BEKO

COLOUR TELEVISIONS

Service Manual 11.1

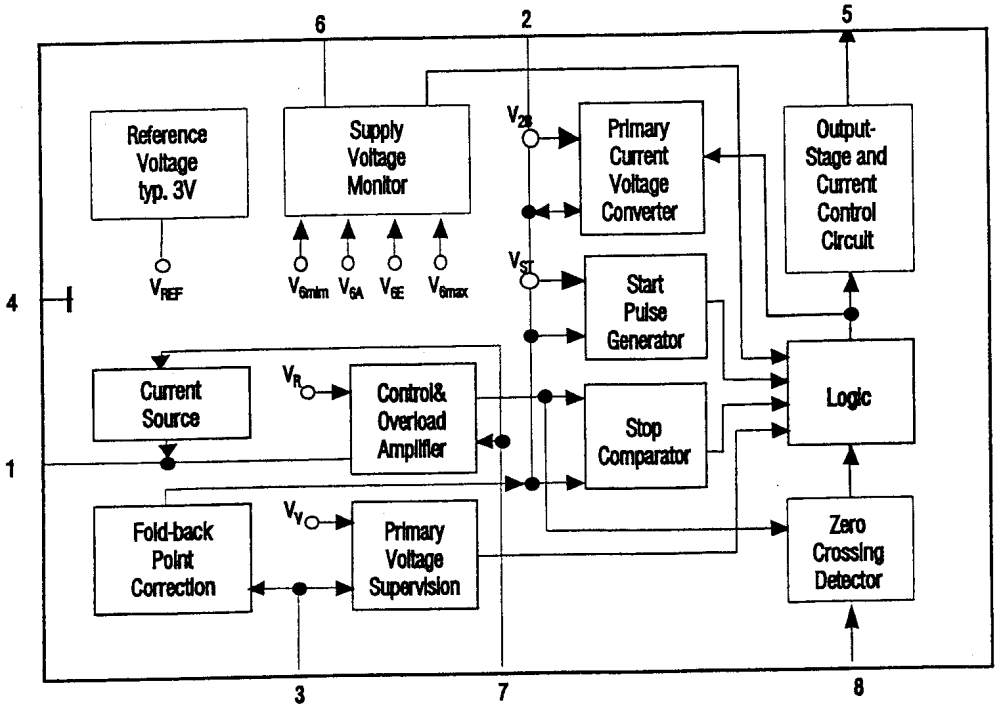
TDA 4605-3
Control IC for Switched-Mode Power Supplies using MOS-Transistor

Features

- Fold-back characteristics provides overload protection for external components
- Burst operation under secondary short-circuit condition implemented
- Protection against open or a short of the control loop
- Switch-off if line voltage is too low (undervoltage switch-off)
- Line voltage dependant compensation of fold-back point
- Soft-start for quiet start-up without noise generated by the transformer
- IC- over temperature protection implemented (thermal shutdown)
- On-IC ringing suppression circuit against parasitic oscillations of the transformer
- AGC-voltage reduction at low load

The IC TDA 4605-3 controls the MOS-power transistor and performs all necessary control and protection functions in free running flyback converters. Because of the fact that a wide load range is achieved, this IC is applicable for consumer as well as industrial power supplies.

The serial circuit and primary winding of the flyback transformer are connected in series to the input voltage. During the switch-on period of the transistor, energy is stored in the transformer. During the switch-off period the energy is fed to the load via the secondary winding. By varying switch-on time of the power transistor, the IC controls each portion of energy transferred to the secondary side such that the output voltage remains nearly independent of load variations. The required control information is taken from the input voltage during the switch-on period and form a regulation winding during the switch-off period. A new cycle will start if the transformer has transferred the stored energy completely into the load.



Circuit Description

In the period before the switch-on threshold is reached the IC is supplied via resistor **R1**; during the start-up phase it uses the energy stored in **C407** under steady state conditions the IC receives its supply voltage from transformer winding 5-6 via diode **D106**. The switching transistor **T401** is a BUZ 90. The parallel connected capacitor C406 and inductance of primary winding 2-8 determine the system resonance frequency. The **R403, C405, D105** circuitry limits overshoot peaks, an **R102** protects the gate of **T401** against static charges.

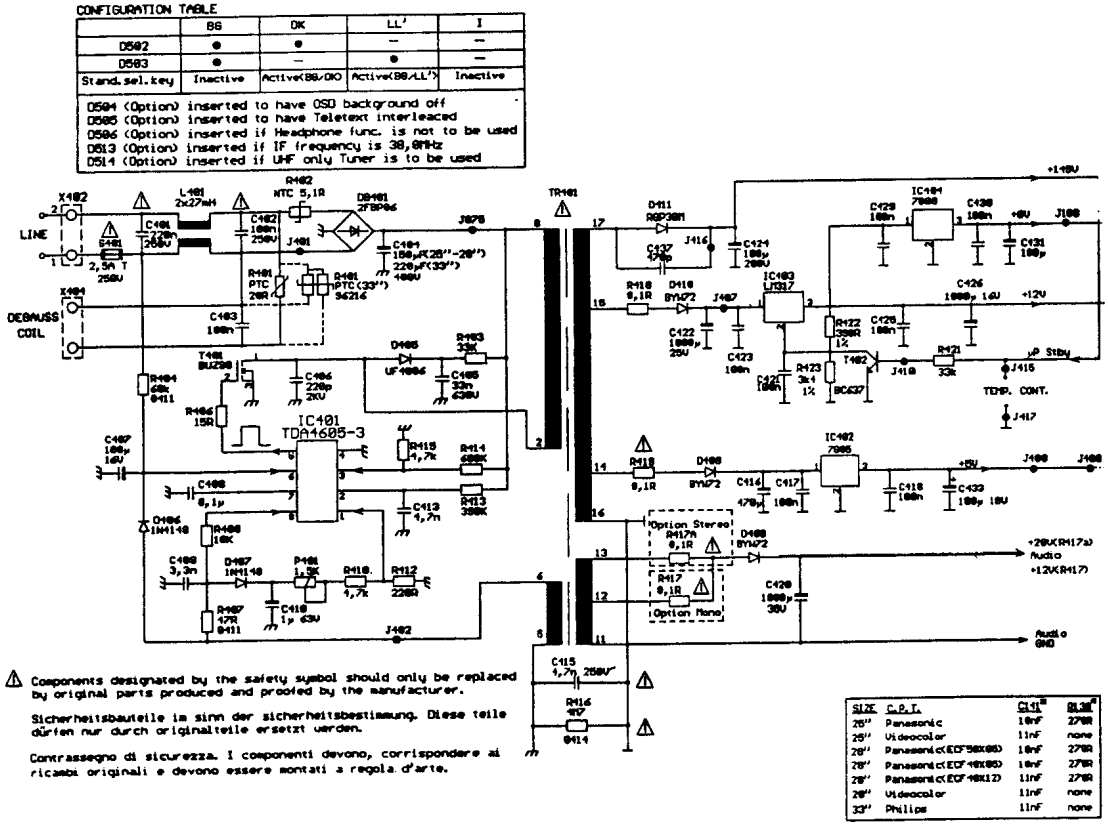
During the conductive phase of the power transistor **T401** the current rise in the primary winding depends on the winding inductance and the mains voltage. The network consisting of **R413, C413** is used to create a model of the sawtooth shaped rise of the collector current. The resulting control voltage is fed into pin 2 of the IC. The RC-time constant given by **R413, C413** must be designed that way that driving the transistor core into saturation is avoided.

The ratio of the voltage divider **R414/R415** is fixing a voltage level threshold. Below this threshold the switching power supply shall stop operation because of the low mains voltage. The control voltage present at pin 3 also determines the correction current for the fold-back point. This current added to the current flowing through **R413** and represents an additional charge to **C413** in order to reduce the turn on phase of **T401**. This is done to stabilize the fold-back point even under higher mains voltages.

Regulation of the switched-mode power supplies via pin 1. The control voltage of winding 5-6 during the off period of **T401** is rectified by **D407** smoothed by **C410** and stepped down at an adjustable ratio by **R412 R410** and **P401** The **R407-C409** network suppresses parasitic overshoots (transformer oscillation). The peak voltage at pin 2, and thus the primary peak current, is adjusted by the IC so that the voltage applied across the control winding, and hence the output voltages, are at the desired level.
When the transformer has supplied its energy to the load, the control voltage passes through zero. The IC detects the zero crossing via series resistors **R408** connected to pin 8. But zero crossings are also produced by transformer oscillation after **T401** has turned off if output is short-circuited. Therefore the IC ignores zero crossings occurring within a specified period of time after **T401** turn-off.

The capacitor **C408** connected to pin 7 causes the power supply to be started with shorter pulses to keep the operating frequency outside the audible range during start-up.

On the secondary side, the output voltages are produced across winding 11 to 17 rectified by **D411, D410, D409, D408** and smoothed by **C424, C422, C416, D420.**



	B6	DK	LL'	I
D502	•	•	–	–
D503	•	–	•	–
Stand.sel.key	Inactive	Active(B6/DK)	Active(B6/LL')	Inactive

D504 (Option) inserted to have OSD background off
D505 (Option) inserted to have Teletext interleaced
D506 (Option) inserted if Headphone func. is not to be used
D513 (Option) inserted if IF frequency is 38,9MHz
D514 (Option) inserted if UHF only Tuner is to be used

⚠ Components designated by the safety symbol should only be replaced by original parts produced and proofed by the manufacturer.

Sicherheitsbauteile im sinn der sicherheitsbestimmung. Diese teile dürfen nur durch originalteile ersetzt werden.

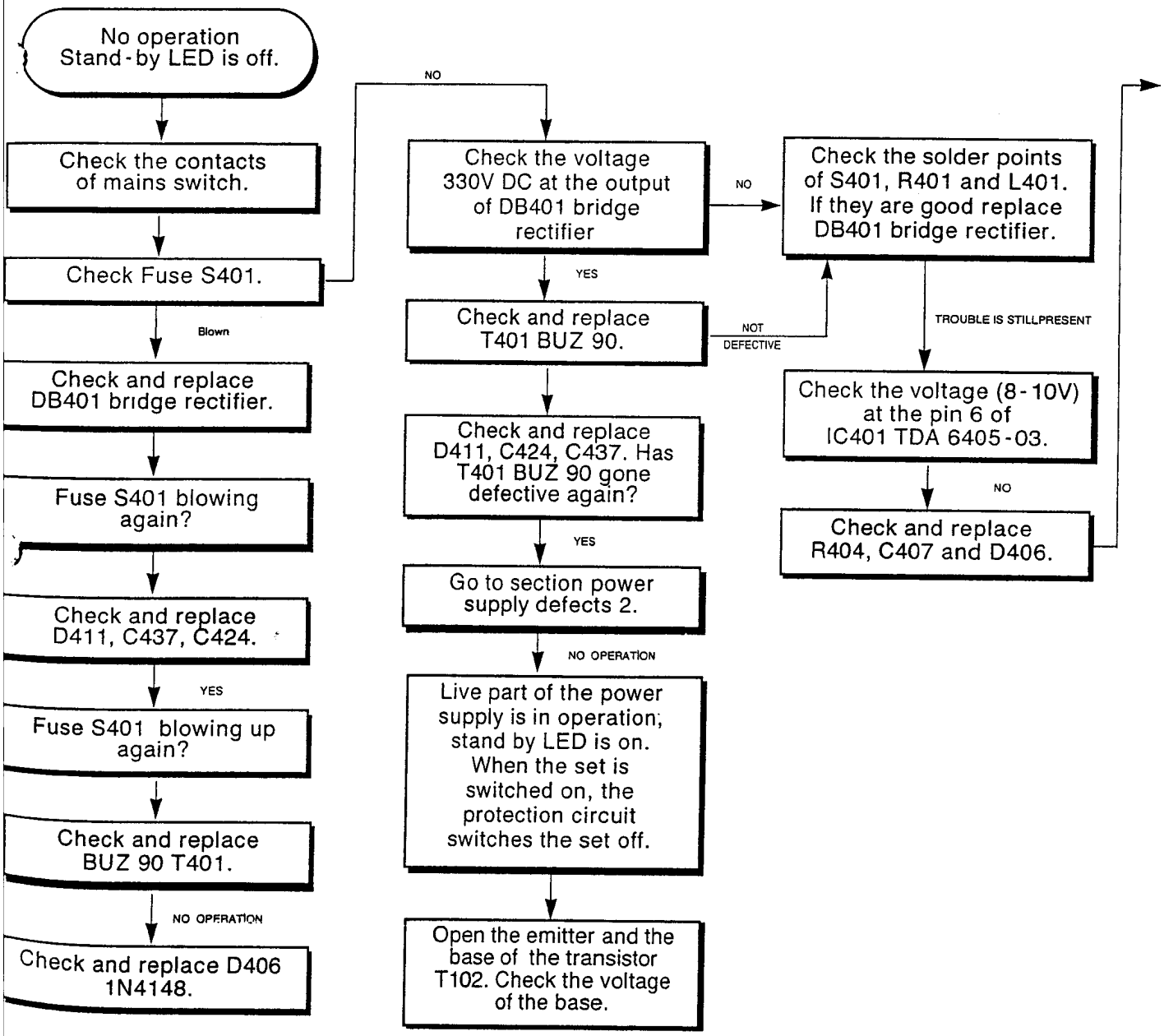
Contrassegno di sicurezza. I componenti devono, corrispondere ai ricambi originali e devono essere montati a regola d'arte.

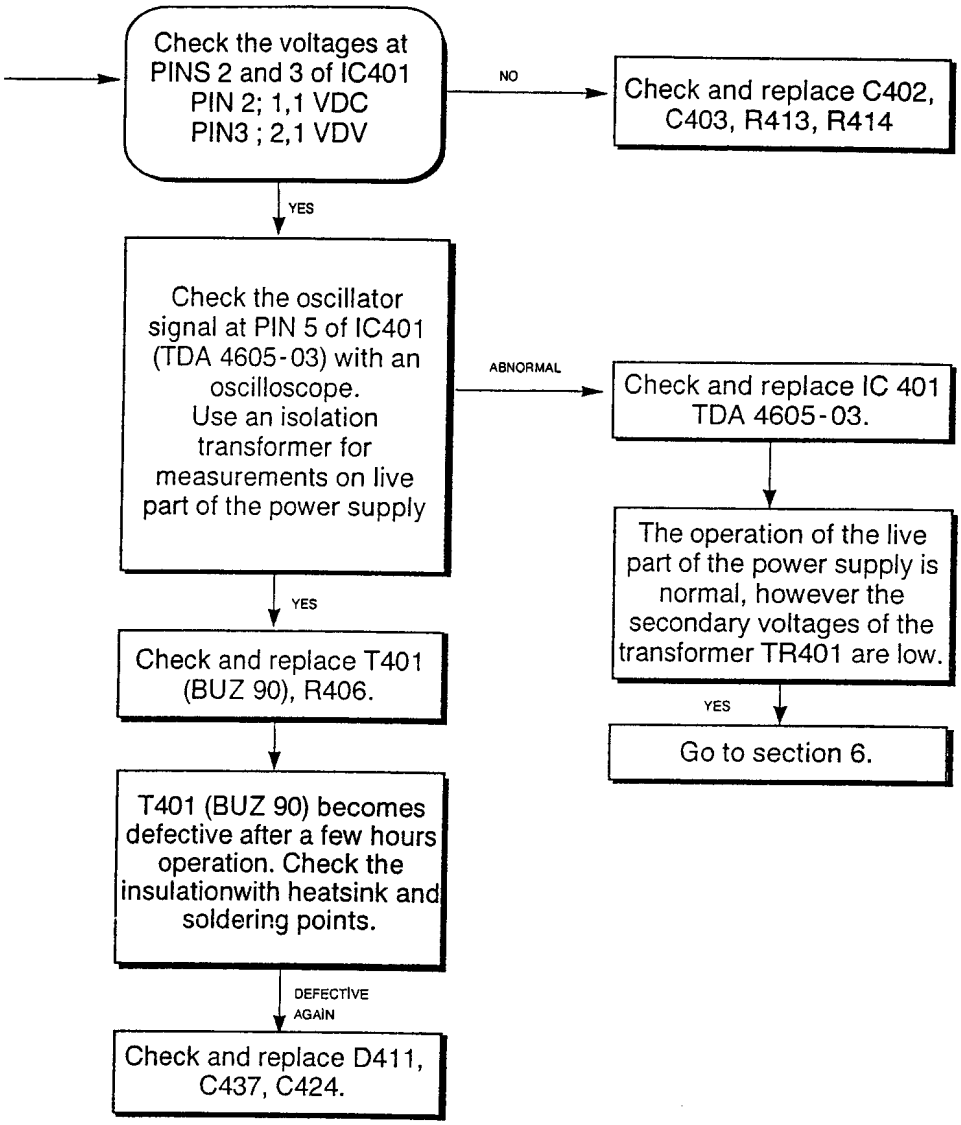
SIZE	C.R.T.	C411	R438
25"	Panasonic	10nF	27ΩR
25"	Videocolor	11nF	none
28"	Panasonic(EOF58X08)	10nF	27ΩR
28"	Panasonic(EOF48X08)	10nF	27ΩR
28"	Panasonic(EOF48X12)	11nF	27ΩR
28"	Videocolor	11nF	none
33"	Philips	11nF	none

TROUBLE SHOOTING

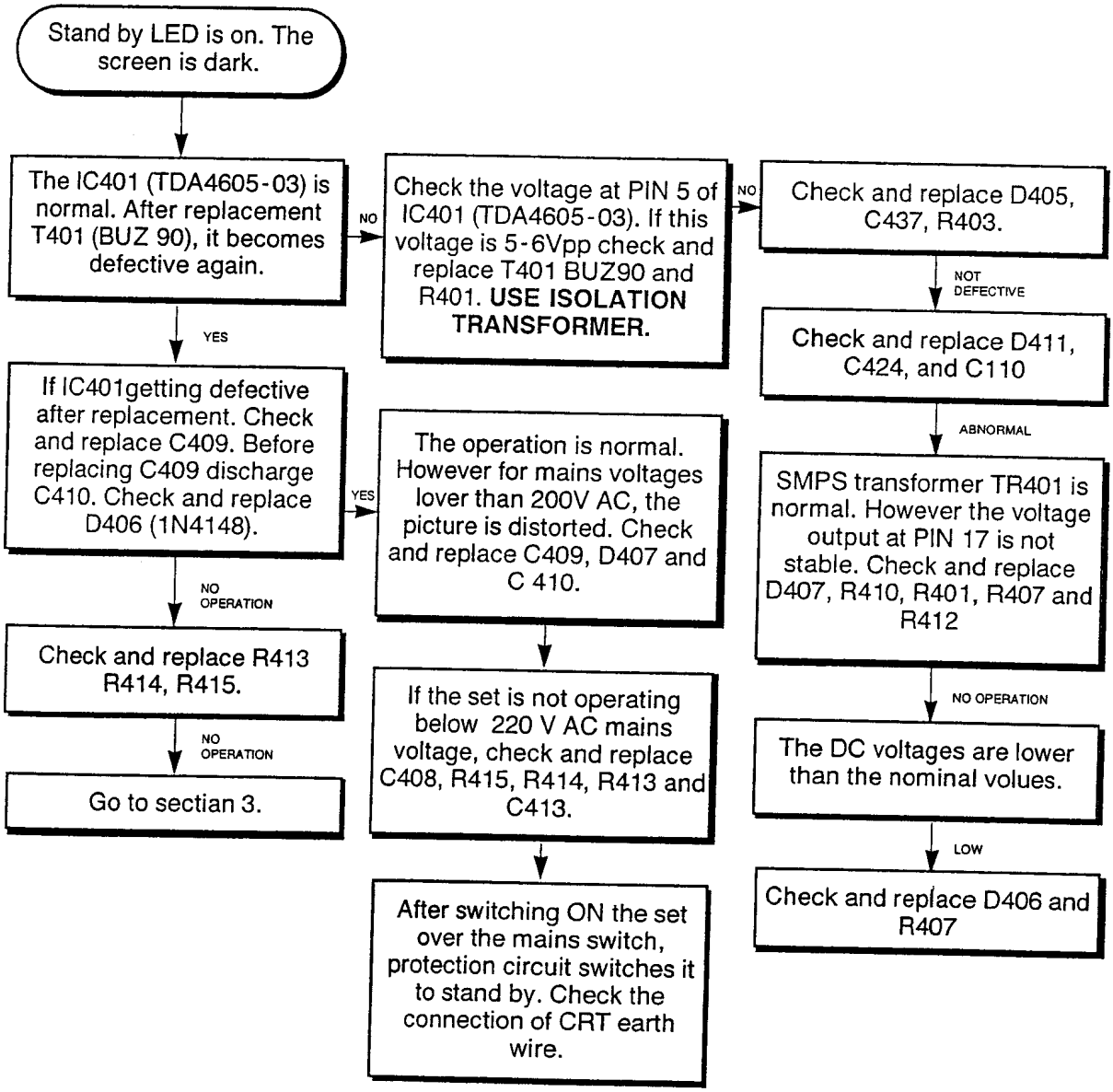
1- POWER SUPPLY DEFECTS I
2- POWER SUPPLY DEFECTS II
3- POWER SUPPLY DEFECTS III
4- SMPS DEFECTS
5- PICTURE DEFECTS I
6- PICTURE DEFECTS II
7- LINE OUTPUT CIRCUIT DEFECTS
8- VERTICAL OUTPUT CIRCUIT DEFECTS
9- MICROCONTROLLER DEFECTS
10- SOUND DEFECTS

1. POWER SUPPLY DEECTS I

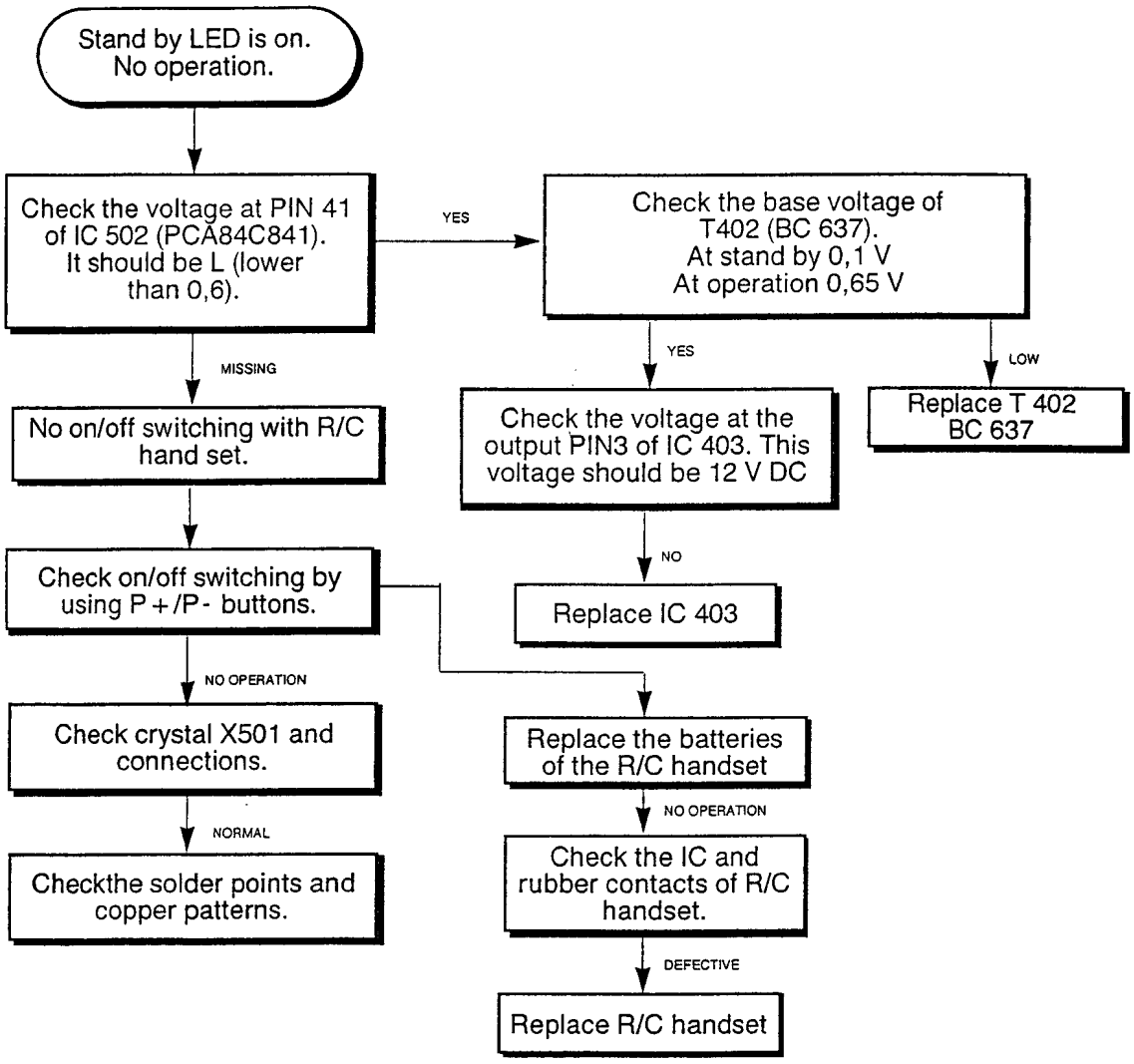



Check the voltages at PINS 2 and 3 of IC401
PIN 2; 1,1 VDC
PIN3 ; 2,1 VDV
NO
Check and replace C402, C403, R413, R414
YES
Check the oscillator signal at PIN 5 of IC401 (TDA 4605-03) with an oscilloscope.
Use an isolation transformer for measurements on live part of the power supply
ABNORMAL
Check and replace IC 401 TDA 4605-03.
The operation of the live part of the power supply is normal, however the secondary voltages of the transformer TR401 are low.
YES
Go to section 6.
YES
Check and replace T401 (BUZ 90), R406.
T401 (BUZ 90) becomes defective after a few hours operation. Check the insulationwith heatsink and soldering points.
DEFECTIVE AGAIN
Check and replace D411, C437, C424.

2. POWER SUPPLY DEFECTS II



3. POWER SUPPLY DEFECTS III



4. SMPS DEFECTS