

## **Certified Satellite Installer—CSI – 2004-5**

### **COMPETENCIES listing**

Proposed Skills Standards and Competencies for workers studying to become satellite systems installers and technicians. For use as a curriculum outline for educational institutions providing training for satellite industry personnel.

#### **A. BASIC SMALL DISH CAPABILITIES**

##### **1.0 Satellite Communications History & Theory**

- 1.1 Demonstrate an understanding of electrostatic and electromagnetic wave propagation.
- 1.2 Identify common frequencies utilized by various common services - frequency bands and relationships - TV lo-hi-UHF bands - FM - AM.
- 1.3 Identify C, Ka and Ku frequency bands and the services provided by each
- 1.4 Identify common satellite services available from DBS systems
- 1.5 Describe the process of encoding and decoding satellite programming
- 1.6 List the orbital slots and names of DirecTV and DISH satellites
- 1.7 Explain the term: footprint
- 1.8 Describe the Clarke Belt

##### **2.0 Satellite Dish Reflectors**

- 2.1 Explain gain of a dish reflector
- 2.2 Explain how the LNBF operates and why it is needed.
- 2.3 Demonstrate ability to track the Clarke belt and aim a DBS dish properly
- 2.4 Explain how the North Star Polaris is related to dish aiming
- 2.5 Describe declination and elevation adjustments required for DBS systems
- 2.6 Explain the terms: FOCAL POINT and FOCAL DISTANCE
- 2.7 Explain how reflector and LNB gain is related to receiver gain
- 2.8 Explain the advantages of offset feed-horns and LNBF's

##### **3.0 Cabling**

- 3.1 Calculate and measure the signal loss in lengths of RG 6 vs 59 coax cable and compare the two
- 3.2 Demonstrate proper waterproofing of cabling at the dish reflector
- 3.3 Explain building entry - crawl space and attic precautions - wall fishing – carpet-cutting precautions and wall plate usage
- 3.4 Demonstrate the ability to properly install coaxial fittings and splices
- 3.5 Explain methods of overcoming obstacles such as walks, driveways, underground wiring, roots and other impediments in underground cabling
- 3.6 Explain unnecessary length and tight coiling or bending of coaxial cable

##### **4.0 Amplifiers**

- 4.1 Describe the function of line boosters - in-line amplifiers and distribution amplifiers and where they are used
- 4.2 Explain how in-line amplifiers are powered
- 4.3 Describe amplifier gain options
- 4.4 Explain why rooftop antenna preamplifiers and amplifiers are used and describe potential problems they may present for satellite installers
- 4.5 List where bandsplitters, diplexers and attenuators are used
- 4.6 Describe Video Switch Boxes and list their usages
- 4.7 Name 5 types of equipment where RF modulators may be used and explain the functions of an RF modulator

- 4.8 Explain the function of band pass filters, signal combiners, multi-switches and amplified signal combiners

## **5.0 Satellite Dish Feed-horns – LNBS & LNBSs**

- 5.1 Describe fixed-diode, tone switching, and dual feeds
- 5.2 Explain wave-guide theory - LNBS's, and why scaler rings are used on feed-horns
  
- 5.3 Explain the difference between horizontal/vertical polarity and circular signal transmission and reception

## **6.0 Satellite System Installation – Site Surveys**

- 6.1 Demonstrate use of common and special satellite, antenna, cable and Telco hand tools
- 6.2 Describe trenching of satellite and antenna cables and special precautions
- 6.3 Describe how to locate and mark buried cables
- 6.4 Explain boring principles (street, sidewalks, etc.)
- 6.5 List building-entry precautions and decision-making pertaining to dish wiring
- 6.6 Describe types of roof mounts for antennas and satellites, including non-penetrating mounting procedures
- 6.7 List important concepts when making a satellite site survey
- 6.8 Explain anti-twist pole modification - concrete calculation and work procedures waterproofing - safety - wall mounts - chimney and tri-pod mounts
- 6.9 Explain in-ground water runoff and cable routing for concrete pole mounts

## **7.0 Satellite Receivers – Digital Technology**

- 7.1 Explain the differences between C/Ku - DirecTV, DISH Network and commercial system receivers
- 7.2 Demonstrate how to authorize consumer or commercial programming
- 7.3 Describe the fuses commonly used in receivers
- 7.4 Explain special codes, parental supervision functions and remote hand unit use
- 7.5 Describe basic (block diagram) receiver circuitry (IF input - decoding - audio & video processing - baseband signals - and stereo)
- 7.6 Describe satellite receiver gain and receiver input signal ranges as they relate to the entire dish system
- 7.7 Describe secondary audio programs - subcarriers - SCPC and pay-per-view services
- 7.8 Describe captioning and on-screen graphics
- 7.9 Describe the purpose of telephone connections to the receiver and computer interfacing with the satellite receiver
- 7.10 Explain how channel tuning voltages perform their functions within the receiver
- 7.11 Demonstrate the uses for menus, programming information and receiver/set up functions of the receiver
- 7.12 Draw an installation diagram showing proper hookup for multi-LNBS, multi-satellite, multi-receiver reception of DirecTV and DISH HDTV programming

## **8.0 Interfacing With Other Consumer Electronics Equipment**

- 8.1 Explain and demonstrate ability to properly utilize interconnections for TV and other consumer electronics equipment
- 8.2 Describe the TV requirements for audio and video signals, RF-out (on channel 3/4) and list proper signal levels expected from receiver ports
- 8.3 Explain how signal modulators work and list appropriate circumstances for them
- 8.4 Describe the usage of video switch boxes, combiners & reverse splitters

- 8.5 Explain the use for cable/normal and VCR/TV switches
- 8.6 Describe telephone wiring and interconnection to satellite receivers

## **9.0 Transmission – Internet Systems**

- 9.1 Describe mounting precautions and rules for transmission outside units
- 9.2 Explain transmission theory and power levels
- 9.3 Compare StarBand, DirectWay, DISH and competing systems features

## **10.0 Troubleshooting, Repairs, Sun Outage**

- 10.1 Describe rain fade and sun outage
- 10.2 List typical distribution system problems such as open and shorted connections
- 10.3 Explain standing waves and identify their presence in a video picture
- 10.4 Describe interference types and methods of prevention or reduction
- 10.5 List possible UHF remote control problems and their solutions
- 10.6 Identify rooftop antenna problems
- 10.7 List problems that are frequently caused when interconnecting various customer-owned equipment
- 10.8 Demonstrate proper use of satellite service equipment including dish alignment tools, electronic service and substitution test equipment
- 10.9 Describe how signal splitters, taps, diplexers and similar cabling equipment can cause problems with the customer's satellite system
- 10.10 Demonstrate proper soldering and de-soldering techniques

## **11.0 Safety**

- 11.1 Explain ESD, its causes and potential dangers to electronics equipment
- 11.2 Explain the safety rules OSHA dictates for workers at heights
- 11.3 List safety rules for ladder usage
- 11.4 Describe proper grounding procedures for satellite equipment
- 11.5 List some possible hazards to electronic equipment caused by defects in building wiring or in associated and connected equipment
- 11.6 Describe grounding rules set by the N.E.C.
- 11.7 Explain potential problems involved in equipment usage and storage in service vehicles

**End small dish competencies 2004-5**