

***FROM THE RIGHT SEAT
WITH DON KAYE***

Precision Performance

Kinds of Performance

Introduction

- **CLIMB PERFORMANCE**
- **POWER CONTROL**
- **FUEL/MIXTURE CONTROL**
- **FLIGHT CONTROL PRECISION**
- **PARTIAL PANEL CONTROL**
- **LANDING PRECISION**

MAX RATE: WHY IMPORTANT

CLIMB PERFORMANCE

- **ONE OBVIOUS REASON:** TELLS HOW QUICKLY YOU CAN CHANGE ALTITUDE.
- **NEXT OBVIOUS:** CAN WE CLEAR OBSTRUCTIONS AFTER TAKEOFF?
- **ZERO ROC* ALTITUDE:** ABSOLUTE CEILING; ONLY ONE AIRSPEED USABLE FOR LEVEL FLIGHT.
- **LEAST OVBIOUS:** BEST WAY TO VERIFY POWER OUTPUT STATUS OF PROP/ENGINE!!!

* ROC = RATE-OF CLIMB

FACTORS AFFECTING MAX ROC

CLIMB PERFORMANCE

- ***NOT CONTROLLABLE BY PILOT:***
 - AIR TEMPERATURE & PRESSURE ALTITUDE (DENSITY ALTITUDE)
 - CONDITION OF ENGINE, PROP, RIGGING, AERO SURFACES; AND DRAG INDUCING ELEMENTS (ICE, DIRT, ADDED ANTENNAS, ETC)*
- ***PILOT RESPONSIBLE AND/OR SELECTABLE***
 - PROPER SETTING OF THROTTLE, RPM, MIXTURE, & COWL FLAP
 - GEAR & FLAP UP & LOCKED
 - AIRPLANE WEIGHT PROJECTED FOR THE CLIMB
 - AIRSPEED FOR MAX ROC

* THESE CAN BE A MAJOR UNKNOWN

HIGH DENSITY ALTITUDE TAKEOFFS

CLIMB PERFORMANCE

THREE KEY PARAMETERS

- TAKEOFF DISTANCE TO LIFT OFF
- TAKEOFF DISTANCE TO CLEAR A 50 FT OBSTACLE
- AVAILABLE RATE OF CLIMB AFTER LIFT-OFF

ON ANY PARTICULAR TAKEOFF, ONE OF THESE IS THE MOST IMPORTANT

TAKEOFF DISTANCES SHOULD TAKE INTO ACCOUNT 7 FACTORS:

- AIR TEMPERATURE
- RUNWAY ROUGHNESS
- WIND VELOCITY
- AIRPORT PRESSURE ALTITUDE
- RUNWAY SLOPE
- AIRPLANE WEIGHT
- FIXED OR VARIABLE PITCH PROP

POWER SELECTION PRECISION

PRECISION POWER CONTROL

- **PILOTS SHOULD BE COMFORTABLE USING A WIDE RANGE OF POWER SETTINGS CORRECTLY**
 - LANDING PATTERNS MAY BE SLOW OR EXPEDITED
 - CRUISE OPTIONS CAN BE FAST, MODERATE, OR ECONOMY
- **COMMIT TO MEMORY THE “KEY NUMBERS” FOR QUICKPOWER CHANGES: THESE PROVIDE QUITE ADEQUATE PRECISION**
 - “KEY NUMBER” IS THE SUM OF MANIFOLD PRESSURE & RPM (IN 100’ S)
 - THESE DO CHANGE SLIGHTLY WITH TEMPERATURE & ALTITUDE, BUT ERROR IS SMALL (UP TO ABOUT 3% POWER)
- **MINIMUM POWER TO MAINTAIN LEVEL FLIGHT (CLEAN CONFIGURATION IS TYPICALLY 35% RATED POWER).**

MIXTURE ADJUSTMENT DISCIPLINE

PRECISION POWER CONTROL

- PRIOR TO TAXI
- PRIOR TO MAGNETO CHECK
- PRIOR TO TAKEOFF
- DURING CLIMB
- AT CRUISE ALTITUDE
- DURING LET-DOWN
- PRIOR TO LANDING
- AFTER LANDING
- AT THE TIME OF ANY OTHER POWER CHANGES

THE PROFICIENT PILOT DOES ALL OF THESE!!!

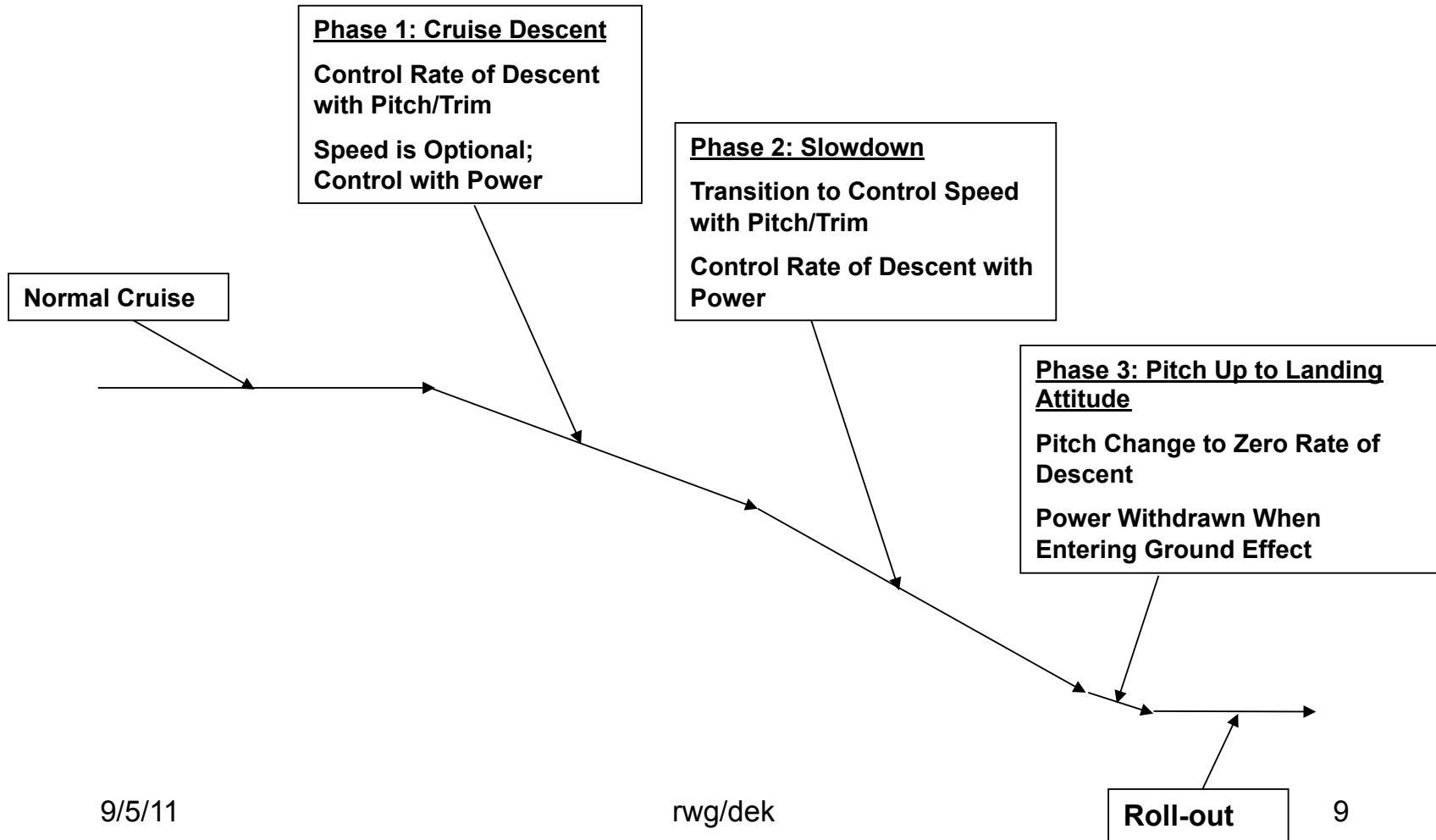
FIVE RULES FOR PRECISION FLIGHT CONTROL

FLIGHT CONTROL PRECISION

1. **PITCH CONTROLS *EITHER SPEED OR RATE-OF-CLIMB/DESCENT* (ROC), WHICHEVER IS MOST IMPORTANT, AT ANY PHASE OF FLIGHT.**
2. **THROTTLE CONTROLS *THE OTHER*. (IF PITCH IS PRIME FOR SPEED, THEN THROTTLE CONTROLS ROC.**
3. **IF THE POWER SETTING FOR THE ITEM 2 CONTROL OPERATION (ABOVE) IS PREDETERMINED, THEN MAKE THE POWER CHANGE *WHILE* ACCOMPLISHING THE ITEM 1 CONTROL OPERATION.**
4. **BANK ANGLE CONTROLS RATE-OF-TURN. REMEMBER TWO VALUES:**
 - **STANDARD RATE OF TURN @ 100 KNOTS REQUIRES 15° BANK**
 - **STANDARD RATE OF TURN @ 150 KNOTS REQUIRES 22° BANK**
5. **FOR SMALL HEADING CORRECTIONS (LESS THAN 5°), USE *MAINLY* THE RUDDER.**

THREE PHASES OF A LANDING

LANDING PRECISION



AIRSPEED ENTERING GROUND EFFECT

LANDING PRECISION

AIRSPEED AT TIME OF ENTERING GROUND EFFECT IS THE MOST IMPORTANT PARAMETER FOR PRECISION LANDINGS

- **FINAL APPROACH AIRSPEED SELECTION CONSIDERS FIVE FACTORS:**
 1. NORMAL OR SHORT FIELD LANDING.
 2. GROSS WEIGHT, HEAVY OR LIGHTER.
 3. FULL OR NO FLAP DEFLECTION.
 4. NORMAL DESCENT POWER, OR POWER WITHDRAWN.
 5. SMOOTH AIR, OR ADD AIRSPEED FOR GUST INCREMENT.
- **EACH OF THE FIVE PARAMETERS PRODUCE 5 TO AS MUCH AS 15 KNOTS CHANGE TO THE OPTIMUM APPROACH SPEEDS.**
- **THE FIVE “DELTA” AIRSPEED CHANGES ADD ALGEBRAICALLY TO PRODUCE THE “OVER THE FENCE” BEST AIRSPEED: SOME ARE ADDED, AND SOME ARE SUBTRACTED.**

OVER-THE-FENCE PRECISION LANDING SPEED

Landing Precision

MODEL	REF. APRCH AIRSPEED	SHORT FIELD	300 LB BELOW GROSS	IDLE POWER	NO FLAPS
SUPER 21 (MPH) [M20E, '66]	78	-5	-5	+5	+10
MOONEY 201 (KTS) [M20J, '89]	72	-5	-5	+5	+10
MOONEY 252 (KTS) [M20K, '87]	75	-5	-5	+5	+8
MOONEY TLS (KTS) [M20M, '91]	80	-5	-5	+5	+9

NOTE: ADD OR SUBTRACT EACH OF FOUR ITEMS, AS REQUIRED,
FROM REF. APCH. AIRSPEED.; GUST INCREMENT MAY ALSO BE NEEDED.
REF. APCH. AIRSPEED = NORMAL LANDING APPROACH @ MAX GW,
WITH NORMAL DESCENT POWER, FULL FLAPS, AND SMOOTH AIR.