

TEST PROCEDURE
04-1059-00
KDR - 510 RAMP TESTER

S/N: _____
Tested By: _____
Date: _____
Mod Status: _____

PURPOSE

This procedure provides an orderly sequence of steps to completely test the KDR-510 Ramp Tester P/N 01-1059-00.

EQUIPMENT

DVM	Fluke 73 (or equiv.)
Freq counter	Any capable of +/- 0.1 PPM at VHF
Vector Signal Analyzer (VSA)	Agilent 89440A or equiv w/AYA option
Power supply	(Any) provides +12Vdc @ 200mA
Personal Computer (PC)	Any standard pc compatable w/hyper terminal
KDR 510 and KMD 540 w/KAC 503 interface card (also needs +12Vdc)	

GENERAL COMMENTS

The final alignment and test procedure consists of the following steps:

- Load the flash memory
- Adjust the VCO tuning and check frequency accuracy
- Adjust the carrier suppression
- Check the error vector magnitude (EVM) performance with the “Rotating Vector Test”
- Check operation with a KDR 510 data receiver and KMD 540 display
- The acceptability of the unit is determined by satisfactory performance for all of the tests

ACRONYMS AND ABBREVIATIONS

FIS-B	Flight information services – broadcast
PC	Conventional IBM compatible with Windows 95 or better
RT	Ramp Tester
VSA	Vector Signal Analyzer

SETUP

Connect the RF output jack on the RT to a spectrum analyzer and a frequency counter. Connect an external DC power supply to the RT (10-30Vdc, 0.2 A max). Connect a standard RS-232 (DB-9 female to DB-9 female, straight through wiring) cable between the COM1 serial port on a PC and the serial port on the RT.

LOAD FLASH MEMORY

Select the HyperTerminal program and configure it as follows:

Com port:	COM1
Baud rate:	4800
Serial Bit Definition:	1 Start, 8 data, no parity, 1 Stop
Flow control:	Hardware
Click: File, then Properties, then Settings	
Backspace	Sends “^H”
Emulation:	Autodetect
TelNet Terminal ID:	ANSI
Back scroll Buffer Lines:	500
Input Translation:	Shift JIS
ASCII Setup:	ASCII Sending: [check] Echo typed characters ASCII Receiving: [check] Wrap lines

Cycle power on the RT, click “Send Text File” and select the desired FIS-B download text file. You should see a stream of ASCII characters stream across the screen. The last characters will be a series of 4 Fs, i.e. ‘.....FF FF’
The Flash memory is now loaded and alignment and testing can proceed.

PROCEDURE

1. Turn on the RT and select 136.45 MHz. Monitor TP-21 voltage with a DC voltmeter and adjust C70 for a TP-21 voltage of 2.2Vdc +/- 0.2 Vdc. Select 136.475 MHz and check that TP-21 voltage is less than 4 Vdc.

_____ 2.2Vdc
_____ < 4Vdc

2. Turn on the RT and select 136.45 MHz. With the VSA on, set the VSA to the ‘Scalar’ mode and set the center frequency to 136.45 MHz. Span can be set to 100 KHz and the RF Ref level set to -30 dBm. Ground pin 3 of J5 (J5-3). The RF output should be about -39 dBm and the RF frequency should be within 200 Hz of the selected RF frequency. Record the data. Remove the ground from J5-3. The RF output should drop more than 20 dB. Alternately adjust R36 and R42 for a minimum RF level on the VSA. The level should be at least 35 dB less than the RF

output recorded in the previous step. Record the level and calculate the actual difference. This difference is the carrier suppression.

- _____ -39dBm +0 / -5
- _____ +/- 200 Hz
- _____ >20 dB drop
- _____ 35dB less (min) than previous step
- _____ carrier suppression dB

NOTE: Each time J5-3 is grounded, the output IQ state rotates one state. One of these states is the 'OFF' state. If the RF output level is very low when J5-3 is grounded, you may have selected the 'OFF' state. If so, then remove and then restore the short to J5-3.

Also note that if the RF output level is > -39dBm then use as many of the T-SELECT resistors as needed in the output pad section in order to set the level to no more than -39dBm power output.

3. Set up the rotating vector test by setting the VSA to display the 'Vector Constellation'

Instrument mode

Digital Demodulation

Demodulation Setup

Demod Format	8PSK
Symbol rate	10,500 symbols per second
Result Length	32 symbols
Measurement Filter	Off
Reference Filter	Raised Cosine
Alpha/BT	0.6

Display A

Measurement Data

IQ Measured	Time
IQ Reference	Time

Data Format

Polar (IQ)	Vector	
More Format	Ideal State	Circle

State Size

15%

Display B

Measurement Date Symbol Table

Turn on the RT and select 136.45 MHz. Set the VSA frequency to 136.45MHz. Ground pin 4 of J5. This initiates a 'Rotating Vector' test mode. This test mode generates a continuously rotating D8PSK signal. Each of the 8 phases is transmitted at a 10,500 symbols per second rate. Each output state is separated by exactly 45 degrees. This test mode will persist until the ground is removed from J5-4. Carefully observe the constellation. Each symbol point should fall close to

the ideal position. Note and record the data as indicated. Remove the short from J5-4. Unplug the external power supply.

EVM (< 10% rms)
 Mag Err (< 5% rms)
 Phase Err (< 5 degrees)
 Freq Err 136.45 Freq Err 136.475
 IQ Offset (> -25 dB)
 XMIT lamp (lights when transmitting)

4. Low battery test. Connect a variable dc power supply (0 to 10Vdc) to the battery terminals. Set the power supply to 6Vdc and turn it on. Press 'Message 1' button. The 'XMIT' indicator should light for about 1 second. Slowly decrease the power supply voltage until the 'LOW BATT' light comes on. Record the power supply output voltage at this point. Turn off and remove the dc power supply.

LO BATT threshold < 4.8Vdc

5. If all the previous tests have been satisfactorily passed, then seal the adjustable components with glyptol or torque seal. Install fresh batteries and reassemble the unit. The final test will be with a KDR 510 and KMD 540/KAC 503 combination. The 510/540 should be wired up as indicated in the KMD 540 installation manual. Use either a 12 or 24 Vdc power supply (2A current capability). Connect the RT RF output to the KDR 510 RF input through a 50 dB pad. Set the RT test frequency. Turn on the KDR 510 and KMD 540 and set the frequency to one of the RT test frequencies. Push the 'MESSAGE 1' button. The APDU count (on the FISB data page) should advance and the 'XMIT' light on the RT should light up for about 1 second each time the button is pushed. Push the 'WX' button on the KMD 540. The KMD 540 screen icon should indicate that METARS are now available. Each time the 'MESSAGE 1' button on the RT is pushed 'lightning bolts' should appear next to the tower in the 'tower' icon on the screen. Select the METAR view page and check a few of the METAR messages (a complete list of the messages is included in the KDR 510 Installation Manual). Testing is now complete.

Lightning bolts appear next to tower