

AUDIO

COMBINER/SEPARATOR

FOR

SE4010/RX4010 SERIES

ASSY 498580

&

ASSY 498564

4.3 Separator, two to four channels A6, Assy 498580.

The module separates two 6000Hz channels into four 2700Hz channels using frequency conversion for the upper channels. The module contains two identical circuits one for USB and one for LSB.

4.3.1 Description.

Two combined channels 300-5700Hz are separated into four baseband channels 300-2700Hz. The two channels which are not converted in frequency are called low channels, USB low and LSB low respectively, while the upconverted channels are called high channels, USB high and LSB high respectively.

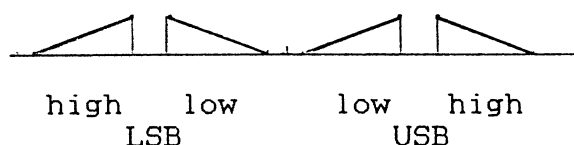


Figure 4.3.1 shows the functional diagram of the module. The main module may be configured as either a channel combiner or a channel separator. It functions as a separator module, when J3 to 18 have pin 2 and 3 connected together.

The balanced input signals are converted to unbalanced signals for internal use in the input amplifiers. The levels may be adjusted and checked on the testpoints TP1 and 3, accessible from the rear panel.

The signals from the input amplifiers are separated into a low channel and a high channel in lowpass and highpass filters respectively, both implemented in switched capacitor technology. These filters are preceded by a continuous time lowpass filter to eliminate the possibility of aliasing caused by sampled data filtering. A highpass filter will attenuate hum and noise below 300Hz.

The low channel signal 300-2700Hz is directly feed to the output amplifier, while the signal in the high channel must be downconverted in the mixer/multiplier circuit to baseband. The output from the multiplier contains the wanted signal and some unwanted products as well. The unwanted signals above 3KHz are removed in the following lowpass filter, before the signal is feed to the output amplifier.

4.3.2 Adjustment.

The input level on J1 may be between $\pm 10\text{dBm}$ (600 ohms). The internal nominal level is 0dBm (0.775VRMS , 1.1Vp , 2.2Vpp). The internal absolut maximum level is 7.0Vpp , which corresponds to $+10\text{dBm}$ for a single tone signal. But remember that a two tone signal will give a peak level, that is 6dB above each single tone level. A RMS showing meter will not show this level, but a lower level. The exact showed level may depend on meter construction. The internal level is monitored on TP 1 and 3. The output level may be checked on the testpoints TP 5 to 8. The testpoint will show actual output level only when the output is connected to a 600 ohms load.

4.4 Combiner, four to two channels A6, Assy 498564.

The module combines four 2700Hz channels into two 6000Hz channels using frequency conversion for the upper channels.

The module contains two identical circuits one for USB and one for LSB.

4.4.1 Description.

Four baseband channels 300–2700Hz are converted to two channels each occupying 6KHz bandwidth. The two channels which are not converted in frequency are called low channels, USB low and LSB low respectively, while the upconverted channels are called high channels, USB high and LSB high respectively.

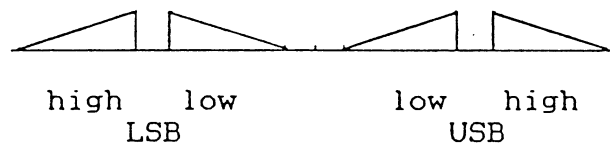


Figure 4.1 shows the functional diagram of the module. The main module may be configured as either a channel combiner or a channel separator. It functions as a combiner module, when J3 to 18 pin 1 and 2 are connected together.

The balanced input signals are converted to unbalanced signals for internal use in the input amplifiers. The levels may be adjusted and checked on the four testpoints TP1-4, accessible from the rear panel.

The signals from the input amplifiers are bandlimited to 2700Hz in filters implemented in switched capacitor technology. These filters are preceded by a continuous time lowpass filter to eliminate the possibility of aliasing caused by sampled data filtering. A highpass filter will attenuate hum and noise below 300Hz.

The low channel signal 300–2700Hz is directly feed to the summing network, while the signal for the high channel must be upconverted in the mixer/multiplier circuit. The output from this multiplier contains the wanted signal and some unwanted products as well. The unwanted signals above 6KHz and below 3KHz are removed in the following low-/highpass filter combination. The output from the low-/highpass filter is feed to the other input of the summing network.

The signal to the output amplifier now consists of the low channel 300–2700Hz and the high channel 3300–5700Hz.

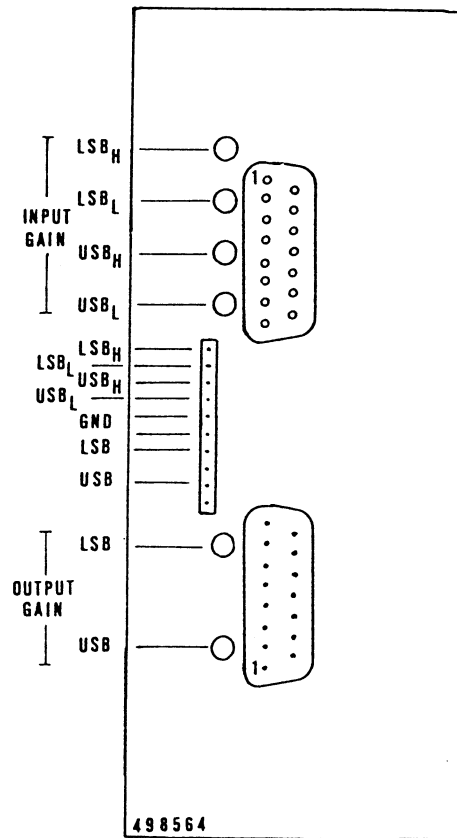
4.4.2 Adjustment.

The input levels on J1 may be between ± 10 dBm (600 ohms).

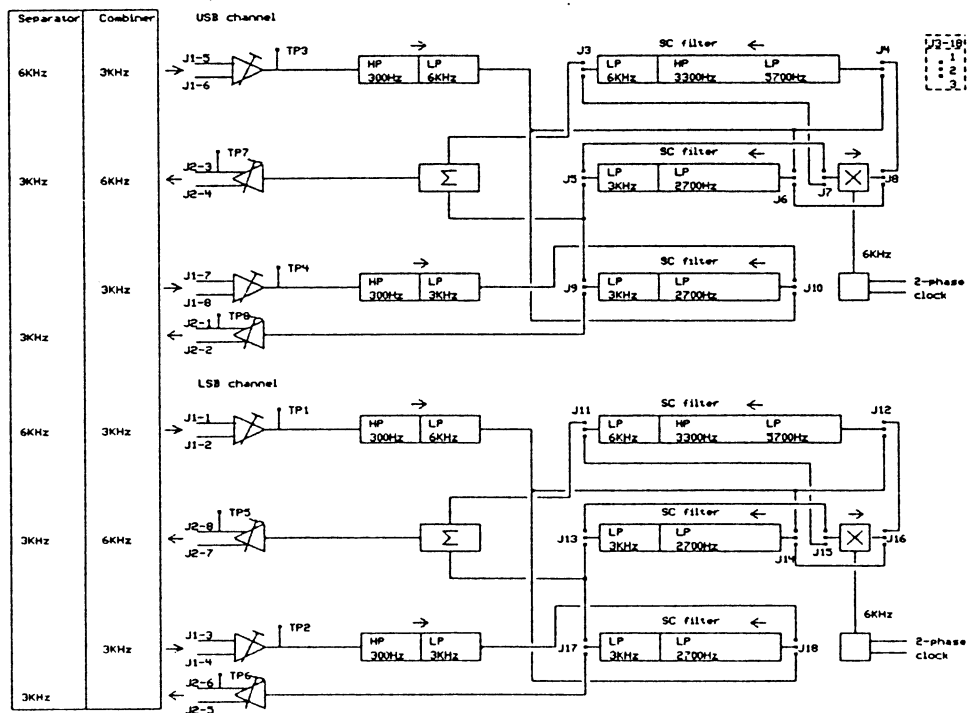
The internal nominal level is 0dBm (0.775VRMS, 1.1Vp, 2.2Vpp).

The internal absolute maximum level is 7.0Vpp, which corresponds to +10dBm for a single tone signal. But remember that a two tone signal will give a peak level, that is 6dB above each single tone level. A RMS showing meter will not show this level, but a lower level. The exact showed level may depend on the meter construction. The internal levels may be monitored on TP 1 to 4.

The output level may be checked on the testpoints TP5 and 7. The testpoint will show actual output level only when the output is connected to a 600 ohms load.



Rear Plate A6, Combiner.



Block Diagram A6, Combiner.

ASSY 498564, Combiner

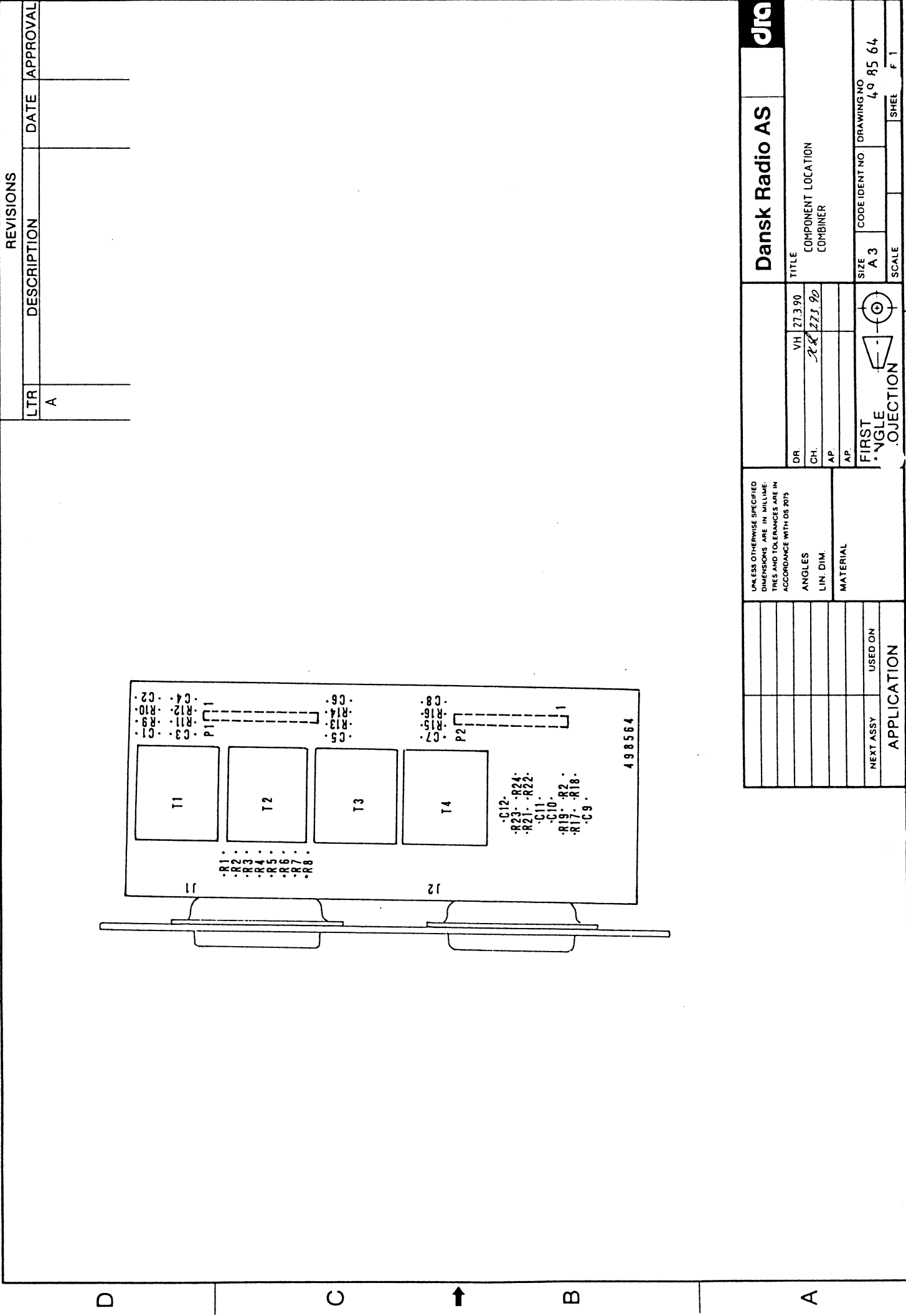
Service Sheet A6

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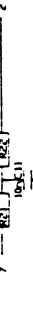
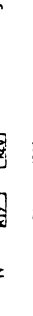
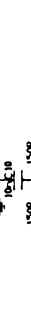
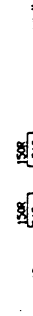
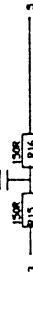
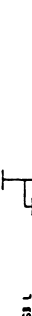
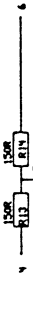
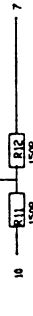
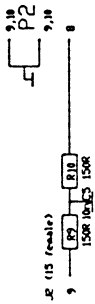
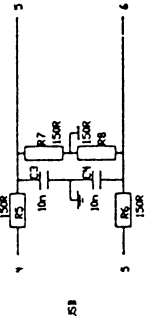
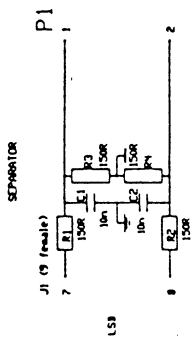
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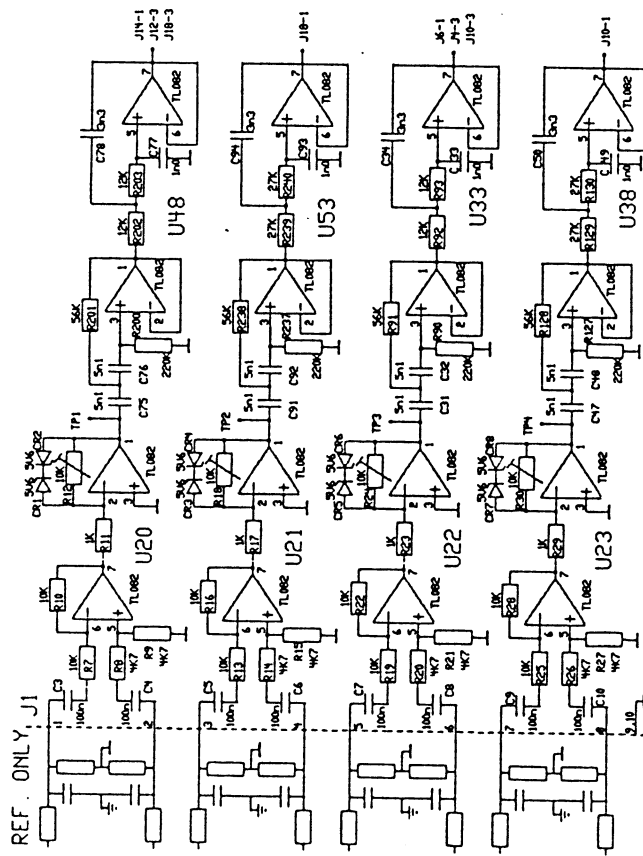
SECTION 	
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- 1 Balanced to unbalanced input amplifiers.
U20,21,22,23 are parts of four identical input circuits for balanced to unbalanced conversion. The level on each input may be adjusted and the internal level may be checked on TP 1-4. The signals from the input amplifiers are feed through a high-pass filter to remove low frequency hum and noise, and through a lowpass filter, that functions as an antialiasing filter for the following switched capacitor filter. These filters are constructed around U48,53,33,38.

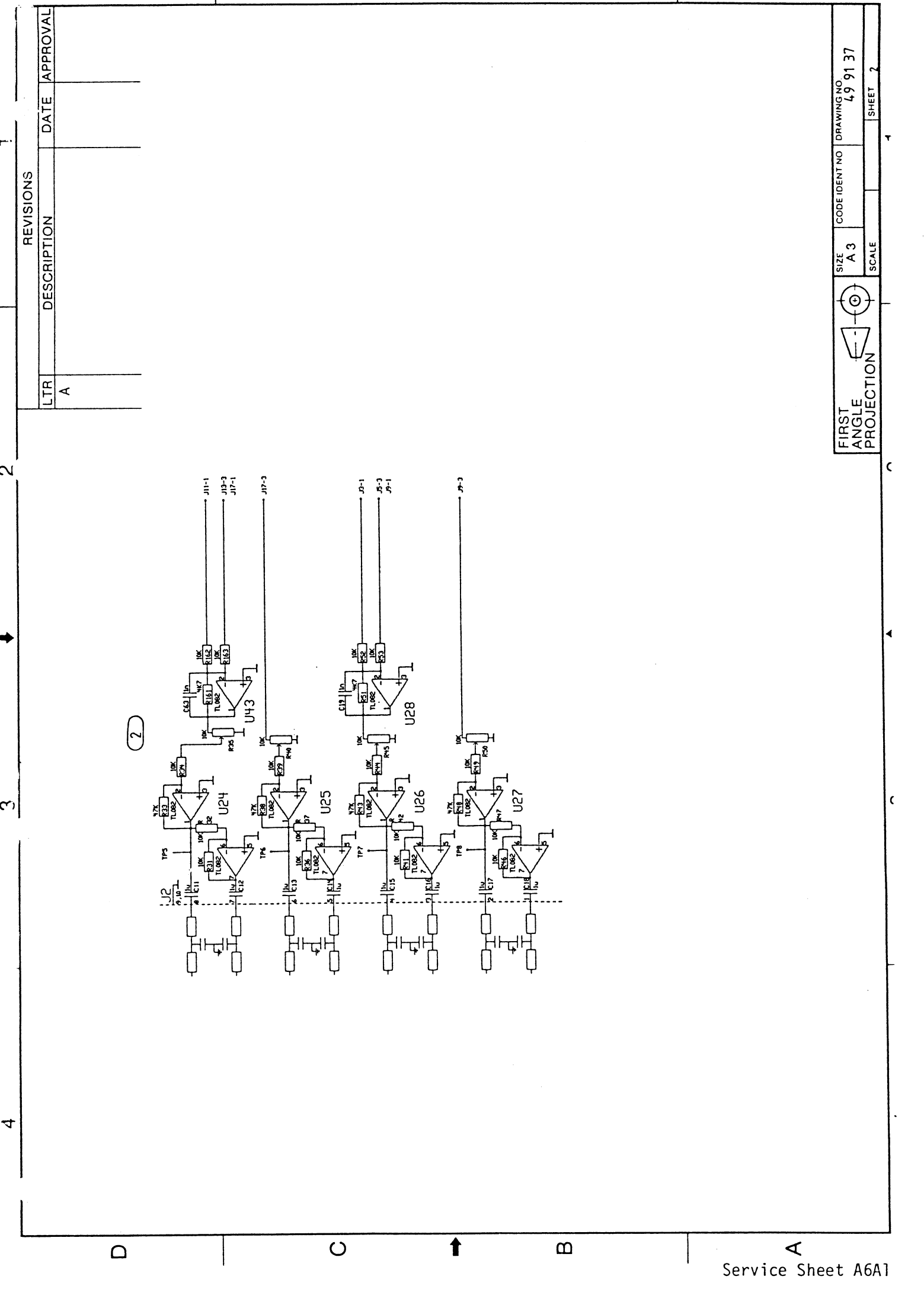
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- 2 Output amplifiers.
U24,25,26,27 are parts of the output amplifiers for unbalanced to balanced conversion. the output level may be adjusted and the level checked on TP 5-8.



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FIRST ANGLE PROJECTION

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SHEET 2

3 Switched capacitor block.

The switched capacitor filter SC block consists of four identical lowpass filters 2700Hz and two identical bandpass filters 3300-5700Hz.

The lowpass filters are constructed of SC filter circuits with surrounding components, U35,36, U40,41, U50,51, U55,56.

The filter is a 8. order elliptical filter controlled from a clock of 149.85KHz for normal use and a clock of 166.05KHz, if keying signal above 2700Hz has to be transferred through the filter. The filter has a corner frequency of 2700Hz and attenuates signals above 3300Hz more than 50dB.

The signal out of a SC filter also contains a small amount of switching signals. which are removed in a normal active filter, constructed of U34,39,49 and 54 with surrounding components.

The bandpass filter are also constructed of SC filter circuits with surrounding components U30,31,32 and U45,46,47.

The filter is a 6.order elliptical lowpass and highpass filter with a passband of 3300-5700Hz and will attenuate signals below 2700Hz more than 40dB, and signals above 6300Hz more than 30dB. The signals are further filtered at the output of the SC filter in the lowpass/highpass filter U28,29 and U43,44.

4 Mixer/multiplier.

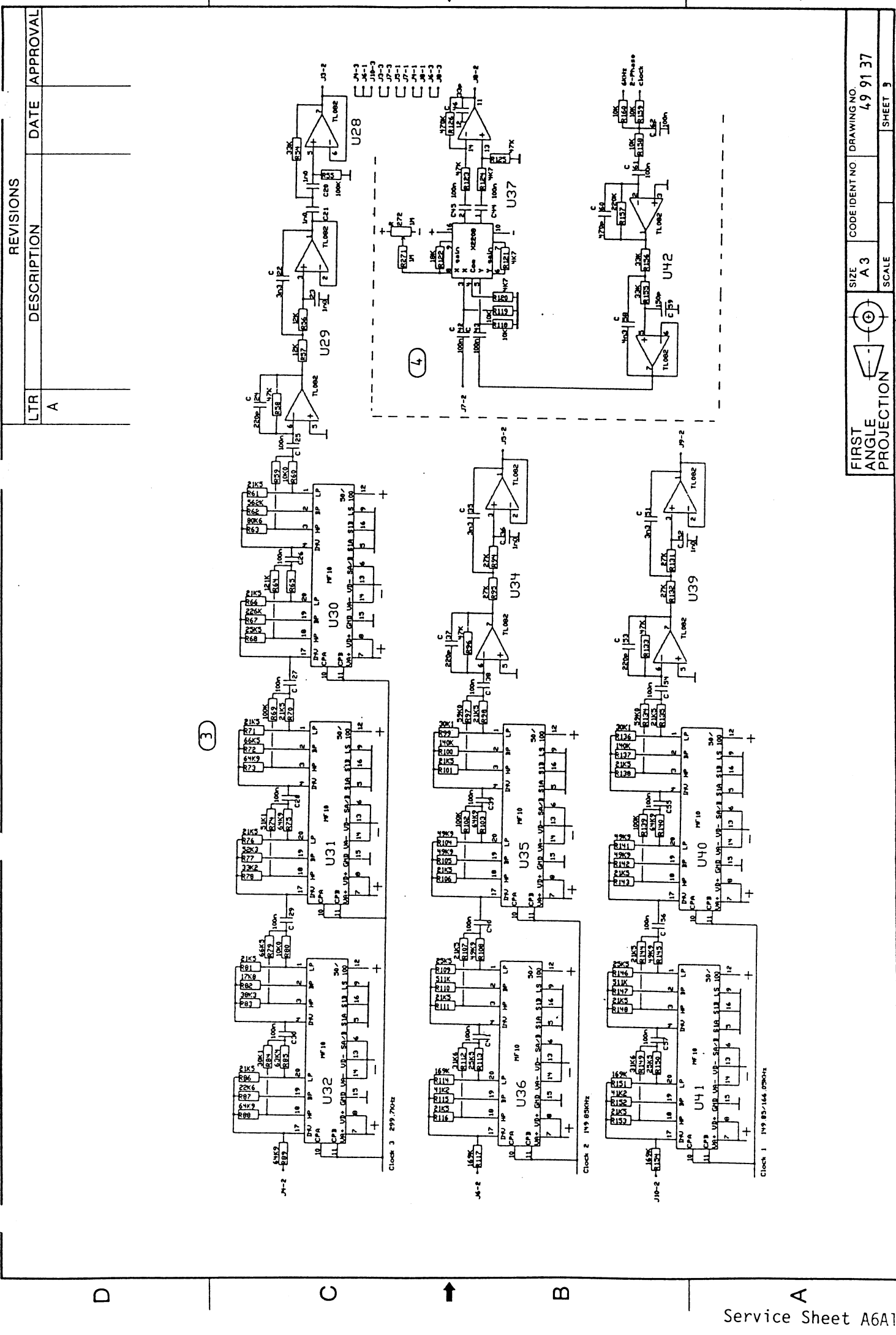
The two identical mixer circuits are constructed around the analog multiplier circuits U37 and U52. The multipliers are driven with a sinus LO signal to minimize unwanted mixer products. This signal is constructed from a two phase digital clock signal U42 and U57.

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3 Switched capacitor block.

The switched capacitor filter SC block consists of four identical lowpass filters 2700Hz and two identical bandpass filters 3300-5700Hz.

The lowpass filters are constructed of SC filter circuits with surrounding components, U35,36, U40,41, U50,51, U55,56.

The filter is a 8. order elliptical filter controlled from a clock of 149.85KHz for normal use and a clock of 166.05KHz, if keying signal above 2700Hz has to be transferred through the filter. The filter has a corner frequency of 2700Hz and attenuates signals above 3300Hz more than 50dB.

The signal out of a SC filter also contains a small amount of switching signals. which are removed in a normal active filter, constructed of U34,39,49 and 54 with surrounding components.

The bandpass filter are also constructed of SC filter circuits with surrounding components U30,31,32 and U45,46,47.

The filter is a 6.order elliptical lowpass and highpass filter with a passband of 3300-5700Hz and will attenuate signals below 2700Hz more than 40dB, and signals above 6300Hz more than 30dB. The signals are further filtered at the output of the SC filter in the lowpass/highpass filter U28,29 and U43,44.

4 Mixer/multiplier.

The two identical mixer circuits are constructed around the analog multiplier circuits U37 and U52. The multipliers are driven with a sinus LO signal to minimize unwanted mixer products. This signal is constructed from a two phase digital clock signal U42 and U57.

5 Clock generator.

All clock signals for the SC filters and the mixer LO signals are generated from a crystal controlled oscillator of 6144KHz. U1,2,3,4,5,6,7,8.

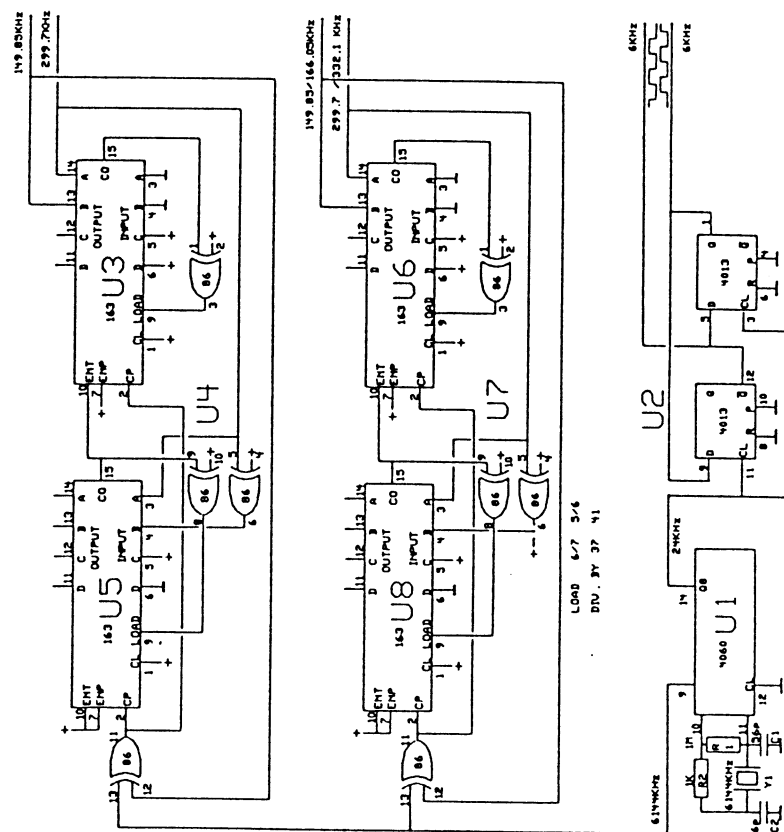
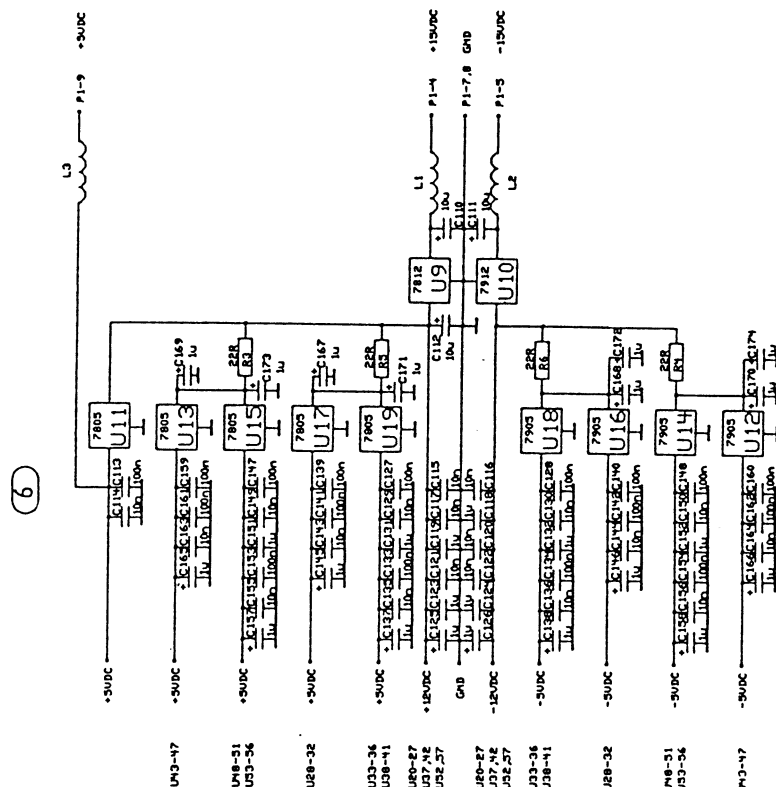
6 Power supply.

The digital circuits are supplied from a 5V regulator U11 or directly from P1-9.

The I/O analog circuits and the mixer circuits are supplied from +/-12VDC regulators U9 and U10.

The rest of the circuits are supplied from +/-5VDC by means of several regulators U12-19.

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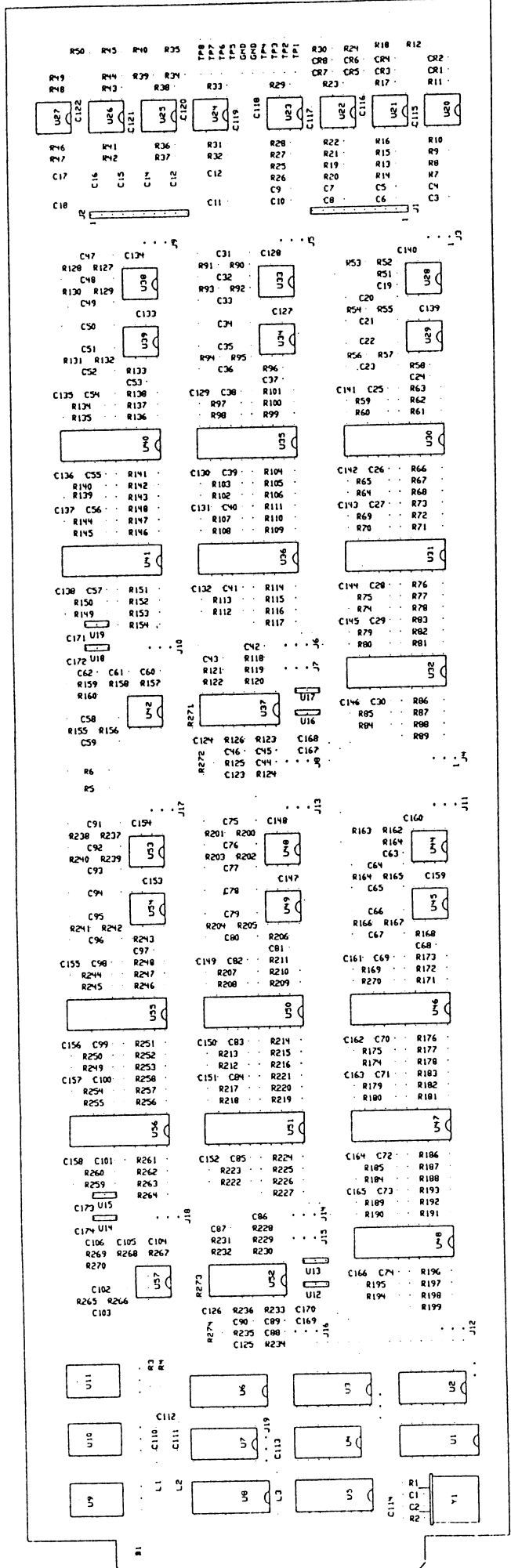
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SHEET 5



Dansk Radio AS

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SCALE	SHEET 1 OF 1

REFDES.	FUNCNO	DESCRIPTION	SPECIFICATION	MANUFACTOR
R180	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R181	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R182	66K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R183	64K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R184	51K1	RESISTOR METALFILM 1%	MRS25	PHILIPS
R185	64K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R186	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R187	52K3	RESISTOR METALFILM 1%	MRS25	PHILIPS
R188	33K2	RESISTOR METALFILM 1%	MRS25	PHILIPS
R189	66K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R190	10K0	RESISTOR METALFILM 1%	MRS25	PHILIPS
R191	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R192	17K8	RESISTOR METALFILM 1%	MRS25	PHILIPS
R193	38K3	RESISTOR METALFILM 1%	MRS25	PHILIPS
R194	30K1	RESISTOR METALFILM 1%	MRS25	PHILIPS
R195	63K4	RESISTOR METALFILM 1%	MRS25	PHILIPS
R196	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R197	22K6	RESISTOR METALFILM 1%	MRS25	PHILIPS
R198	64K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R199	64K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R200	220K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R201	56K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R202	12K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R203	12K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R204	27K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R205	27K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R206	47K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R207	59K0	RESISTOR METALFILM 1%	MRS25	PHILIPS
R208	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R209	30K1	RESISTOR METALFILM 1%	MRS25	PHILIPS
R210	140K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R211	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R212	100K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R213	64K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R214	49K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R215	49K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R216	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R217	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R218	49K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R219	25K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R220	511K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R221	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R222	31K6	RESISTOR METALFILM 1%	MRS25	PHILIPS
R223	25K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R224	169K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R225	41K2	RESISTOR METALFILM 1%	MRS25	PHILIPS
R226	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R227	169K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R228	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R229	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R230	4K7	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R231	4K7	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R232	18K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R233	47K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R234	4K7	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R235	47K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R236	470K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R237	220K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R238	56K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R239	27K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R240	27K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS

REFDES.	FUNCNO	DESCRIPTION	SPECIFICATION	MANUFACTOR
R119	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R120	4K7	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R121	4K7	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R122	18K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R123	47K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R124	4K7	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R125	47K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R126	470K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R127	220K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R128	56K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R129	27K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R130	27K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R131	27K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R132	27K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R133	47K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R134	59K0	RESISTOR METALFILM 1%	MRS25	PHILIPS
R135	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R136	30K1	RESISTOR METALFILM 1%	MRS25	PHILIPS
R137	140K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R138	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R139	100K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R140	64K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R141	49K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R142	49K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R143	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R144	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R145	49K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R146	25K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R147	511K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R148	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R149	31K6	RESISTOR METALFILM 1%	MRS25	PHILIPS
R150	25K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R151	169K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R152	41K2	RESISTOR METALFILM 1%	MRS25	PHILIPS
R153	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R154	169K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R155	33K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R156	33K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R157	220K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R158	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R159	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R160	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R161	4K7	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R162	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R163	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R164	33K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R165	100K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R166	12K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R167	12K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R168	47K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R169		NOT USED		
R170	10K0	RESISTOR METALFILM 1%	MRS25	PHILIPS
R171	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R172	562K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R173	80K6	RESISTOR METALFILM 1%	MRS25	PHILIPS
R174	121K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R175		NOT USED		
R176	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R177	226K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R178	25K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R179	100K	RESISTOR METALFILM 1%	MRS25	PHILIPS

REFDES.	FUNCNO	DESCRIPTION	SPECIFICATION	MANUFACTOR
R058	47K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R059		NOT USED		
R060	10K0	RESISTOR METALFILM 1%	MRS25	PHILIPS
R061	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R062	562K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R063	80K6	RESISTOR METALFILM 1%	MRS25	PHILIPS
R064	121K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R065		NOT USED		
R066	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R067	226K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R068	25K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R069	100K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R070	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R071	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R072	66K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R073	64K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R074	51K1	RESISTOR METALFILM 1%	MRS25	PHILIPS
R075	64K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R076	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R077	52K3	RESISTOR METALFILM 1%	MRS25	PHILIPS
R078	33K2	RESISTOR METALFILM 1%	MRS25	PHILIPS
R079	66K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R080	10K0	RESISTOR METALFILM 1%	MRS25	PHILIPS
R081	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R082	17K8	RESISTOR METALFILM 1%	MRS25	PHILIPS
R083	38K3	RESISTOR METALFILM 1%	MRS25	PHILIPS
R084	30K1	RESISTOR METALFILM 1%	MRS25	PHILIPS
R085	63K4	RESISTOR METALFILM 1%	MRS25	PHILIPS
R086	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R087	22K6	RESISTOR METALFILM 1%	MRS25	PHILIPS
R088	64K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R089	64K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R090	220K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R091	56K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R092	12K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R093	12K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R094	27K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R095	27K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R096	47K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R097	59K0	RESISTOR METALFILM 1%	MRS25	PHILIPS
R098	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R099	30K1	RESISTOR METALFILM 1%	MRS25	PHILIPS
R100	140K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R101	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R102	100K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R103	64K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R104	49K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R105	49K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R106	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R107	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R108	49K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R109	25K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R110	511K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R111	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R112	31K6	RESISTOR METALFILM 1%	MRS25	PHILIPS
R113	25K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R114	169K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R115	41K2	RESISTOR METALFILM 1%	MRS25	PHILIPS
R116	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R117	169K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R118	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS

REFDES.FUNCNO		DESCRIPTION	SPECIFICATION	MANUFACTOR
L1	COIL	COIL HIGH CURRENT		COMINAS
L2	COIL	COIL HIGH CURRENT		COMINAS
L3	COIL	COIL HIGH CURRENT		COMINAS
R001	1M	RESISTOR METALFILM 0,5W	SFR16T	PHILIPS
R002	1K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R003	22R	RESISTOR POWER	CR37	PHILIPS
R004	22R	RESISTOR POWER	CR37	PHILIPS
R005	22R	RESISTOR POWER	CR37	PHILIPS
R006	22R	RESISTOR POWER	CR37	PHILIPS
R007	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R008	4K7	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R009	4K7	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R010	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R011	1K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R012	10K	RESISTOR VARIABLE	3323W-1-103	BOURNS
R013	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R014	4K7	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R015	4K7	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R016	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R017	1K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R018	10K	RESISTOR VARIABLE	3323W-1-103	BOURNS
R019	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R020	4K7	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R021	4K7	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R022	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R023	1K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R024	10K	RESISTOR VARIABLE	3323W-1-103	BOURNS
R025	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R026	4K7	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R027	4K7	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R028	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R029	1K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R030	10K	RESISTOR VARIABLE	3323W-1-103	BOURNS
R031	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R032	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R033	47K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R034	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R035	10K	RESISTOR VARIABLE	3323W-1-103	BOURNS
R036	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R037	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R038	47K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R039	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R040	10K	RESISTOR VARIABLE	3323W-1-103	BOURNS
R041	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R042	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R043	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R044	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R045	10K	RESISTOR VARIABLE	3323W-1-103	BOURNS
R046	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R047	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R048	47K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R049	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R050	10K	RESISTOR VARIABLE	3323W-1-103	BOURNS
R051	4K7	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R052	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R053	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R054	33K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R055	100K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R056	12K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R057	12K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS

REFDES.	FUNCNO	DESCRIPTION	SPECIFICATION	MANUFACTOR
C117	10N	CAPACITOR CERAMIC PLATE	10N 2222629	PHILIPS
C118	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C119	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C120	10N	CAPACITOR CERAMIC PLATE	10N 2222629	PHILIPS
C121	10N	CAPACITOR CERAMIC PLATE	10N 2222629	PHILIPS
C122	10N	CAPACITOR CERAMIC PLATE	10N 2222629	PHILIPS
C123	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C124	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C125	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C126	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C127	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C128	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C129	10N	CAPACITOR CERAMIC PLATE	10N 2222629	PHILIPS
C130	10N	CAPACITOR CERAMIC PLATE	10N 2222629	PHILIPS
C131	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C132	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C133	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C134	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C135	10N	CAPACITOR CERAMIC PLATE	10N 2222629	PHILIPS
C136	10N	CAPACITOR CERAMIC PLATE	10N 2222629	PHILIPS
C137	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C138	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C139	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C140	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C141	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C142	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C143	10N	CAPACITOR CERAMIC PLATE	10N 2222629	PHILIPS
C144	10N	CAPACITOR CERAMIC PLATE	10N 2222629	PHILIPS
C145	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C146	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C147	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C148	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C149	10N	CAPACITOR CERAMIC PLATE	10N 2222629	PHILIPS
C150	10N	CAPACITOR CERAMIC PLATE	10N 2222629	PHILIPS
C151	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C152	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C153	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C154	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C155	10N	CAPACITOR CERAMIC PLATE	10N 2222629	PHILIPS
C156	10N	CAPACITOR CERAMIC PLATE	10N 2222629	PHILIPS
C157	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C158	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C159	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C160	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C161	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C162	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C163	10N	CAPACITOR CERAMIC PLATE	10N 2222629	PHILIPS
C164	10N	CAPACITOR CERAMIC PLATE	10N 2222629	PHILIPS
C165	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C166	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C167	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C168	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C169	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C170	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C171	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C172	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C173	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
C174	1MI	CAPACITOR TANTAL	1MICRO 35V	NEC
CR1-8	ZPD5V6	DIODE ZENER 5V6	ZPD 5V6	PHILIPS

REFDES.	FUNCNO	DESCRIPTION	SPECIFICATION	MANUFACTOR
C056	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C057	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C058	4N3	CAPACITOR FILM 1%	2222-463-8-4302	PHILIPS
C059	150P	CAPACITOR FILM 1%	2222-463-8-1501	PHILIPS
C060	470P	CAPACITOR CERAMIC PLATE	2222-630-19471	PHILIPS
C061	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C062	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C063	1N	CAPACITOR CERAMIC PLATE	1N 2222629	PHILIPS
C064	1N0	CAPACITOR FILM 1%	2222-463-8-1002	PHILIPS
C065	1N0	CAPACITOR FILM 1%	2222-463-8-1002	PHILIPS
C066	3N3	CAPACITOR FILM 1%	2222-463-8-3302	PHILIPS
C067	1N0	CAPACITOR FILM 1%	2222-463-8-1002	PHILIPS
C068	220P	CAPACITOR CERAMIC PLATE	2222-630-19221	PHILIPS
C069	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C070	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C071	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C072	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C073	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C074	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C075	5N1	CAPACITOR FILM 1%	2222-463-8-5102	PHILIPS
C076	5N1	CAPACITOR FILM 1%	2222-463-8-5102	PHILIPS
C077	1N0	CAPACITOR FILM 1%	2222-463-8-1002	PHILIPS
C078	3N3	CAPACITOR FILM 1%	2222-463-8-3302	PHILIPS
C079	3N3	CAPACITOR FILM 1%	2222-463-8-3302	PHILIPS
C080	1N0	CAPACITOR FILM 1%	2222-463-8-1002	PHILIPS
C081	470P	CAPACITOR CERAMIC PLATE	2222-630-19471	PHILIPS
C082	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C083	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C084	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C085	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C086	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C087	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C088	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C089	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C090	33P	CAPACITOR CERAMIC PLATE	33P NPO 683	PHILIPS
C091	5N1	CAPACITOR FILM 1%	2222-463-8-5102	PHILIPS
C092	5N1	CAPACITOR FILM 1%	2222-463-8-5102	PHILIPS
C093	1N0	CAPACITOR FILM 1%	2222-463-8-1002	PHILIPS
C094	3N3	CAPACITOR FILM 1%	2222-463-8-3302	PHILIPS
C095	3N3	CAPACITOR FILM 1%	2222-463-8-3302	PHILIPS
C096	1N0	CAPACITOR FILM 1%	2222-463-8-1002	PHILIPS
C097	470P	CAPACITOR CERAMIC PLATE	2222-630-19471	PHILIPS
C098	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C099	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C100	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C101	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C102	4N3	CAPACITOR FILM 1%	2222-463-8-4302	PHILIPS
C103	150P	CAPACITOR FILM 1%	2222-463-8-1501	PHILIPS
C104	470P	CAPACITOR CERAMIC PLATE	2222-630-19471	PHILIPS
C105	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C106	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C107		NOT USED		
C108		NOT USED		
C109		NOT USED		
C110	10MI	CAPACITOR TANTAL	10MICRO 16V	NEC
C111	10MI	CAPACITOR TANTAL	10MICRO 16V	NEC
C112	10MI	CAPACITOR TANTAL	10MICRO 16V	NEC
C113	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C114	10N	CAPACITOR CERAMIC PLATE	10N 2222629	PHILIPS
C115	10N	CAPACITOR CERAMIC PLATE	10N 2222629	PHILIPS
C116	10N	CAPACITOR CERAMIC PLATE	10N 2222629	PHILIPS

PARTSLIST SPECIFICATION FOR: 499137

REFDES.	FUNCNO	DESCRIPTION	SPECIFICATION	MANUFACTOR
C001	56P	CAPACITOR CERAMIC PLATE	56P NPO 683	PHILIPS
C002	56P	CAPACITOR CERAMIC PLATE	56P NPO 683	PHILIPS
C003	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C004	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C005	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C006	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C007	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C008	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C009	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C010	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C011	1MI	CAPACITOR FILM	1MICRO MKS2 63V	WIMA
C012	1MI	CAPACITOR FILM	1MICRO MKS2 63V	WIMA
C013	1MI	CAPACITOR FILM	1MICRO MKS2 63V	WIMA
C014	1MI	CAPACITOR FILM	1MICRO MKS2 63V	WIMA
C015	1MI	CAPACITOR FILM	1MICRO MKS2 63V	WIMA
C016	1MI	CAPACITOR FILM	1MICRO MKS2 63V	WIMA
C017	1MI	CAPACITOR FILM	1MICRO MKS2 63V	WIMA
C018	1MI	CAPACITOR FILM	1MICRO MKS2 63V	WIMA
C019	1N	CAPACITOR CERAMIC PLATE	1N 2222629	PHILIPS
C020	1N0	CAPACITOR FILM 1%	2222-463-8-1002	PHILIPS
C021	1N0	CAPACITOR FILM 1%	2222-463-8-1002	PHILIPS
C022	3N3	CAPACITOR FILM 1%	2222-463-8-3302	PHILIPS
C023	1N0	CAPACITOR FILM 1%	2222-463-8-1002	PHILIPS
C024	220P	CAPACITOR CERAMIC PLATE	2222-630-19221	PHILIPS
C025	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C026	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C027	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C028	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C029	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C030	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C031	5N1	CAPACITOR FILM 1%	2222-463-8-5102	PHILIPS
C032	5N1	CAPACITOR FILM 1%	2222-463-8-5102	PHILIPS
C033	1N0	CAPACITOR FILM 1%	2222-463-8-1002	PHILIPS
C034	3N3	CAPACITOR FILM 1%	2222-463-8-3302	PHILIPS
C035	3N3	CAPACITOR FILM 1%	2222-463-8-3302	PHILIPS
C036	1N0	CAPACITOR FILM 1%	2222-463-8-1002	PHILIPS
C037	220P	CAPACITOR CERAMIC PLATE	2222-630-19221	PHILIPS
C038	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C039	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C040	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C041	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C042	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C043	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C044	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C045	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C046	33P	CAPACITOR CERAMIC PLATE	33P NPO 683	PHILIPS
C047	5N1	CAPACITOR FILM 1%	2222-463-8-5102	PHILIPS
C048	5N1	CAPACITOR FILM 1%	2222-463-8-5102	PHILIPS
C049	1N0	CAPACITOR FILM 1%	2222-463-8-1002	PHILIPS
C050	3N3	CAPACITOR FILM 1%	2222-463-8-5102	PHILIPS
C051	3N3	CAPACITOR FILM 1%	2222-463-8-5102	PHILIPS
C052	1N0	CAPACITOR FILM 1%	2222-463-8-1002	PHILIPS
C053	220P	CAPACITOR CERAMIC PLATE	2222-630-19221	PHILIPS
C054	100N	CAPACITOR FILM	100N MKS2 63V	WIMA
C055	100N	CAPACITOR FILM	100N MKS2 63V	WIMA

PARTSLIST SPECIFICATION FOR: 498564

REFDES.FUNCNO.	DESCRIPTION	SPECIFICATION	MANUFACTOR
A6A1	COMBINER/SEPARATOR MODULE	499137	DRA
C1-12	10N CAPACITOR CERAMIC PLATE	2222629	PHILIPS
J1	D-15 D CONNECTOR 15 FEMALE	CDF-15-L-SN	CONEC
J2	D-15 D CONNECTOR 15 MALE	CDS-15-L-SN	CONEC
P1	10 POL 10 POSITION FEMALE	90147-1210	MOLEX
P2	10 POL 10 POSITION FEMALE	90147-1210	MOLEX
R1-24	150R RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
T1-4	TRANSFORMER 600 OHMS LINE		DRA

PARTSLIST SPECIFICATION FOR: 498580

REFDES.FUNCNO.	DESCRIPTION	SPECIFICATION	MANUFACTOR
A6A1	COMBINER/SEPARATOR MODULE	499137	DRA
C1-12	10N CAPACITOR CERAMIC PLATE	2222629	PHILIPS
J1	D-9 D CONNECTOR 9 FEMALE	CDF-09-L-SN	CONEC
J2	D-15 D CONNECTOR 15 FEMALE	CDF-15-L-SN	CONEC
P1	10 POL 10 POSITION FEMALE	90147-1210	MOLEX
P2	10 POL 10 POSITION FEMALE	90147-1210	MOLEX
R1-24	150R RESISTOR METALFILM 0.5W	SFR16T	PHILIPS

REFDES.	FUNCNO	DESCRIPTION	SPECIFICATION	MANUFACTOR
U27	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST
U28	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST
U29	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST
U30	MF10	FILTER DUAL SWITCHED CAPA	MF10	MAXIM
U31	MF10	FILTER DUAL SWITCHED CAPA	MF10	MAXIM
U32	MF10	FILTER DUAL SWITCHED CAPA	MF10	MAXIM
U33	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST
U34	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST
U35	MF10	FILTER DUAL SWITCHED CAPA	MF10	MAXIM
U36	MF10	FILTER DUAL SWITCHED CAPA	MF10	MAXIM
U37	X2208	ANALOG MULTIPLIER, MIXER	X2208	EXAR
U38	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST
U39	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST
U40	MF10	FILTER DUAL SWITCHED CAPA	MF10	MAXIM
U41	MF10	FILTER DUAL SWITCHED CAPA	MF10	MAXIM
U42	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST
U43	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST
U44	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST
U45	MF10	FILTER DUAL SWITCHED CAPA	MF10	MAXIM
U46	MF10	FILTER DUAL SWITCHED CAPA	MF10	MAXIM
U47	MF10	FILTER DUAL SWITCHED CAPA	MF10	MAXIM
U48	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST
U49	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST
U50	MF10	FILTER DUAL SWITCHED CAPA	MF10	MAXIM
U51	MF10	FILTER DUAL SWITCHED CAPA	MF10	MAXIM
U52	X2208	ANALOG MULTIPLIER, MIXER	X2208	EXAR
U53	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST
U54	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST
U55	MF10	FILTER DUAL SWITCHED CAPA	MF10	MAXIM
U56	MF10	FILTER DUAL SWITCHED CAPA	MF10	MAXIM
U57	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST
Y1	6.144MHZ	CRYSTAL AT 30PF	6.144MHZ	COMINAS

REFDES.	FUNCNO	DESCRIPTION	SPECIFICATION	MANUFACTOR
R241	27K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R242	27K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R243	47K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R244	59K0	RESISTOR METALFILM 1%	MRS25	PHILIPS
R245	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R246	30K1	RESISTOR METALFILM 1%	MRS25	PHILIPS
R247	140K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R248	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R249	100K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R250	64K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R251	49K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R252	49K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R253	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R254	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R255	49K9	RESISTOR METALFILM 1%	MRS25	PHILIPS
R256	25K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R257	511K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R258	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R259	31K6	RESISTOR METALFILM 1%	MRS25	PHILIPS
R260	25K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R261	169K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R262	41K2	RESISTOR METALFILM 1%	MRS25	PHILIPS
R263	21K5	RESISTOR METALFILM 1%	MRS25	PHILIPS
R264	169K	RESISTOR METALFILM 1%	MRS25	PHILIPS
R265	33K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R266	33K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R267	220K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R268	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R269	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R270	10K	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R271	1M	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R272	1M	RESISTOR VARIABLE	3323W-1-105	BOURNS
R273	1M	RESISTOR METALFILM 0.5W	SFR16T	PHILIPS
R274	1M	RESISTOR VARIABLE	3323W-1-105	BOURNS
U01	74HC4060	14 STAGE COUNTER OSCILL	74HC4060	RCA
U02	4013	DUAL D TYPE FLIP-FLOP	CD4013	RCA
U03	74HC163	SYNC 4 BIT BINARY COUNTER	74HC163	RCA
U04	74HC86	QUAD 2 INPUT EXCL OR GATE	74HC86	RCA
U05	74HC163	SYNC 4 BIT BINARY COUNTER	74HC163	RCA
U06	74HC163	SYNC 4 BIT BINARY COUNTER	74HC163	RCA
U07	74HC86	QUAD 2 INPUT EXCL OR GATE	74HC86	RCA
U08	74HC163	SYNC 4 BIT BINARY COUNTER	74HC163	RCA
U09	7812	VOLTAGE REGULATOR +12V	7812	MOTOROLA
U10	7912	VOLTAGE REGULATOR -12V	7912	MOTOROLA
U11	7805	VOLTAGE REGULATOR +5V	7805	MOTOROLA
U12	7905	VOLTAGE REGULATOR -5V	7905	MOTOROLA
U13	7805	VOLTAGE REGULATOR +5V	7805	MOTOROLA
U14	7905	VOLTAGE REGULATOR -5V	7905	MOTOROLA
U15	7805	VOLTAGE REGULATOR +5V	7805	MOTOROLA
U16	7905	VOLTAGE REGULATOR -5V	7905	MOTOROLA
U17	7805	VOLTAGE REGULATOR +5V	7805	MOTOROLA
U18	7905	VOLTAGE REGULATOR -5V	7905	MOTOROLA
U19	7805	VOLTAGE REGULATOR +5V	7805	MOTOROLA
U20	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST
U21	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST
U22	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST
U23	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST
U24	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST
U25	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST
U26	TL082	DUAL OP AMP BIFET	TL082	TEXAS INST