

# SMA TV SYSTEM

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## المقدمة

اهدى هذه البحث الصغير المتواضع الى نقابة المهندسين و جميع المهندسين فى كردستان العراق والذين يحبون التصاميم و المشاريع الكهربائية المتطورة و صديق البيئة وكذلك حكومة اقليم كردستان و اتمنى ان يكون هذه البحث اساسا لتنظيم المشاريع الاستراتيجية و خصوصا الابنية الحديثة لان هناك اخطاء جسيمة فى مشاريعنا و على هذا الاساس للخبرة فى هذا المجال اريد ان اساهم فى حل المشاكل المشاريع اتمنى ان تحصل مشاريعنا فى كردستان و العراق على مقاييس الدولية و اشكر كل من ساهم فى مساعدتي .

وشكرا ...

# **SMA TV SYSTEM**

## SECTION 1- IP-SMATV

### PART1GENERAL

#### 1.1 RELATEDDOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and the requirements of section 260000 of the specifications, apply to this Section.

#### 1.2 SUMMARY

#### 1.3 SUB MITTALS

- A. Product Data: Include dimensions and data on features and components for each product specified. Include wiring diagrams and elevation view of front panel showing control and indicating devices. Include data on ratings, and a detailed description of operating modes and any load limitations that may apply.
- B. ShopDrawings:
  - 1. Wiring Diagrams: Detail wiring and differentiate between manufacturer-installed and field-installed wiring. Include diagrams for equipment and for system with all terminals and inter connection side notified.
  - 2. Floor Plans: Indicate final outlet locations and routing soface way connections.
  - 3. System Operation Description: Detailed description for this Project, including method of operation and supervision of circuits and sequence of operations. Manufacturer's standard descriptions for generic systems are not acceptable.
  - 4. All documents required by local regulations in the format required by the separates.
- C. Field Test Reports: Indicate and inter prêt test results for compliance with performance requirements.
- D. Coordination Drawings: Plans, sections, and elevations drawn to scale and coordinating installations access to them.
- E. Field quality-control test reports .
- F. Operation and maintenance data .
- G. Product Certificates: Signed by manufacturers of system components certifying that products furnished comply with requirements.
- H. Installer Certificates : Signed by manufacturer certifying that installers comply with requirements.

I.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer approved by the manufacturer for both installation and maintenance of equipment required for this Section.
- A. Electrical Test reports/certificates by recognized test laboratories (such as TUV, VERITAS) shall be submitted to prove compliance with the specifications.

1.5 EXTRAMATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.6 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

- B. Special Warranty: A written warranty, signed by Contractor and manufacturer, agreeing to replace any component of the system that do not meet requirements or that fail within the specified warranty period.
  - 1. Warranty Period: 2 years from date of Substantial Completion for any component of the system.

## PART2PRODUCTS

### 2.1 EQUIPMENT AND MATERIALS

- A. Coordinate components and features to form an integrated system. Match components and interconnections for optimum performance of specified functions.
- B. Expansion Capability: Adequate for increased number of stations in the future by 20 percent above those indicated without adding internal components or main trunk cable conductors.
- C. Equipment: Modular type using solid-state components, fully rated for continuous duty, Select for normal operation on input power usually supplied at 220 to 230V,50Hz.

### 2.2 SCOPE OF WORK

- A. The SMA TV contractor's Scope of Work shall include but not be limited to the following:
  - 1. Installation of an SMA TV with RF and IF Distribution Network by RF/IF tap and splitters compatible with the number of inputs as specified on riser diagram.
  - 2. IP-TV HEAD END
  - 3. IP-TV GATE WAY
  - 4. SOFTWARE
  - 5. SERVER (BY CLIENT)
  - 6. IP-TV-BOX.
  - 7. Integration of a fully functional SMA TV system with system performance analysis.
  - 8. Provide test equipment and Spare parts.
  - 9. Testing, commissioning and optimization.

### 2.3 INSTALLATION OF THE SMATV DISTRIBUTION NETWORK

- A. The SMATV contractor shall be responsible to submit final drawings (shop drawings) indicating the finally out, cables routing and type.
- B. Shielded pipe should be used in trunk lines due to the proximity of Main Power lines close than 2 meters as specified in Functional Specification for the SMATV system. For maximum reliability against strokes, steel tape armor with over-jacketing or rigid-conduit such as gray electrical PVC will be installed.
- C. Conduits should be at least twice the section of the enclosed cables. Precautions should be taken to avoid dripping solvent or

cement on to cable insulation.

- D. The SMATV contractor shall supervise the layout cables type as indicated on drawings and riser diagram in the whole distribution.
- E. SMATV distribution amplifiers shall be necessary in different points over the main trunk lines. SMA TV distribution amplifiers shall have adjustable gain & slope control to keep the difference of levels between VHF and UHF , due to the losses in the distribution Network.
- F. Variable equalizers before each line SMATV amplifier shall be provided to ensure a minimum of 70 dBu TV point without gap between VHF and UHF channels. The equalizing of signal levels shall reduce the possibility of adjacent channels inter modulation distortion.

#### **1. SatelliteDishFarm**

It is anticipated that dish antennas related to the SMATV system will be located on the roof of theHospital Building. In order to provide a suitable range of channel availability for the international patronage of the establishment, the following dishes are to be provided:



## -Nilesat

Each dish is to be located on a 500mx500m by 300m deep concrete plint hand secured with anchor bolts. Dishes will be orientated as per site conditions:

The LNB's with in each dish are cabled to the SMA TV head end rack via RG11Coaxial Cable

### **II. SMATV Head End**

This narrative provides a description of Head End system to be provided for the SMA TV System and its purpose , and it is recommended that the schematic drawings are refer red to for guidance when reading this.

The SMATV head-end performs the following major functions.

- i) Reception of Antenna Signals from Roof mounted Satellite Dishes
- ii) Location of Individually Tuned Satellite Receivers
- iii) Modulation of Satellite TV and radio channels on to a single RF cable network
- iv) Launch of Signals to remote distribution enclosures

- G. The SMA TV Head End system will be located IN THE SERVER ROOM. 70 Satellite Receivers will be located in equipment racks an individually tuned to free-to- air channels or channels subscribed to by the hospital's management

## **PART3EXECUTION**

### **3.1 INSTALLATION**

- A. Install equipment to comply with manufacturer's written instructions.
- B. Wiring Method : Install wiring in race way. Conceal cable and race way except in un finished spaces.
- C. Wiring and cabling within Enclosures: Bundle, lace, and train conductors to terminal points with no excess . Use lacing bars in cabinets.
- D. Cabling and Wiring : Install number and size of conductors as recommended by system manufacturer for functions indicated or required.
- E. Separation of Wires and cables: Install in separate raceways or, where in same enclosure,separate conductors at least 300 mm from adjacent parallel power wiring. Separate other inter communication equipment conductors as recommended by equipment manufacturer.

- F. Splitters, Taps , and Terminations : Splitters out puts, taps, and terminations shall be numbered by terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.
- G. Match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.
- H. Identification of Conductors and Cables: Color-code and numbered conductors and apply wire and cable marking tape to designate wires and cables to identify media in coordination with system wiring diagrams.
- I. Cut and patch existing walls, ceilings, floors, or other building finishes for installation. Repair, restore, and refinish surfaces to original appearance.

## **PART4HEADENDANDSYSTEMTESTING**

### **4.1 SUMMARY**

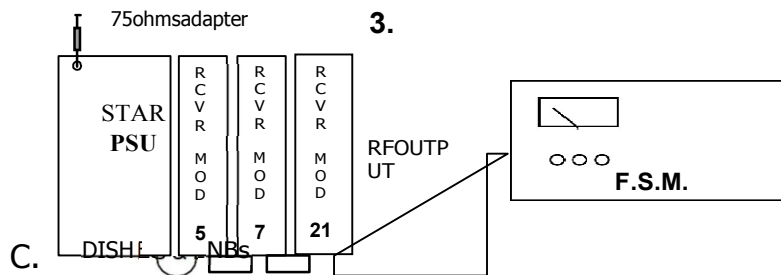
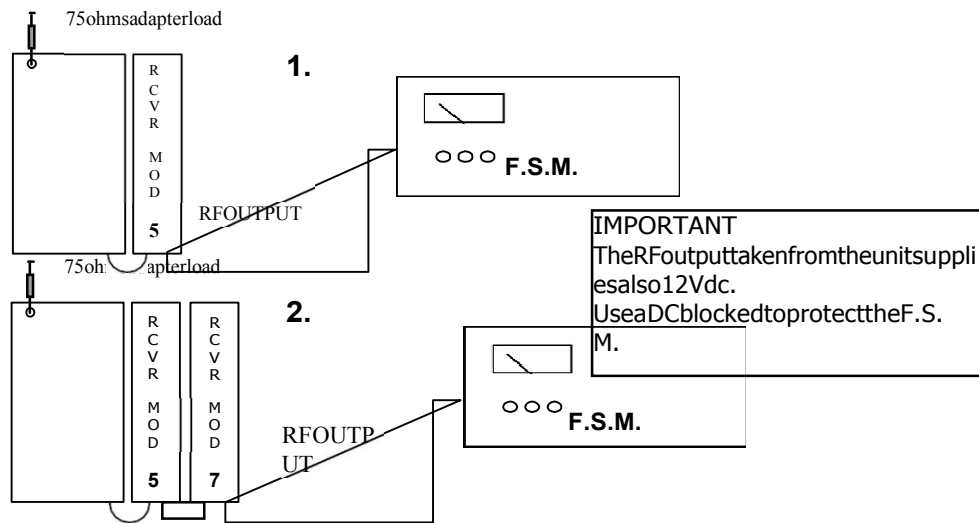
- A. This procedure shall be followed for testing and commissioning the SMATV system. The procedure shall not be restrictive i.e. more test could be imposed on the contractor during commissioning. The procedure targets head ends mainly consisting of stereo modulators and single channel processors.
- B. The alignment procedure shall be based on a Field Strength Meter provided by the contractor.
- C. The single channel system specified must provide an out band spurious ejection around 65dBc.
- D. The SMATV distribution amplification is an essential parameter that determines the performance of the whole SMATV distribution network.

### **4.2 TESTING CHANNEL PROCESSING,AMPLIFICATION AND DISTRUBUTION SYSTEMS**

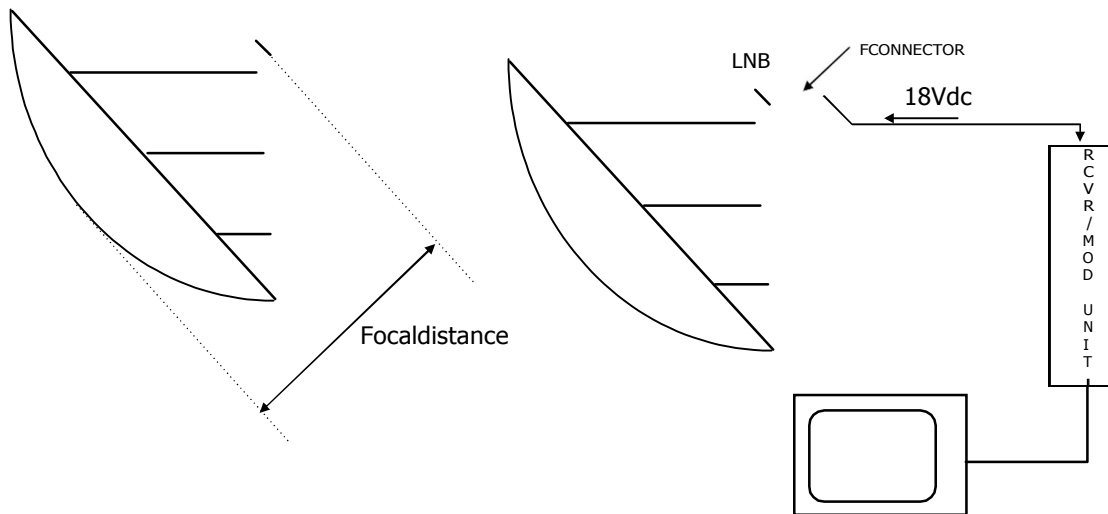
- A. CHANNELSELECTION:
  - 1. As the VSB modules have as output end a loop-through system to amplify and combine all their output channels(their inputs ends can have either a two connectors loop through or a single input connector);Therefore, and because of the output loop-through system, as pacing scheme between channels (in the same rack) must be followed to all owscombining the channels without interference.
    - a. 1 channel spacing or VHF
    - b. 2channels spacing or UHF

B. MODULATOR OUTPUT LEVELS

1. The output channel tuned in each receiver/modulator unit shall be verified such that its output level is higher than 75dBuV.
2. The output level shall be verified by the Field Strength Meter provided by the SMA TV contractor.
3. The RF links for the output loop-through shall also be verified as indicated below. The losses due to each RF link 0.5dB approximately shall be taken in to account.



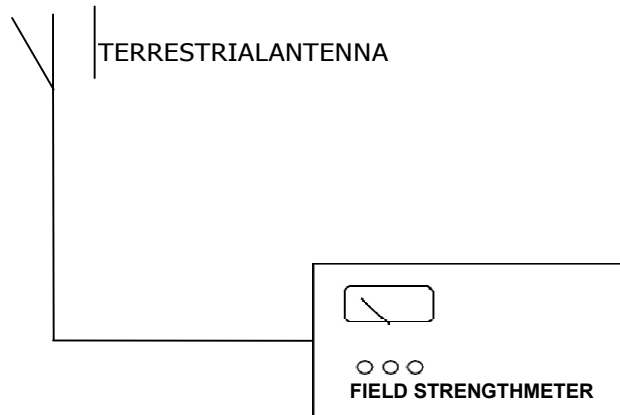
1. The signal coming from each LNB shall be verified. The SMATV contractor, shall provide a Field Strength Meter capable to convert and measure SAT IF signals.
2. Using a satellite receiver/modulator that was previously tested as working correctly; connect the input of the receiver/modulator to the LNB under test and then connect a TV set to the output of receiver/ modul at or unit and check the picture quality.
3. If the picture's quality is not sat is factory, the following shall be verified:
  - a. The focal distance for that particular dish (measured from the bottom of the dish to the center of the feed horn)is correct.



- b. The F connector of the LNB shall be checked and the 18VDC supply from the receiver/modulator Unit to the LNB shall be verified.
- c. The LNB's working condition shall be verified by testing its consumption.
- d. Verify that the adequate polarization of the satellite signal is coming from the LNB(adjust polarity discrimination).
- e. Verify the alignment of the dish.

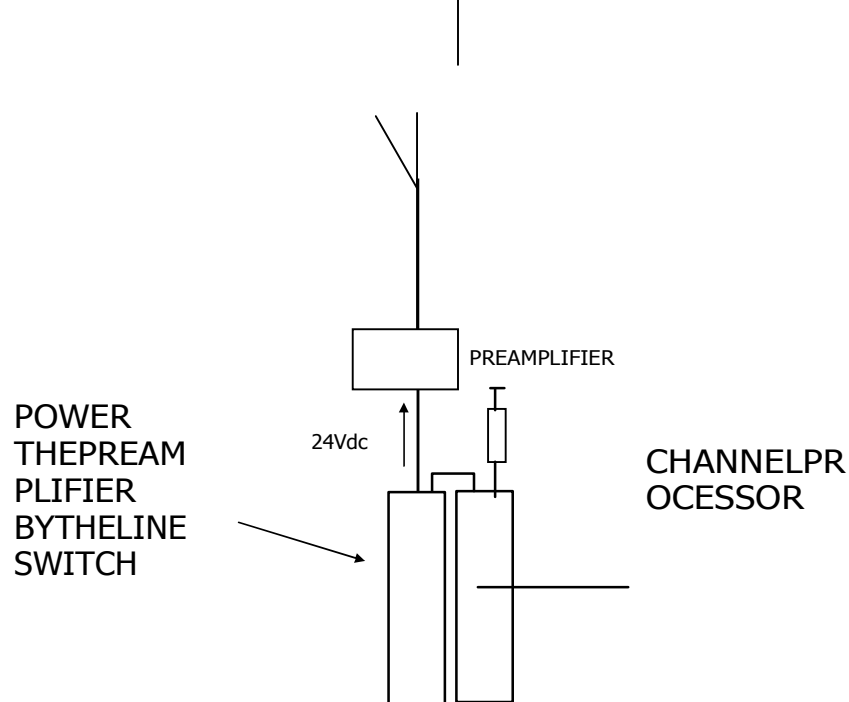
D. TERRESTRIAL TV LOCAL CHANNELS

1. Verify that the output level of the terrestrial channels as well as their reception quality are:
  - a. The output level has to be equal or higher than  $70\text{dB}\mu\text{V}$ .





- b. If the output level is less than  $70\text{dB}\mu\text{V}$ , a pre amplifier shall be provided to obtain the level needed at the input of the channel processors.



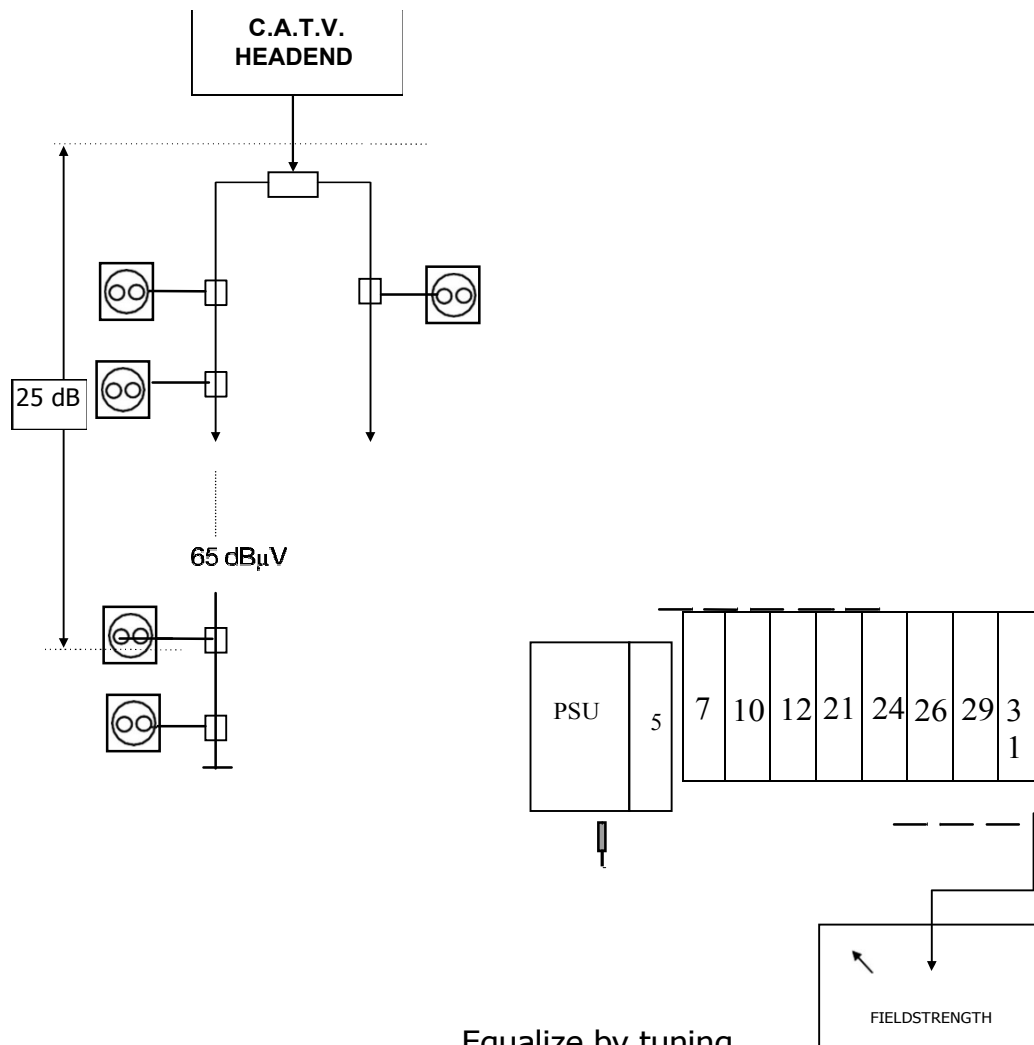
#### E. CHANNEL PROCESSORS OUTPUT LEVELS

1. Inter connect the racks as indicated below.
  - a. The output of the RACK A shall be connected from the unit tuned for the highest output channel.
  - b. The input of the RACK B shall be connected to the amplifier tuned for the lowest channel.
2. The terrestrial channels shall be amplified using amplifiers with 2 input connectors if they are coming from the same antenna (as channels 26 & 31), or using amplifiers with 1 input connector if they are coming from different antennas (as channel 10).
3. Patch all the RF link connections and terminate all non-used ports with a 75 ohms adapter load.
4. Check the output of the amplifiers one by one by connecting the FSM as indicated below.

## F. FINAL EQUALIZATION

- Once all the amplifiers have been interconnected, the final response of the head end shall be equalized for the level required at the outlet, deducting system losses. If the estimated losses from the output of the head end to the wall outlet socket are 25dB(losses due to splitters, taps, multi-switches, vco axial cables,),the output level of the amplifiers shall be adjusted to the following value:

$$(\text{LEVEL AT THE OUTLET}) + \text{LOSSES} = 65\text{dB}\mu\text{V} + 25\text{dB} = 90\text{dB}\mu\text{V}$$



Equalize by tuning channel by channel and adjust ga

G. **PICTUREQUALITY**

1. The picture's quality shall be verified by connecting a TV set to the output of the head end and observing the picture of each channel checking that there is no interference.
2. Should any adjacent channel interference be noticed (by watching the typical frame on the screen), the output of the head end shall be re-equalized thus reducing its output level.
3. If there-equalization does not cancel the interference or if the reduction of the head end's output adversely affects the TV outlets' signal, a different channel combination for the satellite receivers and amplifiers shall be selected. Selecting a different channels combination requires that the channels amplifiers which are tuned for a fixed channel be re-tuned for the new channels configuration by manufacturer specific special equipment.

**PART5 FIELD QUALITY CONTROL, DEMONSTRATION AND STATEMENT OF COMPLIANCE.**

5.1 **FIELDQUALITYCONTROL**

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installations, including connections. Report results in writing.
- B. Retain option in first paragraph below if separate paging speakers are indicated.
- C. Operational Test : As a minimum , like indicated above.
- D. Retesting: Correct deficiencies and retest. Prepare written record of tests.
- E. Report test results in writing.

5.2 **DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust , operate, and maintain SMATV equipment

### 5.3 STATEMENT OF COMPLIANCE

- A. The SMATV system, contractor and product manufacturer (s) shall certify that all the equipment that shall be used in the SMA TV system complies with the most stringent E.N.regulations.

