MICROSOUND SYSTEMS

SLSI-80

School Intercom System

Instruction Manual

CONTENTS

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Revised 22 November, 2001
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1. General Description

The SLSI-80 is a fully electronic exchange with microprocessor control. It is compact and has relay switching for reliable audio control.

The SLSI-80 consists of three basic sections. Central processing unit (CPU), Sub card and Power supply (PSU). The CPU consists mainly of the microprocessor, memory, audio amplifier, tone generator and control functions.

The 30w-rms amplifier can drive up to 96 standard sub stations before a booster amplifier is needed.

The power supply module has outputs of 10V, 24V and 42V. The SLSI-80 operates on 220/250V AC. It is designed for wall mounting for space conservation.

2. Operation

The SLSI-80 intercom can dial any of the sub stations individually, in a group or all together (allcall). If a call back (button on the sub station) is made the system will automatically answer to the master. To redirect a call back to a different master station 96 must be dialled at that master station. If more than one call back is made at the same time the numbers will be stacked and the display will begin to flash. All the numbers in the system can be stacked at the same time. The lowest number will always be answered first.

The software can be configured for different systems. eg. Old Age Homes, Fire Stations, Hospitals, and various other installations.

3. Installation

Pay particular attention to the following points during installation of the exchange. Failure to do so will invalidate the guarantee.

1. The layout should allow for easy servicing and inspection.
2. Avoid installing the unit where it may be affected by vibrations.
3. Choose a low "source noise" AC power supply for the exchange.
4. .Care must be taken to leave space above the SLSI80 as the cover comes off the top.
5. All installations must have separate cables for Master, Sub stations and displays.
6. Cable joints must never be made in ceilings or in inaccessible places, joints should be made in easily accessible DP boxes or in sub stations.
7. All systems have a 220/250v primary winding on the mains transformer, check your mains voltage.
8. Before switching on, check all cables for shorts and earth faults.
9. Always switch power off before unplugging PCB cards.
10. Audio cable must be twisted pair cable.
11. Do not install system in a cupboard. Ensure sufficient air flow around the system.
12. Unplug mains when working on power supply PCB as there is mains present even after switching power off.
13. Never install intercom cable anywhere near P.O. telephone cable or in P.O. cable. (lightning hazard).
14. Never use pairs in multicore cable which carry other audio, music or signals which might cause interference.
15. Sub stations are polarised, the sub must only be connected one way, with the positive wire to the positive side of the capacitor in the sub station. (Blue + , White -).

16. Never slot different thickness cable into the same slot on the Krone strips.
17. Central Exchange must be mounted vertically.
18. The Krone insertion tool must be used to terminate the cables on the Krone modules.
19. A screened cable must be used for the display if there is a possibility that it can be subjected to lighting.
20. The maximum distance a display can be from the central is 100 metres. If more than one display is used the total length of the cable may only be 100 metres, there after a display buffer board must be used.
21. If sub station cables and master station cables have to run in the same conduit, channelling or sleeves the master station cable must be a screened cable with its screen earth at the central to prevent induction from the sub station cable. Sub and master station cables must be kept separate as far as possible.

4. Facilities

1. Master to master dialling.
2. Master to sub calls.
3. Master to P.A. calls.
4. Group calls.
5. All call.
6. Privacy on masters.
7. Priority cancel.
8. Auto cancel. (5 minutes)
9. Auto answer.
10. Change of period tone.
11. Evacuation tone.

5. Special Numbers

a) Dialling

Function	Two digit dialling	Three digit dialling
Master to master call	01 - 04	001 - 004
excluded from group calls (outside horn speaker	05	005
Substations	06 - 76	006 - 128
First group	91 - 06 to 44	991 009 – 096
Second group	92 - 45 to 76	992 097 – 188
Third group	93 - 06 to 76	993
Fourth group	94 - 06 to 24	994
Firth group	95 - 61 to 76	995
Change main master	96	996
Activate period tone	97	997
Activate evacuation tone	98	998
All call	99	999
Software version	SL20405R.41	SL30412R.31

6. Operating Instructions

Any two digit number from 01 to 99 can be dialled. The low numbers are generally to dial other master stations while the numbers above 80 are special functions. The number list will indicate the number to dial for the special functions available on the SLSI-80.

If the light on the master is off the SLSI-80 is ready for use, else it is busy with a call.

After the first digit is dialled the busy light will light and a beep will be heard to indicate that the button has been accepted. The SLSI-80 will now wait for a second digit to be dialled. At any point the cancel button "#" on the master station keyboard can be pressed and the dialling restarted. When the second digit is dialled a beep will be heard again and then a "call-tone" will go through to that number dialled to announce that a call has been made. The operator will now be able to listen to that area.

When the operator wants to speak, the "T" (talk) button (marked as "*" on the keyboard) must be pressed and released when the operator wants to listen.

To terminate the conversation the cancel button must be pressed. The call will automatically be cancelled after a duration of 30 seconds to allow other users' call-backs to be processed.

There are no beeps when operating the "T" button or cancel. The light will go off whenever the cancel button is pressed if the call is made from that station.

7. Privacy Switch

When the privacy switch on the Master station is on, only the call tone will be heard at the Master station if it is dialled. The calling party will hear no audio, until the switch is switched over.

8. Call-backs

When a callback is made from a sub station a callback tone will be heard at the main master station and at the sub station from where the call-back is been made. Immediately the person making the callback will be heard at the main master station. (This is ideal for emergencies).

If at the time of making a callback the SLSI-80 is busy, the callback will go through when the call in progress is cancelled or the auto time-out facility cancels the call. Only at this point will the callback tone go though to the sub station and to the main master station.

If more than one call-back is made at the same time or while a call is in progress, the sub or master station with the lowest number will be answered first (in this way sub stations with lower numbers have a higher priority).
The main master (the master the callback is directed to) can be changed by dialling 96 (or 996 when three digit dialling is used) on the master to which the callback's are directed too.

9. All-call

When all-call is dialled it is not necessary to press the "T" button, as the SLSI-80 will be in forward speech mode.

10. Group calls

There are two standard groups and three optional groups. In the standard system the first group (91) dials all the numbers from 1 - 40 and group two dials all the numbers from 41 - 80. The optional groups dial whatever the system has been configured for. (See configuration table).

11. Period tones

When a Period tone is dialled a period tone will be received at all the Masters and Sub stations connected to the system.

12. Evacuation tone

When a Evacuation tone is dialled a evacuation tone will be received at all the Master and Sub stations connected to the system.

13. Connector Strip Wiring For Four Masters

Pair	1		2		3		4		5		6		7		8	
Strip	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
0	A	B	C	D	EV	PR	ENG	GND	A	B	C	D	S1	S2	S3	O/P
	Master station connections								LED Display connections							
	M3	M4	M5	M6	T1	T2	M7	M8	D3	D4	D5	D6	D7	D8	D9	B1

1	1		2		3		4		5	6	7	8
	M1 M2	M12 M12	M13 M13	M14 M14				
2	NC	NC	NC	NC	9	10	11	12
3	13	14	15	16	17	18	19	20
4	21	22	23	24	25	26	27	28
5	29	30	31	32	33	34	35	36
6	37	38	39	40	41	42	43	44
7	45	46	47	48	49	50	51	52
8	53	54	55	56	57	58	59	60
9	61	62	63	64	65	66	67	68
10	69	70	71	72	73	74	75	76

14. Master Station Wiring

PIN	FUNCTION
M1	Master station + (From krone strip)
M2	Master station - (From krone strip)
M3	DIALLING LINE A \
M4	DIALLING LINE B |
M5	DIALLING LINE C | Common to all masters
M6	DIALLING LINE D |
M7	ENGAGED LINE /
M8	GROUND LINE /

15. Led Display Wiring

PIN	CABLE	FUNCTION
D1		Supply + 24V
D2		Ground
D3		BCD A
D4		BCD B
D5		BCD C
D6		BCD D
D7		Select line 1
D8		Select line 2
D9		Select line 3
D10		Not connected

```
                   Display pcb component view


  +--------------------------------------------+
  |   ---          +---+ +---+ +---+            |
  |    |           | 3 | | 2 | | 1 |            |
  |    |           |   | |   | |   |            |
  |   ---          +---+ +---+ +---+            |
  |   fuse                                      |
  |   0.5 amp                                   |
  |                                             |
  |                                             |
  |                                             |
  |                                             |
  |                                             |
  +--------------------------------------------+


                   Display component view
```
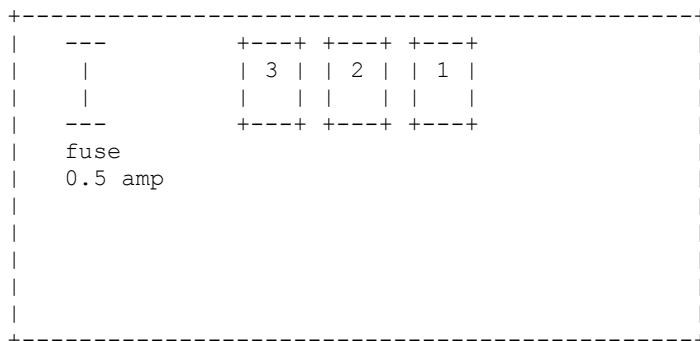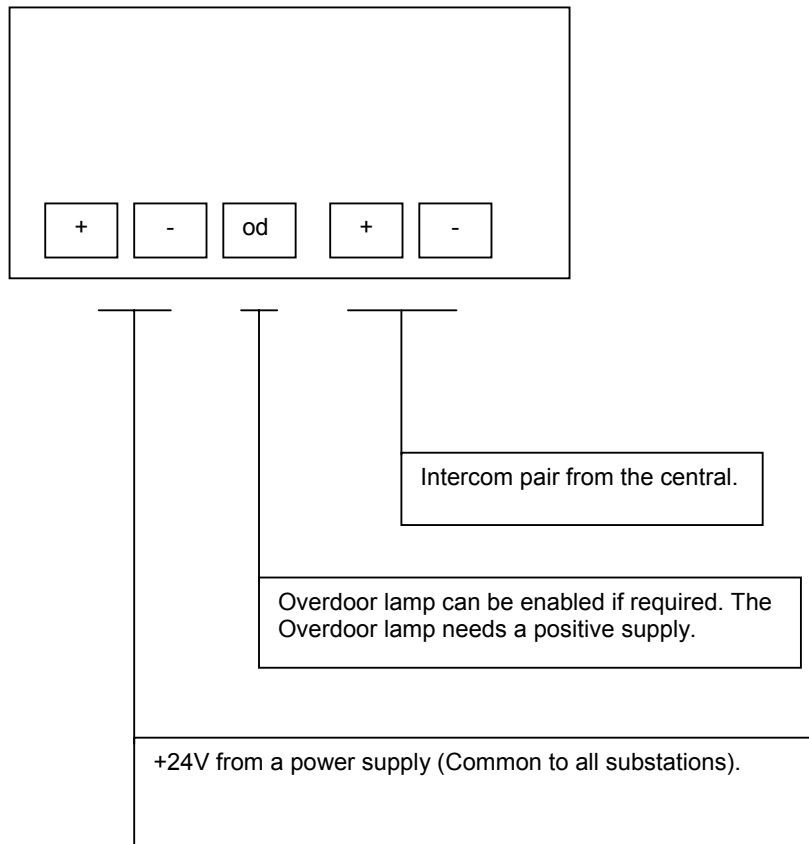
16. Reassurance Substation Wiring

Requires a common positive and negative to each sub station plus a individual intercom pair to each sub station.

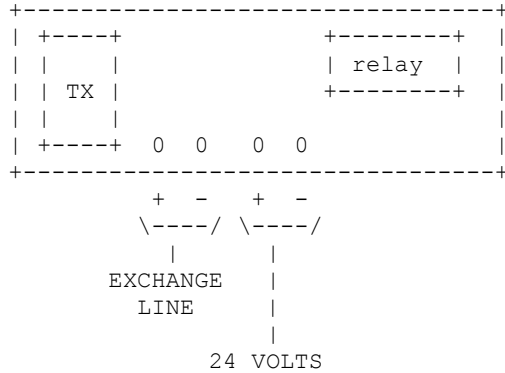Reassurance substation PCB (component view)

+	-	od	+	-

Intercom pair from the central.

Overdoor lamp can be enabled if required. The Overdoor lamp needs a positive supply.

+24V from a power supply (Common to all substations).

17. Answer Point

Requires one individual intercom pair per answer point.

```
           Top view of handset
          +---------------------+
          |                     |
          |                     |
          |                     |
          |                     |
          |                     |
          |                     |
          |                     |
          |                     |
          |                     |
          |                     |
          |                     |
          |                     |
          |                     |
          |+--------------+     |
          || 0 | 3 | 10| 5 |    |
          |+--------------+     |
          |                     |
          |                     |
          +---------------------+
```

```
0.   + substation or horn speaker.
3.   - substation or horn speaker.

10.  + audio line
5.   - audio line
```

18. Music Substation Wiring

Requires a common positive and negative to each sub station, a common screened music pair to each sub station plus an individual intercom pair to each sub station.

Music substation pcb component view

```
+------------------------------+
| +----+             +--------+  |
| |    |             | relay  |  |
| | TX |             +--------+  |
| |    |                         |
| +----+  0   0   0   0          |
+------------------------------+
        +   -   +   -
        \----/ \----/
          |      |
     EXCHANGE    |
       LINE      |
                 |
           24 VOLTS
```

Music input (from buffer amp on the central) on a separate three way connector block. (Screened cable).

NB.
Maximum music output level at sub station is 70 dBA at 1 Metre.

19. Buffer Amp Wiring

```
+-----------+                  +---------------+
|  Music    |---------------->|  Buffer   Amp |------>
|  Source   |                 |  & 24v power  | Music to
+-----------+       +--------->|  supply       | sub stations
            |       |          +---------------+ 1  twisted pr
            |       |                          |    screened cable
            |       |                          |
            |      40v & GND               +-------> +24v & GND
                   from SLSI                     To music sub stations
                   power supply
```

NB.
An additional 24v power supply is required to supply the music sub stations up to a
maximum of 76 sub stations.

Buffer amp pcb component view

```
       +---------------------------------------------+
       |                                             |
       |                                             |
       |                                             |
       |+---+                                        |
24v ||| 0 |                                          |
GND ||| 0 |                               +---+|
GND ||| 0 |           +---+---+           | 0 || Balanced
40v ||| 0 |           | 0 | 0 |           | 0 || music
       |+---+           +---+---+           +---+| output
       +---------------------------------------------+
                 balanced music source
                        input
```

20. Cpu / Audio card Set-up

All CPU cards are identical except for the EPROM contents and the pre-set pots setting.

> P1 - Audio level.
> P2 - Audio limiter.
> P3 - Tone level.

1.   The period and evacuation tone can be activated by dialling or by switching strip 0 (pin 5 and 6) to ground (Strip 0 pin 8) via a switch or relay.
2.   If a master must have priority cancel this must be indicated when ordering.
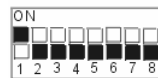
21. Sub Card

1. The systems are factory wired for a specific number of Master and Sub stations.

2. The first Sub card (Master sub card) will always be wired for a combination of Master and Sub stations and can not be swapped with any other sub card. This could apply to the second sub card as well if there are more than eight master stations on the system. The first sub card cannot be swapped with that of a different system unless both systems have the same combination of master stations. The master station relays must have the ground removes. A master sub card can be identified by the two wire links, which are usually installed after the number of masters stations the system is configured for.

3.   Each sub card has a eight way dip switch to select its address.
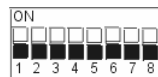
Master Subcard
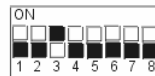
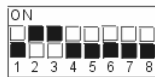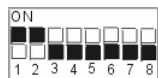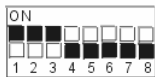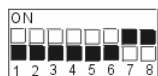Subcard 1
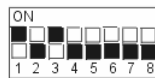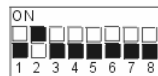
Subcard 2

Subcard 3

Status led on

Subcard 4

Subcard 5

Subcard 6

Subcard 7

22. Diagnostics

All SLSI80 intercom systems manufactured after the 08/02/88 include diagnostics to assist with installation and fault finding. This could change from time to time, but will be kept up to date in the manual. Existing systems software can be updated free of charge if the EPROM is returned.

It is recommended that a Test jig, LED display, Krone Tool, Multimeter and disconnect plugs are available when installing or fault finding a SLSI80 system.

When the system is first switched on 801 will be display on the LED display. This number will remain there until all the callbacks are cleared. If there are no callbacks this should only last for a few seconds. If not the '*' button on any master that is connected to the system can be pressed, the display will then indicate the first number that is giving a callback. This can be cleared or isolated by inserting a disconnect plug. The system will then clear the display if there are no more callbacks, else wait for the next callback to be cleared. If a number is pressed on the master station the display will indicate the master number (if it is working).

Should you have any questions please do not hesitate to contact Microsound Systems.

23. First Line Service

b) *Installation faults*

Dials a wrong number.

Check the master station dialling leads. Check that the subcards are on the correct addresses. Make sure you have the software that you expect to have.

Keeps calling back from a sub station.

Check that you have the substation wires the right way. You can measure the voltage (5 volts DC, only if there is no audio) at the substation. The polarity is indicated on the capacitor (100uF 16v). If a horn is used a capacitor must be in series.

Blows fuse when doing an allcall.

Probably a short on one of the substations. The system will work with a load of approximately 2.5 ohms. Check that the impedance is about 300 ohms on each substation line. (This is highly recommended). If you do not have a impedance meter speak to your manager to get you one and start unplugging subcards. You will have to keep replacing the fuse on the CPU card under the heat sink.

c) *After installation faults*

System is completely dead.

Check all four fuses and the power supply. If this is all ok the CPU card is probably dead.

Master station busy light comes on then stops.

Check the fuse on the CPU card under the heat sink. If a beep was heard as you pressed the number this usually indicates that the audio amp is working. Check that one of the dialling leads is not stuck down.

Master station busy light is on all the time.

Replace the CPU card.

d) Call tone is heard at the sub station but no speech.

Check that the privacy switch on the master station is switched to "0" (no privacy). Replace the LM 3146 on the CPU card.

e) Testing the Display and wiring

This is very difficult as the micro writes to the display quite fast. One way is to use a scope. Check that the BCD and select lines are toggling and that there is 24 v. There is a fuse inside the display.

f) Testing the Master station and wiring

Make sure that the privacy switch is set to "O".

The dialling can be checked by:

1. All the dialling leads (ABCD - pins 3,4,5,6 of the master plug or Krone strip 0 pairs 1,2) should measure 5v to ground.
2. When you press "1" on the master keypad dialling lead A should go low while BCD should remain high.
3. When you press "2" on the master keypad dialling lead B should go low while ACD should remain high.
4. When you press "4" on the master keypad dialling lead C should go low while ABD should remain high.
5. When you press "8" on the master keypad dialling lead D should go low while ABC should remain high.

g) Testing the subcard

Never swop a master subcard with a subcard.

Swop the subcard with a working subcard, change the address. If you want to prevent call backs remove the HEF 4044 on the subcard. There are four call backs on each HEF 4044. Make sure you only use factory approved 4044.

h) Testing the CPU card

Very little one can do in the field about repairing one of these. If the display flashes 801 on the display when the system starts up, this usually indicates the CPU is running.

i) *Software*

The name of the installation will be on the EPROM if software changes have been specified with the order. If the system is standard, the number will be as follows.

SL 20405R.15

SL - is a abbreviation for SLSI. Single link school intercom.
2 -   is the number of digits one needs to dial. (2 or 3).
04 - is the number of masters the system can have.
05 - is the number of subcards the software will dial.
R - indicates different types of software.
15 - is the version number.

Make sure the software is correct for the chassis and master sub card. This is very important. A master sub card can be identified by the two wire links between the relays. Start counting relays from the top right corner to the wire links and this will indicate the number of masters the card is configured for.

24. SLSI80 RECOMMENDED SERVICE KIT

```
1  x SLSICPU85000  CPU/Audio card
1  x SLSIMSBCB400  Master sub card
1  x SLSISUBCB000  Sub card with call back
1  x SLSIMSTL1208  Master station and display
1  x SLSI80        Power supply board
1  x SLSI80        Extender Card
1  x SLSI80        Master station / display test jig

                   Plug in Components

                   SLSI CPU/Audio card

F1        5 Amp Fuse
IC1       HEF 4020
IC14      CPU 8085
IC9       EPROM - Special Software
IC16,17   LF 353
IC18      LM 3146
IC15      LM 566
IC10      RAM 6264
IC7,11    SN 74HC00
IC12,13   SN 74HC138
IC2       SN 74HC245
IC3-6,8   SN 74HC373


                    SLSI Sub card

IC12      HEF 4028
IC13      HEF 4528
IC9,11    HEF 4585
IC1,2     ULN 2803
IC5,6     SN 74HC373
C1-15,18-22 Disk capacitor 0.1uf 50v


                    SLSI Power Supply

F1        1 Amp Fuse
F2        5 Amp Fuse
F3        2 Amp Fuse
```

25. Technical Specifications

Installation
Mains Supply 220/250V AC 150 VA.

Master station.
All wiring on 0,5mm twisted pair telephone cable.
2 Common dialling pairs to all master stations.
1 Common ground line to all master stations.
1 Common engaged line to all master stations.
1 Individual audio pair to each master station.

Sub station.
All wiring on 0,5mm twisted pair telephone cable.
1 Individual pair to each sub for audio and call-back.
1 Common positive pair to all subs if a reassurance lamp
is needed at the sub station.

P.A. Speakers.
All wiring on 0,5mm twisted pair telephone cable.
1 Individual audio pair to each point.

Audio Specifications

Acoustical output of master station	70 dB(A)
Acoustical output of sub station	73 dB(A)
Frequency response	400Hz - 5KHz
Max distortion	less than 1%
Signal to noise ratio	-55 dB
Amplifier output	30 watts continuous

Audio input and output is balanced.

Mechanical
Weight of central is 20 kg.
Dimensions   480 mm height.
                      330 mm wide.
                      210 mm deep.
Cards are standard EURO, 4U x 220 mm, through hole plated,
solder masked pc boards.
Cards plug into backplane motherboard.
PCB connectors are DIN 41612.
Modular system allows easy maintenance.

26. Guarantee

Equipment is guaranteed by the manufacture for a period of six months from the date
of delivery against faulty components and workmanship. ex Factory.

Manufactured by:
Microsound Systems cc
P.O. Box 38220
Booysens
2016
Phone 011 493 2424
Fax 011 492 0347
Email sales@microsound.co.za
Web http://www.microsound.co.za

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