

HAZARDS

Voltages of 60 V and above occur in the equipment. There is a risk of contact with live parts. It is essential to observe the following points:

- The mains power must be disconnected before opening the equipment
- Greatest care must be exercised when working with the equipment in switched-on conditions.
- An attendant should possibly be on hand to disconnect the mains immediately in the event of an accident.

Safety instructions

W A R N I N G The component groups contain **M O S** components!

MOS COMPONENTS

These are protected against destruction caused by normal charging by means of protective structures at the inputs and outputs. In order to protect the components also from very heavy static charges, we recommend that the following rules be observed:

Persons who work with apparatus containing MOS components should be discharged by contact with an earthed object or by bringing the equipment housing to this potential.

MOS components may only be fixed to the housing; the terminals of the components must not be contacted to this.

When the equipment/apparatus is switched on, conductor tracks and unisolated components must not be touched by hand nor must they be shunted to the housing.

MOS components must always be transported in conductive foam material. The terminal connections of the MOS components must not bent over.

Before any soldering work the soldering iron tip is to be quickly tapped on the housing or on an earthed object.

Before the wire bridges are touched with the side cutters, the tool held in the hand must be discharged to earth.

3 SERVICE AND MAINTENANCE

3.1 Trouble-shooting (RX 1001 M / RX 5001)

3.1.1 Built-in test equipment (B I T E)

The self-test is separated into two single tests:

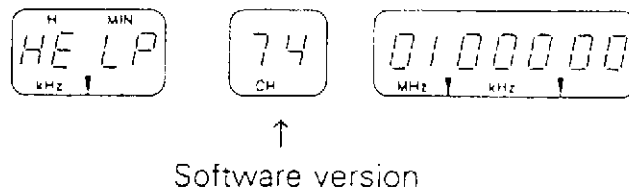
During current operation the following tests are continuously being done:

- HELP 1 Preselection: Check of setting by comparing the reference voltage with the Servo-Pot voltage.
- HELP 2 1. Mixer: Monitoring of Oscillator-level
- HELP 3 2. Mixer: Monitoring of the Mixer Oscillator level.
- HELP 4 Filterboard: Monitoring of the diode switch and the level for 30 kHz IF-OUT
- HELP 5 Demodulator: no continuous monitoring
- HELP 6 525/10 kHz IF-OUT (IF-Output): no continuous monitoring (not used in RX 5001)
- HELP 7 VCO-B: Check whether PLL is locked
- HELP 8 VCO-A: Check whether PLL is locked
- HELP 9 BFO: Check whether PLL is locked
- HELP 10 Power Supply: Monitoring of voltages +5 V, +12 V and +18 V for permissible tolerance
- HELP 11 Buffer-PCB: Monitoring of the reference voltage of the PRESELECTOR middle tuning position (only when Preselector is switched off)
- HELP 12 Serial Interface: Monitoring of correct data from the BCD-switch
- HELP 13 Audio-PCB: no continuous monitoring
- HELP 14 CPU PCB: Monitoring of memory, address bus, data bus, control bus, bus drivers etc., by printing, reading and comparing the test data.
- HELP 15 I/O-PCB: no continuous monitoring
- HELP 16 CLOCK PCB Monitoring of minute changes

In case a failure is being recognized in one of the monitored functions, this will be indicated by the BITE LED flashing. The failure may be detected by releasing the Auto-Test (see chapter 3.1.2).

3.1.2 Releasing the AUTO TEST

The AUTO TEST can be released by the key TEST and it starts with briefly showing the following display



and then performing the LED-test. After this, the individual functions will be checked by means of the 1 MHz-Test Signal. When the test sequence is in progress the "failure indication-LED" lights, and no entry, except ERASE CHANNELS is possible.

The AUTO TEST cannot start when another entry process (for example: selection of mode, entry of frequency) is not yet finished. Only when this process is finished or being interrupted a test can be released again. When the test sequence is over, the failures are indicated. This includes the indication of failures recognized before the current operation. When there are several failures, the individual failure numbers can be made visible by the key *.

By pressing a different key of the keyboard the receiver is being reverted back to the state it was operating in, before releasing the test. In case no failure has been found the receiver automatically will be brought to the previous state again when the test is over. Where ever possible, the circuits are being monitored during the current operation. Arising failures will be indicated in this case by flashing of the "failure indication LED" (refer to 3.1.1).

The AUTO TEST can be also released externally in the REMOTE-position of the CONTROL SWITCH when the REMOTE PRINT is used, and the receiver is remote controlled by a Remote Control RX 1001 F or RX 5001 RC, or a computer. Another method to imitate an Auto Test is the Go/No Go Test refer to chapter 3.1.5.

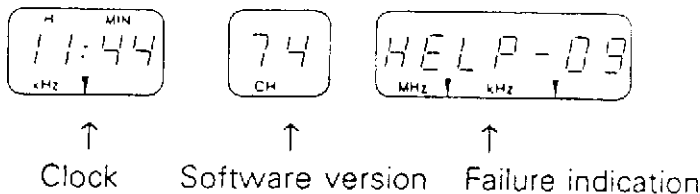
After the LED Test the DISPLAY looks like this:



HELP 01 means Test of the PRESELECTOR acc. to HELP 01 procedure.

The receiver advances automatically to the next test step. Observing the indications HELP 01, HELP 02 etc. one may follow the test run. When the complete test is over and no failure has been detected, the receiver reports this by means of a tone. Simultaneously the LED BITE extinguishes and the receiver gets back to the normal receiver mode.

When the receiver has detected a failure, an indication like this will be given:



i.e.: the receiver has detected a defective BFO. By pressing the key * on the keyboard further malfunctioning groups effected by the present failure may be detected.

3.1.3 Failure Localisation and Exchange of Modules

After the AUTO TEST via the TEST key the failure indication and localisation is shown on the frequency display as for example: HELP 09.

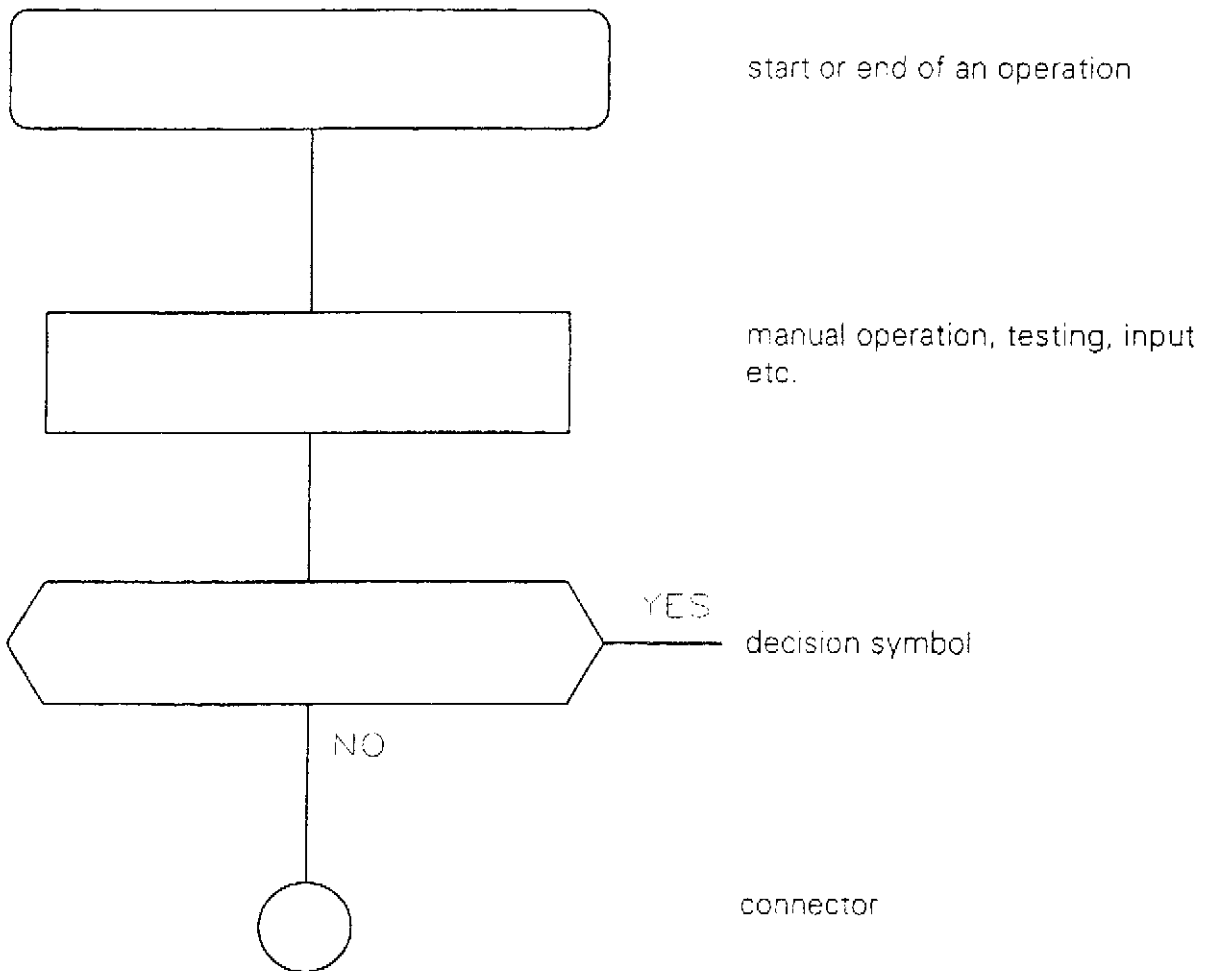
From the diagram may be seen that the module BFO is defective.

If, in this case the TCXO would not oscillate for example, the VCOs A and B could not synchronize either. Therefore, the microprocessor gives as a first report -HELP 09- and as a further failure indication HELP 07, then, (VCO B) and -HELP 08- (VCO A). Failure indications HELP 07 and HELP 08 are being indicated by pressing the key *. By further pressing of *-key HELP 09 will appear, thus allowing all failure indications to be recalled. In order to reset the receiver to the start condition any other key may be pressed.

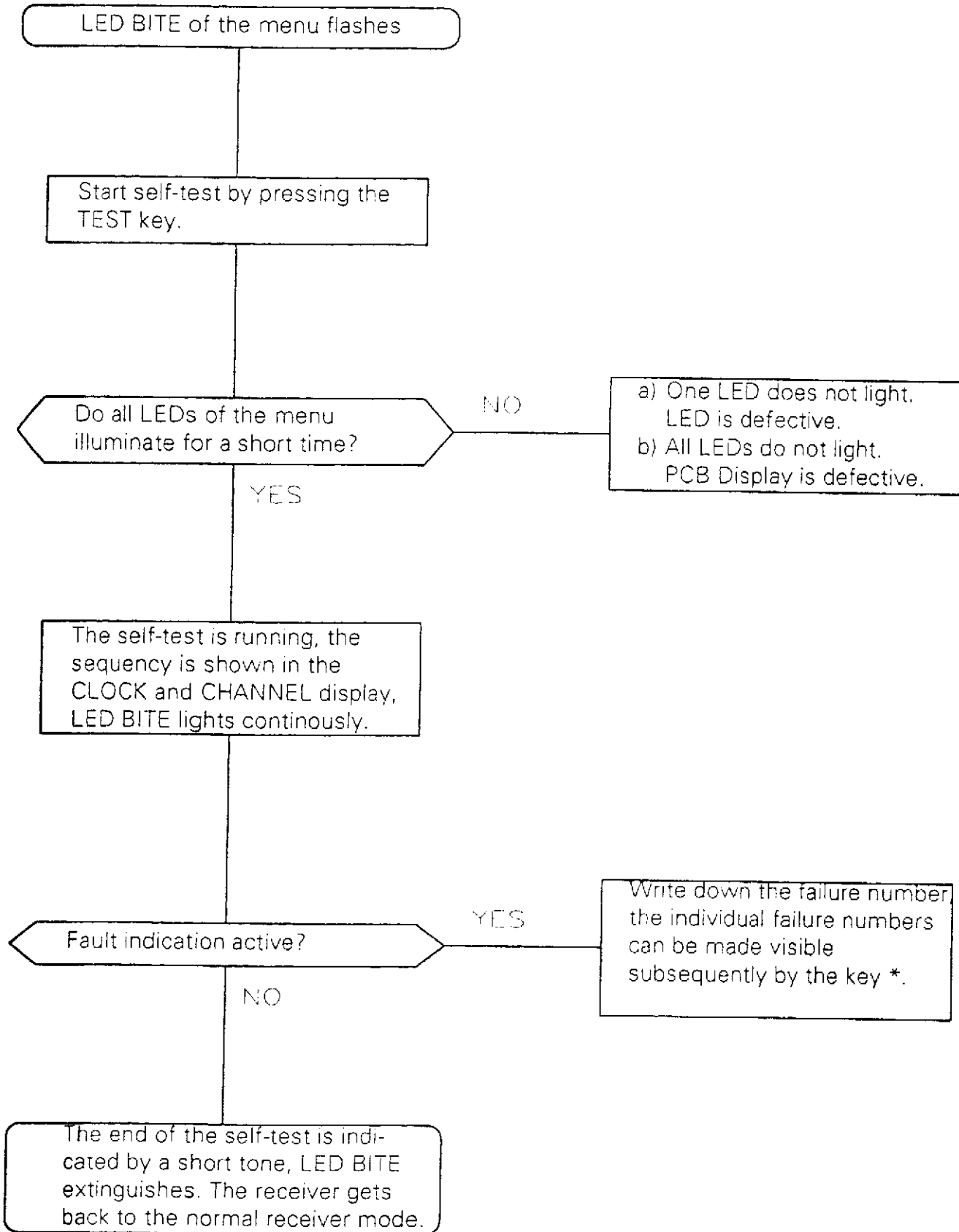
3.1.4 Trouble shooting with the help of the BITE test

If, during the operation in progress, the failure indication LED (BITE) flashes, the specific failure may be detected by pressing the TEST key. A test sequence is then performed, starting with an LED-test of the display. For some time all LEDs light for the operator's visual check.

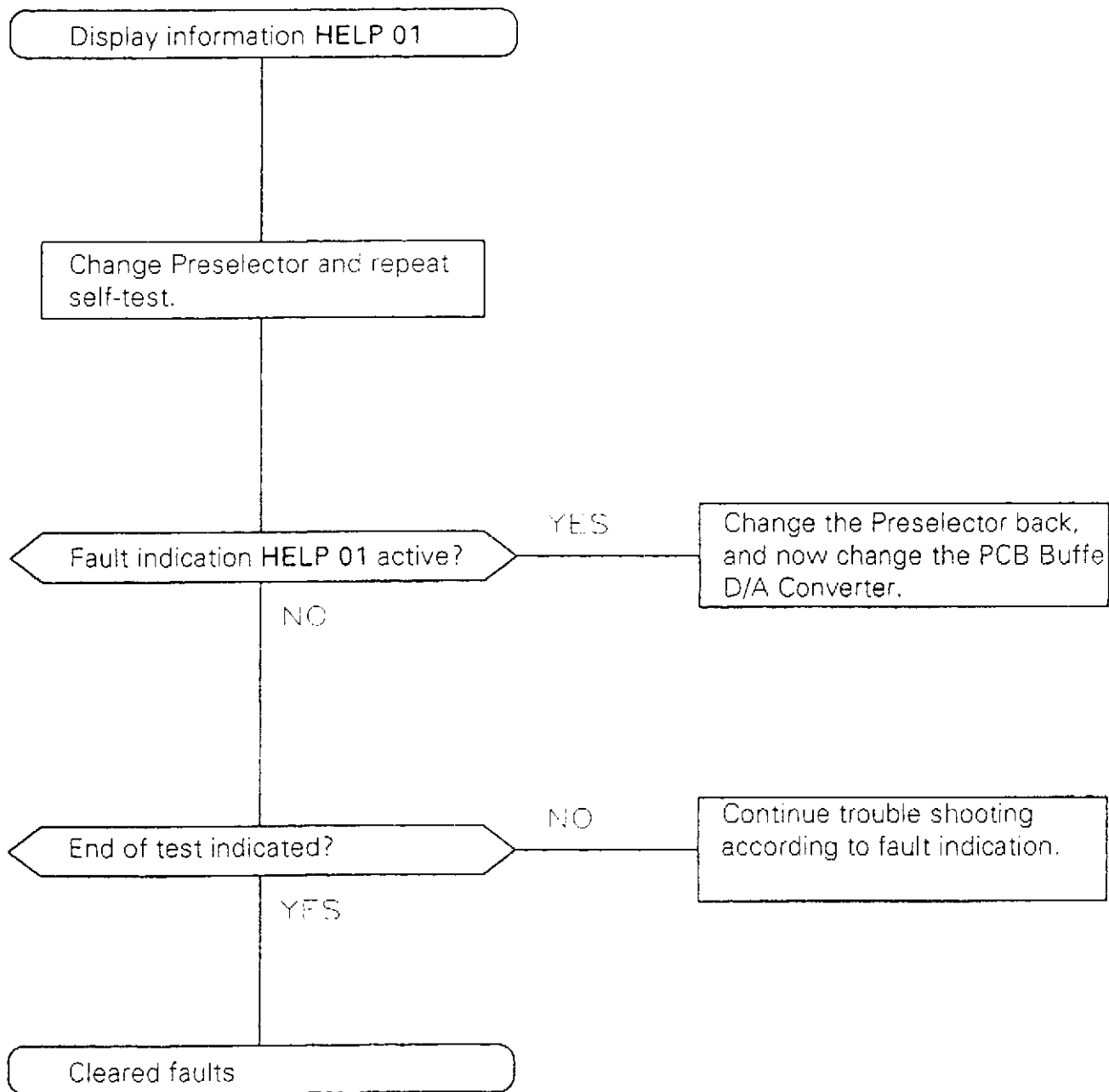
The following symbols are used:



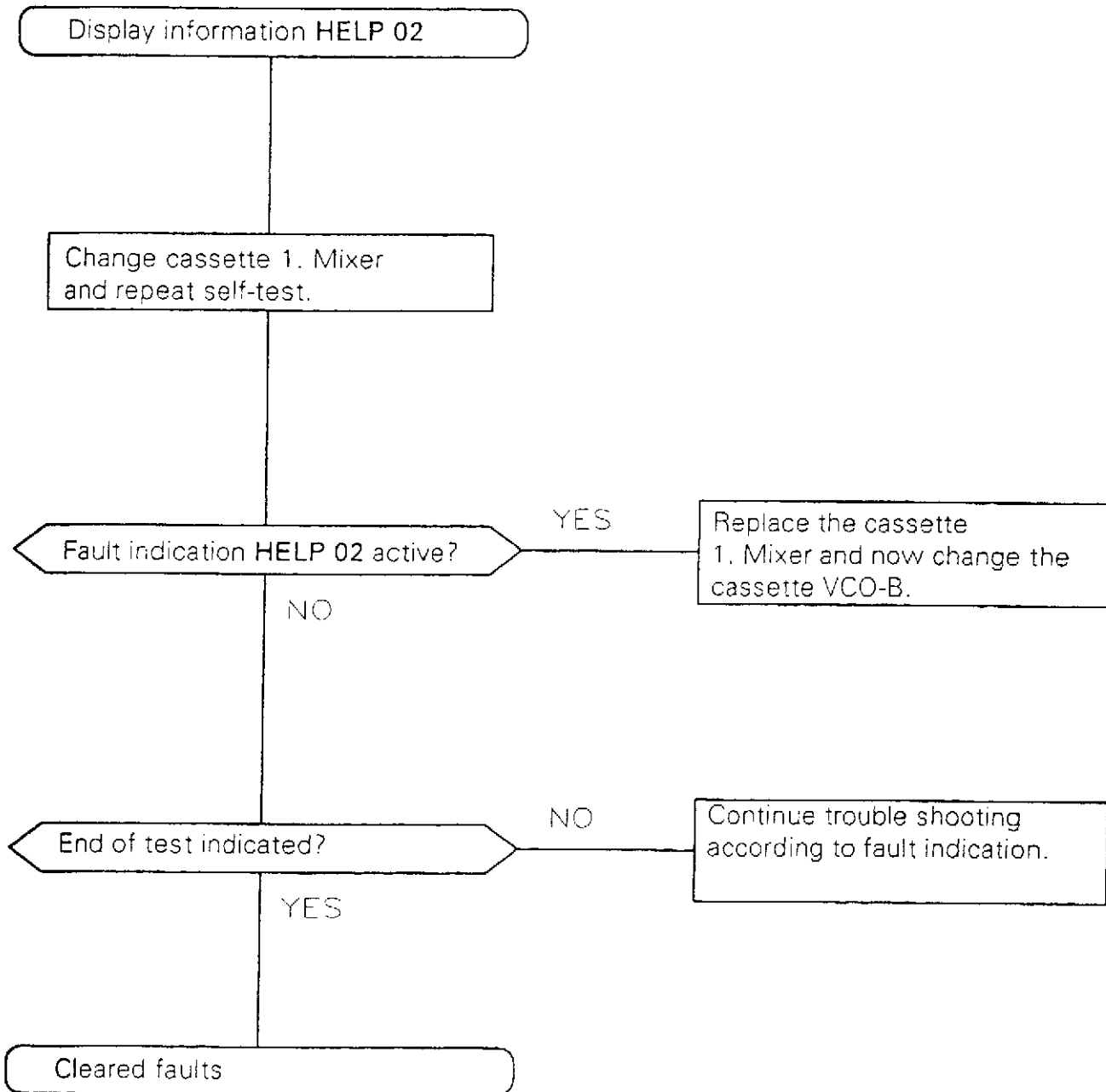
Trouble shooting



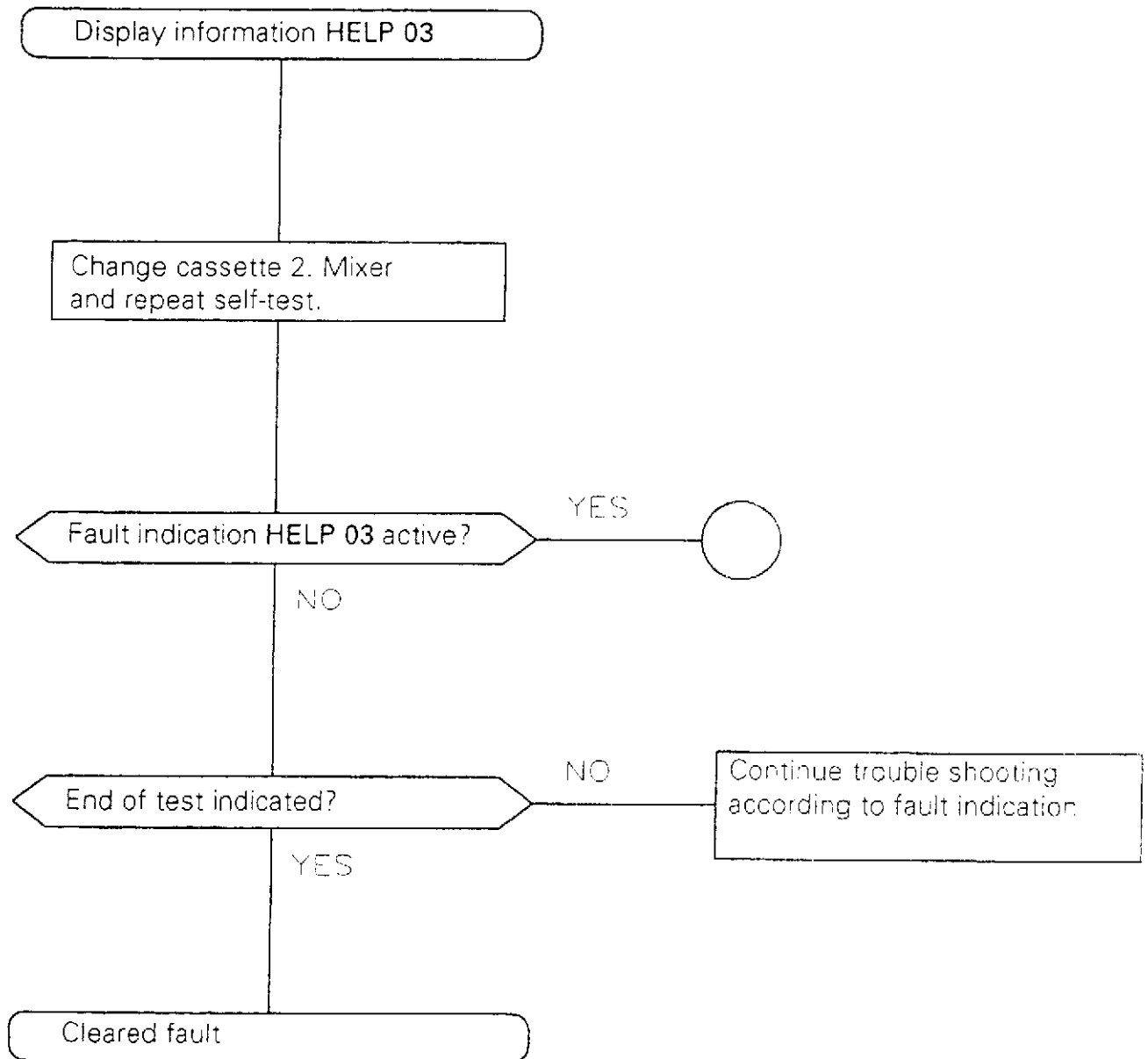
Fault indication HELP 01

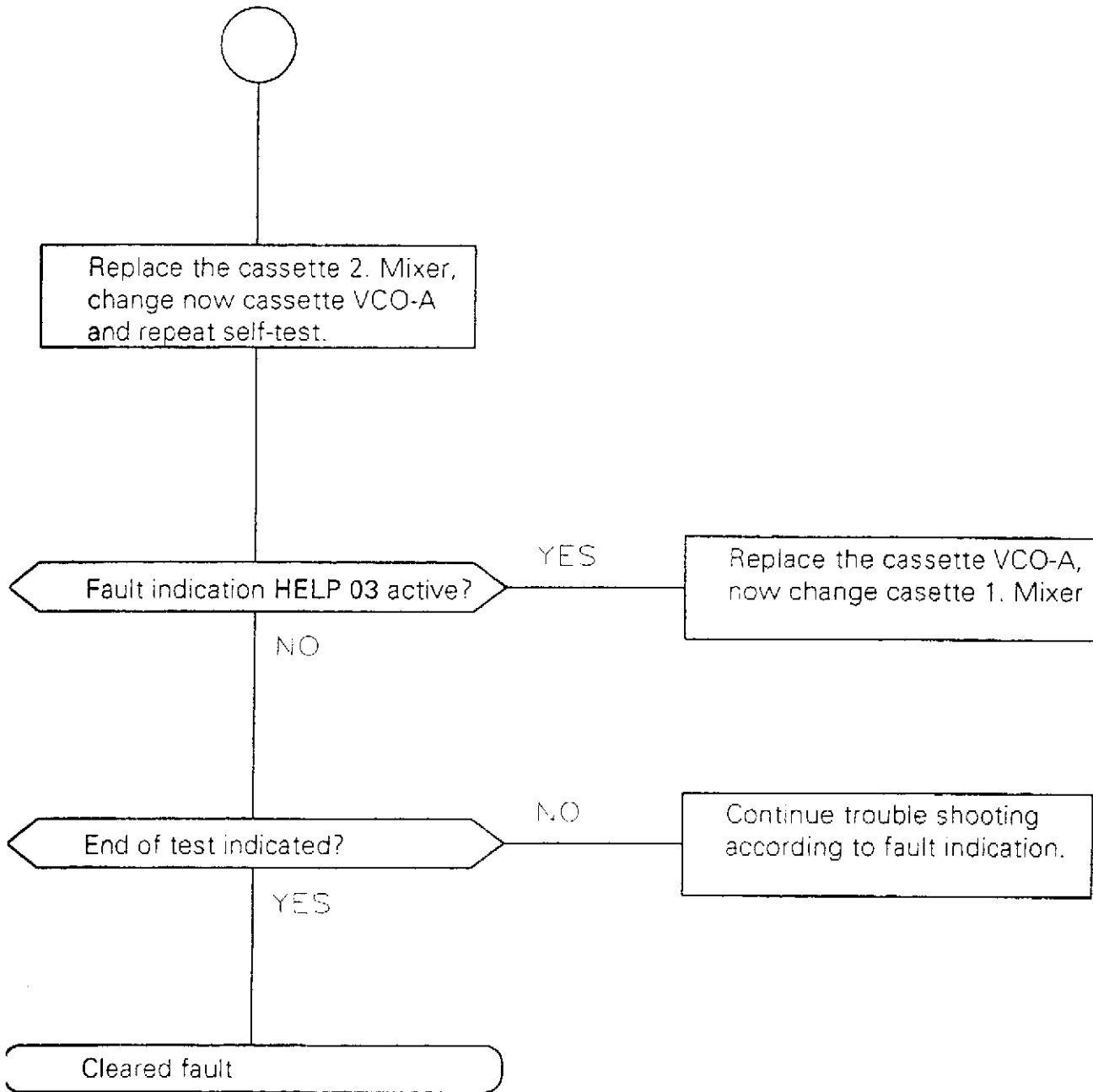


Fault indication HELP 02

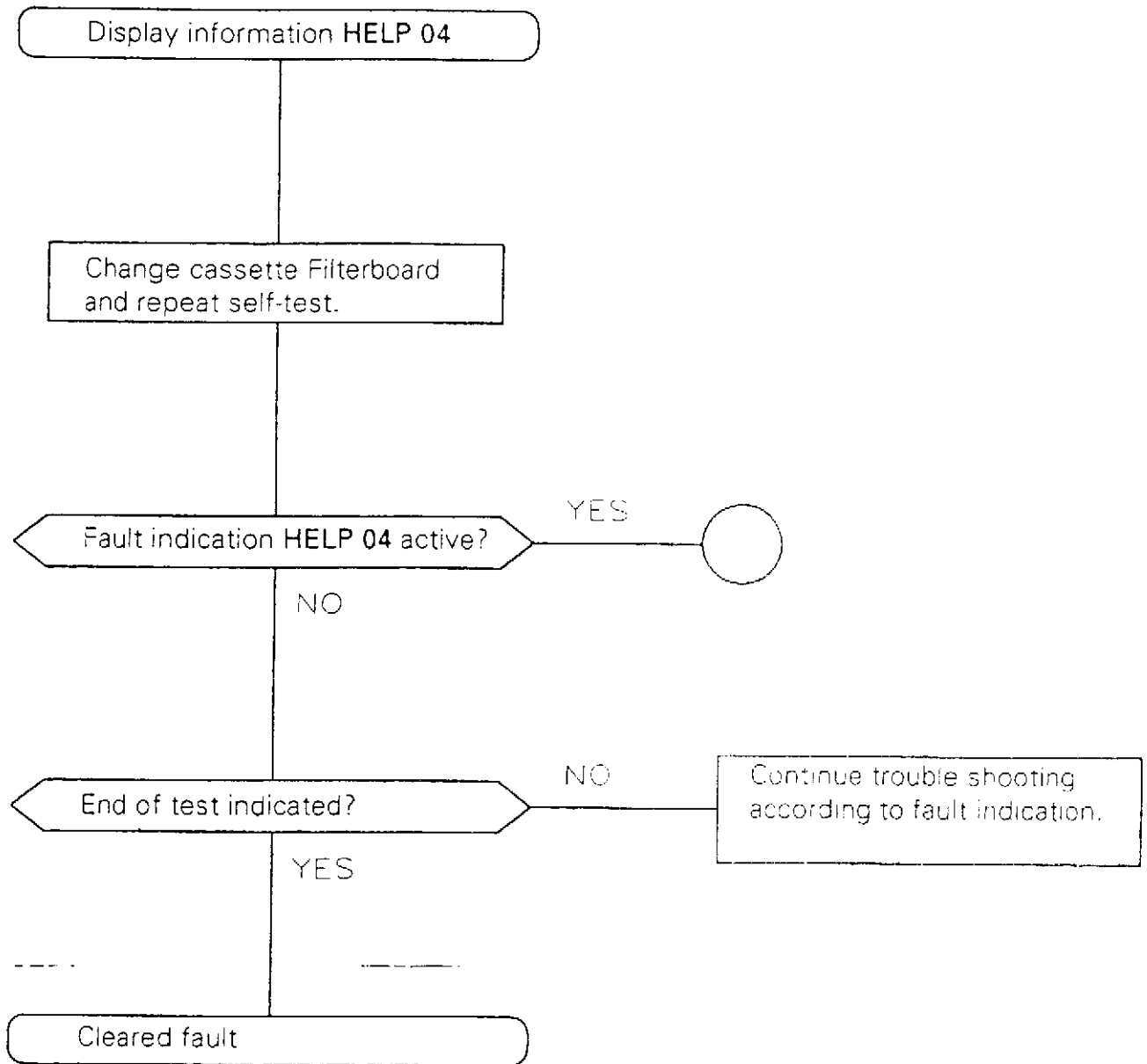


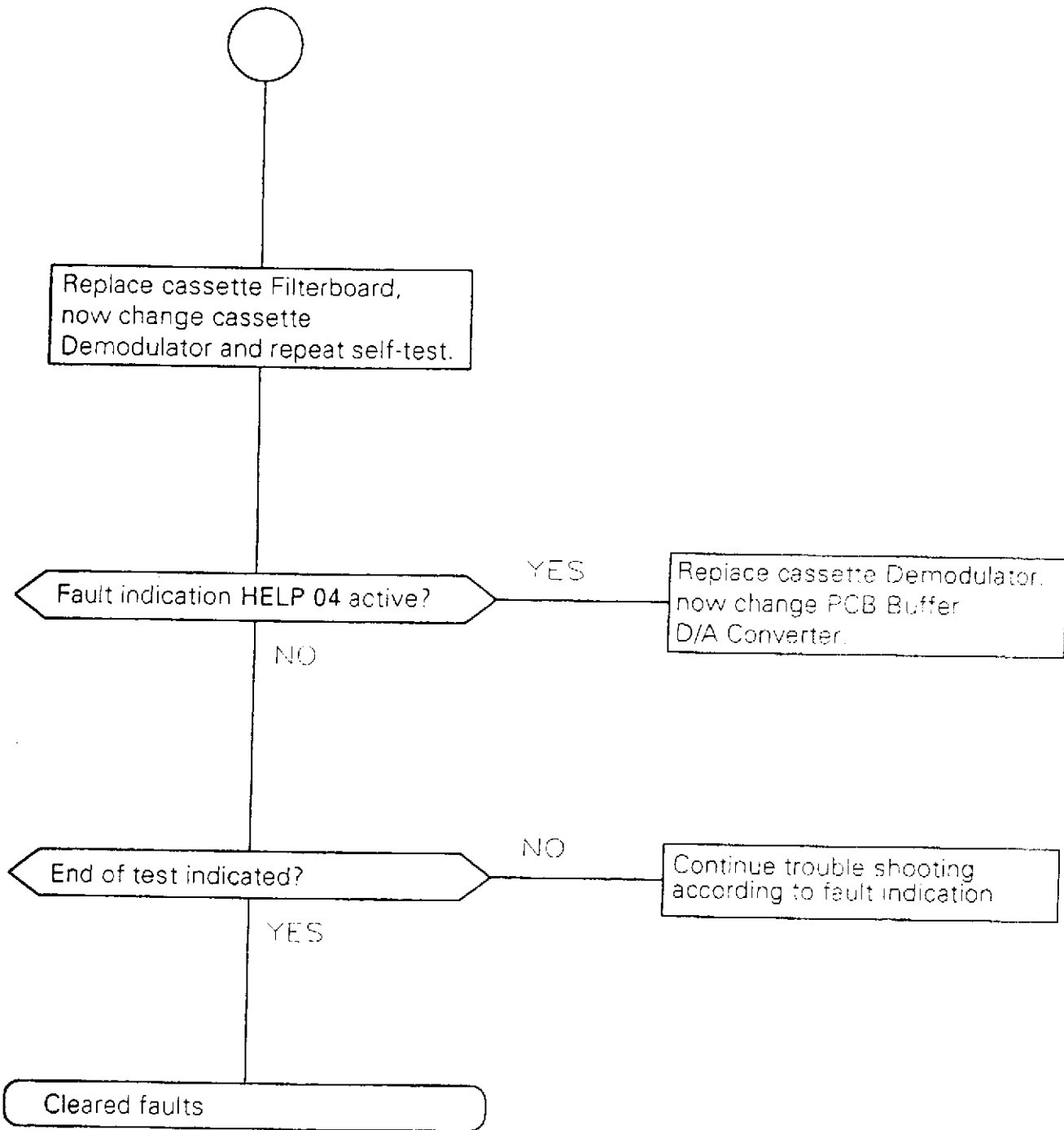
Fault indication HELP 03



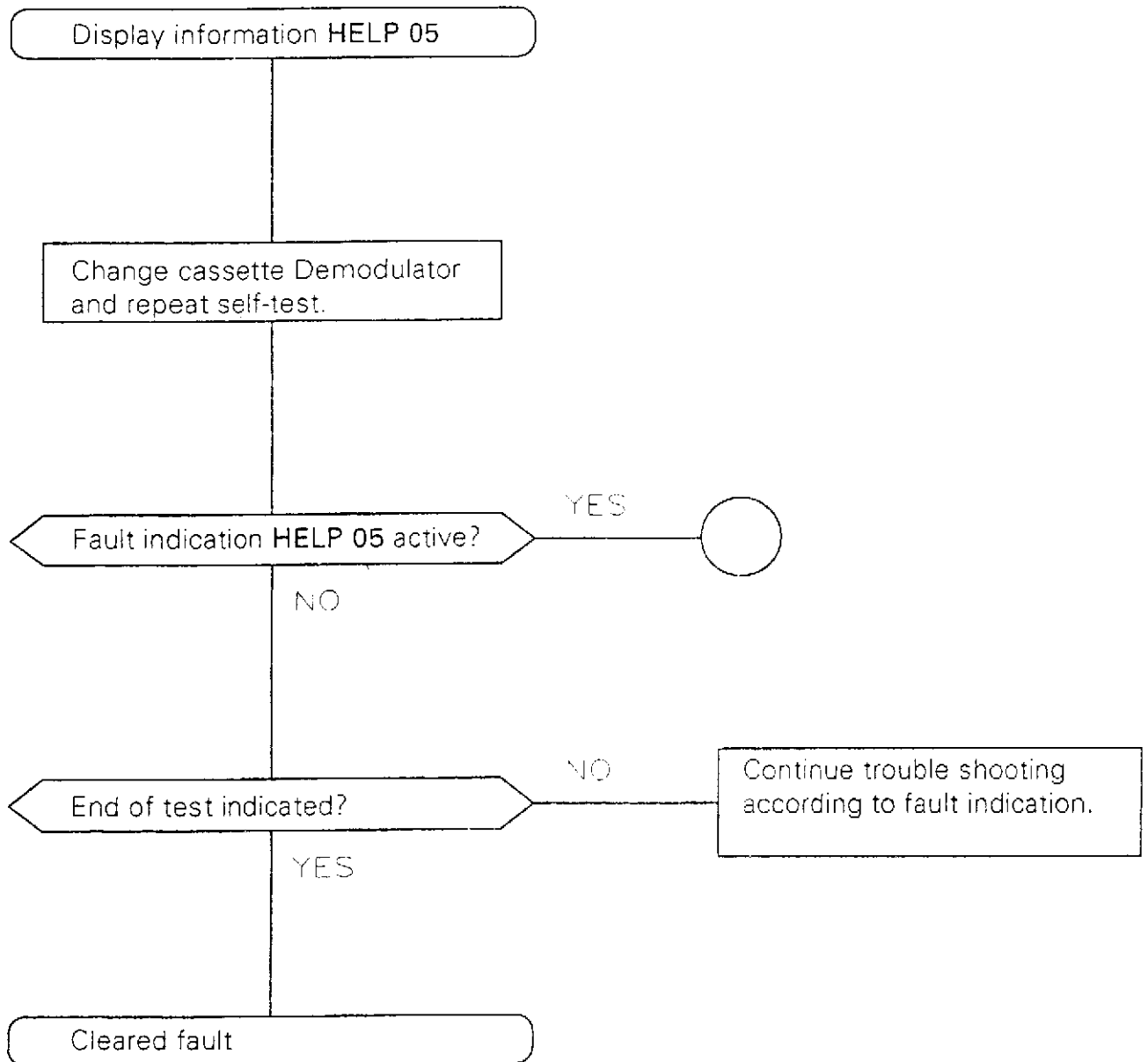


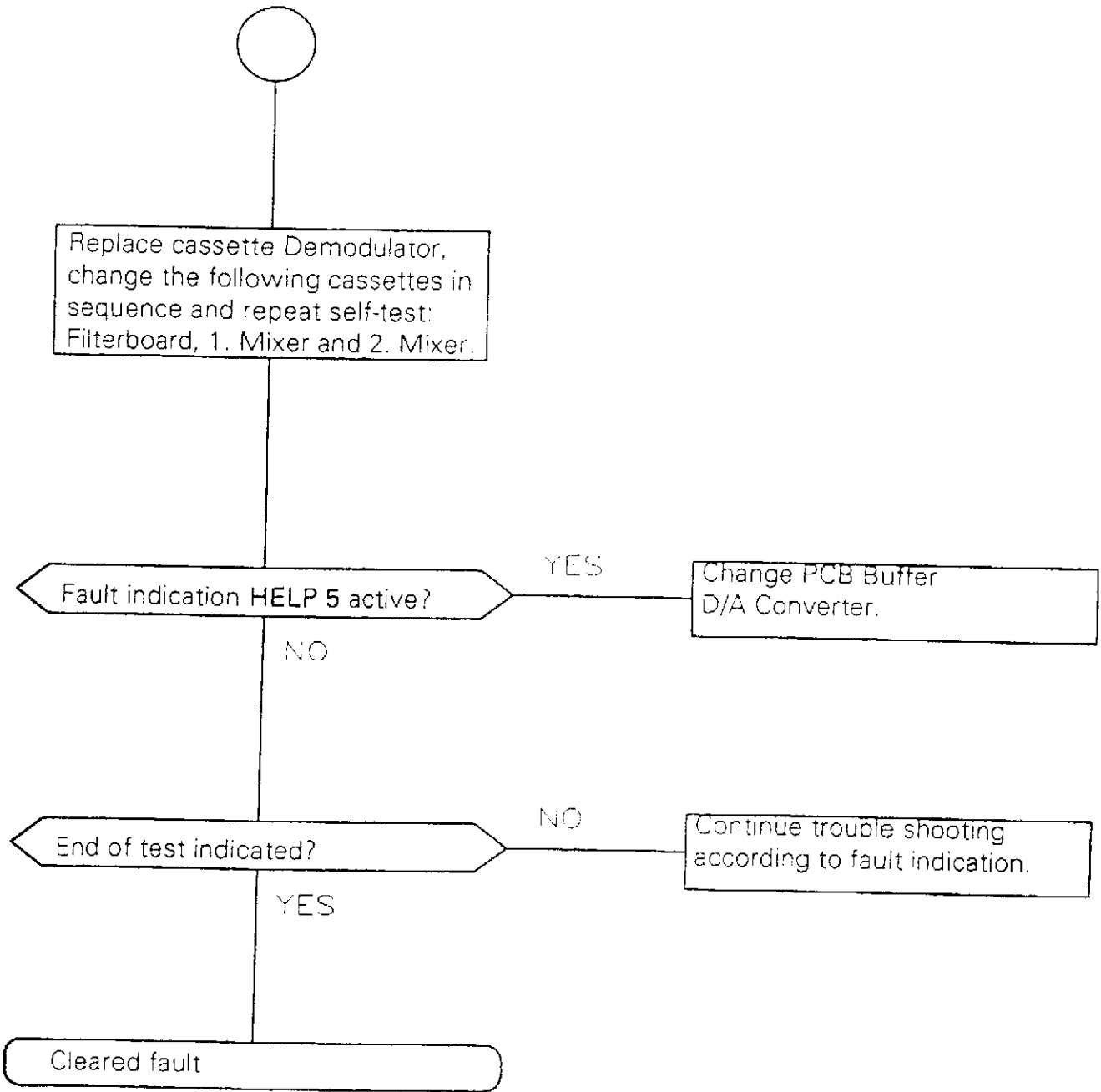
Fault indication HELP 04



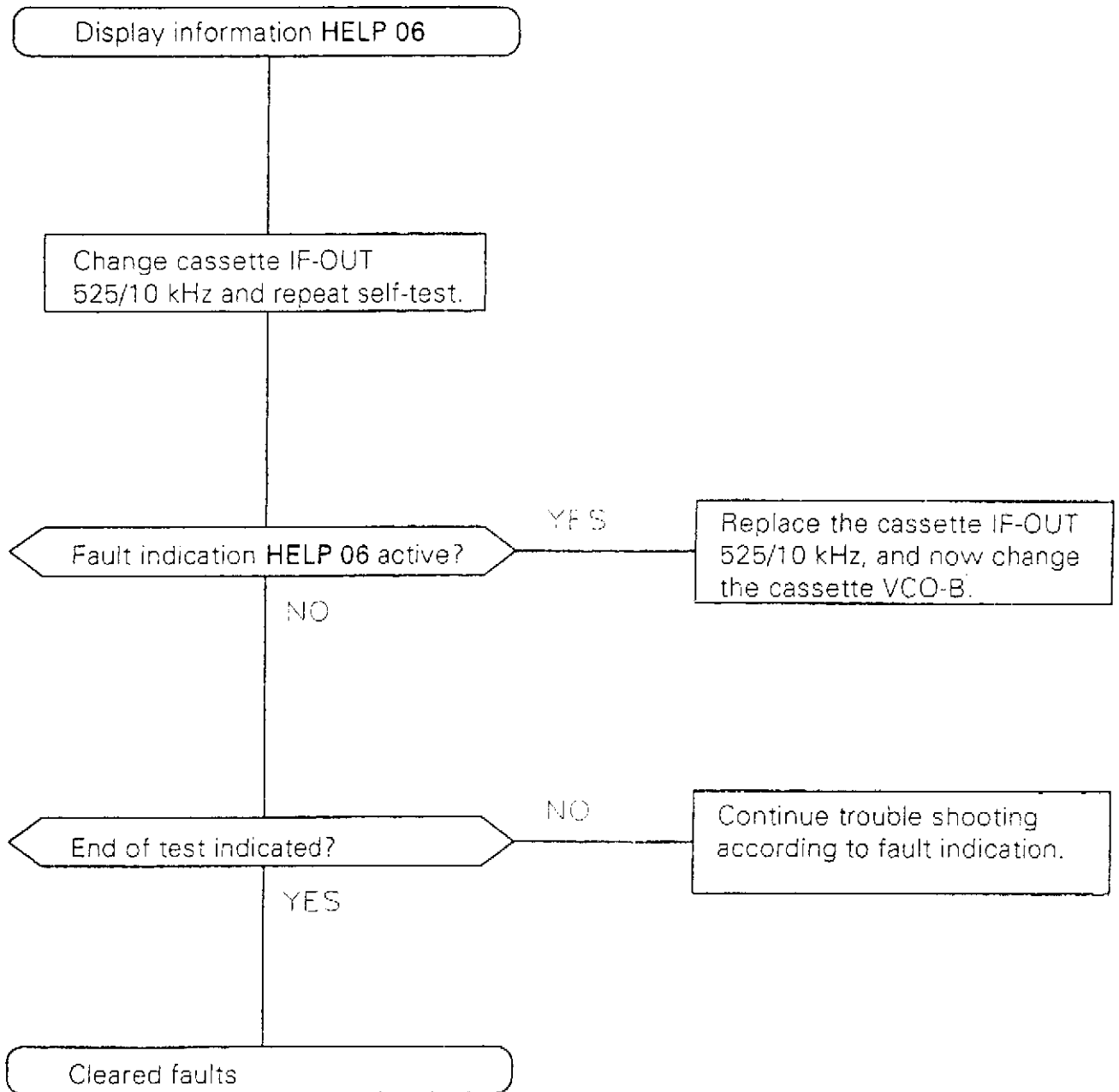


Fault indication HELP 05

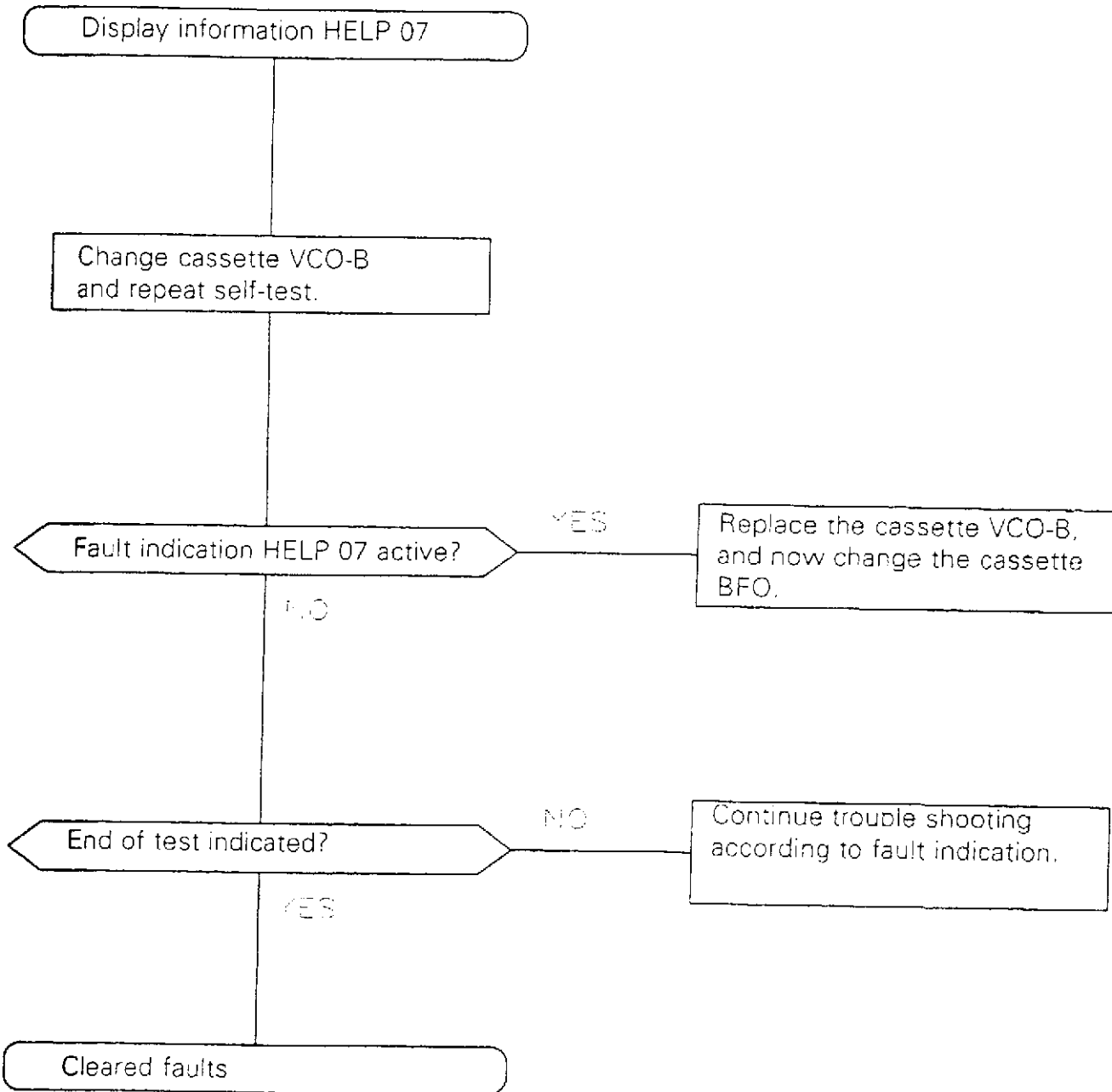




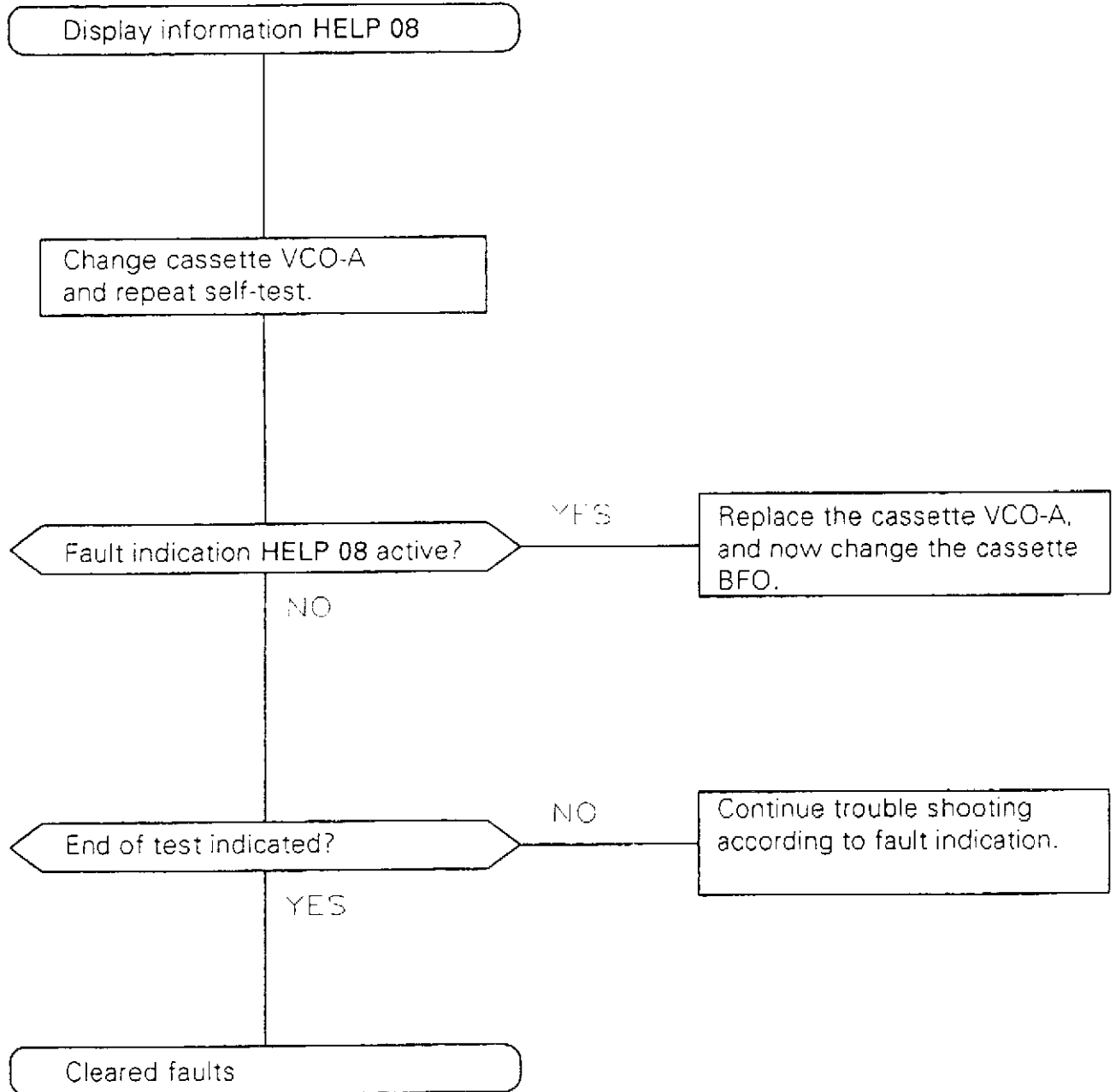
Fault indication HELP 06 (only RX 1001 M)



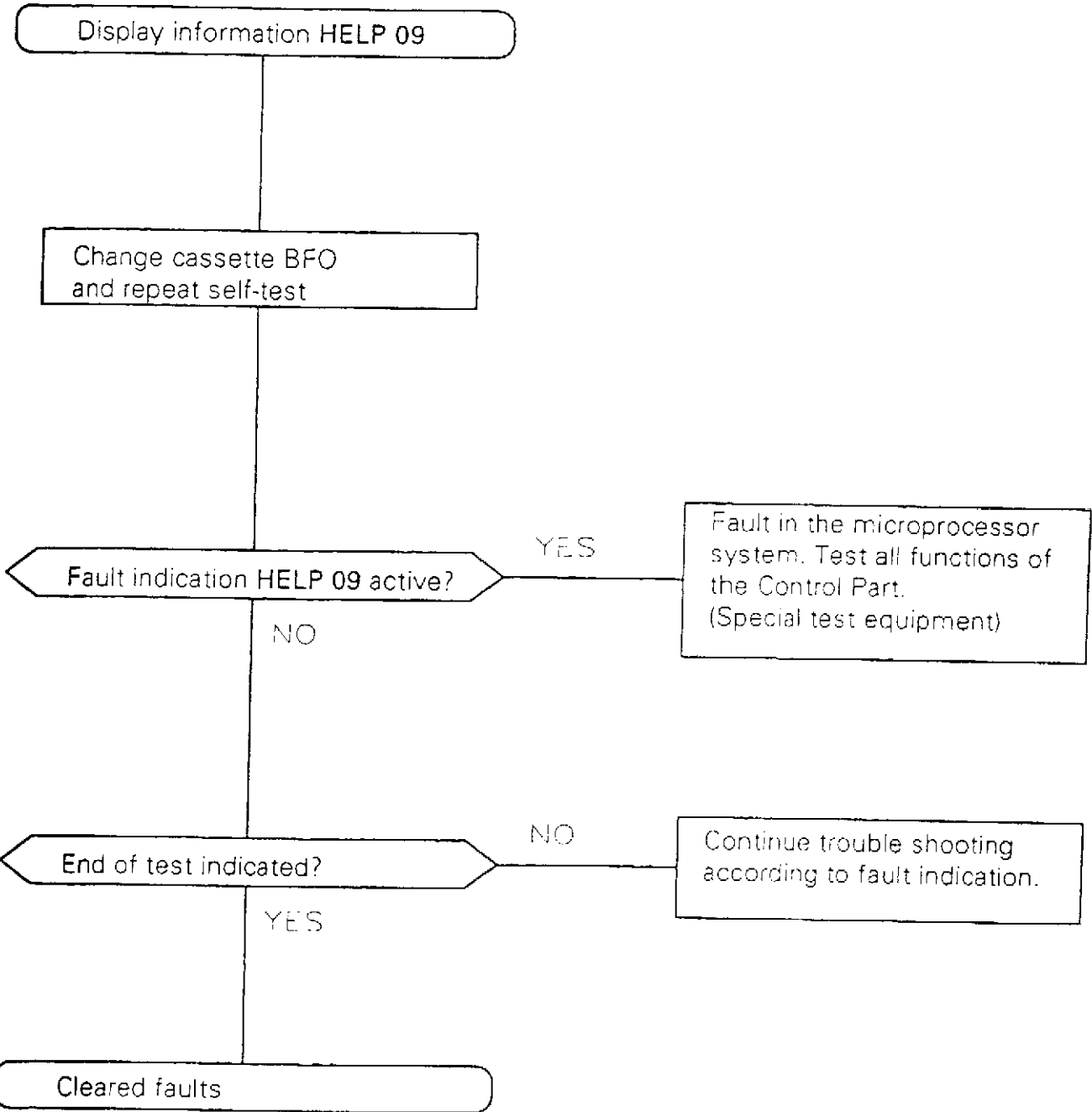
Fault indication HELP 07



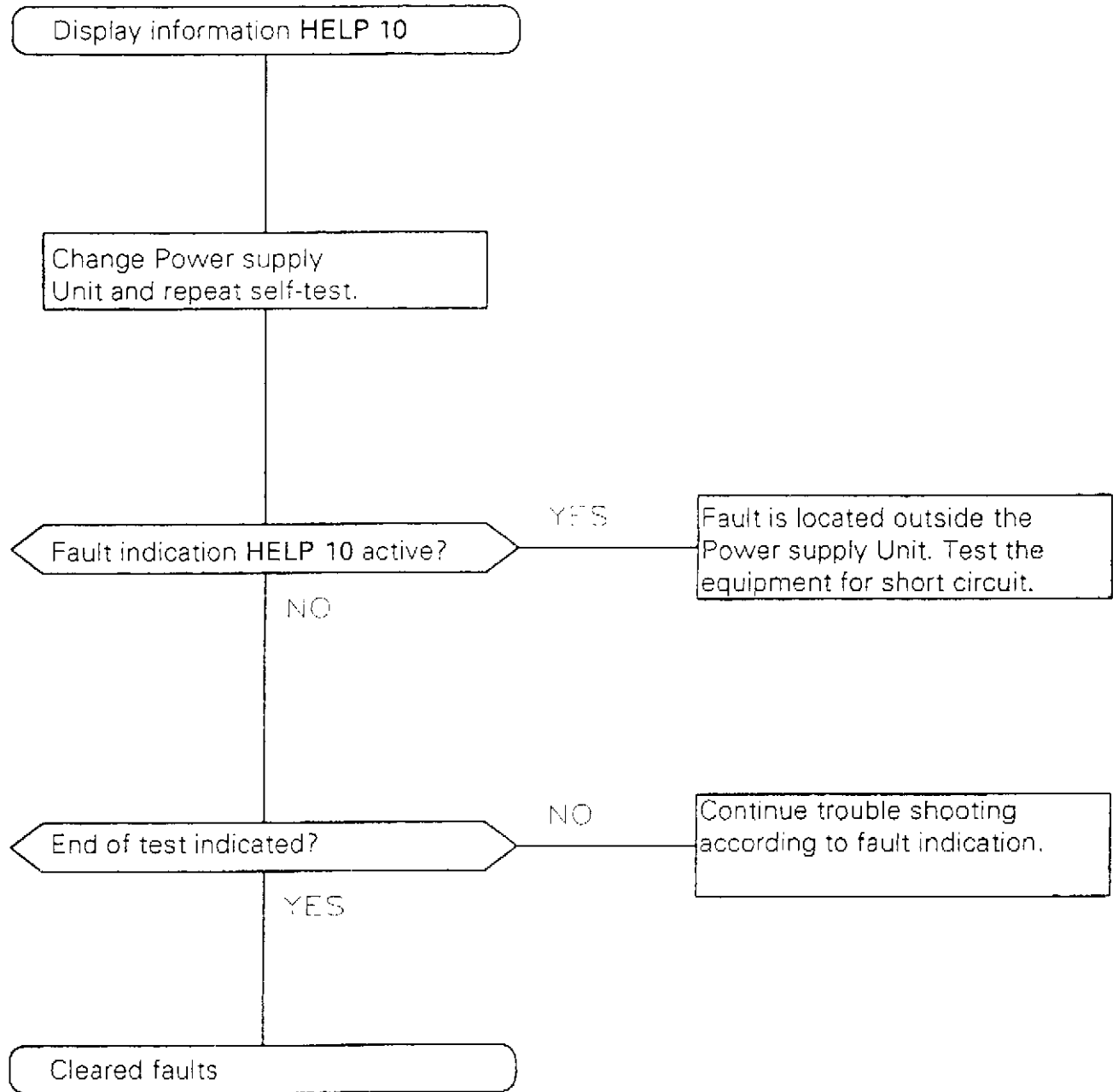
Fault indication HELP 08



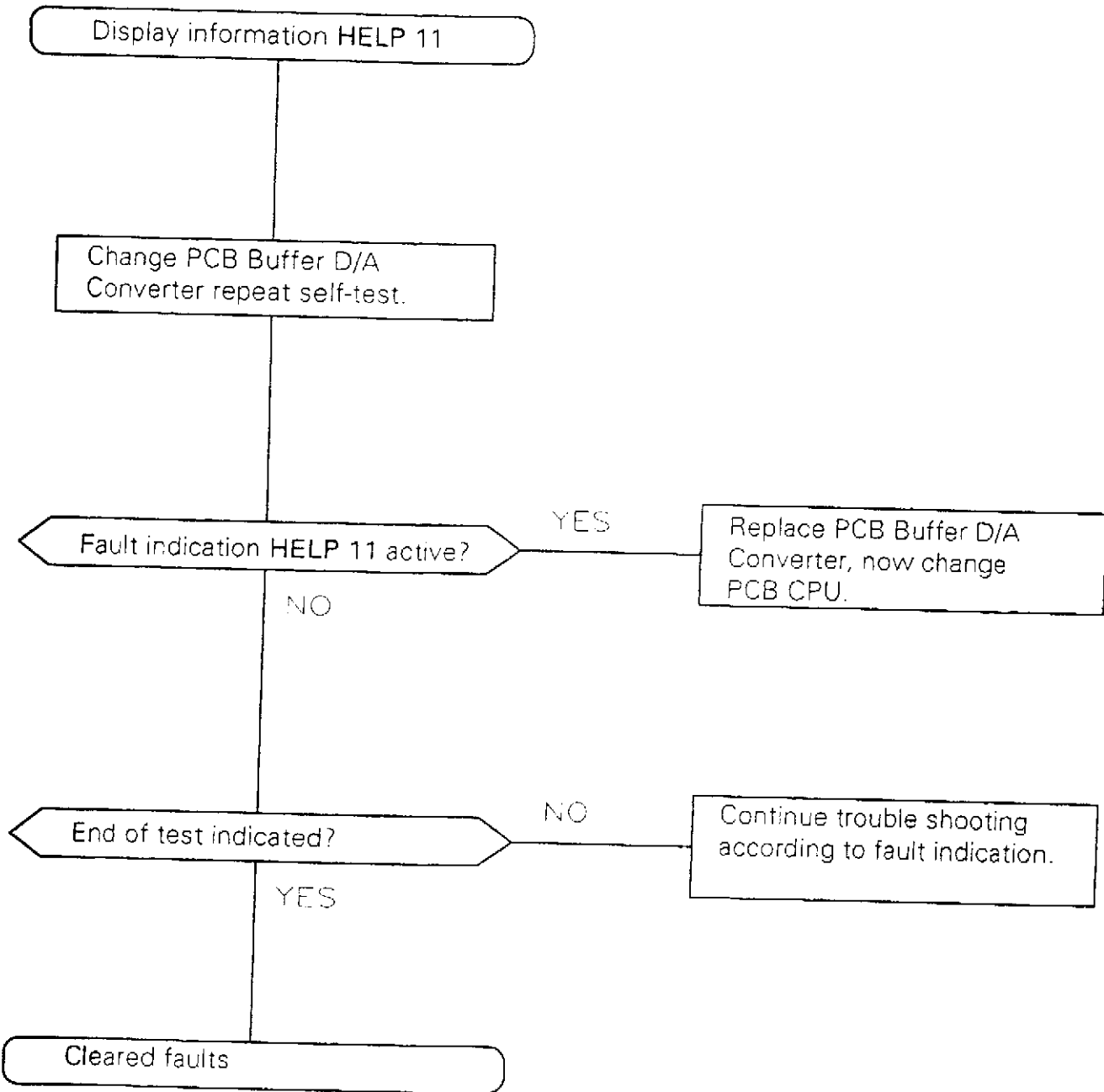
Fault indication HELP 09



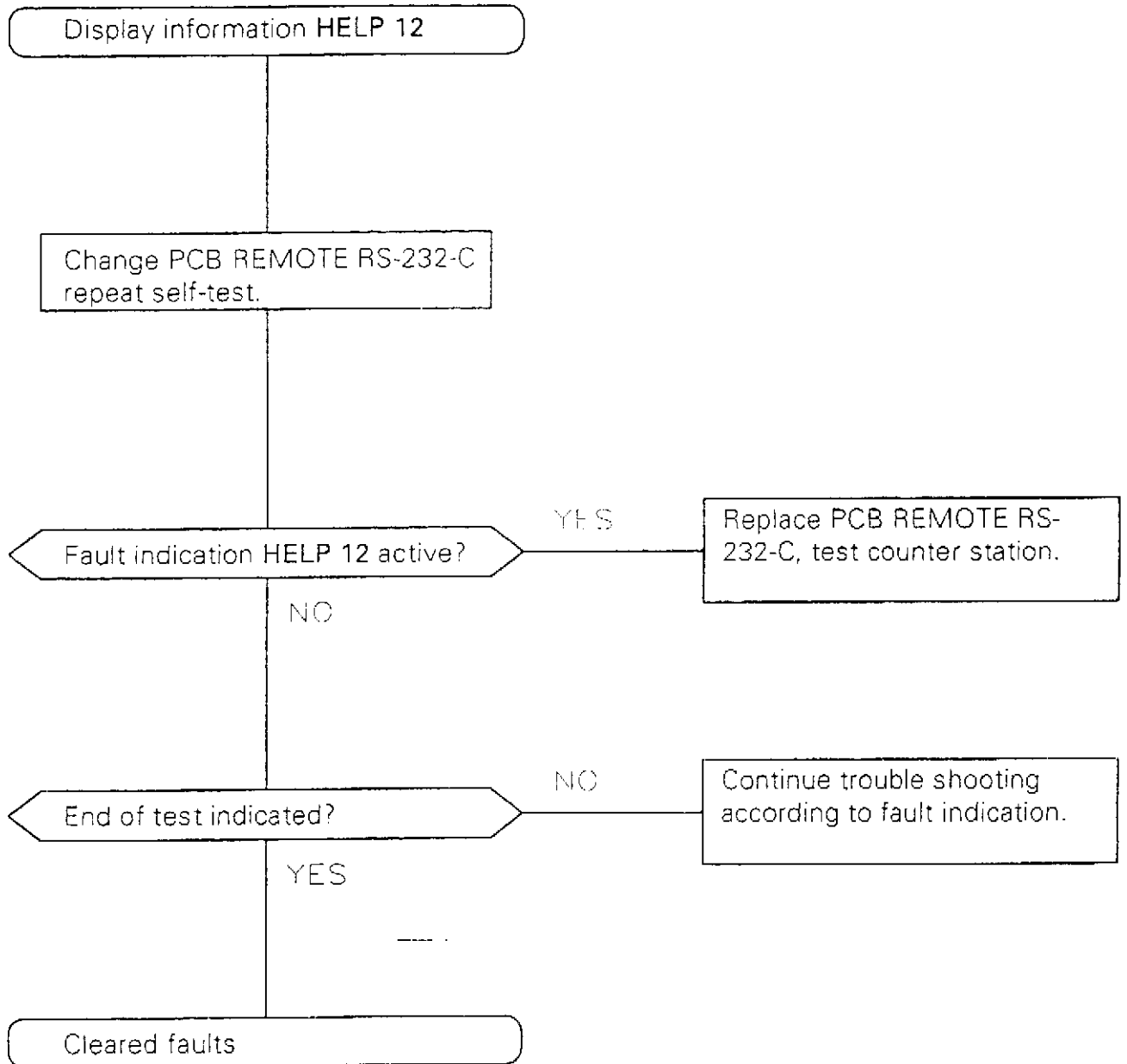
Fault indication HELP 10



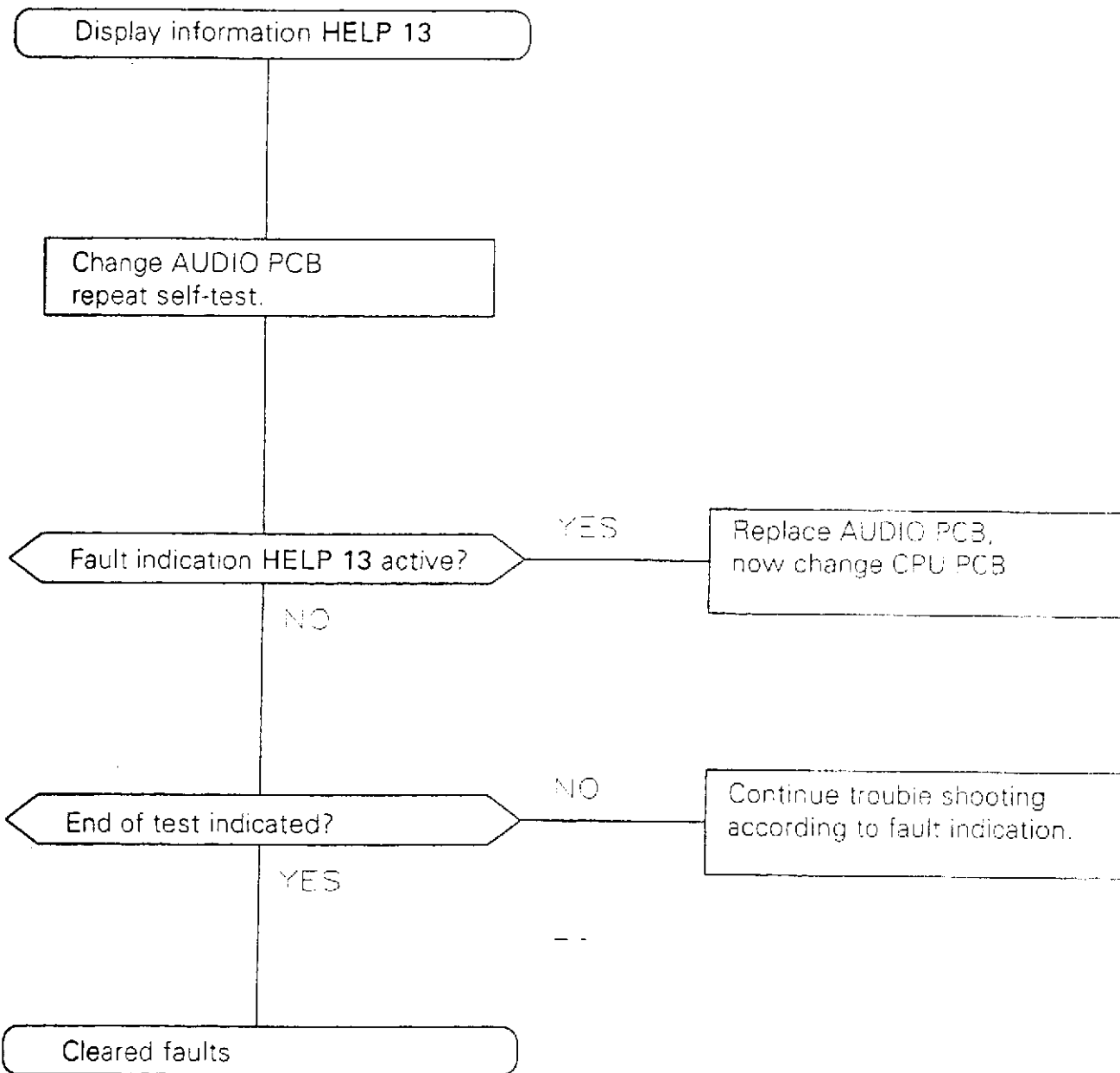
Fault indication HELP 11



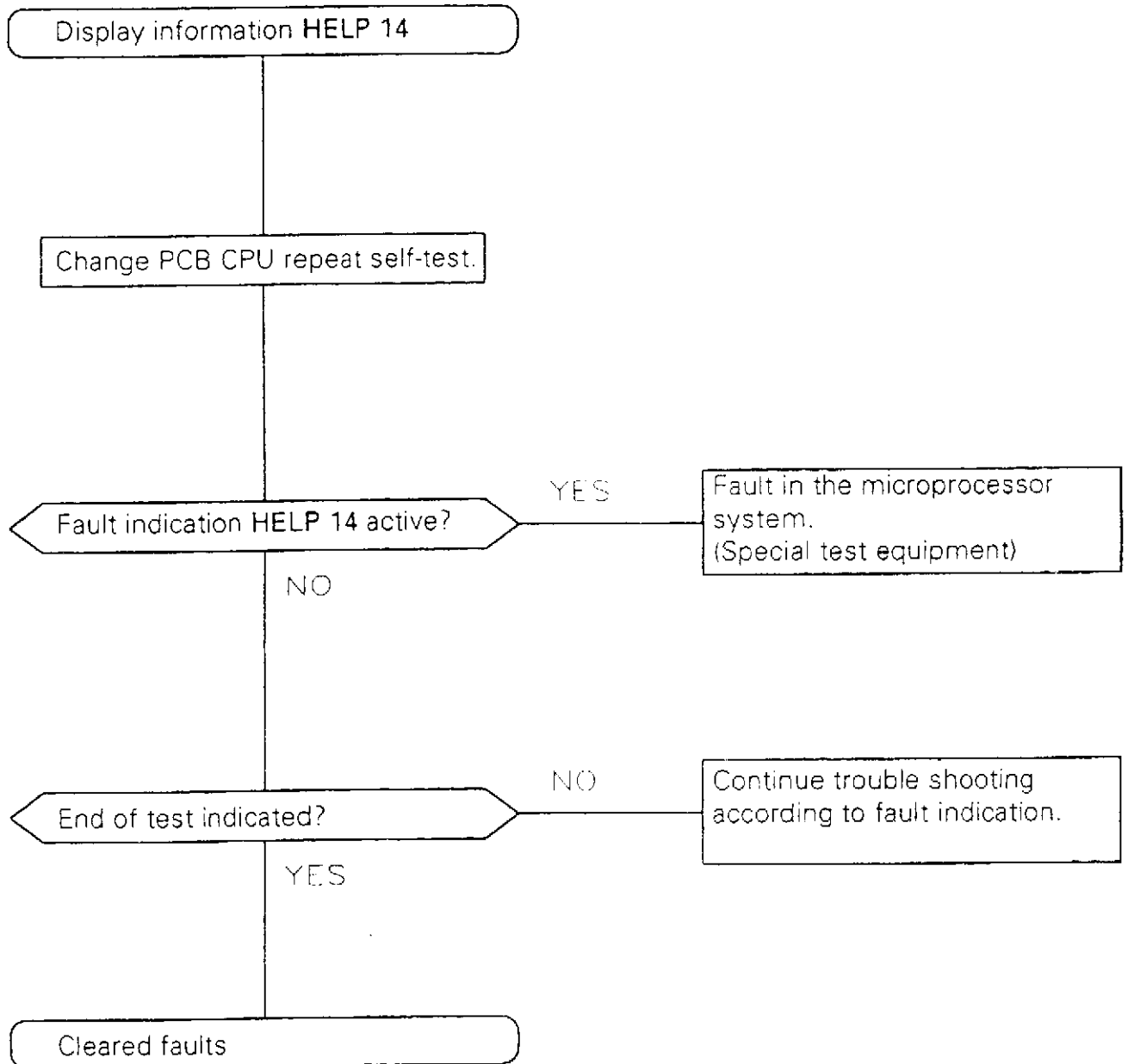
Fault indication HELP 12



Fault indication HELP 13

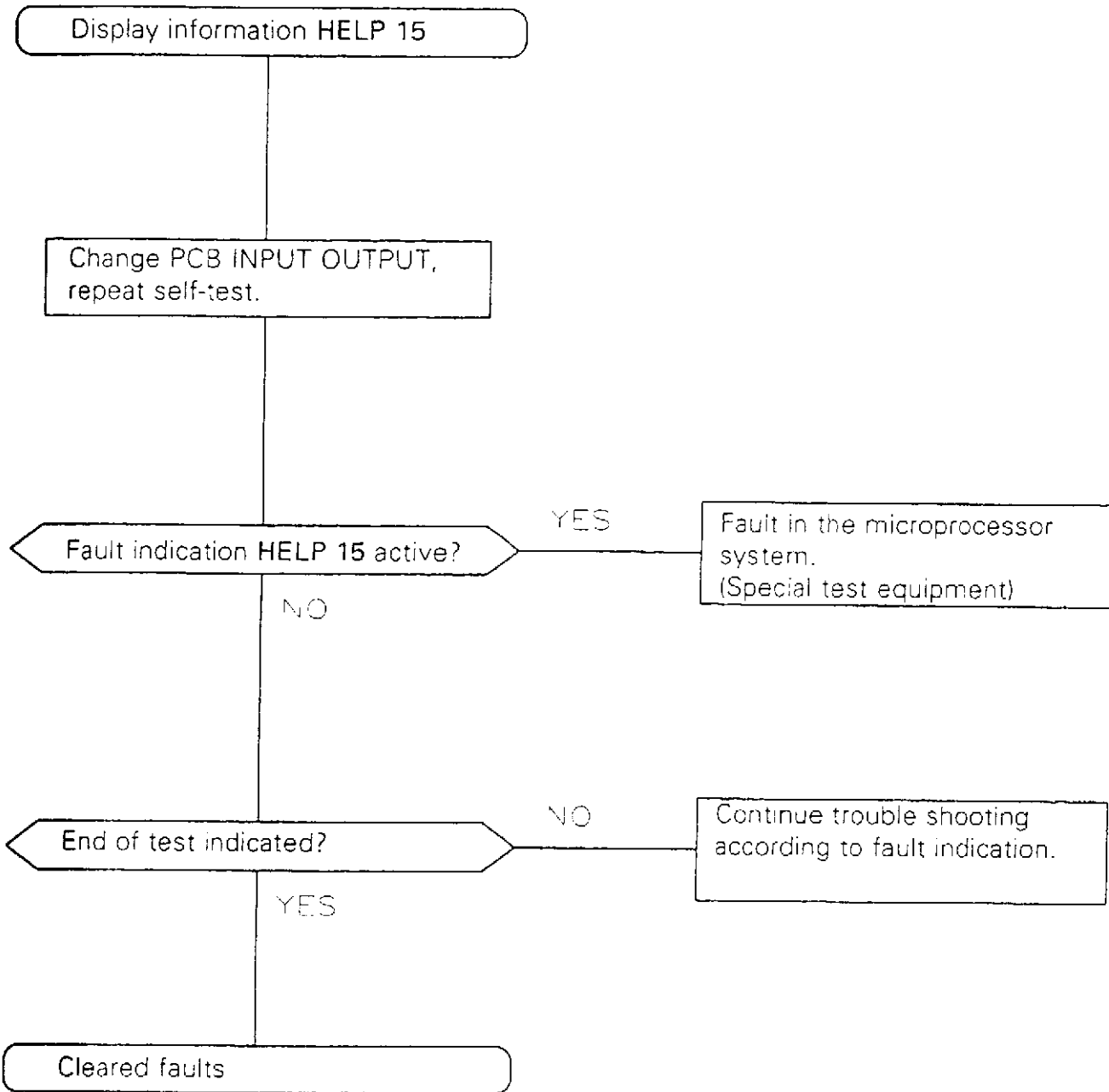


Fault indication HELP 14

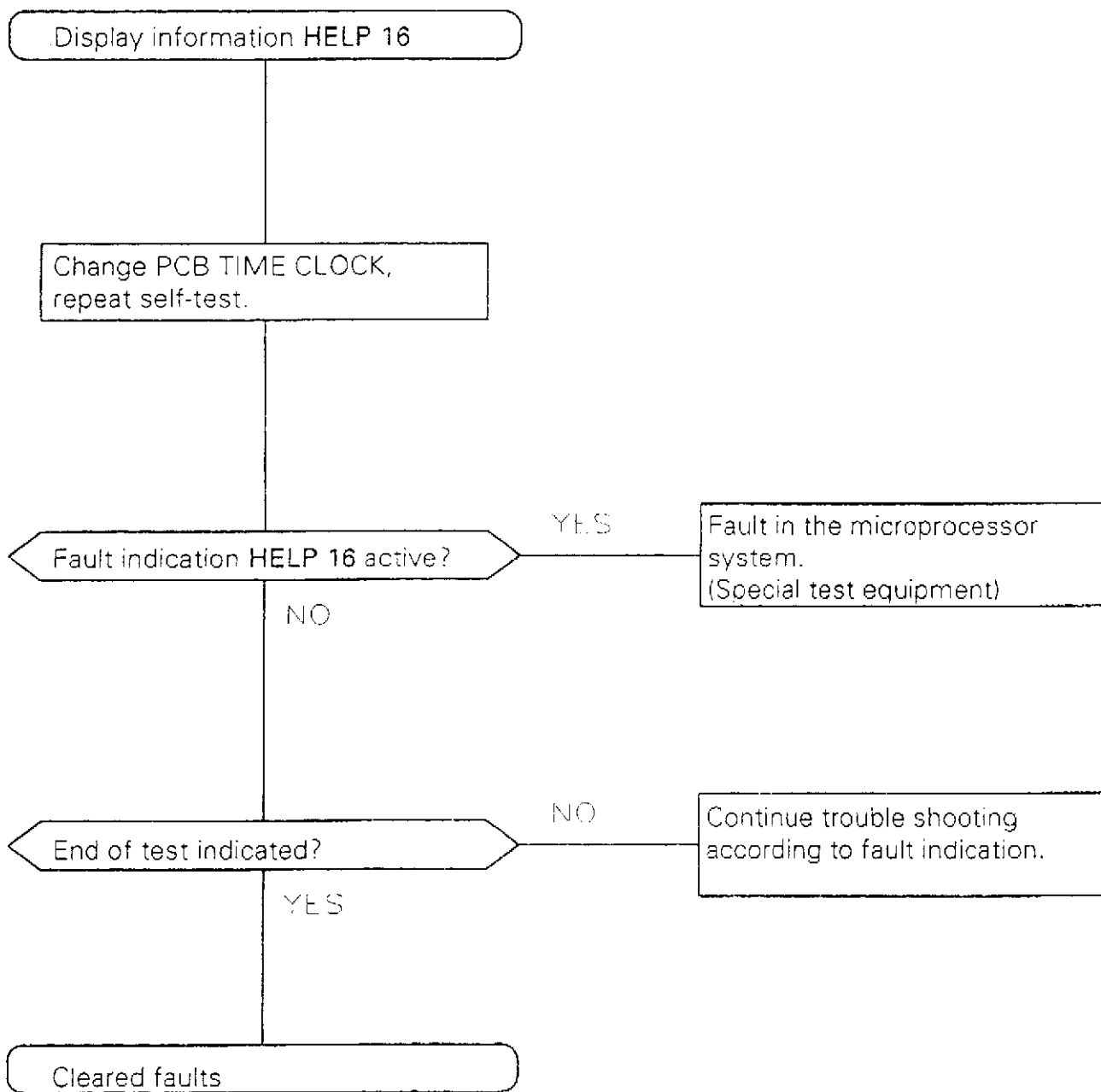


Fault indication HELP 15

The indication HELP 15 can be simulated by the operator (refer to page 3-31).



Fault indication HELP 16



3.1.5 Go/NoGo Test

In case a locally operated receiver is fitted with the option RS 232, a BITE test can be started externally via the remote connector and the result is also being transmitted at this remote connector (Go/NoGo test).

For this Go/NoGo test the following conditions must be set:

- RS 232 option must be fitted
- switch S 2 on RS 232 PCB must be set to position 600 Baud (pull down for DSR)
- switch S 1 on Interconnection PCB must be switched to ON.
- switch S 2.1 on I/O PCB must be switched ON
- switch S 2.2 on I/O PCB must be switched ON

The BITE test is started by sending a high going signal (+12 V) to the DSR input (pin 6) of the remote receptacle.

After the test has finished, the result is being output on the DTR output (pin 20) of the remote receptacle.

pin 20 = +12 V means Go

pin 20 = - 12 V means NoGo

NOTE

During the test and while reading out the result at the DTR output the DSR input must be high (approx. 2 min).

3.1.6 Sequence of the AUTO TEST (BITE)

Testpoint HELP-No.	Group	Tested function	1	2	3	4	5	6
01 ---	Display	All LED's and 7-digit-indications.	off	---	2.5s	---	---	---
02 01 +40	Protector/Preselect.	Switching-on of the 20 dB-Attenuator with switched-on preselector.	>20dBm	AGC-short	0.5s	---	---	Testsignal 10 dB attenuated
03 01 +40	Protector/Preselect.	Switching-off of the 20 dB-Attenuator with switched-on preselector.	off	AGC-short	2.0s	---	---	
04 01 +40	Protector/Preselect.	Switching-on of the 20 dB-Attenuator with preselector switched-off.	>20dBm	AGC-short	0.5s	---	---	Testsignal 10dB attenuated
05 01 +40	Protector/Preselect.	Switching-off of the 20 dB-Attenuator with preselector switched-off.	off	AGC-short	2.0s	---	---	
06 11	Buffer-DA	Testpoints 06-11 with built-in preselector only.						
		Reference voltage for presel. middle position.	off	AGC-short	0.5s	10	H	
07 01 +41	Preselect.	Pass-attenuation 1.6 MHz low pass at 1 MHz (comparison with pass attenuation=Pres.off)	-54dBm	AGC-short	4.0s	---	---	Testsignal 20dB attenuated (switched-on preselector)

REMARK

- 1 1 MHz-Test-Signal
- 2 AGC Setting
- 3 max. Testing time
- 4 HELP-Input TIME CLOCK PCB ST.D
- 5 Nominal level
- 6 Fault simulation

Testpoint HELP-No.	Group	Tested function	1	2	3	4	5	6
08 01 +42	Preselect.	Pass-attenuation 1.6 MHz at 3 MHz (comparison with pass attenuation=Pres.off)	-54dBm	AGC-short	4.0s	—	---	Testsignal 20dB attenuated (switched on preselector)
09 01 +43	Preselect.	Pass-attenuation 4.8 MHz filter at 7 MHz (comparison with pass attenuation=Pres.off)	-54dBm	AGC-short	4.0s	—	---	Testsignal 20dB attenuated (switched on preselector)
10 01 +44	Preselect.	Pass-attenuation 8-17 MHz filter at 11 MHz (comparison with pass attenuation=Pres.off)	-54dBm	AGC-short	4.0s	—	---	Testsignal 20dB attenuated (switched on preselector)
11 01	Preselect.	Pass-attenuation 17-30 MHz filter at 19 MHz	-54dBm	AGC-short	4.0s	—	---	
12 05	Demodul.	Control voltage test	-54dBm	AGC-short	0.5s	21	11	30dB in front of Demodulator
13 02	1. Mixer	Testpoints 13-16 with filter 3 kHz: Amplification with sufficient IF-level	-54dBm	max.ampl.	0.5s	15	H	10dB in front of 1. Mixer
14 03	2. Mixer	Amplification with sufficient IF-level	-54dBm	min.ampl.	0.5s	18	H	10dB in front of 2. Mixer
15 02	1 Mixer	Control with insufficient IF-level	-54dBm	min.ampl.	0.5s	15	L	

REMARK

- 1 1 MHz-Test-Signal
- 2 AGC Setting
- 3 max. Testing time
- 4 HELP-Input TIME CLOCK PCB ST.D
- 5 Nominal level
- 6 Fault simulation.

Testpoint HELP-No.	Group	Tested function	1	2	3	4	5	6
16 03	2. Mixer	Control with insufficient IF-level	-54dBm	max.ampl.	0.5s	18	L	
17 02	1. Mixer	Testpoints 17-24 with filter 6 kHz: Amplification with sufficient IF-level	-54dBm	max.ampl.	0.5s	16	H	10dB in front of 1. Mixer
18 03	2. Mixer	Amplification with sufficient-IF-level	-54dBm	max.ampl.	0.5s	15	H	10dB in front of 2. Mixer
19 05	Demodul.	AGC-Generation and IF-level	-54dBm	max.ampl.	0.5s	21	H	
20 06	525/10kHz	IF-output level	-54dBm	max.ampl.	0.5s	14	H	10dB in front of IF-output. Cass.
21 02	1. Mixer	Control with insufficient IF-level	-54dBm	min.ampl.	0.5s	15	L	
22 03	2. Mixer	Control with insufficient IF-level	-54dBm	min.ampl.	0.5s	18	L	
23 05	Demodul.	AGC-Generation and IF-level	-54dBm	min.ampl.	7.0s	21	L	
24 06	525/10kHz*	IF-output level	-54dBm	min.ampl.	0.5s	14	L	
25 04	Filter/board	Connect filter 6 kHz on 2. Mixer	-54dBm	AGC-short	1.0s	---	---	
26 04	Filter/board	Pass attenuation (filter 2,4 kHz)	-54dBm	AGC-short	1.0s	---	---	

* only tested if fitted (S 1/3 and S 2/1 on Audio II PCB)

REMARK

- 1 1 MHz-Test-Signal
- 2 AGC Setting
- 3 max. Testing time
- 4 HELP-Input: TIME CLOCK PCB ST.D
- 5 Nominal level
- 6 Fault simulation

Testpoint HELP-No.	Group	Tested function	1	2	3	4	5	6
27 04	Filterboard	Pass attenuation (filter 1,5kHz)	-54dBm	AGC-short	1.0s	--	--	
28 04	Filterboard	Pass attenuation (filter 0,6 kHz)	-54dBm	AGC-short	1.0s	--	--	
29 04	Filterboard	Pass attenuation (filter 0,3 kHz)	-54dBm	AGC-short	1.0s	--	--	
30 04	Filterboard	Pass attenuation (filter 0,15 kHz)	-54dBm	AGC-short	1.0s	--	--	
31 04	Filterboard	Pass attenuation (filter 0,1 kHz)	-54dBm	AGC-short	1.0s	--	--	
32 15	I/O PCB	The AGC voltage difference between selected Filter and Bypass must not exceed 10 dB. Function of Input/Output Integrated Circuits P10 1: Write/Read test with A4 and B4-B7 P10 2: Write/Read test with B0-B7 P10 3: Write/Read test with B0, check for valid data at A0/A1 P10 4: Check for valid data at A0-A3	-54dBm	AGC-short	0.02s	--	--	Use an attenuator in front of the Filterboard during measuring of individual filters.

REMARK

- 1 1 MHz-Test-Signal
- 2 AGC Setting
- 3 max. Testing time
- 4 HELP-Input TIME CLOCK PCB ST.D
- 5 Nominal level
- 6 Fault simulation

Testpoint HELP-No.	Group	Tested function	1	2	3	4	5	6
33 63	TTY-Conv.	Test of the connected TTY-Converter (if present) Failure indication of the converter: HELP 61 voltage failure HELP 62 RAM failure HELP 63 Mark-Space-failure	-54dBm	AGC-short	1.2s	--	--	
34 13	Audio PCB	Testpoint 34-35 during complete test: (only when S2.4 on I/O-Print is being switched-on)	>20dBm	AGC-short	1.0s	--	--	
35* 15	I/O PCB	Test of AF-line by tone generation Condition: Loudspeaker switched-on, volume control adjusted.	>50s					Press two keys simultaneously for a short time or
36* 15	I/O PCB	Quiescent position of frequency tuning cct.	>50s					turn the fly wheel knob only once during the test.

REMARK

- 1 1 MHz-Test-Signal
- 2 AGC Setting
- 3 max. Testing time
- 4 HELP-Input TIME CLOCK PCB ST.D
- 5 Nominal level
- 6 Fault simulation

* Only possible when switch S 2/4 on I/O PCB is 'ON'

3.2 Servicing

3.2.1 General

3.2.1.1 Removal of the receiver out of the cabinet

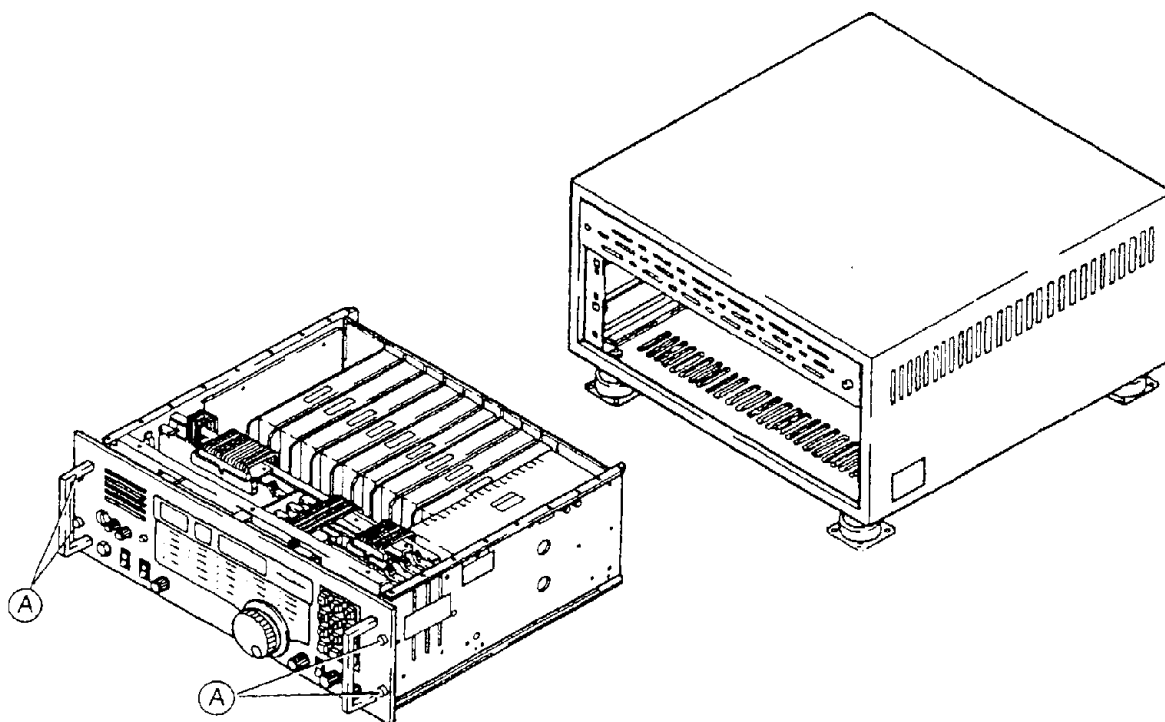


Fig. 3-1 Receiver RX 1001 M/RX 5001with Cabinet

- switch off the receiver
- unscrew mounting screws (A) on the front panel. Captive screws are used.
- remove all cable connections on the rear panel -refer to fig. 3-2-

NOTE

Receivers of the series RX 1001 M/RX 5001 have a data protection; if the mains connector is disconnected from the power supply all stored data are deleted.

- remove the receiver out of the cabinet by the handles

CAUTION

Receiver weight approx. 17 kg

- 1 ST 1 24 V-BATT
- 2 BFO-PLL locked LED
- 3 VCO A PLL's locked LED
- 4 VCO B PLL locked LED
- 5 Bu 2 525 kHz IF-OUTPUT
- 6 St 1 IF-IN
- 7 St F Extern-Connector
- 8 St E TTY-FAX Data Connector (TG 1001)
- 9 Bu 8a BCD-OUT-Connector
- 10 RS 232-C Remote Connector
- 11 Antenna input
- 12 Bu 4 30 kHz IF-OUT
- 13 Bu 2 AF-OUT
- 14 Bu 3 10 kHz IF-OUT
- 15 Bu 1 5 MHz IF-IN
- 16 Bu 4 1/10 MHz Ext. REF IN
- 17 St 2 MAINS
- 19 Bu 10 1/10 MHz Ext. REF OUT
- 19a Bu 4 1 MHz Ext. REF IN
- 20 Bu 2 AF 2-OUT

RX 5001 with option IF-OUT
RX 1001 MB

