Cavity History Summary
CKM - SCRF 3.9GHz Transverse Mode Cavity

Cavity Description					Cleaning Treatment Summary					RFMeasurement Summary								
CAVITY	BEAM TUBE ID (*mm*)	PULL-OUTS	WELDING COMPLETED	Rs @Qo = 2.1e9 (nΩ)	CHEMICAL TREATMENT	ETCH DETAILS	HIGH PRESSURE RINSE @JLAB	HIGH PRESSURE RINSE @A0	HEAT TREATMENT DETAILS	RF Test Date	Resonant Frequency (MHz)	Rs (nΩ)	$E_{D\ Max}$ (MV/m)	X-Rays	T @Freq (K)	T @Rs (K)	T @$E_{D\ Max}$ (K)	Rs correct * (nΩ)
A15-5C-1o	30	NO		112	??	??	??	??	??	1/31/2001	N/A	330	N/A	N/A	N/A	1.53	N/A	
					JLAB prior to 5/22/2001	??	??	??	??	5/22/2001	3908.953	??	??	??	??	??	??	
C15-1C-1A	30	NO	11/17/2000	121	JLAB prior to 2/8/2001	102 μm	Yes ?Time?	?	?	3/14/2001	3946.3	120	??	Yes	?	1.8	N/A	
								< 4/26/2001		4/26/2001	3964.531	118	9.7	Yes	1.8	1.8	1.8	
										5/1/2001	N/A	5500	N/A	??	N/A	2.0	N/A	
					JLAB - 7/29/01	137 μm	20 min	??		8/31/2001	N/A	1420	N/A	??	N/A	1.89	N/A	
										9/4/2001	3959.690	990	6.3	Yes	1.79	1.8	1.79	
					JLAB - 10/12/01	4 x 1 minute BCP @ 6.2 μm/min Tot.= 25 μm	15 min	10/19/2001	JLAB - 800 C - 6 hrs	11/1/2001	3954.240	180	5.9	No	1.73	1.77	1.79	
C15-1C-2A	30	YES	3/23/2001	121						8/24/2001	3955.690	22350	N/A	N/A	1.83	1.83	N/A	
										9/18/2001	3954.000	8500	1.4	??	1.75	1.86	1.76	
					JLAB - 10/12/01	4 x 1 minute BCP @ 6.2 μm/min Tot.= 25 μm	15 min		JLAB - 800 C - 6 hrs	11/15/2001	3950.980	206	6.0	No	1.71	1.71	1.79	
										11/16/2001	3950.930	190	5.9	No	1.70	1.70	1.79	
C15-13C-1A	36	YES	8/27/2001	109						6/27/2002	3930.016	1390	2.6	No	1.89	1.89	1.91	
C15-1C-3A	36	NO	10/17/2001	121	JLAB - 02/06/02	4 x 1 minute BCP @ 5.4 μm/min Tot.=22 μm	15 min		JLAB - 600 C - 10 hrs									
								10/21/2002 20up/20dwn	A0 - 150C Wrap Bake 10/30/2002 - 11/3/2002	11/7/2002	3976.415	1042	5.4	Once	1.78	1.79	1.80	731
C15-3C-1A	36	NO	11/15/2001	109	JLAB - 02/06/02	4 x 1 minute BCP @ 5.4 μm/min Tot.=22 μm	15 min	2/17/2001	JLAB - 600 C - 10 hrs	2/23/2002	3930.583	234	5.1	No	1.78	1.81	1.79	137 / 55
										3/15/2002	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
										5/1/2002	3930.186	265	4.8	No	1.78	1.79	1.78	168
					JLAB - 05/30/02	4 x 3 minutes BCP @ 5.8 μm/min Tot.=70 μm	60 min			7/15/2002	3923.339	278	3.9	No	1.77	1.79	1.79	181
								9/3/2002 20up/20dwn		10/2/2002	3923.307	298	3.4	No	1.79	1.79	1.79	201
								11/19/2002 20up/20dwn	11/15/2002 Fermi 2 hrs @ 800 C	12/4/2002	3923.838	265	3.6	No	1.78	1.78	1.78	168
	Pickup Probe Flange Changed to VPP-4B									12/20/2002	3923.830	196	3.7	No	1.74	1.79	1.80	
	Input Coupler Changed to VIC-4									2/18/2003	3922.986	173	3.5	No	1.79	1.79	1.79	
C15-9C-1B	36	YES	7/19/2002															

Cavity Notation: XXX-nC-sm

XXX = profile shape
n = number of cells
s = serial number (chronological order of fabrication)
m = Niobium shipment utilized for fabrication

* See Rs Correction Note Based upon End Effects Extraction One Page 3 of this Cavity History Table

RF Measurement Details
CKM - SCRF 3.9GHz Transverse Mode Cavity

					Resonant Frequency		Rs_{min}					$E_{D\ Max}$						Design Rs
Cavity	Test Date (yyyy-mm-dd)	Measurer	Input Coupler	Pickup Probe	Frequency @$(Tc/T)_{Freq}$ (MHz)	$(Tc/T)_{Freq}$	Rs (nΩ)	Method tau or Pt	Tc/T @Rs	E_D @Rs (MV/m)	Method tau or Pt	$E_{D\ Max}$ (MV/m)	Method tau or Pt	Rs @$E_{D\ Max}$ (nΩ)	Method tau or Pt	Tc/T @$E_{D\ Max}$	X-Rays (Yes/No)	Rs needed for Qo=2.1E9 (nΩ)
A15-5C-1o	2001 - 01 - 31	Champion	VIC-2	VPP-2	N/A	N/A	330	N/A	6	N/A	N/A	0.9	N/A	N/A	N/A	N/A	N/A	112
A15-5C-1o	2001 - 05 - 22	Champion	VIC-2	VPP-2														112
C15-1C-1A	2001 - 02 - 08	Champion	VIC-1	VPP-1														121
C15-1C-1A	2001 - 03 - 14	Champion	VIC-1	VPP-1	N/A	N/A	120	N/A	5.11	N/A	N/A	??	N/A	N/A	N/A	N/A	N/A	121
C15-1C-1A	2001 - 04 - 26	Champion	VIC-1	VPP-1			118		5.11									121
C15-1C-1A	2001 - 05 - 01	Champion	VIC-1	VPP-1	N/A	N/A	5500	N/A	4.6	0.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	121
C15-1C-1A	2001 - 08 - 31	Berenc	VIC-1	VPP-1	N/A	N/A	1420	tau	4.87	0.8	Pt	N/A	N/A	N/A	N/A	N/A	N/A	121
C15-1C-1A	2001 - 09 - 04	Berenc	VIC-1	VPP-1	3959.690	5.14	990	Pt	5.11	1.8	Pt	6.3	Pt	2140	Pt	5.14	Yes	121
C15-1C-1A	2001 - 11 - 01	Berenc	VIC-1	VPP-1	3954.240	5.33	180	Pt	5.19	0.5	Pt	5.9	Pt	490	Pt	5.15	No	121
C15-1C-2A	2001 - 08 - 24	Berenc	VIC-2	VPP-2	3955.690	5.03	22350	tau	5.03	0.7	tau	N/A	N/A	N/A	N/A	N/A	N/A	121
C15-1C-2A	2001 - 09 - 18	Berenc	VIC-2	VPP-2	3954.000	5.26	8500	Pt	4.94	0.2	Pt	1.4	Pt	31480	Pt	5.23	?	121
C15-1C-2A	2001 - 11 - 15	Berenc	VIC-2	VPP-2	3950.980	5.39	206	Pt	5.39	0.5	Pt	6.0	Pt	680	Pt	5.14	No	121
C15-1C-2A	2002 - 11 - 16	Berenc	VIC-2	VPP-2	3950.930	5.40	190	Pt	5.4	1.2	Pt	5.9	Pt	640	Pt	5.14	No	121
C15-13C-1A	2002 - 06 - 27	Berenc	VIC-3	VPP-4	3930.016	4.87	1390	tau	4.85	0.6	tau	2.6	tau	1880	tau	4.82	No	109
C15-1C-3A	2002 - 11 - 07	Berenc	VIC-1	VPP-5	3976.415	5.17	1042	Pt	5.14	2.3	Pt	5.4	Pt	1231.2	Pt	5.11	Once	121
C15-3C-1A	2002 - 02 - 23	Berenc	VIC-3	VPP-3	3930.583	5.17	234	tau	5.09	3.8	tau	5.1	tau	236	tau	5.14	No	109
C15-3C-1A	2002 - 03 - 15	Berenc	VIC-3	VPP-4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	109
C15-3C-1A	2002 - 05 - 01	Berenc	VIC-3	VPP-4	3930.186	5.17	265	Pt	5.14	1.0	Pt	4.8	Pt	267	Pt	5.17	No	109
C15-3C-1A	2002 - 07 - 15	Berenc	VIC-3	VPP-4	3923.339	5.19	278	Pt	5.15	1.0	Pt	3.9	Pt	347	Pt	5.14	No	109
C15-3C-1A	2002 - 10 - 02	Reid	VIC-3	VPP-4	3923.307	5.14	298	Pt	5.14	1.7	Pt	3.4	Pt	418	Pt	5.13	No	109
C15-3C-1A	2002 - 12 - 04	Berenc	VIC-3	VPP-4	3923.838	5.18	265	Pt	5.17	0.8	Pt	3.6	Pt	297	Pt	5.16	No	109
C15-3C-1A	2002 - 12 - 20	Berenc	VIC-3	VPP-4B	3923.830	5.30	196	tau	5.13	1.7	tau	3.7	tau	199	tau	5.10	No	109
C15-3C-1A	2003 - 02 - 18	Berenc	VIC-4	VPP-4B	3922.986	5.13	173	tau	5.13	0.6	tau	3.5	Pt	247	Pt	5.13	No	109
C15-9C-1B																		

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Correction to Rs Measurements based upon End Effects Extraction

$$\frac{1}{Q_{meas}} = \frac{1}{Q_{cav}} + \frac{1}{Q_{ends}}$$

$$\frac{1}{Q_{meas}} = \frac{N \cdot P_{1-cell}}{N \cdot U_{1-cell}} + \frac{P_{ends}}{N \cdot U_{1-cell}}$$

$$R_{s\,meas} = G \cdot \frac{1}{Q_{meas}} = R_{s\,cav} + G \cdot \frac{1}{Q_{ends}}$$

C15-3C-1A (3-Cell) Recent Measurements:

Without end effects (2003-02-18): $R_{s\,meas} = 173\,n\Omega \quad \Rightarrow \quad Q_{cav} = 1.32 \cdot 10^9$

With end effects (2002-12-04): $R_{s\,meas} = 270\,n\Omega \quad \Rightarrow \quad Q_{meas} = 8.437 \cdot 10^8$

Given these measurement results,

$$Q_{ends\,3-Cell} = 2.35 \cdot 10^9$$

$$Q_{ends\,1-Cell} = \frac{1}{3} \cdot Q_{ends\,3-Cell} = 7.83 \cdot 10^8$$

Extracting the end effects from previous 36-mm beam-piped cavity measurements:

<u>First C15-3C-1A (G=227.8) measurement on 2002-02-23</u>:

$$R_{s\,meas} = 234\,n\Omega$$

$$R_{s\,cav} = 234\,n\Omega - G \cdot \frac{1}{Q_{ends\,3-Cell}} = 137\,n\Omega$$

Note: The Diode Detector was not calibrated until 2002-04-30. Without a Calibration τ_{meas} is in error by ~ -35% to –40%. Assuming τ_{meas} is $0.65\tau_{actual}$, $R_{s\,act} = 0.65 \cdot 234\,n\Omega = 152\,n\Omega$, which implies that $R_{s\,cav} = 152\,n\Omega - G \cdot \frac{1}{Q_{ends\,3-Cell}} = 55\,n\Omega$. Can we believe this?? If so, great!!

<u>C15-1C-1A (1-Cell, G=243.2) measurement on 2002-11-07</u>:

$$R_{s\,meas} = 1042\,n\Omega$$

$$R_{s\,cav} = 1042\,n\Omega - G \cdot \frac{1}{Q_{ends\,1-Cell}} = 731\,n\Omega$$