MODULAR MINING SYSTEMS
ENGINEERING DOCUMENTATION

SPECIFICATION:
302395 M/LC Repeater Hub

CURRENT REVISION	CHANGE DATE	AUTHOR	REMARKS
Rev-A	Jan 20, 04	Romer Johnson	Original Version

1 OBJECTIVE

1.1 The M/LC (Masterlink Cisco Based) Repeater Electonics Unit provides a improved wireless routing infrastucture option to mines. It leverages Cisco Bridge BR350 Technology, adds a 1/2Watt 2.4GHz amplifier, a custom MMS interface board, all in a ruddedized case with Modular's standard connectors.

2 SCOPE

2.1 This product will be part of all M/LC Repeaters used to deploy a Cisco based wireless routing infrastuctue This includes basestations, crushers, 150W solar mobile and fixed repeaters, 300W solar mobile and fixed repeaters.

3 REFERENCES

3.1 Assembly Drawings:

3.1.1 DWG-4010651 CAD Assembly of M/LC Elect cover to baseplate

3.1.2. DWG-4010645 CAD Assembly of M/LC Electonics into cover

3.1.3. DWG-4017649 Photo Assembly Doc of M/LC Electonics Unit

3.2 Schematics

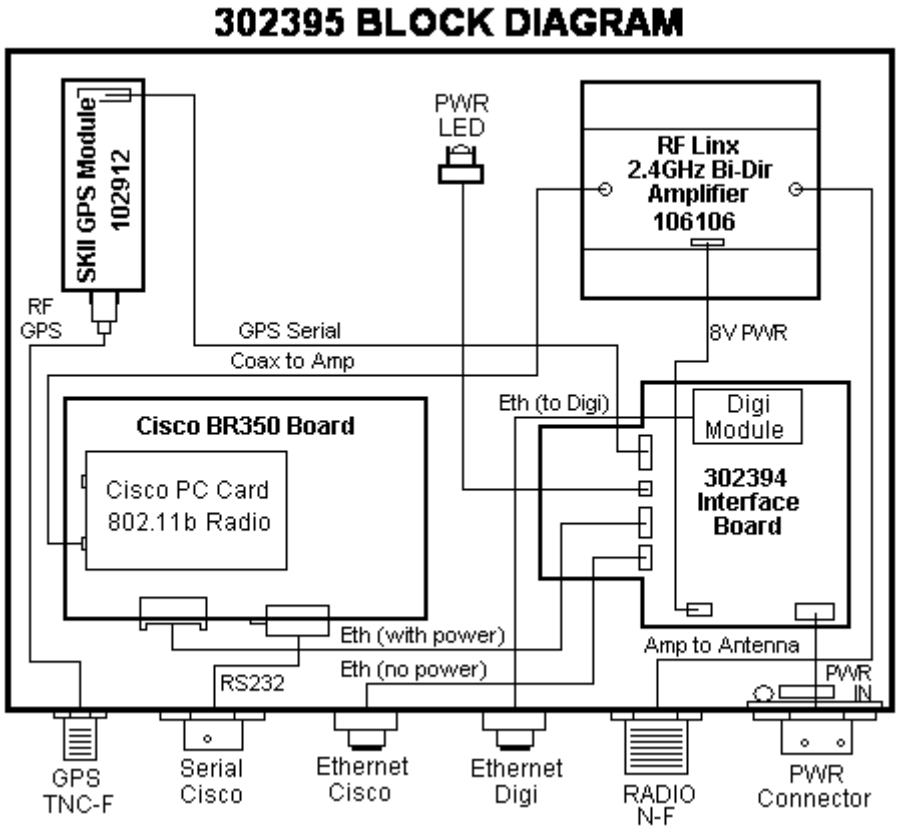
3.2.1 SCH-285-0200 Schematic of 302394 (285) Interface Board

3.2.2 DWG-4010647 Component Assembly of 302394 Interface Board

4 DESCRIPTION / THEORY OF OPERATION

4.1 The 302395 M/LC Electronics Unit takes a standard Cisco BR350 Bridge (industrial version), and places it into a Hardened aluminum enclosure along with other ciruit board to provide a complete ruggedized wireless access point solution. A ½ Watt RF Linx RF Bi-directional amp is added to increase the range of the unit (8 miles at 2Mbps and 3 miles at 11.0Mbps). A SKII OEM GPS Module from Trimble has been added so that the unit is able to report back it's position at all times. A Digi-ConnectME module enables monitoring of the GPS, the SSN chip, as well as providing Analog I/O for Monitoring Battery levels and Temperature. A custom MMS circuit board was designed in order to interface the various components, hold the Digi-ConnectME module, provide power distribution and protection, as well as connector interfacing.

5 BLOCK DIAGRAM



6 TOP LEVEL PART NUMBER

Description	P/N	Drawing
M/LC Electronics Unit Complete Assembly	302395	DWG-4010651

By adding the 201300 baseplate onto the 302418 “Electronics inside Cover” this Top Level is created.

7 MAJOR SUBASSEMBLIES

Description	P/N	Drawing
ASSY M/LC Electronics into Cover	302418	DWG-4010645

This subassembly includes all of the circuit boards and internal harnesses.

Major Parts Description	P/N
RF Amp 2.4GHz Assembly with Power Harness	302415
Cisco BR350 Bridge	106105
OEM GPS Module from Trimble	102912
Interface Circuit Board Complete	302394
Machined Cover	201299

8 INTERNAL HARNESSES

Harness Description	P/N	DWG
Harness M/LC Power Input w/Protection	302340	DWG-4013615
Harness M/LC Panel Mnt LED Red 4”	302341	DWG-4013616
Harness M/LC Cisco Serial Input 10-6S to DE9	302402	DWG-4013639
Harness M/LC Ethernet Turck FKFD to RJ-45 8”	302403	DWG-4013640
Harness M/LC Ethernet Turck FKFD to 4S 2mm	302404	DWG-4013641
Harness M/LC PHR 8S 2mm to RJ45 8”	302405	DWG-4013642
Harness M/LC RF RG188 MMCX to N-F BLKHD	302408	DWG-4013623
Harness M/LC RF RF188 MMCX to MMCX	302413	DWG-4013638
Harness M/LC PHR 2mm 2P unterm	302414	DWG-4013643
Harness M/LC RF GPS RG188 TNC-M to SMB-F	302417	DWG-4013646

9 EXTERNAL CONNECTOR PINOUTS

9.1 POWER INPUT: Circular Mil Type 12-3P

Pin	Signal Name	Type
A	24V Power In	Input
B	GND Power In	Input
C	N.C.	

9.2 CISCO SERIAL PORT: Circular Mil Type 10-6S

Pin	Signal Name	Type
A	Cisco RS-232 TX	Output
B	Cisco RS-232 RX	Input
C	GND	GND
D	N.C.	N.C
E	N.C.	N.C
F	N.C.	N.C

9.3 DIGI CONNECTME ETHERNET PORT: Turck FKFD Type 8S

Pin	Signal Name	Type
1	N.C.	N.C
2	N.C.	N.C
3	N.C.	N.C
4	TX -	Output
5	RX +	Input
6	TX +	Output
7	N.C.	N.C.
8	RX -	Input

9.4 CISCO ETHERNET PORT: Turck FKFD Type 8S

Pin	Signal Name	Type
1	N.C.	N.C
2	N.C.	N.C
3	N.C.	N.C
4	TX -	Output
5	RX +	Input
6	TX +	Output
7	N.C.	N.C.
8	RX -	Input

10 PRODUCTION TEST REQUIREMENTS

10.1 Incoming Test

10.1.1 Test Cisco functionality at incoming using test fixture provided.

10.1.2 Keep cisco in original case and stock

10.2 Final Test following assembly

10.2.1 Test M/LC 302395 using test fixture provided.

10.2.2 Burn in for 24 hours prior to test

10.2.3 Follow Test procedure 201xxx

11 ENVIRONMENTAL SPECIFICATIONS

Specification	Value	Units
Storage Temp Range	-55 to +85	Deg C
Operating Temp Range	-40 to +60	Deg C
Vibration (X,Y,Z) Endurance	4	G
Vibration (X,Y,Z) Resonance	1	G
Vibration Dozer Profile	Passed	
Water	S2	

12 MECHANICAL SPECIFICATIONS

Specification	Value	Units
Size	12.95 X 10.25 X 2.35	IN
Mounting (Same pattern as M/L Hubs)	8.94 X 11.65	IN
Weight	8.5	Lbs
Shock Mounts (Use Red Silcon 106xxx)	4	80Lb

13 ELECTRICAL SPECIFICATIONS

13.1 General

Specification	Value	Units
24V Power Input Range	18 to 38	Volts
Typical Power	7.5 to 8	Watts
Serial Connector	RS-232	EIA Standard
Ethernet Connections	802.3	Standard
GPS (5Vis supplied to External GPS Antenna)	L1	Low Precision
Radio TX Power (802.11b compliant) 27dBm = 1/2 W	½	Watt
Radio Range 11.0Mbps (6dB Omnis)	2-3	Miles
Radio Range 2.0Mbps (6dB Omnis)	8	Miles
Radio RX Sensitivity (at 2.0Mbps)	-93	dBm

13.2 Radio Channel Information - 802.11b Compliant

Channel	Center Frequency	Units
1 (1st Choice)	2.412	GHz
2	2.417	GHz

3	2.422	GHz
4	2.427	GHz
5	2.432	GHz
6 (2nd Choice)	2.437	GHz
7	2.442	GHz
8	2.447	GHz
9	2.452	GHz
10	2.457	GHz
11 (3rd Choice)	2.462	GHz

a. Spectrum from radio is approximately 20MHz Bandwidth, centered around center frequency.
b. A maximum of 3 channels should be used in the same geographic area.
c. It is recommend that Channel #1 be used as first choice.
d. Radio is a Cisco LM350 Built into the BR350 Bridge.