SUB333

60W Subwoofer
(Part of the ESC333 system)

SERVICE MANUAL

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Woodbury, N.Y. 11797
1-800-336-4JBL in the USA

A Harman International Company

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TABLE OF CONTENTS

ESC333 SPECIFICATIONS

LINE VOLTAGE		Voltage	Hi/Lo Line	
US 120vac/60Hz	Yes	120VAC	108-132VAC	
EU 230vac/50-60Hz	Yes	230VAC	207-264VAC	

Parameter	Spec.	Unit	Conditions	Notes
Sat. Amplifiers 30w x 5 ch. section				
Type (Class AB, D, other)	AB	—		ESC350 Sink required
Load Impedance (speaker)	6	Ohms	Nominal	Z-curve required
Rated Output Power	30	Watts	ALL CH.driven	Marketing Spec.
THD@ Rated Power	0.08	%	22k filter	30w (BW 120Hz-15kHz)
THD @ 1 Watt	0.1	%	22k filter	
Max. Output Power	35	Watts	2 ch. Stereo Mode Max	@1%THD
DC Offset	2	mV-DC	@ Speaker Outputs	
Damping factor	>200	DF	—	
Input Sensitivity				(L,C,R,LS,RS)
Input Frequency	1k	Hz	Nominal Freq.	1 input driven
Line Input: Video/AUX	265	mVrms	To Rated Power/ Vol @ Max	1 input driven
Signal to Noise				(L,C,R,LS,RS)
SNR-A-Weighted	100	dBA	relative to 30w power/ 1k ohm term.	A-Weighting filter
SNR-unweighted	75	dBr	relative to 30w power/ 1k ohm term.	22k filter
SNR rel. 1W-unweighted	65	dBr	relative to 1W Output/ 1k ohm term.	22k filter
Residual Noise Floor	1	mVrms	Volume @max, using RMS reading DMM/VOM (or A/P)	
Filters/EQ				(L,C,R,LS,RS)
HPF,Notch,HF boost	Fixed	dBr	0dBr = 1w @ 1kHz	
Subwoofer Amp 60w x 1 ch. section				
Type (Class AB, D, other)	AB	—	—	
Load Impedance (speaker)	4	Ohms	Nominal	
Rated Output Power	60	Watts	ALL CH.driven	
THD@ Rated Power	0.08	%	22k filter	60w (BW 30-120Hz)

Parameter	Spec.	Unit	Conditions	Notes
THD @ 1 Watt	0.1	%	22k filter	
Max. Output Power	80	Watts	2 ch. Stereo Mode @ 50Hz	@1%THD
DC Offset	2	mV-DC	@ Speaker Outputs	
Damping factor	>200	DF	—	
Input Sensitivity				
Input Frequency	50	Hz	Nominal Freq.	1 input driven
Line Input: Video/AUX	265	mVrms	To Rated Power/ Vol @ Max	1 input driven
Signal to Noise				
SNR-A-Weighted	100	dBA	relative to 60w power/ 1k ohm term.	A-Weighting filter
SNR-unweighted	75	dBr	relative to 60w power/ 1k ohm term.	22k filter
SNR rel. 1W-unweighted	65	dBr	relative to 1W Output/ 1k ohm term.	22k filter
Residual Noise Floor	1	mVrms	Volume @max, using RMS reading DMM/VOM (or A/P)	
Input Impedance				
Line Input: Video/AUX	20k	ohms	Nominal	
Optical				
Coax				
Filters/EQ				0dBr = 1w @ 50Hz
HPF, LPF	Fixed	dBr	0dBr = 1w @ 50Hz	
Signal Sens. (ATO)				
Auto-Turn-On (yes/no)	yes			
ATO Input Frequency	1k	Hz		
ATO Level	2	mV	2mV@50Hz into Line Input w/ 1 ch. driven	
ATO Bandwidth	5k	Hz	ATO-LPF for noise immunity	
ATO Turn-on time	5	ms	Amp connected and AC on, then input signal applied	
Auto Mute/ Turn-OFF	20	min.	T before muting, after signal is removed	
Power on Delay time	3	sec.	AC Power Applied	
Transients/Pops				
Signal-Present Transient	5	mV-peak	@ Speaker Outputs	
Turn-on Transient	50	mV-peak	@ Speaker Outputs	AC cycled from
				OFF to ON or ON to OFF
Efficiency				
Stand-by Input Power	15	Watts	@ nom. line voltage	
Max Power Consumption	425	Watts	@ nom. line voltage	@ rated power
Efficiency	50	%	Nominal... At rated output	
Protection				
Short Circuit Protection	yes		Direct short at output	
Thermal Protection	yes		@1/8 max unclipped Power	
DC Offset Protection	yes		DC present at Speaker Out leads	
Line Fuse Rating	5	Amps	Type-T or Slo Blo	

IMPORTANT NOTE

Automatic On/Off and Automatic Digital-Input Selection

The ESC333 offers two unique user-convenience features: Automatic Turn-On/Shut-Down and Automatic Digital-Input Selection.

The Automatic Turn-On feature will turn the ESC333 on as soon as a source connected to its digital inputs (such as DVD, CD player with digital output, or any other device featuring a coaxial or optical digital output) is switched on, or as soon as the unit connected to its last-used analog input starts outputting sound.

When using digital inputs, the Automatic Turn-On can be activated by turning on either one of the connected digital sources such as a DVD player or a CD player with digital output. When using analog inputs (TV or AUX), Automatic Turn-On is available only for the device that was last listened to before the ESC333 shut down. In order to listen to the other device, the ESC333 input needs to be manually selected by using the Input button on the product and on the remote, which, in turn, disables the Automatic Digital-Input Selector until the ESC333 is shut down.

The Automatic Turn-Off shuts the unit down five minutes after all sources connected to its digital inputs are powered down *and* the device connected to its selected analog input stops playing.

The Automatic Digital-Input Selector automatically selects the source connected to its digital inputs when that source is powered on. Upon power down of this digital unit, if no other source is on, the ESC333 will switch itself off after five minutes.

If the analog source that was selected prior to the digital source turning on is still playing, the ESC333 will switch back to that other source. Once a digital source is powered on and selected as an input, turning on a device connected to the other digital input will not switch the input until the selected digital device is first powered off. These two features can only be used if the customer does not manually turn the ESC333 on or off, and does not manually select an input source. Once either of these selections is made manually, the automatic features are disabled as follows:

1. If the ESC333 is turned off manually, it will not turn back on automatically until five minutes after the source connected to the ESC333 is shut down. During these five minutes, it can be turned on either from the front panel or via the remote control.

2. Once an input source is selected manually, the Automatic Source-Selection feature will remain disabled until the ESC333 shuts down.

3. Once any one of the two devices connected to the ESC333 digital inputs is powered on and its input is selected by the ESC333, the device connected to the other digital input of the ESC333 cannot be automatically selected until the already-selected digital device is powered down.

FEATURES

• Complete, self-powered Dolby* Digital home-cinema sound system with five satellite speakers, subwoofer, remote control, and all amplification built in. (Just Add TV!)

• Dolby Digital (AC-3* 5.1 channel), Dolby Pro Logic,* including Phantom and 3-Stereo, and Stereo listening modes.

• Automatic Turn-On and Turn-Off.

• Automatic Source Switching for the digital inputs.

• Two digital (one optical and one coaxial) inputs and two analog inputs.

• 2-Way video-shielded micro-satellites with titanium laminate tweeters and common voicing for all five channels, and an 8-inch, long-throw, floor-firing subwoofer.

• Late Night compression for nighttime listening without unexpected and objectionably loud passages.

• All amplification and controls are mounted in the sub-woofer, eliminating the need for a separate control unit.

• Remote controllable via outboard remote eye that can be mounted with the center channel or separately, so that the subwoofer can be hidden away.

• Wall-mount brackets and floor stands available separately for the satellites.

• Credit-card-type, full-function remote control.

• JBL “error free” speaker cables simplify connection and eliminate possibility of out-of-phase wiring.

• Center foot for horizontal placement of the center channel.

• Rotatable JBL logos to allow for vertical or horizontal placement of the satellites.

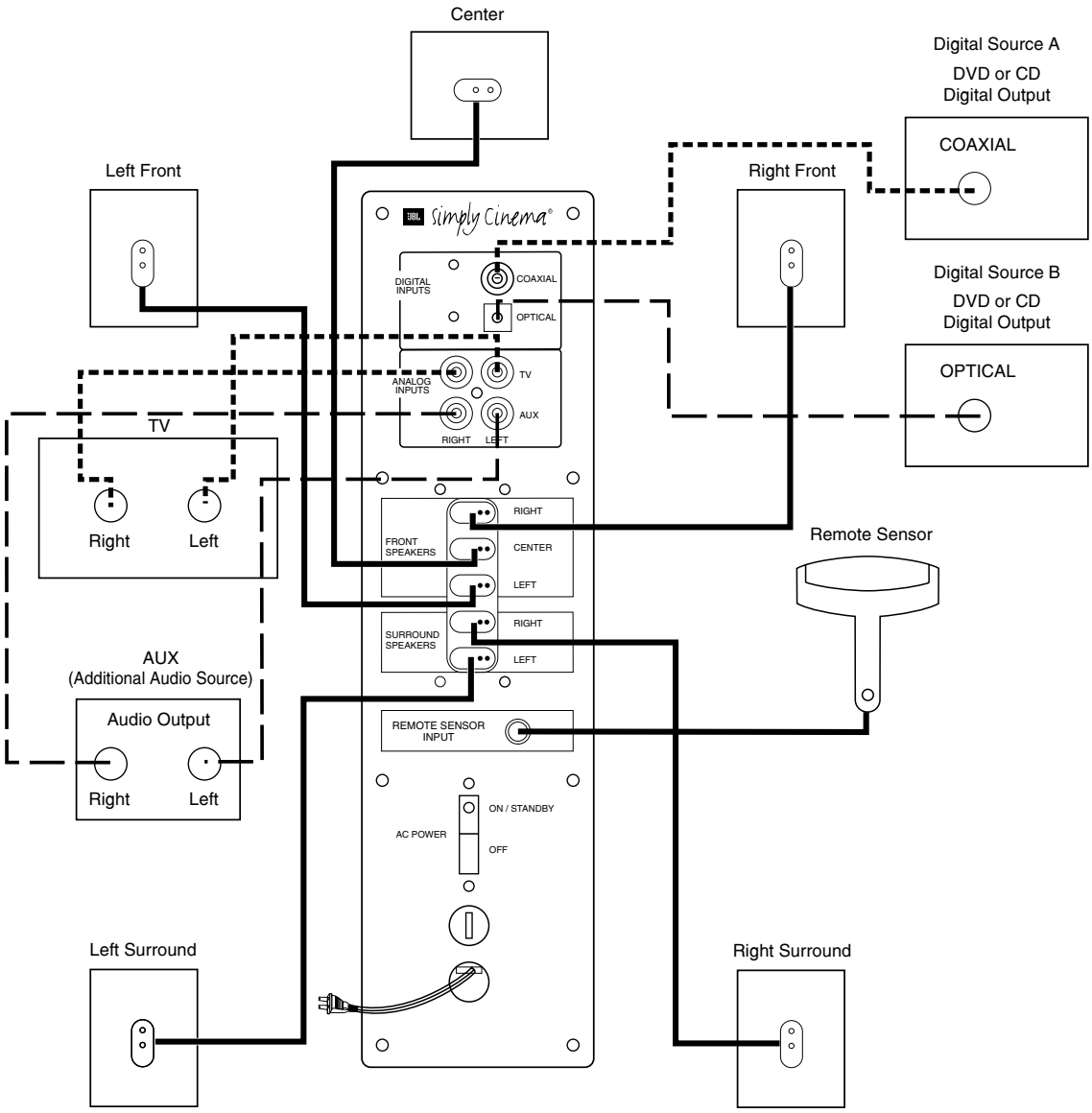
ABOUT DOLBY DIGITAL

The ESC333 features Dolby Digital (also unofficially known as AC-3) multichannel signal processing, a system developed by Dolby Laboratories.

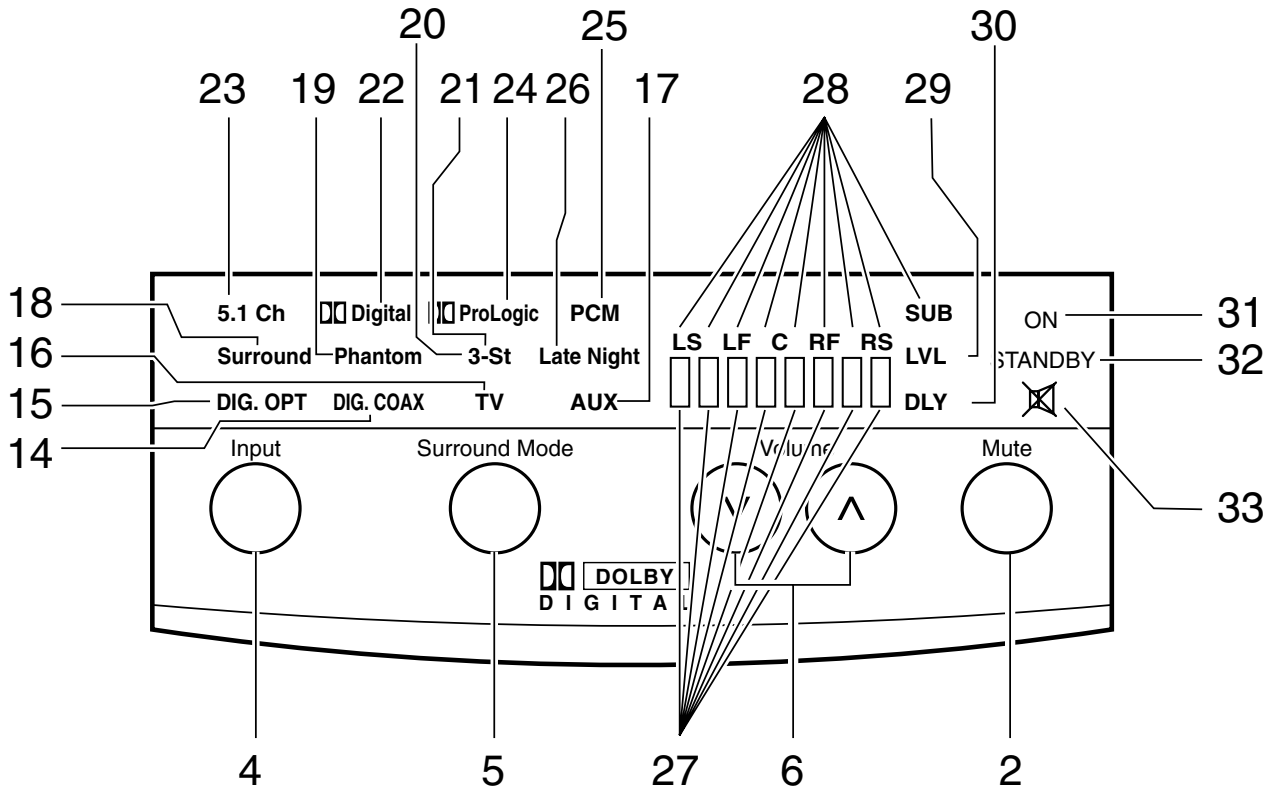
Dolby Digital, unlike “matrixed” systems (such as Dolby Pro Logic) that derive and decode multichannel sound from two channels of sound, is capable of delivering information for one subwoofer and five full-range channels as discrete and individual channels in digital AC-3 data format from sources such as a DVD player. The result is clear and accurate digital sound to each speaker, along with availability of stereo-surround effects (Dolby Pro Logic features mono surrounds).

Dolby Digital is capable of delivering several different formats of surround sound, the most robust one being the 5.1-channel mode, which provides separate signals for five satellite speakers as well as for a subwoofer. The ESC333 features a “5.1-Ch” indicator that illuminates when a Dolby Digital 5.1-channel encoded signal is present. Dolby Digital can also provide other AC-3 digital multichannel signals, as well as 2-channel signals, which can be decoded via Dolby Pro Logic processing into multichannel surround sound. In the latter case, both the Dolby Pro Logic and Dolby Digital indicators will illuminate in the ESC333 display.

ESC333 SPEAKER, SOURCE & REMOTE SENSOR CONNECTIONS

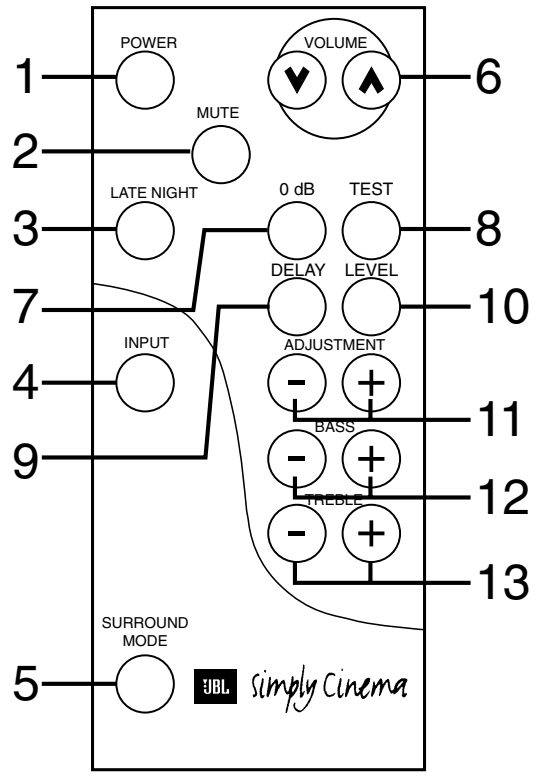


REMOTE AND FRONT-PANEL CONTROLS AND INDICATORS



1. Power

This button, located only on the remote control, allows the user to manually turn on or off the ESC333. Please note that the ESC333 features Automatic Turn-On/Off, and the power switch is not normally used unless it is necessary to override this automatic feature, or in case the analog input to be used is not the last one that was used and so Automatic Turn-On is not available for that input. Please read the details regarding Automatic Turn-On/Off on page 3 of this manual, and keep in mind that if the ESC333 is shut down using this power button, its automatic turn-on feature will remain disabled for five minutes after the source connected to the ESC333 is also shut down. This is to prevent the ESC333 from repeatedly turning itself back on against the user's wishes. The ESC333 can also be powered on by using the Input button (4) on the front panel of the subwoofer or on the remote control. Please note that if input selection is done by pressing the Input button, the Automatic Digital Input Selection of the ESC333 will be disabled until the ESC333 shuts down.



When the ESC333 is plugged into a working electrical outlet and its master switch on the back panel is set to On/Standby, the Standby (32) indicator will illuminate. The ON (31) indicator will light as soon as the ESC333 is turned on either automatically or via the pressing of the Power or Input buttons.

2. Mute

From either the front panel or the remote control, press (Mute) to lower the volume completely. The mute symbol indicator (33) will illuminate. When you press either of the mute buttons again, the volume will return to its previous setting.

Note: The mute function can also be turned off by pressing either of the volume buttons on the front panel or the remote control.

3. Late Night
This feature is available for Dolby Digital only. It compresses the inherently dynamic digital sound so that the quiet and loud passages are not quite as different in sound levels as they ordinarily are. This feature allows the user to watch movies and listen to dialogue at toned-down levels so as not to disturb others by the loud sound effects that may be present. The Late Night indicator (26) illuminates when this feature is active.

4. Input
This control is available on both the front panel and the remote control. It allows manual selection when the user repeatedly presses and releases the button for any of the ESC333's four inputs. The ESC333 features an Automatic Digital Input Selection feature that automatically switches the ESC333 to the source connected to one of its two digital inputs as soon as that device is powered on. Please read the section on page 3 to thoroughly familiarize yourself with the conveniences and conditions of using the Automatic Digital Input Selection feature. The Input switch is also used when the source connected to the ESC333's analog input is not the analog source that was listened to the last time the ESC333 was on (and hence the Automatic Turn-On feature is not available). The Input switch also turns on the ESC333 when pressed (see item 1 earlier in this section). Whenever a specific input is selected either manually or automatically, its indicator (14, 15, 16 or 17) on the ESC333's front panel will be illuminated.

5. Surround Mode
Pressing and releasing this button allows the selection of different listening modes. Surround (18), Phantom (19) and 3-Stereo (20) are available listening options for Dolby Digital and Dolby Pro Logic. Stereo (21) bypasses the surround processing and outputs sound through the right and left-front speakers only. In Surround mode, all five satellites and the sub-woofer will play. In Phantom mode, all speakers except the center channel will play. In 3-Stereo, all speakers except for the two surround speakers will be active.

6. Volume
Press (+) on the remote control or the front panel to raise the system's volume. Press (-) on the remote control or the front panel to lower the system's volume. The volume setting is indicated on the status-bar indicator (27).

7. 0 dB
Press this button to reset the Center, Surround, Balance, Treble and Bass controls to their default positions.

8. Test
Press this button to activate the Test Tone mode.

9. Delay
The relative timing of sounds coming from the center and/or surround speakers compared to the front-left and front-right speakers can be adjusted. The first press of this button allows adjustment of the center channel, all the way from the default setting of 0 ms (milliseconds), which means no delay (all status bars off), to a maximum of 5 ms (5 status bars on). The indicators C (28) and DLY (30) will be on. The second press of the Delay button allows adjustments of the surround speakers; indicators LS (28) and RS (28) and DLY (30) will be on. The delay can be adjusted from zero (all status bars off) to 15 ms (all status bars on) in 5.1 Channel Dolby Digital and from 15 ms (all status bars off) to 30 ms (all status bars on) in Dolby Pro Logic (there is an inherent and fixed 15 ms of delay added in the "matrixed" Dolby Pro Logic to recreate the proper surround effect). The center and surround delay adjustments can be done from either Dolby Digital or Dolby Pro Logic "matrixed" modes. There are no separate delay adjustments for the individual modes of operation. During adjustments, the audio mutes momentarily every time the Adjustment +/– button (11) is pressed. Please note that the status-bar indicator (27) will not display unless Adjustment +/– buttons are pressed. Also, while the status-bar indicator (27) is on, channel indicators (28) and DLY (30) will not be displayed. And, if adjustments are done in a mode where a certain channel is not available, the adjustment step for that channel is skipped. For example, in Phantom mode, the center-channel delay cannot be adjusted since Phantom does not have a center channel. In Stereo, neither the center nor the surround delay can be adjusted since Stereo does not feature surround speakers or a center speaker. A third press of the Delay button will exit the ESC333 from its delay-adjustment mode.

10. Level
The relative level of sounds coming from each of the ESC333's speakers can be adjusted while listening to program material on the ESC333. Repeated pressing and releasing of the Level button allows access to each channel. The display will indicate LVL (29), and the channel indicators (28) LF (Left Front), C (Center), RF (Right Front), LS (Left Surround), RS (Right Surround) and SUB (sub-woofer) will illuminate to indicate the active speaker. The level for the selected channel can then be changed using the Adjustment +/– buttons (11). Levels set in one mode will stay valid for all other modes and are not independent. Please note that the status-bar indicator (27)

will not display unless Adjustment +/– buttons are pressed. And, while the status-bar indicator 27) is on, channel indicators (28) and LVL (29) will not be displayed. Also, if adjustments are done in a mode where a certain channel is not available, the adjustment step for that channel is skipped. For example, in Phantom mode the center-channel level cannot be adjusted since Phantom does not have a center channel. In stereo, neither the center nor the surround levels can be adjusted since Stereo does not feature surround speakers or a center speaker. A seventh press of the Level button will exit the ESC333 from its level-adjustment mode.

11. Adjustment
These buttons are used in conjunction with Test (8), Delay (9), and Level (10) to increase or decrease a setting.

12. Bass
Press (+) to increase the level of low-frequency information. Press (–) to decrease the level of low-frequency information.

13. Treble
Press (+) to increase the level of high-frequency information. Press (–) to decrease the level of high-frequency information.

14–17. Input
One of these four indicators will illuminate, depending on which input is selected.

18–21. Surround
One of these will illuminate, depending on which surround mode is chosen.

22. Dolby Digital
Indicates the presence of a Dolby Digital-encoded AC-3 digital signal.

23. 5.1-Ch
Works in conjunction with the Dolby Digital indicator (22). This indicator illuminates when the Dolby Digital signal contains 6 discrete channels of information (one subwoofer and five satellite channels).

24. Dolby Pro Logic
Illuminates when Dolby Pro Logic decoding of a 2-channel signal is taking place. This indicator may be on by itself (when analog inputs are used), in conjunction with Dolby Digital (when using a digital input where the AC-3 format signal contains two channels and needs to be decoded into multichannel) or together with PCM (when using a digital input where 2-channel PCM-format data is being decoded into multi-channel).

25. PCM
Illuminates when the signal supplied through the selected digital input is in PCM format.

26. Late Night
Illuminates when the Late Night compression is selected.

27. Status-Bar Indicator
These LEDS show the relative setting of volume, bass, treble, speaker level and speaker delay.

28. Speaker Indicator
Identifies the speaker that's being adjusted. LS is Left Surround, LF is Left Front, C is Center, RF is Right Front, RS is Right Surround, and SUB is Subwoofer.

29. Level
Illuminates when the ESC333 is in speaker-level adjustment mode.

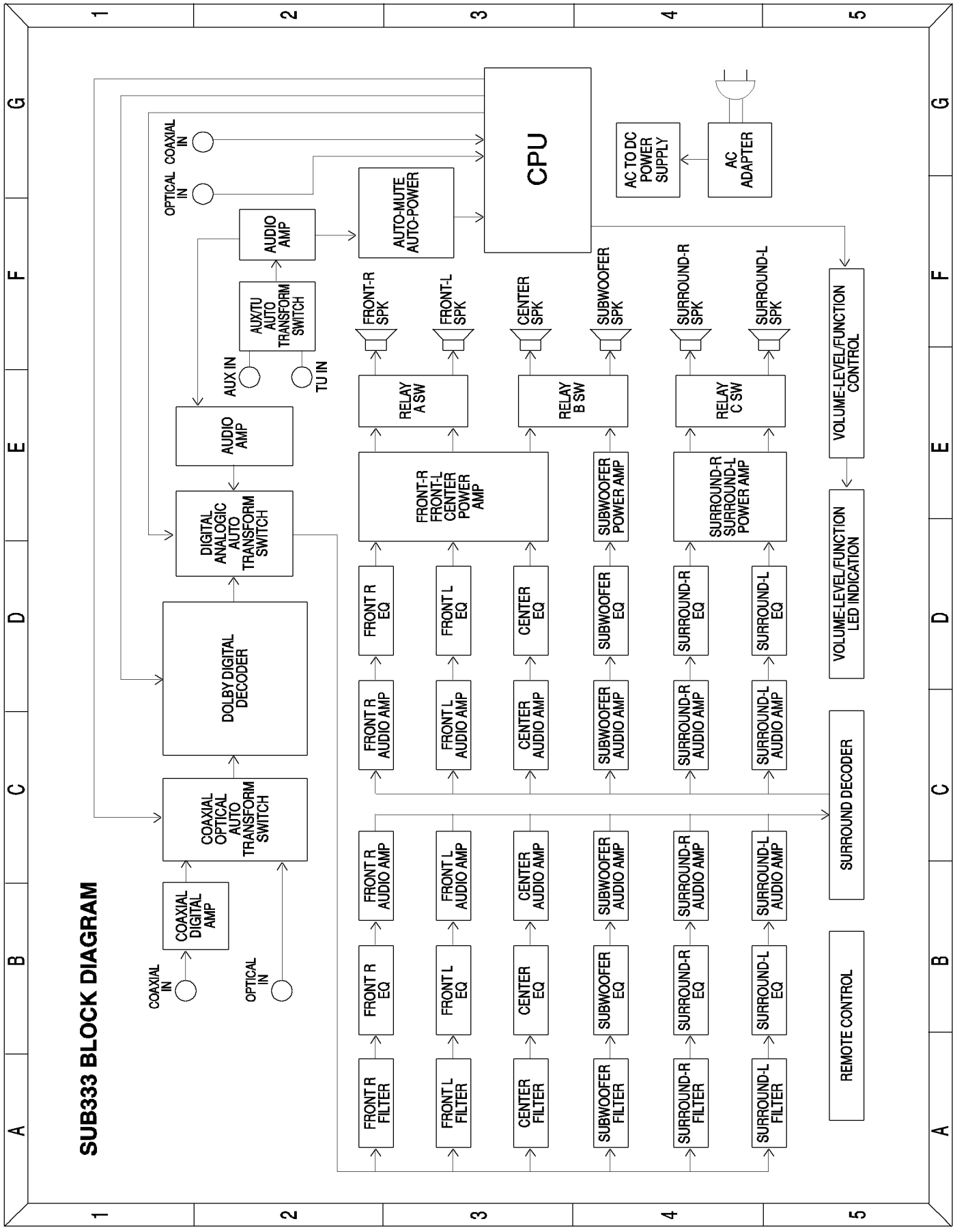
30. Delay
Illuminates when the ESC333 is in speaker-delay adjustment mode.

31. On
Indicates that the ESC333 is fully powered up.

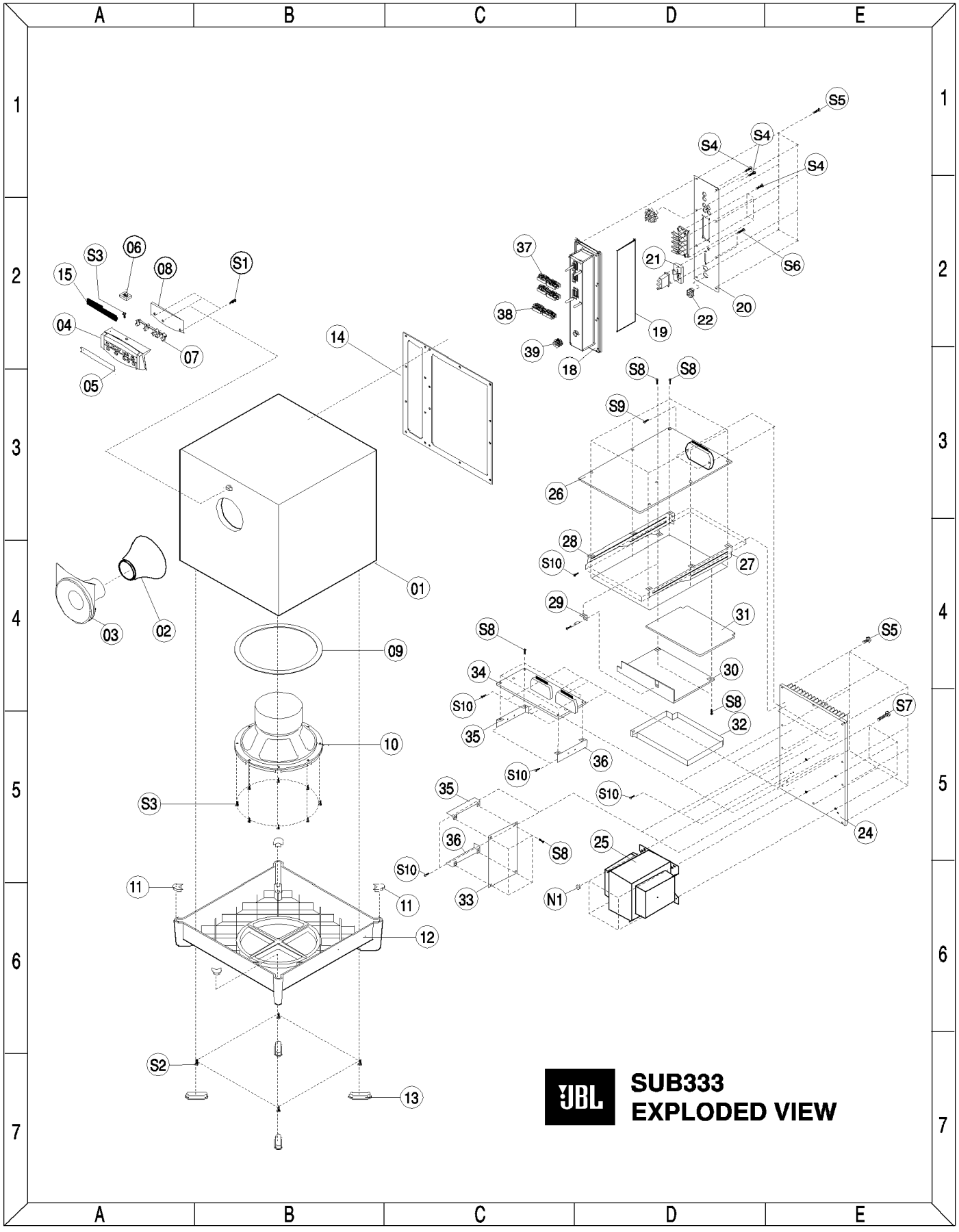
32. Standby
Indicates that the ESC333 is plugged into an active wall outlet and the master switch on the back panel is in On/Standby position, but the unit is not powered on.

33. Mute
Illuminates when the mute function is activated (the ESC333 will be on but will not produce any sound).

SUB333 BLOCK DIAGRAM



SUB333 UNIT EXPLODED VIEW



SUB333 MECHANICAL PARTS LIST

Ref.#	Part #	Description	Qty.
1	EVM0033-001	WOOD BOX	1
2	BPR0020-000	PORT EDGE	1
3	BPR0042-BA0	PORT	1
4	BPF5056-BA1	CONTROL PANEL	1
5	BNP0073-001	PVC PLATE	1
6	BPL0013-001	LOGO PLATE	1
7	BPK5031-000	CONTROL BUTTON ASSEMBLY	1
8	APE0283-001	CONTROL PCB ASSEMBLY	1
9	IVE0041-001	WOOFER GASKET	1
10	FTW6080-312	4 OHM 8' WOOFER	1
11	BRF0015-001	RUBBER PAD	4
12	BPB0012-001	BOTTOM CABINET	1
13	BRF0014-001	RUBBER PAD	4
14	IVE0042-001	BOX SPONGE	1
15	BPH0054-000	LED HOLDER	1
18	BPA0021-001	REAR COVER	1
19	APE0284-001	JACK PCB ASSEMBLY	1
20	GSE0255-001	JACK PLATE	1
21	MSV0001-004	SWITCH ROCKER	1
22	DBU0002-001	BUSHING	1
23	47455-D52	6.5 ft. AC LINE CORD	1
24	GAL0055-003	HEAT SINK	1
25	TTL1201-001	**120V** POWER TRANSFORMER	1
	TTL2301-001	**230V** POWER TRANSFORMER	1
26	APE0280-001	MAIN PCB ASSEMBLY	1
27	GSE0253-001	PCB BRACKET RIGHT	1
28	GSE0254-001	PCB BRACKET LEFT	1
29	GSE0093-001	HEAT SINK BRACKET	1
30	APE0214-003	DECODER PCB ASSEMBLY	1
31	GTN0063-001	SHIELD PLATE UP	1
32	GTN0064-001	SHIELD PLATE DOWN	1
33	APE0281-001	POWER PCB ASSEMBLY	1
34	APE0282-011	DC PCB ASSEMBLY	1
35	GSE0256-001	PCB BRACKET RIGHT	1
36	GSE0257-001	PCB BRACKET LEFT	1
37	BRB0003-001	RUBBER BUSHING	1
38	BRB0004-001	RUBBER BUSHING	1
39	BRB0005-001	RUBBER BUSHING	1
N1	HNI1482	NUT @ 14x3.5 mm	4
S1	H101001-108	SCREW T3.0x1.27P -2RHxL8.0 mm	3
S2	H016504-316	SCREW W6#-20xl16.0 mm	4
S3	H016701-316	SCREW W8#-18xL16.0 mm	8
S4	H101001-310	SCREW T3.0x1.27PxL10.0 mm	3
S5	HO60501-320	SCREW M4.0x0.7PxL20.0 mm	10
S6	H060301-314	SCREW M3.0x0.5PxL14.0 mm	2
S7	H060404-321	SCREW M3.5x0.6PxL21.0 mm	4
S8	H120301-306	SCREW M3.0x0.5PxL6.0 mm	4
S9	H041001-314	SCREW T3.0x1.27P-2RHxL14.0	2
S10	H1110022-306	SCREW T3.0x1.27P-2RHxL6.0	

SUB333 ELECTRICAL PARTS LIST

Ref.#	Part #	Description	Qty.
Fuses			
F901, F902 (DC PCB)	KSA2800-001	FUSE 8A 250V	2
F903, F904 (DC PCB)	KSA2160-003	FUSE 1.6A 250V 5x20 mm W/UL. CSA. T MARKING	2
F905 (DC PCB)	KSA2100-002	FUSE 1A 250V 5x20 mm W/UL. CSA. T MARKING	1
F906, F907 (PWR PCB)	KSA2400-104	FUSE 4A 250V SLOW 5ST BEL 5x20mm CSA/UR/VDE/SE	2

APE0214-003 DECODER PCB ASSY

Ref.#	Part #	Description	Qty.
Connectors			
CN601A	CCN7879-031	CONNECTOR J.S.T. 2.0 mm PH B11B-PH-K TOP SIZE	1
CN602A	CCN2032-L15	CONNECTOR TUC-P15X-B1 PITCH=2.0 mm SIDE	1
CN603A	CCN2032-L07	CONNECTOR TUC-P7X-B1 PITCH=2.0 mm SIDE	1
Capacitors			
C635, C636, C637, C638	PRE3953-101	COND ELECT 100uF 25V 20% 85'C	4
C639, C640	PRM3737-682	COND MYLAR 0.0068uF 100V 5%	2
C641, C642, C643, C644	PRE3951-470	COND ELECT 47uF 10V 20% 85'C	4
C645	PRE3951-100	COND ELECT 10uF 10V 20% 85'C	1
C646, C648, C670	PMA3955-109	COND ELECT 1uF 50V 20% P=2.5 mm AI (MINI)	3
C647, C657, C658, C659, C660, C661, C662, C663, C664, C665, C666, C667, C668, C671, C839, C840, C841, C843	PCW3965-104	CHIP CAP 0.1uF 50V +80-20% TYPE Y5V	18
C649, C651, C652, C653, C654, C790	PMA3951-479	COND ELECT 4.7uF 10V 20% P=2.5 mm AI (MINI)	6
C672, C673	PCW1035-300	CHIP CAP 30pF 50V 5% TYPE NPO	2
C674	PRM3737-473	COND MYLAR 0.047uF 100V 5%	1
C675	PRM3737-103	COND MYLAR 0.01uF 100V 5%	1
C676	PEP2636-104	COND MPEM 0.1uF 63V 5% MINI SIZE (AI)	1
C677, C691, C738, C789, C795, C809 C811	PRE3953-101	COND ELECT 100uF 25V 20% 85'C	7
C678, C679, C682, C683, C688, C692, C693, C696, C697, C700, C701, C803	PCW5635-682	CHIP CAP 0.0068uF 50V 5%	12
C680, C684, C689, C694, C698, C702	PEP2636-474	COND MPEM 0.47uF 63V 5% MINI SIZE (AI)	6
C681, C685, C690, C695, C699, C703	PCW1035-561	CHIP CAP 560pF 50V 5% TYPE NPO	6
C686, C728, C734, C748, C752, C753, C755, C757, C766, C767, C783, C784, C786, C787, C788, C829	PMA3951-470	COND ELECT 47uF 10V 20% P=2.5 mm AI (MINI)	16
C704, C705, C706, C713, C715, C716, C717, C726, C765, C785,	PMA3951-101	COND ELECT 100uF 10V 20% P=2.5 mm AI (MINI)	10
C720, C724, C736, C750, C754, C798, C799, C800, C801, C810, C812, C815, C816	PMA3953-101	COND ELECT 100uF 25V 20% P=2.5 mm AI H=7mm	13
C723, C729, C730, C741, C744, C756	PCW1035-331	CHIP CAP 330pF 50V 5% TYPE NPO	6
C758	PCW1035-220	CHIP CAP 22pF 50V 5% TYPE NPO	1
C759, C832, C880, C882	PRD3545-104	COND DISC 0.1uF 50V 10% Y5P	4
C760	PMA3952-220	COND ELECT 22uF 16V 20% P=2.5 mm AI (MINI)	1
C761	PRM3737-152	COND MYLAR 0.0015uF 100V 5%	1
C762	PRM3737-153	COND MYLAR 0.015uF 100V 5%	1
C764	PRE3951-101	COND ELECT 100uF 10V 20% 85'C	1
C768, C778, C779	PMA3952-101	COND ELECT 100uF 16V 20% P=2.5 mm AI (MNI)	3
C769, C773, C777, C780, C781, C782, C834, C835, C836, C837, C838, C842	PCW1035-470	CHIP CAP 47pF 50V 5% TYPE NPO	12
C770, C776	PEP2636-824	COND MPEM 0.82uF 63V 5% MINI SIZE (AI)	2
C771, C775	PRM3737-562	COND MYLAR 0.0056uF 100V 5%	2
C772, C774	PRM3737-472	COND MYLAR 0.0047uF 100V 5%	2
C813, C814	PMA3955-339	COND ELECT 3.3uF 50V 20% P=2.5 mm AI (MINI)	2
C830, C831	PVE3951-102	COND ELECT 1000uF 10V 20% HI	2
C833	PCW5635-223	CHIP CAP 0.022uF 50V 5% TYPE X7R	1
C881	PCW1035-101	CHIP CAP 100pF 50V 5% TYPE NP	1
C883	PMA3955-479	COND ELECT 4.7uF 50V 20% P=2.5 mm AI (MINI)	1
C887	PCW3955-104	CHIP CAP 0.1uF 50V 20% TYPE Y5V	1
C888	PRD1335-390	COND DISC 39pF 50V 5% NPO	1
Diodes			
D601	RCD4148-001	DIODE SW LL4148 TELEFUNKEN SMT TYPE	1
D602	RAD4001-001	RECTIFIER 1N4001 1A 35VRMS	1
ZD601, ZD602	RAZ0859-073	DIODE ZENR 6.9-7.2V 0.5W HITACHI HZ7B-2	2
Integrated Circuits			
IC601	RCI3861-001	IC 100 PIN ZR38601 ZORAN AC3 DECODER	1
IC605,IC606,IC608, IC609,IC610, IC611,IC612, IC613, IC621, IC622, IC623	RCI0720-001	IC 8 PIN TL072 SMT TYPE DUAL OP-AMP	11
IC607	RCI1117-001	IC 3 PIN REG1117 3.3V	1

SUB333 ELECTRICAL PARTS LIST Cont...

Ref.#	Part #	Description	Qty.
IC614-IC619	RCI4051-001	IC 16 PIN TC4051BFN CHIP 8 CH MULTIPLEXER	6
IC620	RCI6244-001	IC 42 PIN M62446FP ELECTRONIC VOLUME CONTROL	1
IC624	RCI7404-001	IC 14 PIN TC74HC04AFN TOSHIBA HEX INVERTER	1
IC625	RCI4052-001	IC 16 PIN TC4052BFN CHIP 4 CH MULTIPLEXER	1
IC626	RCI4227-001	IC 44 PIN CS4227 6 CH VOL CRYSTAL	1
IC627	RHI0256-001	IC 28 PIN EPROM IC 256K 120ns	1
Resistors			
R601, R670, R674, R675, R676, R891	QCF0152-000	CHIP RES. 0 OHM JUMP WIRE SMT TYPE	6
R673	QCF0152-473	CHIP RES. 47K OHM 1/10W 5% SMT TYPE	1
R677, R736, R741, R746, R750, R756, R764, R809, R812, R823, R888, R889	QCF0152-472	CHIP RES. 4.7K OHM 1/10W 5% SMT TYPE	12
R678, R838, R882, R883, R884	QCF0152-223	CHIP RES. 22K OHM 1/10W 5%	5
R679, R683, R696, R698, R700, R707	QCF0152-222	CHIP RES. 2.2K OHM 1/10W 5% SMT TYPE	6
R680, R695	QCF0152-122	CHIP RES. 1.2K OHM 1/10W 5% SMT TYPE	2
R681, R684, R738, R743, R748, R753, R758, R768	QCF0152-152	CHIP RES 1.5K OHM 1/10W 5% SMT TYPE	8
R682, R697, R699, R701, R848	QCF0152-162	CHIP RES. 1.6K OHM 1/10W 5% SMT TYPE	5
R685, R686, R716, R717, R718, R719, R761, R788, R797, R799, R813, R892, R893, R894, R895, R896, R897	QCF0152-103	CHIP RES. 10K OHM 1/10W 5% SMT TYPE	17
R689	QAF0450-109	RESISTOR 1.0 OHM 1/4W 5% CF	1
R690	QAF0650-472	RESISTOR 4.7K OHM 1/6W 5% CF	1
R691, R709, R720, R721, R722, R723, R785, R791, R798, R802, R808, R821, R825, R826, R835, R849, R850, R851, R852, R853, R855, R856, R876, R877, R878, R879, R880, R881, R898	QCF0152-101	CHIP RES. 100 OHM 1/10W5% SMT TYPE	29
R692	QAF0650-102	RESISTOR 1K OHM 1/6W 5% CF	1
R693	QAF0650-681	RESISTOR 680 OHM 1/6W 5% CF	1
R694, R714, R715, R725, R726	QCF0152-390	CHIP RES. 39 OHM 1/10W 5% SMT TYPE	5
R702	QCF0152-622	CHIP RES. 6.2K OHM 1/10W 5% SMT TYPE	1
R703, R822, R827, R830, R833, R834, R836, R837, R842, R843, R844, R845	QCF0152-822	CHIP RES. 8.2K OHM 1/10W 5% SMT TYPE	12
R706, R740, R745, R751, R754, R762, R846, R854, R864, R865, R868, R869, R875	QCF0152-102	CHIP RES. 1K OHM 1/10W 5% SMT TYPE	13
R708	QCF0152-202	CHIP RES. 2K OHM 1/10W 5% SMT TYPE	1
R710, R711	QCF0152-203	CHIP RES. 20K OHM 1/10W 5% SMT TYPE	2
R712, R713	QCF0152-682	CHIP RES. 6.8K OHM 1/10W 5% SMT TYPE	2
R730	QCF0152-209	CHIP RES. 2 OHM 1/10W 5% SMT TYPE	1
R735, R744, R749, R755, R759, R770	QCF0152-512	CHIP RES. 5.1K OHM 1/10W 5% SMT TYPE	6
R737, R742, R747, R752, R757, R766	QCF0152-562	CHIP RES. 5.6K OHM 1/10W 5% SMT TYPE	6
R801, R803, R804, R805, R806, R816	QCF0152-224	CHIP RES. 220K OHM 1/10W 5% SMT TYPE	6
R807	QCF0152-301	CHIP RES. 300 OHM 1/10W 5% SMT TYPE	1
R810	QCF0152-183	CHIP RES. 18K OHM 1/10W 5% SMT TYPE	1
R815	QCF0152-433	CHIP RES. 43K OHM 1/10W 5% 0805 SMT TYPE	1
R817, R818, R819, R828, R829	QCF0152-362	CHIP RES. 3.6K OHM 1/10W 5% SMT TYPE	5
R820	QCF0152-331	CHIP RES. 330 OHM 1/10W 5% SMT TYPE	1
R847	QCF0152-392	CHIP RES. 3.9K OHM 1/10W 5% SMT TYP	1
R862, R863, R866, R867, R873, R874, R887	QCF0152-272	CHIP RES. 2.7K OHM 1/10W 5% SMT TYPE	7
R885, R886	QHM1050-151	RESISTOR 150OHM 1W 5% MF	2
Transistors			
Q607	RCN1623-001	XISTR NPN SMT TYPE (2SC945) HFE:200-400	1
Q608	RAP0733-001	XISTR PNP 2SA733Q,P NEC AI	1
Q609	RAN2001-001	XISTR NPN 2SC2001L NEC	1
Wires			
CN604	4999A-519	CON/WRE AY 3 COND 150 mm SHIELD WIRE	1
CN605	4999A-520	CON/WRE AY 3 COND 250 mm SHIELD WIRE	1
CN606	4999A-522	CON/WRE AY 2 COND 260 mm SHIELD WIRE	1
Miscellaneous			
L606, L609	SAF0835-001	BEAD RH035083ST-Y7 3.5X8.3X0.76	2
L607, L610	SHC8121-101	CHOKE 100uh	2
L611	SRC0210-001	CHOKE TOKIN SBT-0210	1
COPPER SIDE IC601, IC626	XTP9777-023	TAPE HIGH TEMP TAPE NICHIBAN	
L6, C884, L602, L603, L612, L613, L614, L615, L616D, L617, L619-L649	SCF0805-600	CHIP BEAD 2012A601Y102B TEAM YOUNG	

SUB333 ELECTRICAL PARTS LIST Cont...

Ref.#	Part #	Description	Qty.
L604, L605	SAC7414-100	CHOKE 10uH AI	2
XL602	JQC6071-320	CRYSTAL 32.0000 MHz L=5.0 mm	1

APE0280-001 MAIN PCB ASSY

Connectors

CN201	CCN7879-030	CONNECTOR J.S.T. 2.0 mm PH B10B-PH-K TOP SIZE	1
CN202	CCN7879-028	CONNECTOR J.S.T. 2.0 mm PH B 8B-PH-K TOP SIZE	1
CN203	CCN7879-027	CONNECTOR J.S.T. 2.0 mm PH B 7B-PH-K TOP SIZE	1
CN204	CCN7879-025	CONNECTOR J.S.T. 2.0 mm PH B 5B-PH-K TOP SIZE	1
CN602	CCN2032-015	CONNECTOR TUC-P15P-B1 PITCH=2.0 mm TOP	1
CN603	CCN2032-007	CONNECTOR TUC-P7P-B1 PITCH=2.0 mm TOP	1
CN604	CCN7879-023	CONNECTOR J.S.T. 2.0 mm PH B 3B-PH-K TOP SIZE	1
CN605	CCN1500-023	CONNECTOR B 3B-XH-A 3 PIN POST BASE TOP P:2.5	1
CN606	CCN1500-018	CONNECTOR B 2B-XH-A 2 PIN POST BASE TOP P:2.5	1

Capacitors

C101, C105	PRD4965-103	COND DISC 0.01uF 50V +80-20% Z5V II D=6	2
C102, C106, C110, C111, C206, C211, C325, C326, C336, C337, C338, C339, C403, C404, C605, C606, C637, C638	PRD3965-104	COND DISC 0.1uF 50V +80-20% Y5V/Z5V	18
C104, C108, C201, C323, C324, C414, C503, C504	PRE3955-109	COND ELECT 1uF 50V 20% 85'C	8
C109, C305, C306, C311, C312, C315, C316, C319, C320, C327	PRE3953-470	COND ELECT 47uF 25V 20% 85'C	10
C202, C203	PRD1335-180	COND DISC 18pF 50V 5% NP0 D=5	2
C204	PRE3955-478	COND ELECT 0.47uF 50V 20% 85'C	1
C205	PVE3951-222	COND ELECT 2200uF 10V 20%	1
C207, C210	PRE3952-470	COND ELECT 47uF 16V 20% 85'C	2
C208, C511	PRD4965-223	COND DISC 0.022uF 50V +80-20% Z5V II D=7	2
C209	PRE3952-100	COND ELECT 10uF 16V 20% 85'C	1
C301, C302, C307, C308	PRD3545-101	COND DISC 100pF 50V 10% Y5P	4
C303, C304, C309, C310, C328, C331, C363, C364, C719	PRD1335-470	COND DISC 47pF 50V 5% NP0	9
C313, C314, C321, C322, C356, C357, C418, C419, C705, C706	PRE3953-221	COND ELECT 220uF 25V 20% 85'C	10
C317, C318	PRD1335-220	COND DISC 22pF 50V 5% NP0 D=5	2
C332, C333, C401, C601, C602	PRM3737-822	COND MYLAR 0.0082uF 100V 5%	5
C334, C335, C402, C603, C604	PRD3545-221	COND DISC 220pF 50V 10% Y5P II D=5C330	5
C340, C341, C342, C343, C405, C406, C607, C608, C609, C610	PRM3737-273	COND MYLAR 0.027uF 100V 5%	10
C344, C345, C346, C347, C352, C353, C354, C355, C407, C408, C411, C412, C611, C612, C613, C614, C619, C620, C621, C622	PRM3737-472	COND MYLAR 0.0047uF 100V 5%	20
C348, C349, C410, C413, C501, C502, C617, C618	PRM3737-222	COND MYLAR 0.0022uF 100V 5%	8
C350, C351, C409, C615, C616	PRD3545-201	COND DISC 200pF 50V 10% Y5P	5
C415, C507, C508	PRD1395-509	COND DISC 5pF 50V +-0.5 pF NP0 D=5	3
C416, C505, C506	PRE3952-330	COND ELECT 33uF 16V 20% 85'C	3
C417, C509, C510, C723, C724	PRM3737-104	COND MYLAR 0.1uF 100V 5%	5
C512	PRE3951-100	COND ELECT 10uF 10V 20% 85'C	2
C513, C514, C515, C516	PRE3955-101	COND ELECT 100uF 50V 20%	4
C517	PRE3953-101	COND ELECT 100uF 25V 20% 85'C	1
C523, C524	PRE3954-470	COND ELECT 47uF 35V 20% 85'C	2
C525	PRE3952-471	COND ELECT 470uF 16V 20% 85'C	1
C526	PRE3955-229	COND ELECT 2.2uF 50V 20% 85'C	1
C527	PRE3953-100	COND ELECT 10uF 25V 20% 85'C	1
C720, C721	PRM3737-183	COND MYLAR 0.018uF 100V 5%	2
C722	PRM3737-303	COND MYLAR 0.03uF 100V 5%	1
C725	PRM3737-683	COND MYLAR 0.068uF 100V 5%	1
C726	PRM3737-123	COND MYLAR 0.012uF 100V 5%	1

Diodes

D201, D202, D203, D204, D206, D207, D303, D304, D305, D306, D307, D308, D401, D402, D501, D502, D503, D504, D505, D506, D507, D508	RAD4148-001	DIODE SW 1N4148	22
D205	RAD4001-001	RECTIFIER 1N4001 1A 35VRMS	1
ZD201	RAZ0859-070	DIODE ZENR 5.6-5.9V 0.5W HITACHI HZ6B-2	1
ZD301	RAZ0859-059	DIODE ZENR 2.3-2.5V .5W	1
ZD501,ZD502	RAZ0859-093	DIODE ZENR 22.3-23.3V 0.5W HITACHI HZ22-3	2

SUB333 ELECTRICAL PARTS LIST Cont...

Ref.#	Part #	Description	Qty.
Integrated Circuits			
IC201	RCI8747-041	IC 44 PIN TC9819 8 BIT MICROCONTROLLER	1
IC202, IC203, IC204	RHI4094-001	IC 16 PIN TC4094BP TOSHIBA 8 BIT SHIFT REGISTER	3
IC301	RHI4052-001	IC 16 PIN TC4052BP DIP 4 CH MULTIPLEXER	1
IC302, IC303, IC304, IC401, IC601, IC602, IC702	RHI0740-001	IC 14 PIN TL074CN QUAD OP-AMP	7
IC501	RHI0407-250	IC 20 PIN STK407-250 POWER IC	1
IC701	RHI5218-002	IC 8 PIN M5218AL MITSUBISHI OP AMP L TYPE	1
Resistors			
R101, R103, R106, R108, R113, R118, R119, R120, R214, R229, R230, R237, R251, R252, R253, R254, R255, R256, R257, R258, R259, R261, R263, R265, R267, R269, R271, R273, R275, R277, R279, R283, R285, R287, R289, R290, R291, R292, R311, R312	QAF0650-103	RESISTOR 10K OHM 1/6W 5% CF	40
R102, R107, R321, R322, R378, R379	QAF0650-105	RESISTOR 1.0M OHM 1/6W 5% CF	6
R104, R109, R110, R211, R327	QAF0650-151	RESISTOR 150 OHM 1/6W 5% CF	5
R105, R112, R225, R238, R239, R526, R528, R531, R533	QAF0650-473	RESISTOR 47K OHM 1/6W 5% CF	9
R116, R201, R202, R203, R204, R205, R206, R207, R208, R209, R212, R213, R215, R216, R217, R218, R219, R220, R221, R223, R224, R226, R227, R228, R231, R236, R323, R324, R365, R366, R414, R532, R534, R544, R627, R628, R725, R737	QAF0650-472	RESISTOR 4.7K OHM 1/6W 5% CF	38
R117, R288, R309, R310, R313, R314, R331, R373, R374, R416, R501, R502, R729	QAF0650-102	RESISTOR 1K OHM 1/6W 5% CF	13
R210, R315, R316, R701	QAF0650-332	RESISTOR 3.3K OHM 1/6W 5% CF	4
R232, R317, R318, R369, R370, R735, R736	QAF0650-101	RESISTOR 100 OHM 1/6W 5% CF	7
R240, R355, R356, R357, R358, R380, R410, R411, R417, R420, R427, R503, R504, R521, R522, R527, R619, R620, R621, R622	QAF0650-104	RESISTOR 100K OHM 1/6W 5% CF	20
R247, R381, R382	QAF0650-471	RESISTOR 470 OHM 1/6W 5% CF	3
R248, R249, R260, R262, R264, R266, R268, R270, R272, R274, R276, R278, R280, R284, R286 R293, R294, R295, R296, R297, R298, R299, R422, R425, R509, R510, R517, R518, R539, R540	QAF0650-152	RESISTOR 1.5K OHM 1/6W 5% CF	30
R301, R302, R303, R304, R305, R306, R307, R308, R363, R364, R377, R413, R625, R626	QAF0650-243	RESISTOR 24K OHM 1/6W 5% CF	14
R329, R334	QAF0650-224	RESISTOR 220K OHM 1/6W 5% CF	2
R332, R525, R732	QAF0650-223	RESISTOR 22K OHM 1/6W 5% CF	3
R341, R342, R402, R603, R604	QAF0650-273	RESISTOR 27K OHM 1/6W 5% CF	5
R343, R344, R403, R605, R606	QAF0650-202	RESISTOR 2K OHM 1/6W 5% CF	5
R347, R348, R361, R362, R406, R412, R609, R610, R623, R624	QAF0650-913	RESISTOR 91K OHM 1/6W 5% CF	10
R351, R352, R353, R354, R407, R408, R613, R614, R615, R616	QAF0650-203	RESISTOR 20K OHM 1/6W 5% CF	10
R359, R360, R409, R617, R618, R703, R705	QAF0650-682	RESISTOR 6.8K OHM 1/6W 5% CF	7
R367, R368, R415, R629, R630	QAF0650-752	RESISTOR 7.5K OHM 1/6W 5% CF	5
R375, R376	QAF0650-681	RESISTOR 680 OHM 1/6W 5% CF	2
R383, R384	QAF0650-100	RESISTOR 10 OHM 1/6W 5% CF	2
R421, R511, R512	QAF0650-563	RESISTOR 56K OHM 1/6W 5% CF	3
R423, R513, R514	QAF0250-479	RESISTOR 4.7 OHM 1/2W 5% CF	3
R424, R515, R516	QVE3050-228	RESISTOR 0.22 OHM 3W 5% CEMENT FIXED RADIAL	3
R426, R519, R520, R523	QAF0650-393	RESISTOR 39K OHM 1/6W 5% CF	4
R428, R429	QAF0450-101	RESISTOR 100 OHM 1/4W 5% CF	2
R536, R537	QAF0450-330	RESISTOR 33 OHM 1/4W 5% CF	2
R543, R734	QAF0650-222	RESISTOR 2.2K OHM 1/6W 5% CF	2
R704, R706	QAF0650-153	RESISTOR 15K OHM 1/6W 5% CF	2
R726	QAF0650-362	RESISTOR 3.6K OHM 1/6W 5% CF	1
R727	QAF0650-683	RESISTOR 68K OHM 1/6W 5% CF	1
R731	QAF0650-204	RESISTOR 200K OHM 1/6W 5% CF	1
R733	QAF0650-363	RESISTOR 36K OHM 1/6W 5% CF	1
R738	QAF0650-109	RESISTOR 1 OHM 1/6W 5% CF	1
Transistors			
Q101, Q102, Q103, Q104, Q251, Q252, Q253, Q254, Q255, Q256, Q257, Q258, Q259, Q260, Q261, Q263, Q264, Q267, Q268, Q269, Q272, Q273, Q274, Q275,	RAN0945-001	XISTR NPN 2SC945P NEC	36

SUB333 ELECTRICAL PARTS LIST Cont...

Ref.#	Part #	Description	Qty.
Q276, Q277, Q278, Q279, Q301, Q302, Q402, Q503, Q504, Q505, Q508, Q513			
Q509 Q511	RAN2001-001	XISTR NPN 2SC2001L NEC	2
Q401, Q501, Q502	RAN2878-001	XISTR NPN 2SC2878-A (TE2,M)	3
Q506, Q510	RAP0733-001	XISTR PNP 2SA733Q,P NEC AI	2
Q265, Q266, Q270, Q271, Q512	RAP0952-001	XISTR PNP 2SA952 NEC	5
Miscellaneous			
MAIN PCB-1	GSE0093-001	HEAT SINK BRACKET HT946	1
MAIN PCB-1	GSE0253-001	BRACKET PCB BRACKET-R SECC	1
MAIN PCB-1	GSE0254-001	BRACKET PCB BRACKET-L SECC	1
PCB BKT TO MAIN PCB-7	H120301-306	SCREW T3.0x0.5pxL6.0 mm PAN HEAD BLACK	7
CR201	JQC6070-419	CRYSTAL 4.194304 MHz HC-49/U	1
RL501, RL502	MRL2212-002	RELAY MI-SH-212LM 12V DC 44 mA GOOD SKY	2
L402, L501, L502	SHR6619-001	RF COIL 1uH MDEC T40818-08	3
P3 TO AC3 CPB JW20	20565-060BB	WIRE 22 GA 60 mm BLACK 4-4 UL 1007 TOP COATED	1
P1-P1	20565-130BB	WIRE 22 GA 130 mm BLACK 4-4 UL 1007 TOP COATED	1
P2 TO P2	20565-150BB	WIRE 22 GA 150 mm BLACK 4-4 UL 1007 TOP COATED	1
P4 TO P4	20565-260BB	WIRE 22 GA 260 mm BLACK 4-4 UL 1007 TOP COATED	1
RB904	4999A-512	CON/WRE AY 5 COND 400 mm #18	1
RB502	4999A-515	CON/WRE AY 7 COND 300 mm #18	1
RB301	4999A-517	CON/WRE AY 6 COND 280 mm SHIELD WIRE	1
RB205	4999A-518	CON/WRE AY 3 COND 400 mm SHIELD WIRE	1
RB506	4999A-521	CON/WRE AY 5 COND 200 mm SHIELD WIRE	1
RB302	4999A-526	CON/WRE AY 5 COND 350 mm SHIELD WIRE	1
RB601	4999A-542	CON/WRE AY 11 COND 70mm P=2.0 UL1007 #26 WHT/BLK	1
RB504	500351801B0	COND WIRE 5 COND 180 mm BLACK	1
RB906	500393001B0	COND WIRE 9 COND 300 mm BLACK 26 AWG PITCH=2.5 mm	1

APE0281-001 POWER AMP PCB ASSY

Connectors

CN501	CCN3962-006	CONNECTOR 6 PIN CL3962WVO	1
CN502	CCN3962-007	CONNECTOR 7 PIN CL3962WVO PITCH=3.96 mm	1
CN503	CCN3962-004	CONNECTOR 4 PIN CL3962WVO PITCH=3.96 mm	1
CN504, CN506	CCN1500-016	CONNECTOR B 5B-XH-A 5 PIN POST BASE TOP P:2.5	2
CN505	CCN3962-002	CONNECTOR 2 PIN CL3962WVO P=3 96mm POST BASE TOP	1
CN903	CCN3962-003	CONNECTOR 3 PIN CL3962WVO	1

Capacitors

C623, C624	PRM3737-222	COND MYLAR 0.0022uF 100V 5%	2
C625, C626	PRE3955-109	COND ELECT 1uF 50V 20% 85'C	2
C627, C628, C708, C712	PRE3952-330	COND ELECT 33uF 16V 20% 85'C	4
C629, C630, C709	PRD1395-509	COND DISC 5pF 50V +-0.5 pF NP0 D=5	3
C631, C632, C717	PRM3737-104	COND MYLAR 0.1uF 100V 5%	3
C633, C634, C635, C636, C710, C716	PRE3955-101	COND ELECT 100uF 50V 20% 85'C VENTED TYPE	6
C639	PRE3953-470	COND ELECT 47uF 25V 20% 85'C	1
C640	PRE3953-470	COND ELECT 47uF 25V 20% 85'C	1
C707	PRE3952-100	COND ELECT 10uF 16V 20% 85'C	1
C711	PRD3545-101	COND DISC 100pF 50V 10% Y5P	1
C713, C714	PRD3545-471	COND DISC 470pF 50V 10% Y5P II D=5	2
C718	PRM3737-472	COND MYLAR 0.0047uF 100V 5%	1
C935, C936, C937, C938	PRD4965-223	COND DISC 0.022 uF 50V +80-20% Z5V II D=7	4
C939, C940	PVE3956-222	COND ELECT 2200uF 63V 20%	2

Diodes

D601, D602, D603, D604, D701, D702, D703	RAD4148-001	DIODE SW 1N4148	7
D915, D916, D917, D918	RHD5404-001	RECTIFIER 1N5404	4
ZD601, ZD602	RAZ0859-093	DIODE ZENR 22.3-23.3V 0.5W HITACHI HZ22-3	2

Integrated Circuits

IC603	RHI0407-050	IC 15 PIN STK407-050 POWER IC	1
IC703	RHI4038-001	IC 15 PIN STK4038II POWER IC	1

Resistors

R631, R632, R722	QAF0650-102	RESISTOR 1K OHM 1/6W 5% CF	3
R633, R634, R651, R652, R708, R721	QAF0650-104	RESISTOR 100K OHM 1/6W 5% CF	6
R635, R636, R637, R638, R655, R709, R710, R724	QAF0650-103	RESISTOR 10K OHM 1/6W 5% CF	8
R639, R640, R647, R648, R653, R654, R711, R715, R719	QAF0650-152	RESISTOR 1.5K OHM 1/6W 5% CF	9
R641, R642, R712	QAF0650-563	RESISTOR 56K OHM 1/6W 5% CF	3
R643, R644, R717	QAF0250-479	RESISTOR 4.7 OHM 1/2W 5% CF	3
R645, R646, R718	QVE3050-228	RESISTOR 0.22 OHM 3W 5% CEMENT FIXED RADIAL	3

SUB333 ELECTRICAL PARTS LIST Cont...

Ref.#	Part #	Description	Qty.
R649, R650, R720	QAF0650-393	RESISTOR 39K OHM 1/6W 5% CF	3
R713	QAF0650-223	RESISTOR 22K OHM 1/6W 5% CF	1
R714, R716	QAF0450-101	RESISTOR 100 OHM 1/4W 5% CF	2
R723	QAF0450-330	RESISTOR 33 OHM 1/4W 5% CF	1
Transistors			
Q601, Q602, Q701	RAN2878-001	XISTR NPN 2SC2878-A (TE2,M)	3
Q603, Q604, Q702	RAN0945-001	XISTR NPN 2SC945P NEC	3
Q605	RAP0952-001	XISTR PNP 2SA952 NEC	1
Q606, Q703	RAN2001-001	XISTR NPN 2SC2001L NEC	2
Miscellaneous			
F906, F907	CFC2557-001	FUSE CLIP 5 D 5 X 20 FUSE	4
L601, L602, L701	SHR6619-001	RF COIL 1uH MDEC T40818-08	3
P2 TO P2	20565-081BB	WIRE 22 GA 80mm BROWN 4-4 UL 1007 TOP COATED	1
P1 TO P1	20565-200BB	WIRE 22GA 200 mm BLACK 4-4 UL 1007 TOP COATED	1 1
POWER PCB-1	GSE0256-001	BRACKET PCB BRACKET (R) SECC	1
POWER PCB-1	GSE0257-001	BRACKET PCB BRACKET (L) SECC	1
PCB BKT TO POWER PCB-3	H120301-306	SCREW T3.0x0.5pxL6.0 mm PAN HEAD BLACK	3
PCB BKT TO POWER PCB-1	H120302-306	SCREW M3.0x0.5PxL6.0 mm BLACK W/WASHER	1
RB905	4999A-513	CON/WRE AY 4 COND 250 mm #18	1
RB100	4999A-632	CON/WRE AY 4 COND 250 mm GY-GY P:2.5/2 28AWG UL1533	1
RB102	50024AE1BMM	COND WIRE 3 COND 150 mm BROWN	1
RL701	MRL2212-002	RELAY MI-SH-212LM 12V DC 44 mA GOOD SKY	1

APE0282-021 CONNECTOR PCB ASSY

DC PCB-1	GSE0256-001	BRACKET PCB BRACKET (R) SECC ESC333	
DC PCB-1	GSE0257-001	BRACKET PCB BRACKET (L) SECC ESC333	
PCB BKT TO DC PCB-4	H120301-306	SCREW T3.0x0.5pxL6.0 mm PAN HEAD BLACK	4
RB101	500331501B6	COND WIRE 3 COND 150 mm	1

APE0282-011 DC PCB ASSY

Ref.#	Part #	Description	Qty.
Connectors			
CN901	CCN3962-006	CONNECTOR 6 PIN CL3962WVO	1
CN902	CCN3962-002	CONNECTOR 2 PIN CL3962WVO 96mm POST BASE TOP	1
CN904	CCN3962-005	CONNECTOR 5 PIN CL3962WVO PITCH=3.96 mm	1
CN905	CCN3962-004	CONNECTOR 4 PIN CL3962WVO PITCH=3.96 mm	1
CN906	CCN1500-033	CONNECTOR B 9B-XH-A 9 PIN POST BASE TOP P:2.5	1
Capacitors			
C901, C902, C903, C904, C909, C910, C911, C912, C915, C916, C917, C918, C934	PRD4965-223	COND DISC 0.022 uF 50V +80-20% Z5V II D=7	13
C906, C908	PVE3955-472	COND ELECT 4700uF 50V 20%	2
C913, C914	PVE3954-222	COND ELECT 2200uF 35V 20% 85°C	2
C919	PVE3953-222	COND ELECT 2200uF 25V 20%	1
C920, C922, C924, C925, C927, C929, C931, C933	PRD3965-104	COND DISC 0.1uF 50V +80-20% Y5V/Z5V	8
C921	PRE3953-220	COND ELECT 22uF 25V 20% 85'C	1
C923, C926	PRE3953-221	COND ELECT 220uF 25V 20% 85	2
C928	PRE3954-101	COND ELECT 100uF 35V 20% 85'C	1
C930, C932	PRE3952-101	COND ELECT 100uF 16V 20% 85'C VENTED TYPE	2
Diodes			
D901, D902, D903, D904	RHD0600-400	RECTIFIER 6A 400V P600G	4
D905, D906, D907, D908, D909, D910, D911, D912, D913	RAD4002-001	RECTIFIER 1N4002	9
ZD901	RAZ0859-067	DIODE ZENR 4.7-4.9V 0.5W HITACHI HZ5B-2	1
Integrated Circuits			
IC901	RHI7815-001	IC 3 PIN REGULATOR 15V 1A	1
IC902	RHI7915-001	IC 3 PIN 7915 -15V REGULATOR	1
IC903	RHI7906-001	IC 3 PIN 7906 -6V REGULATOR	1
IC904	RHI7806-001	IC 3 PIN MC7806ACT (5V2) +6V REGULATOR	1
Resistors			
R907	QAF0250-470	RESISTOR 47 OHM 1/2W 5% CF	1
R910	QAF0650-332	RESISTOR 3.3K OHM 1/6W 5% CF	1
R911	QAF0650-472	RESISTOR 4.7K OHM 1/6W 5% CF	1
R912	QAF0650-473	RESISTOR 47K OHM 1/6W 5% CF	1
R913	QAF0650-103	RESISTOR 10K OHM 1/6W 5% CF	1
R914	QAF0450-222	RESISTOR 2.2K OHM 1/4W 5% CF	1
Transistors			
Q906	RAP0733-001	XISTR PNP 2SA733Q,P NEC AI	1
Miscellaneous			
F901-F905	CFC2557-001	FUSE CLIP 5 D 5 X 20 FUSE	1

SUB333 ELECTRICAL PARTS LIST Cont...

Ref.#	Part #	Description	Qty.

APE0282-021 CONNECTOR PCB ASSY

Connectors

CN205, CN305	CCN1500-023	CONNECTOR B 3B-XH-A 3 PIN POST BASE TOP P:2.5	2
CN301, CN303	CCN1500-024	CONNECTOR B 6B-XH-A 6 PIN POST BASE TOP P:2.5	2
CN302, CN304	CCN1500-016	CONNECTOR B 5B-XH-A 5 PIN POST BASE TOP P:2.5	2

Miscellaneous

TO TIN FOIL	CSL6521-002	SOLDER LUG OD7.0xID3.5xT0.3 mm NICKEL	1
PA TO SOLDER LUG	20565-160BB	WIRE 22 GA 160 mm BLACK 4-4 UL 1007 TOP COATED	1

AFA0048-004 CONTROL PANEL ASSY

LEDs

LD203, LD226-LD233, LD236-LD243	KEG0402-001	LED 2x4 mm BRIGHT GREEN	17
LD204, LD205, LD206 LD207, LD210, LD211, LD212, LD214-LD225, LD234, LD235, LD244	KEG0525-001	LED 2.5x5mm BRIGHT GREEN	22
LD201, LD202, LD208, LD209	KER0052-003	LED 2x5 mm RED 523 ID/LD-A HIGH LIGHT	4

Resistors

R243, R244	QAF0650-391	RESISTOR 390 OHM 1/6W 5% CF	2
R242	QAF0650-471	RESISTOR 470 OHM 1/6W 5% CF	1
R245	QAF0650-122	RESISTOR 1.2K OHM 1/6W 5% CF	1

Wires

RB201	4999A-523	CON/WRE AY 10 COND 320 mm PITCH=2.0 mm	1
RB202	4999A-524	CON/WRE AY 8 COND 300 mm PITCH=2.0 mm	1
RB203	4999A-511	CON/WRE AY 7 COND 300 mm PITCH=2.0 mm	1
RB204	4999A-525	CON/WRE AY 5 COND 300 mm PITCH=2.0 mm	1

Miscellaneous

RB201, RB202 (COPPER SIDE)	XTP9777-023	TAPE HIGH TEMP TAPE NICHIBAN 241	
TA201, TA202, TA203, TA204, TA205	MAT2029-001	AI TACT SW 5.0 mm 160 gf ALPS SKHVBE3520	5
	BNP0073-001	PVC PLATE	1
	BPF5056-BA1	CNTL PANEL (DP6P 1083)	1
	BPK5031-000	CNTL KNOB	1
CTRL PCB TO CTRL PANEL-3	H101001-108	SCREW T3.0x1.27p-2RHXL8.mm PAN HEAD NICKEL	3
CONTROL PANEL WIRE DRESSING-2	IVE0085-001	EVA SPONGE L100 x W30 x T2.0mm BACK W/ADHESIVE CONTROL PANEL	2
	BPH0054-000	LED HOLDER ESC333	1

APE0362-001 AMP PLATE ASSEMBLY

Miscellaneous

JACK ASSY-1	BPA0021-001	REAR COVER HI-PS ESC350 (JBL)	1
JACK ASSY-1	BRB0004-001	RUBBER BUS NR-3 0.0616 JACK ASSY-1	1
JACK ASSY-1	KSA1600-001	FUSE 6A 125V SLOW 5x20 mm UL	
JACK ASSY-2	BRB0003-001	RUBBER BUS NR-3	1
	GSE0255-001	JACK PLATE SECC 120V ESC333 (JBL)	
	BRB0005-001	RUBBER BUS NR-3 0.0305 SW RACKER	
	BRF0007-001	RUBBER BLACK 0.0800 AC CORD	1
	DBU0002-001	BUSHING AC LINE BUSHING PIN GOOD 4RF-5	1
	DFH1229-001	FUSE HOLDR FUSE HOLDER FH-B02 10A; DIA 5.2x20 0.5576 COND SAFETY-2	1
LIMITED PCB TO REAR COVER & CON PCB-2	DSS0002-006	SPACER OD5.0xID3.1xH5.0 mm	2
POWER SW TO JACK PLT-2	H060301-314	SCREW M3.0x0.5pxL14.0mm PAN HEAD BLACK	2
AC3 JACK TO JACK PLT-2, JACK PCB TO JACK PLT-4	H101001-310	SCREW T3.0x1.27p-2RHxL10mm PAN HEAD BLACK RCA JACK TO JACK PLT-1	9
CONNECTOR PCB TO REAR COVER-2 LIMITED PCB TO REAR COVER & CON PCB-2	H101002-114	SCREW T3.0x1.27p-2RHxL14mm W/WASHER NICKEL	2
	MSV0001-004	SW ROCKER 5A AC 250V TV-5 CHILY CAT NO.3051 0.7515 POWER SW-1	1
	PLS3559-104	COND SAFTY 0.1uF 250V 20% X2 CAP LEAD:25mm	1
	SLF0201-013	BEAD FERIT BRH 17.5x12.7x9.5 CHILISIN	1
	2559-080022	LINE LINK 370 mm BLACK VDE ESC300 (JBL)	1
	47455-D52	LINE CORD SPT-2 1980mm POLARIZ BLK-UL DOUBLE INSULA FUSE TO AC SW	1
	5823-092BB	WIRE 22 GA 90 mm RED 4-4 UL1617 DOUBLE INSULA BUSHING-1, RUBBER-2	1

SUB333 ELECTRICAL PARTS LIST Cont...

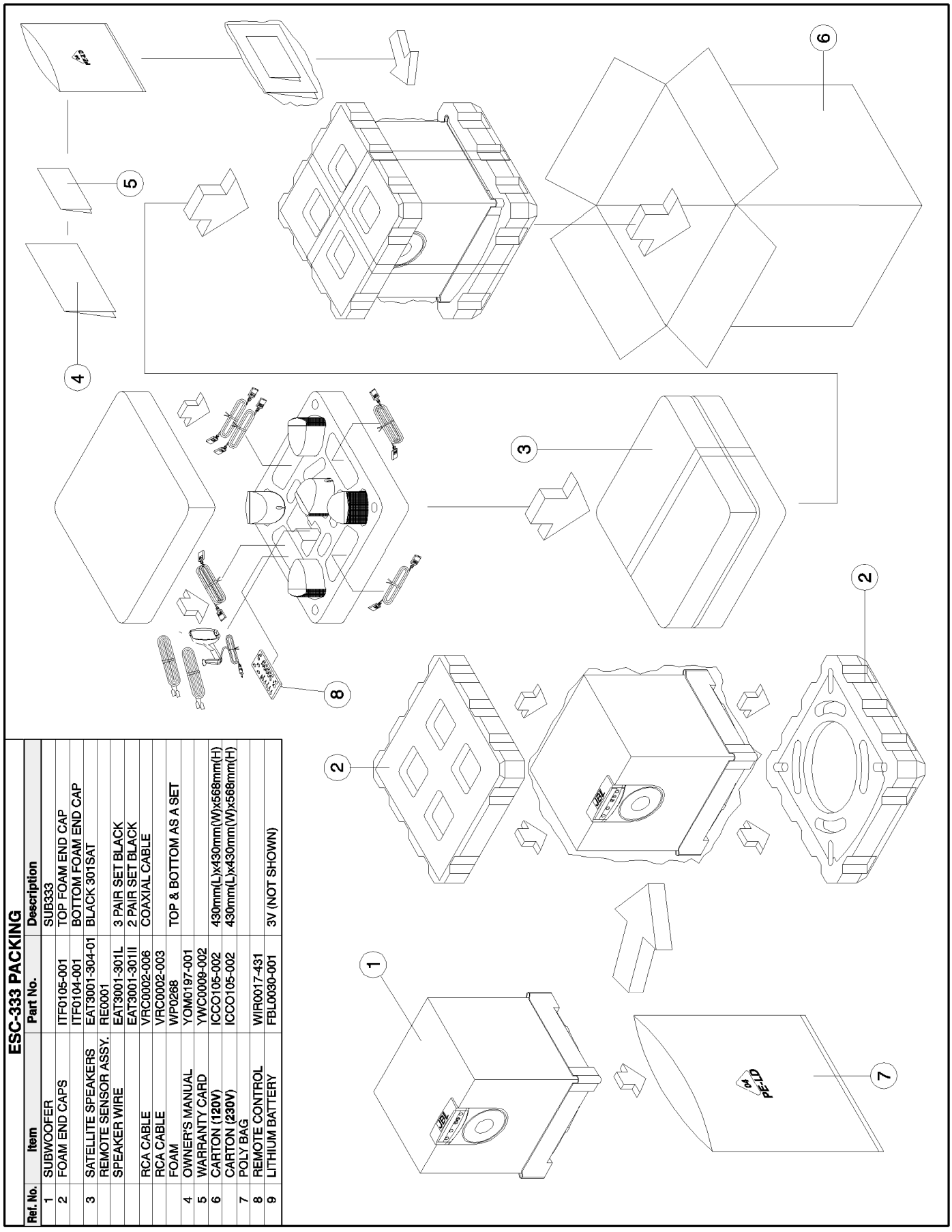
APE0284-001 JACK PCB ASSY

Ref.#	Part #	Description	Qty.
Capacitors			
C358, C359, C360, C361	PRD3545-470	COND DISC 47pF 50V 10% Y5P	4
C362, C518, C519, C520, C521, C522	PRD4965-223	COND DISC 0.022 uF 50V +80-20% Z5V II D=7	6
Jacks			
JK201	CJM9380-028	JACK PHONE JYE TAI 3542-01-030 3.5 DIM	1
JK301	CJR6504-002	JACK RCA 4P RJ-1073-10-0300A JYE TAI RED/WHITE	1
JK302	CTP0008-003	RCA JACK RJ-1081-05-0300A 1T GREEN	1
JK303	CJT0001-001	JACK TOSLINK JACK 2.8121 TO JACK PLATE	1
	CSL6521-002	SOLDER LUG OD7.0xID3.5xT0.3 mm NICKEL	
JK501	CTM0005-001	TERMINAL JACK ASSY MOLEX TYPE	1
Resistors			
R372	QAF0650-472	RESISTOR 4.7K OHM 1/6W 5% CF1	1
L301	SAC7414-100	CHOKE 10uH AI 0.0260 GND TO SOLDER LUG	1
Wires			
	20565-081BB	WIRE 22 GA 80mm BROWN 4-4 UL1007 TOP COATE	
RB303	4999A-527	CON/WRE AY 6 COND 150 mm SHIELD WIRE	1
RB304	4999A-528	CON/WRE AY 5 COND 150 mm SHIELD WIRE	1
RB305	4999A-520	CON/WRE AY 3 COND 250 mm SHIELD WIRE	1
RB501	4999A-516	CON/WRE AY 6 COND 300 mm #18	1
RB503	4999A-514	CON/WRE AY 4 COND 400 mm #18	1

APE0362-001 LIMITER PCB ASSY

Ref.#	Part #	Description	Qty.
Capacitors			
C100	PRN3952-100	COND ELECT 10uF 16V 20% N.P.	1
C101	PRE3953-479	COND ELECT 4.7uF 25V 20% 85'C	1
C102, C104	PRE3953-101	COND ELECT 100uF 25V 20% 85'C	2
C103, C105	PRD3965-104	COND DISC 0.1uF 50V +80-20% Y5V/Z5V	2
Connectors			
CCN1500-015	CONNECTOR	B48-XH-A 4 PIN POST BASE TOP	1
CCN1500-023	CONNECTOR	B 3B-XH-A 3 PIN POST BASE TOP	2
Diodes			
D100, D101	066X0070001	DIODE SW 1N914B	2
Integrated Circuit			
IC100	RHI4558-001	IC 8 PIN JRC4558D JRC OP AMP	1
Resistors			
R100, R103	QAF0650-223	RESISTOR 22K OHM 1/6W 5% CF	2
R101, R102	QAF0650-102	RESISTOR 1K OHM 1/6W 5% CF	2
R104, R105, R107, R109, R110	QAF0650-103	RESISTOR 10K OHM 1/6W 5% CF	5
R106	QAF0650-105	RESISTOR 1.0M OHM 1/6W 5% CF	1
R108	QAF0650-474	RESISTOR 470K OHM 1/6W 5% CF	1
R111, R112	QAF0650-101	RESISTOR 100 OHM 1/6W 5% CF	2
R113	QAF0650-222	RESISTOR 2.2K OHM 1/6W 5% CF	1
Transistors			
Q100, Q101	086X0113501	XISTR NPN 2N3904 MOTOROLA	2
Miscellaneous			
JW100	AI20870-022	WIRE BARE 22 GA TINNED	

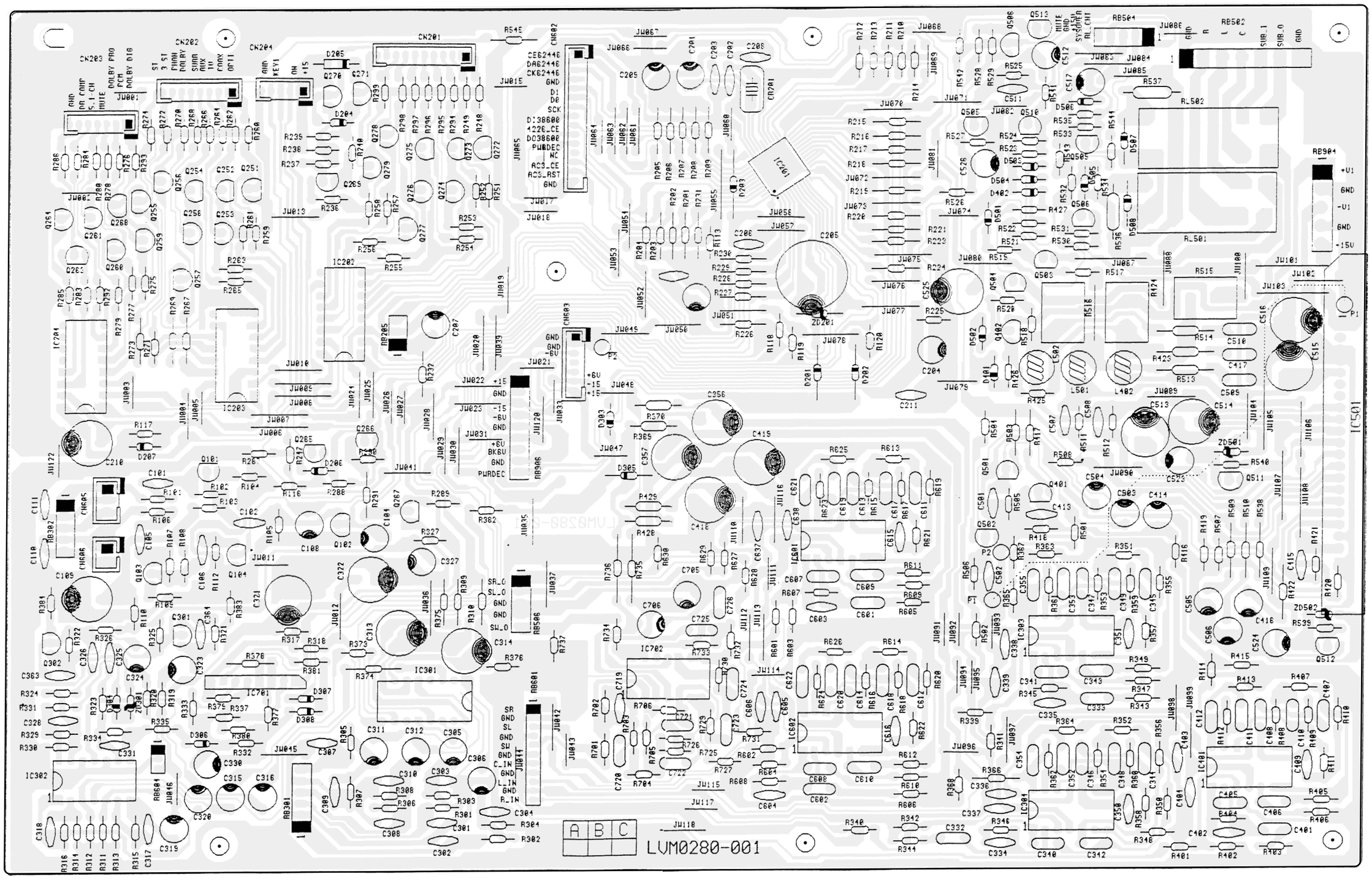
ESC333 PACKING EXPLODED VIEW



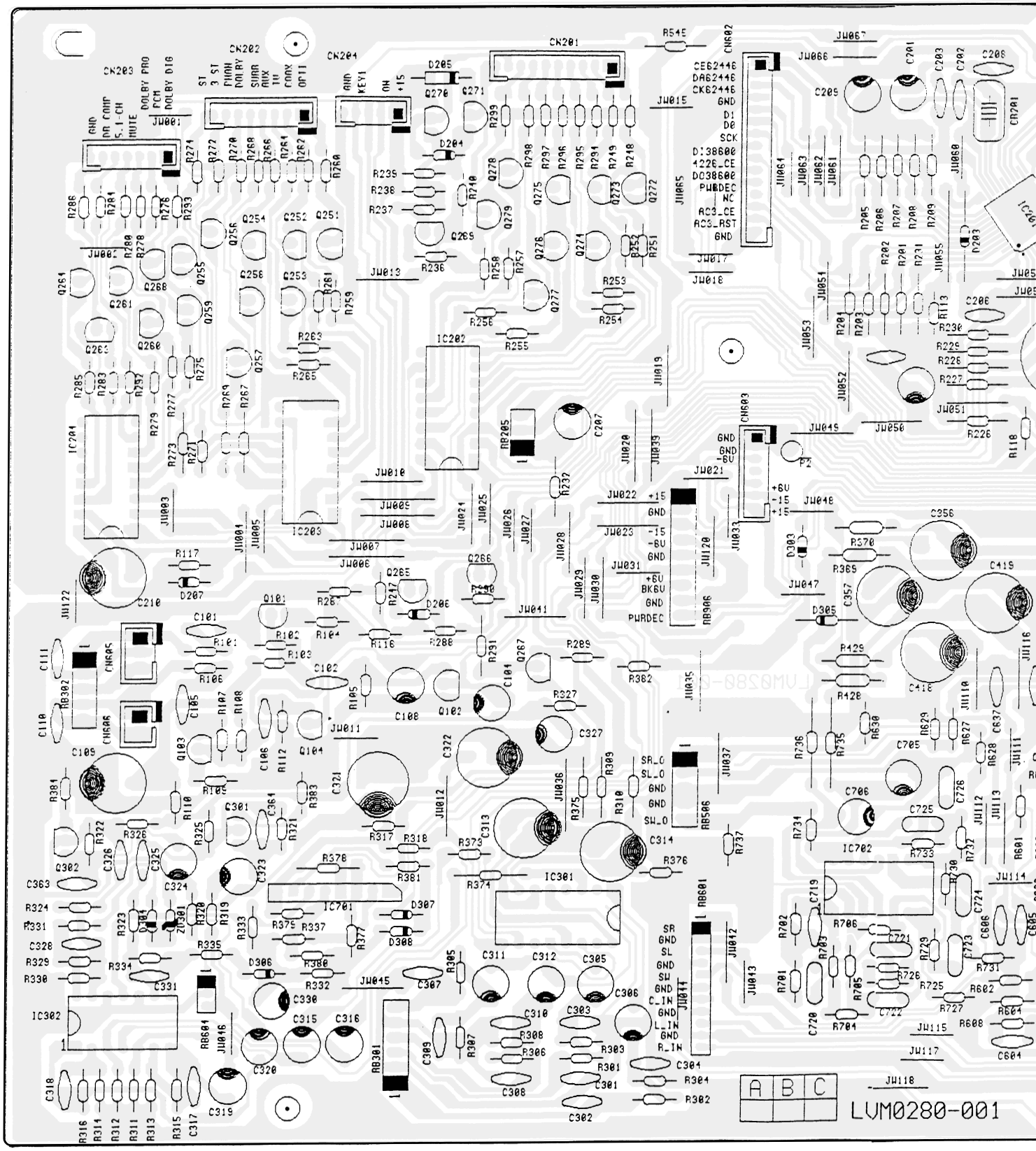
ESC-333 PACKING

Ref. No.	Item	Part No.	Description
1	SUBWOOFER		SUB333
2	FOAM END CAPS	ITF0105-001	TOP FOAM END CAP
		ITF0104-001	BOTTOM FOAM END CAP
3	SATELLITE SPEAKERS	EAT3001-304-01	BLACK 301SAT
	REMOTE SENSOR ASSY.	RE0001	
	SPEAKER WIRE	EAT3001-301L	3 PAIR SET BLACK
		EAT3001-301II	2 PAIR SET BLACK
	RCA CABLE	VRC0002-006	COAXIAL CABLE
	RCA CABLE	VRC0002-003	
	FOAM	WP0268	TOP & BOTTOM AS A SET
4	OWNER'S MANUAL	YOM0197-001	
5	WARRANTY CARD	YWC0009-002	
6	CARTON (120V)	ICC0105-002	430mm(L)x430mm(W)x568mm(H)
	CARTON (230V)	ICC0105-002	430mm(L)x430mm(W)x568mm(H)
7	POLY BAG		
8	REMOTE CONTROL	WIR0017-431	
9	LITHIUM BATTERY	FBL0030-001	3V (NOT SHOWN)

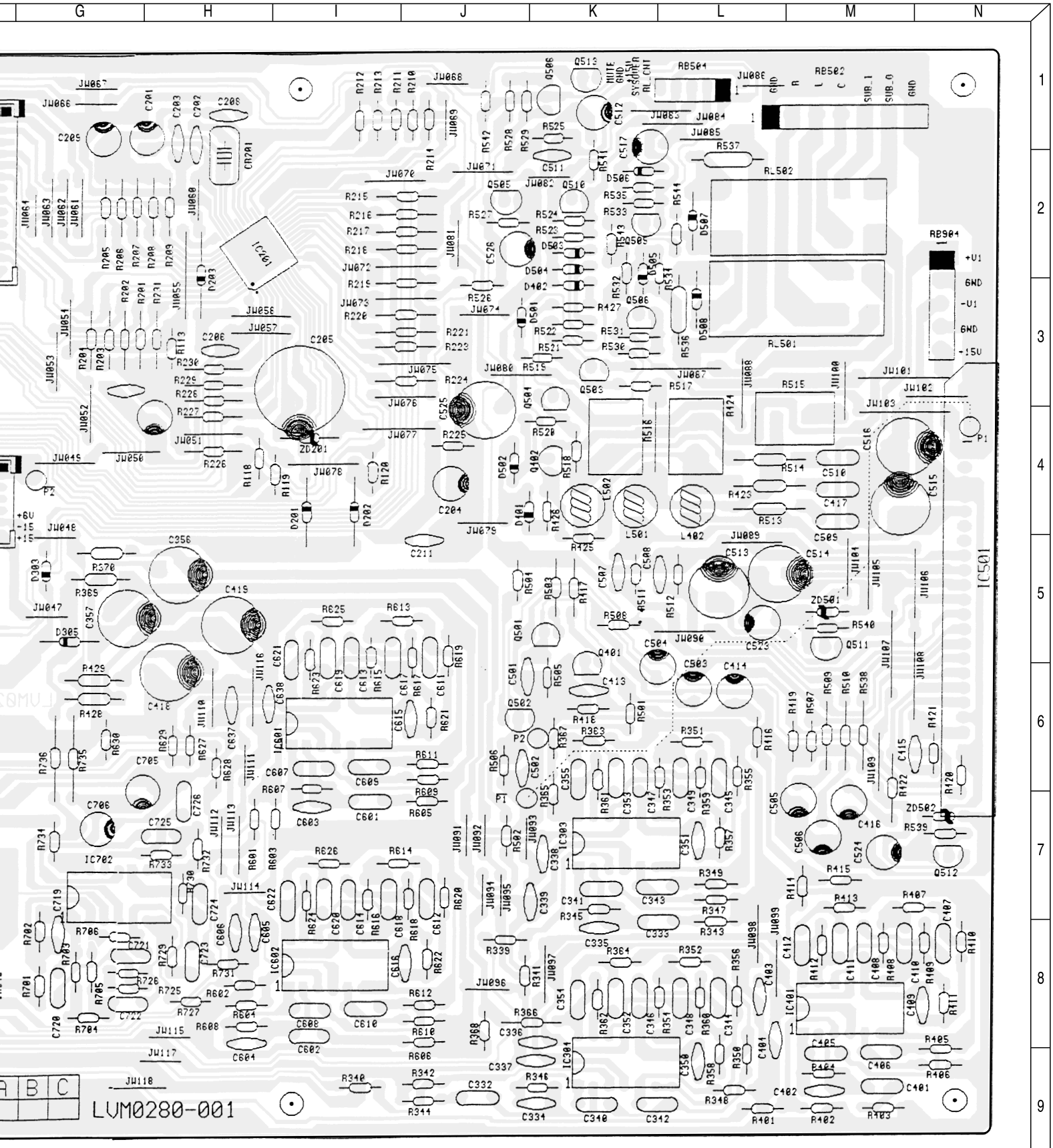
SUB333 MAIN PCB



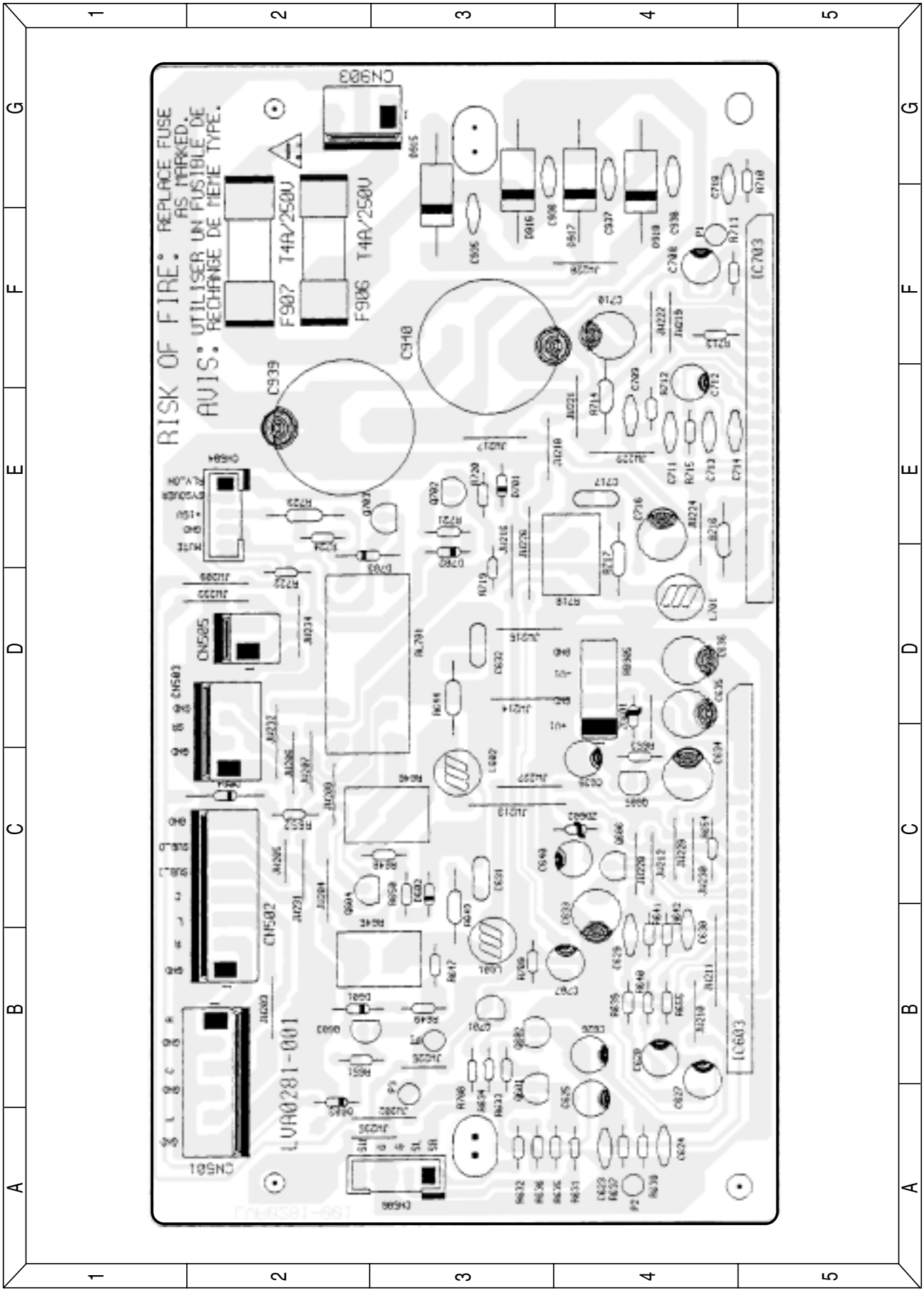
SUB333 MAIN PCB



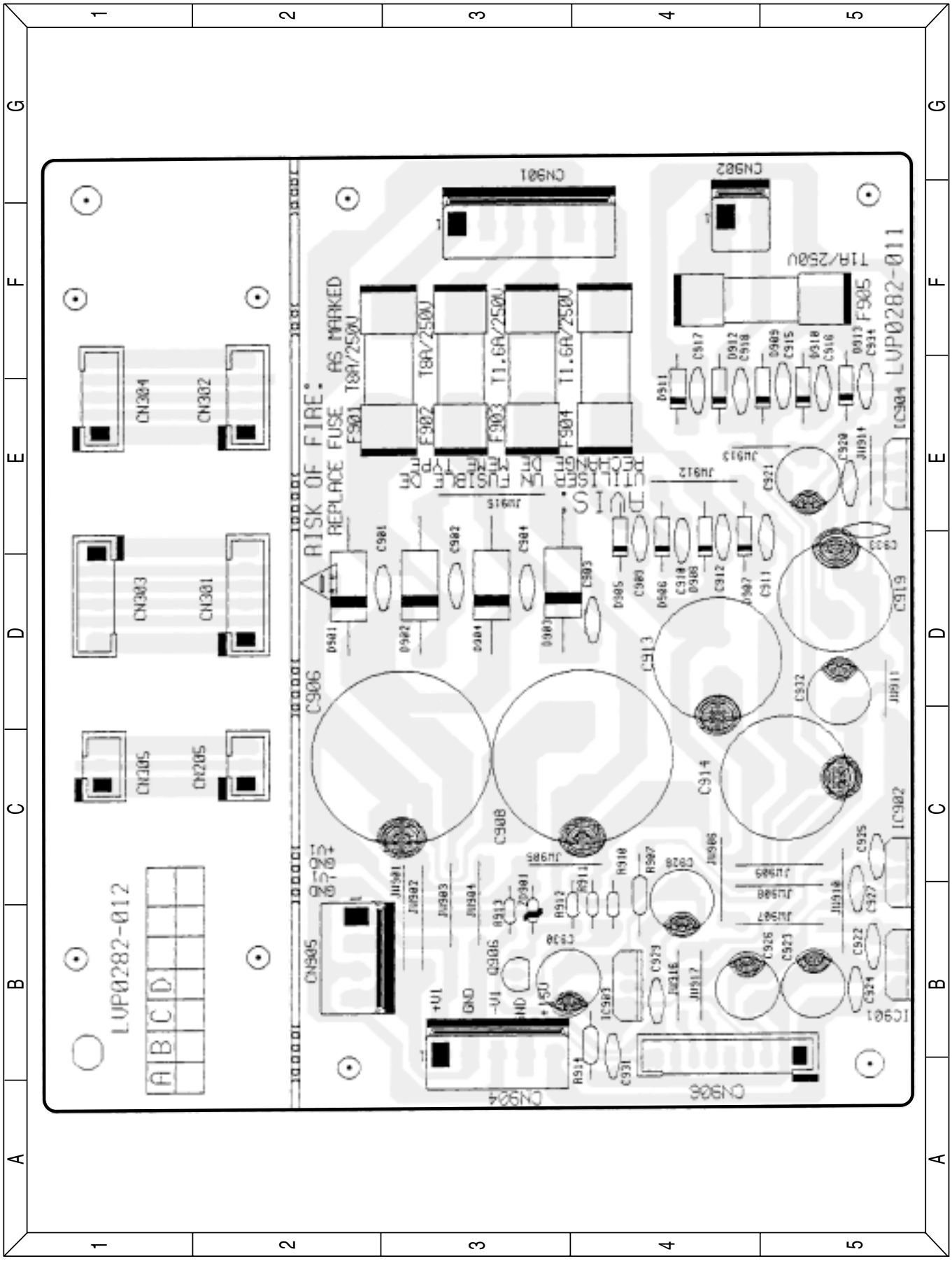
SUB333 MAIN PCB



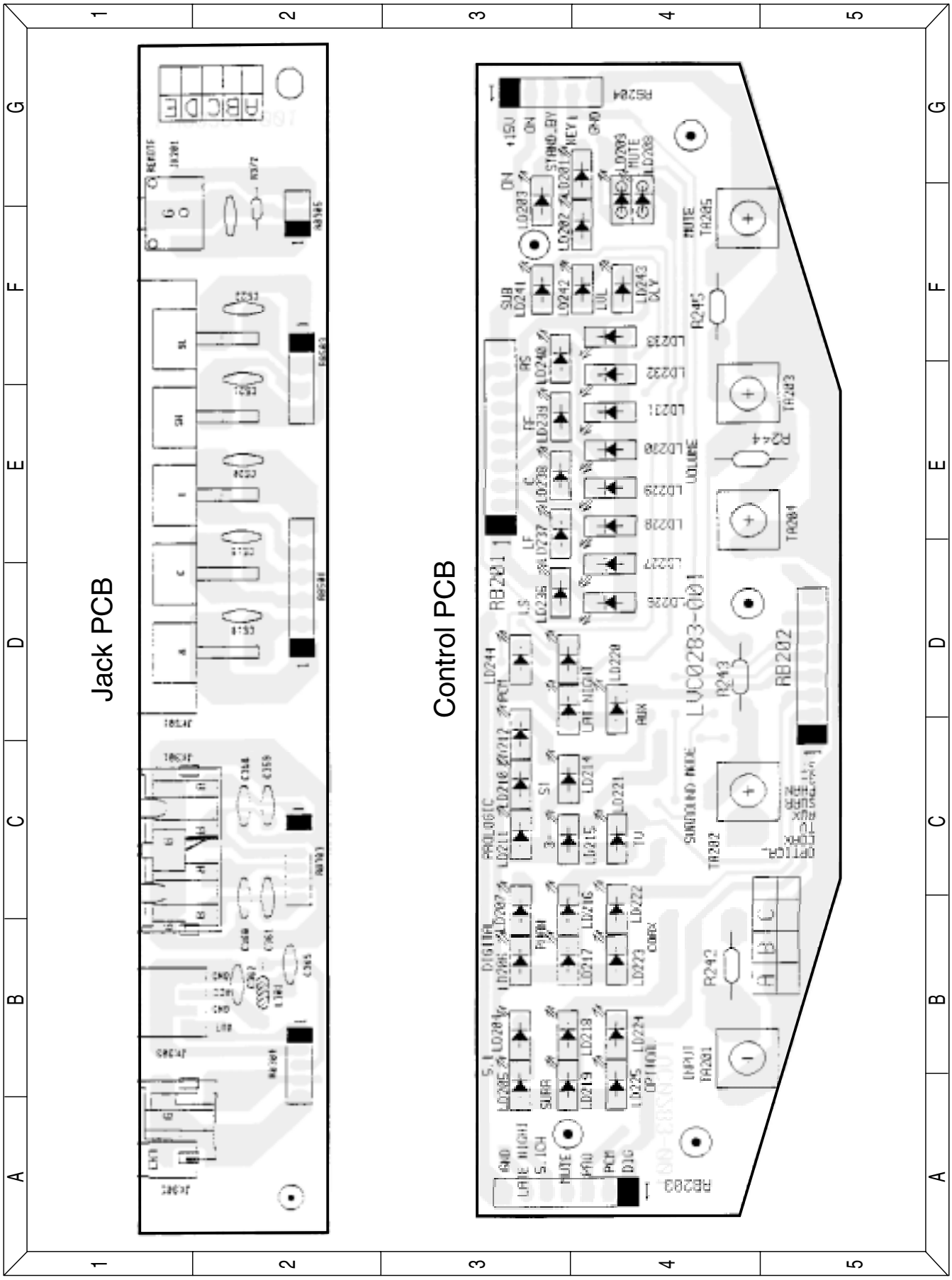
SUB333 POWER PCB



SUB333 DC PCB

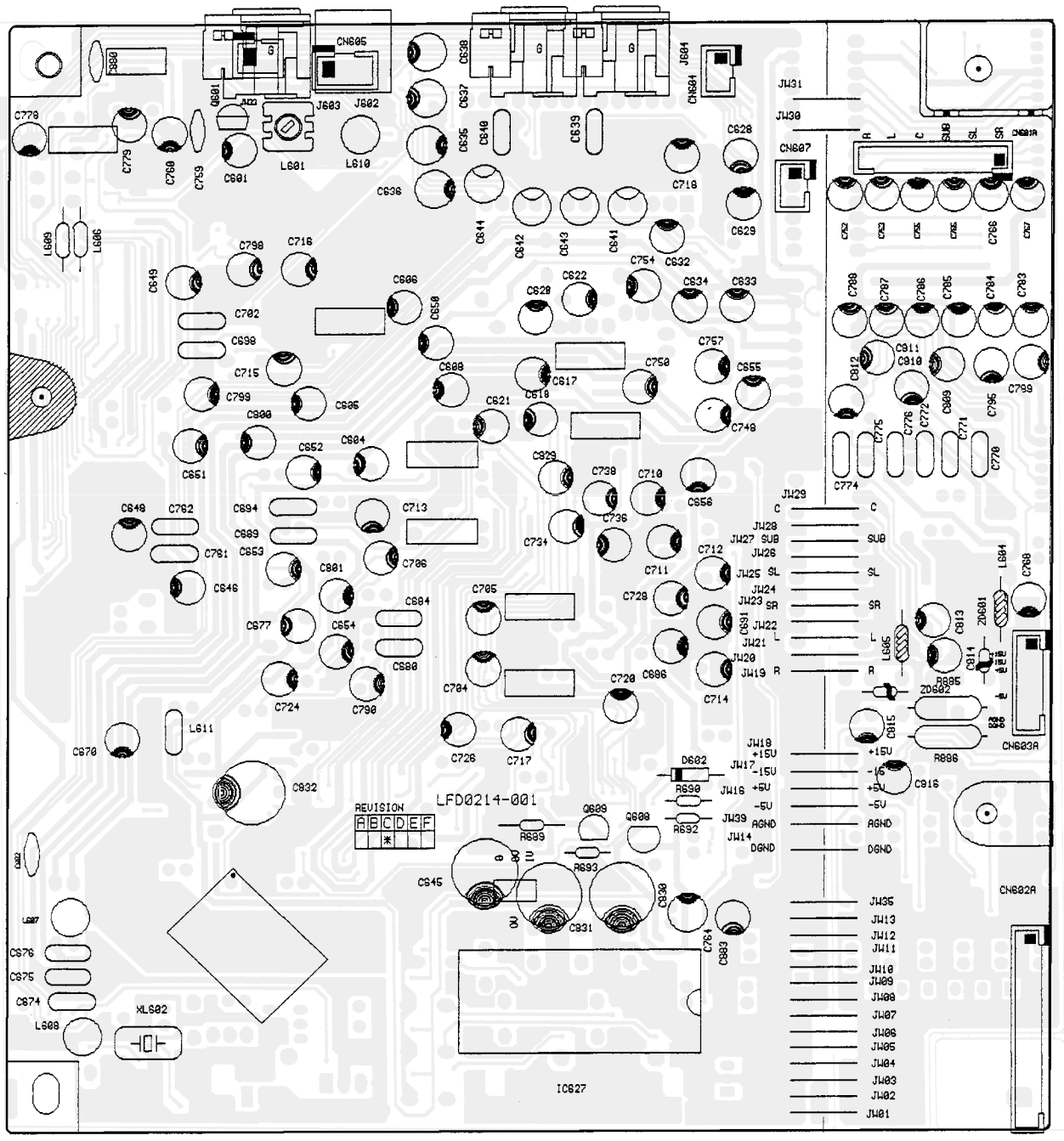


SUB333 JACK & CONTROL PCB's

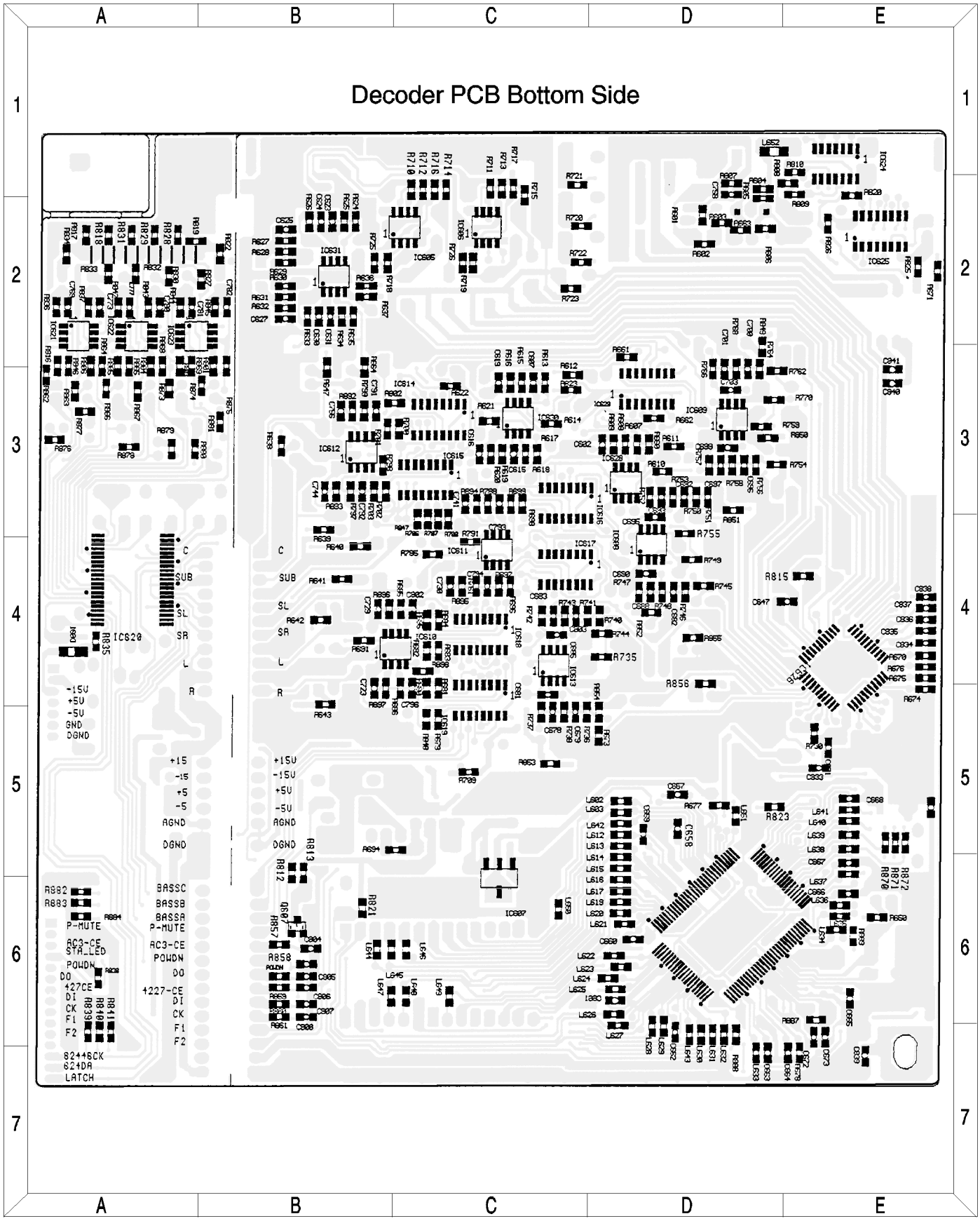


SUB333 DECODER PCB (Top View)

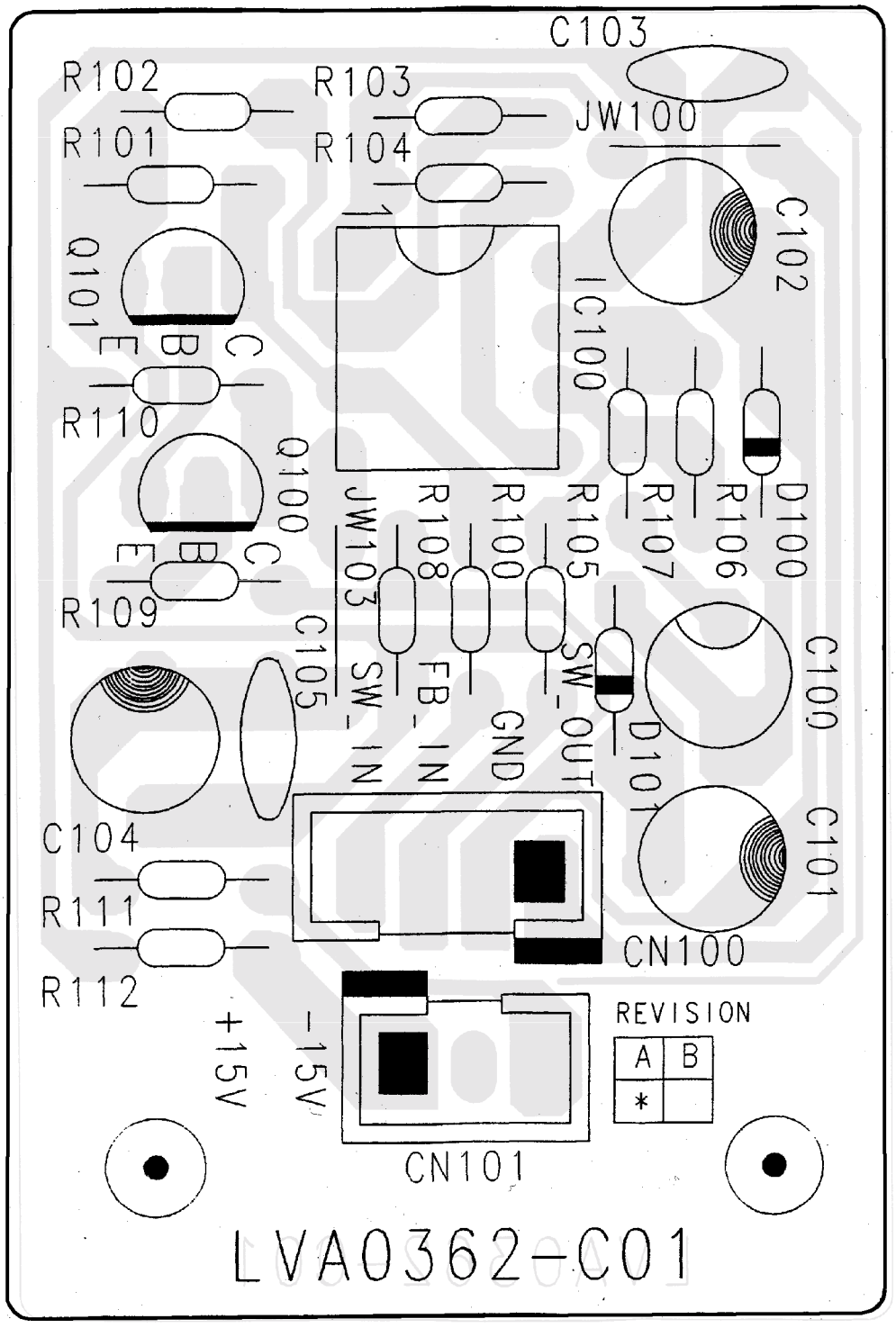
Decoder PCB Top Side



SUB333 DECODER PCB (Bottom View)

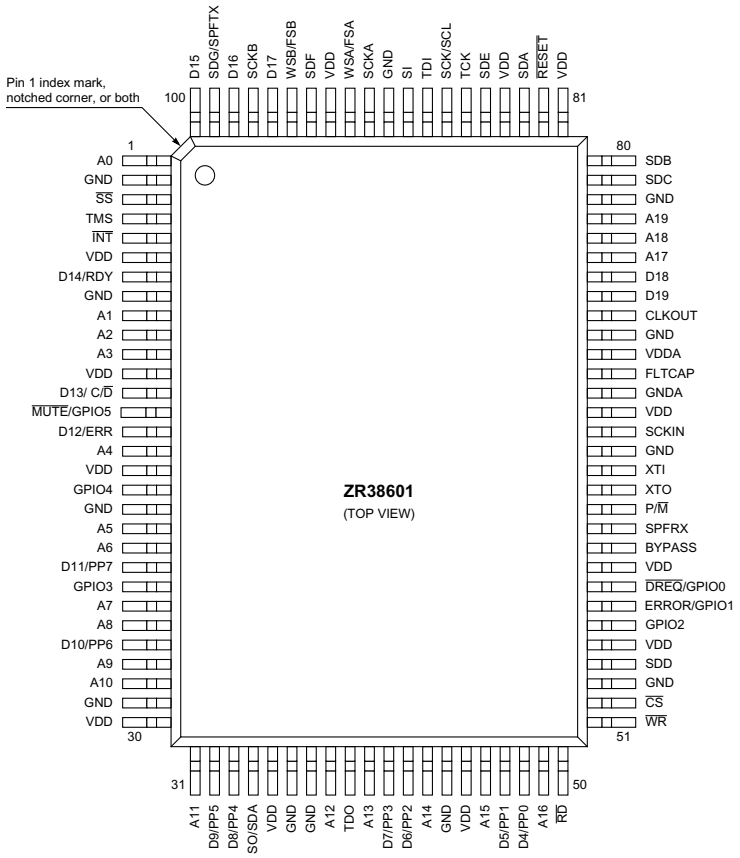


SUB333 LIMITER PCB



INTEGRATED CIRCUIT DIAGRAMS

IC601 - (ZR38601)
AC3 DECODER



PINOUT INFORMATION

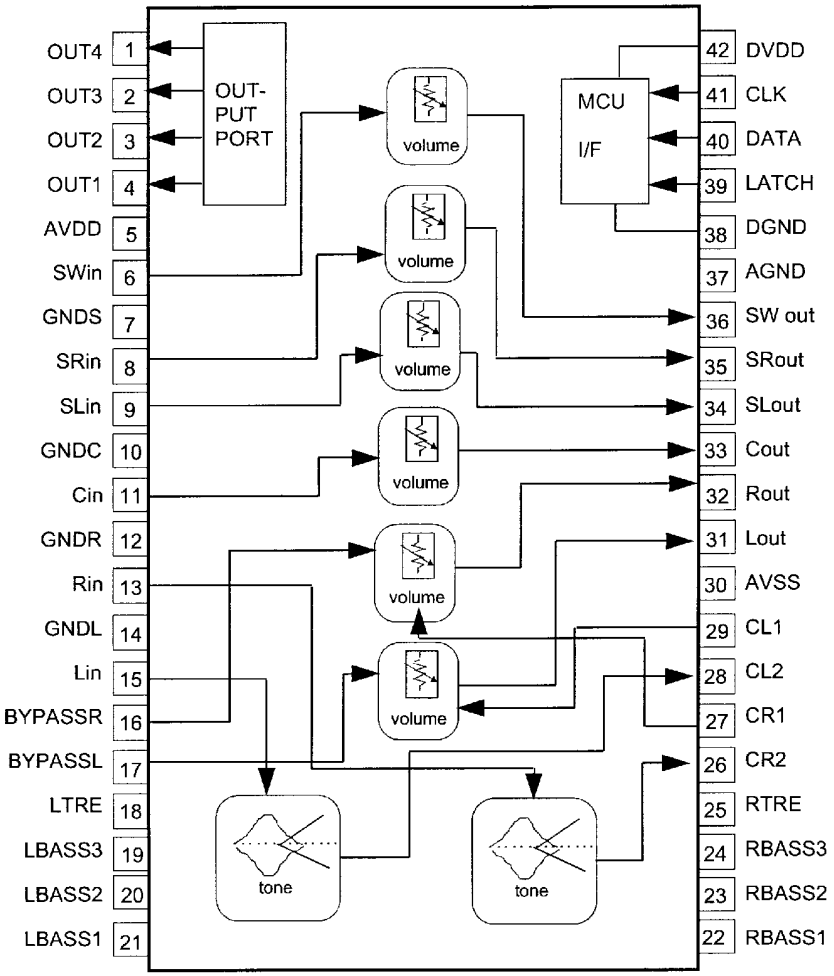
Table 24: 100-Pin PQFP Pin Assignment By Pin Number

Pin #	Pin Name	Pin #	Pin Name	Pin #	Pin Name	Pin #	Pin Name	Pin #	Pin Name
1	A0	21	A6	41	D7/PP3	61	SPFRX	81	VDD
2	GND	22	D11/PP7	42	D6/PP2	62	P/M	82	RESET
3	SS	23	GPIO3	43	A14	63	XTO	83	SDA
4	TMS	24	A7	44	GND	64	XTI	84	VDD
5	INT	25	A8	45	VDD	65	GND	85	SDE
6	VDD	26	D10/PP6	46	A15	66	SCKIN	86	TCK
7	D14/RDY	27	A9	47	D5/PP1	67	VDD	87	SCK/SCL
8	GND	28	A10	48	D4/PP0	68	GNDA	88	TDI
9	A1	29	GND	49	A16	69	FLTCAP	89	SI
10	A2	30	VDD	50	RD	70	VDDA	90	GND
11	A3	31	A11	51	WR	71	GND	91	SCKA
12	VDD	32	D9/PP5	52	CS	72	CLKOUT	92	WSA/FSA
13	D13/ C/D	33	D8/PP4	53	GND	73	D19	93	VDD
14	MUTE/GPIO5	34	SO/SDA	54	SDD	74	D18	94	SDF
15	D12/ERR	35	VDD	55	VDD	75	A17	95	WSB/FSB
16	A4	36	GND	56	GPIO2	76	A18	96	D17
17	VDD	37	GND	57	ERROR/GPIO1	77	A19	97	SCKB
18	GPIO4	38	A12	58	DREQ/GPIO0	78	GND	98	D16
19	GND	39	TDO	59	VDD	79	SDC	99	SDG/SPFTX
20	A5	40	A13	60	BYPASS	80	SDB	100	D15

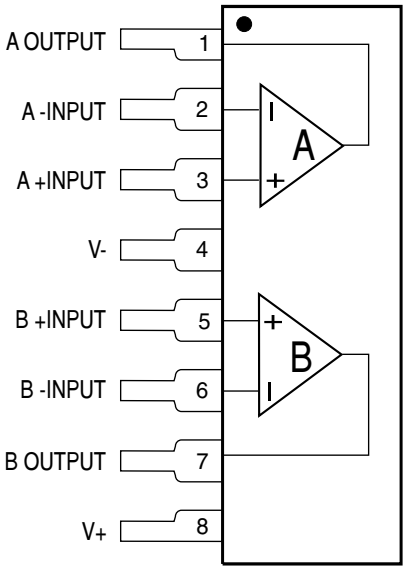
Table 25: 100-Pin PQFP Pin Assignment By Alphabetical Signal Name

Pin Name	Pin #	Pin Name	Pin #	Pin Name	Pin #	Pin Name	Pin #	Pin Name	Pin #
A0	1	BYPASS	60	ERROR/GPIO1	57	P/M	62	TDO	39
A1	9	CLKOUT	72	FLTCAP	69	RD	50	TMS	4
A10	28	CS	52	GND	2	RESET	82	VDD	6
A11	31	D10/PP6	26	GND	8	SCK/SCL	87	VDD	12
A12	38	D11/PP7	22	GND	19	SCKA	91	VDD	17
A13	40	D12/ERR	15	GND	29	SCKB	97	VDD	30
A14	43	D13/ C/D	13	GND	36	SCKIN	66	VDD	35
A15	46	D14/RDY	7	GND	37	SDA	83	VDD	45
A16	49	D15	100	GND	44	SDB	80	VDD	55
A17	75	D16	98	GND	53	SDC	79	VDD	59
A18	76	D17	96	GND	65	SDD	54	VDD	67
A19	77	D18	74	GND	71	SDE	85	VDD	81
A2	10	D19	73	GND	78	SDF	94	VDD	84
A3	11	D4/PP0	48	GND	90	SDG/SPFTX	99	VDD	93
A4	16	D5/PP1	47	GNDA	68	SI	89	VDDA	70
A5	20	D6/PP2	42	GPIO2	56	SO/SDA	34	WR	51
A6	21	D7/PP3	41	GPIO3	23	SPFRX	61	WSA/FSA	92
A7	24	D8/PP4	33	GPIO4	18	SS	3	WSB/FSB	95
A8	25	D9/PP5	32	INT	5	TCK	86	XTI	64
A9	27	DREQ/GPIO0	58	MUTE/GPIO5	14	TDI	88	XTO	63

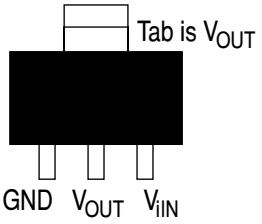
IC620 - (M62446FP) 6 CHANNEL VOLUME CONTROL



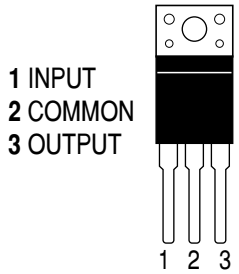
IC701 - (M5218AL) Op Amp L TYPE



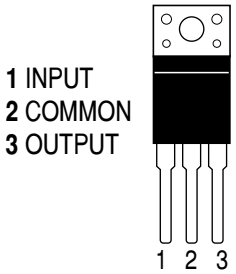
IC607 - (1117) 3.3V REGULATOR



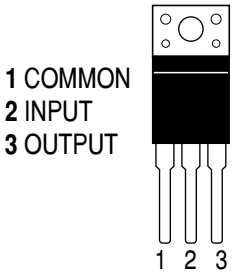
IC901 - (7815) +15V REGULATOR



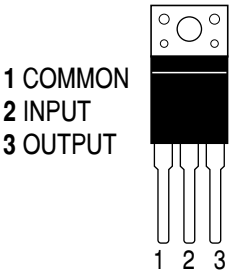
IC904 - (7806) +6 REGULATOR



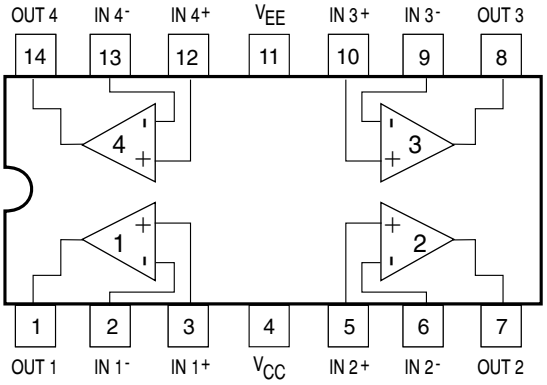
IC903 - (7906) -6V REGULATOR



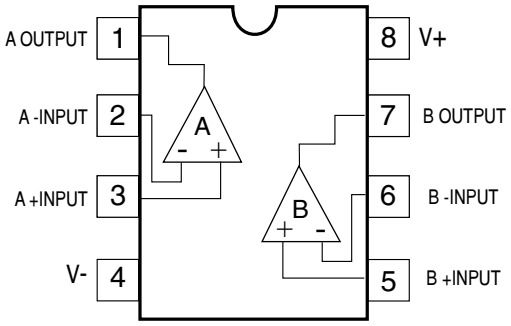
IC902 - (7915) -15V REGULATOR



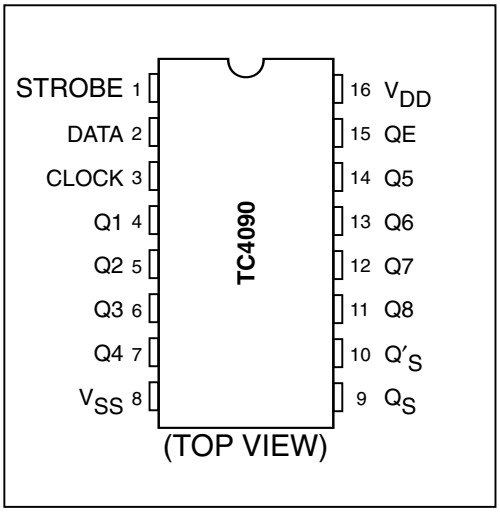
IC302, 303, 304, 401, 601, 602, 702
(TL074) Dual Op-Amp

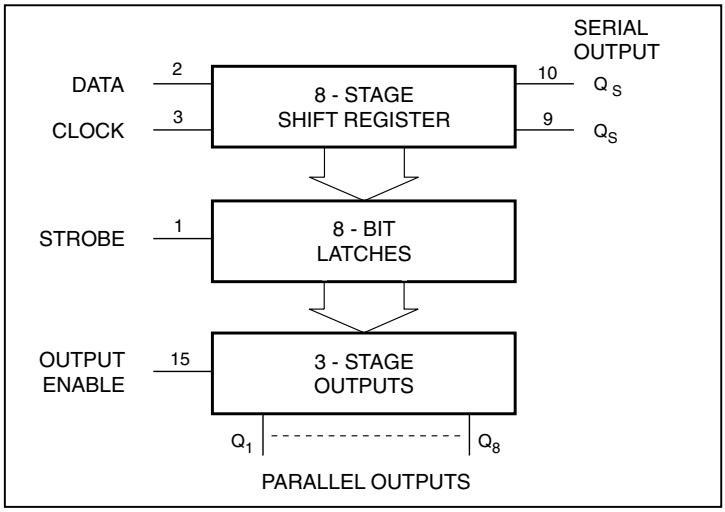


IC605, 606, 608, 609, 610, 611, 612, 613, 621, 622, 623
(TL072) Dual Op-Amp

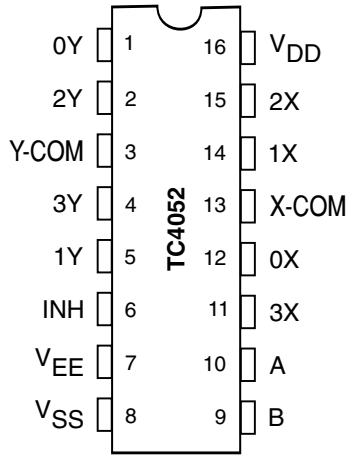


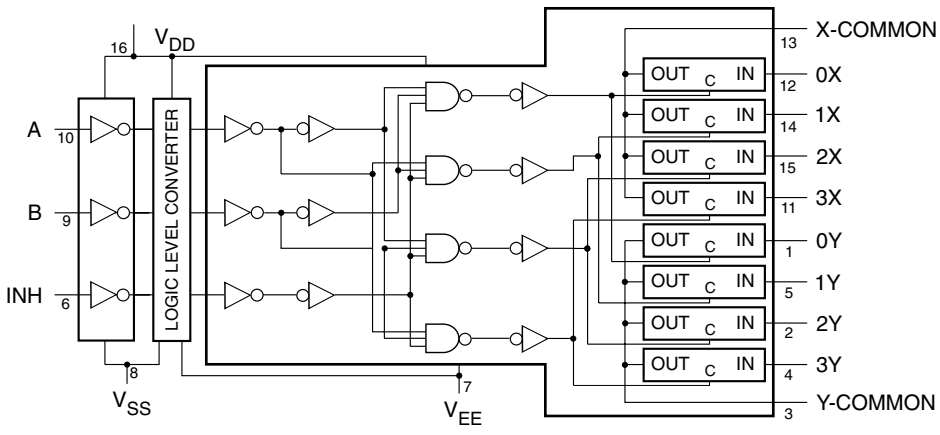
IC202-204 - (TC4090BP) 8 Bit Shift Register



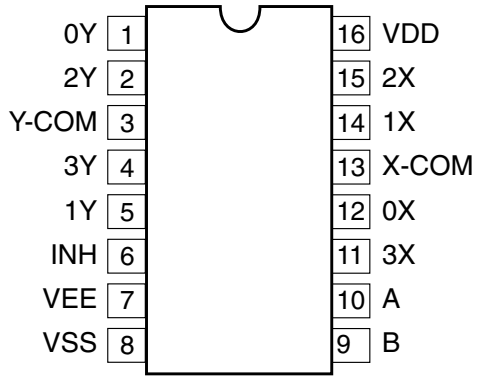


IC625, 301 - (TC4052BP) 4 Channel Multiplexer

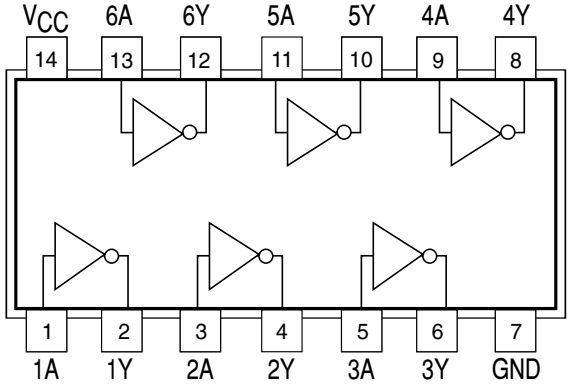




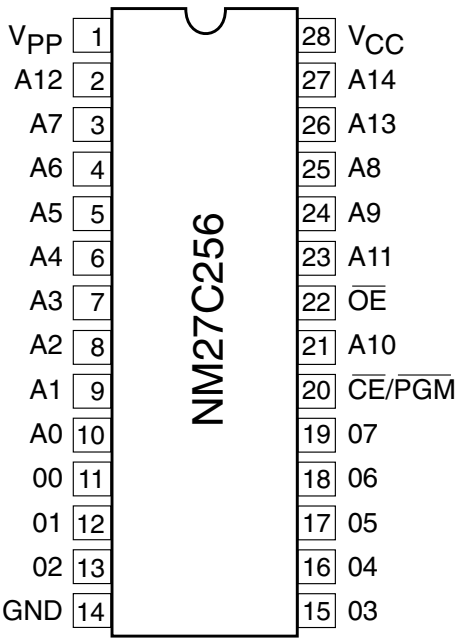
IC614-619 - (TC4051BFN)
8 CHANNEL MULTIPLEXER



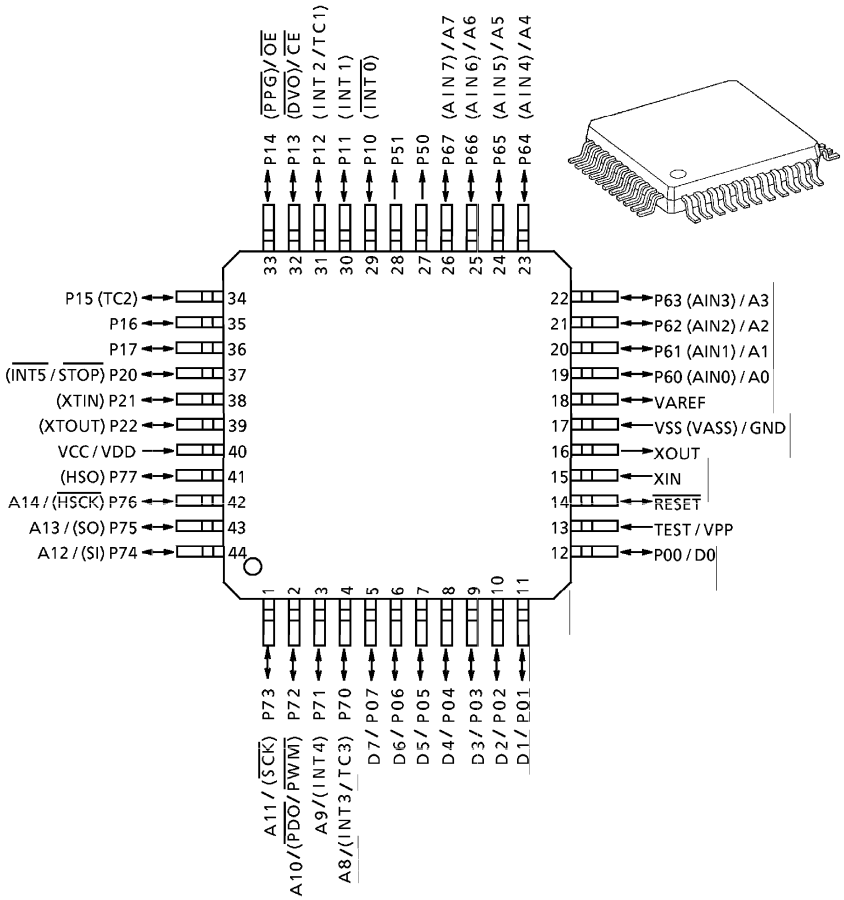
IC624 - (TC74HC04AFN)
HEX INVERTER



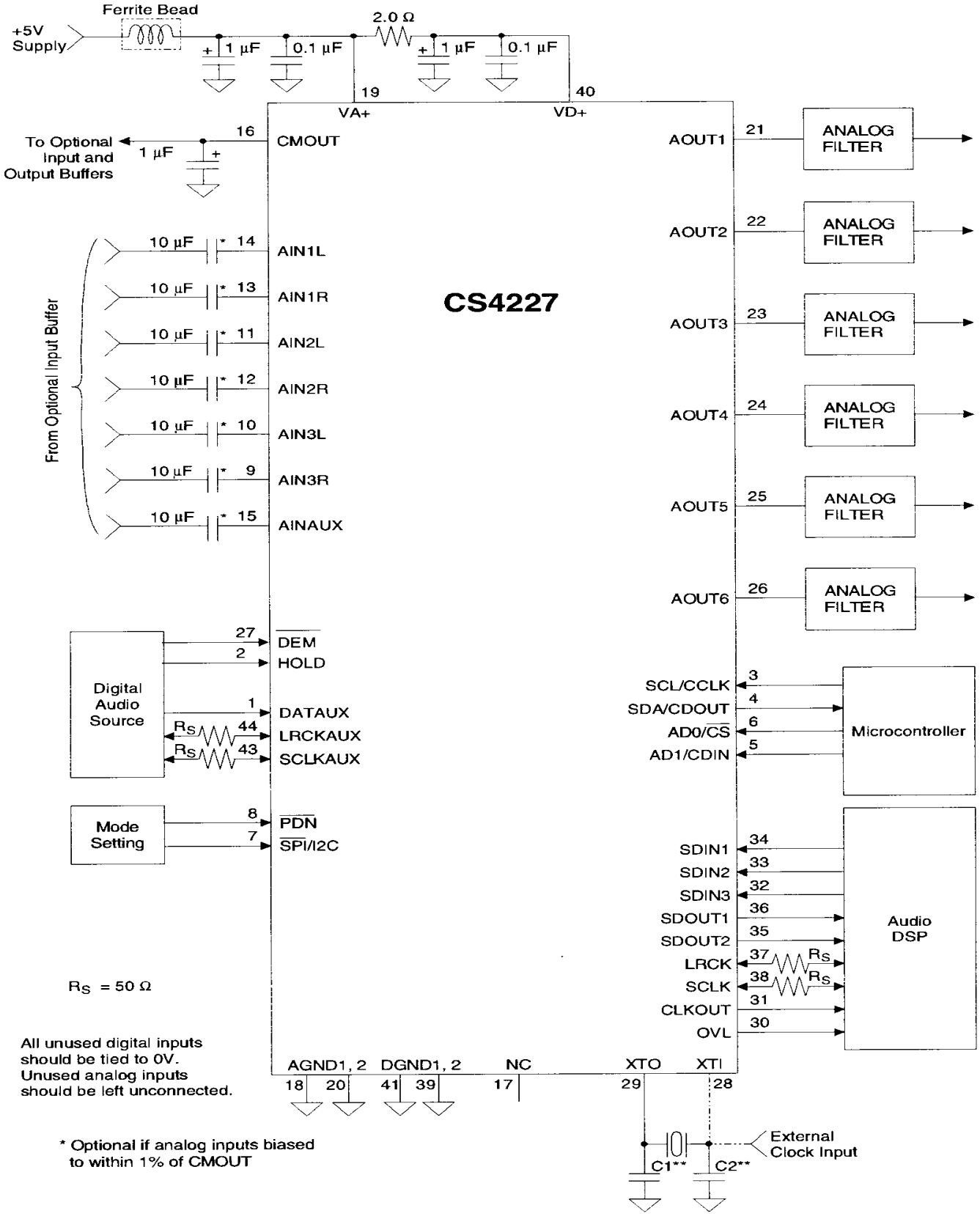
IC627 - EPROM IC 256K 120ns



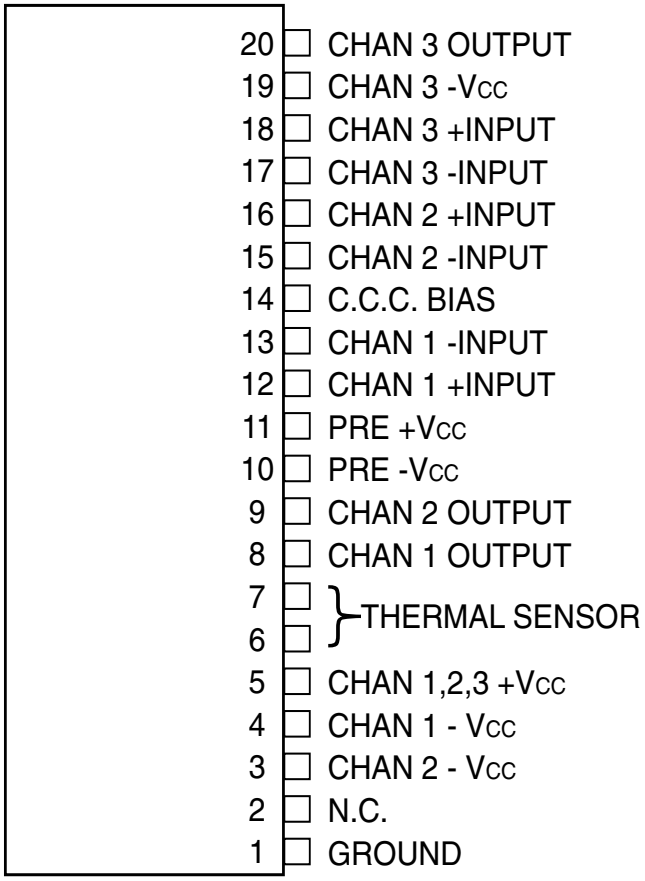
IC201 - (TC9819) ESC333 MASK u-CON



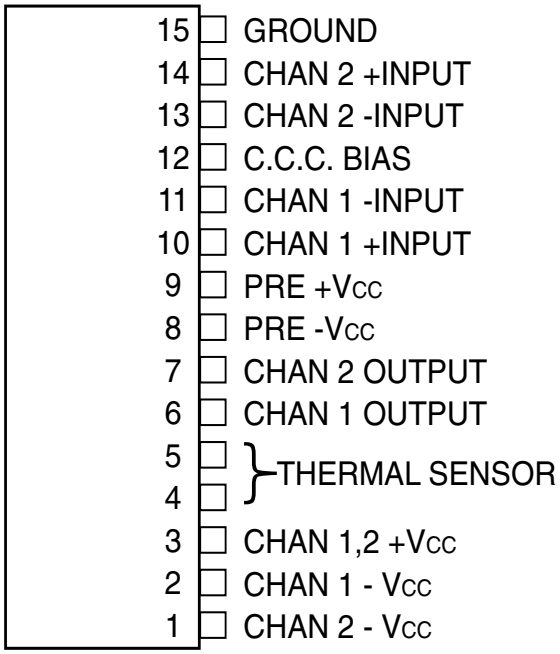
IC626 - (CS4227)
6 CHANNEL VOLUME CRYSTAL



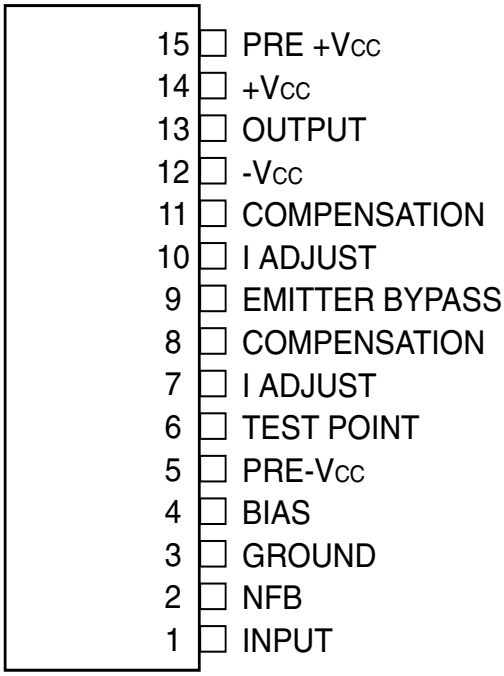
IC501 - (STK407-250)
POWER IC



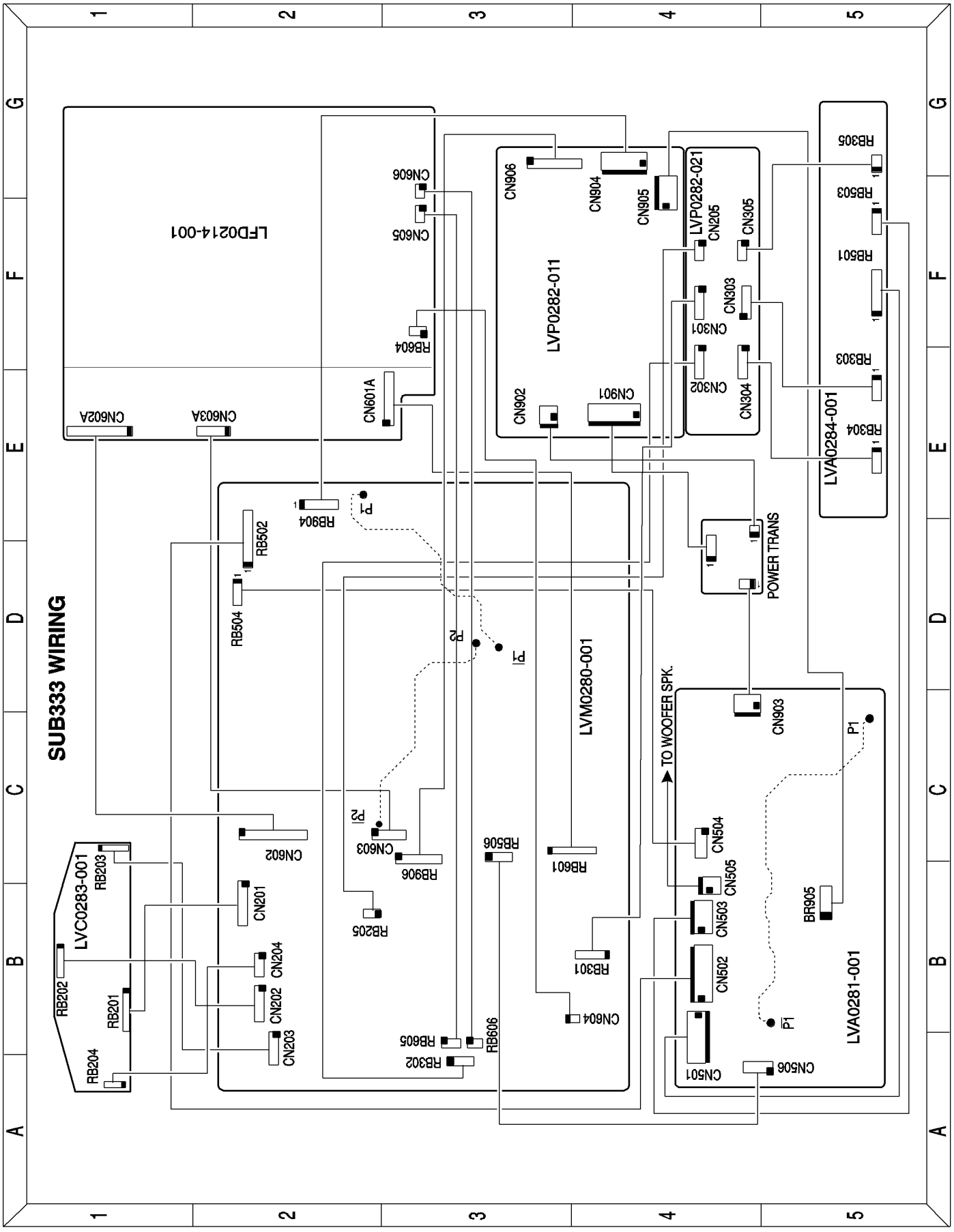
IC603 - (STK470-050)
POWER IC



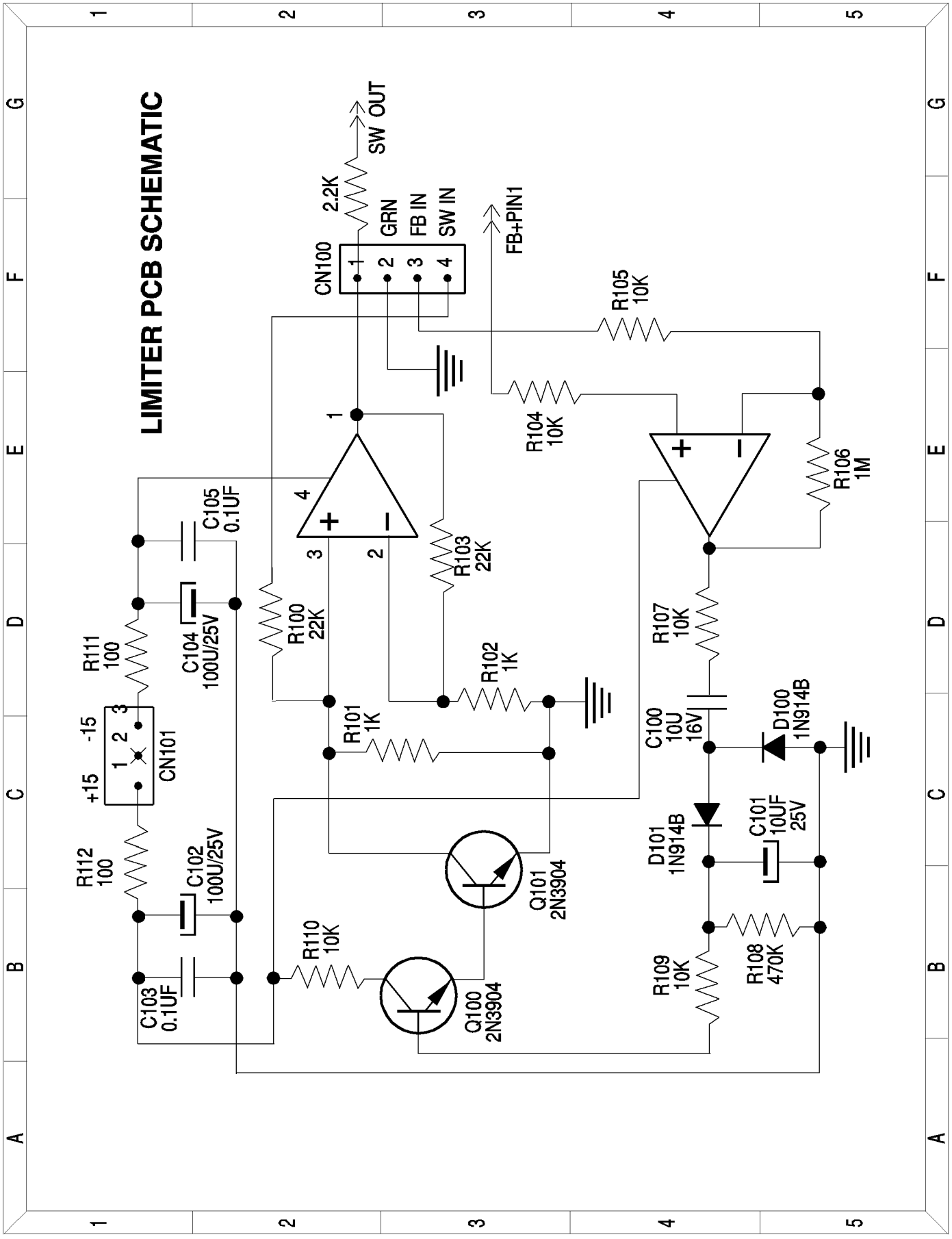
IC703 - (STK4038II) POWER IC



SUB333 WIRING DIAGRAM



SUB333 LIMITER SCHEMATIC



SUB333 AC3 SCHEMATIC

SUB333 PAGE 36 - 1 of 4

SUB333 PAGE 36 - 2 of 4

SUB333 PAGE 36 - 3 of 4

SUB333 PAGE 36 - 4 of 4

SUB333
AC3
SCHEMATIC DIAGRAM

IC601
ZR38601
DOLBY DIGITAL DECODER

IC626
CS4227

IC625
TC4052(FUNCTION_SW)

IC627
EPROM

IC619 4051
IC618 4051
IC617 4051
IC616 4051
IC615 4051
IC614 4051

IC620
M62446FP

IC607
REG1117

IC610A TL072
IC610B TL072
IC611A TL072
IC611B TL072
IC612A TL072
IC612B TL072
IC605A TL072
IC605B TL072
IC606A TL072
IC606B TL072
IC608A TL072
IC608B TL072
IC609A WOOFER TL072
IC609B TL072
IC613A TL072
IC613B TL072
IC621A TL072
IC621B TL072
IC622A TL072
IC622B TL072
IC623A TL072
IC623B TL072

74HC04
IC624A
IC624B

XL602 32MHz

CN602A
CN603
CN604
CN605
CN606A

Q607 2SD945
Q608 2SA733
Q609 2SC2001

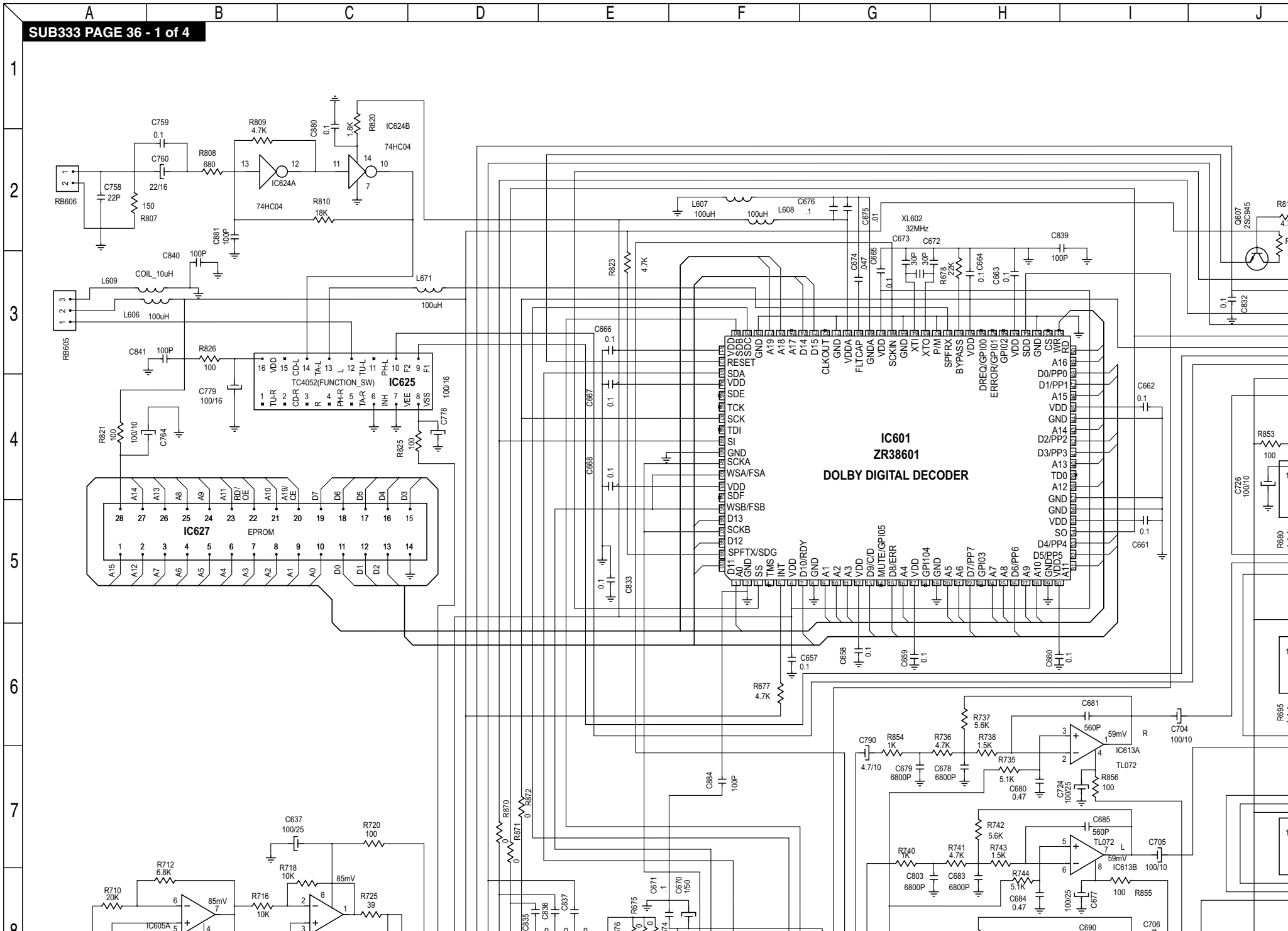
ZD601
ZD602

L604
L605

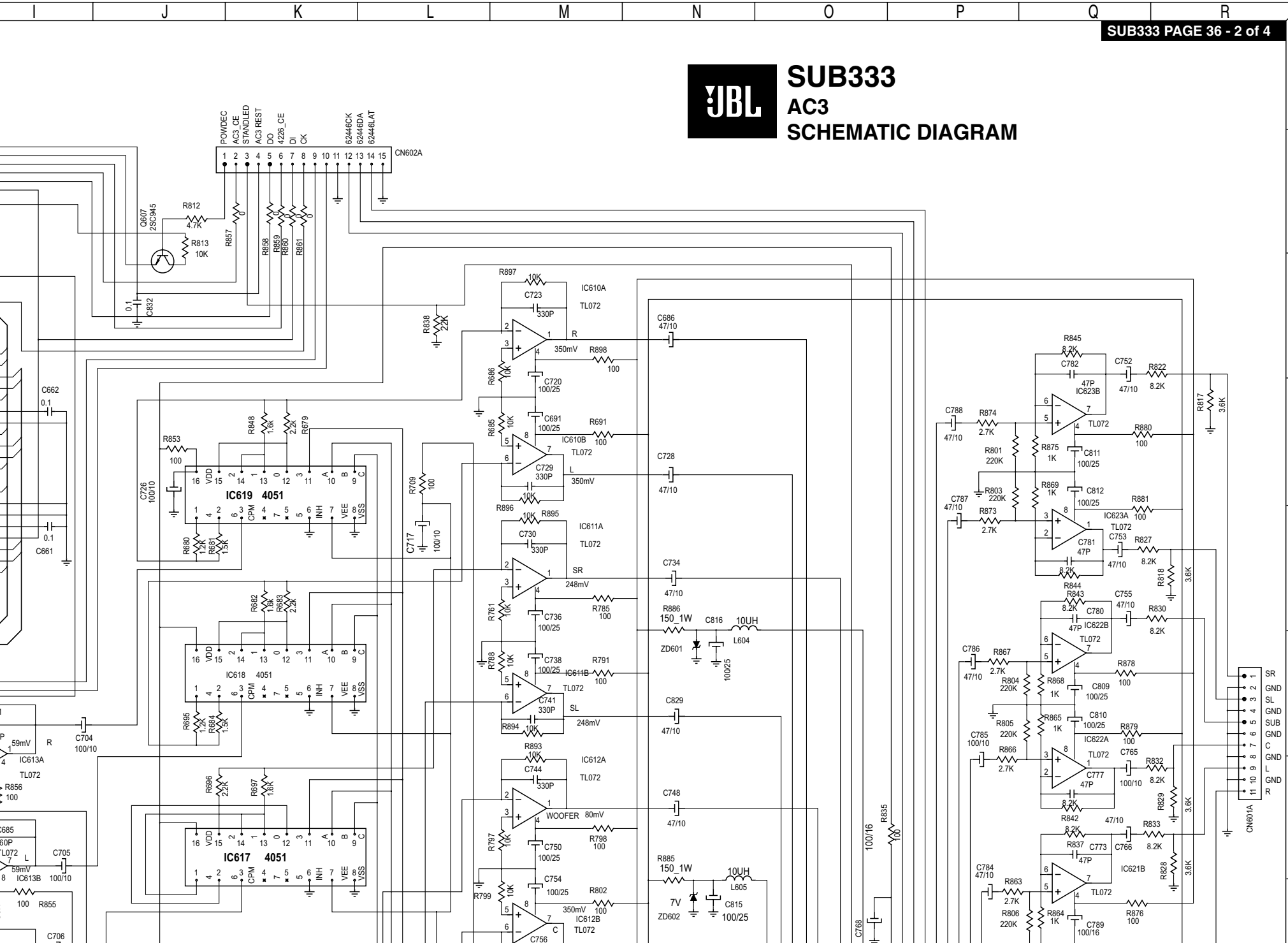
COIL_10uH
L607 100uH
L608 100uH
L609
L606 100uH
L671 100uH
L611 COIL_10uH

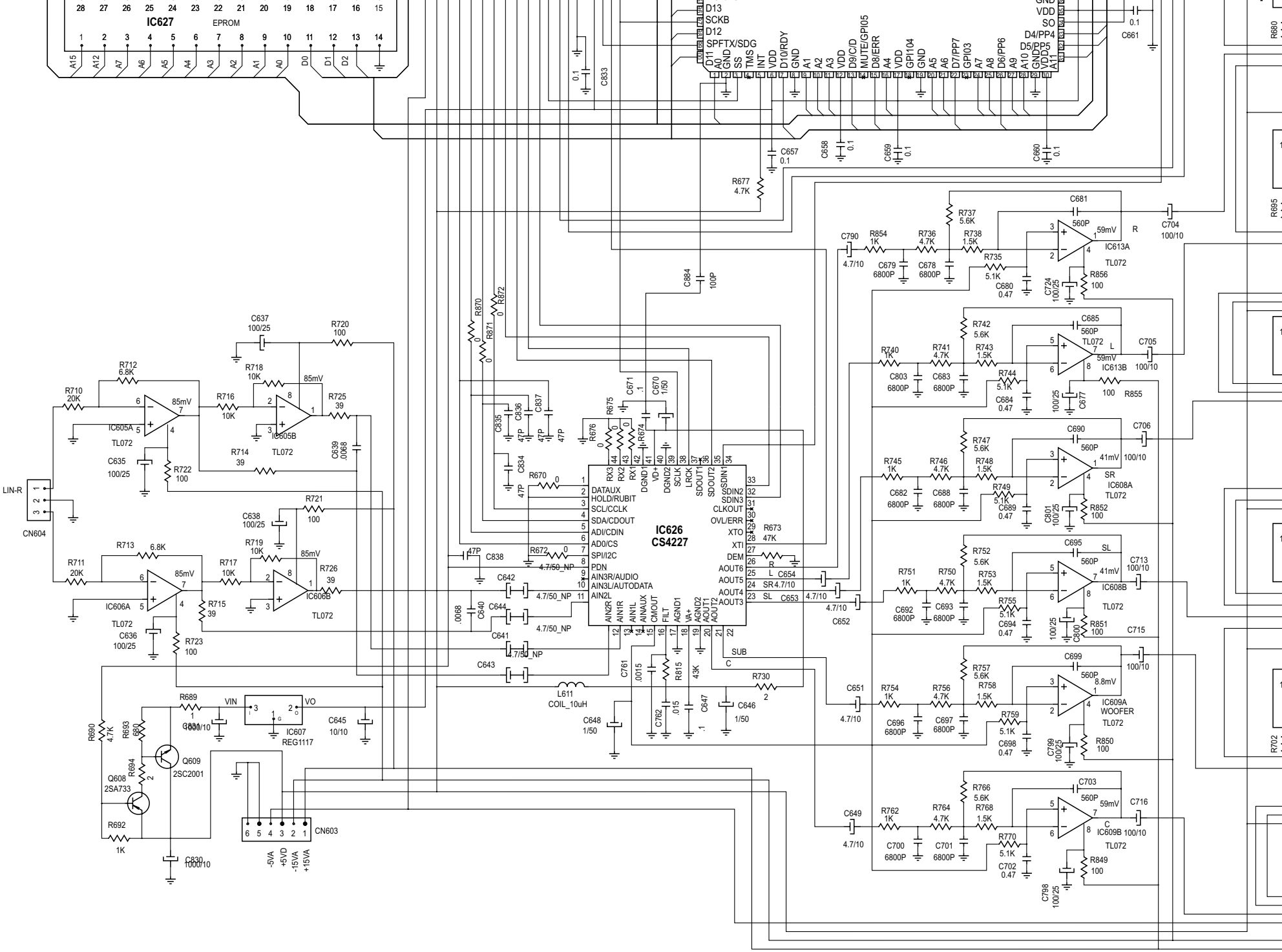
RB605
RB606

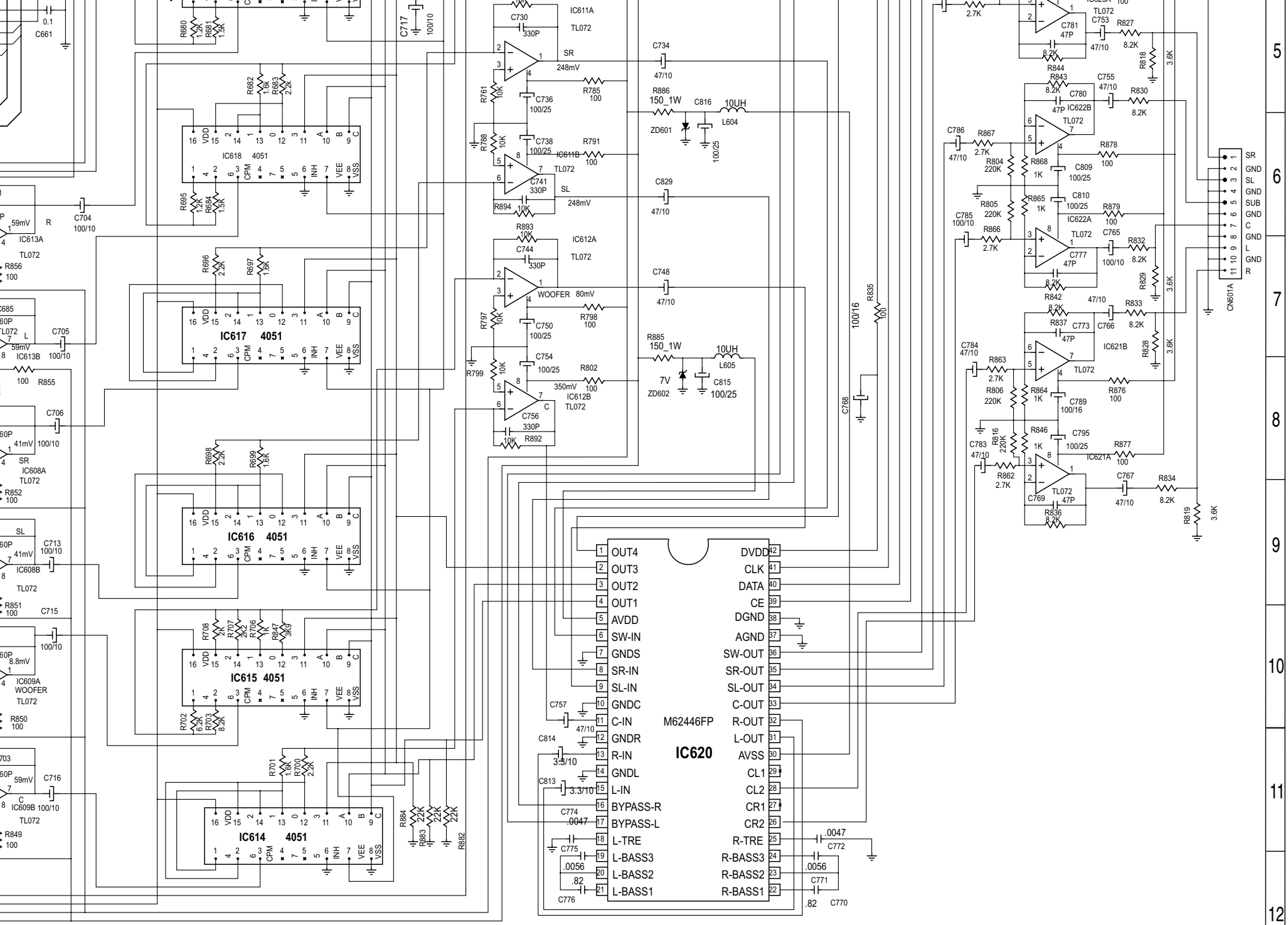
SUB333 PAGE 36 - 1 of 4



SUB333
AC3
SCHEMATIC DIAGRAM




IC627
EPROM
IC626
CS4227
IC605A
IC605B
IC606A
IC606B
IC607
REGIN1117
IC609A
WOOFER
IC609B
IC608A
IC608B
IC613A
IC613B
TL072
CN603
CN604
LIN-R
Q608
2SA733
Q609
2SC2001
L611
COIL_10uH
SUB
-5VA
+5VD
-15VA
+15VA



SUB333 PAGE 36 - 4 of 4

SUB333 MAIN SCHEMATIC

SUB333 PAGE 37 - 1 of 4

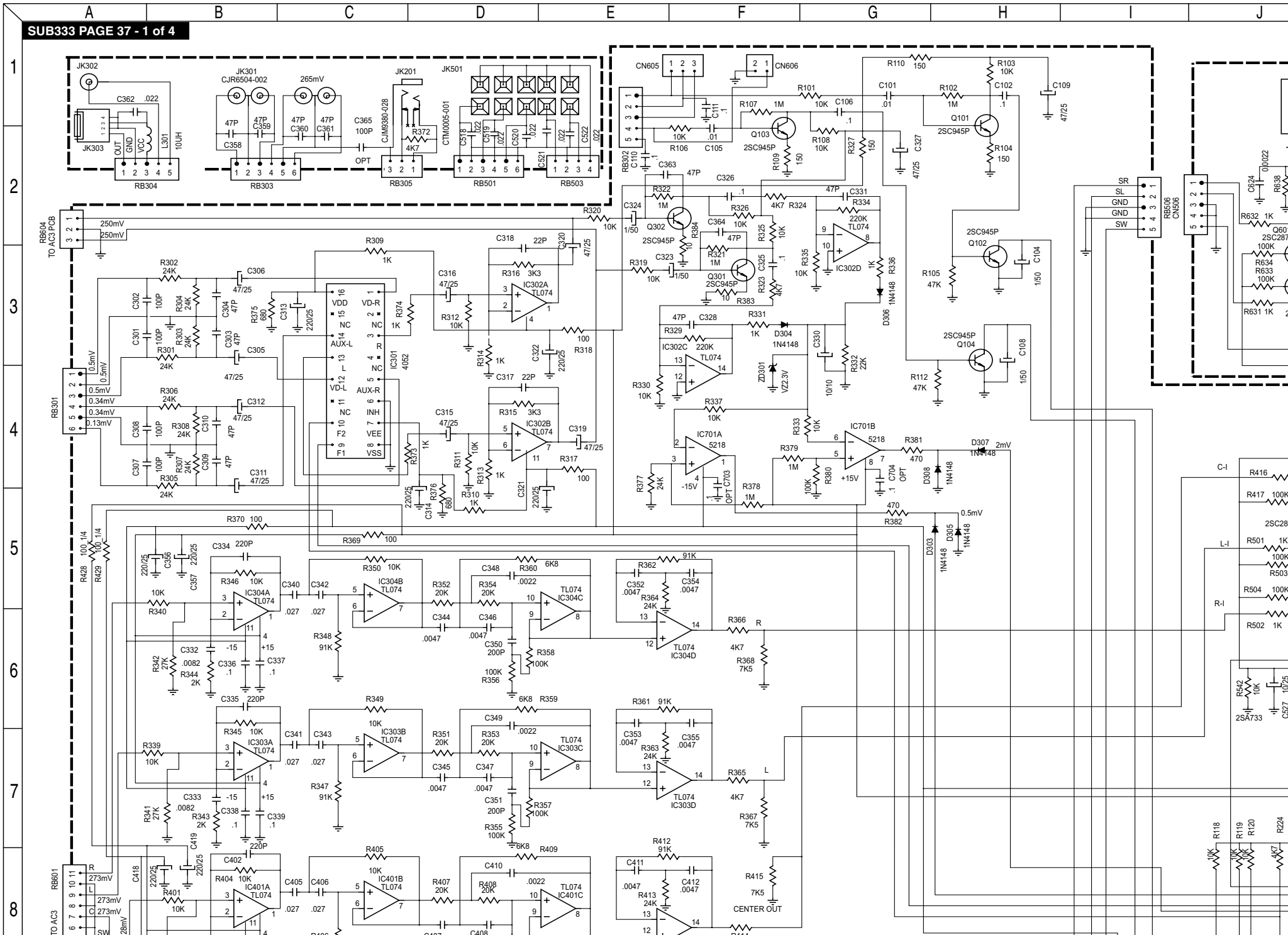
SUB333 PAGE 37 - 2 of 4

SUB333 PAGE 37 - 3 of 4

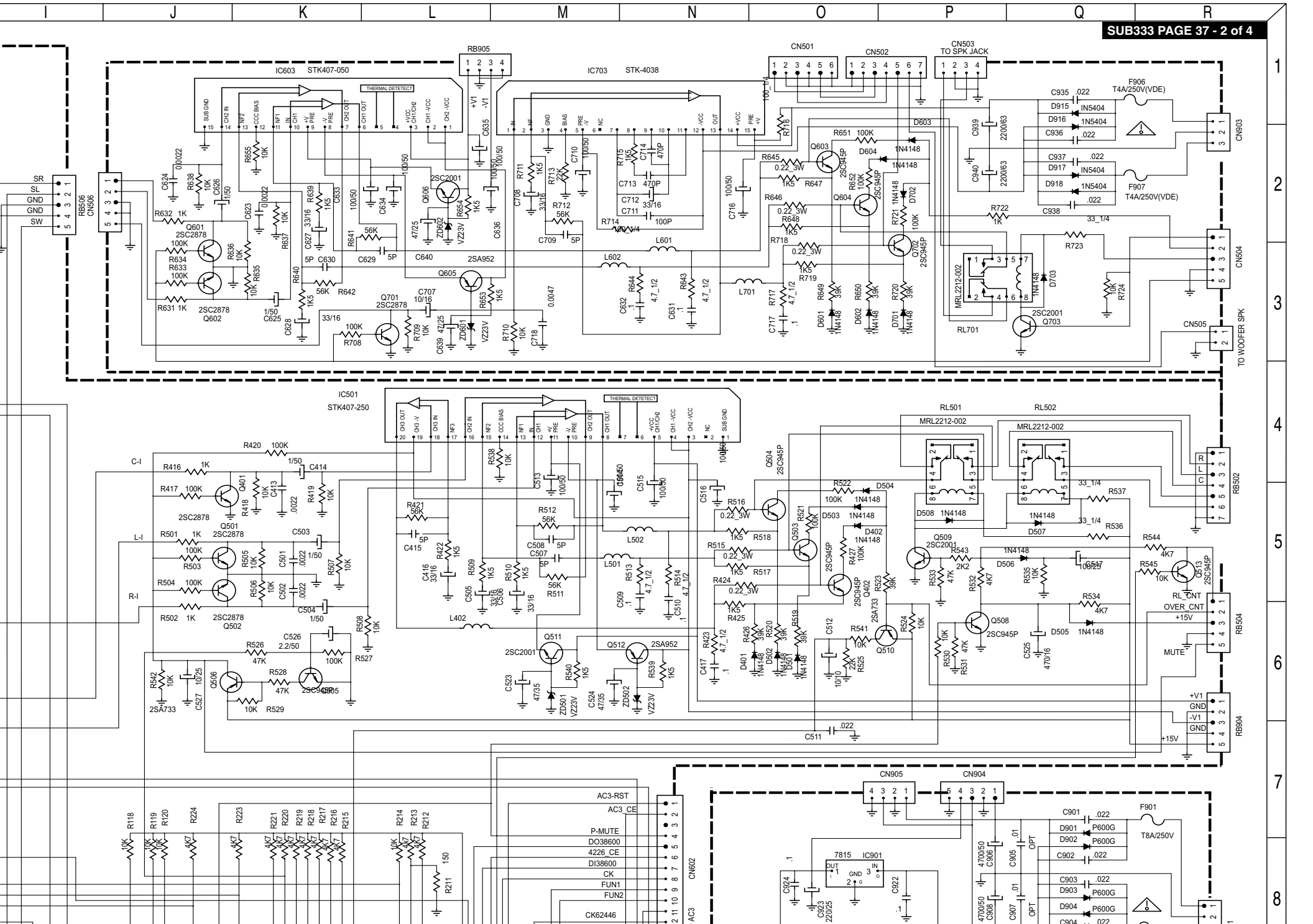
SUB333 PAGE 37 - 4 of 4

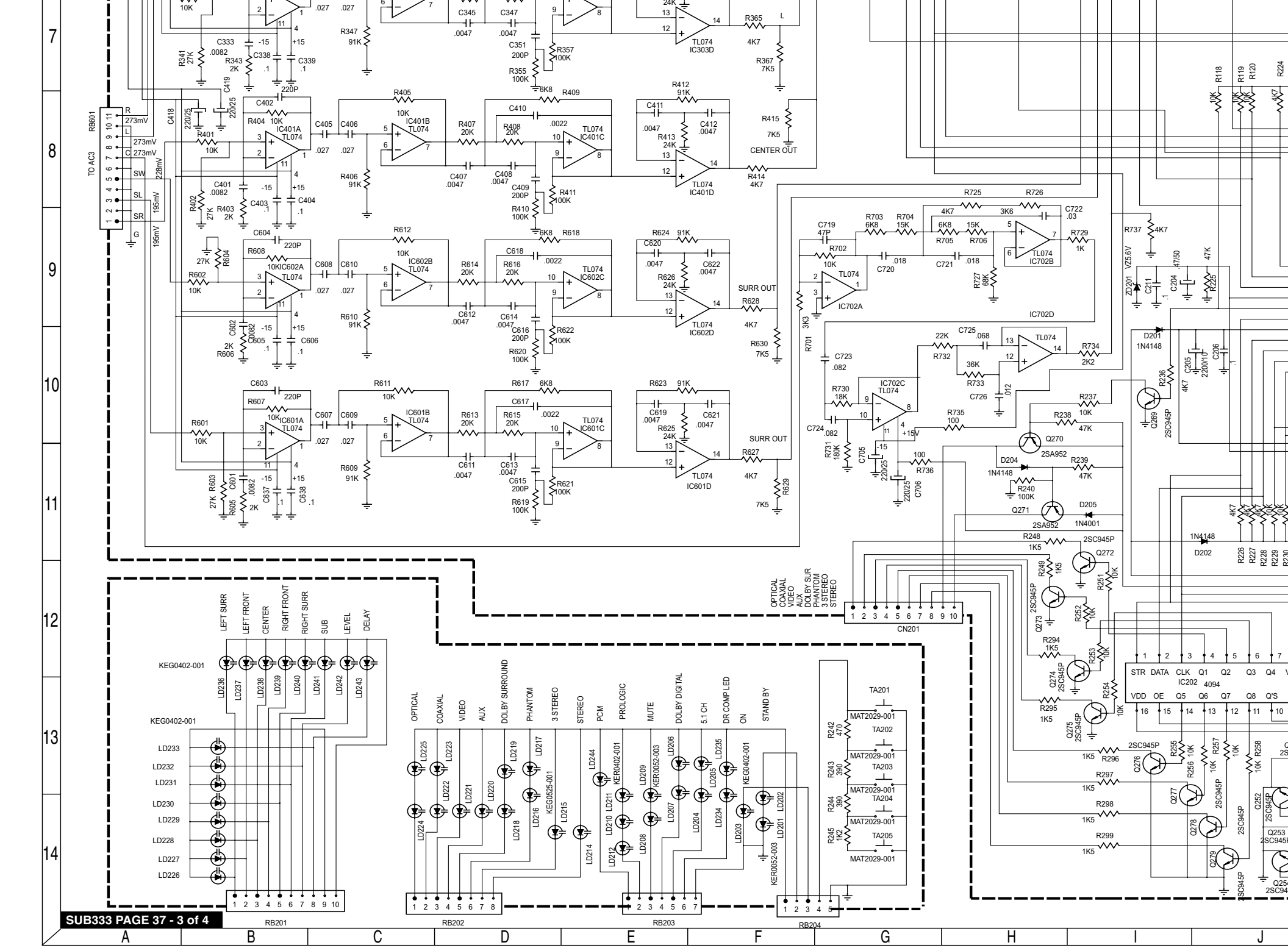
SUB333
MAIN
SCHEMATIC DIAGRAM

SUB333 PAGE 37 - 1 of 4

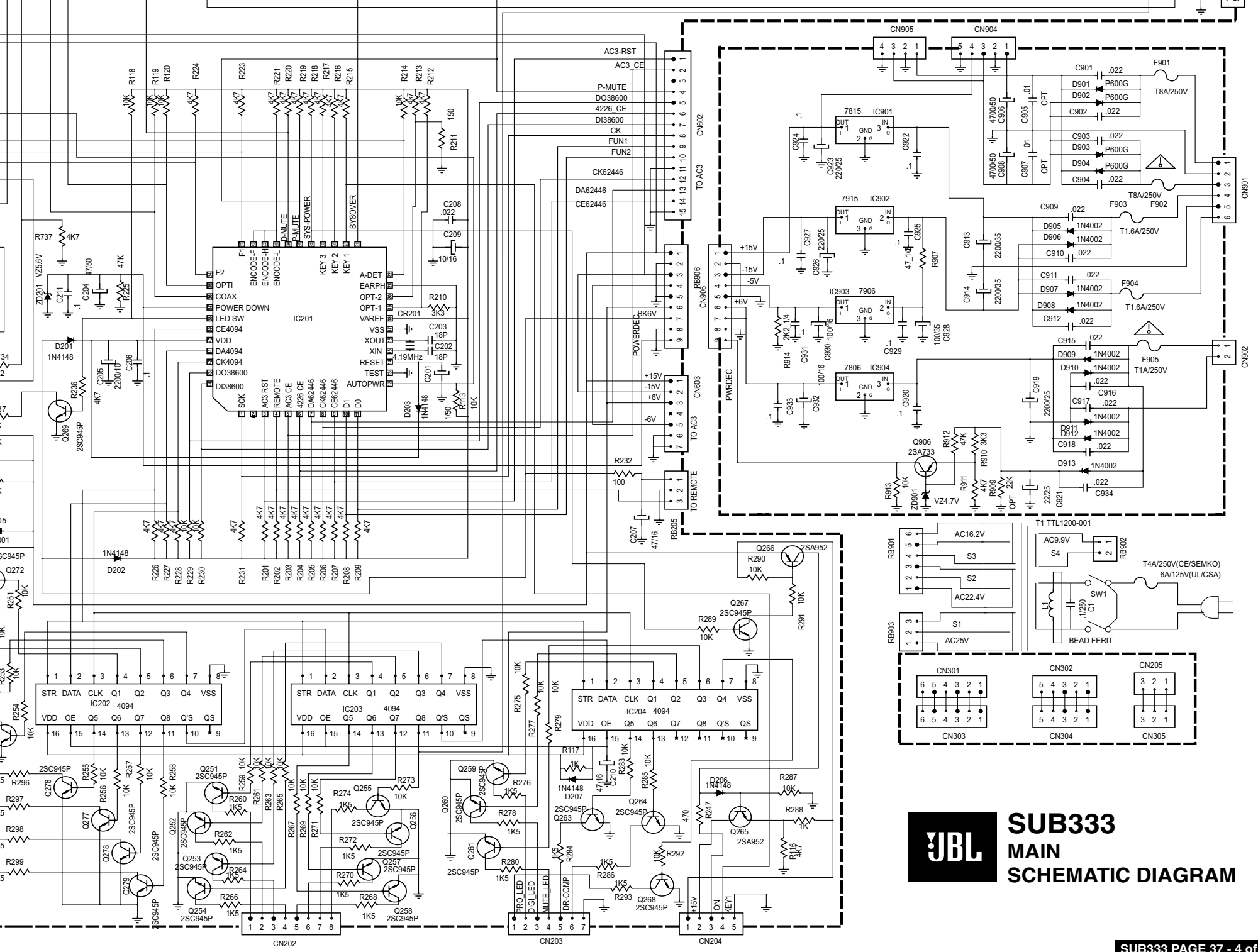


UB333 MAIN SCHEMATIC





SUB333 PAGE 37 - 3 of 4



SUB333
MAIN
SCHEMATIC DIAGRAM