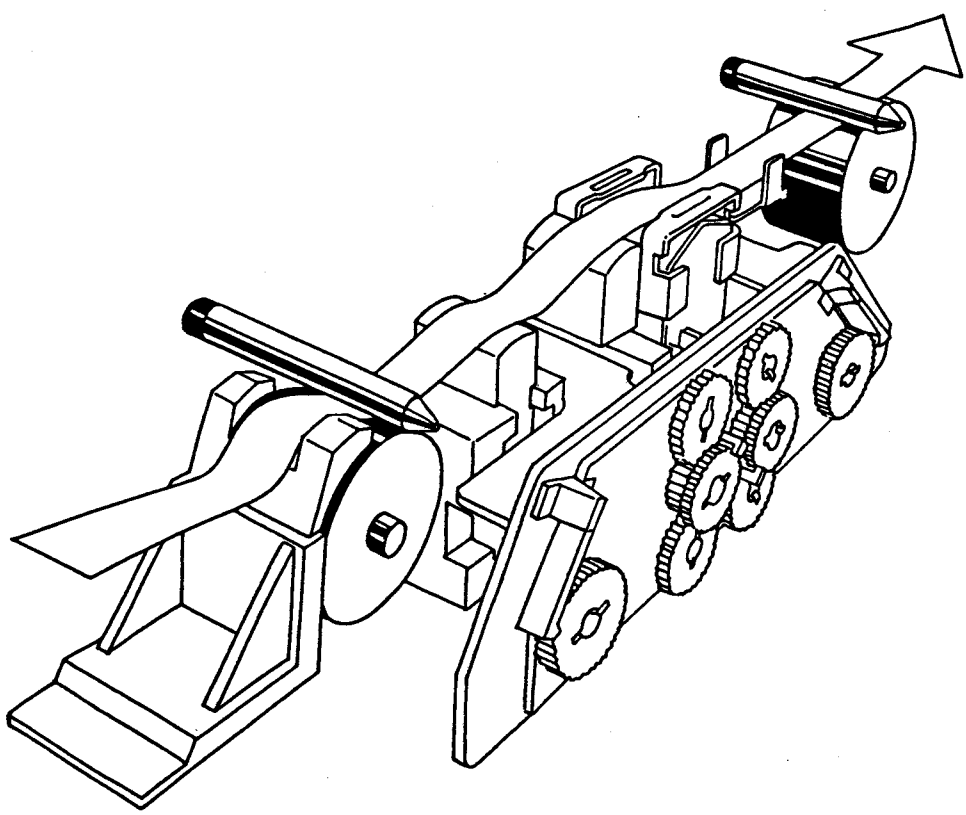
NAKAMICHI DRAGON with Azimuth Error Display



NAKAMICHI DRAGON with Azimuth Error Display, Issue 2

One of the interesting features of the DRAGON cassette deck is the automatic continuous playback azimuth correction, which operates not only for test signals, but guarantees optimum wide bandwidth reproduction of stereo music programme.

In this special version of the DRAGON, the internal correction signal is used to drive an Azimuth Error Display, which indicates the positive and negative error of the tape/cassette combination in arc minutes with respect to the reference playback azimuth.

The display unit derives its drive signal and power supply from the DRAGON. The front panel contains a 3 digit display, reading from 999 to -99, a REF/DEV-switch and a CAL-control.

In the REF-position of the switch, the playback head of the Dragon is moved to the reference azimuth position and the correction system is disabled. The DEV-mode selects automatic correction, with error read-out.

The CAL-control serves to set the display to 000.

Please note: the playback head also moves to the reference position when the cassette lid is opened.

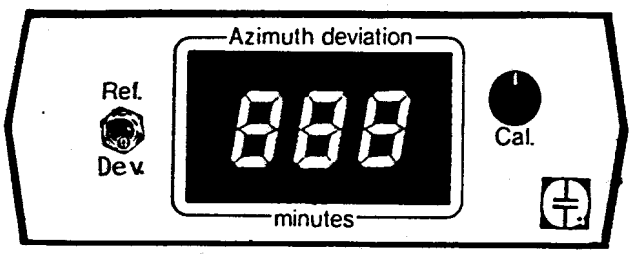


figure 1 Front panel of Deviation Display.

INSTALLATION, ADJUSTMENT and OPERATION

Installation

1. Connect the cable of the display to the Azimuth Deviation output on the back panel of the Dragon.

2. If multiple units are in use, please make sure that the serial numbers of the display and DRAGON match to maintain the original calibration.

3. Switch on the mains power and allow the set to stabilise for a few minutes. The playback head of the DRAGON will now be placed in the reference position.

4. Adjust the CAL-control for 000 deviation.

Adjustment

Before you start, make sure that capstans, heads, pressure rollers and tape guides are in pristine condition, as nothing is more fatal for the quality of cassette reproduction than accumulated dirt.

1. Load a reliable reference playback azimuth cassette, for instance Nakamichi DAO9004 (15 kHz), set the DRAGON controls to: Monitor TAPE, Dolby OFF, Equalisation 70 us.

2. Make sure, that the REF/DEV switch on the display unit is in the DEV-position.

3. Start FORWARD PLAY, and allow the tape travel and head adjustment to stabilise. This may take a minute, the time required to build up the full tape tension between the two capstans.The display blinks during the head adjustment.

4. The display should now indicate 000. Use the CAL-control to correct small deviations.

5. Detailed instructions for calibration of the error indication are given on page 3.

Operation

1. Load a cassette of which you wish to determine the azimuth deviation.

2. Set the DRAGON Equalisation and Dolby controls to the required position and start FORWARD PLAY.

3. Set the REF/DEV-switch to DEV.

4. Allow the tape travel and the deviation reading to stabilise. This may take some time if the cassette does not contain much signal above 3 kHz and if the mechanical quality of the cassette is problematic.

5. Note the deviation.

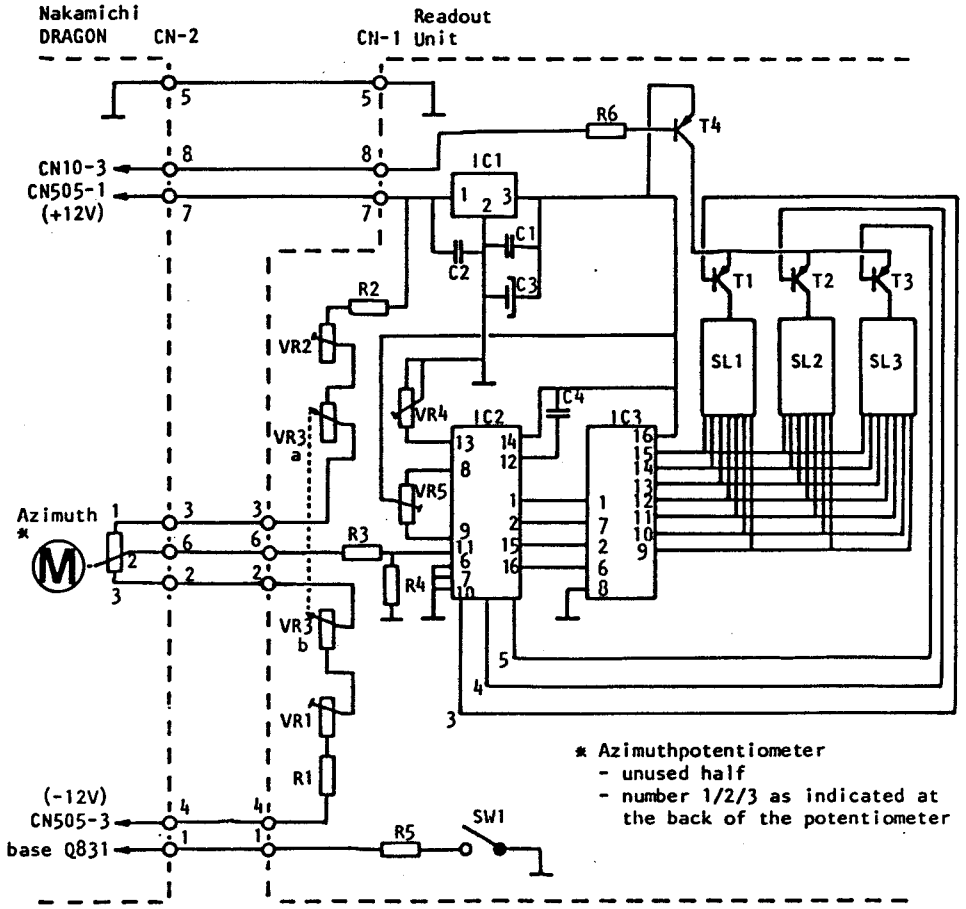
6. Now set the REF/DEV-switch to REF, and observe the change in sound quality on your monitoring system. This procedure allows correlation of azimuth error with its effect on sound quality.

7. If the azimuth error is very small it depends on the frequency/level relationship of the programme material whether the system can redisplay the error after the REF/DEV switch has been reset from REF to DEV.

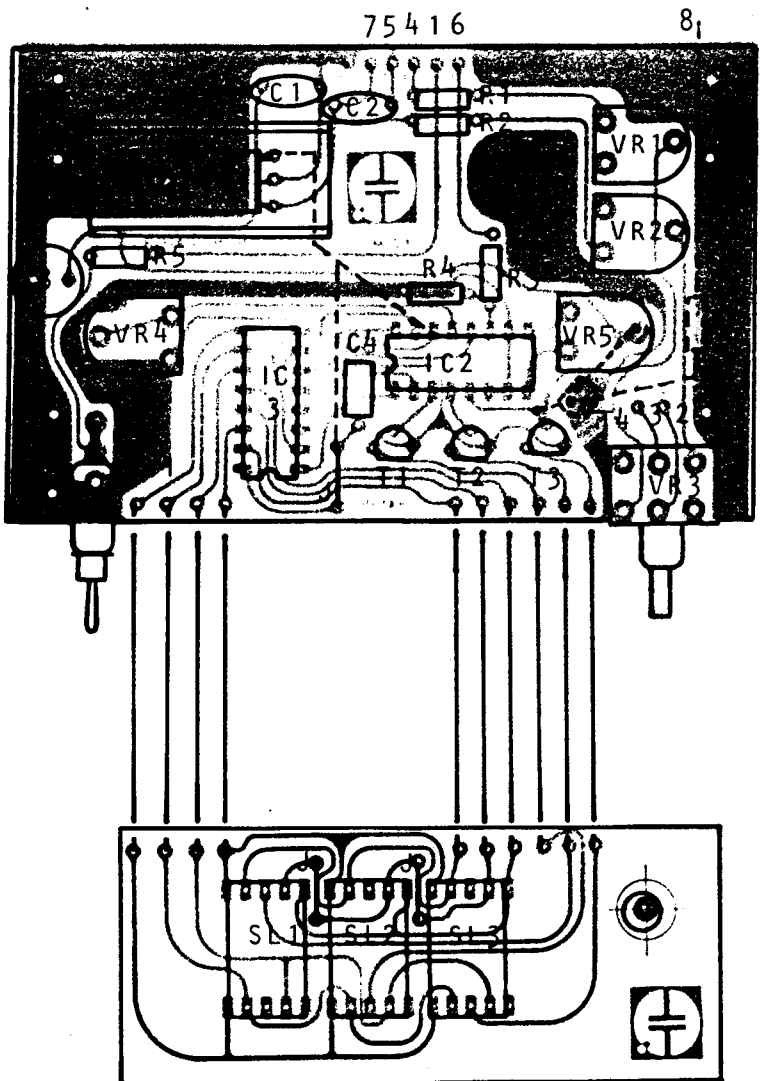
A final word

The Nakamichi Dragon measures the combined errors of magnetic registration and cassette shell. If single capstan cassette decks are used for quality assessment, a given cassette may well produce acceptable results with these decks and still show a considerable error and unacceptable playback quality in the Dragon. In that case, the cassette shell is clearly to blame, and use of this cassette in double capstan decks of which there are by now millions around, will frequently lead to disappointment.

figure 2 - Circuit diagram and circuit board lay-out of the Deviation Display (Issue 2).



Adjustments to be made in the Nakamichi DRAGON (Auto Azimuth PCB):
- change C846 to 0.68uF (was 3.3uF)
- connect pin 10 of IC825 to earth
- add 560k resistor between pin 1 & 2 of IC826
- add 10uF capacitor between base Q825 and earth



stocklist

IC1	uA7805
IC2	CA3162
IC3	CA3161
T1-4	BC557B
R1/2	18k
R3	factory adjusted
R4	3k9
R5	100k
R6	5k6
VR1/2	5k
VR3	5kBx2 (OB07355A)
VR4	22k
VR5	47k
C1/2	47nF(cer)
C3	47uF-16V
C4	330nF MKM
SL1-3	D350PAH (FND507)
SW1	toggle switch
CN1/2	8-pin DIN socket

ALIGNMENT AND CALIBRATION PROCEDURE FOR DRAGON AZIMUTH ERROR INDICATOR

Note 1. Prior to calibration, all standard playback alignments of the deck should be checked for accuracy, following the instructions in the DRAGON service manual.

Note 2. All observations are made on the azimuth error display.

Note 3. Calibration can only be performed using an accurate azimuth error tape with + and -15' error, preferably made on a Studer QC or similar machine, on high quality tape, in a high quality cassette housing. TransTec can supply a calibration cassette upon request.

Note 4. Allow the tape transport to stabilise for 1 minute after starting playback before attempting any calibration step involving cassette playback.

STEP	ADJUSTMENT DISPLAY UNIT	SIGNAL SOURCE	SETTING DRAGON	COMMENT/ ADJUSTMENT
1	VR1,2,3,4 middle position REF/DEV on DEV	azimuth cassette Nakamichi DA09004B	PLAY FWD Dolby OFF Eq. 70 us Monitor:TAPE	Adjust VR5 for 000 reading on display.
2	VR3 middle position REF/DEV on REF		STOP	Adjust VR824 on Auto Azimuth PCB in DRAGON for 000 reading on display.
3	VR3 middle position REF/DEV on DEV	azimuth error cassette +15' (6.3 kHz)	PLAY FWD Monitor:TAPE Dolby OFF	Adjust VR2 for 015 reading on display.
4	idem	azimuth error cassette -15' (6.3 kHz)	idem	Adjust VR1 for -15 reading on display.
5	Repeat steps 1, 3 and 4 until a stable result is achieved.			

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