OPERA 6

DYNAMIC PROGRAMMABLE SYNTHESIZER

DK 600

SCHEMATIC DIAGRAM

SIEL

UPDATED OCTOBER 1983

SOCIETÀ INDUSTRIE ELETTRONICHE s.p.a.

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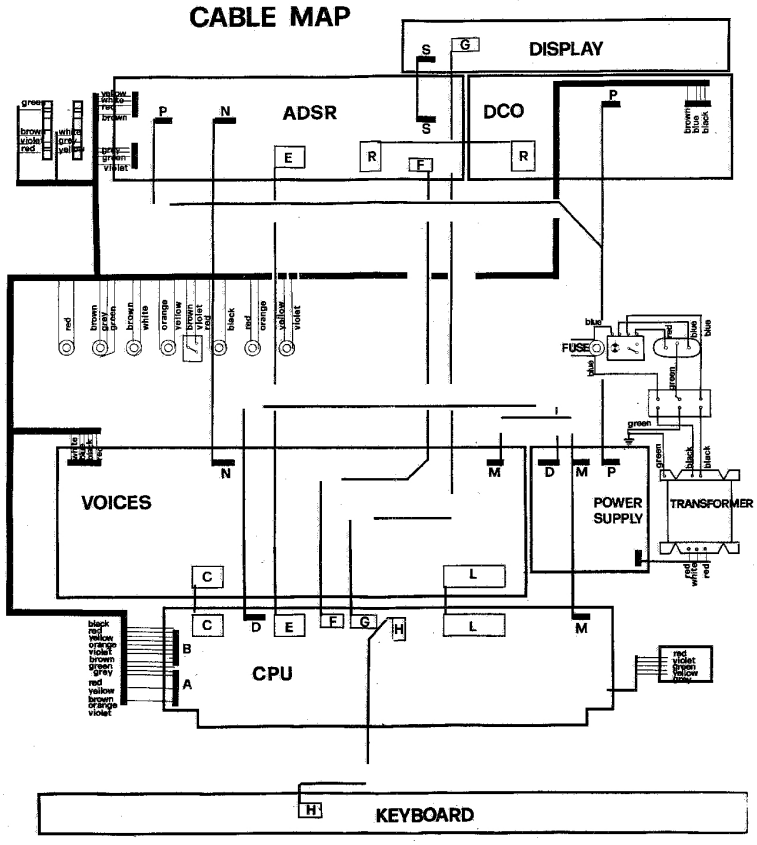
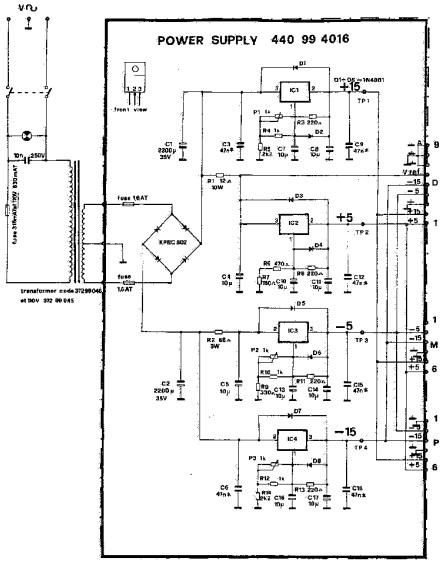
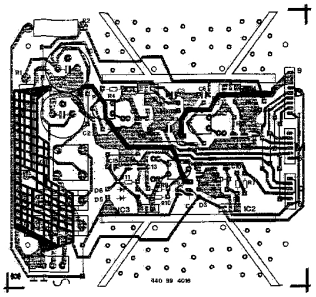
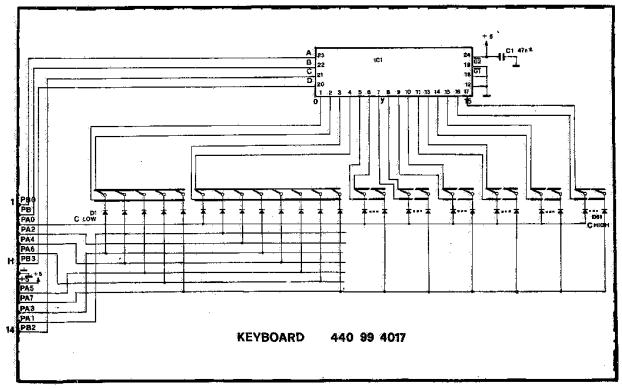
Posizione meccanografica M/790532

CABLE MAP


DISPLAY
S
G
ADSR
DCO
P
N
E
R
F
S
P
R
brown
blue
black
FUSE
blue
red
blue
blue
green
green
black
black
VOICES
N
M
D
M
P
POWER
SUPPLY
TRANSFORMER
red
white
red
C
L
C
D
E
F
G
H
L
M
B
A
CPU
H
KEYBOARD

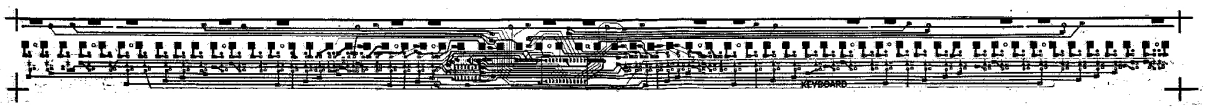






POWER SUPPLY		
I C 1-2	LM 317	367.99.8016
I C 3-4	LM 337	367.99.8005

KEYBOARD		
I C 1	74LS154	367.99.6503



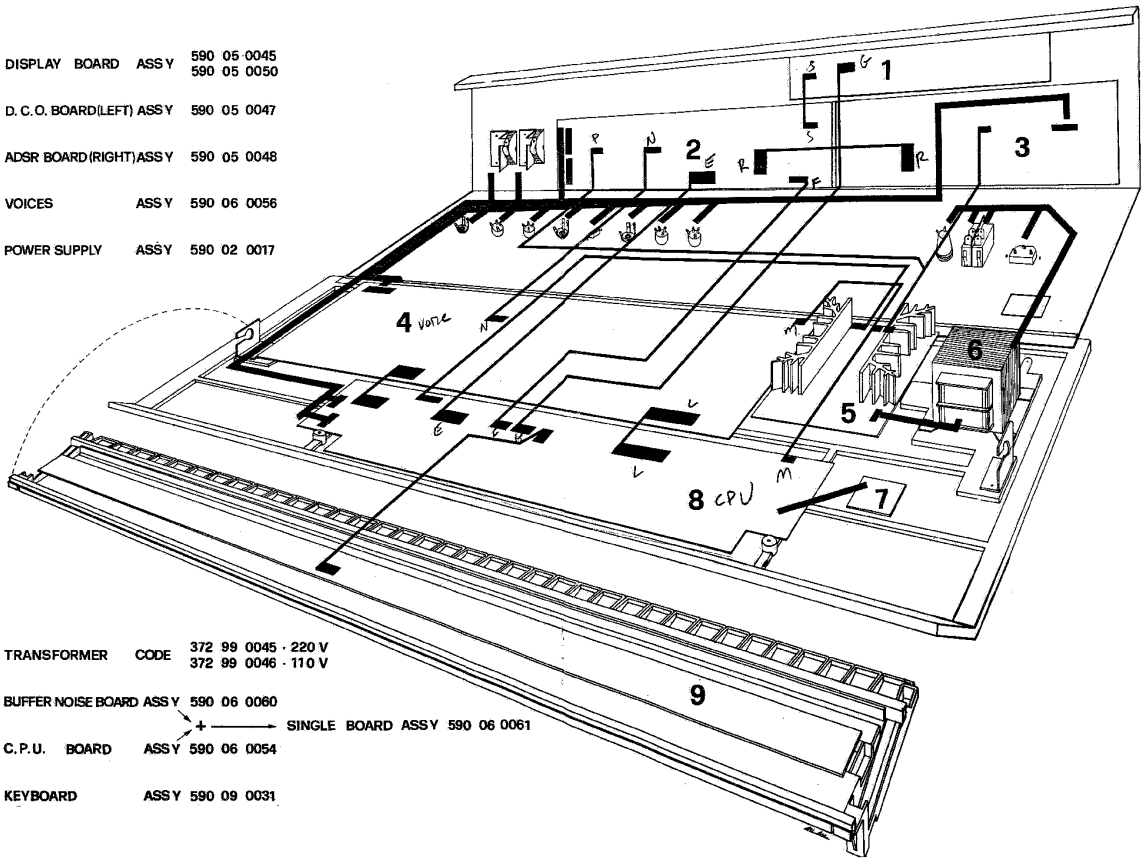
1 DISPLAY BOARD ASSY 590 05 0045
590 05 0050

2 D. C. O. BOARD (LEFT) ASSY 590 05 0047

3 ADSR BOARD (RIGHT) ASSY 590 05 0048

4 VOICES ASSY 590 06 0056

5 POWER SUPPLY ASSY 590 02 0017



6 TRANSFORMER CODE 372 99 0045 · 220 V
372 99 0046 · 110 V

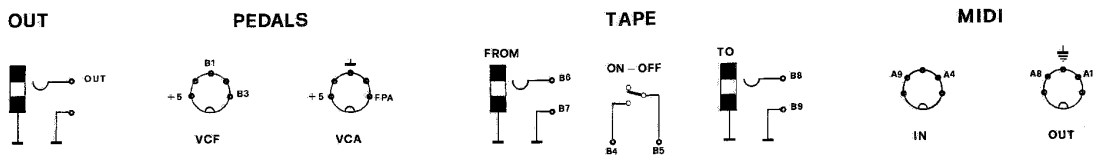
7 BUFFER NOISE BOARD ASSY 590 06 0060

\+ ——→ SINGLE BOARD ASSY 590 06 0061

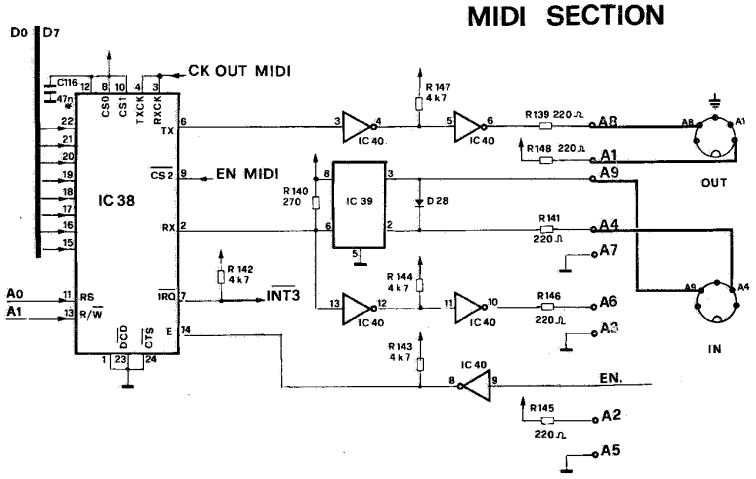
8 C.P.U. BOARD ASSY 590 06 0054

9 KEYBOARD ASSY 590 09 0031

BACK PANEL ASSEMBLY



MIDI SECTION



NOTE

Interconnect cables should not exceed fifty feet (15 meters), and must have a corresponding 5-pin DIN male plug (SWITCHCRAFT 05GM5M or equivalent.) The cable should be shielded twisted pair, with the shield connected to pin 2 at both ends. Notice that while the MIDI OUT jack is grounded to the instrument chassis, MIDI IN is not. This allows the cables to provide their shielding services without creating ground loops.

ADJUSTMENT

ADJUSTMENT SEQUENCE

1. Power Supply Trim
2. HFO A Tuning
3. Waveforms Gen. Amplitude Adjustment
4. VCA Gain Adjustment
5. HFO B Tuning
6. ADSR Time Adjustment
7. VCF Offset Adjustment

All adjustments must be made after the instrument's power has been on for at least five minutes.

POWER SUPPLY TRIM

1) Switch on the instrument.
2) Set DVM to TP1 (.4016) and adjust P1 to read +15.000 V
3) Set DVM to TP2 (.4016) and read +5V ±5%.
4) Set DVM to TP3 (.4016) and adjust P2 to read -5.000 V.
5) Set DVM to TP4 (.4016) and adjust P3 to read - 15.000 V.

Note: the supply must be fully loaded.

HFO A TUNING (.5009)

1) Press FREE, introduce saw-tooth A (L.E.D. WAVES), set CUTOFF to the max. and RESONANCE to the min.
2) Set MASTER TUNE to the center.
3) Press the second 'A' (from the right) and adjust P1 to obtain a 440 Hz frequency (use a diapason).

WAVEFORMS GEN. AMPLITUDE ADJUSTMENT (.5011)

1) Press FREE.
2) Connect oscilloscope to TP9.
3) Introduce saw-tooth A.
4) Press the second 'E' (from the right) and set the saw-tooth amplitude to +4.800 Vpp operating trimmer P3.
5) Press the first 'E' (from the left - three octaves lower than the former) and set amplitude to +4.800 Vpp operating trimmer P4.
6) Verify that the saw-tooth amplitude is +4.800 Vpp on the whole keyboard extension.
7) Connect oscilloscope to TP3.
8) Repeat point 4) operating P1.
9) Repeat point 5) operating P2.
10) Repeat point 6).
11) This adjustment is to be made for the 6 voices.

Adjustment Control

1) Connect oscilloscope to TP24.
2) Recall program 93.
3) Verify that the 6 voices' PW's are at 50%.

VCF CUTOFF AND RESONANCE ADJUSTMENT (.5011)

1) Recall program 91.
2) Connect oscilloscope to TP24.
3) Press any key and set the sine amplitude (any frequency), to 400 mVpp operating P5 of the voice indicated by the lit L.E.D.
4) Repeat point 3) for the 6 voices.
5) Set P8 to the center.
6) Connect freq.m. to TP24.
7) Press any key and set the sine frequency to 880 Hz operating P7 of the voice indicated by the lit L.E.D.
8) Repeat point 7 for the 6 voices.

ADSR TIME ADJUSTMENT (.5011)

1) Recall program 92.
2) Connect oscilloscope to pin 10 (IC 1) or to R7 of voice 1.
3) Press any key and set attack time to 5.800 seconds operating P10 of the voice indicated by the lit L.E.D.
4) Repeat point 3) for the 6 voices.

VCA GAIN ADJUSTMENT (.5011)

1) Press FREE.
2) Introduce saw-tooth A.
3) Set CUTOFF to the max.
4) Set RESONANCE to the min.
5) Connect oscilloscope to TP24.
6) Press middle 'C' and adjust P9 of the voice indicated by the lit L.E.D. to obtain a saw-tooth amplitude equal to 400 mVpp.

HFO B ADJUSTMENT (.5009)

1) Recall program 90.
2) Press any key and adjust P3 so as to eliminate the beat between HFO A and HFO B.

VCF OFFSET ADJUSTMENT (.5011)

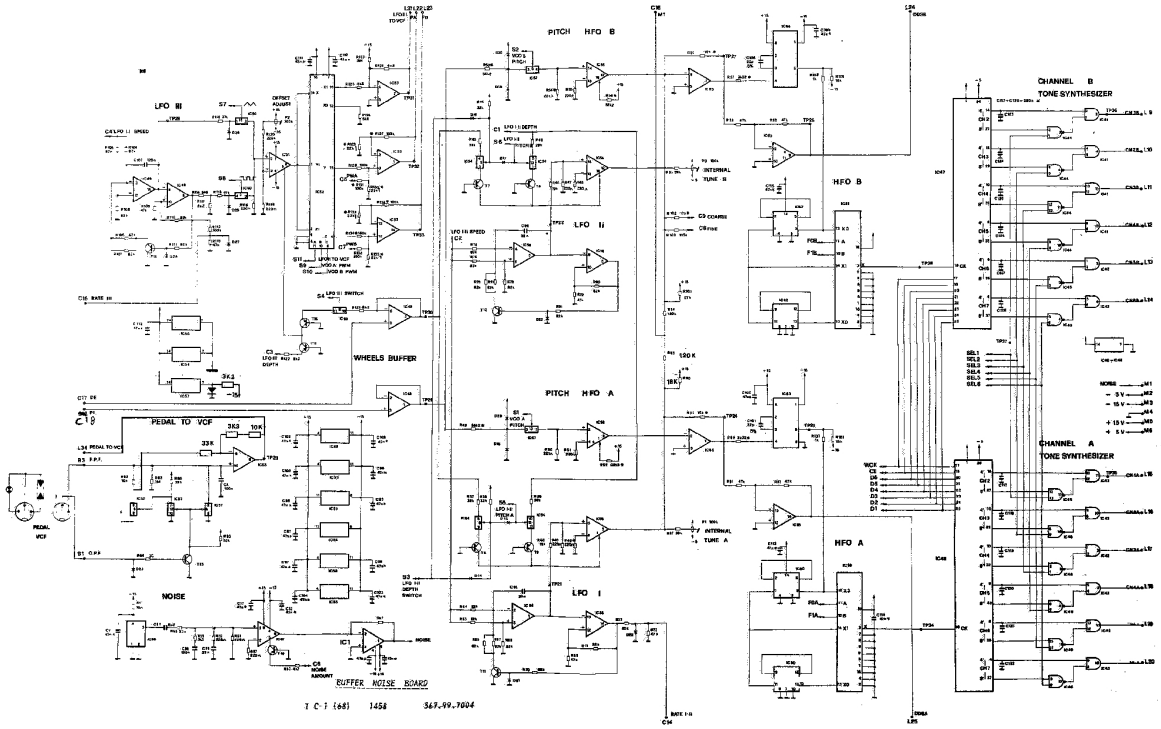
1) Press FREE.
2) Set VCF CUTOFF to 3/4.
3) Set VCF RESONANCE to the min.
4) Connect DMM to TP24.
5) Without depressing any key, read voltage on DMM; e.g.:-1.34 mV.
6) Press any key and adjust P6 of the voice indicated by the lit L.E.D. so as to read the same voltage as per point 5) on the DMM.
7) Repeat point 6)for the 6 voices.

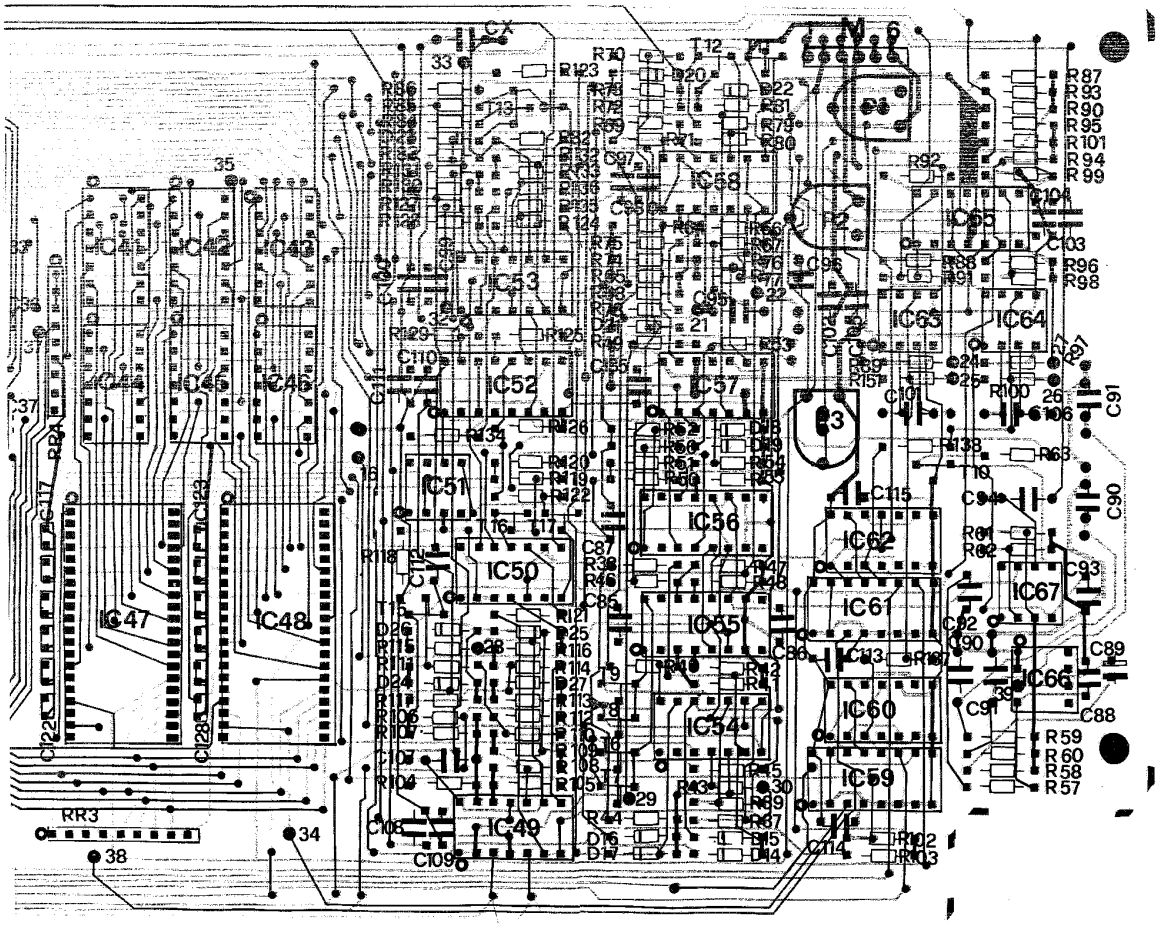
NOTES

- R* IMPLIES SPECIAL RESISTOR
- C* IMPLIES CERAMIC CAPACITOR
- ALL PNP TRANSISTORS ARE BC 560 part code 364.99.0004
- ALL NPN TRANSISTORS ARE BC 239 part code 364.99.0005
- ALL DIODES ARE 1N4148
- ALL RESISTORS ARE 1/4 WATT
- ALL ELECTROLYTIC CAPACITORS ARE 16 V DC UNLESS OTHERWISE INDICATED.

GENERATION SECTION P.C. 440 99 5009 OR 5010 (RIGHT)

UPWARD ARROW INDICATES +5 V




IC41
IC42
IC43
IC44
IC45
IC46
IC47
IC48
IC49
IC50
IC51
IC52
IC53
IC54
IC55
IC56
IC57
IC58
IC59
IC60
IC61
IC62
IC63
IC64
IC65
IC66
IC67
RR3
C91
C90
C89
C88
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R95
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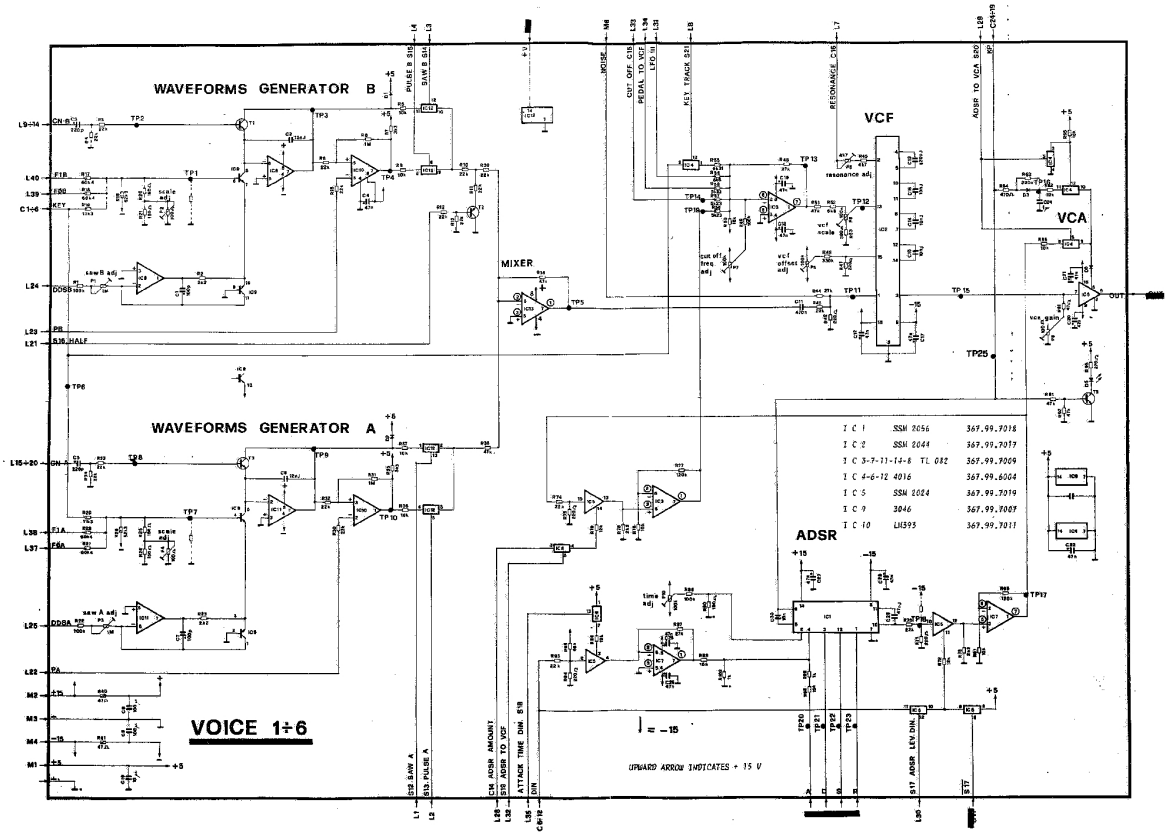
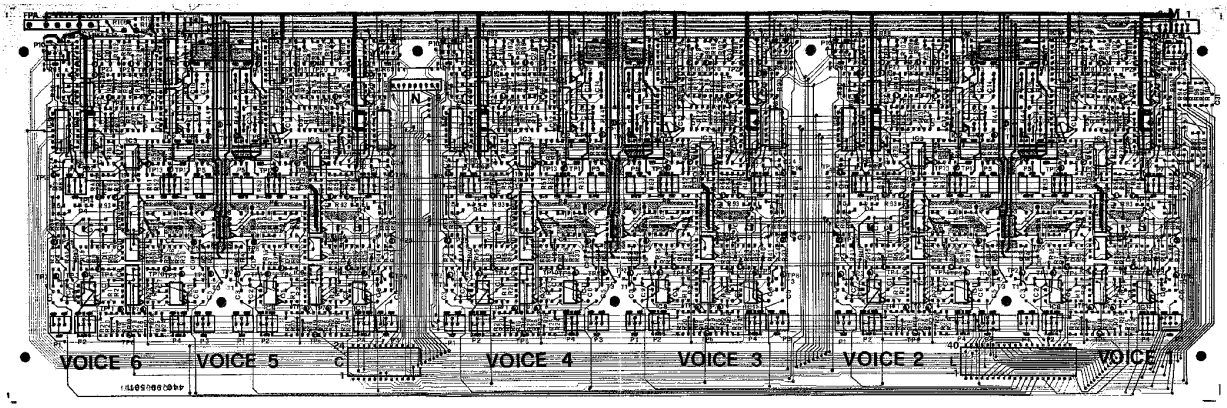
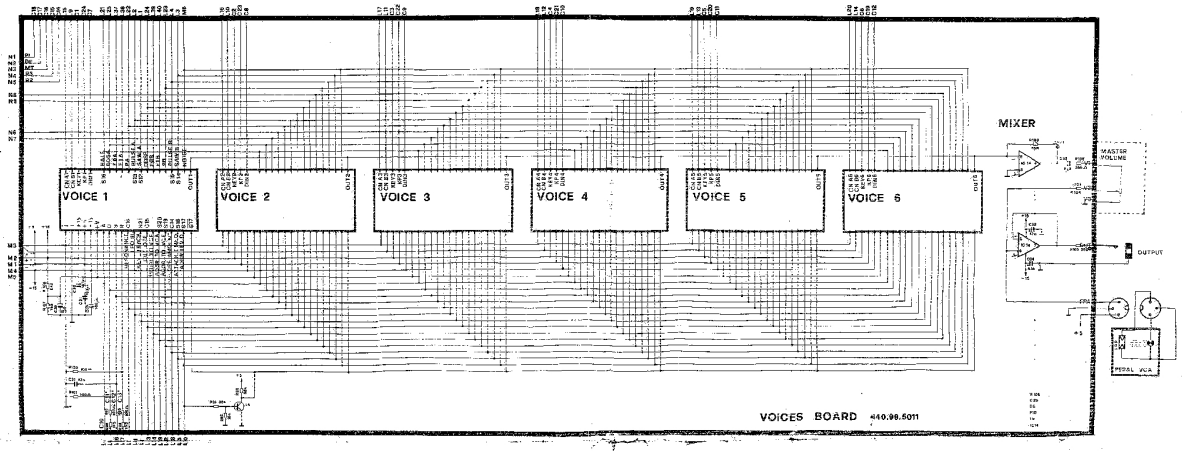
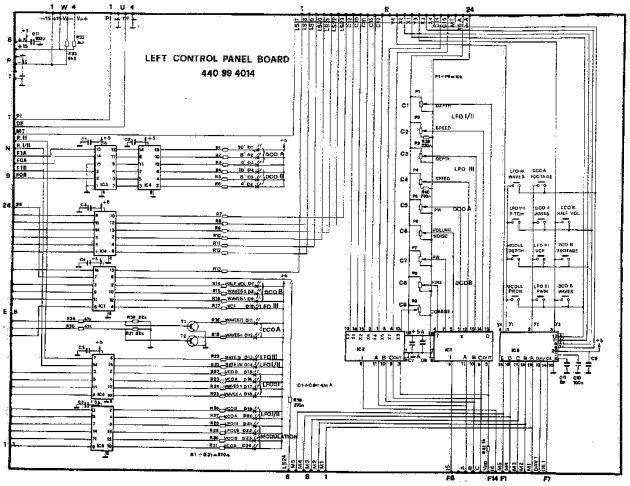
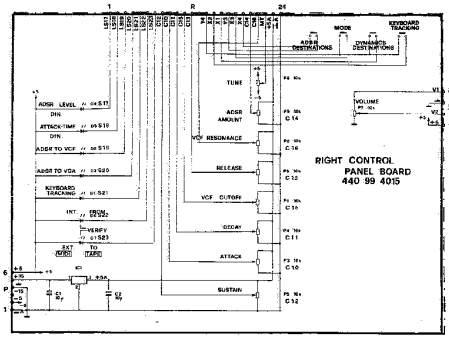
R94
R99
R96
R98
R59
R60
R58
R57


WAVEFORMS GENERATOR B
WAVEFORMS GENERATOR A
VOICE 1÷6
MIXER
VCF
VCA
ADSR
TP25
OUT
UPWARD ARROW INDICATES + 15 V
I C 1 SSM 2056 367.99.7018
I C 2 SSM 2044 367.99.7017
I C 3-7-11-14-8 TL 082 367.99.7009
I C 4-6-12 4016 367.99.6004
I C 5 SSM 2024 367.99.7019
I C 9 3046 367.99.7007
I C 10 LM395 367.99.7011


VOICE 6
VOICE 5
VOICE 4
VOICE 3
VOICE 2
VOICE 1

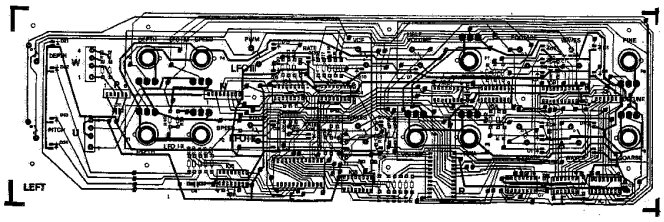

VOICE 1
VOICE 2
VOICE 3
VOICE 4
VOICE 5
VOICE 6
MIXER
MASTER VOLUME
OUTPUT
PEDAL VCA
VOICES BOARD 440.96.5011

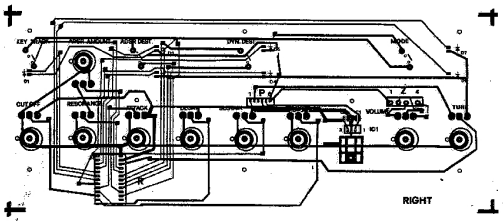


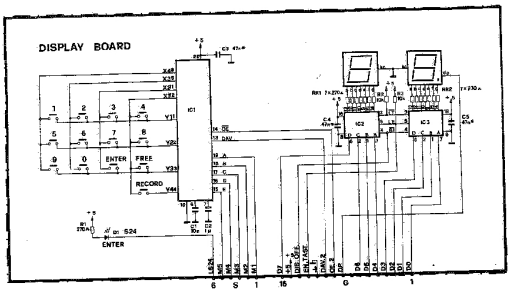


LEFT CONTROL PANEL V.C.O.		
I C 1-2	4051	367.99.6013
I C 3	4555	367.99.6036
I C 4-6	4049	367.99.6012
I C 9	74C923	367.99.6035

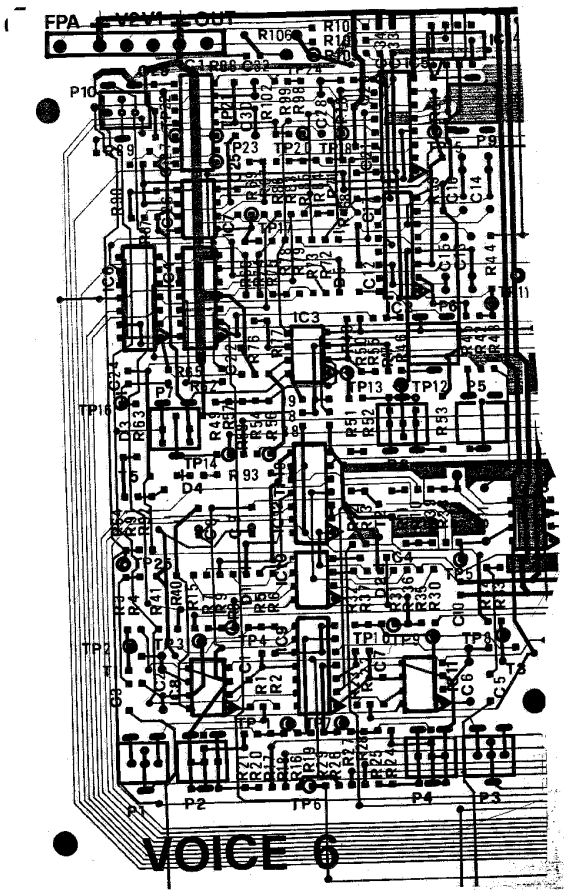
RIGHT CONTROL PANEL A.D.S.R.		
I C 1	7805	367.99.8009



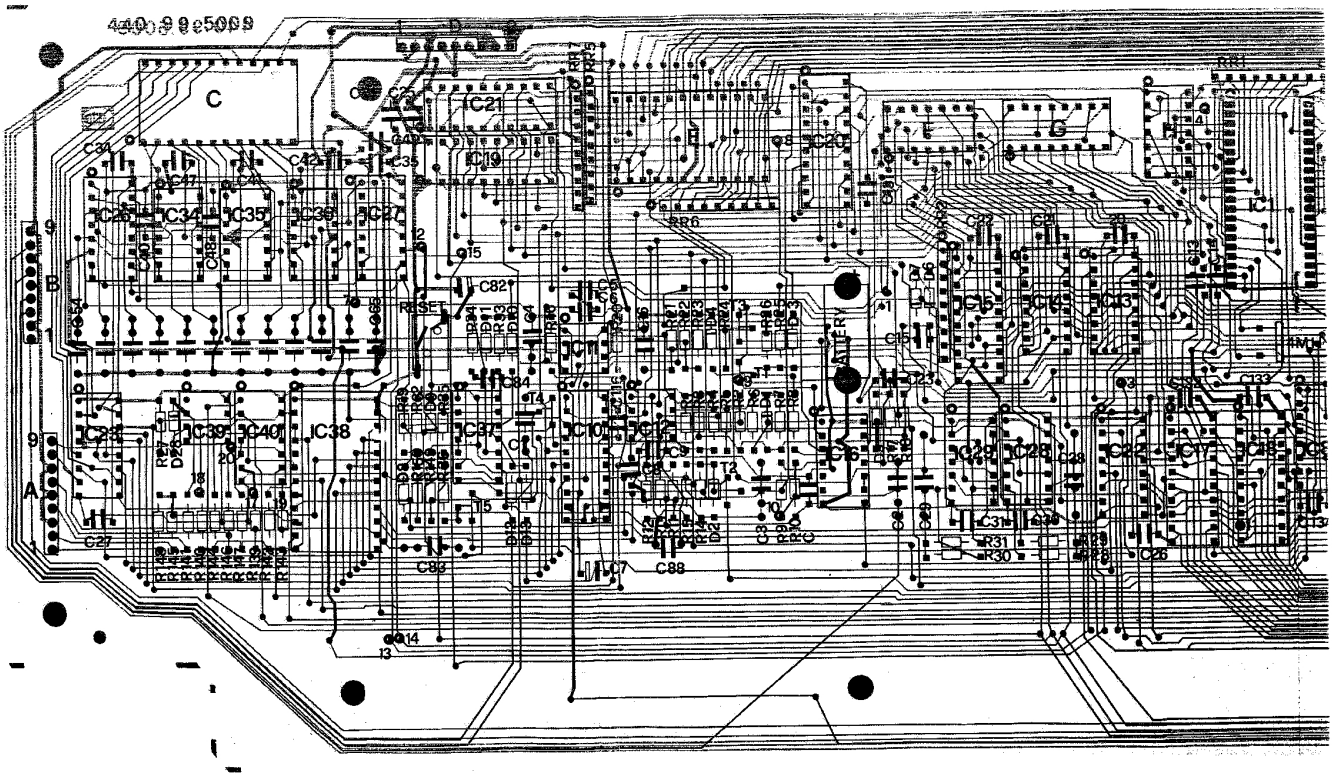




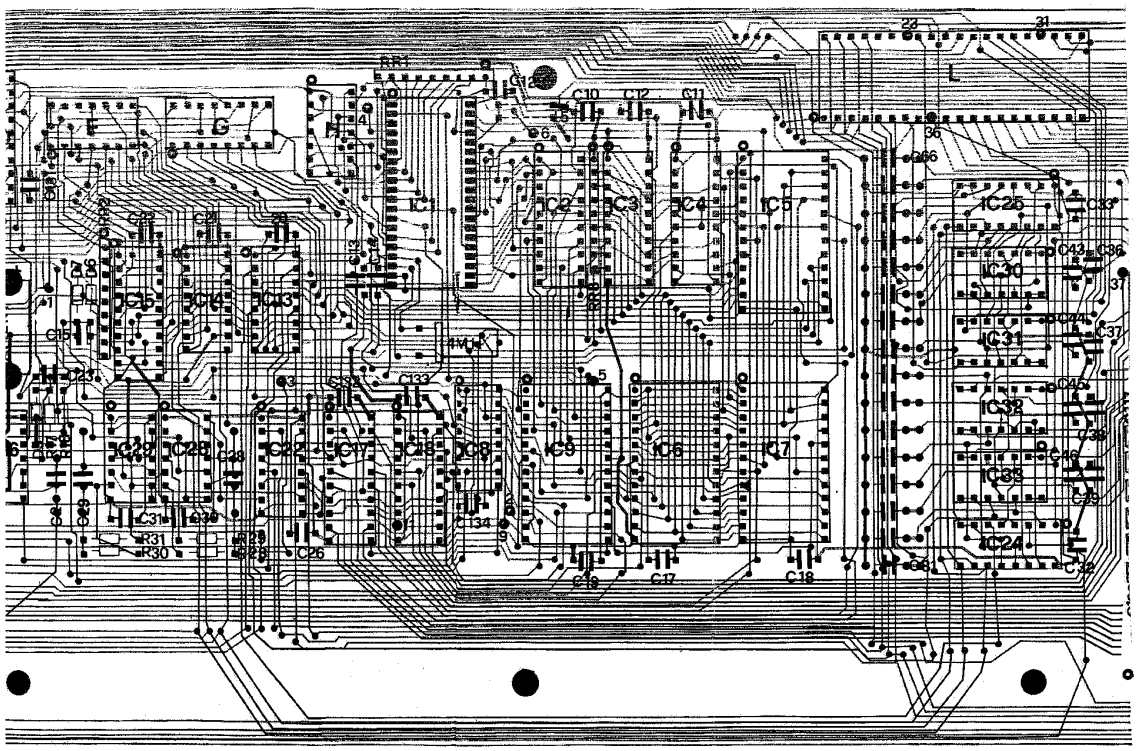
DISPLAY BOARD		
I C 1	74C923	367.99.6035
I C 2-3	4511	367.99.6027
DISPLAY	MAN 4940	361.99.9001

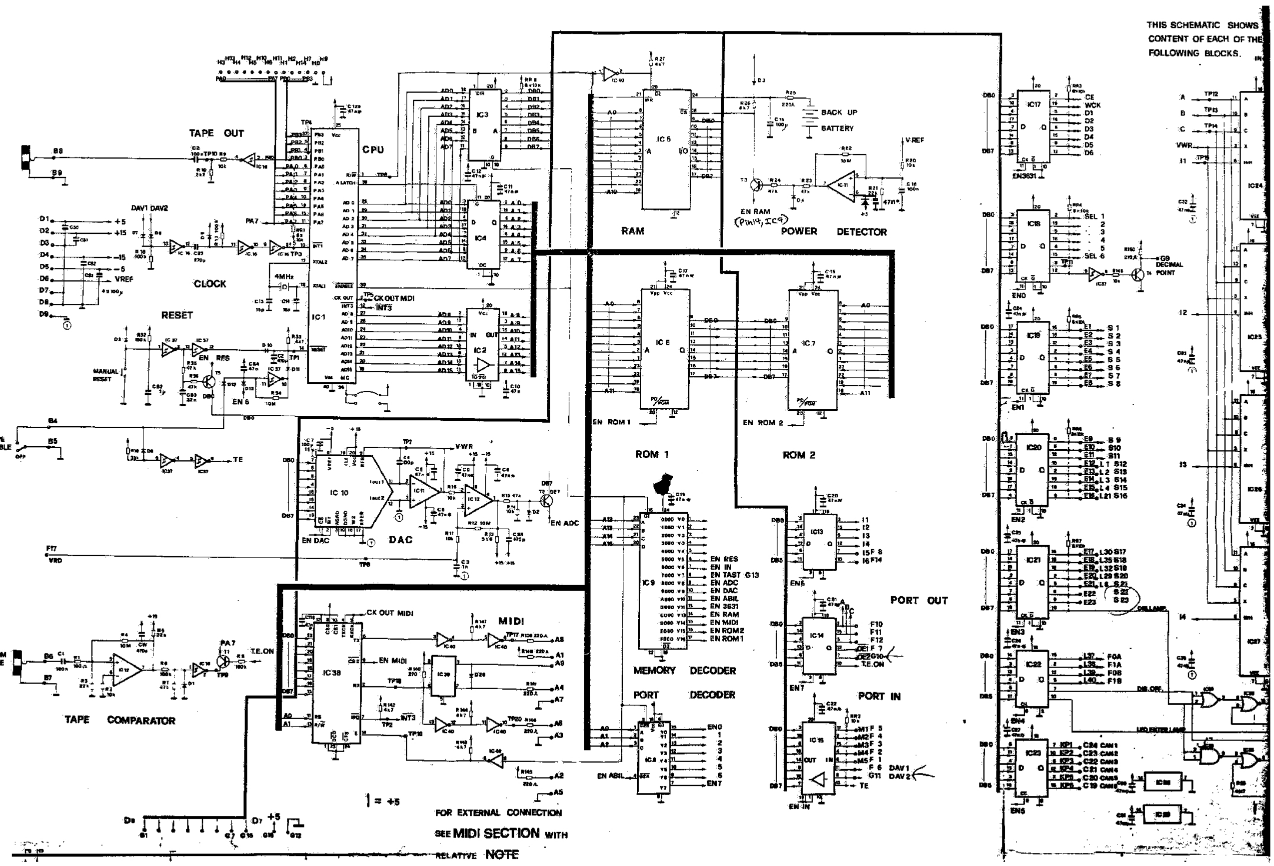


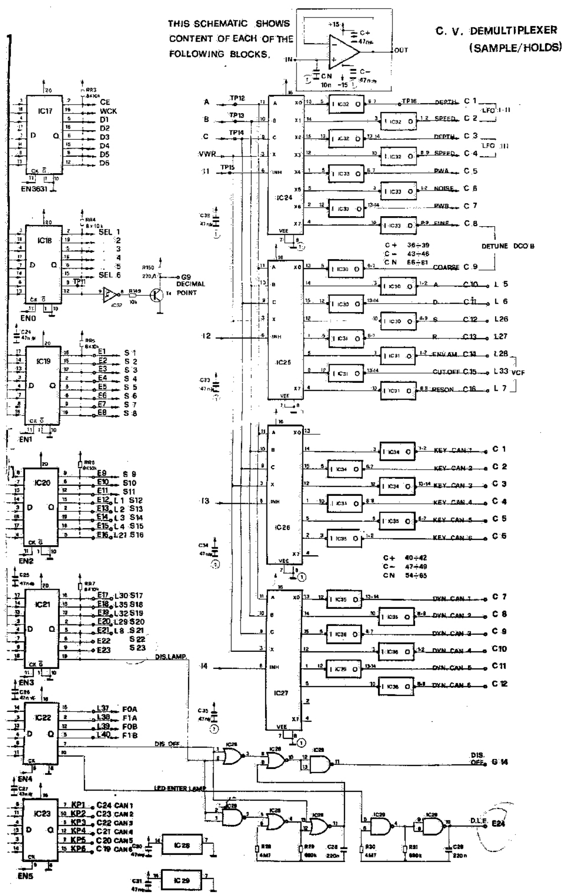
CPU SECTION P. C. 440 99 5009 OR 5010 (LEFT)



9 5009 OR 5010 (LEFT)




THIS SCHEMATIC SHOWS CONTENT OF EACH OF THE FOLLOWING BLOCKS.
TAPE OUT
CPU
RAM
BACK UP BATTERY
POWER DETECTOR
CLOCK
RESET
MANUAL RESET
TAPE ENABLE
ROM 1
ROM 2
DAC
MEMORY DECODER
PORT DECODER
PORT OUT
PORT IN
MIDI
FROM TAPE
TAPE COMPARATOR
= +5
FOR EXTERNAL CONNECTION SEE MIDI SECTION WITH RELATIVE NOTE
DECIMAL POINT



C.P.U BOARD

I C 1	TMS 7000	367.99.4904
I C 2-15	74LS244	367.99.6510
I C 3	74LS245	367.99.6507
I C 4	74LS373	367.99.6508
I C 5	6116	367.99.4003
I C 6-7	2532	367.99.4802
I C 8	74LS138	367.99.6504
I C 9	74LS154	367.99.6503
I C 10	DAC0831	367.99.7022
I C 11	TL082	367.99.7009
I C 12	LM393	367.99.7011
I C 13-14-22-23	74C174	367.99.6034
I C 16-37	40106	367.99.6029
I C 17÷21	74LS377	367.99.6509
I C 24÷27 59-61	4051	367.99.6013
I C 28	4001	367.99.6001
I C 29-44÷46	4011	367.99.6002
I C 30÷36 49-53-58 65	TL084	367.99.7021
I C 38	68B50	367.99.5024
I C 39	6N138	361.99.9501
I C 40	SN 7406	367.99.6301
I C 41÷43	4081	367.99.6006
I C 47-48	RI104	367.99.5021
I C 50-54-57	4016	367.99.6004
I C 51-67	3080	367.99.7006
I C 52	4053	367.99.6031
I C 55-56	13700	367.99.7005
I C 60-62	4013	367.99.6003