NT FIRE & RESCUE SERVICE

Fire Contractors Guide-Book – Electrical - NTFAST

Electrical - NTFAST

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8	May 30 2025	Steve Vitnell – T5	Alignment with NCC 2025 & AS1670.1 -2024 plus minor edits NTFRS corporatizing

Acronyms	Full form
ACMA	Australian Communication & Media Authority
AFA	Automatic Fire Alarm
ASE	Alarm Signalling Equipment (Miri AD2006)
BFSR	Building Fire Safety Report
BOWS	Building occupant warning systems
CPR	Cabling Provider Rules
DIN	Digital Input
DOT	Digital Output
ECP	Emergency Call Point (white coloured MCP)
ERA	Emergency Response Area
EWIS	Emergency warning & intercommunication system
FBP	Fire Brigade Panel (formerly included Fire Fighter Facilities)
FCGB	Fire Contractors Guidebook (this document)
FDAS	Fire Detection & Alarm System
FDCIE	Fire Detection Control Indicting Equipment (formerly FIP)
FSC	Fire Safety Command (within the NTFRS)
JESCC	Joint Emergency Services Communications Centre
MCP	Manual Call Point (red break glass alarm)
NCC	National Construction Code
NTES	Northern Territory Emergency Services
NTFAST	Northern Territory Fire Alarm System Transmission
NTFRS	Northern Territory Fire & Rescue Service
PFES	Police, Fire & Emergency Services
RSSI	Received Signal Strength Indicator
RTU	Radio Telemetry Unit
SOU	Sole occupancy unit
SPL	Sound Pressure Level
V4	Version 4.20 Software
WAN	Wide Area Network
WIP	Warden Intercom Point

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1. Preface

This information is for fire technicians working on Class 2 to 9 buildings and relates to the installed fire equipment of an electrical nature (AS1670.1) with the focus on NTFAST connected buildings, though does not address AS2118, AS2419.1 & AS2941 specific electrical requirements.

This documentation outlines the function of NTFRS Fire Safety Command, NTFAST technicians' role in building compliance and covers NTFAST V4 Digital AD2006 ASE (miri) units.

USED TERM

Legacy site – Site that was first connected via the former Torrens system ASE & now has miri unit as an ASE in an NTFAST box external to FDCIE with 13.8-volt PSU/charger and battery.

2. Regulatory environment of fire equipment

Electrical fire equipment AS1670.1 series, AS/NZS 3000 section 7.2 "Safety Services" and AS2293.1 "Emergency escape lighting and exit signs for buildings" covered by the following NT legislation and national codes:

NT Building Act

NT Fire and Emergency Act

NT Fire and Emergency Regulations

National Construction Code

Australian Standard (as applicable to type of equipment)

NT Licenced Building Certifiers are the Authority Having Jurisdiction in the NT. The Building Certifier will be responsible for issuing the Permit to Occupy.

NTFRS Fire Safety Command

Built Environment: Section focus on reporting on all buildings requiring certification in line with schedule 2 of the NT Building Act. Officers produce reports upon application from certifiers in line with NT Building Act (NT), NT Fire and Emergency Act & Regulations, National Construction Code and Australian Standards.

Fire Safety Emergency Planning: Section focus on inspecting buildings listed in Schedule 2 of the Fire and Emergency Regulations on newly occupied buildings that should have an appropriate certificate of occupancy. Inspections engage new occupants ensuring ongoing emergency planning and fire system maintenance schedules are implemented. NTFRS operational crews also conduct familiarisation inspections to facilitate pre-fire planning.

Fire Safety Compliance: Section focus on inspecting buildings listed in Schedule 2 of the Fire and Emergency Regulations for ongoing fire safety compliance & identification of potential fire related hazards. The compliance division also provides support and background administration to the NTFRS Territory Operations Building Fire Safety Inspection Program. Fire Safety Compliance predominantly focus on existing, occupied buildings that should have an appropriate certificate of occupancy.

Fire Protection Technologies (NTFAST): Responsible for connection and technical maintenance of the NTFAST monitored alarm system. Technical staff provide technical advice to Command officers, stakeholders and general public in relation to installed fire detection and suppression systems.

Fire System Designer provide the fire system design and is responsible for all documentation and baseline data in section 1.7 and System Designer's Statement refer Appendix E.

Fire System Installer install fire safety systems to AS1670.1, .4 & .5 Deem to satisfy NCC (see section 18 item 10) or alternate solution and System Designer's documentation. It is therefore essential for Installers to have a copy of these documents.

Installers of fire systems are required to be *OPEN* category registered with one of five Cabling Provider Rules Registrars, or directly supervise all others working under his registration. This includes the holders of *RESTRICTED* category registration. Cabling Provider Rules (CPRs) issued by the Australian Communication & Media Authority (ACMA) as covered by the Telecommunications Act 1997.

3. Australian Standards on fire Detection

Installer should be aware AS1670.1 clause 3.22.1 requires that detection throughout all areas of the building, except where systems installed to meet the requirements of the NCC, or smoke control detection installed in accordance with section 7. Should be equally aware of Clause 3.23 … "*Detectors are not required in the following locations*:" as listed (a) to (h). AS1670.5 covers special requirements of Special Hazard system installations [gas suppression systems].

Specific detection arrangements as well as nominated areas are in clause 4, 5 and 6 of Spec E2.2a of the NCC. For example, Class 2 may have AS1670.1 detection only *"in public corridors and other internal public spaces."*

Full AS1670.1 coverage is via Section 3.22 (Clauses 3.22.1 to 3.22.12) and NTFAST conditions of connection 13b "partially protected buildings will not be accepted for connection", except as above the NCC requires detection in only certain nominated areas or specific detection arrangements.

4. NTFRS Operational requirements

ONE STOP SHOP – NTFRS is a relatively small fire service. First response is generally one appliance and four fire fighters. The reason for Fire Safety Command having input at the design phase of new buildings to achieve a 'one stop shop' for fire safety equipment.

This means the location of the hydrant/sprinkler booster and sprinkler control valve are in close proximity and visible to the FBP-FDCIE/Building access. The one stop shop design will allow first arriving crews an ability to access all installed fire safety systems. One stop shop operation is not possible on legacy sites that have Sub Panels.

Conventional Sub Panel installation of new building to an existing building NTFAST connected building is a prohibited arrangement. As listed under condition of connection to NTFAST 13b. This is to prevent instances where the appliance first stops at the NTFAST connected FBP and then needs to relocate to a secondary location at some distance from the first.

NETWORK FDCIE – Networked FDCIE on large sites can only be used if the infrastructure for a one stop shop is provided i.e., appropriately located fire hydrant booster with attack hydrant coverage to all networked buildings.

Fire Safety Command advice shall be sort prior to expansions, major changes and upgrades of existing NTFAST sites as required under condition of connection item 7.

5. NTFAST Overview / History

NTFAST is an acronym for “Northern Territory Fire Alarm System Transmission” and came about when the building of a new fire station in Alice Springs at the same time as Torrens the former system used by the NTFRS become obsolete and the company’s closure.

NTFRS invested in technology that could cope with the Territory’s extremes in particular the wet season and lightning storms without the involvement of a third party on NTFRS mission critical system. The first system in Alice Springs was based on AD1000 Miri radio telemetry units (RTU’s - analogue). The rest of the Territory utilises the AD2000 RTU’s - analogue which were set up so that both the NTFAST and Torrens unit were operational during the rollout period of version 1.73 software now referred to as “Old”.

In 2006 the version 3 (V3) upgrade started, enabling the receipt of more inputs than the original 4 Alarm, Standby, Isolate, Test and RSSI. Introducing inputs for minor alarms - sprinkler pump running, zone isolate, MCP, door tamper, valve tamper and mains fail. Some of which are required to meet NCC & standards requirements. Example - Spec 17 S17C12 (2) (a) & (b).

Tester’s feedback of successful and unsuccessful tests via the V3 brigade switch (also DOT 2). Late 2011 the upgraded was completed.

In 2015/16 all track station AD2000 RTU’s were replaced with AD2006 RTU’s with a digital radio modem, ASP and DWN sites were replaced through late 2016 first part of 2017 with AD2006 RTU’s with V4 software ensuring NTFAST remains effective into the future.

NTFAST monitors fire alarms and dispatches automatically via the RTU’s (ASEs) in FBP/FDCIEs. Through repeater sites and back to the Master AD2006 RTU at the fire stations. Designed to operate stand-alone during communication outages. Darwin, Berrimah, Alice Springs and the 5 other Track stations systems are also monitored via the PFES Wide Area Network (WAN) at Joint Emergency Services Communication Centre (JESCC) by Fire Communications Officers (FCO are Police Auxiliaries).

6. NTFAST Alice Springs and Track Stations

The systems in these locations are single repeater sites each mapped for up to 100 sites with ASP having two co-located repeaters (3rd repeater licence frequencies for a future growth).

The repeaters’ locations:

- ASP (Alice Springs) – atop West gap
- JAB (Jabiru) – Fire Station mast
- KTH (Katherine) – Katherine water tanks hill PFES aerial tower
- NHU (Nhulunbuy) – atop Mount Saunders
- TCK (Tennant Creek) – atop Two Tank hill
- YUL (Yulara) – Fire station tower

Track station ASEs all given a 3-letter prefix of the associated Emergency Response Areas (ERA’s) as listed above. ERA maps are located on the NTFRS website (see www.fire.nt.gov.au via Publications tab).

7. NTFAST Darwin

Darwin region divides into five Emergency Response Areas (ERA's). ERA's size designed to ensure Fire Service respond within an appropriate time to emergencies. Each site, depending on its location will fall into one of the following ERA's, receive its prefix from the ERA it is located within.

Greater Darwin ERA's and station locations:

- DWN ERA - No1 Station, 32 Iliffe St Woolner
- CAS ERA - No2 Station, 25 Abala Rd Marrara
- BER ERA - No11 Station, 265 Berrimah Rd Wishart
- PLM ERA - No3 Station, 41 Howard Springs Rd, Howard Springs
- HDO ERA - No 10 Station, 8 Skewes St Humpty Doo

Humpty Doo Station provides daytime cover for its ERA. No3 provides coverage outside these hours for site in the HDO ERA.

These five ERAs have 10 Miri Masters AD2006's for coverage. Seven in DWN/No1 Station. Three are in BER No11 Station. A master is named for the location of repeater it communicates with and mapped for up to 200 sites.

The repeater locations:

- NT House – atop building.
- Marrakai 1 – atop building.
- Marrakai 2 – atop building.
- Marrara – Stadium lighting tower.
- Casuarina – Casuarina Police station tower.
- RDH – atop building.
- Karama – atop water tank.
- Berrimah – atop PMC building.
- Palmerston – Palmerston Police Station Tower
- Humpty Doo – atop water tank.

8. NTFAST ASE (MIRI AD2006)

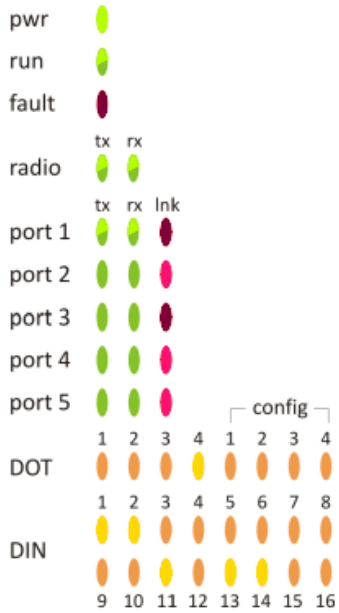
The ASE [miri] unit shall be wholly within all new and replacement Fire panels and mounted upright. ASE power shall come from the FDCIE's primary & secondary power source via a 24-to-12-volt converter. 24 volts direct with a 24-volt rated Brigade switch (24 volt switches have red LED above the Normal position) is possible. ASE power shall be backed-up by the FDCIE secondary power source (batteries) that comply with requirements of AS1670.1 section 3.15. The Miri unit power consumption is 2.5W receiving & 10W transmitting. Miri unit continually receives therefore 0.1 amp @ 24volt. The transmit duration are fraction of a second 0.42 amp @ 24volt. Though transmits can be up to ten times in a minute to as little as once around every 80 to 90 seconds. This will depend on what is happening on the fire panel to the number of other slaves off the particular repeater/master.

The AD2006 Installation as per NTFAST RTU wiring diagrams (see section 15). Each of the minor inputs DIN 9 to 14 shall be independent of one another i.e., the door switch shall only have effect on DIN 12. The door switch input is not to be included in the program string of any other minor inputs.

AD2006 is designed to utilise a digital radio modem.

A correctly functioning AD2006 powered up with the aerial connected will have the following LED pattern with Brigade switch in NORMAL and door open.

LED Indicators



The pwr LED should be on at all times when the unit is powered up.
The run LED should flash at 2Hz when the unit is in RUN mode and 4Hz in PROG mode.
A fault means that the module has received a bad reply to a message.

The tx and rx LEDs reflect the PTT and CD status of the internal radio.

The tx and rx LEDs for each port indicate that a valid system message has been sent or received on that port. A link indication means that the slave time-out period for that port has lapsed or the programmed number of retries have failed and communications have been lost.

The first four LEDs indicate that the physical outputs are active.
The second four LEDs are programmable status indications.

These LEDs indicate that a particular input is active.

GREEN LED	- ON	- FLASHING	- OFF	
RED LED	- ON	- OFF		
YELLOW LED	- ON	- OFF		

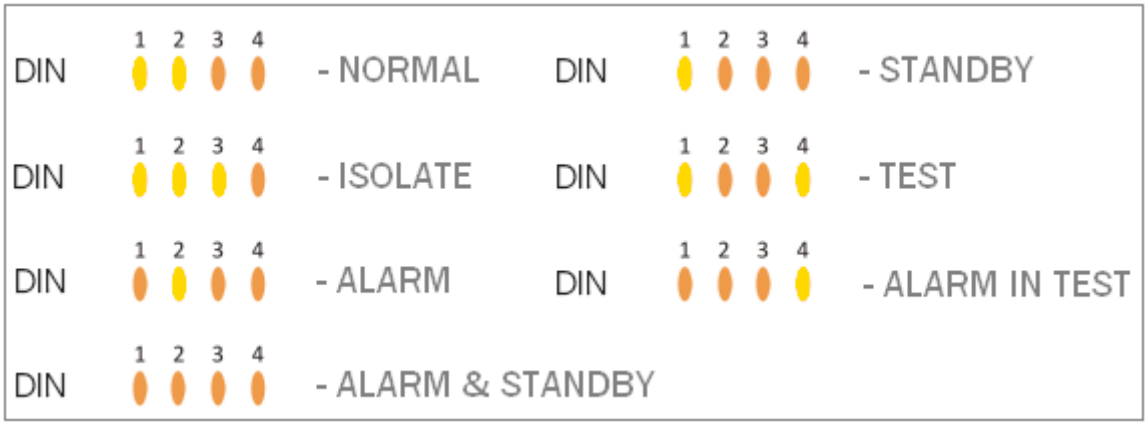
For an NTFAST Miri unit the outputs (DOT) and inputs (DIN) functions are:

DOT 1 is battery charge output (only used on legacy sites)
DOT 2 is test output.
DOT 4 is link OK output (receiving polling signal from the master only)

DOTs 1 and 4 – will normally be ON for legacy sites.
NOTE: *DOT 1 to 1A is a contact that when the miri power is sensed voltage ≥13 volts the contact closes to charge the battery of legacy site miri. DOT 4 is the LINK OK output will be on when the miri unit receives valid polling request.*

DIN 1 is alarm input (on = normal – off = fire alarm)
DIN 2 is standby (fault) input (on = normal – off = fault/s)
DIN 3 is isolate input (brigade switch isolated forces DIN 1 & 2 on overriding their true status – DIN 1 & 2 on site isolated)
DIN 4 is test input (on = site in test for 300 seconds)
DIN 9 is sprinkler pump running input (on = pump running)
DIN 10 is FDCIE zone isolate input (on = zone isolated)
DIN 11 is MCP input (off = MCP alarm active)
DIN 12 is FDCIE door switch input (off = door open)
DIN 13 is sprinkler valve tamper input (off = valve closed)
DIN 14 is FDCIE AC power fail input (off = mains failed)

DIN 1, 2, 11, 13 & 14 – will normally be ON with the door open and FDCIE in normal as represented in the above full LED indicator diagram.



Major input patterns, how to read their statuses

AD2006 can be purchased from some Darwin based fire system suppliers or direct from Miri Technologies

9. Testing and working on site

TESTING – A brigade test regime of 300 seconds test timer Territory wide on all sites. All references to the old 45 seconds test timer (strict 7 to 10 second steps) test regime switching times are no longer relevant. Testers shall only follow the below sequence with the knowledge that they have a full 5 minutes to complete a successful test.

FOR A BRIGADE TEST
Ensure that the "LINK OK" LED is on.

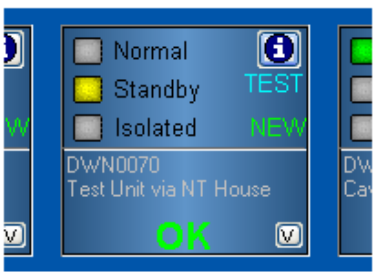
1. Turn the Brigade switch to "TEST' position – DIN 1 and 4 both on.
2. Activate a zone/device into alarm on the FDCIE – DIN 4 on only.
3. Reset the alarm zone/device – DIN 1 and 4 both on.
4. Return the brigade switch to "NORMAL" position.

Each test step should be for a slow count of 10 though can be much longer.
The four steps shall not exceed 300 seconds.

Observe the "TEST" LED.
TEST SUCCESSFUL – "TEST" LED will be on solid for 20 seconds.
TEST FAILURE - "TEST" LED will flash at approximately 1Hz for 20 seconds.

Below are the steps as seen on site mimics on NTFAST

Site in NORMAL



test sequence at 1 & 3 above

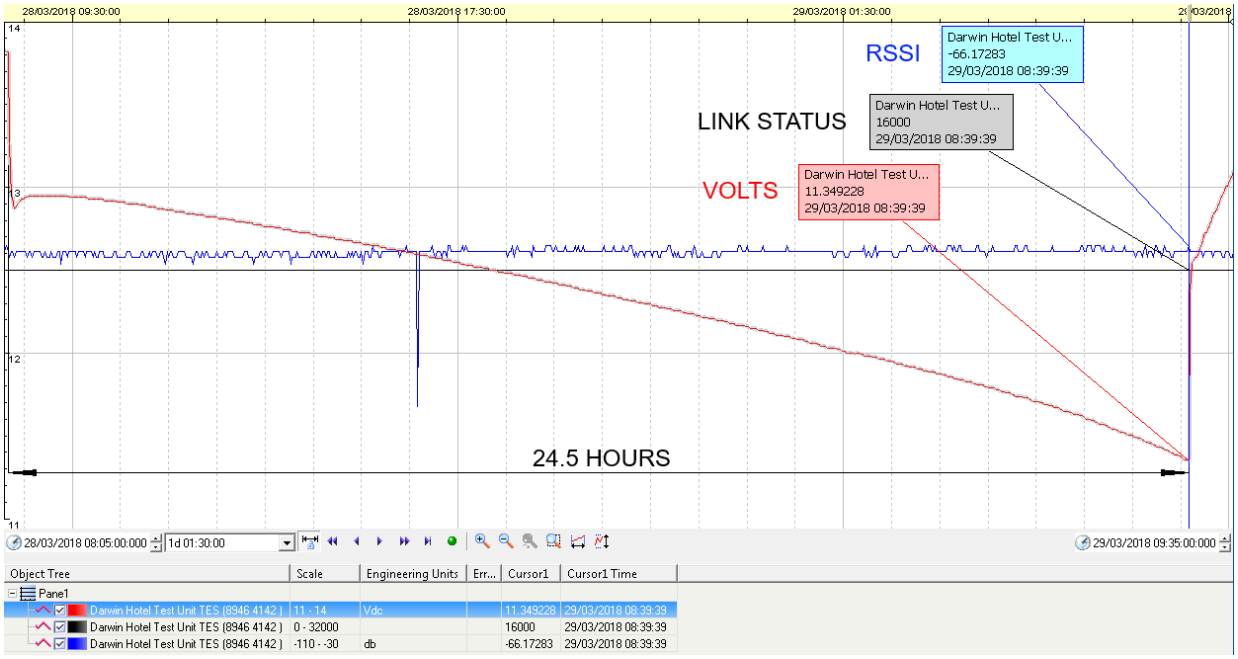
test sequence at 2 above

NTFAST Technicians can provide system familiarisation to technicians and testers by arrangement.

To meet requirements of AS1851– 2012. Testers keep in mind that legacy site and early transition to NTFAST FIPs that have a separate NTFAST battery, must be tested/checked.

Testing/checking done by:
1. -visually check the battery for swelling, cracked terminal seals and terminal corrosion.
2. -check charge voltage/PSU output is 13.8 volts. Ensure the battery knife fuse is connected.
3. -disconnect the 240-volt knife fuse so that the ASE (miri) is running off battery. Recheck battery voltage is above nominal value (12 volts). After 1 minute, (see graph below for reference) if voltage drops to 12 volts or below within this time it should be immediately failed and replaced as soon as possible.
4. -note the final battery voltage reading in the logbook as proof of testing. A trend on the health of the battery with each monthly test can be built-up.
5. -once testing has been complete ensure that knife fuse is reconnected.

"Warning": 240 volts exist within legacy NTFAST box and caution is always required.



DISCHARGE TEST OF NEW FULLY CHARGE 7AH 12VOLT BATTERY
The graph above shows NTFAST 'trend log' for a new 7ah battery with the battery cut-off contacts bypassed (DOT 1 to DOT 1A see section 15). This is included for reference when undertaking the above 1-minute test – a good battery should be of a value well above nominal after 1 minute.
NOTE: *Contact between DOT 1 and 1A closes when the miri input power is greater than 13 volts for 1 minute.*

NOTE: *Unserviceable NTFAST batteries and dirty power are often reason for sites having multiple daily link failures, as the PSU struggles to provide the miri transmit power and charge the flat/unserviceable battery. Result can be brief changes in voltage to the miri CPU reboot value. Dirty power from switch mode PSU can cause the digital radio to stop.*

DAILY REPORTS
Contractors will receive reports as an email attachment from email address 'PFES, reporting' [BRIO.PFES@pfes.nt.gov.au]. Emails sent daily at 07:00 covering the previous 31 hours, (overlapping the previous report) for all the sites they are the nominated contractor.
See example on following page.

Northern Territory Fire and Rescue Service

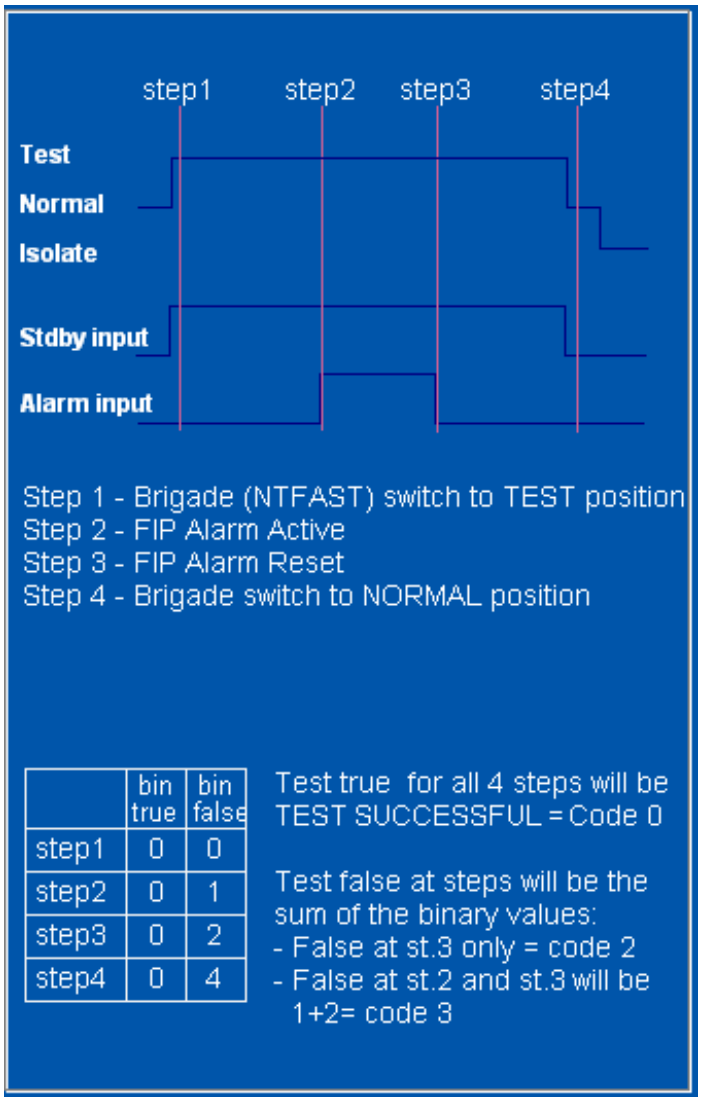
NTFAST Contractor 24 Hour Alarms for the period 23/04/2017 00:00:00 to 24/04/2017 06:59:59

CAS0195 - Michael Long Learning Centre

Date Active	Alarm Type	Active State On Time Stamp	Date Inactive	Active State Off Date Time	Delta Time / Code
18/03/2017	FIP Zone Isolate	17:42:31			
22/04/2017	FIP Standby	15:29:07	23/04/2017	18:29:20	1 03:00:13
23/04/2017	FIP Standby	21:00:14			

Test code # produce from below parameters

Code 2 test unsuccessful



Can happen with no AFA resulting & with an AFA resulting.

Code 2 & No AFA - Test position - alarm active - Normal position then alarm reset <1 sec apart. *(i.e., < 1 to 1.5 second depending where in the polling sequence the system is, and data is sent in the same data packet)*

Code 2 & an AFA - Test position - alarm active - Normal position (alarm sent) - alarm reset.

Code 3 test unsuccessful

Test position - Not alarm active or a non-brigade call zone /device selected - Normal position.

Code 4 test unsuccessful

Test position - alarm active - alarm reset - Isolate position *(No Normal position)*

Code 6 test unsuccessful always results in an AFA.

Test position - alarm active - Normal position (alarm sent) - Isolate position or back in Test position - alarm reset *(alarm reset while the Brigade switch is in Normal, Isolate or back to Test and then reset)*

Or - Test position - alarm active - (after 300 sec test timer runs out – (alarm sent)

Code 7 test unsuccessful

Test position - Not alarm active or a non-brigade call zone /device selected – Isolate position.

Code 0 test successful to NTFRS /NTFAST
Test position (+10 sec) - alarm active (+10 sec) - alarm reset (+10 sec) - Normal position (test result LED should indicate in 8 to 15 seconds)

Daily reports include the following alarms & results.

Full Code AFA	FIP Standby	Brigade Isolate	Test Successful
Test Unsuccessful	Code 0; 2; 3; 4; 6 & 7	Pump Running	FIP Zone isolate.
MCP activated	FIP Door Tamper	Door 2 Tamper (actually valve tampers)	
FIP Power Failure			

WORKING ON SITE/TESTING/SYSTEM IMPAIRMENTS/FDCIE REPLACEMENTS
Best practise - for testers: After opening the FDCIE door the first action should be Brigade (NTFAST) switch to Test position. Followed by the above alarm steps. To ensure successful test the Brigade switch needs to be in normal position for a minimum of 10 seconds. The test LED (also DOT 2) indicates the result.
At all times while the FDCIE door is open, the tester should have the Brigade switch in the 'Isolate' position or zone/s isolated for other onsite tests.

Testers TIP:
During testing of sprinkler systems and the like where there is no FDCIE, where you believe you may be going to exceed the 300 seconds (5 min) before you can achieve the required pressure that returns the pressure switch (site) to normal (DIN 1 on) under test.
1st remove power to the miri (ASE)
2nd normalise the site (continue pumping up until require pressure is reached)
3rd apply power to miri and look for DIN 1 (no DIN 1 remove power instantly you only have a second or two before radio starts and attempts to transmit)
4th leave in Test for 10 seconds
5th brigade switch to 'Normal' from the 'Test' position.
Result may be a successful or failed test dependent on where in the polling cycle it was when the power was removed and re applied, or if it was registered as in link failure on NTFAST in the down time. This procedure will not activate an AFA.
Rectification works to jacking pump, etc before testing again. Test offline the timing required to pressurise the system prior to resuming live testing of the site.

Best practise – for fire contractor working on any FDCIE ensure the brigade switch is in Isolate position. – When working remotely from the FDCIE (especially large sites) the Brigade (NTFAST) switch shall be in the Normal position with only isolation of zone/s in the area of works. A site is offline to a fire alarm signal when in brigade switch isolate or the ASE is powered down/aerial disconnected. Should a contractor be working physically within an FDCIE, the NTFRS position is that the contractor **shall** take the ASE (miri) fully offline!

To take a site offline: contractor shall first switch site to isolate. Remove the aerial or power to miri unit. Both are best but if you are working on the ASE (miri), input function power will need to remain on. Prior to bringing a site online, it is very important to CYCLE THE POWER off and on. To negate any alarms (DIN 1 off) that were created with the miri RTU offline by removal of its aerial, but still powered-up, this will clear the flash memory of any alarms prior to reconnecting aerial.

NOTE: *Helps to have the NTFAST switch in normal before reinstating the aerial connection, as the isolating of the Brigade switch mask the alarm (DIN1) and fault (DIN2) true statuses.*

Offline for short periods: up to 15 to 30 min. When reconnecting the contractor should prove that link is re-established, by turning the Brigade switch to TEST. Wait at least 10 to15 sec and then return to NORMAL (a failed test will occur - flashing test LED. – This is proof of the link working). Alternatively, a full Brigade test - test LED solid for 20 seconds also proof of the link working.

Offline for extended periods: of an hour or more. Contractor shall contact Fire Comms (89221533) to create a job regarding the site will be in Brigade Isolate or in link failure - giving the company name; their name; NTFAST site No/ Name; reason for offline; when expecting to have the site back online - call Fire Comms when finished to confirm link is OK and close the job off.

Offline site job created with Fire Comms: only covers the site for being offline (in link failure) and dispatching/advising an NTFAST technician to attend the site. The fire contractor is responsible for unwanted alarms transmitted due to poor work practises. Fire Comms officers have no ability to stop alarms. The system automatically dispatches the local fire station, and the Fire crew are required turn out to site. Thorough testing of wiring work done on miri inputs (especially Major inputs) loose connections etc is the responsibility of the fire contractor prior to reconnecting the aerial, refer to "*Major inputs patterns, how to read their statuses*" in section 8.

NEVER reconnect an aerial with DIN 1 not illuminated. Reconnection with the brigade switch in the Normal position as Isolate masks DIN 1 & 2 true statuses is best practice.

The above work practices will reduce NTFRS workload of attending unwanted Alarms created by contractors substantially.

What to do when an alarm signal is accidently sent: NTFAST recognised fire contracting company's technicians & testers that have created an alarm signal to NTFRS/NTFAST shall contact Fire Communications Officer (FCO - 89221533) straight away and advise - giving the company name; their name; NTFAST site No/ Name.
Doing so allows the responding Station Officer to turn out to be under normal road conditions, as the NTFRS are required under the Fire and Emergency Act to attend all AFAs.
Next wait onsite for crews' arrival so they can confirm your above phone call, expedite paperwork, to make the appliance & crew available to respond to other emergencies.
NOTE: On occasion where two or more emergencies are happening the S.O. may elect to redirect his appliance elsewhere based on your phone call without attending the AFA.

The below applies the same for where fire contractors have NTFRS crews arrive on site upon which they are working on the fire system even though they don't believe an AFA was sent.
The MOST important contact for the fire technician or tester who was onsite at the time of the AFA is to *call* an NTFAST Technical Officer following your call to the FCO, then they must send a follow up *email* with the AFA details date – time - location.
The *call* is to make NTFAST firstly aware of the fire contractor created unwanted alarm and a chance to discuss & identify possible cause and how it can be mitigated a future event of the same type. Example mitigations - via a better or different work practise; confirmation of correct procedure; identifying if a brigade switch issue.
The *email* secondly and more importantly we will need to document and follow up the unwanted alarm event within the automated system on your behalf.
Where the above process\procedure is followed assist NTFAST in addressing the unwanted alarm fee invoice generation.

NTFAST Technical Officer Contacts
David Williams – Supervising Officer (T6)
P 89955402 M 0408 989 001 E davidm.williams@nt.gov.au

Steve Vitnell – Senior Technical Officer (T5)
P 89955403 M 0439 686 423 E steve.vitnell@nt.gov.au

Macinlay Lovegrove - Technical Officer (T4)
P 89955414 M 0467 962 292 E mac.lovegrove@nt.gov.au

Pro forma email information shall be:
To: Send to all - David, Steve & Mac
Subject line: Fire Technician UWA signal at site … *(number or name)*
Content: Hi David, Steve & Mac
Unwanted alarm incident @ Site … *(number or name).* On … *(date).* At … *(time).*

Fire Contractors Guide-Book – Electrical - NTFAST

This email documents our conversation from the above incident for your follows up … *(add any other detail of the conversation that may be relevant).Common examples: During testing the alarm signal was sent due to test time exceeding 5 minutes; Alarm signal happen post smoke testing after venting and waiting detector reactivated; I simply made a mistake while at the fire panel that resulted in an alarm signal.*

10. New connection to NTFAST

NTFAST connected building fire systems come under numerous categories the most basic being the following three. 1. Required systems; 2. Non-required systems; 3. NT Government building -. self-insured buildings both required and non-required
All New connections to NTFAST start with the engagement of a Building Certifier as per the NT buildings approvals process per condition of connection item 9.
New Connections require a BFSR [Building Fire Safety Report] normally part of a new building BFSR.
New connections to existing building will require a BFSR specific to the FBP & FDAS installation.

Connection to NTFAST and allocation of a site number cannot be arranged until the receipt of a completed current "NTFAST application for connection" (see 'Forms' at www.fire.nt.gov.au via Publication tab) and payment of the application fee.

a) Payment direct to NTFAST Administrator – cash, cheque, or credit card –
   Level 1-32 Illife St (Darwin fire station) Darwin. (Visa or MasterCard and by phone)
b) Payment to RTM – in person or by phone 89991606
   Quote 24FCGB01 131145 and send copy of receipt to the NTFAST Administrator (Alison Austin 89955401 fire.safety@nt.gov.au)

Project's early NTFAST application is necessary, as last-minute application will hold up the NTFAST connection; apply 1 month prior to requiring the site to be connected.

The purchase of AD2006 and Brigade switch along with Yagi aerials from:
Miri Technologies 2 Fellowship Road. Gnangara 6077, WA.
PH (61) 89409 8998 Web: www.miri.com.au

It takes time as above allow a month after receipt of a paid application and zone block plan, for NTFAST connection to be ready. This enables sufficient time for aerial installation signal reliability testing and back-end software, site information changes to be actioned ready to go online. Only a new AD2006 accepted for new sites. The AD2006 programming with an NTFAST map only after an NTFAST application paid for, by dropping it off at NTFRS Darwin Fire Station Fire Protection Technologies /NTFAST office.

In Alice Springs and Track stations, the AD2006 needs taking to the fire station for programmed remotely by NTFAST techs. Fire Safety Command on 89516663 to arrange in Alice Springs and contact the OIC at Track stations.
Switching on site only happens once site keys receipted into the key safe of the responding fire station and all other External NTFAST connection checklist items have been checked by NTFAST.

Greater Darwin stations
Darwin No1 Station (DWN) 32 Iliffe St Woolner
Casuarina No2 Station (CAS) 25 Abala Rd Marrara
Palmerston No3 Station (PLM) 41 Howard Springs Rd, Howard Springs
Berrimah No11 Station (BER) 265 Berrimah Rd Wishart
Humpty Doo No10 Station (HDO) 8 Skewes St Humpty Doo (daytime station)
(HDO sites will requires 2 sets of keys for both HDO and PLM)

Alice Springs & Track stations
Alice Springs No6 Station (ASP) Telegraph Terrace
Jabiru No7 Station (JAB) 1 Gregory Place
Katherine No4 Station (KTH) 58 Acacia Drive
Tennant Creek No5 Station (TCK) 51 Thompson Street
Yulara No9 Station (YUL) 213 Yulara Drive
Nhulunbuy No8 Station (NHU) 3 Westall Street

The NTFAST connection checklist section 12 is what NTFAST technicians will work through to check that new FBP/FDCIE meet the conditions of connection prior to activating a new site.

11. Replacement of FDCIE (FBP)

The replacement an NTFAST connected FBP/FDCIE, of a 'Required system, Non-required system or Government building system'. Starts with the engagement of a Building Certifier to follow the NT buildings approvals process per condition of connection item 9. This involves an NTFRS Building Fire Safety Report [BFSR] being procured by the NT building certifier.

Replacement also covers refurbishment and upgrade of FDCIE/FBP within existing enclosures. Replacement is finalised with an NTFAST technicians completing the External NTFAST connection checklist. During an NTFAST site visit, the contractor will arrange a demonstration of all section 12 NTFAST Connection Checklist items. These includes functions of the FDCIE correctly operate NTFAST, major and minor inputs are wired correctly as per schematic diagrams in section 15.

Replacement/Refurbished Fire Panels shall be treated the same as new panels, fitted with a brigade switch and all major and minor inputs functional on the ASE (Miri unit). Mounting of the ASE unit shall be wholly within the FDCIE, and power shall be from both the FDCIE primary & secondary sources see section 15 for power and wiring details. The ASE unit mounting shall be upright with connection to the bottom side and clearance on top side for the removal and replacement of ASE (miri) units.

Zone Block Plans are an integral part of an FBP/FDCIE installation. ZBP require updating at the time of all major changes, includes FBP/FDCIE replacement/refurbishment. Many sites totally lack a ZBP or are of a poor quality refer section 14 for current requirement detail.

Existing detection where retained should be compatible with the replacement fire panel refer to clause 2.1.1 of AS1670.1. All replacement FDCIE/FBPs shall be in line with clauses 1.4.30 & 1.4.33 being to AS7240.2 & AS4428.3. Therefore, all existing components shall be those of components standards listed in clause 2.1.2. The AS1603 range (old detectors) with a couple of exceptions are no longer make the list of FDAS system components.

The system shall comprise the following:

(a) Fire detectors, selected to suit the particular hazard and risk to life or property, or both, conforming to at least one of the following:

(i) AS ISO 7240.5 Point-type heat detectors.
(ii) AS 7240.6 Carbon monoxide fire detectors.
(iii) AS 7240.7 Point-type smoke detectors.
(iv) AS ISO 7240.8 Carbon monoxide fire detectors with heat sensor.
(v) AS ISO 7240.10 Point-type flame detectors.
(vi) AS 7240.12 Line type smoke detectors using optical beam.
(vii) AS 7240.15 Point-type smoke detector with heat sensor.
(viii) AS 7240.20 Aspirating smoke detector (ASD).
(ix) AS 7240.22 Smoke-detection equipment for ducts.
(x) AS 7240.27 Smoke detectors with CO and heat sensor.
(xi) AS 1603.13 Duct sampling smoke detectors.
(xii) EN 54-22 Resettable line-type heat detectors.
(xiii) EN 54-28 Non-resettable line-type heat detectors.

Section 12 NTFAST connection checklist has been included for contractor's information.

The NTFAST connection checklist is what NTFAST technicians will work through with the installing fire contractor to check that new FBP/FDCIE as well as replaced/refurbished panels meet the conditions of connection. For track station sites this will be done via Facetime to confirm checklist items 3 to 11, 25 & 26 along with input colours are correct.

12. External NTFAST connection checklist

Site Name: _____ SITE#: _____ STN: _____ RPTR: _____
Connection type. _____ LOT#: _____ Certifier/ BFSR: □ _____
CONTRACTOR: _____
NTFAST ASE & FBP checks to AS1670.1 – 2024 & NTFAST conditions of connection.

1□ Application for connection completed and fee paid.
2□ Site keys delivered to appropriate fire station and signed into key safe.
FBP/FDCIE – □ NEW □ REPLACEMENT – Panel type_____
3□ FBP conforming to AS4428.3 or FDCIE as per 1.4.30(b)
4□ FBP location at DBEP. *Refer note 1.*
5□ FBP arrangement meets section 3.6. *Refer note 1.*
6□ ZBP □ approved and □ permanently installed. *Refer note 2.*
7□ LCD Descriptors match building. *Refer note 3.*
8□ External VAD [strobe] □ location, □ label & □ functions. *Refer note 4.*
9□ Cables & terminals clearances. *Refer note 5.*
10□ Tones correct OWS, EWIS or SHCIE stages. *Refer note 6.*
11□ AS4214 & AS4487 suppression systems installed to AS1670.5
ASE MAJOR INPUTS function correctly wired colour to section 15 of FCGB.
12□ Brigade switch has only 3 positions
13□ DIN 1 ALARM on = normal – off = fire alarm □ (white)
14□ DIN 2 STANDBY (FAULT) on = normal – off = fault/s □ (yellow)
15□ DIN 3 ISOLATE DIN 1, 2 & 3 on = site isolated □ (blue)
16□ DIN 4 TEST on = site in test for 300 seconds □ (green)
ASE MINOR INPUTS function correctly wired colour to section 15 of FCGB.
17□ DIN 9 Sprinkler Pump Running on = pump running □ (white)
18□ DIN 10 Zone Isolate on = zone/device isolated/disabled □ (yellow)
19□ DIN 11 FBP MCP off = FBP MCP alarm active □ (blue)
20□ DIN 12 FBP Door Tamper off = FB door open □ (green)
21□ DIN 13 Valve Tamper off = valve closed □ (purple or □red no sprinkler)
22□ DIN 14 FBP Mains Fail off = mains off □ (brown)
23□ Multi panel single ASE networked site inputs [DIN] function from all panels.
ASE [MIRI] UNIT
24□ Serial number _____ □ Software 4.20
25□ Powered from FDCIE PSU/Batteries, 24/12 volts wires □Red to +ve & □Black to –ve.
26□ Mounted upright within the FDCIE, top side clearance to allow removal of unit.
ASE [MIRI] YAGI AERIAL
27□ Aerial installation's cable loss 20 db or greater on NTFAST Fieldfox test equipment.
28□ Alignment to repeater so that RSSI – to required level and reliability.
29□ Amalgamating tape on external aerial connectors.

NOTES

1. *FBP shall be at the DBEP as per clause 2.2.1. FBP-FDCIE as per section 3.6. Location and mounting height to clause 3.6.1. Covering doors labelled 'FIRE PANEL' and not be lockable to clause 3.6.2. – Clearances to clause 3.6.3 or approval from Fire Safety Command [FSC] for minor lesser clearance spacing needs to be sort. Before installing FBP/FDCIE external to the DBEP, location shall require approval from FSC.*

2. *Zone Block Plan – shall be to AS1670.1 clause 3.7 and section 14 of FCGB including water resistant and permanent mounting. Forward for approval prior to inspection as per conditions of connection 13a to FSC/NTFAST electronically with completed ZBP checklist.*

3. *The LCD descriptors match up with zone block plan and the onsite door/room labels or area names (addressable devices) or just single area names (conventional zones).*

4. *External VAD [strobe] to clause 3.5– flashes red within 10m of the DBEP, is wall mounted labelled 'FIRE' with text 50mm white capital letters on red background. Visible from fire appliance approaching from at least 2 directions. Shall be strobe only, all external AADs [sounders] shall comply with Occupant Warning requirements of clause 3.17.*

5. *'LV - Mains power', 'LV Fire' and 'ELV Fire' cable separations and terminations within the FDCIE meet AS/CA S009. Maintaining basic protection as required AS/NZS 3000 clause 1.5.4 and 3.10.1.1 for unsheathed LV cables and terminals.*

6. *BOWS building tone = evacuation (ISO 8201) only.*
EWIS building tone/s = evacuation or alert (ISO 7731) changing to evacuation in phased sequence.
SHCIE systems tones = Stage 1 alert (ISO 7731) changing to Stage 2 evacuation (ISO 8201).

Comments:

Initial checks date/s _____ _____ _____
NTFAST connection completed site now monitored – Contractor notification emailed. Date: _____

13. Aerial requirements

All new aerial installations are required to be 6 element Yagi [450 to 480 MHz] as per ACMA licencing requirements. RFI YB6-61 are the most readily available of the shelf. NTFAST technician's advice should be sort prior to you installing any aerial. This may involve an aerial/RSSI (Received Signal Strength Indicator) survey to determine which repeater to align aerial. Refer section 7 for repeater locations.

Your site aerial installation will need to achieve the lowest possible RSSI and at least match previous results of existing sites and any survey conducted by NTFAST technicians for new sites. No site can be signed off with RSSI worse than -85db to a new Miri unit (ASE) at an extend range from its repeater. Close in sites should achieve far better than this and should be around -65db or better.

The installed aerial system shall require testing with the NTFAST Fieldfox unit for cable loss value greater than 20 db. Poor readings will generally result from using wrong cable like RG59 (75Ω) and connectors, poorly terminated connectors, crushing with cable ties or tight bends/kinks of the coaxial cabling.

Standard RG58 (50Ω) coaxial shall be via SMA104 connector at the Miri unit (ASE) to a maximum cable length of 10 metres to a six element Yagi aerial.

A new small coaxial option that has far better performance and easier to terminate than standard RG58 is RG58 'Cellfoil' (50Ω) and increases to a maximum cable length of 20 metres for equal losses to that of the standards RG58.

All coaxial cable runs need to be kept as short as possible. Coaxial cable runs of greater than 10 metres and up to 55 metres will have to use RG213 (50Ω) with a short 0.5-1m RG58 fly leads at the ASE [miri] end. Only the one RG58 fly lead at the Miri unit when connecting RG213 to a Yagi aerial as the Yagi has its own fly lead. A new large coaxial option that has far better performance than RG213 is CNT400 with almost double to 100 metres for equal losses to that of the RG213. Longer coaxial cable runs up to 171 metres will have to use LDF 4-50A and their specialty fittings (typical of that used on repeater towers).

Older Cable types

CABLE TYPE	*LOSS RELATIVE TO DISTANCE*			
	1 dB	*3 dB*	*6 dB*	*9 dB*
	450MHz	**450MHz**	**450MHz**	**450MHz**
RG58C/U	2.3m	7m	14m	20m
RG223/U	3.1m	9m	18m	28m
RG213/U	6.1m	18m	37m	55m
LDF4-50A	19m	57m	114m	171m

New cable types available.

Cable Type	Loss per metre @ 450MHz
RG58 Cellfoil	0.246dB
CNT400	0.089dB
LDF4-50A	0.048dB

ANTENNA PLACEMENT

Antenna placement is of paramount importance and plays a big part of the antennas and in turn systems performance.

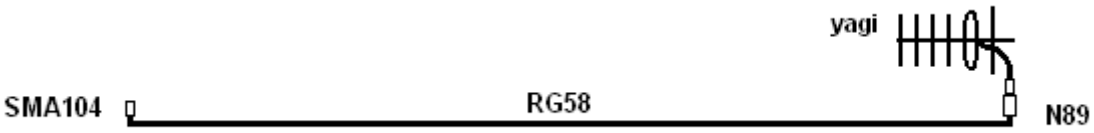
When choosing antenna locations, the aim is to find the largest path of unobstructed space and locate the antennas within that space. It is important to locate antennas as high as possible and definitely clear of any moving obstructions.

It is important to avoid mounting antennas:

1. Against or adjacent to steel structures.
2. In an area that will have constant intermittent obstructions - people walking past, vehicles driving past etc. That is, mount antennas well above such moving obstructions.
3. Near any electrical equipment.
4. Near metal beams, structures etc.
5. Inside any metal enclosures, tin sheds / warehouses etc. - Note meshed wire fences act like a "brick wall" to RF transmissions.
6. Away from guardrails or support beams.
7. Directly above any pipe work or corrugated iron roofs.

Yagi aerials mounting is via an aerial pole or bracket clear of a wall by 150 to 200 mm where clear line of sight is available. Yagi aerials need mounting as high as possible where there is no clear line of sight. The aerial shall be mounted clear of roof by at least 1m or at the height as determined by NTFAST technician survey. All external coaxial connector junctions need sealing from the weather with electrical amalgamating tape. Digital ASE [Miri] and its aerial no longer create an earth fault issue for the FDCIE. The Yagi aerial can be clamp direct to the aerial pole see following photo.

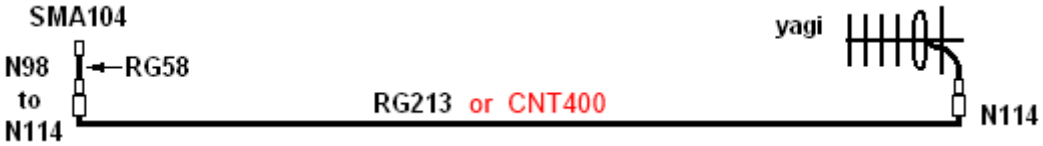
COAXIAL CONNECTOR AERIAL ARRANGEMENTS
LESS THAN 10 METRES



SMA104 – RG58 – N89 – YAGI

Aerial system components less than 10m with standard RG58, the use of 'Cellfoil' RG58 can extend this arrangement to 20m for similar cable loss. Cellfoil also has a 100% screening efficiency compared to standards RG58 much lower value.

COAXIAL CONNECTOR AERIAL ARRANGEMENTS
GREATER THAN 10 METRES



SMA104 – RG58 – N98 – N114 – RG213 – N114 – YAGI
SMA104 – RG58 – N98 – N201 – CNT400 – N201 – YAGI

Aerial system components greater than 10 m to 55m with RG213, the use of CNT400 can extend this arrangement to 100m for similar cable loss.

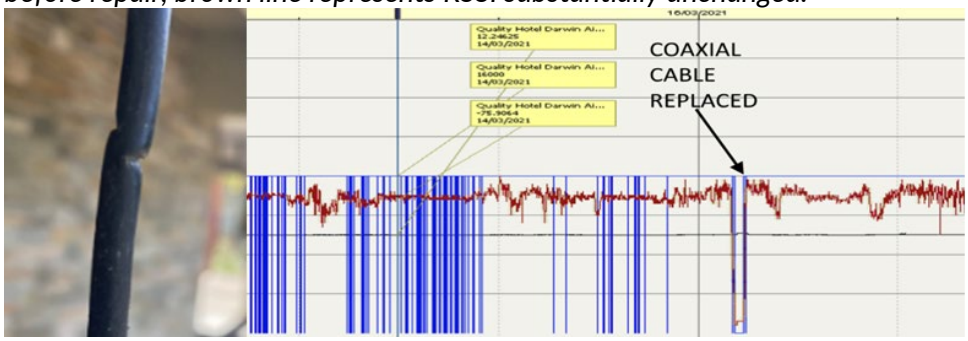
Note with the exception N201 connector all above connectors are crimp type.
N201 centre contact is a push on spring finger fit, only for use on CNT400 and equivalent solid core coaxial cables such as LMR400.

Connector	*Crimp die sizes - Centre contact*	*Crimp sleeve.*
SMA-104	*1.09mm (0.043in)*	*5.41mm (0.21in)*
N89	*1.69mm (0.066in)*	*5.41mm (0.21in)*
N98	*1.69mm 0.066in)*	*5.41mm (0.21in)*
N114	*2.54mm (0.1in)*	*10.54mm (0.41in)*
N201	*spring finger*	*10.54mm (0.41in)*

Use the following web page for N Series connectors.
https://www.rfiwireless.com.au/cable-connectors/coaxial-connectors/n-series.html

COAXIAL CABLE DAMAGE

Kinking damage to coaxial cable as in below photo, as well as cable gland pressure and tight bends will be detrimental to the signal's reliability, which may not be reflected in the RSSI levels as can be seen in below graph when this 7m coax was replaced. *Graph's blue line represents signal's reliability seen going on and off before repair, brown line represents RSSI substantially unchanged.*



14. Zone block plans

Zone Block Plans are where the responding Fire Service first interfaces with the locations' installed fire systems. All zone block plans are an integral part of the FDCIE for which they are compiled (this applies equally to all replacement/ upgrades of an FDCIE). ZBPs need to be a clear concise document that help fire service direct assets deployment in the event of a fire. The ZBP is a plan divided into its distinct areas/zones, for both addressable and conventional detection systems. Zone limits are set out in clause 2.3 and all other separate alarm zone requirements of AS1670.1 see clauses 3.9, 3.13.3 & 3.22.3.

All NTFAST connected FBP/FDCIEs require, under AS1670.1 clause 3.7 and condition of connection 13a. That states "A Zone block plan (**ZBP**)diagram of the building must be provided in accordance with AS1670.1 and to the satisfaction of the NTFRS". An electronic version submitted for approval shall take the form of a fully editable pdf, alternatively a drawing in Paint.net using layers in .pdn file format supplied with editable pdf plans used to compile the ZBP submitted.

To achieve NTFRS approval ZBP Checklist submission process needs following, refer to the start of checklist at end of section 14. The following blue text is commentary of what the NTFRS expects to cover each required item.

Main points for a workable ZBP and the order of the NTFRS reviewing process
1 - Orientation - Fire fighter standing at the FBP the ZBP matches the building when rotated from the horizontal to vertical plain.
2 - FBP/FDCIE location - clearly defined (YOU ARE HERE). Separate version for mimic and other panels
3 - Zone Areas and Labels - shall be clearly defined and legible for fire fighter.
4 - Working info - at the very least stair locations - major access doors and corridors/passageways can also be useful for Fire Fighters to navigate within buildings that are more complex.
5 - First responders Notice in full
All other items that are required to be consistent can be helpful info that is useful to fire fighters after the initial response. They also serve in the house keeping of these documents and site history.

The zone block plan require mounting on the FBP or within the clearance space either side provide for in clause 3.6.3 or above.

As per AS1670.1 Clause 3.7 ZONE BLOCK PLAN
"*A zone block plan of the installation shall be securely mounted and easily accessible at FBP. The plan shall be in the form of a permanent diagram that is water resistant and fade resistant*"

- NTFRS minimum for above requirements - A paper printed block plan/s thermally laminated and mounted behind protective cover/s (Perspex etc) or in a frame/s screwed to the wall in the area around the FBP. NTFRS expect the use of screws in all four corners.

"The lettering shall be a minimum of 3mm and shall include the following information:"

- NTFRS 3mm text shall apply to Zone labels other required text YOU ARE HERE, site name/location shall be larger or made distinct via colour usually red.

"*(a) The layout of the building in which the FDAS is installed.*"

- Minimum of a ground floor plan view for multistorey buildings, where the upper floors consist of only one or two zones detection areas. Tower view arrangement to show upper storey zones is an option, see *high-rise example 1 & 2*. Low rise with larger floor areas that vary greatly between storeys (split level etc) may need a plan view for each floor.

"*(b) The area covered by each zone."*

- To meet the above NTFRS expects plan view/s or plan and tower view dissected into the various zones. Both the area of the sprinkler and detection zones. Using thick borderlines *(fig 1)*, or dissecting lines *(fig 3)* or by using colours *(fig 2)* or varying crosshatching/patterns *(fig 4)* to define zone boundaries. Both solid and hatched zone colour shall be placed under the plans. Each zone shall have label and numbered as appropriate i.e., "ZONE # or ZN # or Z #". A minimum of 3mm text written on the zone with only one icon for each device type that make up the zone adjacent to or under the label. Individual icon for each device will tend to become illegible and just be added clutter. Dual risk areas would therefore have two zone labels per area each with their appropriate icons.

  Small zones may need to have zone label and icons in suitable location with an arrow to the zone. Single device zones for example in-duct detectors, pressure and flow switches (re clauses 3.9, 3.22.3 & 3.13.3). MCP are often a single device zone like the clause 3.11.2 required MCP (usually on Fire panel). The icon shall be located on the plan view in its actual location or with an arrow to actual location. The FBP zone labels/zone area names for the area of coverage on the FBP or in the program. Maybe also added the ZBP where it does not add to making the overall ZBP cluttered (see ZONE 23 in example diagrams on following page).

  An "as installed drawing" (which is required to be supply in the FDCIE) or the full detection design drawing does not comply as a zone block plan. Any diagram with every input device shown just adds clutter, does not always provide a clearly defined zone and on larger sites invariably becomes illegible. Extremely large sites (50 plus zones) may opt for a zone table of detection icons to reduce the clutter as the actual plan view zones will tend to be smaller for these extremely large sites.

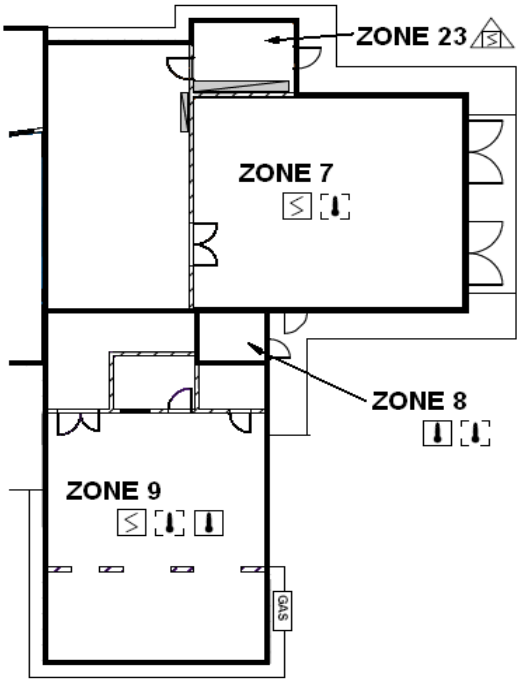
  High rise buildings that only have one or two zones per level need only a ground floor plan that shows at least the fire stairs and major access, a tower view of zones and icons for each level/floor (examples on following pages). Where greater number of zones per level a typical or individual plan views will be required to define zones.

"*(c) The location of all FDCIE, SHCIE, FFCP and EWCIE.*

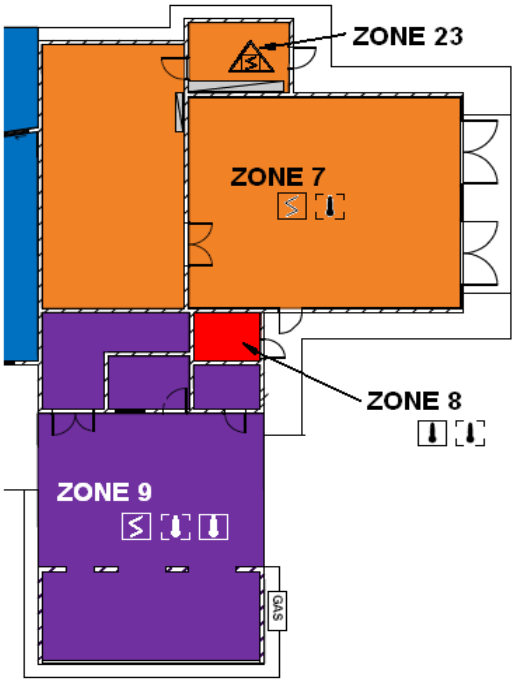
- This subclause only needed when the equipment is not located within or adjacent to the FBP. In all other cases, the icon/symbol for the FBP/FDCIE seen as having met these requirements.

"*(d) The location of the FBP and marked 'YOU ARE HERE'."*

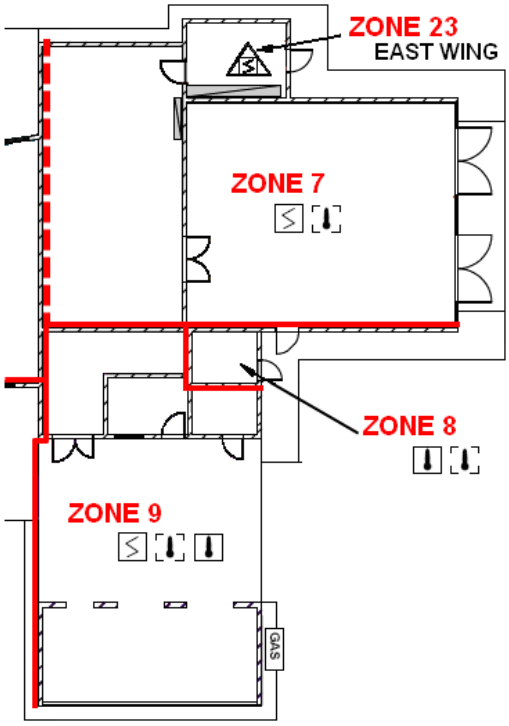
- To meet the above, NTFRS expect to see the words 'YOU ARE HERE' with an arrow or the like pointing to the FDCIE, FBP, Mimic as appropriate, in a text size large enough to draw attention quickly. Contrasting colour/s can also be helpful (use of red works well).



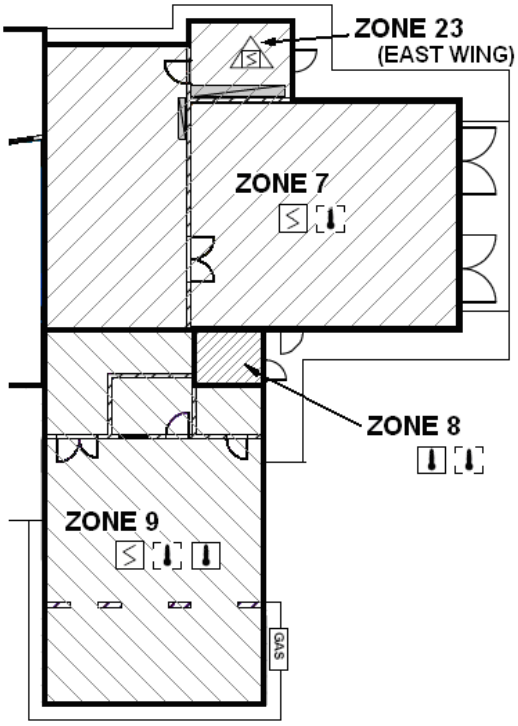
Bordered zones *(fig 1)*



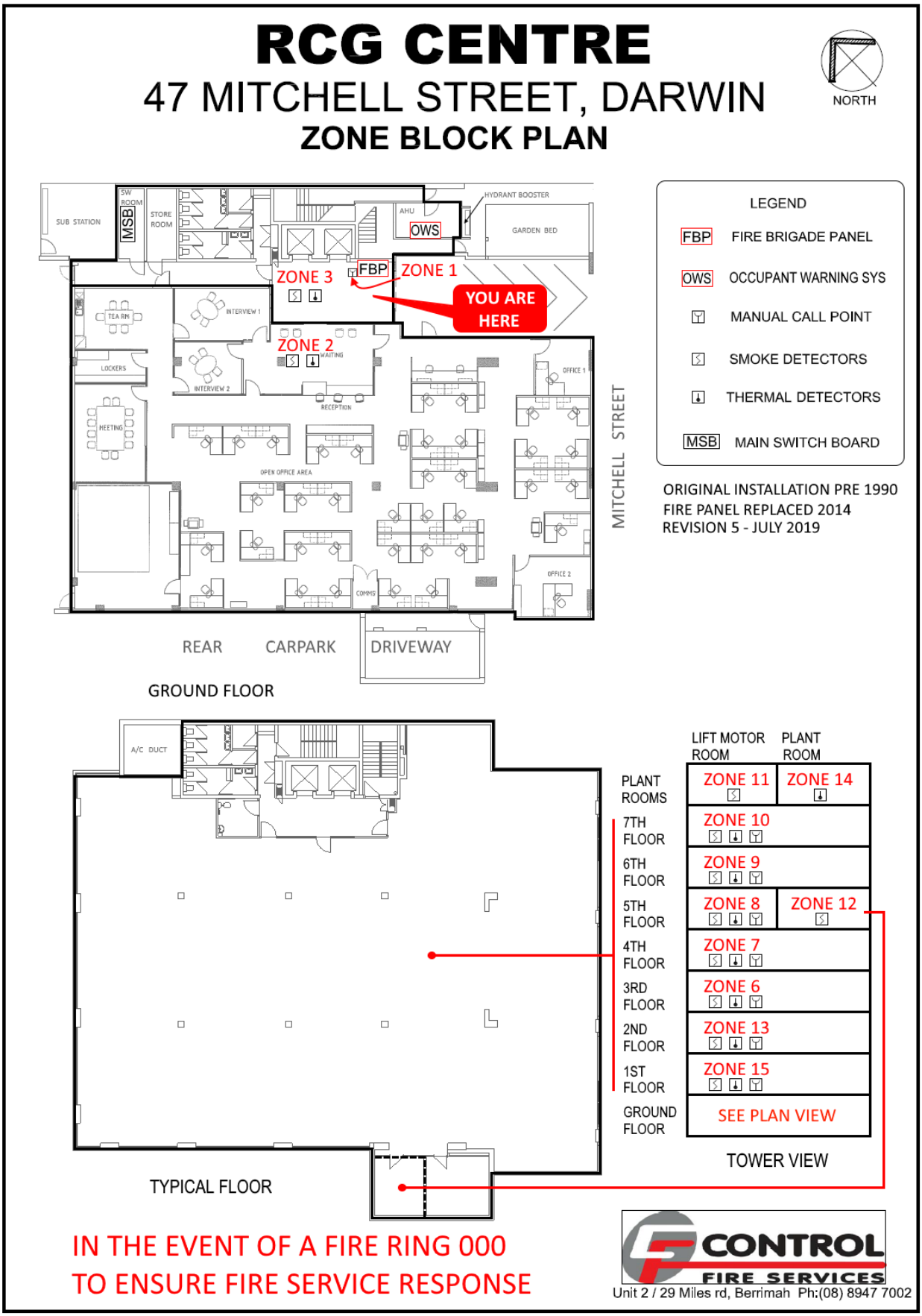
Coloured zones *(fig 2)*



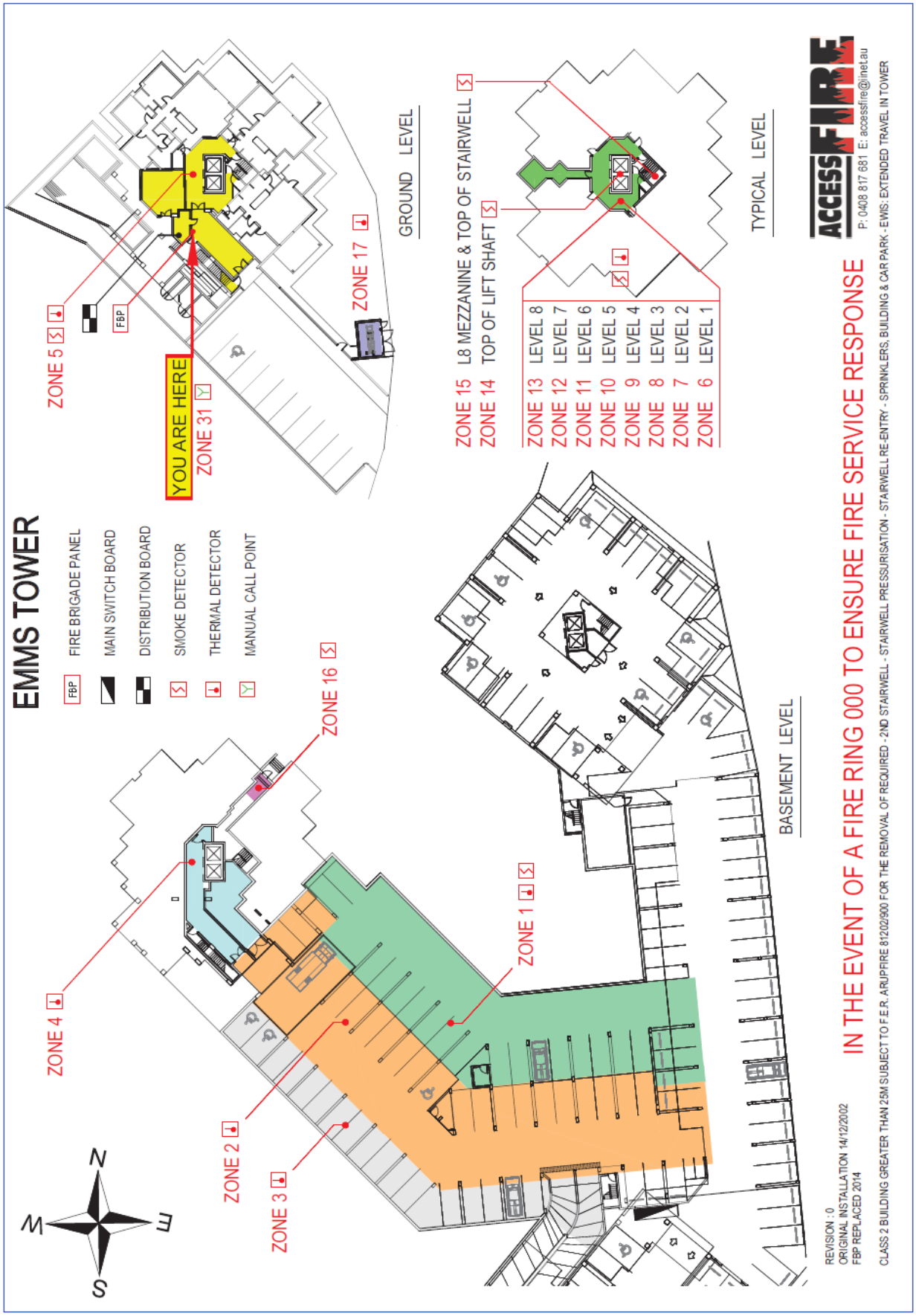
Dissected zones *(fig 3)*



Patterned zones *(fig 4)*



High-rise example 1 [Ground floor & Tower views]



High-rise example 2 [Ground floor, Basement & Typical views]

The proceeding example Zone Block Plans to represent multistorey buildings by tower view & typical view. Where all upper levels are the same and only have one possibly two detection and one wet zone.

"*(e) The location of any fire suppression system controls.*"

- Sprinkler and clean agent (gaseous extinguishant) control valve locations via note or icon.

"(f) The location of the building's main electrical switchboard."

- Via MSB icon or text label.

"*(g) The year of original installation and the date of the latest revision to the block plan.*"

- The year of original installation, followed by the date/year of modification, the additions of any zones, FBP upgrades etc you are installing and should read like "4/2018 FBP replaced" or "4/2018 zone # added", as this is original installation date for that part of the installation. The systems date of original installation and the built date on the original Fire panel can be that used in the ZBP as this date. Most large buildings will have a dated dedication plaque when the building opened that can also be used in the ZBP as the date.
  For first submission to NTFRS Fire Safety Command, shall have a distinct identifier in the form of a revision/version number and may include a date/year or the like: – e.g.
  "Revision 0 - 30/5/18" or "Version 1 - 30/5/18".
  If change/s are required, the resubmitted plan's identifier shall increase numerically: – e.g., "Rev. 1 - 4/6/18" or "Ver. 2 - 4/6/18".

"*(h) A notice stating, "In the event of a fire ring '000' to ensure fire service response" except the lettering height shall be not less than 5 mm".*

- Shall be as quoted and the "*to ensure fire service response"* not be dropped as is commonly done. The whole reason for the notice on monitored sites is to ensure brigade response. Unmonitored sites will need it as an "instruction if there is a fire".

"*(i) Location where baseline data are stored. A label on FDCIE meets this requirement."*

- Example: 'Within FDCIE battery box' or 'RH side of panel in document box'

"*(j) Statement identifying the design criteria used including NCC references, NCC referenced Standard(s) and performance solution as applicable."*

- Following are statement examples:
  Example 1: for a Class 2 with standard smoke detectors.
  "Class 2 buildings FDAS installation are to 2025 NCC Spec 20 - S20C2 (a) (ii). Detector locations meet clause 3.22.1 of AS1670.1 by reference to Spec 20 - S20C4 (2)."

  Example 2: for a Class 3 with ADF smoke detectors arrangement in SOUs.
  "Class 3 buildings FDAS installation are to 2025 NCC Spec 20 - S20C2 (b) (i). Detector locations meet clause 3.22.1 of AS1670.1 by reference to Spec 20 - S20C4 (2). SOU detectors subject to AS1670.1 clause 3.2.3 Alarm Delay Facility requirements."

  Example 3: for a Class 2 with combination smoke detectors and SOU smoke alarms.
  "Class 2 buildings FDAS installation are 2025 NCC Spec 20 - S20C2 (a) (iii). Combination smoke alarm & smoke detector installed by reference to Spec 20 - S20C5. Locations meet clause 3.22.1 of AS1670.1 general detection by reference to Spec 20 - S20C4 (2) (a) (ii). SOU smoke alarms installed to Spec 20 - S20C3 (2) (a) & (b)."

  Example 4 for all Classes of NCC non-required systems which is most NT Government buildings.
  "Class # Buildings FDAS installation is AS1670.1 for NTFAST connection. An NCC non-required system, installed to meet NT Government buildings policy."

Example 5 for all Classes subject to Fire Engineering Report [FER]
"Designed subject to performance solution of *[enter fire engineering company name]* FER *[specify the report number & revision – include where FER differs from NCC deem to satisfy requirements]"* – see High-rise example 2 on previous page as example of type detail.

"*The plan shall be installed in correct orientation of the building.*"

- The most common mistake made when producing a block plan. You must start with the mounting location. This should generally be on the same wall as the FBP and in the space that clause 3.6.3 and Figure 3.6.3 require. Drawing shall be so that standing in front of the FBP walls and items above the FBP will be in front of you, walls, and items below the FBP are behind you, left of FBP is to your left, the right of FBP is to your right.

NTFRS requires Zone block plans to include site name/location this may include 'Fire or Zone Block Plan' and the address.

NTFRS requires Zone block plans to include NORTH arrow/symbol. This can be to show actual North or aligned with a project North end of the site and any direction descriptors associated with the FBP/FDCIE LC Display.

NTFRS requires Zone block plans to include a LEGEND of only actuating device icons used in the diagram. The Normative FIRE ALARM SYMBOLS in Appendix D shall be the basis of symbols to in your legend and plan view/s.

ZONE BLOCK PLAN CHECKLIST – 2025(to clause 3.7 AS1670.1 -2024)

INSTRUCTIONS: Submitted checklist with Zone Block Plan via email, refer to Section 14 of FCGB for more detail on items 1 to 18. Tick off items that are addressed in the ZBP, item such as 4 may be addressed in 'NOTES:' for existing installation that do not meet listed clause requirements. *ZBP need submitting early to avoid delay in NTFAST connection.*
A checklist and one FDAS/buildings ZBP per email submission sent to all 3: davidm.williams@nt.gov.au; steve.vitnell@nt.gov.au; mac.lovegrove@nt.gov.au all further correspondence 'Reply All' maintaining the subject line.

CHECKLIST: Site/Building name_____
ZBP required for the FBP along with versions for Mimic & other panels intended for NTFRS uses.

1□. Zone Block Plan reviewed by installing fire contractor for errors prior to submitting. (CONTRACTOR'S CONTACT NAME_____PHONE# _____).

2□. Plan view/s of building/site same scale with floor levels drawn in horizontal or vertical projection or tower view where limited zones allow, in orientation to the mounting position. [C3.7 last paragraph]

3□. The layout of the building configuration. Showing stair locations and access, major access doors, corridors/passageways within buildings [C3.7 a]

4□. Zone areas of detection, return air & sprinkler systems coverage as well as single device zone location clearly defined and labelled as per AS4428.3 Z#; ZN#; ZONE # or detection zone symbol of Appendix D. Meeting all requirements of clause 2.3 and single device or separate zones clauses 3.9.1; 3.13.3; 3.22.3; 3.22.9 & 7.7 [C3.7 b]

5□. 'The lettering shall be a minimum of 3mm' @A___ size, for the NTFRS the text size shall be uniform capital letters and applies to all plan and tower view zone labels. [C3.7 1st paragraph]

6□. Device icons adjacent to zone labels, one per detection type that make up the zone. [C3.7 b]

7□. The location of the FBP and marked 'YOU ARE HERE'. [C3.7 d] (Remove all references to FIP - FIRE INDICATOR PANEL; SIP/ SFIP – SUB FIRE INDICATOR PANELS)

8□. The location of the building's main electrical switchboard. [C3.7 f - MSB]

9□. The year of original installation along with history of major changes and additions. [C3.7 g]

10□. First responders Notice in full - *'IN THE EVENT OF A FIRE RING '000' TO ENSURE FIRE SERVICE RESPONSE'.* 'This lettering height shall be not less than 5mm.' [C3.7 h]

11□. Location where baseline data are stored. A label on the FDCIE meets this requirement. [C3.7 i]

12□. Statement identifying design criteria used including NCC references, NCC referenced Standard(s) and performance solution as applicable. [C3.7 j – Examples see section 14 FCGB]

13□. North symbol. [C3.7 last paragraph]

NTFRS specific requirements

14□. Revision number on drawing. (*Incrementing for each resubmission of a ZBP*)

15□. Site's name or location. (*Building's name as per its signage or street address*)

16□. Legend - of only the symbols used in the submitted block plan of fire alarm symbols based on those in Appendix D

When installed items (*the below items shall be marked NA [Not Applicable] when not part of an installed system*)

17□. The locations of all other CIE, – like FDCIE, SHCIE, DPCIE, EWCIE, MP [Mimic panels], FFCP & aspirating smoke detector control panels when NOT co-located with the main FBP. [C3.7 c]

18□. The location of any fire suppression system controls – Sprinkler and/or Gas. [C3.7 e]

NOTES: (Add information here that assist assessing this submitted ZBP. –e.g., ZBP upgrade only for installed system of existing conventional zoning; Installation's pre-existing conventional zones does not comply with some clause 2.3 requirements.)

15. NTFAST ASE diagrams

NTFAST –ASE INPUT & OUTPUT FUNCTIONS

DIN RTU Inputs		Description	Normal State
1	A	FIP Fire Alarm	ON
2	S	FIP Standby Warning	ON
3	I	FIP General Isolation	OFF
4	T	FIP Station Test	OFF
5	A	FIP2 Fire Alarm	ON
6	S	FIP2 Standby Warning	ON
7	I	FIP2 General Isolation	OFF
8	T	FIP2 Station Test	OFF
9	SPR	Sprinkler Pump Running	OFF
10	ZI	FIP Zone Isolate	OFF
11	MCP	Manual Call Point	ON
12	T1	Tamper 1 (Fire Indicator Panel door)	ON
13	T2	Tamper 2 (Sprinkler Tamper Valves if installed)	ON
14	PWR	FIP AC Power Failure	ON
15		NC	undefined
16		NC	undefined

DOT RTU Outputs		Description	
1			
2		Alarm 1 Test successful	
3		Alarm 2 Test Successful	
4		Polling/Enabled	

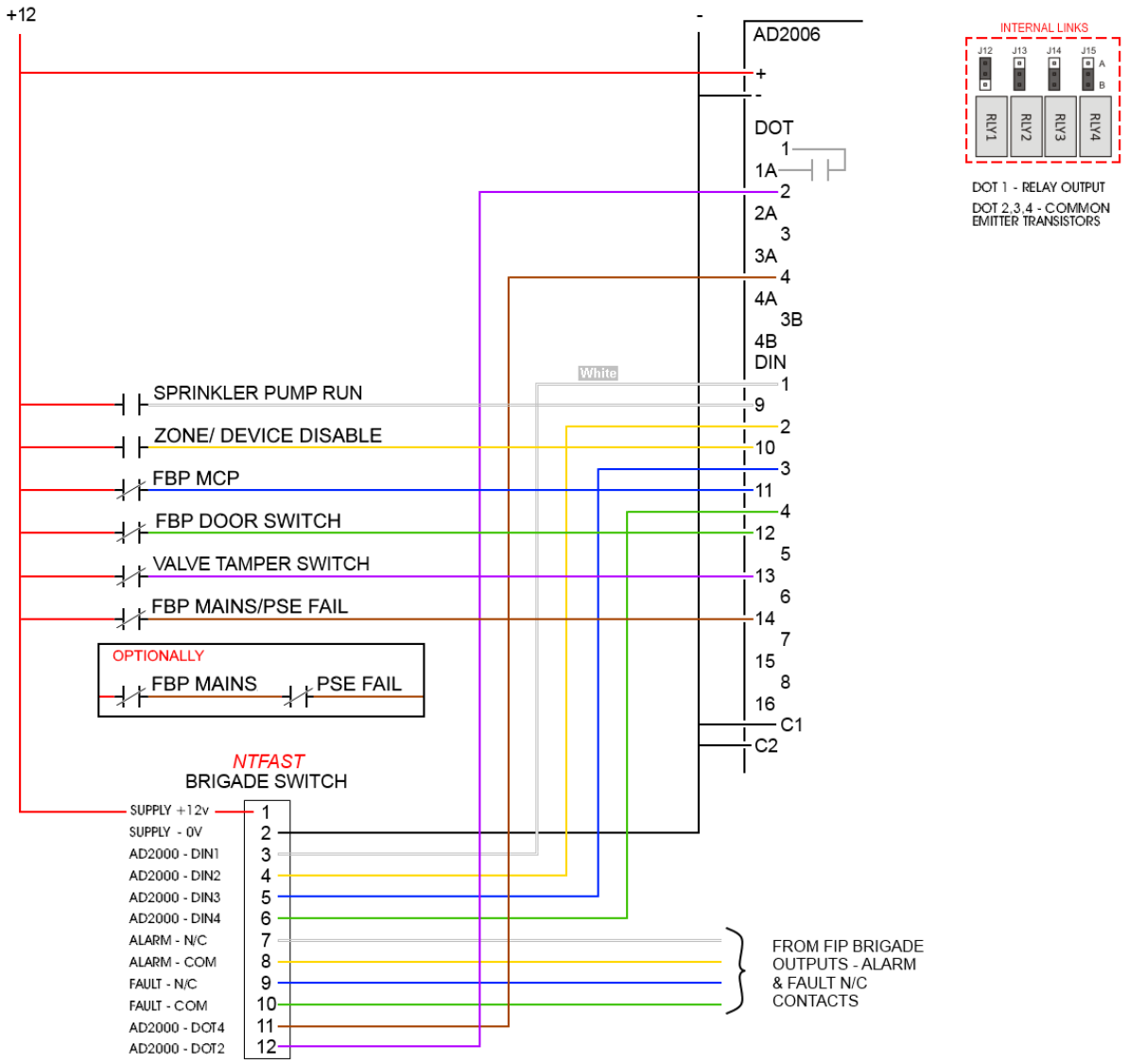
Test Result Indicator DOT 2 & 3

20 seconds solid LED = Brigade test successful
20 seconds Flashing = Brigade test unsuccessful

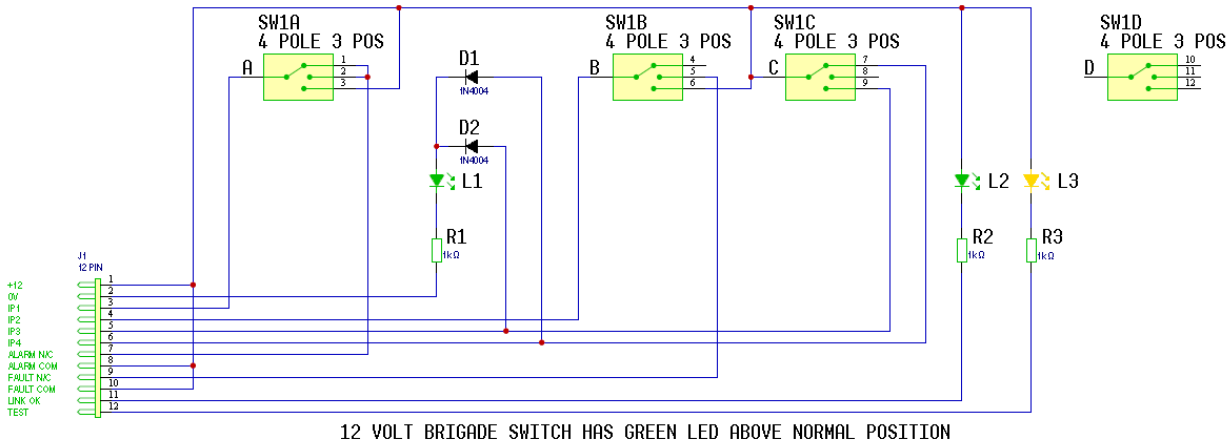
RTU power relay DOT 1

Utilised on legacy sites, to switching off battery charging when PSU output < 13 Volts

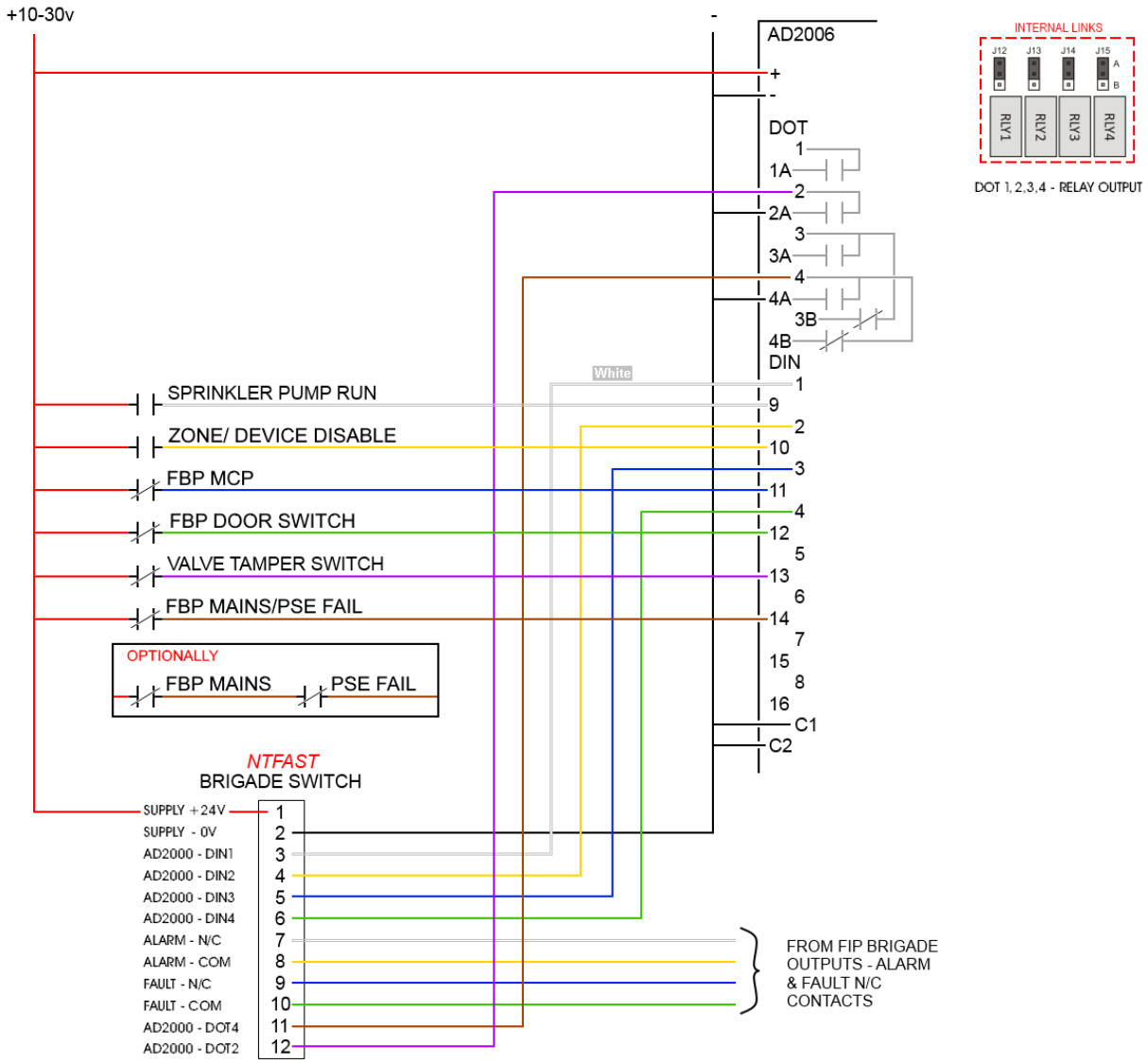
NTFAST ASE SCHEMATIC DIAGRAM (12 VOLT)



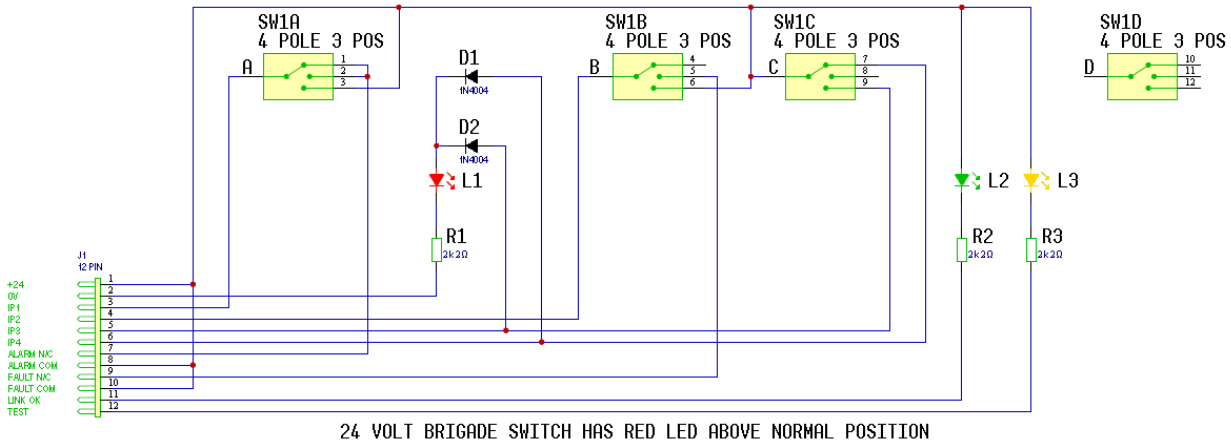
NTFAST BRIGADE SWITCH SCHEMATIC DIAGRAM



NTFAST ASE SCHEMATIC DIAGRAM (24 VOLT)

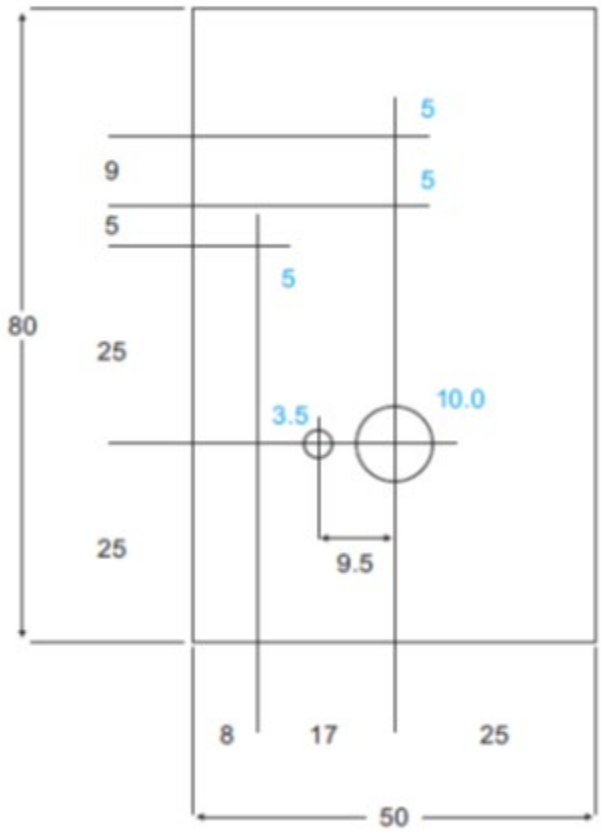


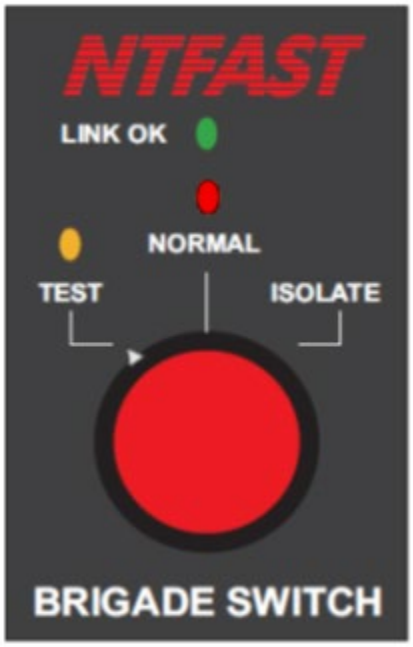
NTFAST BRIGADE SWITCH SCHEMATIC DIAGRAM



NTFAST 8 core cable with correct colours is made by Garland Cables MC78GY/100 – 8 x 1/0.20mm Security Cable. Has been source by Darwin electrical wholesaler.

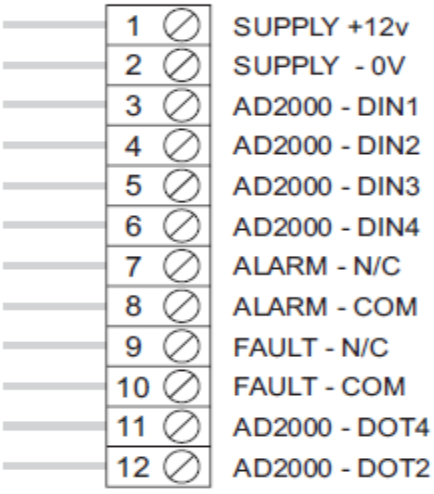
NTFAST - BRIGADE SWITCH





PANEL TEMPLATE

(VIEWED FROM FRONT)



WIRING

16. NTFAST conditions of connection

Conditions are set out on the rear of application for connection to NTFAST.
Current application/conditions can be found under 'Forms' on NTFRS Publications webpage link below.
https://pfes.nt.gov.au/fire-and-rescue-service/publications

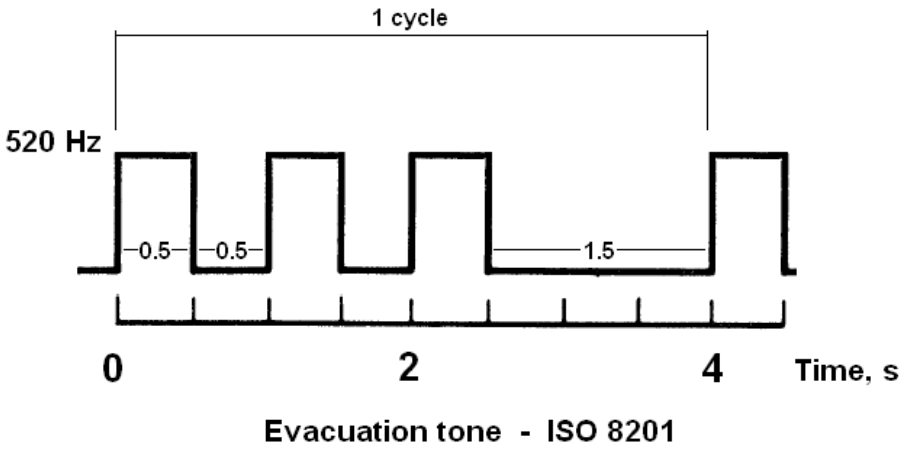
17. Occupant warning tones

There are two distinct categories BOWS [Building Occupant Warning System] covered by AS1670.1 clause 3.17.1(b) and EWIS [Emergency Warning & Intercom System] covered by AS1670.1 clause 3.17.1(a) which refers you to its own standard AS1670.4.

For all BOWS systems installation is to comply with AS1670.1, section 3.17 specifies that amplifier tone generator or sounder/sounder bases be set to output evacuation tone only as specified in ISO 8201 on alarm activation. The evacuation signal shall consist of the temporal pattern as shown below, with the frequencies that are the default in Australia as specified in AS4428.16. Other signals may be more appropriate for use where the ambient noise will mask the signal. Amplified sound systems and EWCIE complying with AS4428.16 Grade 3 shall have inserted speech that includes the words 'Fire' and 'Evacuate' inserted into the temporal pattern tone.

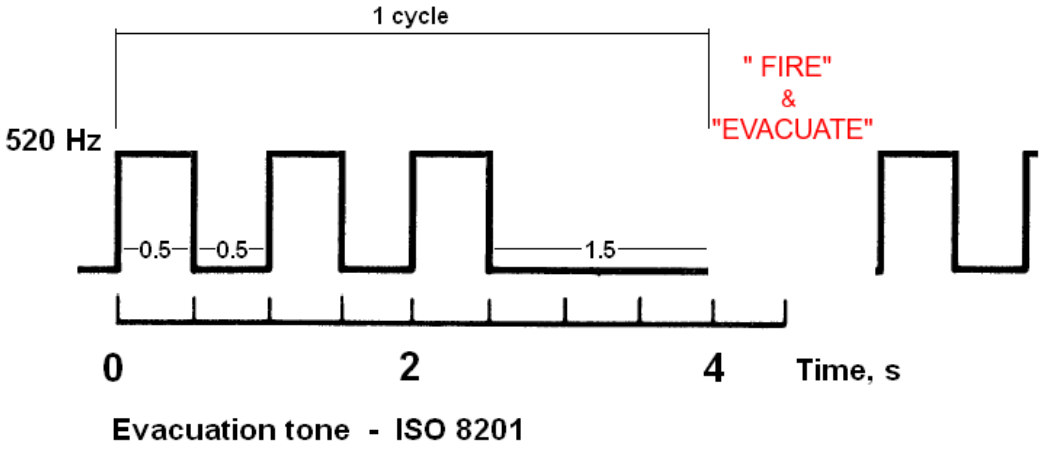
For AS1670.5 systems, ISO 7731 is the required tone for stage 1 and ISO 8201 is the required tone for stage 2. Clause 2.8.1 of AS1670.5 requires special arrangements with the general building occupant warning of a building where the SHCIE only protects part of a building.

Sounder [AAD] evacuation tone –clause 3.17.2(b)



Evacuation tone - ISO 8201

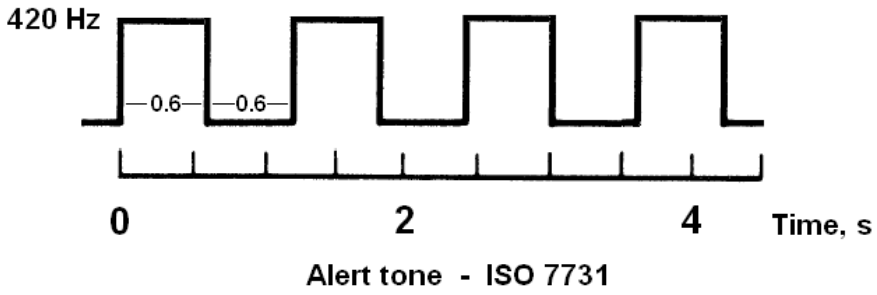
Amplified sound systems & EWCIE to AS4428.16 Grade 3 evacuation tone –clause 3.17.2(d)



Evacuation tone - ISO 8201

For all EWIS systems installation is to comply with AS1670.4, Section 4, be programmed to produce Alert tone as specified in ISO 7731 throughout the installation on alarm activation (subject AS1670.4 C4.4). It shall switch to the evacuation tone at the prescribed time from initiation in a logical cascade sequence as set by a building emergency management plan (AS3745) or fire engineering. In a high-rise building, this will nearly always be the alarm floor in evacuation after the prescribed time. Two floors above and one below shall go into evacuation at the end of 2 x prescribed time, with the 2 up 1 down sequence continuing with each multiple of prescribed time period elapsing.

This sequence is important because it ties in with the design of the buildings fire stairwell pressurisation and capacity to maintain the required environment within the fire stairwell.

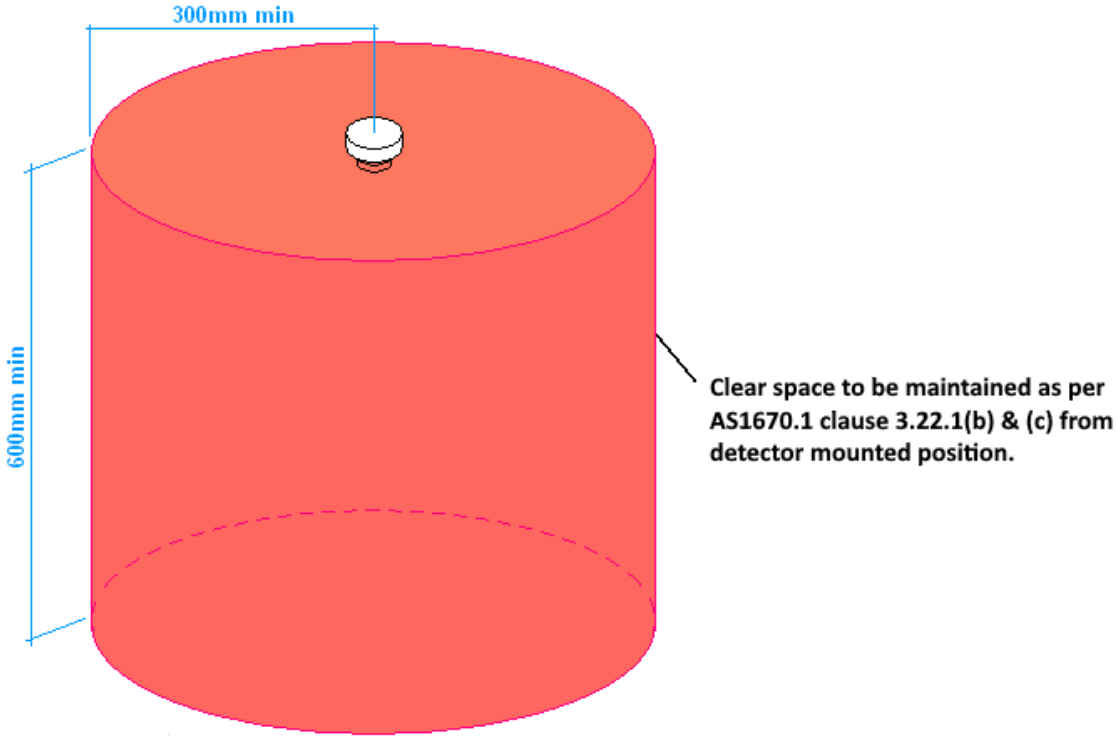


Alert tone - ISO 7731

18. FAQs and common issues

1 – NTFRS position on AVF. NTFRS NTFAST connected systems shall have all smoke detectors set to AVF. Considering AS1670.1 requirements of clause 3.2.5 this clause doesn't allow certain listed device types to be set to AVF this can become an issue when installing smoke detectors and non AVF equipment / devices (MCPs) on conventional zones.

2 – Detector minimum clear space. All detectors are to be mounted so that a clear space of 300 mm radius, to 600 mm deep is maintained from each detector refer to clause 3.22.1(b). Where it is not possible detectors shall be located to provide maximum clearances from beams and other obstructions refer 3.22.1(c). Spacing requirement is exempt for detectors installed to meet clauses 3.22.5 Cupboards and 3.22.11 Vertical shafts and openings.



3 – NTFRS position on concealed and roof space detection. The guidance of Appendix L clause L3, heat detectors have a greater resistance to adverse environmental conditions, which you find in these spaces, should be used as they reduce unwanted alarms.

Aspirating detection is also an option in adverse environmental conditions as these detection systems incorporate sophisticated filters and /or electronic dust rejection. Cost is sometimes a limiting factor.

It should be noted the unwanted alarms that result from installing point type smoke detector in these areas will be borne by building owners often 12 to 18 months from installation completion, as resulting in multiple unwanted alarms, each charged @ $1302 (2024-25). There is also the potential extra risk to the NT Community and the NTFRS assets having unnecessary movements at high speed.

4 – Changes to installed fire system. In line with section 11, installed fire systems fall under 2 categories. All 'required systems' will require a Building Certifiers approval of changes and appropriate documentation.

Changes to 'Non-required systems' connected to NTFAST need to comply with AS1670.1 as a condition of connection to NTFAST and the appropriate documentation.

As an example, changing detectors from smoke to thermal would need Certifier approval and sound reasons, *like location is near kitchen or kitchenette.*

The following issues also need to be taken into consideration.

- Maximum spacing between thermals are closer than for smoke detectors see sections 4 & 5 AS1670.1
- Photoelectric smoke detectors "…shall be installed in all sleeping areas." refer clause 3.22.1 AS1670.1
- Photoelectric smoke detectors "…shall be installed in circulation spaces leading to exits" refer clause 3.22.1 AS1670.1
- It is NCC or Fire Engineering required smoke detector between sleeping areas and the rest of an SOU/hotel room (this is a real problem in studio apartments and hotel rooms with kitchenettes that do not have cooking exhaust extraction systems)

5 – NTFRS position on Alterations to existing installations. Consistent with AS1670.1 and 1.7.3 is the clause that needs to be applied. It requires that "*Alterations to existing installations shall be designed and installed to the requirements of this Standard*……". Any thoroughly designed installation shall be to AS1670.1. Clause 3.27.1 is the starting point for detector selection /location. Clause 3.22.1 requires that detection be provided throughout all areas of the building except as detailed in clause 3.23 and where detection is installed in accordance with Section 7. Detection shall be installed in the locations specified in the NCC. This same clause specifies photoelectric smoke detectors "……*shall be installed in all sleeping areas*." Also "……*shall be installed in circulation spaces leading to exits*."

Appendix. M - GUIDANCE FOR THE SELECTION OF DETECTORS
States "The fire detection and alarm system should operate before the escape routes become smoke-logged to such an extent that occupants will have difficulty finding their way out of the building". It gives recommendations of the selection of detectors and list typical areas, including suggested detection devices.

6 – The two different warning systems: BOWS and EWIS. Both are installed along with, or as part of an AS1670.1: Fire.

BOWS – Building Occupant Warning System is the standard warning system of AS1670.1 and is covered by clause 3.17 (b). This type of warning shall go straight into evacuation tone only (see section 17). Installation maybe electronic sounders, or amplified sound system (with verbal message).

EWIS – Emergency Warning & Intercommunication System is the warning system / equipment installed in buildings over 25m and other NCC required classes of buildings as covered clause 3.17(a) & AS1670.4: Section 4 Sound systems and Section 5 Intercom systems where the alert signal or phased evacuation is intended to be used.
The EWIS can be identified by the Warden Intercom Point (WIP) handsets (red phones). This type of occupant warning system involves a sequence of escalating stages. Upon alarm activation the system goes through alert tone first (from 0 up to 10 min see AS1670.4 C4.4) throughout the whole building. The alert is the signal for fire / floor wardens to man their WIPs. The alert will activate for period usually around 2 min. The systems sequence and times may be specifically designed by a Fire Engineer or the Buildings Emergency Management Plan.

The Cascading sequences are based around the required stairwell pressurisation's ability to maintain the required positive pressure within the stairwell allowing for three levels with open doors. The following is the most common sequence:
Fire alarm initiates alert tone to all floors/areas (allowing wardens to man their WIPs)

After the first prescribed time period, the system escalates so that the alarm floor goes into evacuation. After a further period of time, it shall escalate again so that 2 floors above and 1 below the fire floor go into evacuation. This should continue 2 up 1 down after each further time periods until all floors are in evacuation.
EWIS allows for trained chief warden to take control of the evacuation and even stop it should a warden investigation find that a false alarm has occurred - they just can't touch the FIP or FIP section of a combined panel.

7 – Wiring of BOWS circuits as all transmission paths are required to be supervised for fault as per 3.20 "(d) Loudspeaker & (e) VAD, VWD, AAD and tactile alarms devices."

Where new additions of sounders or speakers connected to an older Fire panel (with non-monitored output), wiring shall be done so that monitoring could be achieved when the Fire panel is upgraded i.e., a daisy chain is maintained, or circuit runs all the way back to the Fire panel (no star connections in field wiring). The required "as installed" drawing shall show the sounder/s or speaker/s to which new additions are connected.

8 – Maintenance and testing for fire detection systems in the NT is to AS1851 – 2012.

9 – Guards on detectors. AS1670.1 clause 3.22.1 requires that the location of a detector be such that (b) "A clear space of at least 300 mm radius, to a depth of 600 mm, shall be maintained from the detector or sampling point." (c) "Indicators shall be visible from the path of normal entry to the area."

The following is advice regarding guards over detectors from CSIRO ActivFire one of the main conformity testing bodies in Australia for detectors.

1. Currently smoke detectors are evaluated/verified and certified to the conformance requirements of AS 1603.2 or AS 7240.7 (Australian detector standards).

2. The technical requirements and test methods of Australian detector standards differ to those applied by US agencies such as UL (Standard for Safety UL 268).

3. Consequently, with reference to the "Damage Stopper", US evaluations (testing and results) do not correlate with the requirements Australian detector standards.

4. Were certification sought for the "Damage Stopper", each specified smoke detector proposed for fitment with the device would need to be evaluated to the relevant sensitivity test methods of Australian detector standards to verify that the "entry impedance" of the "stopper" did not result in detection of smoke at a level less than the minimum requirements of the standards.

10 – Class of building. AS1670.1 clause 3.22.1 states 'Detection shall be installed in the location specified in the NCC' which over rules AS1670.1 requirements when it comes to certain classes of buildings (see Spec 20 for full details). The most common is clause 2 allows for smoke alarms or detectors systems or a combination of both.
"S20C4 (2) - In a Class 2 or 3 building or Class 4 part of a building.
(a) Smoke detectors must be installed—
(i)within each sole-occupancy unit, in accordance with the requirements for alarms in S20C3(a) [smoke alarm locations] and (2)(b); and
(ii)subject to (b), in public corridors and other internal public spaces."

11 – Sloping ceiling surfaces & roofs. AS1670.1 clauses 4.1.3 and 5.1.3 covers the requirements for heat and smoke detectors respectively. Both require that "*detectors shall be installed between 0.5m and 1.5m from the apex…*"
Planning detection zone layout shall best be achieved by starting with the initial installation at the correct distance from the apex and then spacing appropriately from this row.

Clause 1.4.72 defines Sloping surfaces as "*any surface, roof or ceiling with a slope greater than 1 in 10.*"

Clause 4.1.1 requires that the heat detector sensing element be between 15mm and 100mm from ceiling or roof. Where the roof purlins inhibit free flow of heat, the detector may be installed on the purlins, provided the purlin extends no further than 300mm from the roof.

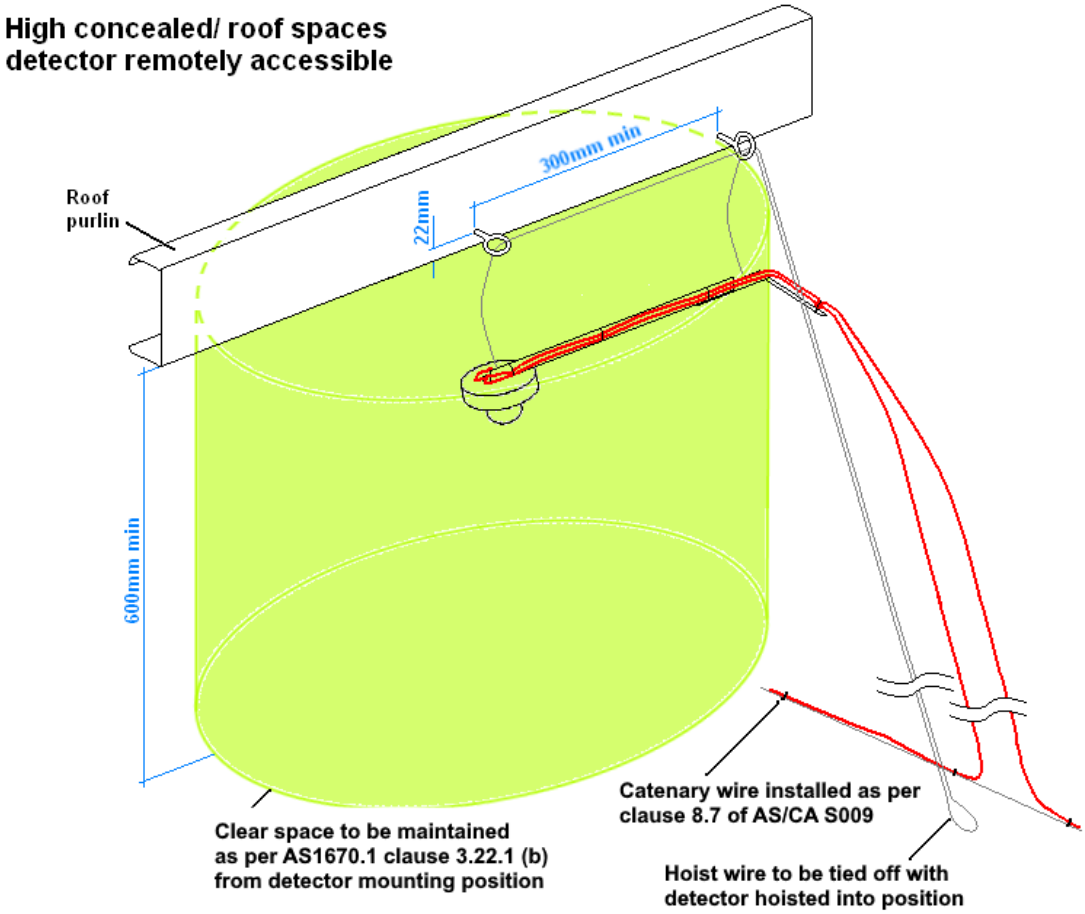
Clause 5.1.1 requires that the opening to the sensing element for ceiling-mounted point-type detectors shall be not less than 25mm and normally not more than 300mm below the ceiling, roof or apex.

12 – <u>High concealed roof space detection.</u> The NTFRS position on these detectors, is that AS1670.1 requirements apply for this detection from clause 3.22.1 (b); "*a clear space of at least 300mm radius, to a depth of 600m, shall be maintained from the detector or sampling point. Where it is not possible detectors shall be located to provide maximum clearances from beams and other obstructions refer 3.22.1(c)*

For clause 4.1.1 being thermals; "*Each detector shall be installed so that no part of the sensing element is less than 15mm or more than 100mm below the ceiling or roof. Where roof purlins inhibit the free flow of heat to the detector, the detector shall only be installed on the purlin where the purlin extends no further than 300mm from the roof.*" This requires that detectors be mounted directly on the roof/ceiling (often done by attaching to detector to mesh/chicken wire) or alternatively screwed to the underside of roof purlins.

Below is one roof purlin bracket arrangement that complies with all AS1670.1 requirements that can be lower to ceiling grid or a required clause 3.22.4.1 *Access for maintenance* point for replacement/servicing works.

Materials used in above photo available from hardware store:
1 – Carinya MABA6221 Make-a-bracket Angle 20x20x600 long (1mm)
(Cut in half 300mm minimum required)
2 – Carinya MA 0019 Make-a-bracket bracket 100x100x20 2mm thick
(Straighten to 135˚)
3 – 2 pop rivets 4.8 mm (joining items 1&2 through last 2 holes)
4 – Zenith WLB0420 50mm 14mm diameter eye bolts
(Extra nuts and washers)
5 – 2mm wire rope galvanised
(Laced through holes in bracket and loop through eyebolts as per below diagram)



13 – <u>Fire Brigade Panel (FBP) location & Designated Building Entry Point (DBEP)</u>

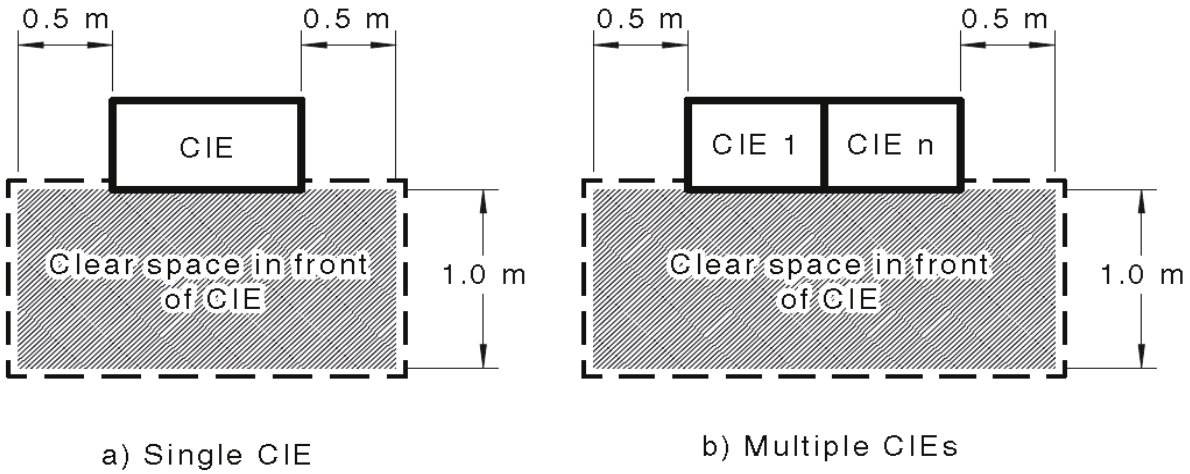
As per clause 2.2.1. A Fire Brigade Panel shall be located 'At the DBEP…'.
Usually, the building foyer or lobby. FBP shall be installed to clause 3.6.
Alternative suitable location may be agreed to by Fire Safety Command where One Stop Shop infrastructure enhances operational requirements.

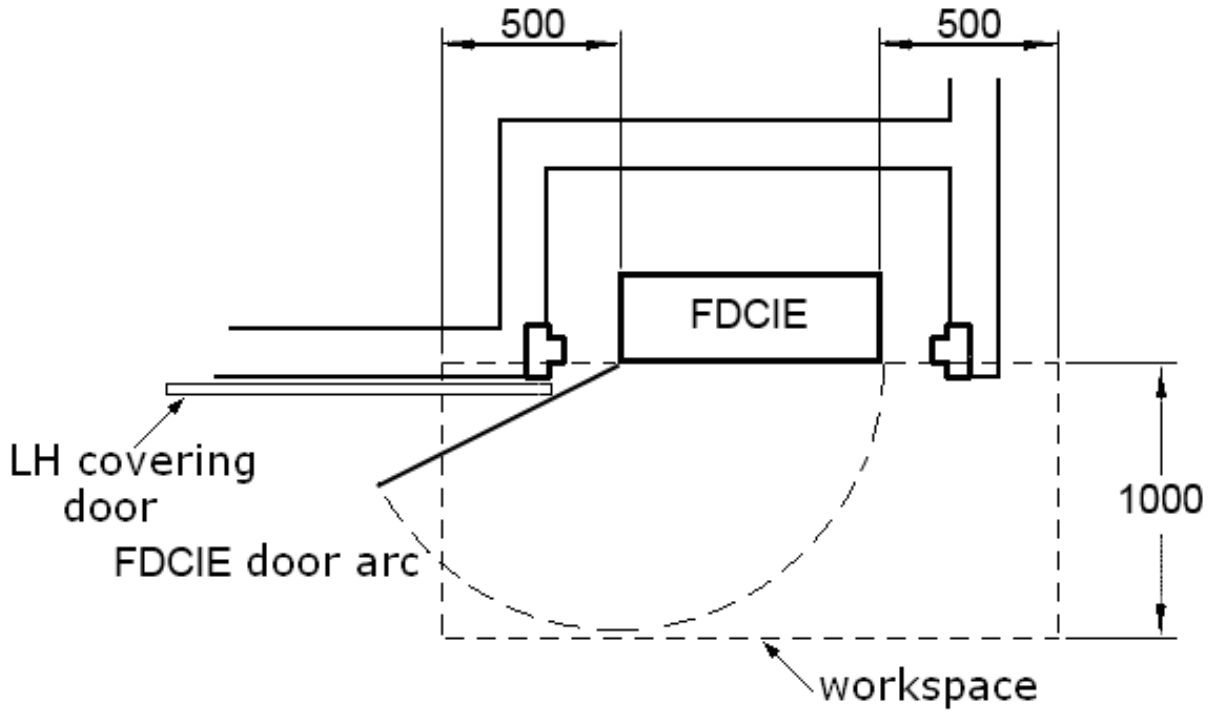
Some of points you need to be clear on are:

1 – FBP and FDCIE can be separate units or one and the same as in a standard fire panel. FDCIE can be located as per clause 3.6 where this is remote from the designated building entry point shall require a fire brigade panel (FBP) installed as above at the designated building entry point (c 2.2.1).

2 – Full clearance shall be maintained (c 3.6.3 & fig 3.6.3) where covering door/s are used the clearance shall substantially maintain by place the FDCIE forward within the enclosure against the back of the covering door/s, see example below.

3 – Covering door/s shall have the 'FIRE PANEL' label at 50 mm letter size, a means of overcoming any sound level attenuation by this door/s and not be lockable (c 3.6.2)



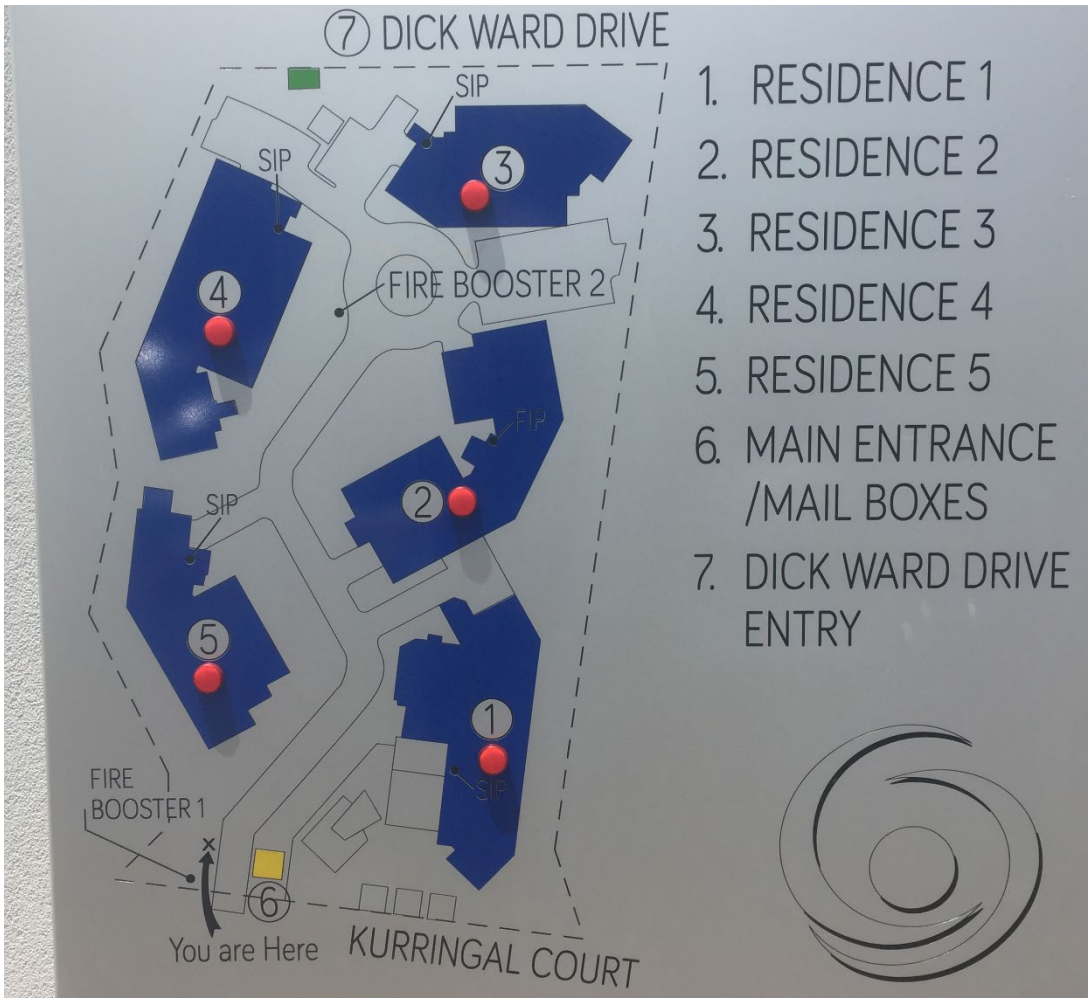


14– <u>Designated Site Entry Point (DSEP)</u>

Small multi building sites will require to meet condition of connection 13b.
Waiving of condition of connection 13b will require FSC approval, ASE arrangement under clauses 2.2.2 (b) or (c) & 2.3 shall need to be met via full networking of the site fire system. Along with number of other fire systems requirements primary of which is site hydrant coverage. Clause 2.2.2 (b) & (c) are that arriving crew can identify the building in alarm *"without exiting the fire appliance."* See an examples of 2.2.2 (b) below.

Large multi building sites to have a single ASE (miri) arrangement under 'Clause 2.2.2 (a) An FBP'. The site shall have 24-hour manned gatehouse at the DSEP. Generally, this arrangement will only be approved by FSC for defence bases where security identify the location and provide escort and access to building upon fire crew arrival at the DSEP.

Clause 2.2.2(b) examples



19. Unwanted alarms

First and foremost, a fire contractor and tester need to read and understand the section 9 part titled 'WORKING ON SITE /SYSTEM IMPAIRMENTS/FIP REPLACEMENTS'. Following these instructional best practises will ensure that fire contractors themselves never create an unwanted alarm.

Some unwanted alarms are unavoidable, although Fire Contractors can have a large influence in reducing them. Since the introduction of unwanted alarm charges, the NTFRS has seen a substantial reduction in the number of unwanted alarms from sites that have put the effort into reducing them.

All detectors have a limited life which can be greatly influenced by the environmental conditions. Most manufacturer nominate 10 years of in-service life as a maximum. Once you have an alarm in an area, NTFRS data shows other alarms often follow. This may be in the range of a few weeks to some months.

What is often overlooked is that AS1851-2012 requires as part of annual testing, a survey of all areas of the building for any condition that may cause nuisance alarms, refer to Table 6.4.1.4 this, where aging, dirty and insect infested detectors need to be identified and action before they cause unwanted alarm.

This is where the Fire Contractor can be of value to your client and the NTFRS.

When assessing application for waiver, the waiver committee looks for evidence of a mitigation strategy that your client adopts for reducing future alarms. Acceptable mitigation considered by the waiver committee will generally require more than replacement of a single detector, particularly for activation without apparent cause or where the activation is due to aged or dirty detectors.

Waivers requested with evidence of the fire contractor's attending relatively promptly to replace the offending detector and reinstate the system, followed with replacement of some others in the zone or area of similar age or condition may be looked at favourably. For ant/insect or gecko infestations the application of pest control measures, sealing cable entry holes, etc. (*Ant powder on the back of detector before reseating keeps both ants and geckos at bay.*)

The mitigation works have a 30-day window from receipt of unwanted alarm charges being sent out to submitting a request for waiver.

Information regarding the waiver process can be found on the NTFRS website.