A publication of

CDS electronics bv,

Maassluis, The Netherlands

September 15, 1995

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2 Introduction

2.1 Features

The 788-LD digital dimmer pack features are:

- Four independent dimmer / switch channels, each channel up to 1 kW output.
- 0 to 100% dimming or on/off switching channels.
- Maximum total load 16 A.
- Controllable by a DMX-512 light controller such as the LanBox-LC
- Short circuit and overload protected without fuses.
- Both ordinary and halogen lighting.
- Mains available from back of 788-LD so that several dimmer packs, or other devices, may be chained.

3 Installation

3.1 DIP switch settings

At the front end of the 788-LD, a set of 14 DIP switches can be found. These switches need to be set to:

- run a test sequence without a DMX controller connected. (§3.1.1)
- set up the 788-LD for 4- or 8- DMX channel operation. (§3.1.2)
- select the DMX address range (§3.1.3)
- select dimmer or switch operation for each channel (§3.1.4)

3.1.1 Test mode

It is possible to check correct operation of the dimmer pack without having a DMX controller available or connected yet. The DIP switch numbered 10 is used to select between normal operation (with DMX controller) and the test mode.

If switch number 10 is switched on (up), all other switch settings are ignored and the 788-LD runs a stand-alone test sequence which consists of smoothly increasing the power output of each channel one at a time to maximum output and than switching off the channel.

Note: Basically the setting of all DIP switches but switch 10 are ignored. However, switch 1 to 10 should not all be off because this will program a different 788-LD operating mode as will be described in §3.1.2

3.1.2 Operating mode selection

The 788-LD can be operated in two different modes. These are:

- Mode I: 4-channel DMX, only dimmer output can be controlled.
- Mode II: 8-channel DMX. Not only the dimmer output can be controlled, but also the speed at which changes in this setting will become effective.

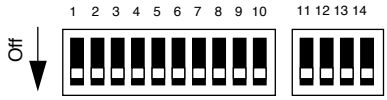
The two modes of operation will be described in §4. The operating mode is a setting that is internally remembered by the 788-LD. There is not a specific DIP switch that selects mode I or II. To select a specific mode of operation, follow the procedure described in this paragraph.

Next to the DIP switches, a green LED is situated which will light after switching on the 788-LD, indicating that the 788-LD is operational. You will find that directly after switching on, the green LED will blink several times before lighting continuously. This blinking indicates the operating mode that is currently selected. The blinking pattern is different for the two operating modes.

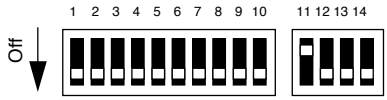
- Mode II: The green LED lights three times in succession at a relatively slow rate of once per second.
- Mode I: The LED lights faster, approximately twice per second, and five times in succession before starting to light continuously.

Note that if the green LED should blink continuously at a very fast rate of approximately 5 times per second, the 788-LD is in a overload or short-circuit situation and is actually not operational.

To change the operating mode selection, turn off the 788-LD first. Than set the DIP switches in the ‘programming mode’ according to the following figure:



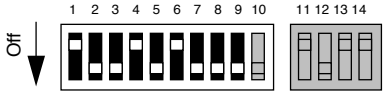
When in the programming mode, DIP switch 11 selects between mode I (switch off) as in the figure above or mode II (switch on) as in the figure below.



The selected mode is stored internally in the 788-LD at the moment the 788-LD is switched on, and will be remembered even if the 788-LD is switched off. As mentioned the mode can be checked by watching the green LED blinking after switching on. After switching on the 788-LD once in the programming mode with the correct operating mode selected, the 788-LD may be switched off and the DIP switches may be set definitively to select the required DMX channel range as will be described on the following page.

3.1.3 DMX channel selection

DIP switches 1 to 9 determine the starting number of the DMX channel range. The following figure for example shows the setting for DMX channel 41. The 788-LD will occupy address 41…44 if in mode I or 41…48 if in mode II.



Find the required DMX starting channel number in the table below. Read the setting for DIP switch 1 to 5 in the most left column in the row of the cell found. Read the setting for DIP switch 6 to 9 in the most upper row in the column of that cell. DIP switch 10 should always be Off (↓).

12345 6789	↓↓↓↓	↑↓↓↓	↓↑↓↓	↑↑↓↓	↓↓↑↓	↑↓↑↓	↓↑↑↓	↑↑↑↓	↓↓↓↑	↑↓↓↑	↓↑↓↑	↑↑↓↑	↓↓↑↑	↑↓↑↑	↓↑↑↑	↑↑↑↑
↓↓↓↓↓...	S[1]	32	64	96	128	160	192	224	256	288	320	352	384	416	448	480
↑↓↓↓↓...	1	33	65	97	129	161	193	225	257	289	321	353	385	417	449	481
↓↑↓↓↓...	2	34	66	98	130	162	194	226	258	290	322	354	386	418	450	482
↑↑↓↓↓...	3	35	67	99	131	163	195	227	259	291	323	355	387	419	451	483
↓↓↑↓↓...	4	36	68	100	132	164	196	228	260	292	324	356	388	420	452	484
↑↓↑↓↓...	5	37	69	101	133	165	197	229	261	293	325	357	389	421	453	485
↓↑↑↓↓...	6	38	70	102	134	166	198	230	262	294	326	358	390	422	454	486
↑↑↑↓↓...	7	39	71	103	135	167	199	231	263	295	327	359	391	423	455	487
↓↓↓↑↓...	8	40	72	104	136	168	200	232	264	296	328	360	392	424	456	488
↑↓↓↑↓...	9	41	73	105	137	169	201	233	265	297	329	361	393	425	457	489
↓↑↓↑↓...	10	42	74	106	138	170	202	234	266	298	330	362	394	426	458	490
↑↑↓↑↓...	11	43	75	107	139	171	203	235	267	299	331	363	395	427	459	491
↓↓↑↑↓...	12	44	76	108	140	172	204	236	268	300	332	364	396	428	460	492
↑↓↑↑↓...	13	45	77	109	141	173	205	237	269	301	333	365	397	429	461	493
↓↑↑↑↓...	14	46	78	110	142	174	206	238	270	302	334	366	398	430	462	494
↑↑↑↑↓...	15	47	79	111	143	175	207	239	271	303	335	367	399	431	463	495
↓↓↓↓↑...	16	48	80	112	144	176	208	240	272	304	336	368	400	432	464	496
↑↓↓↓↑...	17	49	81	113	145	177	209	241	273	305	337	369	401	433	465	497
↓↑↓↓↑...	18	50	82	114	146	178	210	242	274	306	338	370	402	434	466	498
↑↑↓↓↑...	19	51	83	115	147	179	211	243	275	307	339	371	403	435	467	499
↓↓↑↓↑...	20	52	84	116	148	180	212	244	276	308	340	372	404	436	468	500
↑↓↑↓↑...	21	53	85	117	149	181	213	245	277	309	341	373	405	437	469	501
↓↑↑↓↑...	22	54	86	118	150	182	214	246	278	310	342	374	406	438	470	502
↑↑↑↓↑...	23	55	87	119	151	183	215	247	279	311	343	375	407	439	471	503
↓↓↓↑↑...	24	56	88	120	152	184	216	248	280	312	344	376	408	440	472	-
↑↓↓↑↑...	25	57	89	121	153	185	217	249	281	313	345	377	409	441	473	-
↓↑↓↑↑...	26	58	90	122	154	186	218	250	282	314	346	378	410	442	474	-
↑↑↓↑↑...	27	59	91	123	155	187	219	251	283	315	347	379	411	443	475	-
↓↓↑↑↑...	28	60	92	124	156	188	220	252	284	316	348	380	412	444	476	-
↑↓↑↑↑...	29	61	93	125	157	189	221	253	285	317	349	381	413	445	477	-
↓↑↑↑↑...	30	62	94	126	158	190	222	254	286	318	350	382	414	446	478	-
↑↑↑↑↑...	31	63	95	127	159	191	223	255	287	319	351	383	415	447	479	-

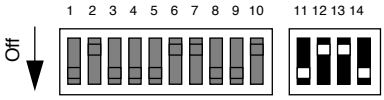
1) Setting used to configure the 788-LD for either 4- or 8-channel operation. Refer to §3.1.2.

3.1.4 Dimmer or switch operation selection

DIP switches 11 to 14 select between dimmer or switch operation of each channel. In the dimmer mode, the output can be smoothly dimmed from 0 to 100%. For some devices that should be damaged by dimmed power, the switch mode can be selected.

In the switch mode, the power output is either 0 or 100%, even if the DMX controller should set up a dimmed output for that channel.

In the following figure, output 1 and 4 are set to the switch mode while output 2 and 3 are set to the dimmer mode.



For DIP switch 11 to 14 the following table applies:

Switch	Off(↓)	On (↑)
11	output 1 in switch mode	output 1 in dimmer mode
12	output 2 in switch mode	output 2 in dimmer mode
13	output 3 in switch mode	output 3 in dimmer mode
14	output 4 in switch mode	output 4 in dimmer mode

3.2 Connecting the 788-LD to a DMX controller

To connect the 788-LD to your DMX controller, take the following steps:

- Connect the data output of your DMX controller to the DMX input of the 788-LD using 3-pin XLR cable, which is standard balanced microphone cable. Possibly your DMX controller has a 5-pin XLR data output in which case you should use a cable that adapts from 5- to 3-pin XLR. The table below shows the connections of such a cable.
- If you are using only one 788-LD, insert the XLR termination plug that came with the DMX controller into the DMX output connector of the dimmer pack.
- If you are using more than one DMX device, connect the data output of each device to the data input of the next device. The order in which the devices are connected together is not important so the most efficient cabling route may be used. Plug the XLR termination plug into the last DMX device in the link.
- Possibly you want to connect 3-pin and 5-pin DMX devices together in one link. In that case you should adapt from 3- to 5-pin XLR or from 5- to 3-pin XLR. The table below shows the connections of such cables.
- Check the DMX activity indication LED on the 788-LD, this is the yellow LED, and if available a DMX activity indication LED on the DMX controller. These indicators should flicker vaguely providing that the controller is active. If the indication LED should be constantly off or constantly on at a high intensity, your cabling is not correct. Possible causes are bad connections, short circuits or twisted polarity of the DMX signals.

5-pin XLR output to 3-pin XLR input DMX cable		
Description	5-pin male XLR	3-pin female XLR
Ground (screen)	1	1
(-) signal	2	3
(+) signal	3	2
Not used	4	-
Not used	5	-

3-pin XLR output to 5-pin XLR input DMX cable		
Description	3-pin male XLR	5-pin female XLR
Ground (screen)	1	1
(-) signal	3	2
(+) signal	2	3
Not used	-	4
Not used	-	5

4 Operation

4.1 Mode I

In mode I, the DMX controller can only select the dimming percentage of each output. The selected DMX base channel number plus 3 subsequent DMX channels are occupied by the 788-LD according to the following table.

DMX Channel Offset	DMX Values	Effect
+0	0…255	**Dimmer channel 1** Dimmer full on (no light)…Dimmer full off (light)
+1	0…255	**Dimmer channel 2** Dimmer full on (no light)…Dimmer full off (light)
+2	0…255	**Dimmer channel 3** Dimmer full on (no light)…Dimmer full off (light)
+3	0…255	**Dimmer channel 4** Dimmer full on (no light)…Dimmer full off (light)

The dimmer outputs will go to the dimming percentage selected by the DMX controller immediately after the DMX controller modifies this setting.

The DMX channel offsets listed in the table above should be added to the DMX base channel number selected by DIP switches to obtain the actual DMX channel number for a specific output.

4.2 Mode II

In mode II, the DMX controller can not only select the dimming percentage of each output, but also the speed at which changes in this dimming output should be carried out. The selected DMX base channel number plus 7 subsequent DMX channels are occupied by the 788-LD according to the following table.

DMX Channel Offset	DMX Values	Effect
+0	0…255	**Dimmer channel 1** Dimmer full on (no light)…Dimmer full off (light)
+1	0…255	**Dimmer Speed channel 1** Fast…Slow
+2	0…255	**Dimmer channel 2** Dimmer full on (no light)…Dimmer full off (light)
+3	0…255	**Dimmer Speed channel 2** Fast…Slow
+4	0…255	**Dimmer channel 3** Dimmer full on (no light)…Dimmer full off (light)
+5	0…255	**Dimmer Speed channel 3** Fast…Slow
+6	0…255	**Dimmer channel 4** Dimmer full on (no light)…Dimmer full off (light)
+7	0…255	**Dimmer Speed channel 4** Fast…Slow

The DMX channel offsets listed in the table above should be added to the DMX base channel number selected by DIP switches to obtain the actual DMX channel number for a specific output.

4.3 Switch operation

Outputs for which DIP switches select switch operation are never dimmed, regardless of the setting of the DMX controller. For such channels, a dimmer setting in the range 0…127 causes that output to be off while a dimmer setting of 128…255 causes that output to be 100% on.

4.4 Overload and short circuit protection

When the 788-LD senses an overload or short circuit situation, all outputs are switched off immediately and the green LED starts blinking very fast, approximately 5 times per second. After the overload situation has been solved normal operation will resume after the 788-LD internal temperature drops below the critical value.

An short circuit condition is detected if a current more than 100 A flows for some short period of time. This mechanism provides an adequate short circuit protection. However, when switching on cold lights, a current equal to approximately 10 times the regular current will flow for a short period of time. This means that when switching on 4 lights of 1 kW, a current of approx. 4 x 40 = 160 A will flow, causing the protection mechanism to detect a short circuit. All outputs will be switched off.

There are two methods to avoid this problem. If lights are not switched on simultaneously but with the shortest possible delays between switching on each individual output, the 788-LD will not detect a short-circuit.

An easier method is never to switch off the lights. If the lights are powered at the least possible output setting, thus almost maximal dimmed, the lights will be warmed continuously and a large current when switching on will be avoided.

4.5 Indication LEDs

As mentioned, the green LED on the 788-LD indicates the operating mode directly after switching on the 788-LD as described in §3.1.2. During operation, this LED may indicate an overload or short circuit.

The yellow LED indicates DMX activity and may be helpful searching for problems in DMX cabling or connection.

Normally, a DMX controller transmits DMX data continuously. If the correct DMX cables are used and the 788-LD is connected properly to an active DMX controller, the yellow LED should show a vague flickering. In an erroneous situation, the yellow LED is off or lights at an alarming fierceness. Possible problems in the DMX cabling are: bad connections, short-circuits or twisted polarity of the DMX signals.

5 Technical specifications

Power supply	230 Vac ; 50 Hz
Ambient temperature	0…+40 °C
Humidity	30…90% RH
Dimensions	229 x 104 x 90 mm
Output per channel	max. 1 kW
Max. total load, including devices chained to power supply	16 A
This device complies with the European low voltage directive and the European EMC directive according to the following standards:	
electric safety	EN60950
emission (at 4 x 300 W load)	EN55022 class B EN55014 EN60555[1]
immunity	EN50082-1

1) To avoid intolerable voltage fluctuations in the mains and remain compliant to the European EMC standard EN60555-3, do not exceed the limits in the following table:

load variation	max. number of changes per minute
400 W	unlimited
670 W	476
1300	26
2600	2.8

6 Safety instructions

- The socket outlet shall be installed near the equipment and shall be easily accessible.
- The 788-LD is grounded through the power cord. To avoid electric shock, plug the power cord into a properly wired receptacle where earth ground has been verified by a qualified service person.
- To avoid personal injury and warrant proper operation, do not remove covers or panels from the 788-LD. There are no fuses or replaceable parts inside the 788-LD.
- Do not operate the 788-LD in humid environments. The 788-LD may be used in an environment with a maximum relative humidity of 90%.
- If the 788-LD should be mounted on a location where it could be potentially hazardous if the connection would get loose, additional precautionary measures should be taken. The 788-LD should for instance be mounted using an additional mounting string tied between 788-LD and the bracket on which it is mounted.