

# TechComm

Direction Finder  
Systems

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## TC-4025A RACKMOUNT DIRECTION FINDER PROCESSOR / RECEIVER



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## **PRINCIPLES OF OPERATION**

The DF Processor is a goniometer type direction finder that uses a variety of DF Antennas. The DF Antennas may be Monopole, Dipole, Log Periodic, Annular Slot or other beam former, or various combinations thereof.

The various DF antenna arrays have an omni-directional receive capability and during signal processing develop a minimum of four equally spaced beam patterns, with a discernible front-to-back ratio. The front-to-back ratio of each beam pattern and the crossover point of adjacent beam pattern determines the frequency at which the DF Antenna will provide optimum performance within each bay or frequency band.

The Direction Finder Processor is the controlling device in the direction finder system. As the receiver is tuned to a desired signal, the processor generates sine or square wave signals at a constant rate; each at a 90 degree phase shift from the preceding or following sine or square wave.

The received signal is AM modulated by the processor-generated control signal at each output of the antenna. The signals are combined and fed to a receiver where it is AM detected. The audio base band contains the specified control and other received signal characteristics. The AM detected signal is fed to the DF processor that selects the control signal component, measures the phase angle relative to the reference phase and converts it into bearing information.

The processor then adds to the bearing information any offset programmed at the front panel, host controller or system software, and displays the resultant bearing in a 3-digit readout and a corresponding relative compass pointer for those processors having a front panel display. The processor continues to measure and update the front bearing information at the selected slow or fast rate until the received signal is no longer present.

At signal loss, the control signal Hz component is no longer present and the display, if present, is frozen, displaying the last bearing calculated and the processor resets until a new signal is present. Software controlled variants that have no built-in display will indicate that the DF bearing is active or from memory, indicating that the DF processor is bearing information is not being updated.

## **SPECIFICATIONS :**

DF Processing Technique.....	Phase/Amplitude electronic rotating goniometer, digitally processed
Frequency Range.....	200 kHz -3.0 GHz, limited by receiver/DF antenna
Signal formats (modulation).....	AM, FM, SSB, CW
Signal Bandwidths.....	200 Hz through 10 MHz, determined by receiver
Sensitivity .....	6 dB signal-to-noise ratio for a bearing indication
Instrument processing accuracy .....	± 1 degree
Instrument processing resolution.....	1 degree
Response time .....	better than 80 msec
Calibration .....	Factory

### **Front Panel Controls**

Power .....	On / Off
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### **Rear Panel Inputs/Outputs**

Power Input .....	+12Vdc (11-13.6Vdc); +24Vdc (20-28Vdc) Optional 110/220VAC Optional
Antenna Control.....	MIL multi-pin connector
RF Input.....	TNC (DF IN)
Remote Control (Opt).....	RS-232 via DB-9; RJ-45:UDP via RJ-45
Audio Out.....	BNC
RS-232 .....	DB-9
Ethernet.....	RJ45 (Optional)

### **Remote Control**

Software.....	Basic Control /Display Software; internal receiver or factory integrated external receiver
Frequency.....	Internal Receiver
Receiver Mode .....	Receiver Detection Mode
Volume .....	Internal Receiver
Squelch.....	Internal Receiver
DF Mode .....	DF or OMNI Mode
Preamplifier.....	Switch in / out (Antenna PostAmp)
Line of Bearing:	
Digital .....	3-Digit, 1-degree resolution
Circular Display.....	Compass pointer, 1-degree increments
Antenna Mounting .....	Air/Ground switch
BIT .....	Option -Sequential LOB display by DF Antenna Quadrant - Verifies signal path integrity
DF Integration.....	Selectable 00-99 samples averaged before display
Bearing Offset.....	000 to 359 degrees, Operator Programmed

<b>Processor Size</b> .....	1.75" high x 19.00" wide x 14.00" deep Including front and rear panel Connectors
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<b>Processor Weight</b> .....	8 lbs. approx., depending upon Options
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**Environmental**

Temperature: Operating..... 0 degrees to +50 degrees C  
Non-Operating..... -10 degrees to +70 degrees C  
Humidity..... 0 to 95%

**FEATURES:**

Antenna Band Selection.....Automatic, based on frequency selected at receiver or host controller.

Integration Speed.....Operator selected averaging rate from 1-99 LOB' samples are evaluated before updating display

Offset..... Operator determined and Stored value used to compensate for DF Antenna orientation error

Air / Ground Mode..... Electrically reverses the East / West drive lines when DF Antenna is inverted for installation on aircraft

OMNI Mode.....Disables the DF Antenna commutation and activates all Antenna drive lines simultaneously for improved reception of weak signals

Built-In-Test.....Activates test sequence to verify integrity of each DF antenna drive line in all DF Antenna frequency bands (also Requires BIT Option in DF Antenna)

**Front Panel**

RS-232 ..... 9-Pin D Sub Female Connector – (Not all models)  
RS-232 Serial Interface (Configured as DCE Device) Auxiliary control with Blank Front Panel

Ethernet..... RJ45 Connector IEEE 802.3 Compliant interface for communication over a network

ANT / IO.....15-Pin Female Circular MIL connector  
Provides power /control signals to DF Antenna  
D Subminiature Connector - for Blank Front Panel

Color: Black Standard, Sand and Olive Drab optional

**RECEIVER SPECIFICATIONS : (Standard Configuration, Others Available)**

Frequency Range..... 100 KHz to 3.0 GHz  
 (Performance between 100-530 KHz is not guaranteed)

Tuning ..... 100 Hz steps

Detection Modes..... WFM, NFM, AM, USB, LSB, CW

Sensitivity:

	0.500-2.0 MHz	2.0 -30 MHz	30 - 470 MHz	
	(10dB S/N)	(10dB S/N)	(10dB S/N)	
AM	3.50 $\mu$ V	2.50 $\mu$ V	0.70 $\mu$ V	
SSB		1.50 $\mu$ V	0.30 $\mu$ V	

	30 - 470 MHz	0.470 - 1GHz	1.0-1.3 GHz	1.3 – 3.0 GHz
	12dB SINAD	12dB SINAD	12dB SINAD	12dB SINAD
NFM	0.35 $\mu$ V	0.50 $\mu$ V	1.00 $\mu$ V	2.50 $\mu$ V
WFM	1.00 $\mu$ V	1.50 $\mu$ V		

Selectivity:

SSB	3 KHz (-6dB)		9KHz (-60dB)	
AM	3KHz (-6dB)	9 KHz (-6dB)	9KHz (-60dB)	20 KHz (-40dB)
WAM	12 KHz (-6dB)			25 KHz (-40dB)
NFM	12 KHz (-6dB)			25 KHz (-40dB)
WFM	150 KHz (-3dB)		380 KHz (-20dB)	