Roger Dynamic SoundField & Roger Focus

Lindsay Roberts, Au.D.
Pediatric and School Specialist
PA, WV, OH, IN, MI, KY & TN

PHONAK life is on

Can You Decipher This?

I cdnuolt blveiee taht I cluod aulaclty uesdnatnrd waht I was rdanieg.

The phaonmneal pweor of the hmuan mind.

Aoccdrnig to a rscheearch at Cmabrigde Uinervtisy, it deosn't mttaer in waht oredr the ltteers in a wrod are, the olny iprmoatnt tihng is taht the frist and lsat ltteer be in the rghit pclae.

The rset can be a taotl mses and you can sitll raed it wouthit a porbelm. Tihs is bcuseae the huamn mnid deos not raed ervey lteter by istlef, but the wrod as a wlohe.

Amzanig huh? yaeh and I awlyas tghuhot slpeling was ipmorantt!

PHONAK life is on

The challenges of understanding

- Meaningful education requires that children can hear their teachers well
- Children with hearing loss face challenges in classrooms, which can be very noisy
- Extensive studies* have shown that hearing instruments alone are often not enough and that intelligent solutions are needed
- FM has been the typical solution

*Proceedings ACCESS (2003) & Proceedings ACCESS 2 (2008)

PHONAK life is on

A history of firsts for the classroom

2013

roger

The first to use adaptive digital wireless transmission at 2.4 GHz

2007

Dynamic FM

The first adaptive FM system

2003

Multi-frequency FM

The first frequency-flexible FM system

2000

MLx

The first universal ear-level FM receiver

1996

MicroLink

The first miniaturized ear-level FM receiver

PHONAK life is on

Have You Met Roger?

roger

PHONAK life is on

Bridging the understanding gap with Roger

UNIQUE

Roger is the new digital standard that uses 2.4 GHz technology. It bridges the understanding gap, in noise and over distance, by wirelessly transmitting the speaker's voice directly to the listener.

roger

PHONAK life is on

Why the name Roger?

- Roger comes from aviation
- It means *message received and understood*

PHONAK life is on

What is Roger?

- Roger is a new digital wireless technology standard that replaces FM
- Allows for low delay and reliable long-range broadcast to miniature, low-power receivers
- Operates on 2.4 GHz band (ISM), with intelligent adaptive protocols
- Audio bandwidth up to 7300 Hz
- Privacy is guaranteed

roger

PHONAK life is on

Roger Dynamic SoundField

- Classroom noise is not only a problem for students with hearing difficulties.
- It can also make understanding the teacher difficult for children with normal hearing
  - APD
  - ADHD
  - Autism
  - second language learners
- Roger Dynamic SoundField offers the same stunning sound quality as today's Dynamic SoundField system, but it is now also compatible with Roger ear-level receivers
  - Guaranteeing all children can enjoy Roger levels of speech intelligibility.

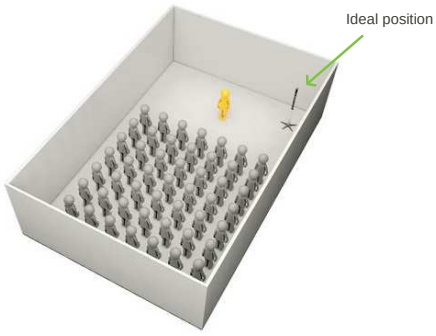
PHONAK life is on

Roger DigiMaster 5000

- Adaptive behavior
- One DigiMaster 5000 per classroom
- Microphones: Roger inspiro or Roger inspiro SoundField
- Options: Roger DynaMic, Roger AudioHub
- For normal-sized classrooms : 100 m^2 / 1076 ft^2 and more
- Floor stand or wall mounted
- 12-loudspeaker array
- Audio input

PHONAK life is on

Roger DigiMaster 5000 placement



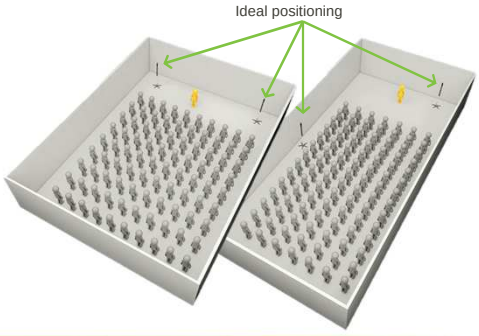
PHONAK life is on

Roger DigiMaster 7000

- 15 loudspeakers in an array
- Adaptive behavior
- Up to Two DigiMaster 7000s per room
- Microphones: Roger inspiro or Roger inspiro SoundField
- Options: Roger DynaMic, Roger AudioHub
- For larger rooms up to 300 m^2 / 3230 ft^2
- Floor stand or wall mounted
- Audio input

PHONAK life is on

Roger DigiMaster 7000 placement

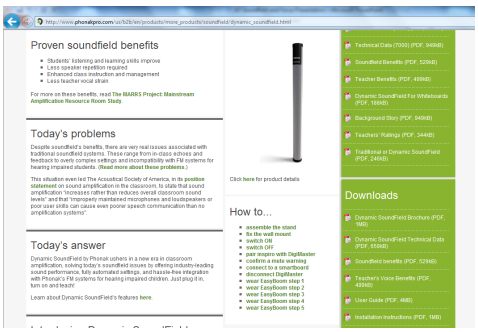


PHONAK life is on

Roger inspiro

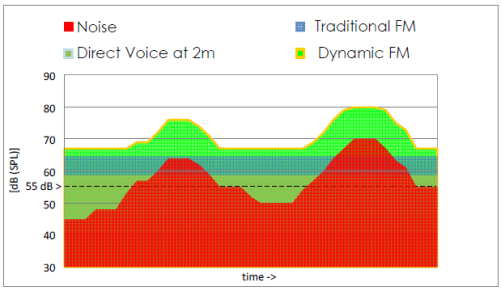
- Roger inspiro - recommended classroom solution
  - FM
  - Roger
  - SoundField
  - Digimaster x
  - Audiohub
  - DynaMic

PHONAK life is on



PHONAK life is on

Dynamic or Adaptive Wireless Technology



Benefits for students

- Improved sentence recognition ability
- Increased student attention, interaction and participation
- Quicker acquisition of reading, writing and numeracy skills
- Easier deciphering of language in early learning years
- Better understanding of teacher for non-native speakers
- Expanded seating options for students with attention deficit issues

PHONAK life is on

Benefits for teachers

- 100% of teachers identified a decrease in vocal strain and fatigue as a key personal benefit of using a soundfield amplification system
  - Teacher absences due to vocal strain and voice fatigue decreased from 15% percent to an average of 2-3% in one year (MARRS, 2005b)
- Aids class instruction and management
- Fewer discipline problems through improved voice-control of students
- Less stress
- Improved in-class mobility

PHONAK life is on

What teachers say about Roger Dynamic SoundField

"When I forget to turn it on the students are quick to remind me. I think Roger Dynamic SoundField is the best system I have had the opportunity to use in my 20 years of teaching."

Sarah Daoust, elementary school teacher, Michigan, USA.

PHONAK life is on

Roger SoundField Research

PHONAK life is on

Dynamic SoundField research overview

Topic	Researcher	Place	More information in
Teacher benefits	Brent Tustin	New Zealand	Field Study News
Performance	Felix Goldbeck	Switzerland	Field Study News
Clickers	Debi Vickers	London	Publication
Acoustics	Bradford Barackus	London	Publication submitted
Performance & FM	Jace Wolfe	Oklahoma	Presentation, publication expected

PHONAK life is on

Latest soundfield research by Jace Wolfe

- Compare Dynamic SoundField versus a fixed-gain, soundfield system utilizing four loudspeakers strategically placed in the classroom
- In quiet and in noise
- With normal hearing listeners and listeners with a hearing loss
- Children and adults
- Comparisons:
  - Dynamic SoundField ←→ Dynamic SoundField + Personal FM
  - Fixed-gain, multi-loudspeaker soundfield ←→ Fixed-gain, multi-loudspeaker soundfield + Personal FM
  - Personal FM alone

PHONAK life is on

Main inclusion criteria

- Normal hearing children
  - 5 to 13 years old
  - No reported history of language, processing, or attention disorders
- Normal hearing adults
  - 18 to 50 years old
  - No history of significant otologic disorders
- Children with hearing loss
  - 5 to 13 years old
  - Four-frequency pure tone average between 35-75 dB HL
  - Full-time hearing aid users
  - At least 60% correct on age-appropriate monosyllabic word recognition test
  - Spoken language aptitude within one year of chronological age

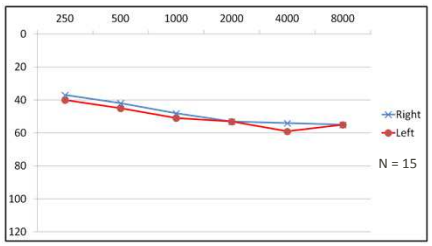
PHONAK life is on

Subjects

- 15 Children with Hearing Loss
  - 6-13 years old
  - Mean Age: 9.5 years old
  - 4FPTA Range: 35 to 68.75 dB
- 15 Children with Normal Hearing
  - 5-12 years old
  - Mean Age: 8 years old
- 10 Adults with Normal Hearing
  - 18-48 years old
  - Mean Age: 34 years old

PHONAK life is on

Mean Hearing Loss



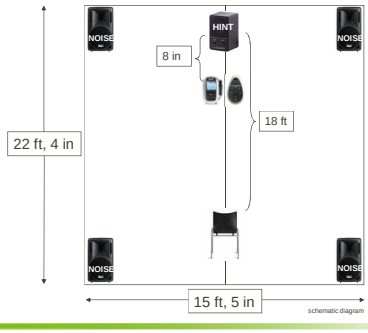
- Subjects wore a variety of behind-the-ear hearing aids.

PHONAK life is on

Audio Enhancement Elite II Classroom Audio Distribution System

PHONAK life is on

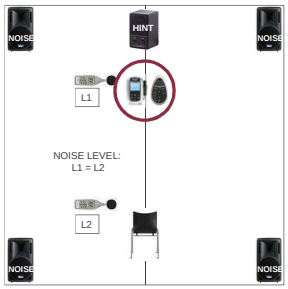
Classroom Setup: dimensions



PHONAK life is on

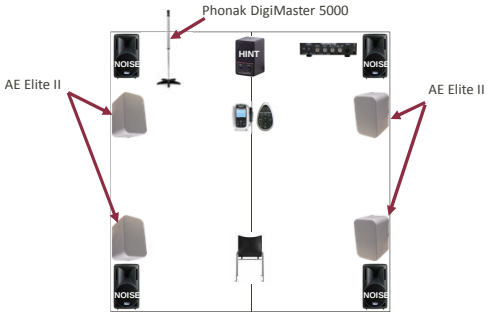
Background noise levels

- Classroom noise was presented from the four loudspeakers in the corners of the room
- Tested in:
- Quiet & Noise at
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 70 dB(A)
- 75 dB(A)



PHONAK life is on

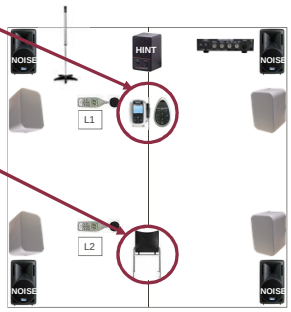
Positioning of loudspeakers



PHONAK life is on

Presentation level of HINT sentences

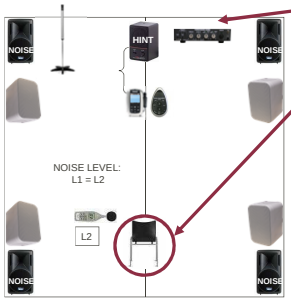
- HINT sentences presented at 85 dB(A) to microphone
- HINT sentence level at the subject was 64 dB(A)



PHONAK life is on

Gain settings

The output of the Phonak DigiMaster 5000 was set to the automatic default setting.



The gain of the Elite II was set to provide an equivalent level in quiet at the subject location.

This resulted in the HINT sentences being presented at 68 dB(A) at the subject location.

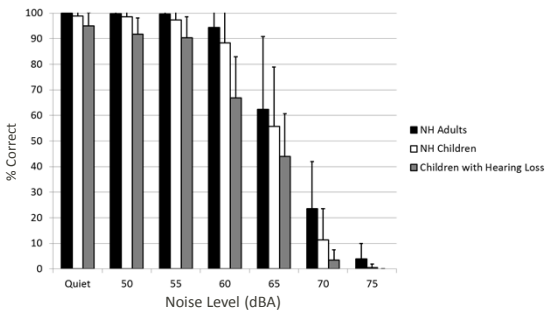
PHONAK life is on

Test Conditions

- No soundfield or personal FM
- Roger Dynamic SoundField alone
- Audio Enhancement Elite II alone
- Roger Dynamic SoundField + Personal FM
  - Roger inspiro to DigiMaster 5000 and Personal FM
- Audio Enhancement Elite II + Personal FM
  - Roger inspiro connected to audio output port of Elite II
- Personal FM alone
  - Roger inspiro to personal FM

PHONAK life is on

Results: speech recognition without soundfield or personal FM



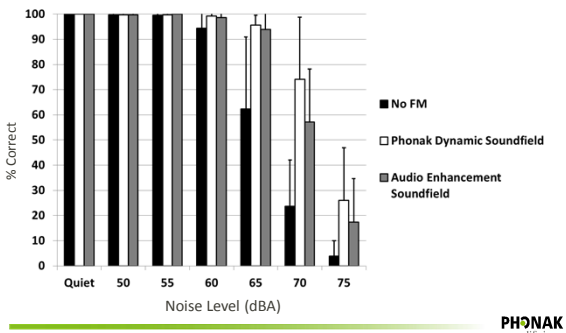
PHONAK life is on

Results

- Adults understand speech in noise better than children
- Children with normal hearing understand speech in noise better than children with hearing loss
- The difference between groups becomes greater at higher noise levels
- All groups experience more trouble in noise (60, 65, 70, & 75 dB(A)).
  - Performance became progressively poorer from 60 to 75 dB(A)

PHONAK life is on

Normal hearing adults with soundfield



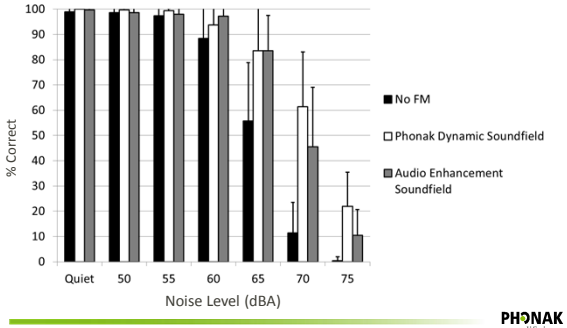
PHONAK life is on

Results

- Soundfield improve adults' speech recognition in noise at noise levels of 65, 70, and 75 dB(A)
- Roger Dynamic SoundField provided better speech recognition in noise than Audio Enhancement Elite II system at 70 and 75 dB(A)

PHONAK life is on

Normal Hearing Children with soundfield



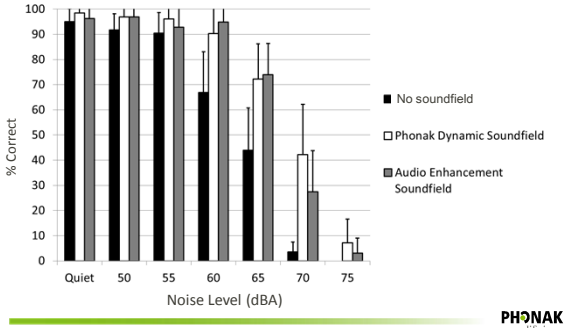
PHONAK life is on

Results

- Soundfield improves speech recognition in noise of children with normal hearing at noise levels of 60, 65, 70, and 75 dB(A)
- Roger Dynamic SoundField provided better speech recognition in noise than Audio Enhancement Elite II system at 70 and 75 dB(A)

PHONAK life is on

Children with hearing loss



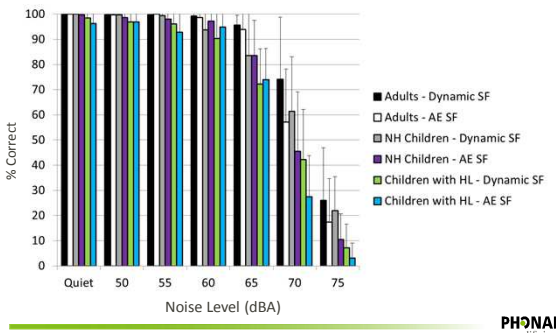
PHONAK life is on

Results

- Soundfield improves speech recognition in noise of children with hearing loss at noise levels of 60, 65, 70, and 75 dB(A)
- Roger Dynamic Soundfield provided better speech recognition in noise than Audio Enhancement Elite II system at 70 and 75 dB(A)

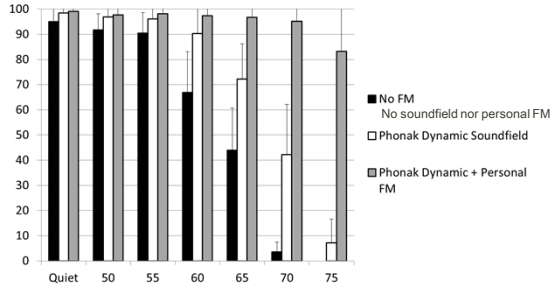
PHONAK life is on

Soundfield performance across groups



PHONAK life is on

Soundfield ←→ Soundfield + Personal FM



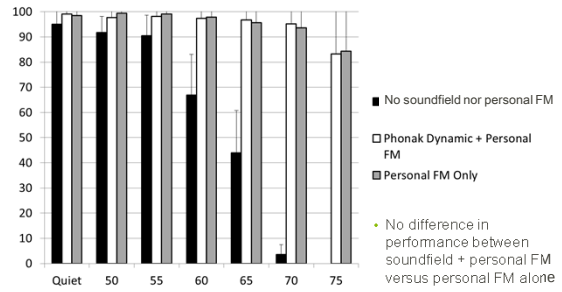
PHONAK life is on

Results

- Personal FM better than no FM at all noise levels.
- Personal FM better than soundfield at 60, 65, 70, and 75 dB(A)

PHONAK life is on

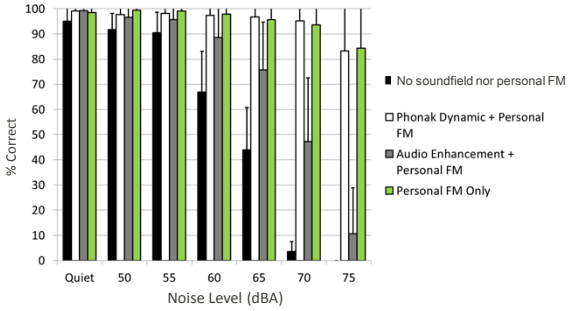
Roger Dynamic SoundField + Personal FM ←→ Personal FM alone



- No difference in performance between soundfield + personal FM versus personal FM alone

PHONAK life is on

Children with Hearing Loss
Soundfield + FM ←→ Personal FM



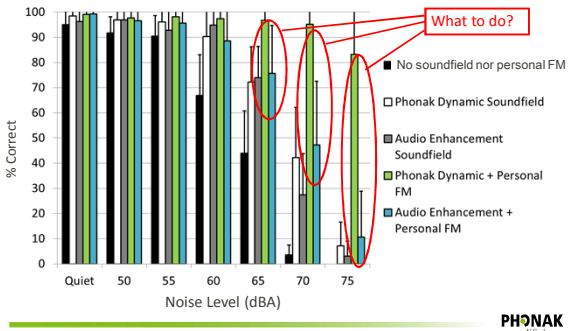
PHONAK life is on

Results

- Roger Dynamic SoundField + personal FM and personal FM alone are both better than Audio Enhancement soundfield + personal FM at 60, 65, 70, and 75 dB(A)

PHONAK life is on

Children with hearing loss
Soundfield vs. soundfield + Personal FM



PHONAK life is on

Possible causes of decreased speech understanding

- Loss of adaptive (Dynamic) signal
- Loss of noise pre-processing at inspiro
- Insufficient input from audio output of the other CAD to inspiro
- Antenna in FM inspiro

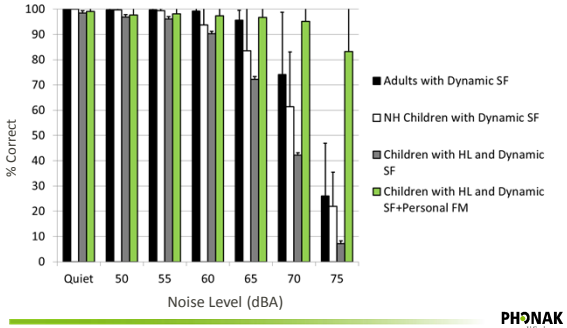
- AAA guideline states:

5.2.3. Coupled ADS and Personal FM Verification

"Because of potential undesirable variation when interfacing a classroom ADS and personal FM System, the connection of the personal FM Transmitter to the audio output of the ADS is not recommended. The teacher should wear two microphones, one for the personal FM Receivers(s) and one for the ADS (parallel signal processing). Alternatively, the teacher may wear a transmitter that directly serves, both the personal FM Receivers(s) worn by the student(s) and an FM Receiver that provides input to the ADS (sequential signal processing)."

PHONAK life is on

Good News
Children with Hearing Loss vs. "Gold Standard"



PHONAK life is on

Conclusions/Clinical Implications

- Adults understand speech in noise better than children.
- Children with NH understand speech in noise better than children with HL.
- Soundfield improves speech recognition in noise for all subjects
- Dynamic SoundField provides better speech recognition in noise than fixed-gain soundfield
- Personal FM provides the largest improvement in speech recognition in noise.
- Phonak Dynamic SoundField + Personal FM provides better performance in noise than AE Elite II + Personal FM.
- Little to no speech recognition in noise improvement with Phonak Dynamic SoundField + Personal FM vs. Personal FM alone.
  - But soundfield may improve classroom acoustics in real world.

PHONAK life is on

Roger Focus
Because every child deserves the chance to focus

PHONAK life is on

Roger Focus

- Unilateral hearing loss
- Minimal hearing loss
- Auditory processing disorder
- ADHD
- Autism
- Dyslexia

PHONAK life is on

Zero hassle and full compatability

Turn on → Connect → Go!

roger

PHONAK life is on

Focus on fun

PHONAK life is on

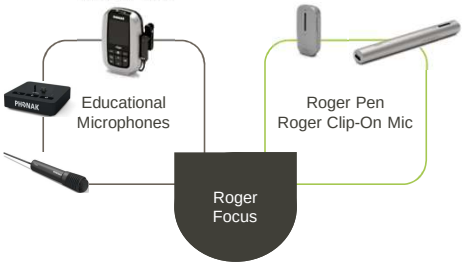
Roger Pen

- Easily access other talkers in the classroom
- Student can have control of microphone

PHONAK life is on

Focus on flexibility

- Roger Microphones and Focus



roger

PHONAK life is on

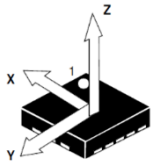
Roger Pen in detail

roger

PHONAK life is on

The Roger Pen features an accelerometer

- An accelerometer is a small mechanical and electronic component that measures accelerations in three dimensions (X, Y and Z)
- The accelerometer continuously informs the Roger Pen about its orientation with respect to the direction of gravity to choose a microphone mode automatically
- It also tells the Roger Pen when it is accidentally dropped
- Smart phones use accelerometers for instance to rotate pictures to avoid they are ever displayed upside down



PHONAK life is on

Automatically chooses microphone mode

- Lanyard - Useful for listening to one single talker (teacher)
- Conference - Place flat on the table to listen to several talkers (group work)
- Interview - Point in the direction of the talker (students asking questions)

PHONAK life is on

Listening to Multimedia via the Audio Cable or docking station

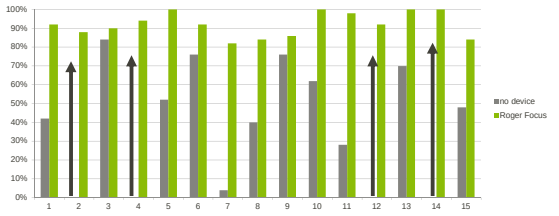
- Instant broadcasting of audio signal when audio is played
  - Microphones are muted
  - Use audio cable to plug into headphone jack of computer
  - Connect docking station to smart board, media, etc.

PHONAK life is on

Roger Clip-On Mic in detail

Maximum performance: Roger Focus evidence

Speech-in-noise testing revealed an average improvement of 53% with Roger Focus compared to no device



N=15 BKB-SIN, -5dB SNR noise at 65dBSPL

Note: with the exception of subjects 3 and 9 all individual scores showed significant improvement

Subjects 2, 4, 12, and 14 scored 0% without any device and almost 100% with Roger Focus.

THANK YOU

&

QUESTIONS?