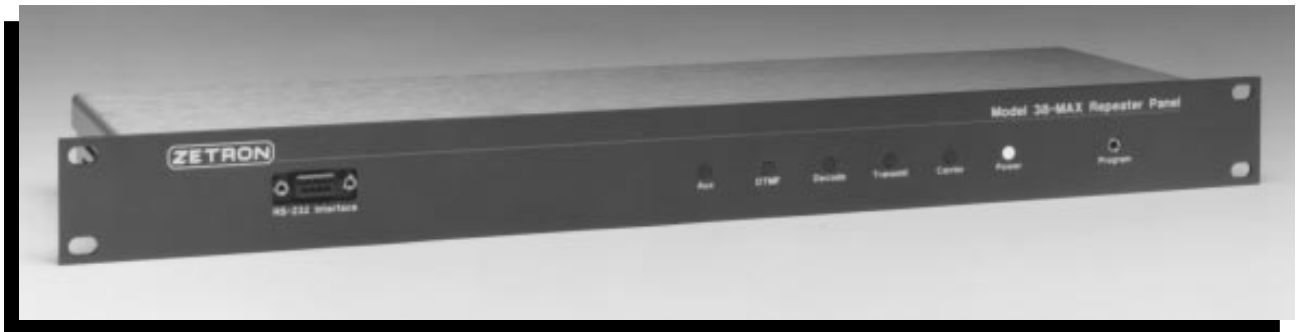


Repeater Panel



FEATURES

- Three-year warranty and interconnect trade-up option
- 160 user groups (50 CTCSS and 110 DCS)
- ToneLock high performance decoding
- Squelch tail elimination for proper operation
- Airtime accumulation and prepay per user
- Airtime usage graphs
- Dynamic conversation limits
- RS-232 and remote DTMF programming
- Program or monitor while in use via RS-232
- Per user programmable features
- Site alarm and auxiliary relay
- Privacy mode prevents “barge-ins”
- Vacant tones and codes can be reserved
- Courtesy tone and tailbips
- Remote PTT input for wireline takeover

INTRODUCTION

The Zetron Model 38-MAX is a high capacity, remotely programmable, community repeater controller. It provides individualized repeater service for up to 160 different customer groups using 50 CTCSS tones and 110 DCS codes. This makes it the ideal panel for scan-based trunking applications.

In addition to a large user-group capacity, the 38-MAX offers other unique features to enhance repeater performance. An “airtime usage summary” provides a convenient method of determining the loading across every tone/code. A “dynamic conversation timer” automatically lengthens and shortens the maximum conversation limit in accordance with the rise and fall of traffic patterns.

A “dual time constant squelch” compensates for the difference in transmission strengths between nearby radios and distant or obstructed radios.

Performance Features

The Model 38-MAX is equipped with *all* of the performance features serious community repeater operators have come to demand.

ToneLock 3dB SINAD decoding, a Zetron exclusive, eliminates dropouts resulting from weak, fading signals, or high modulation levels. The usable range of the repeater will not be limited by the decode performance of the repeater tone panel when a Model 38-MAX is in control.

The Model 38-MAX recognizes when a radio unkeys with squelch tail elimination, silently muting repeater receiver audio. The Model 38-MAX also transmits squelch tail elimination ensuring that listening radios quiet instantly without an annoying noise burst.

High quality audio processing circuits in the Model 38-MAX are designed to ensure the best audio quality available.

Special Features

Individual station IDs may be programmed for each user, and a single system ID may be programmed for private carrier or cooperative applications. Automatic station ID means that users are no longer required to use valuable air time speaking their call sign. The Morse code ID feature automatically transmits a user’s call sign at the beginning of a transmission and at programmed intervals.

Courtesy beeps may be used to encourage unfamiliar radio users when to begin speaking, or tailbips (one beep per second) can occur during the repeater hold time.

The **reserved user feature** prevents a co-channel system operator from commandeering a

temporarily unused tone or code. The Model 38-MAX reserves a tone or code by transmitting an alert signal and muting repeat audio when it detects the tone or code.

The **privacy mode** feature prevents users on different CTCSS tones or digital codes from assuming control of the repeater until after the transmitter hold time expires. This reduces or eliminates repeater bargains.

The **anti-kerchunker filter** cancels the transmit hold time and drops the repeater transmitter immediately if a mobile transmission lasts less than the specified time. This prevents prolonged repeater transmissions due to momentary mobile key-ups. The anti-kerchunker filter time is programmable.

The **auxiliary relay** provides a contact closure that can be programmed to close whenever a specific CTCSS tone or DCS code is received. Any individual tone or code, or group of tones or codes may be programmed to activate the relay.

Cross tone, cross code, and tone code encoding give the Model 38-MAX the most flexibility. This feature also permits multiple repeaters at different locations to be placed on a single frequency. Mobiles may roam between two or more systems, accessing each individual repeater with a different tone or code, and receiving on a common tone. The courtesy tone frequency may be set to a different pitch for each repeater to distinguish the repeater location or coverage.

Temporary cross-tone, or cross-tone defeat may be initiated using a DTMF keypad on a mobile or handheld radio. This feature provides a simple method for the repeater operator to communicate with any subscriber on the system.

The **site alarm** feature will transmit a DTMF page with any CTCSS or DCS code, and an audible alert when the alarm input detects activity. The alarm may be used to alert the system operator of site conditions such as break-in, high temperature, or equipment failure.

CHANNEL MANAGEMENT

An **internal database** keeps track of all airtime use and, for accounting purposes, downloads to a PC or Zetron's airtime billing package.

A **prepaid airtime** feature allows a customer to purchase a block of airtime in advance. As the customer uses the repeater, the amount of unused airtime decreases. When the supply of prepaid airtime is nearly gone, the customer hears a warning tone whenever a radio unkeys. If the customer does not purchase additional airtime, the customer's tone reverts to reserved status when the original block of time runs out. This permits the system operator to pre-bill problem customers.

The **airtime hog** feature penalizes long winded talkers on a per user basis. If a user exceeds a preprogrammed time limit, the user is prohibited from using the repeater for the programmed penalty period. Warning tones are sent when a penalty is imminent.

Dynamic conversation time limits may be selected on a per user basis. Based on the repeater loading, the time limits will get shorter as the loading increases. This feature regulates access to the system during peak load times. The minimum and maximum conversation limits are selectable by the repeater operator.

PROGRAMMING AND CONTROL

Adding or removing customer groups from the radio shop is easily accomplished using a radio with DTMF encode, packet radio, or a terminal with a dial-up modem.

The built-in RS-232 port may be used with nearly any terminal or personal computer.* The terminal or PC may be connected directly to the unit, or remotely via telephone modem or packet radio. Programming by terminal or computer is made simple and efficient through the use of menus and prompts. Off-line database backup and restore is made possible through the use of ZCU, the Zetron Communications Utility for IBM PC compatible computers.

The Model 38-MAX remains fully operational while being programmed from the RS-232 port. This means the repeater stays on the air even while retrieving data, changing parameters, or monitoring the system in real-time. A graphical representation of the Model 38-MAX front panel may be viewed on an ANSI compatible terminal to monitor real-time system functions. The screen will show:

Z E T R O N		Model 38-MAX Repeater Panel					
32%	009:14:56	100.0	█	d 074	█	█	█
Loading	Airtime	Encoding	Decoding	Transmit	Carrier		

INSTALLATION AND SETUP

Easy installation and setup ensures that a technician can install a Model 38-MAX in nearly any repeater or duplex station. Installers will appreciate the detachable screw terminal connector that makes the installation a snap. Factory wired cables and field proven application notes take the guesswork out of the installation procedure. Installation application notes are included in the instruction manual for the most popular repeaters from companies such as Ericsson/G.E., E.F. Johnson, Icom, Midland, Motorola, Regency, Repco, Standard, Tait, Uniden, and others. Only six connections are required in typical installations, and expert interface assistance is available from Zetron.

* The RS-232 port on the front panel of the 38-MAX is designed for user-friendly connection to a laptop or PC. It is not intended for use with a directly connected Model 8B Repeater Programmer/Timekeeper. An 8B may be used for programming only if the 8B is connected to a radio and operating in the "LIVE" mode (not the "PROGRAM" mode).

System Programming

Enter ? to repeat this menu

- | | |
|-------------------------|---------------------------|
| 1. COR user# = 0 | 19. Alarm DTMF = *1239# |
| 2. 1st Tx hold = 20 | 20. Alarm tone = 0 None |
| 3. AntiKerchunk = 0 | 21. Alarm pwr up = Off |
| 4. Tail bips = Off | 22. Password = 12038 |
| 5. Beep freq = 1000 | 23. Access user# = 0 |
| 6. Timeout time = 3 | 24. Access alarm = Off |
| 7. Timeout ID = Off | 25. Access delay = 0 |
| 8. ID interval = 15 | 26. Mic txhold = 0 |
| 9. ID frequency = 1200 | 27. Remote type = 0 Morse |
| 10. ID speed = 22 | 28. Baud rate = 4800 |
| 11. ID periodic = Off | 29. Serial tone# = Off |
| 12. ID sys user# = 0 | 30. DCStx invert = Off |
| 13. Hog idle = 5 | 31. DCSrx invert = Off |
| 14. Hog penalty = 30 | 32. DCS bit errs = 2 |
| 15. Hog minimum = 10 | 33. CTCSS delay = 80 |
| 16. Hog maximum = 100 | 34. CTCSS hold = 0 |
| 17. Min airtime = Off | 35. Interdigit = 4 |
| 18. Remote PTT = 0 None | |

User Programming Example

Items to program (user 51 shown) are:

- | |
|-------------------------|
| 1. User enable = On |
| 2. DCS decode = d 023 |
| 3. Encode = d 023 |
| 4. Txhold time = 20 |
| 5. CTCSS tail = On |
| 6. Morse Id = WNCR-414 |
| 7. Reserve mode = Off |
| 8. Privacy mode = On |
| 9. Que beep = Off |
| 10. Last user ID = Off |
| 11. DTMF cmds = Off |
| 12. Hog limit = 0 |
| 13. Prepay mode = Off |
| 14. Airtime = 001:03:02 |
| 15. Aux relay = Off |

Airtime Usage Summary

* = Enabled Each * represents 5 minutes of airtime

- | | | | |
|------|-------|-----------|-------|
| * 1 | 67.0 | 001:02:05 | ***** |
| 2 | 69.4 | 000:04:32 | * |
| * 3 | 71.9 | 000:15:32 | *** |
| 4 | 74.4 | 001:45:31 | ***** |
| * 5 | 77.0 | 002:33:54 | ***** |
| 7 | 82.5 | 000:43:51 | ***** |
| * 8 | 85.4 | 000:16:02 | *** |
| * 13 | 100.0 | 002:15:43 | ***** |
| * 16 | 110.9 | 002:53:49 | ***** |
| 23 | 141.3 | 002:12:31 | ***** |
| 31 | 171.3 | 001:21:23 | ***** |
| * 39 | 196.6 | 001:04:34 | ***** |
| * 51 | d 023 | 001:03:02 | ***** |
| * 53 | d 026 | 000:43:21 | ***** |
| * 54 | d 031 | 000:24:42 | **** |
| * 55 | d 032 | 003:02:52 | ***** |
| * 56 | d 036 | 000:56:49 | ***** |
| * 58 | d 047 | 000:54:06 | ***** |
| * 59 | d 051 | 000:33:42 | ***** |
| * 60 | d 053 | 001:32:59 | ***** |

MAIN ENHANCEMENTS OF THE 38-MAX OVER THE 38A

- 160 user groups (50 CTCSS, 110 DCS) may be active simultaneously
- Airtime usage summary (see chart at left) provides a visual graph of how long each tone/code is on the channel
- "Dynamic conversation timer" automatically shortens conversations when traffic increases
- Easier, more straight-forward programming codes

SPECIFICATIONS

DECODER

CTCSS tones	50 standard tones between 67 and 254 Hz
CTCSS bandwidth	1.0%
DCS codes	110, programmable as any octal code 000-777. Default settings for 104 standard DCS codes
DCS noise immunity	Up to four bit errors in any position
Sensitivity	ToneLock 3dB SINAD CTCSS, 5dB SINAD DCS
Squelch tail elimination	Detects CTCSS reverse burst and DCS turnoff code
Input impedance	50K-ohm AC coupled. For connection to unswitched discriminator audio

ENCODER

Frequency accuracy	0.05 Hz
Frequency stability	Crystal controlled
Output amplitude	0.0 to 3.0 V p-p
Output slope	Flat or de-emphasized
Output distortion	Less than 2%
Impedance	Less than 1K-ohm AC coupled
Squelch tail elimination	DCS turnoff code sent, CTCSS encode drops minimum of 150ms before PTT, muting listening receivers

TONE ENCODER

Morse ID frequency	1200Hz; adjustable ± 800 Hz
Beep frequency	1000 Hz; adjustable 400 to 4000 Hz
DTMF encoder	Standard DTMF tones

GENERAL

Connections	Discriminator audio, Receive carrier detect, Transmit audio, CTCSS/DCS encode, PTT, Power, Ground, Auxiliary relay output, Site alarm input
Connector type	Detachable screw terminal
Transmit	SPDT relay
Adjustments	Rear panel accessible; Rx input level, Tx output level, CTCSS/DCS encode level, Carrier detect threshold
Indicators	Power, Rx carrier, Transmit, CTCSS DCS Decode, DTMF, Aux relay
Serial data port	RS-232 compatible levels
Interface	Tx data, Rx data, ground
Handshake	XON/XOFF protocol
Baud rate	Selectable: 150, 300, 600, 1200, 2400, 4800, 9600 RS-232 port fully operational while unit is active on the channel
Rear switches	Audio input level high/low, audio input flat/de-emphasis, CTCSS/DCS encode level high/low, CTCSS/DCS encode flat/de-emphasis, audio output level high/low, COR internal/external, COR polarity normal/invert, COR pull-up on off
COR input range	Adjustable threshold of 0 to 7 VDC. Detection requires a 1 volt change between carrier and no carrier conditions
Current consumption	70 mA at 13.8 VDC (LEDs disabled), 100 mA typical
Operating voltage	11.0 VDC to 15.0 VDC
Rackmount size	1.7" x 19" x 4.8"
Weight	2.2 lb.
Operating temperature	0 to 65° C.

ZETRON TONE PANELS

Model 37 Repeaterman for when only 2 CTCSS tones are needed in a small module.

Model 37-MAX Repeater Pal for all 154 CTCSS/DCS in a small module.

Model 48jr Repeater Patch for both interconnect and 154 CTCSS/DCS in a small module.

Model 38A Repeater Panel with RS-232 port and airtime accumulation for up to 60 user groups.

Model 38-MAX Repeater Panel for up to 160 user groups and detailed channel analysis.

Model 39 Premium Repeater Panel for systems that need a built-in keypad/LCD on front panel.

Model 48-MAX Interconnected Tone Panel for full-featured interconnect and tone panel in one package.

For more information on this and other Zetron products, contact:

