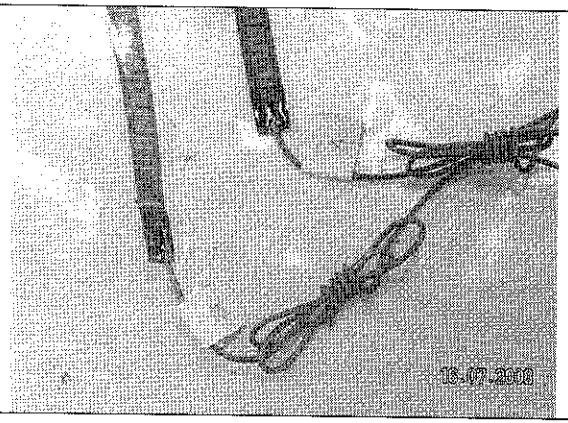
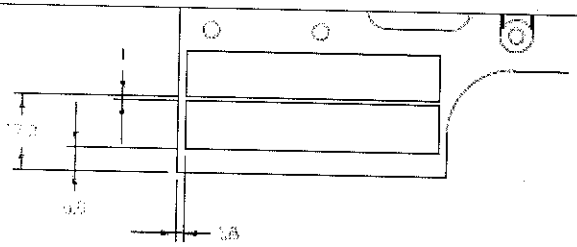
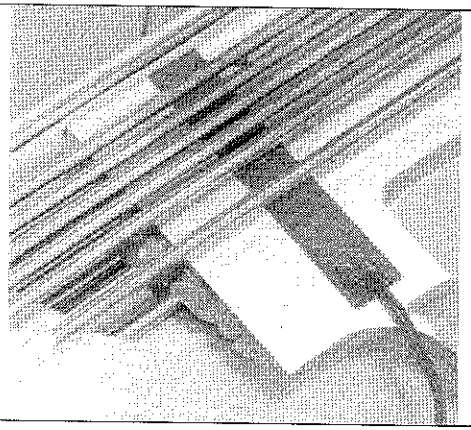
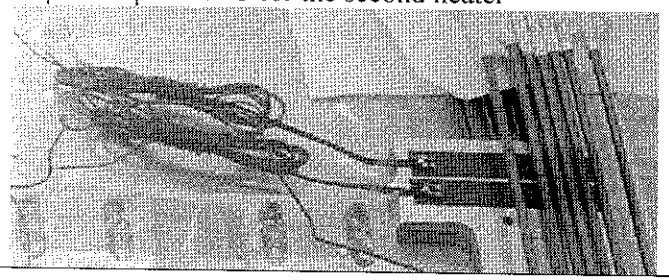
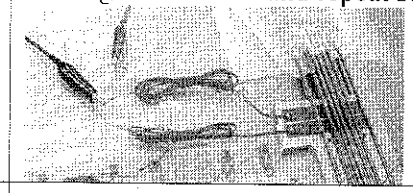
7.2 Liquid line Inlet/outlet foil heater installation procedure sheet

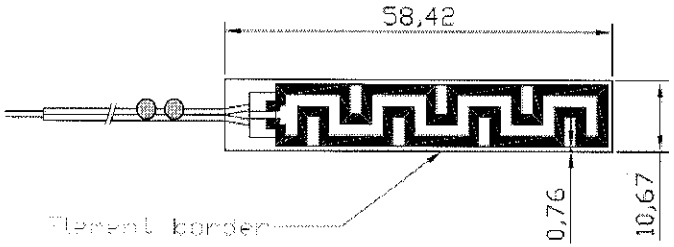
	Inlet/outlet foil heater installation procedure		company: NDC		date: ~~19~~ 09 JANUARY '09	
	Fill in by hand.		engineer: E. Zoodi		location: AIDC	
Step	Action	Monitoring	Value	**Result**	Comment	√
1.	Record condenser model (P-ram, P-wake, S-ram, S-wake)	T.I. description	-	FM2 SR		
2.	Record model (EM / 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 (Appendix A) the part number correspondent.	Part number TTCS heater ID	A or B	OK		

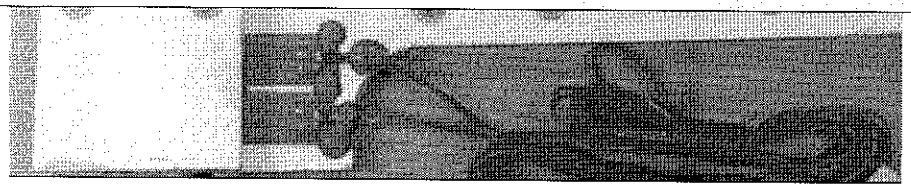
	Inlet/outlet foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
				OK		
6.	label the lead wire near the heater that it can be clearly identified when for check. Report in the table (appendix A) the part number correspondent	Part number TTCS heater ID	A or B	OK	SEE TABLE	
7.	Check the resistance and record	resistance	7.3 Ohm +/- 10%	OK	A→ 7.74 B→ 7.65	
	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	√
						
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		

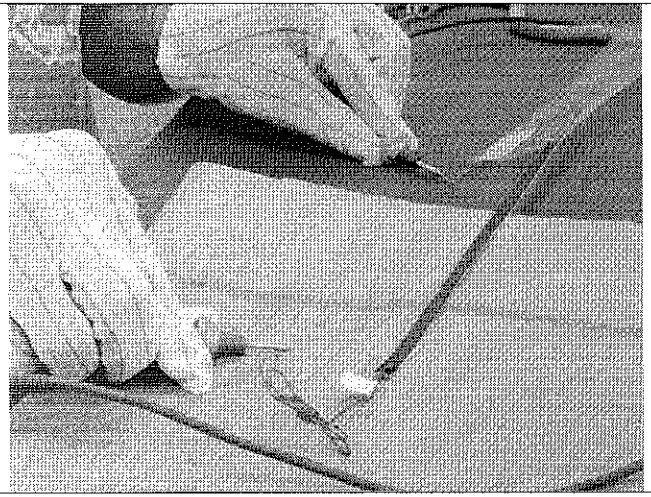
	Inlet/outlet foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
15.	For QM check resistance after gluing per heater individually For FM check resistance after gluing per heater individually		7.3 Ohm +/- 10%	A= 7.86 Ω B= 7.79 Ω		
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		
	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= 4.2V I_A= 0.53 A Vb= 4.2V		

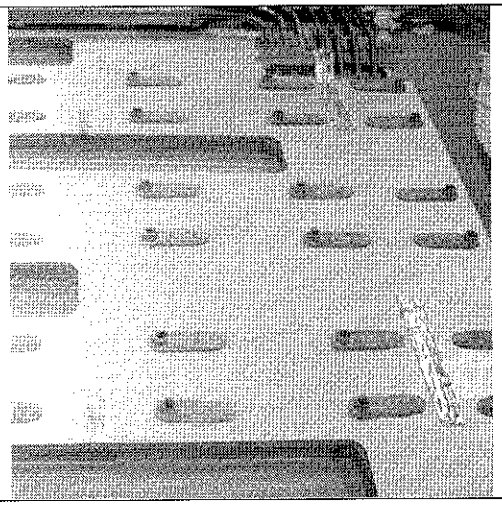
	Inlet/outlet foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
	Record the voltage and current values of the heater			Ib= 0.28A 0.53A -0.5kA		
21.	Recored the derived resistance	Resistance	V/I	RA_{dev}= RB_{dev}=		
22.	Check the derived resistance with the measured one (step 7)	Resistance	From step 7	RA_{mes}= RB_{mes}=		
	Heater tape installation				PERFORMED ON:	
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)					

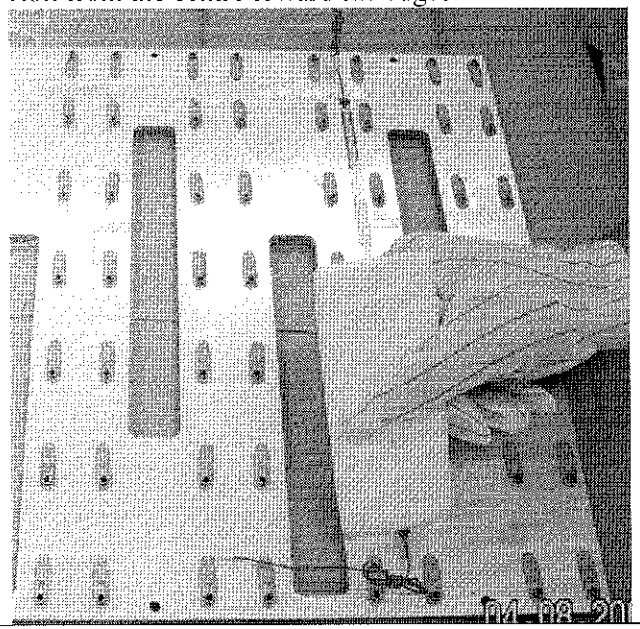
	Inlet/outlet foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
	 (no spot on the edge of the heaters!)					
25.	7 days for fully curing					
26.	End					

7.3 Condenser 120 V foil heater installation procedure sheet

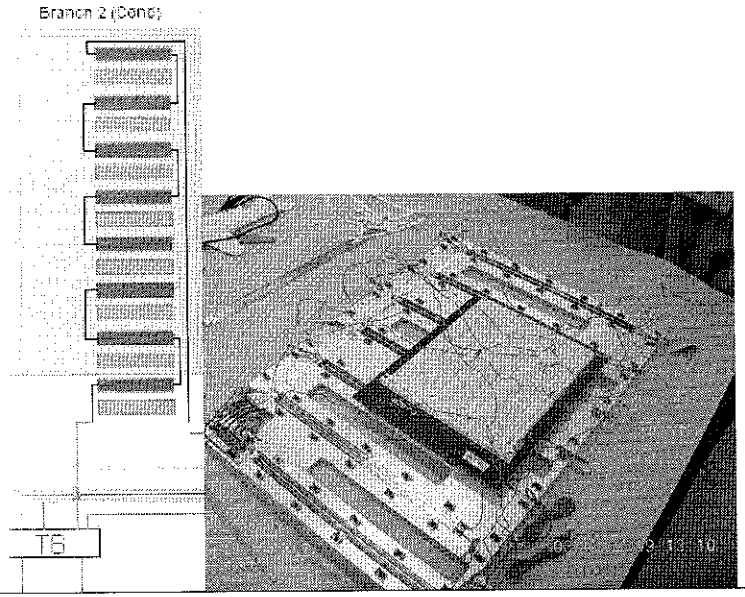
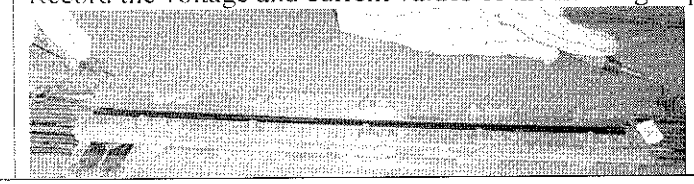
	Condenser 120 V foil heater installation procedure		company: ADE		date: 9 JANUARY / 13 JANUARY	
	Fill in by hand.		engineer: E. Jacobs		location: ADC	
Step	Action	Monitoring	Value	**Result**	Comment	√
1.	Record condenser model (P-ram, P-wake, S-ram, S-wake)	T.I. description	-	FM 2 SR		
2.	Record model (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		

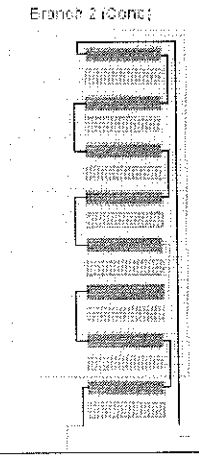
	Condenser 120 V foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
						
	Surface preparation					
9.	Wipe the bonding surface area with K-Dry tissues or equivalent dampened with isopropyl alcohol.			OK		
10.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

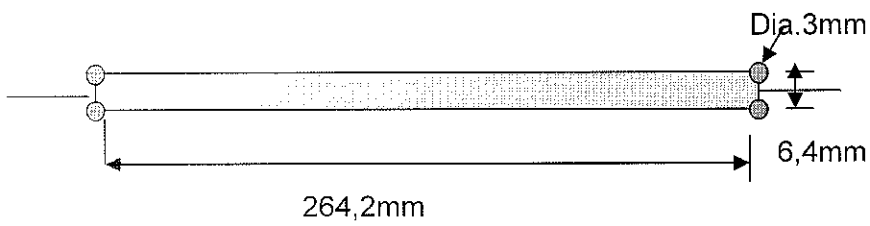
	Condenser 120 V foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
						
11.	Prepare the location and dimension of MINCO heater according to Appendix B and drawing ET5998-09-DR-001-A-KW-CONDENSOR ASSEMBLY or 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		

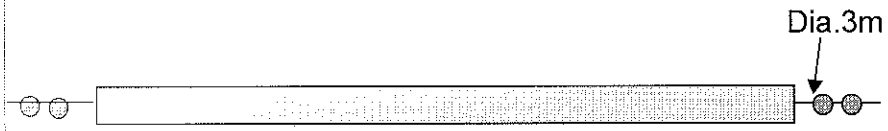
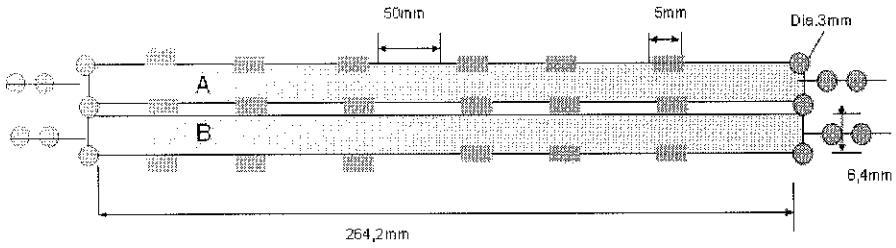
	Condenser 120 V foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
13.	Use a rubber roller (or equivalent tool) to press the heater onto the top plate. Roll from the centre toward the edges. 			OK		
14.	Repeats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

	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 = 401.78 (NO 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 = 50.046 V Ia = 0.1238 A		

	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 (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= 50V Ib= 0.124		

	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 HM1		
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		

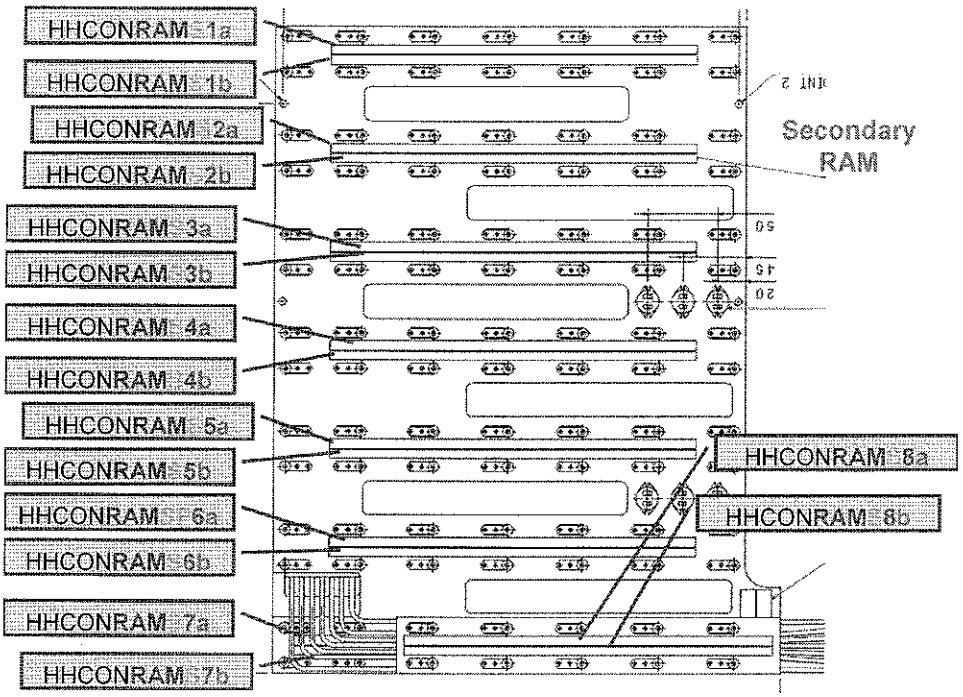
	Condenser 120 V foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
31.	7 days for fully curing					
32.	End					

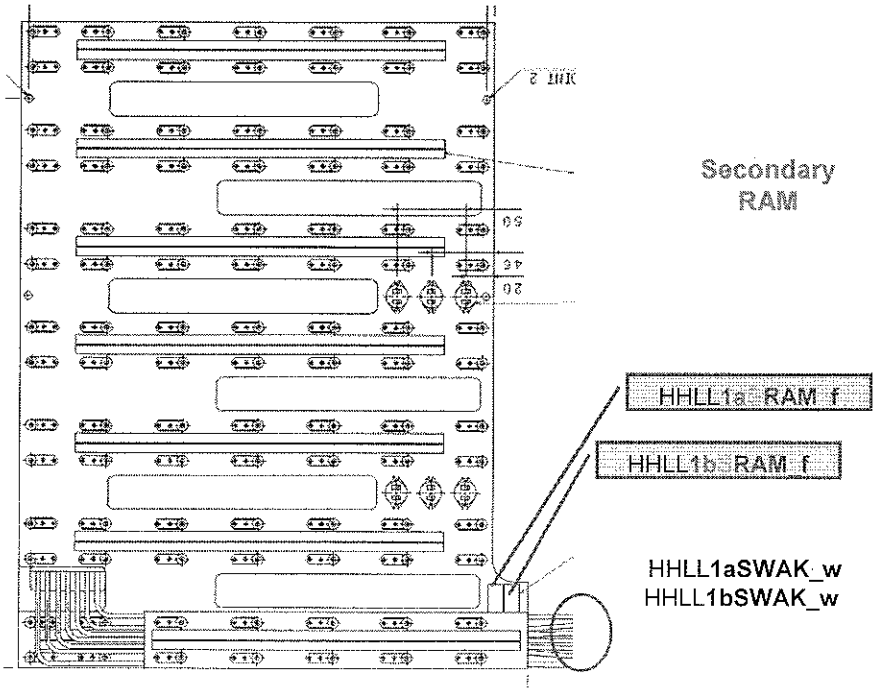
8 Appendix A

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	Ω BEFORE GLUING	Ω AFTER GLUING
Inlet/outlet foil heater	QM	HHLL1aPW_f			
		HHLL1bPW_f			
	PW	HHLL**1aPWAK_f**			
		HHLL**1bPWAK_f**			
	SR FR2	HHLL**1aSRAM_f**	N° 3	7.74	7.86
		HHLL**1bSRAM_f**	N° 4	7.65	7.79
	PR	HHLL**1aPRAM_f**			
		HHLL**1bPRAM_f**			
	SW	HHLL**1aSWAK_f**			
		HHLL**1bSWAK_f**			
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			

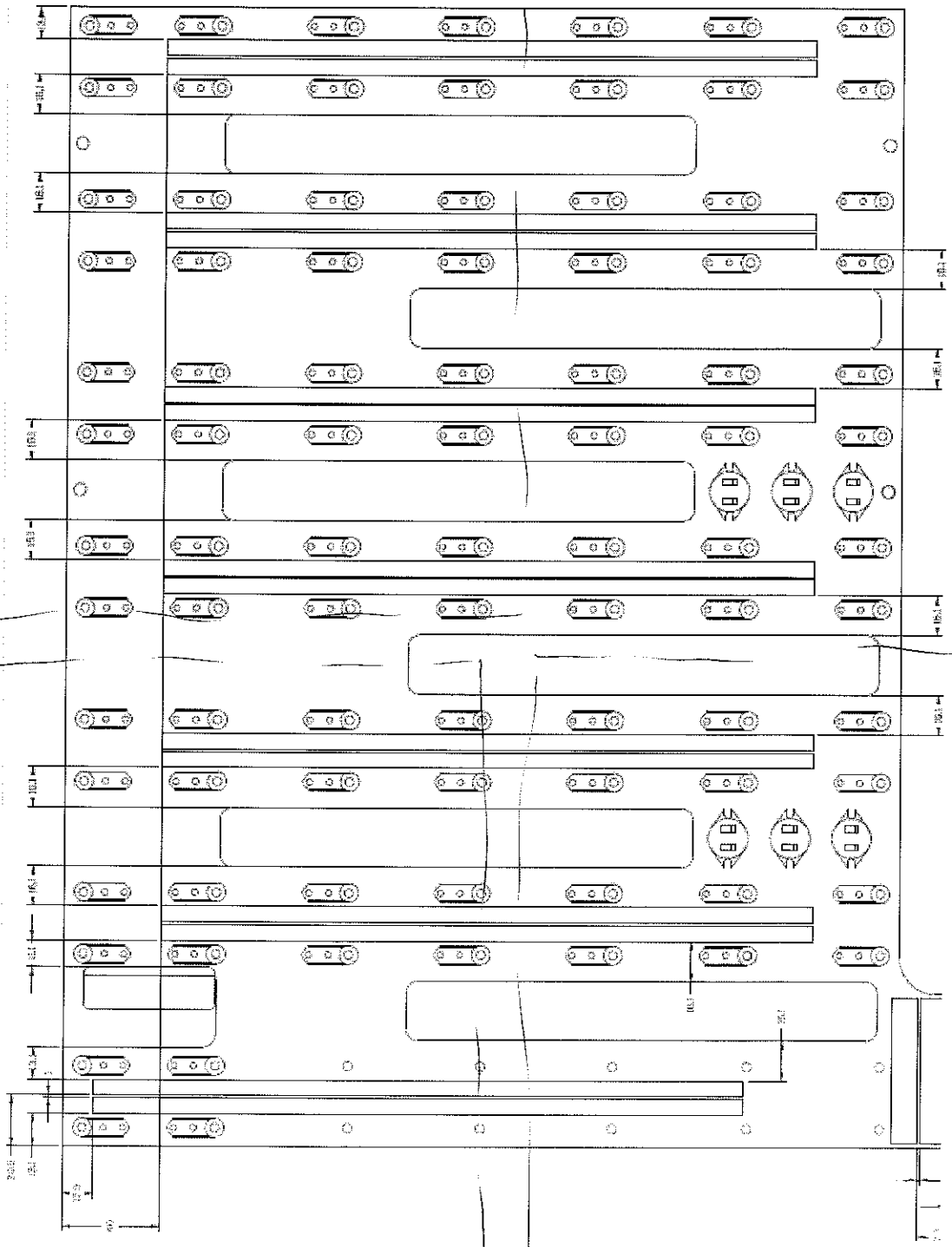
	SR (FM2)	HHCONRAMS1a 019	50.85	
		HHCONRAMS1b 020	50.31	
		HHCONRAMS2a 021	50.06	
		HHCONRAMS2b 022	50.25	
		HHCONRAMS3a 023	50.72	
		HHCONRAMS3b 024	50.50	
026	49.29	HHCONRAMS4a 025	49.74	
	← HH CONRAMS4b	HHCONRAMS5a 027	50.46	
		HHCONRAMS5b 028	49.89	
		HHCONRAMS6a 029	50.77	
		HHCONRAMS6b 030	50.32	
	UNDER STRAIN RELIEF	HHCONRAMS7a 017	49.78	49.93
		HHCONRAMS7b 018	49.96	50.06
		HHCONRAMS8b 031	50.20	
		HHCONRAMS8a 032	50.06	
	PR (FM3)	HHCONRAMP1a		
		HHCONRAMP1b		
		HHCONRAMP2a		
		HHCONRAMP2b		
		HHCONRAMP3a		
		HHCONRAMP3b		
		HHCONRAMP4a		
		HHCONRAMP5a		
		HHCONRAMP5b		
		HHCONRAMP6a		
		HHCONRAMP6b		
		HHCONRAMP7a		
		HHCONRAMP7b		
		HHCONRAMP8b		
		HHCONRAMP8a		
	SW (FM4)	HHCONWAKES1a		
		HHCONWAKES1b		
		HHCONWAKES2a		
		HHCONWAKES2b		
		HHCONWAKES3a		

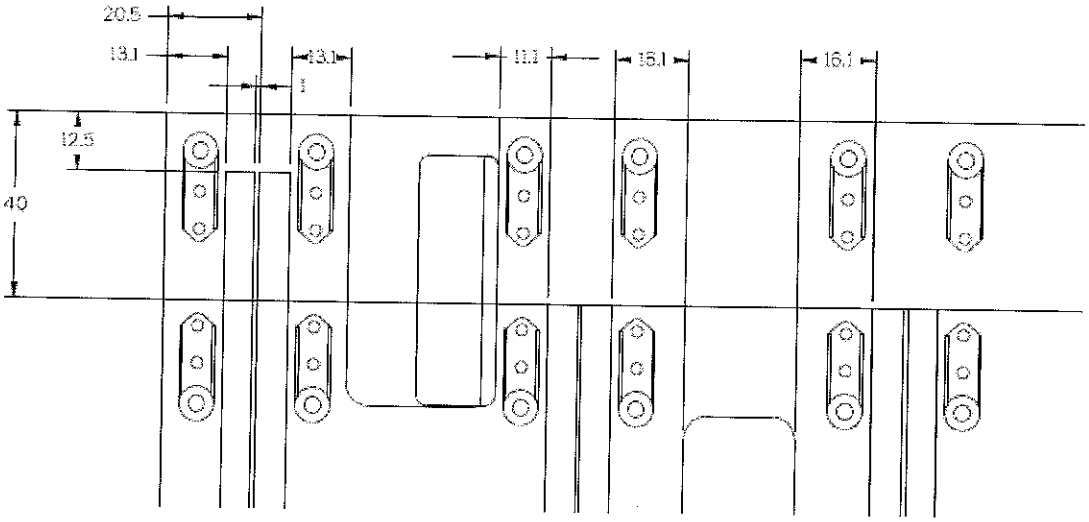

HHCONRAM_1a
HHCONRAM_1b
HHCONRAM_2a
HHCONRAM_2b
HHCONRAM_3a
HHCONRAM_3b
HHCONRAM_4a
HHCONRAM_4b
HHCONRAM_5a
HHCONRAM_5b
HHCONRAM_6a
HHCONRAM_6b
HHCONRAM_7a
HHCONRAM_7b
HHCONRAM_8a
HHCONRAM_8b
Secondary RAM

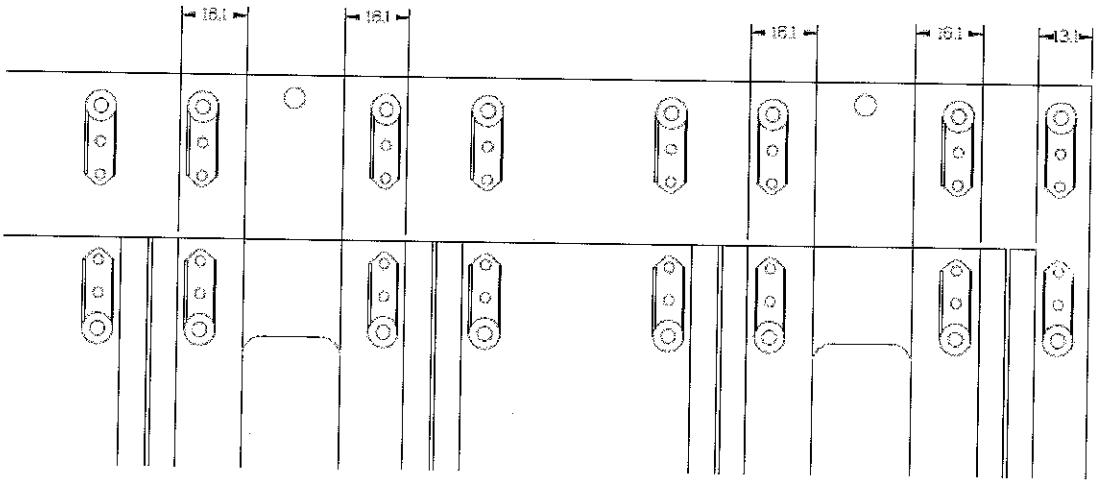

Secondary RAM
HHLL1a RAM f
HHLL1b RAM f
HHLL1aSWAK_w
HHLL1bSWAK_w

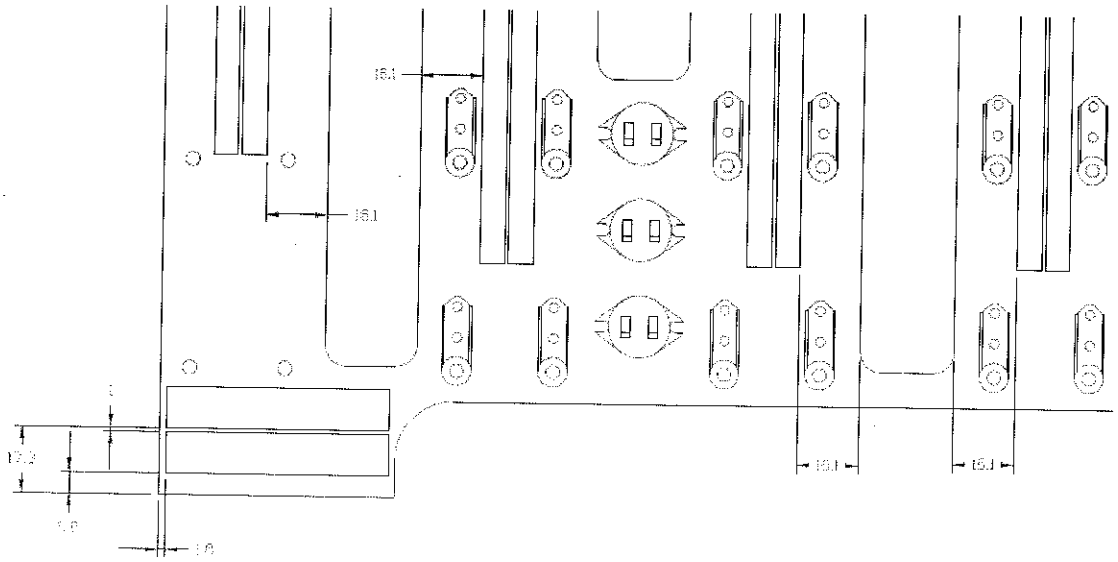
9 Appendix B

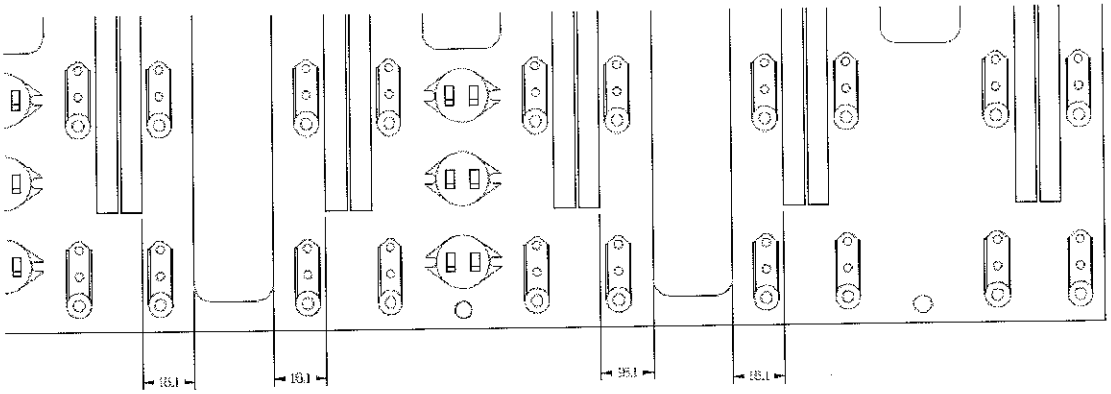
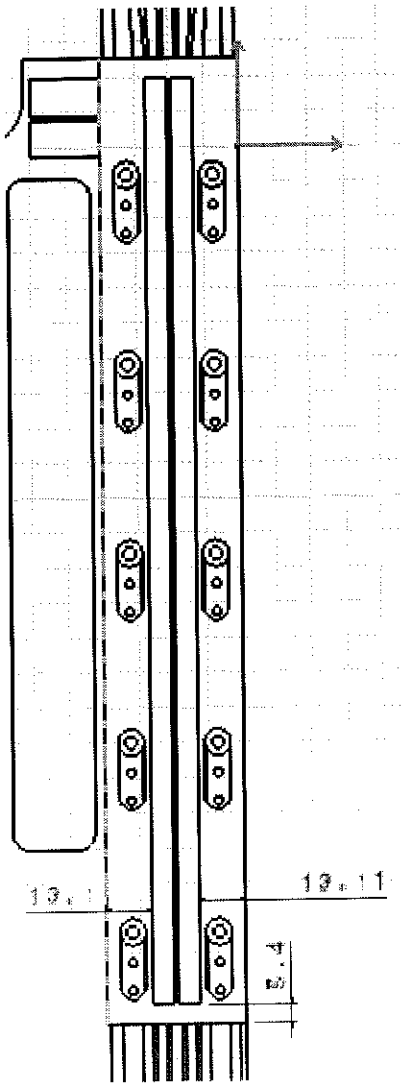
Foil heater positioning on top plate




20.5
13.1
13.1
1
11.1
16.1
16.1
12.5
40
A


16.1
16.1
16.1
16.1
13.1
B


16.1
16.1
C
16.1
16.1



Foil heater positioning on top strain relief