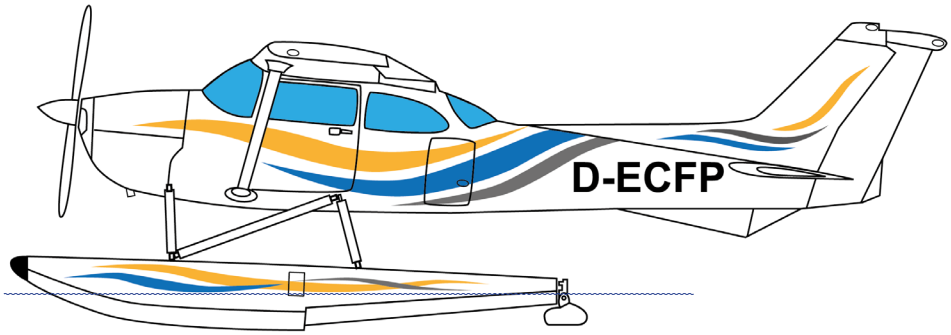
BALTIC SEAPLANE

PILOT'S OPERATING HANDBOOK | PART B

and

FAA APPROVED AIRPLANE FLIGHT MANUAL



WIPAIRE, INC

172P AMPHIBIAN

THIS DOKUMENT MUST BE CARRIED IN THE AIRPLANE AT ALL TIMES.

SERIAL NO.: 172-7423
REGISTRATION NO.: D-ECFP

THE WIPAIRE FLIGHT MANUAL COVERS ONLY THE SEAPLANE CONFIGURATION. FOR LIMITATIONS, PROCEDURES AND PERFORMANCE INFORMATION NOT CONTAINED IN THIS SUPPLEMENT, CONSULT TO CHAPTER 01 - 09 IN PART A.

WIPAIRE, INC
FLEMMING FIELD (KSGS), MNS, USA

30 MAY 1980

PART A

CHAPTER 01 - 08

PART B

CHAPTER 09
SUPPLEMENTS

- WIPAIRE (POH)
- EDM - 900
- KX 155A
- GARMIN 340

WIPAIRE, INC.

• MANUFACTURERS OF WIPLINE FLOATS & SKIS
• SPECIALISTS IN AIRCRAFT MODIFICATION
www.wipaire.com
1700 Henry Avenue - Fleming Field
South St. Paul, MN 55075
651-451-1205

FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT 15A

FOR

AMPHIBIAN OPERATION

IN THE

180 BHP CESSNA MODELS 172M, N, P

AND F172M, N, P

WITH

WIPLINE MODEL 2350 AMPHIBIAN FLOATS

REG. NO. EI-CFP

SER. NO. 172-74428

This AFM Supplement must be carried in the airplane readily available to the pilot when the airplane is modified by the installation of Wipline Model 2350 Amphibian floats, in accordance with STC SA00900CH. *The information contained herein supplements or supersedes the basic* Owners Manual only in those areas listed. For limitations, procedures and performance information not contained in this Supplement, consult the basic placards, manuals, the Owner's Manual, the Pilot's Operating Handbook, and the engine STC AFM Supplement as applicable.

FAA APPROVED: Joyce Mieras

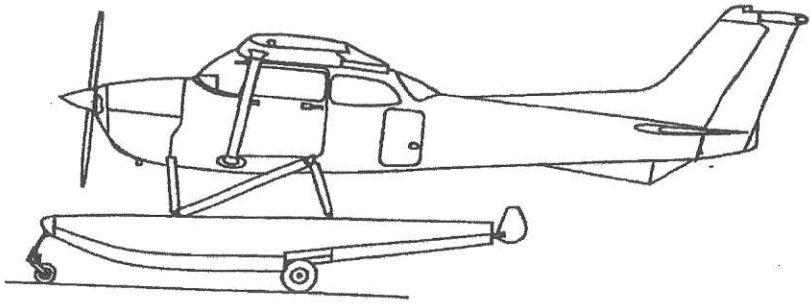
Royace Prather, Manager
Chicago Aircraft...
Certification Office
FAA Central Region
Date: 22 AUG 2005

LOG OF REVISIONS

REV. NO.	PAGES	DESCRIPTION	DATE	FAA APPROVED*

*Approved by Manager, Chicago Aircraft Certification Office.
NOTE: Revised text is indicated by a vertical black line along right margin.

Figure 1.



SECTION 1

GENERAL

INTRODUCTION

This AFM, written especially for operators of the Cessna Skyhawk amphibian, provides information not found in the Owner's Manual. It contains procedures and data required for safe and efficient operation of the Cessna 172M, N, P and F172M, N, P modified with a 180 BHP engine upgrade and equipped with Wipline Model 2350 amphibious floats.

Information contained in the Owner's Manual for the Skyhawk, or the engine STC AFM, which is the same as that for the floatplane, is generally not repeated in this supplement.

DESCRIPTIVE DATA

ENGINE
O-360 180 BPH Lycoming
IO-360 180 BPH Lycoming
PROPELLER

Propeller Manufacturer: McCauley Accessory Division

Propeller Model Number: McCauley 1A200/DFA8243 or 1A200/WFA8243
Number of Blades: 2
Propeller Diameter, Maximum: 82 inches.
Minimum: 80.4 inches.
Propeller Type: Fixed Pitch.
or
Propeller Manufacturer: Hartzell

Propeller Model Number: HC-C2YK-1BF/F8477-4 or HC-C2YR/F8477-4
Number of Blades: 2
Propeller Diameter, Maximum: 80 inches.
Minimum: 78.4 inches.
Propeller Type: Constant Speed

MAXIMUM CERTIFICATED WEIGHTS

Takeoff:	2550 Lbs.
Landing	2550 Lbs.

SPECIFIC LOADINGS

Wing Loading:	14.53	lbs./ft^2
Power Loading:	14.16	lbs./hp.

SECTION 2
LIMITATIONS

INTRODUCTION

Except as shown in this section, the amphibian operating limitations are the same as those for the Skyhawk landplane. The limitations in this section apply only to operations of the 180 BHP models 172M, N, P and F172M, N, P equipped with Wipline Model 2350 floats. The limitations included in this section have been approved by the Federal Aviation Administration. Observance of these operating limitations is required by Federal Aviation Regulations.

AIRSPEED LIMITATIONS

Airspeed limitations and their operational significance are shown in figure 2

MODELS		172M F172M	172M, N F172M, N		172P
	SPEED	MCAS	KCAS	REMARKS	KCAS
V_{NE}	Never exceed speed	182	160	Do not exceed this speed in any operation.	158
V_{NO}	Maximum structural cruising speed	145	128	Do not exceed this speed except in smooth air, and then only with caution.	127
V_A	Maneuvering Speed	112	97	Do not make full or abrupt control movements above this speed.	99
V_{FE}	Maximum Flap Extended Speed:	100	87	Do not exceed this speed with flaps down.	87
V_{LO}, V_{LE}	Max speed for gear operation, max speed with gear down.	140	120	Do not exceed this speed with gear extended or in operation.	120

AIRSPEED INDICATOR MARKINGS

Airspeed indicator markings are the same as those for the Landplane. Due to small differences in airspeed system calibration and stall speeds with floats installed, the stall speeds as shown in Section 5 of this supplement are slightly different from those of the Landplane.

POWER PLANT LIMITATIONS

ENGINE
O-360 180 BPH Lycoming
IO-360 180 BPH Lycoming
PROPELLER

Propeller Manufacturer: McCauley Accessory Division

Propeller Model Number: McCauley 1A200/DFA8243 or 1A200/WFA8243
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Number of Blades: 2
Propeller Diameter, Maximum: 80 inches.
Minimum: 78.4 inches.
Propeller Type: Constant Speed

WEIGHT LIMITS

Maximum Takeoff Weight: 2550 Lbs.

Maximum Landing Weight: 2550 Lbs.

NOTE:

When floats are installed, it is possible to exceed the maximum takeoff weight with all seats occupied and minimum fuel.

CENTER OF GRAVITY LIMITS

Center of Gravity Range:

Forward – 37.0 inches aft of datum at 2100 lbs. or less, with straight line variation to 39.5 inches aft of datum at 2550 lbs.

Aft - 45.5 inches aft of datum at all weights.

Reference Datum: Lower portion of front face of firewall.

MANEUVER LIMITS

The amphibian is certificated in the normal category. The normal category is applicable to aircraft intended for non-aerobatic operations. These include any maneuvers incidental to normal flying including stalls (except whip stalls), lazy eights, chandelles, and steep turns in which the angle of bank is not more than 60°. Aerobatic maneuvers, including spins, are not approved.

FLIGHT LOAD FACTOR LIMITS

Flight Load Factors:
*Flaps Up .....+3.8g. - 1.52g
*Flaps Down .....+3.0g

*The design load factors are 150% of the above and, in all cases, the structure meets or exceeds design loads.

OTHER LIMITATIONS

WATER RUDDER LIMITATIONS

Water rudders must be retracted for all flight operations.

AMPHIBIAN OPERATION

Landing on water is PROHIBITED unless all four landing gear are fully retracted.

PLACARDS

The following information must be displayed in the form of composite or individual placards in addition to those specified in the Owner's Manual.

1. Locate below landplane operations limitations placard:
p/n 10A3-6284

In full view of the pilot:

FLOATPLANE OPERATIONS LIMITATIONS

The markings and placards installed in this airplane contain operating limitations which must be complied with when operating this airplane in the Normal Category. Other operating limitations which must be complied with when operating this airplane in this category are contained in the Pilot's Operating Handbook and FAA Approved Flight Manual Supplement.

No acrobatic maneuvers, including spins, approved.
Flight into known icing conditions prohibited.

This airplane is certificated for the following flight operations as of the date of original airworthiness certificate:

DAY NIGHT VFR IFR

2. As near as practical to the airspeed indicator:
p/n 10A3-6452

FLOATPLANE
Stall speeds are approximately 5 KIAS lower than indicator markings.

3. In full view of the pilot:
p/n 6B3-2243-2

WATER RUDDER UP FOR ALL FLIGHT OPERATIONS

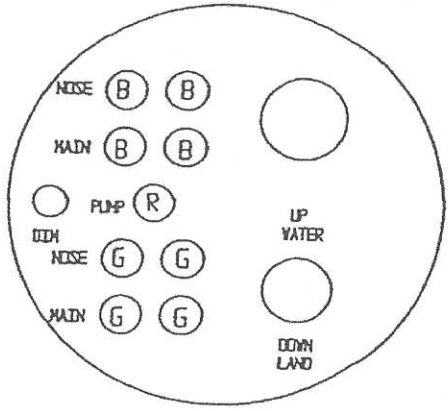
4. Locate in clear view of pilot: p/n 6B3-2243-3

DO NOT LAND ON WATER UNLESS GEAR IS FULLY RETRACTED.

5. Locate at the emergency gear hand pump: p/n 15A3-6283

EMERGENCY HANDPUMP PULL GEAR MOTOR CIRCUIT BREAKER SELECT DESIRED GEAR POSITION PUMP GEAR TO DESIRED POSITION"

6. Locate on the gear selector switch: p/n 10B3-6202



7. In clear view of pilot: p/n 15A3-6279

REFER TO WIPLINE AFM SUPPLEMENT FOR OPERATION WITH WIPLINE FLOATS INSTALLED

8. At the water rudder retract handle: p/n 3A3-1115-1, -2, -3

WATER RUDDER CONTROL

DOWN	UP

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SECTION 3

EMERGENCY PROCEDURES

INTRODUCTION

Checklist and amplified procedures contained in the basic Owner's Manual generally should be followed. The additional or changed procedures specifically required for operation of the 172M, N, P and F172M, N, P equipped with Wipline Model 2350 floats are presented in this section.

WARNING!

There is no substitute for proper and complete pre-flight planning habits and their continual review in minimizing emergencies. Be thoroughly knowledgeable of hazards and conditions which represent potential dangers, and be aware of the capabilities and limitations of the airplane.

AIRSPEEDS FOR EMERGENCY OPERATION

The speeds listed below should be substituted, as appropriate, for the speeds contained in the basic Owner's Manual for Cessna Models 172M, N, P and F172M, N, P.

Engine Failure After Takeoff:

Wing Flaps Down 10° .....65 KIAS ; 75 MIAS

Maneuvering Speed:
2550 Lbs 172M.....112 MCAS
172N.....97 KCAS
172P.....99 KCAS

Recommended Glide.....70 KIAS ; 80 MIAS

Precautionary Landing with Engine Power - Flaps Down.....65 KIAS ; 70 MIAS

Landing Without Engine Power

Wing Flaps Down.....65 KIAS ; 75 MIAS

OPERATIONAL CHECKLISTS

Procedures in the Operational Checklists portion of this section shown in **bold-face** type are immediate-action items which should be committed to memory.

ENGINE FAILURE

ENGINE FAILURE DURING TAKEOFF RUN

1. **Throttle -- IDLE.**
2. **Control Wheel -- FULL Aft.**
3. Mixture -- IDLE CUT-OFF.
4. Ignition Switch -- OFF.
5 Master Switch -- OFF.

FORCED LANDINGS

EMERGENCY LANDING ON WATER WITHOUT ENGINE POWER

1. **Airspeed -- flaps UP: .....70 KIAS – 80 MIAS**
flaps DOWN: ..... 65 KIAS ; 75 MIAS
2. Landing Gear -- **UP (4 blue lights).**
3. Mixture -- **IDLE CUT-OFF.**
4. Fuel Selector Valve -- **OFF.**
5. Ignition Switch -- **OFF.**
6. Water Rudders -- **UP.**
7. Wing Flaps -- **AS REQUIRED.**
8. Master Switch -- **OFF.**
9. Doors -- **UNLATCH PRIOR TO APPROACH.**
10. Touchdown -- **SLIGHTLY TAIL LOW.**
11. Control Wheel -- **HOLD FULL AFT as amphibian decelerates.**

EMERGENCY LANDING ON LAND WITHOUT ENGINE POWER

1. **Airspeed flaps UP: .....70 KIAS – 80 MIAS**
flaps DOWN: .....65 KIAS – 75 MIAS
2. Landing Gear -- **DOWN (4 green lights) for smooth terrain.**
UP (4 blue lights) for rough terrain.
3. Mixture -- **IDLE CUT-OFF.**
4. Fuel Selector Valve -- **OFF.**
5. Ignition Switch -- **OFF.**
6. Water Rudders -- **UP.**
7. Wing Flaps -- **AS REQUIRED (30° recommended).**
8. Master Switch -- **OFF.**
9. Doors -- **UNLATCH PRIOR TO APPROACH.**
10. Touchdown -- **LEVEL ATTITUDE.**
11. Control Wheel -- **FULL AFT (after landing).**
12. Brakes -- **AS REQUIRED.**

LANDING GEAR MALFUNCTION PROCEDURES

LANDING GEAR FAILS TO RETRACT OR EXTEND

1. Battery Switch -- ON.
2. Landing Gear Switch – RE-CHECK IN DESIRED POSITION.
3. Landing Gear Circuit Breaker -- CHECK IN.
4. Gear Lights - 4 BLUE for gear UP.
   4 GREEN for gear DOWN.
5. Gear Position - CHECK VISUALLY.

If gear still in improper position:

6. Gear Switch -- RECYCLE.
7. Landing Gear Motor -- CHECK red light ON.
8. Airspeed -- REDUCE to minimize air loads on gear.

If gear motor is inoperative or gear is still not in desired position:

9. Landing Gear Circuit Breaker -- PULL.
10. Landing Gear Switch -- DESIRED POSITION.
11. Emergency Valve -- SELECT DESIRED POSITION.
12. Emergency Hand pump -- PUMP until resistance becomes heavy (may be as many as 120 cycles).

13. Gear Position Lights -- CHECK DESIRED LIGHTS (4) ILLUMINATED.
14. Gear Position -- CONFIRM VISUALLY.

WARNING!

DO NOT LAND ON WATER UNLESS GEAR IS FULLY RETRACTED

GEAR UP OR PARTIALLY EXTENDED - LANDING ON LAND (ONLY)

1. Seats, Seat Belts, Shoulder Harness -- SECURE.
2. Runway -- SELECT longest smooth ground or grass surface available.
3. Gear Switch -- UP to permit partially extended gear to retract and maintain level attitude during ground run.
4. Wing Flaps -- FULL DOWN.
5. Airspeed .....60 KIAS – 70 MIAS
6. Doors -- UNLATCH PRIOR TO TOUCHDOWN.
7. Master Switch -- OFF.
8. Touchdown -- LEVEL with MINIMUM SINK.
9. Control Wheel -- FULL AFT (after touchdown).
10. Mixture -- IDLE CUT OFF (after touchdown).
11. Fuel -- OFF (after touchdown).

AMPLIFIED PROCEDURES

MAXIMUM GLIDE

After an engine failure in flight, the recommended glide speed as shown in figure 3 should be established as quickly as possible. In the likely event the propeller should stop, maintain the speed shown.

* PROPELLER WINDMILLING	* SPEED
	70 KIAS
	80 MIAS
* ZERO WIND	
	* FLAPS UP

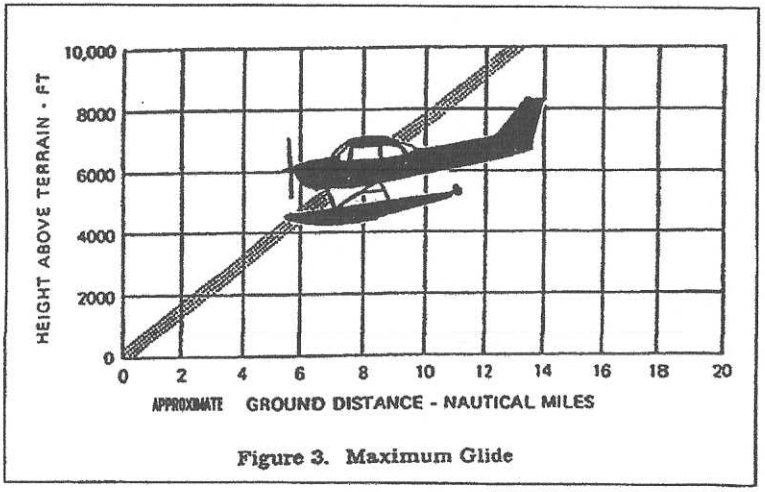


Figure 3. Maximum Glide

SECTION 4

NORMAL PROCEDURES

INTRODUCTION

Checklist and amplified procedures contained in the basic Owner's Manual generally should be followed. The additional or changed procedures specifically required for operation of the 172M, N, P and F172M, N, P equipped with Wipline Model 2350 floats are presented in this section.

SPEEDS FOR NORMAL OPERATION

Unless otherwise noted, the following speeds are based on a maximum weight of 2550 pounds and may be used for any lesser weight.

Takeoff:
Normal Climb Out (10° flaps).....65 KIAS ; 75 MIAS

Maximum Performance, Flaps 10°, Speed at 50 ft. . . . . .60 KAIS ; 70 MIAS

Enroute Climb, Flaps Up:
Normal .....70-80 KIAS ; 75-85 MIAS
Best Rate of Climb, Sea Level .....70 KIAS – 75 MIAS
Best Rate of Climb, 10,000 Ft .....65 KIAS – 70 MIAS

Landing Approach:
Normal Approach
Flaps Up..... 65-75 KIAS ; 75-85 MIAS
Normal Approach
Flaps Down.....60-70 KIAS ; 70-80 MIAS
Maximum Performance – Flaps Down – Speed at 50 ft.....60 KIAS ; 70 MIAS

Balked Landing:
Maximum Power, Flaps 20°. .....60 KIAS – 70 MIAS

Maximum Recommended Turbulent Air Penetration Speed:
2550 Lbs 172M..... 112 MCAS
172N.....97 MCAS
172P.....99 KCAS

CHECKLIST PROCEDURES

PREFLIGHT INSPECTION

1. Amphibian Approved Flight Manual AVAILABLE IN THE AIRPLANE.
2. Floats, Struts and Fairings -- INSPECT for dents, cracks,scratches,etc.
3. Float Compartments -- INSPECT for water accumulation.

NOTE

Remove rubber plugs which serve as stoppers on the standpipe in each float compartment and pump out any accumulation of water. Reinstall rubber plugs with enough pressure for a snug fit.

4. Water Rudders -- CHECK actuation cables.

BEFORE STARTING ENGINE

1. Water Rudder Operation -- CHECK VISUALLY.
2. Water Rudders -- DOWN for taxiing on water (retract lever. full fwd. UP for taxiing on land (retraction lever full aft).

TAKEOFF

TAKEOFF ON WATER

1. Landing Gear -- UP.
2. Water Rudders -- UP (retraction lever full aft).
3. Wing Flaps -- 0°- 10° (10° preferred).
4. Carburetor Heat (if applicable)-- COLD.
5. Control Wheel -- HOLD FULL AFT.
6. Power -- FULL THROTTLE (Advance Slowly), Prop Control (if applicable) to 2600 RPM.
7. Mixture – RICH or LEAN FOR ELEVATION. Max RPM above 3000' with fixed pitch Prop.
8. Control Wheel -- MOVE FORWARD when the nose stops rising to attain planing Attitude (on the step).
9. Airspeed – 45-50 KIAS ; 50-60 MIAS
10. Control Wheel -- APPLY LIGHT BACK PRESSURE to lift off.
11. Climb Speed -- flaps 10°: . . . . . .70 MIAS; 60 KIAS. With obstacles ahead, climb at flaps 10°: 70 MIAS ; 60 KIAS.
12. Wing Flaps -- UP after all obstacles are cleared and safe airspeed is attained

NOTE

To reduce takeoff water run, the technique of raising one float out of the water may be used. This procedure is described in the amplified procedures in this section.

TAKEOFF ON LAND

1. Water Rudders -- UP (retraction lever full aft).
2. Wing Flaps -- 0° to 10° (10° for short field).
3. Carburetor Heat – COLD (if applicable).
4. Power -- FULL THROTTLE (Advance Slowly), Prop Control (if applicable) to 2600 RPM.

NOTE

For short field takeoffs, apply and hold brakes while throttle, propeller (if applicable) and mixture are set.

5. Mixture – RICH or LEAN FOR ELEVATION. Max RPM above 3000' with fixed pitch Prop.
6. Rotate for Lift-off – 50-60 MIAS
7. Climb Speed - flaps 10° -- 60 KIAS ; 70 MIAS
   With obstacles ahead, climb (flaps 10°) at 60 KIAS ; 70 MIAS.
8. Wing Flaps -- UP after all obstacles are cleared and a safe airspeed is attained
9. Landing Gear -- RETRACT.

ENROUTE CLIMB

NORMAL CLIMB

1. Airspeed .....70-80 KIAS ; 75-95 MIAS

MAXIMUM PERFORMANCE CLIMB

1 Airspeed ..... 70 KIAS (Sea level) to 65 KIAS (10,000 feet)
.....85 MIAS (Sea level) to 70 MIAS (10,000 feet)

BEFORE LANDING

BEFORE LANDING ON WATER

1. Landing Gear -- UP.
2. Landing Gear Lights -- 4 BLUE (Check On).
3. Landing Gear Position -- CONFIRM VISUALLY.
4. Water Rudders -- UP.
5. Wing Flaps -- AS DESIRED.
6. Airspeed flaps UP -- 65-75 KIAS ; 75-85 MIAS
   Airspeed flaps DOWN..... 60-70 KIAS ; 70-80 MIAS
   With obstacle, use 60 KIAS ; 70 MIAS over the obstacle.

BEFORE LANDING ON LAND

1. Landing Gear -- DOWN.
2. Landing Gear Lights -- 4 GREEN (Check on).
3. Landing Gear Position -- CONFIRM VISUALLY.
4. Water Rudders -- UP.
5. Wing Flaps -- AS DESIRED.
6. Airspeed -- flaps UP
   65-75 KIAS ; 75-85 MIAS
   Airspeed -- flaps DOWN
   60-70 KIAS ; 70-80 MIAS

With obstacles, use 60 KIAS ; 70 MIAS over the obstacle.

LANDING
LANDING ON WATER

1. Touchdown -- SLIGHTLY TAIL LOW.
2. Control Wheel -- HOLD FULL AFT as amphibian decelerates to taxi speed.

NOTE

With forward loading, a slight nose-down pitch may occur if the elevator is not held full up as floatplane comes down off step.

LANDING ON LAND

1. Touchdown -- SLIGHTLY TAIL LOW.
2. Control Wheel -- LOWER NOSEWHEELS to runway.
3. Brakes -- USE AS REQUIRED.

AFTER LANDING

1. Water Rudders -- DOWN (except on land).

SECURING AIRPLANE

1. Fuel Selector Valve -- LEFT TANK or RIGHT TANK to minimize cross-feeding and ensure maximum fuel capacity when refueling.

AMPLIFIED PROCEDURES

TAXIING ON WATER

Taxi with water rudders down. It is best to limit the engine to 800 RPM for normal taxi because water piles up in front of the float bow at higher engine speeds. Taxiing with higher engine RPM may result in engine overheating and will not appreciably increase the taxi speed. In addition, it may lead to water spray striking the propeller tips, causing propeller tip erosion.

During all low speed taxi operations, the elevator should be positioned to keep the float bows out of the water as far as possible. Normally, this requires holding the control full aft. For minimum taxi speed in close quarters, use idle RPM with full carburetor heat and a single magneto. This procedure is recommended for short periods of time only.

Although taxiing is very simple with the water rudders, it is sometimes necessary to sail the floatplane under high wind conditions. In addition to the normal flight controls, the wing flaps and cabin doors will aid in sailing. Water rudders should be retracted during sailing. To taxi great distances, it may be advisable to taxi on the step with the water rudders retracted. Turns on the step from an upwind heading may be made with safety providing they are not too sharp and if ailerons are used to counteract any overturning tendency.

TAXIING ON LAND

The nose wheels are full swiveling on the amphibian. Steering is accomplished by use of the brakes installed on the main wheels. An occasional tapping of the brakes may be utilized to maintain the desired taxi path under normal conditions.

TAKEOFF ON WATER

Start the takeoff by applying full throttle smoothly while holding the control wheel full aft. When the nose stops rising, move the control wheel forward slowly to place the amphibian on the step. Slow control movement and light control pressures produce the best results. Attempts to force the floatplane into the planing attitude will generally result in loss of speed and delay in getting on the step. The floatplane will assume a planing attitude which permits acceleration to takeoff speed, at which time the floatplane will fly off smoothly.

The use of 10° wing flaps throughout the takeoff run is recommended. Upon reaching a safe altitude and airspeed, retract the wing flaps slowly, especially when flying over glassy water because a loss of altitude is not very apparent over such a surface.

If porpoising is encountered while on the step, apply additional control wheel back pressure to correct the excessively nose-low attitude. If this does not correct the porpoising, immediately reduce power to idle and allow the floatplane to slow to taxi speed, at which time the takeoff can again be initiated.

To clear an obstacle after takeoff with 10° wing flaps, use an obstacle clearance speed of 60 KIAS – 70 MIAS for maximum performance. Under some adverse combinations of takeoff weight, pressure altitude, and air temperature, operation on glassy water may require significantly longer takeoff distances to accelerate to the liftoff speed, and allowance should be made for this.

If liftoff is difficult due to high lake elevation or glassy water, the following procedure is recommended: With the floatplane in the planing attitude, apply full aileron to raise one float out of the water. When one float leaves the water, apply slight elevator back pressure to complete the takeoff. Care must be taken to stop the rising wing as soon as the float is clear of the water, and in crosswinds, raise only the downwind wing. With one float out of the water, the floatplane accelerates to takeoff speed almost instantaneously.

For a crosswind takeoff, start the takeoff run with wing flaps up, ailerons deflected partially into the wind and water rudders extended for better directional control. Flaps should be extended to 10° and the water rudders retracted when the floatplane is on the step; the remainder of the takeoff is normal. If the floats are lifted from the water one at a time, the downwind float should be lifted first. Takeoff from larger bodies of water should always be made into the wind. The chop/waves generated in winds of 10 knots and more may inhibit engine operation due to spray and may prevent the amphibian from attaining the step under these conditions in crosswinds.

TAKEOFF ON LAND

Normal takeoffs are accomplished with the wing flaps extended 0-10°. As speed increases, the elevator control should be gradually moved aft of the neutral position, and when the amphibian feels light (40-50 KIAS – 46-58 MIAS), a light back pressure on the control wheel will allow the amphibian to fly off smoothly.

To clear an obstacle after takeoff, use 10° wing flaps and an obstacle clearance speed of 60 KIAS – 70 MIAS for maximum performance. Upon reaching a safe altitude and airspeed, retract wing flaps slowly. The landing gear should be retracted when the point is reached where a wheels-down forced landing on that runway would be impractical. Recommended procedures for enroute climb are the same as for the landplane.

LANDING

Normal landings can be made power on or power off using approach speeds of 75-85 MIAS – 65-75 KIAS with flaps up; and 70-80 MIAS ; 60-70 KIAS with flaps down. If landing site is restricted, use full flaps with idle power and an airspeed of 70 MIAS ; 60 KIAS over any obstacle

GLASSY WATER LANDING

With glassy water conditions, flaps should be extended to 20° and enough power used to maintain a low rate of descent (approximately 200 feet per minute). The floatplane should be flown onto the water at this sink rate with no flare attempted since height above glassy water is nearly impossible to judge. Power should be reduced to idle and control wheel back pressure increased upon contacting the surface. As the floatplane decelerates off the step, apply full back pressure on the control wheel. If this glassy water technique is used in conjunction with an obstacle clearance approach, allowance should be made for appreciably longer total distances than are typical of normal water conditions.

CROSSWIND LANDING

The wing-low slip method should be used with the upwind float contacting the surface first.

SECTION 5
PERFORMANCE

INTRODUCTION

This section provides the performance information on the 180 BHP 172M, N, P and F172M, N, P amphibian required under CAR3.

AIRSPEED CALIBRATION

The Airspeed Calibration Charts from the Float Owner's Manual, the Pilot's Operating Handbook, or the aircraft Owner's Manual may be generally used.

STALL SPEEDS

CONDITIONS:
Power Off

MOST FORWARD CENTER OF GRAVITY
MODEL 172M, N, P and F172M, N, P

		ANGLE OF BANK			
		0°	30°	45°	60°
WEIGHT	FLAP DEFLEC-TION	KCAS Or MCAS	KCAS Or MCAS	KCAS Or MCAS	KCAS Or MCAS
2550 lbs.	UP	55 KCAS	59 KCAS	65 KCAS	77 KCAS
	20	51 KCAS	54 KCAS	60 KCAS	71 KCAS
	30	50 KCAS	53 KCAS	59 KCAS	70 KCAS
2550 lbs.	UP	63 MCAS	68 MCAS	75 MCAS	88 MCAS
	20	59 MCAS	60 MCAS	69 MCAS	82 MCAS
	30	58 MCAS	61 KIAS	68 MCAS	81 MCAS

Figure 5. Stall Speeds

CLIMB PERFORMANCE

The Climb Performance of the Cessna models 172M, N, P and F172M, N, P on Wipline 2350 Floats equals or exceeds that required by CAR 3.

SECTION 6

WEIGHT & BALANCE

INTRODUCTION

Weight and balance information contained in the basic Owner's Manual generally should be used, and will enable you to operate the floatplane within the prescribed weight and center of gravity limitations. The changed information specifically required for operation of the 180 BHP equipped 172M, N, P and F172M, N, P equipped with Wipline Model 2350 Amphibian floats is presented in this section.

NOTE

When floats are installed, it is possible to exceed the maximum takeoff weight with all seats occupied and minimum fuel.

WARNING!!

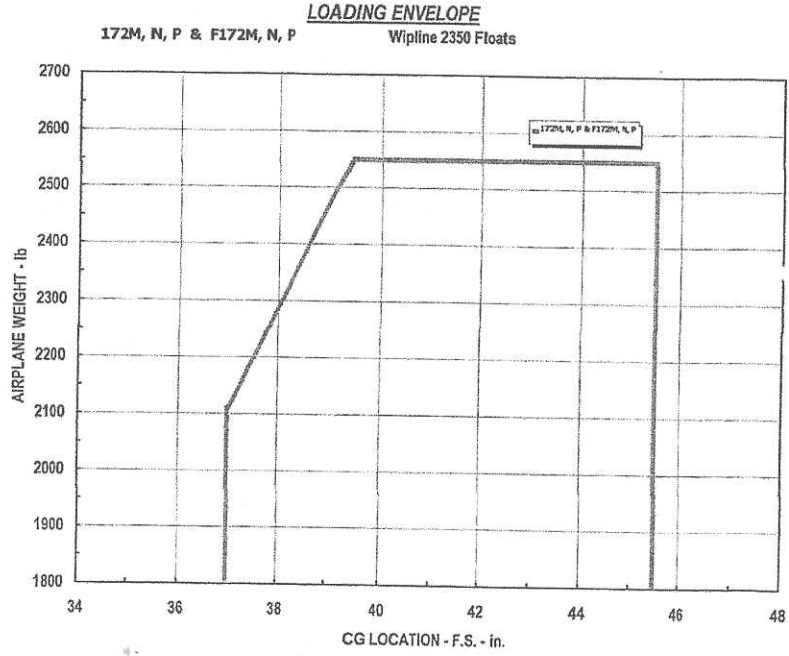
It is the responsibility of the pilot to ensure that the amphibian is loaded properly. Operation outside of prescribed weight and balance limitations could result in an accident and serious or fatal injury.

FLOAT BAGGAGE COMPARTMENTS

Baggage may be carried in the float baggage compartments in accordance with the following limitations:

COMPARTMENT	MAX WT	ARM	MOM
LEFT	50 Lbs.	20	1000
RIGHT	50 Lbs.	20	1000

Center of Gravity Limits



SECTION 7

AIRPLANE & SYSTEMS DESCRIPTION

INTRODUCTION

This section contains a description of the modifications and equipment associated specifically with the installation of Wipline Model 2350 amphibious floats.

WARNING !!

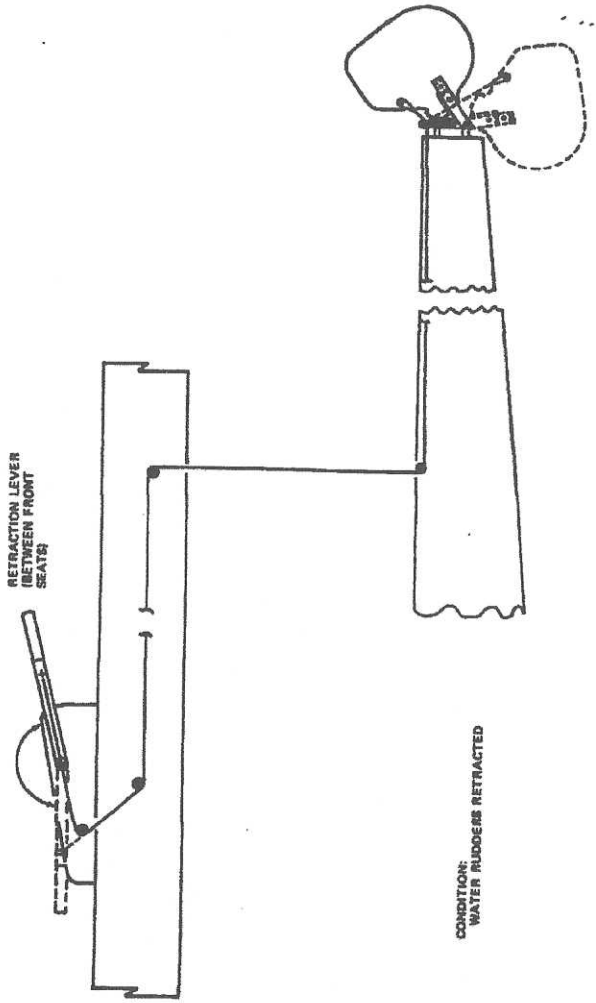
Complete familiarity with the airplane and its systems will not only increase the pilot's proficiency and ensure optimum operation, but could provide a basis for analyzing system malfunctions in case an emergency is encountered. Information in this section will assist in that familiarization. The responsible pilot will want to be prepared *to make proper and precise responses in every situation.*

THE AMPHIBIAN

The floatplane is similar to the landplane with the following exceptions:

1. Floats, incorporating retractable landing gear and a water rudder steering system, replace the landing gear. A water rudder retraction lever connected to the dual water rudders by cables is located on the cabin floor between the front seats. Water rudders are locked in center when retracted for improved directional stability.
2. Additional fuselage structure is added to support the float installation.
3. Additional structural "V" brace is installed between the top of the front door posts and the cowl deck.
4. Interconnect springs are added between the rudder and aileron control systems for improved lateral stability.
5. The fuel strainer installation is modified for floatplane use.
6. The standard propeller is replaced with a propeller of larger diameter (80 inches) and flatter pitch.
7. Hoisting provisions are added to the top of the fuselage.
8. Fueling steps and assist handles are mounted on the forward fuselage, and steps are mounted on the wing struts to aid in refueling the airplane.
9. Amphibian placards are added.
10. Water rudder stops are added to the water rudder blades for added directional stability.

Figure 7. Water Rudder Retraction System.



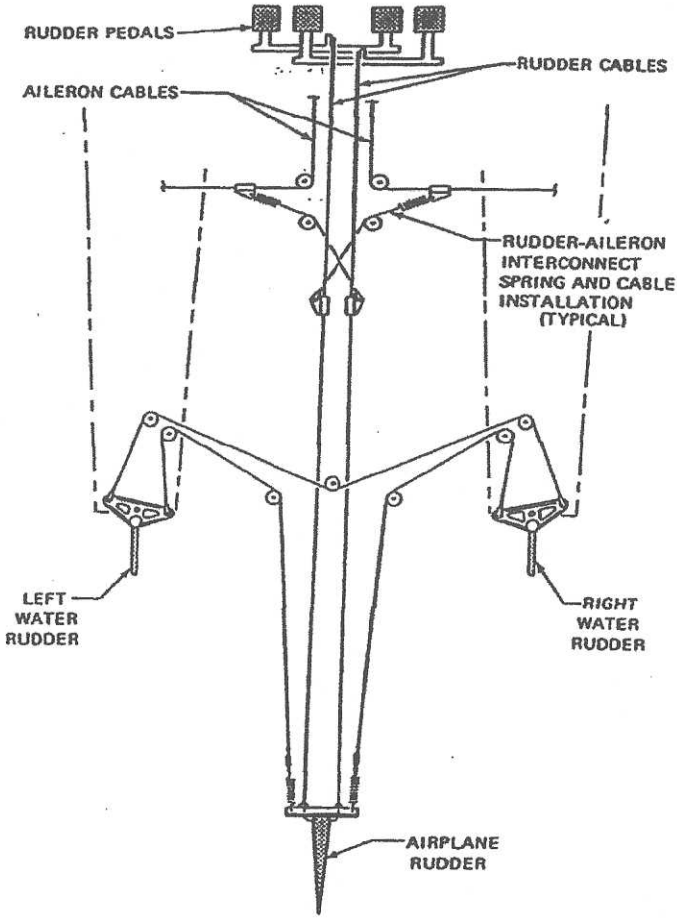
WATER RUDDER SYSTEM

Retractable water rudders (Figure 7), mounted at the aft end of each float, are connected by a system of cables and springs to the rudder pedals. Normal rudder pedal operation moves the water rudders to provide steering control (Figure 8) for taxiing.

The water rudders are equipped with centering locks (attached to each retraction hinge) which, when the water rudders are retracted, make contact with a plate on the stern of each float, locking the rudders in the centered position. Springs within the water rudder steering system permit normal airplane rudder action with the water rudders retracted, and improve directional stability in flight.

A water rudder retraction lever, located on the cabin floor between the front seats, is used to manually raise and lower the water rudders. During takeoff, landing, and in flight, the handle should be in the UP (aft) position. With the handle in this position, the water rudders are up. When the lever is rotated forward to the DOWN position, the water rudders extend to the full down position for water taxiing.

Figure 8. Water Rudder Steering System



AMPHIBIAN OPERATION

1. Water operation procedures are similar to any common amphibian.

2. Landing gear operation.

   a. The aircraft is equipped with landing gear powered by an electrohydraulic power pack (located on the firewall of the aircraft). Am emergency hand pump is provided for operation of float landing gear in case of power or electrical failure.

   b. A set of four blue lights (one for each wheel) indicates gear up position and a set of four green lights indicates gear down position. The four blue lights indicate gear up and locked. The four lights of each color are the means of identifying that the landing gear is locked in the up or down position. There are visual indicators also.

   c. A red light marked "PUMP ON" is also provided to warn the pilot that the power pack is running during gear transit. It should shut off automatically after the desired gear position is attained by means of a pressure sensing switch cutting off the power when pressure builds up after gears are locked. Should this sensing device fail, and the pump does not shut off, the power can be manually turned off by pulling out the landing gear circuit breaker. The gear can still be operated using the power pack by turning the power back on (pushing the landing gear circuit breaker in) and selecting the next desired position and again manually turning off the power if necessary. The faulty pressure sensing switch should be repaired at the time of next landing.

   d. The pressure switch is also designed to turn on the power pack when pressure in the system drops below a certain value to rebuild the system pressure back up to shut off pressure. Therefore, if the pump comes on momentarily (an aural cue) when turning on the master switch, or the red light momentarily illuminates during flight, it merely means the pressure has fallen off and the pump is coming on to build it up. A sight gauge is provided on the power pack reservoir and the level should be kept in the upper 25% of the range. Excessive illumination of the red light indicates a significant hydraulic leak (either internal or external) and the circuit breaker should be pulled and fluid level checked followed by repair of the system.

   e. An emergency hand pump is located on the floor between the two front seats for use in the event the normal hydraulic system fails. The hand pump may be used to retract or extend the landing gear.

   f. Prior to utilizing the emergency hand pump, pull the circuit breaker to deactivate the electric hydraulic pump. Select UP or DOWN using the normal landing gear selector handle. Hand pump handle, pump vertically (approximately 120 cycles for extension or retraction). When a gear reaches the selected position, its indicator light will illuminate. After all four gear are in the selected position, there is a noted increase in resistance of hand pump operation.

SECTION 8

AIRPLANE HANDLING, SERVICE & MAINTENANCE

INTRODUCTION

Section 8 of the basic Pilot's Operating Handbook (if available) applies, in general, to the amphibian. The following recommended procedures apply specifically to the amphibian operation. (Cleaning and maintenance of the floats should be accomplished as suggested in the Wipline Floats Service and Maintenance Manual).

MOORING

Proper securing of the amphibian can vary considerably, depending on the type of operation involved and the facilities available. Each operator should use the method most appropriate for his operation. Some of the most common mooring alternatives are as follows:

1. The amphibian can be moored to a buoy, using a yoke tied to the forward float cleats, so that it will freely weathervane into the wind.
2. The amphibian can be secured to a dock using the fore and aft cleats of one float, although this method is generally not recommended unless the water is calm and the amphibian is attended.
3. The amphibian may be removed from the water (by use of a special lift under the spreader bars) and secured by using the wing tiedown rings and float cleats. If conditions permit the amphibian to be beached, ensure that the shoreline is free of rocks or abrasive material that may damage the floats.

SERVICING

Service the airplane in accordance with Section 8 of the Owner's Manual.

Pilot's Guide

Engine Data Management

EDM-900
Primary
TSO/STC

J.P. INSTRUMENTS INC.
Information: P. O. Box 7033
Huntington Beach, CA 92646

Factory: 3185-B Airway Ave.
Costa Mesa, CA 92626

(714) 557-3805 Fax (714) 557-9840

www.jpinstruments.com

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Product Features

- Hands-free, automatic scanning
- Lean Find™ finds the first and last cylinder to peak with true peak detect—eliminates false peaks
- Displays both leaned temperature below peak and peak
- Battery voltage with alarm
- Amperes (load or charge/discharge meter)
- Programmable alarm limits
- Exhaust Gas Temperatures (EGTs) to stable 1°F resolution
- DIF low to high EGT with alarm
- Shock cooling monitored on *every* cylinder
- Fast response probes
- Non-volatile long term memory
- Records and stores data up to 30 hours
- Post-flight data retrieval
- Data retrieval software
- Oil pressure
- Oil temperature
- Turbine inlet temperature, if applicable (optional)
- Outside air temperature
- Compressor discharge temperature (optional)
- Carburetor temperature or induction temperature (optional)
- Fuel pressure, if applicable
- Fuel level Voltage, Resistive or Capacitive (frequency)
- Fuel Flow
    - Solid-state rotor fuel flow transducer
    - Fuel quantity in gallons, kilograms, liters, or pounds
    - Low fuel quantity alarm
    - Low fuel time alarm
    - GPS interface
    - Instantaneous fuel flow rate
    - Total amount of fuel consumed
    - Total fuel remaining
    - Time to empty at the current fuel flow rate
- RPM and manifold pressure
- Automatically calculates percent horsepower
- Hobbs® timer
- Remote Auxiliary Display (RAD)

Section 1 - Section-1 Getting Started

This is a summary of basic operation. Detailed descriptions of all operations appear later in this Pilot's Guide.

EDM-900 primary instrument has preset alarm limits and cautionary ranges per the POH (user cannot change them) typically for the following measurements of: oil temperature, oil pressure, fuel pressure, fuel quantity, cylinder head temperature, turbine inlet temperature, manifold pressure, and RPM.

Note: Fuel quantity gauges must be calibrated to the aircraft and will not be functional until the fuel calibration process has been performed.

View Angle

The best view angle for the pilot is in the horizontal mode with the buttons on the bottom. The best Portrait mode is with the buttons on the right.

View angles are per the table below:

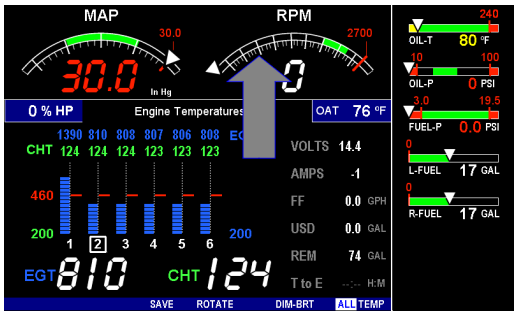
Viewing angle	Horizontal	Left	65 Degrees
		Right	65 Degrees
	Vertical	Up	60 Degrees
		Down	50 Degrees

List of abbreviations and acronyms

Gauge Function	Message Area Alarm Abbreviation
Primary	**Primary**
Engine rotational speed	RPM xxxx
Engine Manifold Pressure	MAP xx.x in hg
Engine Cylinder Head Temp	CHT2 xxx ºF
Engine Oil Temperature	O-T xxx ºF
Engine Oil Pressure	O-P xxx ºF
Fuel Pressure	F-P xx PSI
Fuel Flow to engine	F-F xx.x GPH
Comp. Discharge Temp.	CDT xxx ºF
Turbine inlet Temp. Left side	TIT-L xxxx ºF
Turbine Inlet Temp. Right side	TIT-R xxxx ºF
Single Turbine Inlet Temp.	TIT xxxx ºF
Non-Primary	**Non-Primary**
Exhaust Gas Temp.	EGT2 xxxx ºF
Shock Cooling of CHT	CLD xx º/MIN
Differential Temp. of EGT	DIF xx ºF
Bus Voltage	Volts xx.x
Amperage Load	AMPS xx
Outside Air Temp.	OAT xx ºF
Estimated Time to Empty	Est. T to E xx:xx H:M
Fuel used to date	USED xx.x GAL
Estimated Remaining fuel	Est. REM xx GAL
Estimated Fuel required to Waypoint	Est. WP REQ xx GAL
Estimated Fuel Remaining at Waypoint	Est. WP RES xx GAL
Nautical Miles per Gallon	ECON xx.x MPG
Brightness, Dim control	DIM/BRT

Rotation

Holding the step button in for 5 seconds, **with the engine OFF**, will produce the gray arrow. This arrow can be rotated to a new up position by tapping the LF button to rotate and then the STEP button for save. If you chose the one bad angle (Landscape mode with the buttons on top and the JPI logo upside down), return the instrument to JPI and JPI will rotate the screen with the buttons on the bottom.



Fuel Flow Computer Basics (independent of fuel quantity)

The fuel flow computer tracks the fuel flowing to the engine and computes various values based on this. At installation, then each time you refuel the aircraft, you must inform the EDM about how much useable fuel is onboard. This is done via the *REFUEL* function.
See page 36 for detailed information

Control Button Basics

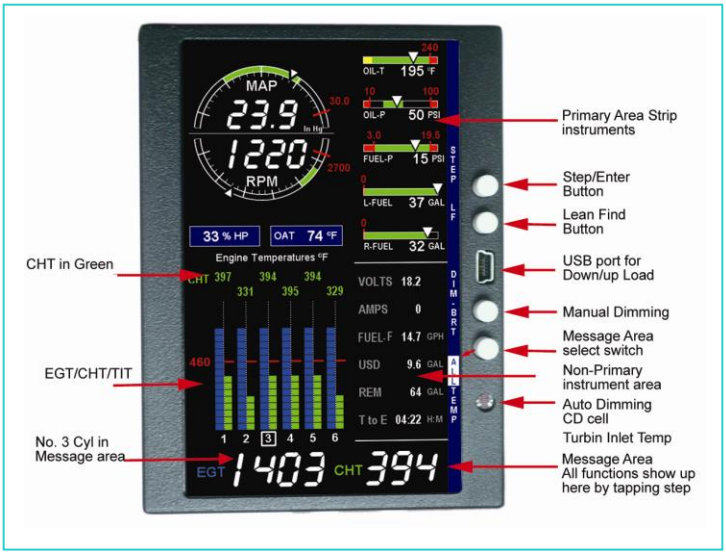
Four operating buttons control all functions of the EDM. These buttons change labels depending on the current state of the EDM.

(1st)	(2nd)	(3rd)	(4th)
STEP	LF	DIM	ALL /TEMP/FUEL
●	●	●	●

Display Screen Basics

The display screen is arranged into three sections. The top left is the *MAP* and *RPM* section. The bottom left is the *Scanner*® section or message area. On the right side are the horizontal primary strip gauges. Non-Primary gauges have a digital read out only. The instrument ranges and alarm limits are configured to match those of your aircraft POH when the EDM is set up as a Primary instrument. TIT column is to the right of the last EGT/CHT when applicable.

Horizontal Display Mode

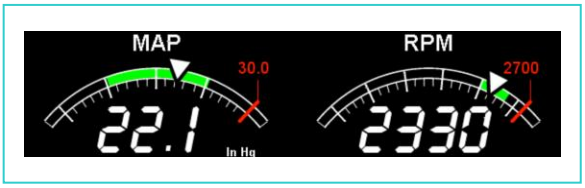


Vertical Display Mode

Remote Annunciate Light Basics

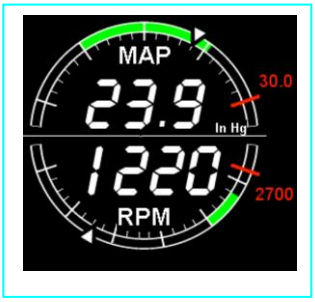
The Remote Annunciator Light '**RAL'** provides notification that an alarm is present in the display, for all Primary gauges. Upon power up, the RAL shows Red and yellow indicating it is functional. Before each flight, confirm that it is functional. Non-functioning RAL must be repaired before flight.

Remote Annunciator Light (RAL)



Horizontal mode

Vertical mode

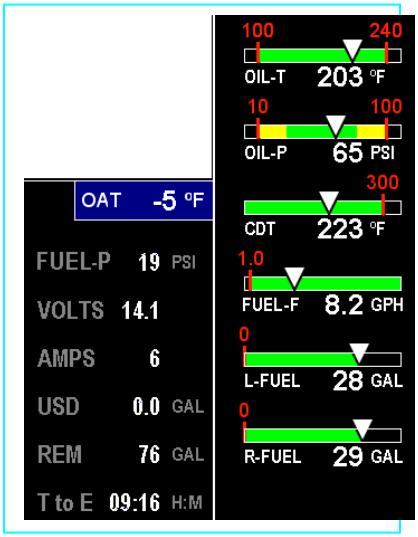


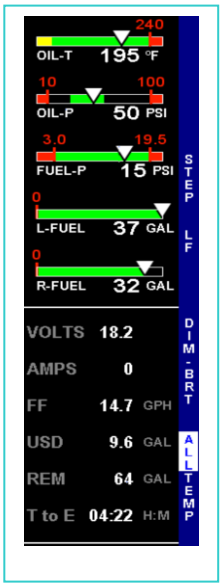
RPM and MAP Display Basics

In the vertical mode to the right and the Horizontal mode above MAP (Manifold Pressure) and RPM (Revolutions per Minute) are shown. Operations exceeding red line cause the digital value to turn red or yellow with the RAL coming on and a digital value in the Scanner message area.

Linear Bar Graph Display Basics

The Bar Graphs section contains dedicated bar graphs with digital display. An example is shown here. Pointers move horizontally left to right showing value changes and digital readouts turn red when primary exceedances occur. Non primary functions flash white.





Horizontal/Landscape mode

Vertical/Portrait mode

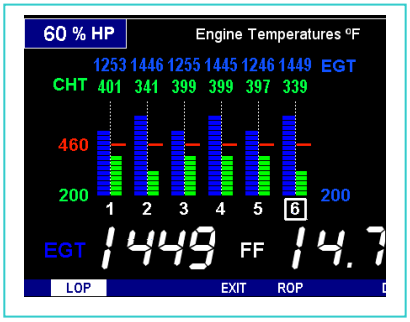
Scanner® Information Area

The Scanner® Information Area provides expanded information in the form of alpha-numeric messages, parameters and calculations. In Auto-Scan, parameters will 'scan by' once every 4 seconds (default). This rate can be changed in Pilot Programming Mode. Tap the STEP button for 'Manual' selection of any parameter. Parameters for the installed options will be displayed. To start the automatic scan tap LF and then STEP.

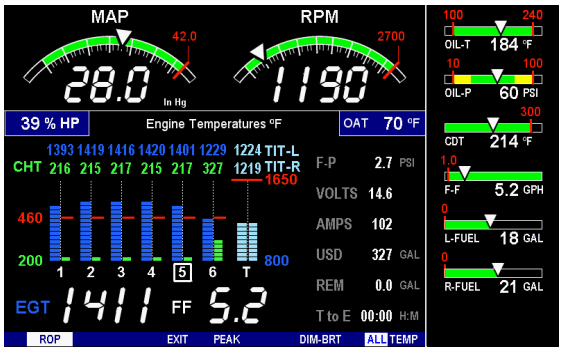
DISPLAY	PARAMETER	DESCRIPTION
EGT *1436* CHT *382*	EGT/CHT	Shows successive pairs of EGT & CHT per STEP tap.
TIT 1580 °F	TIT	Single Turbine Inlet Temp.
TIT-L and -R 1490 °F	TIT-L, TIT -R	Two Turbine Inlet Temp. Left and Right engine side
Oil-T 204 °F	OIL TEMP	Oil temperature in degrees F
Oil-P 64 PSI	OIL PRES	Oil pressure in psi
F-P16 PSI	FUEL PRES.	Fuel pressure in psi
F-F 2.7GPH	FUEL FLOW	Fuel flow in GPH
CLD 75 °F	SHOCK COOL	CHT cooling rate (deg/min)
VOLTS 13.9	BATTERY	Battery/Bus voltage
AMPS -6	Amperage	Set up per the specific aircraft
OAT 23 °F	OAT	Outside air temperature F or C
DIF 40 °F	DIF	Hottest minus coldest EGT
CRB 56 °F	CRB	Carburetor Air Temp (only allowed if IAT not present)
CDT 145 °F	CDT	Compressor Discharge Temp (only allowed if CRB not present)
IAT 105 °F	IAT	Induction Air Temp
Est. REM 68.0 GAL	FUEL REMAINING	Calculated fuel remaining on board based on what the pilot put in as maximum.
WP REQ 12.7 GAL	FUEL REQUIRED	Calculated fuel required to reach waypoint or destination (GPS interface must be corrected)
Est. WP REM 63 GAL	FUEL RESERVE	Calculated fuel reserve at waypoint (GPS interface must be correct)
ECON 9.8 MPG	Nautical MILES PER GALLON	Calculated fuel miles per units (GPS interface required)
EST. T to E 04:32 H:M	Estimated Time to Empty	Calculated time remaining to fuel exhaustion in Hours and Minutes at present power.
GPH 15.0 GPH	FUEL FLOW RATE	Actual fuel flow rate in Gallons per hour
USD 7.2 GAL	FUEL USED	Actual fuel used by the engine
FUEL-P 64 PSI	FUEL PRES	Fuel pressure in PSI

LeanFind Basics

Simply pre-lean, tap the **LF** button (Lean Find) and begin leaning. The EDM will assist you in finding the first cylinder to peak. This example is for Rich of Peak, ROP. See page 26 for a more detailed description of leaning. Press LOP to exit the ROP mode and enter the LOP mode.



1. Establish cruise at approximately 65 to 75% power and pre-lean the mixture to 50°F estimated rich of peak EGT on any cylinder.
2. Wait about 30 seconds, then tap the **LF** button.
3. Begin leaning the mixture smoothly *without stopping*. Turn a Vernier about ¼ turn per second; retract a non-Vernier or quadrant lever so that EGT rises about 10°F per second.
4. Stop leaning when you see *LEANEST* for two seconds, followed by—for example— EGT1449 FF14.7 The left number is the current temperature of the first EGT to peak and the right number is the current fuel flow.
5. Now tap the **PEAK** button to display the EGT difference from peak which is very useful for setting desired degrees below peak.
6. Slowly enrich the mixture noting that the EGT difference diminishes as EGT climbs back to peak, followed by it going minus again. Stop enriching at the desired EGT difference (such as 'EGT -*75*').
7. You can also see what the peak EGT was by holding the **PEAK** button.
8. Tap **STEP** to exit the Lean Find Mode.



Section 2 - Interpreting Data

Operation for each Phase of Flight

(Worth adding to your run-up checklist)

Engine Run-Up

Suggested setup:

- Set engine to run-up RPM

Normalize view:

- Manual mode

Verify:

- Uniform rise of about 50°F in all EGTs in single magneto operation.
- Uniform rise of EGTs with application of the mixture control.

Be alert for:

- unusually low voltage (less than nominal battery voltage)
- cold OIL and normal oil pressure
- abnormally high CHT
- Large drop in EGT on one cylinder in single magneto operation—may be fouled spark plug.

Take-Off, Climb, and Full Throttle Operations

Suggested setup:

- Standard view
- Automatic mode

Verify:

- EGTs and CHTs consistent with past climbs. EGTs should be in the 1100 to 1300°F range (100° to 300°F cooler than cruise) due to fuel cooling.

Be alert for:

- High EGT in one cylinder, 300°F above the others may indicate plugged injector or leaking manifold gasket on a carbureted engine. At high density altitude an overly rich mixture can significantly reduce engine power.
- If all EGT columns go off scale to the top of the column, be sure you are not in Normalize view, as indicated by the symbol NRM above the Scanner® section.

Cruise

After the engine is warmed up, use Lean Find to lean the mixture.

Suggested setup:

- Normalize view
- Automatic mode

Be alert for:

- Uneven EGTs (injected engines). Make fine adjustments to throttle, then RPM, then mixture to level the display columns.
- Abnormal patterns of EGTs and CHT. (see *Engine Diagnosis Chart* on page 16).

Descent

Suggested setup:

- Standard view
- Manual mode

Be alert for:

- CLD: shock cooling alarm is set to -60°F. Average cool rates of -40°F/minute to -50°F/minute are normal, depending on the engine size.

Typical Normal Measurements

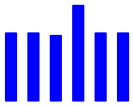
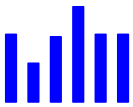
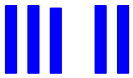
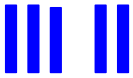
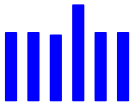
The following chart lists typical *normal* measurement values that you will observe for most general aircraft engines. Your particular engine's ranges may not fall within these values.

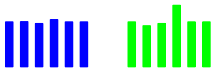
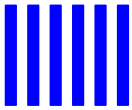
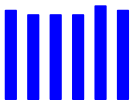
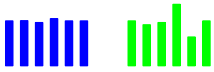
Measurement	***Normal range***	***Comments***
EGTs in Cruise	1350°F	• under 200 HP engines
	1550°F	• high performance engines • (EGT should drop 200°F when full throttle is applied)
EGT span (DIF)	70 to 90°F	• fuel injected engines
	120 to 150°F	• carbureted engines
TIT	1600°F average	• 100° higher than EGT
CHTs	350°F (OAT 60°F)	• normally aspirated engines
	410°F	• Turbocharged engines
CHT span	50 to 70°F	• 100° with gasket probes
OIL T	200°F	• oil cooler thermostat typically opens at 180°F
OIL P	30 to 60 psi	• varies with aircraft type
FUEL P (injected)	14 to 18 psi	• varies with aircraft type
FUEL P (carbureted)	0.5 to 8 psi	
Shock cooling*	-40°/minute	• tightly cowled engines
	-55°/minute	• Bonanza
	-200°/minute	• helicopter

* Maintain a cooling rate magnitude of less than -50°/minute. You will find that the cylinder with the greatest shock cooling may shift from front cylinders (during climb out) to the rear cylinders (during descent).

Engine Diagnosis Chart

The following chart will help you diagnose engine problems in your aircraft.

Display	*Symptom*	*Probable Cause*	*Recommended Action*
	TIT ~100° higher than EGTs	This is normal	
	75° to 100° EGT rise for one cylinder during flight	Spark plug not firing due to fouling, faulty plug, wire or distributor.	Enrich mixture to return EGT to normal. Have plugs checked.
	EGT Increase or decrease after ignition maintenance	Improper timing: high EGT → retarded ignition; low EGT → advanced ignition.	Check EGT for each magneto to determine any uneven timing.
	Loss of EGT for one cylinder. Engine rough	Stuck valve. Other cylinders are okay.	Have valve train checked.
	Loss of EGT for one cylinder; *no digital EGT*	Failed probe or failed wire harness.	Swap probes to determine if probe or wire harness is bad.
	Decrease in EGT for one cylinder	Intake valve not opening fully; faulty valve lifter.	Have valve lifter or rocker arm checked.
	Increase in DIF at low RPM	Low compression (blow by) in cylinder	Check compression.
	EGT and CHT not uniform	Normal for carbureted engines. Dirty fuel injectors or fouled plugs.	Check injectors and plugs.
	Decrease in EGT for all cylinders	Decrease in airflow into the induction system. Carb or induction ice.	Check for change in manifold pressure.

Display	Symptom	Probable Cause	Recommended Action
	Slow rise in EGT. Low CHT	Burned exhaust valve. CHT is low due to low power output.	Have compression checked.
	High CHT on cylinders on one side of engine	Obstruction under cowling.	Check for improper installed baffling, cowl flap misalignment or bird nests.
	Rapid rise in CHT of one cylinder	Detonation.	Reduce power.
	Sudden off scale rise for any or all cylinders	Pre-ignition Normalize view or failed probe	Full rich and reduce power. Change to Standard view Check probe.
(no picture)	Loss of peak EGT	Poor ignition or vapor in fuel injection system.	Have magneto tested.
(no picture)	Decrease in peak or flat EGT response to leaning process	Detonation. Usually the result of 80 Octane fuel in 100 Octane engine.	Enrich mixture, reduce power and re-lean mixture. Repeat to find power setting where normal peak is obtained or run rich.
	Below 10,000 ft. full throttle causes EGTs to rise	Weak or defective mechanical fuel pump.	Apply boost pump. If EGTs drop, replace fuel pump.
	CHT more than 500°, EGT normal. Adjacent EGT may be low	Leaking exhaust gasket blowing on CHT probe.	Look for white powder around cylinder to determine leak area.

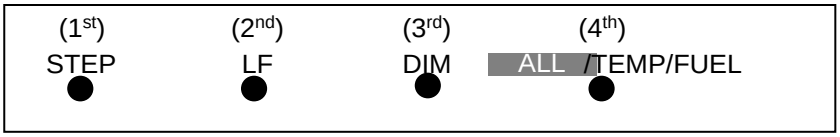
Section 3 - Displays and Controls

The EDM monitors engine temperatures, pressures and voltages, assists in adjusting the fuel/air mixture, and helps diagnose engine malfunctions. There are multiple components of the user interface:

- Four front panel operating buttons below the bottom of the display.
- RPM and MAP display in the upper left corner of the display
- Scanner analog display including cylinder number and index square in the lower left corner of the display
- Scanner digital display for numeric readouts and messages at the bottom left
- Bar graph displays on the right half of the display

Control Buttons

Four operating buttons control all functions of the EDM. These buttons may change labels depending on the current operating mode of the EDM. The term *tap* is used to denote pressing a button momentarily. The term *hold* is used to denote pressing and holding a button for five seconds or longer. Button layout is shown below:



1st Button

- In the Automatic mode, *tapping* the **STEP** button stops Scanner auto-sequencing and changes to Manual mode. Each *tap* of the **STEP** button then displays the next measurement in the sequence. Holding the **STEP** button sequences in reverse order.
- In the Lean Find mode tapping the **EXIT** button will terminate the Lean Find mode and change to the Automatic mode.
- In the Program mode tapping the **NEXT** button will advance to the next item.

2nd Button

- In Automatic or Manual modes, tapping the **LF** button will activate the Lean Find mode.
- In the LF mode holding the **LF** button after peak EGT is found will display the peak EGT.
- In Automatic or Manual modes holding the **LF** button for three seconds will toggle between Standard and Normalize (NRM) views.
- In the programming mode, tapping the **PLUS** or **MINUS** button will allow you to edit a parameter value.

- Holding **LF** during power up will display the primary alarm limits after the self-test is complete.

1st and 2nd Buttons

- Holding both the **STEP** and **LF** buttons simultaneously for five seconds will enter the pilot programming mode.
- Just after entering Lean Find Mode (but before any EGT has risen), holding both First and Second buttons for five seconds will toggle between LOP or ROP leaning modes.
- Tapping both the **STEP** and **LF** buttons simultaneously in Manual mode toggles to 'include' or 'exclude' the displayed non-primary measurement from the Automatic mode only. The excluded measurement will show up in the manual mode.

3rd Button

- Tapping **DIM** (brightness decreases) or holding **DIM** (brightness increases) allows decrease or increase brightness respectively.

2nd and 3rd Buttons

- Holding both the **LF** and **DIM** buttons simultaneously will display the Hobbs readings. Tap button labeled **NEXT** to see additional information screens.

4th Button (ALL/TEMP/FUEL)

- Select what is shown during Scanner auto-sequence. Choices are **ALL**, **TEMP** or **FUEL**. Highlighted one is what is active.

Scanner EGT and CHT Analog Bar Graph

The height of each column represents a EGT or CHT or TIT (if installed) temperature**.** Note: when in certain modes, such as leaning or normalize, the EGT resolution will temporarily be finer.

Cylinder Numbers and Index

Just below the bar graph columns are numbers identifying the respective cylinder. If TIT is installed, it is labeled by the letter **T** underneath. A square 'Cylinder I.D. Index' surrounding a number indicates what cylinder is currently selected and relates to the digital display.

Scanner Digital Display

Located under the Scanner bar graph area is the alphanumeric display. It displays alphanumeric values for different parameters as well as status and alarm messages.

Normalize / Standard View

To toggle between Standard and the Normalize views, hold the **LF** button for three seconds until the **NRM** icon toggles on or off. Note: Normalize cannot be activated while in Lean Find mode.

- **Standard view** (when the **NRM** icon is *not* lit): the EGT top of the columns represent absolute temperature.
- **Normalize view** (when the **NRM** icon is lighted): When you change to the Normalize view, all EGT columns are initially normalized to the mid-point for deviation trend analysis. Any changes are shown as an increase or decrease relative to the mid-point, thus giving an instantaneous indication that an EGT has deviated. You normally use normalize in level cruise, but it is also useful during steady state run-ups. Note: A common misapplication is to be in the Normalize view and then change power setting. This causes all columns to go off scale, high or low. Select Standard view before changing power or altitude.

Temperature Units (°F or °C)

The EDM can display engine temps in either **°F** or **°C** (Fahrenheit or Celsius). In Primary configurations, this is set to the same units as the configuration the aircraft was originally certified to.

Linear Bar Graph Displays

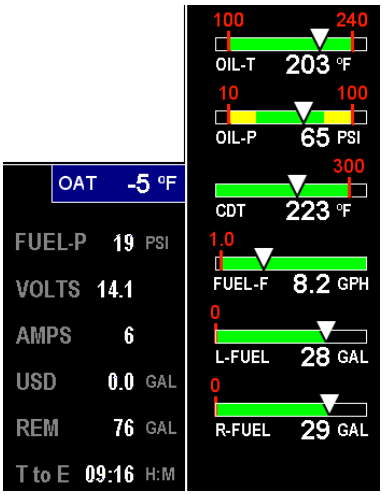
The linear bar graphs are arranged on the right half of the display. A typical layout is depicted here (Note: your actual configuration may vary). Typical functions that can be displayed are:

Primary gauges

- **Oil temperature**
- **Oil pressure**
- **Compressor Discharge temp**
- **Fuel Flow.**
- **Left tank fuel quantity**
- **Right tank fuel quantity**

Non Primary gauges

- **Fuel pressure**
- **Volts**
- **Amps**
- **Fuel USED Estimated**
- **Fuel REM Estimated**
- **Time to Empty Estimated**
- **Outside Air Tem.**



Non Primary **Primary**

The range of the bar graphs depends on the programming. Range, redlines and/or limits are typically set to match the original aircrafts gauge markings. The primary and non-primary (advisory) gauge sequences are configurable using the “Factory Program Mode”. EDM-900 gauge limitations cannot be user modified.

See ‘Section 9 - First Time Setup and Customization’.

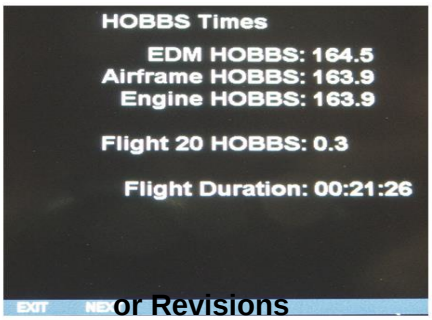
Note: Amps can operate either as a (Amps Charge) charge/discharge or (Amps Load) load meter, depending on programming.

Remote Annunciate Light

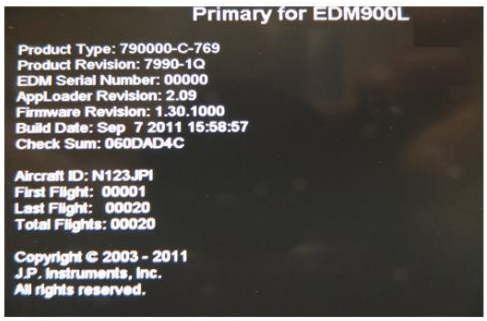
The remote auxiliary ‘**ALERT LIGHT’** provides redundancy. Upon power up the Remote Annunciate Light displays Red and Yellow. If the RAL is not working abort the flight. While the EDM’s programmed configuration (aircraft make and model and primary status) is shown in the display. Mentally Confirm that it matches your aircraft configuration before using the instrument. If it does not match the aircraft configuration abort the flight.

Additional Displays Hobbs, Revisions, and Alarm Limits

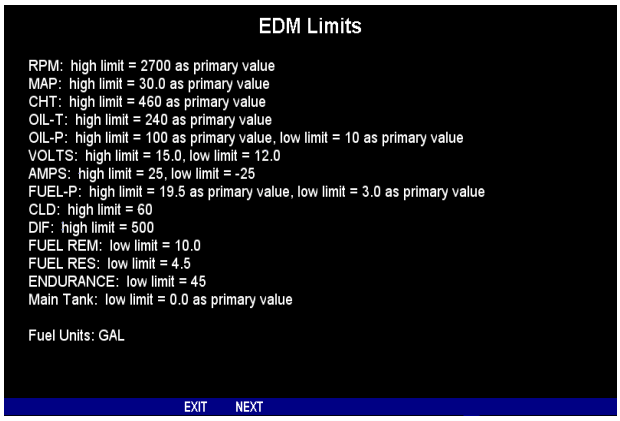
Holding both the **LF** and **DIM** buttons simultaneously will display the Hobbs times and Revisions or programmed limitations (by tapping the NEXT button) similar to the example below:



or Revisions



or Programmed Limits in this Instrument.



Dimming the Display

Automatic dimming is provided to the panel display. You can manually adjust brightness by tapping the DIM button. You will see **DIM BRT.** Holding **DIM** lowers brightness or holding **BRT** increase brightness. The percentage of brightness is displayed in the message area.

Section 4 - Operating Modes

The EDM has four basic operating modes: *Automatic*, *Manual, Program* and *Lean Find*. Lean Find is described in the next section; Program mode is described on page 41, ‘. When you first turn on the power the EDM starts in the Manual mode, but will enter the Automatic mode after a few minutes. The Automatic mode provides you with engine monitoring information for the majority of flight conditions. To optimize the mixture, use the Lean Find mode. To display specific parameters, use the Manual mode. In either Automatic or Manual modes, the display always shows the Scanner bar graphs for EGT and CHT for each cylinder and TIT (if so equipped) with the temperatures above the columns except in the vertical mode only the CHT temperatures are shown.

Automatic Mode

To activate Automatic Scanner Mode, just tap the LF button, then tap the STEP button. In the Automatic mode the EDM changes which measurement is displayed every four seconds (factory default is ‘Auto

Scan Rate 4'), however you can change this rate in the Program Mode. A setting of zero disables auto scanning altogether. The order of automatic scan if the switch is in the **ALL MODE**: EGT/CHT, TIT, CLD, DIFF, CDT,OIL-T, REM, T to E, GPH, USD, AMP, Volts, OIL-P, and Fuel-P.

Some non-primary measurements can be excluded from the *Automatic mode:* tap STEP to enter the Manual mode. Tap STEP repeatedly to index to the measurement you want to exclude. Then tap both the STEP and LF buttons simultaneously. Excluded measurements display a decimal point before the measurement name. For example:

Included: 1540 CDT Excluded: 1540 •CDT

Tapping the STEP and LF buttons simultaneously will toggle back and forth between *include* and *exclude*. Note: All measurements are always checked for alarm conditions every second.

- Every time you turn on the EDM, all measurements are reset to be *included*.
- *All* installed measurements are always displayed in the Manual mode. Exclusion only applies to the Automatic mode.

Manual Mode

To activate Manual Mode, just tap the STEP button. Use the Manual mode when you want to lock on one specific measurement such as shock cooling during descent, or your hottest CHT during climbs. To select the desired parameter, tap the STEP button until it appears. To return to the Automatic mode, tap the LF button and then tap the STEP button. You may completely disable the Automatic mode by setting zero for 'Auto Scan Rate 4'. See Pilot Programming.

Scan Sequence Example

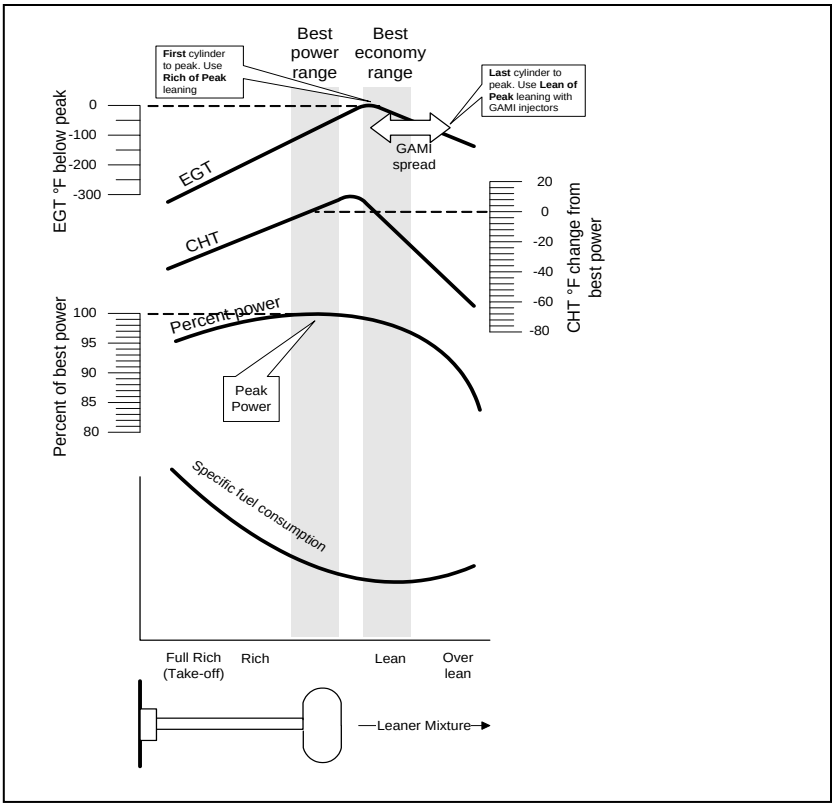
Measurement	*EXAMPLE*	*COMMENTS*
EGT, CHT	EGT 1354 CHT 335	Square indicates the cylinder being viewed
TIT	1370 TIT	Turbine Inlet Temperature # 1
Shock Cooling	-30 CLD	Square indicates fastest cooling cylinder
Compressor Discharge Temperature	300 CDT	Temperature into intercooler
Induction Air Temperature	125 IAT	Temperature out of the intercooler
Carburetor Temperature	-22 CRB	(Not available when CDT is installed)
Difference between hottest and coldest EGT	80 DIF	Square indicates most widely deviating cylinder
Fuel Remaining	Est. REM XX GAL	In gallons, liters, pounds or kilograms
Fuel required to next GPS WP or Destination at present power	WP REQ XX GAL	Present with GPS interface, valid signal and way point
Fuel Reserve at next GPS WP or Destination	Est. WP REM XX GAL	Present with GPS interface, valid signal and way point
Nautical Miles per Gal	ECON XX.X MPG	Present with GPS interface and valid signal. MPK, MPL, MPP for dif units
Time to Empty	Est. T to E XX:XX H:M	Hours: minutes calculated remaining at current fuel burn.
Total Fuel Used	USD X.X GAL	Since last refueling or trip total.

Section 5 - Lean Find

The EDM supports two methods of leaning; **ROP** (Rich Of Peak) and **LOP** (Lean Of Peak). Note: on power-up, the unit defaults to Rich Of Peak mode, but is easily changed to Lean Of Peak mode. During Rich Of Peak leaning, you'll finalize the mixture to about 20° to 80° Rich of Peak (depending on engine operating requirements). However, with the advent of closely balanced injectors (such as GAMI), it is possible to set the mixture lean of peak—thus saving fuel and running the engine cooler. Both Rich Of Peak and Lean Of Peak processes are described in detail in this manual.

Upon reaching cruise configuration, use the Lean Find mode to identify the correct cylinder to reach peak EGT (for Rich Of Peak this is the FIRST to peak, for Lean Of Peak this is the LAST to peak). To change from one method to the other, right after activating Lean Find, hold **STEP** and **LF** and the other method will be momentarily shown: **ROP** (Rich Of Peak) or **LOP** (Lean Of Peak). Release buttons after other method appears.

The following depicts the power, mixture and temperature relationships.



The following pages provide step by step guidelines in leaning your engine, for both rich of peak and lean of peak modes:

As the mixture is leaned, EGT rises to a peak temperature, and then drops as the mixture is further leaned. Peak *power* occurs at a mixture using more fuel than a mixture set to best economy. Best *economy* occurs closer to peak EGT than best (peak) power. Consult your engine manufacturer's manual for your best power and best economy settings. Accurate leaning yields optimal engine temperatures. By being able to

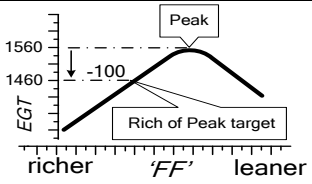
precisely adjust the mixture, your engine can produce either the best fuel economy or maximum power, whichever you choose.

A single EGT gauge merely gives you an average of a few cylinder's temperature: some cylinders can be too rich, while others too

lean. Variations produced by differences in fuel distribution, ignition, and compression will cause each cylinder to peak at a different temperature. In some cases the coldest cylinder will peak first. TIT will run up to 100 degrees hotter than the hottest EGT.

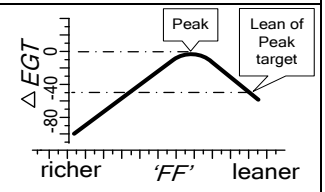
Rich of Peak leaning is as simple as:

A. Pre-lean your mixture.
B. Tap the LF button (verify *ROP* appears).
C. Lean mixture until *LEANEST* flashes *(*peak found).
D. Enrichen to the desired value 'Rich Of Peak'.

R	Procedure	Scanner Example	Comments
1	Establish cruise at 65 to 75% power.		
2	Pre-lean the mixture to 50°F estimated rich of peak on any EGT: _____°F.	EGT *1490* CHT *370*	* See 'Pre-leaning' page 31.
3	Wait one minute		Let engine stabilize.
4	Tap the LF button	ROP	Start Lean Find (if *LOP* appears hold STEP & LF until *ROP appears*)
5	Lean the mixture at approx. 10°/second *without* pausing.	EGT *1520* FF *13.8*	Flashing cylinder I.D. box identifies that EGT increased at least 15°F. EDM is now looking for first EGT to peak.
6	Stop leaning when a column begins flashing. You will see *LEANEST* for one second, followed by:	EGT *1545* FF *12.4*	Flashing cylinder I.D. box *AND* its column indicates leanest cylinder. Due to thermal inertia this will usually be about -15°F down the lean side of peak.
7	If you hold PEAK, the values of EGT and FF when peak was found are displayed.	EGT ↑*1560* FF *12.9*	Captured peak EGT value and peak FF are displayed.
8	If you tap PEAK, the difference from peak EGT is shown. Tap again to return to the peaked EGT value.	EGTΔ *-90* FF *13.4*	A useful mode for setting mixture the desired degrees rich of peak - no math required! NOTE: Unit remembers view last used.
9	Slowly enrich the mixture noting that EGT is returning to peak. Stop enriching at the desired EGT. 'Peak': best Econ. 'ROP' target: best power.	EGT *1560* FF *12.9* EGT *1460* FF *13.6* (100º RICH OF PEAK)	

Lean of Peak leaning is as simple as:

A. Pre-lean your mixture.
B. Tap the LF button (verify *LOP* appears).
C. Lean mixture until *RICHEST* flashes *(*peak found).
D. Enrichen to the desired value 'Lean Of Peak'.

L	Procedure	Scanner Example	Comments
1	Establish cruise at 65 to 75% power.		
2	Pre-lean the mixture to 50°F estimated rich of peak on any EGT: _____°F.	EGT *1490* CHT *370*	* See 'Pre-leaning' page 31.
3	Wait one minute		Let engine stabilize.
4	Tap the LF button	LOP	Start Lean Find (if *ROP* appears, hold STEP & LF until *LOP appears*)
5	Lean the mixture at approx. 10°/second *without* pausing. (cylinder I.D. box flashes when a EGT rises 15°F)	EGT *1520* FF *13.8*	Flashing cylinder I.D. box identifies the hottest EGT and that an EGT has increased at least 15°F which arms the EDM to now look for first EGT to peak.
6	After the first EGT peaks, you will see ***LEANEST*** for one second and bars coming from the top down. Continue leaning.	EGTΔ *-17* FF *12.4*	When bars come from the top down, the cylinder I.D. box identifies the first EGT that peaked (leanest). Continue leaning.
7	When ***RICHEST*** appears, fine tune the delta EGT to the desired degrees below 'Peak' (Lean of peak).	EGTΔ *-45* FF *11.6*	
8	If you hold PEAK, the peak EGT recorded will be displayed along with FF spread.	EGT↑ *1560* FFΔ *0.6*	Captured peak EGT value and the FF spread between richest and leanest cylinders.

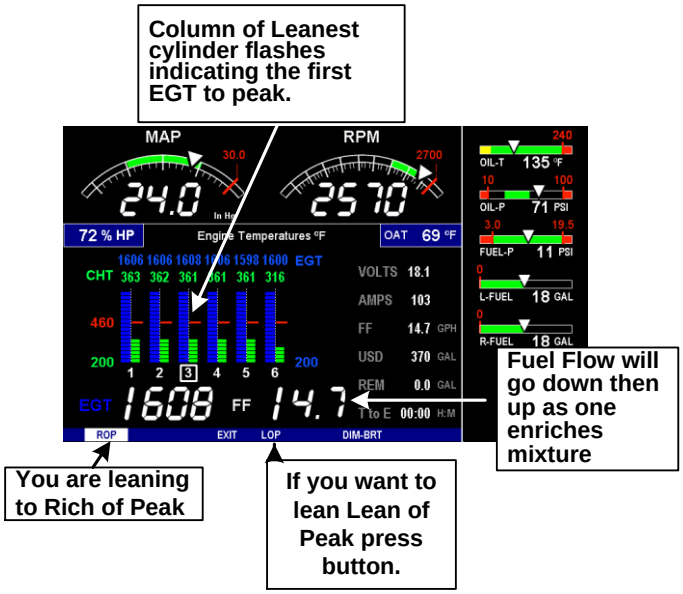
Lean Find Procedure—General Explanation

Lycoming and Continental established specific restrictions on leaning that must be followed, such as percent power, climb leaning, and TIT limits. Lycoming recommends operation at peak of EGT at 75% or less power only. Continental recommends operation at peak EGT at 65% or less power only. This guide does not supersede specific recommendations of the engine or airframe manufacturer**. It is your responsibility to know your aircraft's limitations.**

Pre-leaning: The leaning process typically begins with 'pre-leaning' by leaning the mixture until you see the hottest cylinder peak. Ensure all cylinders are operating rich of peak EGT (note: you can optionally activate 'Normalize' - hold LF until **NRM** appears - making it easier to confirm all EGTs decrease). Now enrich the mixture to achieve a 50° drop on the hottest EGT. Ensure that all EGTs decrease. Wait one minute to allow temperatures to stabilize.

***Lean Find-Initiation*:** Initiate the EDM leaning mode by tapping the LF button. Note that the EDM displays its current leaning mode momentarily: '*ROP'* for operating Rich of Peak or '*LOP'* for operating Lean of Peak. Then the current mode will show up in the message bar white on black, also you will see the alternate mode over the LF button. You have 10 seconds to choose the alternate mode which will disappear indicating your chosen mode white on black. To change, simply exit the mode you are in and re-tap the LF button. The EDM is now waiting for a 15° rise on any EGT (this feature significantly reduces false peaks). Lean the mixture *without pausing* to achieve about a 10 deg per second change. With a Vernier mixture control, turn the knob about a quarter turn every second. With a non-Vernier or quadrant mixture control, lean slowly and smoothly about 1/16 inch every five seconds (note: leaning accurately with a quadrant system is difficult due to its mechanical linkage).

Lean Find-Activation: When a 15° EGT rise occurs, Lean Find activates (indicated by a cylinder I.D. box flashing over the number of the hottest EGT). **Remember: The Lean Find mode is not active until a cylinder I.D. box is flashing.** To show the progress of the leaning process, the EDM now displays the hottest EGT in the left side of the digital display and the fuel flow in the right side. This information allows you to observe the EGT behavior throughout the leaning process.



Leaning Rich Of Peak (ROP) Detection: Eventually, one cylinder will reach peak before any of the other cylinders. The EDM will determine this automatically. The EDM will indicate success in finding a peak by displaying the word ***LEANEST*** for two seconds and flashing its corresponding Cylinder column. The *Scanner*® Information Area will also display the current value for the EGT on the left, and the fuel flow value on the right, for final adjustment of the mixture, do not exit until the leaning process is complete. The peak EGT value and Fuel Flow value encountered during leaning is remembered by the EDM and can be displayed by holding the PEAK button during Lean Find Mode.

Finalizing the Rich Of Peak Mixture: You may now enrichen the mixture to operate at peak or continue enriching to a value of your choice (typically between 50 to 100° rich of peak for best power), consistent with the procedures defined in your aircraft and/or engine manual. Because during the leaning process the mixture control was not stopped at the exact time the column flashed the value shown will be 5 to 10 degrees on the lean side. So as the mixture is enriched the temperature will go up to peak and then down as the mixture is enriched further. Note: tap PEAK to see the current difference from the peak temperature. This is handy for finalizing mixture. Tapping EXIT exits the lean find mode and automatic scanning resumes.

Leaning Lean Of Peak (LOP) Detection: Note: This mode should only be used when your engine is equipped with balanced fuel injectors or you have a DIF value of around 80 degrees. When using the Lean of Peak mode, you lean until *all* EGTs decrease slightly below their respective peaks. The EDM has automatic peak detection and will sequentially indicate leaning progress. When the first EGT peaks, the word ***LEANEST*** appears and the cylinder I.D. box highlights the cylinder number. Each column successively drops as leaning continues. When the last column drops (last EGT peaks), ***RICHEST*** appears and its respective column flashes momentarily. The last EGT to peak is the one you will use when setting the final mixture.

Finalizing the Lean Of Peak Mixture: The *Scanner*® Information Area displays the degrees below peak for the **last** (or richest) EGT to peak, giving you precise information necessary in setting the final mixture. Adjust the mixture to achieve the desired value below peak (using the digital EGT readout) or before engine roughness occurs. Caution: do not lean to the point where the engine runs rough. Note: the peak EGT value encountered during leaning can be recalled by holding the PEAK button. Do not exit until finished or all values will be lost. Tapping STEP exits the lean find mode and automatic scanning resumes.

Peak Detected - Lean Of Peak Mode LOP

Expanded Leaning Procedures

Lean Of Peak, LOP mode: During the 'lean of peak' process, the EDM hunts for the last cylinder to peak. Ultimately, you want to have ALL cylinders operating on the lean side of peak. You will final adjust your mixture to this cylinder. To provide a unique graphical depiction during lean of peak operation, the columns become inverted after the first EGT goes just beyond peak. Each EGT column then originates from the top of the display and drops downward. As each subsequent EGT goes past peak, its column will begin falling. The columns length depicts how far the EGT has dropped below its original peak. In this mode, each segment is **5° F**. You will continue to lean until the last EGT peaks (note: never lean to the point where the engine is running rough). When the last EGT peaks, its column will flash and ***RICHEST*** appears***.*** The digital readout will show the current temperature difference from where peak EGT occurred and the current fuel flow (if so equipped). Note: holding the PEAK button will show the captured peak value of the 'last EGT to peak' and also the difference in fuel flow between the first and last to peak (known as the GAMI Spread). This is a good indication of injector balance (the smaller the FF difference, the better the balance). Tapping STEP exits the lean find mode and automatic scanning resumes.

Leaning Turbocharged Engines: *The leaning process for turbocharged engines is by reference to the first EGT or TIT to reach peak. Therefore you should use the Rich Of Peak mode. The factory TIT red line (typically 1650°F to 1750°F) may limit the leaning process, depending on flight conditions. If TIT exceeds red line (but not by more than 99°), the EDM will allow you to continue leaning for one minute before a TIT alarm activates. NOTE: TIT can read approximately 100°F hotter than the hottest EGT due to unburned fuel in the exhaust igniting and is not necessarily abnormal behavior. The reduced size of the JPI Hastaloy-X-tip probes produce faster response and are more accurate than the massive factory installed probes. Therefore a JPI probe may read as much as 100°F higher than a factory installed probe.*

Common Misapplications

Some of the more common misapplications made by first-time EDM users are presented here in an attempt to help you avoid similar problems.

Problem	*Situation*	*Corrective action*
Lean Find finds a 'peak' too soon.	Failure to pre-lean before performing Lean Find or you stopped leaning.	• Follow the pre-lean procedure page 29.
	Leaning too slowly.	• Lean more quickly.
Peak not found	Lean Find not activated or you stopped leaning.	• Lean at the speed of approximately 10°F per second.
Off-scale EGT bars, too high or low	You forgot that you set the EDM in the Normalize view and later notice that the EGT bars go off-scale.	• The higher sensitivity (10° per segment) of the Normalize view can quickly go too high or low off-scale with only small changes in EGT.
First cylinder to peak is not the hottest	This is normal. The first cylinder to peak is not necessarily the hottest.	• None
EGT rises during single magneto check	This is normal, due to incomplete combustion persisting longer.	• None
EGT not uniform during low power operation	This is normal. Fuel and air distribution is not optimal at low power settings.	• None
No display of %HP	FF, MAP, RPM, OAT not reading or not equipped	• FF, RPM, OAT, MAP required for %HP

Section 6 - Fuel Flow Operation

Fuel Management

Without a means of measuring accurate fuel flow, you must rely on the aircraft fuel gauges or total time of flight. Aircraft fuel gauges are notoriously inaccurate (they are only required by the FAA to read accurately when displaying *empty)*. Determining fuel consumption by multiplying time of flight by estimated flow rate is, at best, an approximation, and assumes a constant fuel flow rate for each phase of flight. However, the EDM Fuel Flow Option uses a small, turbine transducer that measures the fuel flowing into the engine. Higher fuel flow causes the transducer turbine to rotate faster which generates a faster pulse rate. Because the transducer turbine generates thousands of pulses per gallon of fuel, it can measure with high resolution the amount of fuel that flows into the engine. Prior to engine start you inform the EDM Fuel Flow Computer system of the known quantity of fuel onboard, it then subsequently tracks all fuel delivered to the engine.

IMPORTANT !

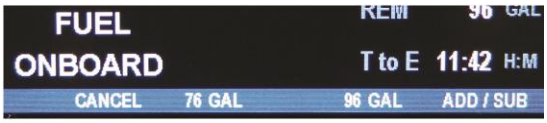
For EDM fuel calculations to be accurate, it is mandatory that you inform the EDM of the correct amount of usable fuel onboard the aircraft and confirm proper operation of the fuel flow transducer prior to and during flight. Do not rely on fuel flow instruments to determine fuel levels in tanks. Refer to original fuel flow documentation for primary fuel management information.

Start Up Fuel

On power-up, you will be prompted to enter any fuel you might have added to the aircraft (this process updates the **REM** and **USD** values).

The EDM will flash ***REFUEL?*** . If you didn't add any fuel, simply tap **NO** to quit, otherwise tap **YES** to pick one of the three quickset choices below:

If you say YES then you will see ***Fuel onboard***, if you have ***Aux tanks*** you will see TWO chooses like in the example 76 GAL Main and Main + Aux = 96GAL. You pick the one you want to enter.



Upon making a choice you will see your choice as ***Initial Fuel***

If you tap ***ADD SUBTRACT*** then you can add say 10 gallons

NOTE: If you forgot to perform your EDM REFUEL before starting the engine, it can still be performed. The EDM will automatically subtract any burned fuel from the value you choose. Go to Program mode and the first item is REFUEL

You are responsible for ensuring that your usage of the REFUEL ***feature results in the EDM's REM parameter showing the correct amount of usable fuel remaining onboard the aircraft.***

Resetting ‘USD’

USD is automatically reset whenever you perform ***REFUEL*** on your EDM (except if TRIP mode = yes).

After filling your tanks and prior to engine start you should inform the EDM that the aircraft has been filled. In this case ***USD*** is automatically set to zero.

To manually zero the amount of fuel *USD* at any time, manually STEP to display ***USD*** and then hold both DIM (button 3) and EGT/FF (button 4) until the display shows ‘***USD 0.0 GAL*** ’ (this normally takes about five seconds).

Trip Mode (Accumulate Trip Totalizer)

Trip mode is typically used if you want to track the total fuel used over a multi-stop cross country. To have the ***USD*** parameter continuously accumulate total consumed fuel, set *TRIP? Y*. ‘Trip Mode’ is described in the ‘Program Mode section’. Note: typically, *TRIP?* is set to ***‘N’*** so that ***USD*** will be reset every time you fuel the aircraft.

Scanner Fuel Flow Display Select

Button four selects three different Scanner filters - ALL, EGT or Fuel. Tapping this button will select the next choice (shown after the ‘/’ symbol):

- **ALL/TEMP:** all installed parameters are shown in Scanner (and battery voltage).
- **TEMP/Fuel:** only the installed temperature parameters are shown in Scanner.
- **Fuel/ALL:** only fuel flow parameters are shown in Scanner.

Section 7 - Alarms

Whenever a primary measured parameter falls outside of the normal allowed operating limits, i.e. goes beyond redline, the main display will blink an alert icon. This consists of the current digital value and a flashing red label in the Scanner area and the RED Remote Annunciator Light. For example, if CHT 2 is at 480, and redline is 460, the alert would be displayed as *CHT2 480 ºF*.

Tapping the CLEAR button extinguishes the alert.

Primary alarm limits for each specific aircraft model are set by JPI in accordance with the POH and are not programmable by the pilot. These typically include some or all of the following measurements**:** CHT, CDT, Oil-T, Oil-P, Fuel-P, GAL LEFT, GAL RIGHT, MAP, RPM, Fuel Flow, and TIT. To view the alarm limits screen hold both buttons 2 & 3 during normal operation, tap NEXT until the list is displayed.

The primary functions for your installation are shown on the Primary label on the back of the instrument and are identical to those specified in the FAA Approved Airplane Flight Manual/Pilot's Operating Handbook.

Alarm Priority Hierarchy

1.	OILP_LO
2.	FP_LO
3.	OILT_HI
4.	CHT
5.	TIT
6.	FLVL
7.	REM
8.	FP_HI
9.	MAP
10.	DIF
11.	CLD
12.	RPM
13.	OILT
14.	BUS
15.	OILP_HI
16.	AMPS
17.	CDT
18.	BAL
19.	FUEL_END
20.	FUEL_RES
21.	EGT
22.	Fuel Flow

Section 8 - Memory and Data Download

The EDM compresses and records **all** displayed parameters once every **six seconds (default)** in Long Term Data Memory (note: you can change this rate to be 1 to 500 seconds). This data is retrievable by inserting a USB Drive into the jack on the front of the instrument and following the prompts. You can choose to retrieve '*ALL'* the data stored in the EDM, or only the '*NEW'* data recorded since your last retrieval. In either case, the selected data in the EDM is not erased. The data can later be viewed on EZTrends2, a PC program available from JPI or over the internet.

RPM is greater than 500. The amount of data that the EDM can store will vary depending on how rapidly parameters change. The typical storage capacity is greater than 300 hours at a 6 second recording interval, but can vary depending on configuration. When the memory becomes full, the oldest data will be discarded to make room for the newest. All data are time-stamped. The EDM contains a real-time clock that may be set when you initially program your instrument. You may change the recording interval from 1 to 500 seconds, even in flight (when you change the interval in flight, the current flight file is closed and a new flight file is started at the new interval).

Downloading Data from the EDM

Downloading is a simple process. Follow the steps below:

a. With the EDM powered up, plug the USB flash drive adaptor and flash drive into the EDM USB port.

b. Wait for the EDM display to show *DOWNLOAD: NEW*.

c. To download only the new data since the last download, tap the STEP button.

d. To download all data in the EDM, tap the CHANGE button to see *DOWNLOAD: ALL*, then tap STEP.

e. You will see a 'progress indicator' as the data is copied to the USB flash drive. DO NOT INTERRUPT THIS PROCESS. When the download is complete the display on the EDM will show DONE and then return to normal operation.

f. Wait until the process is complete then remove the USB flash drive from the USB connector.

Note the adapter supplied with the Kit for a mini USB

Transferring data from the USB Flash Drive to a PC

To transfer your data from the USB flash drive to your PC, follow these easy steps.

1. On your PC, start the EzTrends2 program.
2. Plug in the USB flash drive into an available USB port.
3. In EzTrends2, select the Move and Plot Data from Memory Stick option.
4. In the displayed list, find the USB flash drive and double click it.
5. Select the file you wish to plot and then select the flight in that file.

Refer to the EzTrends2 manual for details on how to use EzTrends2.

Section 9 - First Time Setup and Customization

Your EDM comes with most settings programmed. However some settings you will fine tune to your installation and/or preferences. We recommend you perform the following minimum set up:

1. **Pilot Programming Mode:**

- Set the GPS Communications format to match your type of GPS.
- Fine tuning of fuel flow K-factor is important as it affects your fuel computer parameter accuracies.
- Set the Engine HP equal to your engines rated horsepower.
- Perform the HP Constants set up for best accuracy of the Percent Horsepower readout.
- Optionally fine tune other parameters such as MAP, OAT.

Pilot Programming Mode

To start Pilot Program Mode, hold both **STEP** and **LF** buttons until you see **PROGRAM** for two seconds. Then tap the **NEXT** button to advance to the desired item in the list. Hold the **NEXT** button to back up in the list. Either tap **NEXT** until you see **END. Yes** and then tap **EXIT** or hold both **NEXT** and **LF** to save changes.

First button advances to NEXT item	*Second button selects values*	*Comments*
Program Mode		Stays on for two seconds.
Refuel?		Tap **REFUEL** to change fuel status. Exits program mode when done.
Auto Scan Rate 4	0 ⇔ 9	Scan rate (seconds between parameters) in the Automatic Mode. **0** disables the Automatic Mode.
Trip Used? No	YES ⇔ NO	**NO**: When Refuel mode used on EDM, total fuel used is reset to 0. **YES**: accumulate total fuel used rather than reset to 0 at each refueling. See page 46.
ORIG TIT-N	YES ⇔ NO	If equipped with TIT and using ships original TIT probe change “N” to “Y”.
EGT Display in 1’s	1’s 10’s	Tapping **1’s** sets the digital display to one-degree resolution; tapping **10’s** sets 10°. (10° resolution is easier to interpret the EGTs.)
OAT Display ºF	F ⇔ C	Tap **C** to display OAT in Celsius, **F** to display in Fahrenheit. Hold **STEP** and **LF** for 5 seconds to **ADJUST** the OAT calibration**.**
OAT Adjustment 0	PLUS ⇔ MINUS	Adjust the indicated temperature up or down by up to 10° using **PLUS** or **MINUS**. For example, **OAT+3** adjust the OAT 3° higher.
HP Constants	NEXT	Hold **NEXT** and button 2 for 5 seconds until you see **ADJUST** HP Constant. Tap PLUS or MINUSto adjust up or down. HOLD buttons 1&2 to save. This is where you do a one time adjustment for % HP setting.

HP Constant= 125	10 ⇔999	Hold **NEXT** and button 2 until you see **ADJUST**. Tap **PLUS** or **MINUS** to adjust (%HP display will reflect changes). Hold **NEXT** and button 2 to save changes.
Map Adjustment +0.0	-3.0 ⇔ +3.0	Correct the MAP to the altimeter setting at a sea level airport ±3.0 inHg. Hold **NEXT** and button 2 for 5 seconds until you see **ADJUST**. Use **PLUS** or **MINUS** to adjust. Tap **SAVE** to save changes. Tap **NEXT** to skip to next item.
K-Factor 1 29.90	00.10 ⇔ 99.99	Set the instrument's K-factor to match the fuel flow transducer K-factor and performance. Hold **DIGIT** and button 2 for 5 seconds until you see **ADJUST**. Use **DIGIT**, **PLUS** or **MINUS** to adjust. Hold **NEXT** and button 2 to save changes.
K-Factor 2	00.10 ⇔ 99.99	Applies only to pressurized carburetors.
CARB? Y	YES ⇔ NO	Set to N if injected.
CARB = 1	PLUS ⇔ MINUS	F/F Filter (Higher the number the better the dampening effect) (Fuel pump pulses).
GPS Format = 6	0 ⇔8	Adjust to set the GPS Communications format. Hold **NEXT** and button 2 for 5 seconds until you see **ADJUST**. Use **PLUS** or **MINUS** to adjust. Tap **SAVE** to save changes. Tap **NEXT** to skip to next item. See page 51.
Time: 18:23:59	00:00:00 ⇔ 23:59:59	Hold **NEXT** and button 2 for 5 seconds until you see **ADJUST**. Use **Hours**, **Minutes**, **Seconds** to adjust. Tap **SAVE** to save changes. Tap **NEXT** to skip to next item.
Date: 05/14/09	01/01/00 ⇔ 12/31/99	Hold **NEXT** and button 2 for 5 seconds until you see **ADJUST**. Use **Month, Day, Year** to adjust. Tap **SAVE** to save changes. Tap **NEXT** to skip to next item.
RECORD TIME: 6	PLUS ⇔ MINUS	Record time in seconds.
END? Yes	END? Yes	**Yes** exits the pilot program mode. **No** reenters pilot program mode.
FACTORY Mode		Stays on for two seconds.

FUEL UNITS: GAL	Hold buttons 1 and 2 to enter the change fuel units function.	Default unit is GAL. Tap CHANGE to choose a different unit. Hold buttons 1 and 2 to Save the new fuel unit.
MAIN TANK SIZE =	PLUS ⇔ MINUS	In gallons or preset value. Use PLUS or MINUS to adjust. Tap NEXT to skip to the next item.
AUX TANK SIZE =	PLUS ⇔ MINUS	In gallons or preset value. Use PLUS or MINUS to adjust. Tap NEXT to skip to the next item.
FUEL USD REMINDER	PLUS ⇔ MINUS	In gallons or preset value. Use PLUS or MINUS to adjust. Tap NEXT to skip to the next item.
REMINDER TIMEOUT = 5	PLUS ⇔ MINUS	Sets duration on display in minutes. Use PLUS or MINUS to adjust. Tap NEXT to skip to the next item.
CHANGE ADVISORY LIMITS	YES ⇔ NO	Tap YES or NO to enter gauges with no yellow bands displayed. This affects Amps, Volts Hi, Volts Low, DIF, CLD, Low time to empty, Low fuel REM.
CHANGE PRE-ALARMS	YES ⇔ NO	Tap YES to enable pre-alarms for HI EGT, HI CHT, HI OIL-T, LOW TANK.
ENABLE PRE-ALARM MSGS	YES ⇔ NO	Tap YES or NO to enter gauges for pre-alarm setting.
AVERAGE CRUISE RPM 2400	NEXT	Hold NEXT and button 2 until you see ADJUST for two seconds. Tap PLUS or MINUS to adjust. Hold NEXT and button 2 to Save. Average cruise is based on a percentage of RPM redline. A one to one ratio for TACH TIME is achieved at this setting.
AMPS ADJUSTMENT + 0	PLUS ⇔ MINUS	Use PLUS or MINUS to adjust. Tap NEXT to skip to the next item.
Engine HP 210	NEXT	Hold NEXT and button 2 until you see ADJUST for two seconds. Tap PLUS or MINUS to adjust. Hold NEXT and button 2 to Save.
Engine Constant 13.7	NEXT	Hold NEXT and button 2 until you see ADJUST for two seconds. Tap PLUS or MINUS to adjust. Hold NEXT and button 2 to Save. (Use 13.7 for turbo'd , 14.9 for naturally aspirated or turbo normalized engines).

FUEL-P SENSOR =	NEXT	Hold NEXT and button 2 until you see ADJUST for two seconds. Tap CHANGE to adjust. Hold NEXT and button 2 to Save.
R-FACTOR CYL = 6	PLUS ⇔ MINUS	For the number of cylinders for your engine, double R-Factor for dual mags.
CUSTOMIZE DISPLAY	YES ⇔ NO	Allows swapping of RPM and MAP gauges, adjust sequence of primary and advisory gauges.
LOP DFLT? N	YES ⇔ NO	Tap YES to make LOP your default setting. Tap NO to keep ROP your default setting.
CO GUARDIAN? Y	YES ⇔ NO	Select YES or NO and tap NEXT to go to the next item.
FDR OUTPUT? Y	YES ⇔ NO	Allows recording output. Select YES or NO and hit NEXT to go to the next item.
END? Yes	YES ⇔ NO	YES exits the pilot program mode.
NO re-enters the FACTORY programming mode. Holding buttons 1 and 2 will go into the Hobbs Time change function.		
AIRFRAME HOBBS:	NEXT	Hold NEXT and button 2 until you see ADJUST for two seconds. Tap DIGIT to move to the next digit, PLUS or MINUS to adjust. Hold buttons 1 and 2 to Save and move onto Tach Time.
TACH TIME: 0000.0	NEXT	Hold NEXT and button 2 until you see ADJUST for two seconds. Tap DIGIT to move to the next digit, PLUS or MINUS to adjust. Hold buttons 1 and 2 to Save.
END? Yes		**Yes exits the pilot program mode. No re-enters pilot FACTORY program mode.**

Section 10 - Adjusting Manifold Pressure & %HP

Adjusting the HP Constant for Rich of Peak Operation

To fine tune the %HP readout, follow this procedure airborne between 5,000 and 8,000 feet MSL. (note: Verify that the MAP adjustment has been perform prior to this process).

1. Enter the pilot program mode by simultaneously holding the STEP and LF buttons for five seconds.
2. Tap STEP repeatedly until you see **HP Constant**. Hold both NEXT and Button 2 until you see PLUS and MINUS appear in status bar. Now **HP Constant 120** should appear. Hold both NEXT and Button 2 until you see **ADJUST** momentarily.
3. Set the MP and RPM per your POH to 70 percent power. Let conditions stabilize.
4. Adjust the HP Constant value PLUS or MINUS so that the %HP reading on the display equals '***70*** **%HP**'. Note: this is the percent of maximum horsepower.
5. Hold both NEXT and Button 2 until you see **SET**.

Adjusting the MAP

This procedure allows you to adjust the MAP to the altimeter setting at a sea level airport. **NOTE: If airport is not at sea level, use the correction table on the next page to derive corrected sea level altimeter setting).**

1. Enter the pilot program mode by simultaneously holding the STEP and LF buttons for five seconds.
2. Tap NEXT repeatedly until you see **MAP ADJUSTMENT +0.0**. Then hold both the NEXT and Button 2 until you see **ADJUST** momentarily.
3. Adjust the value using the PLUS or MINUS until the value equals the altimeter setting (sea level airport). The adjustment range for the MAP is ±3.0 inHg.
4. Hold both NEXT and Button 2 until you see **SET**.

Manifold Pressure Calibration

The manifold pressure must be calibrated to the ambient air pressure. Enter the current ambient barometric pressure. The engine must *not* be running. This setting is *not* the same as the altimeter setting that you receive from ATIS or Unicom. It will vary with field elevation. Use the chart below to calculate the MP FACTOR. Multiply this MP FACTOR by the altimeter setting that you receive from ATIS or Unicom. For example if the field elevation is 1700 ft and the altimeter setting is 30.1, the MP FACTOR is 0.9400 from the table. Multiply 30.1 x 0.9400 to get the ambient MP of 28.29.

Field Elev.	MP FACTOR	1200	0.9574	3100	0.8929	5000	0.8320
-500	1.0182	1300	0.9539	3200	0.8896	5100	0.8289
-400	1.0145	1400	0..4	3300	0.8863	5200	0.8258
-300	1.0109	1500	0.9469	3400	0.8830	5300	0.8227
-200	1.0073	1600	0.9435	3500	0.8798	5400	0.8196
-100	1.0036	1700	0.9400	3600	0.8765	5500	0.8165
0	1.0000	1800	0.9366	3700	0.8733	5600	0.8135
100	0.9964	1900	0.9332	3800	0.8700	5700	0.8104
200	0.9928	2000	0.9298	3900	0.8668	5800	0.8074
300	0.9892	2100	0.9264	4000	0.8636	5900	0.8043
400	0.9856	2200	0.9230	4100	0.8604	6000	0.8013
500	0.9821	2300	0.9196	4200	0.8572	6100	0.7983
600	0.9785	2400	0.9162	4300	0.8540	6200	0.7953
700	0.9750	2500	0.9129	4400	0.8508	6300	0.7923
800	0.9714	2600	0.9095	4500	0.8477	6400	0.7893
900	0.9679	2700	0.9062	4600	0.8445	6500	0.7863
1000	0.9644	2800	0.9028	4700	0.8414	6600	0.7833
1100	0.9609	2900	0.8995	4800	0.8382	6700	0.7804
		3000	0.8962	4900	0.8351		

Adjusting the HP Value

You must set the nominal horsepower of your engine. This value is used to calculate the percent horsepower display.

1. Enter the pilot program mode by simultaneously holding the STEP and LF buttons for five seconds.
2. Tap NEXT repeatedly until you see **Engine HP 200**. Then hold both the NEXT and Button 2 until you see **ADJUST** momentarily.
3. Adjust the value PLUS or MINUS to equal your engines HP.
4. Hold both NEXT and Button 2 until you see **SET**.

Section 11 - Programming the Fuel Flow

Fuel Flow Parameters

Three additional parameters may be set by the pilot when the Fuel Flow Option is installed:

- K Factor—the fuel flow transducer calibration constant.
- Accumulate—default is OFF: resets the fuel *used* to 0 every time you inform the EDM that the aircraft was refueled. With accumulate ON, fuel *used* will continue to accumulate for all subsequent flights.
- GPS Communications fuel data format.

K Factor

The K factor is shown on the fuel flow transducer as a four-digit number, which is the number of pulses generated per tenth gallon of fuel flow. **Before installing the transducer, write down the K factor here _____.** To enter the number into the EDM, place a decimal point two places from the right of the number. For example if the K factor written on the fuel flow transducer is '2912' enter 29.12 in the EDM K factor parameter field.

The K factor can be changed in the pilot programming procedure. *When the K factor is changed during a trip, calculations of fuel used, fuel remaining and time to empty are not retroactively recalculated.*

Fuel Flow K factor

The K factor is shown on the fuel flow transducer as a hand written four-digit number, which represents the number of pulses per tenth gallon of fuel flow. **Before installing the transducer, record its K factor here _____.** The EDM stores the K Factor in the form **29.12**, i.e. if the transducer K factor is 2912, you would enter 29.12 in the EDM's K factor field.

Fine Tuning the K Factor

The K factor shown on the fuel flow transducer does not take into account your aircraft's particular installation. Fuel hose diameters and lengths, elbows, fittings and routing can cause the true K factor to be different from that shown on the fuel flow transducer.

You must use the following procedure to fine tune the K factor.

1. Make at least three flights of about two to three hours each. Note the actual fuel used (as determined by topping the tanks) and the EDM calculation of the fuel consumed for each flight = USD.

Flight	*Fuel USED shown by EDM (total tank - REM)*	*Actual fuel used by topping tanks*
1		
2		
3		
Total	❶	❷

2. Total ❶ the EDM fuel used and ❷ the actual fuel used.
3. Record the current K factor here ❸_____ and in the table below.
4. Calculate the Adjustment ratio:

   Adjustment ratio = $\frac{(❶ \quad / ❷ \quad) - 1}{2}$

5. New K Factor = ❸ x (Adjustment ratio +1).

Record the values here:

Date	*❶EDM fuel used*	*❷actual fuel used*	*❸Current K factor*	*New K factor*	*Pilot's initials*

Setting the K factor

This procedure differs somewhat from setting other parameters. If you haven't already done so, start the pilot programming procedure by simultaneously holding the STEP and LF buttons for a few seconds until you see the word *PROGRAM* appear.

1. Tap STEP button to advance to the *KF-SET* screen *KF=29.90 .*

2. Hold both the STEP and LF buttons for a few seconds until the first digit flashes (shown here as a larger digit for illustration purposes): *29.00*
3. Tap or hold the LF button to change flashing digit: *19.00*
4. Tap STEP button to move to next digit: *19.00*
5. Tap or hold the LF button to change flashing digit: *18.00*
6. Tap STEP button for next digit: *18.00*
7. Repeat items 5 and 6 for the remaining two digits.
8. Hold STEP and LF buttons until the parameter is saved.

Fine Tuning the K factor

The K factor shown on the fuel flow transducer does not take into account your aircraft's particular installation. Fuel hose diameters and lengths, elbows, fittings and routing can cause the true K factor to be different from that shown on the fuel flow transducer. Fine tuning is accomplished over multiple flights of sufficient duration and repeatable conditions. Use the process below to calculate and correct the K Factor to achieve maximum performance. Note: This process adjusts the K. factor only half of the correction. We recommend this because it minimizes 'chasing' a correction target back and forth.

Programming Trip Mode

Trip Mode keeps a running total of fuel used (USD) for all flights. If Trip Mode = No, fuel 'USD' is zeroed after updating the EDM's fuel computer via **Refuel** modes. NOTE: to clear the fuel used display at any time, tap STEP until you see USD. Hold both DIM and ALL/EGT/FF (buttons 3&4) until the display shows '.0 USD'.

1. Enter the pilot program mode by simultaneously holding the STEP and LF buttons for five seconds.
2. Tap NEXT repeatedly until you see **TRIP Used? No** .
3. Tap YES to select the trip mode or NO to deselect mode.
4. Tap NEXT to accept your choice.

Setting the GPS Com Format

This process allows you to select what GPS communication format the EDM should use when sending fuel flow data to the GPS. See table below with the numeric GPS-C values and their corresponding formats.

1. Enter the pilot program mode by simultaneously holding the STEP and LF buttons for five seconds.
2. Tap NEXT repeatedly until you see **GPS FORMAT** .
3. Hold DIGIT and Button 2 until **ADJUST** appears
4. Select desired code value using PLUS or MINUS.
5. Hold both NEXT and Button 2 until you see **SET**.

GPS-C	*Type of GPS Format*
0	No fuel data output
1	Garmin (Shadin Miniflow format)
2	Allied Signal (format B) "To waypoint only"
4	Arnav/EI fuel flow data
4	Allied Signal (format C) *
5	(Not used)
6	Garmin 430/530 GNX-80/GX-60 "To waypoint only"
7	Garmin 430/530 GNX-80/GX-60 "To Destination only"
8	Bendix(B) - DEST

Troubleshooting the EDM

Diagnostic Testing on Startup and During Flight

When your EDM is first turned on, it tests internal components, calibration and integrity of the probes. Most alarms are disabled until the engine has been started.

During flight, probes are constantly checked for inconsistent or intermittent signals. A faulty channel or probe encountered during start-up or during flight will be deleted from the sequence, producing a missing column or blank digital data.

Diagnostic Messages

The following displays indicate malfunctions in the system:

Startup and Operational Diagnostics

0.0 GPH	Zero's indicate Fuel flow is too low to register
--- GPH	Dashes indicate No fuel flow transducer signals
--- H.M	Dashes indicate No fuel flow transducer signals
OPEN PRB	Open probe. Wiring to probe is open circuit. Check wiring and crimps. Swap probes to troubleshoot.
BAD-PRB	Bad probe. Erratic reading. May be poor electrical connection. Swap probes to troubleshoot.
Red 'X' drawn through a gauge	Gauge is non-functional.
CAL ERR	Calibration error. Return unit to factory.
DSP XXX	Internal communication error. Return unit to factory.
COMM ERR	Internal communication error. Return unit to factory.
NO I 5 MV	Calibration error. Return unit to factory.
NO 50MV	Calibration error. Return unit to factory.

NO 2.5V	Calibration error. Return unit to factory.
PWR DWN	Power down the instrument and power up again.
WARNCAL, WARNCFG	Transient warning messages. If they persistently occur, return the unit to JPI for repair.
HOBSERR	The time of the most recent flight may not be reflected in the HOBBS meter.
HOBSBAD	The HOBBS data has been corrupted. The HOBBS meter will be cleared.
HANGCFG, HANGCAL	Internal system errors. Return unit to factory.

GPS Interface Diagnostics

Measurements 'xxx REQ', 'xxx RES' and 'xxx MPG' are all missing from the scan.	No communications from GPS receiver to EDM. Possibly no connection or aircraft GPS is off.
NO - COM message and 'xxx REQ', 'xxx RES' and 'xxx MPG' are all missing from the scan.	Communications are received by EDM and the Auto-Protocol setup is in process. Verify correct output format setup in GPS receiver; check GPS connections.
NO - SIG message and 'xxx REQ', 'xxx RES' and 'xxx MPG' are all missing from the scan.	GPS receiver has insufficient signal for valid data.
NO - WPT message and 'xxx REQ', 'xxx RES' are all missing from the scan.	No waypoints are programmed into the aircraft GPS receiver.

Section 12 - Appendices

Shock Cooling (CLD)

Cooling the cylinders too fast can result in cracking and eventual failure. Lycoming Service Instruction 1094D (March 25, 1994) on ***Fuel Mixture Leaning Procedures*** **states:**

> "At all times, caution must be taken not to shock cool the cylinders. The maximum recommended temperature change from Lycoming should not exceed 50°F per minute cooling rate."

JPI checks shock cooling (CLD) on all cylinders displaying the fastest cooling cylinder in degrees per minute cooling rate.

List of ALL messages in EDM-900

Startup Banner Messages
==========
EDM900
PRIMARY FOR
182P-SA000152WI 550

Refuel Messages
==========
REFUEL?
TOP OFF? MAIN 74.0 GAL
CHANGE FUEL QTY? + X.X GAL
Adjusted by + 0.5 GAL
Initial Fuel 71.6 GAL

LeanFind Messages (ROP)
==========
ROP
EGT 1494 FF 17.7
NOPEAK
EGT 1494 FF 17.7
LEANEST
ROP -90 FF 12.5

LeanFind Messages (LOP)
==========
ROP
EGT 1494 FF 17.7
NOPEAK
LOP
EGT 1494 FF 17.7
LEANEST
RICHEST
LOP -55 FF 11.5

LCD Brightness Messages
==========
LCD BRIGHTNESS: 2%

'Normal' Scanner Messages
==========
EGT 1494 CHT 332
OIL-T 195 °F
VOLTS 27.4
T to E 00:04 H:M
CLD 0 ° / Min
DIF 8 °F
Est. REM 74.0 GAL
WP REQ 12.5 GAL
Est. RES 61.5 GAL
ECON 9.9 MPG
F-F 14.7 GPH
AMPS 0
VOLTS 27.4
FUEL-P 13 PSI

Primary Alert Messages (All RED text, channel name flashing)
==========
L-FUEL 0 GAL
R-FUEL 0 GAL
CHT1 476 °F
OIL-T 245 °F
DIF 1382 °F
BAD PROBE CHT5
REM 1.1 GAL
RPM 2760
MP 37.7 In. Hg

Non-Primary Alert Messages (All WHITE text, channel name flashing)
==========
T to E 00:04 H:M
CLD 87 ° / Min
Est. REM 74.0 GAL
BAD PROBE EGT3
VOLTS 21.4
AMPS -5

Data Download Messages
==========
DOWNLOAD: NEW
DOWNLOAD: ALL
DOWNLOAD: EXIT

Pilot Program Messages
==========
PROGRAM
REFUEL?
Auto Scan Rate 4
Trip Used? No
Trip Used? Yes
EGT Display In 1's
EGT Display In 10's
OAT Display :F
OAT Display :C
HP Constants
Engine HP 300
MAP ADJUSTMENT +0.0
K-Factor 1 30.45
CARB? No
CARB? Yes
CARB=2
GPS Format
#0: No Output
#1: Shadin
#2: Bendix(B)-WP
#3: Arnav/EI fuel data
#4: Bendix(C)
#5: No Output
#6: GNS 430/530-WP
#7: GNS 430/530-DEST
#8 Bendix(B)-DEST
Time: 13:17:45
Date: 07/11/11
End?
Please wait...Saving changes.

Navigation Data Formats

Output of GPS; input to EDM. The EDM automatically configures itself for one of three industry standard data formats:

Format	*Baud*	
NMEA-183 (Marine Nav Data Format)	4,800	This is the format for most handheld GPS receivers. Loran must have sentences RMA & RMB. GPS must have sentences RMB & RMC.
Aviation Data Format	9,600	"Output sentence type 1" Required sentences are: A, B, C, D, E, I and L first character identifier byte. Sentence terminator may be either <CR><LF> or <CR> alone.
Northstar (Northstar binary)	1,200	M1 setup select "NO EXTENDED", "NAV ONLY"

Navigation Data Ports for GPS Comm

(These ports are independent of the EDM serial data output port.)

Navigation Data (output from GPS; input to EDM)

Compatible with RS-232, TTL, RS-423, RS-422 SDA.
Serial format: 8 data, 1 start, no parity. Baud 1200, 4800, or 9600, depending on the GPS data output format. The EDM automatically detects the GPS data output format and is independent of the GPS-C setting.

Fuel Data (input to GPS; output from EDM)

RS-232 Serial format: 8 data, 1 start, no parity. Baud 9600. Output format is determined by the GPS-C setting, but may be over-ridden by the GPS navigation format: If the EDM senses Northstar or NMEA-183 navigation data input, there will be no fuel data output.

Interface connections to selected GPS models

	EDM P4 - Pin 1 to:	**EDM P4 - Pin 2 to:**
Arnav 5000	Pin 4	Pin 5
Garmin 195	(nc)	Pin 4
Garmin 430 / 430	Pin 57	Pin 56
Northstar M3P	(nc)	Pin 6 (leave pin 11 open)
UPS GX50 / 60	Pin 4	Pin 5

Section 13 - Technical Support

JPI offers both e-mail and telephone technical support. Have your model and serial number ready when you call. Call ***JPI*** for a **return authorization number (RMA)** before returning any equipment.

J.P.INSTRUMENTS Inc.
3185-B Airway
Costa Mesa, CA 92626
Call: (800) 345-4574
Web: www.jpinstruments.com

Limited Warranty

J.P. Instruments Inc. (JPI) warrants all parts in your new EDM to be free from defects in material and workmanship under normal use. Our obligation under this warranty is limited to repair or exchange of any defective part of this unit if the part is returned, shipping prepaid, within three years for electronics and one year for probes from the date of original purchase. Installation labor is the responsibility of the aircraft owner. Homebuilt aircraft warranty starts when the aircraft is certified for flight. Replacement parts carry a warranty for the balance of the warranty period.

Under this warranty, JPI is not responsible for any service charges, including removal, installation, nor any other consequential damages. JPI incurs no obligation under this warranty unless a Warranty Registration Certificate describing the warranted product has been completed and mailed to JPI with all information requested.

This warranty is void on any product which has been subject to misuse, accident, damage caused by negligence, damage in transit, handling or modification which, in the opinion of JPI, has altered or repaired the product in any way that effects the reliability or detracts from the performance of the product, or any product whereon the serial number has been altered, defaced, effaced or destroyed.

This warranty is in lieu of all other warranties expressed or implied and other obligations of liability on JPI's part, and it neither assumes nor authorizes any other person to assume for JPI any other liability in connection with the sale of JPI products.

To initiate this warranty, the aircraft owner must submit a completed Data Logging Worksheet to JPI. Upon receiving a completed worksheet, JPI will initiate the warranty from the date of original purchase. Any replacement parts carry a warranty that extends for the balance of the period of the original warranty. For homebuilt aircraft the warranty starts when the aircraft is certificated for flight and noted on the warranty card.

*

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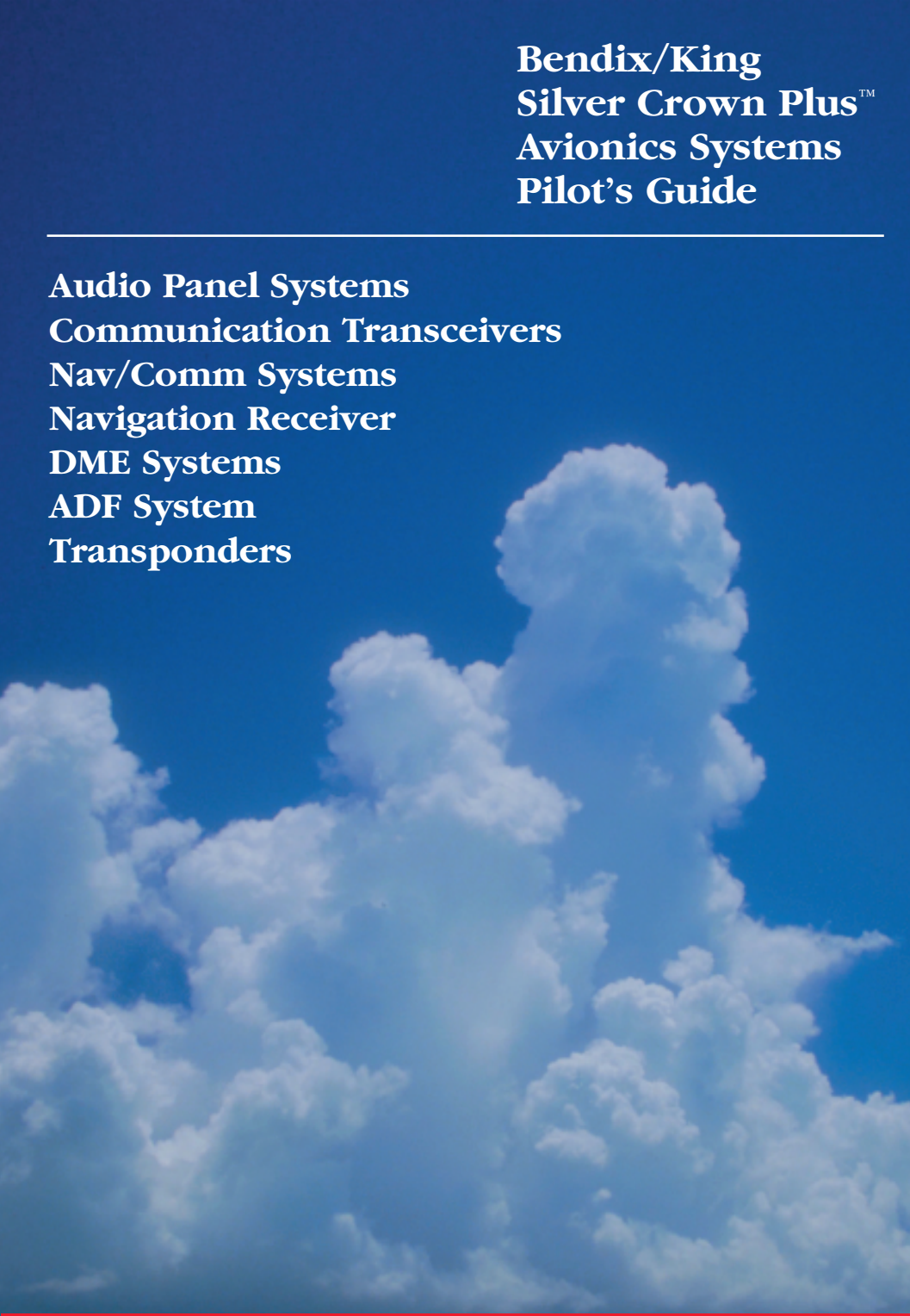
Bendix/King Silver Crown Plus™ Avionics Systems Pilot's Guide

Audio Panel Systems
Communication Transceivers
Nav/Comm Systems
Navigation Receiver
DME Systems
ADF System
Transponders



Honeywell

The information contained in this manual is for reference use only. If any information contained herein conflicts with similar information contained in the Airplane Flight Manual Supplement, the information in the Airplane Flight Manual Supplement shall take precedence.

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Bendix/King Silver Crown Plus™ Avionics Systems Pilot's Guide

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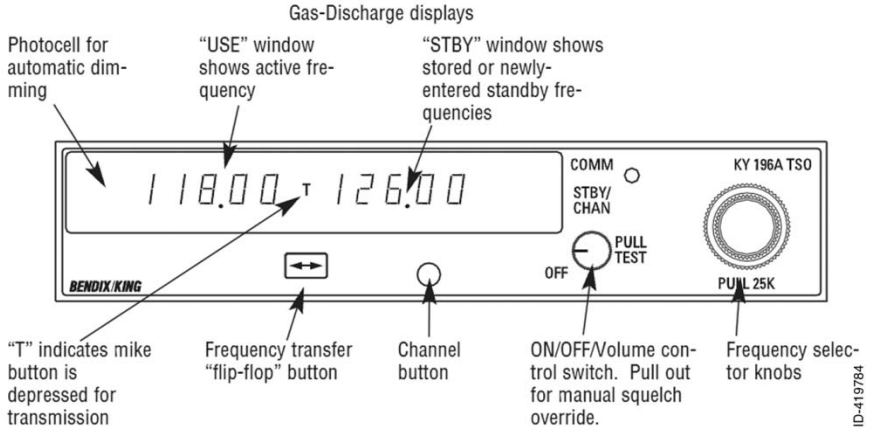
ATTENTION

The operation of the GPS Navigation, Multi-Function Display and/or Traffic Information Services components of your particular Silver Crown Plus System are covered in separate publications. Choose the publication pertaining to your installation from the list below:

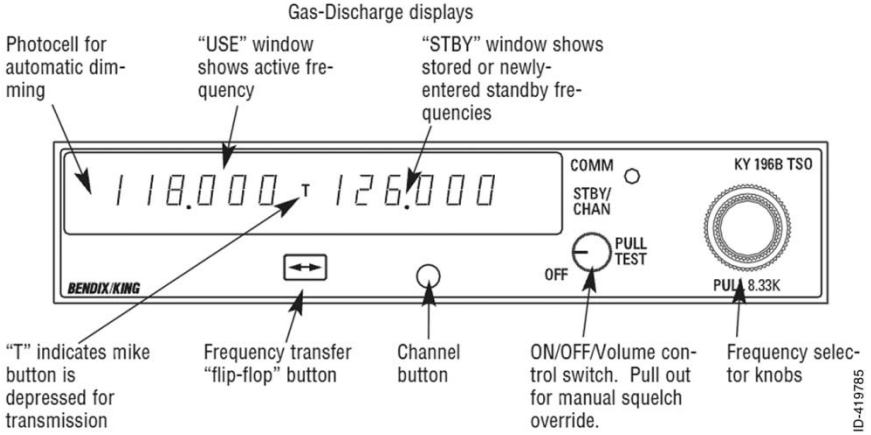
Description	Publication Part Number
KMD 150 Multi-Function Display/GPS	006-18220-0000
KLN 94 GPS Navigation System	006-18207-0000
KLN 89B GPS Navigation System	006-08786-0000
KLN 90B GPS Navigation System	006-08772-0000
KMD 550/850 Traffic Addendum	006-18238-0000

KY 196A, KY 197A and KY 196B VHF Communications Transceivers

KY 196A, KY 197A and KY 196B Operation



KY 196A/197A



KY 196B

Power Up

When you turn the ON/OFF/Volume knob clockwise to the "ON" position, your unit will display the frequencies last used in the "USE" and "STBY" (standby) windows.

To override the automatic squelch, pull the ON/OFF/Volume knob out and, judging by static noise, rotate it to the desired volume level. Push the knob back in to activate the automatic squelch.

NOTE: As with all avionics, the KY 196A, KY 197A and KY 196B should be turned on only after engine startup. This simple precaution will help protect the solid-state circuitry and

extend the operating life of your equipment.

Transmitting

During COMM transmissions, a "T" will appear between the "USE" and "STBY" windows to indicate the keying of the microphone.

KY 196A/197A Frequency Mode (Normal Operation)

1. Select a new frequency in the "STBY" window, using the frequency selection knobs. The larger knob controls changes in increments of 1MHz. The smaller knob controls changes in increments of 50kHz when pushed in, and 25kHz when pulled out.

At the outside limits of the band, the display will "wrap around" to the other end of the band, going from 136MHz to
118MHz.

2. Press the transfer button to activate the new frequency. The newly entered frequency in the "STBY" window flip-flops with the frequency in the "USE" window. This new frequency is now available for use. An optional remote-mounted frequency transfer button may also be used to perform this "flip-flop" function.

KY 196B Frequency Mode (Normal Operation)

1. Select a new frequency in the "STBY" window, using the frequency selection knobs. The larger knob controls changes in increments of 1MHz. The smaller knob allows selection of 25kHz frequencies only when pushed in, and both 8.33kHz and 25kHz frequencies when pulled out.

At the outside limits of the band, the display will "wrap around" to the other end of the band, going from 136MHz to 118MHz.

2. Press the transfer button to activate the new frequency. The newly entered frequency in the "STBY" window flip-flops with the frequency in the "USE" window. This new frequency is now available for use. An optional remote-mounted frequency transfer button may also be used to perform this "flip-flop" function.

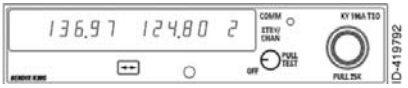
Program Mode

The Program Mode is used to program frequencies for use in the Channel Mode.

1. Depress the channel (CHAN) button for more than two seconds, until the channel number (to the right

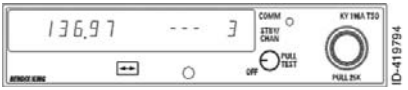
of the standby frequency) begins flashing. The most recently used active frequency will remain displayed in the “USE” window.

2. Turning either frequency selection knob will change the channel.



3. Once you’ve selected the desired channel number, you may program a new frequency by pressing the transfer button. This will cause the frequency in the “STBY” window to flash. The tuning knobs are now used to enter desired frequency.

4. To program additional channels, push the transfer button again to make the channel number flash, and repeat step three above.



5. If you with to program fewer than nine channels while skipping certain channel numbers, rotate the MHZ frequency knob left or right beyond 136MHz or 118MHz. Dashes (---) will appear in the “STBY” window, indicating that the channel will be skipped when the system is operating in the Channel Mode.

6. To exit the Program Mode, momentarily press the channel button. The unit will also automatically exit the Program Mode if no programming occurs within approximately 20 seconds.

The Program-Secure Mode

The Program Secure Mode may be used to lock a desired frequency to a specific channel number, prohibiting program changes from the front of the unit. Your KY 196A, KY 197A or KY 196B should be taken to your Bendix/King dealer for programming in the Program Secure Mode.

Channel Mode

The Channel Mode is used to recall preset frequencies stored in memory.

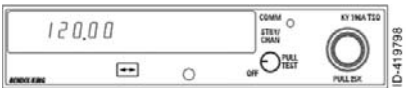
1. To enter the Channel Mode momentarily, push the channel button while in the Frequency Mode. The active frequency remains displayed in the “USE” window, and the last used channel number and its associated frequency are displayed in the “CHAN” and “STBY” windows.

If no channels have been programmed, channel 1 automatically disappears and dashes are displayed in the “STBY” window.

2. Turn either frequency selection knob to change the channel number

and the channel's corresponding frequency in the "STBY" window.

3. If there is no activity for five seconds, the radio will exit the Channel Mode and return to the Frequency Mode, with the channel frequency remaining in the "STBY" window.



4. You can also return to the Frequency Mode by either:

a. Pressing the channel button before the five-second delay, in which case the radio recalls the "USE" and "STBY" frequencies prior to entering the Channel Mode, or

b. Pressing the transfer button, so that the channel frequency becomes the active frequency and the last "USE" frequency becomes the new "STBY" frequency.

NOTE: If the optional remote channel increment switch is installed, each activation of the switch will put the unit in the Channel Mode and advance the channel number from the previous channel used.

Direct Tune Mode

The Direct Tune Mode is entered by pressing and holding the transfer button for longer than two seconds. The "STBY" frequency will disappear and the frequency in the active window can be changed with the frequency selection knobs.

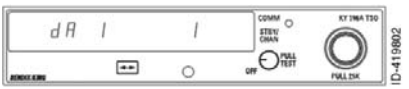
Momentarily pushing the transfer button will return the unit to the Frequency Mode (normal operation). The "STBY" frequency displayed prior to entering the Direct Tune Mode will return unchanged.

Default Mode

Turning on your KY 196A, KY 197A or KY 196B while pressing the transfer button will bring the unit up in the Direct Tune Mode and install 120.00MHz or 120.000MHz (KY 196B) as the active frequency. This will aid the pilot in blind tuning the radio in the unlikely event of display failure.

Display Adjust Modes

To enter the Display Adjust Mode, press and hold the channel button until the Program Mode is entered. Continue holding the channel button while simultaneously pressing and holding the frequency transfer button until "dA 1" replaces the frequency in the "USE" window.



The frequency selector knobs are used to change the value in the “STBY” window. Momentarily pressing the channel button steps the unit through the Display Adjust Modes, “dA 1” through “dA 3”. Press the frequency transfer button to exit the Display Adjust Mode.

Display Adjust 1 (dA 1) is used to vary the dim/bright response time to changes in ambient light on the display photocell. The range of values for dA 1 is 1-8, with 1 representing normal.

The normal setting, 1, provides immediate display brightness changes when there are changes in the light falling on the photocell. With dA 1 set to a value of 8, the response time is approximately eight seconds. dA 1 values of 2 through 7 provide intermediate response times.

Display adjustment 2 (dA 2) is used to vary the display brightness when ambient light conditions are less than direct sunlight, such as in a dark cockpit. dA 2 values range from 0-64, with 0 being dimmest and 64 being brightest; the normal dA 2 setting is 20.

dA 3 values range from 0 to 255, with 0 being dimmest and 255 being brightest. This adjustment varies the amount of ambient light required for the display to reach its full dim and bright levels. Normal dA 3 values for a new display range from 0 to 30.

A common use of dA 3 is to adjust the KY 196A, KY 197A or KY 196B display brightness to match the brightness of other radios’ displays. Another use is to provide display brightness compensation as the display ages.

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KX 155A and KX 165A
VHF Communication/Navigation Transceivers

KX 155A and KX 165A Operation (25 kHz Versions)

All controls required to operate the KX 155A and KX 165A are located on the unit front panel.

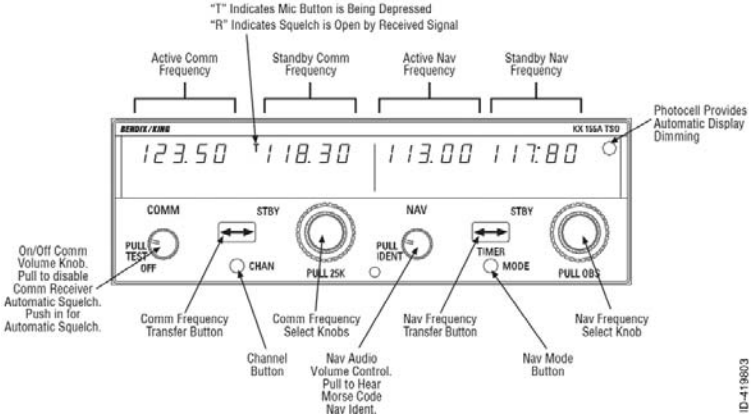


FIGURE 1A
KX 155A and KX 165A (25 kHz Versions) CONTROL FUNCTION

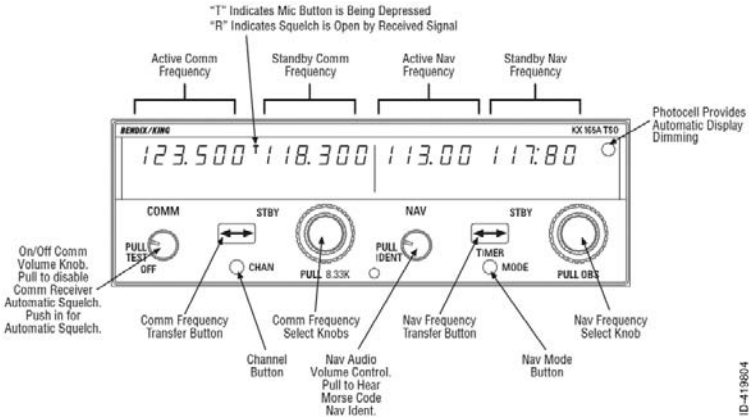


FIGURE 1B
KX 165A (8.33 kHz Versions) CONTROL FUNCTION

NOTE: The 25 kHz and 8.33 kHz versions of the KX 165A are distinguishable from one another in two ways. The 25 kHz version has “PULL 25K” nomenclature below the Comm Frequency Select Knobs while the 8.33 version has “PULL 8.33K”. In addition, the 25 kHz version has two digits to the right of the decimal in the Comm frequency while the 8.33 kHz version has three digits to the right of the decimal. The 8.33 kHz channel spacing is required for flight in certain European (ICAO EUR Region) airspace.

COMM Transceiver

Rotate the VOL knob clockwise from the OFF position. Pull the VOL knob out and adjust for desired listening level. Push the VOL knob back in to actuate the automatic squelch.

The left portion of the digital display readout is allocated for COMM ACTIVE and COMM STANDBY frequencies with a "T" between them to indicate TRANSMIT and an "R" to indicate RECEIVE modes of operation.

Select the desired operating frequency in the standby display by rotating the Frequency Select Knobs either clockwise or counterclockwise. A clockwise rotation will increment the previous frequency while a counterclockwise rotation will decrement the previous frequency.

The outer knob will change the MHz portion of the standby display. At one band-edge (118 or 136 MHz) the following 1 MHz change will wrap around to the other band-edge.

KX 155A and KX 165A 25 kHz Versions

The inner knob will change the kHz portion of the standby display. It will change in increments of 50 kHz when the knob is pushed in and 25 kHz when the knob is pulled out. The frequency wrap around at the edge of the band is also utilized when incrementing or decrementing the kHz portion of the standby display.

KX 165A 8.33 kHz Version

The inner knob will change the kHz portion of the standby display. It allows selection of 25 kHz frequencies only when the knob is pushed in and both 8.33 kHz and 25 kHz frequencies when the knob is pulled out. The frequency wrap around at the edge of the band is also utilized when incrementing or decrementing the kHz portion of the standby display.

To tune the radio to the desired operating frequency, the desired frequency must be entered into the standby display (Figure 2) and then the transfer button must be pushed. This will trade the contents of the active and standby displays (Figure 3).

NOTE: An optional remote-mounted transfer switch may also be installed in a convenient location (such as the control yoke) to perform the transfer operation.

The operating frequency can also be entered by accessing the ACTIVE ENTRY (direct tune) mode which is done by pushing and holding the COMM TRANSFER button for 2 or more seconds. In the direct tune mode, only the active part of the display is visible (Figure 4). The desired frequency can be directly entered into the display. Push the COMM TRANSFER button again to return to the active/standby display.

FIGURE 2
Frequency entered in standby display

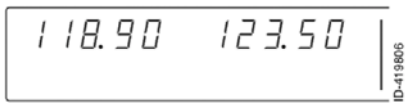


FIGURE 3
Active/standby frequencies toggle

FIGURE 4
Frequency entered in active entry mode

The transceiver is always tuned to the frequency appearing in the ACTIVE display. It is therefore possible to have two different frequencies stored in the ACTIVE and STANDBY displays and to change back and forth between them at the simple push of the transfer button.

During the transmit mode of operation, a “T” will appear between the ACTIVE and STANDBY displays. An “R” will appear between the ACTIVE and STANDBY displays if a detected signal is strong enough to open the squelch, signifying that the transceiver is in the receive mode of operation.

A non-volatile memory stores the comm ACTIVE and STANDBY frequencies on power down. When the unit is turned on again, the COMM ACTIVE and STANDBY windows will display the same ACTIVE and STANDBY frequencies that were displayed before power down.

The KX 155A and KX 165A also have provisions to program 32 channels. Pressing the CHAN button for 2 or more seconds will cause the unit to enter the channel program mode. Upon entering the channel program mode, “PG” is displayed next to the channel number and the channel number will flash indicating that it can be programmed (Figure 5).

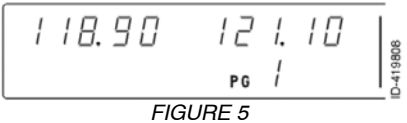


FIGURE 5
Entering channel program mode

The desired channel can be selected by turning the comm kHz knob (Figure 6).

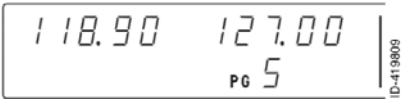


FIGURE 6
Selecting desired channel

The channel frequency can be entered by pushing the COMM TRANSFER button which will cause the standby frequency to flash. The comm frequency knobs are then used to enter the desired frequency (Figure 7).

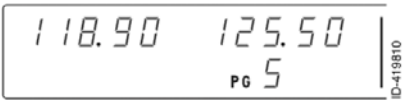


FIGURE 7
Selecting desired frequency

If dashes (displayed when rotating the outer knob between 136 MHz and 118 MHz) are entered instead of a frequency, the corresponding channel is skipped in channel selection mode (Figure 8).

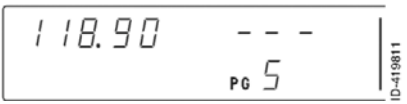


FIGURE 8
Corresponding channel is skipped in channel selection mode

Additional channels may be programmed by pressing the COMM TRANSFER button and using the same procedure. To exit the program mode and save the channel information, momentarily push the CHAN button. This will cause the unit to return to the previous frequency entry mode. The unit will also exit the channel program mode if there is no button or knob activity for 20 seconds.The channel selection mode can then be entered by momentarily pushing the CHAN button (Figure 9).

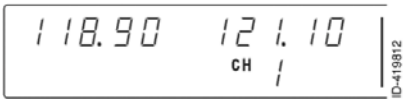


FIGURE 9
Entering channel selection mode

"CH" is displayed next to the last used channel number.
NOTE: If no channels have been programmed, channel 1 appears with dashes
displayed.

The comm frequency knobs can be used to select the desired channel (Figure 10).

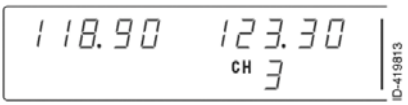


FIGURE 10
Selecting desired channel

The unit will automatically exit the channel mode, with the channel frequency remaining in the STANDBY window, if no channel is selected within 5 seconds after entering the channel selection mode. The channel frequency is then made the ACTIVE frequency in the normal manner by pressing the COMM TRANSFER button.

NOTE: An optional remote-mounted channel switch may be installed that increments the next programmed channel into the standby window each time the switch is activated. The unit is placed in the transmit mode by depressing the MIC KEY button.

The unit has a stuck microphone alert feature. If the microphone is keyed continuously for greater than 33 seconds, the transmitter stops transmitting and the active Comm frequency flashes to alert the pilot of the stuck microphone condition.

NOTE: Radio control of airport runway lighting is available at selected airports to provide airborne control of lights by keying the aircraft's microphone. Approved lighting systems may be activated by keying the microphone as indicated below:
7 times in 5 sec. - Highest intensity available
5 times in 5 sec. - Medium or lower intensity
3 times in 5 sec. - Lowest intensity available

Due to the close proximity of airports using the same frequency, an airport's radio controlled lighting receiver may be set at a low sensitivity, requiring the aircraft to be relatively close to activate the system. It is also important to be very deliberate with the keying. The requirement for the ground station decoder is such that it will not respond to very rapid or "staccato" transmissions. If the first attempt at lighting the runway lights is unsuccessful, repeat with a slower,

more deliberate cadence of microphone keying.

NAV Receiver

The right portion of the display is allocated to NAV receiver information. The frequency channeling is similar to the COMM when operating in the frequency mode (Figure 1A and 1B). The NAV increment/decrement knobs are located on the right hand side of the front panel. The outer knob operates in 1 MHz steps and increments/decrements the STANDBY frequency display.

The inner knob operates in 50 kHz steps. The NAV receiver's lower and upper frequency limits are 108.00 MHz and 117.95 MHz. Exceeding the upper limit of frequency band will automatically return to the lower limit and vice versa.

Depressing the NAV frequency transfer button for 2 seconds or more will cause the display to go in to the ACTIVE ENTRY mode. Only the ACTIVE frequency will be displayed and it can be directly changed by using the NAV inc/dec knobs. The display will return to the ACTIVE/STANDBY mode when the NAV frequency transfer button is pushed.

Depressing the mode button will cause the NAV display to go from the ACTIVE/STANDBY format to the ACTIVE/CDI (Course Deviation Indicator) format as shown in Figure 11.

The vertical "needle" moves side to side similar to a mechanical CDI. When the needle is centered, the aircraft is on the selected OBS course. When the active frequency is tuned to a VOR frequency, the center of the CDI scale displays the "TO" or "FROM" indicator.

In the CDI mode, the increment/decrement knob (pushed in) channels the ACTIVE frequency window and depressing the frequency transfer button will cause the ACTIVE frequency to be placed in blind storage and the STANDBY frequency (in blind storage) to be displayed in the ACTIVE window display.

When the ACTIVE window is tuned to a VOR frequency, the standby frequency area is replaced by a three digit OBS (Omni Bearing Selector) display. The desired OBS course can be selected by pulling out the inner NAV frequency knob and turning it. The CDI needle may be automatically centered with a "TO" indication by depressing the mode button for 2 seconds. This OBS display is independent of any OBS course selected on an external CDI or HSI. An "OBS" in the middle of the NAV display will flash while the inner NAV frequency knob is pulled out. The CDI is displayed on the line below the frequency/OBS.

When the ACTIVE window is tuned to a localizer frequency, the standby frequency area is replaced by "LOC" (Figure 12).

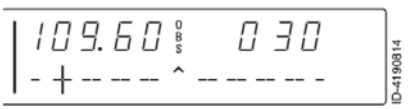


FIGURE 11
Nav display active VOR frequency/ CDI format

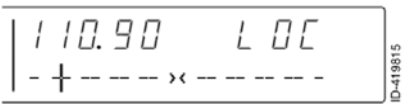


FIGURE 12
Nav display Active localizer frequency/ CDI format

When the received signal is too weak to ensure accuracy the display will "flag". See Figure 13.

FIGURE 13
VOR flag display

Depressing the mode button will cause the NAV display to go from the ACTIVE/CDI format to the ACTIVE/BEARING format. In the BEARING mode, the increment/ decrement knob channels the ACTIVE frequency window and depressing the frequency transfer button will cause the ACTIVE frequency to be placed in blind storage and the STANDBY frequency (in blind storage) to be displayed in the ACTIVE window display. In bearing mode of operation, the right hand window of NAV display shows the bearing TO the station.

Figure 14 illustrates the NAV side of the display in this mode.

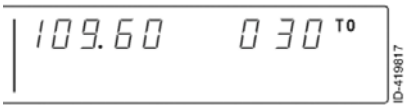


FIGURE 14
VOR mode bearing to function

When a too weak or invalid VOR signal is received the display flags as shown in Figure 15.

FIGURE 15
VOR mode active/bearing, flag display

Another push of the mode button will cause the NAV display to go from the ACTIVE/BEARING format to the ACTIVE/RADIAL format as shown in Figure 16.

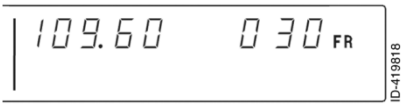


FIGURE 16
VOR mode radial from function

In the RADIAL mode, the increment/ decrement knob channels the ACTIVE frequency window and depressing the frequency transfer button will cause the ACTIVE frequency to be placed in blind storage and the STANDBY frequency (in blind storage) to be displayed in the ACTIVE window display. In radial mode of operation, the right hand window of NAV display shows the radial FROM the station. Figure 16 illustrates the NAV side of the display in this mode.

When a too weak or invalid VOR signal is received the display flags as shown in Figure 17.

FIGURE 17
VOR mode active/radial flag display

Another push of the mode button will cause the unit to go into the TIMER mode. See Figure 18.

FIGURE 18
Timer mode

When the unit is turned on the elapsed timer begins counting upwards from zero. The timer can be stopped and reset to zero by pushing the NAV frequency transfer button for 2 seconds or more causing the ET on the display to flash. In this state the timer can be set as a countdown timer or the elapsed timer can be restarted. The countdown timer is set by using the NAV inc/dec knobs to set the desired time and then pushing the NAV frequency transfer button to start the timer. The outer knob selects minutes, the inner knob in the “in” position selects ten second intervals, and the inner knob in the “out” position selects individual seconds. After the countdown timer reaches zero, the counter will begin to count upwards indefinitely while flashing for the first 15 seconds. Or the elapsed timer can also be reset to zero and started again after it has been stopped and reset to zero by pushing the NAV frequency transfer button. The Audio Alert, if installed, is then sounded.

The NAV ACTIVE and STANDBY frequencies are stored in the memory on power down and return on power up.

When the smaller increment/decrement knob is pushed in, depressing the NAV TRANSFER button will interchange the ACTIVE and STANDBY frequencies. The NAV IDENT knob is active in the pulled out position so that both voice and ident can be heard. When this knob is pushed in, the ident tone is attenuated. The volume of voice/ident can be adjusted by turning this knob.

Pilot Configuration

This mode can be accessed by pressing and holding the Nav Mode Button for more than 2 seconds and then pressing the Nav Frequency Transfer Button for an additional 2 seconds, while continuing to hold the Nav Mode Button. When the Pilot Config Mode is entered the unit will show the “SWRV” mnemonic which is the unit software revision level. Adjustment pages can be accessed by MODE button presses.

The pilot may adjust two parameters in the pilot configuration, the display minimum brightness and sidetone volume level.

Minimum Brightness (BRIM) will have a range of 0 - 255. The dimmest is 0 and the brightest is 255.

Sidetone volume level is adjusted when SIDE is displayed. Values from 0 - 255 may be selected with 0 being least volume, 255 being the greatest.

Subsequent presses of the MODE button sequences through SWRV, BRIM, SIDE, and then back to SWRV.

Momentarily pressing the Nav Transfer Button exits Pilot configuration mode. The Nav returns to its pre-Pilot Config state with the new brightness and sidetone levels stored in non-volatile memory.

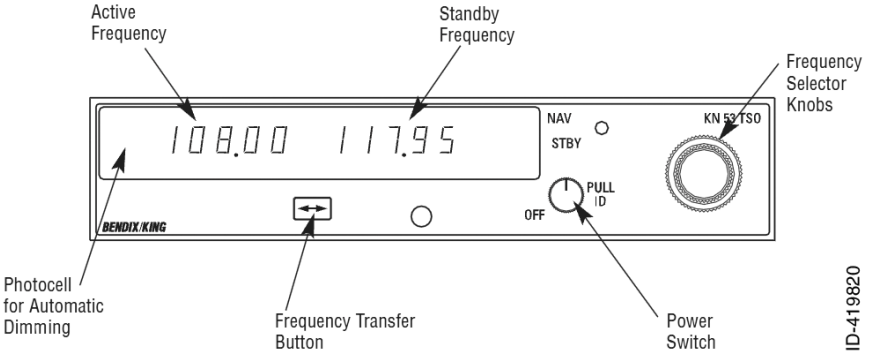
Default Mode

Turning on the KX 155A or KX 165A while pressing either the COMM

or NAV frequency transfer button will bring the unit up in the Direct Tune Mode. 120.00MHz (120.000MHz in 8.33 kHz KX 165A) will be the active COMM frequency and 110.00 MHz will be the active NAV frequency. This will aid the pilot in blind tuning the radio in the unlikely event of display failure.

KN 53
Silver Crown TSO'd Navigation Receiver

Operating the KN 53



Power Switch

This knob controls ON/OFF/VOL/IDENT. To turn on the unit, rotate the knob clockwise from the detented OFF position. Rotation of this control also adjusts NAV audio volume. NAV voice can be heard when the knob is pushed in. When the knob is pulled out, the Morse Code IDENT signal plus voice can be heard.

Frequency Selection

By rotating the concentric frequency selector knobs either clockwise or counterclockwise, the desired operating frequency can be dialed into the standby display window. A clockwise rotation will increase the displayed frequency number, while a counterclockwise rotation will decrease it. The larger selector knob is used to change the MHz portion of the frequency display; the smaller knob changes the kHz portion in 50 kHz steps. At either band edge of the 108.00 to 117.95 MHz frequency spectrum, an off-scale rotation will wrap the display around to the other frequency band-edge (i.e., 117.95 advances to 108.95 with MHz knob rotation, or 117.00 with kHz knob rotation). DME and optional internal glideslope channeling are also controlled by these selector knobs.

NAV Frequency Operation

The desired operating frequency is first entered into the standby display. To activate, push the transfer button. This will interchange the frequencies in the 'use' and 'standby' displays and tune the receiver to the new operating frequency.

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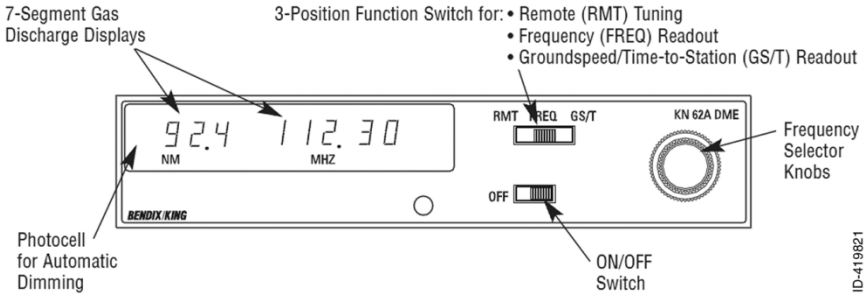
KN 62A and KN 64
TSO'd Silver Crown Digital DMEs

Operating the KN 62A and KN 64 DMEs



Operation

Turn on the unit only after engine start-up. Also, turn avionics off prior to engine shut-down. These simple precautions should be practiced with all avionics. It will protect the solid-state circuitry from short duration high voltage spikes and extend the operational life of your avionics.

The 3-position function switch determines both the information displayed and the channeling source.

Place the function switch on Frequency (FREQ). The unit is channeled internally with its own two concentric frequency selection knobs. The smaller of the two knobs has an "in" and an "out" position. When in the "in" position, this smaller knob changes the 0.1 MHz digit (0.0, 0.1, 0.2, etc.). When pulled "out", it adds 0.05 MHz to the frequency and tunes in 0.1 MHz steps (0.05, 0.15, 0.25, etc.). Pushing the smaller knob "in" subtracts 0.05 MHz from the displayed frequency. The outer, larger knob changes the larger digits (1 MHz, 10 MHz). In FREQ mode, the unit will display distance and the selected frequency. (See Figure 19.)

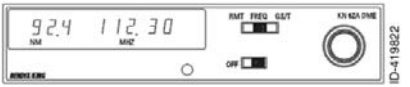


FIGURE 19.
Distance/Frequency FREQ Mode.

Now move the function switch to the Groundspeed/Time-to-Station (GS/T) position. The unit will hold the internally selected frequency and will display distance, groundspeed and time-to-station. (See Figure 20.)

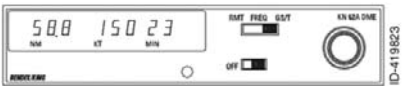


FIGURE 20.
Distance/Groundspeed/TTS GS/T Mode.

Rotating the frequency selector will have no effect on the display, because the DME is in "Frequency Hold". This frequency hold feature in the GS/T mode prevents accidental

rechanneling of the DME when the frequency is not displayed.

Place the function switch in the Remote* (RMT) position, and your DME will be channeled when you select your NAV frequency on the NAV receiver. Search time is usually about one second. When the unit locks on a ground station, it will display distance, groundspeed and time-to-station. (See Figure 21.)

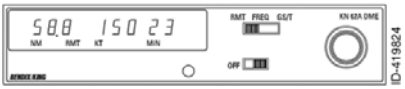


FIGURE 21.
Distance/Groundspeed/TTS RMT Mode.

Prior to lock on, "dashes" will be displayed. (See Figure 22.)

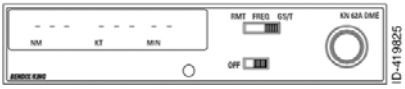


FIGURE 22.
Prior to Lock On.

Note that you may have two frequencies available at all times (one remotely selected on the NAV receiver and one internally selected with the unit's controls).

*Remote channeling requires wiring to the NAV receiver.

Operational Notes

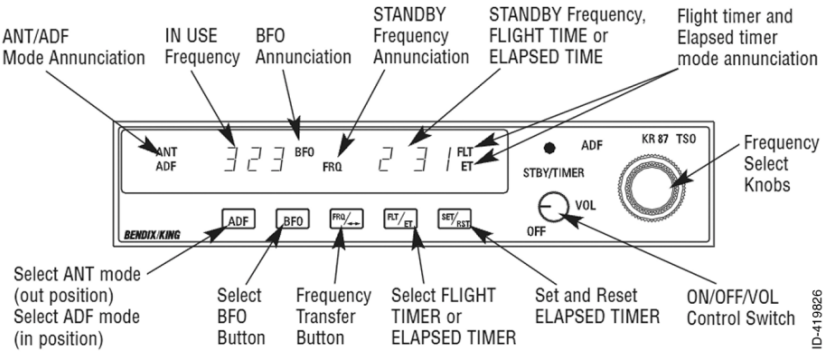
The KN 62A and KN 64 have an audio output for use in identifying the DME ground station being received. The audio level is preset at the factory, but may be easily adjusted through the top cover.

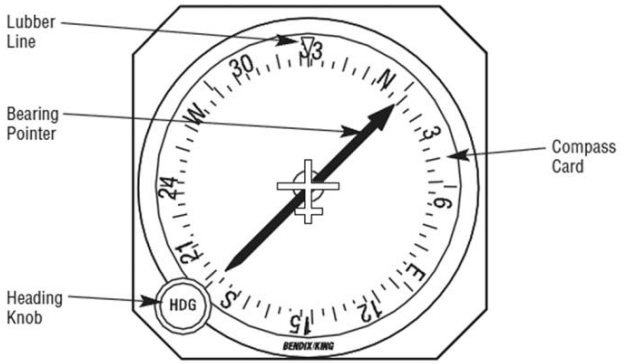
The unit electronically converts to distance the elapsed time required for signals to travel to and from the ground station. This distance is then indicated in nautical miles on the Distance/ Speed/Time-to-Station display. This distance, commonly referred to as slant range distance, should not be confused with actual along-the-ground distance. The difference between actual ground distance and slant range is least at low altitude and/or long range. If the range is three times the altitude or greater, error is negligible.

The effective range of DME depends on many factors, most important being the altitude of the aircraft. Other contributing factors are the location and elevation of the station, DME transmitter power output, and receiver sensitivity.

The groundspeed feature incorporated in the unit measures the rate of change in DME slant range distance with time. This speed is then read from 0 to 999 knots in 1 knot increments. To obtain accurate groundspeed, the aircraft must be tracking directly to or from the station. To obtain accurate time to station, the aircraft must be tracking directly to the station.

KR 87
Silver Crown ADF System
Operating the KR 87





KI 227
KS 227-00 shown, non-slaved, standard
KI 227-01 slaved, optional

KI 228
Slaved KI 228-01 shown.
Standard KI 228-00 also
available with manually
rotatable compass card.

KI 229

KNI 582

ID-419827

Turn-on

Rotate the ON/OFF/VOL knob clockwise from the detented "OFF" position. The unit will be activated and will be ready to operate. Rotation of this control also adjusts audio volume. The KR 87 has "audio muting" which causes the audio output to be muted unless the receiver is locked on a valid station.

Frequency Selection

The active frequency (to which the ADF is tuned) is displayed in the left side of the window at all times. A standby frequency is displayed in the right side when "FRQ" is annunciated. The standby frequency is placed in "blind" memory when either FLT (Flight Time) or ET (Elapsed Time) mode is selected.

With "FRQ" annunciated, the standby frequency is selected using the frequency select knobs which may be rotated either clockwise or counterclockwise. Pull the small inner knob out to tune 1's. Push the smaller inner knob in to tune 10's. The outer knob tunes the 100's and the 1000's up to 1799.

The standby frequency selected may then be put into the active window by pressing the "FRQ" button. The standby and active frequencies will be exchanged (flip-flopped), the new frequency will become active, and the former active frequency will go into standby.

Operating Modes

Antenna (ANT) mode is selected and annunciated when the "ADF" button is in the "out" position. ANT provides improved audio reception from the station tuned and is usually used for identification. The bearing pointer in the KI 227 indicator will be deactivated and immediately turn to the 90° relative position and remain there during ANT reception.

The ADF mode is selected and annunciated when the "ADF" button is in the depressed position. ADF activates the bearing pointer in the KI 227 indicator, causing it to move without hesitation to point in the direction of the station relative to the aircraft heading. The compass card on the KI 227 may be rotated as desired by using the heading knob.

NOTE: The KI 227-01 or KI 228-01 indicators, when installed with a Bendix/King KCS 55A Compass System, have a slaved compass card. Magnetic heading of the aircraft will be under the lubber line. **The indication of this compass card should be compared with that of the KI 525A master indicator from time to time. Check especially after steep bank turns and taxi turns. If a discrepancy between the two readings exists, the KI 227-01 or KI 228-01 compass card should be synchronized to the KI 525A compass card by rotating the "SYNC" knob on the indicator.**

Outside of the United States some stations are unmodulated and use an interrupted carrier for identification purposes. The BFO mode, activated and annunciated when the “BFO” button is depressed, permits the carrier wave and the associated Morse code identifier broadcast on the carrier wave to be heard.

ADF Test

(PRE-FLIGHT OR IN-FLIGHT)
Select ANT mode. This will cause the bearing pointer to move directly to the parked 90° position. Make sure the unit is tuned to a usable frequency. Now select ADF mode and the needle should move without hesitation to the station bearing. Excessive sluggishness, wavering or reversals indicate a signal that is too weak or a system malfunction.

Operating the Timers

The flight timer will always be automatically reset to :00 whenever power is interrupted either by the avionics master switch or the unit’s ON/OFF switch. An optional external switch may be installed which, when activated, will stop or start the flight timer. This switch would be of use during a nonrefueling stop when resetting the flight timer is not desired. On some aircraft it may be desirable to use the aircraft strut switch instead of a manual switch to stop and start the flight timer. It should be emphasized that the start/stop function will only operate with power applied to the unit. Always read flight time prior to power shutdown.

Flight time or elapsed time are displayed and annunciated alternatively by depressing the FLT/ET button. The flight timer continues to count up until the unit is turned off or stopped with an external switch. The elapsed timer may be reset back to :00 by pressing the SET/RST button. It will then start counting up again.

NOTE: Pressing the SET/RST button will reset the elapsed timer whether it is being displayed or not.)

The elapsed timer also has a “count-down” mode

To enter the countdown mode, the SET/RST button is depressed for about two seconds, or until the “ET” annunciation begins to flash. It is now in the ET set mode, and a time up to 59 minutes, 59 seconds may be preset into the elapsed timer with the concentric knobs. The preset time will be displayed and remain unchanged until SET/RST is pressed again, which will start the elapsed timer counting down from the preset time. When the timer reaches :00 it will start to count up as the display flashes for 15 seconds and an aural alarm, if installed, is activated for about 1 second.

NOTE: The standby frequency which is in memory while flight time or elapsed time modes are being displayed may be called back by

pressing the FRQ button, then transferred to active use by pressing the FRQ button again.

While FLT or ET is displayed the "in use" frequency on the left side of the window may be changed, by using the frequency select knobs, without any effect on the stored standby frequency or the other modes. This feature is especially useful when searching for stations with unknown frequencies.

Erroneous ADF Bearings Due to Radio Frequency Phenomena

Station Overlap

In the U.S., the FCC, which assigns AM radio frequencies, occasionally will assign the same frequency to more than one station in an area. Certain conditions, such as Night Effect, may cause signals from such stations to overlap. This should be taken into consideration when using AM broadcast stations for navigation.

Sunspots and atmospheric phenomena may occasionally distort reception so that signals from two stations on the same frequency will overlap. For this reason it is always wise to make positive identification of the station being tuned, by switching the function selector to ANT and listening for station call letters.

Electrical Storms

In the vicinity of electrical storms, an ADF Indicator pointer tends to swing from the station tuned toward the electrical discharges. Location of the storm can be useful information, but the erratic behavior of the pointer should be taken into account.

Night Effect

This is a disturbance particularly strong just after sunset and just after dawn. An ADF indicator pointer may swing erratically at these times. If possible, tune to the most powerful station at the lowest frequency. If this is not possible, take the average of pointer oscillations to determine relative station bearing.

Mountain Effect

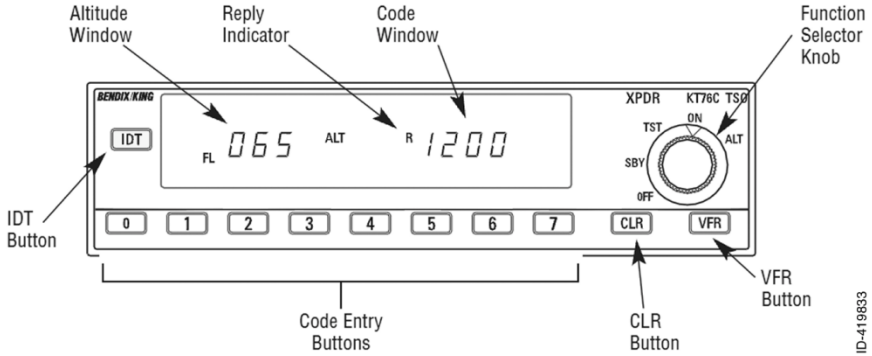
Radio waves reflecting from the surface of mountains may cause the pointer to fluctuate or show an erroneous bearing. This should be taken into account when taking bearings over mountainous terrain.

Coastal Refraction

Radio waves may be refracted when passing from land to sea or when moving parallel to the coastline. This should be taken into account when operating near coastal areas.

KT 76C
Bendix/King Panel-Mounted Transponder

KT 76C OPERATION



About Transponders

Your Honeywell Bendix/King transponder is a radio transmitter and receiver which operates on radar frequencies. Receiving ground radar interrogations at 1030 MHz, it returns a coded response of pulses to groundbased radar on a frequency of 1090 MHz.

As with other Mode A/Mode C transponders, the KT 76C replies with any one of 4,096 codes, which differ in the position and number of pulses transmitted. By “replying” to ground transmissions, your KT 76C enables ATC computers to display aircraft identification, altitude and ground speed on Enroute, Approach or Departure Control radar screens. When the IDENT button is pressed, your aircraft will be positively identified to the Air Traffic Controller.

Operating the KT 76C

Before starting your aircraft’s engine, make sure that the KT 76C function selector knob, or your avionics master, is turned to OFF. After engine start, turn the function selector knob to SBY (standby). Give your transponder about 45 seconds to become operational.

Select the proper reply code by pressing the desired code entry buttons. The reply code will be displayed in the code window. Before takeoff, rotate the function selector knob to the ALT (altitude) position for Mode C altitude reporting to ATC. If you do not have an encoding altimeter, rotate the function switch to ON for Mode A reporting.

Altitude Display

The KT 76C displays Flight Level Altitude, marked by the letters “FL” and a number in hundreds of feet, on the left side of the display. For example, the reading “FL 065” corresponds to the altitude of 6,500 feet, referenced to 29.92 inches of mercury (or 1013 hP) at sea level. Flight Level Altitude represents

"pressure altitude," and should not be confused with true altitude. Please note that the displayed altitude may not agree exactly with the aircraft's altimeter when flying below 18,000 feet, because encoders are preset to 29.92 inches of mercury. An encoder's altitude transmission is automatically corrected for proper altimeter setting by a ground based computer, to present the correct altitude to the controller.

Ranging from -1,000 to +99,000 feet, Flight Level Altitude is displayed only when altitude reporting is enabled. If the altitude window is blank or shows a series of dashes (as in the case of an invalid altimeter code being reported), altitude reporting will be disabled.

CLR Button

Code entry mistakes are corrected, one digit at a time, by pressing the CLR button and reentering the correct code. The last active code will be displayed if a complete four-digit code has not been entered and there is no activity on any of the code entry buttons, the VFR button, or the CLR button for four seconds.

VFR Button

Momentarily pressing the VFR button will enter a pre-programmed VFR code, typically 1200, in the code window. Pressing and holding the VFR button for two seconds will cause the last active code to be displayed.

During installation, it may be desired to set the default VFR code to a code other than 1200. The VFR code is programmed by the following sequence:

1. Place the unit in standby.
2. Enter the desired VFR code with the ident code pushbutton switches.
3. Depress the "VFR" pushbutton while holding the "IDT" pushbutton in its depressed position.

Reply Indicator

The reply indicator blinks to indicate that the KT 76C is functioning properly and replying to interrogations.

Squawk Ident

When you are asked to "ident" by ATC, press the IDT button. The reply indicator will illuminate continuously for 18 seconds during the ident interval.

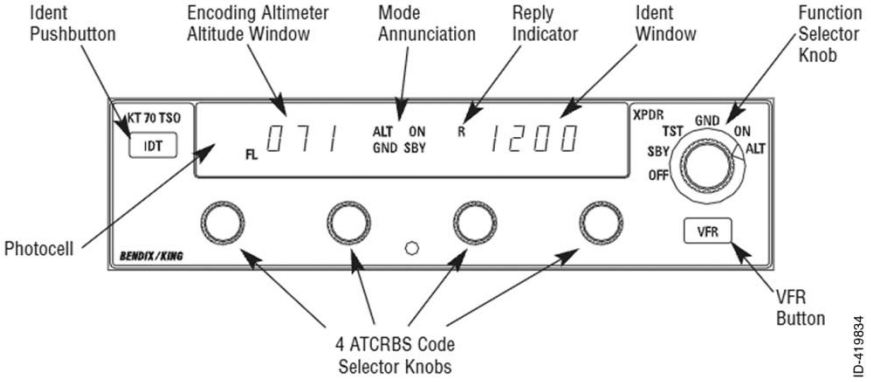
Important Codes

7700 - Emergency
7600 - Communication Failure
7500 - Hijacking
0000 - Military - **DO NOT USE!**

See the Aeronautical Information Manual (AIM) for detailed explanation of these codes and their use.

KT 70 and KT 71
Panel-Mounted Transponders

Operating the KT 70 and KT 71



IDENT Button

Marked IDT, the KT 70/71's Ident button is pressed when ATC requests an "Ident" or "Squawk Ident" from your aircraft. When the Ident button is pressed, the reply indicator, an "R"-shaped annunciator light will glow for approximately 18 seconds. An optional Remote Ident switch may also be installed to perform the same function.

ID Code

The ATCRBS Transponder Identification code (squawk code) for the aircraft is displayed in the Ident Window on the right side of the display. Each of the four Transponder Code Selector Knobs selects a separate digit of the identification code.

Reply

The lighted "R" reply indicator blinks when the transponder is replying to a valid interrogation and illuminates for 18 seconds after the initiation of the Ident.

Altitude Display

The KT 70 and KT 71 display Flight Level Altitude, marked by the letters "FL" and a number in hundreds of feet, on the left side of the display. For example, the reading "FL 071" corresponds to an altitude of 7,100 feet, referenced to 29.92 inches of mercury (or 1013 hP) at sea level. Flight Level Altitude represents "pressure altitude", and should not be confused with true altitude. Please note that the displayed altitude may not agree exactly with the aircraft's altimeter when flying below 18,000 feet, because encoders are preset to 29.92 inches of mercury. An

encoder's altitude transmission is automatically corrected for proper altimeter setting by a ground-based computer, to present the correct altitude to the controller.

Ranging from -1,000 to +99,900 feet, Flight Level Altitude is displayed only when altitude reporting is enabled. If the altitude window is blank or shows a series of dashes (as in the case of an invalid altimeter code being reported), altitude reporting will be disabled.

VFR

Momentarily pressing the VFR Pushbutton/Function Selector Knob recalls the preprogrammed VFR code, superseding whatever code was previously entered. If the VFR Pushbutton is pressed inadvertently, the previous code may be retrieved by pressing the Function Selector Knob and holding it for two seconds.

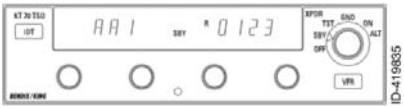
If a preset VFR code other than the factory-set 1200 is desired, a new code may be programmed as follows:

1. Place the unit in Standby (SBY)
2. Select the desired VFR code
3. While holding the IDT (Ident) button in, momentarily press the VFR button (Function Selector Knob).

Function Selector Knob

The Function Selector Knob on the right side of the KT 70 and KT 71 enables you to choose from among the following operating modes:

OFF - The unit is not receiving power. ***For the KT 70 only,*** when the unit is turned to another mode, the installerprogrammed aircraft address and the aircraft's maximum airspeed will be displayed, according to the following sequence:



1.) The "FL" window will display "AA1", while, for two seconds, the Ident window will display the first four digits of the unique aircraft address code.

2.) The "FL" window will display "AA2" and the Ident window will display the last four digits of the aircraft address code.

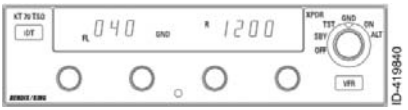
3.) The "FL" window will display the lower limit and the Ident window the upper limit of the preprogrammed airspeed range, again for two seconds. The six programmable ranges include 0-75, 75-150, 150-300, 300-600, 600-1200 and greater than 1200 knots.

SBY (STANDBY) - In Standby on both the KT 70 and KT 71, the unit is energized but is inhibited from replying to any interrogation. "SBY" is

shown on the display, while the altitude display is disabled.

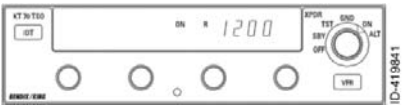
TST (TEST) - Replies are disabled in test mode, and the unit illuminates all segments of the display for at least four seconds. A series of internal tests is performed to check the KT 70/71's integrity, verifying all EEPROM data and making hardware and squitter checks.

Should a squitter error occur, the transmitter is considered inoperative, and the message "F01" will appear on the altitude display. Should an EEPROM error be detected, the messages "F02" (internal) or "F03" (external) will appear. If the KT 70 or KT 71 detect a hardware failure that prohibits normal operation, the message "F04" will be shown. If no errors are detected, the unit remains in test mode.

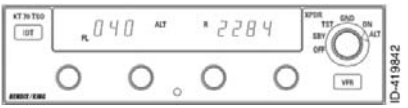


GND (GROUND) - In the KT 71, all interrogations are inhibited. In the KT 70, ATCRBS (Air Traffic Control Radar Beacon System) Mode A&C interrogations are inhibited, but the KT 70 will reply to all valid Mode S interrogations, provided a Mode S status bit is set to indicate the aircraft is on the ground. In both units, the ID code is shown on the right side of the display, with altitude reported on the left side. The letters "GND" are also displayed in this mode.

NOTE: An optional remote "air/ground" switch may be installed on the aircraft's landing gear strut to keep the KT 70 and KT 71 in the GND mode until the airplane is airborne. This feature eliminates the need to activate the unit's ON or ALT modes after takeoff.



ON - The KT 70 is able to reply to all valid Mode A, C and S interrogations (Mode A and C on the KT 71). However, the altitude information will not be transmitted. In the ON mode, the altitude window is left blank, the ID code is shown on the right and the "ON" annunciation is shown on the display.



ALT - In the "ALTITUDE" mode, the KT 70 replies to all valid Mode A, C and S interrogations (Mode A and C on the KT 71). The ID code is displayed in the right window and altitude information (in hundreds of feet) is shown on the left.

DISPLAY ADJUST MODE – The KT 70's and 71's displays feature three programmable adjustments: dA 1, dA 2 and dA 3. Display Adjust 1 (dA 1) is used to vary the dim/bright response

time to changes in ambient light. A setting of 1 provides immediate display brightness changes when there are changes in the light falling on the photocell. With dA 1 set to a value of 8, the response time is approximately eight seconds. dA 1 values of 2 through 7 provide intermediate response times. The factory setting is 1.

Display Adjust 2 (dA 2) is used to vary the display brightness when ambient light conditions are less than direct sunlight, such as in a dark cockpit at night. The factory setting is 20.

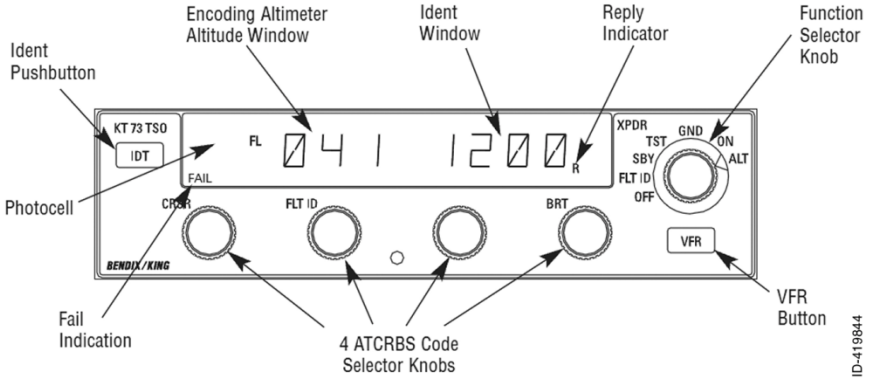
Display Adjust 3 (dA 3) varies the amount of ambient light required for the display to reach its full dim and bright levels. A common use of dA 3 is to adjust the KT 70 and KT 71 display brightness to match the brightness of other radios' displays and to provide display brightness compensation as the display ages. The factory setting is 0.

The following steps allow you to access these adjustments:

1. Turn the Function Selector Knob to TST.
2. Press and hold the IDT button for five seconds, until "dA 1" appears in the altitude window.
3. Select the desired display adjustment (dA 1, dA 2, dA 3) by pressing the VFR pushbutton.
4. Set the desired adjustment value in the IDENT window, using the Ident Code Selector Knob on the far right. Note the settings below:
   - dA 1 (Photocell response): 1-8, 1=Fastest, 8=Slowest
   - dA 2 (Display brightness): 0-64, 0=Dimmest, 64=Brightest
   - dA 3 (Vendor/Age compensation): 0-255, 0=Normal/Dimmest, 255=Brightest
5. Press the IDT pushbutton or turn the Function Selector Knob to exit the display adjust mode, saving the new values.

KT 73
Mode S, Datalink Transponder

Operating the KT 73



IDENT Button

Marked IDT, the KT 73's Ident button is pressed when ATC requests an "Ident" or "Squawk Ident" from your aircraft. When the Ident button is pressed while in the GND, ON or ALT modes, “IDT” will be illuminated on the display for approximately 18 seconds. An optional Remote Ident switch may also be installed to perform the same function.

ID Code

The ATCRBS Transponder Identification code (squawk code) for the aircraft is displayed in the Ident Window on the right side of the display. Each of the four Transponder Code Selector Knobs selects a separate digit of the identification code.

Reply Indicator

When the KT 73 is replying to a valid ground Mode S interrogation, the reply nomenclature “R” will be illuminated twice per second. When the KT 73 is replying to a valid ATCRBS or airborne Mode S interrogation, the reply nomenclature “R” will be illuminated once per second.

Altitude Display

When the ALT mode is selected, the KT 73 displays the current Flight Level, marked by the letters “FL” and a number in hundreds of feet. This is shown on the left side of the display. For example, if “FL 071” is displayed, this corresponds to a reported pressure altitude of 7,100 feet. Note that the displayed Flight Level, or pressure altitude, may not agree with the aircraft’s baro-corrected altitude under non-standard conditions. The Flight Level, or pressure altitude, reported by the KT 73 will be corrected as required by the ATC facility.

A fault in the altitude interface or an invalid altitude input to the KT 73 will cause the display to show a series of dashes when the KT 73 is in the ALT mode.

VFR

Momentarily pressing the VFR Pushbutton recalls the preprogrammed VFR code, superseding whatever code was previously entered. If the VFR Pushbutton is pressed inadvertently, the previous code may be retrieved by pressing the VFR button and holding it for two seconds.

If a preset VFR code other than the factory-set 1200 is desired, a new code may be programmed as follows:

1. Place the unit in Standby (SBY)
2. Select the desired VFR code
3. While holding the IDT (Ident) button in, momentarily press the VFR button.

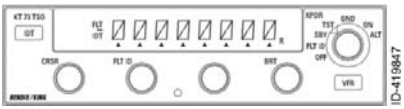
Function Selector Knob

The Function Selector Knob on the right side of the KT 73 enables you to choose from the following operating modes:

OFF - The unit is not receiving power. When the unit is turned to another mode, it will reply or squitter within two seconds, according to the selected mode.

FLT ID (FLIGHT ID) - The Flight ID should be the aircraft identification employed in the flight plan. When no flight plan is available, the registration marking of the aircraft should be used. When the FLT ID mode is selected, the KT 73 is inhibited from replying to any interrogation, "FLT ID" is annunciated on the display and the flight ID is displayed. The Flight ID is modified by rotating the CRSR knob to position the cursor (▲) under the character to be changed then rotating the FLT ID knob to select the desired character. Once the CRSR and FLT ID knobs have been idle for 5 seconds or the mode select knob has been turned to the SBY position the flight ID will be saved.

SBY (STANDBY) - In Standby, the unit is energized but is inhibited from replying to any interrogation. "SBY" is shown on the left side of the display and the ID code is shown on the right.



TST (TEST) - Replies are disabled and all display segments are illuminated for at least four seconds. A series of internal tests is performed to check the KT 73's integrity, verifying all aircraft specific configuration data and make hardware and squitter checks. If no faults are detected, "TEST OK" is displayed and an audio message "TEST OK" is annunciated, if the audio function is installed.

The audio volume is set during installation. Contact your avionics installer to adjust the volume level to your personal preference.

Should a fault be detected, "SBY" will be displayed on the left and the

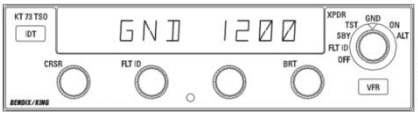
display on the right will cycle through all the detected faults. If the faults are associated with external data, an audio message “CHECK FAULT CODES” will be annunciated. Faults internal to the KT 73 will annunciate an audio message “TRANSPONDER TEST FAIL”. Internal faults will also cause “FAIL” to be annunciated in the lower left of the display in any mode of operation.

The fault codes are as follows:

F1YY* - Squitter (Internal)
F2YY* - Internal or External EEPROM (Internal)
F3YY* - Hardware (Internal)
F401 - Mode S address/Max Airspeed (Internal)
F5YY* - Gilham or Executive (External)
F6YY* - Interface (External)

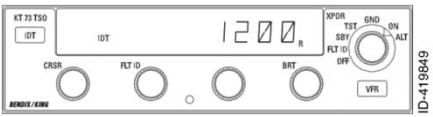
* YY denotes the specific fault.

Except for the acquisition data fault (code 101), the KT 73 will not inhibit replies when an internal fault is identified.



GND (GROUND) - The KT 73 will inhibit ATCRBS (Air Traffic Control Radar Beacon System), ATCRBS/Mode S All Call and Mode S-only All Call replies. However, the unit will continue to generate Mode S squitter transmissions and reply to discretely addressed Mode S interrogations. The ID code is shown on the right side of the display and the letters "GND" are shown on the left side.

NOTE: An optional remote "air/ground" switch may be installed. This feature eliminates the need to manually place the KT 73 in the GND mode. In addition, when the aircraft is airborne, the KT 73 will function as though the Function Selector Knob is in the ALT position when it is actually in the GND position.



ON - The KT 73 is able to reply to all valid Mode A, C and S interrogations. However, the altitude information will not be transmitted. In the ON mode, the altitude window is left blank and the ID code is shown on the right side of the display.

ALT (ALTITUDE) - The KT 73 replies to all valid Mode A, C and S interrogations. The ID code is displayed in the right window and altitude information (in hundreds of feet) is shown on the left. The letters "FL" will be illuminated, indicating Flight Level. If altitude information is unavailable or invalid, the left portion of the display will be dashed.

DISPLAY BRIGHTNESS ADJUSTMENT - The KT 73's display brightness is controlled by an ambient light sensor. In addition, it has a manual adjustment to allow for matching to the brightnes of other

lighted displays that may be in the cockpit. The display is adjusted in the test (TST) mode.

To manually adjust the display brightness, perform the following operations:

1. Turn the Function Selector Knob to "TST".
2. Turn the BRT knob clockwise to increase the display brightness, or counterclockwise to decrease the display brightness.

The eight carets below the alphanumeric display characters indicate the brightness setting (relative to the photocell reading). Maximum brightness is indicated by all eight carets being illuminated. Minimum brightness is indicated by no carets being illuminated. The factory default setting is represented by four carets being illuminated. Pressing the IDT button will return the brightness to the default factory value.

3. Turn the Function Selector Knob from TST to store the display brightness settings.

NOTE: If power is removed from the KT 73 while still in the test mode, the brightness setting will be lost and the unit will revert to the last known setting.

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TT31 Mode S Transponder
Operating Manual

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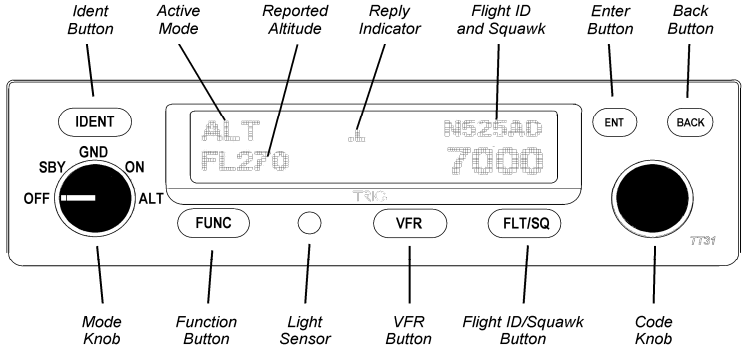
EN / DE / FR

Front Panel



Display

The display shows the operating mode of the transponder, the reported pressure altitude, and the current squawk code and Flight ID. The reply indicator is active when the transponder replies to interrogations.

The pressure altitude is displayed as a Flight Level, which is the pressure altitude in hundreds of feet. When non-standard atmospheric conditions apply, this may not match the altimeter indicated altitude, but will be correctly displayed by the ATC radar.

Mode Selector Knob

The left hand knob controls the power to the transponder and the operating mode.

OFF	Power is removed from the transponder.
SBY	The transponder is on, but will not reply to any interrogations.
GND	The transponder will respond to Mode S ground interrogations from surface movement radar.
ON	The transponder will respond to all interrogations, but altitude reporting is suppressed.
ALT	The transponder will respond to all interrogations.

When airborne, the transponder should always be set to ALT unless otherwise directed by Air Traffic Control. When you are taxiing on the ground, the transponder should be set to GND unless your installation includes a gear squat switch. Aircraft installations that include a gear squat switch will automatically select GND on landing.

Push Buttons

IDENT — Press the IDENT button when ATC instructs you to “Ident” or “Squawk Ident”. This activates the SPI pulse in the transponder replies for 18 seconds. IDENT will appear in the display.

FUNC — Pressing the FUNC button provides access to the flight timer, stopwatch, ADS-B monitor (depending on installation) and altitude monitor function.

VFR — Pressing the VFR button sets the transponder to the pre-programmed conspicuity code. Pressing the button again restores the previous squawk code.

FLT/SQ — Pressing FLT/SQ alternates the primary display between squawk code and Flight ID.

ENT — The ENT button enters a digit in the code selector.

BACK — The BACK button goes back to the previous digit in the code selector.

Code Selector Knob

The right hand knob is used to set squawk codes and the Flight ID. The FLT/SQ button selects which will be updated. Turning the knob will highlight the first digit on the display, and the digit can be changed as required. Press the ENT button to advance to the next digit. When ENT is pressed on the last digit, the new squawk code or Flight ID will replace the previous value. If the code entry is not completed within 7 seconds, the changes are ignored and the previous code restored.

1200	VFR code in the USA
7000	VFR code commonly used in Europe
7500	Hijack code
7600	Loss of communications
7700	Emergency code

The Flight ID should correspond to the aircraft call sign entered on your flight plan. If no flight plan is active, the aircraft registration should be used as your Flight ID. Use only letters and digits. If the Flight ID is less than 8 characters long, entering a blank character will end it.

Flight Timer

The Flight Timer records the time for which the transponder has been powered on and operating in flight mode – either ON or ALT. Press the FUNC button to display the Flight Timer.

Stopwatch

The stopwatch can be used as a convenient timer. Press the FUNC button to display the stopwatch. Pressing ENT will reset and start the timer. Pressing ENT again will stop the timer.

Altitude Monitor

The Altitude Monitor activates an audio annunciator or annunciator light (depending on installation) when the aircraft pressure altitude differs from the selected altitude by more than 200 feet. Press the FUNC button to display the altitude monitor enable screen. Pressing ENT toggles the altitude monitor at the current altitude.

When altitude monitoring is in use, a small deviation pointer appears adjacent to the altitude display on the transponder.

ADS-B Monitor

The ADS-B Monitor is only available on installations that include an ADS-B position source. The ADS-B Monitor provides a display of the position information that is being transmitted in ADS-B position reports. This can provide confirmation that the correct information is being transmitted, particularly where the GPS source is remote from the transponder.

In the event that valid position information is NOT available from the GPS, the latitude and longitude display will be replaced by dashes; if no valid latitude and longitude is shown then ADS-B position information is NOT being transmitted.

Loss of ADS-B position information will also result in a WARNING message being displayed.

Warning Messages

If the transponder detects a problem, the screen will indicate WARNING and a brief statement of the problem. Depending on the nature of the problem, your transponder may not be replying to interrogations. Note the message on the screen and pass that information to your avionics maintenance organisation. Press ENT to clear the message; if the fault is still present the message will reappear.

Fault Annunciation

If the transponder detects an internal failure, the screen will indicate FAULT and a brief statement of the problem. No replies will be made to interrogations when a fault is detected.

Some FAULT indications can be recovered by switching the transponder off and back on again, although in all cases a FAULT code implies that there is a fault with the transponder or the installation. Note the FAULT message at the bottom of the screen and pass that information to your avionics maintenance organisation.

Configuration Mode

The system is configured when it is first installed by your avionics supplier. Configuration items include the Mode S aircraft address, the interface to the other aircraft systems, the aircraft category, and the pre-programmed values for VFR squawk code. To view or change these settings you must use Configuration Mode.

> **Do not use Configuration Mode in flight. Check with your avionics installer before changing the configuration.**

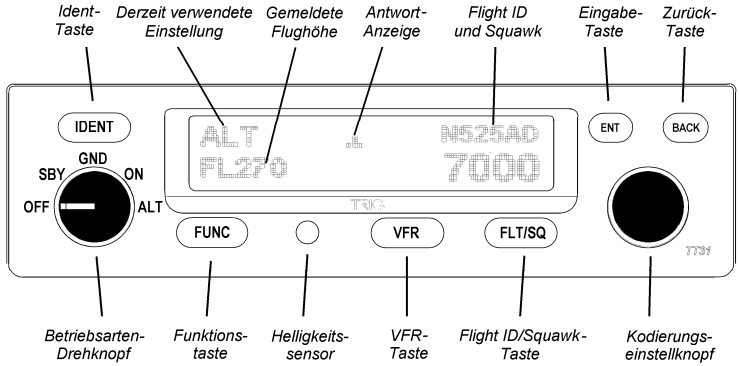
To enter configuration mode, hold down the FUNC button whilst switching on the transponder. Configuration items can be changed using the Code Knob and the ENT and BACK buttons. Pressing FUNC advances to the next configuration item.

When configuration is complete, switch the transponder off. When it is switched back on the transponder will use the new configuration.

Low Temperature Operation

The TT31 is certified to operate correctly down to -20C, but at low temperatures the display may be impaired. On a cold day you may need to wait for the cockpit to warm up to ensure normal operation.

Gerätefront



Anzeige

Die Anzeige gibt folgendes wieder: Betriebsart des Transponders, die gemeldete Druckhöhe, sowie den derzeitigen Squawk Code und Flight ID. Die „Reply“-Anzeige ist aktiv, wenn das Gerät auf Anfragen antwortet.

Die Druckhöhe wird als Flugfläche (FL) angezeigt, d.h. als Druckhöhe in Schritten von 100 Fuß. Wenn die Wetterlage von der Standardatmosphäre abweicht, kann die Anzeige u.U. von der des Höhenmessers abweichen, wird aber vom ATC Radar korrekt wiedergegeben.

Betriebsarten-Drehknopf

Der linke Drehknopf regelt die Stromversorgung zum Transponder sowie die Betriebsart.

OFF Die Stromzufuhr zum Transponder ist unterbrochen.

SBY Der Transponder ist eingeschaltet, antwortet aber nicht auf Anfragen.

GND Der Transponder antwortet auf Mode-S-Anfragen des Vorfeld-Radars.

ON Der Transponder antwortet auf alle Anfragen, aber ohne Höhenübermittlung.

ALT Der Transponder antwortet auf alle Anfragen.

Im Fluge sollte der Transponder stets auf „ALT“ eingestellt sein, außer wenn die Flugsicherung dies über Funk anders fordert. Beim Rollen

am Boden sollte der Transponder stets auf „GND“ eingestellt sein, es sei denn Ihr Lfz hat einen Bodensicherheitsschalter. Bei Einbauten in Lfz mit Bodensicherheitsschalter wird die Funktion „GND“ bei der Landung automatisch aktiviert.

Drucktasten

IDENT	Drücken Sie die „IDENT“-Taste, wenn die Flugsicherung Sie zum „Ident“ oder „Squawk Ident“ auffordert. Dies aktiviert den SPI-Puls in den Antworten des Transponders für 18 Sekunden. Die Funktion IDENT wird in der Anzeige des Gerätes wiedergegeben.
FUNC	Durch Drücken der „FUNC“-Taste gelangen Sie zu den Funktionen der Flugzeitmessung, Stoppuhr, ADS-B Monitor (in Abhängigkeit der Ausrüstung) und Flughöhenüberwachung.
VFR	Ein Druck auf die „VFR“-Taste aktiviert den vorprogrammierten Code. Ein weiterer Tastendruck reaktiviert den vorherigen Squawk-Code.
FLT/SQ	Mit der Taste „FLT/SQ“ können Sie zwischen der Anzeige des Squawk-Codes und der Flight ID wechseln.
ENT	Mit der „ENT“-Taste können Sie einzelne Zahlen eingeben.
BACK	Durch Drücken der Taste „BACK“ können Sie bei Eingabe des Codes eine Stelle zurückgehen.

Kodierungseinstellknopf

Der rechte Drehknopf wird zur Einstellung von Squawk-Codes und Flight IDs benutzt. Mit der „FLT/SQ“-Taste wird die jeweils zu ändernde Funktion gewählt. Ein Drehen des Knopfes aktiviert die erste Stelle der Anzeige, die dann nach Bedarf geändert werden kann. Per „ENT“-Taste gelangt man zur jeweils nächsten Stelle. Wenn bei der letzten Stelle „ENT“ gedrückt wird, ersetzt der neue Squawk-Code oder die neue Flight ID die zuvor genutzten Zahlen. Wenn eine Zahl nicht innerhalb von 7 Sekunden verändert wird, werden die bisherigen Änderungen vom Gerät ignoriert, und die vorherige Zahlenkombination wird wieder hergestellt.

1200	VFR code in den USA
7000	Am häufigsten in Europa genutzter VFR-Code
7500	Code für Entführungen
7600	Funkausfall
7700	Notfall

Die Flight ID sollte dem Rufzeichen entsprechen, das Sie im Flugplan eingetragen haben. Wenn Sie keinen Flugplan erstellt haben, sollte das Kennzeichen des Lfz als Flight ID genutzt werden. Benutzen Sie nur Buchstaben und Zahlen. Wenn die Flight ID kürzer als acht Stellen ist, geben Sie eine Leerstelle als Endzeichen ein.

Flugzeitmessung

Der Flugzeitmesser zeichnet die Zeit auf, seitdem die Stromzufuhr zum Transponder eingeschaltet und eine der Flugeinstellungen, d.h. „ON“ oder „ALT“, aktiviert wurde. Durch Drücken der „FUNC“-Taste können Sie die Flugzeit anzeigen lassen.

Stoppuhr

Die Stoppuhr kann ebenfalls zur Zeitmessung genutzt werden. Drücken Sie die „FUNC“-Taste, um die Stoppuhr aufzurufen. Ein Druck auf „ENT“ wird die Stoppuhr auf 0 setzen und neu starten. Ein weiterer Druck auf „ENT“ hält die Zeitmessung an.

Flughöhenüberwachung

Die Flughöhenüberwachung aktiviert ein akustisches oder optisches Warnsignal (in Abhängigkeit der Ausrüstung), wenn die Flughöhe mehr als 200 Fuß von der zuvor eingestellten Angabe abweicht. Drücken Sie die „FUNC“-Taste bis zum Erreichen der Anzeige zur Aktivierung der Funktion „Altitude Monitor“. Per „ENT“-Taste programmieren Sie Ihre aktuelle Flughöhe als Ausgangswert.

Wenn diese Funktion eingeschaltet ist, erscheint neben der Höhenangabe die kleine Abweichungsanzeige nach oben oder unten.

ADS-B Monitor

Diese Funktion kann nur genutzt werden, wenn das Lfz zur Positionsbestimmung für ADS-B ausgerüstet ist. Der ADS-B Monitor zeigt die Position basierend auf Daten, die durch ADS-B-Positionsmeldungen übermittelt werden. Dies kann zur Bestätigung der Richtigkeit der übertragenen Positionsinformationen dienen, insbesondere, wenn der GPS-Empfang sehr schwach ist.

Falls eine zuverlässigen Positionsangabe durch das GPS NICHT möglich ist, werden die Längen- und Breitengrade als Horizontalstriche angezeigt. Wenn dies der Fall ist, werden ADS-B-Positionsinformationen NICHT übermittelt.

Warnmeldungen

Falls eine Störung auftritt, meldet der Transponder dies sofort. Die Anzeige WARNING leuchtet auf; zusätzlich wird eine kurze

Beschreibung des Problems angezeigt. Es ist nun von der Art des Problems abhängig, ob der Transponder weiterhin auf Anfragen antwortet. Übermitteln Sie diese Fehlermeldung an Ihren Avionik-Betrieb. Drücken Sie ENT, und die Fehlermeldung erlischt. Falls das Problem weiterhin besteht, wird der Transponder dies entsprechend melden.

Fehlermeldung

Wenn der Transponder einen internen Fehler feststellt, wird dies in der Anzeige durch „FAULT“ plus einer kurzen Problembeschreibung gemeldet. Sobald ein Fehler festgestellt wurde, antwortet der Transponder nicht mehr auf Anfragen durch die Flugsicherung.

Einige „FAULT“-Anzeigen können durch Aus- und Einschalten des Transponders behoben werden, jedoch bedeutet jede Anzeige dieser Art, dass ein Fehler im Gerät oder der Installation vorliegt. Melden Sie die vom Gerät entsprechend gegebene Problembeschreibung zur Behebung an Ihren Avionik-Betrieb.

Einstellung „Konfiguration“

Das Gerät ist zum Zeitpunkt des Einbaus durch Ihren Avionik-Zulieferer konfiguriert. Die Konfiguration beinhaltet den Mode-S-Code, das Interface zu anderen Geräten, die Lfz-Kategorie, und die vorprogrammierten Werte für VFR Squawk Codes. Um diese Einstellungen zu sehen oder zu ändern müssen Sie die Einstellung „Konfiguration“ benutzen.

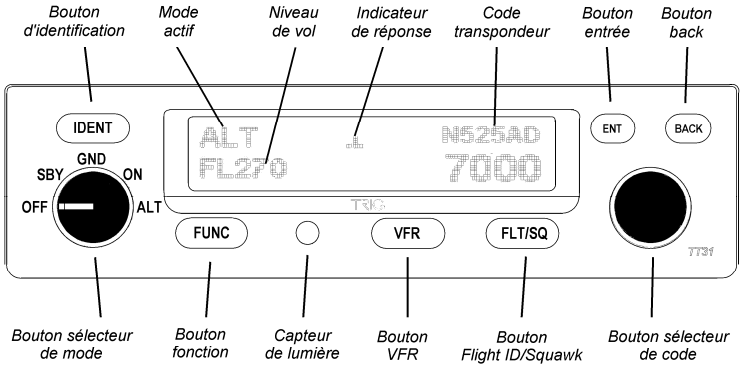
> **Benutzen Sie die Einstellung „Konfiguration“ niemals im Fluge. Setzen Sie sich mit Ihrem Avionik-Betrieb in Verbindung, bevor Sie die Konfiguration verändern.**

Um zur Einstellung „Konfiguration“ zu gelangen, halten Sie die Taste „FUNC“ gedrückt, während Sie das Gerät einschalten. Konfigurationspunkte können durch Drehen des Kodierungsdrehknopfes und durch Drücken der Tasten „ENT“ und „BACK“ verändert werden. Nach Abschluss der Konfiguration schalten Sie den Transponder aus. Sobald er erneut eingeschaltet wird, benutzt er die neue Konfiguration.

Betrieb bei niedriger Temperatur

Der TT31 ist zugelassen für fehlerfreien Betrieb bis zu –20°C, auch wenn bei sehr niedrigen Temperaturen u.U. die Anzeigequalität vermindert ist. Um die normale Benutzung unter kalten Bedingungen sicherzustellen, ist es ggf. erforderlich, eine adäquate Kabinentemperatur zu erzeugen.

Panneau



Affichage

L'écran affiche le mode de fonctionnement du transpondeur, l'altitude-pression mesurée, ainsi que le code transpondeur et le code d'identification de vol en cours. L'indicateur de réponse est actif lorsque le transpondeur répond aux interrogations.

L'altitude-pression s'affiche en niveau de vol, c'est à dire l'altitude-pression en centaines de pieds. Lorsque les conditions atmosphériques ne sont pas standards, cette valeur peut être différente de l'altitude indiquée par l'altimètre, mais son affichage sera correct sur les écrans radar du contrôle de la circulation aérienne.

Bouton Sélecteur de Mode

Le bouton de gauche commande la mise sous tension du transpondeur ainsi que le mode de fonctionnement.

OFF Le transpondeur est hors tension.

SBY Le transpondeur est sous tension mais ne répondra à aucune interrogation.

GND Le transpondeur répondra aux interrogations du sol en Mode S des radars de mouvement à la surface.

ON Le transpondeur répondra à toutes les interrogations, mais sans information d'altitude.

ALT Le transpondeur répondra à toutes les interrogations.

En vol, le transpondeur doit toujours être sur ALT sauf avis contraire du contrôle de la circulation aérienne. Lorsque l'appareil roule au sol, le transpondeur doit être sur GND sauf si l'installation comprend un

contact de train validant la position sol de l'avion; dans ce cas, la sélection de GND est automatique à l'atterrissage.

Boutons Poussoirs

IDENT Appuyer sur IDT lorsque le contrôle de la circulation aérienne demande « Ident » ou « Squawk Ident ». Ceci active l'impulsion spéciale d'identification de position (SPI) dans les réponses du transpondeur pendant 18 secondes. IDENT apparaîtra à l'écran.

FUNC Appuyer sur le bouton FUNC permet d'accéder au temporisateur de vol, au chronomètre, au moniteur d'ADS-B (selon l'installation) et à la fonction de moniteur d'altitude.

VFR Une pression sur le bouton VFR permet d'afficher directement le code pré-programmé. Une seconde pression sur ce bouton restaure le code transpondeur précédent.

FLT/SQ La pression de FLT/SQ alterne l'affichage primaire entre le squawk code et l'identification de vol.

ENT Le bouton ENT permet de valider chaque chiffre dans le sélecteur de code.

BACK Le bouton BACK saute de nouveau au chiffre précédent dans le sélecteur de code.

Bouton Sélecteur

Le bouton de droite permet d'afficher le code transpondeur et le code d'identification de vol. Le bouton FLT/SQ choisit qui sera mis à jour. La rotation du bouton accentuera le premier chiffre sur l'affichage, et le chiffre peut être changé comme exigé. Appuyer sur ENT pour avancer au chiffre suivant. Lorsque le bouton ENT est enfoncé après le dernier chiffre, le nouveau code transpondeur ou le nouveau code d'identification de vol s'affiche en remplacement du précédent. Si le code n'est pas saisi en moins de 7 secondes, les modifications sont ignorées et le code précédent est restauré.

1200	Code VFR aux Etats-Unis
7000	Code VFR couramment utilisé en Europe
7500	Intervention illicite
7600	Panne radio
7700	Code de détresse

Le code d'identification de vol doit correspondre à numéro de vol déclaré dans le plan de vol. S'il n'y a pas de plan de vol, l'immatriculation de l'avion doit être utilisée comme code d'identification de vol. Utiliser uniquement des lettres et des chiffres. Si le code d'identification de vol comporte moins de 8 caractères, saisir un caractère espace pour le terminer.

Temporisateur de Vol

Le temporisateur de vol enregistre le temps l'où le transpondeur a été mis sous tension et actionnant en vol le mode ON ou ALT. Appuyez sur le bouton FUNC pour montrer le temporisateur de vol.

Chronomètre

Le chronomètre peut être employé comme temporisateur commode. Appuyez sur le bouton FUNC pour montrer le chronomètre. En serrant la volonté ENT remettez à zéro et commencez le temporisateur. La pression ENT encore arrêtera le temporisateur.

Moniteur D'Altitude

Le moniteur d'altitude active un annonciateur ou une lumière audio d'annonciateur (selon l'installation) quand l'altitude pression d'avion diffère de l'altitude choisie par plus de 200 pieds. Appuyez sur le bouton FUNC pour montrer le moniteur d'altitude permettent l'écran. Serrant les cabillots ENT l'altitude surveillent à l'altitude courante.

Quand la surveillance d'altitude est en service, un petit indicateur de déviation apparaît à côté de l'affichage d'altitude sur le transpondeur.

Moniteur ADS-B

Le moniteur d'ADS-B est seulement disponible sur les installations qui incluent une source de position d'ADS-B. Le moniteur d'ADS-B fournit un affichage d'information de position qui est transmise dans des rapports de position d'ADS-B. Ceci peut fournir la confirmation que l'information correcte est transmise, en particulier où la source de GPS est éloignée du transpondeur.

Au cas où l'information valide de position ne serait pas fournie par le GPS, l'affichage de latitude et de longitude sera remplacé par des tirets; si aucune latitude et longitude valides n'est montrée alors l'information de position d'ADS-B n'est pas transmise.

Messages d'avertissement

Si le transpondeur détecte un problème, l'écran affichera WARNING ainsi qu'un bref état de la situation. En fonction de la nature du problème, il se peut que le transpondeur ne réponde plus aux

interrogations. Noter le message qui apparaît à l'écran et transmettre l'information au service de maintenance du fournisseur d'avionique. Appuyer sur ENT pour effacer le message; si la panne est toujours présente, le message réapparaîtra.

Annonce de Panne

Si le transpondeur détecte une panne interne grave, un message FAULT apparaît à l'écran avec un bref état de la situation. Le transpondeur ne répond plus aux interrogations lorsqu'une panne est détectée.

Certaines indications de pannes (FAULT) peuvent être rétablies en mettant le transpondeur hors tension puis à nouveau sous tension, bien que dans tous les cas, un message FAULT indique un problème avec le transpondeur ou avec l'installation. Noter le message FAULT en bas de l'écran et transmettre l'information au service de maintenance du fournisseur d'électronique aéronautique**.**

Mode Configuration

Le système est configuré lors de sa première installation par le fournisseur d'avionique. Les éléments de configuration comprennent l'adresse Mode S de l'avion, l'interface avec les autres systèmes de l'avion, la catégorie de l'avion, et les valeurs pré-programmées du code transpondeur VFR. Pour visualiser ou modifier ces réglages, le mode configuration doit être utilisé.

> **Ne pas utiliser le mode configuration en vol. Consulter votre installateur d'avionique avant toute modification de la configuration.**

Pour passer en mode configuration, maintenir le bouton FN enfoncé tout en mettant sous tension du transpondeur. Les éléments de configuration peuvent être modifiés à l'aide du bouton sélecteur de code et les boutons ENT et BACK. Une pression sur FN permet d'avancer jusqu'à l'élément de configuration suivant.

Lorsque la configuration est terminée, mettre le transpondeur hors tension. Lorsqu'il sera de nouveau mis sous tension, le transpondeur utilisera la nouvelle configuration.

Opération à Basses Températures

Le transpondeur est certifié pour fonctionner correctement jusqu'à -20°C, mais à ces températures, l'affichage peut s'en trouver affecté. S'il fait froid, un temps d'attente jusqu'à ce que le cockpit soit réchauffé peut être nécessaire pour garantir un fonctionnement normal.

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DIGITALUHR

(Für alle Baumuster)

1. ALLGEMEINES

Der Quarz-Chronometer ASTRO TECH LC-2 (siehe Abb. 1) ist ein Präzisionszeitmesser in Festkörperbauweise, der dem Piloten die Tageszeit, das Datum und das zwischen einer Reihe von ausgewählten Ereignissen (z.B. Kontrollpunkte während des Fluges oder Streckenabschnitte eines Überlandfluges) verstrichene Zeitintervall anzeigt. Diese drei Betriebsarten laufen unabhängig voneinander ab und können abwechselnd über die 4stellige Flüssigkristall-Anzeigeeinheit auf der Vorderseite des Instrumentes zur Anzeige gebracht werden. Über drei Drucktasten direkt unter dem Anzeigefeld lassen sich alle Zeitmesserbetriebsarten bedienen. Die Einstellung dieser Betriebsarten ist in den Abbildungen 2 und 3 kurz erläutert.

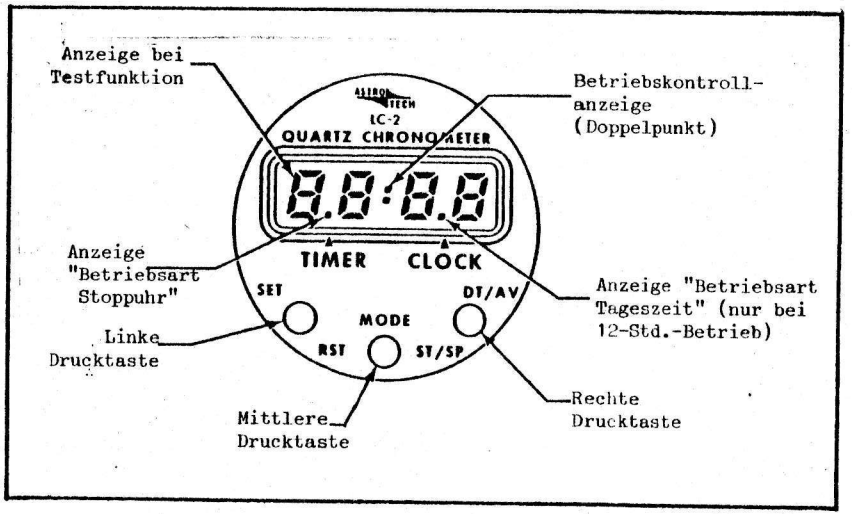


Abb. 1 Digitaluhr

deutliche Anzeige gewährleistet. Die Lichtstärke dieser Hintergrundleuchte wird über die Bedienknöpfe für Kabinenbeleuchtung eingestellt. Ferner weist die Anzeigeeinheit eine Prüffunktion auf (siehe Abb. 1), mit der die einzelnen Leuchtsegmente des Anzeigefeldes auf Funktion geprüft werden können. Zum Einschalten der Prüffunktion sind linke und rechte Drucktaste gleichzeitig zu drücken.

2. BETRIEBSGRENZEN

Die Betriebsgrenzen des Flugzeugs ändern sich bei Einbau der Digitaluhr nicht.

3. NOTVERFAHREN

Die Notverfahren des Flugzeugs ändern sich bei Einbau der Digitaluhr nicht.

4. NORMALE BETRIEBSVERFAHREN

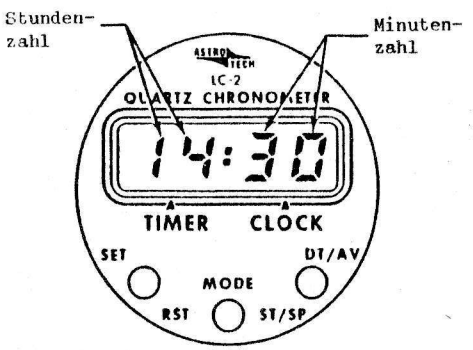
Betriebsart "Tageszeit" und "Datum"

In der Betriebsart Tagezeit (siehe Abb. 2) erscheint im Anzeigefeld die Tageszeit in Stunden und Minuten, während die Betriebskontrollanzeige (Doppelpunkt) im Zehnsekundentakt für jeweils 1 Sekunde erlischt und damit ein einwandfreies Funktionieren anzeigt. Drückt man bei Betriebsart Tageszeit die rechte Drucktaste kurz nieder, so erscheint im Anzeigefeld eine numerische Anzeige des Datums, wobei der Monat des laufenden Jahres links und der Monatstag rechts vom Doppelpunkt aufleuchtet. Die Anzeige kehrt nach ungefähr 1,5 Sekunden automatisch in die Betriebsart Tageszeit zurück. Wird jedoch die rechte Drucktaste länger als ungefähr 2 Sekunden in niedergedrückter Stellung gehalten, so erscheint zwar im Anzeigefeld ebenfalls wieder die Tageszeit; die Betriebskontrollanzeige (Doppelpunkt) ändert sich jedoch, indem sie entweder ununterbrochen leuchtet oder vollkommen erlischt. In diesem Fall ist lediglich die rechte Drucktaste noch-

wieder vorschriftsmäßig im Zehnsekundentakt für 1 Sekunde erlischt.

Anmerkung

Die Betriebsart "Tageszeit" wurde werkseitig auf 24-Std.-Betrieb eingestellt. Diese Einstellung kann in einen 12-Std.-Betrieb abgeändert werden, indem man die Stellung eines Schiebeschalters ändert, der über eine kleine Öffnung unten im Uhrgehäuse zugänglich ist. Es ist zu beachten, daß bei 24-Std.-Betrieb die Anzeige für Betriebsart "Tageszeit" nicht aufleuchtet.



Linke Taste:	Einstellung von Datum und Tageszeit (unter gleichzeitiger Benutzung der rechten Taste)
Mittlere Taste:	Abwechselnd Anzeige von Tageszeit oder Zeitintervall
Rechte Taste:	Kurzzeitige Anzeige des Datums; nach 1,5 s erscheint im Anzeigefeld wieder die Tageszeit.

Abb. 2 Betriebsart "Tageszeit"

Genaue Einstellung von Datum und Tageszeit (siehe Abb. 2)

Die genaue Einstellung von Datum und Tageszeit erfolgt in der Betriebsart Tageszeit, wobei linke und rechte Drucktaste wie folgt zu bedienen sind:

Einstellung des Datums:

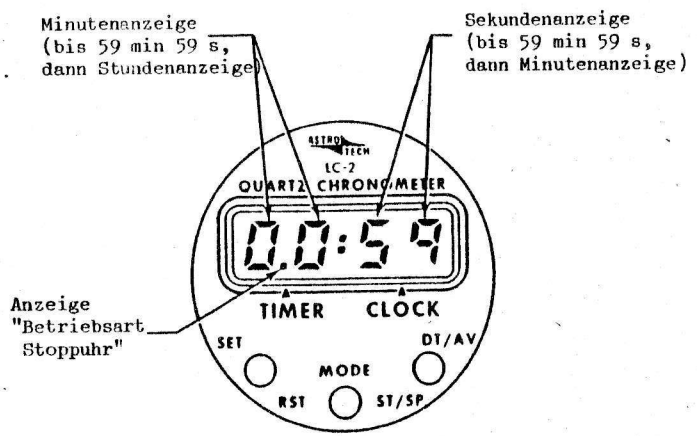
Linke Taste einmal drücken: im Anzeigefeld blinkt der Monat. Rechte Taste drücken: die Monatszahl nimmt um 1 pro Sekunde (Taste niedergedrückt halten) oder um 1 pro Tastendruck zu, bis die gewünschte Monatszahl aufleuchtet. Linke Taste nochmals drücken: im Anzeigefeld blinkt der Monatstag. Gewünschten Monatstag unter Benutzung der rechten Taste wie oben beschrieben einstellen.

vor. Der 29. Februar von Schaltjahren ist jedoch nicht in die Kalenderbetriebsart einprogrammiert, so daß das Datum gleich auf den 1. März springt. Dies kann am darauffolgenden Tag korrigiert werden, indem man die Datumsangabe auf den 1. März zurückstellt.

Einstellung der Tageszeit:

Linke Taste erneut zweimal drücken: im Anzeigefeld blinkt die Stundenzahl. Stundenzahl unter Benutzung der rechten Taste wie oben beschrieben auf die gewünschte Bezugszeit vorrücken lassen. Linke Taste nochmals drücken: im Anzeigefeld blinkt die Minutenzahl. Minutenzahl auf die nächste ganze Minute der Bezugszeit vorrücken lassen und durch nochmalige Drücken der linken Taste Minutenanzeige blockieren. Sobald die Bezugszeit die im Anzeigefeld festgehaltene Zeit erreicht, rechte Taste drücken: die Uhr nimmt ihren normalen Betrieb wieder auf und läuft synchron mit der Bezugszeit ab.

Manchmal kann es u.U. überflüssig sein, die Minutenanzeige der Uhr auf einen neuen Wert einzustellen, z.B. wenn man in andere Zeitzonen einfliegt. In diesem Fall ist die blinkende Minutenzahl nicht zu verstellen, sondern nur die linke Taste nochmals zu drücken, damit die Uhr ohne Änderung der Minutenanzeige ihren normalen Betrieb wieder aufnimmt.



Linke Taste:	Rückstellung der Stoppuhr auf Null
Mittlere Taste:	Abwechselnd Anzeige von Tageszeit oder Zeitintervall
Rechte Taste:	Abwechselnd Start und Stopp der Stoppuhr; das Zeitintervall wird ggf. zu einem schon vorher gemessenen Zeitintervall addiert

Abb. 3 Betriebsart "Stoppuhr"

Betriebsart "Stoppuhr"

Die vollkommen unabhängig arbeitende 24-Std.-Stoppuhr (siehe Abb. 3) wird wie folgt bedient: Mittlere Drucktaste (Betriebsartenwahl) drücken, bis die Punktanzeige für "Betriebsart Stoppuhr" aufleuchtet. Zeitangabe im Anzeigefeld durch Drücken der linken Taste auf Null zurückstellen. Messung des Zeitablaufes eines Ereignisses durch Drücken der rechten Taste starten: die Stoppuhr beginnt in Minuten und Sekunden zu zählen, und der Doppelpunkt (Betriebskontrollanzeige) erlischt im Sekundentakt für jeweils 0,1 Sekunden. Nach Erreichen von 59 Minuten und 59 Sekunden geht

Weight and Balance Graph D-ECFP

1 Crew Total	Weight lbs	C.G. Arm total / 1000	Moment inches
Basic A/C	1908,1	37,8	72,1
Crew (80 kg)	176,0	37,0	6,5
Fuel 163 ltr (1.58) (163 ltr max)	257,5	48,0	12,4
Baggage (54 kg) (54 kg max)	118,8	95,0	11,3
Take Off Weight (2550 lbs max)	2460,4		102,3

One Pilot

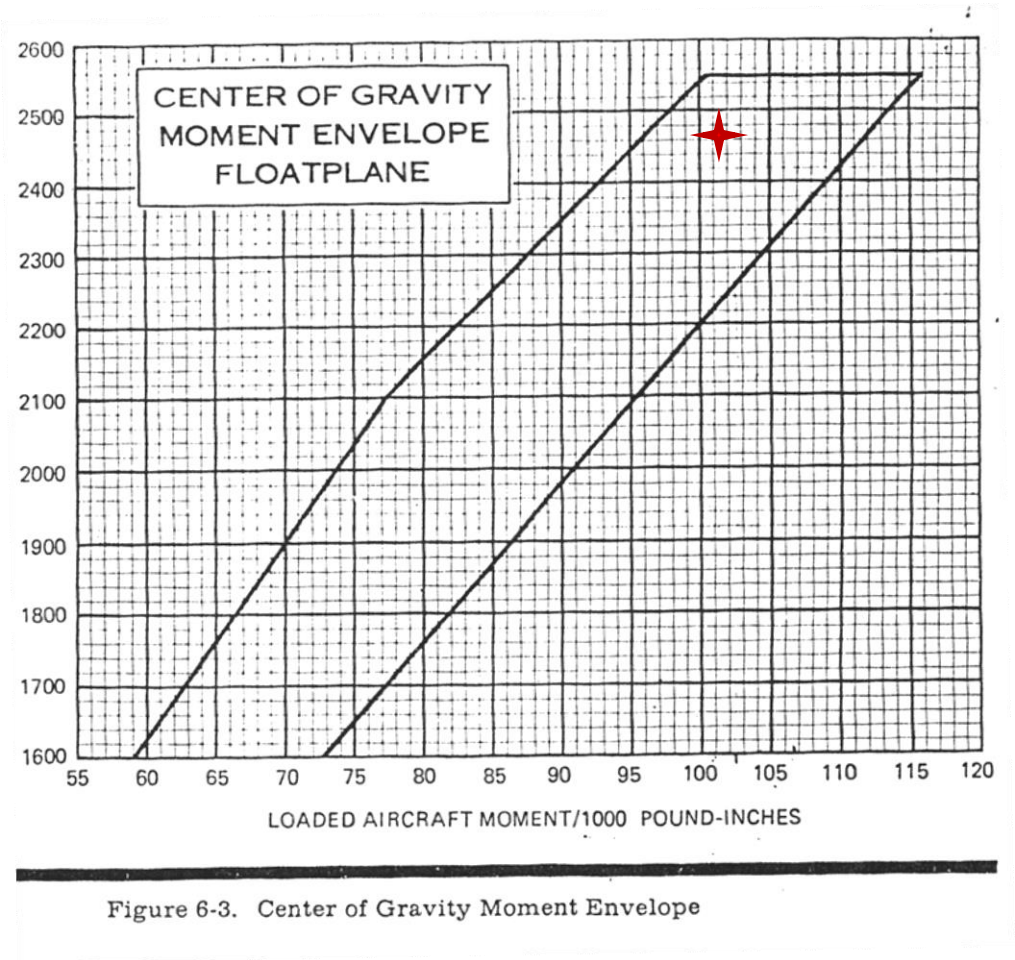


Figure 6-3. Center of Gravity Moment Envelope

1 Crew, 1 Pax Total	Weight lbs	C.G. Arm total / 1000	Moment inches
Basic A/C	1908,1	37,8	72,1
Crew, 1Pax (160 Kg)	352,0	37,0	13,0
Fuel 163 ltr (1,58) 163 ltr max	257,5	48,0	12,4
Baggage (14 kg) Max 54 kg	31,8	95,0	2,9
Take Off Weight max 2550 lbs	2549,4		100,4

One Pilot, one Passenger

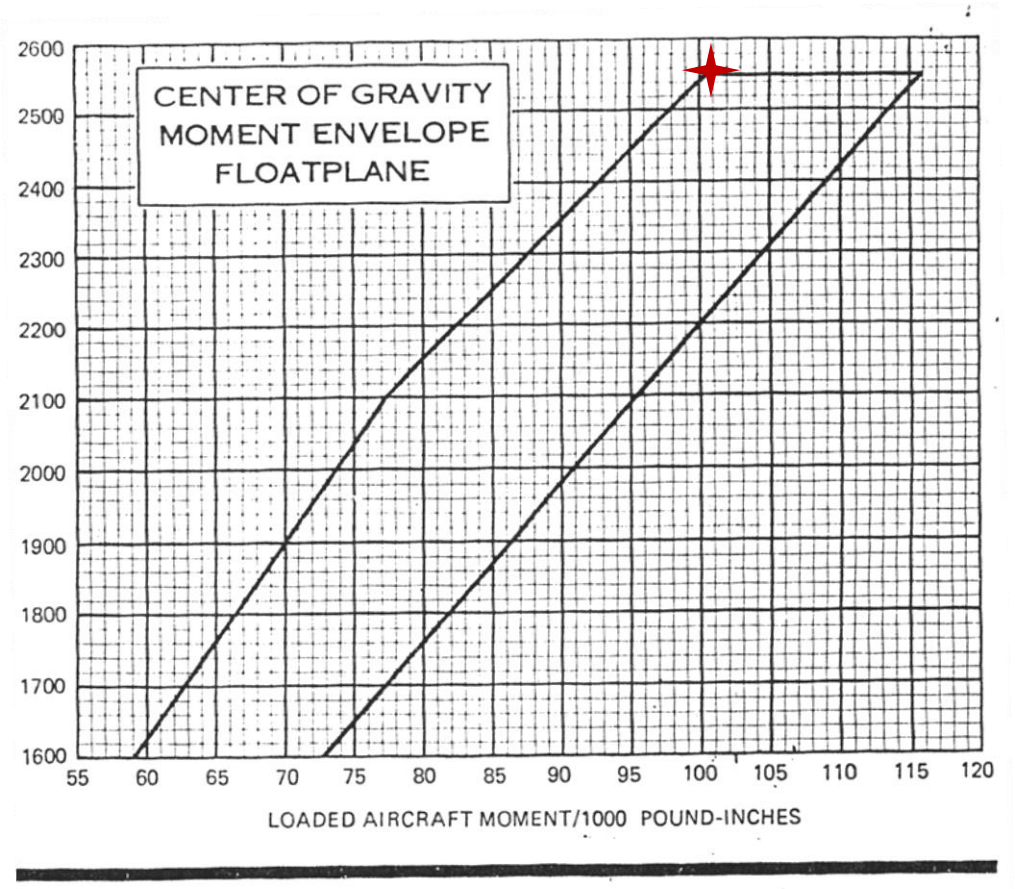


Figure 6-3. Center of Gravity Moment Envelope

1 Crew, 2 Pax Total	Weight lbs	C.G. Arm total / 1000	Moment inches
Basic A/C	1908,1	37,8	72,1
Crew, 1Pax (160 Kg)	352,0	37,0	13,0
1 PX (80kg)	176,0	73,0	12,8
Fuel 72 ltr (1,58) 163 ltr max	113,8	48,0	5,7
Baggage 0 kg Max 54 kg	0,0	95,0	0,0
Take Off Weight max 2550 lbs	2549,9		103,6

One Pilot, two Passengers

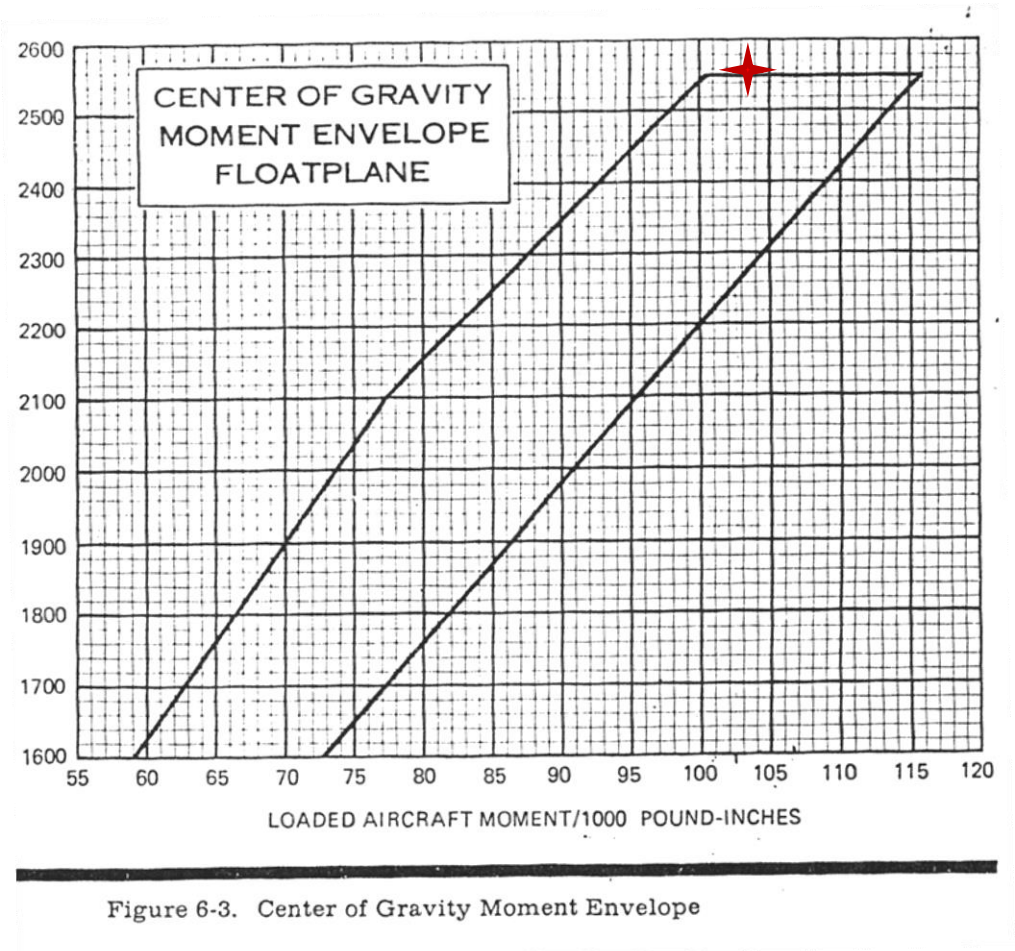


Figure 6-3. Center of Gravity Moment Envelope