

**BATTLE SMARTS**

MASTERS OF THE SCENARIO

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# HF & VHF/UHF Signal Classifiers

TAN 205DSP / TAN 230DSP

## Main Features

- Real Time Signal Detection
- Real Time Modulation Classification
- Real Time Signal Type Classification
- Center Frequency Measurement
- Built in Signal Recognition Library
- Low False Alarm Rate
- High Probability of Detection
- PC AT Cards (ISA Bus)
- Software Programmed or Downloaded
- Downloadable Signals Library
- Comprehensive BIT



**TADIRAN**  
ELECTRONIC SYSTEMS LTD. 

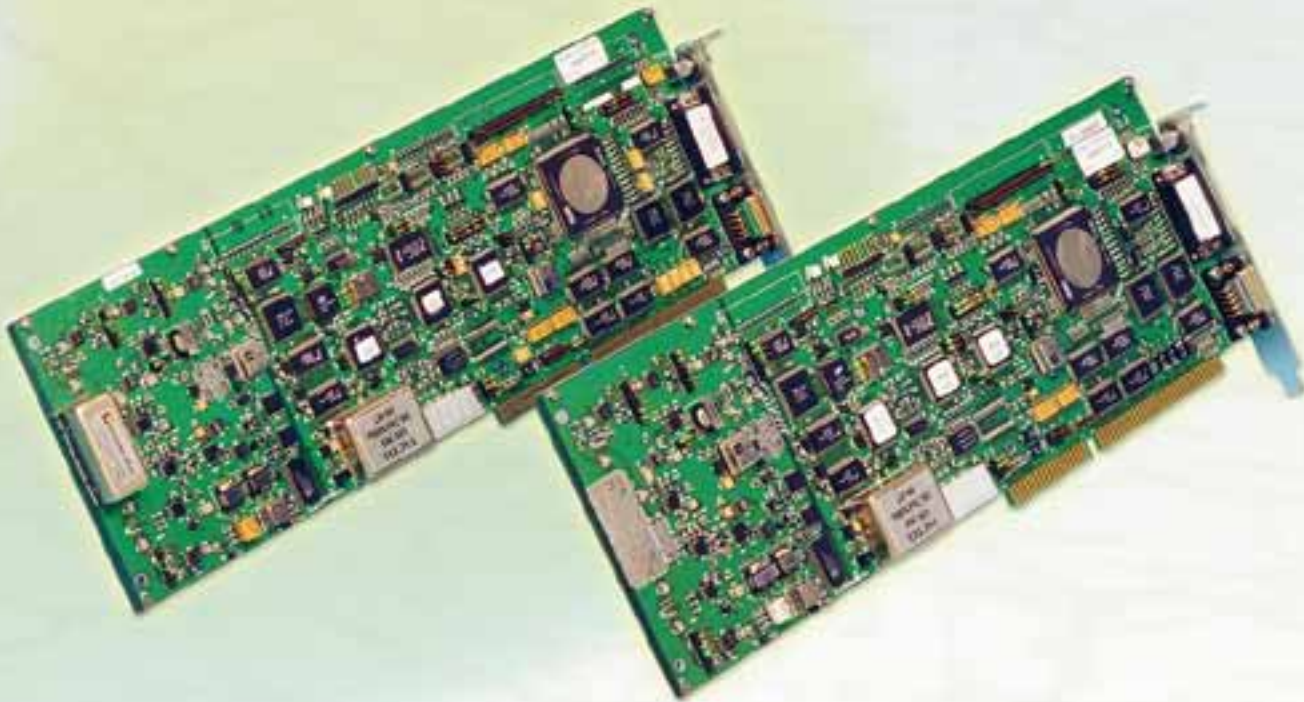
# Product Overview

The signal classifiers, by real time analysis and classification of monitored signals provide up-to-date data regarding signal characteristics, enabling identification of hostile communication transmissions for the electronic picture establishment.

The signal classifiers automatically perform the following functions:

- Verification of genuine signal reception (*e.g. not noise*)
- Modulation classification
- Signal type classification (*Compares the received signal characteristics to signal types stored in the library*)

In many cases a digital signal may be heard by the operator as a simple noise, which is very common in advanced communication radios. However, the presence of a specific type of signal can be recognized only by using the sophisticated signal classifiers. The operator may then record the signal for further analysis and possible off-line decoding. The signal classifier is a key element in modern COMINT systems, providing a unique source of information.



# Concept

■ Three levels of classification are performed by the Signal Classifier:

- **Level 0:** Activity detection
- **Level 1:** Modulation classification (e.g. AM, FM, CW, etc.) and center frequency measurement
- **Level 2:** Signal type classification (e.g. FSK, PSK of various types, Voice and Morse)

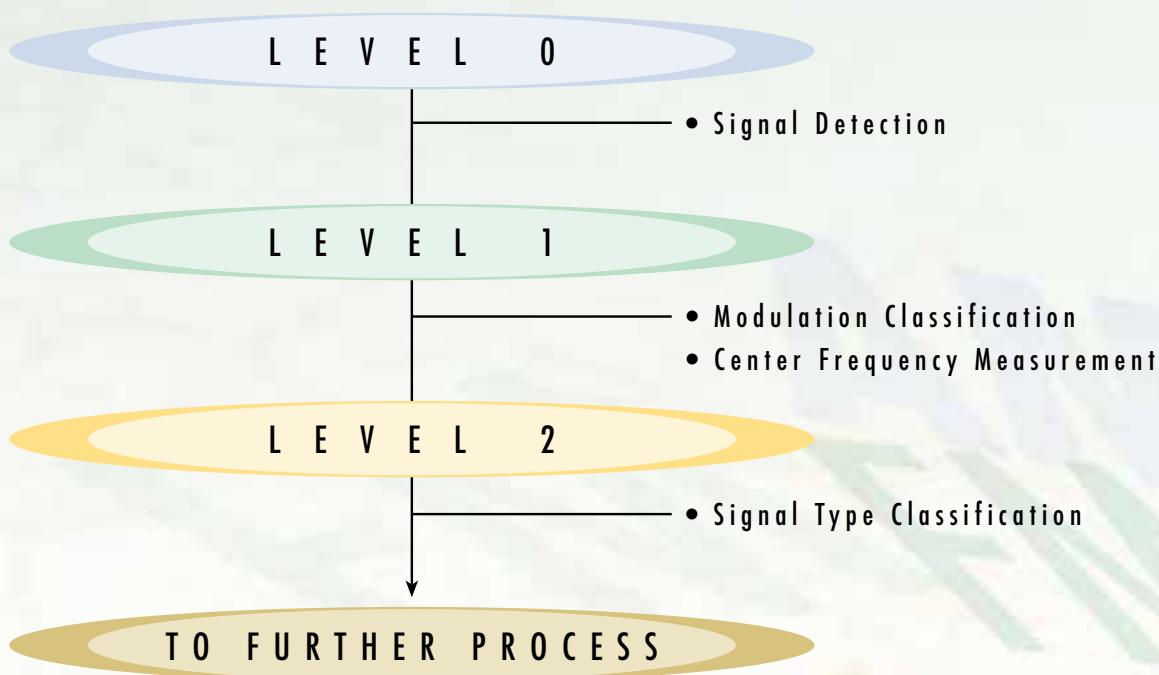
■ The first two levels are implemented by a single long PC AT board. The TAN 205DSP-1 is dedicated for the V/UHF band and the TAN 230DSP-1 is dedicated for the HF band. Both, TAN 205DSP-1 and TAN 230DSP-1, digitally process the IF signals.

■ The level 2 classification is based on comparison of the received signal with a library of target signals stored in the Classifier.

The level 2 classification is implemented by the same or by another TAN 205DSP-2 or TAN 230DSP-2 operating in the V/UHF and HF range respectively. Both, TAN 205DSP-2 and TAN 230DSP-2, digitally process the audio signals.

■ The classifier library of signals is prepared from two sources:

- Standard library of signals
- In the case of a new signal being detected, the signal is recorded by the COMINT system and may be added to the library by TADIRAN



# Characteristics

	TAN 205DSP-1	TAN 230DSP-1
Probability of activity detection (level 0)	99% for a SNR $\geq$ 10 dB	99% for a SNR $\geq$ 10 dB
Activity detection time (level 0)	3.5 mSec (not including receiver settling)	6 mSec (not including receiver settling)
Typical modulation types	AM, NBFM, WBFM, CW, PSK, MSK	CW, AM, SSB
Probability of modulation detection (level 1)	99% for a SNR $\geq$ 10 dB	99% for a SNR $\geq$ 10 dB
Modulation false alarm rate (level 1)	10 <sup>-4</sup>	10 <sup>-2</sup>
Modulation classification time (level 1)	25 mSec	25 mSec
IF input	Level: -10 $\pm$ 2 dBm. Other levels from -2 to -38 dBm are possible using programmable attenuators, factory adjusted. Center frequency: 21.4 MHz BW: 50 kHz	Level: -10 $\pm$ 2 dBm. Other levels from -2 to -38 dBm are possible using programmable attenuators, factory adjusted. Center frequency: 455 kHz BW: 4 or 6 kHz, factory selectable
Center frequency measurement	Resolution: 10 Hz } (within $\pm$ 6 kHz shift) Accuracy: 100 Hz }	Resolution: 10 Hz } (within $\pm$ 1200 Hz IF bandwidth) Accuracy: 100 Hz }
Nominal audio signal	Frequency: 1 kHz AM modulation index: 50% FM deviation: 6 kHz	Frequency: 1 kHz AM modulation index: 50% SSB: 1 kHz
Size	Long PC AT card	Long PC AT card

	TAN 205DSP-2	TAN 230DSP-2																																												
Typical signal types	<ul style="list-style-type: none"> <li>• Voice</li> <li>• FSK- including separation to various standards</li> <li>• PSK- including separation between signals in various frequencies (number of phases in 2 or 4)</li> <li>• CW</li> <li>• Silence/Noise</li> </ul>	<ul style="list-style-type: none"> <li>• Voice</li> <li>• FSK- including separation to various standards</li> <li>• Morse</li> <li>• CW</li> <li>• Silence/Noise</li> </ul>																																												
Number of signals in the library	The maximum number of signals in the library is 127 and an additional unknown signal type that is not included in the library.																																													
Probability of correct classification	The probability of correct classification depends on the signals library. Typical results are better than 90% for SNR=20dB at the audio input to the classifier.																																													
Audio input	<ul style="list-style-type: none"> <li>• Level: 1 to 3 Vpp</li> <li>• BW: 300 Hz to 11 kHz</li> <li>• Impedance : 600 ohm</li> </ul>	<ul style="list-style-type: none"> <li>• Level: 1 to 3 Vpp</li> <li>• BW: 300 Hz to 3.4 kHz</li> <li>• Impedance : 600 ohm</li> </ul>																																												
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Signals list (standard library)	<table border="1"> <thead> <tr> <th>Signal No.</th> <th>Description</th> <th>Signal No.</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>VOICE</td> <td>1</td> <td>VOICE</td> </tr> <tr> <td>2</td> <td>NOISE</td> <td>2</td> <td>NOISE</td> </tr> <tr> <td>3</td> <td>SINE WAVE</td> <td>3</td> <td>SINE WAVE</td> </tr> <tr> <td>4</td> <td>SILENCE</td> <td>4</td> <td>SILENCE</td> </tr> <tr> <td>5</td> <td>FSK2, 1200-2200 Hz 1200 Baud</td> <td>5</td> <td>FSK2, <math>\Delta</math>200 Hz BR 75</td> </tr> <tr> <td>6</td> <td>FSK2, 1680-1860 Hz 50 Baud</td> <td>6</td> <td>FSK2, <math>\Delta</math>200 Hz BR 300</td> </tr> <tr> <td>7</td> <td>FSK2, 1680-1860 Hz 75 Baud</td> <td>7</td> <td>FSK2, <math>\Delta</math>1000 Hz BR 600</td> </tr> <tr> <td>8</td> <td>FSK2, 1300-2100 Hz 1200 Baud</td> <td>8</td> <td>Morse 5-100 c/s</td> </tr> <tr> <td>9</td> <td>PSK2, 1200 Hz 1200 b/s</td> <td>9</td> <td>FSK4, <math>\Delta</math>500 Hz BR 50</td> </tr> <tr> <td>10</td> <td>QPSK, 1800 Hz 2400 b/s</td> <td>10</td> <td>FSK4, <math>\Delta</math>400 Hz BR 96</td> </tr> </tbody> </table>	Signal No.	Description	Signal No.	Description	1	VOICE	1	VOICE	2	NOISE	2	NOISE	3	SINE WAVE	3	SINE WAVE	4	SILENCE	4	SILENCE	5	FSK2, 1200-2200 Hz 1200 Baud	5	FSK2, $\Delta$ 200 Hz BR 75	6	FSK2, 1680-1860 Hz 50 Baud	6	FSK2, $\Delta$ 200 Hz BR 300	7	FSK2, 1680-1860 Hz 75 Baud	7	FSK2, $\Delta$ 1000 Hz BR 600	8	FSK2, 1300-2100 Hz 1200 Baud	8	Morse 5-100 c/s	9	PSK2, 1200 Hz 1200 b/s	9	FSK4, $\Delta$ 500 Hz BR 50	10	QPSK, 1800 Hz 2400 b/s	10	FSK4, $\Delta$ 400 Hz BR 96	
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All specifications are subject to change without prior notice.



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