

Modem

Apresentação inicial do curso

Fabio Montoro

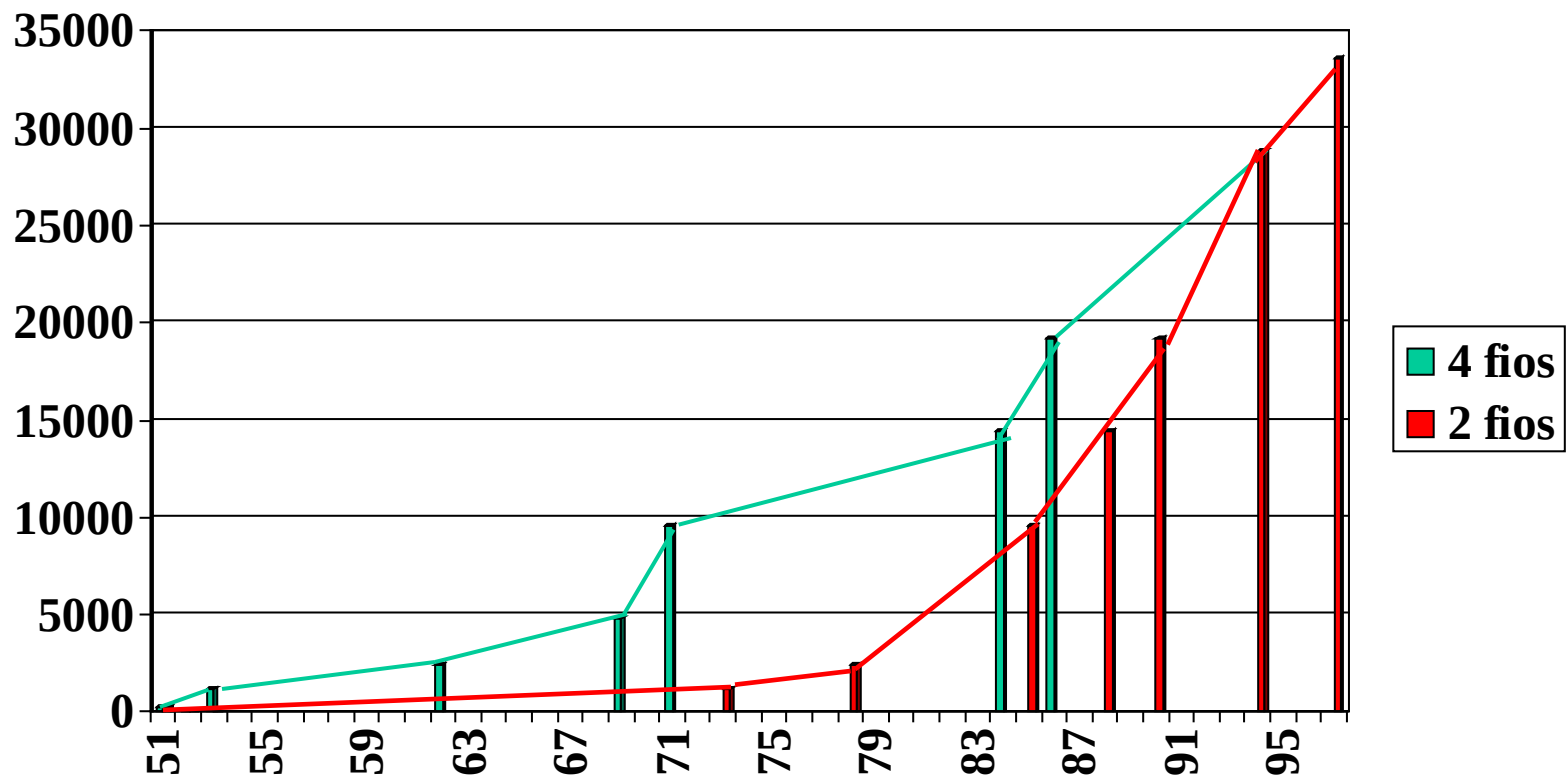
UnB

16 julho 2002

Histórico

- 1955: 1º paper: Horton and Vaughn, “Transmission of Digital Over Telephone Circuits”, Bell System technical Journal, vol. 34 pp 511-528 may 1955
- 1958: 1º Modem comercial: Fev 1958, Bell Lab
- 1964: IBM lança as controladoras 27xx
- 1968: USA permite ligar outros modems à linha, com DAA
- 1978: USA permite ligar modems diretamente à linha
- 1983: Texas lança o DSP TMS320

Evolução dos modems





INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

V.34

(02/98)

SERIES V: DATA COMMUNICATION OVER THE
TELEPHONE NETWORK

Interfaces and voiceband modems

**A modem operating at data signalling rates
of up to 33 600 bit/s for use on the general
switched telephone network and on leased
point-to-point 2-wire telephone-type circuits**

ITU-T Recommendation V.34

(Previously CCITT Recommendation)



INTERNATIONAL TELECOMMUNICATION UNION

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TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

V.90

(09/98)

SERIES V: DATA COMMUNICATION OVER THE
TELEPHONE NETWORK

Simultaneous transmission of data and other signals

**A digital modem and analogue modem pair for use
on the Public Switched Telephone Network (PSTN)
at data signalling rates of up to 56 000 bit/s
downstream and up to 33 600 bit/s upstream**

ITU-T Recommendation V.90

(Previously CCITT Recommendation)



Racal-Vadic

VA3413 Dual Acoustic Coupler Full Duplex 1200 bps & 0-300 bps

Check These Major Benefits

- VA3400 & 103/113 Originate Only Operation
- 1200 bps & 0-300 bps Full Duplex
- Automatic Identification of Called Modem
- Automatic Character Length Recognition
- Advanced Acoustic Design
- Latest Digital Circuitry
- Compact, Easy to Install and Use
- VA3400 Series Compatibility
- UL and CSA Approved
- Nationwide Distribution

World's First Dual Acoustic Coupler

The world's first dual acoustic coupler, the VA3413, provides both 1200 bps and 0 to 300 bps full duplex asynchronous operation, and is fully compatible with Racal-Vadic's VA3400 and Bell 103/113 type modems. This compact coupler satisfies, in one portable unit, almost all originate applications for full duplex 1200 bps and 0 to 300 bps data transmission over the switched network.

Automatic Identification of Called Modem

To simplify operation, the VA3413, under microprocessor control, automatically detects which type of modem has been called, making it unnecessary for the user to have to manually select the VA3400 or 103 mode.

Automatic Character Length Recognition

The VA3413 also provides automatic 9 or 10 bit character length recognition in the VA3400 mode, which again simplifies operation since the user can communicate with either 9 bit (primarily IBM), or 10 bit systems without any physical changes to the modem.

Advanced Acoustic Design

The VA3413 incorporates many advanced design techniques. The acoustic cups have double flange seals to provide excellent noise isolation. The unique handset to microphone coupling virtually eliminates vibration problems to insure outstanding performance with a very low data error rate.



Latest Digital Circuitry

The VA3413 utilizes the latest digital technology including microprocessor based design, low power CMOS components and crystal controlled oscillators, plus automatic manufacturing techniques and computer controlled testing. As in all Racal-Vadic modems, the VA3413 has extensive built-in user diagnostics and displays including Analog Loop Back, Digital Loop Back, and Transmit Reversals.

Compact, Easy to Install and Use

The VA3413 represents a major breakthrough for acoustic coupler users who have had to settle for 300 bps operation. Now, by merely replacing their present coupler, users can instantly step up to 1200 bps full duplex using the same Bell 103 type protocol, yet have the flexibility to operate 0 to 300 bps in the Bell 103/113 mode as well.

VA3400 Series Compatibility

The VA3413 is compatible with an installed base of over 75,000 VA3400 type modems including the VA3405, VA3415, VA3455, and the VA3450 and VA3467 series of microprocessor controlled triple modems.

The V11222PA Modem

DESIGNED FOR INTERNATIONAL USERS

Top of the Line 1200 bps

- V.22 and V.21 CCITT-compatible, 1200 or 300 bps, 2-wire, full duplex
- Synchronous or asynchronous operation
- PSTN or leased-line operation
- Asynchronous MNP™ (Microcom Networking Protocol) error control
- Choice of CCITT V.25bis or Hayes® AT dialing commands
- Stores 15 telephone numbers in nonvolatile memory
- Automatic log-on facility
- Security feature restricts access to options and dialing
- Modem Manager™ feature allows configuration and options to be changed remotely
- Front panel access with Liquid Crystal Display (LCD) or terminal access with plain-English text

Full of Features

The V11222PA, a CCITT V.22 and V.21 compatible modem, is ideal for use on the public switched telephone network or on a leased line. It offers error-free data transmission using MNP error control. The integral auto-dialer allows you the choice of CCITT V.25bis or Hayes AT dialing commands. The modem can be controlled from the front panel or terminal.

Flexible Operation

The V11222PA is simple to operate. If you operate it through a terminal or computer, easy-to-understand prompts and commands guide you along the way.

You can also operate the V11222PA from its front panel. Twelve dual-function keys let you dial, redial, test, set options, switch between voice and data communication, and operate asynchronously or synchronously. An easy-to-read LCD shows prompts, responses, call progress messages, and the status of the V.24 interface signals.

Software options let you custom fit the V11222PA for your applications. Settings are saved in nonvolatile memory so that they remain in effect even if the power is turned off.

Automatic Dialing of Stored Numbers

From a terminal, you can use either V.25bis or extended Hayes AT dialing commands. There are 15 memory locations, each with up to 48 characters, for storing telephone numbers, descriptions, and log-on messages. If the number can't be reached, the modem can be programmed to call an alternate number.



Error-Free Performance

The V11222PA gives you error-free data transmission with MNP error control. The modem continually checks data being passed and automatically retransmits it if errors are detected. The modem can detect if the remote modem has MNP error control and can pass data with or without error control.

Complete Network Control

The Modem Manager and security features give you complete control over your network. The Modem Manager feature allows you to change telephone numbers and log-on instructions, set options, and update passwords on remote V11222PA modems. The security feature, when activated, prevents changes to options, prevents unauthorized calls or data transmission, and allows users to call locations without revealing telephone numbers or passwords.

Power, Performance, Perfection

The Racal-Vadic V11222PA—features and performance at an affordable price.

Racal-Vadic

IBM 5865-2/3, 5866-2/3 and 5868-52/62 Modems



These high-speed, microprocessor-based modems will improve the performance of data communication.



ALLIANCE V.32/19.2M FAX ALLIANCE V.32/19.2 FAX

19.2K FULL-DUPLEX, DIAGNOSTIC, DATA/FAX, MANAGEABLE MODEM



FEATURES/BENEFITS

- High-speed, full-duplex 19.2 Kbps sync and 115.2 Kbps async operation
- Data + FAX transmission with one modem

Managed and unmanaged versions

V.42 & MNP 2-4 for error correction

Supports dial-up lines and 2- and 4-wire leased lines

CCITT V.54 diagnostics, and comprehensive local and remote management ease network control

Automatic dial back-up maximizes leased line uptime

- V.13 simulated half-duplex operation
- AT and CCITT V.25bis autodialers
- Call screening and password protection to secure network access
- Supports MNP Class 5 and CCITT V.42bis for async data compression
- Supports versatile configurations with stand-alone and hot-swap rack-mount modems



The Alliance V.32/19.2 FAX (ALX V.32/19.2 FAX) is a universal, multimode, multispeed, data/FAX modem available in both unmanaged and managed (ALX V.32/19.2M) versions. It uses the latest in Digital Signal Processing technology to provide flexible, high-performance communications at 19.2 Kbps for sync traffic, 115.2 Kbps for async traffic, and 14.4 Kbps for FAX traffic. The ALX V.32/19.2 FAX supports advanced features that maximize network uptime: multiple hardware versions to meet flexible installation requirements, rapid setup for both local and remote devices, continuous DTE and telephone line status reporting, and comprehensive diagnostics.

19,200 BPS V.32terbo

The ALX V.32/19.2 FAX modem operates at 19.2K bps full-duplex over both the standard 2-wire Public Switched Telephone Networks (PSTN) in accordance with the V.32terbo specification and over 2- or 4-wire unconditioned leased lines. Fallback rates of 16.8K, 14.4K, 12.0K, 9600, 7200, 4800, 2400, 1200, 1200/75, 600, and 300 bps are also supported. Additionally, the ALX V.32/19.2 FAX supports CCITT V.13 for simulated half-duplex operation.

FAX TRANSMISSIONS

The ALX V.32/19.2 FAX is compatible with Group 3, Class 1 and Class 2 fax and supports multiple modulation standards and speeds for FAX transmission, including:

- CCITT V.17 at 14.4k, 12.0K, 9600, 7200 bps
- CCITT V.29 at 9600, 7200 bps
- CCITT V.27ter at 4800 and 2400 bps
- CCITT V.21 channel 2 at 300 bps for T.30

Integrated support for fax traffic means the ALX V.32/19.2 FAX works with standard communications software packages to:

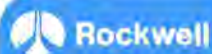
- 1) receive facsimiles on your DTE and print facsimiles on a local, plain paper printer,
- 2) send facsimiles directly from your DTE,
- and 3) send data at rates up to 115.2 Kbps.

NETWORK MANAGEMENT

The ALX V.32/19.2M FAX is compatible with Penril Datability Networks Series 6000 Network Management System. This network management system supports centralized configuration, status monitoring, and diagnostic control over a network of ALX V.32/19.2M FAX modems in any operating mode; dial-up line, leased-line, or a combination of both. The ALX V.32/19.2M FAX reports the condition of the attached DTE device and telephone line to the Network Manager Controller (or other data terminal equipment meeting the flexible requirements of the diagnostic interface). The simple command language lets you to customize the information display to meet your network management objectives.

AUTOMATIC DIAL BACKUP

The ALX V.32/19.2 FAX supports automatic dial back-up for the leased-line applications. The ALX V.32/19.2 FAX monitors the received carrier level and line quality; in the event performance drops below the selected thresholds, the ALX V.32/19.2 FAX will automatically establish a dial connection to the remote ALX V.32/19.2 FAX. Automatic lookback allows the communications path to be returned to the leased line when conditions permit.



MODEM PRODUCTS PRODUCT PREVIEW

R24 2400 BPS Modular Modem

INTRODUCTION

The Rockwell R24 is a high-performance synchronous 2400 bps DPSK modem. Utilizing MOS/LSI technology, the R24 consists of three modular building blocks. It is innovatively designed to enable its economic integration by system designers in a broad range of communication, computer, and control equipment.

Having Bell 201 B/C and CCITT V.26 compatibility, the modular R24 offers the user sufficient flexibility to customize a 2400 bps modem to his specific packaging and functional requirements. With a minimum amount of interface circuitry, the modem can be configured for operation on dedicated lines or on the general switched network.

MODULE VERSATILITY

The versatility of the R24 design is achieved by dividing the modem's functions into three modules. Each module is enclosed in a plastic package which can be plugged into standard connectors or can be wave soldered on one or more printed circuit boards. The pin spacing is on 100 mil. centers.

R24 MODEM EVALUATION

To facilitate evaluation and design-in of the R24 modem for new and existing equipment designs, Rockwell has packaged the three modules with interfacing circuitry on an R24 Modem Evaluation Board (R24MEB) -- see right. Supplied with complete Applications Notes, the R24MEB can be easily combined with terminal systems for real-time performance evaluation.

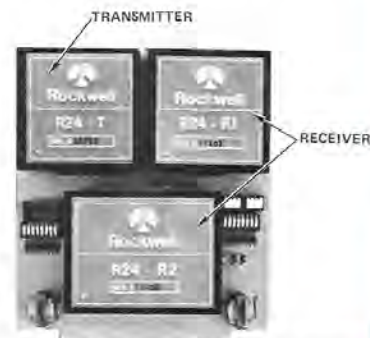
MODULE DIMENSIONS

	W	L	H	PINS
R24-TRANSMITTER	2-3/4"	2-3/4"	1/2"	39 pins
R24-R1 RECEIVER	2-3/4"	2-3/4"	1/2"	15 pins
R24-R2 RECEIVER	2-3/4"	3-1/2"	1/2"	31 pins

(Metric Equivalents: 2-3/4": 69.85 mm;
1/2": 12.70 mm; 3-1/2": 88.90 mm)

FEATURES/BENEFITS

- LSI high density; low power
- 2400/1200 bps modes
- Transmitter-Differential phase modulation
- Receiver-Coherent phase detection
- Bell 201 B/C, CCITT V.26 compatible
- CCITT A/B and U.S. phase options
- Operating modes:
 - Half duplex (2 wire)
 - Full duplex (4 wire)
- Outstanding performance over unconditioned lines
- LSTTL/CMOS compatible digital interface
- Fixed compromise equalizer
- V.27 compatible scrambler/descrambler
- Answer-back tone generation
- Clear-to-send delay options
- New sync option provides rapid resynchronize
- Maximum power consumption approximately 3 watts
- Total module area less than 25 sq. in.

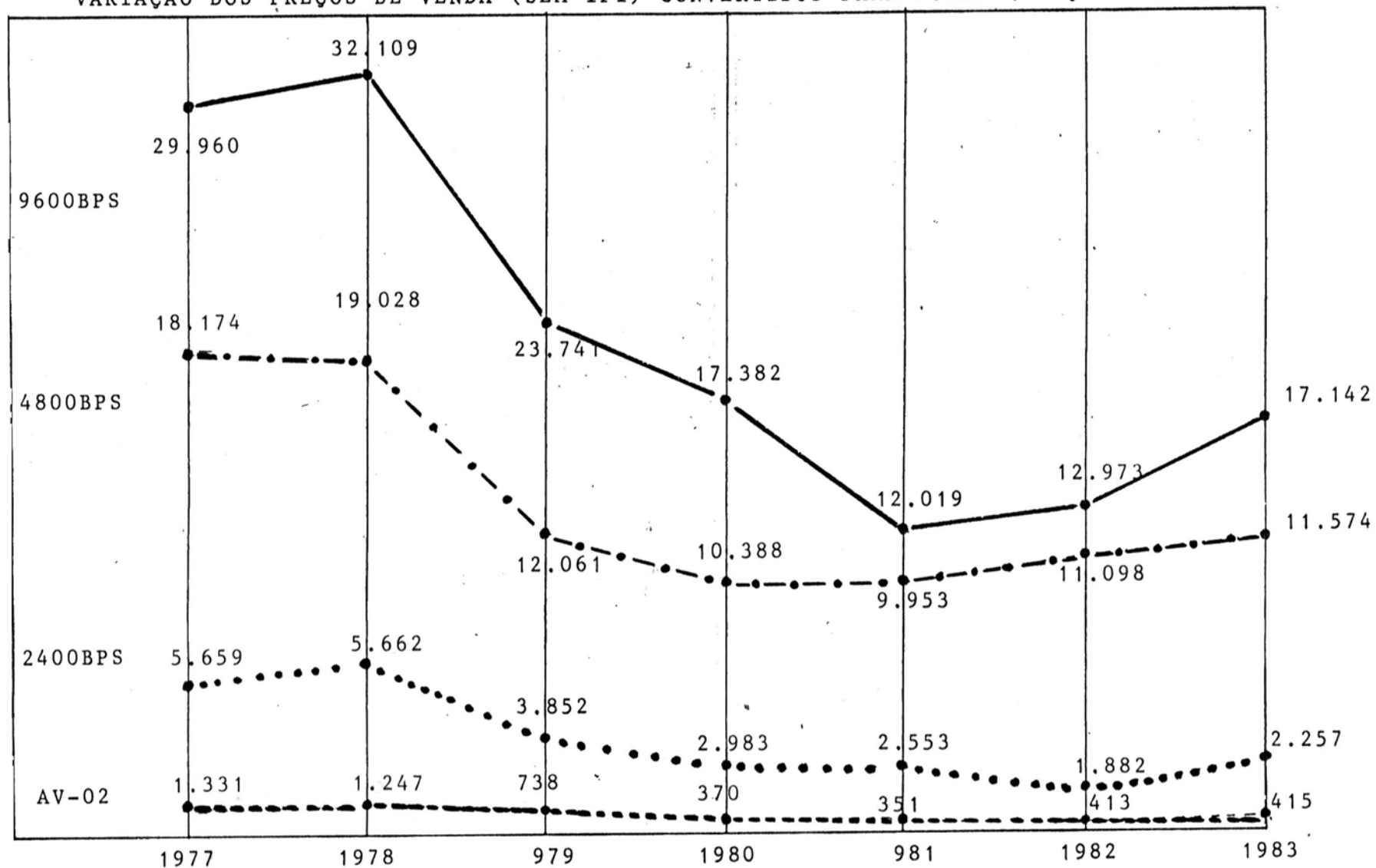


R24 MODEM EVALUATION BOARD (R24MEB)

R24 2400 BPS MODULAR MODEM

US\$
MIL

VARIAÇÃO DOS PREÇOS DE VENDA (SEM IPI) CONVERTIDOS PARA DÓLAR (PREÇO DE NOVEMBRO 1982)



computer professionals. For situations like this, increased speed means a direct increase in productivity.

standards at 300 and 1200 bps, and these modem types are widely supported

terms s and "fu switche system send an nction uses a : signals speed veys w which u or a sc moden paths f

Full-c bility o both di that a : duplex same 1 mouth reasor switche full-dup operati ment."

Table 1: The transmission times for various documents at different baud rates.

Speed (bps)	Screen	Floppy Disk	Moby Dick
300	66 sec	3.2 hr	23 hr
1200	17 sec	48 min	5.75 hr
2400	8.3 sec	24 min	2.9 hr
4800	4.2 sec	12 min	1.4 hr
9600	2.1 sec	6 min	43 min

Table 2: Approximate cost of different speed full-duplex modems.

Speed (bps)	Standard	Cost Range
300	AT&T 103	\$60-\$350
1200	AT&T 212	\$450-\$700
2400	V.22 bis	\$800-\$1400
4800	none	\$2500
9600	V.32	n/a

QUOTATION

TI No. 230344

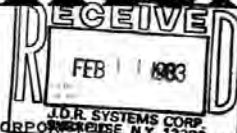
PLEASE REFERENCE THIS NUMBER
ON YOUR PURCHASE ORDER

FROM: Pete Craner

TEXAS INSTRUMENTS INCORPORATED
6700 Old Collamer Road
East Syracuse, NY 13057

TO: JDR Systems
PO Box 7
Dewitt, NY 13214

Attn: Pete Bocon



IMPORTANT

1. THIS QUOTATION EXPIRES 30 DAYS AFTER DATE OF QUOTE.
2. ALL ORDERS ARE SUBJECT TO ACCEPTANCE BY SELLER IN DALLAS, TEXAS.
3. ACCEPTANCE OF BUYER'S ORDER SHALL BE EXPRESSLY CONDITIONED UPON BUYER'S ASSENT TO SELLER'S STANDARD TERMS AND CONDITIONS ON THE REVERSE SIDE HEREOF.

WE ARE PLEASED TO QUOTE IN RESPONSE TO YOUR INQUIRY				TERMS:	NET 30 DAYS		
YOUR INQUIRY NO.	DATE OF INQUIRY	MAIL	TEL.	WIRE	INITIAL DELIVERY:	DATE OF QUOTE	CONFIRM.
	2/4/83	X			AFTER RECEIPT OF ORDER IN DALLAS, TEXAS	2/8/83	X

ITEM NO.	YOUR PART NUMBER	DESCRIPTION AND SPECIFICATIONS	QUANTITY	UNIT PRICE
BUDGETARY PRICING				
01	TMS32010	2H83 - Ceramic Package Only	2H83:	
			1	\$138.00
			100	110.50
			1000	96.50
		1H84 - Plastic Package Available	1H84:	
			1	97.00
			100	79.50
			1000	60.50
			2H84:	
			1	65.00
			100	52.50
			1000	40.00

cc: Jim Jones

Delivery Schedules: All herein are estimates only and subject to change. This is acknowledgment of Buyer's order and TI's Estimated Delivery Schedule for 9 months. Any change in the term of the order are Long Range Schedules. TI shall use its best efforts to meet the Estimated Delivery Schedule.

PC/amd

PLEASE REFER QUESTIONS TO SENDER OR:

MINIMUM LINE ITEM CHARGE:

Semiconductors and Integrated Circuits \$100



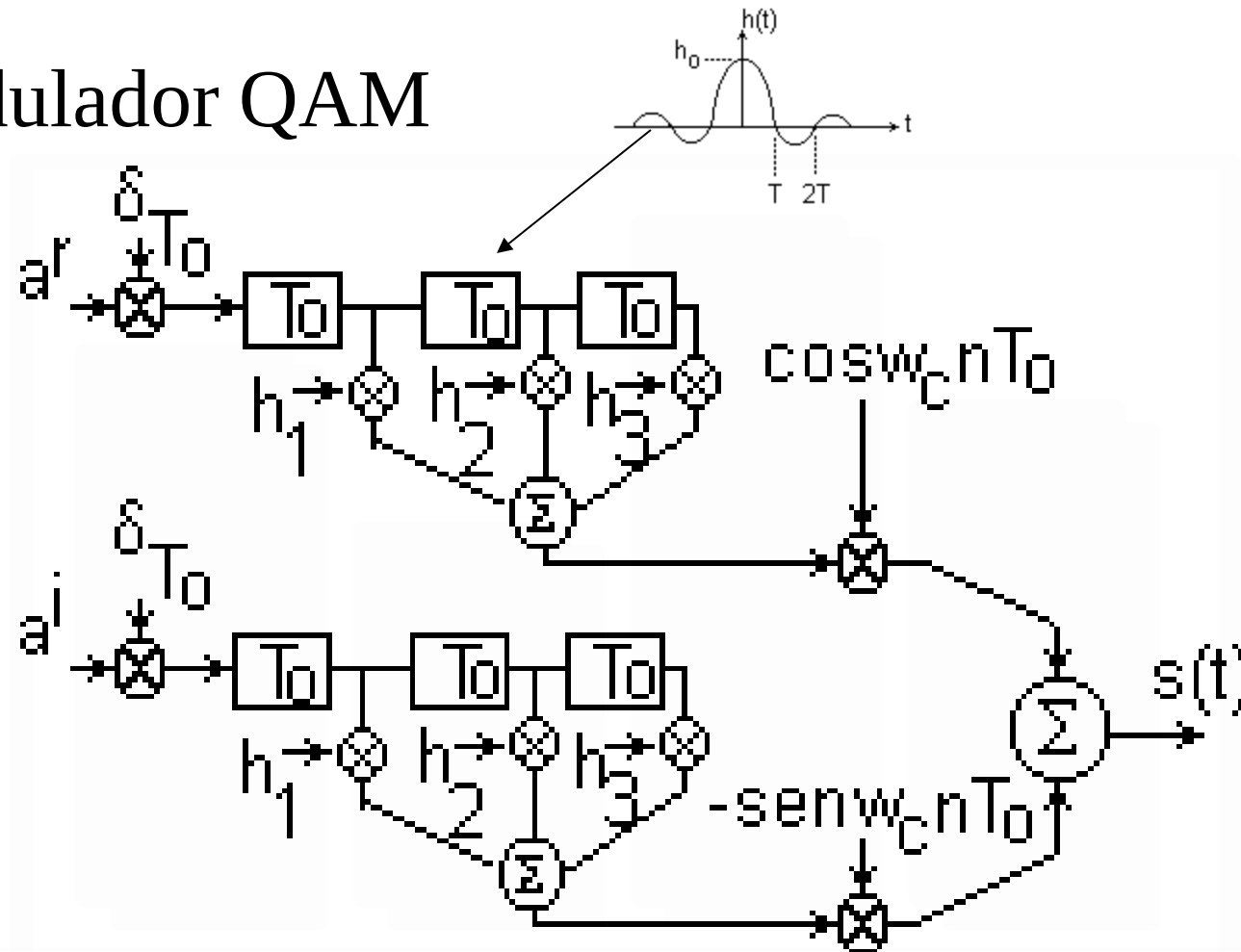
TEXAS INSTRUMENTS
INCORPORATED

POST OFFICE BOX 25012 DALLAS, TEXAS 75265

BY *Pete A. Craner*

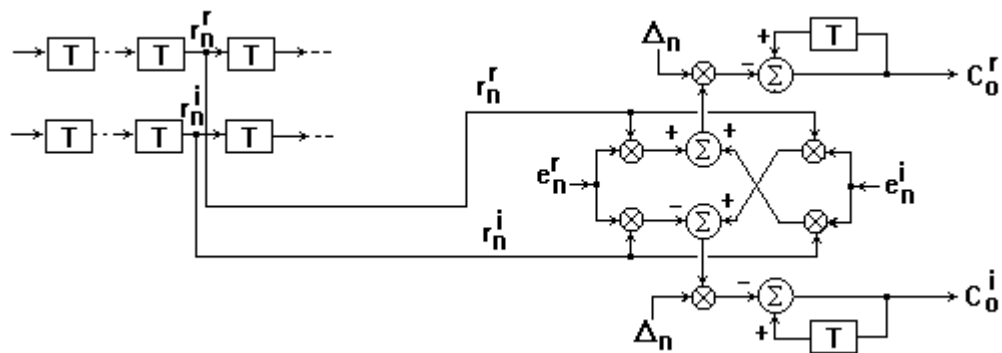
2H83:
1 \$138.00
100 110.50
1000 96.50
1H84:

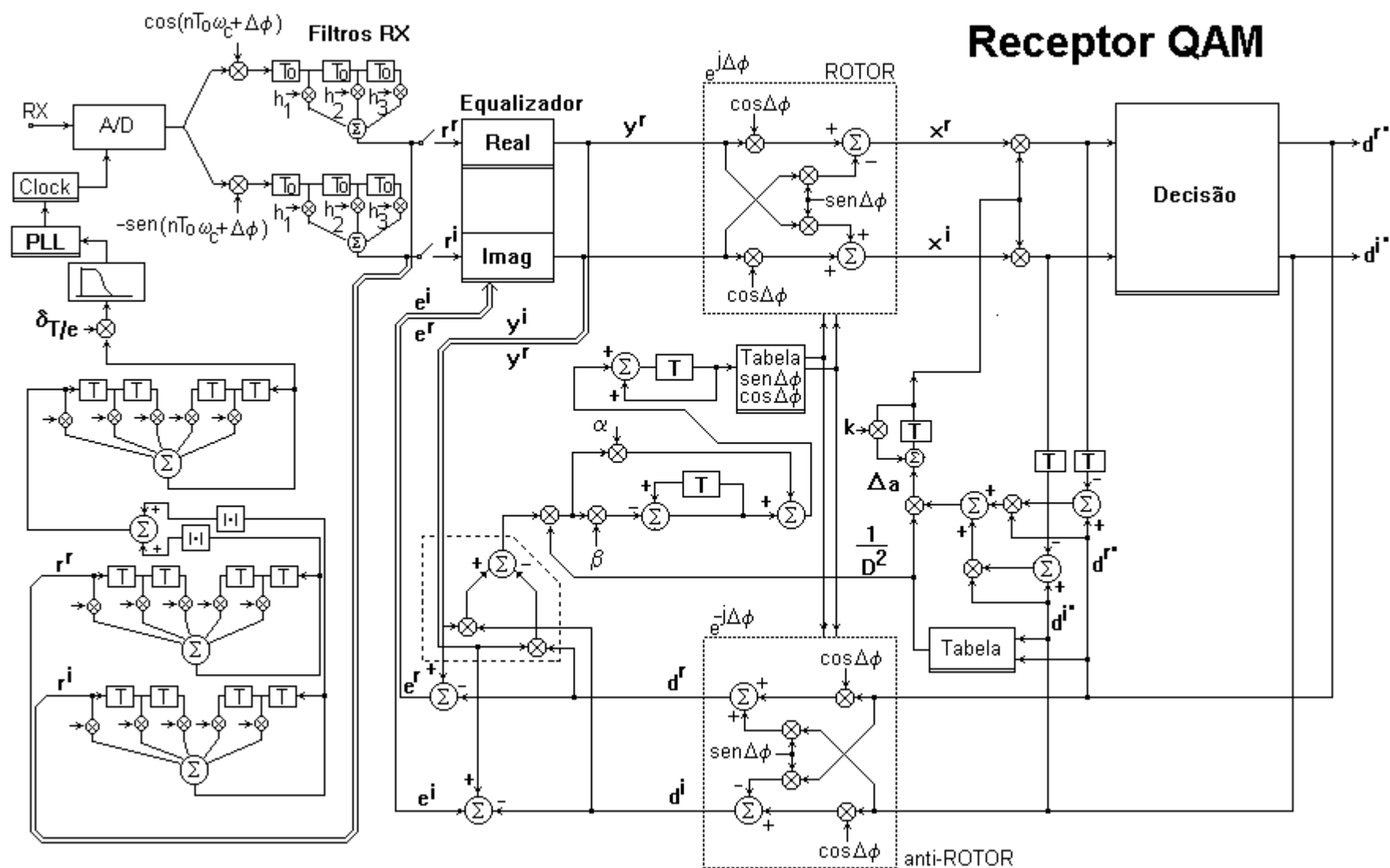
Modulador QAM



$$s(nT_0) = \sum_n a_n^r h(T-nT) \cos(\omega_c n T_0) - \sum_n a_n^i h(T-nT) \sin(\omega_c n T_0)$$

Equalizador Complexo Adaptativo





Processadores de sinal comerciais

MIPS	Ciclo instr [ns]	DSP fabricante, modelo		Instrução [bits]	Barrmto [bits]	ALU [bit]	Preço [US\$/1000]
2,5	400,0	Intel	i2920				
5	200,0	Texas	TMS32010	16	32	16	
5	200,0	Texas	TMS32020	16	32	16	
6,6	150,0	NEC	μPD77C20	23	16	16	
8	125,0	NEC	μPD77C25	23		16	
8	125,0	Analog Dev	ADSP-2100	24	40	16	
8,2	122,0	AT&T	DSP-32	32		32	
10	100,0	Texas	TMS320C25	16	32	16	
10,2	97,5	Motorola	DSP56001	24		24	
20	50,0	Texas	TMS320C51-40	16		16	
28	35,1	Texas	TMS320C51-57	16		16	
40	25,0	Texas	TMS320C51-80	16		16	
80	12,5	Texas	TMS320LC54-80	16		16	6,00
120	8,33	Texas	TMSC54CST	16		16	
532	7,5	Texas	TMS320VC5421-532	16		16	
1200	6,67	Texas	SM320C6201B	16		16	384.00
2400	3,33	Texas	TMS320C6203B-300	16		16	
4800	1,67	Texas	TMS320C6416-600	16		16	

