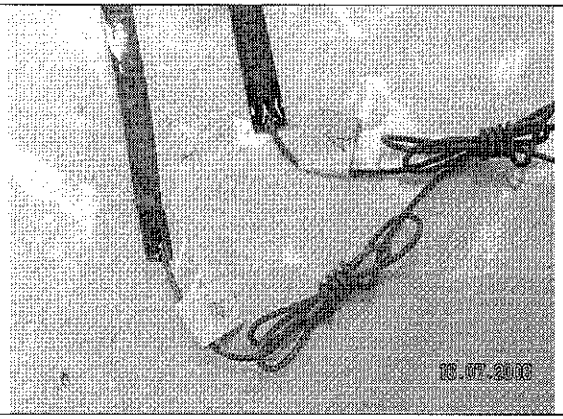
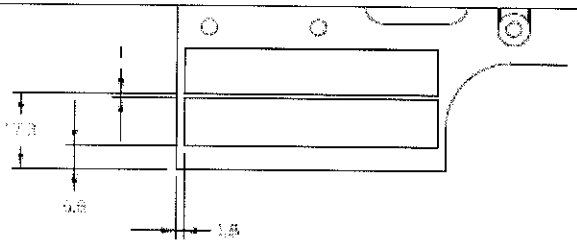
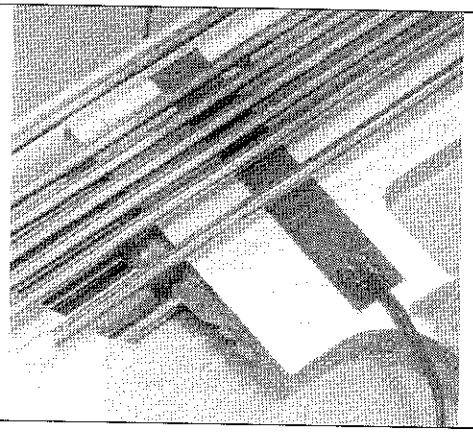
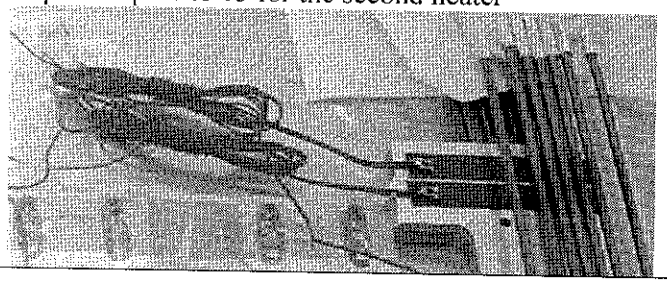
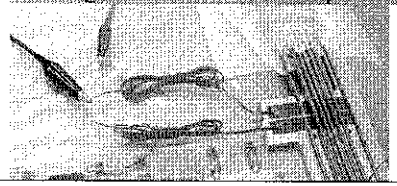
7.2 Liquid line Inlet/outlet foil heater installation procedure sheet

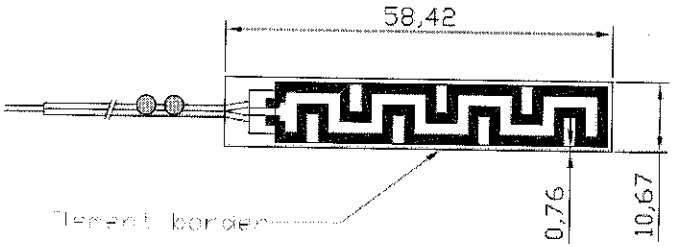
	Inlet/outlet foil heater installation procedure		company: AIDC		date: 31 ST DECEMBER	
	Fill in by hand.		engineer:		location: AIDC	
Step	Action	Monitoring	Value	**Result**	Comment	√
1.	Record condenser model (P-ram, P-wake, S-ram, S-wake)	T.I. description	-	PW		
2.	Record model (EM / QM / FM)	model	-	FM (FM1)		
	Visual and electrical inspection					
3.	Record test equipment used	manufacturer, type		MULTIMETER POWER SUPPLY	GDM-8245 INSTEK : GPC-3030D	
4.	Visual inspection on the heaters to be installed		-	OK		
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	A → PN 1 B → PN 2		

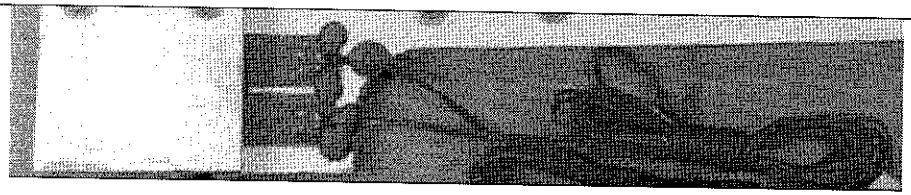
	Inlet/outlet foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
						
6.	label the lead wire near the heater that it can be clearly identified when for check. Report in the table (appendix A) the part number correspondent	Part number TTCS heater ID	A or B	B → PN 2)		
7.	Check the resistance and record	resistance	7.3 Ohm +/- 10%	A → 7.68 ohm B → 7.87 ohm		
	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> 7.71 B> 7.92		
16.	Mark heater groups leads (wires) by means of suitable labels					
17.	For QM/FM: Power on A & B heater parallel to a **4.2 V** power supply. Rolling while warm and repeat several times 					
	Electric Checkouts and Record					
18.	Record Multimeter used	Type; S/N; cal. Valid date				
19.	Record power supply used	Type; S/N; cal. Valid date				
20.	Check the heaters are electrically isolated with the panel by using Multi-meter.					
21.	For QM/FM: Power on heater A to a **4.2 V** power supply.	Voltage	4.2 V	4.2 V (A&B)	DO WE NEED TO	

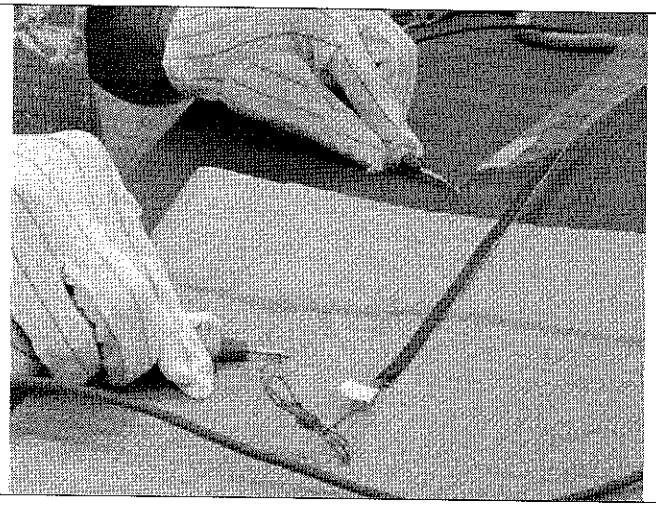
	Inlet/outlet foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
	Record the voltage and current values of the heater For QM/FM: Power on heater B to a 4.2 V power supply. Record the voltage and current values of the heater	current	0.57 A	0.57 A (ARB)	CONNECT OUR THE HEATERS?	
22.	Check the derived resistance with the measured one (step 7)	Resistance	From step 7			
	Heater tape installation				9th JANUARY 2009	
23.	Record glue 3M 2216 data and mixing ratio	Expiring date — Mixing ratio -		28 FEBRUARY '09 715 PARTS IN WEIGHT OK	~~STARTING~~ MIXING TIME: 9.11 a.m	
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)					

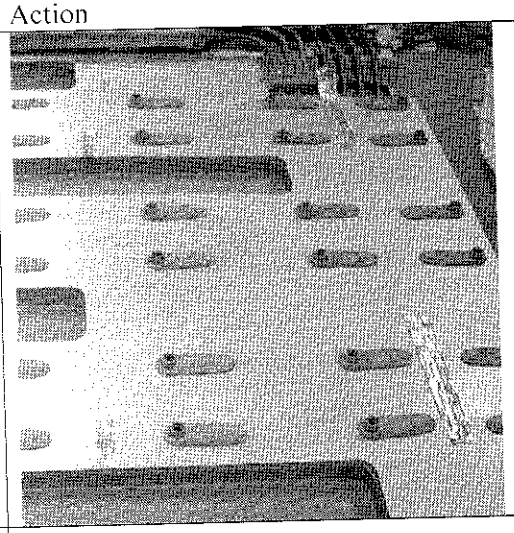
	Inlet/outlet foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
	 (no spot on the edge of the heaters!)			OK		
25.	7 days for fully curing			OK		
26.	End					

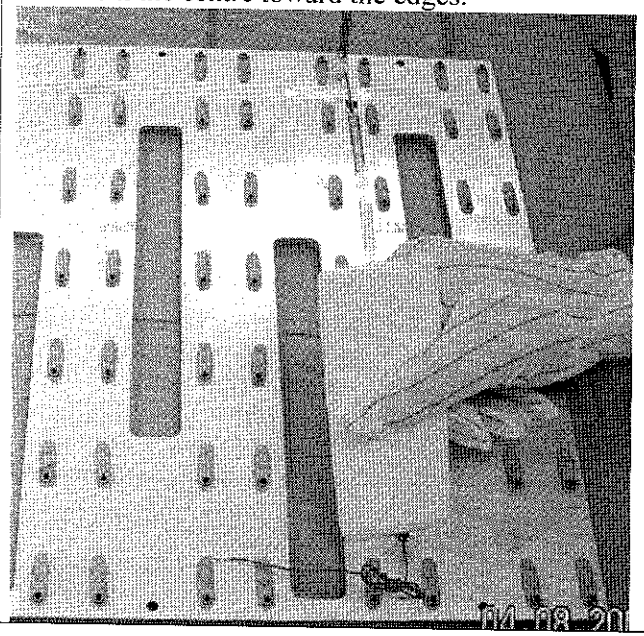
7.3 Condenser 120 V foil heater installation procedure sheet

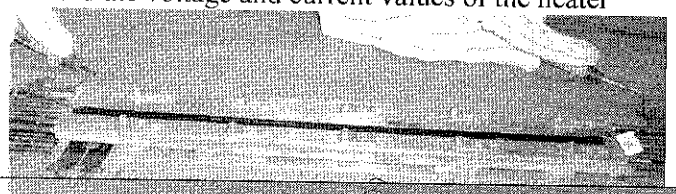
	Condenser 120 V foil heater installation procedure		company: AIDC		date: 31ST DECEMBER	
	Fill in by hand.		engineer:		location: AIDC	
Step	Action	Monitoring	Value	**Result**	Comment	√
1.	Record condenser model (P-ram, P-wake, S-ram, S-wake)	T.I. description	-	PW		
2.	Record model (EM / QM / FM)	model	-	HC(1)		
	Visual and electical inspection					
3.	Record test equipment used	manufacturer, type	MULTIMETER GDT-824S INSTEK POWER SUPPLY: GPC-3030D			
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	A→001		
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	B→002		
7.	Repeat step 5 and 6for the remaining pairs of heaters					
8.	Check the resistance and record	resistance	48.4 Ohm +/- 10%	A→49.51 B→49.53	ON 8 JANUARY FOR RETAINING HEATERS → TABLE APPENDIX A	

001
002

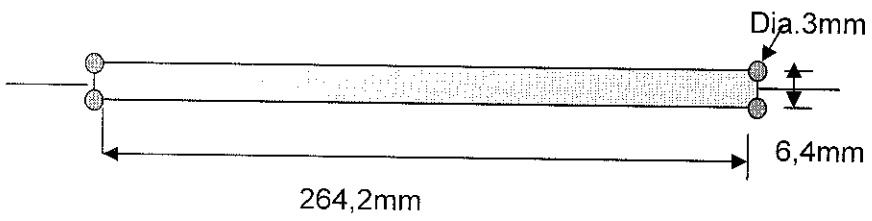
	Condenser 120 V foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
						
	Surface preparation					
9.	Wipe the bonding surface area with K-Dry tissues or equivalent dampened with isopropyl alcohol.			OK	(HEATER G-7002 APPLIED WITH NO CLEANED SURFACE"	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	NO AL. TAPE	OK

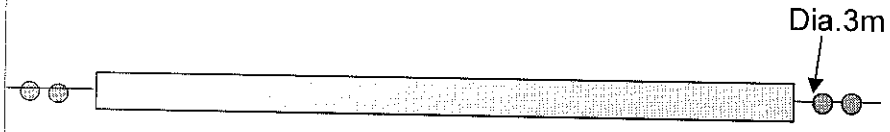
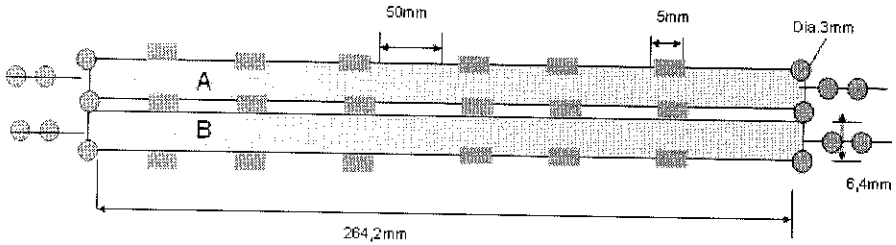
	Condenser 120 V foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
						
11.	Prepare the location and dimension of MINCO heater according to Appendix B and drawing ET5998-09-DR-001-A-KW-CONDENSOR ASSEMBLY or ET5998-10-DR-001-0-KW-CONDENSOR ASSEMBLY (figure in Appendix A)			OK	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	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	OK	
14.	Repeats step 13, make sure no trapped air under the heaters.				→ CHECK RESISTANCE AFTER INSTALLATION: 001 → 49.46	
15.	For QM/FM: Power on A & B heater parallel to a **15 V** power supply. Rolling while warm and repeat several times				002 → 49.53	

	Condenser 120 V foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
16.	Repeat step Errore. L'origine riferimento non è stata trovata. for heaters B					
	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.	For QM/FM: Power on heater A to a **15 V** power supply. Record the voltage and current values of the heater 	Voltage current	15 V 0.3 A 001 ←	15V 0.3 A	As cabling is likely to occur in CERN I prefer only this check in AIDC. APPLY 50 V → I measured = 0.125A R DERIVED = 400 Ω	
21.	For QM/FM: Power on heater B to a **15 V** power supply. Record the voltage and current values of the heater	Voltage current	15 V 0.3 A 002	15 V 0.3 A	APPLY 50 V → I measured: 0.1254 DERIVED ← R = 398 Ω	
22.	Check the derived resistance with the measured one for heaters A(step8)	Resistance	Design: 8*48 = 387.2Ohm		Σi R MEASURED = 399.51 Ω R MEASURED FROM MULTIMETER: 399 (NO POWER ON)	

	Condenser 120 V foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
			[redacted]			
23.	[redacted]	[redacted]	[redacted]	–	SUM OF ALL THE INDIVIDUAL HEATERS: $\Sigma_i R_{i\,MEASURED}$ = 399.51 Ω	
				–	$R_{MEASURED}$ = 398 (NO POWER ON)	
	Heater Tape Installation					
24.	Record glue 3M 2216 data and mixing ratio	Expiring date Mixing ratio	28 FEBRUARY '09 7/5 PARTS IN WEIGHT		9 JANUARY '09 MIXING TIME: 9.11 a.m.	
25.	Put 4 spots of glue on the heater patch corners (3 mm diameter) (**DON'T SPOT GLUE THE HEATERS UNDER STRAIN RELIEF SIDE)**			OK	START GLUING ON THE EDGE AND ON BOUNDARY LINE OF HEATERS.	

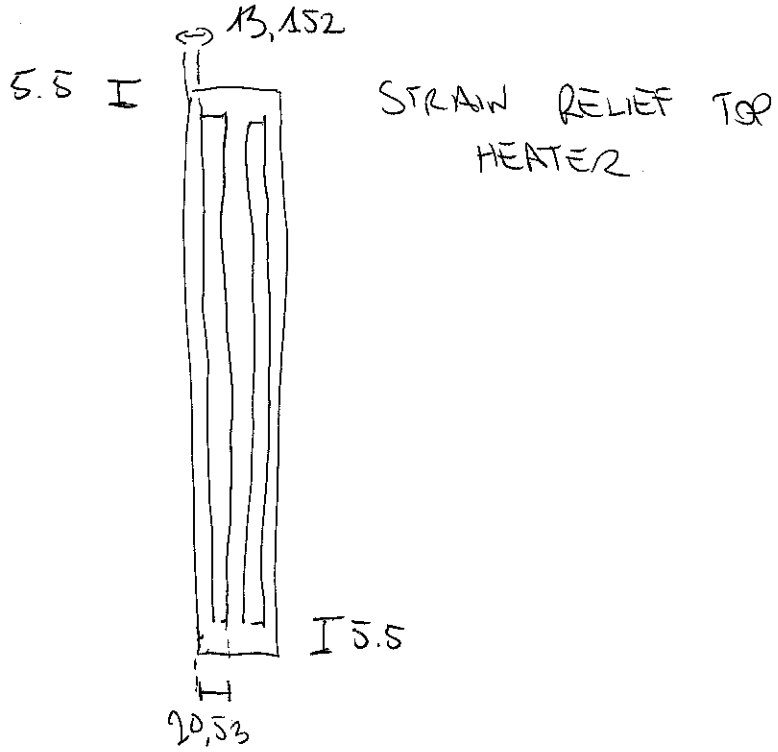


	Condenser 120 V foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
26.	Put glue on the wire leads (3 mm diameter or more, as needed)  NOTE: For heaters under the strain relief side, this wire fixing has to be performed during the final gluing step (together with the installation of all the remaining top plate foil heaters)			OK	PUT TAPE AL TO FIX CABLE BEFORE THE GLUE DROP *MIXING TIME OF GLUE: (FOR CABLE SPOT GLUE) 1h:20 - FINISH: 15:00 - NO SPOT GLUE ON CABLES ON STRAIN RELIEF SIDE	
27.	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	JUST ONLY ONE DROP BETWEEN NUTPLATE POSITIONS.	

	Condenser 120 V foil heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
28.	Repeat step 24 to 27 for all the remaining heaters.			OK	FINISH TIME: 15:00	
29.	7 days for fully curing					
30.	End					

7.4 Wire heater installation procedure sheet

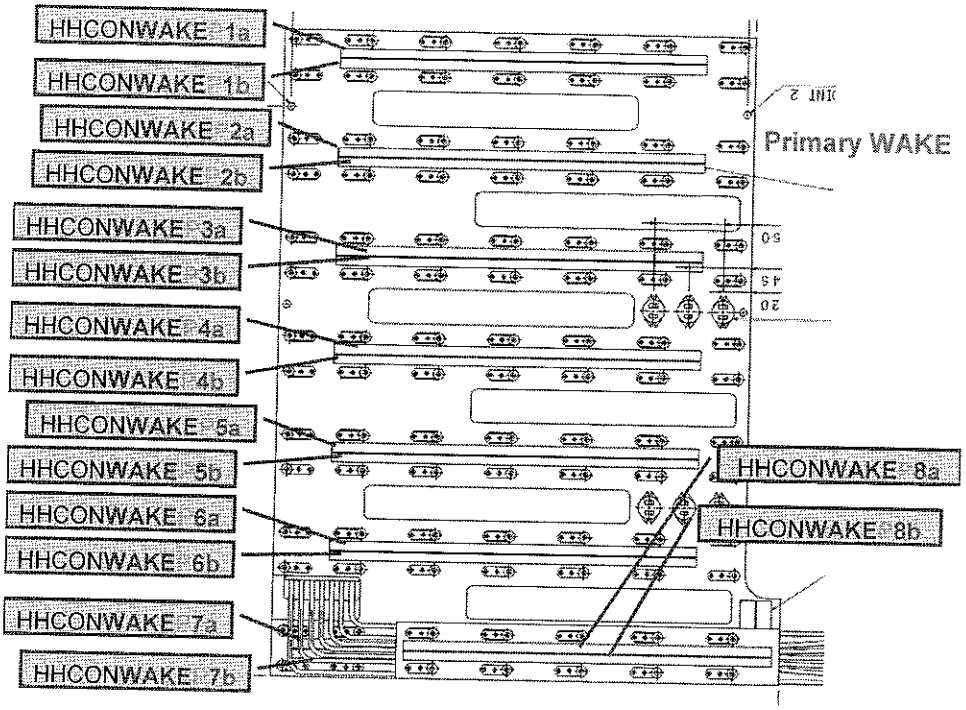
	Wire heater installation procedure		company:		date:	
	Fill in by hand.		engineer:		location:	
Step	Action	Monitoring	Value	**Result**	Comment	√
1.	Record condenser model (P-ram, P-wake, S-ram, S-wake)	T.I. description	-			
2.	Record model (EM / QM / FM)	model	-			
3.	**Visual and electical inspection**					
4.	Record test equipment used	manufacturer, type				
5.	Visual inspection on the heaters to be installed		-			
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			
7.	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			
8.	Check the resistance and record	resistance	48.4 Ohm +/- 10%			

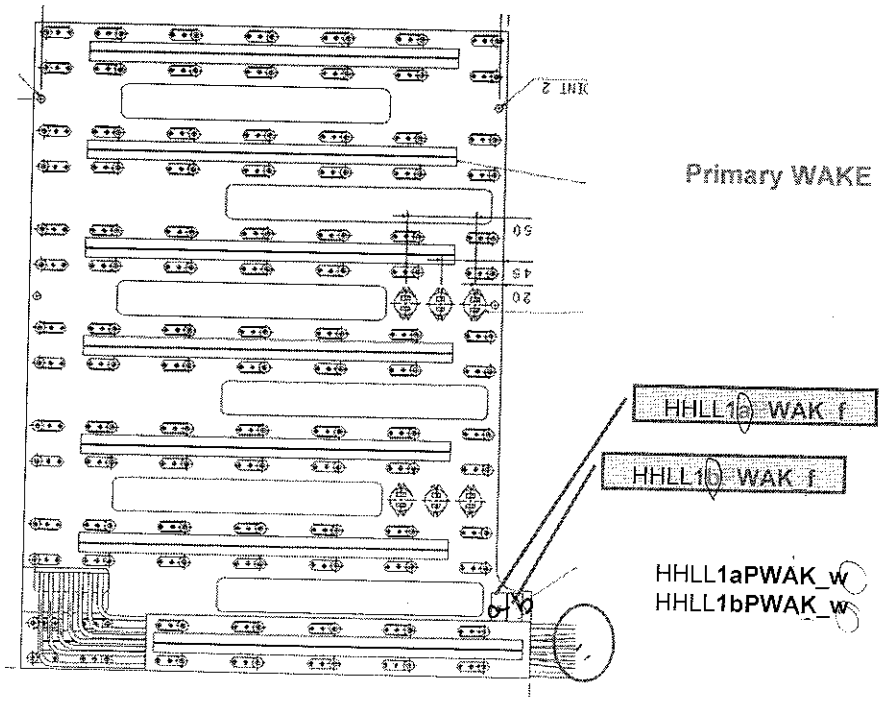

13,152
5.5
STRAIN RELIEF TOP
HEATER
5.5
20,53

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 RESISTANCE CHECK BEFORE	Ω AFTER GLUING
Inlet/outlet foil heater	QM	HHLL1aPW_f			
		HHLL1bPW_f			
	PW FM 1	HHLL**1aPWAK_f**	1		
		HHLL**1bPWAK_f**	2		
	SR FM 2	HHLL**1aSRAM_f**	3	7.75	7.86
		HHLL**1bSRAM_f**	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 (FM 1)	HHCON**WAKEP1a**	003	50.5	
		HHCON**WAKEP1b**	004	49.89	
		HHCONWAKEP2a	005	50.41	
		HHCONWAKEP2b	006	49.99	
		HHCONWAKEP3a	007	49.81	
		HHCONWAKEP3b	008	49.79	
		HHCONWAKEP4a	009	50.27	
HH CON WAKE P 46		**HHCONWAKEP5a**	010 011	50.02 49.08	
		HHCONWAKEP5b	012	50.05	
		HHCONWAKEP6a	013	49.98	
		HHCONWAKEP6b	014	49.3	
	UNDER STRAIN RELIEF	**HHCONWAKEP7a**	001	49.51	
		HHCONWAKEP7b	002	49.53	
	OVER STRAIN RELIEF	**HHCONWAKEP8a**	015	49.8	
		HHCONWAKEP8b	016	50.03	


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 8a
HHCONWAKE 8b
Primary WAKE


Primary WAKE
HHLL1a WAK f
HHLL1b WAK f
HHLL1aPWAK_w
HHLL1bPWAK_w