



HELICOPTER NOISE – COMMUNITY REACTION

NEED FOR NOISE ABATEMENT/FLY PROCEDURES

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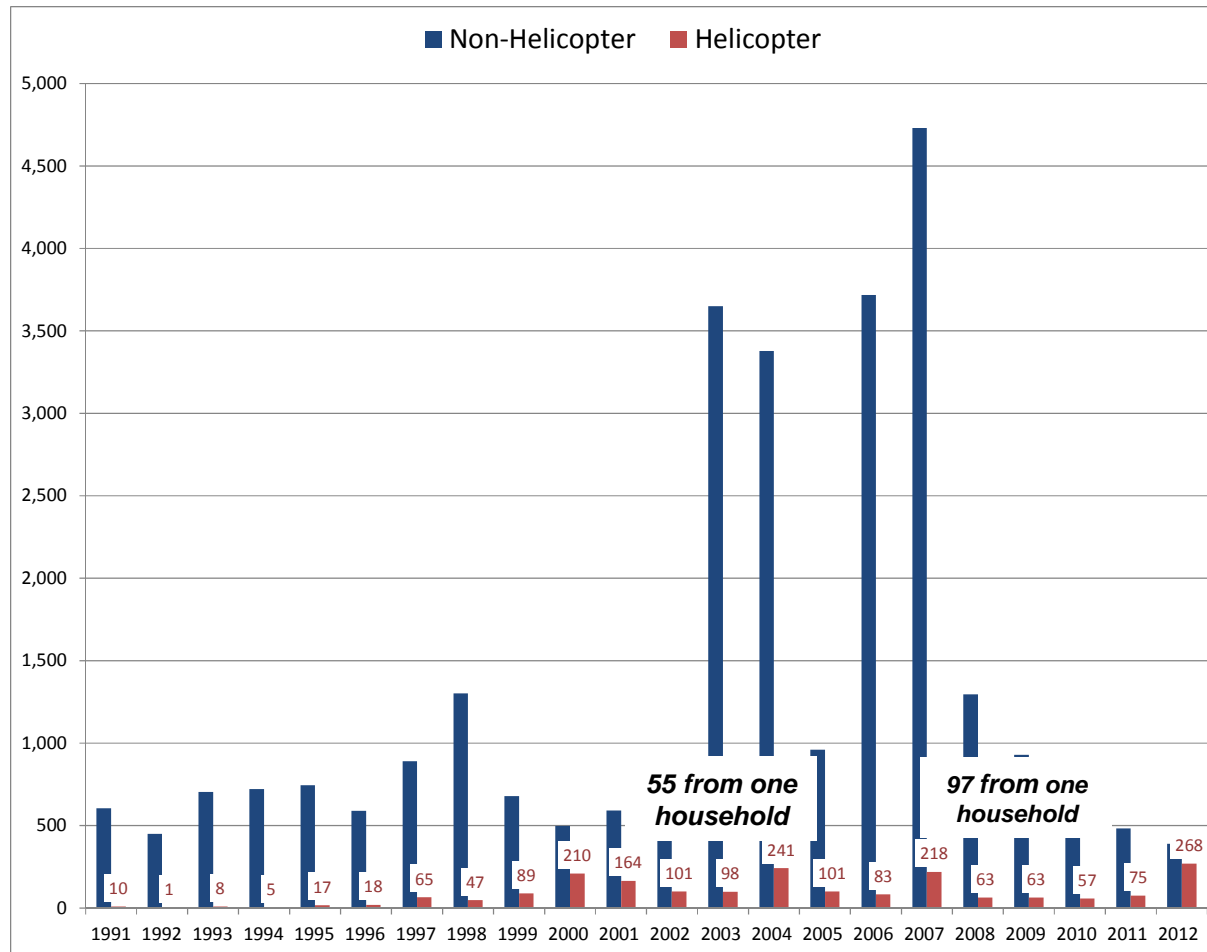


The Issue

- **Helicopter operations are being increasingly curtailed in major operating countries :**
 - **Major cities of Europe; New York, Los Angeles, Las Vegas and now in Chicago**
- **Public opinion is increasingly becoming aggressive forcing the representatives to regulate and restrict operations**
- **This trend is spreading across the country adversely affecting the industry and creating a negative image**



Airplane & Helicopter Noise Complaints (Clark County)



170 from one household



Understanding the Problem



What's unique about Helicopter Noise ?

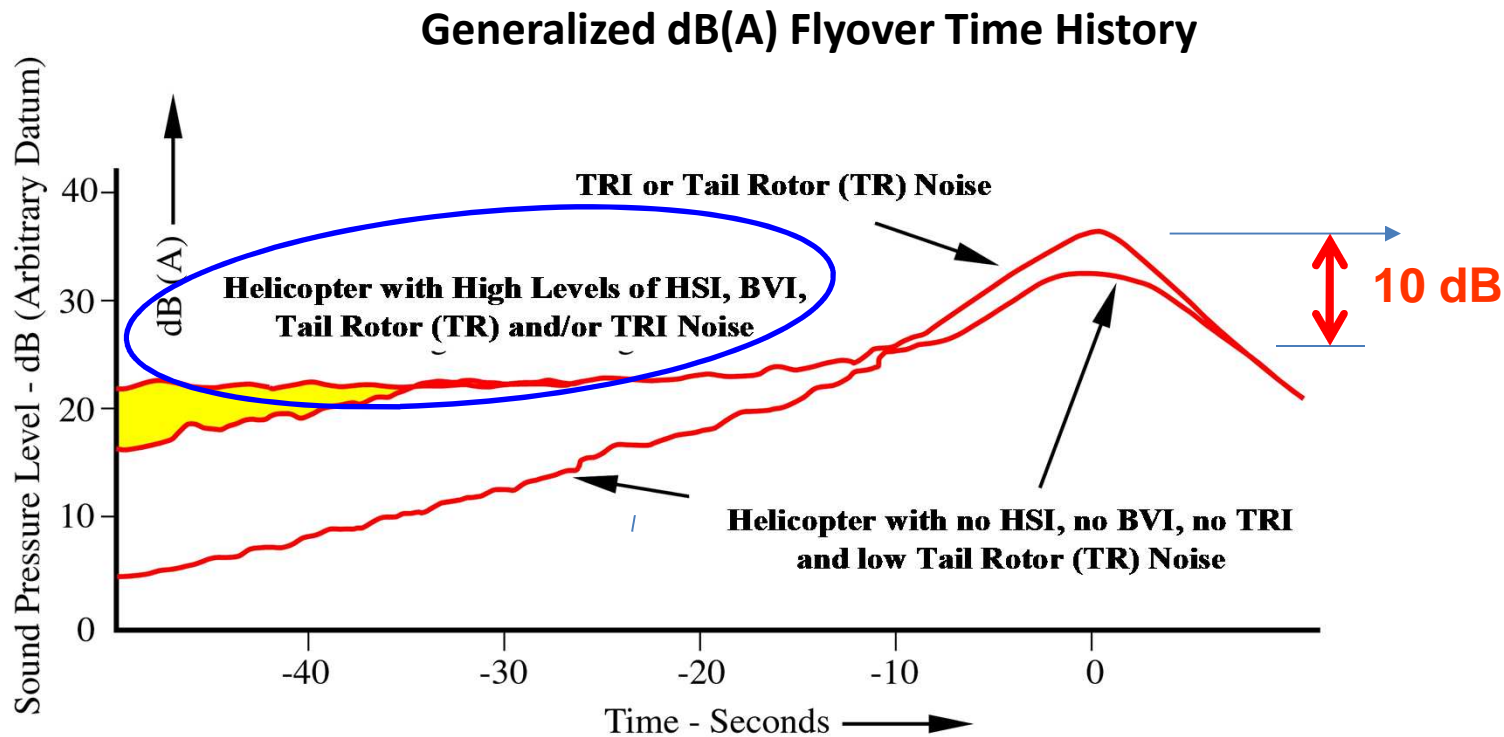
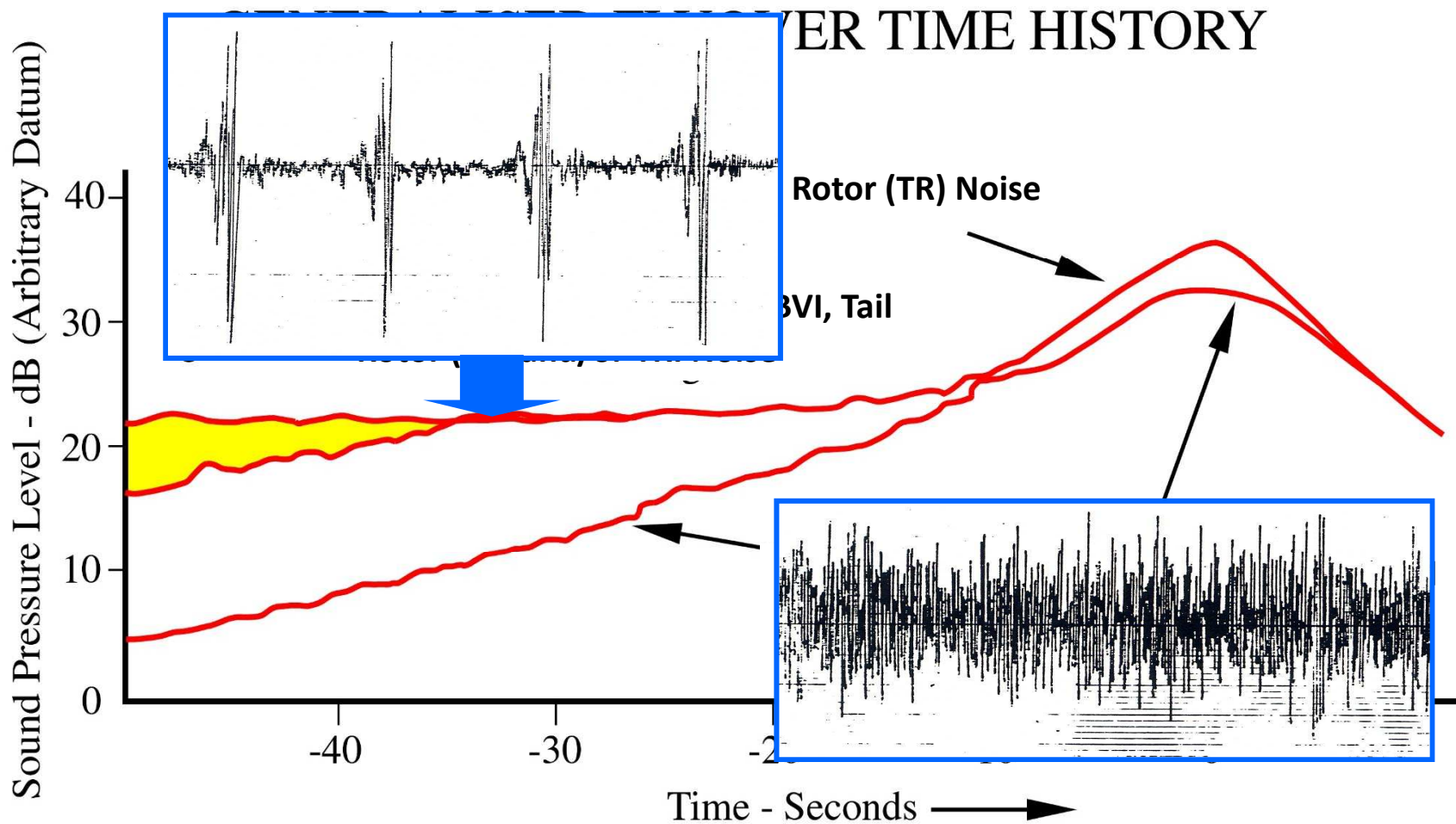


Figure shows A-weighted sound pressure level time history of a helicopter flyover noise – similar in decent. Principal sources of HSI (High speed Impulsive noise) ; sources are MR thickness; BVI noise; MR/TR Interaction (TRI): BVI pronounced during decent and in bank turns

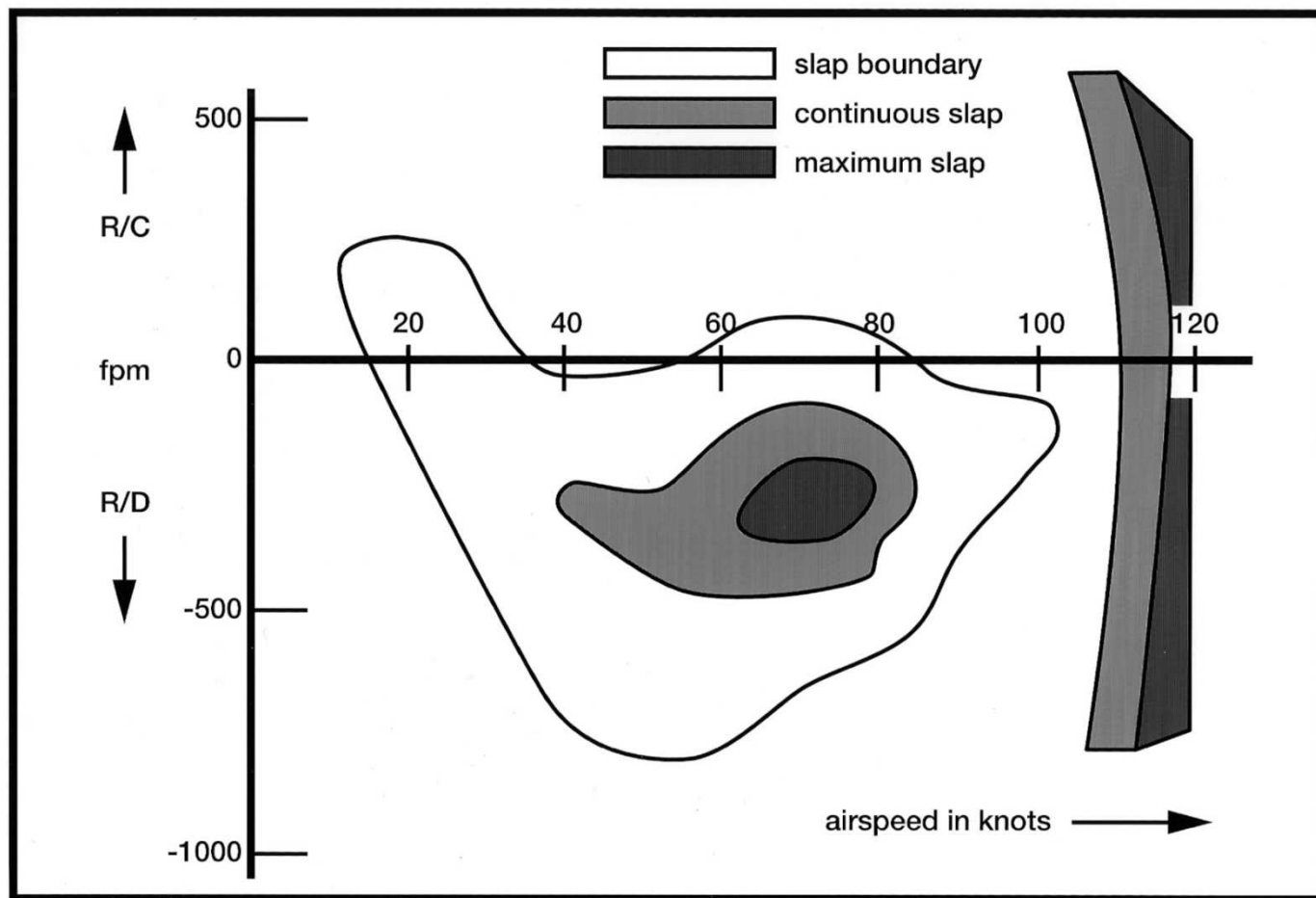


Flyover / Approach Noise





Generic BVI/Blade Slap Noise Characteristics



Bell Data – ‘Medium Helicopter’



Mitigation strategies

Short term : Flying Neighborly

Use of Noise Abatement Procedures.

Long term : Understanding Annoyance

Psycho acoustics

New Design features

It's high time to react



Bell Helicopter “Flying Neighborly” program

- Under leadership of late Charlie Cox (late 70s & 80s), Bell developed “flying neighborly” flight profiles
- By making some changes to the flight procedures particularly during descent (approach), the **“offensive noise” could effectively be eliminated**” by avoiding the ‘slap region’, later known as the ‘blade slap region” and more recently ‘BVI”
- changes to the flight procedures can be made on most helicopters without adverse effect on typical operations except for the need for pilots to learn to know how and when to use such procedures
- Other manufactures evaluated the ‘Bell proposals’ and quickly agreed that it was a ‘good tool’ to control annoying noise



HAI “Flying Neighborly” program

- HAI (HAC : Heliports & Airways committee) established a Fly neighborly steering committee comprising the FAA, the military, and other associations
- Most OEMs established “Noise abatement “ or “Fly neighborly “ procedures
- In 1981 HAI issued a ‘Fly Neighborly Guide’ in which the procedures were published
- HAI officially launched the ‘HAI Fly Neighborly Program’ in February 1982 and the program gained both domestic and international acceptance
- Fly Neighborly program offered the technical information necessary for helicopter operators to use current helicopter as quietly as practical, and to communicate to the public their efforts to make helicopter operations compatible with nearly all land uses

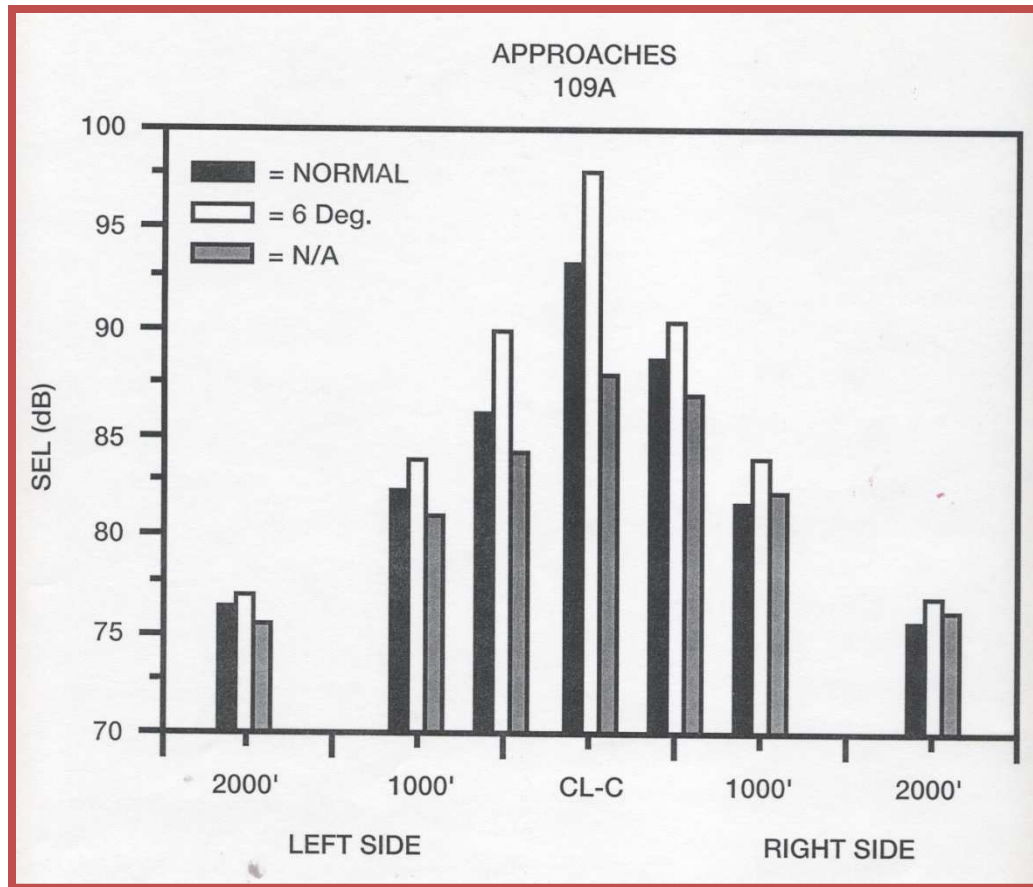


“Fly Neighborly” program - Favorable Acceptance

- In the U. S. the HAI program gained the full support of helicopter operators, regional associations, manufacturer, pilots and communities throughout the country
- Federal, state and local government agencies have embraced the program and taken an active part in sponsoring Fly Neighborly presentations in conjunction with safety seminars and other activities
- Worldwide, the helicopter industry and its related communities were informed about the Fly Neighborly Program and many outside the US adopted a similar approach
- Following the work by Bell (Charles Cox) and support by the HAI Acoustics Committee, the FAA funded noise test of eight helicopters which established in terms the absolute SEL values the noise level for the noise certification 6 degree approach, normal approach and ‘noise abatement approaches’
- **Noise abatement procedures lower ‘maximum noise levels’ by up to 10 dB**

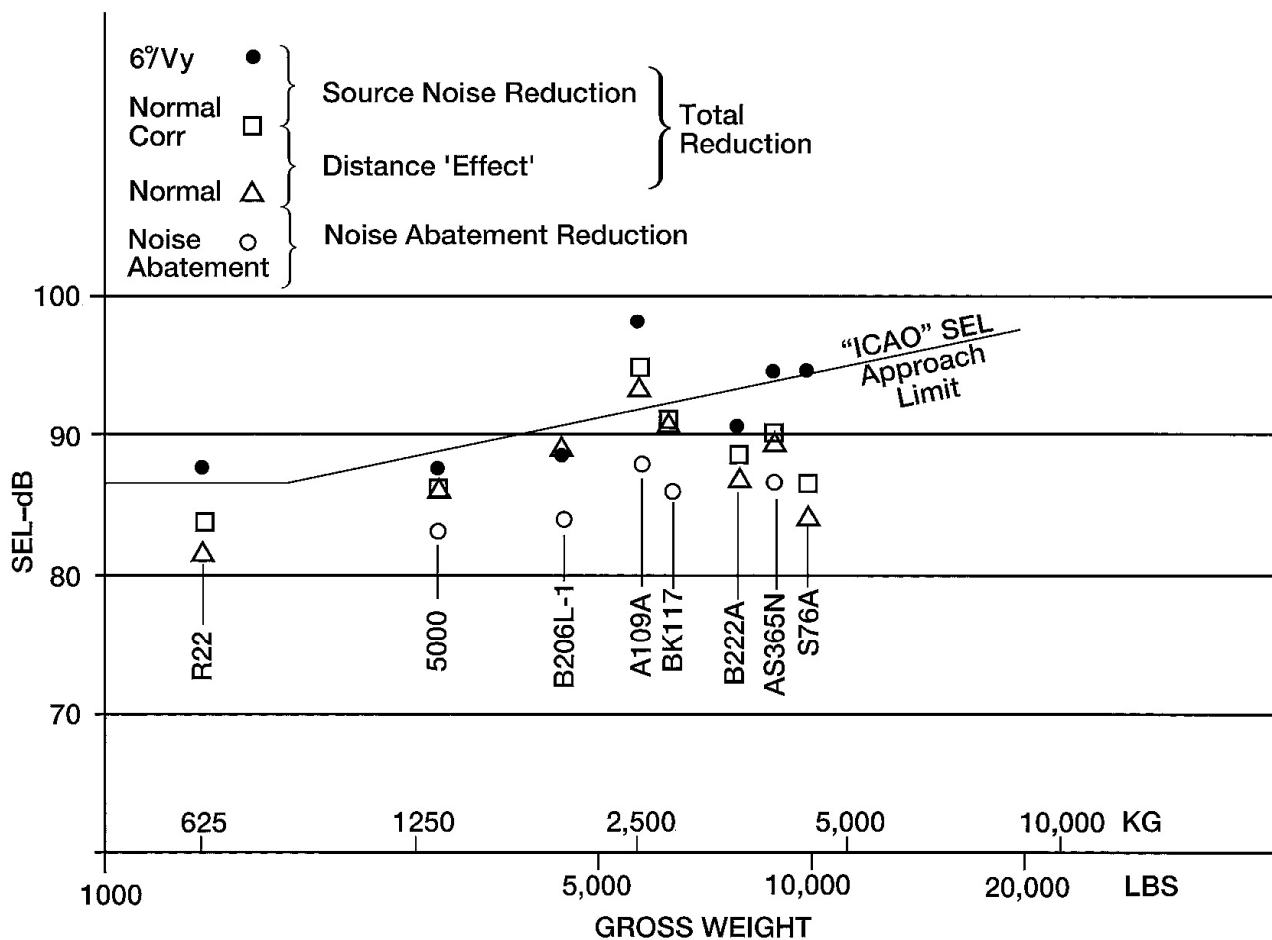


Impact of Noise Abatement Procedures



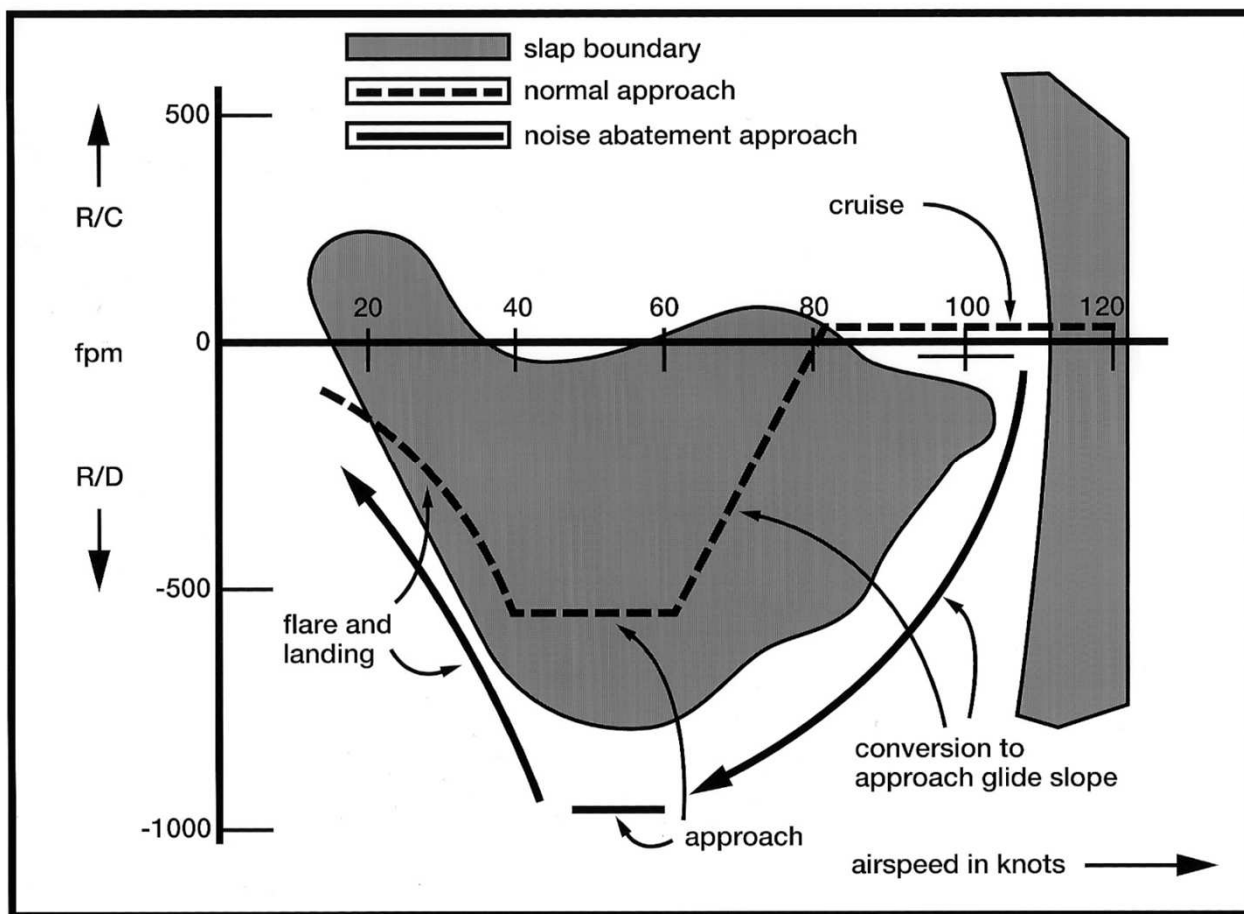


Noise Abatement - Approach Noise Reduction





General Noise Abatement Profile



Bell Data – ‘Medium Helicopter’



The Real Problem : The Long term solution

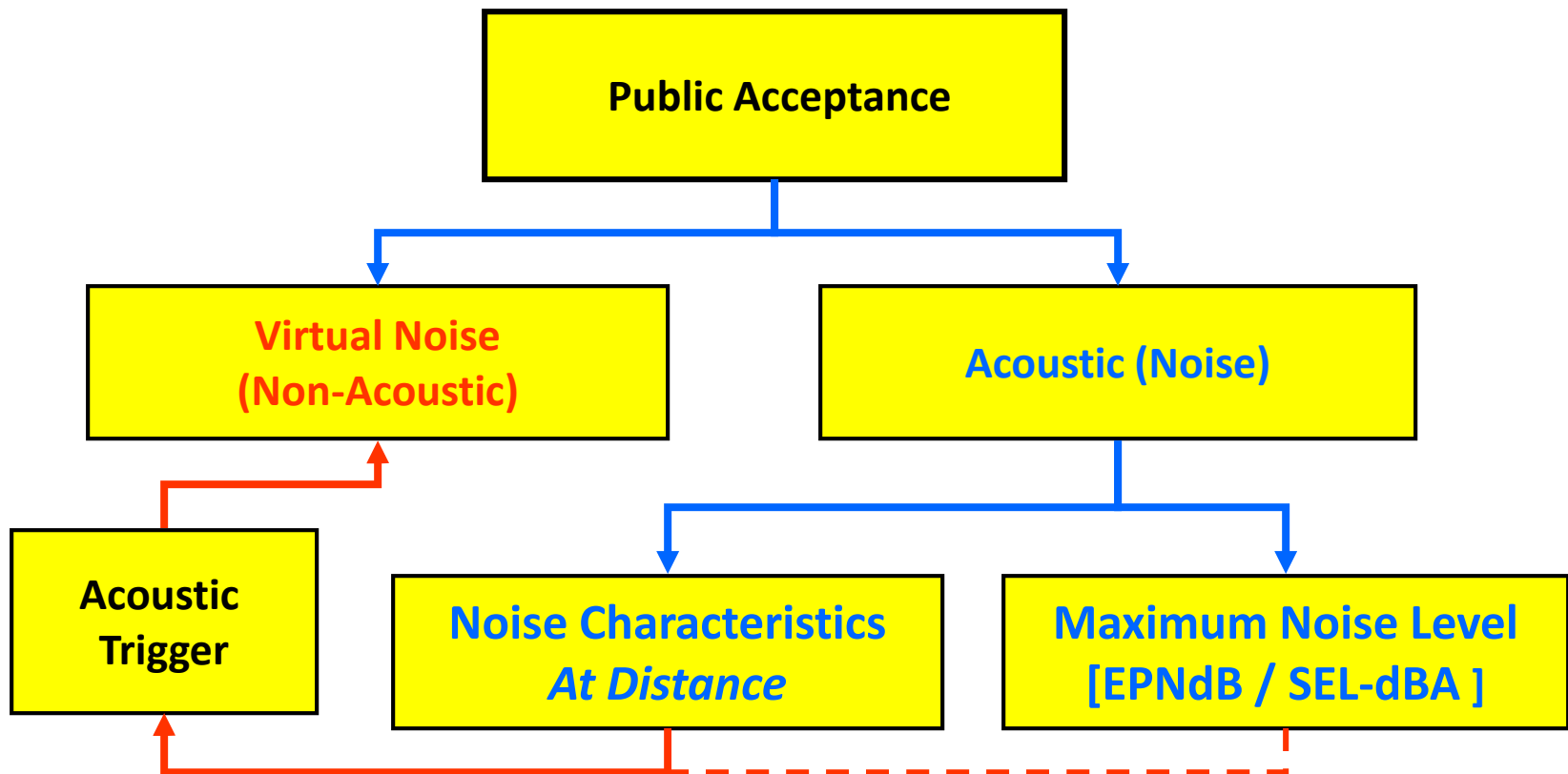


“Virtual Noise” - The Annoying aspect of rotor noise

- The authorities often argue that decreasing the absolute level of helicopter noise (lowering the noise certification limits or introducing operational noise limits) will improve the public acceptance of helicopters
- Studies do not support this view. The subjective character of the sound is **equally or more important than the maximum noise level**
- The reaction to helicopters is dependent on several factors, some of which are completely unrelated to the absolute level of the helicopter noise. These non-acoustic phenomena described collectively as *virtual noise* are usually triggered by acoustic noise
- The non-acoustic component can dictate the level of public response to helicopters.
- Noise at levels 20 dB (or more) below the maximum level provides the initial audible cues that alert an individual to the presence of a helicopter i.e. provide the trigger for the *virtual noise* effect
- **Thus eliminating the impulsive sources will result in greater public acceptance irrespective of the absolute noise level generated**



Public Acceptance





Public Acceptance

Reaction to Rotorcraft Noise Acoustic and Non-Acoustic **

Non-Acoustic Factors Equal or More Important

**** *Virtual Noise ~ Main trigger: 'Impulsive Character'***



Solution

- Long term solution lies in understanding “Annoyance “ and Psycho acoustics
- New design features are required : but difficult to achieve given the physics of rotorcraft flight
- Fixed wing transport aircraft have led the way aggressively to reduce engine noise and operational noise around airport
- This has added immense pressure on the helicopter industry to aggressively pursue long term technological solutions for new designs
- For ‘todays’ helicopters, use “Fly neighborly”/Noise Abatement approaches are “*the way to go*”.



Questions ?