#### A Portable Downlink for LRIT/HRIT Reception in the Field

January 10, 2018

Michael Guberek Reuben Guberek



# **XRIT System Characteristics**

- Receive/Process LRIT (GOES13,14,15 & COMS)
- Receive/Process LRIT (GOES16)
- Receive/Process EUMETCAST
- Weight under 40 kg.
- Assembly under 20 minutes, no tools



### MARK XRIT Transportable MetSat System – Hardware

- Deployable 1.0m Parabolic Reflector
- Field Tripod
- L-Band Feed/Downconverter
- Ku-Band Feed/Downconverter
- Coax IF Signal Cable
- XRIT Receiver/Demodulator and SKU
- DVB-S2 Receiver and EKU
- Laptop Computer / AC Adaptor
- Pelican Air 1615 Carry cases (2)



### MARK XRIT Transportable MetSat System – Software

- Geostationary Satellite Locator
- XRIT Ingest (GOES, MTSAT, COMS-1, ELEKTRO-L)
- iDAP Interactive Image Processing
- Macro PRO Automation Toolset



#### Tactical GEO LRIT/HRIT System 20min setup – no tools





SIDE VIEW shown at 20 degrees above horizon



FRONT VIEW SHOWN AT ZENITH

### Tactical GEO Antenna Unpack (3 mins)







 Deploy the three folded legs of the tripod.





- Remove protective cover from each of three leveling pads.
- Thread part-way each of three leveling pads into the tripod legs.
- Attach the three knobs to top of leveling pads, tighten the captive bolts on each.





 Set assembled tripod on ground, orienting the SOUTH decal on the labeled leg to GEOGRAPHIC South.





### Tactical GEO Antenna Install 12 Reflector sections (6 min)





### Tactical GEO Antenna Install 12 Reflector sections (6 min)

- Assemble the parabolic reflector by joining 12 segments.
- All segments are identical & may be assembled in any order.
- Finger tighten all captive bolts on the back of the segments.



### Tactical GEO Antenna Install Reflector sections (6 min)

- Attach the assembled dish to the azimuth/elevation positioner head.
- Make sure the guide pins in the positioner engage the assembled dish.
- Complete the attachment using the center bolt.





### Tactical GEO Antenna Install Reflector sections (6 min)

- Adjust dish elevation observing the decal indication.
- Lightly tighten the azimuth/elevation levers.





### Tactical GEO Antenna Install feedarms (3 mins)

- Attach the three feedarms to Integrated Feed/Downconverter.
- Finger tighten both captive bolts on each feedarm.
- Attach the combined feed/feedarms to the edge of the dish using two captive bolts on each feedarm.



### **Tactical GEO Antenna**



•Secure the dish with sandbags, stakes, paracord, etc.

•Do not obstruct the parabolic reflector!



### **Orienting Tactical GEO Antenna**

- Set dish ELEVATION using 0-90° decal.
- Set dish AZIMUTH using 0-360° decal.
- Set the feed SKEW using H-V decal.



# XRIT Receiving Station Assembly LAPTOP



# **XRIT Receiving Station Assembly**

- Deploy Laptop on working surface
- Attach power adaptor to rear right of laptop and connect to AC plug (100–240 VAC 50–60 Hz)







# XRIT Receiving Station Assembly RECEIVER



### XRIT Receiving Station Assembly Deploy Receiver on working surface

- Attach power adaptor to rear right of receiver and connect to AC plug (100-240 VAC 50-60 Hz)
- Connect receiver using USB cable to BOTTOM USB port on left of laptop.







### XRIT Receiving Station Assembly Deploy Station Key Unit (SKU) on working surface

- Attach power cord and connect to AC plug (100-240 VAC 50-60 Hz)
- Connect SKU using USB cable to TOP USB port on left of laptop.





### **XRIT Receiving Station Assembly**

- Power on the laptop.
- Observe the LNB Power
  LED
  indicator.
- Observe the received signal level LED indicators





### Tactical GEO Antenna (5 min) Connect Cables

- Attach the N-type connector on the coax cable to the mating connector on the feed.
  (Optional: wrap self-adhesive tape around the connection for lengthy deployment.)
- Attach the coax cable to the lower feedarm using velcro straps. Allow for some slack.
- Play out coax cable from antenna to the receiving station.
- Attach BNC connector to the back of XRIT receiver.



### **XRIT Receiving Station Assembly**

- Maximize received signal by using AZIMUTH control.
- If necessary, make fine adjustments to ELEVATION and FEED SKEW.

0	USB LR	IT Receiver					
	LNB SIGNAL POWER LOCK	SIGNAL LEVEL	USB READY I	SERIAL RX TX	BUFFER E • ½ • F	FRAME SYNC DETECTION	



### **XRIT Receiving Station Assembly**

Observe receiver indicating data transfer to the laptop.





### Software

- Geostationary Antenna Locator
- XRIT Ingest
- Polar Ingest
- iDap
- MacroPro



# Geo LRIT/HRIT Operations

Your station details	
Latitude:	32.85 degrees North + of equator
Longitude:	117.15 degrees West + of Greenwich meridian
Magnetic variation (optional):	degrees East = of your station
Satellite to locate	
Satellite:	GOES West
Longitude:	135 degrees West C of Greenwich meridian
	Locate satellite
Calculated dish setting	IS
Azimuth:	210.7 degrees from true North
Elevation:	47.2 degrees from horizontal
Feed polarisation:	Vertical
Feed skew:	25.4 degrees
	Correct azimuth for magnetic variation
	Correct elevation for atmospheric refraction

### MARK X – XRIT Launch XRIT Ingest Application

Start Stop Pause Resume Ingesting   Image: Start ingesting automatically when software is opened Image: Start ingesting automatically when software is opened Image: Start ingesting automatically when software is opened   Reception File acquisition Decryption and decompression Output   Image: Image: Start ingest data Image: Start ingest data Image: Start ingest data   Receiver type: USB LRIT Receiver • 137 model Image: Start ingest data	Reception Decryption and decompression   Processing data Processing packet   APID Packets   0 1627   1 1627   2 1627   3 1627   4 1627   5 1627   6 1627
Control port: Dartcom LRIT Receiver (COM6)	Awaiting next file      Latest data:         GOES-10         GOES-10         GOES-10 product
telp About Diagnostics About	

### MARK X – XRIT Ingest Software

GLOBAL LG

 Observe data reception quality on XRIT ingest window. Symbol will show up as either green for good reception or red for poor reception.

		F	Eception Processing packet	Decryption and decompress	
I with a sparse	watermane any interest and the second	A A	File type Count	Result	
(Density law			DCS data 1644 EMWIN data 52050	Not encrypted 55 Not compressed 55	
Heception   File a	cquisition   Decryption and decompress	sion   Output	1627 Image data 1406	Not archived 52 Archived 3	
✓ Ingest data			4 1627 5 1627	Archive error	
Receiver type:	USB LRIT Receiver - 137 model	•	6 1627	1	
Control port:	Dartcom LRIT Receiver (COM6)	•	Output Awaiting next file		
Signal display:	Y				
Frequency	1691.0000 - MHz		Latest data:	Jac La	
			GOES-10 Image data		
Downconverter:	Quorum	•	G0ES-10 product IB full disk (5/5)	1 miles	
Innert desiner	USP L DIT Passive		- IR north (5/5)		
ingest device.	1056 Entri Necewer		- IR US (4/5)	AT STATE	
			e- GUES-12		
			B G0ES-12 product B full disk (5/5)	Front	
			- IR north (2/5)	1 1 2 1 C 2	
			Service: LRIT, GOES-12		
			Product: IR full disk Date: Fri, Dec 16, 2005		
			Time: 11:45:13 (GMT) Segments: 5 of 5 (1-5)	Lat 14.65*S. Lon: (	
	A	pply settings			

### LRIT/HRIT Receiver/Demodulator

If necessary, adjust receiver attenuation on back of receiver with tuning screwdriver.





### Interactive Image Manipulation



# LRIT Software

- Handling of all LRIT data from EUMETCast, MSG, GOES and MTSAT.
- Fully automatic ingest and output, with no user intervention required after configuration.
- Multi-threaded, layered architecture allowing simultaneous ingest from different services.
- Designed to meet CGMS and EUMETSAT specifications for implementation and timeliness.
- Rolling archiving of raw and decrypted data up to 7 days and decompressed data up to 366 days.
- Automatic preview creation, with vector map overlays and geographical position read-outs on image previews.





# LRIT Software

- Output of image data as single plane or multiplane iDAP images (navigated and calibrated where possible for albedo or temperature, and with vector map overlays) and as 8-bit or 16-bit PGM files, with area selection, sub-sampling and archiving for up to 366 days.
- Output of text data (such as service messages) via e-mail (access to SMTP server required).
- Activity logging, on-screen alarms and e-mail alarms (access to SMTP server required), plus monitoring of disk space and data stream.





# Training

3

