Andreas Silbermann Organ- 1710

Abbey Church of Saint-Étienne

Marmoutier, Alsace, France

By Blair Batty

Forward

I am a retired organbuilder. I've always had an interest in pipe organ scaling and voicing. Scaling are the measurements of the pipes, that give them the particular sound of a particular organ. Over the years, I have collected and studied the scales of dozens of organs. As it was for my personal use, and I am not an academic, I often failed to note where I got the measurements from.

As this data may be useful to others, I decided to share it. You must use it with caution, as some of it was written down years ago. I may no longer know the source, or how reliable it may be.

Bear in mind when studying the scales, it is pitched at approximately A=392 Hz *(a whole tone below modern concert pitch of A=440 Hz)*, which is an authentic characteristic of its time.

If you are new to scaling, I recommend: http://www.blairbatty.ca/tonal.html#scales

Do contact me, if you have any comments, corrections, sources or questions. I won't be offended.

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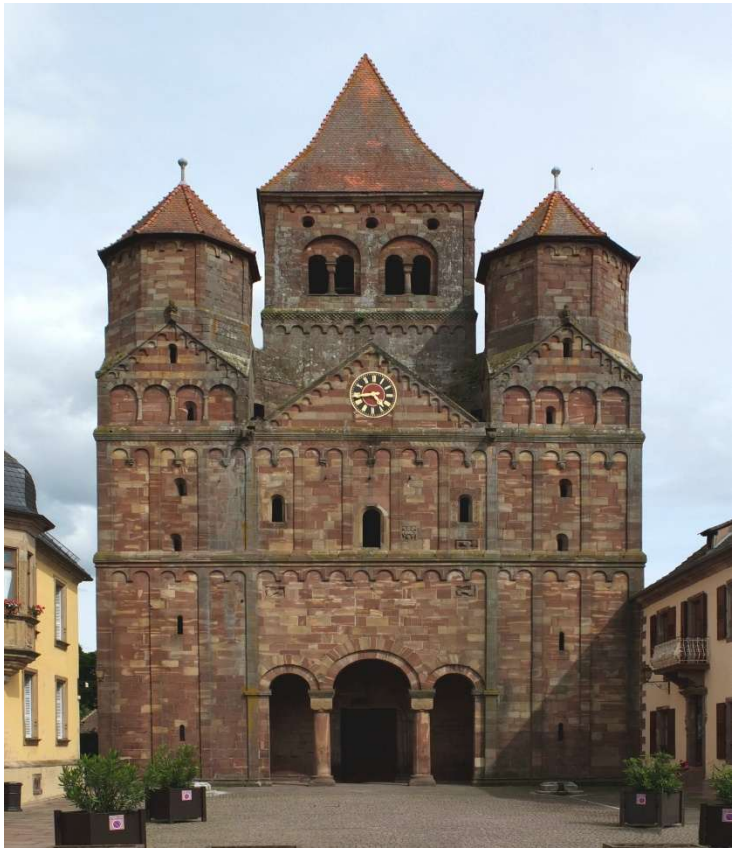


The Marmoutier Organ

Abbey Church of Saint-Étienne (Saint Stephen), Marmoutier, Alsace, France. The Marmoutier Organ is one of the most famous and historically significant organs in the world. It's a masterpiece of 18th-century Alsatian organ building and a jewel of the Baroque and Classical periods.

Built by the renowned organ builder André Silbermann in 1709-1710. The Silbermann family (André and his younger brother Gottfried, who worked in Saxony) are considered among the greatest organ builders of the Baroque era.

Almost Completely Preserved: This is its greatest claim to fame. Unlike most historic organs that have been drastically altered over centuries, the Marmoutier organ retains over 90% of its original pipework

It has 26 stops spread over two manuals and pedal. No couplers between manuals, which is typical of the period. Temperament: The organ is tuned in a historic "Silbermann" temperament, a modified meantone temperament. This creates beautifully pure thirds in some keys and intense, characterful "wolves" (dissonances) in remote keys.

Wind Pressure very low (around 65 mm water column), producing a clear, articulate, and singing tone. The magnificent oak case is a masterpiece of Alsatian Baroque woodcarving, attributed to the sculptor Jean Conrad Wörner. It features columns, cherubs, and the Silbermann eagle.

Mozart Connection: In 1778, Wolfgang Amadeus Mozart visited the abbey with his mother. According to local legend, he improvised on the organ for over three hours, proclaiming, "Now that is what I call an organ!" While the story may be embellished, his visit is documented.

Stoplist

Grand Orgue

16'	Bourdon
8'	Montre
8'	Bourdon
4'	Prestant
2 2/3'	Nazard
2'	Doublette
1 3/5'	Tierce
	Cornet V
	Fourniture III
	Cymbale III
8'	Trompette
8'	Voix humaine
4'	Clairon

Echo

8'	Bourdon
4'	Prestant
2 2/3'	Nazard
2'	Doublette
1 3/5'	Tierce

Positif de dos

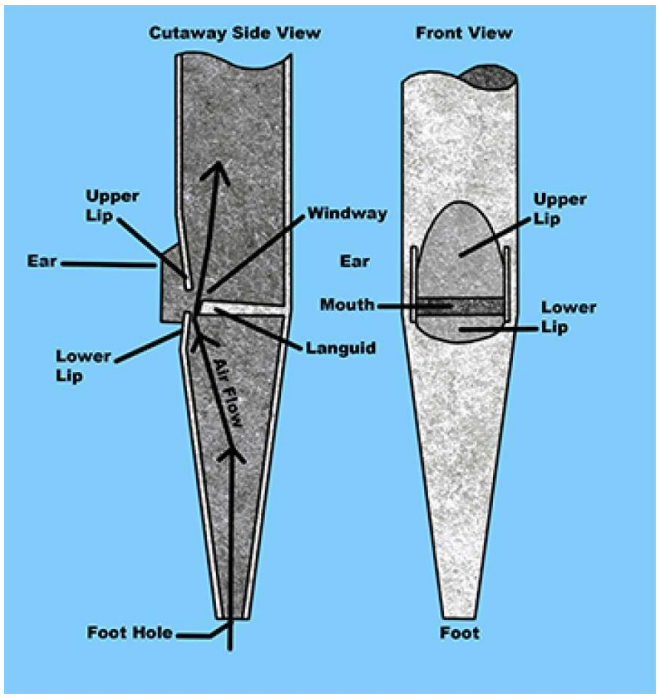
8’	Bourdon
4'	Prestant
2 2/3'	Nazard
2'	Doublette
1 3/5'	Tierce
	Fourniture III
8'	Cromhorne

Pedal

16'	Flute
8'	Flute
4'	Flute
16'	Bombarde *(wood resonators)*
8'	Trompete

Description of Measurements

If you are not familiar with scaling measurements, I recommend you checkout my book of Scaling. It is available for free download from my website http://www.blairbatty.ca/tonal.html#scales. I typically measure every "c" and "f#" pipe, to understand how the dimensions of the pipes change, throughout the compass, from bass to treble.



Diameter: This is the inside diameter of the pipe, measured in millimeters.

Mouthwidth: width of the mouth in millimeters.

Cutup: is distance between the upper and lower lips, in millimeters.

Windway: is the width of the slit of the windway, in millimeters.

Toehole: Is the diameter of the wind hole in the bottom of the foot, in millimeters.

Foot WP: Is the windpressure inside the foot of the pipe, measured in Pascal. Ten Pascal = ~1 millimeter watercolumn.

Calculations

Not everything was measured. Some of the numbers written down here were calculated from the measurements.

Topfer NM: The diameter, mouthwidth and cutup measurements were converted to Topfer Normmeasure and graphed. Mouth NM presumes ¼ mouth as normal, cutup presumes ¼ cutup as normal.

Mouthwidth and cutups: are commonly described as fractions *(e.g. ¼ mouthwidth, ¼ cutup)*. So, these fractions were also calculated.

Foot wp %: is (footpressure/chestpressure)*100; another interesting reference.

Dr Hartmut Ising developed a formula to show how well the mouth matches the resonator. It provides an intonation number (I), a dimensionless value that represents a pipe's timbre and efficiency.

An Ising of 2 is an ideal match between the mouth and the resonator *(but not necessarily the best sound*). The pipe works most efficiently. For a given frequency, what Ising requires is the cutup, and the amount of energy input.

The Ising number provides a useful reference point. But you need some experience to make sense of the numbers. As Ising numbers get larger, the sound gets brighter;

- I=1.4 is typical for a Stopped Diapason.
- I=2 is a typical Diapason.
- I=3 makes a good string.

dB 3pf: Is the theoretical, nearfield, dB loudness of 3 adjacent pipes simultaneously played.

What do the Numbers Tell Us?

Some people, like I, enjoy measuring the various dimensions of the pipes in an organ, and generating various charts and graphs of that data. We do that to discover how the original designer and voicer scaled and manipulated the pipes, to arrive at the sound they wanted.

In very simplistic terms, scaling and voicing can be described in this way:

- Diameter determines the loudness of the fundamental of the pipe.
- Cutup fine-tunes the harmonic content.
- Toehole/mouthwidth/windway fine-tunes the loudness.

Of course, it's not that simple. For example, you can increase the scale of the pipe, which would increase the loudness of the fundamental *(and will also make the tone brighter)*. Then by reducing the toehole size which reduces the wind and loudness, and by using a lower cutup to reduce the brightness you can approximate the original pipes sound. But it is not identical, change has consequence.

GRAND ORGUE — MARMOUTIER

		C	C°	c'	c''	c'''
Principal	8	145	97	52	36	21
Bourdon	16	180/180	110/110	60/60	48	30
Bourdon	8	110/110	60/54	47 rohr / ~~60~~/54	28	20
Prestant	4'	86	50	31	19	12
Quinte	2 2/3'	84	48	31	21	14
Doublette	2'	44	26	16	12	8
Tierce	1 3/5	53	33	22	15	9
Fourniture	1 1/3	31.5	18			
	1	24	9.6???!!!			
	2/3	18	12			
Cymbal	1/2	14.5				
	1/3	11.1				
	1/4	9.8				

Note 16 & 8 Bourdons are same scale

MARMOUTIER

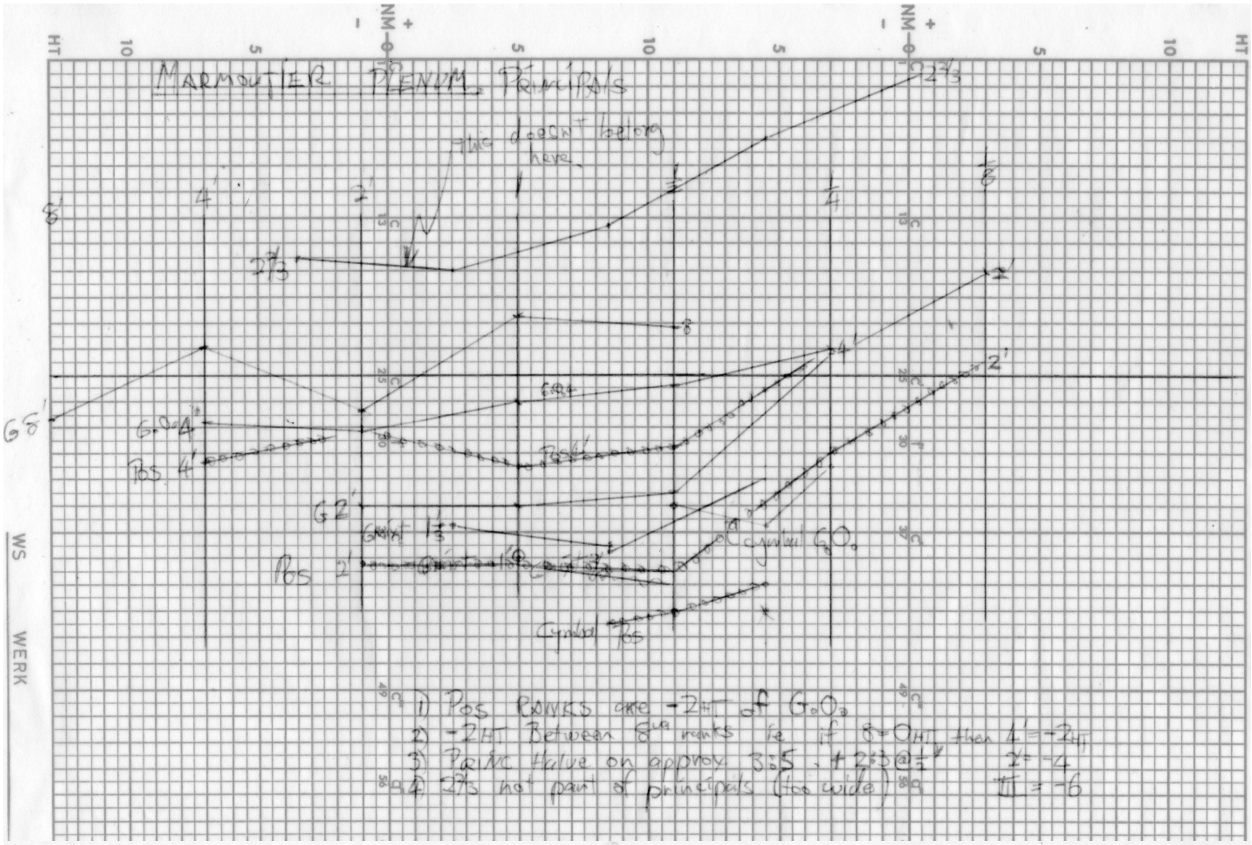
	C	c	c'	c''	c'''
Bourdon 8'	110/105	61	40	26	18 (Rohrfl.)
Principal 4'	80	50	28	17	12 "
Flote (Rohr) 4'	60	40	26	24	16 (conical from g')
Nazard 2 2/3	48 #1	30 5	29	19	
(another source gives this →)	68 #2	45	30	18	13
Doublette 2'	40	24	14	10	7
Terz 1 3/5	50	31	29 !!	13	8
Cromorne 8'	33	31	30	28	26

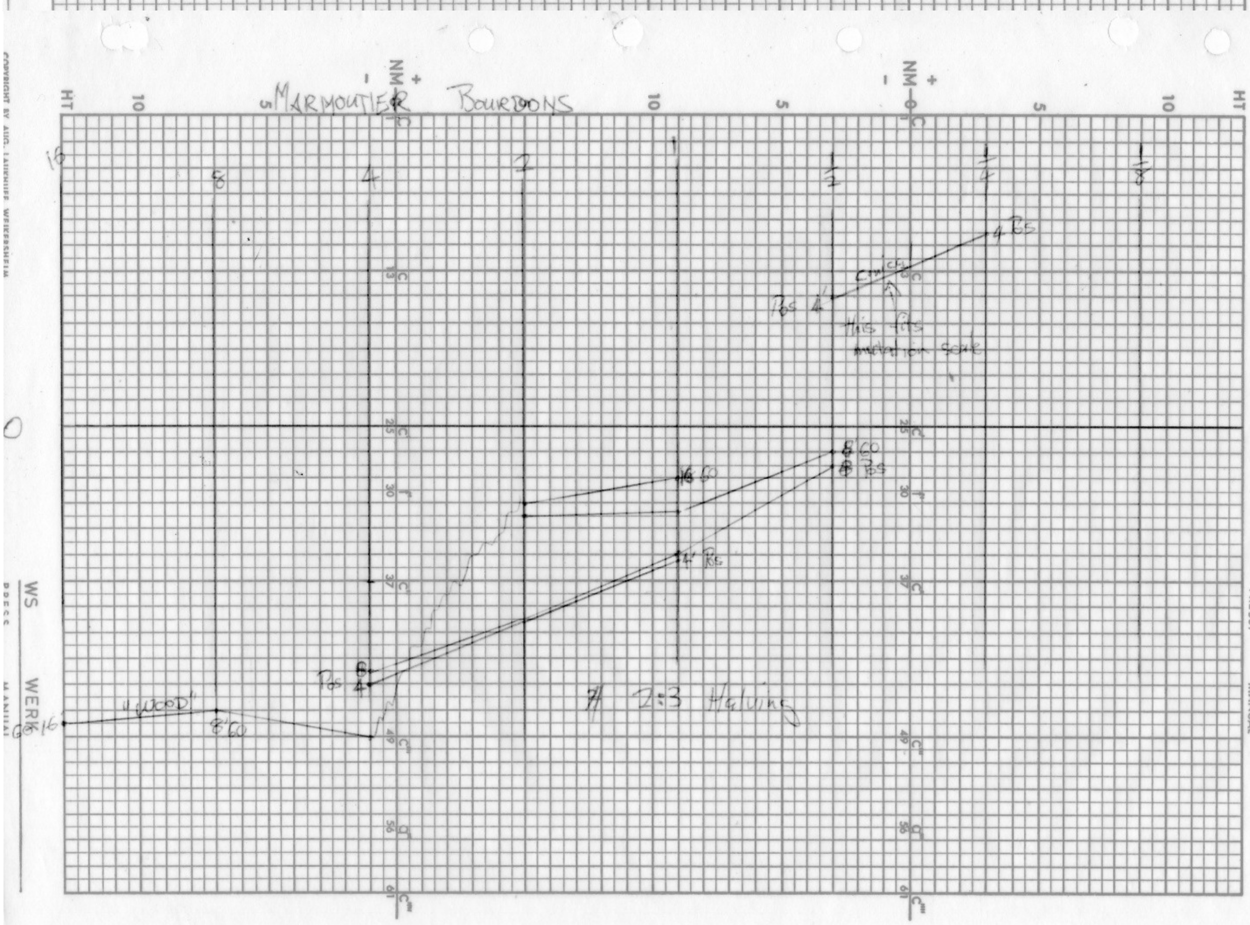
Cymbal

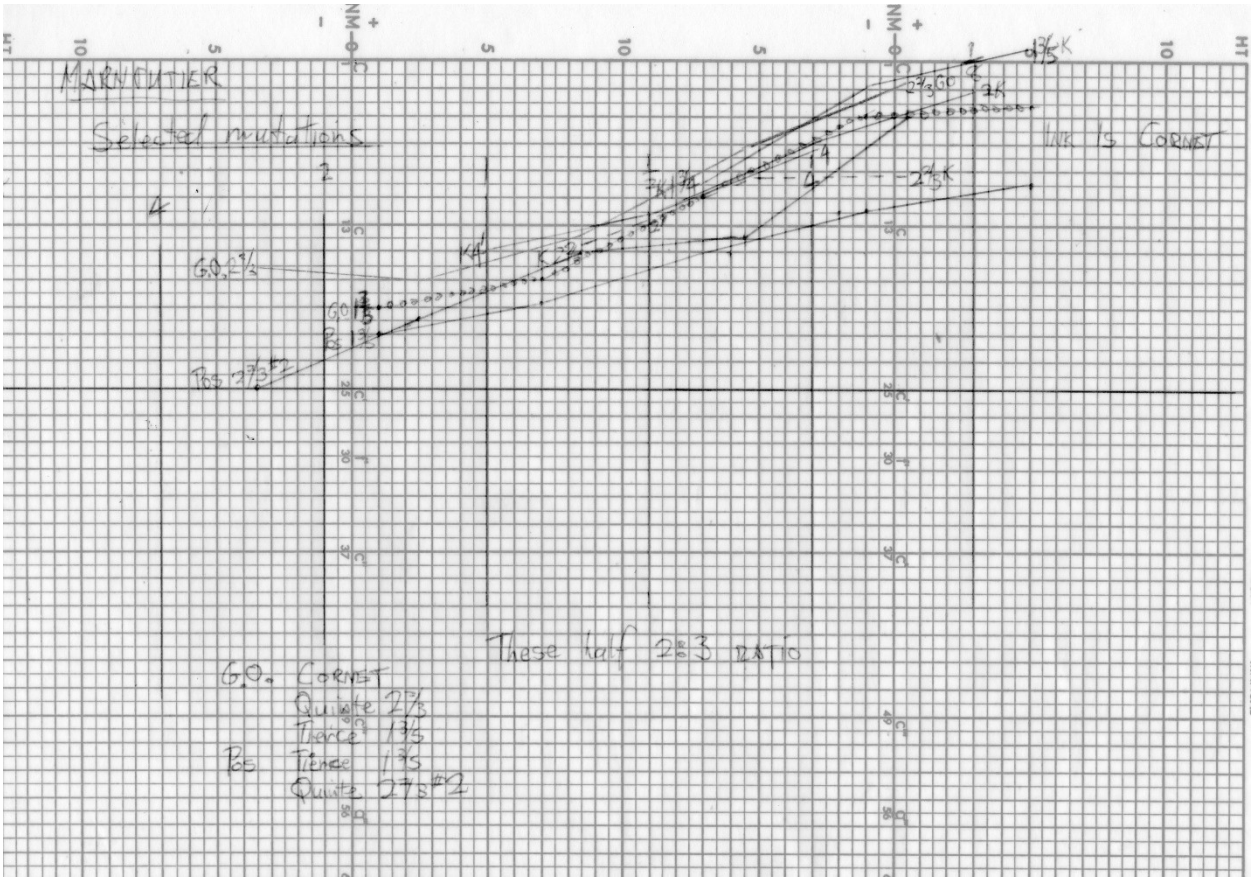
c''	C					1	3/3 1/2
	6				1 1/3	1	2/3
	4			2	1 1/3	1	
	c'		2 2/3	2	1 1/3		
	g'	4	2 2/3	2			
	c''						

2/3' = 16
1/2' = 13.1
1/3' = 10.5

NOTE 8ed 4 flutes are similar to G.O. 16 8'


MARMOUTIER PLENUM PRINCIPALS
this doesn't belong here
1) Pos Ranks are -2HT of G.O.
2) -2HT Between 8va ranks ie if 8=0HT then 4'=-2HT
3) Princ Halve on approx 3:5, + 2:3 @ 1/4
2' = -4
4) 2 2/3 not part of principals (too wide)
III = -6


MARMOUTIER BOURDONS
"WOOD"
critical
this fits mutation scale
2:3 Halving


MARKTUTTER
Selected modulations
INK IS CORNET
These half 2&3 ratio
6.0. CORNET
Quinte 2⅔
Tierce 1⅗
Ped Tierce 1⅗
Quinte 2⅔

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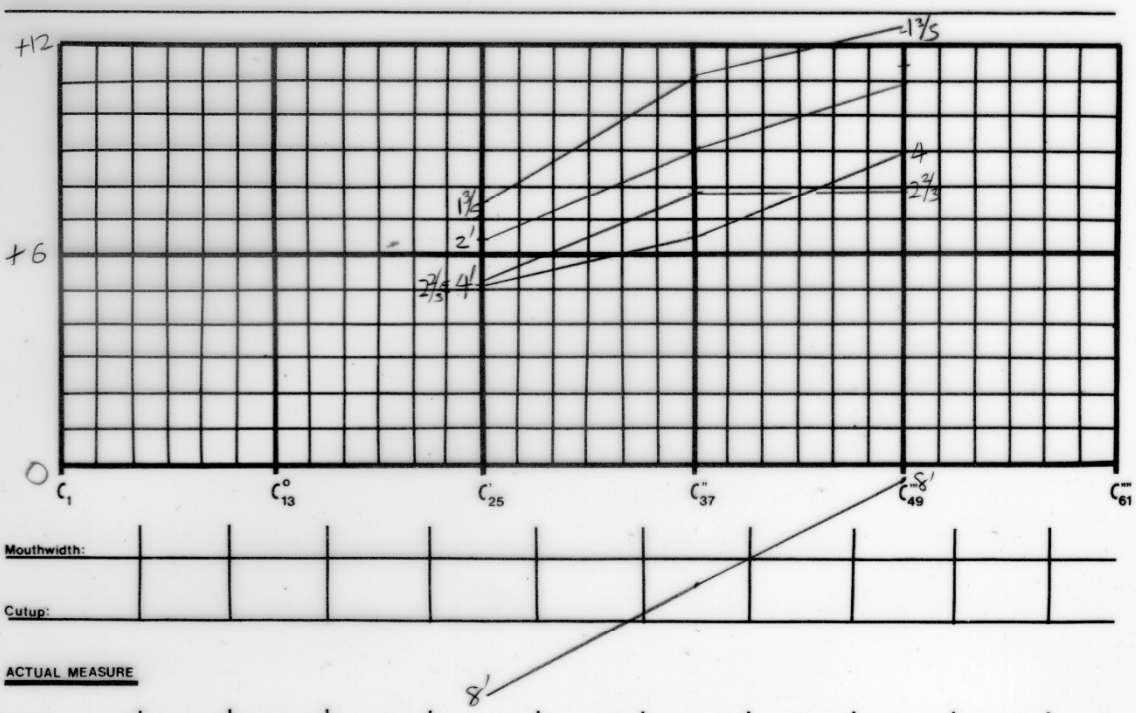
Stop: CORNET II Div.: G.O.

Windpressure: Pitch:

Builder: Date:

Church: MARMOUTIER

Description of site & organ:



Mouthwidth:

Cutup:

ACTUAL MEASURE

	Top Diameter:								
Bourdon 8	Diameter at Mouth:			40		27		19	
4	Mouthwidth:			40		25.5		17	
2 2/3	Cutup:			30		20		12	
2	Metal Thickness:			25.5		16.8		11	
1 3/5	Windway:			22.5		15.5		10	
	Languid:								
	Body Length:								
	Toe Hole ø:								

A. B. Batty

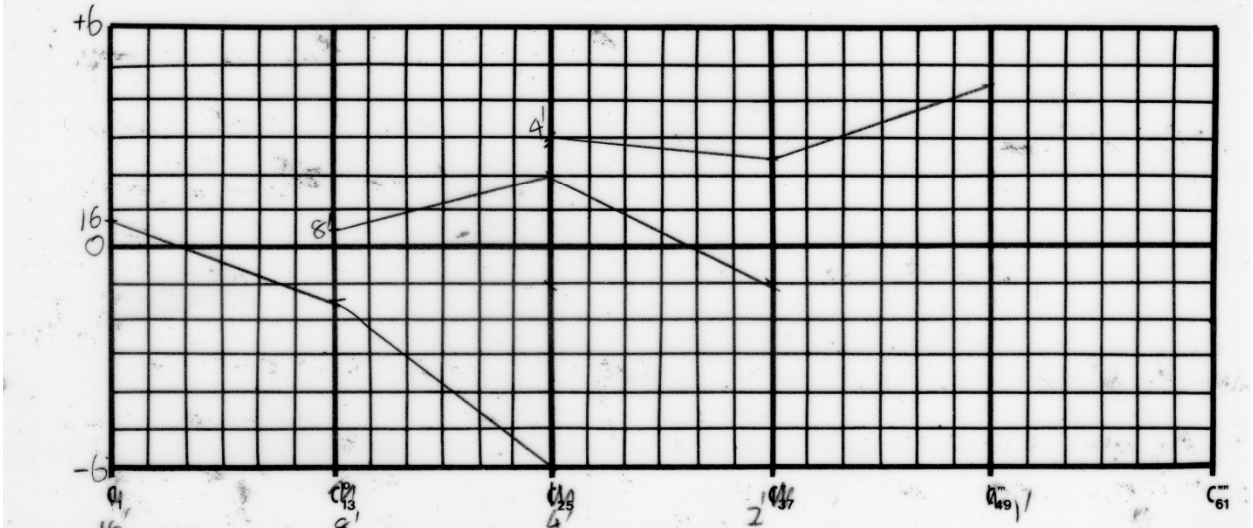
Stop: PEDALFLOTE 16, 8, 4' Div.: PED

Builder: Date:

Windpressure: Pitch:

Church: Marmoutier

Description of site & organ:



16' 8' 4' 2' 1'

16 Mouthwidth: 1/4 8' 4'

Cutup:

ACTUAL MEASURE

	16'	8'	4'	2'	1'
16 Top Diameter: ~~210~~ / Diameter at Mouth: ~~270~~		110 / 150	80 / 50		
8 Mouthwidth:		160	100	53	
4 Cutup:			105	61	40
Metal Thickness:					
Windway:					
Languid:					
Body Length:					
Toe Hole ø:					