



## 12-Channel PCM Voice Module



### FEATURES

- Supports twelve analog voice channels
- Toll-quality PCM encoded voice transmission, using A-Law or  $\mu$ -Law companding
- A single MP-2200 can support up to 120 voice channels over four E1 links
- Available interface versions:  
E&M, FXS, FXO or version without signaling
- Soft-selectable gain control for both receive and transmit level
- Configuration via Network Management System
- Fits into any I/O slot of the MP-2200B (6U) or MP-2200F (10U) chassis

### DESCRIPTION

- VC-12 is a 12 voice channel I/O module for the MP-2200, providing toll quality voice transmission. Voice signals are digitized using PCM, in compliance with ITU-T G.711 and AT&T PUB-43801 standards. Encoding and decoding are fully compliant with ITU-T requirements G.712, G.713 and G.714. Voice channel companding is user-selectable for A-Law or  $\mu$ -Law.
- A single MP-2200 chassis equipped with VC-12 modules can support up to 120 voice channels over four E1 links, or up to 96 voice channels over four T1 links.
- Each of the twelve PCM voice channels is allocated a timeslot on the link in a DS-0 compatible format, permitting voice channel switching in a system based on digital cross connect (DACs).
- The following interface versions are available for the VC-12 module:
  - VC-12/E&M** for supporting different types of E&M signaling: EIA RS-464 Types I, II, III, V and British Telecom SSDC5.
  - VC-12/FXS**, FXS interface with loop-start for direct connection to a 2-wire telephone in either of the following applications:
    - Off-premises Extension (OPX), where a local telephone on the PABX can be connected to an off-premises telephone, by dialing only the extension number assigned to the off-premises telephone.
    - Private Line Application (PLAR) (also referred to as Hot Line), where two telephones are connected directly via the E1/T1 link. When the

telephone on one side goes off-hook, the other telephone rings.

**VC-12/FXO**, FXO interface for direct connection to a PABX. VC-12/FXO works opposite a corresponding VC-12/FXS at the remote MP-2200, for connection to the remote extension or PSTN.

**VC-12** version without signaling. This version is intended for applications which do not require end-to-end signaling, or which use only in-band signaling (DTMF, for example).

- Four signaling operation modes are available:
  - Channel-associated signaling (CAS) transmitted in timeslot 16, compatible with ITU-T Rec. G.704 (available when using E1 main links only);
  - In-band “robbed bit multiframe” (RBMF) signaling transfer. This method is compatible with ITU-T Rec. G.704 and AT&T Pub. 43801, and is generally used with  $\mu$ -law companding (method is proprietary when using E1 main links);
  - Proprietary “robbed-bit frame” (RBF) signaling, which avoids the need for multiframe synchronization. RBF allocates the least significant bit of each channel to its own signaling information. This method allows the transmission of 31 voice channels by a MP-2200 system on each E1 link, even when using G.732N framing;
  - No signaling (for VC-12/E&M and VC-12 versions only).

# VC-12

## 12-Channel PCM Voice Module

- To provide feed and ring voltage, VC-12/FXS interface modules require a -48 VDC source. This voltage can be supplied either from a -48 VDC powered MP-2200 chassis, or in the case of an AC powered chassis, from an external Ringer-2000 or Ringer-2200 power supply unit. The feed and ring voltage is supplied directly to the VC-12 modules via the internal voltage bus of the MP-2200 chassis. The stand-alone Ringer-2200 unit can be used to provide the -48 VDC power supply for up to 120 voice channels. Ringer-2000 supports up to 60 voice channels.
- VC-12/E&M modules support Type I signaling standard without the need for an external power supply. For the other types of signaling, the internal -12V power supply is usually sufficient for connection to most PABX systems. (For full support of Types II, III, V and BT SSSDC5 signaling standards, an external -48V power supply may be required.)
- Gain control is soft-adjustable for both receive and transmit directions, enabling easy installation in all environments.
- Diagnostic capabilities include local loopback (where the transmit signal is looped back as the received signal) and loopbacks towards the remote/local equipment. Tone injection of 1 kHz, towards the remote equipment, is also available.
- All operating parameters (excluding switch-set E&M signaling type) are soft-selectable via the MP-2200 management system for both the local and remote modules.
- All twelve voice channels of the VC-12/FXS, VC-12/FXO or VC-12 version modules terminate on a single 50-pin TELCO connector. On the VC-12/E&M modules, each group of six channels terminate on one of two 68-pin SCSI connectors. Octopus cables are available for splitting the module connectors into twelve separate RJ-45 or RJ-11 connectors (see *Ordering*).

## APPLICATIONS

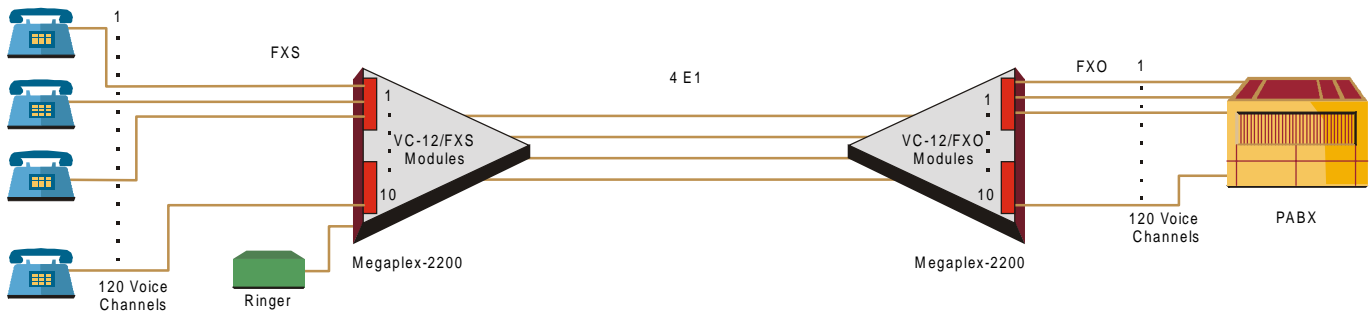


Figure 1. MP-2200 supporting 120 voice channels over 4 E1 links

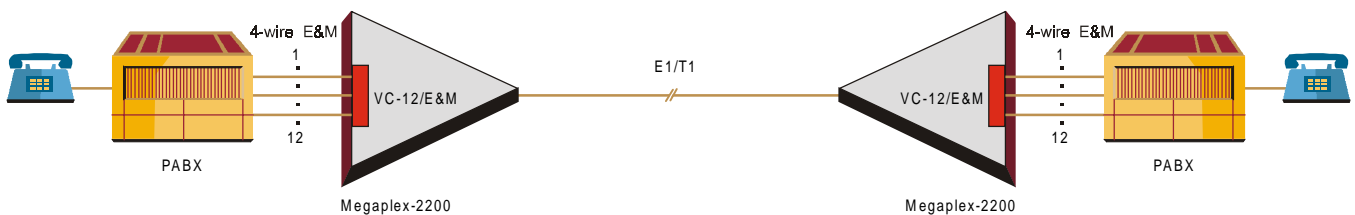


Figure 2. VC-12/E&M connecting twelve channels between PABXs

## 12-Channel PCM Voice Module

## SPECIFICATIONS

- **Number of Voice Channels**  
12
- **Bandwidth Requirement**  
64 kbps per enabled channel (one timeslot)
- **Voice Encoding Technique**  
PCM (per ITU-T G.711 and AT&T PUB-43801),  $\mu$ -Law or A-Law
- **Analog Interface**  
Line type:  
VC-12/E&M, VC-12: 2 or 4-wire, soft-selectable  
VC-12/FXS, VC-12/FXO: 2-wire  
ITU-T standards:  
2-wire: G.713  
4-wire: G.712, G.714
- **Analog Parameters**  
Nominal level: 0 dBm  
Nominal impedance: 600 $\Omega$   
Return loss (ERL):  
better than 20 dB  
Frequency response (Ref. 1020 Hz):  
0 dB  $\pm$ 0.5 dB, 300 to 3000 Hz  
0 dB  $\pm$ 1.1 dB, 250 to 3400 Hz  
Level adjustment: soft-selectable  
VC-12/E&M,  
VC-12: Tx: +8 to -17 dBm  
Rx: +1 to -24 dBm  
VC-12/FXS: Tx: +8 to -13 dBm  
Rx: +2 to -17 dBm  
VC-12/FXO: Tx: +8 to -16 dBm  
Rx: +2 to -23 dBm  
Steps: 1 dB  $\pm$ 0.15 dB, nominal

Signal to total distortion (G.712, G.713 method 2):

- 0 to -30 dBm0:  
better than 33 dB
- +3 to -45 dBm0:  
better than 22 dB

Idle channel noise:  
better than -70 dBm0 (+20 dBnc)

Transformer isolation: 1500 VRMS

- **Signaling**  
(according to interface version)

### VC-12/E&M

User-selectable by switch settings:

- EIA RS-464 type I
- EIA RS-464 types II, III, V and British Telecom SSDC5 using -12V in place of -48V

Pulse dial distortion:  $\pm$ 2 msec max.

### VC-12/FXS

EIA RS-464

Loop-start

#### On-hook/Off-hook threshold:

( $V_{in} = 48V$ )  
3V to 80%  $V_{in}$  between TIP and RING at off-hook state  
Higher than 83%  $V_{in}$  between TIP and RING at on-hook state

#### Feed current:

22 mA ( $\pm$ 10%)

#### External ringer:

70 VRMS ( $\pm$ 10%),  
Overload protected 20 Hz ( $\pm$ 10%),  
1 sec On, 3 sec Off

### VC-12/FXO

EIA RS-464

Loop-start

#### DC impedance:

Off-hook:

- 100 $\Omega$  at 100 mA feed
- 230 $\Omega$  at 25 mA feed

On-hook: Above 1M $\Omega$

#### Ring detector:

20 k $\Omega$  @ 20 Hz, 70 VRMS

Detection:

> 20 VRMS, 17-25 Hz

No detection:

< 5 VRMS

### VC-12

No signaling

- **Dialing**  
DTMF or pulse
- **End-to-End Signaling**

#### T1:

Robbed bit signaling:

- 667 samples per second with D4
- 333 samples per second with ESF
- 8000 samples per second, proprietary

#### E1:

Soft-selectable:

Channel associated signaling per ITU-T G.704 para. 3.3.3.2

Robbed bit signaling for up to 31 PCM channels on E1 link:  
500 samples per second,  
8000 samples per second, proprietary

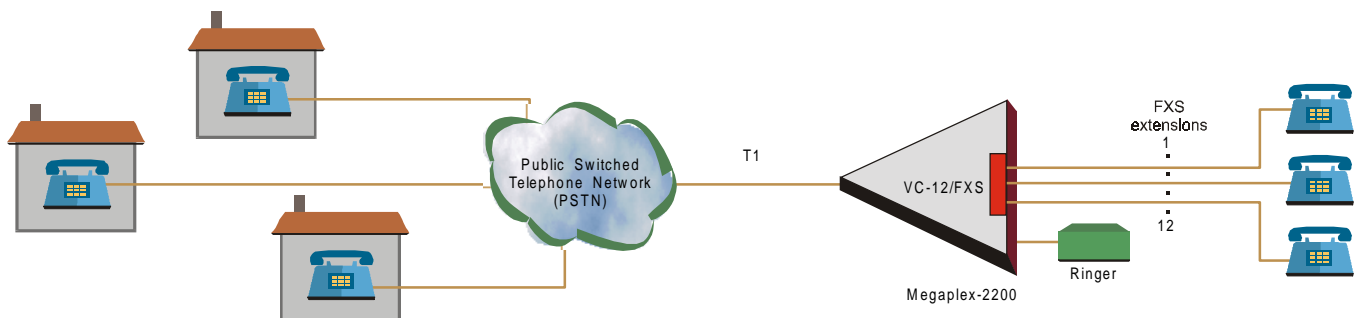


Figure 3. VC-12/FXS connecting twelve remote extensions to PSTN over T1 (Robbed Bit Multiframe)

# VC-12

## 12-Channel PCM Voice Module

- **Diagnostics**

Local loopback - for each channel, towards the local analog equipment  
Remote loopback - for each channel, towards the remote digital equipment  
Tone inject - for one channel at a time, towards the remote digital equipment  
Self test - run automatically for entire system upon power up

- **Indicators**

VC-12/E&M:  
(per channel)  
E-lead  
M-lead  
VC-12/FXS:  
(per channel)  
Remote call  
Local off-hook  
VC-12/FXO:  
(per channel)  
Remote off-hook  
Ring detect  
VC-12:  
Module failure

- **Connectors**

VC-12/E&M:  
two 68-pin SCSI (one for ch1 to ch6, one for ch7 to ch12)  
VC-12/FXS, VC-12/FXO, VC-12:  
one 50-pin TELCO (for all twelve channels)

## ORDERING

**MP2200\$-VC12**/\*  
12-Channel PCM Voice Module for MP-2200

\$ Specify chassis type:  
**BM** for MP-2200B (6U) chassis  
**FM** for MP-2200F (10U) chassis

\* Specify interface:  
**E&M** for E&M  
**FXS** for FXS  
**FXO** for FXO  
(Default is for version without signaling)

*Note:* a Ringer-2000 or Ringer-2200 is required to provide ring voltage for FXS type interfaces.

## CABLES

Octopus cables for splitting the large VC-12 channel connectors and connecting them directly to user equipment connectors. Cable lengths are 2m (6 ft).

**CBL-VC12/FXOS**  
(for VC-12/FXS and VC-12/FXO)  
Cable for connecting one 50-pin TELCO connector to twelve RJ-11 connections.

**CBL-VC12/E&M**  
(for VC-12/E&M)  
Cable for connecting one 68-pin SCSI connector to six RJ-45 connections.

*Note:* two cables must be ordered to support all twelve channels.

**CBL-VC12**  
(for VC-12 without signaling)  
Cable for connecting one 50-pin TELCO connector to twelve RJ-45 connections.



data communications

<http://www.rad.com>

- **Corporate Headquarters**  
12 Hanechoshet Street  
Tel Aviv 69710, Israel  
Tel: (972) 3-6458181  
Fax: (972) 3-6498250, 6474436  
Email: [rad@radmail.rad.co.il](mailto:rad@radmail.rad.co.il)

- **U.S. Main Office**  
900 Corporate Drive  
Mahwah, NJ 07430  
Tel: (201) 529-1100  
Fax: (201) 529-5777  
Email: [market@radusa.com](mailto:market@radusa.com)

764-173-08/98