



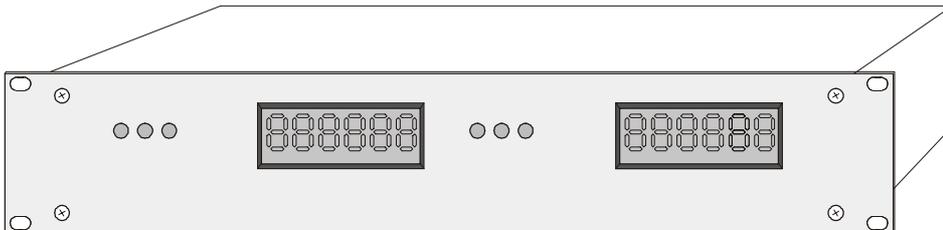
SELCON800 Rack Mounted SelCall Controller Application Note.

Release History

Rev 1.0

Compiled

22/10/1999



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1.0 Introduction

The Pentone SELCON800 Rack Mounting SelCall Controller is a high specification Selcall Encoder and Decoder which can be driven via a serial link from any computer equipment. The Unit functions as a SelCall dispatcher and will also display call progress and incoming SelCall ANI sequences on a high intensity display.

The Unit is available in single or dual channel versions. The dual channel version contains complete circuitry for two independent channels, including independent power supplies. The description below is for the single channel version. For the dual channel version all functions are duplicated.

The unit is capable of decoding a wide range of SelCall tonesets and digit periods. The unit features:-

- Fully Programmable Tonesets and tone sequences
- 8 Decode Masks.
- 8 Programmable Encode Sequences.
- Full Remote Control of Radio PTT and other functions.
- Receive Tone Blanking.
- Balanced Line Drivers and Receivers on all channels.

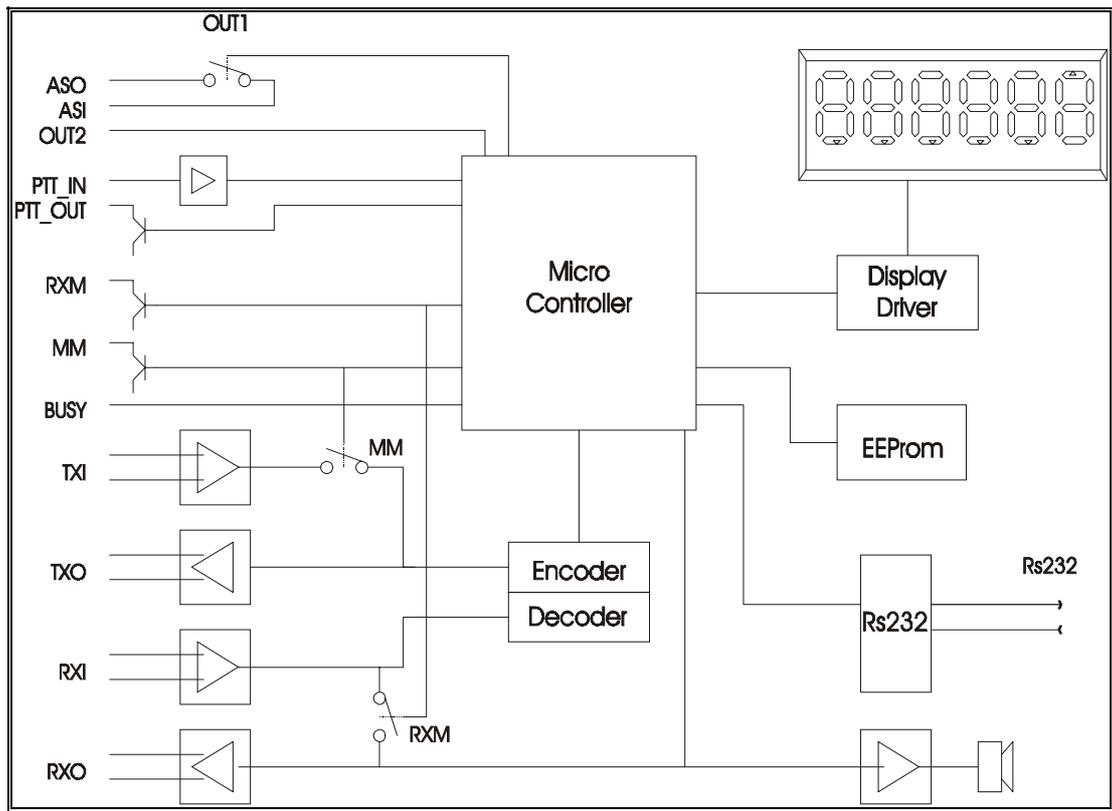


Fig 1 SELCON800 Block Diagram

2.0 Installation

The SELCON800 connects to the host radio equipment via a lead from the Audio connector (25 pin D-Type Connector). Configuration information and SelCall transmit and receive functions are communicated via the 9 pin Serial Connection.

2.1 Connectors

The SELCON800 rear panel provides the following connectors:

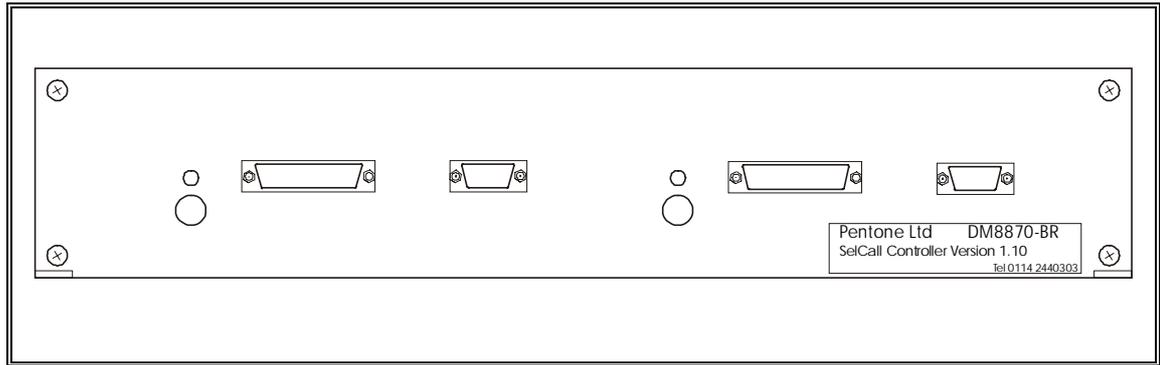


Fig 2. SELCON800 Rear Panel Connectors

2.2 Facilities (25 Pin D-Type Plug)

This connector interfaces the SELCON800 to the existing radio equipment.

D-Type	Header	Pin Name	Type	Function
1	1	RDC	OP	Regulated 5V out
2	3	Agnd	IP	Analogue Ground
3	5	GND	IP	Ground
4	7	ASO	OP	Analogue Switch Out (controlled by OUT1)
5	9	ASI		Analogue Switch In
6	11	OUT2		General purpose O/C Contact.
7	13	RX_MUTE		O/C Contact mute receive audio.
8	15	MIC_MUTE		O/C Contact mute transmit audio
9	17	PTT_OUT		O/C Contact transmit drive
10	19	PTT_IN		Transmitter drive input
11	21	BUSY		Channel Busy input
12	23			
13	25			
14	2	IN1		Non dedicated input
15	4	SS		Reserved for future use
16	6	+12V		Unregulated DC in
17	8	TX_OUT		Single line audio to transmitter
18	10	TO2		Balanced pair audio to transmitter
19	12	TX_IN		Single line audio from local equipment
20	14	TI2		Balanced pair audio from local equipment
21	16	RI2		Balanced pair audio from discriminator
22	18	RX_IN		Single line audio from discriminator
23	20	AGnd		Analogue ground for single line operation
24	22	RX_OUT		Single line audio to local equipment
25	24	RO2		Balanced pair audio to local equipment.

2.3 RS 232 (9 Pin D-Type Socket)

Pin	Pin Name	Type	Function
1	NC		
2	RXD	OP	Data from SELCON800
3	TXD	IP	Data to SELCON800
94	NC		
5	Gnd	IP	Signal Ground
6	DSR	OP	SELCON800 connected
7	RTS		(Not Used)
8	CTS		(Not Used)
9	NC	NC	

2.4 Power Lead

230V – 250V mains power should be supplied to the unit via the mains lead.

3.0 Operation

The Unit operates as a simple interface from computer or PC equipment to a SelCall network. The Unit can be programmed to accept a wide variety of SelCall Message formats.

3.1 Front Panel

The SELCON800 Front Panel Display is shown below.

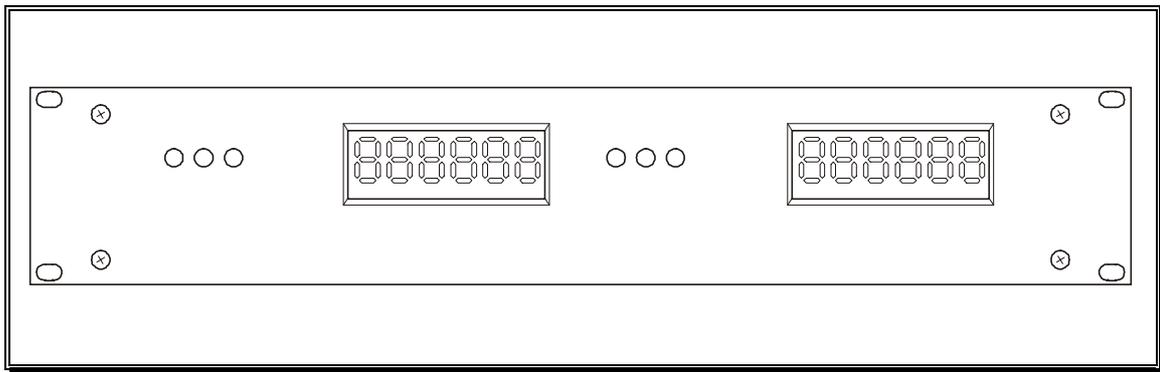


fig 3. SELCON800 Front Panel

When the Unit is powered up the Display will show '254321' indicating that the SELCON800 has completed its self test correctly.

When an incoming SelCall sequence of the correct toneset is detected it is compared with the programmed decode masks. If a match is found it will update the display with the incoming Selcall string and sound an alert. If the message is less than 6 digits, leading digits will be blank. If the message is longer than 6 digits, the Display will show the least significant 6 digits of the message.

In many cases digits within a SelCall sequence may have particular significance, e.g. the last 3 digits might be used for Caller Identification, and it may be desirable to only display the significant digits. This may be simply accomplished by unplugging the display digits which are not required.

The Indicator LEDs are coloured Green, Amber and Red from left to right on the front panel. The Green LED indicates the unit is powered up. The Amber LED indicates Valid tones are being received. The Red LED indicates that a Selcall message is being transmitted.

4.0 Programming The SELCON800

The SELCON800 is supplied configured to decode EEA 40mS and display all 5 digit calls. For other applications, the SELCON800 is fully programmable via the bi-directional RS-232 serial link. The serial port should be configured to 9600 Baud, 8N1. On Power up the board transmits a power up message as follows

```
DM-8870B  
© Pentone Ltd 1999  
V1.10
```

This message will appear on any terminal software connected to the SELCON800 at the correct protocol and allows the user to verify the decoder version number.

4.1 Command Protocol

The SELCON800 is programmed and operated by sending commands from a PC. Each command consists of a concise mnemonic abbreviation, followed by a variable number of parameters separated by comma's and terminated with a <CR> character.

The SELCON800 unit interprets and actions the commands and returns 'OK' if no information was requested, or a repeat of the command with the appropriate parameter values if the command requests information. If a command is given incorrectly or cannot be executed the SELCON800 returns an error code in the format 'ERnn' where 'nn' is the error number.

Note: Some commands take a finite time to process. The controlling software must wait for the response to the existing command before issuing any further commands or instructions may be lost.

The following table gives a brief outline of the command set.

Command	Action	Response	
VE	Version Number	VE=hhhh	Report Version
MEM,Adr, Data MEM,Adr	Write E2 Location Read E2 Location	OK MEM=hhhh	E2 Contents
OP,Bin OP IP	Set Outputs Read Outputs Read Inputs	OK OP=hh IP=hh	Output Settings Input Values
GRP,N GRP REP,N REP	Set Group Tone Read Group Tone Set Repeat Tone Read Repeat Tone	OK GRP=N OK REP=N	
TON,N,Freq TON,N TT,Freq,len	Save Tone N in E2 Read Tone Back from E2 Transmit Tone	OK TONN=freq OK	Tone frequency
SEQ,N,T1,T2,T3,T4,Str SEQ,N TS,T1,T2,T3,T4,Str TX,N1,N2,N3,N4	Save transmit seq. to E2 Read Transmit sequence from E2 Transmit Sequence Immediately Transmit 1 to 4 saved sequences.	OK SEQN=T1,T2,T3,T4,Str OK OK	Transmit string settings Command OK
SD,bw,min,max SD DEC,N,flags,Dmask DEC,N	Decoder Settings Read Decoder Settings Set Decoder Mask Read Decode Mask	OK SD=bw,min,max OK DECN=flags,Dmask	Decoder Settings Decoder Mask
CTL,N,hhhh CTL,N	Set Control Word N Read Control Word N	OK CTLN=hhhh	Control Flags
ATN,N,Freq,Len ATN,N ALT,N,t1,t2,t3,rep ALT,N	Set Alert Tone Read Alert Tone Set Alert Sequence N Read Alert Sequence N	OK ATNN=Freq,Len OK ALTN=t1,t2,t3,rep	Alert Tone Details Alert Sequence Details

4.2 Command Fields Used by SELCON800

The table below details the Command Fields used in programming the SELCON800. Command fields are separated from the command and each other by commas.

Variable:	Type	Range	Description
Adr Data Bin	Hex Hex Integer	0-FF 0-FFFF 0-65536	EEProm address EEProm data (read or write) Bit mapped Output control word. Bit 0 – PTT Out Bit 1 – RX Mute Output Bit 2 – Mic Mute Output Bit 3 – Amp Enable Output Bit 4 – Out1 (Analogue Switch) Output Bit 5 – Out2 TTL Output
N Freq Len T1 T2 T3 T4 Str N1-N4	Tone Integer Integer Integer Integer Integer Integer String Integer	0-F 600-3000 0-2500 0-2500 0-2500 0-2500 0-2500 0-F,G,R,X-Z 0-8	Tone Number Tone frequency in Hz Tone length in ms Length of Lead in delay in ms Length of first tone in ms Length of all other tones in ms Length of lead out delay in ms Tone sequence to encode maximum 8 tones in sequence. 0-F – Tone set tones '0' to 'F' G – Group tone R – 'Repeat tone' Sequence Number to encode
Bw Min Max Flags Dmask	Integer Integer Integer Integer String	0-15 0-2500 0-2500 0-255 0-F,G,R,X-Z	Decoder Bandwidth, Recommended Value 13 Minimum tone length to accept in ms Maximum tone length to accept in ms Nb the first tone in any sequence may be extended Decode flags, (not defined) Tone sequence Decode Mask, max 8 tones in sequence. 0-F – Tone set tones '0' to 'F' G – Group tone
Cflags	Integer	0-65536	Control Flags (See control flags table and operation below)

4.3 Control Flags

The Control Flags determine the automatic operation of the SELCON800. Control Flags are set, cleared and read using the CTL Command.

Flag Bank (N)	Bit	Value / Operation 0	1
0 – Output Control	0 – PTT 1 – RX_MUTE 2 – MIC_MUTE 3 – AMP_EN 4 – PTT_ECHO 5 – RX_MUTE_ALT	Under PC Control Under PC Control Under PC Control Under PC Control No PTT Echo No Mute during Alerts	Active during SelCall TX Active during SelCall RX Active during SelCall TX Active During Alert Generation Echo PTT IN to PTT Out Mute RX during Alerts
1 – Input Control	0 – BUSY CHECK	No BUSY Check	Check BUSY before TX

4.4 Receiver and Error Responses

The table below describes the SELCON800 SelCall Receiver Response, and the Error Return Codes for the commands detailed above.

	Response	Meaning
SelCall Receiver	RX='tttt'	SelCall Sequence Received
Error Returns	OK ER=01 ER=02 ER=03 ER=04 ER=05 ER=06 ER=07	Command Executed Correctly Invalid Command Invalid Field Invalid Separator Syntax Error Field Range Error TX Busy (response to transmit command) Channel Busy (response to transmit command)

4.5 Command Examples

EG1. Set Output Control so that PTT, MIC_MUTE, RX_MUTE and AMP_EN are under automatic control.

Command CTL,0,63<CR>
 Response OK<CR>

In this example, the flag parameter **Cflags** is calculated as the sum of the values of the individual control flags. To switch all flags on CFlags = 1+2+4+8+16+32 = 63.

EG2 To program tone 1 in the toneset to EEA value for tone 1.

Command TON,1,1124<CR>
 Response OK<CR>

The tone frequency 1124Hz is programmed as tone 1 of the toneset. Please see Appendix 5 for details of frequencies for a range of tonesets.

EG3. Transmit SelCall Sequence '12345' in EEA 40mS Toneset. Assuming that the toneset is already programmed to the EEA Values (See EG2)

Command TS,100,40,40,0,12345<CR>
 Response OK<CR>

The sequence '12345' is transmitted, with 100mS lead in delay, 40mS first tone length, 40mS for all the following tones and no lead out time.

EG4. Set Receiver Mask 1 to decode 5 tone strings beginning in the digits '34'

Command DEC,1,0,34XXX<CR>
Response OK<CR>

The Decode Flags (Currently unused) are set to zero, the Decode Mask is set to 34XXX. This will decode all five tone sequences beginning in the digits '34'.

If the SELCON800 unit detects a valid sequence (for example '34567') the following response will be transmitted:

Response RX1=34567<CR>

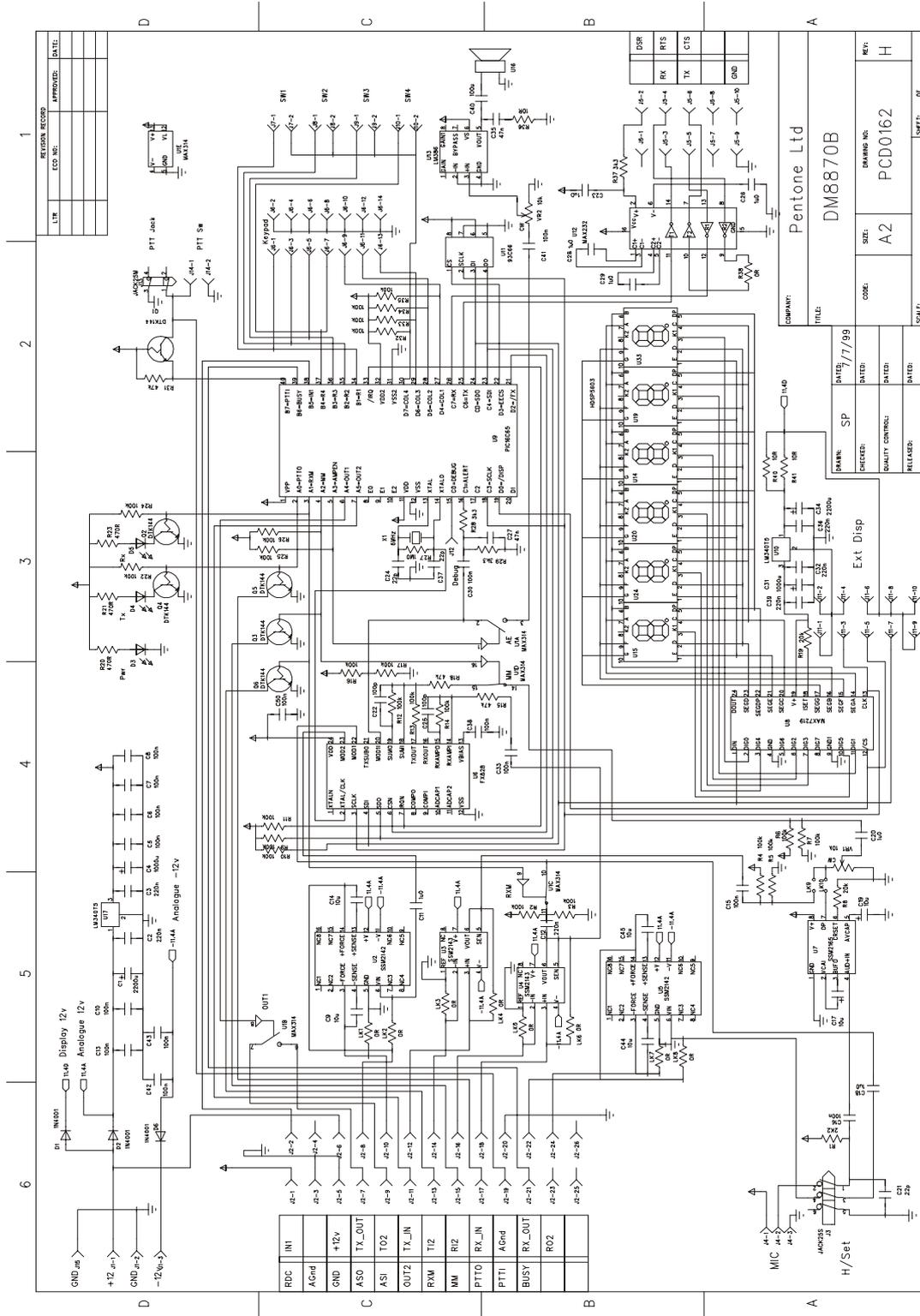
Indicating that the sequence '34567' has been decoded and passed mask1. Note the masks are checked in sequential order and as soon as the first mask is passed all remaining masks are ignored.

4.6 On Board Trimmers

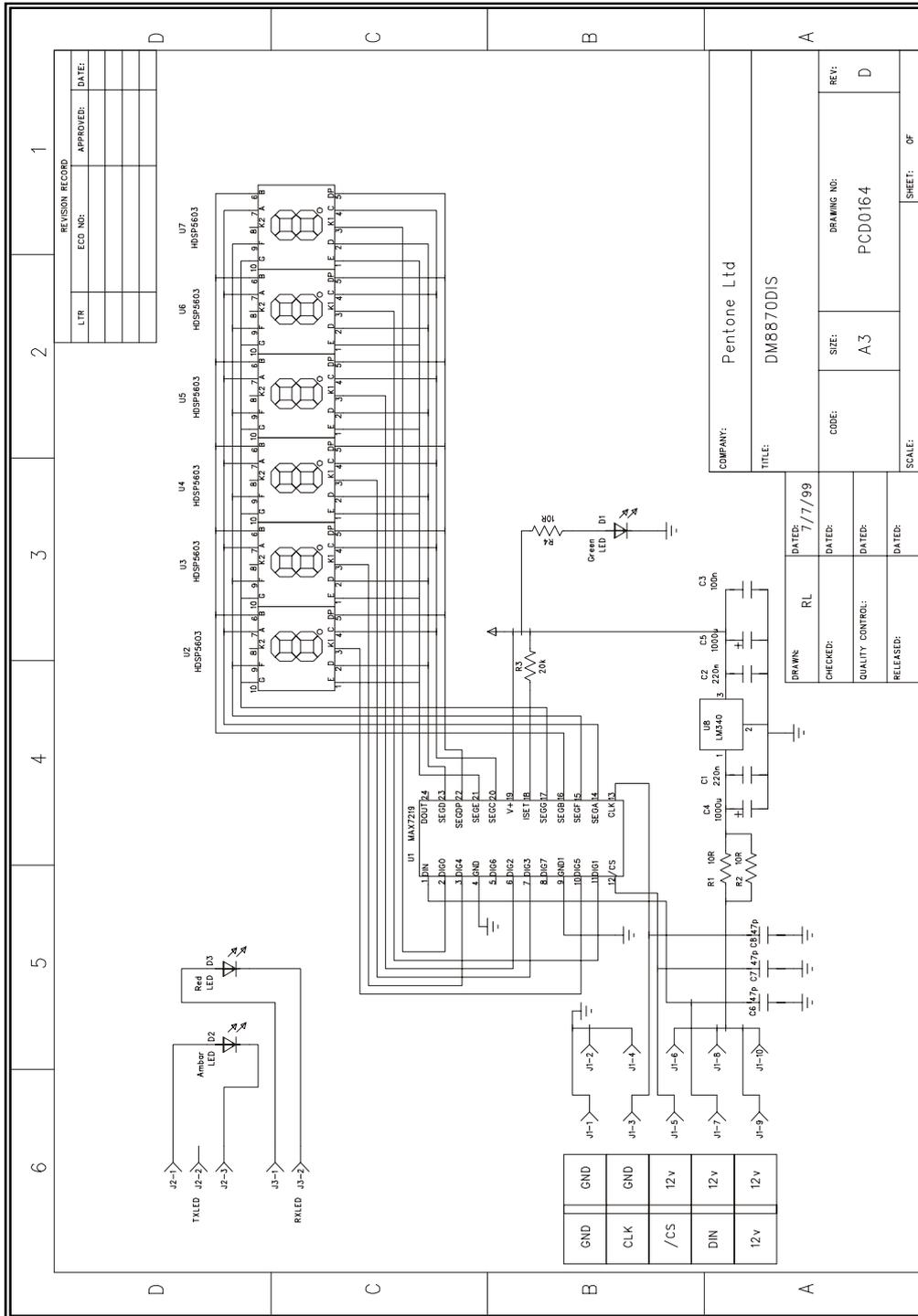
The Alert amplitude to the onboard speaker may be adjusted by means of VR2.

Two programmable trimmers are also provided. TRM,1 adjusts the Alert Level to be mixed with the incoming Audio signal. TRM,2 adjusts the level of the mixed TX tones and TX audio.

Appendix 1. Circuit Diagram Main Board.



Appendix 2. Circuit Diagram Display Board



Appendix 3. Hardware and Technical Specifications.

Absolute Maximum Ratings

Exceeding the maximum rating can result in module damage. Operation of the module outside the operating limits is not implied.

Supply Voltage	12Vdc
Operating Temperature Range	0 to +70 deg. Celsius
Storage Temperature Range	-20 to +85 deg. Celsius

Operating Limits

All module characteristics are measured under the following conditions unless otherwise specified:

Vin = 9.0 Volts, Temp = 20 deg. Celsius

Characteristic	Note	Min.	Typ.	Max.	Unit
Supply Voltage (Vin)		7.0	9.0	13.8	Vdc
Tone Decode Bandwidth		1.1%		2.7%	% of centre frequency
Input Sensitivity	1	31.0			mVrms
Signal input impedance			20.0		MOhm
On Board Clock			6.0		MHz
VDD start voltage to guarantee reset			VSS (0.0)		V
VDD rise time to guarantee reset		0.05	0.1		V/ms

NOTES

1. Under pure-tone conditions.
2. At -4.0dBs S/N (using a 100mS CCIR signal at 248 mVrms).

Appendix 5. Standard Tonesets

	EEA	CCIR	ZVEI1	ZVEI2	ZVEI3	PZVEI	NATEL
0	1981	1981	2400	2400	2200	2400	1633
1	1124	1124	1060	1060	970	1060	631
2	1197	1197	1160	1160	1060	1160	697
3	1275	1275	1270	1270	1160	1270	770
4	1358	1358	1400	1400	1270	1400	852
5	1446	1446	1530	1530	1400	1530	941
6	1540	1540	1670	1670	1530	1670	1040
7	1640	1640	1830	1830	1670	1830	1209
8	1747	1747	2000	2000	1830	2000	1336
9	1860	1860	2200	2200	2000	2200	1477
A	1055	2110	2600	970	2400	2600	1805
B							
C							
D							
E	2400	1055	2800	885	825	970	1995
F							

