

# AUSTAR for Business Installations Procedures Manual

## Document Control Sheet

### Contact for inquiries and Proposed Changes

If there are any questions regarding this document, or suggestions for inclusion or improvement please contact:

Name: Hugh Ragg  
Designation: Technical Operations Performance Manager  
Phone: 07 55606716  
Fax: 07 55606985  
Mobile: 041 2299403  
Email: [hragg@austar.com.au](mailto:hragg@austar.com.au)

Name: Joe Joseph  
Designation: Technical Coordinator  
Phone: 07 55606511  
Fax: 07 55606485  
Mobile: 040 2865255  
Email: [jjoseph@austar.com.au](mailto:jjoseph@austar.com.au)  
Contact MDU Department: [mdu@austar.com.au](mailto:mdu@austar.com.au) Phone 1300736747

**Submitting the Commissioning Reports must be sent to**

[tek@austar.com.au](mailto:tek@austar.com.au)

### Record of changes

Issue No.	Issue Date	Nature of Amendment
Draft	27/05/08	Removal of internal requirements and standardising for external developers etc
2	240211	Contact detail updated

# Commercial Installations Guidelines

## INDEX

1	AUSTAR FOR BUSINESS INSTALLATIONS.....	3
1.1	Introduction	3
1.2	Design Overview	3
1.3	Two categories of AUSTAR For Business installations	3
2	AUSTAR FOR ACCOMMODATION COMMISSION REPORT REQUIREMENTS .....	3
3	BULK HEADEND DESIGN OVERVIEW .....	4
4	MULTISWITCH OPERATION .....	4
5	RACK MOUNTING METHOD .....	5
6	BULK HEADEND DECODER COMBINER METHODS.....	5
7	The Hills CX12 Active Combiner .....	6
8	MODULATED BULK HEADEND.....	7
9	CUSTOMER FTA CONSIDERATIONS .....	8
10	BULK HEADEND CHANNEL ALLOCATION .....	8
11	EXISTING BUILDING MATV CABLING AND UPGRADING .....	8
12	NEW BUILDING MATV DESIGN TYPES AND EXAMPLES.....	9
12.1	Example of integrated single trunk Home Run MATV System: Bulk service to all outlets	10
12.2	Example of a simple Dual Trunk and Tap Bulk headend design in a new building	12
12.3	Example of a Dual Trunk and Tap Bulk headend design into an existing FTA system: 154 outlets	13
12.4	Example of Quad Trunk SMATV System for Bulk + Full Service residential installation.	14
13	FILTERING OUT OF NON-AUTHORISED CUSTOMERS IN BULK HEADEND INSTALLATIONS.....	14

## **1 AUSTAR FOR BUSINESS INSTALLATIONS**

### **1.1 Introduction**

AUSTAR For Business installations provide AUSTAR program content for commercial customers via the Optus C1 satellite.

An AUSTAR for business customer is defined as:

- An AUSTAR Subscription TV service that is viewed in a public area, or
- the dwelling is in or associated with a hotel, motel, holiday let apartment, hospital, mining camp, licensed area, restaurant, shopping centre, retail store or other public viewing area.

### **1.2 Design Overview**

Electrical consultants and SMATV designers need to be aware of the exact subscriber services required within a development, as the technical costs and design requirements vary greatly depending on the type of AUSTAR subscriber requirement planned and tendered for the building. Close initial consultation with AUSTAR is strongly recommended during the early design stage.

### **1.3 Two categories of AUSTAR For Business installations**

AUSTAR has 2 main categories of AUSTAR For Business installations as follows:

#### **1.3.1 AUSTAR For Accommodation:**

- (a) These are Bulk headend installations containing multiple decoders providing typically 6 to 10 modulated AUSTAR channels integrated with local FTA channels distributed in a motel, holiday resort, remote mining camp, hospital, campus, holiday let apartment, etc.
- (b) A Bulk headend can also be integrated with an MDU installation, offering the choice of either full service residential decoder per room / unit, or limited authorised access to typically 6 to 10 analogue AUSTAR channels. This dual service requirement is common in Strata units, which are both holiday let and permanent residential.
- (c) Master Account: An SMATV system with satellite decoder per room or unit in holiday let apartments or short term tenanted dwellings. Each decoder is authorised with a limited channel package, typically 6 to 18 channels, covered under the one master customer account. A decoder per room Master account should only be considered in cases where a bulk headend is not a viable solution, eg. Stand alone holiday cottages separated by large distances, in which extensive underground cabling would not be economically or technically viable.

#### **1.3.2 AUSTAR For Licensed Venues and AUSTAR for Enterprise Venues**

These are Public Viewing Area (PVA) installations, typically 1 to 3 stand alone satellite decoders connected to individual large screen TV monitors for public viewing in a licensed bar, hotel, pub, roadhouse, bank, waiting room, retail outlet, family restaurant, etc.

All licensed PVA style installations must be dual polarity capable to 1 or multiple outlets and installed with a 10.7 GHz L.O. dual output LNB. (For single outlet licensed PVA installations, the second I.F.cable run from the dual output LNB is to be tagged and cable tied to the first I.F. cable run near the decoder or located behind the wallplate.)

## **2 AUSTAR FOR ACCOMMODATION COMMISSION REPORT REQUIREMENTS**

At the completion of new distribution system installations or upgrades, the contractor is required to submit a completed commission report together with the final As-Built drawing and building outline. The As-Built drawing must represent exactly what components and equipment are installed, including any variations to component type or brand, cable lengths, cable type, tap values, system design, etc to that proposed in the site survey. The As-Built drawing and commission report will be used as a reference when QA testing the building by AUSTAR staff.

The Commission Report must comply with the following criteria:

- (a) Completion and submission of the Commission report should be within 5 days of installation completion.
- (b) All details need to be completed. Incomplete reports will be returned to the contractor.

- (c) Launch amplifier details need to be included for all AUSTAR, FTA analogue, FTA digital (where applicable), and other analogue in-house channels such as security cameras, Keno, information and advertising channels.
- (d) Room outlet levels and CCIR picture quality readings need to be recorded for at least 5 rooms / units including an end of line reading, up to a maximum sample of 8, in accordance with the instructions on page 2 of the report.
- (e) An end of line (E.O.L.) outlet result is defined as an outlet located at the furthest distance from the headend, and should demonstrate a worst-case reading for the overall system.
- (f) The As-Built drawings must include a building outline sketch indicating room or unit numbers, to enable identification of sample room level readings with the building layout, especially end of line. This can be a combined or separate drawing to the MATV distribution plan.
- (g) The As-Built drawings may be pasted into the commission report or submitted as separate e-mail attachments in CAD, Visio, Excel, Word, scanned freehand or JPEG formats.

All Commissioning reports should be e-mailed to - [tek@austar.com.au](mailto:tek@austar.com.au) .

### 3 BULK HEADEND DESIGN OVERVIEW

Austar commercial headend designs are normally comprised of between 4 and 12 individual satellite decoders, normally housed within a universal 19" rack or customised shelf system in a secured location, near the logical centre of the distribution system: eg reception or maintenance room. All headend installations must use dual output 10.7 L.O. LNB connected to a suitable multiswitch. Each decoder is generally set to a pre-determined channel, and the decoder outputs are combined either by their RF modulators through a combiner or by their AV outlets using agile modulators. The combined AUSTAR channels are then integrated with the existing FTA and ancillary in-house programs and fed into a launch amplifier for distribution through the MATV system.

#### Decoder I.F. input connection method

A multiswitch is used to improve reliability by eliminating the need for I.F. line amplifiers, power injectors and multiple I.F. splitters between the dual LNB and decoders. A 2 input 12 output multiswitch should be used, as 12 outputs allows for easy future installation of additional decoders. Spare multiswitch tap ports can also be used to supply a dual polarity feed to a manager's decoder or on-site PVA if cable distances allow.

The SMS 2212 F is a cascade style of multiswitch with 2 through ports designed to pass power to other downstream multiswitches in cascaded multiswitch designs. Because of this feature, it is imperative that non-DC passing capacitive, not resistive 75 ohm terminators be inserted into the 2 through ports, to avoid a partial short circuit back to the decoders. These special capacitive terminators come supplied with the SMS2212F multiswitch. All unused tap ports must also be terminated using standard resistive 75 ohm terminators.

**Refer to Standard CX-12 Headend Drawing on page 36.**

### 4 MULTISWITCH OPERATION

The multiswitch works by internally switching and connecting a subscriber outlet to either I.F. polarity depending on the internal set-top decoder output voltage.

If a subscription television channel on the vertical polarity service is selected, the decoder sends 13 volts DC via the I.F. lead back to the multiswitch. The 13-volt supply instructs the multiswitch to connect that decoder to the incoming vertical polarity signal, independent of other decoders connected to the multiswitch.

If a horizontal polarity channel is selected, the decoder sends 18 volts DC via the I.F. lead back to the multiswitch. The 18-volt supply instructs the multiswitch to connect that decoder to the incoming horizontal polarity signal, again independent of other decoders connected to the multiswitch. Line powered multiswitches derive their operating power from the decoder.

Multiswitches exhibit a nominal polarity voltage switching threshold at each port of approximately <14.5 Vdc = vertical polarity operation, >16.0Vdc = horizontal polarity operation.

Multiswitches are designed to provide both 13 and 18Vdc power through to both ports of a dual LNB without the need for mains powered DC injectors. However consideration should be made for injectors where additional I.F. line amplifiers require line powering over cable distances exceeding approximately 50 meters (RG6) or 80 meters (RG11) between multiswitch and dish location.

Both output ports on a dual output LNB can provide either polarity, which is governed by the voltage appearing at each LNB port, which in turn is governed by the AUSTAR program channel selected in the AUSTAR set-top decoder or via a multiswitch.

Multiswitches will not pass any I.F. signal to the set-top decoder if the set-top decoder's internal LNB power option is set to off, resulting in an E52 or no signal error message from that headend decoder.

Most line-powered multiswitches have a small amount of sloped I.F. gain, typically providing 0 to +2 dB at each output port. Some brands provide up to +5dB gain.

The Spaun SMS 2212F provides 0dB, or unity gain between the LNB inputs and each of the 12 outputs

Care needs to be taken not to overload multiswitch input levels. Most multiswitches have internal I.F. amplification to overcome internal splitting losses, and provide a small amount of I.F. gain. Hence, as with any amplifier, they have a maximum output level, (governed by the input level), which must not be exceeded. Maximum input and output levels are usually written on the multiswitch cover.

The installation of splitters, taps or mains isolation devices between the decoder and the multiswitch is not permitted as they can delete the switching operation of the multiswitch.

Only AUSTAR approved multiswitches can be installed into bulk headends.

## 5. DISH SIZE SELECTION

The dish size selected must achieve a minimum of 13 dB C.N.R and 12db MER in clear sky at the L.N.B across all AUSTAR transponder streams wherever multiswitches with no additional I.F. amplification are installed. Refer to the AUSTAR Technical Specifications Document.

### 5 RACK MOUNTING METHOD

Decoders should be mounted within a universal 19" Elgee Sheetmetal rack installed with individual steel shelves. Racks can be either floor standing on castors to allow for ease of servicing, or wall mounted using Elgee wall mounting brackets.

Headend Rack space consideration:

Floor area and height requirements for the 3 most common rack sizes are as follows:-

6 channel headend rack (mm): 550 (w) x 450 (d) x 950 (h)

8 channel headend rack (mm): 550 (w) x 450 (d) x 1300 (h)

10 channel headend rack (mm): 550 (w) x 450 (d) x 1475 (h)

In applications where a rack cannot be used due to space restrictions, customised shelving can be substituted, and the details must be included in the Headend Scope of Works. Each decoder requires an individual shelf to allow for sufficient air circulation, and cannot be enclosed in a non-ventilated cabinet. Decoders must not be stacked on top of each other. Where rack mounted modulators are used, additional rack height should be allowed for the modulator rack assembly to be included with the decoders.

The decoder combiner system and launch amp are normally affixed to the rack, or mounted on a wall mounted support board near the rack.

Sufficient air circulation must be allowed for the launch and distribution amplifiers.

Information on Elgee sheetmetal racks and design options are available from their web address: [www.elgee.com.au](http://www.elgee.com.au)

### 6 BULK HEADEND DECODER COMBINER METHODS

The recommended decoder combining method is determined by the following factors:

- (a) Quantity of local analogue, digital FTA and AUSTAR channels. Eg: in areas with typically 5 local FTA channels and plenty of spare FTA spectrum, a Hills CX-12 active combiner should suffice. The CX-12 is designed to combine up to 12 AUSTAR decoders by using the decoder UHF modulator outputs. In congested areas with multiple FTA translators, modulators may be required to move AUSTAR channels to VHF or S-band frequencies to avoid co-channel interference.
- (b) Existing channels or services already in the system, where adjacent channel operation is often required, hence the need for vestigial sideband modulators.

(Pre-tuned single channel filters and single channel amplifiers are no longer recommended due to their lack of frequency agility and cost of retuning to make way for new FTA services.)

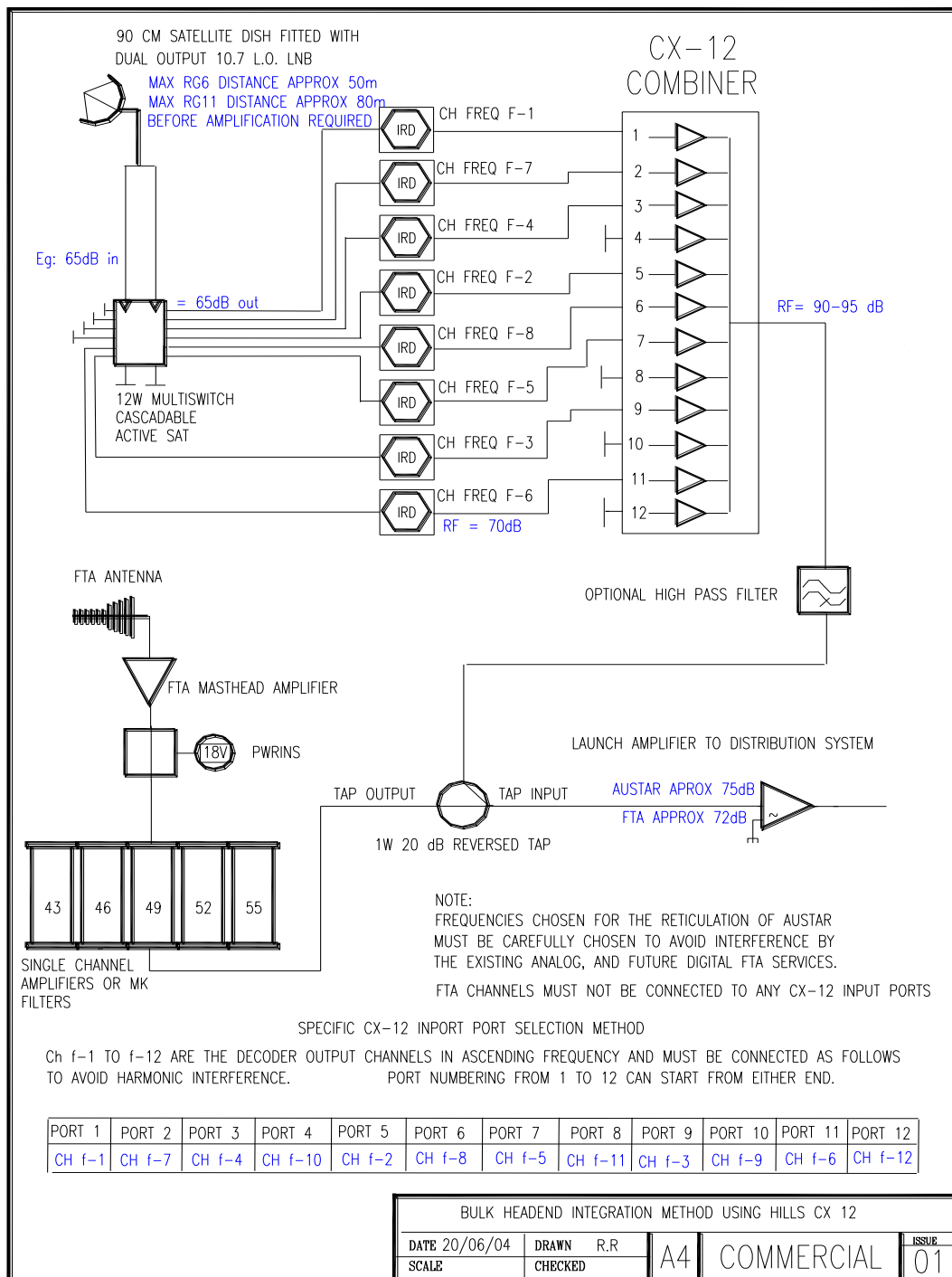
Approved and recommended decoder combiner methods are as follows, based on the above criteria:

## 7 The Hills CX12 Active Combiner

The following diagram illustrates the integration of AUSTAR program channels in a bulk headend via the UHF output of the set top box using a Hills CX12 active combiner. The CX12 combiner has a 15dB gain amplifier on each input to maximise the RF carrier-to-noise ratio prior to the combiner losses involved in the following combining stage.

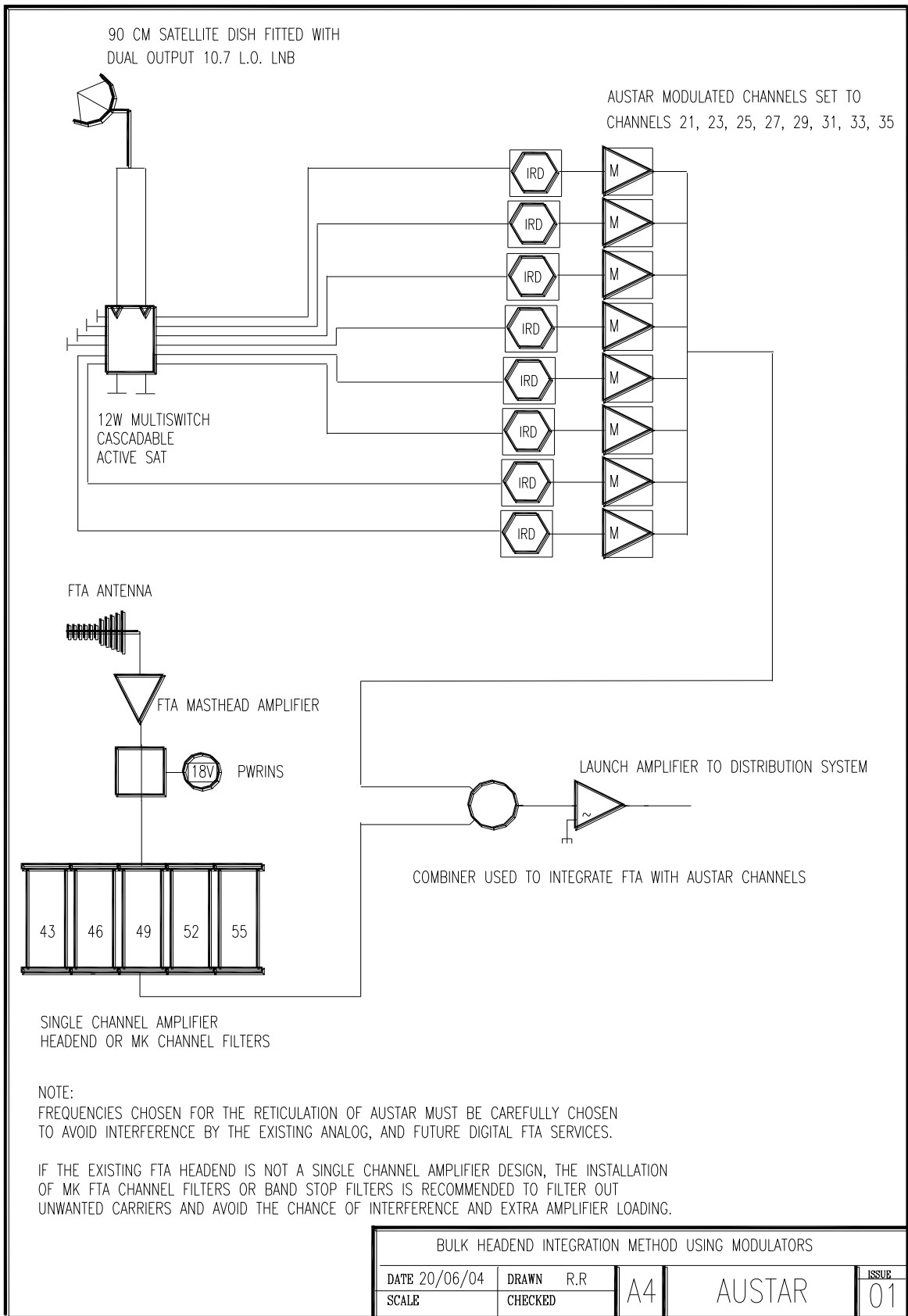
Particular attention must be paid to the specific channel off-setting chart at the base of the drawing. This offsetting chart is supplied on the installation guideline sheet supplied with all CX-12 units. The offset to channels of ascending frequency is required to minimise harmonic distortion between nearby channels due to the summing arrangement of the 12 individual input amplifiers. All unused ports must be terminated with 75 ohm terminators.

### CX-12 Combiner Bulk Headend system Diagram



## 8 MODULATED BULK HEADEND

The following diagram illustrates the integration of AUSTAR program channels in a bulk headend via the audio video output of the set top box using approved modulators.



## **9 CUSTOMER FTA CONSIDERATIONS**

When surveying the local FTA conditions, consideration of installing digital to analogue converters in poor analogue reception areas should be discussed with the customer, where useable digital FTA is available. This also future-proofs the FTA system from eventual closure of the analogue service and reduces analogue FTA loading of the launch amplifier.

## **10 BULK HEADEND CHANNEL ALLOCATION**

AUSTAR RF channels must be spaced at least 1 x complete 7MHz channel apart from each other, and preferably 2 channels away from any FTA channel, when using the AUSTAR decoder RF outputs, or double sideband (DSB) modulators. Adjacent AUSTAR channel allocation can only be allowed when using approved vestigial sideband (VSB) 7 MHz modulators eg: the WISI VSB Topline series, although single, or half channel spacing is the preferred VSB modulator option.

Current and planned digital and analogue FTA channels must not be used for the distribution of any AUSTAR channels, and the headend designer should consult the Australian Broadcast Authority for the local digital and analogue FTA channel plan of the area in which the headend is to be installed.

The proposed AUSTAR headend channel allocation must be stated in the designer's proposed headend CAD drawing, or in the Proposed Channel allocation section in the site survey form, and the final channel allocation must be stated in the As-Build CAD drawing and commission report.

AUSTAR strongly recommends that all non-AUSTAR approved system designs be first forwarded to AUSTAR Field Operations for assessment and approval prior to installation. (Refer to AUSTAR Contact Details at our web site)

## **11 EXISTING BUILDING MATV CABLING AND UPGRADING**

To reduce the chance of unwanted RF ingress, existing MATV trunk cable should be RG6 quad shield, and drop cables RG6 dual shield as a minimum requirement. Dual shield trunk cabling, saddle-and-clamp style splitters and taps, and loop wall plates require upgrading. If any sub standard cable or passive components cannot be replaced, this detail must be clearly outlined and justified in the Scope of Works section in the site survey for assessment and review.

When upgrading an MATV system, AUSTAR approved quad shielded cable and passive components must be used. RG11 quad shield should be used for trunk cables, and RG6 quad shield for drop cables.

The following steps should be used to assess the existing MATV system performance:

- (a) New buildings with no existing FTA, or builds in which the FTA channels will be lower in frequency than some or all of the proposed AUSTAR channels:

Using 2 AUSTAR decoders with RF outputs set to channel 21 and 69, combine the 2 outputs with a 2-way splitter and insert the combined signals into a known quality AUSTAR approved launch amplifier. Set the gain to an appropriate launch level, ideally 105 dBuV. (The decoders do not need any I.F. signal or hits as the AUSTAR Menu can be used to generate a useable test picture and RF output) Alternatively use the decoder UHF output test pattern.

Visit sufficient floors, buildings, wings and rooms to record sufficient sample outlet readings to accurately determine the total system performance. Use a TV to assess picture quality and to check for image ghosting, an indicator of poor system V.S.W.R. due to possible cable damage, faulty connections, un-terminated taps and splitters, etc. Also sweep check for any ingress of FTA channels into the building cabling. If significant FTA channel levels are detected without a FTA headend connected, this indicates poor RF shielding in the system, and may cause leading or lagging FTA ghosts later on.

Enter this launch level and outlet sample data into page 2 of the site survey form.

- (b) Existing FTA MATV systems in which the FTA channels will be higher in frequency than the proposed AUSTAR channels:

Locate the existing FTA launch amplifier. After obtaining the site manager's permission, disconnect the output of the FTA launch amplifier, measure and record FTA output levels, and reconnect.

Visit as many rooms as possible on differing sections of the distribution system and record sufficient sample outlets as above. Enter this launch level and outlet sample data into page 2 of the site survey form.

The room sample levels and CCIR picture quality readings should give a good indication as to how additional AUSTAR channels at a lower frequency will perform in the existing system.

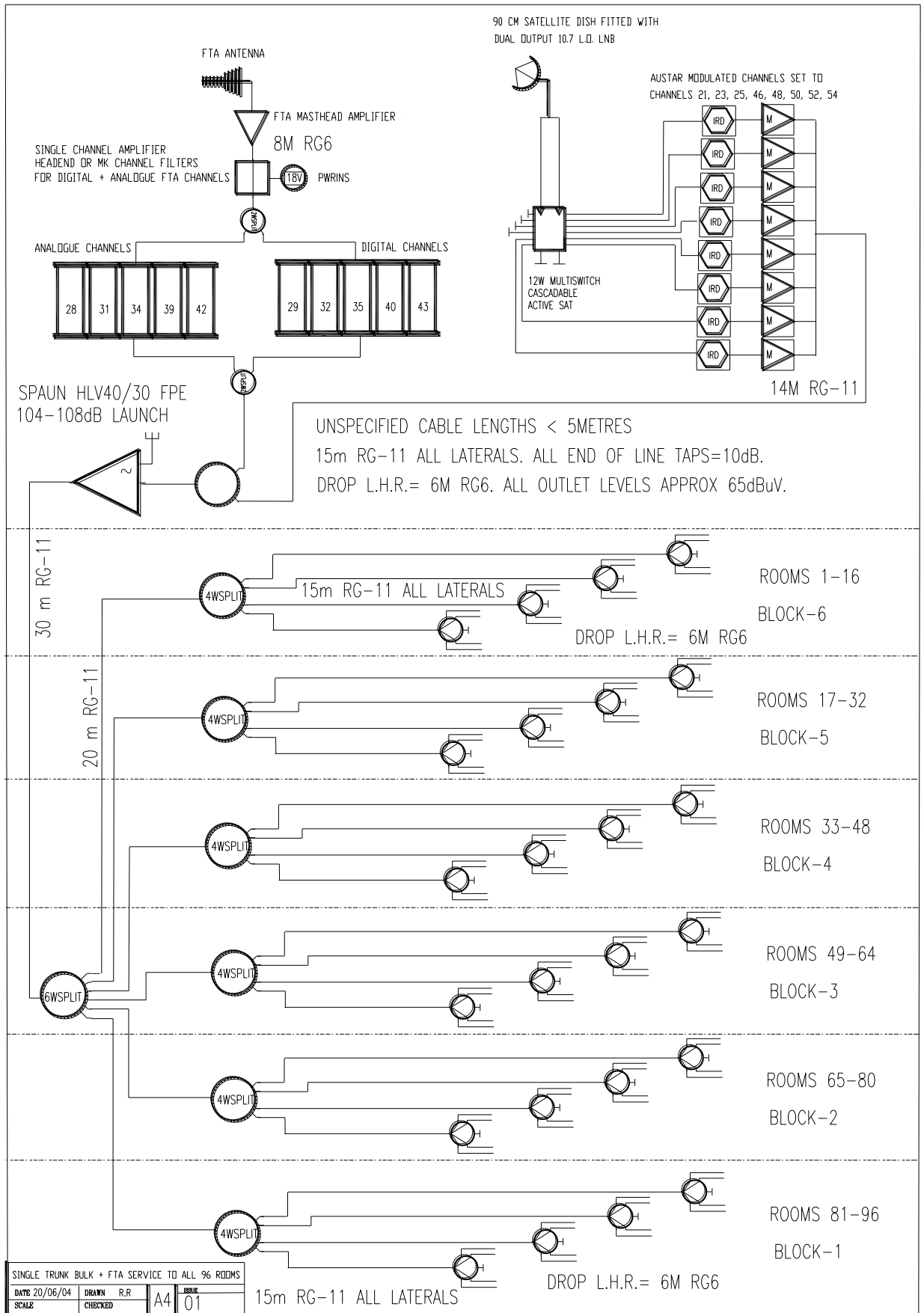
## **12 NEW BUILDING MATV DESIGN TYPES AND EXAMPLES**

All new MATV systems requiring provision of AUSTAR for Business program services must be designed and installed in accordance with the AUSTAR Technical Specification.

In buildings which require distribution of FTA and Bulk headend services to all outlets without exceptions, (eg a motel) a single trunk 'tree and branch' or Star / Home Run MATV system is required, and must be designed to comply with the AUSTAR Technical Specification.

All subscriber drop cables should be star wired from the outlet back to a tap, not a splitter, to maximise isolation between subscriber outlets. Star wired MATV systems are also acceptable for smaller systems. The local FTA channels are mixed with the AUSTAR analogue channels and distributed to all outlets connected to the MATV system. Future partial disconnections of any units from the AUSTAR Bulk service only is not possible with this design as FTA channels are interspersed with AUSTAR channels, and all connected rooms are included within the monthly AUSTAR subscription.

12.1 Example of integrated single trunk Home Run MATV System: Bulk service to all outlets



Buildings that require only partial, or varying take-up of the Bulk headend services over time will require a dual trunked MATV system. (eg: holiday let apartments)

The first trunk and tap system supplies FTA services only to non-AUSTAR subscribers.

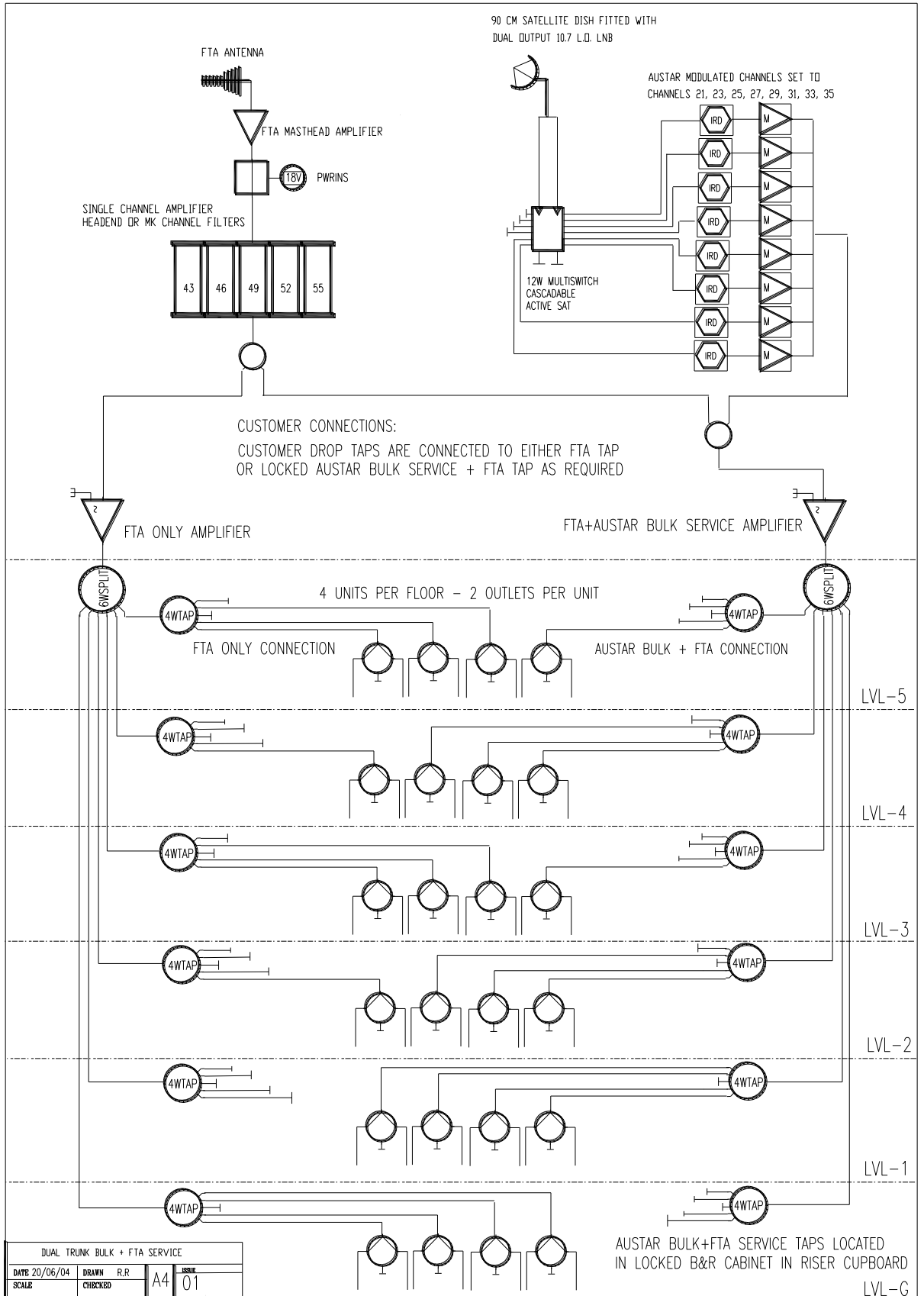
The second parallel trunk and tap system supplies the FTA channels integrated with the authorised AUSTAR bulk channels.

New AUSTAR subscribers have their drop cable disconnected from the FTA only tap and reconnected to the tap carrying both FTA and AUSTAR channels. The AUSTAR taps must be located in a lockable riser cupboard, or AUSTAR authorised lockable cabinet within the riser or roof space. AUSTAR connections and disconnections are only performed by authorised AUSTAR contractors.

Austar subscribers have their drop cable runs connected to the combined FTA + AUSTAR backbone via access to a lockable cabinet housing the access tap.

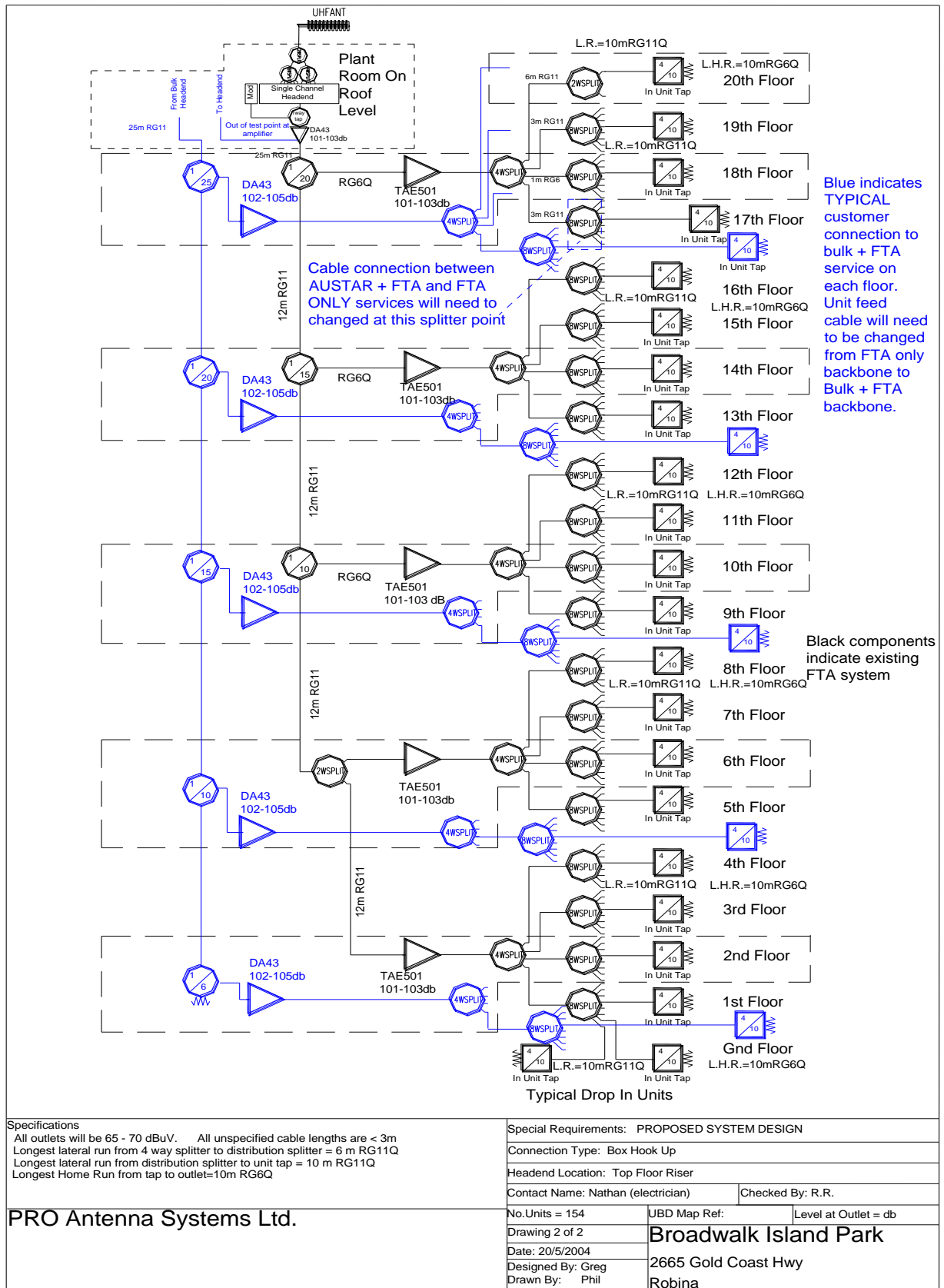
## 12.2 Example of a simple Dual Trunk and Tap Bulk headend design in a new building

Austar subscribers have their drop cable runs connected to the combined FTA + AUSTAR backbone via access to a lockable cabinet housing the access tap.



12.3 Example of a Dual Trunk and Tap Bulk headend design into an existing FTA system: 154 outlets

Austar subscribers have their drop cable runs connected to the combined FTA + AUSTAR backbone via access to a lockable cabinet housing the access tap.

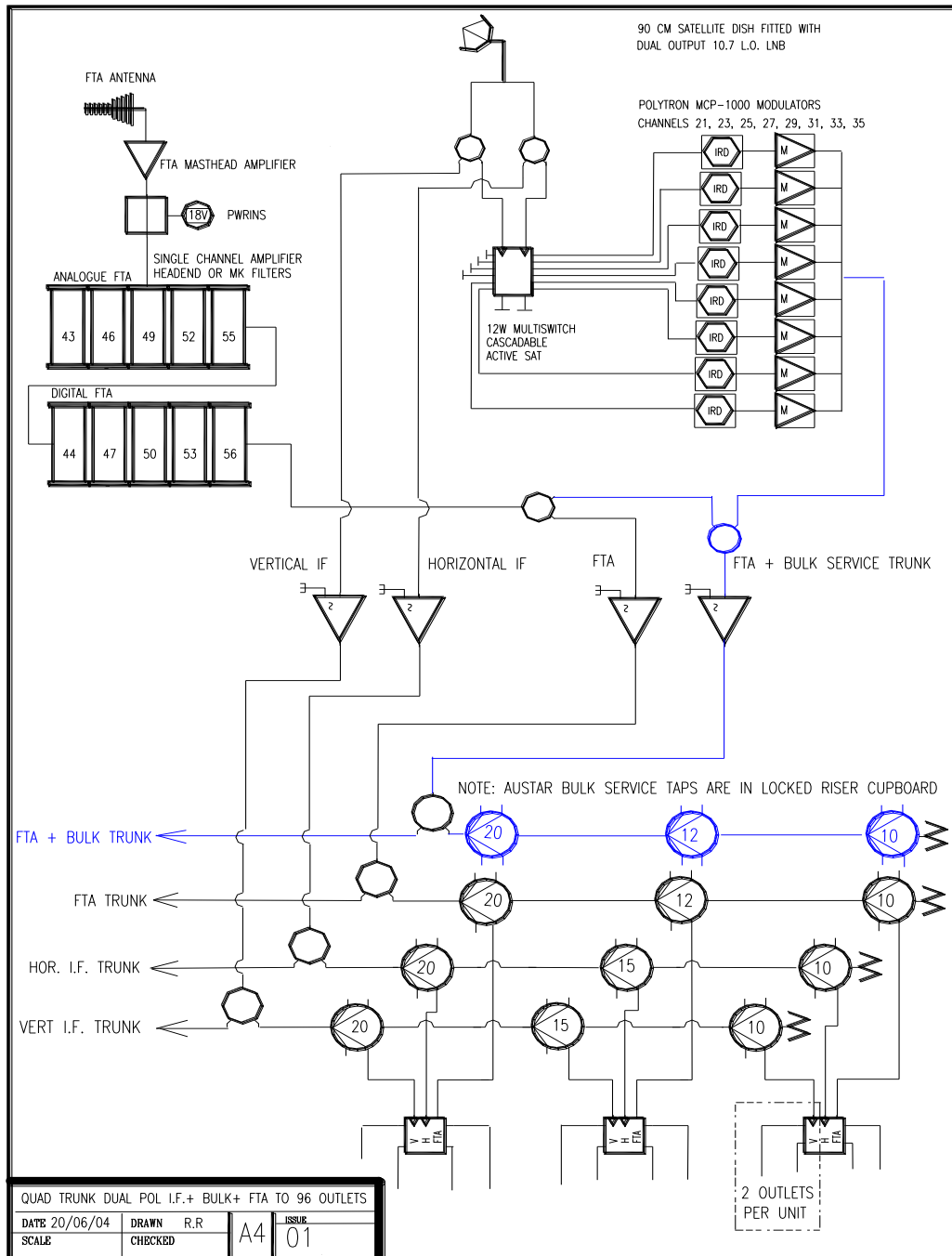


In buildings that require distribution of full service residential style AUSTAR programming requiring a set-top decoder per subscriber, a tri-trunked dual polarity SMATV system is required. (One trunk system is

required for FTA, two additional trunks are required for the dual polarity I.F. system.) These are referred to as Multi Dwelling Units (MDU) and are not covered in this section of the manual. Refer to the AUSTAR MDU Installation Guidelines document for full design requirements.

In buildings which require distribution of both full service dual polarity residential AUSTAR programming and an AUSTAR for Accommodation Bulk service, a quad-trunked SMATV system is required. (One trunk system is required for the FTA, two trunks are required for the dual polarity I.F. system, and a fourth trunk carries the AUSTAR Bulk headend channels integrated with FTA for Bulk service subscriber connections.

#### 12.4 Example of Quad Trunk SMATV System for Bulk + Full Service residential installation.



### 13 FILTERING OUT OF NON-AUTHORISED CUSTOMERS IN BULK HEADEND INSTALLATIONS

Filtering out of non-authorized customers in Bulk Headend installation is not an approved installation method.