

26.

YOU CAN SEE HOW EFFECTIVE
THE ISOLATION IS WHEN THE
EXCITATION FREQUENCY IS WELL
ABOVE THE RESONANT FREQUENCY.

THE TRICK IS TO HAVE
THE RESONANCE FREQUENCY SLOW
DOWN. YOU CAN SOMETIMES
FEEL THE EDGE OF THIS IF
THE RPM DROPS WITH THE
AIR CONDITIONING OR EVEN WHEN
YOU TURN THE ENGINE OFF AS
YOU GET A SHUDDER (SPECIALLY
IN DIESELS) AS THE RPM
FALLS TO ZERO THROUGH
THE RESONANCE.

1.

M6X00410

ADVANCED ENGINE DESIGN.

LECTURE NOTES FOR 17. MARCH.

ENGINE MOUNTING & FORCE TRANSMISSION THROUGH THE MOUNTS.

A TYPICAL INTERNAL COMBUSTION ENGINE GENERATES FIRST AND SECOND ORDER INERTIA FORCES. THE FIRST ORDER ARE USUALLY BALANCED OUT ON THE CRAWTSWAFT, BUT OFTEN STRONG SECOND ORDER FORCES ARE LEFT UNBALANCED.

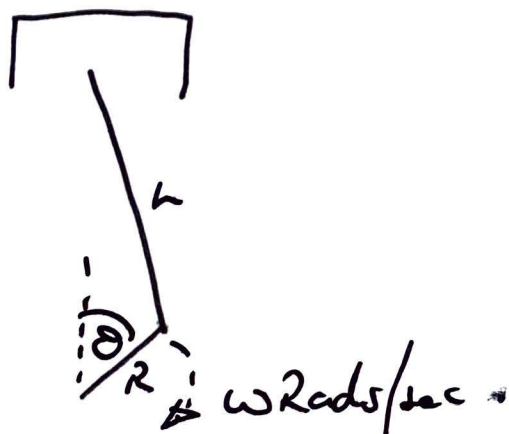
IF YOU TAKE A SINGLE CYLINDER ENGINE MOUNTED VERTICALLY IN A CAR, THE RECIPROCATING ~~AND~~ ~~AND~~ CYLINDER MASSES LEAD TO

2. THE FOLLOWING VERTICAL FORCES:

1. FIRST ORDER :

$$F = M_{\text{rec}} \cdot R \omega^2 \cos \theta.$$

— (1)



2. SECOND ORDER :

$$F = \frac{R}{L} M_{\text{rec}} \cdot R \omega^2 \cos 2\theta.$$

— (2)

IN - AN INLINE 4 CYLINDER ENGINE
WITH A SINGLE PLANE COUNTERSHEFT
THE FIRST ORDER FORCES CANCEL
BUT THE SECOND ORDER FORCES ADD
UP TO A TOTAL OF :