

AN6357N, AN6359N

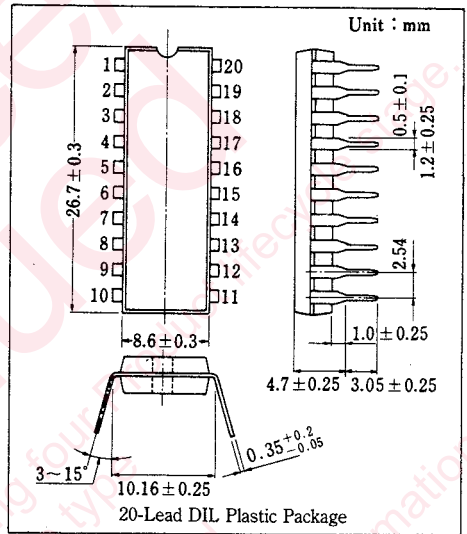
VTR Capstan Interface Circuits

■ Outline

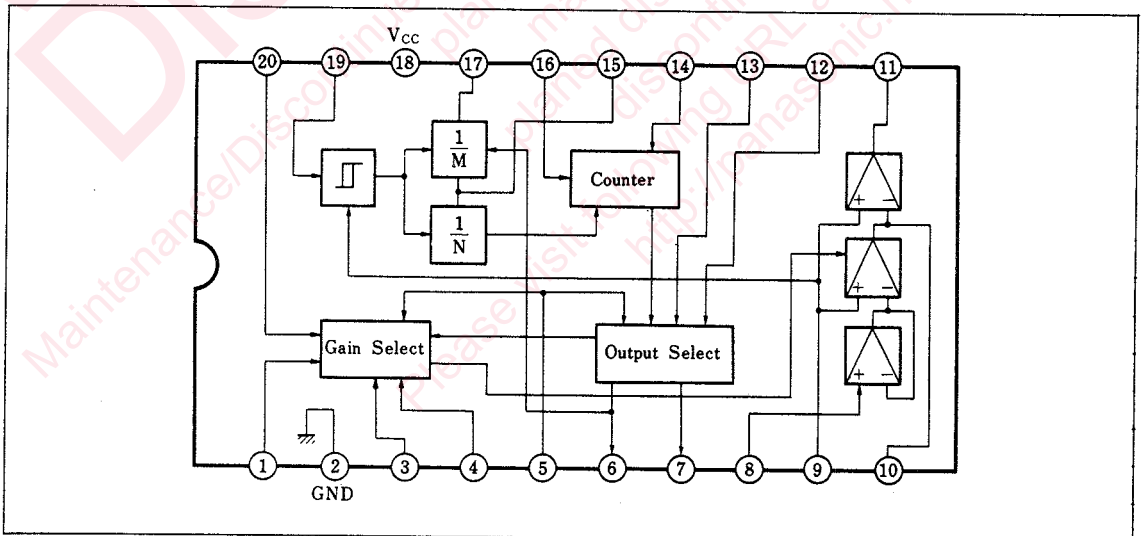
The AN6357N and AN6359N are integrated circuits designed for VTR capstan interface.

■ Features

- The functions consist of :
 - FG Amplifier
 - 2H/4H/6H automatic detector
 - FG divider
 - Gain automatic change circuit
- Supply voltage : 5V



■ Block Diagram



■ Pin

| Pin No. | Pin Name | Pin No. | Pin Name |
|---------|----------------------------------|---------|-------------------|
| 1 | Mode Select B | 11 | Cap. Error Output |
| 2 | GND | 12 | REC./P.B. Select |
| 3 | Mode Select C | 13 | Rec.2/4/6 Select |
| 4 | Mode Select $\times \frac{1}{2}$ | 14 | Memory |
| 5 | PAL/NTSC Select | 15 | FG Divide Select |
| 6 | B Output | 16 | P.B. CTL Input |
| 7 | A Output | 17 | Cap. FG Output |
| 8 | Cap. Error Input | 18 | V _{CC} |
| 9 | Reference Input | 19 | Cap. FG Input |
| 10 | OP Amp. Input | 20 | Mode Select A |

■ Absolute Maximum Ratings (Ta=25°C)

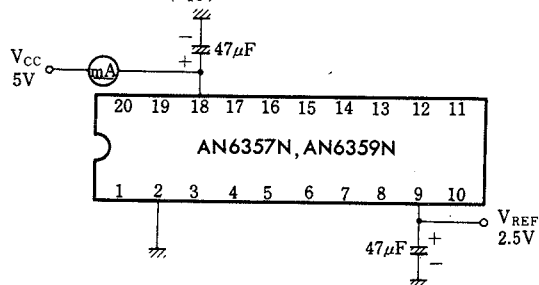
| Item | Symbol | Rating | Unit |
|-------------------------------|------------------|----------|------|
| Supply voltage | V _{CC} | 6.0 | V |
| Power dissipation (Ta=70°C) | P _D | 100 | mW |
| Operating ambient temperature | T _{opr} | -20~+70 | °C |
| Storage temperature | T _{stg} | -55~+150 | °C |

■ Electrical Characteristics (Ta=25°C ± 2°C)

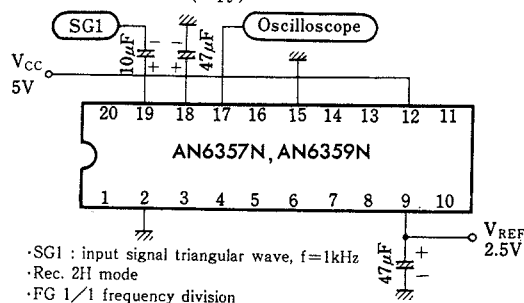
| Item | Symbol | Test Circuit | Condition | min. | typ. | max. | Unit |
|--|-------------------------|--------------|--|------|------|------|------|
| Circuit current | I ₁₈ | 1 | V _{CC} =5V V _{REF} =2.5V | 7 | | 14 | mA |
| FG Amp. input sensitivity | S ₁₉ | 2 | V _{CC} =5V | 30 | | | mV |
| FG high-level freq. dividing output | V _{OH17} | 3 | V _{CC} =5V | 4.6 | | | V |
| FG low-level freq. dividing output | V _{OL17} | 3 | V _{CC} =5V | | | 0.4 | V |
| A/B high-level output | V _{OH A, B} | 4 | V _{CC} =5V, -I=2mA | 3.3 | | | V |
| A/B low-level output | V _{OL A, B} | 4 | V _{CC} =5V | | | 0.4 | V |
| P.B. CTL input sensitivity | S ₁₆ | 5 | V _{CC} =5V | 3.0 | | | V |
| Mode select sensitivity Rec./P.B. PAL/MTSC. $\times \frac{1}{2}$, C, A, B | S _(Mode) | 6 | V _{CC} =5V | 3.0 | | | V |
| OP. Amp. 3 high-level output | V _{OH11} | 7 | V _{CC} =5V | 3.8 | | | V |
| OP. Amp. 3 low-level output | V _{OL11} | 7 | V _{CC} =5V | | | 1.1 | V |
| Total offset OP. Amp. NTSC 2H | V _{O(offset)2} | 8 | V _{CC} =5V | | | 30 | mV |
| Total offset OP. Amp. NTSC 6H | V _{O(offset)6} | 8 | V _{CC} =5V | | | 30 | mV |
| OP. Amp. 2 gain | G _{V2} | 9 | V _{CC} =5V | -4 | | +2 | dB |

Note) Operating supply range V_{CC(opr)}=4.5~5.5V

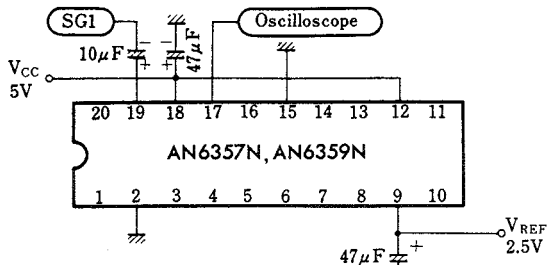
Test Circuit 1 (I₁₈)



Test Circuit 2 (S₁₉)

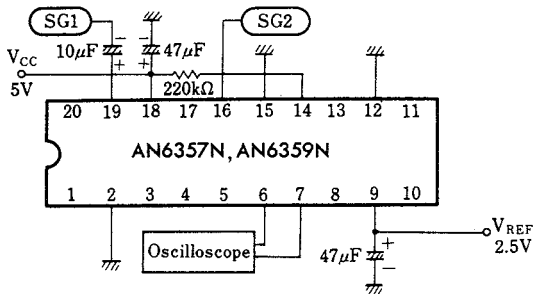


Test Circuit 3 (V_{OH17} , V_{OL17})



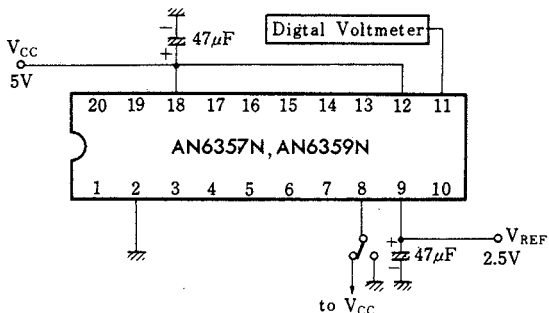
- SG1 input signal rectangular wave
- Rec. 2H mode
- FG 1/1 frequency division

Test Circuit 5 (S_{16})

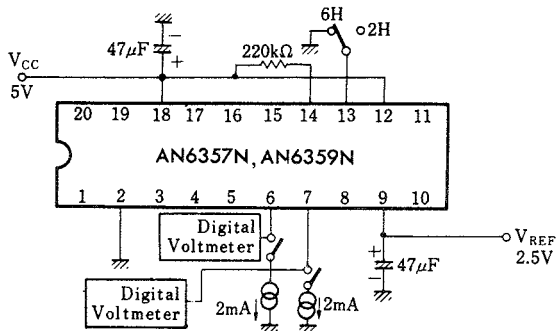


- SG1 input signal rectangular wave
f=2.4kHz, 100mV_{P-P}
- SG2 input signal rectangular wave
f=300Hz
- ※6H mode (Pins ⑥ and ⑦ at "H") when a sufficient large CTL signal is input, but forced 2H mode (Pins ⑥ and ⑦ at "L") when the CTL signal comes to below input sensitivity

Test Circuit 7 (V_{OH11} , V_{OL11})

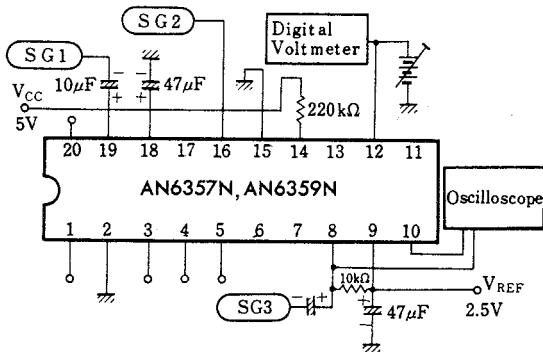


Test Circuit 4 (V_{OHA} , V_{OHB} , V_{OLA} , V_{OLB})



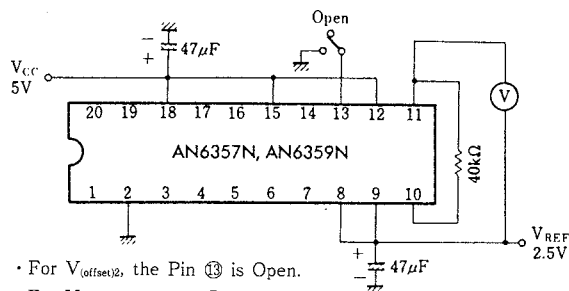
- V_{OHA} , V_{OLA} , Pin ⑦ output
- V_{OHB} , V_{OLB} , Pin ⑥ output
- ※Draw out a 2mA current from the Pins ⑦ and ⑥ in the Rec. 6H mode (Pin ⑬ GND), and measure high-level voltages (V_{OHA} , V_{OHB}) with a digital voltmeter.
- ※Measure the low levels (V_{OLA} , V_{OLB}) of the Pins ⑦ and ⑥ in the Rec. 2H mode (Pin ⑬ Open).

Test Circuit 6 ($S_{(Mode)}$)



- SG1 input signal rectangular wave
f=250Hz, 100mV_{P-P}
- SG2 input signal rectangular wave
f=30Hz, 5V_{O-P}
- SG3 input signal sine wave
f=500Hz, 3V_{P-P}
- Use the oscilloscope in the X-Y mode.
- ※The left figure shows a Rec./PB select sensitivity test circuit. In the same manner as the Pin ⑫, measure the voltage, at which gain is switched, as to the other Pins.

Test Circuit 8 ($V_{O(\text{offset})2}$, $V_{O(\text{offset})6}$)



- For $V_{O(\text{offset})2}$, the Pin ⑬ is Open.
- For $V_{O(\text{offset})6}$, the Pin ⑬ is GND.

Function Description

1. Capstan FG Frequency Dividing Function

By setting the frequency division selector Pin ⑬, an input FG signal can be frequency-divided as shown in the table below:

| Mode | Pin ⑬ | Vcc | Open | GND |
|------|-------|-----|------|-----|
| NTSC | 2 H | 1/2 | 1/2 | 1/4 |
| | 4 H | 1/2 | 1/2 | 1/4 |
| | 6 H | 1/4 | 1/2 | 1/4 |
| PAL | 3 H | 1/2 | 1/2 | 1/4 |
| | 6 H | 1/4 | 1/2 | 1/4 |

2. Recording Mode Automatic Detecting Function

In playing back a recorded tape, this function can automatically detect the tape recording mode and play back the tape in the same mode as when recording. The top of the table below shows input FG frequencies in the regular state of each mode, and the bottom shows threshold values for automatic selection.

(1) AN6357N

| Pin ⑬ | NTSC | | | PAL | |
|-------|------|------|-----|------|-------|
| | 2 H | 4 H | 6 H | 3 H | 6 H |
| Vcc | 2160 | 1080 | 720 | 1515 | 757.5 |
| Open | 1440 | 720 | 480 | 1010 | 505 |
| GND | 720 | 360 | 240 | 505 | 252.5 |
| | 490 | 310 | | 410 | |

The detection output above is made from output in accordance with the table below:

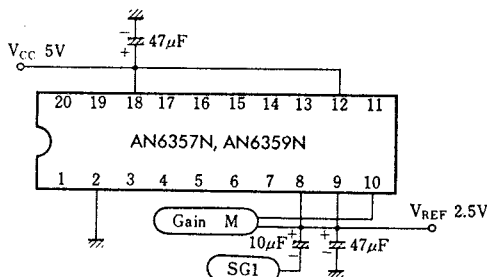
| Output | NTSC | | | PAL | |
|------------------------|------|-----|-----|-----|-----|
| | 2 H | 4 H | 6 H | 3 H | 6 H |
| A ₀ (Pin ⑦) | L | H | H | H | H |
| B ₀ (Pin ⑥) | L | L | H | L | H |

The detection output above is made from Output in accordance with the table below:

| Time | Special Mode | × 1/2 | | Normal | | C | | B | | A | |
|------|--------------|------------|-------|------------|-------|------------|-------|------------|--------|------------|------|
| | | Multipliei | dB | Multipliei | dB | Multipliei | dB | Multipliei | dB | Multipliei | dB |
| NTSC | 2H | 0.4 | -7.76 | 1.0 | 0 | 2.45 | 7.78 | 5.3 | 14.5 | 11.0 | 20.8 |
| | 4H | 0.2 | -14.0 | 0.5 | -6.02 | 1.23 | 1.76 | 2.65 | 8.46 | 5.5 | 14.8 |
| | 6H*1 | 0.072 | -22.8 | 0.182 | 14.8 | 0.445 | -7.02 | 0.964 | -0.322 | 2.0 | 6.02 |
| | 6H*2 | 0.267 | -11.5 | 0.667 | -3.52 | 1.63 | 4.26 | 3.53 | 11.0 | 7.33 | 17.3 |
| PAL | 3H | 0.4 | -7.96 | 1.0 | 0 | 2.45 | 7.78 | 5.3 | 14.5 | 11.0 | 20.8 |
| | 6H | 0.2 | -14.0 | 0.5 | -6.02 | 1.23 | 1.76 | 2.65 | 8.46 | 5.5 | 14.8 |

- * 1 Pin ⑬ as either GND or Open
- * 2 Pin ⑬ as Vcc
- * The left table shows design specifications.

Test Circuit 9 (G_{V2})



- For V_{OFF2} , the Pin ⑬ is Open.
- For V_{OFF6} , the Pin ⑬ is GND.

• SGI input signal sine wave $f=500\text{Hz}$, $1V_{P-P}$

(2) AN6359N

| Pin ⑬ | NTSC | | | PAL | |
|-------|------|-----|-----|-----|-------|
| | 2 H | 4 H | 6 H | 3 H | 6 H |
| Vcc | 1080 | 540 | 360 | 758 | 379 |
| Open | 720 | 360 | 240 | 505 | 252.5 |
| GND | 360 | 180 | 120 | 253 | 126.5 |
| | 245 | 155 | | 205 | |

NTSC 30 Hz, PAL 25 Hz for a PB CTL signal

3. Memory Function

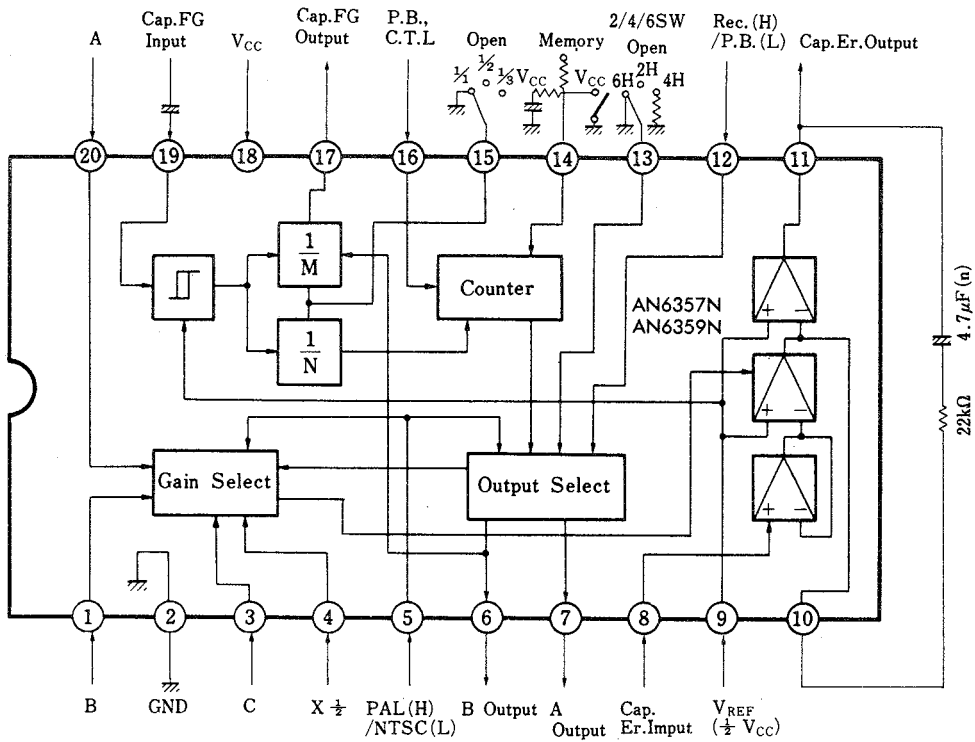
The playback mode when the Pin ⑬ is set can be stored by setting the Pin ⑬ to Low at playback time. This can be used for special playback such as still, slow, etc.

4. Capstan Loop Gain Correcting Function

A capstan speed control loop gain correction circuit is incorporated. By externally setting PAL or NTSC, this function automatically corrects a gain in accordance with the recording or playback time mode. For special playback, 4 kinds of gains other than Normal can be set. The table below shows how to set for a special mode selection.

| Mode | Pin No. | 4 (× 1/2) | 3 (C) | 1 (B) | 20 (A) |
|------------|---------|-----------|-------|-------|--------|
| 1/2 (Slow) | | H | × | × | × |
| Normal | | L | L | L | L |
| C (X2-X3) | | L | H | L | L |
| B (X4-X7) | | L | × | H | L |
| A (X8-X15) | | L | × | × | H |

■ Application Circuit



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