Station Ergonomics:
What? Why? How?

Prepared by:
Rick Heinrich
NØYY

Station Ergonomics is Personal

- Everyone is DIFFERENT
  - Height
  - Weight
  - Eyesight – do you wear bifocals?
- How do you operate? DX? Contests? Casual ragchewing?
- What is your operating style?
  - Keyboard focus (contesting)
  - Radio focus (DX-ing)
  - Peripherals / Accessories focus - Digi
  - Station Automation vs Manual Control
- Are you a tinkerer? New things? New Buttons?

Is your station "designed" or is it a "work in progress"?

What is Station Ergonomics

Is how your body fits into your operating environment

A Few Words about Design vs Work in Progress

- Human nature is to open the new box and put it on the table and plug in your cables and turn it on!
  - Yeah, maybe you read the manual – but probably not!
  - Wow, that's a great feature, I need a cable
  - Let's see how do I interface that with my computer or amplifier? Wow, there's more cables needed.

Hmmm…
Look familiar?

The Ergonomic Perspective of a Designed Station

- Another way of looking at this is a way to minimize the impact of fatigue
- Eye strain, neck strain, sore lower back, numb lower legs, are all reasons to get up and walk around
- AND history shows that when you are walking around to stretch your legs you are prone to distractions

Let's look at ergonomics as part of the design process!

Getting Started

- Where is the station located?
  - Is it warm? Cold?
- What is the height of your table?
  - A standard kitchen table is 30 inches
  - A standard computer table is 28 inches
- What is the height of your chair?
  - Is it adjustable?
  - Is it designed for long periods of use?

Do you know and understand your design goals and constraints

Let's Start with the Chair

- It should be adjustable
  - Seat height
  - Armrest height and depth (Can they be removed?)
  - Seatpan
    - Can you move it Forward / Back?
  - The Chair
    - Most support reclining – BUT will it allow a forward tilt?
      - Think about what your body does when you reach for the radio
  - Lumbar support
    - Adjustable height and support
      - Again, think about lumbar support when you lean forward!
  - Neck and shoulder support

Comfort is not the #1 criteria – body fit is the most important!

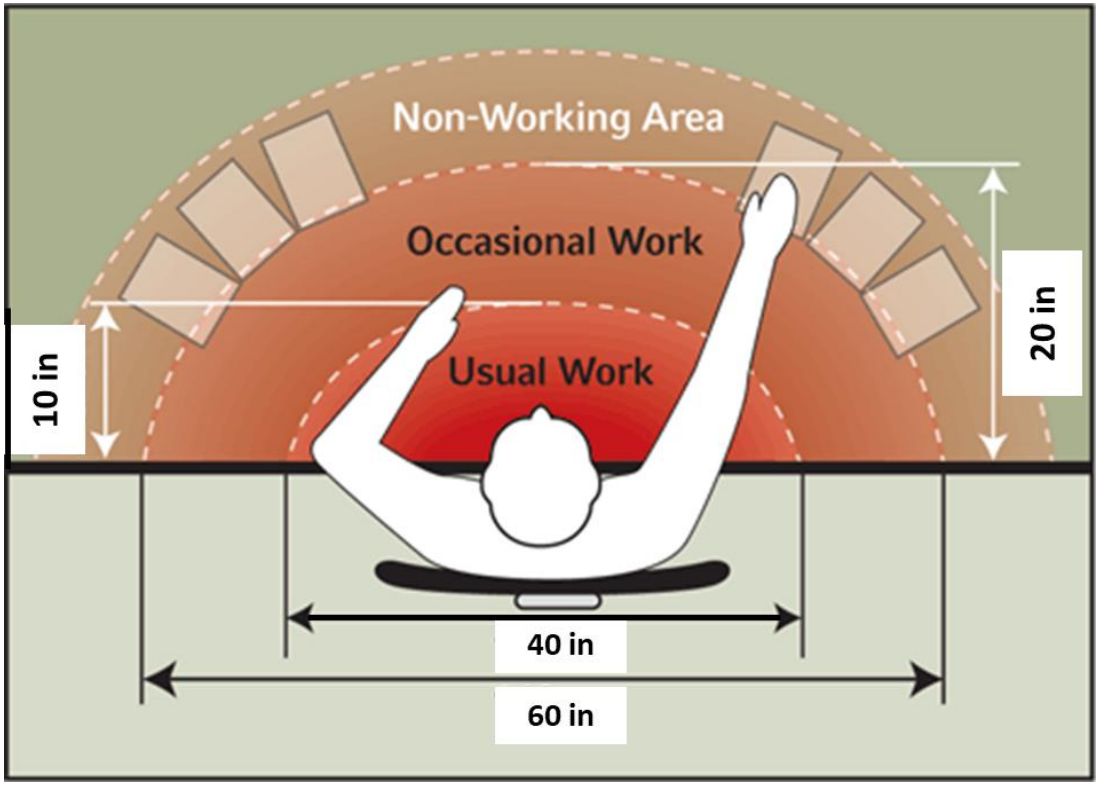
The Chair is your Body's Interface to the Table and Beyond

- Feet need to be flat on the floor or supported
- Chair height needs to keep your hips level with your knees
- The seat pan should NOT press into the underside of your legs behind the knee – that will limit blood flow and cause your feet to go numb after long periods of sitting
- Adjust your foot support and tilt of the chair to maintain hand and wrist support from the armrest and work surface
- If you have to lean forward to access radio controls you lose the benefit of a matched chair and work surface

The Work Surface

- Let's start with height – preferred is 28 inches
  - But the range is 25 to 29 inches
- This gives you the most flexibility in chair height to maintain proper body interface to the work surface
- It should be stable
- Wheels can be considered ***IF*** they can be locked and are part of the total height of the work surface
- When the chair is adjusted for proper body interface to the table, the height of the table should allow enough clearance for both thigh and for foot movement
- Don't forget to include any footrest under the foot to maintain posture an to eliminate seat pan pressure behind the knees

The Ergonomics of the Work Surface

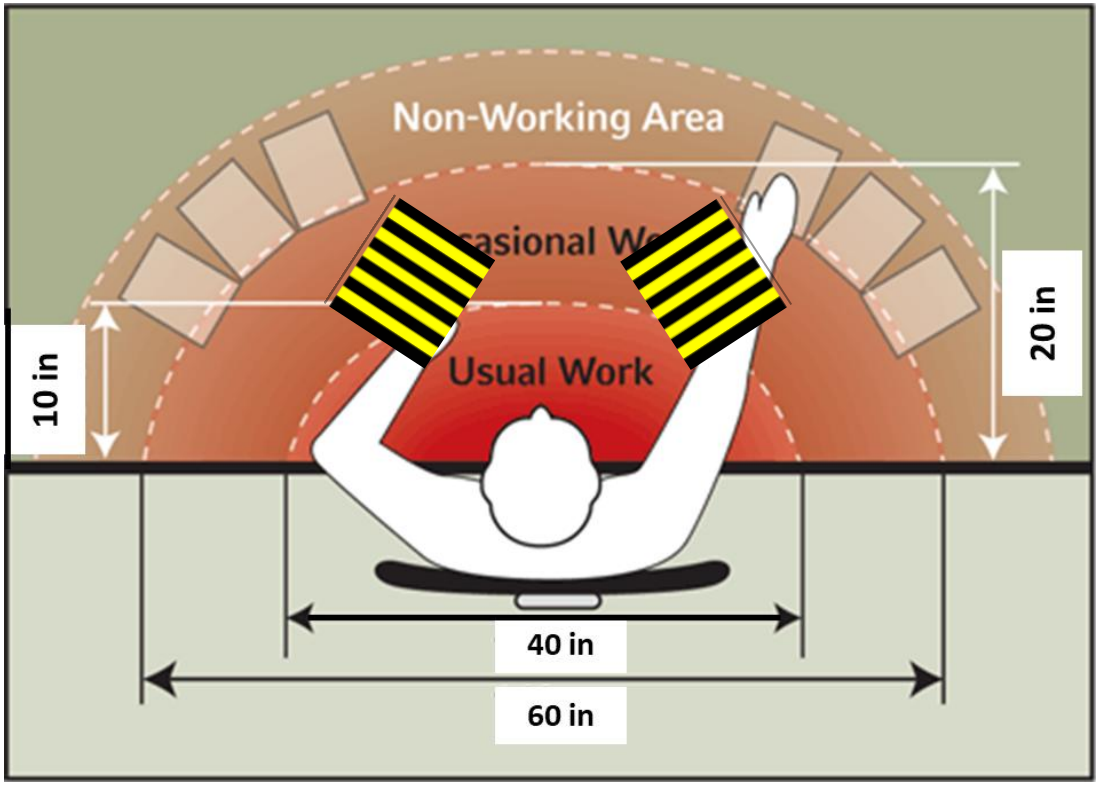


Note the position and relationship of the chair, body, and work surface edge. This is important to recognize full support of the wrists and forearms. It is also important to observe that typical mouse movement will transition from Usual to Occasional work zones.

Work Zones (*Reach Radius*)

- Usual *(Keyboard / Mouse)*
- Occasional *(Radio Controls)*
- Non-Working *(Observe)*

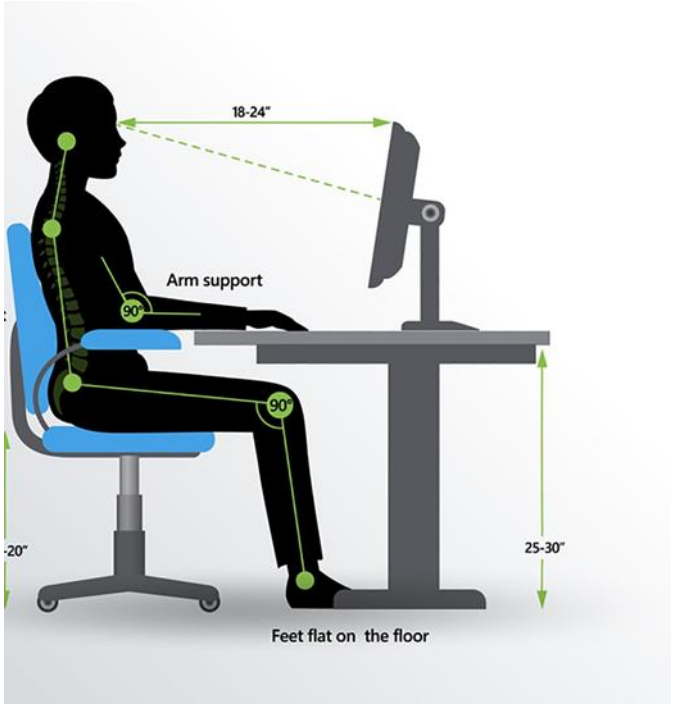
A Conflict Zone



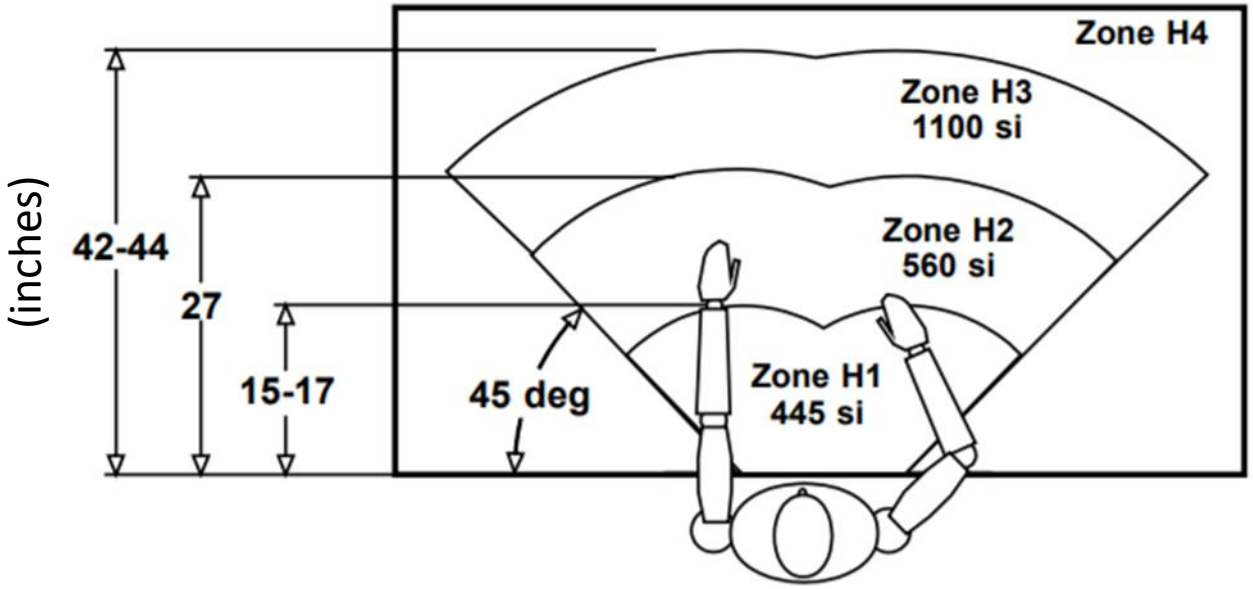
These are conflict zones. Be aware that a keyer paddle and mouse typically compete for the same real estate! (For clarity, if you are right-handed, the conflict is on the right, and vice versa.)

Supporting the Arms

- Note the position of the armrest and work surface
- Full support from the elbow to the wrist/hand is important to reduce wrist and finger fatigue
- If you suffer from arthritis, the lack of support can be especially difficult
- But be aware that many armrests cannot be moved forward and back which will likely cause a conflict with how your body can access the work zone.



Work Zone Definitions



The 45° angle described forms a limit for "comfortable" reach. This implies that Zone H4 is outside the reach area without twisting or leaning.

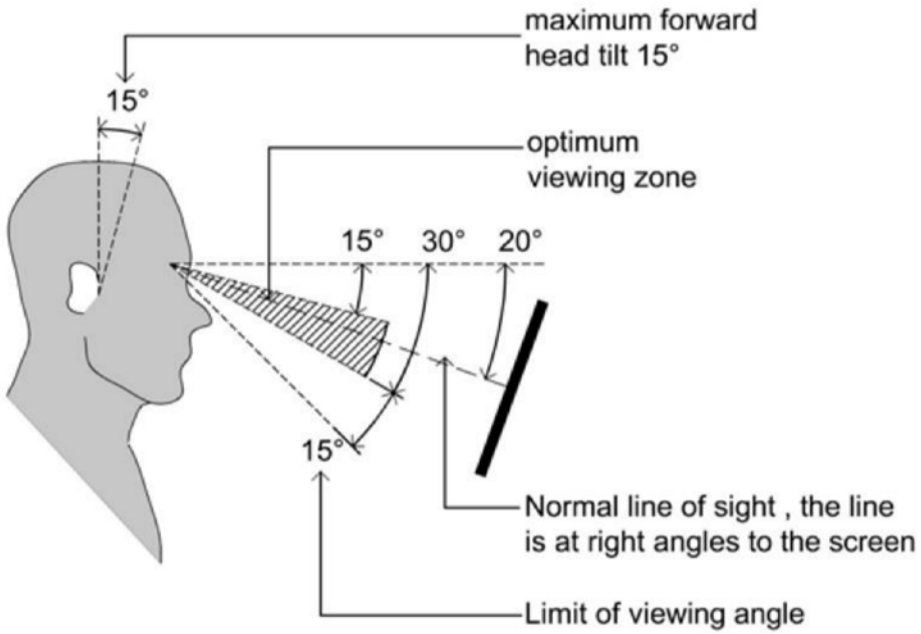
Body Position and the Reach Radius

- Arms should be supported while you operate so there is no stress on your shoulders or that you are forced to change the geometry of your arms, wrists, elbows, etc.

- Operator position should allow for about 3 inches between the stomach and the work surface edge (this will vary by body type)

- The mouse should be at the same height as the keyboard
  - The motion of the mouse transitions through two work zones – the Usual and Occasional zones
  - To minimize those longer work zone transitions, consider the use of a Trackball
    - This is what Air Traffic Controllers use for cursor positioning

The Viewing Profile of the Work Zone



This is based on head tilt, screen position, vision (bifocals?), etc. You can influence this with how you arrange your operating windows. [Note: this is why most operators put the Entry window at the bottom of the screen.]

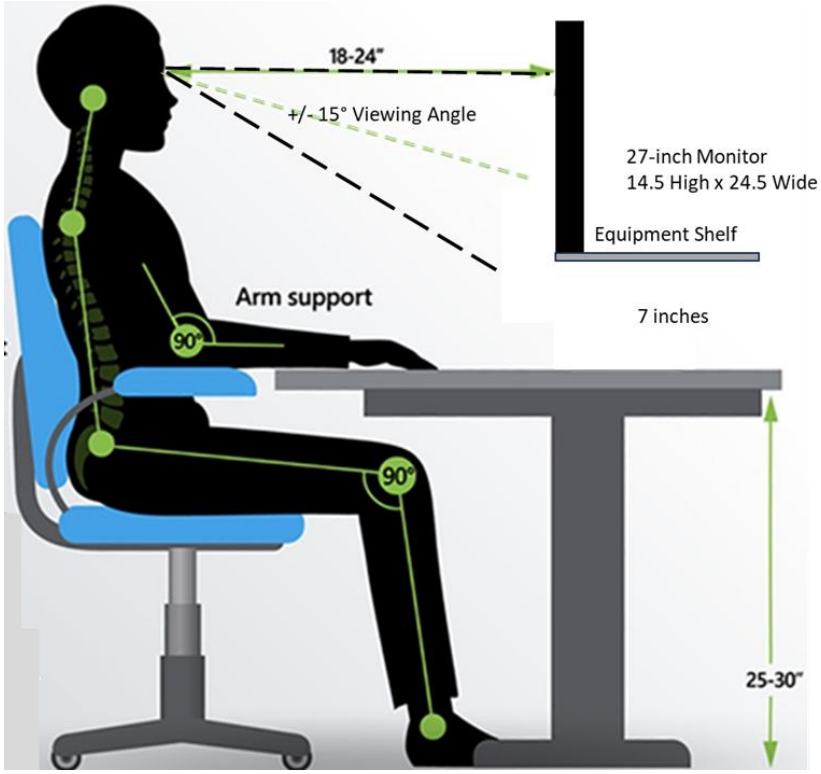
The Viewing Profile of the Work Zone

- All displays should be perpendicular to your eyes
- This includes radio front panels – especially with spectrum and waterfall displays
- The general recommendation is that the monitor base should be on the work surface
  - There can be some flexibility depending on the predominant viewing “oval” – lower middle on the display
- Bifocal lenses may be focused quite low on the monitor screen – full lens prescription computer glasses may be more appropriate because they can offer a full screen view

Neck strain based on head tilt is the key consideration

Tailoring the Viewing Profile of the Work Zone

- This is an example of allowing the monitor to be raised while meeting the viewing profile
  - Repeated information entry e.g. logging should be in the lower half of he display
  - Status information should be in the upper half of the display



This allows equipment to be placed below a monitor

Keyboard / Radio Placement

- The keyboard should be centered in the Usual Work Zone
  - But be careful – on a full-size keyboard the numeric keypad will provide an offset to the center of the keyboard
  - This exacerbates the conflict zone! Now a part of the keyboard impinges on this limited real estate!
- Wrists and forearms should be supported at the front edge of the work surface
- Radio placement should allow for supported forearms and wrists which may be difficult if the radio tuning knob is behind the keyboard
  - Consider working a DX pileup and constantly adjusting the radio while having to reach over the keyboard

Some Esoterics…

- The front edge of the work surface should be rounded e.g. bull-nose, etc.
  - A sharp corner will be problematic after a couple of hours

- Not included here are more sophisticated work surfaces that can be raised and lowered to allow sitting or standing while operating
  - This concept is already in place in the office environment

Chairs Revisited – A New Family of Choices

- The typical operating chair is a desk or executive chair – one-size-fits-all

- Enter the family of ***gaming chairs***
  - Developed for sitting for extended periods
  - Come in different sizes based on body shape and needs
  - Many more adjustments
  - Used by competitive gamers

Secretlab
Titan EVO

Summary

- This is not a new concept – consider a police or fire dispatcher – they have similar work zones
- Now you have some perspective of ergonomic "design" criteria
- There are many variants depending on your operating goals
  - Single radio
  - Reconfigurable for SO2R or M/S

The price of entry discussed here enables more fun, better scores, and a better feeling of physical wellbeing in the aftermath of a contest or extended operating session