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# MASTERCALL

TELEPHONE CALL DIVERTER

MODEL MC-4044 SERIES 8

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INSTRUCTION AND INSTALLATION MANUAL

G/99120A EDITION 3

JULY, 2006

ACA SUPPLIER'S CODE N468

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DESIGNED AND MADE IN AUSTRALIA

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## MASTERCALL MC-4044 SERIES 8

### TELEPHONE CALL DIVERSION SYSTEM

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# **MASTERCALL MC-4044 SERIES 8 TELEPHONE CALL DIVERSION SYSTEM**

**DESIGN TWO THOUSAND PTY LTD MELBOURNE AUSTRALIA**

## **SECTION 1 – GENERAL DESCRIPTION OF THE MASTERCALL SYSTEM**

The MASTERCALL Call Diverter manufactured by Design Two Thousand Pty Ltd diverts incoming calls on one line via a second line to any dial up telephone number. Incoming phone calls are redirected to the required number via the normal public switched telephone network (PSTN). 'Double' diversion and diversion to international numbers is possible with this system.

Design Two Thousand Pty Ltd, established in 1968, has been making Mastercall units since 1981, and this MC-4044 Series 8 is the new flagship model. It is the digital successor to the well-proven MC-4044 Series 5.

Things that make the new Series 8 unique are full remote programmability without the need for a modem, real voice prompts to the user, and the many advantages of digital signal processing.

MASTERCALL MC4044 Series8 Telephone Call Diverter incorporates the following features and many more:

- Full Remote Control with digitized voice prompts and responses
- Local Keypad programming
- Programmable diversion announcement
- Programmable identification announcement
- Programmable ID tone
- Diversion if no answer or auto-turn on
- Screened call diversion
- Call counter
- Two to eight number try
- Voice frequency hybrid amplifier
- Call progress detectors
- Loop current detectors for calling party control and answer detect
- 12 → 48 volt dc (nom.) operation (12 V dc 750 mA power adaptor supplied)
- Alarm Input (Optional)

## **SECTION 2 – INSTALLATION INSTRUCTIONS**

Two telephone lines and a mains power point are required for Mastercall to operate. Batteries are NOT required to retain data in memory nor to retain dialing and announcements. An optional battery standby system is available to keep Mastercall diverting in the event of mains power failure.

Several software facilities need to be programmed, including entering the diversion number and selecting the required Recorded Voice Announcements (RVA). These are described in Section 3. All programming operations can be performed using the inbuilt Keypad or by Remote Control over the telephone.

### **Diverter Connection**

The diverter is connected to the telephone lines using the line cords provided. To check the connection, a telephone should get dial tone when plugged into either telephone socket.

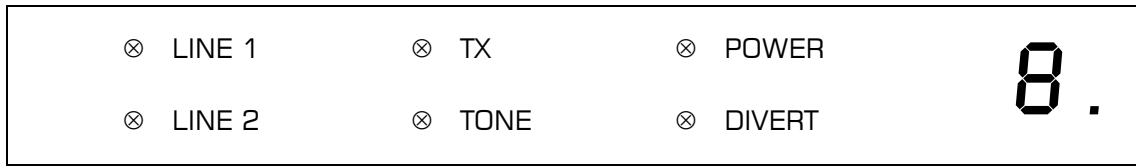
The 12V power adaptor is connected to the diverter power socket at the rear of the unit and to a mains power point at which time the 'POWER' LED will light up.

Once installed, the Call Diverter diverts calls that come in on line one (factory setting).

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## SECTION 3 – PROGRAMMING INSTRUCTIONS

### DISPLAY PANEL



INDICATOR	MEANING
POWER	The Power is on
DIVERT	Diversion is activated
LINE 1	Line 1 is ringing or seized
LINE 2	Line 2 is ringing or seized
TX	Audio is transmitted from Line 1 to Line 2
TONE	Valid service tone or DTMF is detected and/or Audio is transmitted from Line 2 to Line 1
8.	Displays diversion number, programming information and activity codes

### THE KEYPAD

The Mastercall keypad is used to program Mastercall. The operation of Mastercall at the keypad is detailed in this section.

#### MASTERCALL Activate/Deactivate (Diversion on/off)

By pressing 1, the MASTERCALL divert state is toggled. The yellow 'DIVERT' LED on the display panel indicates the diversion-activated state. When this LED is on, the activated state is selected and all incoming calls will be diverted to the pre-programmed number. The yellow 'DIVERT' LED stays on when a diverted call is in progress.

#### Diversion Numbers

The number that Mastercall dials is programmed via the keypad. To enter a new diversion number you enter: 21 nnnn nnnn #, where nnnn nnnn is the required diversion number (up to 23 digits).

#### Second Diversion Number

If the first number is unanswered or engaged, a second number can be tried. To enter a new second diversion number you enter:

22 nnnn nnnn #, where nnnn nnnn is the second number if required (up to 23 digits).

#### Please Note:

- Up to eight diversion numbers may be entered using the entry codes 21 through to 28.
- To turn off or erase a number simply enter a single '0' as the diversion number.

#### Other Notes:

1. A dialing pause can be entered by pressing \*#.
2. A star (\*) can be entered by pressing \*\*.
3. A hash (#) can be entered by pressing ##.
4. To check the diversion number(s) press 2x#.

---

## Identification Tone

When a diverted call is answered, MASTERCALL can send a special connect tone to indicate the diversion and that the audio path is open to the caller.

To activate the ID Tone, press 81.  
To deactivate the ID tone, press 80.

## Call Counter (Option)

Press 30 and MASTERCALL will display the number of successful diversions (0-999).  
Press 30 then \* if you wish to reset (clear) the counter.

## REMOTE CONTROL OPERATION

MASTERCALL can also be programmed remotely from another telephone. Operation is dialing d here. Please note that ALL programming operations can be performed by Remote Control. So after having accessed Remote Control, simply program by phone as you would at the Keypad.

### Programming the Personal Identification Number (PIN) for Remote Control Access

Access .to remote programming is protected by a PIN which is stored via the keypad. This four digit number is programmed by pressing the following keys.

1. \* # 0 pppp #, where pppp is the 4 digit code
- This number cannot be recalled, so if it is forgotten, a new number must be stored.

### To Access Remote Control

1. Dial the line 2 telephone number.
2. MASTERCALL will answer with the Remote voice prompt after the preprogrammed answer delay.
3. After the message has finished, enter the PIN number using a DTMF dialing telephone or a portable DTMF encoder.

### Activate/deactivate MASTERCALL

You will be prompted by the dialing d voice.

1. To change the divert status between on/off, press 1.

### Confirmation of diversion number(s)

1. Press 21 then #.
2. The diversion number will be replayed.

### Change the diversion number

1. Press 21.
2. After the prompt has finished, enter the required number
3. Press #
4. The new number will then be replayed.

The programming can be done in any sequence. Once programming is completed, replace the receiver and MASTERCALL will hang up in 5-20 seconds. Do not test the diverter until 20 seconds have elapsed.

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## RECORDED VOICE ANNOUNCEMENTS (RVA)

MASTERCALL can play a digitally recorded announcement to the caller while the call is being re-directed to another number. MASTERCALL can also announce the origin of the diverted call to the party receiving calls. The Digital Voice Announcer represents the latest in digital EPROM and EEPROM based voice announcements.

The Recorded Voice Announcements are grouped as follows:

### Standard Diversion Announcement

A standard announcement, *“Please hold the line...ring ring...”*, is played to the caller while the call is being re-directed to the pre-programmed diversion number.

To Enable the Standard Diversion Announcement (from the Keypad):

1. Press 71.
2. The display reads ‘on’.

To Disable the Standard Diversion Announcement (from the Keypad):

1. Press 70
2. The display reads ‘off’.

### Personalised Diversion Announcement (Optional)

A personally recorded announcement up to 16 seconds in length (recordable from any telephone) is played to the caller while the call is being re-directed to the pre-programmed diversion number. This feature will only work if MASTERCALL is fitted with the PRVA hardware.

To Record the Personalised Diversion Announcement (by Remote Control):

1. Call line 2 of MASTERCALL, listen for one ring, hang up and wait a few seconds.
2. Redial line 2 and wait for greeting *“Hello, this is MASTERCALL, please enter PIN”*.
3. Enter your four digit PIN.
4. Press 75
5. Listen for *“Record Announcement”*.
6. Dictate your announcement clearly then press #. The announcement will be replayed. Repeat steps 4 – 6 if necessary. The announcement is automatically enabled.
7. Enter other programming changes or hang up.

Summary: Enter PIN, 75...record announcement...#, hang up.

To Enable the Personalised Diversion Announcement (from the Keypad):

1. Press 71
2. The display reads ‘on’.

To Disable the Personalised Diversion Announcement (from the Keypad):

3. Press 70
4. The display reads ‘off’.

### Standard Identification Tone

A short series of “Connecting Tones” is played to the receiving party on answering a diverted call.

To Enable the Standard Identification Tone (from the Keypad):

1. Press 81.
2. The display reads ‘on’.

To Disable the Standard Identification Tone (from the Keypad):

1. Press 80.
2. The display reads ‘off’.

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## Personalised Identification Announcement (Optional)

A personally recorded announcement (recordable from any telephone), announcing from where the diverted call has originated, is played to the receiving party when they first answer a diverted call. For example: “*Melbourne Office*”. This feature will only work if MASTERCALL is fitted with the PRVA hardware.

To Record the Personalised Identification Announcement (by Remote Control):

1. Call line 2 of MASTERCALL, listen for one ring, hang up and wait a few seconds.
2. Redial line 2 and wait for greeting “*Hello, this is MASTERCALL, please enter PIN*”.
3. Enter your four digit PIN.
4. Press 85.
5. Listen for “*Record Announcement*”.
6. Dictate your announcement clearly then press #. The announcement will be replayed. Repeat steps 4 – 6 if necessary. The announcement is automatically enabled.
7. Enter other programming changes or hang up.

Summary: Enter PIN, 85...record announcement...#, hang up.

To Disable the Personalised Identification Announcement (from the Keypad):

1. Press 80.
2. The display reads ‘off’.

Notes:

The Diversion Announcement and the Identification Announcement can be independently enabled or disabled from the Keypad or by Remote Control from any remote telephone. Recording the announcements can only be done by Remote Control.

## KEYPAD ENABLE/DISABLE

The keypad can be disabled and enabled via the entry of a special code. When enabled the keypad is used to perform all functions detailed here. When the keypad is disabled, the only keys that work are the 1 key to turn the diverter on and off, and the following code to enable the keypad.

The sequence to enable/disable the keypad is as follows.

To enable the Keypad (to unlock it): Press \* 3333 #. *UNLOCK* is displayed.

To disable the Keypad (to lock it): Press # 3333 #. If any key other than 1 or # is pressed, *LOCK* will be displayed

## AUTO-TURN ON

MASTERCALL can be programmed to automatically turn on and divert a call after a preset delay. When MASTERCALL is in the de-activated state, and the incoming telephone rings, MASTERCALL will activate and process the diversion request and remain activated after the call. The delay before auto turn on is entered as a 3 digit number which is the turn on delay in seconds.

1. \* 6703 #
  2. \* 24 sss \* #, where sss is the delay in seconds
- To disable Auto-Turn On, program sss as 000.

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## SYSTEM CONFIGURATION CODES

Using either the MASTERCALL Keypad or by Remote Control, enter System access code \* 67 03 #, listen for "Please enter command"

### COMMANDS

- \* nn where nn is option code number
- n = entry
- # = scroll down to next option number
- \* \* = abandon (do not save any changes)
- \* # = store (save any changes)

After either storing or abandoning program changes you can continue to make other programming changes, press ## to end, or simply hang up.

### System Options Programming

\*6703# = Access to System Options Programming

	Option	Range	Default	Description
*01	Reversal On Idle & COD Ignore	0,1	0	0 = ROI detect for disconnect, 1 = ROI ignore
*02	Answer Detect Mode	0,1,2	0	0 = Speech or ROA, 1 = speech only, 2 = ROA only
*03	Post Dial Answer Delay	000-255	030	How long a wait for answer before dialing next number
*04	Hybrid return loss	000-255	080	Hybrid amplifier return loss in dB/4
*05	Dial Tone Ignore	0,1	0	0 = dial tone before dialing, 1 = 2 sec before dial
*10	Method of Remote Control Access on Line 2	0,1	0	0 = one call for remote access, 1 = two calls for remote access
*11	Seconds before Remote Control Answer on Line 2	000-090	006	Number of seconds that Line 2 rings before answer.
*15	Silence Disconnect_M	000-255	002	Minutes of silence for disconnect
*16	Total Call Time Limit_M	000-255	060	Minutes allowed before automatic disconnect
*24	Auto-Turn On	000-255	000	Seconds of ringing before Auto-Turn On when diversion is off.
*61	Gain L1 → L2 in dB	00-30	10	How loud voice is from line 1 to line 2.
*62	Gain L2 → L1 in dB	00-30	10	How loud voice is from line 2 to line 1
*64	Hybrid Amplifier Loop Margin	00-30	10	Increasing this value decreases duplex gain

\*# = Save

## = End programming and hang up.

Notes:

- \*67709600# sets all options to the factory default, the MASTERCALL responds "Thank you, please enter command". Take care not to unintentionally enter this command!!!
- \*67709630# erases all diversion numbers stored in MASTERCALL. MASTERCALL responds "Thank you, please enter command". Take care not to unintentionally enter this command!!!

## HYBRID AMPLIFIER BALANCING

Full duplex amplification can be achieved by performing the hybrid balancing procedure.

1. Press \*6703# on the Mastercall Keypad.
2. Press \*04
3. Enter 000
4. Press \*#

- Ring line 1 and listen for the sweep tone and Mastercall will display the return loss. Wait a few seconds and hang up.
- Ring line 2 and listen for the sweep tone and Mastercall will display the return loss. Hang up.

The hybrid return loss is automatically set for as much full duplex amplification possible. You can repeat the above procedure at any time.



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## SECTION 4 - DESCRIPTION OF OPERATION

MASTERCALL is a call redirection unit capable of dialling out a preset number(s). Tone and line current detection is provided in software to determine when a call has been answered. MASTERCALL then connects the incoming call to the answering party. The lines are released when either or both parties hang up.

### Diversion of Incoming Call

The operational sequence for an incoming phone call on line 1 is:

1. Dial out number on line 2.
2. When answered, send ID announcement.
3. Answer line 1 incoming call and connect through to line 2.
4. Disconnect call on receipt of line lockout or the disconnect signal from the exchange ( or DTMF \*# forced disconnection).

### Activity Codes on Display

- 0. = Silence.
- 1. = Busy tone.
- 2. = Modulated dial tone.
- 3. = Number Unobtainable (NU).
- 4. = Speech.
- 5. = Steady tone.
- 6. = No progress or 'random' busy tone detected.
- 7. = Ring tone.
- 8. = Connecting caller to diverted number.
- 9. = Deciding.

## SECTION 5 - TESTING

After installation, there are several facets that need to be tested. These include the connection to the phone lines and dialling operation of the diverter.

### Diversion of incoming call

1. Dial line 1 from another telephone.
2. Check the diverter for correct out-dialing on line 2 and connection of call.
3. Terminate call and check that the call diverter disconnects.

### Line current detection

If the call diverter is specially wired in Mode 3 to the phone line (in series, like a facsimile machine):

1. Set diverter to off mode (diversion deactivated).
2. Lift up a handset on either line in turn.
3. Check that the decimal point is illuminated.
4. Hang up handset and check the point goes out.

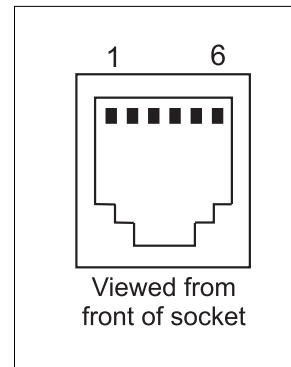
NOTES:

## SECTION 6 - CONNECTIONS

### TELEPHONE

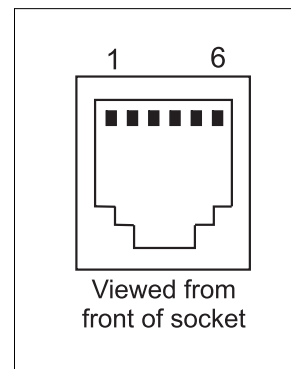
#### LINE 1

PIN	DESCRIPTION
1	
2	
3	Ring (Lb)
4	Tip (La)
5	
6	



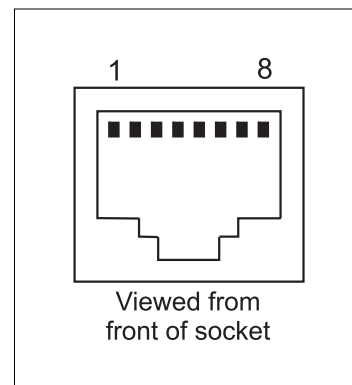
#### LINE 2

PIN	DESCRIPTION
1	
2	
3	Ring (Lb)
4	Tip (La)
5	
6	



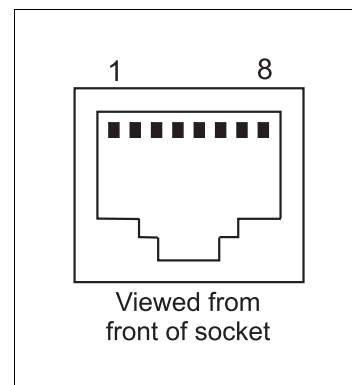
### ALARM INPUT & AUXILIARY OUTPUT RELAYS

PIN	DESCRIPTION
1	Relay 1 Normally Open
2	Relay 1 Common
3	Relay 1 Normally Closed
4	Alarm In
5	Ground
6	Relay 2 Normally Open
7	Relay 2 Common
8	Relay 2 Normally Closed



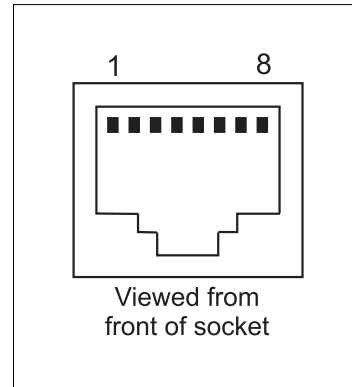
### RADIO

PIN	DESCRIPTION
1	PTT Common
2	PTT Normally Open
3	MAP 27 (Digital) Out
4	COS Indication from Radio
5	MAP 27 (Digital) In
6	Signal Ground (Return) (OV)
7	Audio Out from TACT to Radio (Tx)
8	Audio In to TACT from Radio (Rx)



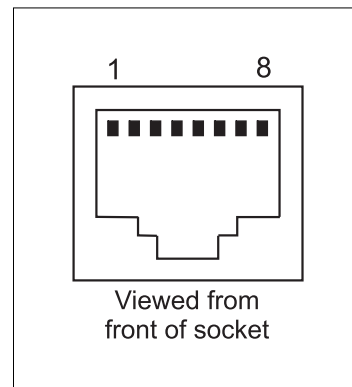
**PC RS232 COM 1 (Configured as DCE)**

PIN	DESCRIPTION
1	CD (Common to Modem)
2	RI (Common to Modem)
3	RXD (Data received by PC)
4	DTR (Common to Modem)
5	TXD (Data Transmitted by PC)
6	Ground
7	RTS (Common to Modem)
8	CTS (Common to Modem)



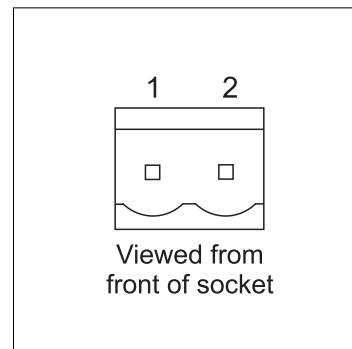
**MODEM RS232 COM 2 (Configured as DCE)**

PIN	DESCRIPTION
1	CD (Common to PC)
2	RI (Common to PC)
3	RXD (Data received by Modem)
4	DTR (Common to PC)
5	TXD (Data Transmitted by Modem)
6	Ground
7	RTS (Common to PC)
8	CTS (Common to PC)



**POWER**

PIN	DESCRIPTION
1, 2	12 → 48 Vdc, isolated, polarity insensitive



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## SECTION 6 - GENERAL

### PROGRAMMING SUMMARY

Divert activate/deactivate	1
Check first diversion number	21 #
Check second diversion number	22 #
Change first diversion number	21 nnnn nnnn #
Change second diversion number	22 nnnn nnnn #
Enter hash (#)	# #
Enter star (*)	* *
Enter dialling pause	* #
Check call counter	30
Reset call counter	30 *
Check second call counter	60
Reset second call counter	60 *
Deactivate diversion announcement to caller	70
Activate diversion announcement to caller	71
Record & activate personalised announcement	75 ... # (By remote only)
Deactivate ID announcement/tone	80
Activate ID tone	81
Record & activate personalised ID announcement	85 ...# (By remote only)
Check third diversion number	23 #
Change third diversion number	23 nnnn nnnn #
Transfer Call	92 #
Eight Number Models	
Check first diversion number	21 #
Check second diversion number	22 #
Check third number	23 #
Check fourth diversion number	24 #
Check fifth diversion number	25 #
Check sixth diversion number	26 #
Check seventh diversion number	27 #
Check eighth diversion number	28 #
Change first diversion number	21 nnnn nnnn #
Change second diversion number	22 nnnn nnnn #
Change third diversion number	23 nnnn nnnn #
Change fourth diversion number	24 nnnn nnnn #
Change fifth diversion number	25 nnnn nnnn #
Change sixth diversion number	26 nnnn nnnn #
Change seventh diversion number	27 nnnn nnnn #
Change eighth diversion number	28 nnnn nnnn #

---

Select first number	41
Select second number	42
Select third number	43
Select fourth number	44
Select fifth number	45
Select sixth number	46
Select seventh number	47
Select eighth number	48
EPROM version number	* 48 #
Forced disconnection	*#
Amp down	# 66 #
Amp up	* 66 #
Enable keypad	* 3333 #
Disable keypad	# 3333 #
Auto-Turn On	*6703# *24 sss *#
Store or change PIN	* #0 pppp #
Access to system options	* 67 03 #
Access to factory options	* 67 7096 50 #
Master Reset Australia	* 67 7096 00 # (CAUTION)
Master Reset Eaglefone	* 67 7096 01 # (CAUTION)
Master Reset Belgium	* 67 7096 02 # (CAUTION)
Master Reset South Africa	* 67 7096 03 # (CAUTION)
Master Reset Indonesia	* 67 7096 04 # (CAUTION)
Master Reset Suffix Selection	* 67 7096 05 # (CAUTION)
Master Reset Germany	* 67 7096 06 # (CAUTION)
Master Reset Spain	* 67 7096 07 # (CAUTION)
End	*#*#

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## SPECIFICATIONS

### AMPLIFIER

Frequency Range	300 Hz to 3.4 kHz (-3dB).
Input - Output Impedance	220 ohm + 120 nF // 820 ohm (complex).
Return Loss	> 17 dB, 300 Hz to 3400 Hz.
Insertion Gain	30 dB +/- 2 dB maximum.
Output Level	-10 dBm → 0 dBm programmable.
Noise	< -50 dBm unweighted, 300 Hz to 3.4 kHz.
Method of operation	Software controlled semi/full duplex.

### CONTROL LOGIC

Micro-controller	Motorola MC68HC16Z1CPV16.
Random Access Memory	8K static.
Program Memory	
Firmware Storage Medium	2 x 64K byte (512 bits) EPROM.
System Number	V492713
Speech Number	V492600
Interface	8 bit latched data.
Number, Status & Option Storage	Electrically Erasable Programmable Read Only Memory (EEPROM).
Dialling Pulse (Decadic)	Electronic, controlled by processor. 10 pps. 34/66 Mark/Space ratio.
Tone (DTMF)	Electronic, controlled by processor. 70 ms on, 70 ms off.
Number Storage	1 → 8 phone numbers of up to 23 digits each (local, STD or IDD calls), programmable from Keypad or remotely by telephone.
COM ports	RS 232C
Displays	Single digit 14mm 7 segment LED. Power On LED (Red). Divert On LED (Yellow). Line1, Line 2, Transmit and Tone LEDs (green).
Controls	12 button keyboard.

### RECORDED VOICE ANNOUNCEMENTS

Standard Voice Announcements	
Storage medium	EPROM.
Recording method	32K bit/sec ADPCM.
Personalised Voice Announcements (Optional)	
Storage medium	Linear EEPROM.
Recording method	Analogue, time sampled at 8 kHz.
Record time	Up to 60 seconds.

### DETECTORS

Activity detector	
Sensitivity	Software adjustable.
DTMF detector	
Sensitivity	> -40 dB.
Detect time	> 50 ms.
Dial Tone detector	
Frequency range	380 Hz - 550 Hz.
Sensitivity	> 50 mV.

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## GENERAL

Power Input		12 → 48 V dc (nom.) (12 V 750 mA power adaptor supplied).
Power Consumption	Stand-by	250mA (3W) @ 12 V
	Operating	typically 380 mA (4.5W) @ 12 V.
Remote Control		'Touch Tone' DTMF telephone or encoder, with Talk-back.
Telecom Connection		Mode 1 (parallel) or mode 3.
Enclosure	Desk Top	Powder coated, metal enclosure.
	Dimensions	W350mm x D240mm x H25 - 60mm.
Enclosure	Rack Mount	Powder coated, metal enclosure, acrylic front
	Dimensions	W 19" x D250mm x H44mm (1 U high).
Packed Weight		3 kg.
AUSTEL Permit Number		A94/05/0234
ACA Supplier's Code		N 468

**Please note: specifications are subject to change**



## **MASTERCALL MC-4044 SERIES 8**

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