Journal of the Quadri- and Poly-Geometry Group 2019

Digital Edition

Chris van Tienhoven et al.

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Messages #1 - #60

Contents

1 Introduction

This journal is a compilation of messages from the **Quadri- and Poly-Geometry (QPG)** forum, where mathematicians and geometry enthusiasts exchange ideas on the properties of **quadrilaterals**, **polygons**, and **curves of nth degree**. The discussions cover a wide range of topics, from classical geometric theorems to new discoveries and insights.

The origins of this journal trace back to the Quadri Figures Group (QFG, available at https://groups.io/g/Quadri-Figures-Group), which was active from 2013 until November 2019. In November 2019, the forum transitioned into the Quadri- and Poly-Geometry Group (QPG, available at https://groups.io/g/Quadri-and-Poly-Geometry) forum, which continues to facilitate discussions on quadrilaterals, polygons, and related topics. Over the years, these forums have evolved into valuable resources for exploring both well-established results and novel perspectives in geometry. For both forums, an **annual record of all incoming messages** is compiled in this journal.

This journal is available in **PDF format** and includes a **table of contents** that organizes all messages by subject. Navigation is made easy through **hyperlinks** embedded in the message numbers, allowing users to quickly jump between related discussions or return to the table of contents for further reference.

Many of the topics discussed here are closely related to the Encyclopedia of Poly Geometry, available at https://www.chrisvantienhoven.nl/, which aims to systematically classify and analyze geometric structures. By collecting these forum messages, this journal serves both as a **historical archive** and as a **source of inspiration** for further research in the fascinating world of geometry.

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2 Authors

This section presents an alphabetical overview of the authors who contributed messages to this volume of the Journal.

- Bernard Keizer
- Chris van Tienhoven
- Eckart Schmidt
- Vu Thanh Tung

2.1 Author Index

This section provides an index of all authors who contributed messages to this volume of the Journal.
Each entry lists the author's name, their identifier, and the message numbers associated with their contributions. The list below shows the authors along with the numbers of related messages. Click on a number to go to the corresponding page.

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2.2 Author Information

This section presents background information on the contributing authors. Short biographical notes, areas of interest, and selected publications are included to provide context for their contributions to the Journal. These profiles offer readers an opportunity to become acquainted with the individual behind the names and to appreciate the diverse mathematical backgrounds represented in this volume. Author information is included only insofar as it has been provided or was available.

Chris van Tienhoven

Global Location
Living in the Netherlands.

Year of Birth
1950.

Short Biography
Chris van Tienhoven graduated in mathematics from Leiden University and has built a career as an entrepreneur working across information technology and graphic design. He also remained active in geometry. Central to his work is a lifelong habit of reducing complexity into simplicity and creating clear, durable structures. He values order, coherence, and long-term vision—principles. All of this eventually led to the creation of the Encyclopedia of Poly Geometry.

Themes, Interests, and Relevant Publications

- Lifelong interest in geometry, beginning in secondary school, with a special fascination for Van Aubel's Theorem.
- Developed the notion of Perspective Fields.
- Initiator of the systematic development and documentation of Quadri Geometry, later expanded into Poly Geometry.
- Founder of the online communities *Quadri Figures Group* and *Quadri and Poly Geometry Group*.
- Editor and compiler of the Annual Journals that collect and preserve the discussions and discoveries of these groups.
- Founder of the Encyclopedia of Poly Geometry (where all entries without external references originate from his own work).

Selected Publications

- Chris van Tienhoven, Dario Pellegrinetti, *Quadrigon Geometry: Circumscribed Squares and Van Aubel Points*. Journal of Geometry and Graphics, Vol. 25, No. 1, 2021.

Other Remarks
Website: www.chrisvantienhoven.nl
Biography: www.chrisvantienhoven.nl/header/biography/

Eckart Schmidt

Location
Living in Germany.

Year of Birth / Generation
1939.

Short Biography
Eckart Schmidt is a former teacher of mathematics and physics at a full-time secondary school, with a long-standing interest in geometry. His work spans several decades and includes numerous contributions to geometric constructions, classical geometry, and the study of n-gons and their transformations.

Themes and Interests

- Geometric constructions using CABRI

Selected Publications

- F. Bachmann & E. Schmidt: *n Ecke.* B.I. Hochschultaschenbuch 471/471a, Mannheim/Wien/Zürich, 1970.
- E. Schmidt: *Abbildungen und Klassen von n Ecken.* MNU XXV (1972), pp. 146–150ff.
- E. Schmidt: *Affin reguläre n Ecke und ihre regulären Komponenten.* MNU XXXIX (1986), pp. 193–198ff.
- E. Schmidt: *Mittelsenkrechtenvierecke eines Vierecks.* PM 2/44 (2002), pp. 84–88ff.
- E. Schmidt: *Circumcenters of Residual Triangles.* Forum Geometricorum 3 (2003), 125–134.
- J. Kühl & E. Schmidt: *Husumer Rechenhandschriften und Paul Halckes Mathematisches Sinnen Confect.* Mitteilungen der Mathematischen Gesellschaft in Hamburg XXIII/2 (2004), 111–156.
- E. Schmidt: *Geradenkonstellationen.* MNU 60/1 (2007), 28–29.
- E. Schmidt: *Billardvierecke eines Sehnenvierecks.* MNU 63/5 (2010), 267–269.
- Additional contributions on geometric constructions (see Themen and EQF-notes).

Additional Remarks

- Co-founder of the Encyclopedia of Poly Geometry and one of the principal contributors to QPG.
- Website: www.eckartschmidt.de

3 Subjects

The list below shows the subjects along with the numbers of related messages. Click on a number to go to the corresponding page.

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4 Messages

4.1 Message Index

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4.2 Messages

Message: #1
Date: 2019-11-18
From: van10hoven@gmail.com
Subject: a new group and a new start

```
Dear friends,

The new Quadri- and Poly-Geometry group is now open for new
messages.

We had a great time at the Yahoo Quadri-Figures Group with
almost 4.000 messages in six and a half years.
We investigated all kind of Quadrilateral subjects enriching the
Encyclopedia of Quadri-Figures. I remember the discussion of
Eckart Schmidt and Bernard Keizer about the most interesting
QL-Cu1 cubic. We investigated Morley's Miracles, which became a
start of the Encyclopedia of Polygon Geometry. I remember
Bernard Keizer's Epi- and Hypo-cycloids inscribed in an n-Line.
The discussion about Hofstadter points/n-Angle Centers having
its effect in triangles, quadrilaterals and pentalaterals. The
exploration of the mysterious 5 common points of the 3 versions
of the QA-Cu7 cubic in a Quadrilateral leading to many
unexpected new properties of a Pentangle often dug up by Eckart
Schmidt and Bernard Keizer. And of course the new thoughts about
the Cayley-Bacharach Theorem and the many many "splitter" of
Eckart. And of course many shorter discussions of many other
members. Not only tough stuff but also new insights, older and
unknown theorems, etc. Everything related to our main subjects
was welcome. Thank you all.
I am sure there will be many more challenging subjects to
discuss now.
Let's go on and have a wonderful time in this new group.

Best regards,

Chris van Tienhoven
```

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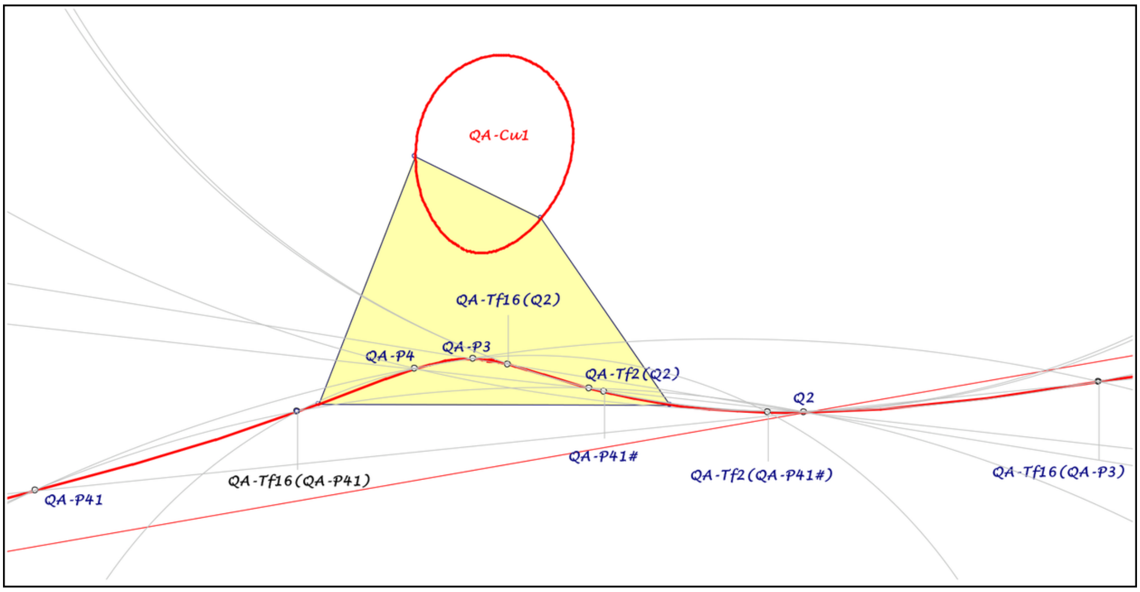
Message: #2
Date: 2019-11-19
From: eckart_schmidt@t-online.de
Subject: Points on QA-Cu1

```
Dear Chris,

I try, to start in the new group:

On QA-Cu1 there are four relevant QA-points:
... QA-P3, QA-P4, QA-P41 and
... Q2 = intersection of QA-Cu1 and its asymptote.
I think, Q2 should have an own item in EQF,
... properties are already mentioned under QA-Cu1.

QA-Cu1 is invariant wrt the transformations
... X-->X^ means QA-Tf2,
... ... partners on QA-Cu1 are collinear QA-P4.
... X-->X# means isogonality wrt QA-Tr2,
... ... partners are collinear with the point at infinity
        of the asymptote.
... X-->X~ means QA-Tf16,
... ... partners are collinear with QA-P3.

Some properties:
Q2.QA-P3 intersects QA-Cu1 in Q2~.

Q2.QA-P4 intersects QA-Cu1 in Q2^,
... which has -by the way-  the following property:
Take the circumconics of the Miquel triangle QA-Tr2
... wrt two pairs of different QA-vertices
... and consider the 4th intersections of these pairs of conics,
... which give a new triangle on QA-Cu1,
... perspective QA-Tr2 with perspector Q2^.

Q2.QA-P41 intersects QA-Cu1 in QA-P3~.

In EQF a further point on QA-Cu1 is mentioned:
... QA-Tf1(QA-L9) = QA-P41#,
... ... isogonal conjugated of QA-P41 wrt QA-Tr2:
... QA-P41#~ = Q2^.

Perhaps unexpected:
Q2, QA-P41, QA-P3~ collinear.
Q2, QA-P41~, QA-P41#^ collinear.
Q2, Q2^, QA-P41, QA-P41~ concyclic.
Q2, Q2~, QA-P41#, QA-P41#^ concyclic.
Q2, QA-P4, QA-P3~, QA-P41#^ concyclic.
QA-P3, QA-P4, QA-P41, QA-P3~ concyclic.
```

```
QA-P3, QA-P4, QA-P41~, QA-P41#^ concyclic.

Best regards Eckart

PS. For points on QA-Cu1
... QA-Tf16 is the Cayley-Bacharach transformation
... wrt QA-vertices, QA-P4 and the circular points.
```



2019-11-19.pdf

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Message: #3
Date: 2019-11-21
From: van10hoven@gmail.com
Subject: Re: Points on QA-Cu1

```
Dear Eckart,

Beautiful properties of QA-P3, QA-P4, QA-P41, and the three
transformations X->X^, X->X#, X->X~.
It shows the more that QA-Cu1 is a pivotal Isocubic.
I agree Q2 should have an own item in EQF. But you know,
priorities, time, … It’s all so limited . . .

Best regards,
Chris
```

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Message: #4
Date: 2019-11-22
From: eckart_schmidt@t-online.de
Subject: 5P-s-P5

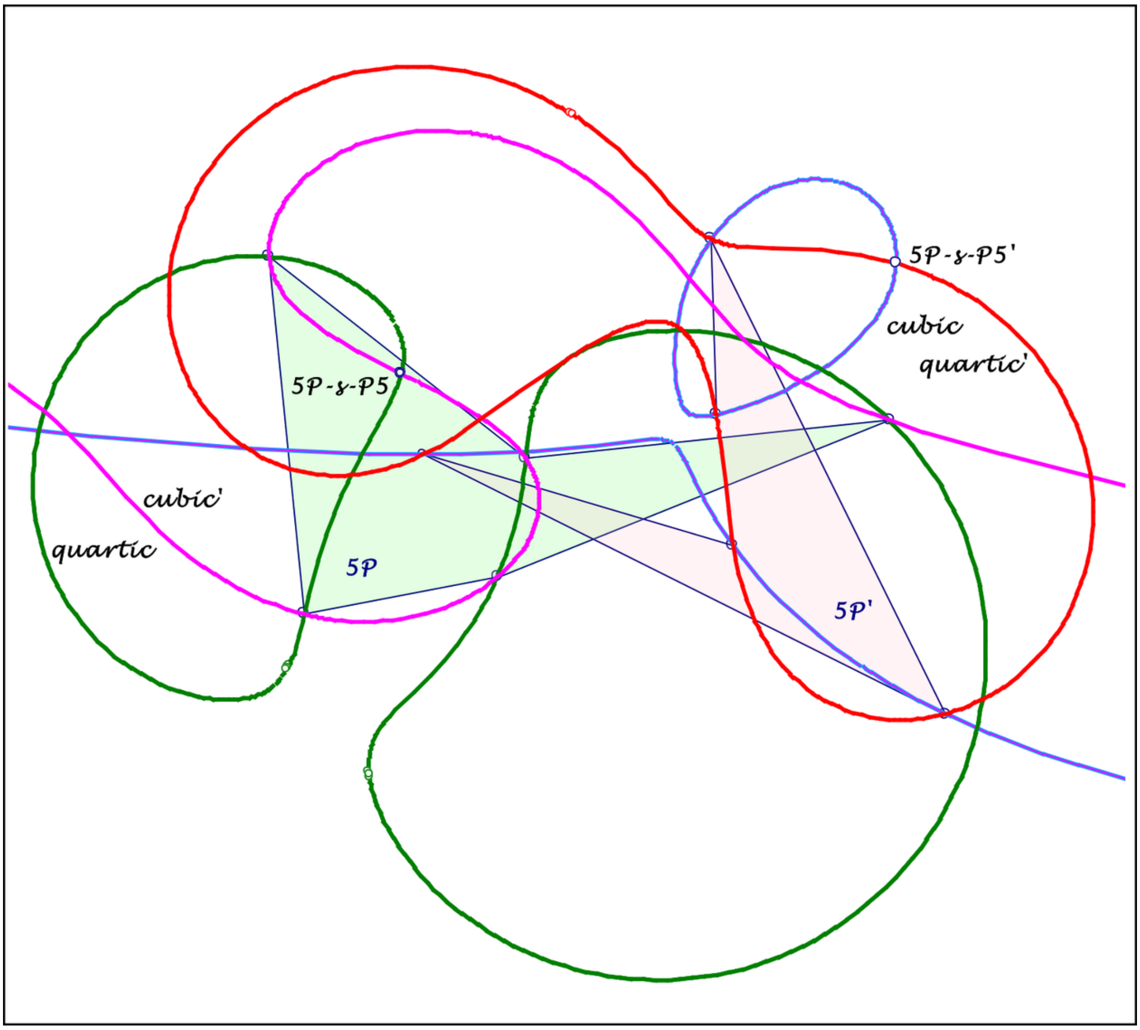
```
Dear Bernard,

is the following property already mentioned?

The 5P-s-P5 of your "twin 5P" are 5P-CSC-partner,
... 6th intersection of the quartic of one 5P and the cubic of
the other 5P.

Best regards Eckart

PS. The 5P-CSC-transformation should have an own item in EPG.
```



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Message: #5
Date: 2019-11-22
From: bernard.keizer@gmail.com
Subject: Re: a new group and a new start

```
Dear Chris,
Many thanks for your kind message, which reminds many items dug
up by Eckart and me !
The fight goes on ...
The forum is dead, long live the forum !
Best regards
Bernard
```

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Message: #6
Date: 2019-11-22
From: bernard.keizer@gmail.com
Subject: Re: 5P-s-P5

```
Dear Eckart,
This property was already mentionned in my 2 messages 3757 and
3758 in the old forum !
Of course I agree with your PS, but I would include the twin
conics, cubics and quartics ...
Best regards
Bernard
```

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Message: #7
Date: 2019-11-24
From: van10hoven@gmail.com
Subject: Re: a new group and a new start

```
Dear friends,

Our friend Francisco Javier has become a moderator of our group.
Therefore the existence of our group no longer depends on one
person.
Recent months I discussed a lot with Francisco (and Antreas)
about the future of our Yahoo Groups and their migration.
Therefore there is a lot of information with us about dealing
with groups.
Once we even met together with our families in Amsterdam,
visiting the “Rijksmuseum” and we had a good time together.
I am glad about his support.

Best regards,

Chris
```

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Message: #8
Date: 2019-11-24
From: bernard.keizer@gmail.com
Subject: Re: Points on QA-Cu1

```
Dear Eckart,
I found your message very stimulating, specially the last remark
in PS.
I thought we knew everything on QA-Cu1, but it wasn't true !
I think we understand always better these CB and cb
transformations.
On any cubic, 7 points define a CB transformation, which is an
isoconjugation with fixed points the 4 tangentials of the pivot
on the cubic (construction possible from the 7 points).
On a circular cubic, 5 points define with the 2 circular points
a cb transformation, which is an isoconjugation the same way
with fixed points the tangentials of the pivot (construction
also possible from the 5 points).
If you take now any point and it's 4 tangentials on QA-Cu1, the
cb transformation wrt these 5 points is an isoconjugation with
fixed points the 4 tangentials of the pivot, *which is the
isogonal conjugate of the initial point*.
In particular, for the 4 QA-vertices and their QA-P4, the pivot
is QA-P3 and the cb transformation of the 5 points and the 2
circular points is QA-Tf16, which swaps the diagonal triangle
and the Miquel triangle.
The same way, for the isogonal conjugates of the QA-vertices and
their QA-P4, which is QA-P3, the pivot is QA-P4 and the cb
transformation of the 5 points and the 2 circular points is
QA-Tf2.
I suppose there are other possible examples involving the
vertices of the Miquel triangle, the in and excenters of this
triangle, your point Q2 and the infinity point of the asymptote
...
I hope my assumption is correct (this gives also for Chris new
5P-s-P4 points)
Best regards
Bernard
```

Message: #9
Date: 2019-11-26
From: bernard.keizer@gmail.com
Subject: Re: Points on QA-Cu1

Dear Eckart,
All this was perhaps obvious, as QA-P4 of the 4 tangentials of a point on QA-Cu1 is the point itself and cb(point P on the curve + it's tangentials) is an isoconjugation wrt the DT of the 4 tangentials with fixed points these 4 tangentials ; the pivot on QA-Cu1 is the isogonal of the point wrt the Miquel triangle, id est the QA-P3 of the 4 tangentials, swapping the DT vertices and the Miquel triangle vertices.
All this holds for QL-Cu1, which is a particular QA-Cu1 and for QA-Cu7, which is a particular bicursal QL-Cu1.
For example, each QA-Cu7 is the QA-Cu1 of the qa of the 4 points UjVjUkVk ; the dt is QG-P1,QG-P18 and QG-P19 and the miquel triangle is QA-P2, QA-P4 and QA-P41 of the initial QA.
qa-p4 of the qa is QG-P19, qa-p2 is csci(qa-p4) and the isogonal of qa-p4 wrt the Miquel triangle is qa-p3.
Then it holds that on this QA-Cu7 cb(Uj,Vj,Uk,Vk,QG-P19i) is an isoconjugation wrt the dt with fixed points the Uj,Vj,Uk,Vk and pivot their qa-p3, swapping the vertices of dt and of miquel triangle.
Best regards
Bernard

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Message: #10
Date: 2019-11-30
From: eckart_schmidt@t-online.de
Subject: Re: Points on QA-Cu1

```
Dear Bernard, dear Chris,

a further property of Q2,
... the intersection of QA-Cu1 and its asymptote:
Consider a reference QA with its QA-Cu1
... and the quadrangle QA' on QA-Cu1 with tangential QA-P3.
Q2 is the Cayley-Bacharach point of the vertices of QA and QA'.
Vertices of QA' are the fixed points of QA-Tf16 on QA-Cu1.
QA and QA' have the same
... QA-Cu1, QA-Tr2 and the point QA-P9,
... swapped QA-P3 and QA-P4,
... QA-Tf2' = QA-Tf16 and QA-Tf16' = QA-Tf2.
QA and QA' are four times perspective
... wrt the in- and excenters of QA-Tr2.

Best regards Eckart

PS: Is the following property of Q2 already mentioned:
Q2 is the tangential wrt QA-Cu1 of the vertices of the
Miquel-triangle.
```

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Message: #11
Date: 2019-12-01
From: bernard.keizer@gmail.com
Subject: Re: Points on QA-Cu1

Dear Eckart,
I'm glad that you are back in the forum !
I regret that you didn't answer my messages.
One contains a mistake : the tangentials of QA-P3 are not the isogonals of the QA-vertices, but they are the vertices of your QA' !
QA and QA' are in a Reye configuration with the in and excenters of the Miquel triangle and the DT and DT' are in a Reye configuation with the QA formed by the vertices of the Miquel triangle and the infinity point of the line QA-P3QA-P4, parallel to the asymptote.
I hope that the rest is correct, in particular cb(vertices of QA' + QA-P3) is QA-Tf2 with pivot QA-P4.
What are cb(vertices of QA + QA-P3) and cb(vertices of QA' + QA-P4) ?
Best regards
Bernard
The property of Q2 in the PS is mentionned in EQF under QA-Cu1

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Message: #12
Date: 2019-12-02
From: eckart_schmidt@t-online.de
Subject: Re: Points on QA-Cu1

```
Dear Bernard,

excuse my late answer,
... but I had difficulties in understanding (notation see PS):.

Wrt #8:
The bold marked isogonality was new for me, thanks.
But the next passage I could not confirm:
... QA-P4 of the isogonal conjugates of the QA-vertices
    is res(Q2,QA-P4).
This will be the mistake, you mentioned in #11.

cb(QA'+QA-P3) = QA-Tf2 is correct,
see also in my #10: QA-Tf16' = QA-Tf2.

Wrt #11:
cb(QA+QA-P3) with pivot res(QA-P4,QA-Tf16(QA-P3)),
cb(QA'+QA-P4) with pivot QA-Tf16(QA-P41),

generalization:
cb(QA,P) with pivot res(P,res(QA-P3,res(P*,QA-Tf16(P)).
Maybe, this can be described easier!

Wrt #9:
Excuse, I cannot interpret your 2nd passage,
... but I shall try to confirm your example.

Best regards Eckart

PS: P* = isogonal conjugate wrt QA-Tr2.
res(X,Y) for QA-Cu1-points = 3rd intersection of QA-Cu1 and X.Y.
```

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Message: #13
Date: 2019-12-02
From: bernard.keizer@gmail.com
Subject: Re: Points on QA-Cu1

```
Dear Eckart,
Thanks for your answer, specially for the generalisation of
cb(QA,P) !
Perhaps this alternative construction :
The QA circumconic through P cuts the cubic QA-Cu1 in a 6th
point S.
S and the infinity point of QA-P3QA-P4 (and of the asymptote)
are cb-partners.
Therefore, the parallel through S to QA-P3QA-P4 cuts the conic
in a 2nd point T, which is 5P-s-P4 of (QA + P) and the cubic in
a 2nd finite point Q, which is the pivot of cb(QA,P).
What about the transformation P to Q, which leaves QA-Cu1
invariant ? (It's not an involution)
Best regards
Bernard
```

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Message: #14
Date: 2019-12-03
From: bernard.keizer@gmail.com
Subject: Re: Points on QA-Cu1

```
Dear Eckart,
The pivot Q is the isogonal of the 6th intersection S.
But is it correct that the pivot Q is also QA-Tf2(QA-Tf16(P)) ?
It works for P = QA-P4 or QA-P3
Best regards
Bernard
```

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Message: #15
Date: 2019-12-03
From: eckart_schmidt@t-online.de
Subject: Re: Points on QA-Cu1

```
Dear Bernard,

your construction in #13 leads to a really interesting
... transformation TF for QA-Cu1-points:
TF(P) = res(P4,res(P,P3),
... for P, T, P3 are collinear.

Writing this message, I received your message,
... with the same result:
... Tf2(TF(Tf16(X))) = X for QA-points.

Best regards Eckart
```

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Message: #16
Date: 2019-12-03
From: eckart_schmidt@t-online.de
Subject: Re: Points on QA-Cu1

```
Dear Bernard,

first observations wrt your new transformation
... TF: X --> Tf2(Tf16(X)),
... TFinv: X --> Tf16(Tf2(X)).

(1) TF is not an involution, as you already mentioned.
(2) TF(P4) = P3, TF(P41*) = Q2.
(3) TF(Tr2-vertex X) = res(X,P41*).
(4) TF(Tr1-vertex X) = res(X, infinity point of the asymptote).
(5) TF of the QA-vertices gives a new quadrangle QA',
... perspective QA with perspector Tf16(P41*).

Best regards Eckart
```

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Message: #17
Date: 2019-12-04
From: eckart_schmidt@t-online.de
Subject: Re: Points on QA-Cu1

```
Dear Chris, dear Bernard,

once more a property of Q2 (notation see PS):

Consider a QA and any point T on QA-Cu1,
... further QA' with vertices on QA-Cu1 and tangential T.
cb wrt QA and T maps QA-P4 to X on QA-Cu1,
    X = res(T,QA-P3) = QA-Tf16(T),
cb wrt QA' and T maps QA-P4 to Y on QA-Cu1,
    Y = res(T*,QA-P4) = QA-Tf2(T*).Q2 = res(X,Y).

What about the Cayley-Bacharach point (on QA-Cu1)
... for the eight vertices of QA and QA'?

Best regards Eckart

PS:
P*  isogonal conjugate wrt QA-Tr2.
res(P,Q) for points on QA-Cu1 = 3rd intersection
    of QA-Cu1 and P.Q.
cb is the Cayley Bacharach transformation
... wrt five points and the two circular points.
```

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Message: #18
Date: 2019-12-05
From: bernard.keizer@gmail.com
Subject: Re: Points on QA-Cu1

Dear Chris, dear Eckart,
Intriguing and interesting property of Q2 !
In fact, it is a special case of a much more general property.
Lets take 3 aligned points P, Q and R on QA-Cu1.
Each point is the tangential or QA-P4 of a QA and defines a transformation Tf = cb(QA + QA-P4).
Let's name QAp, QAq and QAr the 3 QAs, Tfp, Tfq and Tfr the 3 trandformations and tgP, tgQ and tgR the 3 tangentials of P, Q and R.
First, the 12 vertices of the 3 QAs are in a Reye configuation, as well as the 3 QAs formed by the 3 DTs and the points P, Q and R.
Then the Tfq and Tfr of 2 Tfp partners are aligned with tgP and the same cyclically.
In your example, the infinity point of the asymtote, QA-P4 and QA-P3 are aligned.
The Tf2 and Tf16 of 2 isogonal points wrt the Miquel triangle are aligned with Q2, tangential of the infinity point.
The same way, the isogonal and Tf16 of 2 Tf2 partners are aligned with QA-P41, tangential of QA-P4.
Last, the isogonal and Tf2 partners of 2 Tf16 partners are aligned with the tangential of QA-P3.
If 3 points are aligned, their tangentials are aligned too and Q2, QA-P41 and the tangential of QA-P3 are aligned ...
Best regards
Bernard

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Message: #19
Date: 2019-12-05
From: bernard.keizer@gmail.com
Subject: Re: Points on QA-Cu1

```
Dear Eckart,
You ask for the CB point of the 8 vertices of 2 QAs on QA-Cu1.
It is the 3rd intersection of the line joining the 2 QA-P41 (or
tangentials of the QA-P4) with the cubic.
Using Cotterill's construction, 8 points on a cubic and the foci
of 2 groups of 4 points give 70 foci and 35 lines through the CB
of the 8 points.
Here the focus of a QA on QA-Cu1 is QA-P41.
Best regards
Bernard
```

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Message: #20
Date: 2019-12-05
From: eckart_schmidt@t-online.de
Subject: Re: Points on QA-Cu1

```
Dear Bernard,

thanks for #19, now I remember
... the CB-point of two QA on QA-Cu1....
Excuse, that I haven't parat my own results (see QFG #2477).

Perhaps new:
(1) The CB-point of two quadrangles on QA-Cu1,
... with the same Miquel-triangle and isogonal tangentials,
... is Q2.

(2) Consider two QA on QA-Cu1 with the same Miquel triangle
... and their diagonal triangles,
... which have a perspector P on QA-Cu1:

The CB-point of the quadrangles
... and the cb-point of the triangles
... are collinear with res(P,P*).

Best regards Eckart
```

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Message: #21
Date: 2019-12-05
From: bernard.keizer@gmail.com
Subject: Re: Points on QA-Cu1

```
Dear Eckart,
There is a little istake in my message 18
Each point P, Q and R is the QA-P3 of a QA and defines a
transformation Tf = cb(QA + QA-P4).
I think the rest is correct
Best regards
Bernard
```

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Message: #22
Date: 2019-12-05
From: eckart_schmidt@t-online.de
Subject: Re: Points on QA-Cu1

```
Dear Bernard,

thanks for the detailed elaboration in #18!
The final property
"If three points on QA-Cu1 are aligned, their tangentials too."
I published 2005 on my homepage,
see 6(a) in http://eckartschmidt.de/Zirkul..pdf

Further properties wrt three collinear points:
For two collinear triples  P1,Q1,R1 and P2,Q2,R2 on QA-Cu1
... the 3rd intersections of P1P2, Q1Q2 and R1R2 are collinear.
For three collinear points P1,Q1,R1
... and P2,Q2,R2 with the same tangential
... P2,Q2,R2 and res(P1,P2), res(Q1,Q2), res(R1,R2)
... lie on a conic.

Best regards Eckart
```

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Message: #23
Date: 2019-12-05
From: eckart_schmidt@t-online.de
Subject: QG-P16

```
Dear Chris,

worth to be mentioned in EQF:

The three QG-P16 points of a quadrangle
... are perspective QA-Tr2 wrt QA-P4,
... are perspective QA-Tr1 wrt the infinity point of QA-L4.

Best regards Eckart
```

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Message: #24
Date: 2019-12-05
From: van10hoven@gmail.com
Subject: Re: QG-P16

```
Dear Eckart,

It has been mentioned in QA-Tr-2.

Best regards, Chris
```

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Message: #25
Date: 2019-12-06
From: eckart_schmidt@t-online.de
Subject: Re: QG-P16

```
Dear Chris,

thanks for information, but excuse,
... I searched only under QG-P16,
... reading "The three QG-P16 points of a quadrilateral …",
... missing "The three QG-P16 points of a quadrangle …".

Are the following QA-observations already mentioned?

The QG-P16-triangle is the diagonal triangle
... for the quadrangle of the fixed points for QA-Tf16
    on QA-Cu1.

The cb-point of the QG-P16-triangle and QA-Tr1
... is the tangential of Q2.

The cb-point of the QG-P16-triangle and QA-Tr2
... is QA-Tf16(QA-P41), which is
... ... isogonal conjugated of the cb-point of QA-Tr1
        and QA-Tr2.

The cb-point of QA-Tr1 and QA-Tr2 is QA-Tf2(QA-Tf16(QA-P3)).

These three cb-points are collinear with Q2.

Best regards Eckart

PS: cb-point means Cayley-Bacharach point
... of 6 points and the two circular points.
```

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Message: #26
Date: 2019-12-06
From: bernard.keizer@gmail.com
Subject: Re: Points on QA-Cu1

```
Dear Eckart,
Thanks a lot for reminding your beautiful note Geometrie auf der
Zirkularkurve.
I had read it with great interest many years ago and put it in
the bibliography of my 1rst article
(see http://bernardkeizer.blogspot.com/)
There are several ways to obtain cb(QA + P) on QA-Cu1
You gave first res(P,TF16(res(isogP,Tf16(P)))
I gave then Tf2(Tf16(P))
But 2 others are possible:
Isog(Tfx(P)) with Tfx with pivot P41=tgP4 or Tfy(Isog(P) with
Tfy with pivot tgP3
Best regards
Bernard
```

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Message: #27
Date: 2019-12-07
From: eckart_schmidt@t-online.de
Subject: QA-Tf4

```
Dear Chris,

perhaps new: QA-Tf4 is 5PCSC wrt QA + QA-P4.

Best regards Eckart

PS: Has 5PCSC already an item in EPG?
```

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Message: #28
Date: 2019-12-08
From: bernard.keizer@gmail.com
Subject: Re: a new group and a new start

```
Dear Chris,
It is a great idea to put ETC, EQF and EPG with the same link as
the forum itself !
Best regards
Bernard
```

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Message: #29
Date: 2019-12-09
From: bernard.keizer@gmail.com
Subject: Re: QG-P16

```
Dear Eckart,
I suppose there is a typo in your message.
1) 4 points on a cubic cannot be collinear
2) if the 2 last cb points are isogonal conjugates, they are
aligned with the infinity point of QA-P3QA-P4 and not with Q2
Best regards
Bernard
PS How do you draw simply cb of 6 points ?
Taking 4 points, the circumconics and the P41 of the 4 points
and the 2 last points, the circumcircles and the P41 of the 2
points and the circular points ?
```

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Message: #30
Date: 2019-12-09
From: bernard.keizer@gmail.com
Subject: Re: QA-Tf4

```
Dear Eckart,
Beautiful, indeed !
Best regards
Bernard
PS Of course, this property deserves to be mentionned in EQF
under QA-Tf4
```

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Message: #31
Date: 2019-12-11
From: eckart_schmidt@t-online.de
Subject: Re: QG-P16

```
Dear Bernard,

thanks for your review in #29.
Of course the 3 cb-points are not collinear with Q2,
... Q2 is collinear with the second cb-point
    and QA-Tf2(QA-P41*).

Are the following transformations for QA-Cu1-points already
mentioned?
CB(QA,QA-Tr2) with pivot res(Q2,QA-P41*)
CB(QA,QG-P16-triangle) with pivot
res(QA-Tf16(QA-P41),QA-Tf16(QA-P3)).

You ask for a construction of the cb-point of six points and the
two circular points,
... but I cannot give a simple construction.

In QFG #3403 I tried to describe:
If we replace in Hart's construction of the CB-point 8P-s-P1
... the initial conics 12345, 12346, 12356 by circles 345, 346,
    356,
... we get the CB-point of 3,4,5,6,7,8 and the two circular
    points.
It was a hard work, to get in this way a macro, which I use now.

Best regards Eckart

PS. Sorry, I don't understand the last question in #29.
```

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Message: #32
Date: 2019-12-11
From: eckart_schmidt@t-online.de
Subject: Dual Perspector

```
Dear Bernard, dear Chris,

perhaps of interest:
A triangle and its dual trilateral wrt a QA or QL,
... in the sense of QA-8/QL-8,
... are perspective.

Examples:
QL-Tr2 of a QG and its QA-dual trilateral
... have QG-P1 as dual perspector.

The dual perspector of QA-Tr2 and its dual QA-trilateral
... is the QA-Tr2-isogonal conjugated
... of the intersection of QA-P4.QA-P41 and the asymptote
    of QA-Cu1.

The dual perspector of the QG-L3-trilateral of a QL
... is the dual of QL-L9.

Perhaps there are other interesting examples.

Best regards Eckart
```

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Message: #33
Date: 2019-12-12
From: bernard.keizer@gmail.com
Subject: Re: QG-P16

```
Dear Eckart, I think I never understood Hart's construction !
I regret that this construction is not explained in EPG for 8
points (8P-s-P1) or for 6 points  ...
However, knowing how to draw a circumcubic of 7 points with a
pivot P or a circular circumcubic of 5 points, there are several
possibilities of finding either CB(8 points) or cb(6 points) :
1) drawing 2 circumcubics of 8 points with 2 other points X and
Y ; the 2 cubics intersect in CB(8) (this construction is
possible with Geogebra with ImplicitCurve through 9 points)
2) drawing a circumcubic of 7 points with pivot the 8th point ;
CB(8) is the tangential of the pivot on the cubic (8 possible
cubics)
3) provided you already know a circumcubic of the 8 points, you
may use Cotterill's construction with the foci of 2 groups of 4
points on the cubic ; CB(8) is the 3rd intersection of the line
through the foci and the cubic (70 foci and 35 lines)
4) drawing a circular circumcubic of 6 points is generally not
possible and the 1rst construction of CB(8) doesn't work for
cb(6)
5) drawing a circular circumcubic of 5 points with the pivot in
the 6th point is pssible ; cb(6) is the tangential of the pivot
on the cubic (6 possible cubics)
6) provided you already know a circular circumcubic of the 6
points, you may adapt Cotterill's construction with the focus of
a group of 4 points and the focus of a 2nd group of 2 points +
the 2 circular points (in this case, the conics are circles
centered on the perpendicular bisector of the 2 last points) ;
cb(6) is the 3rd intersection of the line through the 2 foci and
the cubic (this time, there are 30 foci and 15 lines)
*I thought this last construction was the one you used, hence my
last question in 29* (but the foci are QA-P41 only for Qa
vertices having the same tangential on the cubic)
Best regards
Bernard
```

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Message: #34
Date: 2019-12-12
From: van10hoven@gmail.com
Subject: QA-conics

```
Dear friends,

Let P1.P2.P3.P4 be a Quadrangle.
Let QA-DT be its Diagonal Triangle.
Let P1g, P2g, P3g, P4g be the isogonal conjugates of resp. P1,
P2, P3, P4 wrt QA-DT.
Let P1t, P2t, P3t, P4t be the isotomic conjugates of resp. P1,
P2, P3, P4 wrt QA-DT.
I proved algebraically that
* P1, P2, P3, P4, P1g, P2g, P3g, P4g are coconic, and
* P1, P2, P3, P4, P1t, P2t,  P3t,  P4t are coconic
Is something known about these conics?

Best regards,
Chris
```

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Message: #35
Date: 2019-12-12
From: tungvtt@gmail.com
Subject: Re: QA-conics

```
Dear Chris,

I also observe that

* P1g, P2g, P3g, P4g, P1t, P2t,  P3t,  P4t are coconic

Best regards,
Vu Thanh Tung
```

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Message: #36
Date: 2019-12-13
From: eckart_schmidt@t-online.de
Subject: Re: QA-conics

```
Dear Chris,

for any isoconjugation of QA-Tr1 holds,
… that QA-vertices and their isoconjugates are coconic.

Best regards Eckart
```

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Message: #37
Date: 2019-12-13
From: bernard.keizer@gmail.com
Subject: Re: QA-conics

```
Dear Chris,
For any isoconjugation wrt DT, the isoconjugates of QA vertices
form a new QA with the same DT.
3 vertices of both QA's are therefore the vertices of the
anticevian triangle of the 4th.
Any conic through the QA vertices (socalled diagonal conics)
contains the vertices of the anticevian triangles wrt DT of all
it's points.
See Bernard Gibert Special Isocubics in the Triangle Plane page
30 with the equation of the conic.
Best regards
Bernard
```

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Message: #38
Date: 2019-12-13
From: bernard.keizer@gmail.com
Subject: Re: QA-conics

```
Dear Chris,
Let perhaps say it more simply, taking in account Vu Thanh
Tung's remark :
Any 2 points and the vertices of their anticevian triangles wrt
a given triangle are coconic.
Best regards
Bernard
```

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Message: #39
Date: 2019-12-13
From: eckart_schmidt@t-online.de
Subject: New QA-hyperbola

```
Dear Bernard, dear Chris,

consider the QA-Tr2-isogonal image of the QA-Cu1-asymptote,
... which is a circumhyperbola of QA-Tr2,
... bearing Q2 (intersection of QA-Cu1 and its asymptote),
... bearing the infinity point of the QA-Cu1-asymptote,
... bearing the infinity point of QA-P1.4.7
... and the dual perspector of QA-Tr2 (see #32).

There is another aspect of this hyperbola:

Circles through two QA-Tr2-isogonal points P, P* on QA-Cu1 and a
Miquel-point
... contact QA-Cu1 in the Miquel-points.
... (see 7b in http://eckartschmidt.de/Zirkul..pdf )
... Tangents in the Miquel-points intersect in Q2,
... lines from the circle-centers to the Miquel-points
    intersect in QA-P9,
... radical axes of contact circle and QA-Tr2-circumcircle
    intersect in a new point X,
... on P.P* with isogonal conjugate on the QA-Cu1-asymptote
... in the 2nd intersection of the asymptote
    and a QA-Tr2-circumconic through P, P*.

The locus of these points X is the hyperbola above.

Best regards Eckart
```

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Message: #40
Date: 2019-12-13
From: tungvtt@gmail.com
Subject: Re: QA-conics

Dear Chris, Bernard and Eckart,

"Any 2 points and the vertices of their anticevian triangles wrt a given triangle are coconic."
The conic passing through 8 points is known as bianticevian conic.

Best regards,

Vu Thanh Tung

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Message: #41
Date: 2019-12-19
From: bernard.keizer@gmail.com
Subject: Re: QA-Tf4

Dear Eckart,
Is it correct that QA-P4 of the 4 circumcenters is QA-P4 of the 4 QA-vertices ?
I try to draw the twin conics, cubics and quartics and I have difficulties in order to find the point U.
Can you help me ?
Best regards
Bernard

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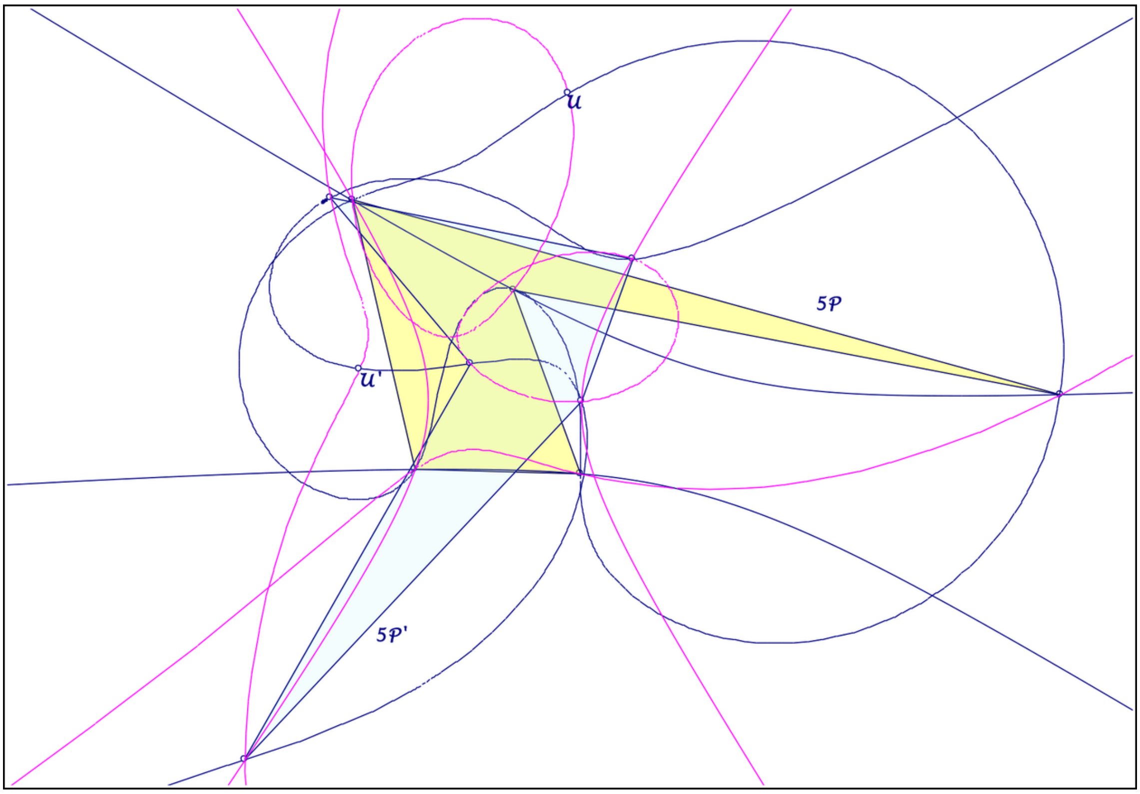
Message: #42
Date: 2019-12-19
From: eckart_schmidt@t-online.de
Subject: Re: QA-Tf4

```
Dear Bernard,

wrt  #41 a short reaction:
You are right wrt the QA-P4 points.
The point U will be 5P-s-P5.
Perhaps helpful the attached drawing
... with the twin elements.

Best regards Eckart

PS: Excuse that I haven't answered up to now your detailed #33.
```



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Message: #43
Date: 2019-12-19
From: bernard.keizer@gmail.com

Subject: Re: QA-Tf4

```
Dear Eckart,
Looking at your picture, it seems it is the general case.
My specific question was in the case of 4 points and their QA-P4
(one of the 5 CSC is an infinity point)
I suppose your construction gives U and U', but what about the
twin curves ?
Thanks in advance
Best regards
Bernard
```

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Message: #44
Date: 2019-12-19
From: eckart_schmidt@t-online.de
Subject: Re: QA-Tf4

```
Dear Bernard,

I haven't realized, that you consider special 5P = QA + QA-P4.
In this case
... the cubic degenerates to an orthogonal hyperbola (and the
line at
infinity?),
... through 5P-CSC(Pi), Pi vertices of QA,
... centered in QA-P3 with asymptotes parallel to those of
QA-Co2,

U = 5P-s-P5 = QA-P4.

Best regards Eckart
```

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Message: #45
Date: 2019-12-20
From: eckart_schmidt@t-online.de
Subject: Two Cayley-Bacharach Points

```
Dear Bernard, dear Chris,

here two Cayley-Bacharach points 8P-s-P1
... for two relevant triangles and the two circular points:

cb(QA-Tr1,QA-Tr2) = QA-Tf2(QA-Tf16(QA-P3))
... = res(Tf16(Q2), QA-P41*) on QA-Cu1.

cb(QL-Tr1,QL-Tr2) = infinity point of QL-dual lines for points
on QL-P13.17.24
... = infinity point of the line through one vertex
    and 5P-s-P4 of the other 5 vertices.

Best regards Eckart
```

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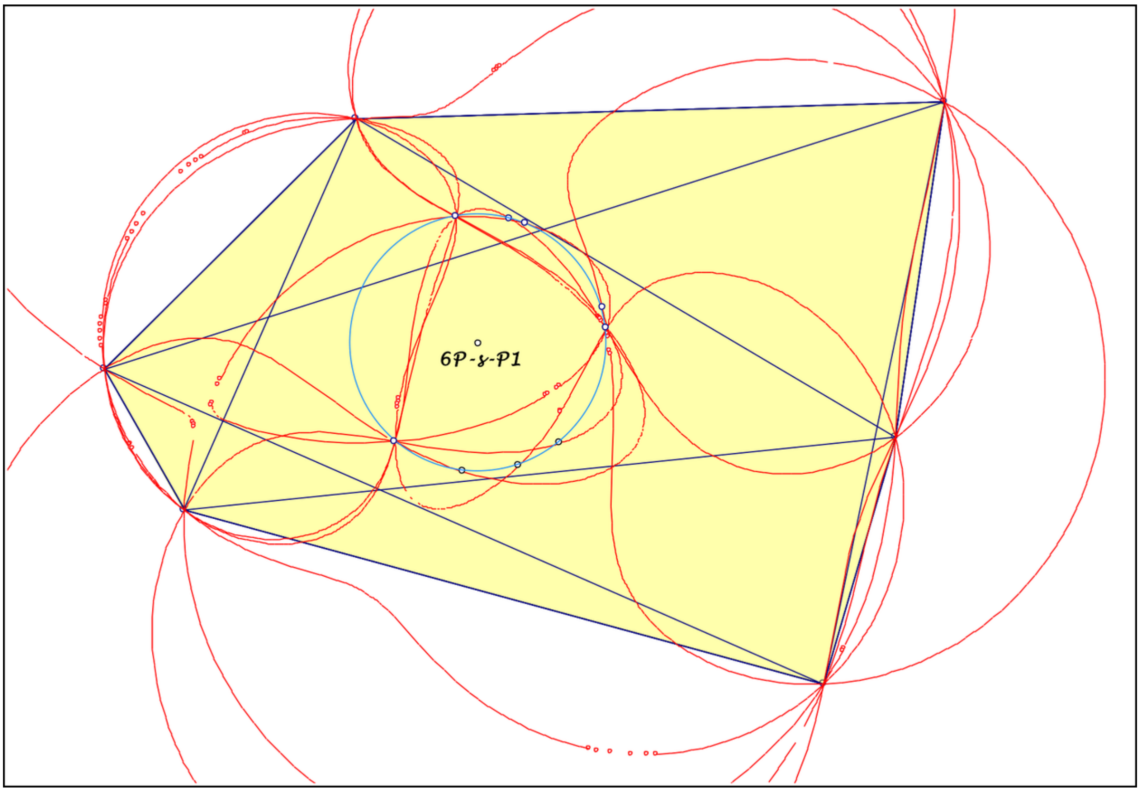
Message: #46
Date: 2019-12-21
From: eckart_schmidt@t-online.de
Subject: 5P-Quartics for 6P

```
Dear Bernard, dear Chris,

the six 5P-quartics for a 6P have up to three common points,
... what about these common points?

First observation:
These common points lie on the circle
... of the six concyclic 5P-s-P5 for the 6P,
... centered in 6P-s-P1 (see QFG #3586,
... but replace 5P-s-P1 by 5P-s-P5).

Best regards Eckart
```



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Message: #47
Date: 2019-12-21
From: bernard.keizer@gmail.com
Subject: Re: QA-Tf4

Dear Eckart,
Many thanks for your help !
This time, I succeeded in drawing the figure.
Some observations :
the isogonals of each of the 4 points wrt the triangle of the 3 others are the reflexions of the point in QA-P2 and lie on QA-Co2
the inverse of this isogonal wrt the circumcircle of the 3 others is the point isgi
the CSC(isgi) are the reflexions of the circumcenters in QA-P3
as you mentionned already, QA-P4 is 5P-s-P5 and 6
* QA-P3 is the middle of QA-P45P-s-P4
* the cubic degenerates in the conic centered in QA-P3 and the infinity line (which contains the circular points and CSC(QA-P4)
the CSC of the cubic is a quartic through the 4 Pi and their QA-P4 and through the isgi (i = 1 to 4)
QA-P4 is a node and the tangents in QA-P4 to the quartic are orthogonal and recut the conic and the quartic in 2 points V2 and V3
the circumcircle of QA-P4 (which is also the point V1) and V2 and V3 passes through 5P-s-P4
QA-P4 is the orthocenter of the V triangle (rectangular in QA-P4)
the Euler circle of the V triangle passes through QA-P4, the middles of QA-P4V2 and QA-P4V3 and QA-P3
this circle (I named it Newton circle) passes through the middles of Piisgi and it's center is 5P-s-P3
Best regards
Bernard
PS What about the twin conic through the circumcenters and the infinity point, the twin circular cubic through the 4 points and their QA-P4 (like QA-Cu1 ?) and it's CSC the twin quartic ?

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Message: #48
Date: 2019-12-21
From: bernard.keizer@gmail.com
Subject: Re: QA-Tf4

```
Dear Eckart,
Wrt my last PS
The twin cubic is a circular cubic through the 4 points and
their QA-P4,which contains CSC(isg'i)
We know only one isg'i, which is QA-P4 as the QA-P4 of the 4
circumcenters
The cubic contains CSC(QA-P4), which is an infinity point
I suppose it is like the 1rst cubic a degenerated cubic formed
by a conic and the infinity line (through the circular points)
This time it contains the 4 points and QA-P4
May be it is simply the circumconic of these 5 points ,
In this case the twin quartic is CSC(circumconic)
Do you agree with this interpretation ?
Best regards
Bernard
```

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Message: #49
Date: 2019-12-21
From: eckart_schmidt@t-online.de
Subject: Re: QA-Tf4

```
Dear Bernard,

I have not studied all your properties,
... for I have difficulties to follow your research
... for a 5P = QA+QA-P4.
If you consider the twin 5P,
... you need 5P-CSC(QA-P4), which is not defined.
So I cannot judge your conclusions.

Best regards Eckart

PS: What is the reason, that you research
... the twin elements of this special 5P so detailed?
```

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Message: #50
Date: 2019-12-23
From: bernard.keizer@gmail.com
Subject: Re: QA-Tf4

Dear Eckart,
I feel a little bit disappointed and discouraged, not to say simply sad, by reading your last message !
Apparently, you didn't read my 2 messages.
Of course, the twin conic is not defined, but the twin cubics are, as well as their CSC, the twin quartics !
To add just one last property, the points 5P-s-P3 and 5p-s-P4 in the general construction are CSC partners (this property is not in EQF, as the CSC is not yet in EQF)
In the case of 4 points and their QA-P4, 5P-s-P4 is the reflexion of QA-P4 in QA-P3 and 5P-s-P3 is the middle of QA-P4QA-P9.
The circle through the middles of the segments Piisgi with isgi = QA-P4(3points + QA-P4) is the circle with diameter QA-P4QA-P9.
The quartic CSC(orthogonal hyperbola centered in QA-P3 through the circumcenters) is invariant in the CSC which swaps the points Pi and the isgi ...
For your last question, my wife asks me since a long time why I spend so much time in drawing figures which interest noone of my friends and noone of my children or grandchildren !
I could answer like Jacobi to Legendre that the unique goal of the science is the honor of the human spirit.
Mor simply or modestly, I find those figures beautiful and most of the time thanks to you I understand always better the relations between separate elements we discovered ...
For example, QA-Cu1 is the only circular pivotal isocubic with pivot QA-P4 and is invariant in the transformation cb(4 points + their QA-P4), which is also QA-Tf2.
The degenerated cubic formed by the circumconic of the 4 points and their QA-P4 and the infinity line is also invariant in the same cb transformation and the line through the 2 pivots is QA-P45P-s-P4 and is a parallel to the asymptote of QA-Cu1 ; it's not surprising that QA-P3, QA-P4 and 5P-s-P4 are aligned ...
Merry Christmas and Happy New Year
Best regards
Bernard

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Message: #51
Date: 2019-12-23
From: eckart_schmidt@t-online.de
Subject: Re: QA-Tf4

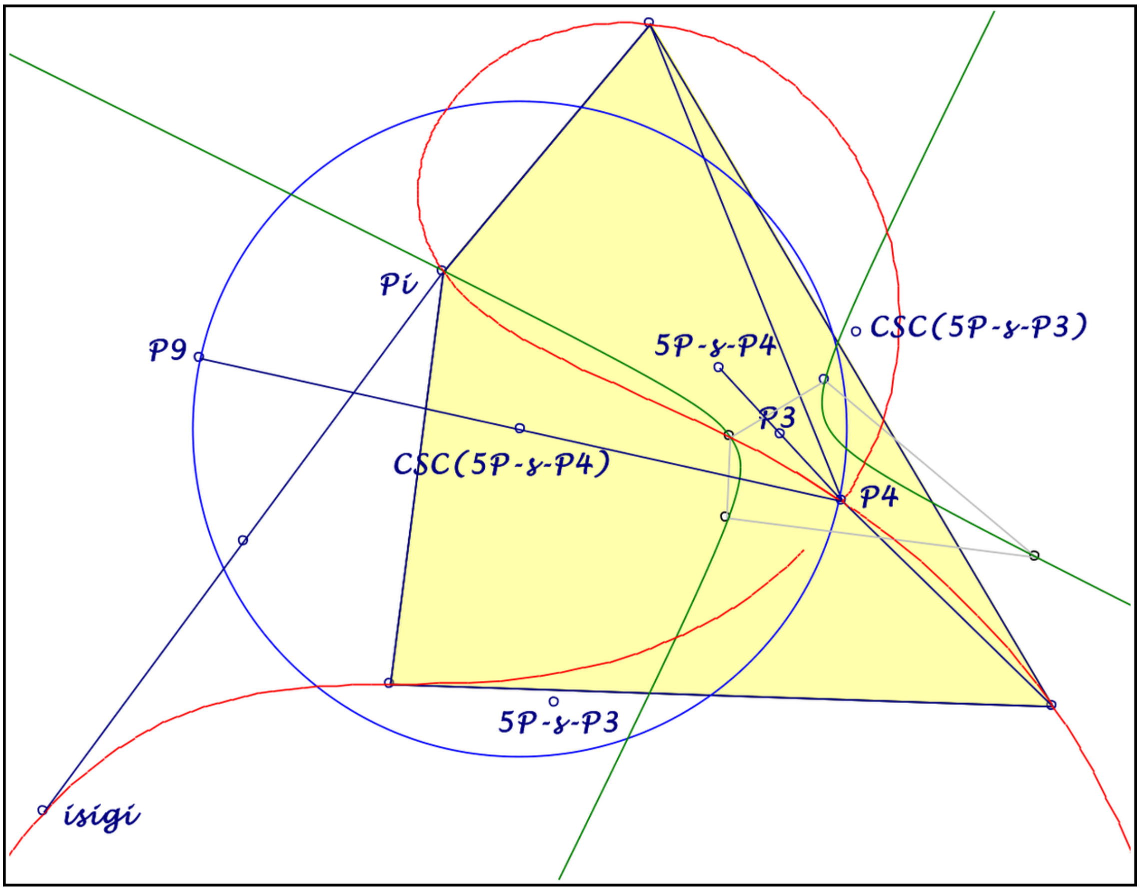
```
Dear Bernard,

after Christmas I shall try once more,
... to reproduce your twin-properties.
Here only some remarks wrt your last message #50:

(1) " ... the points 5P-s-P3 and 5p-s-P4
    in the general construction are CSC partners ..."
I think, this doesn't hold for the 5PCSC (see attached drawing).
So the next passage has to be corrected:
(2) "In the case of 4 points and their QA-P4, ... 5PCSC(5P-s-P4)
     is the middle of QA-P4QA-P9."
(3) "The circle through the middles of the segments Piisgi
     with isgi = QA-P4(3points + QA-P4)
     ... is the circle with diameter QA-P4QA-P9."
I think, this doesn't hold (see attached drawing).
(4) "The quartic
    ... is invariant in the CSC which swaps the points Pi and
    the isgi ..."
    ... in addition: The center of this CSC is 5PCSC(5P-s-P4).

What are my misunderstandings wrt (1) and (3)?

Merry Christmas and best regards Eckart
```



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Message: #52
Date: 2019-12-23
From: van10hoven@gmail.com
Subject: interesting problem with polygons, the illumination problem

---

Dear friends,

There is an interesting problem with polygons, the illumination problem:
The illumination problem is a resolved mathematical problem attributed to Ernst Straus in the 1950's. Straus asked if a room with mirrored walls can always be illuminated by a single point light source, allowing for repeated reflection of light off the mirrored walls. Alternatively, the question can be stated as asking that if a billiard table can be constructed in any required shape, is there a shape possible such that there is a point where it is impossible to pot the billiard ball in a pocket at another point, assuming the ball is point-like and continues infinitely rather than stopping due to friction.

The problem was first solved in 1958 by Roger Penrose using ellipses to form the Penrose unilluminable room. He showed there exists a room with curved walls that must always have dark regions if lit only by a single point source. This problem was also solved for polygonal rooms by George Tokarsky in 1995 for 2 and 3 dimensions, which showed there exists an unilluminable polygonal 26-sided room with a "dark spot" which is not illuminated from another point in the room, even allowing for repeated reflections. These were rare cases, when a finite number of dark points (rather than regions) are unilluminable only from a fixed position of the point source. In 1997, two different 24-sided rooms with the same properties were put forward by G. Tokarsky and D. Castro separately.

In 1995, Tokarsky found the first polygonal unilluminable room which had 4 sides and two fixed boundary points. In 2016, Lelièvre, Monteil and Weiss showed that a light source in a polygonal room whose angles (in degrees) are all rational numbers will illuminate the entire polygon, with the possible exception of a finite number of points.
See: http://mathworld.wolfram.com/IlluminationProblem.html
See: https://youtu.be/xhj5er1k6GQ
Have a nice Christmas and a happy new year.

Best regards,
Chris

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Message: #53
Date: 2019-12-24
From: bernard.keizer@gmail.com
Subject: Re: QA-Tf4

```
Dear Eckart,
Thank you for checking my affirmations.
Please accept my humble apologies for this loosing of time !
Of course you're right, 5P-s-P3 and 5P-s-P4 are not CSC
partners.
I mixed the Newton circle of the middles of the segments joining
2 conjugate points on the quartic (in particular Pi and isgi),
centered in 5P-s-P3
and the circle of inversion in the CSC swapping the Pi and the
isgi, centered in CSC(5P-s-P4)
Beginning of Alzheimer perhaps ...
I hope the rest of my properties is correct
Perhaps visible on your figure with the special case, these well
known properties from the Moebius transformation :
naming mi the middle of the segment Piisgi, the line Piisgi is
the bisector of the angle P4miP9 and the 4 points Pi, isgi, P4
and P9 are concyclic
Best regards
Bernard
PS I couldn't let you wait until next year to correct my
mistakes ...
```

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Message: #54
Date: 2019-12-24
From: bernard.keizer@gmail.com
Subject: Triple points of QA-Cu7

Dear Chris, dear Eckart,
Before leaving for a while the fascinating item of the 5 triple points, perhaps these last properties.
The 3 QA-Cu7 are circular circumcubics of the 5 points with pivots the QG-P1.
On each of these 3 cubics, it's possible to find the cb partners of points on the curves, for example QG-P1 itself (it will be the tangential), QG-P19, QA-P2, QA-P4 and QA-P41.
As Eckart already mentionned, the QG-P1cb(QG-P1) concour in a point Z as well as the QA-P19cb(QG-P19) in a point V and the QA-P41cb(QA-P41) in a point W isogonal of 5P-s-P4 of the 5 points wrt DT .
If I'm not wrong not mentionned before, 2 lines QG-P1QA-P2 (carrying 2 cb(QA-P2)) intersect in a point ti on the line through 5P-s-P4 and the 3rd QG-P1
and 2 lines QG-P1QA-P4 (carrying 2 cb(QA-P4)) intersect in a point wi on the line through W and the 3rd QG-P1 (carrying QA-P41 and cb(QA-P41)).
The twin cubic with pivot the infinity point of the Newton Line is a Van Rees focal circular cubic circumscribed to the 5 points.
Beside the 3 QA-Cu7 and this twin cubic, the cubics with pivots in Z, V, W or the points ti or wi give interesting circular circumcubics of the 5 points.
There are a lot of other interesting points on the QA-Cu7 like QG-P18 ...
Best regards, merry christmas and happy newyear
Bernard

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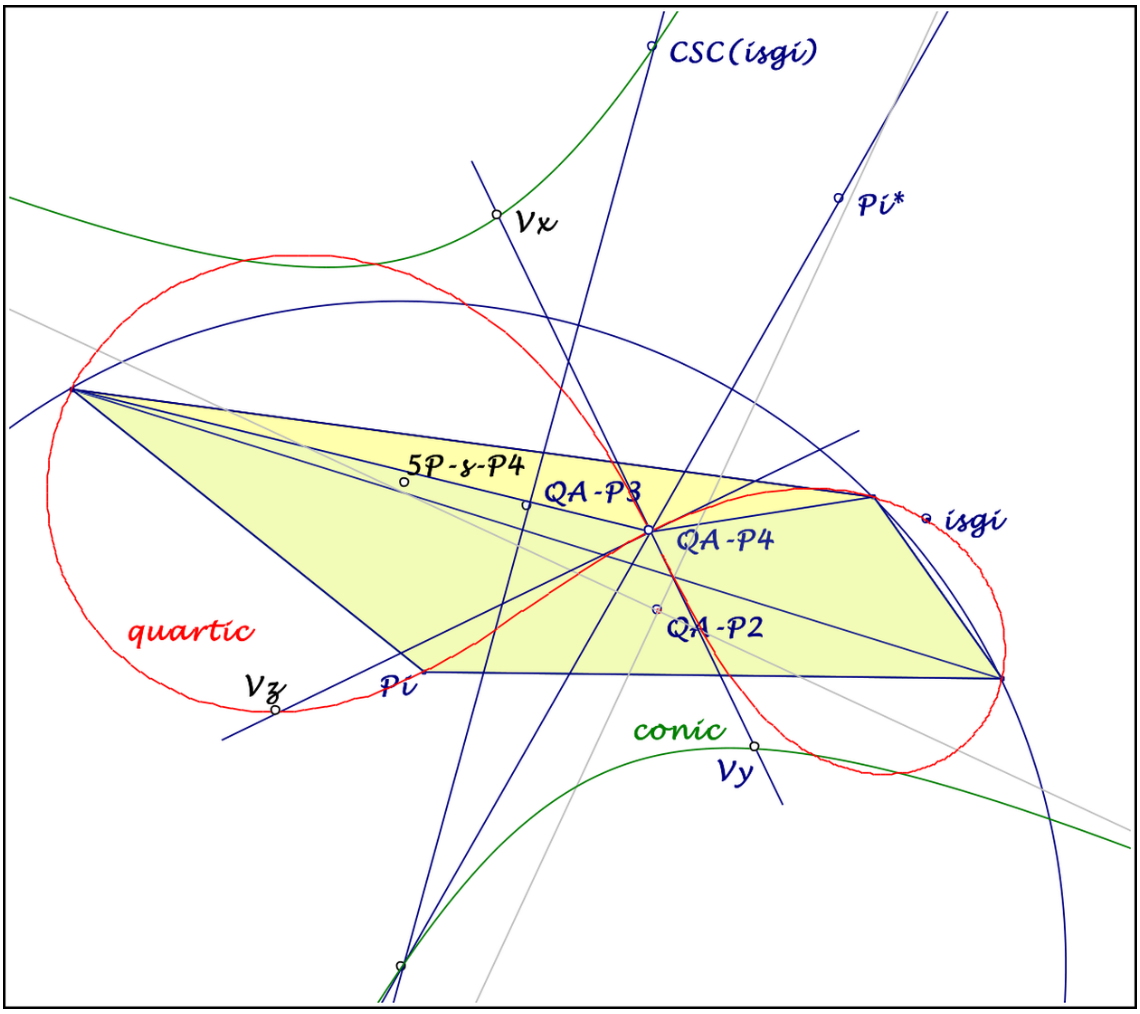
Message: #55
Date: 2019-12-28
From: eckart_schmidt@t-online.de
Subject: Re: QA-Tf4

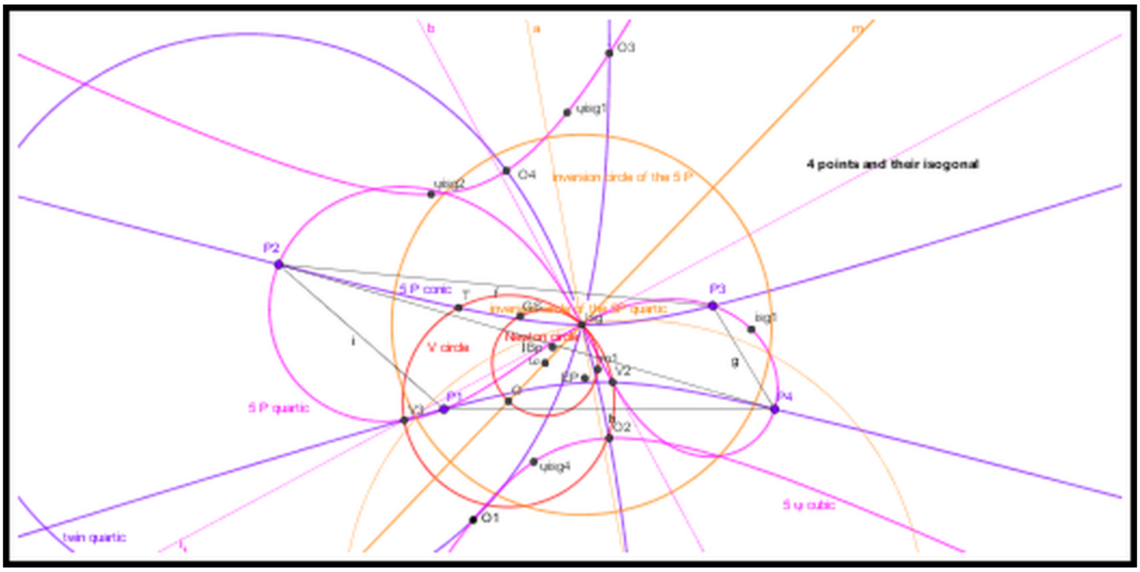
```
Dear Bernard,

starting with your #47 :
I think the first two observations doesn't hold,
... but the third is right (see attached file).
I stopped my reproduction: What are the points V2,V3,
... where the tangents in QA-P4 "recut the conic and the
    quartic"?
There are three points Vx,y,z in my figure.

Best regards Eckart
```



2019-12-28.pdf

Message: #56
Date: 2019-12-29
From: bernard.keizer@gmail.com
Subject: Re: QA-Tf4

```
Dear Eckart,
I think we globally agree with a few typos or elliptic
formulations in my own messages.
The isogonal of *QA-P4* (and not P1) wrt P2P3P4 is the reflexion
of P1 wrt QA-P2 ...
The tangents to the quartic in QA-P4 recut the conic *of the 5
points* and the quartic in V2 and V3 ...
The Newton circle (centered in 5P-s-P) contains the middles of
the segments Piisgi and QA-P3.
The homothetic of this circle in the homothety with center QA-P4
and ratio 2 is the V circle, which cuts the 5P conic in the 4
points V1(in QA-P4), V2, V3 and 5P-s-P4.
I think the lines through QA-P4 and V2 or V3 are tangent to the
quartic in QA-P4 (?)
As alredy mentionned, P1isg1 is the bisector of QA-P4IsgQA-P9
and the 4 points P1, isg1, QA-P4 and QA-P9 are concyclic.
I tried to reproduce your figure with 4 points in a
configuration similar to yours
(I suppose my notations will be obvious with Bp, EP, GS and Isg
QA-P1, 2 3 and 4, psi is CSC
Best regards
Bernard
```



CBfigure 30.ggb

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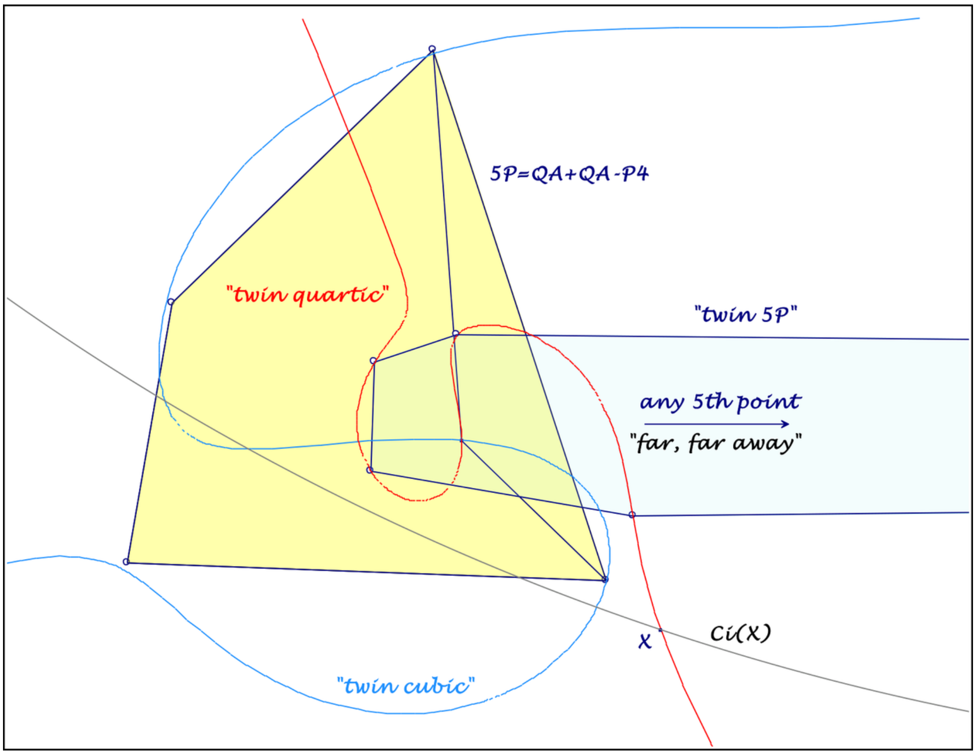
Message: #57
Date: 2019-12-30
From: eckart_schmidt@t-online.de
Subject: Re: QA-Tf4

Dear Bernard,

thanks for explanations in #59,
… now I could reproduce your #47
… with interesting properties for special 5P = QA+QA-P4.
Sorry, but I couldn't open your attachment.

For the twin cubic / quartic in #48 for special 5P = QA+QA-P4,
… I have another interpretation (see attached file):
The twin 5P doesn't exist, for the 5th point is any infinity point.
… For any approximated infinity point we get by construction
… an approximated twin QA-circumcubic through QA-P4,
… whose CSC-image is a twin quartic,
… which satisfies the condition for a twin quartic,
… that for their points holds X on Ci(X) (see QFG #3599).
So the twin cubics / quartics for a 5P = QA+QA-P4 are not unique.

Best regards Eckart



2019-12-31.pdf

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Message: #58
Date: 2019-12-30
From: eckart_schmidt@t-online.de
Subject: QA-P2

```
Dear Chris,

perhaps new:
The Simson line of QA-P2 wrt QA-Tr1 is QA-P6.QA-P36.

Best regards Eckart
```

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Message: #59
Date: 2019-12-31
From: bernard.keizer@gmail.com
Subject: Re: QA-P2

```
Dear Eckart,
This property is mentionned in EQF under QA-P36.
The Steiner Line of QA-P2 wrt QA-Tr1 is QA-P4QA-P12.
Best regards
Bernard
```

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Message: #60
Date: 2019-12-31
From: bernard.keizer@gmail.com
Subject: Re: QA-Tf4

```
Dear Eckart,
Sorry, I forgot to convert my Geogebra figure in pdf
Thanks for your explanation, I think you are right !
In the general case, both cubics have the same pivot as the
infinity point of the common Newton Line.
Here the Newton Line is not defined and can have any direction
...
Best regards
Bernard
```

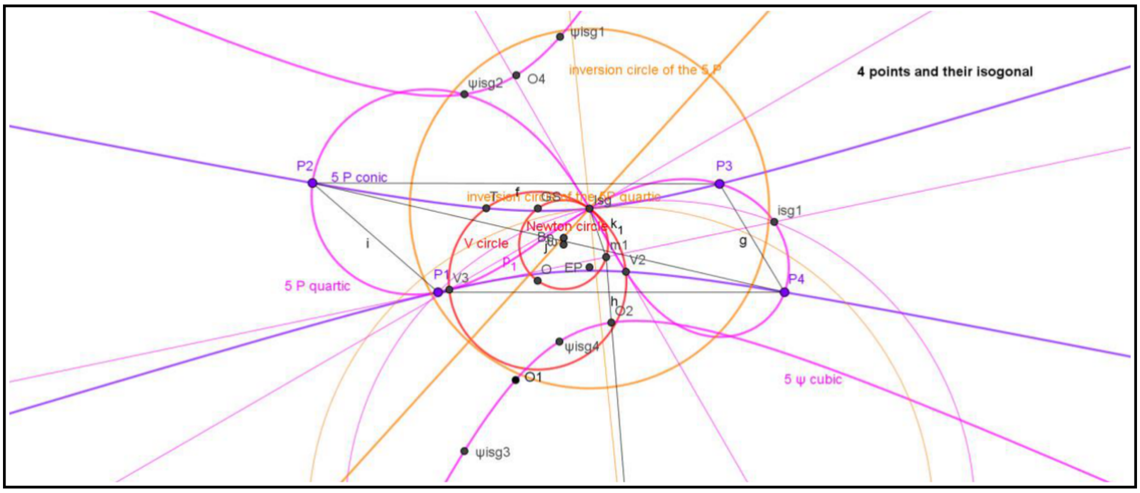

figure 4P _ Isg.pdf

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5 Keyword Index

The list below shows several keywords along with numbers of related messages. Click on a number to go to the corresponding page.

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6 Colophon

Sources & Contact

Web address (QPG Forum): https://groups.io/g/Quadri-and-Poly-Geometry
EPG Encyclopedia (content reference): https://www.chrisvantienhoven.nl
Editorial correspondence: van10hoven@gmail.com

Journal of the Quadri- and Poly-Geometry Group

ISSN: (to be assigned)
Published by: Uitgeverij Varenboom
Editorial Board: Chris van Tienhoven

Published Volumes:

- Volume 7 (2025), messages #2560–#2897
- Volume 6 (2024), messages #2052–#2559
- Volume 5 (2023), messages #1545–#2051
- Volume 4 (2022), messages #1295–#1544
- Volume 3 (2021), messages #631–#1294
- Volume 2 (2020), messages #61–#630
- Volume 1 (Nov. 2019–Dec. 2019), messages #1–#60

Predecessor Journal:
Journal of the Quadri-Figures Group

ISSN: (to be assigned)
Published by: Uitgeverij Varenboom
Editorial Board: Chris van Tienhoven

Volumes of the predecessor journal:

- Volume 7 (Jan. 2019–Oct. 2019), messages #3280–#3906
- Volume 6 (2018), messages #2780–#3299
- Volume 5 (2017), messages #2170–#2799
- Volume 4 (2016), messages #1403–#2169
- Volume 3 (2015), messages #917–#1402
- Volume 2 (2014), messages #394–#916
- Volume 1 (2013), messages #1–#393