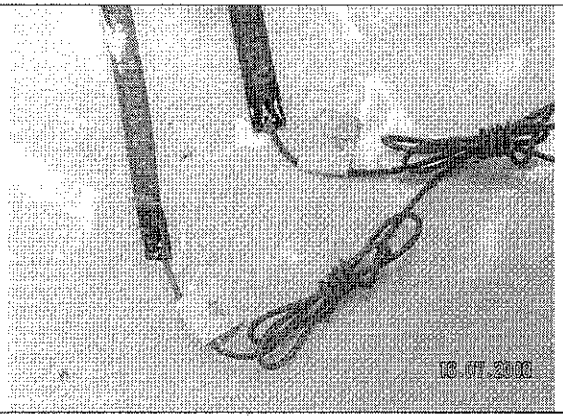
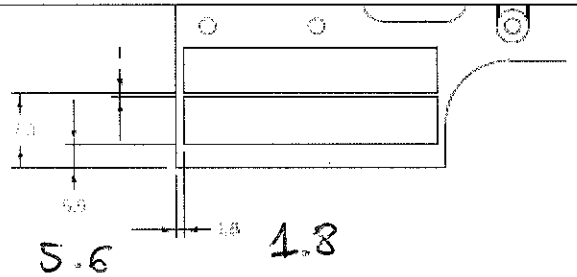
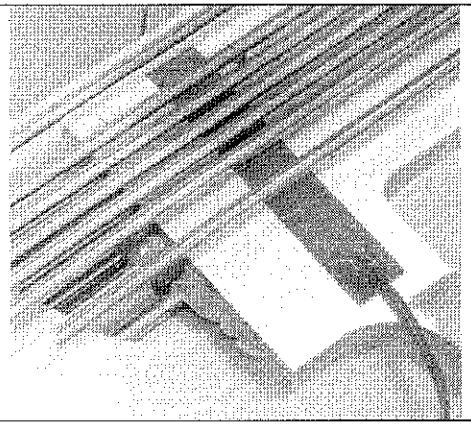
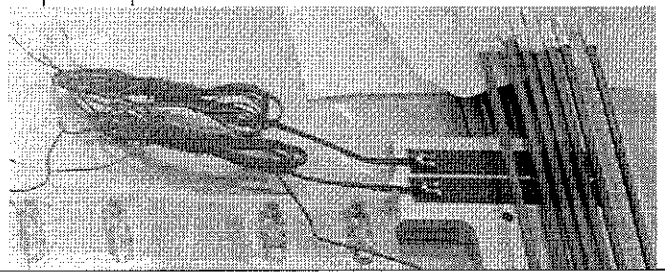
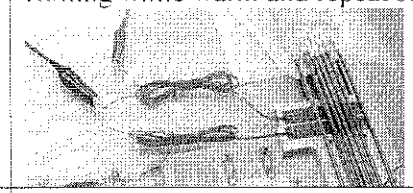
7.2 Liquid line Inlet/outlet foil heater installation procedure sheet

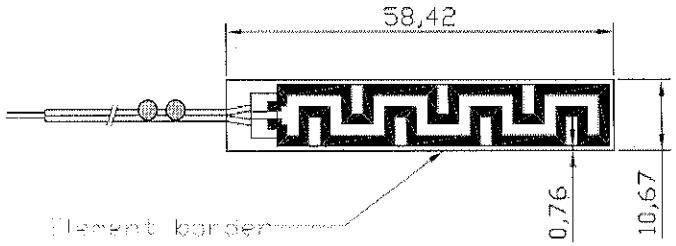
	Inlet/outlet foil heater installation procedure		company: AZDC		date: 21. January 2009	
	Fill in by hand.		engineer: Shrek		location: AZDC	
Step	Action	Monitoring	Value	**Result**	Comment	√
1.	Record condenser model (P-ram, P-wake, S-ram, S-wake)	T.I. description	-	#1h SW		
2.	Record model (EM / QM / FM)	model	-			
	Visual and electical inspection					
3.	Record test equipment used	manufacturer, type				
4.	Visual inspection on the heaters to be installed		-			
5.	Label the lead wire near the heater that it can be clearly identified when for check. Report in the table (Appendix A) the part number correspondent.	Part number TTCS heater ID	A or B	ok		

	Inlet/outlet foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
				ok		
6.	label the lead wire near the heater that it can be clearly identified when for check. Report in the table (appendix A) the part number correspondent	Part number TTCS heater ID	A or B	ok	see table	
7.	Check the resistance and record	resistance	7.3 Ohm +/- 10%	ok		
	Surface preparation					
8.	Wipe the bonding surface area with K-Dry tissues or equivalent dampened with isopropyl alcohol.			ok		
9.	Determine the required position of the heater and mark reference points with Aluminum tape. Close out all gaps around the edge of heaters			ok		

	Inlet/outlet foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
17.3						
10.	Prepare the location and dimension of MINCO heater according to. Drawing ET5998-09-DR-001-A-KW-CONDENSOR ASSEMBLY or ET5998-10-DR-001-0-KW-CONDENSOR ASSEMBLY (and figure in Appendix A)			ok		
11.	Strip the adhesive backing from the heater and lay the heater on the top plate per the reference drawing and gently press it into place per figure in appendix A			ok		

	Inlet/outlet foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
						
12.	Use a rubber roller (or equivalent tool) to press the heater onto the top plate. Roll from the centre toward the edges.			ok		
13.	Repeats step 12, make sure no trapped air under the heaters.			ok		
14.	Repeat step 11 to 13 for the second heater 			ok		

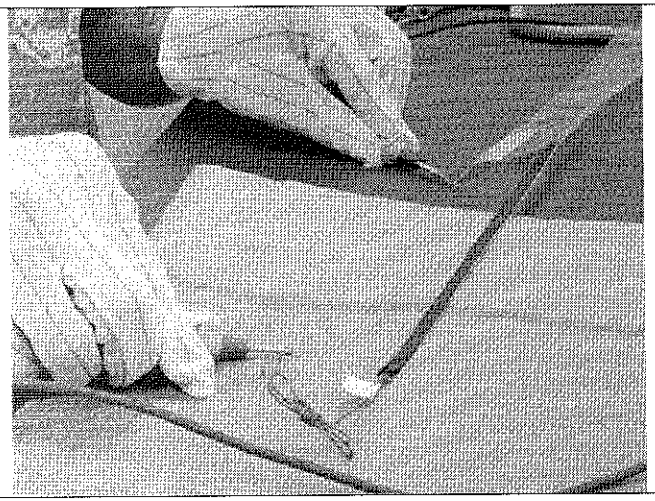
	Inlet/outlet foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
15.	For QM check resistance after gluing per heater individually For FM check resistance after gluing per heater individually		7.3 Ohm +/- 10%	A= B=	The origenal B is changed.	
16.	For QM/FM: Power on A & B heater parallel to a **4.2 V** power supply. Rolling while warm and repeat several times 			ok	and removed. We re-install a new one.	
	Electric Checkouts and Record					
17.	Record Multimeter used	Type; S/N; cal. Valid date				
18.	Record power supply used	Type; S/N; cal. Valid date				
19.	Check the heaters are electrically isolated with the panel by using Multi-meter.					
20.	For QM/FM: Power on heater A to a **4.2 V** power supply.. Record the voltage and current values of the heater For QM/FM: Power on heater B to a **4.2 V** power supply..	Voltage current	4.2 V 0.57 A	V_A= 4.201 v I_A= 0.53 A Vb= 4.2 v		

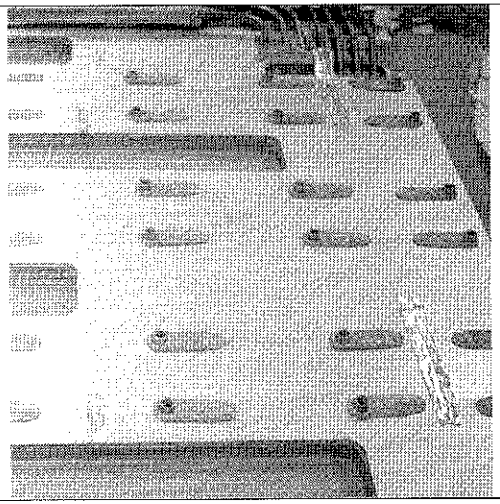
	Inlet/outlet foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
	Record the voltage and current values of the heater			Ib= 0.53 ⇒ 0.64A		
21.	Recored the derived resistance	Resistance	V/I	RA_{dev}= RB_{dev}=		
22.	Check the derived resistance with the measured one (step 7)	Resistance	From step 7	RA_{mes}= RB_{mes}=		
	Heater tape installation					
23.	Record glue 3M 2216 data and mixing ratio	Expiring date Mixing ratio				
24.	Put glue on the wire leads (3 mm diameter or more, as needed)  NOTE: this wire fixing has to be performed during the final gluing step (together with the installation of all the remaining top plate foil heaters)					

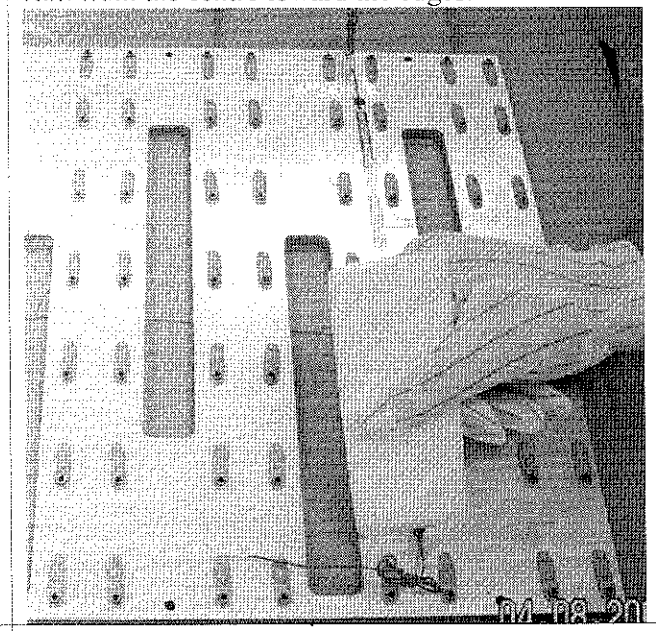
	Inlet/outlet foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
	(no spot on the edge of the heaters!)					
25.	7 days for fully curing					
26.	End					

7.3 Condenser 120 V foil heater installation procedure sheet

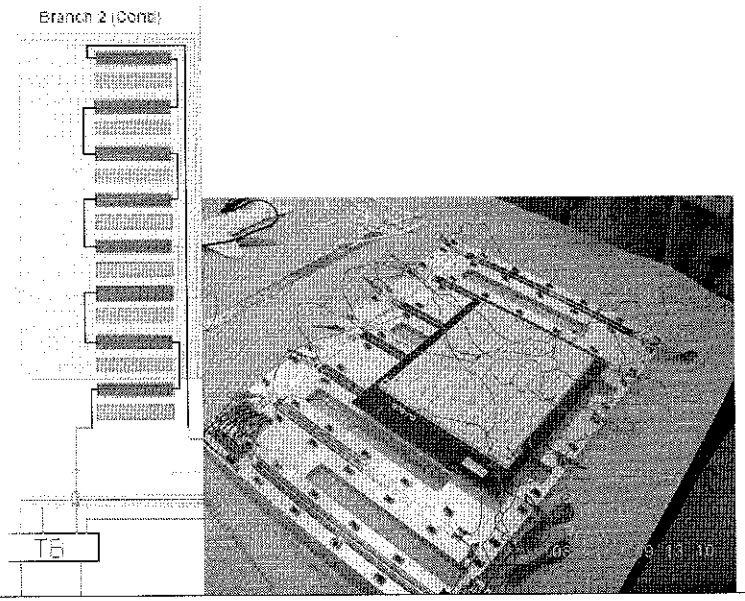
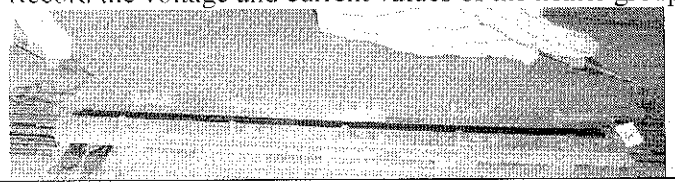
	Condenser 120 V foil heater installation procedure		company: KIDC		date: 3 Feb 2009	
	Fill in by hand.		engineer:		location: KIDC	
Step	Action	Monitoring	Value	**Result**	Comment	√
1.	Record condenser model (P-ram, P-wake, S-ram, S-wake)	T.I. description	-	FM k SW		
2.	Record model (EM / QM / FM)	model	-	FM		
	Visual and electical inspection					
3.	Record test equipment used	manufacturer, type				
4.	Visual inspection on the heaters to be installed		-			
5.	Label the lead wire near the heater that it can be clearly identified when for check. Report in the table on appendix A the part number correspondent.	Part number TTCS heater ID	A or B	ok	see table	
6.	label the lead wire near the heater that it can be clearly identified when for check. Report in the table on appendix A the part number correspondent	Part number TTCS heater ID	A or B	ok	see table	
7.	Repeat step 5 and 6for the remaining pairs of heaters			ok		
8.	Check the resistance and record (in table in Appendix A)	resistance	48.4 Ohm +/- 10%	ok		

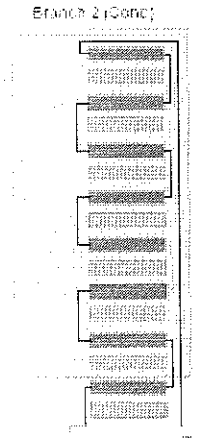
	Condenser 120 V foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
						
	Surface preparation					
9.	Wipe the bonding surface area with K-Dry tissues or equivalent dampened with isopropyl alcohol.			ok		
10.	Determine the required position of the heater and mark reference points with Aluminum tape. Close out all gaps around the edge of heaters			ok		

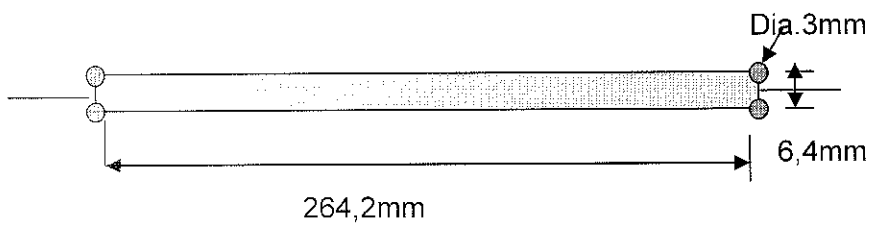
	Condenser 120 V foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
						
11.	Prepare the location and dimension of MINCO heater according to Appendix B and drawing ET5998-09-DR-001-A-KW-CONDENSOR ASSEMBLY or ET5998-10-DR-001-0-KW-CONDENSOR ASSEMBLY (figure in Appendix A)			ok		
12.	Strip the adhesive backing from the heater and lay the heater on the top plate per the reference drawing and gently press it into place per figure in appendix A			ok		

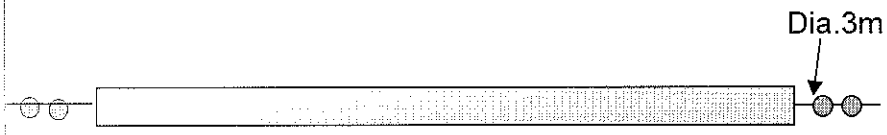
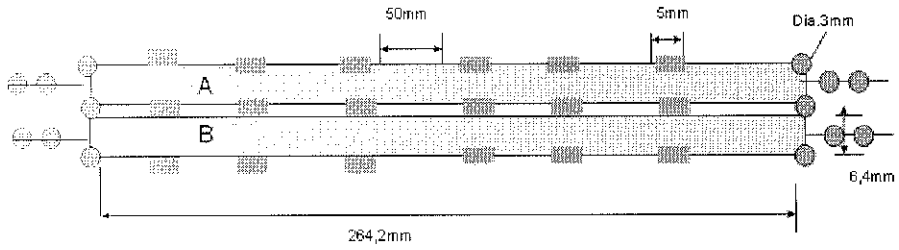
	Condenser 120 V foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
13.	Use a rubber roller (or equivalent tool) to press the heater onto the top plate. Roll from the centre toward the edges. 			ok		
14.	Repeats step 13, make sure no trapped air under the heaters.			ok		
15.	For QM/FM: Power on A heater parallel to a ~~50 V~~ 15V power supply. Rolling while warm and repeat several times					

	Condenser 120 V foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
16.	Repeat step15 for heaters B			ok		
	Electric Checkouts and Record					
17.	Record Multimeter used	Type; S/N; cal. Valid date				
18.	Record power supply used	Type; S/N; cal. Valid date				
19.	Check the heaters are electrically isolated by using Multi-meter.					
20.	Connect all heaters A in series(red), using a bread-board					

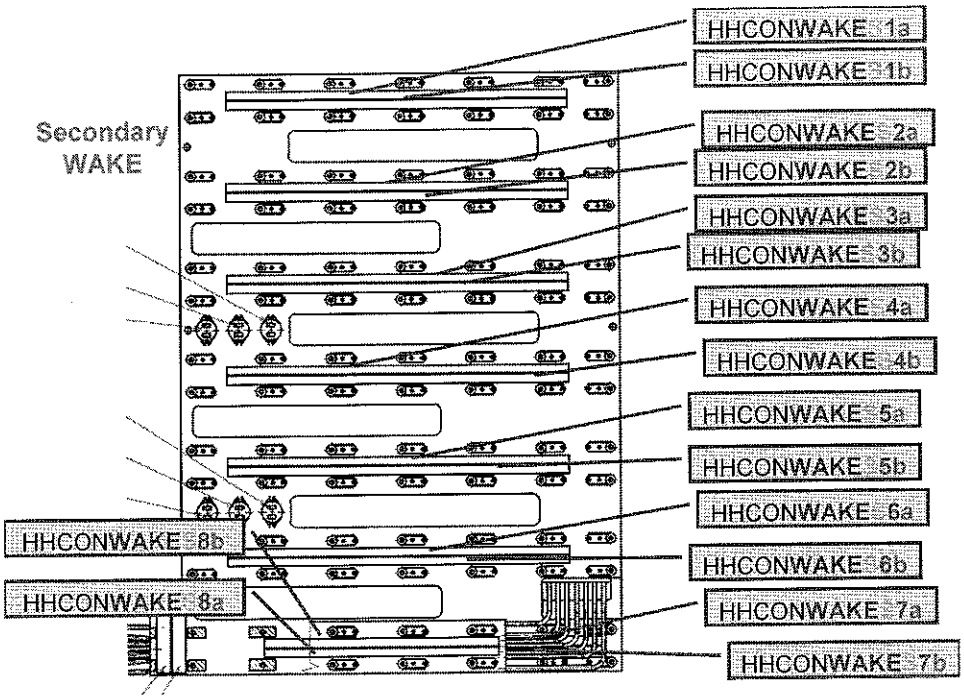
	Condenser 120 V foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
					R_A = ~~4000~~ 4000.08 (NS power)	
21.	For QM/FM: Power on heaters A to a **50 V** power supply.. Record the voltage and current values of the heater group 	Voltage current		Va = 50 V Ia = 14.03 mA		

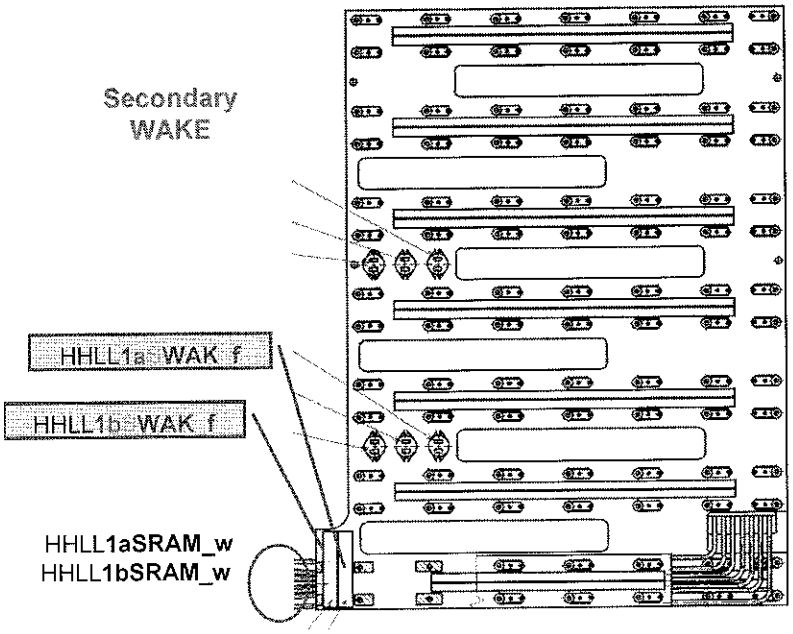
	Condenser 120 V foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
22.	Check the derived resistance with the measured one for heaters A(step8)	Resistance	Design: 8*48,4=387,2Ohm From step 8(measured): 8*R_{step8}= Ohm	**Derived Resistance (V/A)(Ω) Ra=**		
23.	Connect all heater B in series (orange) 				R_B = 399.68 (no power)	
24.	For QM/FM: Power on heaters B to a **50 V** power supply. Record the voltage and current values of the heaters	Voltage current		Vb= 50 V Ib= 124.51 mA		

	Condenser 120 V foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
25.	Check the derived resistance with the measured one for heaters B(step8)	Resistance	Design: 8*48,4=387,2Ohm From step 8: $8*R_{step8}$= Ohm	**Derived Resistance (V/A)(Ω) Rb=**		
	Heater Tape Installation					
26.	Record glue 3M 2216 data and mixing ratio	Expiring date Mixing ratio		as the same of FM 1.		
27.	Put 4 spots of glue on the heater patch corners (3 mm diameter) (**DON'T SPOT GLUE THE HEATERS UNDER STRAIN RELIEF SIDE)**  			ok		

	Condenser 120 V foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
28.	Put glue on the wire leads (3 mm diameter or more, as needed)  			ok		
29.	Put glue on the edges : every 50 mm put a spot of glue of this size: 2 to 3 mm wide (i.e.: across the edge), enough to bridge the heater and the surface underneath 5 mm long (i.e.: along the edge) **(DON'T SPOT GLUE THE HEATERS UNDER STRAIN RELIEF SIDE)**  			ok		
30.	Repeat step 26 to 29 for all the remaining heaters.			ok		

	Condenser 120 V foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
31.	7 days for fully curing					
32.	End					


Secondary WAKE
HHCONWAKE_1a
HHCONWAKE_1b
HHCONWAKE_2a
HHCONWAKE_2b
HHCONWAKE_3a
HHCONWAKE_3b
HHCONWAKE_4a
HHCONWAKE_4b
HHCONWAKE_5a
HHCONWAKE_5b
HHCONWAKE_6a
HHCONWAKE_6b
HHCONWAKE_7a
HHCONWAKE_7b
HHCONWAKE_8b
HHCONWAKE_8a


Secondary WAKE
HHLL1a_WAK_f
HHLL1b_WAK_f
HHLL1aSRAM_w
HHLL1bSRAM_w

8 Appendix A

In the following tables are described the correspondence between the ID heater on TTCS loop are related to the heater P/N provided by the supplier:

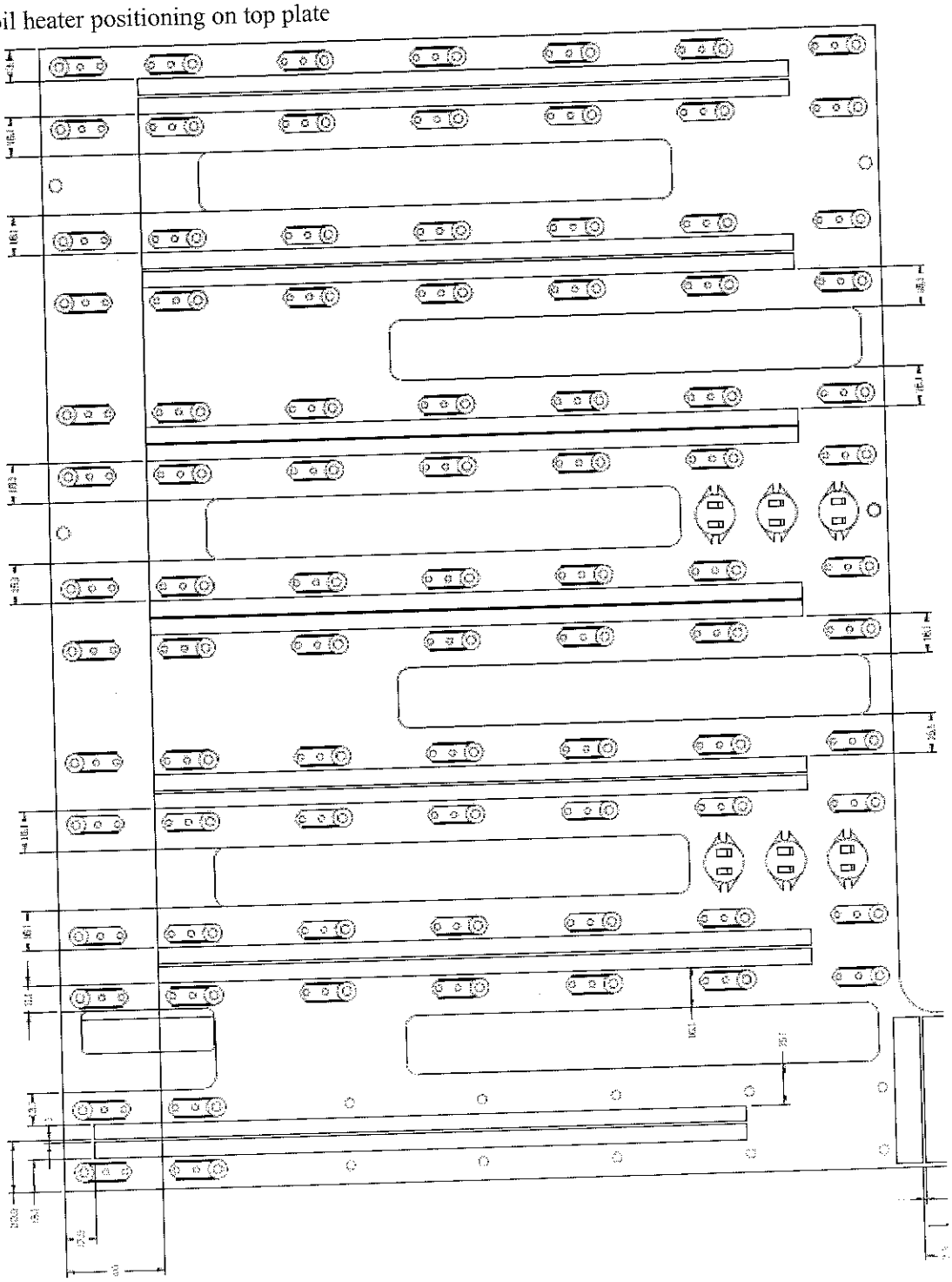
Location/	Condenser	ID heater	P/N
Inlet/outlet foil heater	QM	HHLL1aPW_f HHLL1bPW_f	
	PW	HHLL**1aPWAK_f** HHLL**1bPWAK_f**	
	SR	HHLL**1aSRAM_f** HHLL**1bSRAM_f**	
	PR	HHLL**1aPRAM_f** HHLL**1bPRAM_f**	
	SW Fk	HHLL**1aSWAK_f** 9 HHLL**1bSWAK_f** 11	7.84 ~~7.84~~ 7.656
Condenser foil heater	QM	HHCON**WP7a**	
		HHCON**WP7b**	
	PW	HHCON**WAKEP1a**	
		HHCON**WAKEP1b**	
		HHCONWAKEP2a	
		HHCONWAKEP2b	
		HHCONWAKEP3a	
		HHCONWAKEP3b	
		HHCONWAKEP4a	
		HHCONWAKEP5a	
		HHCONWAKEP5b	
		HHCONWAKEP6a	
		HHCONWAKEP6b	
		HHCONWAKEP7a	
		HHCONWAKEP7b	
		HHCONWAKEP8b	
		HHCONWAKEP8a	

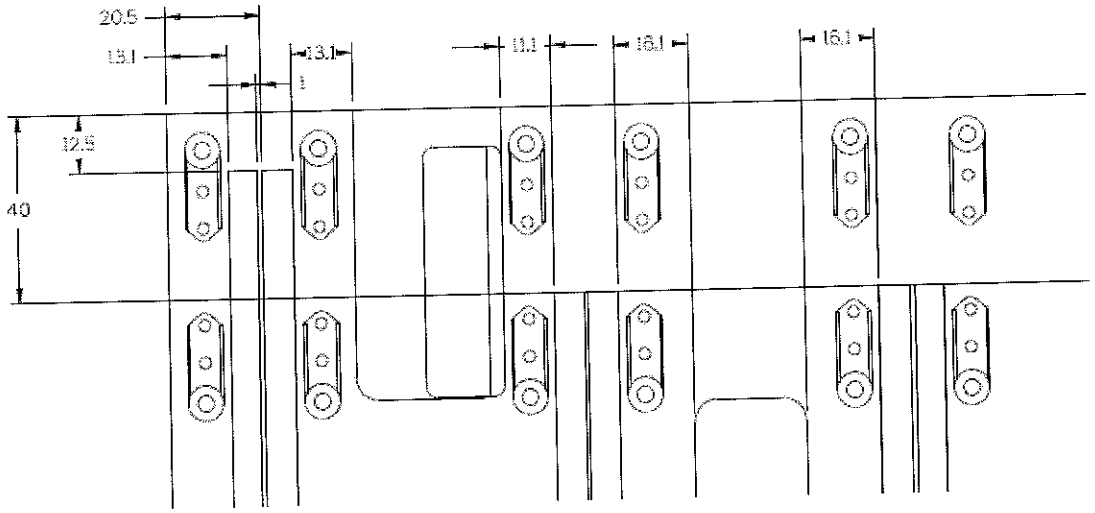
SR	HHCONRAMS1a			
	HHCONRAMS1b			
	HHCONRAMS2a			
	HHCONRAMS2b			
	HHCONRAMS3a			
	HHCONRAMS3b			
	HHCONRAMS4a			
	HHCONRAMS5a			
	HHCONRAMS5b			
	HHCONRAMS6a			
	HHCONRAMS6b			
	HHCONRAMS7a			
	HHCONRAMS7b			
	HHCONRAMS8b			
	HHCONRAMS8a			
PR	HHCONRAMP1a			
	HHCONRAMP1b			
	HHCONRAMP2a			
	HHCONRAMP2b			
	HHCONRAMP3a			
	HHCONRAMP3b			
	HHCONRAMP4a			
	HHCONRAMP5a			
	HHCONRAMP5b			
	HHCONRAMP6a			
	HHCONRAMP6b			
	HHCONRAMP7a			
	HHCONRAMP7b			
	HHCONRAMP8b			
	HHCONRAMP8a			
SW FM 4	HHCONWAKES1a	51	50.08	
	HHCONWAKES1b	52	50.25	
	HHCONWAKES2a	53	50.41	
	HHCONWAKES2b	54	50.52	
	HHCONWAKES3a	55	50.59	

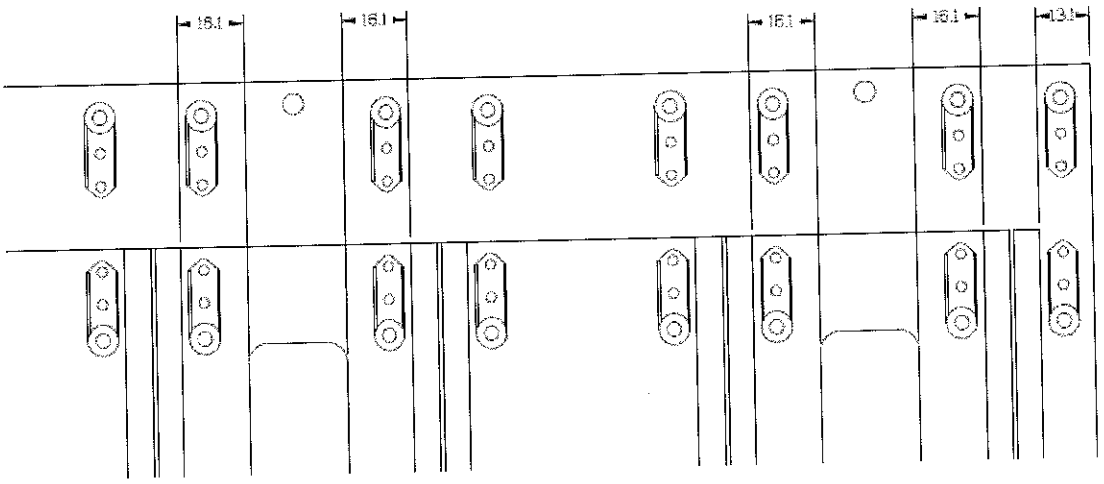
			No	before	after
		HHCONWAKES3b	56	49.76	
		HHCONWAKES4a	57	49.88	
HHCONWAKES4b	~~68~~ 64	50.67			
		HHCONWAKES5a	65	50.47	
		HHCONWAKES5b	66	50.14	
		HHCONWAKES6a	67	49.98	
		HHCONWAKES6b	68	49.76	
under strain relief		HHCONWAKES7a	49	49.68	
		HHCONWAKES7b	50	50.10	
		HHCONWAKES8b	69	49.93	
		HHCONWAKES8a	70	49.94	
Liquid line wire heater	QM	HHLL1aPW_w			
		HHLL1bPW_w			
	PW	HHLL**1aPWAK_w**			
		HHLL**1bPWAK_w**			
	SR	HHLL**1aSRAM_w**			
		HHLL**1bSRAM_w**			
	PR	HHLL**1aPRAM_w**			
		HHLL**1bPRAM_w**			
	SW	HHLL**1aSWAK_w**			
		HHLL**1bSWAK_w**			

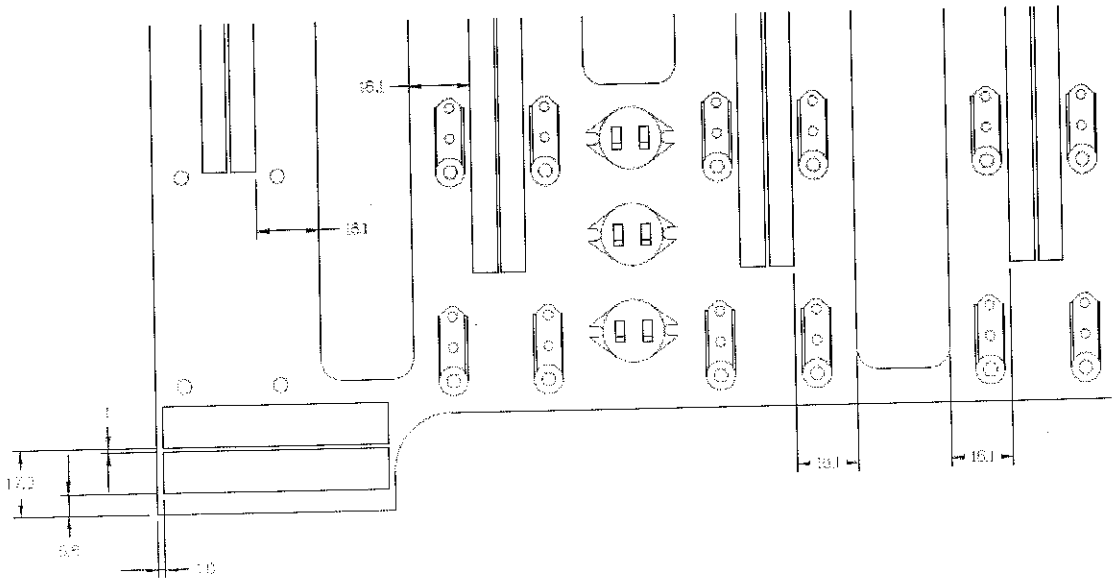
9 Appendix B

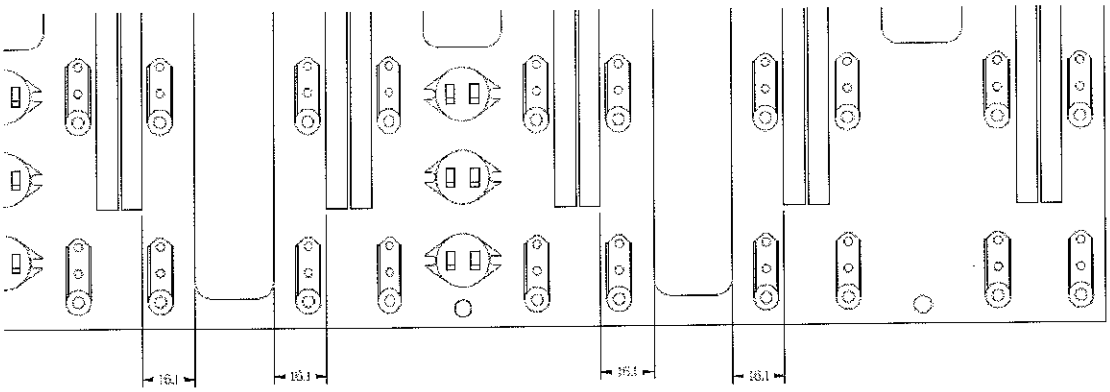
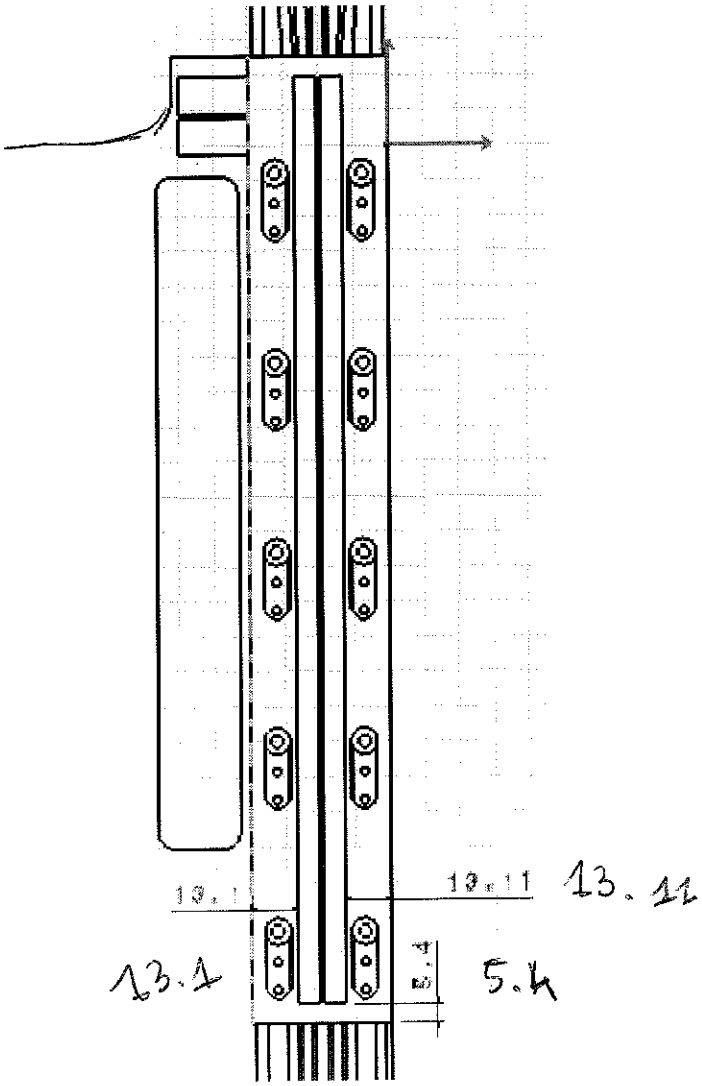
Foil heater positioning on top plate




20.5
13.1
13.1
1
11.1
16.1
16.1
12.5
40


16.1
16.1
16.1
16.1
13.1


16.1
16.1
1
17.3
16.1
16.1



Foil heater positioning on top strain relief