February 22, 2006
alidadewireharness.xls
ATA42fiberDistribution.doc

Control box

2: PIC microcontroller, I/O board

1: Single board computer

3: power management (converters, battery management)

10BASE-FL/10BASE-T
Media converter

Power supply:
120 VAC input
24 VDC output

Conduit to rim

Conduit to PAX

AWE5 (AR1)

R'

CAT5

AWC1 AWC2 AWC3 AWC4 AWC5 AWC6 AWC7 AWC8 AWC9 AWC10 AWC11 AWC12 AWC13

IEC-320

9P

AWE1 AWE2 AWE3 AWE4 AWE6 AWE7 AWE8 AWE9 AWE10 AWE11 AWE12 AWE13 AWE14 AWE15 AWE16 AWE17-1 AWE17-2 AWE18 AWE19

24V HVaux
24V brakes

5V 9V 24V

AC-MMF (SC)

Battery

AS-SMF

Azimuth

Encoder

pot

T

Terminal?

Elevation Encoder

Float

ATA Alidade Relay Board
2005 Sep 19 (1.0)

Driver box

- dual axis board
- 120 VAC, 24 VDC
- fuses
  - rectifiers, capacitors inside box

Daughter-board

Dual-axis drive board

amplifier

amplifier

D15 D25 D15 D25

LM 35

AWD1 AWD2 AWD3 AWD4-1 AWD4-2

120 VAC 14AWG

110 VAC 14AWG

Transformer 1 kVA

Wout, Vout, Uout, GND, Brake1, Brake2

Win, Vin, Uin, A, /A, B, /B, X, /X, 5V, GND, Temp

Elevation Enclosure

L

T

Connector

El brake

M

El motor

Terminal?

Connector

Az brake

Connector

M

Az motor

Alidade wire harnessing Enclosure								
Reference ELMCOverview.vsd								
22-Feb-06								
AWE1	Input power wires through pedestal							
	A	**Description**	**B**	**Comment**	**Color**	**Size**	**Twist**	**Length**
Wires	1	120VAC		65 strand wire Beldon	white	#12		
	2	Return		8527	black	#12		
	3	Ground		Beldon 8520	green	#14		
Ends	A	bare wire	screw terminal block behind pie-plate					
	B	MlxB3	terminal on Alidade Relay Board					
AWE2	Transformer							
	A	**Description**		**Comment**	**Color**	**Size**	**Twist**	**Length**
Wires	1	120VAC		These wires except Ground are all on the toroid, we provide connector	white	#14		
	2	Return			black	#14		
	3							
	4	100VAC			red	#14		
	5	Return			red	#14		
End	A	MlxB5	connector on alidade relay card					
AWE3	Power to motors							
	A	**Description**	**B**	**Comment**	**Color**	**Size**	**Twist**	**Length**
Wires	1	110VAC		Use standard power cord and chop off plug	black	#14		2 ft
	2	Return			white	#14		
	3	Ground			green	#14		
Ends	A	MlxB4	connector on alidade relay board					
	B	IEC-320	right angle plug on drive box					
AWE4	Power for control box							
	A	**Description**	**B**	**Comment**	**Color**	**Size**	**Twist**	**Length**
Wires	1	120VAC		Use standard power cord and chop off plug	white	#18		
	2	Return			black	#18		
	3	Ground			green	#18		
Ends	A	MlxB3	connector on alidade relay board					
	B	IEC-320	right angle plug on control box (may not exist in rt angle?)					
AWE5	Power for rim power box		(also called **AR1**)					
	A	**Description**	**B**	**Comment**	**Color**	**Size**	**Twist**	**Length**
Wires	1	120VAC		wire	black	#14		
	2	Return			white	#14		
	3	Ground			green	#14		
Ends	A	MlxB3	connector on alidade relay board					
	B	ParlBlade U Gnd	connector in rim power box					
AWE6	15-wire cable from alidade relay board to drive box							
	A	**Description**	**B**	**Comment**				**Length**
s	1	az brakes +24V	1	1&9 are controlled with the main drives transformer power				
	2	Ground	2					
	3	24V aux	3					
	4	Ground	4					
	5	drive enable +	5	5&13 are connected through relay contacts which are closed				
	6	Ground	6	when the main drives transformer power relay is latched				

Wires/pin	7	Az cw limit	7	7&15 are connected to 8 via NC switches				
	8	Az limit common	8					
	9	el brakes +24V	9					
	10	Ground	10	Belden 9947	maybe			
	11	24V aux	11	awaiting quote from cablestogo.com				
	12	Ground	12					
	13	drive enable -	13					
	14	Ground	14					
	15	Az ccw limit	15					
Ends	A	D15P	Dsub to alidade relay board					
	B	D15S	Dsub to drive box		connects to AWD2A			
AWE7	25-wire cable from alidade relay board to control box							
	A	**Description**	**B**	**Comment**				**Length**
Wires/pins	1	brakes +24V	1	1,3,5,11,14,16,18, 24 are power and control signals from the				
	2	Ground	2	control box				
	3	24V aux	3					
	4	Ground	4					
	5	5V sensor +	5					
	6	Ground	6					
	7	float in	7	7,8,9,10,12,13,20,21,22,23,25 are logic and sensor signals				
	8	T input1 -	8	returning to the control box				
	9	T input2 -	9					
	10	Az brake sense	10					
	11	Latch	11	main drives transformer power is latched by holding 24 logic high				
	12	Pot 1	12	while pulsing 11 logic low-high-low				
	13	Pot wiper	13	wrap pot is wired to relay board such that resistance between 13				
	14	brakes +24V	14	and 25 increases when azimuth rotates cw				
	15	Ground	15					
	16	24V aux	16					
	17	Ground	17					
	18	5V sensor -	18	awaiting quote from cablestogo.com				
	19	Ground	19					
	20	T input1 +	20					
	21	T input2 +	21					
	22	electronics reset	22					
	23	El brake sense	23					
	24	Unlatch	24					
	25	Pot 2	25					
Ends	A	D25S	Dsub to alidade relay board					
	B	D25P	Dsub to control box					
AWE8	motor power and brakes for azimuth							
	A	**Description**	**B**	**Comment**	**Color**	**Size**	**Twist**	**Length**
	1	W1	W		purple	#14		
	2	W2						
	14	W3						
	15	W4						
	3	N/C						
	16	N/C						
	4	V1	V		brown	#14		
	5	V2						
	17	V3						

Wires/pins	18	V4						
	6	N/C						
	19	N/C						
	7	U1	U		blue	#14		
	8	U1						
	20	U1						
	21	U1						
	9	N/C						
	22	N/C						
	10	G1	Ground		green	#14		
	11	G2						
	23	G3						
	24	G4						
	12	BP			blue	#16		
	13	BM			blue	#16		
	25	SHIELD			shield	shield		
Ends	A	D25P	filtered D25S on board					
	B	MlxS6a	M connector on motor					
	C	MlxS2a	wires part of brake					
AWE9	encoders and hall's for azimuth							
	A	**Description**	**B**	**Comment**	**Color**	**Size**	**Twist**	**Length**
Wires/pins	1	N/C		GND on board	N/C			
	2	U			brown			
	3	V			gray			
	4	W			white			
	5	GND			black		V	
	6	X			purple		Z	
	7	B			green		Y	
	8	A			blue		X	
	9	thermal sensor		GPIN5	orange		W	
	10	GND thermal sensor		GND	orang/white		W	
	11	Vcc (+5V)			red		V	
	12	N/C		GND on board	N/C			
	13	/X			purple/blk		Z	
	14	/B			green/blk		Y	
	15	/A			blue/blk		X	
Ends	A	D15P	filtered D15S on board					
	B	M	M connector on motor					
AWE10	motor power and brakes for elevation					Alternate Sort Pin #		
	A	**Description**	**B**	**Comment**	**Color**	**Size**	**Twist**	**Length**
	1	W1	W		purple	#14		
	2	W2						
	14	W3						
	15	W4						
	3	N/C						
	16	N/C						
	4	V1	V		brown	#14		
	5	V2						
	17	V3						
	18	V4						
s	6	N/C						

Wires/pin	19	N/C						
	7	U1	U		blue	#14		
	8	U1						
	20	U1						
	21	U1						
	9	N/C						
	22	N/C						
	10	G1	Ground		green	#14		
	11	G2						
	23	G3						
	24	G4						
	12	BP			blue	#16		
	13	BM			blue	#16		
	25	SHIELD			shield	shield		
Ends	A	D25P	filtered D25S on board					
	B	MlxS6a	M connector on motor					
	C	MlxS2a	wires part of brake					
AWE11	encoders and hall's for elevation							
	A	**Description**	**B**	**Comment**	**Color**	**Size**	**Twist**	**Length**
Wires/pins	1	N/C		GND on board	N/C			
	2	U			brown			
	3	V			gray			
	4	W			white			
	5	GND			black		V	
	6	X			purple		Z	
	7	B			green		Y	
	8	A			blue		X	
	9	thermal sensor		GPIN5	orange		W	
	10	GND thermal sensor		GND	orang/white		W	
	11	Vcc (+5V)			red		V	
	12	N/C		GND on board	N/C			
	13	/X			purple/blk		Z	
	14	/B			green/blk		Y	
	15	/A			blue/blk		X	
Ends	A	D15P	filtered D15S on board					
	B	D15P	D 15p on motor					
AWE12	encoder for azimuth			(P/N: R176H-03600Q-5L10-AT40SP-24MN)				
	A	**Description**	**B**	**Comment**	**Color**	**Size**	**Twist**	**Length**
Wires/pins	1	A			yellow			
	2	B			green			
	3	IND			blue			
	4	N/C			shield			
	5	+V			red			
	6	/A			brown			
	7	/B			orange			
	8	/IND			white			
	9	COMMON			black			
Ends	A	D9P	Dsub on control box					
	B	--	cable part of encoder					
AWE13	encoder for elevation			(P/N: 9220S03600D5L10D99SP04EA)				

	A	Description	B	Comment	Color	Size	Twist	Length
Wires/pins	1	A			yellow			
	2	B			green			
	3	IND			blue			
	4	N/C			shield			
	5	+5V			red			
	6	/A			brown			
	7	/B			orange			
	8	/IND			white			
	9	COMMON			black			
Ends	A	D9P	Dsub on control box					
	B	--	cable part of encoder					
AWE14	battery for control box							
	A	**Description**	**B**	**Comment**	**Color**	**Size**	**Twist**	
Wires/pins	1	+12V	1				**Z**	
	2	+12V	1				**Z**	
	3	N/C						
	4	GND	2		black		**Y**	
	5	GND	2		black		**Y**	
	6	+12V	1				**Z**	
	7	N/C						
	8	N/C						
	9	GND	2		black		**Y**	
Ends	A	D9S						
	B	Spade?						
AWE15	Signal from relay board to pie-plate			LappUSA (Olflex) 900P Cable, 3 conductor #24, 811442				
	A	**Description**	**B**	**Comment**	**Color**	**Size**	**Twist**	
Wires	1				black	#24		
	2				black	#24		
	3				green/yello	#24		
Ends	A	MlxT3	on alidade relay board					
	B	bare	behind pie plate					
AWE16	signal from oil float							
Wire	1							
	2							
Ends	A	MlxT2	on alidade relay board					
	B	Crimps?						
AWE17-1	Signal from temperature sensor to relay board							
Wires	1			Lm-35 Device in TO-220				
	2							
	3							
Ends	A	MlxT3	to alidade relay board					
	B	?	temperature sensor					
AWE17-2	Signal from temperature sensor to relay board							
Wires	1			Lm-35 Device in TO-220				
	2							
	3							
nds	A	MlxT3	to alidade relay board					

Er	B	?	temperature sensor					
AWE17-3	Signal from temperature sensor to relay board							
Wires	1			Lm-35 Device in TO-220				
	2							
	3							
Ends	A	MlxT3	to alidade relay board					
	B	?	temperature sensor		REMOVE (COMBINES W/ E-19)			
AWE18	Signal from az wrap potentiometer							
Wires	1							
	2							
	3							
Ends	A	bare wire	posts on pot					
	B	MlxT3	on alidade relay board					
AWE19	Signal from elevation level sensor							
Wires	1	red	+5V					
	2	green	signal	INCLUDE EL THERMAL				
	3	blue	ground					
Ends	A	XXX connector	to alidade relay board					

Alidade wire harnessing: controller box

Reference ELMCOverview.vsd

22-Feb-06

AWC1 Power from relay board to power mgmt board

Wires: 1, 2, 3

Ends: A IEC-320; B Terminals

AWC2 25-wire cable from alidade relay board to control box

	A	Description	B,C,D	Comment	Color	Size	Twist	Length
Wires/pins	1	brakes +24V	C1	power mgmt board	brown	all wires #24 AWG	Z	7.5"
	2	Ground	C2		black		Z	7.5"
	3	24V aux	D1		purple		Y	7.5"
	4	Ground	D2		black		Y	7.5"
	5	+5V	B19	microcontroller board	red		X	7.5"
	6	Ground	B15		black		X	7.5"
	7	float in	B6		green			7.5"
	8	T 2 input	B9		blue			7.5"
	9	T 4 input	B10		yellow			7.5"
	10	Az brake sense	B13		white			7.5"
	11	Latch	B7		orange			7.5"
	12	Pot 1 (GND)	B18		black		W	7.5"
	13	Pot wiper	B16		green			7.5"
	14	brakes +24V	C1	power mgmt board	brown		Z	7.5"
	15	Ground	C2		black		Z	7.5"
	16	24V aux	D1		purple		Y	7.5"
	17	Ground	D2		black		Y	7.5"
	18	+5V	B20	microcontroller board	red		X	7.5"
	19	Ground	B3		black		X	7.5"
	20	T 1 input	B11		green			7.5"
	21	T 3 input	B12		blue			7.5"
	22	electronics reset (on/off)	B5		yellow			7.5"
	23	El brake sense	B8		white			7.5"
	24	Unlatch (drives on/off)	B14		grey			7.5"
	25	Pot 2 (+5V)	B17		red		W	7.5"
Ends	A	56-126-004	filtered D25 Socket on top of control b			connects to AWE7B		
	B	WM2527-ND/WM62510-ND	2x10 100mil ucntrlr board			(22-55-2201/16-02-0102)		
	C	770849-2/770522-1	power mgmt board		relay/brakes		JameCo 236321	
	D	770849-2/770522-1	power mgmt board		HV aux		JameCo 236321	

1: N/C	3: GND	5: RST	7: LTCH	9: T2	11: T1	13: ABS	15: GND	17: P5V	19: +5V
2: N/C	4: N/C	6: FLT	8: EBS	10: T4	12: T3	14: ULTC	16: WPR	18: GND	20: +5V

AWC3 encoder for azimuth (P/N: R176H-03600Q-5L10-AT40SP-24MN)

	A	Description	B	Comment	Color	Size	Twist	Length
Wires/pins	1	A	4		yellow	all wires #24 AWG	Z	5.5"
	2	B	6		green		Y	5.5"
	3	IND (Z)	8		blue		X	5.5"
	4	N/C						
	5	+5V	10		red		W	5.5"
	6	/A	3		brown		Z	5.5"
	7	/B	5		orange		Y	5.5"
	8	/IND (Z)	7		white		X	5.5"
	9	COMMON	9		black		W	5.5"
Ends	A	56-106-010	filtered Dsub 9 socket on control box			connects to AWE12A		
	B	WM2522-ND/WM62510-ND	2x5 0.100" on ucntrlr card			(22-55-2101/16-02-0102)		

1: GND	3: /Z (IND)	5: /B	7: /A	9: NC

		2: +5V	4: Z (IND	6: B	8: A	10: NC		

AWC4	encoder for elevation			(P/N: 9220S03600D5L10D99SP04EA)				
	A	**Description**	**B**	**Comment**	**Color**	**Size**	**Twist**	**Length**
Wires/pins	1	A	4		yellow	all wires #24 AWG	Z	5.5"
	2	B	6		green		Y	5.5"
	3	IND (Z)	8		blue		X	5.5"
	4	N/C						
	5	+5V	10		red		W	5.5"
	6	/A	3		brown		Z	5.5"
	7	/B	5		orange		Y	5.5"
	8	/IND (Z)	7		white		X	5.5"
	9	COMMON	9		black		W	5.5"
Ends	A	56-106-010				connects to AWE13A		
	B	WM2522-ND/WM62510-ND	2x5 0.100" on ucntrlr card			(22-55-2101/16-02-0102)		

1: GND	3: /Z (IND	5: /B	7: /A	9: NC	
2: +5V	4: Z (IND	6: B	8: A	10: NC	

AWC5	battery							
	A	**Description**	**B**	**Comment**	**Color**	**Size**	**Twist**	**Length**
Wires/pins	1	+12V	1		red		Z	5"
	2	+12V	1		red		Z	5"
	3	N/C						
	4	GND	2		black		Y	5"
	5	GND	2		black		Y	5"
	6	+12V	1		red		Z	5"
	7	N/C						
	8	N/C						
	9	GND	2		black		Y	5"
Ends	A	56-101-010	filtered Dsub 9 pin on control box			connects to AWE14A		
	B	770849-2/770522-1						

AWC6								
standard CAT5 cable		Rj-45	10" long	?				

AWC7	9V to media converter from power mgmt board							
	A	**Description**	**B**	**Comment**	**Color**	**Size**	**Twist**	**Length**
Wires	1	+9V	1	red		18		20"
	2	Common	2	black		18		20"
Ends	A	round						
	B	770849-2/770522-1	This connector numbering is opposite to 0.100" connectors					

AWC8	24 V from power supply to power mgmt board							
	A	**Description**	**B**	**Comment**	**Color**	**Size**	**Twist**	**Length**
Wires	1	+24V	1	red		18		12"
	2	Common	2	black		18		12"
Ends	A	terminals						
	B	770849-2/770522-1						

AWC9	5V to SBC							
	A	**Description**	**B**	**Comment**	**Color**	**Size**	**Twist**	**Length**
Wires	1	+5V	1	red				11"
	2	Common	2	black				11"
Ends	A	4-wire plug						
	B	770849-2/770522-1						

AWC10	12 VDC from Pwer Mgment to uCntrlr board							
	A	**Description**	**B**	**Comment**	**Color**	**Size**	**Twist**	**Length**
Wires	1	+12V	1	red				6.5"

Wires	2	Common	2	black				6.5"
Ends	A	770849-2/770522-1						
	B	770849-2/770522-1		0.156" pitch				
AWC11	SBC reset (goes between the uCntrlr board and SBC)							
	A	**Description**	**B**	**Comment**	**Color**	**Size**	**Twist**	**Length**
Wires	1	power	1	green	change?			10.5"
	2	ground	2	black				10.5"
	3	reset	3	red				10.5"
	4	N/C	4	1 to left as	looking down on SBC			
	5	N/C	5					
Ends	A	WM2803-ND/WM62510-ND	1x5 100mil connector on ucntrlr card			(50-57-9005/16-02-0102)		
	B	WM2803-ND/WM62510-ND	1x5 100mil connector on SBC			(50-57-9005/16-02-0102)		
AWC12	electronics on/off (between uCntrlr board and power management board)							
	A	**Description**	**B**	**Comment**	**Color**	**Size**	**Twist**	**Length**
Wires	1	electronics on/off	1		green			7"
	2	ground	2		black			7"
	3	battery voltage /3	3		yellow			7"
Ends	A	1x3 0.100" unpolarized						
	B	1x3 0.100" unpolarized						
AWC13	short cat 5 crossover cable between SBC (second LAN) and uCntrlr board							
crossover CAT5 cable								6"

Alidade wire harnessing: drive box

Reference ELMCOverview.vsd

22-Feb-06

AWD1 3-wire power cable from box lid to drive board

	A	Description	B	Color	Size	Twist	Length
Wires	1	100VAC		white	14AWG		?"
	2	Return		black			?"
	3	Ground		green			8"
Ends	A	bare wire	solder terminals on IEC-320				
	B	bare wire	screw terminals on drive board				

AWD2 15-wire cable from drive-box top to daughter board/drive board

	A	Description	B,C,D	Color	Size	Twist	Length
Wires/pins	1	az brakes +24V	C	Brown	all wires #22AWG	Z	5
	2	Ground	C	Black		Z	5
	3	24V aux	C	Red		Y	5
	4	Ground	D	Black		Y	9.5
	5	drive enable +	B1	Orange		X	12
	6	Ground	D	Black		W	9.5
	7	Az cw limit	B3	Yellow		W	12
	8	Az limit common	B4	Green		W	12
	9	el brakes +24V	C	Blue		V	5
	10	Ground	C	Black		V	5
	11	24V aux	C	Purple		Y	5
	12	Ground	D	Black		Y	9.5
	13	drive enable -	B2	Grey		X	12
	14	Ground	D	Black		W	9.5
	15	Az ccw limit	B5	White		W	12
Ends	A	56-111-010	filtered Dsub15P on driver box top		connects to AWE6B		
	B	WM2803-ND/WM625	1x5 100mil connector on daughter card			(50-57-9005/16-02-0102)	
	C	bare wire	screw terminal on driver board				
	D	gnd lug	round 6-32				

AWD3 temperature sensor cable from drive board to daughter card

	A	Description	B	Color	Size	Twist	Length
	1	GND	3	black			6"
	2	T	2	yellow			6"
	3	+5	1	red			6"
	A		1x3 100mil		(on daughter)		
	B		3-wire molex socket		(on driver)		

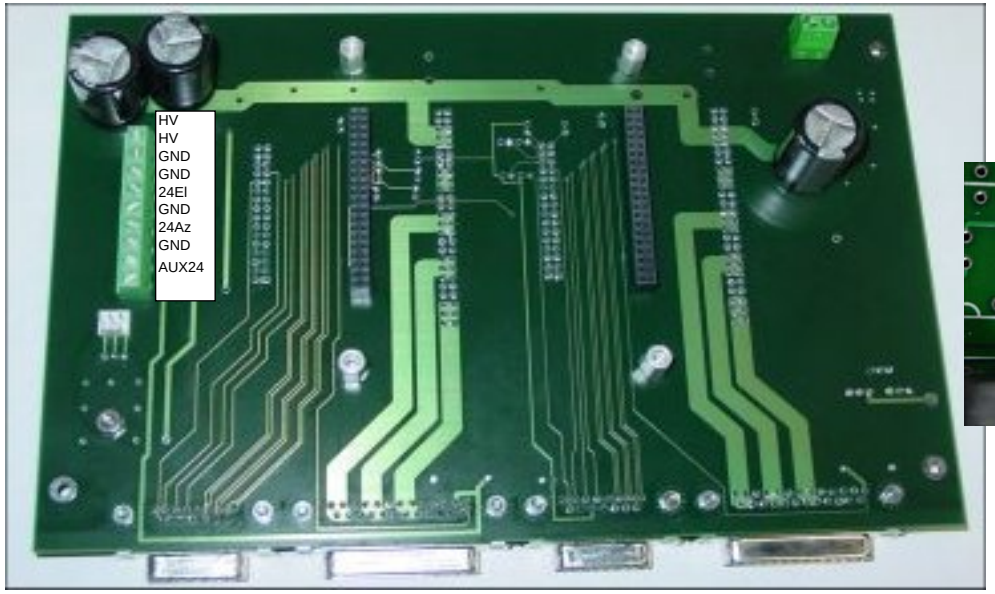
AWD4-1 temperature sensor cable from heatsink to daughter card

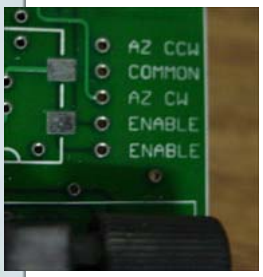
	A	Description	B	Color	Size	Twist	Length
	1	GND		black			?"
	2	T		yellow			?"
	3	+5		red			?"
	A		1x3 100mil		(on daughter)		
	B		leads		LM35		

AWD4-2 temperature sensor cable from airflow to daughter card

	A	Description	B	Color	Size	Twist	Length
	1	GND		black			?"

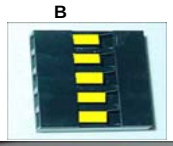
	2	T		yellow			?"	
	3	+5		red	LM35		?"	
	A		1x3 100mil		(on daughter)			
	B		leads		LM35			

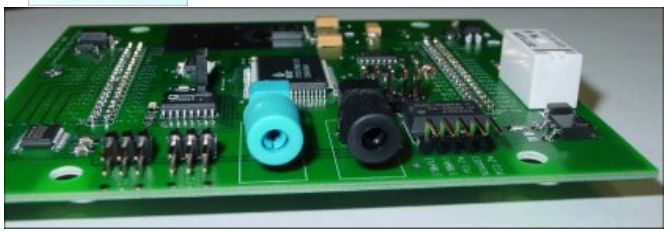




B

5
4
3
2
1





Temperature sensors in drive box (at daughter card)
The top right temp sensor connector goes to the air outlet.
The bottom right connector goes to the sensor on Calvin's board.
The bottom left connector goes to the regeneration resistors.
The top left connector is not connected.