



National Centre for Radio Astrophysics

Internal Technical Report

On

Integration of legacy Online Sentinel system Parameters with new TGC system

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Abbreviations:

<i>TGC</i>	<i>Tango based GMRT Control and Monitoring system</i>
<i>TANGO</i>	<i>Taco based Next Generation Objects</i>
<i>LMC</i>	<i>Local Monitoring and Control</i>
<i>MCM</i>	<i>Monitoring and Control Module</i>
<i>GMRT</i>	<i>Giant Metrewave Radio Telescope</i>
<i>ANTCOM</i>	<i>Antenna Base Computer</i>

Figures:

<i>Fig 2.1</i>	<i>Sentinel system sensors</i>
<i>Fig 3.1 -A</i>	<i>ANTCOM PIU back side image</i>
<i>Fig 3.1 -B</i>	<i>OFCSNT Rabbit card back side image</i>
<i>Fig 3.2</i>	<i>New Monitoring cable</i>
<i>Fig 3.3</i>	<i>Raw value and voltages on Rabbit web page</i>
<i>Fig 4.1</i>	<i>Sentinel and Power supply Monitoring window</i>
<i>Fig 4.2</i>	<i>Three Phase Monitoring log</i>
<i>Fig 4.3</i>	<i>Antenna Base Temperature Log</i>

1) Abstract

GMRT consists of an array of 30 fully steerable parabolic dishes, each of 45- m in diameter, located over a region of about 25 Kms. All the antenna shell equipped with various sub system (*FE, OFC, TGC, Servo, Analog and Digital Backend etc.*) electronics hardware's to control antenna for providing best results to radio astronomy. So it is necessary to provides safety and protection to all sub-systems from fire, smoke and high temperature. In legacy online system all antenna base parameters are getting monitored in CEB using web based tool. GMRT sentinel system is taking responsibility of C&M of all these parameters. As a part of upgrade now Control and Monitoring facility is taken care by new TGC system. So it is necessary to enable monitoring facility in upgraded TGC system for monitor sentinel system parameters and it's logs to identify fault at the antenna base.

2) Introduction

In GMRT legacy system sentinel parameters are getting monitoring using antenna base computer called is as ANTCOM. This ANTCOM is the vital Antenna base computer located in each of the antenna shells. It receives various parameters sent by COMH and performs all the tasks and passes the vital information to various systems like Servo Control Computer, MCM-s and FPS. MCM Card is a general purpose Micro-controller based card which provides 16 TTL Control O/P-s and monitors 64 analog signals. Antenna base have various sentinel systems hardware like Smoke Unit, Temperature monitoring unit, MSEB/DGSET 3 Phase monitoring unit and New Rabbit processor (RCM 4300) as shown in below **Figure 2.1**.



a) Temperature Monitoring Unit



b) Smoke & Fire Alarm Sensor



c) MSEB/DGSET power monitoring Unit



d) Rabbit card (RCM 4300)

Fig 2.1) Sentinel system sensors and OFCSNT Rabbit card

Technical details of these sentinel system sensors are mentioned in **Table 2.1**

Table 2.1) Sentinel system sensors details

Sr. No	Monitoring Hardware	Technical details	Location	Nos. @ antenna base
1	Temperature sensor	National Semiconductor make LM-35 (0-100 degC) , O/p: 10mV/degC, Resolution of 0.5degC	At all 30 antennae	1
2	Smoke & Fire detection sensor	System Sensor make Americium-241 based ionization Smoke Detector-1412B.	At All 30 antennae one above the Servo System racks, one above the Receiver System racks and one above the Electrical power distribution box.	3
3	MSEB Unit	Transformer , Bridge rectifier, Filter circuit	Near Electrical Power distribution panel	1
4	Rabbit Card	64 monitoring channel, 32 Control O/P	At all 30 antennae (called as OFCSNT rabbit card)	1

3) Hardware Connection details with online system

To integrate all sentinel system parameters and 3 Phase monitoring unit status with new TGC based system we used antenna based Ofcsnt rabbit card to read all this parameters through ANTCOM. This Antenna base Computer in online system is used to monitor those parameters. It has two 32 bit monitoring port as shown in **Fig 3.1-(A)**. Telemetry team mapped the pin connection and designed new monitoring connector cable as show in **Fig 3.2** to connect ANTCOM and ofcsnt. We tapped wire from Monitoring port 2 and connected to ofcsnt Rabbit MCM card at port 2. In existing ofcsnt card we have spared monitoring channel from that we used total 15 (Ch no. 50 to 64) channel to integrate with existing sentinel system. Pin configuration of ofcsnt Rabbit card is showing in **Fig 3.2**. Telemetry team has been completed this interfacing work at all 30 antennae.

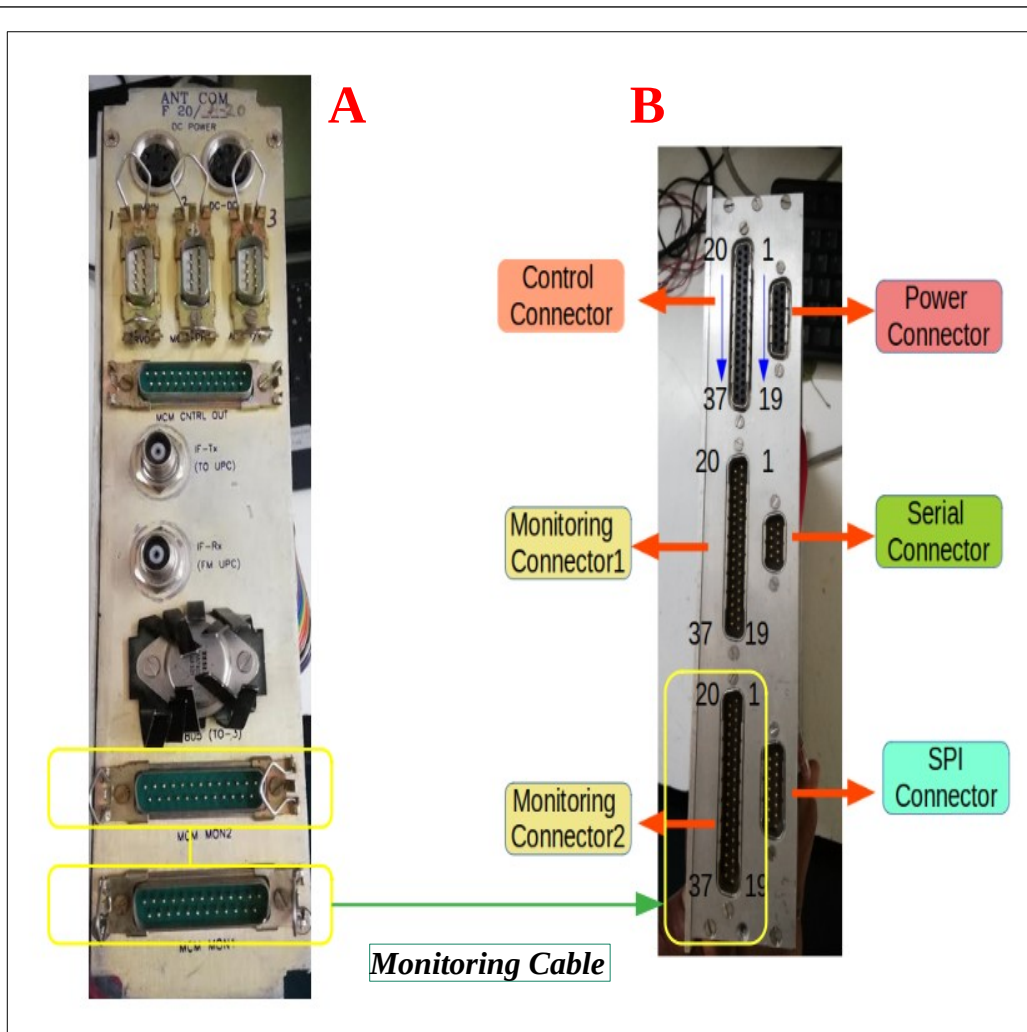


Fig 3.1) Connection between Antcom and Ofcsnt rabbit card

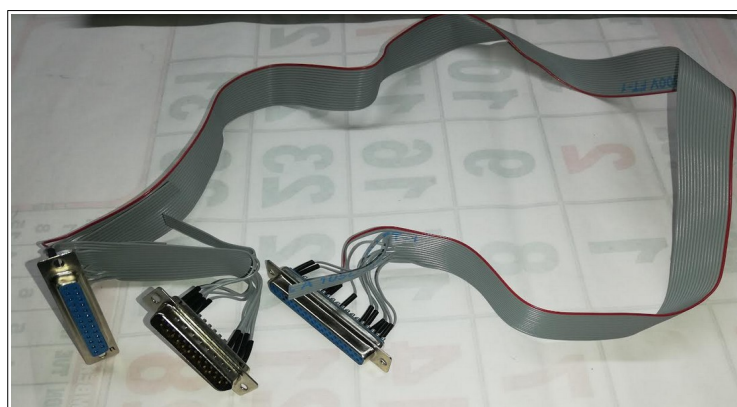


Fig 3.2) New Monitoring cable

Pin mapping between Antcom and Ofcsnt Rabbit card is mentioned in **Table 3.1**

Table 3.1) Pin mapping details between Rabbit card and ANTCOM

Rabbit box Connector pin	MCM Monitoring channel	Parameters Name	Descriptions/ ANTCOM pin
55	50	MSEB _R	MSEB POWER (Antcom MON Port 1 Pin no-11)
56	51	MSEB _Y	MSEB POWER (Antcom MON Port 1 Pin no-12)
57	52	MSEB _B	MSEB POWER (Antcom MON Port 1 Pin no-13)
58	53	DGSET_R	DGSET POWER (Antcom MON Port 1 Pin no-14)
59	54	DGSET_Y	DGSET POWER (Antcom MON Port 1 Pin no-15)
60	55	DGSET_B	DGSET POWER (Antcom MON Port 1 Pin no-16)
61	56	INTLOCK	Interlock status (Antcom MON Port 1 Pin no-3)
62	57	INTROPOW	Intruder sensor DC power
63	58	INTRO	Intruder sensor
64	59	SMOKEPOW	Smoke sensor DC power
65	60	SMOKE	Smoke sensor (Antcom MON Port 1 Pin no-10)
66	61	TEMP2POW	Temp. sensor 2 DC power
67	62	TEMP1POW	Temp. sensor 1 DC power
68	63	TEMP2	Temp. sensor 2 (Antcom MON Port 1 Pin no-2)
69	64	TEMP1	Temp. sensor 1 (Antcom MON Port 1 Pin no-1)

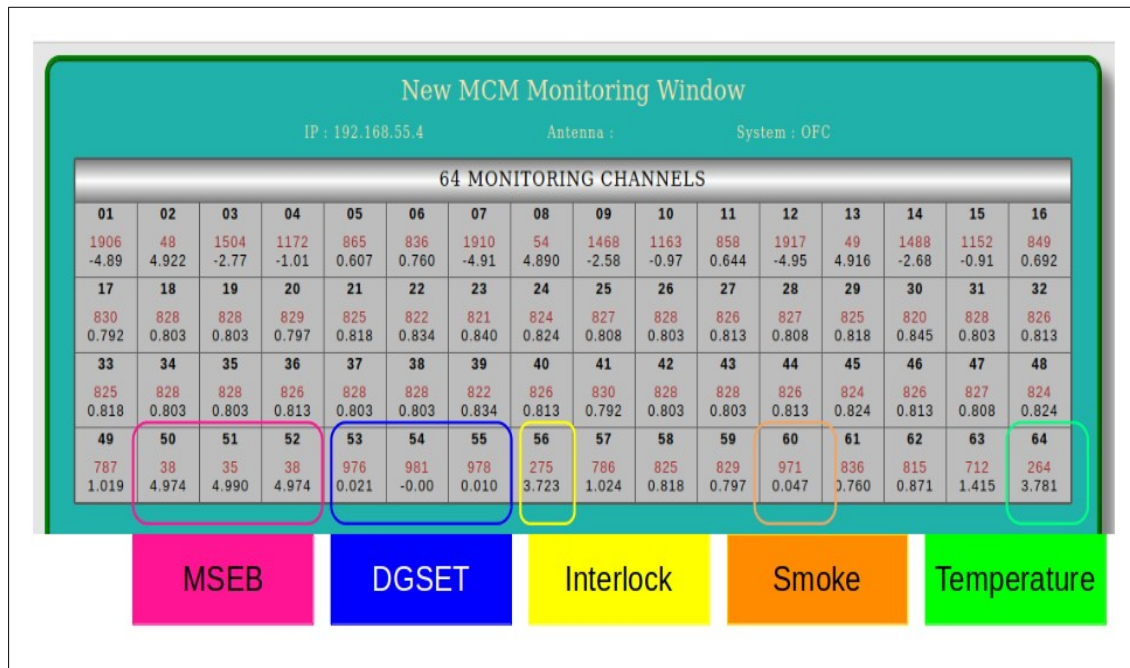


Fig 3.3) Raw value and voltage on Rabbit web page

To check raw voltage of monitoring points for any antenna need to be open particular antenna Ofsnt Rabbit IP.

Example: 192.168.XX.4 , (where, XX = 31 to 60)

Once you open particular antenna IP in browser you will see the web page as shown in **Fig 3.5** it will show you the raw voltages of 64 monitoring channel of Ofsnt Rabbit MCM card. As shown in above figure channel No **50, 51, 52, 53, 54, 55, 56, 60, 64** are used to monitor sentinel system sensor readings and three phase power supply unit status.

Table 3.2) Channel voltages

Rabbit MCM Channel No	Description	Voltage
50, 51, 52	It show the status of MSEB (R,Y,B) power supply	~ 4.9 V = MSEB phase ON 0 V = MSEB phase OFF
53, 54, 55	It show the status of DGSET (R,Y,B) power supply	~ 4.9 V = DGSET phase ON 0 V = DGSET phase OFF
56	It show the status of interlock circuit	~3.7 V = Interlock circuit OFF 0 V = Interlock circuit ON
60	It show the status of Smoke sensor	0 V = No Smoke

		5 V = Smoke
64	It show the status of Temperature sensor	Temp = F (Voltage)

Temperature Conversion Formula from raw voltage, ($rw[x]$ = Raw voltage of 'x' channel)

$$Temp (^\circ C) = ((((980 - rw [64]) / 196.0) * 1.035) / 5.0) * 100;$$

4) Web base Monitoring tool for TGC system

All Sentinel system and DGSET/MSEB parameters logs are available on GMRT web tool developed by *Shri Santaji katore*. Below logs we can see on the web tool.

http://www.gmrt.ncra.tifr.res.in/gmrt_users/help/eng_tools.html

- Antenna Base Temperature
- Central Lab temperature
- Power Supply
- Smoke detector
- Antenna Link
- Alarm log

Sentinel and Power Supply monitoring (TGC)
Sunday, 20 December 2020 14:08:55

ANTENNA	C00	C01	C02	C03	C04	C05	C06	C08	C09	C10	C11	C12	C13	C14	E02	E03	E04	E05	E06	S01	S02	S03	S04	S06	W01	W02	W03	W04	W05	W06	ANTENNA
MSEB	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	MSEB
DGSET	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	DGSET
TEMP	21.8	20.8	21.4	23.1	22.4	23.0	23.9	21.8	20.0	21.4	21.7	22.5	22.2	23.2	22.7	22.0	21.6	22.1	22.9	22.2	21.7	21.3	20.4	23.4	23.1	22.4	23.8	22.0	21.7	23.3	TEMP
SMOKE	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	SMOKE
Correlator-room	Control-room			Image-room			Receiver-room			Server-room			Dhruva	Google	NCRA-link			BSNL-link													
24.0 ° C	28.4 ° C			27.6 ° C			28.6 ° C			29.9 ° C			Down	Down	Down			Down													

History
antenna base temperature(TGC)
central lab temperature
three phase mseb and dgset(TGC)
smoke detector(TGC)
callsheet
internet link

Fig 4.1) Sentinel and Power supply Monitoring window

- This monitoring facility is useful for Electrical team to identify fault by checking logs.
- All sentinel system parameter (Temperature, Fire and Smoke) logs are available on single web page to identify type of fault occurred at antenna base.
- Easy to identify fault at antenna base, it will reduce the downtime.

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Hardware Installation and Testing at antenna base:	Mahadev Misal , Bhavesh Kunbi, Samir Lokhande, Amol Chavhan, Bharat Shete
Web Page Related work	Shri. Santaji Katore