HITACHI
SERVICE MANUAL

TY | **No. 302 E**

HA-M70

Technical Information

No. 288 EF HA-M70
No. 297 EGF HA-M70

This Service Manual gives a description of the new circuits in the HA-M70 and so it should be used together with the manual for the HA-M70 (Manual No. 288EF or 297EGF) which was recently distributed.

DESCRIPTION OF NEW CIRCUITS

This unit employs a microcomputer to select the functions using the one-touch system (function control circuit), perform muting and control the tape deck and turntable. Fig. 1 shows a block diagram of the inside of the microcomputer (HD38702 A10) and Fig. 2 shows a block diagram of the unit itself.

Block diagram of inside of microcomputer (HD38702 A10)

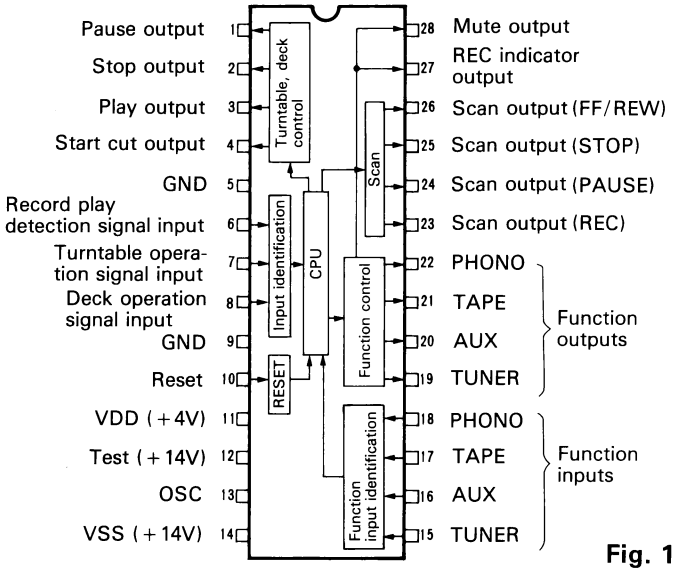

Fig. 1

Table 1 List of HD 38702 A10 Functions

Pin no.	Name	Details
① ~ ③	Deck control signal	PAUSE, STOP, PLAY signals are output at high level.
④	Turntable control signal	START/CUT signal is output at high level.
⑥	Record play detection signal	Low level signal is input when stylus descends onto turntable record.
⑦	Turntable operation signal (T/T signal)	Operational mode of turntable is input; low level when turntable is operating, otherwise signal is high level.
⑧	Deck operation signal	Operational mode of deck is input; correspondence is made with scan outputs ㉓ ~ ㉖ and input is judged when corresponding scan signal is high level. Input is judged as "corresponding signal available "when low level and as "no corresponding signal available" when high level.
⑮ ~ ⑱	Function input signal	Signal switched by function switch is input; judged as "signal available" when low level.
⑲ ~ ㉒ ㉗	Function output signal	Function signal is output. Function which is selected by signal for indicator and input selector circuit is put in high level.
㉓ ~ ㉖	Scan signal	Scan signal for deck operation signal acceptance is output. This is set to high level with corresponding signal only and is switched in succession (used together with pin ⑧).
㉘	Mute signal	Mute signal is output at high level. Control signal of muting circuit for reducing shock noise heard when turntable starts and when stylus descends onto surface of record. When ⑥ record play detection signal is input, function is released for about 1 second (signal is set to low level).

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT.

STEREO AMPLIFIER

October 1981 TOYOKAWA WORKS

BLOCK DIAGRAM

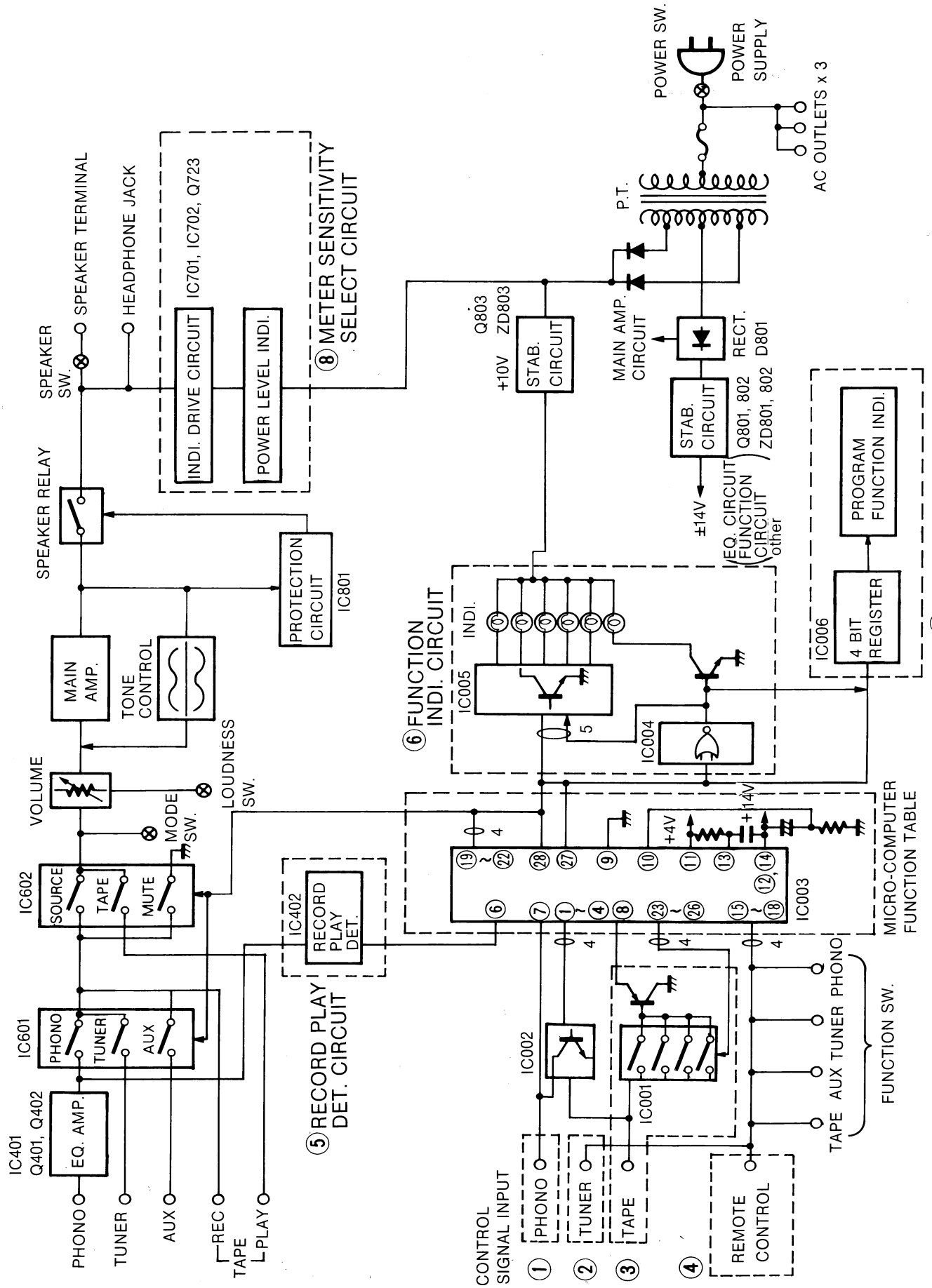

Fig. 2

1. Turntable control circuit

The T/T signal is set low while the turntable platter is rotating and high when the turntable is stopped.
When the T/T signal is set low or when the amplifier's PHONO button is depressed, the PHONO indicator winks.
The winking stops in the following the conditions:
(1) When about 25 seconds have elapsed from when the winking started.
(2) When the stylus descends onto the record and the record play detection circuit functions.
(3) When the T/T signal rise is detected.
A high pulse (approx. 50 msec) is output from pin ④ of microcomputer IC003 for the START/CUT signal. When this signal is output with the T/T signal at low, it functions as the cut signal; when the T/T signal is high, it functions as the start signal. The T/T signal is monitored in IC003 and controlled so that the START/CUT signal operation is not reversed. Therefore, when the T/T signal is high, the START/CUT signal will not be output even if the function is switched from PHONO to any other function.

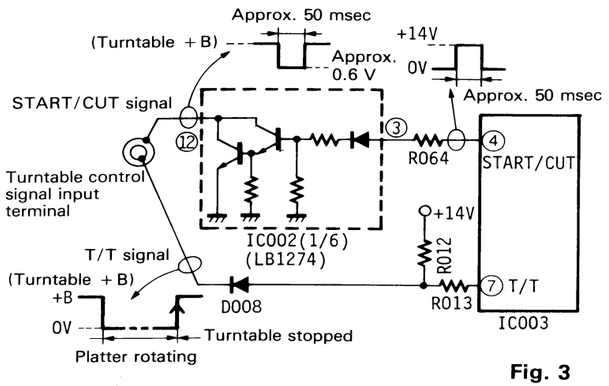

Fig. 3

2. Tuner Control Circuit

The tuner control signal input terminal's input is connected in parallel with the TUNER position of the function switch, and the function switch is selected to TUNER by setting this pin low (shorting to ground).

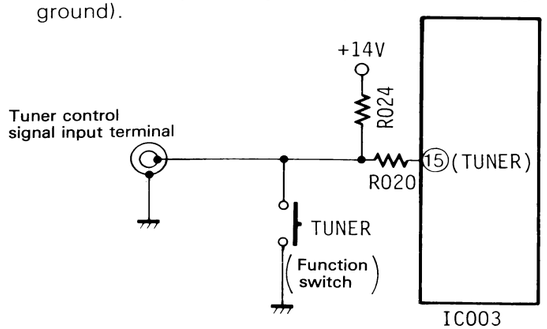

Fig. 4

3. Deck Control Circuit

(1) Deck operation signal input
Among the signals from the tape deck control signal input terminal, the PLAY signal is input to pin ⑰ of microcomputer IC003 in parallel with the TAPE position of the function switch by Q002 and IC002.
The other signals are grouped into four signals by the diodes, and only one of these four signals is selected by the microcomputer scan signal (㉓ ~ ㉖) and IC001 to enter pin ⑧ of the microcomputer. By selecting the scan signals in sequence, all the deck operation signals except the PLAY signal are entered into pin ⑧ of IC003. These signals are used for judging the control of the indicators related to the tape and function selection.
(2) Deck control signal output
When the TAPE function button is depressed, a low level signal is entered into pin ⑰ of IC003. As a result, the output signal (high) from pin ③ of IC003 enters pin ④ of IC002, and a low level PLAY signal is output to the tape deck control signal input pin ① from the output pin ⑪ (open collector) of this IC. This is also the same for the other PAUSE and STOP signals. It is only in these three modes that the deck can be controlled from the amplifier.

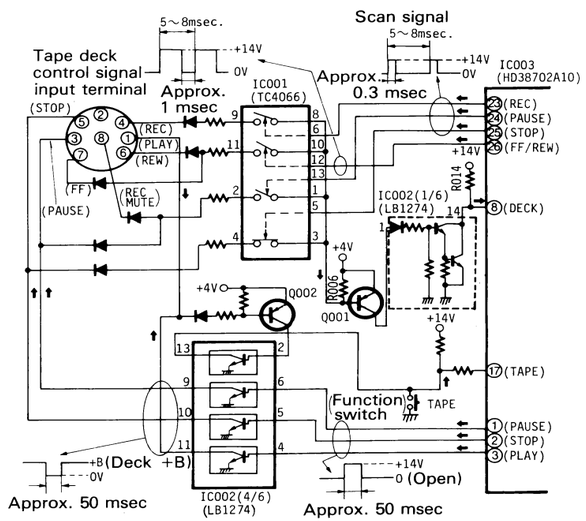

Fig. 5

4. Remote Control Input

When the optional OU-M70 is connected to the remote control terminal, the same operations as those of the function switch can be performed by the OU-M70 operation.
Short between ① and ② ..... PHONO
Short between ③ and ② ..... TUNER
Short between ④ and ② ..... AUX
Short between ⑤ and ② ..... TAPE

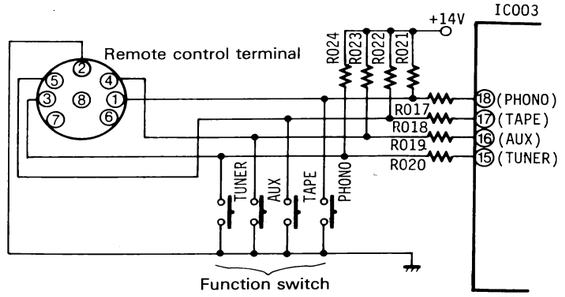

Fig. 6

5. Record Play Detection Circuit

The output signal from the equalizer amplifier is amplified by about 40 dB, rectified and integrated. Whether or not this signal exceeds its fixed level (0.5 V) is detected by the comparator. The detected signal is entered into pin ⑥ of IC003. When a signal is present in the equalizer amplifier output, the IC003 pin ⑥ is set low.

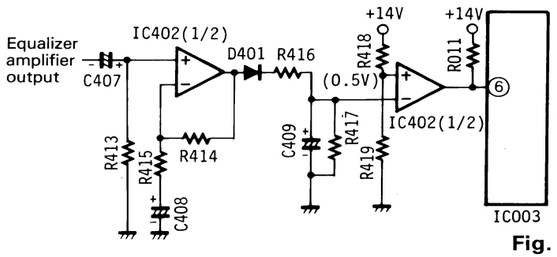

Fig. 7

[Principle of Comparator Operation]

When the comparator is configured using an OP-amp, its output voltage is determined in accordance with the input conditions, as indicated in Table 2.

Principle of comparater operation

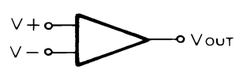

Fig. 8

Table 2

Input condition	Vout
V− > V+	L (−Vcc)
V− < V+	H (+Vcc)

6. Function Indicator Circuit

The IC005 current drivers are driven by the output from the microcomputer IC003. The TAPE PLAY and REC PAUSE indicators employ IC004 and their lamps light as shown in Table 3.

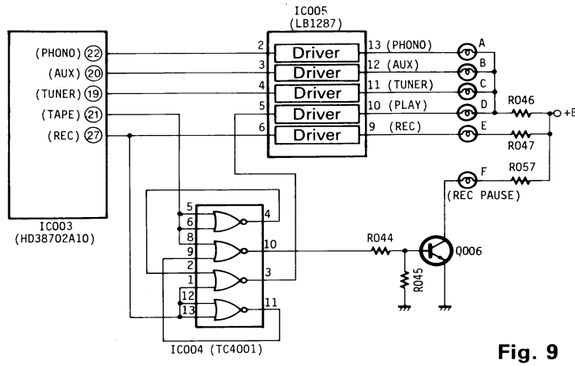

Fig. 9

Table 3 Lighting of PLAY (D), REC (E), REC PAUSE (F) lamps

Deck mode	TAPE㉑	REC㉗	Lamp
STOP	L	L	OFF
PLAY	H	L	D
REC PAUSE	L	H	E, F
REC	H	H	E

7. Program Function indicator Circuit

When TUNER, AUX and TAPE PLAY indicator outputs are available while the PHONO indicator is winking (high mute signal), the signal is latched and indicated by the indicator. Resetting is performed when the PHONO indicator is OFF and mute is OFF.
In Fig. 10 IC006 (TC4076) functions in accordance with the truth value table of Table 4. While CLEAR pin ⑮ is high or , in other words, when both IC003 MUTE pin ㉘ and PHONO pin ㉒ are low, IC006 output pins ③~⑤ are set low and the program function indicators go off.
In all other modes when the CLEAR pin ⑮ is low (PHONO indicator is either lighted or winking) the program function writing enable mode is established. However, at all times except when the PHONO indicator is winking, the function is selected immediately and so there are no program function operation and indication.
When the TUNER, AUX or TAPE PLAY signal (signals which cause the function indicators to light) is set high in this mode, the DATA signal (pins ⑭ ~ ⑫) is set high and the CLOCK pin ⑦ changes from low to high (⌐). As a result, the DATA signal is accepted, it is output from output pins (③~⑤) and the corresponding LED lights. If the programmed function signal is no longer available (CLOCK pin ⑦: ¬), ,

its data are latched and the mode is retained until the next CLEAR signal or CLOCK signal is input. Fig. 11 is a timing chart. Since this circuit is an indicator circuit, the actual program function operation is controlled by microcomputer IC003.

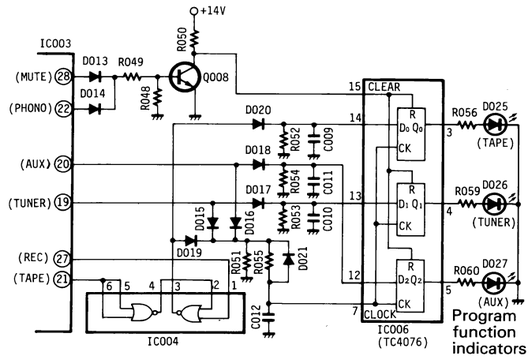

Fig. 10

Table 4 Truth values (TC4076)

CLEAR⑮	CLOCK⑦	D(D0~D2)	Q(Q0~Q2)
H	※	※	L
L	L	※	Q*
L	H	※	Q*
L	↓	※	Q*
L	↑	H	H
L	↑	L	L

Q*: Previous mode is retained.
※: High or low status is irrelevant

Timing Chart

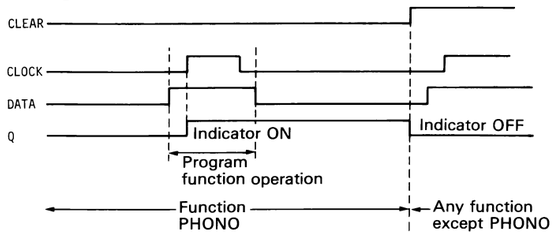

Fig. 11

8. Meter Sensitivity Selector Circuit

This unit adopts a meter sensitivity selector circuit whose sensitivity automatically changes when the output increases. This circuit is featured in the power level indicator.

The output signal from the power amplifier is rectified and integrated and IC702 performs a comparison operation to determine whether the signal has exceeded the rating (reference value). If the rating has not been exceeded, the signal enters pin ⑩ of IC701 as it is. If the rating has been exceeded, output pin ① of IC702 is set high. As a result, the MAX LED (red) lights while at the same time Q723 is turned on and the signal is attenuated by R736 and 752. Consequently, the meter's input voltage drops, the sensitivity decreases and the LED lighting position changes from MAX to near MIN. The IC701 amplifier output pin ⑫ level enters pin ⑥ of IC702 where detection is performed to see whether the rating has been exceeded. Nothing changes if the rating is exceeded but when the detected value is less than the rating, output pin ⑦ of IC702 is set high, this is entered into pin ⑬ of IC701 and all the meter's LEDs (green) light. (The MAX LED (red) does not light in this case.)

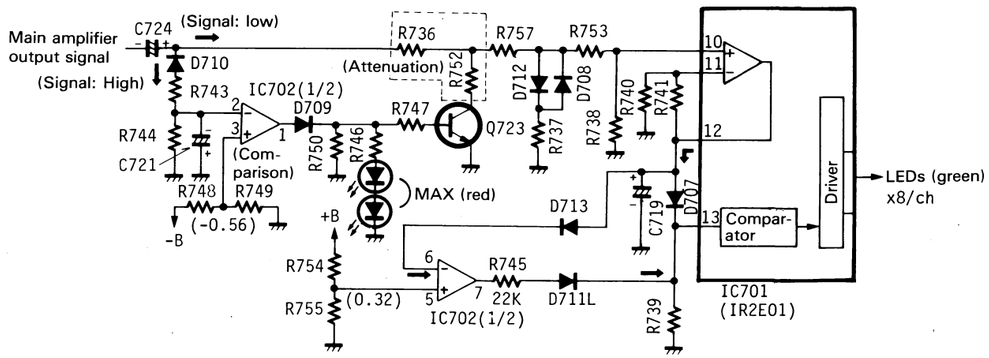

Fig. 12

HITACHI SALES CORPORATION OF AMERICA
Eastern Regional Office
1200 Wall Street West, Lyndhurst, New Jersey 07071
Tel. 201-935-8980
Mid-Western Regional Office
1400 Morse Ave., Elk Grove Village, III. 60007
Tel. 312-593-1550
Southern Regional Office
510 Plaza Drive College Park, Georgia 30349
Tel. 404-763-0360
Western Regional Office
401 West Artesia Boulevard, Compton, California 90220
Tel. 213-537-8383
HITACHI SALES CORPORATION OF HAWAII, INC
3219 Koapaka Street Honolulu, Hawaii 96819, U.S.A.
Tel. 808-836-3621
HITACHI (HSC) CANADA INC.
3300 Trans Canada Highway Pointe Claire, Quebec H9R1B
Tel. 514-697-9150
HITACHI SALES EUROPA GmbH
2 Hamburg 54, Kleine Bahnstraße 8, West Germany
Tel. 850 60 70-75
HITACHI SALES (U.K.) Ltd.
Hitachi House, Station Road, Hayes, Middlesex UB3 4DR
Tel. 01-848-8787 (Service Centre: 01-848-3551)
HITACHI SALES SCANDINAVIA AB
Rissneleden 8, Sundbyberg, Box 7138, S-172-07 Sundbyberg 7, Sweden
Tel 08-98 52 80

HITACHI SALES NORWAY A/S
Oerebekk 1620 Gressvik P.O. Box 46 N-1601 Fredrikstad, Norway
Tel. 032-28050
SUOMEN HITACHI OY
Box 151, SF-15100 Lahti 10, Finland
Tel. Lahti 44 241
HITACHI SALES A/S
Kuldyssen 13, DK-2630 Taastrup, Denmark
Tel. 02-999200
HITACHI SALES A.G.
5600 Lenzburg, Switzerland
Tel. 064-513621
HITACHI-FRANCE (Radio-Télévision Electro-Ménager) S.A.
9, Boulvard Ney 75018, Paris, France
Tel. 201-25-00
HITACHI SALES WARENHANDELS GMBH
A-1180/Wien, Kreuzgasse 27
Tel. (0043222) 439367/8
HITACHI SALES AUSTRALIA Pty Ltd.
153 Keys Road, Moorabbin, Victoria 3189 Australia
Tel. 95-8722
HITACHI Ltd. TOKYO JAPAN
Head Office: 5-1, 1-chome, marunouchi, Chiyoda-ku, Tokyo 100, Japan
Tel. Tokyo (212) 1111
Cable Address: "HITACHY" TOKYO

HA-M70 TY No. 302 E (G • F)

Printed in Japan (H)