submitted to an appropriate testing laboratory. If any problems are subsequently found by the testing laboratory, the Director will likely require retrofitting of whatever corrections are necessary to achieve compliance for all such EGMs installed in the casino.

3.13.1.3 Magnetic interference

An EGM cannot have its game properties changed by the application of magnetic interference level of a maximum of 10 Gauss at a distance of 5 cm from the surface of the EGM. The test set-up and test procedure will be in accordance with MIL 461C RS01.

3.13.2 Electrostatic interference

3.13.2.1 Shielding and earthing

Protection against static discharge requires that the steel cabinets be appropriately earthed, i.e. earthed in such a way that discharge energy does not enter the electronics or other sensitive components. When appropriate earthing has not been totally achieved, the following methods assist in reducing static discharge:

- (a) It is recommended, but not mandatory, that any external plastic components should be made of conductive plastic.
- (b) Floor coverings in the vicinity of gaming equipment should preferably be conductive, e.g. conductive vinyl as used in computer rooms. (Note that this is a site recommendation rather than an EGM requirement).

3.13.2.2 Communications interfaces

Immunity to static discharge, in particular lightning strikes, also places certain requirements on communications interfaces. These are discussed under section 3.14.

3.13.2.3 Electrostatic test requirement

Note that the following tests require that the equipment under test be running gaming software during the tests, and the effects if any on the correct functioning of the software is assessed as part of the tests.

3.13.2.3.1 Total immunity test

An EGM must exhibit total immunity (i.e. must not be affected at all) to human body electrostatic discharges on all player-exposed areas.

In addition, when subjected to such human body electrostatic discharges, an EGM must not interfere with the operation of any other such attached gaming device (e.g. via local data communications wiring).

These test will be conducted with a severity level of $\pm 15\text{kV}$ for air discharge and $\pm 7.5\text{kV}$ for contact discharge. The test set-up and test methodology will be as per IEC.801-2.

3.13.2.3.2 Temporary disruption test

An EGM may exhibit temporary disruption when subjected to electrostatic discharges greater than human body discharges, but must exhibit a capacity to recover and complete any interrupted play without loss or corruption of any stored or displayed information, game play state, game play outcome or gaming statistics and without component failure. Under no circumstances should there be an abnormal payout of coins from hopper (if one exists) when exposed to the higher levels of ESD.

Testing of temporary disruption will be conducted with a severity level of $\pm 25\text{kV}$ for air discharge and $\pm 10\text{kV}$ for contact discharge. The test set-up and test methodology will be as per IEC.801-2.

3.13.2.4 ESD Build-up in Cash Boxes

The Director advises that high ESD levels may build-up in cash boxes of EGMs. The Director recommends, for reasons of safety of employees and potential damage to coin counting equipment, that cash box bases employ some method of prevention or dissipation of such ESD.

3.13.2.5 Anti-static Carpets

All carpet near to EGMs must have permanent anti-static properties. (Note that this is a site requirement rather than an EGM requirement).

3.13.3 Radio Frequency interference

An EGM cannot have its game properties changed by the application of radio frequency interference (RFI). The test set-up and test procedure will be in accordance with IEC.801-3, severity level 2 (including draft amendments). The Frequency range tested will be 27 to 1000 Mhz with field strength of 3 volts per meter.

3.14 Communications interfaces - Line isolation

3.14.1 Data communications line isolation

3.14.1.1 Isolation voltage

To achieve mains power, lightning and other (including deliberate) static discharge immunity, all communications (including LAN) interfaces between EGMs and other devices must achieve at least three thousand volts of line isolation. (It should be noted that Austel requires 3.5 kV of line isolation for equipment attached to the Telecom network). This will not be practicably achievable using most conventional data

communications technology, so the following Requirements remain as the bare minimum necessary.

3.14.1.2 Electrostatic discharge

When subjected to human body electrostatic discharges, an EGM must not interfere with the operation of any other such attached gaming device (i.e. via local data communications wiring).

3.14.1.3 Power disruption

If the supply of mains power to a gaming device is disrupted, the EGM must not interfere with the operation of any other such attached gaming device (i.e. via local data communications wiring).

3.14.1.4 Ground Isolation

There must be no mains ground interconnections via data cabling between devices powered from different wall outlets. Amongst other things, this Requirement rules out V.28 (RS-232-C) in such applications. RS-422, which is designed to operate with a floating ground, will generally be acceptable provided that any shield or signal grounds are not connected to the mains ground.

3.14.2 Telecom circuits

All Telecom circuits connected to the EGMs and/or EMS or components of the EMS, if any, leaving a premises must be fitted with gas discharge protection components, or similar devices which provide at least the same protection, at the premises' Telecom MDF. The use of isolation transformers, which is mandated by Austel anyway, is not sufficient. {This is a Casino site requirement rather than an EGM requirement}

3.14.3 Austel Requirements

All equipment, if any, attached to the Telecom network, and all Casino telecommunications wiring, must satisfy Austel's requirements with respect to line isolation and earthing.

3.15 Mains power supply

All EGMs shall have surge protection and battery backup systems for protection of data and EGM status.

3.15.1 Power supply filtering

An EGM must employ power supply filtering sufficient to prevent disruption of the device by any of the following. Disruption means any form of misoperation, component failure, or interference via local data communications with any attached gaming device.

- (1) Brown outs.
- (2) Repeated switching on and off of the AC power.
- (3) Jiggling the power cord connection at the wall outlet, i.e. the all-powerful "not plugged in properly" test.
- (4) Application of a fast transient (5/50ns) voltage of 2.5kV to AC power lines and 1kV to I/O, data and control lines. The tests will be conducted in accordance with IEC.801-4.
- (5) Injection of a surge voltage of 2.5kV (1.2/50 μ s) to AC power lines. The tests will be conducted in accordance with IEC.801-5 (Draft).
- (6) Introduction of voltage variations of $\pm 20\%$ to the AC mains input.

3.15.2 Battery Backup

The EGM must be equipped with a backup power supply capable of maintaining for a period of 30 days, during mains power fluctuations or loss, the accuracy of all electronic meters, date and time and other necessary information. Any rechargeable battery involved in this backup power supply must be in a state of charge during normal operation of the EGM.

Manufacturers employing either EE-PROMs or long-life non-rechargeable (lithium) batteries for memory retention will be considered to meet this requirement. RAM chips that contain a (long life) battery as a part of the memory package are also likely to meet this requirement.

Batteries must be connected to the board(s) that contain the RAM in a manner so that they cannot be easily removed. This goal can be achieved by soldering the battery to the board or, if socketed, screwing the battery to the board or socket or securing it by some other approved physical method.

Batteries must be "long life" with a life of at least five (5) years.

3.16 Safety of patrons, employees and others

All equipment must have all necessary electrical supply and any other regulatory authority approvals, if they exist. If standards are introduced and required by these authorities in the future, demonstration of compliance with these standards for all equipment will be necessary.

EGMs are to meet AS3000 and AS3260. The Director may elect to issue revisions to these requirements after receiving any issuance of specific directives from the electricity regulator.

All electrical and mechanical parts and design principles shall follow acceptable industrial codes and standards in both design and manufacture.

EGMs shall be designed and manufactured so as to ensure that the player will not be subjected to any physical, electrical, electromagnetic or mechanical hazards.

3.17 Liquid spills

Liquid spills applied to the readily accessible areas of a gaming device readily accessible (eg. display glass, button panel, coin slot, coin tray, site controller) must not compromise the integrity of the material or information stored or operated in that cabinet or the safety of the patrons operating the equipment.

This leads to the following specific requirements:

1. Spilled liquid must not enter logic cabinet(s),
2. Spilled liquid must not disrupt the normal function of enter push buttons,
3. Spilled liquid must not enter power supplies,
4. Spilled liquid must not enter high voltage wiring,
5. If liquids are spilled into a coin/note acceptor, the only degradation permitted is for the acceptor to reject all coins/notes. Entering a state where incorrect coins/notes are accepted or correct coins/notes are accepted but not credited to the customer is not acceptable.

3.18 Environmental testing

3.18.1 Requirement for Environmental Testing

The Casino environment is expected to be relatively constant in terms of temperature and humidity range. However, if the EGMs are not capable of operation in temperatures outside the norm, the Director may require that all EGMs that have not received environmental testing certification be powered off whenever there is a failure of the air conditioning in the Casino and these EGMs are in an affected area.

In addition, the Director is concerned that the EGMs will operate properly after they have been stored in environments with possible extremes of temperature and humidity.

For these reasons the Director requires environmental testing certification of EGMs.

For EGM operation in the Galleria Casino, the Director will conditionally accept, if all other criteria are met, EGMs that have not yet received an environmental compliance

certificate if the manufacturer can demonstrate that the device has been submitted, or scheduled to be submitted, to an appropriate testing laboratory. If any problems are subsequently found by the testing laboratory, the Director will likely require retrofitting of whatever corrections are necessary to achieve compliance for all such EGMs installed in the casino.

3.18.2 Testing Methodology

Environmental testing is to be conducted at typical and at the equipment's specified maximum and minimum extremes of temperature and humidity. The equipment must be adequately stabilised to each environmental condition before each test commences.

The Director expects EGMs to be able to operate between 0°C to 40°C still air ambient and 10% to 95% humidity (environmental standard AS1099). Manufacturers are to provide details of equipment or components that do not meet these guidelines. The Director requires the equipment to run within the equipment's own environmental specifications.

3.19 Data Communications

The following are the minimum requirements relative to data communications between the EGM and the EMS.

3.19.1 Line Discipline

The data communications must make use of reliable line discipline/protocol to protect against line errors, to handle flow control, polling, etc. (no error control is unacceptable)

3.19.2 Cyclic Redundancy Checks

The data communications must make use of Cyclic Redundancy Checks (CRCs) - use of only parity or simple checksum byte is unacceptable). This may be implemented via an approved computation in software if necessary.

3.19.3 Withstand Communication Errors

The data communications must be able to withstand varying error rates from low to high. Data communication error generators will be used by the Director to verify this.

3.19.4 Message Formats / Protocol

The Director must approve the message formats and protocol used for data communications.

3.19.5 Data Communication Control of EGMs

The Director is not opposed to the control of EGMs by an EMS. In fact there are several advantages perceived with the implementation of remote control of EGMs.

However, only approved control functions of EGMs may be implemented. These control functions must be clearly specified in the protocol documentation.

The implementation of the data communications processing program(s) within each EGM must be modularised and well structured such that it is clearly obvious which control functions have been implemented by the EGM.

3.19.6 Wiring Harness Interface to EGMs

The Director requires direct communication of information from the EGM's microprocessor via an approved serial communication line as opposed to "wiring harness" interfaces to EGMs.

EGMs with "wiring harness" interfaces will be acceptable for the Galleria Casino.

The Director will assess the operation of such wiring harness to determine any such influence on the operation and security of the EGM.

The Director's assessment will include the following areas:

- (1) The potential for financial information and EGM events to be lost if the wiring harness is disconnected.
- (2) The potential for financial information and EGM events to be lost if the wiring harness interface device is not operational.
- (3) The potential for "Hard meter pulses" which are used to pass financial information to the wiring harness interface device to some times "run away" leading to highly inaccurate financial data and/or false increment to jackpots.

3.20 EGM Software Auditing and Verification

The software auditing and verification of an EGM (whether a new EGM or an update of an existing EGM) is a difficult and time consuming exercise. The following are requirements to facilitate the verification process.

3.20.1 Documentation

Detailed documentation of the EGM is to be provided. This is to include operational, hardware and software technical and system design documents. Please refer to section 8 for more details of what is required.

3.20.2 Program Source Examination

All program source for all EGMs and other devices in the EMS will be examined by the Director and/or its representatives. All source programs are to be provided on magnetic media to the Director (which will provide the appropriate non-disclosure agreements). Subsequent releases (after the initial) are also to have sources provided in this way.

3.20.3 Source Compilation

The Director will compile/assemble/link all versions of EGM software. These will either be used as the release version of software or will be compared for exact match with the officially released software. The supplier is to describe the type of computer(s) necessary to perform the creation of the software and is to supply all compilers, assemblers, cross reference tools, linkers, etc. necessary to complete this task.

The general goal is to ensure that the programs that are being tested and the source programs that are being examined are the same.

3.20.4 Compilation Facilities

In order to create the versions of EGM software, the Director will require the supply of hardware and software platforms to enable the compilation, assembly, linking, etc. of the software. The Director has a preference for facilities that run on a PC-like system.

All compilers, assemblers, linkers, etc. must be able to generate cross reference listings.

3.20.5 Source Control and Upgrade

Each software revision must be separately type approved.

The supplier is to provide new versions of software organised by a software control system cross-referencing back to the previous release supplied to the Director.

3.20.6 Source Languages

The Director requires that EGM software be written in a "high level language" (e.g. PASCAL or C). The Director will not fail the assessment of EGMs for operation in the Galleria Casino where programs are written in assembly language

The Director will still consider revisions to previously approved assembly language programs and may still approve new programs with a limited number of key modules written in assembler for performance or other such reasons.

3.20.7 Program Structure

The Director requires that all EGM programs be well structured, well commented and well documented.

3.20.8 Partitioning into secure and insecure parts of the system

It is recommended that the design of the software should be such that there is a partitioning into secure and insecure parts of the system.

3.20.9 Software variants specifically for testing purposes

There are significant advantages if the software designer can supply (approved) software variants specifically for testing purposes. Examples of these are special RNGs to pass through pre-defined sequences or the ability to easily add a large number of credits to an EGM (e.g. play without real money). No possibility must exist for testing variants of software versions to come on-line in the Casino either in an EGM or any component of the EMS.

Testing hooks to assist with the use of external instrumentation such as processor emulators are also of use. An example of this is provision of prescribed breakpoint addresses.

3.21 Alternative Gaming Units

The Director may approve the use of alternative gaming units for entering credits into an EGM other than money (i.e. coins). This section discusses some of the alternatives and security points that apply to them.

3.21.1 Smart Cards

A Smart Card is defined as a card or key that contains a miniature computer and memory within it that allows information on the card to be updated in the device into which it is placed - i.e. can be updated without access to a central database.

For use in the Casino, deposits and withdrawals would be made at cashier stations while at EGMs the balance would be dynamically updated as games are played (and won).

If a Smart card is to be used, the Director would have to be satisfied with all aspects of security. Some of the major concerns are

- (a) there must be no way of changing the balance or other information on the card from any device other than those approved on the gaming system,

- (b) Smart cards from other systems cannot be used,
- (c) there must be some method of catering for damaged or destroyed Smart cards when there were funds on the card.

3.21.2 Account Cards

An account card (or key) is defined as one where there is a unique serial number or other such identification which is passed to a central point when the card is entered into a reader. The financial details of the card, including the current balance, are maintained on a database held on a central computer.

3.21.2.1 Method of Recording of Serial Number

The method of the recording of the serial number is to be secure from forgery. A standard magnetic strip may not be acceptable.

3.21.2.2 Uniqueness of Serial Number

There must be no chance that two cards can have the same serial number.

3.21.2.3 Serial Number Checking

The serial number must have sufficient redundancy checking to ensure that mis-reads have less than a 0.01% chance of returning another valid serial number.

3.21.3 Tokens

The Director will accept the use of tokens instead of coins for EGMs in the Casino provided that the following criteria are met:

- (a) the token must have unique properties so that invalid "slugs" or valid coins will not be accepted by the token reader (except for programmable coin acceptors as per 3.9.9)
- (b) the tokens must be unique so that these tokens will not be in use elsewhere outside of the Casino,
- (c) the supply of tokens must be secure in that it must not be possible for quantities of tokens to appear other than from the EGM operator.

Where Tokens are used in the Casino, EGMs must process Tokens as if they were coins (refer to 3.9 and 3.10).

3.21.4 Banknote Input Devices

3.21.4.1 Valid Notes

- 3.21.4.1.1 A note acceptor device must be capable of discriminating between valid and invalid notes.
- 3.21.4.1.2 Valid notes include all legal Australian note currency and Casino vouchers approved for acceptance into note acceptor devices by the Director of Casino Surveillance.
- 3.21.4.1.3 Casino vouchers may include numeric and textual images and printing, bar codes, hollerith patterns or other such approved encoding to indicate the value of each voucher.
- 3.21.4.1.4 Casino vouchers may be generated by an EGM in circumstances such as large cash payouts and jackpot wins. Technical requirements for generation of Casino vouchers by EGMs are not yet covered in this document but will need to be added before an implementation of Casino vouchers is developed.
- 3.21.4.1.5 Casino vouchers may be pre-printed forms issued by the Casino via manual methods.

3.21.4.2 Note Reading Security

- 3.21.4.2.1 A note acceptor device must be electronically based and be configured to ensure that it only accepts Valid Notes and rejects all others.
- 3.21.4.2.2 Once set, the note acceptor device must be protected from any form of simple adjustment which leads to deterioration of the note acceptor accuracy and note discrimination qualities or performance.

In particular the adjustment of the tolerance level for accepting notes of varying quality, or the alteration of any of the possible checking procedures is prohibited in the field. If a reader has multiple tolerance levels then the ability to switch to lower levels is to be disabled.

- 3.21.4.2.3 Note acceptor devices must incorporate sophisticated detection methods to validate notes by multiple evaluation methods (eg magnetic, ink colour and density).
- 3.21.4.2.4 It must not be possible from one or more banknotes to create a larger number of banknotes such that any of the additional banknotes are accepted as valid banknotes.
- 3.21.4.2.5 It must not be possible to disable any of the note acceptor validation steps or procedures.

- 3.21.4.2.6 Note acceptor devices must be constructed in a manner that protects against vandalism, abuse or fraudulent activity. The Director must be satisfied the design and implementation of a note acceptor device in an EGM has addressed the following items:
- a. ability to resist liquid spill entering the note acceptor,
 - b. ability to resist burning materials entering the note acceptor,
 - c. ability to prevent the insertion of foreign objects into the note acceptor,
 - d. ability to easily alter the note path from the exterior of the EGM without leaving evidence of physical modification of the device,
 - e. note path must be designed to resist jams and impairment during insertion, acceptance and storage of notes.
- 3.21.4.2.7 A note acceptor device must include a mechanism (including combination of software, hardware and firmware) which prohibits the input of notes during periods when the EGM is inoperable or disabled.
- 3.21.4.2.8 A note acceptor device must include a mechanism which will automatically disable the acceptance of notes at any time the EGM current credit amount exceeds a value specified by the Director of Casino Surveillance. It will be acceptable to incorporate a facility to change this value however the procedures for implementing a change must include either access to the EGM Logic Area or via command from the Electronic Monitoring System.
- 3.21.4.2.9 Note acceptor devices must conduct a self test at each power up. In the event of a self test failure the note acceptor must automatically disable itself (ie enter note reject state) until the error state has been cleared.
- 3.21.4.2.10 If fitted external to an EGM, the note acceptor device must be secured in such a way that all screws, nuts and other fitting devices cannot be accessed externally to the unit or EGM (eg must be bolted from inside the EGM).
- 3.21.4.2.11 Interconnecting cables from the note acceptor device to the EGM must not be exposed external to the EGM.
- 3.21.4.2.12 The note acceptor device must employ a reliable means of transmitting credit values to the EGM. Pulse stream interface or serial communication without error detection/correction are not considered to be reliable communication methods.
- 3.21.4.3 Access to Note Acceptor Devices

- 3.21.4.3.1 Access to note acceptor components and note storage areas is to be secured via key lock.
- 3.21.4.3.2 Note storage areas are to be locked to the same security level as cashbox areas and similar key management standards are to apply; that is, dual access key security. This lock must securely hold into place a cover over the note storage area.
- 3.21.4.3.3 Attendant or Technician staff access to clear note jams in the acceptor device must not provide access to the note storage area.
- 3.21.4.3.4 Access to the note acceptor components is to disable the EGM from game play until such time as the access is cleared, and must also cause an access event (cf drop door open) to be recorded by the Electronic Monitoring System.
- 3.21.4.3.5 Access to the note acceptor components and note storage areas must not allow access to the EGM coin storage (drop box) area or vice versa.
- 3.21.4.4 Note Acceptor Operations
 - 3.21.4.4.1 Valid notes accepted into an EGM must result in a valid credit message to the EGM for the full amount of the values of the notes accepted.
 - 3.21.4.4.2 All valid notes are to be deposited into the secure note storage area.
 - 3.21.4.4.3 All invalid or disabled notes are to be rejected and returned to the player.
 - 3.21.4.4.4 Notes must be either prevented from being entered, or be rejected during periods when the EGM is inoperable for whatever reason.
 - 3.21.4.4.5 A note acceptor device may be implemented with a means to enable or disable particular value notes. The procedure for setting acceptable note values, including via EMS command, must be approved by the Director of Casino Surveillance.
 - 3.21.4.4.6 The note acceptor device must have a note receptacle full sensor. Bank note acceptance must be disabled when the receptacle is full and a significant event sent to the EMS.
 - 3.21.4.4.7 If the banknote acceptor only accepts banknotes in a particular direction, orientation or with a particular side facing up, there must be sufficient instructions on the EGM artwork to clearly indicate this to the patrons. A label with a graphical picture of the banknote orientation attached near the banknote entry point is considered to be the best method of meeting this requirement.

- 3.21.4.4.8 A Banknote Acceptor must de-activate itself if any part of the Banknote Acceptor is missing that is related to the validation process or delivery of the banknote to the storage area e.g. banknote receptacle.
- 3.21.4.4.9 Under no circumstances may credits be lost if banknotes are input during game play.
- 3.21.4.4.10 The EGM must be able to cater for simultaneous input of banknotes and coins.
- 3.21.4.4.11 EGMs must ensure that all banknotes accepted will correctly increment the player's balance and relevant meters in all circumstances. This includes but is not limited to cases of power failure, door open, coin tilt, audit mode entry or any other form of de-activation of the EGM.

3.21.4.5 Metering

- 3.21.4.5.1 A note acceptor device must maintain sufficient metering to be able to report the following: Not all of these meters are required for operation in the Galleria Casino.
 - a. Total number of notes accepted
 - b. Total monetary value of notes accepted
 - c. Counts of all rejected notes
 - d. Breakdown by note value
 - e. Last five notes accepted
- 3.21.4.5.2 The note reader specific meters of section 3.21.4.5.1 except e. (Last five notes accepted) must be passed to and stored by the EMS for EGMs with banknote readers that are to operate in the permanent casino.

3.21.4.6 Significant Events

For operation in the permanent casino the EGM is to forward the following note acceptance specific significant events to the EMS and the EMS is to record the events as per section 6.2.

1. Note receptacle door is opened
2. Note receptacle is removed
3. Note jams
4. Excessive Note Rejects (indicating that perhaps an attack is happening on the EGM).
5. Note receptacle full

6. Banknote Yo Yo - if a Yo Yo is possible

3.21.4.7 Reconciliation of Currency Accepted by a Note Acceptor

3.21.4.7.1 To provide adequate information to assist in the reconciliation of actual currency cleared from a Banknote Acceptor and the metered amounts as held by the EGM and EMS, an EGM with a Banknote Acceptor must transmit the following data to the EMS each time the Banknote Receptacle is replaced with an empty receptacle:

1. Total number of banknotes expected to be held in the removed receptacle
2. Total monetary value of banknotes expected to be held in the removed receptacle.
3. Total number of banknotes by denomination expected to be held in the removed receptacle.

3.21.4.7.2 Notification that the banknote receptacle is replaced with an empty receptacle may take various forms; including:

1. Entry of a special code or PIN sequence on the EGM
2. Activation of a special employee key at the EGM
3. An EMS "Automatic Clearance" function which will assume all notifications of receptacle removal during the "clearance" period are actual replacements with empty receptacles.
4. Any other method approved by the Director of Casino Surveillance

3.21.4.7.3 The specifications of 3.21.4.7.1 and 3.21.4.7.2 are not required to be met for the Galleria Casino.

3.22 Account Betting

3.22.1 Approval of Account Betting

All schemes for account betting which enable cashless wagering via a card, key or other such device require the approval of the Director.

3.22.2 Credit Betting Not Permitted

Under no circumstances will the Director approve "credit betting" - i.e. will not allow a customer to "borrow" money from the Casino Operator to place wagers. The term "Account betting" therefore refers to wagers placed against an account that has had monies deposited into the account before wagering takes place. No wager can exceed the balance of an account. All accounts shall only be capable of drawing down on funds lodged as deposits with the Casino Operator.

The term "Deposit betting" is commonly used to refer to the method of Account betting that may be approved by the Director.

3.22.3 Method of Account Identification

The method of account identification must have the approval of the Director. Specific details relative to account cards are contained in section 3.21.

3.22.4 PIN Protection

The Director prefers that all account cards have the option of PIN protection to prevent invalid withdrawals or gaming from stolen or lost account cards. The customer must have the ability to request account cards without PINs.

4. Technical Requirements - Financial

4.1 Recording of Financial Data

4.1.1 Category A Information

An EGM must be capable of detecting and recording the following financial data:

- a. Total coins/tokens accepted by coin acceptor mechanism/s.
- b. Total coins/tokens paid as coins-out.
- c. Total credits played.
- d. Total credits won.
- e. Total credits/tokens paid manually (cancel credits).
- f. Total number of coins to cash box.

4.1.2 Category B Information

An EGM must also be capable of detecting and recording the following data (however the Director will not fail the assessment of EGMs for the Galleria Casino purely because they do not detect and record all this data):

- a. Total number of games played (Stroke).
- b. Number of times the logic area(s) have been accessed.
- c. Total hopper fills (coins/tokens manually inserted in the hopper).
- d. Coins input to hopper.
- e. Current hopper level.
- f. Total standalone jackpot contributions made.
- g. Total standalone jackpot contributions won.
- h. Current credit balance.
- i. Total Bonus credits won
- j. Total number of notes accepted
- k. Total monetary value of notes accepted
- l. Counts of all rejected notes
- m. Breakdown by note value

4.1.3 Category C Information

The Director recommends that an EGM be capable of detecting and recording the following data:

- a. Total number of games won.
- b. Number of times cash door(s) have been accessed.
- c. Number of times general area door(s) have been accessed.

- d. For the case of multiple coin acceptor mechanisms, total coins accepted by each of the coin acceptor mechanisms separately.
- e. For the case of EGMs with multiple games, total credits played and total credits won for each of the games in the EGM.

4.2 Transmission of Data to the EMS

4.2.1 Information to be Transmitted to the EMS

Category A information must be periodically transmitted to and recorded by the EMS. Category B information and Category C information (where provided) recorded by an EGM must also be transmitted and recorded by the EMS. The Director will not fail the assessment of EGMs for the Galleria Casino purely because they do not transmit Category B and/or Category C information to the EMS.

4.2.2 Method of Transmission

The method of transmission of data to the EMS must be approved by the Director. The data communication principles of section 3.19 must be followed.

5. Technical Requirements - Operations

5.1 Dispute Resolution

5.1.1 Last Game Data

An EGM must store sufficient data for the last game played to enable Casino personnel to adequately resolve disputes with patrons including:

- a. Type of game played.
- b. Prize table used.
- c. Winning payout entries and amount(s) won (if any).
- d. Player credit balance before the game.
- e. Amount bet.
- f. Player credit balance after the game.
- g. Player choices (if any) involved in game outcome.
- h. Jackpot amount and indication if won or not (if any).
- i. Free game information, if any.
- j. Bonus information, if any.

5.1.2 Number of games to be stored

The EGM must be capable of storing last game data for at least five (5) of the most recent previous games.

5.1.3 Method of Last Game Data Storage

All last game data storage as well as metering and other important data is to be retained in the EGM in a way that preserves the data across power failures.

The data is to be recorded in such a way and using sufficient multiple and separate copies to ensure that the correctness of the data can be verified.

5.1.4 Last Game Replay

For the last five (5) previous games held by the EGM it must be possible to show to the player the results of the game in a clear and understandable manner. This has the following implications:

a. Card Games

All cards used in a game must be shown on the screen in the format that they are normally shown to the player. In Draw Poker, it is necessary to show which cards were held and which were discarded. If Double-up is played, all cards involved in the Double-up must also be displayed.

b. Keno and Bingo

For Keno and Bingo all of the balls drawn, the selections made by the player and the final "catch" are to be displayed in a similar manner as was originally shown to the player.

c. Spinning Reel Games

The EGM must display, at least, the final resting place of the reels, the options (play lines and/or number of coins selected) and an indication of winnings in a similar manner as was originally shown to the player.

For a Stepper Motor EGM, this means spinning the reels to the final resting point at the completion of the game and illuminating / flashing any lights or other indicators that were in that state at the end of that game. The wheels, lights and display must be returned to their original states when the viewing of the last game replay is completed.

5.2 Display of Game Outcome

5.2.1 Method of display to be approved

The method of display of game outcome must be approved by the Director. The guidelines for such approval will be Victorian Legislation and Regulation and accepted community standards. Approval will not be unreasonably withheld.

5.2.2 Video display

The display of game outcome may be by depiction on a video display. In this case the video image must be generated by the EGM's computer. External input to drive the video, such as by television broadcast, will not be permitted.

Note that other forms of video display other than cathode ray tube (CRT) may be permitted. Light emitting diode displays (LEDs) and liquid crystal displays (LCDs) are acceptable if all other specifications are met.

5.2.3 Display via physical wheels

The method of display of game outcome may be by the positioning of the final resting orientation of spinning reels, wheels or other similar devices provided that the following conditions are satisfied.

- (1) The movement and position of the wheel or wheels must be fully controlled at all times by the EGM's computer.
- (2) The current position of the wheel or wheels must be monitored at all times by the EGM's computer.
- (3) The random behaviour Requirements must be met. That is, the random game play behaviour must be totally determined by an approved RNG. The random game play behaviour must not in any way be controlled or affected by the motion or position of the wheel or wheels.
- (4) The EGM recovery Requirements must be met. That is, correct EGM recovery and replay of games must be achieved following interruption to play due to any cause.
- (5) Any malfunction of the physical wheel or wheels (e.g. wheel position not as commanded by the computer or physical "tilt" of a wheel) must be detected by the EGM's computer. Detection of malfunction must result in the following.
 - (a) Display of a "machine malfunction" message or indication to the player via a video, LED or other display.
 - (b) Saving of all game play information necessary for later EGM recovery and correct game replay.
 - (c) Any other actions necessary in the event of an EGM malfunction.
 - (d) De-activation of the EGM until cleared in an approved manner.
- (6) If in the middle of a stepper motor game (i.e. while the wheels are spinning) there is an EGM malfunction, EGM de-activation, EGM off-line, EGM shut-down, EGM powered-off or any other EGM condition where game play cannot continue, the EGM must employ some display means to continuously and unambiguously indicate to the player the following.
 - (a) The current position of the wheel or wheels is not valid.
 - (b) The current position of the wheel or wheels does not indicate a game result.

In circumstances where this display cannot be performed, e.g power fail of the EGM, the Director may accept the alternative of Rules covering this situation which are clearly displayed in the Casino that use these devices. In particular an EGM may display a sign that says that if all "lights are off" on the EGM, the wheels do not necessarily represent a game result.

5.3 EGM Recovery - Last Game Restart

In the event of EGM failure or de-activation for any reason, including power failure or EGM "Tilt" conditions, the EGM must be able to recover its state before the interruption. This means that, as a minimum, all machine statistics, player credit balance and the current game will be restored to exactly the state when the de-activation occurred. This is especially important in games which involve some element of player decision (e.g. Draw Poker), games which take a long time to complete (e.g. games which may involve re-spins) and free game sequences.

5.4 Player Information

5.4.1 Wagering information

An EGM must have a facility to display to the player the following information.

- (1) The player's current credit balance. The Director prefers that the player have an ability to turn off the display of the credit balance.
- (2) The current wager amount.
- (3) All possible winning outcomes.
- (4) Win amounts for each possible winning outcomes.
- (5) The amount won for the last completed game (until the next game starts).
- (6) The player options selected for the last completed game (until the next game starts).
- (7) For multi-game EGMs, the name of the current game must be displayed during all game play screens.

5.4.2 Win Amount Display Consistency

A number of possible methods could be used to display possible win amounts:

- (1) Payout amount - the actual dollar amount to be won for each winning outcome given the presently selected bet amount.
- (2) Number of credits paid - the amount to be won for each winning outcome expressed as the number of minimum bet units (e.g. 20¢ units). The actual dollar amount to be won is calculated as the number of credits multiplied by the minimum bet amount.
- (3) Payout multiplier. The actual dollar amount to be won is calculated as the payout multiplier multiplied by the presently selected bet amount.

- (4) Odds. The payout multiplier is calculated as $Odds+1$ and then the actual dollar amount may be calculated. For example, at a winning odds of 100/1 and a bet amount of \$2, the payout amount for a win is \$202.
- (5) Not displayed on EGM. Payouts are defined elsewhere such as on EGM artwork or in rules of play documentation.

These different display methods provide potential for player confusion. To the extent that is practicable for the range of games offered, an EGM is to clearly and consistently use for all games offered only one method of displaying win amounts.

5.4.3 Rules of play

The Casino must provide or display, on the EGM or otherwise, the rules of play together with the payout schedule for each game offered.

5.4.4 Graphic depiction

In the case of games that depict real situations, graphics must as closely as practicable resemble the real situation. For example, in the case of card games, an EGM must use a colour display with images of cards that closely resemble the standard playing cards.

5.5 Double-up

EGM games may have a "double-up" feature where permitted by the approved rules of the game. The following specifications apply to such features.

5.5.1 Entry and Exit of Double-up Feature

If a Double-up feature is provided, the player must be given a choice of whether to enter the double-up game or not.

Initial entry to the double-up game must be conditional upon an immediately preceding occurrence of a winning event in the primary game e.g. any win in Draw Poker may give the option of entry into the double-up game.

The winning event that gives entry to the double-up game must not involve the winning of a Standalone progressive or Linked Progressive jackpot.

At the end of each double-up attempt, the player must be given a choice to transfer the whole part of the entitlement obtained from the double-up game to the credit meter. The Director prefers that the player be given the option of transferring part of the entitlement obtained from the double-up game to the credit meter.

5.5.2 Number of Double-up Attempts Permitted

A maximum of five (5) consecutive double-up attempts may be made following a win on the primary game.

5.5.3 Player Return in Double-up

The double-up game must be a "zero expectation game" i.e. it must have a theoretical 100% player return. This means that the probability of winning a double-up sequence must be precisely 1/2 (0.5000000). If a "Triple-up" sequence was offered, the probability of winning the triple-up sequence must be precisely 1/3 (0.333333333333333333333333 etc.).

5.5.4 Metering

The amounts bet on the double-up game are not to be added to the credits played meters (only amounts staked on the initial game are recorded); the credits won meter is to record wins from the initial game only as they are affected by the final double-up attempt (including the "null" attempt where the double-up option is not taken). That is, only credits taken as wins by the player are to be added to the credits won meter. The following two examples demonstrate the metering required:

- (1) The Player wagers 2 credits and wins 6 on Draw Poker (3 for 1). The Player then doubles twice, winning the first and losing the second.

Credits Played	= 2
Credits Won	= 0

- (2) The Player wagers 2 credits and wins 6 on Draw Poker (3 for 1). The Player then doubles twice, winning both and then exits the double-up feature.

Credits Played	= 2
Credits Won	= 24

5.5.5 Last Game Replay

As indicated in section 5.1.4(a) (last game replay for card games) all cards (or other methods of display of double-up outcome) involved in the double-up sequence must be displayed as a part of the last game replay.

5.6 Hardware maintenance of EGMs

5.6.1 Methods

Hardware maintenance of EGMs shall be by any of the following means.

- (1) Use of diagnostic software.
- (2) Non-invasive testing and fault diagnosis.
- (3) Non-damaging testing and fault diagnosis.
- (4) Component replacement.
- (5) Board replacement.
- (6) Assembly replacement.

5.6.2 Prohibited methods

Hardware maintenance of EGMs shall not be by any of the following means.

- (1) Testing and fault diagnosis requiring the cutting of circuit board tracks.
- (2) Testing and fault diagnosis requiring the drilling of circuit boards (e.g. to cut embedded tracks).
- (3) Testing and fault diagnosis requiring the addition of circuit board patch wires.
- (4) Thermal overstressing of components.
- (5) Removal or insertion of components while power is applied to the equipment, unless the equipment has been specifically designed to withstand such actions and then only by following the appropriate procedures laid down by the manufacturers for such actions.

5.6.3 Data to be retained

Subject to meter change procedures all EGM statistics, game play information and EGM metering information stored in the EGM (whether by electronic, magnetic, mechanical or other means) shall be retained correctly during hardware maintenance and shall be protected against damage, destruction or alteration during maintenance operations. Maintenance procedures should be such that clearance of the metering information is only performed as a last resort if all other procedures have failed and then may only be performed by procedures approved by the Director.

5.6.4 Electrostatic discharge

All hardware maintenance will follow good industry practice with respect to protecting the equipment from static discharge. In particular, where appropriate, the following shall be observed.

- (1) All components and assemblies to be stored and transported in antistatic packaging at all times.
- (2) No components or assemblies to be touched unless the technician is earthed via a wrist strap.
- (3) Maintenance work-areas to be earthed and fitted with earthed floor mats, earthed bench mats and wrist strap earth points.

{Note that this is a maintenance requirement not an EGM requirement.}

5.7 Credit Redemption

5.7.1 Permissible Methods

Payouts may be awarded as any of the following:

1. Credit to player account.
2. Cash payouts from the gaming equipment.
3. Attendant payment (Cancelled Credit).

It is preferred that the player be able to toggle between alternative actions if more than one is offered.

5.7.2 Permissible Occasions

The cash out button or its equivalent must be operable, and cash out functions must be available at any time **EXCEPT**:

1. during game play,
2. whilst the gaming device is in a Test or Audit Mode.,
3. whilst any monitored door is open,
4. whilst the gaming device is in a fault or de-activation condition that does not allow for the collection of credits as defined by this document, or approved protocol documents,
5. if directed not to do a cash-out by the EMS or a component of the EMS,
6. while a foreground software signature check is being performed,
7. while de-activated for any reason.

5.7.3 Permissible Scenarios

The Casino Operator will establish a Maximum Hopper Pay limit for EGMs. If a patron attempts to collect available credits, and the total coin value of these credits is greater than the maximum hopper pay amount, OR after a hopper pay, the patron attempts to collect any residual credits (eg. tokenised game), the gaming device shall either:

1. return to game play,
2. initiate funds transfer to an appropriate player account for the amount due,
3. automatically lock-up and go into a hand-pay (cancel credit) state, whereby the player may be given the option to either receive the hand-pay OR cancel the hand-pay and play out the remaining credits.

The EGM, in this circumstance, may also offer the player the option of playing a special “residual credits gamble feature” as described below.

5.7.3.1 HOPPER PAY:

If a patron attempts to collect available credits, and the total coin value of these credits is less than the maximum hopper pay amount, the gaming device shall dispense the equivalent value in coins from the hopper.

If the hopper is unable to pay the full amount then approved alternative pay methods may be used (as above) including refill of the hopper with additional coins and continuance of the hopper pay..

5.7.3.2 RESIDUAL CREDITS GAMBLE FEATURE:

When a player has a number of residual or partial credits which is too small to be collected from the hopper (ie credits for less than the value of one token/coin) the EGM may offer a feature to bet the residual credits in order to attempt to win an amount which can be dispensed from the hopper (with no residual credits). The following requirements apply to any such feature:

1. It must be possible to enter the residual credits gamble feature only after all possible coins/tokens have been dispensed by the hopper.
2. The theoretical return to the player of the feature must be a minimum of 87% and maximum 100%.
3. Credits won from the feature may be automatically dispensed by the hopper.
4. All relevant hardware software and game meters (eg. credits played, credits won, money out, hopper level, player's credits, player's collect meter) must balance and are to be appropriately updated.
5. Bets made from the residual credits gamble feature must increment all progressive jackpots (if any) and are to be recorded as if wagered on the EGM's game.
6. Additional meters that record separately the feature's turnover and the feature's win are not obligatory and, if provided, must not be utilised in deriving any critical meters.
7. All rules and instructions of the feature are to be clearly visible to the player either on the EGM display and/or artwork and are not to be misleading.
8. If (after a cash out has been performed) a number of residual credits are left on the machine, the player must be made aware of the residual credits gamble feature with an appropriate message displayed on the screen or alpha numeric display.
9. The result of the residual credits gamble feature must be displayed to the player for a period of time acceptable to the Director.
10. The last game replay must either display the gamble feature result or contain sufficient information (eg updated meters) to derive the result.
11. It must not be possible for the residual credits gamble feature to be confused with any other EGM feature, eg. double up.
12. If the feature is offered on a multi-game EGM, the feature must (for meter purposes of each individual game) either be considered to be part of the game from where the feature was invoked or the feature treated as a separate game.

5.7.4 Display

Whenever credits are redeemed by a player, the number of credits or cash value paid out must be clearly displayed to the player.

6. Electronic Monitoring Systems

The Director requires that the Casino Operator implement an Electronic Monitoring System (EMS) capable of meeting the following broad functions:

- a. Real time commands to the Casino Surveillance System.
- b. Logging, reporting and searching of EGM Events.
- c. Collection of individual machine financial and meter data.
- d. Reconciliation of meter data against cash box hard count.
- e. Performance reporting as specified from time to time by the Director.

The EMS must be computer based with sufficient capacity (processing, memory, communications interfaces and hard disk storage) to efficiently monitor all gaming devices within the Casino. The computer system must be secure and interfaces to each gaming machine must be powered separately from the gaming machine to ensure continued monitoring even during maintenance activities.

The required characteristics of an acceptable EMS are as follows:

6.1 Central Logging of Statistics and Data

6.1.1 Central logging

Game play statistics and machine event data are to be held in a single (backed-up) central computer system, i.e. in the Central Monitoring Computer (EMS). They may also be held in intermediate points in the EMS.

6.1.2 Statistical Information to be collected

Statistic information is to be collected and held for each individual EGM as well as accumulated for the Casino. The units in which each statistic is to be measured is to be approved by the Director but may include cents, dollars, number of coins/tokens or others.

The Director requires that the information transmitted to the EMS detailed in section 4.2 be maintained by the EMS.

6.1.3 EGM Event Data to be Collected

The Director requires that all available EGM events, as defined in section 6.2, be collected and stored by the EMS. The storage of these events by the EMS is to occur as they occur or as soon as practicable after they occur.

6.1.4 Electronic transfer

Game play statistics information and event data will be passed to the EMS by an approved electronic data communications means in a timely manner by schedule and/or on demand.

6.1.5 Access by the Director

The Director is to be able to access this central register of statistics at any time. The EMS is provide comprehensive search mechanisms for the purpose of examination of events and statistical data. The search mechanism should cater for a variety of "keys" for the search including date, time, event number, EGM number, etc.

6.2 EGM Event Data

The EMS must observe and record the following EGM events:

- (1) Power reset.
- (2) The opening of the main door.
- (3) The closing of the main door.
- (4) The authorised opening of the cash box door.
- (5) The unauthorised opening of the cash box door.
- (6) The closing of the cash box door.
- (7) The opening of the logic door.
- (8) The closing of the logic door.
- (9) Reverse coin-in. (Coin Tilt)
- (10) Inappropriate coin-in, if the inappropriate coin-in is not returned or credited to the player. (Coin Tilt)
- (11) Coin-in error. (Coin Tilt)
- (12) Hopper empty or timed-out (hopper failed to make payment).
- (13) Hopper runaway, i.e. more than one unintended coins paid out.
- (14) Jackpot and/or Large Win.
- (15) Stepper motor reel tilt.
- (16) Unrecoverable RAM error (RAM defective or corrupted). (CMOS RAM failure)
- (17) Program error (defective program storage media). (CMOS RAM failure)
- (18) Signature validation error on any memory area.
- (19) Low RAM battery. (CMOS RAM failure)
- (20) Triggering of an anti-tamper device.
- (21) Failure of diverter to move to correct state
- (22) Other Machine tilts, if any.
- (23) Signature validation error as determined by the EMS.
- (24) Cancel credit.
- (25) Note receptacle door is opened

- (26) The authorised removal of the banknote receptacle.
- (27) The unauthorised removal of the banknote receptacle.
- (28) Note jams
- (29) Excessive Note Rejects (indicating that perhaps an attack is happening on the EGM).
- (30) Note receptacle full
- (31) Banknote Yo Yo - if a Yo Yo is possible
- (32) EGM critical memory clear - Master Reset
- (33) Jackpot parameter or configuration change - including initial establishment, modification or deletion

The determination that a door opening is authorised or not may be made by the EGM or the EMS. The actual mechanism used to signify an authorised opening (e.g. special card or key entry) must have the approval of the Director

The Director will not fail the assessment of an EMS for operation in the Galleria Casino purely because it does not record all of the above events.

6.3 Real-time Commands to the Casino Surveillance System

The EMS must be capable of real time communication with the Casino Surveillance System to command surveillance activity to individual, or groups of, gaming machines.

The EGM events listed in section 6.2 all require activation of the surveillance system.

6.4 Central Site Recovery

Following any failure, it must be possible to restore the state of the EMS and its database without losing data. The Director expects that this be achieved by the combination of the following strategies.

6.4.1 Transaction Logging

The Director expects the EMS to record with time and date stamp all vital transactions received from EGMs in a log file(s) or database. The method of transaction logging is to be approved by the Director.

6.4.2 Disaster Recovery

The Director expects that, in the event of a failure whereby the system cannot be restarted in any other way, it must be possible to reload the database from the last backup point (e.g. last night) and fully recover at least all of the following vital transactions.

- (a) EGM events
- (b) manual database updates
- (c) turnover and other metering statistics
- (d) jackpot transactions including contributions, winnings and current value for each jackpot in the system but only when the EMS is maintaining the jackpot or when an EGM or jackpot controller has transmitted this information to the EMS.

Jackpot controllers that do not directly communicate with the EMS will be permitted for use in the Galleria Casino provided that they meet the requirements of section 7.4 of this document. Jackpot transactions for these controllers will not need to be recovered by the EMS in the case of a disaster recovery.

6.4.3 Checkpoint Recovery

The Director recommends that a checkpoint or similar scheme be implemented whereby in the event of a total system crash, the system can be fully recovered within a short period of time.

6.5 Database and System Back-up

The Director requires periodic back-ups (at least daily) of the variable database files on the EMS Computer disks. The back-up medium must be approved. The modern high capacity cartridge tapes or the equivalent are recommended. Offsite storage of at least one copy of the back-up is mandatory.

6.6 EMS Hardware

The Director must approve the computer system(s) that are to be used to monitor the EGMs - i.e. the EMS. The following are broad requirements / recommendations for this hardware:

6.6.1 Duplication

The Director requires that the central computer system be duplicated so that if a computer or part of a computer fails, gaming can continue. To this end a variety of configurations may be accepted such as:

- (a) A central computer with a second computer in "cold standby" configuration (i.e. disks are swapped to the second computer should be first computer fail),
- (b) A central computer with a second computer in "hot standby" configuration (i.e. messages are passed from primary computer to second computer as they occur. Important transactions must be logged on both computers before a response is passed back to the originator),

- (c) A fail-safe or fully duplicated computer (multiple processors, memory, I/O channels, power supplies, etc.).

6.6.2 Multiple Log Files

The Director requires that there be at least two physical copies for each file and/or database that contains vital financial and event information. For this requirement, mirrored disk files (which are a way of protecting against one form of failure) are not considered adequate for the two physical copies criteria.

6.6.3 Printing

Reports that are to be supplied to the Director must be printed on a device that provides high quality and reliability. For this reason the Director recommends the use of a laser printer.

6.6.4 Password Protection

The Operating System of the computer must provide comprehensive password security. It is expected that all programs and important data files can only be accessed by entry of a password which will be known only to authorised personnel.

The Director requires that storage of passwords and PINs be in an encrypted, non-reversible form. This means that if a person (authorised or not) reads the file that stores the PIN data, he/she must not be able to reconstruct the PIN from that data even if he/she knows the PIN creation algorithm.

A program must be available that will list all registered users on the system including their privilege level.

6.6.5 Approved Files On EMS Disk

Only approved programs, data files and operating system files may be kept on the disk of the EMS computers. In specific, editors, compilers, assemblers and data manipulation programs (other than as a part of the normal program suite) must not be available anywhere on the system.

6.7 Interface with the Victorian Casino and Gaming Authority

6.7.1 Reporting Requirements

Details of reporting requirements of the Casino Operator are to be provided by the Victorian Casino and Gaming Authority in a separate document.

6.7.2 Link to Authority Computing Facilities

There is to be an electronic link from the Gaming Operator's central computer site to the Authority's computer facilities. This link is for the purpose of down loading (through a modem or other approved method) financial and game play statistical data on a daily basis (or at a frequency agreed by the Director). The specification of data to be transferred is detailed in a separate document.

6.8 System Auditibility and Control

The operational and system control of the Casino's EMS must be administered within the Authority's audit guidelines. Specific points relative to system audibility are included in this section.

6.8.1 Separate Compilation of EMS Software

All EMS application software must be independently compiled in the presence of the Director's representative to verify that the programs supplied to the Director for evaluation are in fact the programs that are actually run.

6.8.2 Validation of Operational Software

A method of validation of operational software is to be provided. The procedure used should be able to detect if there are missing or extra programs on the system as well as verifying that the proper programs exist.

6.8.3 Virus Protection

The EMS is to have proper Virus protection and detection mechanisms where appropriate.

6.8.4 Change Control System

The EMS software is to be maintained under an approved software change control system.

6.9 Development System

The Casino Operator must provide a fully configured development system to enable new versions of EMS software and new EGMs and their games to be adequately tested in an appropriate environment.

The Director may approve the use of the back-up computer system for the development system provided that the security measures are adequate relative to the switching of the development computer into the live network when required.

6.10 Computer Room Environment

The following points apply to the computer room and its environment that is to house the central computers of the EMS.

Note that full compliance with the standards in this section (6.10) will not be required for the Galleria Casino where the Casino Operator can demonstrate to the satisfaction of the Director that they are not achievable due to timelines and/or the temporary nature of the facility.

6.10.1 Security

The EMS computer room is to be a secure area where only authorised personnel may enter. The method of locking and entry into the computer room is to be approved. The Director recommends the adoption of an electronic locking system that provides monitoring information of entry and exit of personnel.

There is to be a detection system that provides an alarm when unauthorised entry to the computer room is attempted.

6.10.2 Fire Protection

The EMS computer room must have an appropriate automatic fire detection and protection system.

The computer room must have several appropriate (non-water) hand-held fire extinguishers strategically placed to counter small localised fires.

6.10.3 Power Backup

6.10.3.1 UPS

The Director requires that the EMS be protected against power fluctuations and temporary loss by installation of a UPS or other such device. The Director recommends that the UPS be capable of sustaining at least 10 minutes of operation of the computer system, security system, tele-communication equipment and computer terminals (operations and hotline) in the event of a mains power failure.

All equipment situated in the computer room is to be earthed back through the UPS and is to comply with Australian Standard AS3000-1986.

6.10.3.2 Generator

The Director requires that the EMS be protected against long term loss of power by installation of a generator or other such device. The generator should have the fuel capacity to support the computer systems, air conditioning, security system, telecommunication equipment, computer terminals (operations and hotline) and sufficient lighting for normal operation of the computer room and hotline area for a period of 24 hours.

The generator is to be started and tested at least monthly.

6.10.4 Air Conditioning and Environment

The EMS central computer room must have appropriate air conditioning to maintain the environment required by the computer(s) for normal operation. There must be sufficient duplication in the air conditioning to allow the EMS to continue operation should there be a failure of a single component of the air conditioning system.

The air conditioning equipment is to be designed to provide a high degree of air filtration to remove the majority of dust from the air. This requirement for filtration is to capture 95% of British Standard BS2831 Test Dust Number 2.

6.10.5 Emergency Lighting

The EMS computer room must have an emergency lighting system that automatically lights when mains power is lost. If this operates from the UPS, there must be sufficient capacity in the UPS to cater for the lights (plus computers and air conditioning). It is not recommended that the emergency lighting system be driven by power from the UPS.

6.10.6 Environmental Monitoring System

The operating environmental systems (at least the power and air conditioning) are to be monitored by a computerised system that will perform automated switching to backup systems (e.g. mains power to generator) for most component failures of the environmental system.

6.10.7 Electrostatic Discharge Protection

Static electricity in the computer room must be kept to an absolute minimum. The Director recommends the installation of anti-static mats at all entry points to the computer room if other methods of reducing static have not been adopted. Floor coverings in the computer room should be approved vinyl or wool carpet tiles.

7. Jackpots

7.1 Definitions

7.1.1 Jackpot

A Jackpot is defined to be a game whereby a part of the wager amount is added to a pool or account (commonly called the jackpot). When a certain winning criteria is achieved by a player the jackpot is "won" and the winner(s) receive an amount from the pool (as specified by the rules of the game) as a prize and the pool is then deducted by the prize amount and/or reset to a minimum amount. In most implementations, the minimum amount is a non-zero value, often called a "Seed", which encourages players to participate in the next jackpot. A Jackpot may have components of extra contributions from the Casino Operator.

A jackpot may be won by either a game oriented result (e.g. Royal Flush in correct order or 12 out of 12 Keno) or by a non-game oriented result (e.g. a jackpot contribution forces the jackpot to exceed a predetermined (and secret) level thereby becoming a winner).

7.1.2 Standalone Progressive Jackpot

A Standalone Progressive Jackpot is defined to be one where contributions to the jackpot and the possibility of winning the jackpot only apply to a single EGM. The EGM may have one or more jackpots associated with it.

7.1.3 Linked Progressive Jackpot

A Linked Progressive Jackpot is defined to be one that enables two or more EGMs within the Casino to participate in one or more common jackpots.

7.1.4 Mystery Jackpot

A Mystery Jackpot is one where the winning of the jackpot is determined by an external jackpot controller or the EMS rather than the EGM. In most circumstances, the winning of the jackpot has nothing to do with the actual result of the game as it appeared to the player i.e. the winning of this kind of jackpot is by non-game oriented result.

7.1.5 Bonus Jackpot

A Bonus Jackpot is one where an EGM is instructed by an external device to pay additional bonus prizes where the amount/multiplier, bonus eligibility criteria and time period are specified by the external device.

7.2 General Principles

The following principles apply to the implementation of all styles of jackpots though many are appropriate to "linked jackpots". The requirements for each individual style of jackpot are in the subsequent sections

7.2.1 Jackpot Parameters

Parameters for the setting and control of all jackpots shall be included in the EGM internal controls and procedures manual which shall require approval of the Authority.

7.2.2 Jackpot Fairness

In order to have a jackpot that is equally fair to all players the following principles must be followed.

- (1) All players that play jackpot games must be eligible to win the jackpot. Exceptions to this jackpot rule should be submitted to the Director for individual approval before any development work on the jackpot is commenced.
- (2) Jackpot contributions must not be assimilated into revenue. If a cap is established on any jackpot all additional contributions once that cap is reached are to be credited to a diversion pool if the maximum has been reached. Please refer to section 7.2.5 below for the treatment of diversion of jackpot contributions.

The Director recommends, but does not require, that the following jackpot fairness rules also apply:

- (3) The probability of the player winning the jackpot be directly proportional to the size of the wager.
- (4) The proportionality factor in 7.2.2(3) does not vary between type of EGM and/or game(s) played.

The proportionality factor in 7.2.2(3) might be achieved in the following ways:

- (a) restriction of all plays to the jackpot to a single denomination (e.g. \$1) - either by only allowing a single bet amount to play that game or to only allow a single bet amount to be eligible to win the jackpot (if permitted by the Director as described in section 7.2.2(1)),
- (b) implementation of the jackpot on multiple line, single denomination "spinning wheel" EGMs,

- (c) implementation of a mystery jackpot where the winning is determined by an event other than the game result such as the jackpot contribution making a (random) predetermined amount be exceeded.

The proportionality factor in 7.2.2(3) may not be achieved by modification of the method of selection or determination of the game result (e.g. fiddling with a deck of cards).

7.2.3 Jackpot Winner Determination

Traditional jackpots are won by some event that happens as a result of the game being played. For example, a 10 out of 10 Keno catch or a Royal Flush (maybe in order) might be examples of this event. The Director requires that all jackpot winners are determined by the EGM as a result of such a game oriented event except that the Director will accept schemes where mystery jackpots are determined by a jackpot controller or EMS provided that:

- (a) all technical requirements of section 7.6 are met
- (b) appropriate internal controls are in place.

7.2.4 Jackpot Display Updates

The update of the current amount of the progressive jackpot(s) should be as often as possible. The Director will not approve a scheme where the jackpot displays are normally "significantly inaccurate" for a substantial period of time. The Director will accept a scheme where the jackpot displays "artificially" increment based upon a value and increment rate passed to the display by the EMS and/or EGM provided that he/she is satisfied with the security and accuracy of the display.

7.2.5 Partial Jackpot Redirection

7.2.5.1 Diversion Pools

Jackpots may have a diversion pool scheme where a portion of the jackpot contribution is redirected to another pool such that when the current jackpot is won, this pool is added to the restart level of the next jackpot. This partial jackpot redirection may involve variable diversion rates where the size of the primary jackpot determines the diversion factor.

All jackpot diversion schemes and parameters require the approval of the Authority as per section 7.2.1 of this document. No diversion scheme will be approved by the Authority if the diversion pool can "grow to infinity".

Note that the Authority will not approve a jackpot scheme whereby the diversion pool is used to fund a "minimum jackpot level" unless the definition of the minimum jackpot is treated to be zero for the purposes of calculation of expected player return.

7.2.5.2 Reimbursement Pools

Jackpots may have a reimbursement pool scheme where the Operator adds money to a Jackpot and then a portion of the jackpot contribution is redirected to another pool to pay back the Operator for the money added. This partial jackpot redirection to a reimbursement pool may involve variable diversion rates where the size of the primary jackpot determines the diversion factor.

Redirection of jackpot contribution portions must immediately cease when the reimbursement pool reaches a zero amount - i.e. all monies have been repaid.

The method of adding money to a jackpot, including active jackpots, must be approved by the Director. Note that it is not permitted for monies to be subtracted from an active jackpot - refer to section 7.2.9 for conversion or elimination of jackpots.

All jackpot reimbursement schemes and parameters require the approval of the Authority as per section 7.2.1 of this document.

7.2.6 Multiple Jackpot Winners

The possibility of more than one player winning the jackpot at the same time is to be resolved. The Director does not recommend a simple algorithm of paying the first one in the current jackpot, and then the subsequent the minimum.

The Director recommends that there is to be an implementation of a time window, roughly equivalent to the time it will take to reset the jackpot displays, whereby multiple winners arriving in that time window share the jackpot in some manner. Whether to parimutuel the current jackpot or to pay a copy to each or whatever is up to the Casino Operator but the method must be approved by the Director.

7.2.7 Jackpot Winners When Communications Go Down

It is necessary to resolve the problem that occurs when an EGM determines that a jackpot has been won, but the link to the jackpot controller or EMS becomes inoperable. There are at least two possible things to do:

- (1) insist that in order to win the jackpot that communication to the host be guaranteed first. This has the disadvantage that the player may be "cheated" out of his/her winning jackpot - even if he/she does not know he/she has been cheated,
or
- (2) allow a manual method of indicating to the system that a jackpot has been won, in these circumstances, which may be entered through a EMS control terminal or other procedure approved by the Director. The inherent security risks of this

method are to be resolved to the satisfaction of the Director if this method is to be approved.

The Director requires resolution of this problem before the jackpot is implemented. Whatever the resolution, the Player rules must clearly state what is to happen in this circumstance.

7.2.8 Jackpot display equipment

Any jackpot display equipment that is to be used in the Casino, whether it be connected to a local controller or to an EGM, must satisfy all of the hardware and software requirements that are required of EGMs for the relevant technical specifications.

7.2.9 Conversion or Elimination of Jackpots

7.2.9.1 Permission for Conversion of a Jackpot

The Casino Operator must receive permission from the Director if a jackpot is to be converted or combined into another jackpot.

7.2.9.2 Permission for Elimination of a Jackpot

The Casino Operator must receive permission from the Director if a jackpot is to be eliminated. Because the elimination of a jackpot represents the assimilation of the jackpot contributions into revenue, the Director will only approve the elimination of a jackpot under special circumstances.

If a jackpot is to be eliminated, the amount of the jackpot contributions is to be deducted from the "Total Jackpot Contributions" for the Casino for the purposes of calculation of minimum player return for the Casino.

7.2.10 Communication of Jackpot Information

The Director requires that communication of jackpot information, i.e. jackpot increments and win notification, to/from the EGM and the external jackpot controller or EMS be via direct serial communication with the micro-processor that controls the EGM.

The Director will accept linked progressive and mystery jackpot schemes where jackpot information is gathered via "wiring harness" interfaces to the EGMs but only for operation in the Galleria Casino and only if the wire harness arrangement has been determined acceptable in accordance with 3.19.6.

7.2.11 Fixed Prize Jackpots

Jackpots which pay fixed prizes when won, whether linked progressive or mystery, will be permitted in the Casino as long as the fixed prize has received the approval of the Director. If the jackpot win pays a non-cash prize the following rules apply:

1. The VCGA will deem the value of the prize for the purposes of settlement with the jackpot pool, to be the Operator's purchase price of the prize. Documentation substantiating the actual purchase price must be maintained by the Casino Operator and made available to the VCGA upon request.
2. When requesting approval for new jackpots with non-cash prizes, the Casino Operator must submit to the Director the public's perceived "retail" value of the prize as well as the actual purchase price.

7.3 Standalone Progressive Jackpots

The Standalone Progressive Jackpot may be entirely controlled by the EGM itself or be controlled by an external jackpot controller. The following points apply to any implementation but are most apropos to EGM controlled jackpots.

7.3.1 Recovery of Software Meters

The EGM must be able to determine when some of its memory is corrupted but other is still valid and appropriately recover the valid information into all of the meter storage devices. Recovery from all variations of meter storage failure must be demonstrated before a jackpot EGM will be approved.

7.3.2 Recovery of Jackpot Amounts

Should there be a total EGM and/or RAM failure, it will be necessary to recover the "un-won" jackpot contributions into the replacement EGM. However, the Director views the ability to "manually change" a jackpot amount as a potential security risk. The Casino Operator must specify a method of handling this recovery situation which must be approved by the Director. One possible alternative that may be accepted is:

the jackpot update procedure is only performed as a part of a full reconfiguration of an EGM. If a full configuration is done, a significant event is to be recorded and the update amounts for each jackpot is to be logged.

Note that the value of the jackpots when an EGM fails may not be known. For this reason the EMS is to receive from the EGMs and maintain in its database the current value of the jackpots on at least a daily basis for recovery and audit reasons.

7.3.3 Jackpot Amount Storage

The Director recommends that the current jackpot amounts be stored in the EGM in absolute amounts, in units to be approved by the Director, rather than in terms of numbers of plays of the jackpot. This will facilitate the conversion of a jackpot EGM

from one denomination or another. The Director will not approve the conversion of EGM jackpot denominations unless this requirement is met.

7.4 Jackpot Controllers

Jackpots may be maintained and controlled by an external jackpot controller, or from the central point of the EMS. If an external jackpot controller is maintaining a jackpot the following points apply:

7.4.1 Jackpot Controller Security

The Director must approve the physical and software security schemes applicable to each Jackpot Controller implementation. The location and access to Jackpot Controllers as per section 8.3 will be assessed by the Director to determine the adequacy of each scheme.

It is a fundamental requirement that software integrity of a Jackpot Controller is maintained and the Director will need to be satisfied as to all schemes for monitoring and restricting access to hardware and software. Unless agreed otherwise by the Director the following requirements must be met:

- (a) the controller must have a logic door which senses its opening even when power is off. The controller must remain disabled when the logic door has been opened until manually reset by any of the reactivation methods as described for logic doors in 3.3.4,
- (b) door opens and other such events must be observed and recorded by the EMS as for EGMs,
- (c) the controller must pass, on demand from the EMS, the same kind of signature checks as the EGM.

For operation in the Galleria Casino, the Director will not fail the assessment of jackpot controllers purely because they do not meet all of the criteria of this section.

7.4.2 Recovery of Software Meters

The principles described of the EGM in section 7.3.2 for Recovery of Software Meters must equally apply to the local controller that maintains jackpots.

7.4.3 Recovery of Jackpot Amounts

The principles described of the EGM in section 7.3.3 for Recovery of Jackpot Amounts must equally apply to the local controller that maintains jackpots.

7.4.4 Jackpot Controller Hardware Requirements

The Director requires that jackpot controllers achieve at least the same standards of hardware requirements as for EGMs. In specific, approval of a jackpot controller will not be granted until the jackpot controller demonstrates conformance to the following EGM requirements:

- (a) Manipulation of EGM hardware as per section 3.11
- (b) Physical construction as per section 3.12
- (c) Magnetic and electromagnetic interference as per section 3.13.1
- (d) Electrostatic interference as per section 3.13.2
- (e) Radio frequency interference as per section 3.13.3
- (f) Data communications line isolation as per section 3.14.1
- (g) Power supply filtering as per section 3.15.1
- (h) Battery backup as per section 3.15.2
- (i) Electrical safety as per section 3.16

7.4.5 Jackpot Controller Software Auditing and Verification

The EGM software auditing and verification requirements apply equally to jackpot controllers. Therefore a jackpot controller must meet the requirements of section 3.20 of this document.

7.5 Linked Progressive Jackpots

7.5.1 Maintenance and Control of Linked Progressive Jackpots

Linked Progressive Jackpots may be maintained and controlled by an external jackpot controller or from the central point of the EMS. If a external jackpot controller is maintaining a linked progressive jackpot all of the principles of section 7.4 must apply.

7.5.2 Linked Progressive Jackpot Winner Determination

All linked progressive jackpot wins will be determined by an EGM participating in the jackpot and will be based upon a game oriented event as described in section 7.2.3.

7.6 Mystery Jackpots

7.6.1 Maintenance and Control of Mystery Jackpots

Mystery jackpots may be maintained and controlled by an external jackpot controller or by the EMS. If an external controller is maintaining a mystery jackpot all of the principles of section 7.4 must apply.

7.6.2 Mystery Jackpot Win Notification

The notification of the winning of the Mystery jackpot is to be passed by electronic means to the EGM which is to signify in an approved manner to the player that he/she has won the Mystery jackpot and the amount that has been won.

The Director prefers that the jackpot amount won be automatically credited to the player's credit balance.

Notification of mystery jackpot win at an EGM will not be required for EGM operation in the Galleria Casino.

7.6.3 Mystery Jackpot Win Determination

The determination of a mystery jackpot win must follow the same requirements as for game result determination in EGMs. In specific, this means that any RNG used by a jackpot controller or the EMS to determine the jackpot win or criteria for the jackpot win must meet the minimum requirements for RNGs described in Appendix A.

7.7 Bonus Jackpots

7.7.1 Bonus Jackpot Parameters

All Bonus Jackpot parameters are to receive the approval of the Director. The parameters that are to be established, at a minimum, are:

1. Criteria for commencement of Bonus Jackpot sequences
2. Criteria for completion / stopping of Bonus Jackpot sequences
3. Criteria for an EGM awarding a bonus prize
4. Criteria for an EGM determining the amount of the bonus prize
5. Contribution to Bonus Jackpot pools - including start-up values and contribution rates.

7.7.2 Maintenance and Control of Bonus Jackpots

Bonus jackpots may be maintained and controlled by an external jackpot controller or by the EMS. If an external controller is maintaining a bonus jackpot all of the principles of section 7.4 must apply.

7.7.3 Bonus Jackpots Accounting

The EMS must account for all Bonus jackpot monies. At a minimum it must maintain and be able to report the following:

1. Bonus Jackpot Contributions made
2. Bonus Jackpot Contributions won
3. Bonus Jackpot Start-up values won
4. Current Bonus Jackpot Amount(s)

7.7.4 Bonus Jackpot Display

1. There must be some indication to indicate to patrons that a Bonus Jackpot sequence is currently happening. This indication may be an external jackpot display, appropriate messages on the participating EGMs or other means approved by the Director.
2. There must be some method on the winning EGM to display to the player that a Bonus Prize has been won.
3. The method and content of Bonus Jackpot display is to receive the approval of the Director.

8. Other Gaming Equipment Requirements

The majority of the specifications in the TRD refer to requirements for EGMs. Many of the requirements will also apply to other gaming equipment. This section clarifies which requirements will apply to gaming equipment other than EGMs and Jackpot Controllers (which are covered in section 7.4 of this document).

8.1 Passive Cashier/Enquiry Stations

Passive Cashier/Enquiry Stations are those devices which do not actively participate in the update of gaming tokens, coins, notes or other such components of a gaming system. An example of a passive Cashier/Enquiry terminal is a “dumb terminal”.

Passive Cashier/Enquiry Stations will need only to meet electrical and public safety requirements as specified in section 3.16.

8.2 Active Cashier/Enquiry Stations

An Active Cashier/Enquiry Station is one that does directly participate in update of gaming tokens or other such components of a gaming system. Examples of Active Cashier/Enquiry Terminals are PC's with Smart card readers/writers or online banknote validator devices.

The requirements to be met by such devices will be depend upon the characteristics and functions of the particular device but may include the requirements of sections 3.11 through 3.19 and possibly 3.20 depending if the device is driven by onboard software.

8.3 EMS Interface Equipment

The EMS Interface Equipment is defined to be equipment that provides a component of the connection between the EGM and the Central Point of the EMS. There are four categories of EMS interface equipment.

8.3.1 Equipment Resident within a Secure Computer Room

The only EGM specific requirements that will need to be met by EMS interface equipment that resides within a secure computer room (as defined in section 6.10) is the communication interface requirements i.e. sections 3.14 Communications interfaces - Line Isolation (but only if the device communicates with components outside the computer room) and 3.19 Data Communications.

8.3.2 Equipment Outside a Computer Room - not Normally Accessed

Equipment outside of a computer room which is not normally accessed must meet some of the requirements of an EGM - depending upon its function. Examples of such devices would be a local controller or front end which is locked in a cabinet or closet or a gaming machine interface board contained within a locked compartment in gaming machine furniture.

8.3.3 Equipment Outside a Computer Room - Normally Accessed

Equipment outside of a computer room which is normally accessed must meet most of the requirements of an EGM - depending upon its function. An example of such a device would be a site controller which also provided cashier terminal functions where there is potential risk from liquid spill or ESD.

8.3.4 Equipment Contained within an EGM

Equipment contained within an EGM must meet all of the appropriate requirements of the EGM. An example is a gaming machine interface board that is contained within an EGM's logic area or another logic area within the EGM.

9. Glossary of Terms

- BB-RAM : Battery Backed Random Access Memory (a form of electronic read/write memory that incorporates a battery so as to retain memory contents while the equipment is powered off).
- CCITT : Consultative Committee International on Telephony and Telegraphy.
- CLA : Combined Linear Algorithm (a type of RNG).
- CPU : Central Processing Unit (the microprocessor controlling the EGM).
- CRC : Cyclic Redundancy Code.
- CRT : Cathode Ray Tube.
- DMA : Direct Memory Access (data flows that bypass the CPU).
- EE-PROM : Electrically Erasable Programmable Read Only Memory (a form of electronic read/write memory that retains its contents while powered off).
- EGM : Electronic Gaming Machine.
- EMI : Electro Magnetic Interference.
- EMR : Electro Magnetic Radiation.
- EMS : The computerised Electronic Monitoring System of the Casino Operator's network.
- EPROM : UV-Erasable Programmable Read Only Memory (the form of electronic read only memory used to store a device's operational programs and non-changeable data elements and tables).
- FPLA : Fusible link Field Programmable Logic Array (used to store hardware logic firmware).
- ICE : In-Circuit Emulator.
- LAN : Local Area Network.
- LCA : Linear Congruential Algorithm (a type of RNG).
- LCD : Liquid Crystal Display.
- LED : Light Emitting Diode.
- MDF : Main Distribution Frame.
- NTU : Network Terminating Unit (interface device to Telecom data network).
- NOLA : N-th Order Linear Algorithm (a type of RNG).
- NV-RAM : Non Volatile Random Access Memory (a form of electronic read/write memory that does not lose its contents when the equipment is powered off).
- PCB : Printed Circuit Board.
- PAL : Fusible link Programmable Array Logic (used to store hardware logic firmware).
- PROM : Fusible link Programmable Read Only Memory (a form of electronic read only memory). Expected to be used to store hardware logic firmware in a similar manner to PAL or FPLA devices.
- RAM : Random Access Memory (electronic read/write memory).
- RFI : Radio Frequency Interference.
- ROM : Mask programmed Read Only Memory (a form of electronic read only memory). This document has been written in terms of use of EPROM program storage, so as far as this document is concerned, ROM is an allowable type of EPROM.
- RNG : Random Number Generator.

- UPS : Uninterruptable Power Supply (a no-break mains power supply including battery backup equipment).
- UV : Ultra Violet light.
- VCGA : The Victorian Casino and Gaming Authority
- VDU : Video Display Unit