



## Introduction

The LCS-4 Combiner Switch is an indoor unit that provides combining/splitting for L-Band modems, plus it operates as a redundancy controller for RF switches located at the antenna. The unit's features include:

- 4-way L-Band combining for modulators
- 4-way L-Band splitting for demodulators
- L-Band Interface to ODU/BUC and LNB
- 1:1 controller for BUC redundancy
- 1:1 controller for LNB redundancy
- Hot swap power supplies replaceable from the front
- Options for redundant BUC power supplies
  - 24 VDC at 100 W
  - 48 VDC at 180 W
- BUC PS supports up to 10 W C-Band and 8 W Ku-Band
- High stability internal 0.02 ppm 10 MHz reference

## Operation

The LCS-4 Combiner Switch resides between the L-Band modems and outdoor BUCs and LNBs. A built in 4-way combiner sums the L-Band modulators and delivers traffic to the online BUC while powering the redundant BUC and maintaining it in active standby. Similarly, the L-Band signals from the online LNB are delivered to the L-Band demodulators by a built in 4-way splitter, while the offline LNB is powered and ready in active standby. A block diagram of the LCS-4 is provided.

The inputs and outputs of the Combiner Switch are L-Band (no frequency translation). DC power and 10 MHz are inserted and sent to the BUC and LNB up the center conductor of optional IF cables. Two of the TX combiner inputs accept FSK from the modulator and pass it through for monitor and control of BUCs that support FSK operation.

The LCS-4 continuously monitors the BUCs and LNBs for faults and independently protects them. When a fault is detected the signals are transferred to the standby path. In the event that both BUCs (or both LNBs) are faulted, switchover is inhibited until one of the faults is cleared.

## Manual/Remote Operation

Operation of the unit is normally automatic; however, the unit is also controlled using a front panel keypad or an RS-232/-485 remote port. When operated from the front panel the following controls and LEDs are provided:

- AUTO/MAN selects automatic or manual operation
- CAL stores nominal BUC and LNB current for fault limits
- BUC A/B online
- LNB A/B online
- Individual DC Power ON/OFF for each BUC and LNB
- Separate 10 MHz ON/OFF for each BUC and LNB
- Status LEDs for BUC-A, BUC-B, LNB-A and LNB-B, the LCS-4 and Prime Power A and B

## 10 MHz Reference

The LCS-4 delivers a 10 MHz reference signal to the BUC and LNB through interconnecting coaxial cables. Normally, the internal 0.02 ppm oscillator is used, but the unit will also phase lock to an external 10 MHz source. The 10 MHz signal also is internally buffered and delivered to 4 BNC connectors for use by modems (not required) or other earth station equipment.

## LCS-4 Reduces Modem/System Cost

Two features built into the LCS-4 reduce overall system cost:

- The 0.02 ppm reference in LCS-4 allows the use of L-Band Modems with lower stability (to 1.0 ppm, depending upon the modem) while maintaining overall frequency accuracy.
- The LCS-4 is available with single or redundant BUC power supplies eliminating the need for a BUC power supply in the modem.

The cost advantage improves as the number of modems increases.



## Specifications

Operating Frequency	950 to 1950 MHz (L-Band)
TX IF Connector	Type N, Female, 4 combined inputs, 2 switched outputs
TX Return Loss	10 dB minimum, 50 $\Omega$
TX Gain	-10 dB maximum loss, Combiner Input to unit output
TX Input Level	0 dBm composite operating, +10 dBm no damage
RX IF Connector	Type F, Female, 2 switched inputs and 4 split outputs
RX Return Loss	10 dB minimum, 75 $\Omega$
RX Gain	0 $\pm$ 3 dB, LNB Input to Splitter Output
RX Input Level	0 dBm composite operating, +10 dBm no damage
Frequency Reference	Internal or external
Reference Stability	10 MHz, 0.02 ppm (Internal)
Internal/External Reference Phase Noise	Frequency Offset    dBc/Hz 1 Hz            -80 10 Hz           -110 100 Hz          -135 1 kHz            -140 10 kHz          -150 100 kHz        -150
Reference Level	ODU/BUC: 0 $\pm$ 3 dBm LNB: -3 $\pm$ 3 dBm
External Reference Input	10 MHz, -10 to +15 dBm, 1 BNC Female connector
Reference Output	0 dBm $\pm$ 3 dB at 4 BNC female connectors
Reference Return Loss	Input/Output: 15 dB minimum, 50 $\Omega$
Power Supply	1 or 2 assemblies hot swap from front panel. Includes unit power supply or unit power + ODU/BUC supply
ODU/BUC Supply	24 VDC 100 W, AC Input (see prime power) 48 VDC 180 W, AC Input
Switchover Time	Within 1.5 seconds of fault detection

## Options

Hardware	1 or 2 Unit Power Supply (No BUC PS), AC Input
Hardware	1 or 2 Unit PS + BUC 24 VDC 100 W, AC Input
Hardware	1 or 2 Unit PS + BUC 48 VDC 180 W, AC Input
Hardware	L-Band IFL Cables
Hardware	1:1 C- or Ku-Band BUC Redundancy Switch
Hardware	1:1 C- or Ku-Band LNB Redundancy Switch
Hardware	Cables, LCS-4 to BUC and LNB Redundancy Switch
Hardware	BUC and LNB Redundancy Mounting Kits

## Environmental and Physical

Temperature Range	
Operating	0 to 50°C (32° to 122°F)
Storage	-40 to +70°C (-40° to 158°F)
Dimensions (2RU) (height x width x depth)	3.5" x 19.0" x 21.25" (8.9 x 48.3 x 54 cm)
Weight	15 lbs (7.0 kg)
Prime Power, AC	90 to 264 VAC, 47 to 63 Hz
No BUC:	70 W maximum
100 W BUC PS:	180 W (1 BUC PS), 300 W (2 BUC PS) max.
180 W BUC PS:	275 W (1 BUC PS), 500-W (2 BUC PS) max.
Approvals	CE as follows: EN 55022 Class B (Emissions) EN 50082-1 (Immunity) EN 60950 (Safety) FCC Part 15 Class B



Rear Panel