

# RMI



ROCKY MOUNTAIN INSTRUMENT

PO Box 683 ! 202 Fremont Street ! Thermopolis, WY 82443 ! 307.864-9300

<http://rkymtn.com> • [info@rkymtn.com](mailto:info@rkymtn.com) • FAX 307.864-2350

March 15, 2005

## ***UPDATE NOTICE!***

### ***μENCODER:***

- **NONVOLATILE MEMORY EXPIRATION DATE:** Units purchased up through serial number 850 contain a nonvolatile memory (NVRAM) that has its own internal backup battery. This battery is rated for a minimum of 10 years by the manufacturer. Our experience is that actual battery life is 2-5 years more than that. The NVRAM maintains the look-up tables and programmable options. The NVRAM we are currently using is based on a newer, battery-less technology that should never need to be replaced. If your unit's age falls into the 10 to 13 year old group, you may want to replace your NVRAM before it decides to die on its own... maybe in a far away place. You would want to schedule the replacement when you will have a few days downtime.

The upgrade kits contain the newer style NVRAM, miscellaneous hardware, current version software, and complete instructions. There is ONE CAVEAT... the old NVRAM is a 24 pin dual-inline integrated circuit that is **SOLDERED** to the PC board. You (or a knowledgeable friend) will need a solder sucker (wick braid not allowed) to remove the old NVRAM without damaging the PC board pads or traces.

If you don't feel you are up to removing the soldered-in parts, we are offering two other options. The most expensive is to return the unit for us to handle the complete upgrade. The other (and the one we prefer because of time constraints) is for you to return the PC board for us to remove the necessary parts, enclose the upgrade kit, and return everything to you for completion. The reason for the high labor cost for us to do the entire job is not only to remove and replace the parts, but recording the current programming options, reentering those options and the lookup tables and recalibrating the airspeed and altitude. These are steps that you can handle, as you did when you built the unit.

You can verify the age of your NVRAM by removing the cover of the unit and looking at the date printed on the NVRAM. It is a black rectangle shape, U27, marked with "DALLAS DS1220 NONVOLATILE SRAM". The first two digits of the lower-left number is the year the IC was manufactured.

Check the upgrade options and prices at the bottom of this section.

- **SOFTWARE UPGRADES** - Following is an abbreviated list of changes made in software since January >93:

Version 8.00, 8.01, 8.02 changes

1. Pressing in on the SET knob while adjusting the altimeter setting changes the tenths digit for faster altimeter setting. Let up on the knob to change the hundredths digit.
2. New method of entering hold mode added. If already level, instead of going through the enter Alert Altitude procedure, just hold up on the ALRT switch until the timeout expires and the display reverts to indicated altitude. When the switch is released, the unit will automatically enter an Alert Altitude based on current indicated altitude rounded to the nearest 100 feet and then automatically enter hold mode.
3. True altitude added. View true altitude the same as true airspeed and true air temperature by holding down the TAS switch. True altitude will appear in the normal altitude position. **Alt/GndSn** menu item added to enter the elevation and temperature of the ground station that determined your current altimeter setting.
9. **SER/OUTPt/CUSt** menu item added to allow custom serial output formats.
10. Serial port input added. **SER/InPUt/rOFF** turns off serial reception.
11. Compass heading can now be displayed in place of the digital VSI. An external sensor must be added to the serial input port for the feature to work. **SER/InPUt/Hdg** turns on serial reception from the external sensor. The three digit compass heading is inserted into the **Std** serial output stream. Menu item **OPt/Hdg/YES** selects display of the compass heading instead of the VSI digits. The VSI bargraph functions in normal mode.
12. Input/output serial port baud rates changed. **SER/bAUD** menu now has 300, 600, 1200, 2400, 4100 and 8200 baud. (Changed again in version 10.0)
14. **Srv/SrLn** menu item added to view/change your unit's serial number.
15. Mach and true airspeed calculation accuracy increased.
16. TAS display was totally blank when airspeed was zero... bug fixed.
17. Accuracy increased on mach number and TAS.
19. Added Northstar serial format output.
21. Mile per hour option added for airspeeds.

#### Version 8.03 changes

1. Added serial format (abbreviated) for Trimble series 2000 equipment.

#### Version 10.00, 10.01, 10.02 and 10.03 changes

NOTE: The 7.86432MHZ crystal used in previous versions must be replaced with a 7.3728 crystal. This hardware change enables the serial output to operate at standard baud rates for new GPS systems.

1. Hardware change crystal frequency to 7.3728MHZ. Serial port baud rates available now are: 1200, 2400, 4800, 9600 and 19200.
2. Add audio and/or visual alarm for 18,000 feet passage. When ascending, altimeter setting is automatically changed to 29.92 and warning issued in case other altimeter need adjusting. When descending through 18,000 feet, an audio and/or visual warning reminds the pilot to enter the new altimeter setting. A new menu item **AUD/FLCHG** added to allow selection of visual only or visual/audio warning on 18,000 passage.
4. Bendix/King KLN90, KLN90A and KLN90B airdata formats added to possible serial output formats. New menu items **SER/GPSty/bEndA** and **SER/GPSty/bEndB** added.
5. Shadin airdata format added to possible serial output formats. This format feeds airdata information (airspeeds, altitudes, temperatures etc.) to many of the newer GPS navigation units. A new menu item **SER/GPSty/Shd** added to select the standard Shadin format.
6. A new menu item **OPt/GPSAt** added with a **P** (pressure) or **I** (indicated) option to allow the option to send normal pressure altitude or indicated altitude in all GPS systems serial formats. Normal serial format outputs pressure altitude and requires the pilot to enter the current altimeter setting into the GPS system that is receiving air data information from the unit. With the **I** option, the GPS altimeter setting can be set and left at 29.92 InHg (1013 mb).
7. A new menu item **OPt/HdGb** added to allow compass heading to be viewed in the altimeter setting portion of the display when the DALT switch is pressed. The **OPt/HdG** menu item to view heading in VSI is changed to **OPt/HdGv** to help distinguish between the two.
8. Extended altimeter setting range from 28.00-31.00 InHg to 27.50-31.50 InHg.

#### Version 11.00 changes

NOTE: The LCD used in previous versions must be replaced with a new version that has the ability to display degrees Fahrenheit.

1. **OPt/TEMP** menu item added to select option of viewing temperatures in degrees centigrade or degrees fahrenheit.
2. **OPt/HdGv** menu item changed to **OPt/HdGvP** to signify that selection will permanently show compass heading in the digital portion of the VSI. The new LCD has a descriptor HDG on the display when heading is being shown.
3. **OPt/HdGb** menu item changed to **OPt/HdGvt** to signify that selection will temporarily show compass heading in the digital portion of the VSI.

#### Version 11.10 changes

1. Change automatic barometer changeover altitude from 18000 feet to a user entered altitude. Some overseas countries use a different altitude for changeover.
2. Fix bug in standard and manufacture serial output formats. When VSI was zero, bad checksum was being output.
3. Change **SER/InPUt/C100** to **SER/InPUt/C-HdG** for new RMI compass module.
4. Change compass heading input code to read new RMI compass module.
5. Add new **SER/OUTPt/TrFLt** serial output format for the Trimble TrimFlight (TAS and Heading only)
6. Add new **SER/OUTPt/SHAdS** serial output format.

7. Change **SEr/OUtPt/SHAd** to **SEr/OUtPt/SHAdZ** to differentiate between AS≡ and AZ≡ format.
8. Add code to support new Simtek NVRAM integrated circuit.

Version 11.20 changes (visible to user)

1. Added new serial format **Ser/GPSty/trAnS** for serial transponders.

**NOTE:** At this point, we also created a 10.20 version that contains all the identical functions of the 11.20 version, except that again, the 10.20 version only works with the earlier LCD displays that do not have degrees Fahrenheit. This 10.20 version is the final version that will work with that display. To add functions detailed below or for later versions will require an upgrade to include the newer LCD display.

Version 11.21 changes (visible to user)

1. Corrected bug in calculation of degrees F of true air temperature.

Version 11.30 changes (visible to user)

1. Added smoothing function to compass heading to reduce compass heading jitter when the Model 303 compass module is attached.
2. Added new Mach limit warning for high-speed aircraft **IAS/MACHL**.

Version 12.00 changes

1. This software is to support a hardware change from the electroluminescent (EL) backlight to a fiber-optic backlight system. It is not applicable to any earlier units without changing the display driver PC board.



ROCKY MOUNTAIN INSTRUMENT

PO Box 683 ! 202 Fremont Street ! Thermopolis, WY 82443 ! 307.864-9300

http://rkymtn.com ! info@rkymtn.com ! FAX 307.864-9264

## ***μENCODER UPGRADE ORDER FORM***

### ***CUSTOMER . . . .***

Name \_\_\_\_\_ Credit Card # \_\_\_\_\_

Business \_\_\_\_\_ Expiration Date \_\_\_\_\_

Security Code \_\_\_\_\_

Signature \_\_\_\_\_

Street \_\_\_\_\_ City \_\_\_\_\_ ST \_\_\_\_\_ Zip \_\_\_\_\_

Phone (\_\_\_\_) \_\_\_\_\_

E-mail \_\_\_\_\_

All prices include domestic shipping. Circle desired item.

### **Upgrade to version 10.20 software from earlier versions**

Kit without new NVRAM ----- \$ 50.00

Above including factory installation ----- \$ 90.00

Kit with new NVRAM ----- \$ 80.00

Above including RMI removal of old soldered-in parts ----- \$110.00

Above including factory installation ----- \$190.00

### **Upgrade to version 11.30 from 10.20 or earlier versions**

Kit without new NVRAM ----- \$ 90.00

Above including factory installation ----- \$170.00

Kit with new NVRAM ----- \$120.00

Above including RMI removal of old soldered-in parts ----- \$150.00

Above including full factory installation----- \$260.00

### **Upgrade to version 11.30 from 11.00 or later versions**

Kit without new NVRAM ----- \$ 50.00

Above including full factory installation----- \$ 90.00

Kit with new NVRAM (not necessary if your serial number is 851 or larger) - \$ 80.00

Above including RMI removal of old soldered-in parts ----- \$ 110.00

Above including full factory installation----- \$190.00

**When returning the PC boards for parts removal, follow the instructions on the next page.**

RECAP: There are three MAIN reasons for upgrading; 1) to replace the old NVRAM, 2) to add degrees Fahrenheit to the display, and 3) additional software features such as serial formats for GPS systems etc. NVRAM replacement would be desirable for units over 10 years old. Then, the choice of whether to upgrade to version 10.20 or 11.30 will depend on whether you want degrees Fahrenheit, or software features added after version 11.20. If neither is important, the least expensive upgrade is to version 10.20, as the display does not need to be replaced.

## **Instructions for return of PC boards for removal of soldered-in NVRAM and related parts.**

1. Before removal of the microEncoder from the aircraft, you should record all your programming options. These, along with the lookup tables for the unit's airspeed and altitude sensors will be lost when changing the NVRAM. **Use the programming checklist on the next two pages** to record your current settings. There will probably be more entries on the checklist than options/settings that exist in your unit. These are features/options that have been added in later versions. You can also plan ahead for what options/settings you would want in the unit when the upgrade is completed.
2. Remove the unit from the aircraft.
3. Remove the cover after removing the four screws at the rear of the unit.
4. Unplug the multi-colored ribbon cable and the two twisted pair plugs from their sockets. These connect the display assembly to the main PC board. Remove the four screws on the side of the chassis that hold the front faceplate assembly. Be sure to note that these screws are a special, short length, and should not be substituted with other length screws when you reassemble the unit. Pull the faceplate assembly forward to remove it from the main assembly.
5. You will remove most of the fasteners connecting the PC boards to the main chassis, leaving a few to hold things in place for shipping... with the boards still in the chassis. Remove the four hex-head jackscrews and locknuts at the rear of the unit. Remove all but the center two screws from the PC board containing the two sensors with the tubing attached. Remove the two large brass nuts and washers that anchor the tubing bulkhead fittings to the chassis. You do not need to pull the bulkhead fitting out of their holes. All we have left to finish the job is the three screws on the main PC board and the two screws on the A/D board.
6. Wrap the remaining assembly in bubble wrap or other protective packing to send to us.
7. We will remove the parts to be replaced, and return the unit with the upgrade kit. The upgrade kit will contain all the parts and instructions to finish the upgrade.
8. In case you have misplaced the lookup tables that have to be reentered into the unit, we will include copies of those tables when returning the unit.

## **microEncoder Programming Checklist**

This checklist serves to help select and record your programming option choices and aircraft performance values. The list is in the same order as it appears while the  $\mu$ ENCODER is in the programming mode. Refer to the *Menu Map* section in the programming manual and details following it for complete information on each entry.

OPt/brSEt	InHg Mb	altimeter setting units
OPt/AStyP	KTS MIAS	airspeeds in knots or mph
OPt/ASdIS	IAS TAS TAS&TAT M	airspeed normally indicate
OPt/ALtFt	1 10	altitude display increments
OPt/APPFt	1 10	approach altitude display increments
OPt/TOSEC	_____ 2 to 10	timeout delay in seconds
OPt/rCFt	_____ 1000 to 6000	VSI bargraph maximum FPM
OPt/rCSEn	_____ 0 to 2	VSI bargraph sensitivity
OPt/rCSEC	_____ 3 to 10	VSI display damping action in secs
OPt/AStIS	_____ 1 to 10	airspeed trend indicator sensitivity
OPt/HdGvP	YES NO	compass heading in place of VSI digits permanently
OPt/HdGvt	YES NO	compass heading in place of VSI digits temporarily
OPt/GPSAt	P I	pressure or indicated altitude in air data output
OPt/tEMP	EC EF	temperatures in degrees centigrade or Fahrenheit
AUd/APP	YES NO	approach mode audio alarm
AUd/ALErt	YES NO	converge/hold mode audio alarm
AUd/StALL	YES NO	stall range audio alarm
AUd/yEL	YES NO	Vno warning audio alarm
AUd/rEd	YES NO	Vne warning audio alarm
AUd/FLCHG	YES NO	flight level change (default 18000ft) warning audio alarm
AUd/APSEC	_____ 1 to 10	approach mode audio alarm duration in secs
ALt/GndSn	Variable	ground station altitude/temperature
ALt/CONvG	_____	converge warning distance
ALt/HOLd	_____	hold alarm distance
ALt/APP	_____	approach alarm distance
Alt/FLCHG	_____	altitude to flight level changeover
IAS/rEd	_____	Vne speed (red line)
IAS/yEL	_____	Vno speed (btm. of yellow arc, top of green arc)
IAS/GEAr	_____	safe gear extension speed
IAS/FLAP	_____	safe flap extension speed (top of white arc)
IAS/StLHI	_____	upper stall range speed (bottom of green arc)
IAS/StLLO	_____	lower stall range speed (bottom of white arc)
IAS/GEArA	_____	external gear warning trigger speed
IAS/MACHL	_____	Mach limit speed in form .xxx

CAL/IAS	Completed, date _____	calibrate indicated airspeed
CAL/Alt	Completed, date _____	calibrate altimeter
CAL/Oat	Completed, date _____	calibrate outside air temperature
CAL/ECdr	Completed, date _____	encoder correspondence

tbL Tables menu not used after initial manufacture

SEr/OUtPt	OFF Std MFr	serial port (airdata) transmission format
	GPS CUSr	
SEr/InPUt	OFF C-HdG	serial port receive mode
SEr/bAUd	1200 2400 4800	serial port baud rate
	9600 19200	

SEr/CUSrL	YES NO	00 - indicated altitude
	YES NO	01 - pressure altitude
	YES NO	02 - density altitude
	YES NO	03 - true altitude
	YES NO	04 - alert altitude currently set
	YES NO	05 - indicated airspeed in knots or MPH
	YES NO	06 - true airspeed in knots or MPH
	YES NO	07 - indicated airspeed in Mach
	YES NO	08 - VSI in 10's of FPM
	YES NO	09 - outside air temperature
	YES NO	10 - true air temperature
	YES NO	11 - altimeter setting
	YES NO	12 - altitude being presented to the transponder
	YES NO	13 - compass heading from KVH sensor
	YES NO	14 - indicator flags
	YES NO	15 - include GPS/Loran C

SEr/GPSty	MOrrO nOStr trMbL	GPS/Loran C air data output format
	bEndA bEndB SHadZ	
	ShasS trFLt don't care	

Srv/SHO1	Not settable	active demo mode
Srv/SHO2	Not settable	static demo mode
Srv/SHO3	Not settable	mfr. demo mode
Srv/ECdr1	Maintenance routine	encoder test
Srv/ECdr2	Maintenance routine	encoder test
Srv/bArO	Not implemented	
Srv/SrLn	_____	serial number
Srv/vEr	Not settable	software version
Srv/COrr	Not settable	encoder correspondence
Srv/dSPLy	Not settable	display test
Srv/GtEST	Maintenance routine	external gear warning test
Srv/bEEP	Maintenance routine	audiotest